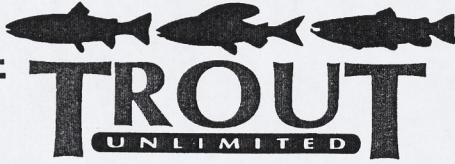


MONTANA



Main Office

P.O. Box 7186

Missoula, MT 59807

(406) 543-0054

19 February, 2003

Dick Vincent
Executive Director
Montana Trout Foundation
P.O. Box 3165
Bozeman, MT 59715

Dear Dick:

Enclosed are six copies of our application and proposal to the Montana Trout Foundation to help fund our Streamflow Enhancement Program in 2003. Because we are in the fifth year of below-average precipitation and streamflows, we're stepping up this program significantly this year. We are also focusing on some priority streams that have outstanding fisheries and which have been hardest hit by low flows, including the Smith, Jefferson, Big Hole, upper Clark Fork and Bitterroot.

John Wilson and me, in collaboration with Bruce Rehwinkel of our Jefferson River Project as well as attorneys Laura Ziemer and Stan Bradshaw of national TU's Western Water Project, will all be spending more time on flow-related initiatives this year. Denny Workman is also on the team as a consultant for our Warm Springs/Upper Clark Fork work. His involvement is paying off in spades. We will have more water in Warm Springs Creek and the upper Clark Fork, and some of the credit goes to Denny's work with us last season.

I sincerely hope the Trout Foundation will continue its long-standing support of this project this year. We value the partnership tremendously.

In early April I'll be sending a final report on the 2002 project and grant award.

Best,

Bruce Farling
Executive Director

MONTANA TROUT FOUNDATION
GRANT APPLICATION FORM

1. Individual(s) or organization presenting proposal MONTANA Council of
TROUT Unlimited
2. Project title 2003 STREAMFLOW ENHANCEMENT PROJECT
3. Project director BRUCE FARLING
Address Box 7186 MISSOULA, MT 59807 Phone 406-543-0054
4. MTF funds requested \$ _____ Local Cash \$ _____ In-Kind \$ _____
5. Proposed dates of project APRIL 2003 - APRIL 2004
6. Project planners and/or steering committee:
- | | |
|--|---|
| <u>JOHN WILSON, CONSERVATION DIRECTOR</u>
Name/occupation | <u>DENNIS WORKMAN, FISHERY BIOLOGIST</u>
Name/occupation |
| <u>LARA ZIEMER, ATTORNEY</u>
Name/occupation | _____
Name/occupation |
7. Experts in the field(s) of the project who have helped plan it:
- | | |
|--------------------------------|--|
| <u>STAN BRADSHAW</u>
Name | <u>ATTORNEY, TROUT UNLIMITED WESTERN WATER PROJECT</u>
Professional affiliation |
| <u>BRUCE REHWINKEL</u>
Name | <u>FISHERIES BIOLOGIST, JEFFERSON RIVER PROJECT</u>
Professional affiliation |
8. **Narrative of proposal and abstract:** On a separate sheet(s), typed, double-space, describe your project, its methodology or special features, its objectives, and the manner in which they will be met. Also on a separate sheet, provide a one-paragraph abstract of your proposal.
9. **Evaluation:** Include in your proposal narrative the specific ways that you will assess the results of your project. Your evaluative procedure is a critical section of the application; if funded, a significant portion (30%) of the funding will be withheld until MTF has received your concluding report, budget statement, evaluation, and a one-paragraph abstract of the work done. (See Item #2 of the AGREEMENT in Proposed Budget.)
10. Whenever appropriate and possible, you should include copies of *curriculum vitae* (especially one- or two-person projects) to strengthen your proposal and to facilitate judgments of the competence(s) being brought to the project.
11. **SIX** copies of your complete proposal must be submitted. MTF cannot review proposals which do not meet this requirement. Whether or not you include the original ("ribbon copy") is optional. Send all copies to Chair, Grants and Awards Committee, Montana Trout Foundation, P.O. Box 337 Bozeman, MT 59711.

