001-18 2188 Operations and Personnel

Explain how this Project addresses a specific Project 2188 License Article(s):
Funding for the wages and operations of FWP 2188 project personnel who identify, develop, assesses, monitor, and implement projects that meet the FERC 2188 license conditions.

Provide justification for Priority 1, 2 or 3 (above) that you selected:
FWP 2188 Project Personnel will be involved in all three priority levels.
Project Sponsor (submitted by): **Dave Moser-FWP Fisheries Biologist**
Travis Lohrenz-FWP Fisheries Technician
Location of Proposed Project: **Ennis, Madison River drainage**

Total Project Cost:

Personnel	**$116,400.00[1]/**
Operations	**$ 27,000.00**
	$143,400.00
Overhead (12.9%)	**$ 18,499.00**
2018 cost	**$161,899.00**

TAC Funds (Cost-Share) Requested for Project: **$ 161,899.00**

I. Introduction; brief statement of project to be completed with pertinent background information.
Articles 404,408,409,412,413,412
II. Objectives; explicit statement(s) of what is intended to be accomplished.
Articles 404,408,409,412,413,412
III. Methods; description of how Project objectives will be accomplished.
Articles 404,408,409,412,413,412
IV. Schedule; when the Project work will begin and end.
Jan 1,2018-Dec 31-2018
V. Personnel; who will do the work? Identify Project leader or principal investigator.
FWP 2188 project personnel Travis Lohrenz Technician III, and Nick Larson seasonal Technician II will conduct the monitoring and enhancement activities.

VI. Project budget must include amounts for the following:

Direct Labor	**$116,400.00**
Travel and Living	**$ 10,000.00**
Materials	**$ 17,000.00**
Other Direct Expenses	
Direct Overhead	**$ 18,499.00**
	$161,899.00

All cost-share sources and amounts, including estimation of "in-kind" contributions

[1] / 1.77 FTE based on current budget rates and State of Montana FY17/18 projections

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will "success" for this project be monitored or demonstrated?

Preparation and submittal of annual report to NWE describing the work of the previous year's fisheries activities.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management: **NA**

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines: **NA**

002-18 Ennis Office Rent

Explain how this Project addresses a specific Project 2188 License Article(s):

Provides office, shop and storage for the FWP 2188 Madison Fisheries program

Provide justification for Priority 1, 2 or 3 (above) that you selected:
Provides office, shop, and storage for 2188 operations, which addresses all three priority levels.

Project Sponsor (submitted by): **Dave Moser- FWP Biologist**,
Travis Lohrenz-FWP Fisheries Technician

Location of Proposed Project: **Ennis**

Total Project Cost: **$6,000.00**

TAC Funds (Cost-Share) Requested for Project: **$6,000.00**

I. Introduction; brief statement of project to be completed with pertinent background information.

One year office and shop space for FWP Madison 2188 Fisheries

II. Objectives; explicit statement(s) of what is intended to be accomplished.
See I.
III. Methods; description of how Project objectives will be accomplished.
Normal billing and payment
IV. Schedule; when the Project work will begin and end.
2018 billing cycle
V. Personnel; who will do the work? Identify Project leader or principal investigator.
FWP 2188 project personnel

VI. Project budget must include amounts for the following:

Direct Labor
Travel and Living
Materials
Other Direct Expenses **$6,000.00**
Direct Overhead
All cost-share sources and amounts, including estimation of "in-kind" contributions

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this
Project. How will "success" for this project be monitored or demonstrated? **NA**

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management: **NA**

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines:

004-18 Sun Ranch Westslope Cutthroat Broodstock Program - Hatchery Operations

This project specifically impacts Grayling Creek in Yellowstone National Park, a tributary to Hebgen Reservoir, and Hebgen Reservoir itself. As westslope cutthroat repopulate Grayling Creek, there will be continued recruitment into Hebgen Reservoir and the Madison River. Additionally, with MT Fish, Wildlife & Parks' (FWP) efforts, westslope cutthroat trout recruitment will also occur in tributaries to the Big Hole River, tributaries to the Missouri River above Canyon Ferry, and tributaries to the Missouri above Great Falls.

The Grayling Creek restoration efforts fall into Priority 1 of 2188 License projects. Hebgen Reservoir and the Madison River will benefit from westslope cutthroat trout recruitment out of Grayling Creek. FWP's efforts would be categorized as Priority 2, with recruitment from Cherry Creek, in the Big Hole drainage, providing recruitment to the Big Hole and possibly Jefferson Rivers. Restoration efforts on Elk Horn Creek would deliver recruitment to the upper Missouri River, above Canyon Ferry Reservoir. And, work in the N.F. Highwood Creeks will supply or enhance WCT populations in the Missouri River above Great Falls.

Proposal Submitted by: Buddy Drake, Drake & Associates Inc, Sun Ranch Project Coordinator

Location of Proposed Project: Sun Ranch, Cameron, MT

Total Project Cost: $30,000.00

TAC Funds (Cost-Share) Requested: $10,000.00

I. Introduction.

This project includes the development of a genetically variable westslope cutthroat broodstock (the Sun Ranch Broodstock) and the operation of the Sun Ranch Broodstock hatchery facility. This broodstock will serve as a source of eggs and fish for restoration of westslope cutthroat trout within the upper Missouri River basin. In the past, this project has been a combined effort between the Sun Ranch, MT Fish, Wildlife & Parks, Yellowstone National Park, and the U.S. Forest Service. This request is for westslope recovery efforts in Yellowstone National Park.

II. Objectives.

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) (WCT) are recognized as one of 14 interior subspecies of cutthroat trout (Behnke 1992), and are the most widely distributed native trout in the inland Pacific Northwest, occurring in Montana, Idaho, and Canada, as well as in disjunct populations in Oregon and Washington. In Montana, native westslope cutthroat trout (WCT) occur in the Columbia River and upper Missouri River basins, including the Madison River drainage.

Westslope cutthroat trout were considered a Category 2 Candidate species by the U.S. Fish and Wildlife Service (USFWS) until the deletion of that category in February 1996. They were petitioned for listing as threatened under the Endangered Species Act in June 1997 (American

Wildlands et al. 1997). Following an extensive status review, the U.S. Fish and Wildlife Service determined in April 2000 that westslope cutthroat trout were not warranted for federal listing (Federal Register 2000). That finding was challenged in federal court and in August of 2003, the U.S. Fish and Wildlife Service again issued a not warranted finding.

Although still widespread, WCT distribution and numbers have declined significantly in the past 100 years due to a variety of causes (Thurow et al. 1997). Westslope cutthroat trout in the upper Missouri basin currently occupy less than 5% of their original range within the basin (Shepard et al. 1997).

The Sun Ranch, USFS, YNP and FWP have initiated restoration efforts for westslope cutthroat trout in the upper Missouri that will dovetail with existing and future westslope cutthroat trout planning and conservation efforts. To ensure the continued survival of Montana's state fish in the upper Missouri River drainage, projects to expand its current range in the drainage are necessary. The proposed project will benefit westslope cutthroat trout by establishing a regionally representative captive broodstock (the Sun Ranch westslope cutthroat broodstock) of genetically pure WCT that will serve as a source of eggs and fish for reintroductions within the upper Missouri basin. This broodstock will also serve as a gene bank containing genetic contributions from pure westslope cutthroat populations that may otherwise disappear or become hybridized before conservation measures can be put in place to protect them. The sources of the pure WCT used to found the broodstock will be upper Missouri tributaries containing pure WCTs as determined by genetic testing. The overall goal of this project is to build additional populations of westslope cutthroat trout to healthy levels within the species' historical range, including Yellowstone National Park.

The objectives of this proposal are:

1) Establish and maintain a westslope cutthroat broodstock genetically suitable for restoration of westslope cutthroat trout in the upper Missouri river basin.

2) Continue an ongoing hatchery program raising genetically pure WCT for Yellowstone National Park recovery efforts.

3) Provide hatchery eyed eggs for placement in remote site incubation systems (RSI's) to establish replicate WCT populations within the waters of the upper Missouri River drainage.

The overall goal that drives this project is to build additional populations of westslope cutthroat trout to healthy levels within the species' historical range, which includes Yellowstone National Park.

III. Methods.

The Sun Ranch, LLC, and Montana Department of Fish, Wildlife and Parks entered into a Cooperative Agreement in 2001 to combine their resources to establish a genetically pure broodstock for restoration of the westslope cutthroat trout in the upper Missouri basin. An Environmental Assessment and Decision Notice have been completed for the westslope cutthroat

broodstock activities on the Sun Ranch. Streams within the upper Missouri River basin that contain sufficient numbers of disease-free, genetically pure westslope cutthroat trout were identified as potential sources of eggs. In order to maximize genetic diversity, several drainages were used as donor sources and a minimum effective population size of 50 (25 unique matings) was used. Fish from donor streams were tested for disease status and WCTs were verified for genetic purity by electrophoresis. Throughout the spawning season fish will be collected and spawned. After initial rearing, the fry will be enumerated to ensure an equal contribution from each mating and then released into the Sun Ranch brood pond. When the brood fish become sexually mature, they will be spawned and the resulting eggs and/or fry will be used to reestablish wild westslope cutthroat trout populations as part of the recovery program for westslope cutthroat trout in the upper Missouri River basin.

As part of this program, Sun Ranch has constructed a hatchery building and 3 acre brood pond that will contain the regionally representative captive broodstock (the Sun Ranch westslope cutthroat broodstock) of genetically pure WCT that will serve as a source of eggs and fish for reintroductions within the upper Missouri basin. This grant will provide funding for one years' hatchery operational costs of the broodstock program at the Sun Ranch.

Initial wild donor populations have been identified and tested for genetic purity and fish pathogens. Collection of fertilized eggs began in 2001. Close to 600 progeny from the 2002 egg collection were introduced into the brood pond on October 26, 2002. These individuals represent matings of twenty-nine adults. On October 9, 2003 and additional 566 pure WCT fry were introduced in the Sun Ranch brood pond. On October 12, 2004, 820 pure WCT fry were transferred from the hatchery to the brood pond. Several additional wild donor populations are needed to continue the program. Each potential source must be tested for disease and for genetic purity. From 2004 to 2017, approximately 1000 – 1500 fry have been introduced annually to the brood pond.

In conjunction with this generalized broodstock program, a second approach of replicating and enhancing populations began in 2002. Collected eggs are incubated and eyed in the Sun Ranch hatchery and then taken and placed in remote site incubation systems (RSI's). These eggs hatch on site, and contributed directly to the depleted population within that system.

2005 was the first year that eggs were taken from brood fish in the pond. A total of 15 females were spawned, and their eggs were fertilized by at least two males per female. The total number of Sun Ranch brood eggs that eyed-up in the hatchery was 3,671. From those eggs, 1025 fry were added to the brood pond, along with 1299 fry from three additional drainages.

The results from 2017:
In 2017 the Sun Ranch Hatchery incubated a total of 70,061 eggs with an overall eye-up percentage of 73% from the Sun Ranch brood, and 17.5 percent from eggs provided by FWP. A total of 20,470 Sun Ranch eggs survived eye-up. Of those, 15,100 were distributed into Yellowstone Park's Grayling Creek; Elk Horn Creek, in FWP's region 4 received 4,370, and 1,000 were returned to the Sun Ranch brood pond for use. FWP's egg source originated from Cherry and Granite Lakes in the Big Hole drainage, and totaled 44,825. A total of 5,858 eyed eggs were placed in RSI's in Cherry Creek, Big Hole drainage. Because eye-up percentage was so poor in the FWP eggs, several eggs were subjected to examination in a vinegar filled test

tube. The eggs appeared to have several been fertilized, but no growth occurred afterwards. We suspect the eggs may have suffered from oxygen deficiency during transport to the hatchery.

Activities funded by this grant will include fish spawning, chemical treatment of eggs before introduction into the hatchery, as well as the incubation, treatment and monitoring of those eggs. Additionally, it will also cover the cost of daily hatchery maintenance, heater maintenance, minor plumbing adjustments, and cleaning during 2018.

IV. Schedule.

The hatchery will be maintained from May through July, 2018.

V. Personnel.

Drake & Associates contracted with Wes Orr, U.S. Fish & Wildlife Service (retired) as the Sun Ranch hatchery manager.

VI. Budget:

Hatchery wages (including travel) and operational costs: $25,000

List all other funding (cost-share) sources and amounts for this project:

Applied for:	Yellowstone National Park	- $ 10,000
	Northwestern Energy	- $ 10,000
	Madison River Foundation	- $ 5,000

To date, the Sun Ranch Partners, LLC has contributed over $830,000 to the project. The yearly use of hatchery space and brood pond, as well as electrical costs, should be considered as an "in-kind" contribution.

VII. Deliverables.

Short term: The rearing of genetically pure westslope cutthroat fry.
Long term: Eggs/fry for reintroduction into Federal waters that were historically WCT habitat in the Missouri River Basin.

VII Cultural Resources:

No land-disturbing activities are associated with this proposal.

005-18 Emergency/contingency fund

Explain how this Project addresses a specific Project 2188 License Article(s): Priority 1: This fund will be used for, but not be limited to, emergency purchasing of equipment, scoping potential stream rehab proposals, and support of 2018 approved and potentially proposals.

Provide justification for Priority 1, 2 or 3 (above) that you selected: During ongoing operations and proposal work there are times when this approved proposal would allow for immediate funding of equipment, stream restoration assessments or other conditions that may require immediate attention. This proposal will eliminate (within the $5,000 limit) the need for TAC approval of a new proposal for spending of TAC funds.

Project Sponsor (submitted by): Brent Mabbott

Location of Proposed Project: Within TAC approved proposals.

Total Project Cost: $10,000

TAC Funds (Cost-Share) Requested for Project: $10,000

I. Introduction; Contingency funding to be used in emergency situations

II. Objectives; To have TAC approved funding for emergency situations as noted above.

III. Methods; Funding will used for situations as noted above.

IV. Schedule; Used when needed during 2018

V. Personnel; Brent Mabbott will determine and report usage of funding.

VI. Project budget must include amounts for the following:

Direct Labor
Travel and Living
Materials…yes
Other Direct Expenses…yes
Direct Overhead
All cost-share sources and amounts, including estimation of "in-kind" contributions

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. Spending will be reported at annual meeting.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has

been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.
Generally NA but maybe used for this if needed

Summarize here how you will complete requirements for Cultural Resource Management: NA

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016. NA

Summarize here how you will comply with Montana water rights laws, policies and guidelines: NA

006-18 Habitat Project Consultant Assistance

Explain how this Project addresses a specific Project 2188 License Article(s):

408-2) evaluate the potential to enhance tributary spawning to increase the contribution of natural reproduction to the Hebgen Reservoir fishery;4) identify, restore, and protect important riparian areas;7) evaluate the potential to enhance tributary spawning to increase the contribution of natural reproduction to the upper Madison River fishery.

409-(1) stream structure enhancements in the upper Madison River; (2) river bank enhancements in the upper and lower Madison River to enhance trout habitat; (3) fish habitat enhancement both in main stem and tributary streams, including enhancement for all life stages of fishes; 9) riparian habitat restoration.

412-4) identify, restore, and protect important riparian areas along Ennis Lake and the lower Madison River;10) evaluate the potential to enhance tributary spawning to increase the contribution of natural reproduction to the lower Madison River fishery

Provide justification for Priority 1, 2 or 3 (above) that you selected:

Project addresses 2188 License requirements for the identification and implementation of PM&E measures to benefit fisheries or wildlife populations or their habitats within the main stem Madison River (Hebgen Reservoir to Three Forks); fisheries or wildlife populations or their habitats in primary tributaries or on adjacent lands and, in doing so, provide PM&E for Madison River (Hebgen Reservoir to Three Forks). Meeting criteria for both priority 1 and 2 consideration.

Project Sponsor (submitted by):
Travis Lohrenz-MFWP

Location of Proposed Project:
Madison River Drainage from Hebgen to Three Forks

Total Project Cost: **$10,000.00**
TAC Funds (Cost-Share) Requested for Project: **$10,000.00**

I. Introduction; brief statement of project to be completed with pertinent background information.
Habitat projects addressed in the FERC license agreements (Articles 408,409,412) have been proposed and funded since the inception of the PM&E funding program. To date, viable habitat projects have been difficult to identify and even more difficult to implement. This proposal is to establish a contract with McNeal Resources (Allen McNeal) to continue working on habitat restoration projects in the Madison Valley and drainage. Consultant may also work on identifying and developing projects on other streams and rivers in the FERC Project 2188 project area as opportunities arise. This project will cover the cost of project design and permitting and also will defray construction oversight costs.

II. Objectives; explicit statement(s) of what is intended to be accomplished.
Investigative and scoping work on other projects will proceed during the year as time allows.

III. Methods; description of how Project objectives will be accomplished.
A contract would be established between NWE and McNeal Resources to complete this work.

IV. Schedule; when the Project work will begin and end.
Investigative and scoping work on other projects will proceed during the year as time allows.

V. Personnel; who will do the work? Identify Project leader or principal investigator.
Work on this project will be accomplished by McNeal Resources Inc. (Allen McNeal) in cooperation with private landowners, construction contractors, MDFWP staff, and staff from other organizations and agencies.

VI. Project budget must include amounts for the following:
Direct Labor- Consultant and contractors will design and construct. FWP biologists and staff will provide oversight.

Travel and Living-N/A
Materials- Raw materials required for stream reconstruction will be incorporated into stream specific proposals.
Other Direct Expenses-N/A
Direct Overhead- N/A – claims will be submitted directly from consultant to NWE for payment
All cost-share sources and amounts, including estimation of "in-kind" contributions

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will "success" for this project be monitored or demonstrated?
This proposal is designed to design and complete habitat projects in the MadTAC project area. Success will be measured in habitat projects completed and stream/river length that has been restored.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management:

Cultural resource surveys will be conducted and SHPO clearance will obtained prior to the initiation of any ground disturbing activities on habitat improvement projects funded by MadTAC.

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines:

All water right issues will be addressed in accordance with Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9-March-2016 prior to the initiation of any ground disturbing activities on habitat improvement projects on streams and wetlands funded by MadTAC.

007-18 2018 Beaverhead-Deerlodge NF Seasonal Technician Funding Request

Explain how this Project addresses a specific Project 2188 License Article(s):
This project would partially fund USFS Fisheries Technicians to assist USFS and MFWP biologists on multiple projects and monitoring efforts in field season 2018. General duties that address the following articles include: population monitoring for species of special concern (population estimates, presence/absence surveys, nonnative removals, collection of genetic material); assisting with tributary stream habitat enhancement projects; fish barrier site identification, reconnaissance, and barrier maintenance; and assist MFWP fisheries personnel with their 2018 program of work (monitoring and project) as needed in the upper Madison River drainage.

ARTICLE 408 7) Monitor fish species of special concern (i.e., Arctic grayling and westslope cutthroat trout).

ARTICLE 409 3) Fish habitat enhancement both in main stem and tributary streams, including enhancement for all life stages of fishes. 6) Inclusion or exclusion of fish barriers.

ARTICLE 412 4) Protect and aid the recovery of threatened and endangered fish species and other aquatic species of special concern, including Arctic grayling, in Madison Reservoir and the lower Madison River.

Provide justification for Priority 1, 2 or 3 (above) that you selected:
Priority 2: The USFS technicians would assist with projects which meet License Article requirements and PM&E for fisheries populations and their habitats in primary tributaries and provide PM&E for Madison River resources, as directed by USFS, MFWP and NWE fisheries personnel.

Project Sponsor (submitted by): Darin Watschke, USFS Fisheries, Beaverhead-Deerlodge NF, Madison Ranger District
Location of Proposed Project: Upper Madison River and tributaries

Total Project Cost:	**$29,860**
TAC B-D GS/6 Technician $148.90/day x 35 days	=$5,212
B-D GS/6 Tech USFS Contribution $148.90/day x 100 days	=$14,890
TAC B-D GS/4 Technician $119.40/day x 25 days	=$2,985
B-D GS/4 Tech USFS Contribution $119.40/day x 50 days	=$5,970
TAC Field Gear for Technicians	=$803
TAC Funds (Cost-Share) Requested for Project:	**$9,000**

I. Introduction; brief statement of project to be completed with pertinent background information.
This funding request is for cost sharing USFS Fisheries Technician salaries in 2018. The USFS Region 1 has undergone considerable budget reductions. Limited resources are available to local FS biologists to obtain the seasonal work force required to assist NWE and Montana Fish,

Wildlife and Parks (MFWP) in implementing the Fisheries, Wildlife, and Water Quality Protection, Mitigation and Enhancement Plan in the Madison River drainage as part of FERC licensing requirements for Project 2188. The requested funding would augment internal dollars and enable hiring of one GS/4 and one GS/6 Fisheries Techs out of the Madison Ranger District.