AGREEMENT: It is understood that any funds granted as a result of this request are subject to the following conditions:

1. The funds granted your proposal are to be used only for the purposes set forth therein.
2. Thirty percent of this grant will be withheld until you have submitted 1) a concluding report of expenditures and remainders (if any), 2) a detailed evaluation of the project, and 3) a one-paragraph abstract of the evaluation. The concluding report, evaluation, and abstract must be submitted within 30 days of the completion of the work proposed in your application.
3. All publications or news releases relevant to this project must include appropriate acknowledgment of MTF funding.
4. MTF reserves, and you do hereby grant to MTF, the right to copy, reprint, reproduce, publish, republish, disseminate and to otherwise make use of all reports, studies, data findings, conclusions, recommendations, and all other written, graphic or pictorial material resulting from your project whether or not copyrighted, published, or otherwise protected under a proprietary claim by you or your designee; provided, that if such work be claimed or protected under such proprietary protection, then MTF agrees to provide a disclosure to that effect along with a statement that the work is being used with the permission of its author.
5. You shall pay, indemnify and forever hold MTF harmless from any liability arising out of the contract work, including, but not limited to, any claim arising out of libel, slander or copyright, patent, trademark, trade name or other proprietary infringement.

Brian Farley Date 2/19/03
Project Director (signature)

Date _____
Person responsible for financial records/reports, if other than Project Director (signature)

Abstract

The Year 2003 Streamflow Enhancement Program of the Montana Council of Trout Unlimited (Montana TU) combines research, education, advocacy and monitoring to ensure the state's high-quality coldwater streams and their key tributaries have adequate and consistent flows for maintaining robust native and wild trout populations, meeting water quality objectives necessary for maintaining outstanding trout fisheries, and satisfying angler demand for trout fishing experiences that are unmatched in the United States. During 2003, Montana TU will: 1.) Monitor and influence the deliberations of the Montana Drought Advisory Task Force; 2.) Continue working with water users in the Jefferson River drainage to implement water conservation strategies requiring water measurement and increased water conveyance efficiency; 3.) Continue the next phase of our effort to protect instream flows in the Smith River by challenging 14 applications for new groundwater permits in the alluvial aquifer that recharges the river; 4.) Contribute to a collaborative project with the Bitterroot Watershed Partnership to assess irrigation structure barriers and entrainment of fish in ditches in 4-6 key tributaries of the Bitterroot River; 5.) Work with national TU staff and Montana FWP in developing a proposal that extends the life of the contract for 10,000 acre-feet of stored water used for instream flows in the Bitterroot River; 6.) Help develop new short-term and long-term solutions – including possible water transfers and conservation projects – to address chronic dewatering in the key grayling stretches of the Big Hole River; and 7.) Implement and improve on the second year of the novel water management agreement with Arco wherein Montana TU manages stored water from the Silver Lake system in Warm Springs Creek drainage in the upper Clark Fork drainage. Montana TU is asking the Montana Trout Foundation for \$5,700 that when leveraged with other sources will help fund the project's total \$63,200 budget. Montana TU requests no money for salaries from the Foundation.

**PROPOSAL TO FUND THE MONTANA TROUT UNLIMITED
2003 STREAMFLOW ENHANCEMENT PROGRAM**

Submitted to

MONTANA TROUT FOUNDATION

by

MONTANA COUNCIL OF TROUT UNLIMITED

Bruce Farling, executive director

P.O. Box 7186

Missoula, Montana 59807

406/543-0054

montrout@montana.com

FEBRUARY 2003

I. Introduction

The Year 2003 Streamflow Enhancement Program of the Montana Council of Trout Unlimited (Montana TU) combines research, education, advocacy and monitoring to ensure the state's high-quality coldwater streams and their key tributaries have adequate and consistent flows for:

- 1.) Maintaining diverse native and wild trout populations at or near biological carrying capacity;
- 2.) Meeting water quality objectives necessary for maintaining outstanding trout fisheries; and
- 3.) Satisfying angler demand for trout fishing experiences that are unmatched in the United States.

During 2003, Montana TU will focus strategically on key fisheries that have acute flow problems exacerbated by the fifth-straight year of below-average precipitation. These include the Bitterroot, Smith, Jefferson, Big Hole and upper Clark Fork Rivers. In addition, we will continue monitoring the Montana Drought Advisory Task Force and its activities, while attempting to influence policy, funding and measures that could be beneficial to wild trout.