II. Objectives; explicit statement(s) of what is intended to be accomplished.
The FS technicians would aid State, Federal, and NWE biologist in FY17 with the following:

- Narrows Creek Dam Construction Project
- WF Madison Stream Habitat Enhancement
- Bear Creek Days Fish Dissections
- WF Ruby River Willow Planting
- Greenhorn Creek WCT Translocations
- South Willow Creek (Potosi Camp Ground) culvert and headgate project
- Wigwam and Teepee Creek Habitat Monitoring
- Wally McClure Creek WCT Collection
- Inventory and Monitoring of Arctic Grayling and Westslope Cutthroat Trout in the Madison River drainage
- WCT Genetics Collection
- Sensitive Amphibian Surveys in the Madison River drainage
- Aquatic Invasive Species (AIS) Inventory and Monitoring in the Madison River drainage – High Risk Waters
- Assist MFWP and Custer-Gallatin NF with 2018 field work on Madison River, Hebgen and Ennis Reservoir as needed
- Assist MFWP with Madison drainage high mountain lakes inventory work

III. Methods; description of how Project objectives will be accomplished.
Forest Service seasonal technicians would work cooperatively with NWE and MFWP crews throughout the FY18 field season to accomplish the fisheries objectives outlined above within the Madison River drainage.

IV. Schedule; when the Project work will begin and end. May 2018 – November 2018
V. Personnel; who will do the work? Identify Project leader or principal investigator.
Two Fisheries Technicians (GS/4 and GS/6), project lead is USFS Fisheries Biologist

VI. Project budget must include amounts for the following:

Direct Labor =$8,197
Travel and Living
Materials =$803
Other Direct Expenses
Direct Overhead (8%)
All cost-share sources and amounts, including estimation of "in-kind" contributions

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will "success" for this project be monitored or demonstrated? The success of this project will be demonstrated by reporting the field work days

spent and annual accomplishments related to Articles 408, 409 and 412 in the Madison River drainage, reservoirs, and tributaries.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management:
Not Applicable - cultural resource management is not required as part of this proposal.

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines:
Not Applicable – compliance with waters rights laws, policies and guidelines are not required for this proposal.

008-18 2018 Custer Gallatin NF's Seasonal Technician Funding

Explain how this Project addresses a specific Project 2188 License Article(s):
This project would partially fund two Custer Gallatin National Forest Fish Technicians to assist NWE, MFWP, and USFS biologists with multiple projects including monitoring and surveys during the 2018 field season. General duties that address the following articles include: population & habitat monitoring for species of special concern (population estimates, presence/absence surveys, nonnative removals, collection of genetic material, temperature monitoring, riparian & stream channel monitoring, etc.); assisting with stream and lake enhancement projects; and, fish barrier site identification, reconnaissance, and maintenance.

ARTICLE 408 7) Monitor fish species of special concern (i.e., Arctic grayling and westslope cutthroat trout).

ARTICLE 409 3) Fish habitat enhancement both in main stem and tributary streams, including enhancement for all life stages of fishes. 6) Inclusion or exclusion of fish barriers.

ARTICLE 412 4) Protect and aid the recovery of threatened and endangered fish species and other aquatic species of special concern, including Arctic grayling, in Madison Reservoir and the lower Madison River.

Provide justification for Priority 1, 2 or 3 (above) that you selected:
Priority 2: The USFS technicians would assist with projects which meet License Article requirements and PM&E for fisheries populations and their habitats in primary tributaries and provide PM&E for Madison River resources, as directed by USFS, MFWP and NWE fisheries personnel.

Project Sponsor (submitted by): Bruce Roberts, Custer Gallatin National Forest, Hebgen Lake Ranger District

Location of Proposed Project: Upper Madison River and tributaries
Total Project Cost:

GS-6 Technician TAC $154.00 x 20 days		$ 3,080
GS-5 Technician TAC $139.00 x 20 days		$ 2,780
GS-6 Technician In-Kind Contribution $154.00 x 40 days	$ 6,160	
GS-5 Technician In-King Contribution $139.00 x 40 days	$ 5,560	
Overhead (1.0%)	$ 59	
Total =	$17,639	

TAC Funds (Cost-Share) Requested for Project:
$3,080 + $2,780 + $59 (1% overhead) = $5,919

Approved $6000

I. Introduction; brief statement of project to be completed with pertinent background information.

This funding request is for cost sharing USFS Fisheries Technician salaries in 2018. The USFS Region 1 Fisheries Program has undergone considerable reductions. Limited resources are available to local FS biologists to obtain the seasonal work force required to assist NWE and MFWP in implementing the Fisheries, Wildlife, and Water Quality Protection, Mitigation and Enhancement Plan in the Madison River drainage as part of FERC licensing requirements for Project 2188.

II. Objectives; explicit statement(s) of what is intended to be accomplished.
The FS technicians would aid State, Federal, and NWE biologist in FY18 with the following:

- Beaver Creek fish barrier touch up
- Cabin Creek electrofishing
- South Fork Madison River WCT restoration
- Watkins Creek post habitat improvement monitoring
- Riparian vegetation and stream channel monitoring
- Wally McClure Creek WCT collection
- WCT population monitoring
- Thermograph deployment and retrieval
- WCT genetics collection
- Amphibian surveys and monitoring
- Aquatic Invasive Species (AIS) inventory and monitoring in the Madison River drainage – high risk waters.
- Assist MFWP and NWE staff with their 2018 Program of Work on Madison River, Hebgen and Ennis Reservoir as needed.

III. Methods; description of how Project objectives will be accomplished.
Forest Service seasonal technicians would work cooperatively with NWE and MFWP crews throughout the FY18 field season to accomplish the fisheries objectives outlined above within the Madison River drainage.

IV. Schedule; when the Project work will begin and end. May 2018 – November 2018

V. Personnel; who will do the work? Identify Project leader or principal investigator.
One GS-6 and one GS-5 Fisheries Technician. Project lead is CGNF West Zone Fisheries Biologist

VI. Project budget must include amounts for the following:

Direct Labor = $5,860
Travel and Living
Materials
Other Direct Expenses
Direct Overhead (1%) = $59
All cost-share sources and amounts, including estimation of “in-kind” contributions

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will “success” for this project be monitored or demonstrated?

The success of this project will be demonstrated by reporting the field work days spent and annual accomplishments related to Articles 408, 409 and 412 in the Madison River drainage, reservoirs, and tributaries.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management: NA

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the intent of Montana water rights laws and policies and with NWE's water rights guidelines for wetland projects.

Summarize here how you will comply with Montana and NWE water rights laws, policies and guidelines**:** NA

009-18 Rating Curve Development

Explain how this Project addresses a specific Project 2188 License Article(s):
Development of a rating curve specifically addresses Articles:

- **403** – Madison River flow management
- **408**-Monitor the effects of modified project operations on the upper Madison River fish populations.
- **412**-Monitor the effects of modified project operations (including pulsed flows) on Madison Reservoir and lower Madison River fish populations.
- **413** – mitigation of thermal effects
- **419** – monitoring of flushing flows

Provide justification for Priority 1, 2 or 3 (above) that you selected:
This project is categorized as a Priority 1.

Development of a rating curve will assist with the maintenance of minimum flow requirements that are needed to maintain suitable conditions for Madison River fish and associated aquatic life. Establishing a rating curve for the Ennis gauge will contribute to a better understanding of spatial changes in streamflow in the Upper Madison River Basin. This information will be beneficial to water managers in the basin including fisheries managers, NorthWestern Energy resource coordinators, irrigators, guides and outfitters, and river recreationists. Additionally, stream discharge monitoring will be an asset to NorthWestern Energy operations to manage streamflows for the Madison Thermal Program during summer months to balance Hebgen outflow and Madison pulse flow needs.

Project Sponsor (submitted by):
Travis Lohrenz- Fisheries Technician-Montana Fish, Wildlife and Parks
Location of Proposed Project: Madison River, Ennis Highway 287 Bridge

Total Project Cost: $3184
TAC Funds (Cost-Share) Requested for Project: $2184

I. Introduction; brief statement of project to be completed with pertinent background information.
In 2017, FWP in partnership with NWE, established a Madison River monitoring station at Ennis Bridge. The new station provides stream temperature and river stage information in the lower end of the upper Madison River basin. The information is available real-time via the internet to help FWP manage fisheries resources and NWE resource coordinators to manage Madison River streamflows. FWP staff attempted to measure flows to establish a rating curve in 2017 but due to safety concerns and limited discharge measuring equipment, a rating curve could not be established.
This project will employ USGS to measure streamflows and establish a rating curve for the existing river gauge at Ennis. This will allow the site managers to publish Madison River streamflow information in addition to river stage.

Physical stream processes, biological resources, and recreational values of a stream depend on its hydrologic regime. Monitoring the streamflow regime in a regulated river system is vital information to manage programs that have been developed and executed on the Madison River to best replicate the natural stream processes and the associated benefits to stream and riparian habitat health. The development of a rating curve, would be a useful tool in fine tuning these programs (e.g., frequency, magnitude, duration, timing and rate of change) in the face of a changing climate and increased recreational use.

II. Objectives; explicit statement(s) of what is intended to be accomplished.
Development of a rating curve by establishing a relationship with river stage and discharge.

III. Methods; description of how Project objectives will be accomplished.
Project will be accomplished through discharge measurement at differing river stages to establish a relationship with river stage and discharge. Establishment of the relation will require the services and equipment provided by the USGS for river discharge measurements during months of high flows (March-June).

IV. Schedule; when the Project work will begin and end.
If approved USGS personnel will initiate discharge measurements in March, 2018 and make a final measurement in June, 2018.

V. Personnel; who will do the work? Identify Project leader or principal investigator.
USGS hydrological technicians

VI. Project budget must include amounts for the following:

Direct Labor ($520.00 x 4 measurements)	$2080
Direct Overhead 5% administration	$104
NWE (in kind) data and website management	$1000
Total	$3184

All cost-share sources and amounts, including estimation of “in-kind” contributions

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will “success” for this project be monitored or demonstrated?
A rating curve that can be used to enhance or refine the management of minimum flow requirements for aquatic species and benefit water management for the Madison Thermal Program during summer months to balance Hebgen outflow and Madison pulse flow needs of river flows

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE

representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management:
NA

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines:
NA

010-18 French Creek Fish Barrier

Explain how this Project addresses a specific Project 2188 License Article(s):

This project is located in the upper Missouri River drainage in the Big Hole River. The purpose of this project is to construct a fish barrier and restore native Arctic grayling and westslope cutthroat trout to 40 miles of French Creek upstream of the barrier. Arctic grayling were widespread in the Missouri River drainage but have declined dramatically. The construction and continued operation of dams in the system have contributed to the decline and in some cases extirpation of this species by interrupting migration and changing flow, temperature and sediment regimes in the rivers. The Big Hole is the last remaining fluvial population in the lower 48 states. This project will mitigate for the impacts of dams on the Missouri and Madison rivers by restoring a fluvial population in the Big Hole River in 40 miles of habitat in French Creek. This would represent only the 2nd population of fluvial Arctic grayling that will exist in the absence of non-native fish species. This project could provide valuable information on the impacts of non-native fish species on Arctic grayling. The relationship between fluvial Arctic grayling and non-native salmonid species is poorly understood, but this project will provide information on this relationship and help guide restoration action in the future. Given the large nature of the system upstream of the fish barrier and the high quality of the habitat for grayling (mostly low gradient channels with wide healthy riparian areas) grayling will be able to express both fluvial and resident life histories in the stream. Multiple tributaries are open for fish to migrate into and spawn and then return to the mainstem creek.

Similarly, westslope cutthroat trout were widespread in the Missouri River drainage but have declined dramatically due to various factors including the construction and operations of dams. This proposed project will mitigate the impacts of Madison and Missouri river dams on native fish species in the upper Missouri River drainage. Restoring cutthroat trout to 40 miles of French Creek will increase the number of secured miles of stream in the Big Hole by roughly 50%. It will also secure 2 non-hybridized populations of westslope cutthroat trout that remain in the French Creek drainage in American Creek (occupying 1 mile of habitat) and Sixmile Creek (3 miles of occupied habitat).

This project will also benefit western pearlshell mussels which are present in French Creek. Pearlshell mussels require native fish species in order to complete their life cycle and also to disperse to different habitats. Dams on the Missouri River and Madison systems have interrupted fish migrations and thermal regimes which have likely impacted the ability of mussels to reproduce and disperse to different habitats. Pearlshell mussels are present in French Creek at low density. In the neighboring Deep Creek pearlshell mussels are thriving. Deep Creek supports reproducing Arctic grayling and other native fish which may be why the mussel population is thriving. With the restoration of native fish to French Creek and restoration of habitat through other projects we anticipate the mussel population will expand and begin again to reproduce and disperse naturally.

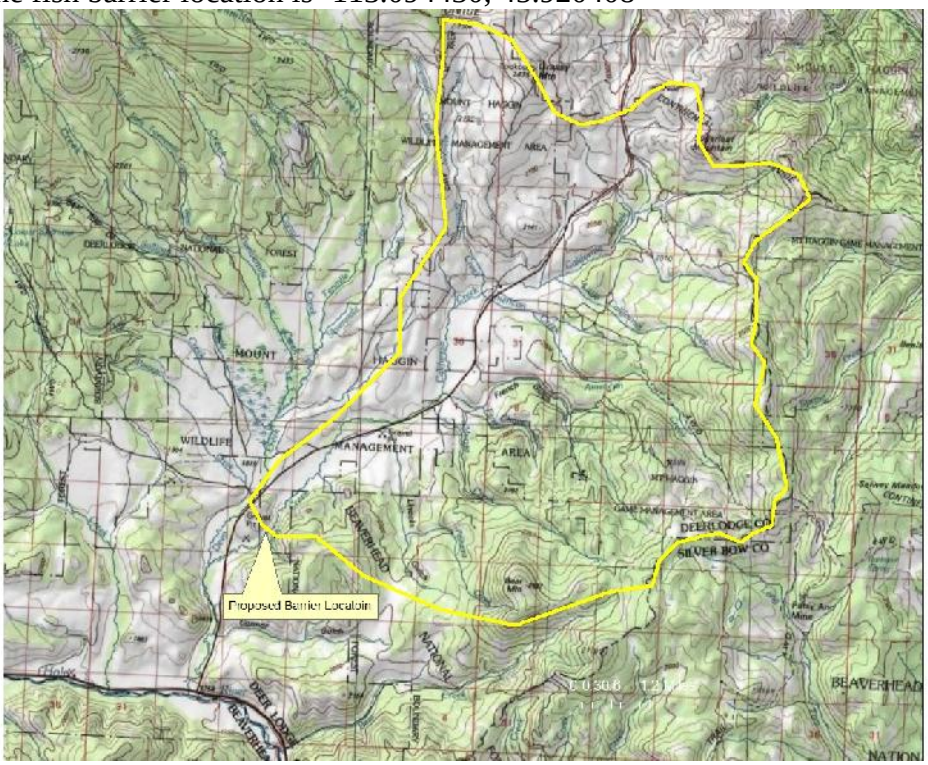
Provide justification for Priority 1, 2 or 3 (above) that you selected:

This project fits into the Priority 2 category. It is not in the Madison River drainage or in the Missouri River drainage between Holter and Fort Peck dams; however, it does mitigate for the impacts of the dams on native species such as Arctic grayling, westslope cutthroat trout and

pearlshell mussels as described above. This project will also go a long way to ensuring that Arctic grayling and westslope cutthroat trout are not listed as threatened under the Endangered Species Act which could bring additional regulations and stipulations on dam operations.

Project Sponsor:
Jim Olsen
Fisheries Biologist, Montana Fish Wildlife and Parks
1820 Meadowlark Lane
Butte, MT 59701
406-533-8451
jimolsen@mt.gov

Location of Proposed Project:
French Creek is a tributary to Deep Creek which flows into the Big Hole River near Wise River. The fish barrier location is -113.094430, 45.920408



Total Project Cost: $408,700
TAC Funds (Cost-Share) Requested for Project: $30,000

I. Introduction

The overarching goal of this project is to restore the native fish assemblage and habitat in French Creek, a tributary to Deep Creek and the Big Hole River. The French Creek drainage lies on lands owned and managed by FWP (Mount Haggin Wildlife Management Area), US Forest Service and BLM. The task that will be accomplished and the purpose for this grant is the construction of a fish migration barrier near the mouth of the creek on Mount Haggin Wildlife

Management Area to prevent upstream fish passage. There are approximately 40 miles of habitat upstream of the proposed fish barrier site that are currently occupied by trout. Construction would commence in the summer of 2017 if adequate funding is obtained. Once a fish barrier is in place, non-native brook trout and rainbow trout would be removed from the stream using a piscicide such as rotenone and native westslope cutthroat trout and Arctic grayling would be reintroduced. The Big Hole is the last remaining location where aboriginal fluvial Arctic grayling persist. Construction of a fish barrier is one of the tasks in the larger scale restoration of the watershed which includes habitat restoration.

Pioneer Technical was contracted in the spring of 2013 to develop a design for the proposed fish barrier. A final design and cost estimate was completed in 2017. The design specifications for the barrier include being structurally sound during a 100-year flood event and preventing fish passage up to a 50-year flood event. The barrier would be constructed in a small confined reach of French Creek near the downstream boundary of the Mount Haggin Wildlife Management Area. The barrier would consist of an earthen dam with a concrete spillway. The spillway design is a 2-drop structure with a splash pad between the drops (see photo below). The riprap for the project would be obtained on site from the talus hillslopes. The fill for the barrier would be obtained from a stock pile at French Gulch located a few miles upstream. This stockpile was created as part of placer mining restoration done on the stream in 2016.

The Big Hole is the last remaining drainage where aboriginal fluvial Arctic grayling remain in the lower 48 states. The majority of stream miles upstream of the proposed fish barrier in French Creek would be considered a “C” type meandering stream channel with high quality pools and abundant willows. This type of habitat is very similar to the type of habitat present farther upstream in the Big Hole River watershed where grayling are present. Only one other similar project has been conducted in the upper Missouri River drainage where non-native fish species were removed with the objective of restoring Arctic grayling (Grayling Creek in Yellowstone National Park). French Creek would represent the largest tributary population of fluvial Arctic grayling in the Big Hole drainage and the only the second population within their native range to exist in the absence of non-native fish.

One of the restoration goals in the Upper Missouri River Basin including the Big Hole is to secure WCT in a minimum of 20% of their historically occupied habitat (FWP 2012). Populations of WCT are considered secure when they are isolated from non-native fishes, typically by a physical fish passage barrier, have a population size of at least 2,500 fish, and occupy sufficient (5 to 6 miles) habitat to assure long-term persistence. In the Big Hole the 20% target goal represents approximately 420 miles of stream occupied by secured WCT populations. Nearly 60 miles of secured WCT habitat has been added through restoration efforts over the past 6 years bringing the total of secured miles to approximately 80. Completion of the French Creek native fish restoration project would result in a nearly 50% increase in cutthroat trout habitat in the Big Hole drainage.

Photo 1. Barrier on Cherry Creek near Melrose, MT which is similar in design to the French Creek barrier.

This project would greatly aid in keeping Arctic grayling and westslope cutthroat trout from becoming listed as threatened under the Endangered Species Act. In addition, nearly the entire project area is located on public property and is wide open to public access. Having a native fishery of this size in high quality habitat will present a unique opportunity for anglers. The chance to catch native grayling and cutthroat together in a stream will be a rare treat. Native fish restoration in French Creek is part of an overarching watershed approach to restore aquatic and terrestrial habitats and improve fish and wildlife abundance and water quality in the French Creek drainage. Focusing on habitat improvements in addition to native fish restoration in the drainage will insure that the project will be successful. Pearlshell mussels are also present at low abundance in French Creek. Fish and habitat restoration could lead to the conservation of this native and declining species in the drainage.

The final design for the fish barrier project was completed in the summer of 2017 and the project went out to bid in September; however, no bids were received within the amount of money secured. Therefore, we are seeking additional funds to make up the shortfall and then plan to put the project out for bid again in the spring of 2018.

II. Objectives.

The overall goal of this project is to restore native westslope cutthroat trout and Arctic grayling to over 40 miles of habitat in the French Creek drainage.