Specifically, we will:

1. Monitor and influence the deliberations of the Montana Drought Advisory Task Force.
2. Continue working with water users in the Jefferson River drainage to implement water conservation strategies requiring water measurement and increased water conveyance efficiency. This includes implementing temporary ditch lining in the Jefferson and possibly the Creeklyn Canals, while working on a project to plug leaky sections of the Parrot Canal.
3. Continue the next phase of our effort to protect instream flows in the Smith River by challenging 14 applications for new groundwater permits in the alluvial aquifer that recharges the river.
4. Contribute to a collaborative project with the Bitterroot Watershed Partnership to assess irrigation structure barriers and entrainment of fish in ditches in 4-6 key tributaries of the Bitterroot River.

5. Work with national TU staff and Montana FWP in developing a proposal that extends the life of the contract for 10,000 acre-feet of stored water used for instream flows in the Bitterroot River.
6. Help develop new short-term and long-term solutions – including possible water transfers and conservation projects – to address chronic dewatering in the key grayling stretches of the Big Hole River.
7. Implement and improve on the second year of the novel water management agreement with Arco wherein Montana TU manages stored water from the Silver Lake system in Warm Springs Creek drainage in the upper Clark Fork drainage.

Montana TU is the main conservation group in Montana focusing on instream flow protection, voluntary drought plans and innovative water conservation projects that improve flows for the state's wild trout. Our 2003 priorities focus on reducing the impacts of five-years of below-average precipitation and river flows while taking advantage of new financial and policy tools aimed at instream flow protection. Many of these tools, including legal water transfer mechanisms, new federal funding, innovative technological advances in ditch lining and soil-moisture measurement, have been created or promoted by TU.

In addition, Montana TU along with its chapters and national TU partners will continue in 2003 to help improve creative drought planning in the Jefferson, Big Blackfoot and Big Hole drainages. Hydrological evaluations indicate these strategies resulted in minimum stream flows in 2000, 2001 and 2002 that weren't available in previous dry years. In 2003 we'll further expand our efforts to protect the only institutional instream flow protection we have in Montana, and that is the "Murphy Rights" on 12 of our Blue Ribbon Streams. Both the Smith and Big Blackfoot Rivers are Murphy Right streams.

II. Program Objectives and Methods

The 2003 Stream Enhancement Program includes these objectives and methods:

1. *Monitoring and influencing the deliberations of the Montana Drought Advisory Task Force.*

The task force, established by the legislature and chaired by the lieutenant governor, monitors snowpack, drought and runoff potential for the state. During dry years the task force identifies mitigation measures ostensibly aimed at reducing the adverse effects of low streamflows. Generally, trout receive short shrift by this group. However, Montana TU's efforts to highlight the importance of fishery protection in recent low-water years (such as 1994, 1998, 2000, 2001 and 2002) has led to increased attention to measures that have improved survival for aquatic communities. For example, the Big Hole Watershed group's creation of a voluntary drought plan resulted from Montana TU's efforts in 1994 to focus attention on dewatering in key fisheries. Our prodding also forced creation of an action committee for drought years, and the state staff assigned to it have identified funding sources for short-term water conservation measures. Montana's Future Fishery Improvement Program, for example, now includes a short-term grant cycle that makes dollars available in early spring during drought years for water conservation measures benefiting wild fish. We intend on monitoring the committee's activities this year, including attending some of its meetings.

2. Continue working with water users in the Jefferson River drainage to implement water conservation strategies using water measurement and increased water conveyance efficiency.

Montana TU is partnering with TU national on a multi-year project to improve the fishery of the Jefferson River. We originally identified nearly 20 separate water conservation or habitat restoration projects that we could implement and which could potentially lead to a measurable improvement in the Jefferson's fishery. We continue adding and subtracting from that list. In 2002, we invested in several pilot projects that increase the efficiency of irrigation water conveyance in the valley. This included a pilot project that applied a polymer-based temporary ditch sealant to 22 miles of two of the four main canals in the valley. Unfortunately, a Montana Dept. of Transportation project interfered with 11 miles of the Creeklyn Canal portion of the project. Still, we estimate through Aquarod measurements and various discharge calculations that the sealant application on the remaining 11 miles of the Jefferson Canal may have reduced ditch loss enough so that about 13 cfs was saved at the headgate. This represents about 25 percent of the target minimum survival flow in the Jefferson River at Waterloo. In 2003 flows never got below this minimal short-term survival flow, which is an improvement from pre-drought plan years such as 1988 when the river was dry at this point. In 2003, we plan on applying the sealant to about 25 miles of two canals. We will

measure flows at different points in the canal to determine sealant efficiency, and irrigators will be asked to cooperate as they have in the past to reduce their diversions at the headgate as a tradeoff for increased conveyance efficiency.