Objective 1. Construct a fish barrier

Objective 2. Remove non-native fish (EDNA tests will be done to verify non-native fish have been removed).
Objective 3. Restock westslope cutthroat trout and Arctic grayling from sources within the Big Hole drainage.
Objective 4. Monitor the fish population for indicators of success

III. Methods; description of how Project objectives will be accomplished.

The barrier project is slated to go out for bid again in the early spring of 2018. A qualified construction firm will be hired to do the construction and the oversight of the barrier project will be provided by Pioneer Technical Inc. It is anticipated that the project will begin in July or August and will take 60 days to complete.

Once the fish barrier is completed, fish removals will begin in 2019. Fish removals will consist of applying rotenone to French Creek and all of its tributary streams systematically down to the fish barrier. Potassium permanganate would be applied to the stream at the fish barrier to neutralize any rotenone and prevent fish from being affected downstream. The treatment will be repeated the following year. EDNA testing will be done of the water in French Creek upstream of the fish barrier once it appears fish have been completely removed. If non-native fish remain the stream will be treated again until all non-native fish are removed.

French Creek and its tributaries will be restocked with Arctic grayling from the Big Hole brood stock which is harbored in Axolotl Lake near Ennis, MT. Eggs would be introduced using remote stream-side incubators or fry would be released directly to the stream. This process would be repeated for a minimum of 3 years or until it is evident that natural reproduction is occurring and sustaining the population. Westslope cutthroat trout would also similarly be introduced. The brood source for Big Hole westslope cutthroat trout is kept in Cherry and Granite lakes near Melrose. Eggs would be collected from these lakes and incubated in French Creek and its tributaries for a period of 3 years and thereafter it is anticipated that the fishery would become self-sustaining.

French Creek and tributaries would be periodically monitored through electrofishing to determine the density of fish present and if reproduction is occurring. Electrofishing monitoring sections have already been established in French Creek, California Creek, American Creek, French Gulch, Moose Creek and Sixmile Creek.

IV. Schedule; when the Project work will begin and end.

Construction of the fish barrier is expected to begin in July of 2018 and be completed prior to the end of September 2018.
Fish removals would begin the year after the barrier has been constructed and would last 2-3 years.
Fish reintroduction will take a minimum of 3 years.
Monitoring after project completion will be done periodically (3-5 years)

V. Personnel;.

Jim Olsen (project lead)
Fisheries Biologist, Montana Fish Wildlife and Parks

Paul Valle, FWP Design and Construction Bureau
Kevin McDonnel, FWP Project Engineer

Design Firm:
Pioneer Technical Inc
Butte, MT

Construction Firm: To be determined in 2018

VI. Project budget:

Project Budget	
Design and Oversight	$53,000.00
Construction/Labor	$296,160.00
Travel and Living	$0.00
Materials, Concrete-Rebar	$42,540.00
Other Direct Expenses	$0.00
Direct Overhead	$0.00
In Kind fill	$70,000.00
In kind riprap	$40,000.00
Sub Total	$501,700.00
Contingency	$17,000.00
Total	**$518,700.00**

Project Funding	
Secured Funding	
Montana Department of Transportation	$60,000.00
FFIP	$73,000.00
Bring Back the Natives (NFWF)	$32,500.00
US Forest Service RAC Funds	$15,000.00
FFIP 2	$72,000.00
WNTI -USFWS	$41,300.00
State Wildife Grants	$25,000.00
In Kind Rock and Fill	$110,000.00
Sub Total	$428,800.00
Non Secured Funding	
George Grant Chapter TU	$5,000.00
MT Trout Foundation	$10,000.00
NFWF	$15,000.00
Northwest Energy	$30,000.00
American Fisheries Society	$5,000.00
Arctic Grayling Recovery Program	$5,000.00
BLM Grayling	$10,000.00
Patagonia	$10,000.00
Total	**$518,800.00**

VII. Deliverables;

The outcome of this project will be the restoration of native Arctic grayling and westslope cutthroat trout to 40 miles of stream. The project will represent the largest project to date for grayling restoration involving the removal of non-native fish and will greatly expand their current range within their native habitat. The project will also produce a 50% increase in secured habitat in the Big Hole drainage for westslope cutthroat trout. This project would greatly aid in keeping Arctic grayling and westslope cutthroat trout from becoming listed as threatened under the Endangered Species Act. Further, the stream will provide a unique angling experience where Arctic grayling and westslope cutthroat trout can be caught together in a stream.

VIII. Cultural Resources.

A cultural resources inventory of the areas proposed for fish barrier construction has been conducted by GCM Services Inc. of Butte, MT. This inventory covered the proposed fish barrier site (Ferguson 2013). No cultural resources were identified in the area of the proposed fish barrier and the State Historical Preservation office concurred with these findings (see below).

Big Sky. Big Land. Big History.
Montana
Historical Society

Historic Preservation
Museum
Outreach & Interpretation
Publications
Research Center

RECEIVED
OCT 29 2013
DESIGN & CONSTRUCTION
DEPT. OF FISH, WILDLIFE & PARKS

October 28, 2013

Bardell Mangum, Landscape Architect
Design & Construction
Montana Fish, Wildlife & Parks
1420 East Sixth Avenue
P.O. Box 200701
Helena, Montana 59620-0701

RE: French Creek Fish Barrier
Deer Lodge County, Montana

Dear Mr. Mangum:

Thank you for the letter (received October 28, 2013) and opportunity to comment on the proposed installation of a fish barrier on French Creek in the Mount Haggin Wildlife Management Area in Deer Lodge County, Montana. Based on the received documentation, we concur with the determination that the proposed action will have no effect on heritage properties.

Please note that our concurrence does not substitute for a good faith effort to consult with interested parties, local government authorities, and American Indian Tribes. If you receive a comment that substantially relates to heritage properties located in or adjacent to the action's Area of Potential Effect, please immediately forward it to our office for review. Include any documentation of how the comment has been addressed. In the meantime, if you have any questions or comments do not hesitate to contact me at (406) 444-0388 or kore@mt.gov. Thank you for consulting with us.

Sincerely,

Kathryn Ore
Review and Compliance Officer
Montana State Historic Preservation Office

File: FWP/Fish – 2013 – 2013102502

225 North Roberts Street
P.O. Box 201201
Helena, MT 59620-1201
(406) 444-2694
(406) 444-2696 FAX
montanahistoricalsociety.org

IX. Water Rights.

No water rights or changes to water rights are necessary for this project.

012-18 Elk River Fish Barrier Design

Explain how this Project addresses a specific Project 2188 License Article(s):
This Elk River Fish Passage Barrier will secure over 40 stream miles of native Westslope cutthroat trout habitat in a primary tributary to the Madison River.

ARTICLE 409
6) Inclusion or exclusion of fish barriers.

ARTICLE 412
4) Protect and aid the recovery of threatened and endangered fish species and other aquatic species of special concern, including Arctic grayling, in Madison Reservoir and the lower Madison River

Provide justification for Priority 1, 2 or 3 (above) that you selected:
Priority 2: This fish barrier design is the first phase required in a long-term project that will secure over 40 stream miles of native Westslope cutthroat trout habitat in a primary tributary to the Madison River.

Project Sponsor (submitted by): Darin Watschke, Madison Ranger District

Location of Proposed Project: Elk River, tributary to WF Madison River

Total Project Cost: Dale White: 25 days @$414/day = $10,350
Structure Engineering: D J& A = $3,800
$14,150

TAC Funds (Cost-Share) Requested for Project:
Dale White: 10 days @$414/day = $4,140
Structure Engineering: D J& A = $3,360
$7,500

I. Introduction; brief statement of project to be completed with pertinent background information. This project will cost share the total funding required for a USFS hydro-engineer and a contracted structural engineer to complete a stamped and final design for the Elk River Fish Passage Barrier on the Beaverhead-Deerlodge NF, Madison Ranger District. The total project cost is about $14k ($7.5k TAC) commensurate contracted designs have been in the $25k to $30k range. This design is the precursor to building the Elk River Barrier and restoring over 40 upstream miles of habitat for native WCT in the Madison River drainage.

II. Objectives; explicit statement(s) of what is intended to be accomplished.
A stamped barrier design and associated documentation that meet USFS construction standards and a construction cost estimate.

III. Methods; description of how Project objectives will be accomplished.
Dale White, Custer-Gallatin Hydro/Engineer, and survey crew were funded by the B-D NF in 2017 to conduct a full survey of the Elk River barrier site. Since, Dale has completed some

preliminary drawings and requires additional funding in 2018 to complete the design. Additionally, a USFS accepted IDIQ contractor (DJ&A) would be utilized to review and confirm all structural requirements of the design.

IV. Schedule; when the Project work will begin and end. The design work would start in January 2018 and would be completed by September 2018.

V. Personnel; who will do the work? Identify Project leader or principal investigator.
Dale White and DJ&A would complete the design, project lead is Darin Watschke

VI. Project budget must include amounts for the following:

Direct Labor	$7,500
Travel and Living	
Materials	
Other Direct Expenses	
Direct Overhead	

All cost-share sources and amounts, including estimation of "in-kind" contributions

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will "success" for this project be monitored or demonstrated?
A completed barrier design and associated documentation that meet USFS design and construction standards as well as a final cost estimate.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.
Summarize here how you will complete requirements for Cultural Resource Management:
Not Applicable - cultural resource management is not required for barrier design completion.

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines:
Barrier design and construction on USFS administered lands is compliant with state and federal waters rights laws, policies and guidelines. NA

Proposal: 013-18 MOA with FWP 2018-2026

Location of Proposed Project: Madison River Drainage, southwest Montana

Total Project Cost: $349.093[1]
TAC Funds (Cost-Share) Requested:
$197,299. in 2018, with anticipated annual 2% increases through 2026

Introduction
Throughout most of the 2188 project area in the Madison River drainage, the FERC license requires annual fish population monitoring, evaluation, and development of measures to reduce hydroelectric project impacts on fisheries and aquatic habitats. Annual monitoring is critical to:

1) determine the influence of hydroelectric projects operations on river and reservoir fish populations;

2) to evaluate the need and type of protection, mitigation, and enhancement projects; and

3) to evaluate the success of protection, mitigation and enhancement activities.

Montana Fish, Wildlife and Parks (FWP) has conducted routine and periodic monitoring in many areas of the drainage, but due to changing priorities and fiscal conditions there is no long-term guarantee that current monitoring activities will continue. The intent of this proposal is to forge a long-term cooperative agreement that insures NWE is able to meet FERC-mandated fisheries monitoring and evaluation requirements as well as to facilitate FWP participation in the development and implementation of mitigation and enhancement measures in a cost-effective manner.

I. Objectives.

Hebgen Reservoir and the Upper Madison River, including Hebgen tailwater and Quake Lake:

1) Conduct spring gill-netting with experimental floating and sinking gillnets in standardized locations. This series has been conducted by FWP annually since 1971 and is the best trend indicator of relative change in fish assemblages. Biological data collected includes number caught by species; length and weight characteristics; age composition of selected species; hatchery vs wild origin (if known); food habits of selected species; disease information.

2) Conduct annual population estimates in the upper Madison River to monitor population abundance and assess effectiveness of mitigation and enhancement measures. MFWP has conducted population estimates annually since 1967, and uses this data to determine the overall age distribution, health, and habitat needs of the fish population. Biological data collected includes number caught by species; length and weight characteristics; age composition of selected species; disease information.

3) Protect instream habitat and riparian areas by applying pertinent state and federal laws. Projects that potentially will affect quality of instream habitat and riparian area will be monitored and recommendations made throughout their proposal and implementation stages.

[1/] Includes FWP R3 Management personnel & operations expended in the Madison Drainage

4) Native fish species will be monitored and projects developed to secure, recover, and expand their populations. The State has developed and is implementing recovery plans/conservation agreements for fluvial Arctic grayling and westslope cutthroat trout. Efforts to conserve and re-establish westslope cutthroat trout in portions of upper Madison River tributaries are on-going, with several streams identified as potential sites for non-native removal and WCT re-introduction.

5) Madison River tributaries are being assessed for native fish restoration potential and to determine the feasibility of establishing spawning runs of rainbow trout from the Madison River. Qualities being assessed include presence of barriers, potential for flow enhancement through irrigation system improvements, and spawning & rearing potential.

6) Fish usage of Madison River and Hebgen Reservoir tributaries for spawning and rearing has been documented and is being monitored to assess characteristics to identify habitat improvements to provide better management of recreational fisheries.

7) Fish response to habitat improvement projects on Madison River and Hebgen Reservoir tributaries are being conducted.

8) Monitoring of fish entrainment in irrigation canals with consideration of screening or other methods to reduce or eliminate entrainment.

9) Water and air temperature are monitored throughout the upper Madison River annually. Data are collected from late-April through early-October each year.

Ennis Reservoir, the Bypass Reach, and the lower Madison River:

1) Fall gill-netting with sinking and floating nets is conducted at standardized locations in Ennis Reservoir in alternate years. Biological data collected includes number caught by species; length and weight characteristics; and disease information.

2) Young-of-the-year Arctic grayling beach seining index sites in Ennis Reservoir have been developed based on data collected by MSU, NWE (then, PPL Montana or MPC), and FWP 2188 Project personnel in 1993-95. This method is employed in an effort to index the Ennis Reservoir adfluvial grayling population without electrofishing the spawning adults. Seining is conducted each fall at the index sites.

3) Annual population estimates are conducted in the lower Madison River to monitor population abundance and assess effectiveness of mitigation and enhancement measures. MFWP has conducted population estimates annually since 1967, and uses this data to determine the

overall age distribution, health, and habitat needs of the fish population. Biological data collected includes number caught by species; length and weight characteristics; age composition of selected species; disease information.

4) Native fish species will be monitored and projects developed to secure, recover, and expand their populations. The State has developed and is implementing recovery plans/conservation agreements for fluvial Arctic grayling and westslope cutthroat trout. Efforts are presently underway to re-establish fluvial Arctic grayling in the headwaters of the Missouri River, which includes the lower Madison River. The on-going Cherry Creek Native Fish Introduction Project has, to date, removed non-native trout and established westslope cutthroat trout in approximately 42 miles of the Cherry Creek Project area. Another 19 stream miles is expected to become available in 2010.

5) Population estimates of trout have periodically been conducted in the Bypass Reach of the Madison River, between Ennis Dam and Powerhouse, since 1992. Radio telemetry of rainbow trout, brown trout, and whitefish captured and implanted in the Bypass documented their seasonal movements and responses to flow fluctuations in the Bypass.

6) Water and air temperature are monitored throughout the upper Madison River annually. Data are collected from late-April through early-October each year.

In addition to the monitoring activities specified above, FWP personnel will cooperate with NWE and other groups, organizations, and agencies to develop and implement fisheries and habitat protection, mitigation and enhancement activities throughout the project area as specified in the FERC 2188 license. Most PM&E measures will require additional funding on a case-by-case basis as determined by the Technical Advisory Committee.

II. Methods.

Work will be performed using standard methods currently employed by MFWP in similar surveys. Methods are subject to change pending discussion and approval by Technical Advisory Committee.

III. Schedule.

Seasonal schedule of activities is provided for each item in Article 408,409 and 412. Several elements in monitoring plan will require assistance from existing NWE fisheries personnel. Deviations from seasonal and annual schedules may occur if approved by Technical Advisory Committee.

IV. Personnel.

Project Leader:	Travis Horton, MFWP, Regional Fisheries Manager
Project Biologists:	Dave Moser, MFWP, 2188 Project, Bozeman/Ennis
Project Technicians:	Travis Lohrenz, MFWP 2188 Project, Ennis
	F&W Tech II, MFWP, 2188 Project, Ennis
	Other temporary and seasonal technicians

015-18 North Fork Spanish Creek Fish Barrier

Explain how this Project addresses a specific Project 2188 License Article(s):

This project addresses Article 409, Section 3 - fish habitat enhancement both in main stem and tributary streams, including enhancement for all life stages of fishes and Section 6) inclusion or exclusion of fish barriers; and, Article 412, Section 5 – protect and aid the recovery of threatened and endangered fish species and other aquatic species of special concern.

Provide justification for Priority 1, 2 or 3 (above) that you selected:

The proposed project is a Priority 3 proposal. The scope of work is located within the greater Missouri River drainage. A new locally adapted westslope cutthroat trout population will be established that can be used to jump start future westslope cutthroat trout restoration projects within the greater Missouri River drainage above Fort Peck Reservoir. In addition, to replication of nearest neighbor WCT - Wildhorse and Elkhorn in the Gallatin and Last Chance, Ruby Creek, and Wally McClure in the Madison - we further propose to attempt reintroduction of fluvial arctic grayling in N. Fork Spanish Creek and the outlet channel of Chiquita Lake. These species undoubtedly lived in sympatry historically and North Fork Spanish Creek may have the habitat requirements necessary to survive and reproduce.

Sponsor (submitted by): **Carter Kruse (Turner Enterprises, Inc.), Dave Moser (Montana Fish, Wildlife and Parks) and Bruce Roberts (Custer Gallatin National Forest).**

Location of Proposed Project: **North Fork Spanish Creek, Madison County, Montana**

Total Project Cost: **$430,000 (Barrier Construction Only)**

CONTRIBUTORS	ORIGINAL FUNDING	SUPPLEMENTAL FUNDING	SUB-TOTALS
TURNER ENTERPRISES, INC	$40,000*	$20,000	$60,000
NATIONAL FISH AND WILDLIFE FOUNDATION	$90,000	$50,000 Pending	$140,000
FUTURE FISHERIES	$60,000	$30,000 Pending	$90,000
WESTERN NATIVE TROUT INITIATIVE	$15,000	-	$15,000
CUSTER GALLATIN NATIONAL FOREST	$25,000	-	$25,000
NORTHWESTERN ENERGY	-	$75,000	$75,000
MADISON GALLATIN TROUT UNLIMITED	-	$30,000 Pending	$30,000
TOTALS	$230,000	$205,000	$435,000

*** = $20,000 pent on design**

TAC Funds (Cost-Share) Requested for Project: **$45,000 – this funding request represents additional needs for matching funds to complete barrier construction in August of 2018**

I. Introduction; brief statement of project to be completed with pertinent background information.

The local collaborative partnership consisting of Turner Enterprises, Inc./Turner Endangered Species Fund, Montana Fish, Wildlife and Parks and Custer Gallatin National Forest proposed to restore native westslope cutthroat trout to 17 stream miles and nine acres of lake habitat within the upper North Fork Spanish Creek sub-watershed and Gallatin River sub-basin within Madison County, Montana. Seventy five percent of the project is on readily accessible public lands. The proposed project will require the construction of a fish migration barrier, complete removal of non-native trout, and restocking. Successful implementation of this project, located predominately on public lands, will more than double the 2% of currently habitat occupied by genetically pure native trout in the Gallatin River sub-basin, and provide a large, self-sustaining population as a source of individuals for restoration elsewhere including the Madison River drainage.

Westslope cutthroat trout are currently found in only 5% of their historically occupied habitat in the upper Missouri River. In the Gallatin River portion of that range wild, aboriginal, genetically pure westslope cutthroat trout remain in low densities in only 4 of 1048 (0.5%) suitable stream miles. Introductions of westslope cutthroat trout into historically fishless or renovated reaches of stream have added another 12 miles of occupied habitat. This proposed North Fork Spanish Creek project will double the currently occupied habitat in the Gallatin River sub-watershed and result in the only self-sustaining population large enough to provide consistent numbers of source individuals for other restoration projects. Moreover, the project size proposed will be large enough to ensure long-term genetic and demographic population health.

Westslope cutthroat trout have declined primarily due to competition and hybridization with non-native salmonids and habitat degradation. Here we will use piscicides and a constructed fish migration barrier to remove non-native trout from the upper 17 miles of the North Fork Spanish Creek watershed and prevent their reinvasion. The project represents the last of seven native cutthroat trout restoration projects sponsored or initiated by the Turner organization's Native Cutthroat Trout Initiative program that will ultimately lead to recovery of native cutthroat trout in over 250 miles of stream throughout western United States.

Additional funds are being requested from Trout Unlimited (Madison Gallatin Chapter), $30,000, NFWF, $25,000, Future Fisheries $30,000. These funds , if acquired, would allow partners to start contracting for August of 2018.