In addition, we hope to begin a new project in 2003 to measure conveyance losses in the leakiest sections of the Parrot Canal, the largest ditch in the valley. We will also begin a study to determine the feasibility and alternatives for fixing these reaches. It's possible we may receive Natural Resources Conservation Service funding recently appropriated by Congress to help us expand the evaluation to find the most efficient and cost effective conservation measures.

3. Continue the next phase of our effort to protect instream flows in the Smith River by challenging 14 applications for new groundwater permits affecting the alluvial aquifer that recharges the main-stem river.

In late 2001, Montana DNRC received 14 applications for new groundwater use permits in the Smith River valley above Fort Logan. Several of the center pivot irrigation systems these permits will legitimize are already in use, a development we consider illegal. The Smith basin is included in the upper Missouri River basin closure for new surface water use permits. Because the new permit requests will use alluvial groundwater that recharges the Smith, we contend approval of the application is tantamount to continuing the dewatering of the Smith. This violates the basin closure. In 2002, we objected to one of the permits under DNRC water right administration. Moreover, we prodded the agency to prepare an analysis of the cumulative effect of the proposed well on the river. We also organized other downstream water right holders to join with us and FWP to resist DNRC issuing these permits. We hired a professional geohydrologist to assist us. He concluded unequivocally groundwater is immediately and directly connected to surface water, the test in the closure for prohibiting new groundwater permits. In 2003, we anticipate participating in contested case hearings on the permits, while ensuring DNRC's cumulative effects analysis is technically sound and not inordinately influenced by politics.

4. Contribute to a collaborative project with the Bitterroot Watershed Partnership to assess irrigation-structure barriers and entrainment of fish in ditches in 4-6 key tributaries of the Bitterroot River.

We are working with the Bitterroot Watershed Partnership, a collaborative of water users, agencies and conservationists, to evaluate limiting factors for fisheries in 16 Bitterroot River

tributaries. This evaluation will tackle up to six streams in 2003, and the focus will be on irrigation-related impacts. We are contributing funding and some in-kind labor to the project. This project compliments work we did in 2002 that helped steer more than \$900,000 of federal, state and private funds to projects that screen irrigation ditches and reduce fish-migration barriers at diversions on the main-stem of the Bitterroot and Skalkaho Creek. Moreover, data from this project will be used for a more ambitious watershed-scale restoration effort proposed for the Bitterroot.

5. Work with national TU legal staff and Montana FWP in developing a proposal that extends the life of the contract for 10,000 acre-feet of stored water used for instream flows in the Bitterroot River.

The FWP contract for 10,000 acre-feet of state water from Painted Rocks Reservoir in the upper Bitterroot drainage expires in 2004. This water is essential for maintaining streamflows down to Bell Crossing near Victor during low-flow months. We will assist legal staff from national TU's Western Water Project in its collaborative effort with Montana FWP to negotiate a long-term – and we hope, permanent – contract for this vital water.

6. Help develop new short-term and long-term solutions – including possible water transfers and conservation projects -- to address chronic dewatering in the key grayling stretches of the Big Hole River.

The voluntary drought plan in place during the last four years for the Big Hole River has proven essential to maintaining streamflows above historical low flows. Unfortunately, five straight years of drought demand that additional measures be undertaken. Despite maintaining survival flows in key reaches of the river in all but a few August and September days in the last few years, the population of fluvial arctic grayling in the river is dwindling. In 2003, we will work with our local chapter, the Big Hole watershed committee, FWP, local landowners and the U.S. Fish and Wildlife Service to identify and implement new short-term and long-term measures to improve flows. This includes possibly tweaking the existing voluntary drought plan to modify irrigation diversions between mid-May and mid-June in order to reduce the risk of drying up grayling spawning sites. Spring and fall population estimates from 2002 indicate that recruitment has been severely harmed in recent years. Part of the problem could be early season water diversions. We will also identify short-term water transfer opportunities – including the potential

of water lease payments – with more irrigators in the upper valley, and target options for outright purchase of four miles of key riparian habitat and associated water right along the chronically dewatered Wisdom-reach of the river. This reach includes critical spawning and rearing habitat for grayling.