The partnership agrees that the proposed North Fork Spanish Creek project is the best larger scale restoration opportunity to restore native westslope cutthroat trout within the larger Gallatin River sub-basin and worth the extra funds necessary to construct the barrier. Besides the large amount of stream miles and lake acres, there are other attributes that make this project important including remoteness of the project area which reduces

potential for intentional or inadvertent sabotage, high quality habitat, heterogeneity of habitat, and willingness of adjacent landowner and partners.

National Fish and Wildlife Foundation (NFWF) has given our partnership until mid-November 2017 to sign a contract for their original $90,000 grant. Greater Yellowstone Coalition has verbally agreed to seek an additional $50,000 from their membership. The partnership is seeking another $130,000 from other funding sources including this $75,000 from NorthWestern Energy. Montana Fish, Wildlife and Parks and the Custer Gallatin National Forest have completed a joint Environmental Assessment (EA) to implement their respective portions of the project. Montana Fish, Wildlife and Parks recently signed their decision. The Custer Gallatin National Forest has yet to sign their Decision Notice (DN) and Finding of No Significant Impact (FONSI), but the Forest Supervisor's signature is expected within the month. The draft DN and FONSI was released to the public during for a 45-day objection period. No objections were received so the project can move forward upon the Forest Supervisor's signature. The addition of Arctic grayling to this proposal will require a supplemental EA under MEPA. The characteristics and plight of both these species are very similar and both species would meet the goals of the original EA. Moreover, any additional requirements under NEPA or the Wilderness Act will be addressed prior to barrier construction.

II. Objectives; explicit statement(s) of what is intended to be accomplished.
Restore native westslope cutthroat trout and fluvial Arctic grayling to 17 miles of stream habitat and nine acres of lake habitat.

III. Methods; description of how Project objectives will be accomplished.
Because the proposed barrier is located on private land, Turner Enterprises, Inc. plans to design, contract including contract oversight, and manage the barrier. The partnership plans to cooperatively implement the treatment of the lakes and streams, restocking and monitoring. Project partners have a long history of successfully working together to accomplish native fish restoration goals (e.g., Cherry Creek of the Madison River).

IV. Schedule; when the Project work will begin and end.
The barrier will be constructed August 2018 with lake and stream treatments starting simultaneously and continuing for a period of 2-3 years.

V. Personnel; who will do the work? Identify Project leader or principal investigator.
Carter Kruse (Director of Conservation, Turner Enterprises, Inc.) – Project Lead for TEI will oversee Grants & Agreement, fund transmittal, and barrier contracting, construction and management. George Austiguy (Professional Engineer, Pioneer Technical Services) – Lead engineer will oversee daily contractual inspections and obligations. Dale White (Professional Engineer, Custer Gallatin National Forest) – Will assist with daily contractual inspections when George Austiguy is not available.

VI. Project budget must include amounts for the following:
This request of $45,000 and the $30,000 previously granted will go directly to the construction of the barrier with no portion of the funding going towards employee salaries.

VII. Deliverables; describe work product (reports, habitat restoration, etc.) which will result from this Project. How will "success" for this project be monitored or demonstrated?
Return of native westslope cutthroat trout to 17 miles of stream habitat and nine lake acres. Broad source for future westslope cutthroat trout restoration project throughout the greater Missouri River drainage. Introduction and return of native fluvial Arctic grayling to 17 miles of stream habitat and two mountain lakes.

VIII. Cultural Resources. Cultural Resource Management (CRM) requirements for any activity related to this Project must be completed and documented to NWE as a condition of any TAC grant. TAC funds may not be used for any land-disturbing activity, or the modification, renovation, or removal of any buildings or structures until the CRM consultation process has been completed. Agency applicants must submit a copy of the proposed project to a designated Cultural Resource Specialist for their agency. Private parties or non-governmental organizations are encouraged to submit a copy of their proposed project to a CRM consultant they may have employed. Private parties and non-governmental organizations may also contact the NWE representative for further information or assistance. Applications submitted without this section completed, will be held by the TAC, without any action, until the information has been submitted.

Summarize here how you will complete requirements for Cultural Resource Management:
The Custer Gallatin National Forest will provide in-kind contribution to complete required cultural resource surveys and compliance.

IX. Water Rights. For projects that involve development, restoration or enhancement of wetlands, please describe how the project will comply with the Montana DNRC's "Guidance for Landowners and Practitioners Engaged in Stream and Wetland Restoration Activities", issued by the Water Resources Division on 9March2016.

Summarize here how you will comply with Montana water rights laws, policies and guidelines:

Turner Enterprises, Inc. Flying D Ranch holds all appropriated water rights on North Fork Spanish Creek. All water rights on North Fork Spanish Creek are instream flow rights. The proposed barrier and fish restoration project will not store water or otherwise impact existing water rights on North Fork Spanish Creek. In fact the proposed project is compatible with instream flow rights held by Turner Enterprises, Inc.

Proposal 016-18 MOA with USFS 2018-2026

Date: August 22, 2017
Location of Proposed Project: Madison River Drainage, southwest Montana
Total Project Cost: $47,309

TAC Funds (Cost-Share) Requested:
$14,919 in 2018, with anticipated annual 2% increases through 2026

Introduction

Throughout most of the 2188 project area in the Madison River drainage, the FERC license requires annual fish population monitoring, evaluation, and development of measures to reduce hydroelectric project impacts on fisheries and aquatic habitats. Annual monitoring is critical to:

1) determine the influence of hydroelectric projects operations on river and reservoir fish populations;

2) to evaluate the need and type of protection, mitigation, and enhancement projects; and

3) to evaluate the success of protection, mitigation and enhancement activities.

U. S. Forest Service has assisted Montana Fish, Wildlife and Parks (FWP) when conducting routine and periodic monitoring in many areas of the drainage, but due to changing priorities and fiscal conditions there is no long-term guarantee that current monitoring activities will continue. The intent of this proposal is to forge a long-term cooperative agreement that insures NWE is able to meet FERC-mandated fisheries monitoring and evaluation requirements as well as to facilitate USFS participation in the development and implementation of mitigation and enhancement measures in a cost-effective manner.

V. Objectives. The USFS in cooperation with FWP may assist or take the lead in conducting the following FERC License Article activities:

Hebgen Reservoir and the Upper Madison River, including Hebgen tailwater and Quake Lake:

10) Conduct spring gill-netting with experimental floating and sinking gillnets in standardized locations. This series has been conducted by FWP annually since 1971 and is the best trend indicator of relative change in fish assemblages. Biological data collected includes number caught by species; length and weight characteristics; age composition of selected species; hatchery vs wild origin (if known); food habits of selected species; disease information.

11) Conduct annual population estimates in the upper Madison River to monitor population abundance and assess effectiveness of mitigation and enhancement measures. MFWP has conducted population estimates annually since 1967, and uses this data to determine the overall age distribution, health, and habitat needs of the fish population. Biological data

collected includes number caught by species; length and weight characteristics; age composition of selected species; disease information.

12) Protect instream habitat and riparian areas by applying pertinent state and federal laws. Projects that potentially will affect quality of instream habitat and riparian area will be monitored and recommendations made throughout their proposal and implementation stages.

13) Native fish species will be monitored and projects developed to secure, recover, and expand their populations. The State has developed and is implementing recovery plans/conservation agreements for fluvial Arctic grayling and westslope cutthroat trout. Efforts to conserve and re-establish westslope cutthroat trout in portions of upper Madison River tributaries are on-going, with several streams identified as potential sites for non-native removal and WCT re-introduction.

14) Madison River tributaries are being assessed for native fish restoration potential and to determine the feasibility of establishing spawning runs of rainbow trout from the Madison River. Qualities being assessed include presence of barriers, potential for flow enhancement through irrigation system improvements, and spawning & rearing potential.

15) Fish usage of Madison River and Hebgen Reservoir tributaries for spawning and rearing has been documented and is being monitored to assess characteristics to identify habitat improvements to provide better management of recreational fisheries.

16) Fish response to habitat improvement projects on Madison River and Hebgen Reservoir tributaries are being conducted.
17) Monitoring of fish entrainment in irrigation canals with consideration of screening or other methods to reduce or eliminate entrainment.

18) Water and air temperature are monitored throughout the upper Madison River annually. Data are collected from late-April through early-October each year.

Ennis Reservoir, the Bypass Reach, and the lower Madison River:

7) Fall gill-netting with sinking and floating nets is conducted at standardized locations in Ennis Reservoir in alternate years. Biological data collected includes number caught by species; length and weight characteristics; and disease information.

8) Young-of-the-year Arctic grayling beach seining index sites in Ennis Reservoir have been developed based on data collected by MSU, PPL Montana (then MPC), and FWP 2188 Project personnel in 1993-95. This method is employed in an effort to index the Ennis Reservoir adfluvial grayling population without electrofishing the spawning adults. Seining is conducted each fall at the index sites.

9) Annual population estimates are conducted in the lower Madison River to monitor population abundance and assess effectiveness of mitigation and enhancement measures. MFWP has conducted population estimates annually since 1967, and uses this data to determine the

overall age distribution, health, and habitat needs of the fish population. Biological data collected includes number caught by species; length and weight characteristics; age composition of selected species; disease information.

10) Native fish species will be monitored and projects developed to secure, recover, and expand their populations. The State has developed and is implementing recovery plans/conservation agreements for fluvial Arctic grayling and westslope cutthroat trout. Efforts are presently underway to re-establish fluvial Arctic grayling in the headwaters of the Missouri River, which includes the lower Madison River. The on-going Cherry Creek Native Fish Introduction Project has, to date, removed non-native trout and established westslope cutthroat trout in approximately 42 miles of the Cherry Creek Project area. Another 19 stream miles is expected to become available in 2010.

11) Population estimates of trout have periodically been conducted in the Bypass Reach of the Madison River, between Ennis Dam and Powerhouse, since 1992. Radio telemetry of rainbow trout, brown trout, and whitefish captured and implanted in the Bypass documented their seasonal movements and responses to flow fluctuations in the Bypass.

12) Water and air temperature are monitored throughout the upper Madison River annually. Data are collected from late-April through early-October each year.

In addition to the monitoring activities specified above, USFS personnel will cooperate with, FWP, NWE and other groups, organizations, and agencies to develop and implement fisheries and habitat protection, mitigation and enhancement activities throughout the project area as specified in the FERC 2188 license. Most PM&E measures will require additional funding on a case-by-case basis as determined by the Technical Advisory Committee.

VI. Methods.

Work will be performed using standard methods currently employed by MFWP in similar surveys. Methods are subject to change pending discussion and approval by Technical Advisory Committee.