7. Implement and improve on the novel water management agreement with Arco wherein Montana TU manages stored water from the Silver Lake system in the Warm Springs Creek drainage of the upper Clark Fork drainage.

Along with legal staff from national TU's Western Water Project, we were able to implement an agreement with Arco to help manage up to 8,000 acre-feet of stored water from the Silver Lake storage system in upper Warm Springs Creek. This arrangement helped us maintain healthier flows for trout as measured at the stream gauge near the creek's mouth. Warm Springs Creek is one of the upper Clark Fork's most important brown trout spawning tributaries. In addition, it is the last remaining core area for bull trout in the upper watershed. In 2003, we will refine the agreement and begin a more rigorous operational and monitoring program that allows us to better watchdog irrigation diversions along the stream, determine the biological effect of the flows, and improve our stewardship of the stored water throughout the year. This project complements nascent investigations we have begun on the upper Clark Fork River to improve streamflows from the mouth of Warm Springs Creek to Deer Lodge.

III. Program Evaluation Criteria

Montana TU's staff and executive committee will evaluate the program's success by ensuring that at least 70 percent of the above objectives are implemented in the 12-month period following notification the grant has been awarded.

Because of unanticipated circumstances (extreme low-water year, fish kills, emergencies at dams, etc.), it is possible Montana TU may have to modify its priorities during the funding period. Montana TU will contact the Foundation should it appear unforeseen circumstances will dictate a major departure from project goals.

Success of the program will be measured by comparing each objective's specific tasks to what occurs on the ground. Progress will be evaluated 12 months after grant approval. The

objectives will be incorporated into Montana TU's conservation planning, and success will be part of the annual evaluation of Montana TU's executive director.

Montana TU will provide the Montana Trout Foundation with a final report, detailing the success of each element at the conclusion of the grant period.

IV. Program Budget and Request to Montana Trout Foundation

The full 2003 program budget for our instream flow work – excluding that contributed as in-kind work from national TU's Western Water Project – in 2003 will be \$63,200. This also doesn't include national TU contributions to our Jefferson River Project or pass-through funds we receive from other sources for on-the-ground implementation. Montana TU is requesting \$5,700 from the Montana Trout Foundation. Montana TU, using three sources, will fund the balance:

1. Chapter donations – 4/2003 to 4/2004
2. Individual donors – 4/2003 to 4/2004
3. Sales of MTU license plates – 4/2003 to 4/2004

V. Project Staff and Qualifications

Bruce Farling, executive director of Montana TU, will coordinate the program. Farling, Montana TU's first executive director, is in his tenth year working for Montana TU. Prior to that, he was conservation director of the Clark Fork Coalition for seven years and a wilderness manager for the U.S. Forest Service for 9 years. Farling has a B.S. in environmental sciences from the University of Oregon, and completed work towards an M.A. in journalism at the University of Montana. Farling has extensive experience in water policy and instream flow issues in Montana, and has been appointed to a number of state and federal advisory groups affecting water and fishery policy.

Martina Baker, program assistant for Montana TU, will provide administrative staffing for the project. Baker has worked for Montana TU since October 2003. She has a B.A. in communications and five years experience working in project administration.

John Wilson is Montana TU's conservation director. Hired by Montana TU in the fall of 2000, Wilson formerly worked as manager of the Montana Land Reliance for 11 years. He previously worked as the Tourism Dept. Director in Montana's Dept. of Commerce. Wilson has a

B.S. in economics and an M.A. in environmental studies. Wilson's experience in land conservation, water rights and fundraising makes him ideally suited to work on this project.

Project advisors and partners include **Laura Ziemer**, a Bozeman attorney who is director of national TU's Montana Water Project, and **Stan Bradshaw**, of Helena, who was hired by the Montana Water Project in 2001. Ziemer is an accomplished attorney, specializing in water use and water quality law. Bradshaw, a former attorney with Montana FWP and DEQ, is past resource director of Montana TU. He is an architect of much of Montana's instream flow policy.

Professional fishery biologist **Bruce Rehwinkel** will work on the Jefferson River portion of our Stream Enhancement Program. Rehwinkel, formerly field biologist and program staff for Montana FWP, was hired by TU national in 2001 to coordinate the Jefferson watershed venture.

Professional project consultants include **Campbell Stringer**, a certified hydrogeologist with Maxim Technologies, and **Dennis Workman**, a consulting fishery biologist. Stringer has an M.S. in hydrogeology from the University of Montana and has been involved in hydrogeological investigations all over Montana. Workman is a retired Montana FWP fishery biologist whose last position was regional fishery manager in FWP Region II. He has a B.S and M.A in wildlife and fishery management from Montana State.

MONTANA TROUT FOUNDATION Proposed Budget and Agreement

(Itemize)* MTF Funds	Local/In-Kind Funds	Cash
Personal CONSULTING	2,000	4,500
LEGAL	500	5,000
SALARY		28,000
2. Travel	1,000	2,000
3. Equipment		
4. Materials SEAL-IT APPLICATION	2,000	3,500
5. Other PHONE	200	400
RENT		2,500
COPIES/POSTAGE		600
Totals	5,700	44,500

TOTAL PROJECT COST \$ 63,200

- MTF rates salaries a very low priority and will fund them only when extraordinary justification is presented.

Note: MTF funds may not be used to pay indirect costs. MTF has letters on file with Vice President for Research at Montana State University and the University of Montana which state MTF's position on indirect costs.

**MONTANA TROUT FOUNDATION
GRANT APPLICATION FORM**

1. Individual(s) or organization presenting proposal: Yaak Valley Forest Council
2. Project Title: Headwaters Restoration Partnership Project
3. Project Director: Robyn King, Executive Director, YVFC
4. MTF funds requested \$3500 Matching Funds _____
5. Proposed dates of project: June 1, 2003 through October 15, 2003

6. Project participants (primary):

Robyn King, Project Coordinator, YVFC

Kris Newgard, Hydrologist, USFS

Mike Hensler, Biologist, MT FWP

Wayne Hirst, Accountant, Cutthroat Trout Foundation

Josh Boyd, Biologist, USFS

7. Experts in the field(s) of the project who have helped plan it:

Please refer to item #6 above.

8. **Executive Summary:** Please attach an executive summary of your project which is complete enough so a reviewer can fully understand the project.
9. **Evaluation:** Include in your proposal narrative, the specific ways that you will assess the results of your project. Your evaluation procedure is a critical section of the application: if funded, a significant portion (30%) of the funding will be withheld until MTF has received your concluding report, budget statement, evaluation, and a one-paragraph abstract of the work done. (see item #2 of the AGREEMENT in Proposed Budget).
10. Whenever appropriate and possible, you should include copies of *curriculum vitae* (especially one- or two-person projects) to strengthen and to facilitate judgments of the competence(s) being brought to the project.
11. **SIX** copies of your complete proposal must be submitted. MTF cannot review proposals, which do not meet this requirement. Whether or not you include the original copy is optional. Send all copies to: E. Richard Vincent, Montana Trout Foundation, P.O. Box 3165, Bozeman, MT 59715.

EXECUTIVE SUMMARY

The Headwaters Restoration Partnership Project (HRPP) is a collaborative, multi-year rehabilitation/restoration project with an initial focus on improving sensitive fish habitat (i.e., redband and cutthroat trout) in the headwaters of the Yaak River, located in extreme northwest Montana. HRPP activities proposed for 2003-2004 include continued stream surveys to identify areas of concern (based on identified limiting factors impacting sensitive fish populations in the headwaters of the Yaak River), fish distribution surveys, genetic lab work associated with fish surveys, implementing at least twelve small-scale sediment reduction rehabilitation projects at sites identified through stream surveys conducted in 2001 and 2002, and implementing a large-scale native plant revegetation project on 4.2 miles of road that will be decommissioned by the US Forest Service in 2003.

Yaak Valley Forest Council
Yaak Headwaters Restoration Partnership Project

Yaak Valley Forest Council's Mission Statement: Created in 1997, Yaak Valley Forest Council is a grassroots community organization governed by a five-member board of directors in the northwest corner of Montana. Our mission is to protect the last remaining roadless cores in the Yaak Valley, approximately 175,000 acres in the northern tier of the Kootenai National Forest; to encourage and support the development and nurturing of a sustainable local economy that is in harmony with the natural environment; and to maintain and restore the valley's ecological integrity by conserving and improving habitat for populations of native species, including, but not limited to redband rainbow trout, westslope cutthroat trout, lynx, grizzly bears, wolves, as well as other sensitive species. YVFC is dedicated to cultivating and encouraging meaningful dialog between historically polarized groups within the valley, bringing these groups to the same table to find common ground on ecosystem-based forest management practices.