VII. Schedule.

Seasonal schedule of activities is provided for each item in Article 408,409 and 412. Several elements in monitoring plan will require assistance from existing NWE fisheries personnel. Deviations from seasonal and annual schedules may occur if approved by Technical Advisory Committee.

VIII. Personnel.

Project Leader:	Travis Horton, MFWP, Regional Fisheries Manager
Project Biologists:	Dave Moser, FWP, Bozeman/Ennis
	Bruce Roberts, USFS, Bozeman
	Darin Watschke, USFS, Ennis
Project Technicians:	Travis Lohrenz, MFWP 2188 Project, Ennis
	F&W Tech II, MFWP, 2188 Project, Ennis
	Tim Weiss, MFWP, Bozeman
	Other temporary and seasonal technicians

017-18 A Streamside Study to Determine the Temperature Requirements of Juvenile Madison River Mountain Whitefish

Christine Verhille. Montana State University. Department of Ecology.
christine.verhille@montana.edu; 406 994 4844.
Travis Horton. Montana Fish, Wildlife, and Parks. Region 3.
David Moser Montana Fish, Wildlife, and Parks. Region 3.

November 17, 2017

This project meets Priority 3 requirements: 2188 License PM&E projects which meet License Article requirements by providing scientific or other tangible PM&E benefits to Madison-Missouri River fisheries or wildlife populations or their habitats.

Justification for Priority 3: This proposal meets Priority 3 requirements for cold water fish populations in the Madison River. Climate change and associated variation in magnitude and timing of run-off may negatively impact cold water fish populations in the upper and lower Madison River. The ability to attenuate thermal maxima is of critical concern. This study will provide data on physiological stresses and metabolic requirements for salmonids in a real-world environment.

These data may also be useful in determining whether restrictions on fishing (i.e. hoot owl closures) are helpful, necessary, or need to be modified.

Location of Proposed Project: Lower Madison River

Total Project Cost: $174,153

TAC Funds (Cost-Share) Requested for Project: $60,000

Approved $20,000

I. Introduction:

Contemporary warming of river ecosystems has the potential to endanger populations of Montana's cold-water salmonids and, consequentially, is threatening the state's aquatic recreation industry. A recent unprecedented disease outbreak in mountain whitefish associated with warm river waters caused a temporary closure of an economically important stretch of the Yellowstone River to recreational activity with an estimated loss of up to $520,000 (Sage 2016). With average monthly summer water temperatures of the Madison River, warming at a rate of at least 0.06°C per year since 1977 (USGS 2017), cold-water fish populations in this river are increasingly threatened by warm waters. Despite this threat encroaching on Montana's aquatic ecosystems and economy, our limited knowledge of the water temperature requirements of local fish populations makes development and justification of actions to protect these species challenging for fisheries managers. Therefore, I propose the design and application of a mobile fish laboratory capable of river- and lake-side measurements of fish physiological responses to environmental conditions.

Although many of Montana's salmonids are experiencing unprecedented warm waters, mountain whitefish on the Madison River are a high priority local population for streamside studies quantifying temperature requirements. Madison River biologists are concerned about the recent mountain white fish disease outbreak on the Yellowstone River because the Madison River, which is also associated with an important aquatic recreation economy, has been warming. Physiological studies on this species are sparse because, unlike many other salmonids, mountain whitefish rapidly deteriorate in health when relocated from their habitat to hatchery or laboratory conditions. The mobile lab facilitates rapid measurements on wild-captured fish maintained in their habitat water and returned to their habitat within 24 hours, thus minimizing the confounding

effects of stress and acclimation to laboratory conditions. We propose this streamside study the provide the first description of the temperature response of Madison River mountain whitefish aerobic capacity, and subsequent quantification of the population's temperature range for optimal performance. ***However, the objectives can easily be adapted for other salmonid fish species to accommodate funding priorities.***

This study will use swim tunnel respirometery techniques to quantify the response of aerobic capacity to water temperature for juvenile mountain whitefish in the Madison River. Topt is the range in water temperature where aerobic capacity of a fish is maximal. The aerobic capacity at a given water temperature is measured as aerobic scope; the observed difference or range between the maximum respiratory performance (i.e., maximum oxygen consumption) and resting respiratory performance (i.e., resting oxygen consumption) at that water temperature. The Tp points are the pejus water temperatures (pejus means 'getting worse'); therefore, the Tp points are the water temperatures where aerobic scope begins to decline relative to at Topt (i.e., Tp values set the width of the Topt window; Figure 1). Ultimately, as warming water temperature approaches Topt, the potential to increase maximum cardiorespiratory performance (oxygen consumption by exercising fish) fails to keep up with the required increase in respiratory rate in a resting fish (Farrell 2009). Tcrit is the water temperature where the aerobic scope is zero, and any activity (e.g., swimming or feeding) above and beyond the basic resting requirements is impossible. At water temperatures exceeding Tcrit, even basic metabolic requirements for survival are not met, making death imminent.

Figure 1. Schematic of resting and maximum oxygen consumption and aerobic scope. See text for details. Topt = optimum temperature, Tp = pejus temperatures, Tcrit = critical temperatures. The Topt window corresponds to the range of temperatures between the upper and lower Tp (Parsons 2011).

This study will provide an accurate understanding of the water temperature requirements of and influences on the study fish. These include: the optimal temperature range, the degrees of sublethal stress caused by water temperatures exceeding the optimal range, and temperatures that directly causing mortalities. This knowledge will inform managers in determination of NorthWestern pulse flow management and summer fishing impacts.

II. Objectives:

The optimal temperature range and upper critical temperature will be determined for juvenile mountain whitefish (or other priority species).

III. Methods:

The study is designed to measure a resting and a swimming (maximum) metabolic rate for individual fish at water
temperatures between 13 and 26 °C, an ecologically realistic water temperature range for Madison River salmonids. The mobile swim tunnel respirometery lab will be located beside the river and supplied with filtered river water. Wild fish will be captured from the river daily, via seine netting, for metabolic rate measurements in the mobile lab and return to the river within 24 hours. This approach has been applied successfully to described the response of aerobic scope to temperature for cold water fish species (rainbow trout) as a part of the FERC relicensing process for a Californian dam (e.g., Verhille et al. 2016).

IV. Schedule:

From January until May 2018, a mobile swim tunnel respirometery lab will be designed and constructed, then tested with hatchery-reared juvenile rainbow trout. In July and August 2018, the mobile lab will be located at the Madison River, north of Ennis, and metabolism measurements will be performed on locally-captured fish. The study will be repeated during July and August 2019 in order to ensure sufficient data for statistical determination of water temperature response curves of aerobic scope. In 2020 a report and scientific paper for peer-review publication, both summarizing the major findings of this study, will be prepared.

V. Personnel:

This work will be performed by a Montana State University graduate student and undergraduate technician under the supervision of Christine Verhille, the PI. In kind sustenance with fish captures will also be provided by Montana Fish, Wildlife, and Parks.

VI. Project budget:

Matching* Matching# Required

DIRECT LABOR $66,500 $20,500 0

Christine Verhille, Asst. Professor Salary $6,500 $6,500 0

M.Sc. Student salary $60,000 0 0

Undergraduate Technician 0 $14,000 0

CONTRACTED SERVICES $3000 0 $10,600

TRAVEL AND LIVING $3,000 $7,370 0

MATERIALS 0 0 $31,835

Supplies 0 0 $17,968

Total Equipment: 0 0 $13,867

Mobile laboratory trailer **0** 0 $8,000

PyroScience Firesting 4 **0** 0 $5,867

OTHER DIRECT EXPENSES $3505 $6,575 $15,000

Fringe benefits (37% faculty, 1% students)

$3005 $2,545 0

MS student tuition and fees 0 0 $15,000

Misc. direct costs $500 $4,000 0

Total direct costs $76,005 $34,415 $57,435

Modified Direct Costs 0 $34,415 $28,658

Modified Direct Overhead (10%) 0 $3,441.50 $2,856.80

Total estimated costs $76,005 $37,857 $60,292

* Matching funds coming from MSU new faculty start up package funds provided to Christine Verhille and in-kind support from Montana Fish Wildlife and Parks. These sources accrue no overhead charges. #Matching funds we are acquiring from other sources. Proposals are being submitted to the National and Madison Gallatin chapters of Trout Unlimited, Montana Trout Foundation, the Madison River Foundation, and the Greater Yellowstone Collation.

VII. Deliverables:

This study will determine the optimal temperature range and upper critical temperature of the study species. A report, summarizing the study and its findings and recommendations for management guidelines, will be provided at the end of the study.

A manuscript describing the study and results will be submitted for peer-review publication.

Success of this project will be continuously assessed during the streamside study and at the end of the study.

During the study, rigorous data quality control checks will be continuously applied. These involve video recording of fish during metabolic rate measurements to ensure irregular behavior does not produce misleading measurement; daily check of sensitive equipment for precise and accurate readings; continuous preliminary analysis of collected data to ensure findings are realistic. At the end of the study, success will be assessed based on the confidence of optimal temperature range and upper critical temperature estimates determined through statistical analyses.

VIII. Cultural Resources:

Not applicable

IX. Water Rights:

This study involves no modification of wetlands.

Literature Cited

Farrell, A.P., Commentary – Environmental, antecedents and climate change: lessons from the study of temperature physiology and river migration of salmonids. The Journal of Experimental Biology 212, 3771-3780 Published by The Company of Biologists 2009 doi:10.1242/jeb.023671. Available online at: http://jeb.biologists.org/content/212/23/3771.full.pdf

Parsons, E.J.E. 2011. Cardiorespiratory physiology and temperature tolerance among populations of sockeye salmon (*Oncorhynchus nerka*). A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Faculty of graduate studies (Zoology) The University of British Columbia (Vancouver) August 2011.

Sage, Jeremy L. 2016. "Economic Contributions of the Yellowstone River to Park County, Montana". Institute for Tourism and Recreation Research Publications. Paper 346. http://scholarworks.umt.edu/itrr_pubs/346

Verhille, C. E., English, K. K., Cocherell, D. E., Farrell, A. P., & Fangue, N. A. (2016). High thermal tolerance of a rainbow trout population near its southern range limit suggests local thermal adjustment. *Conservation Physiology*, *4*, 1–12. https://doi.org/10.1093/conphys/cow057