PROPOSAL NARRATIVE

The following is a description of YVFC's current, long-term fisheries habitat restoration program, the **Yaak Headwaters Restoration Partnership Project**:

Western Montana's only native rainbow trout is the Kootenai River redband, also referred to as inland redband rainbow trout. Its range and population has been reduced by habitat loss and competition from non-natives. Recent concern has arisen that the Kootenai River Basin redband trout population is at a high risk of extinction due to habitat fragmentation, stream habitat degradation and hybridization with non-native rainbow trout. The strongest population in Montana is in the Yaak headwaters of the North Fork, East Fork and Basin Creek. This genetically pure population is most secure in the unroaded portions of Basin Creek, which lie within the Mount Henry roadless area. However, stabilizing and increasing the population depends upon habitat restoration efforts in other headwater tributaries.

A 1999 Master's thesis by Clint Muhlfeld has identified the important habitat characteristics that influence the distribution and abundance of Kootenai River redband trout. The headwaters area includes the strongest population of genetically pure redband, which is protected from hybridization by a barrier falls near Lake Okaga on the East Fork of the Yaak River. Muhlfeld recommends immediate habitat restoration to stabilize this population stronghold while a broader conservation plan is developed. According to Muhlfeld, "...redband trout in Montana are in immediate need of research-based conservation and management."

Initiated by YVFC in the spring of 1999, with the professional assistance of Clint Muhlfeld (Species Specialist with Montana Fish, Wildlife and Parks, as well as Species of Special Concern Co-Chair for American Fisheries, Montana Chapter), the Yaak Headwaters Restoration Partnership Project focuses on fisheries restoration in the upper Yaak drainage. The resulting Headwaters Group was formed for the purpose of bringing

private parties and government agencies together to work collaboratively to improve fisheries habitat in the Yaak River basin. Headwaters Group partners include the U.S. Forest Service, Montana Fish, Wildlife and Parks, U.S. Fish and Wildlife Service, Yaak Valley Forest Council, Trout Unlimited, and the Cutthroat Trout Foundation, with YVFC acting as lead coordinator for communications, planning, and fundraising. A Memorandum of Understanding between participants has been finalized. Other groups and agencies involved on an informal basis are the Kootenai River Network and Natural Resources Conservation Service.

OBJECTIVES, ACTIVITIES, ANTICIPATED RESULTS, EVALUATION **And ASSOCIATED COSTS**

As discussed in the summary, the **objectives** of the project for 2003-2004 will be to continue and expand data collection within the project area by conducting stream and fish surveys, while addressing identified limiting factors through site-specific implementation projects (i.e., providing fish passage where defective culverts create barriers, reducing sediment load with bank stabilization and defective culvert replacement or removal, etc), and raising awareness of the project.

Objectives will be reached through the following **activities** (estimated costs follow activity descriptions):

- Continue **stream surveys** and data collection on seventy-five miles of stream (of the remaining 150 miles, which includes all of the US portion of the East Fork, West Fork, and North Fork of the Yaak River) to document problem sites associated with identified limiting factors affecting the focus species, *Oncorhynchus mykiss gairdneri*, the redband trout, as well as other native fish encountered, at an approximate cost of **\$7500**;
- Begin **fish distribution surveys** followed by **genetic lab work** to assist in the prioritization of future rehabilitation/restoration site implementation efforts, as well as identify areas where hybridization has occurred, and to identify hybridization trends when compared to genetic samples taken a decade ago. Distribution surveys will also show where other native fish such as westslope cutthroat, sculpins, and mountain whitefish occur. Finally, fish surveys will afford the Headwaters Group an idea where we may want to monitor fisheries long term with more intensive sampling and habitat measurements.

Distribution Surveys: USFS will provide a fisheries biologist to act as crew leader for the initial year of fish surveys, as well as electrofisher equipment; YVFC will hire a crew of two local residents to provide support to the leader, and in subsequent years will be qualified to carry out independent surveys of this type. Cost for training and state certification for these two crew persons is \$360; survey work and equipment is estimated at \$8280 (i.e., \$600 equipment, \$7680 actual surveys over an eight-week period, for a total of **\$8640**).

Genetic Sampling Lab Work: Estimated at **\$11,250**
(i.e., \$30/fish x 25 fish/site x 15 sites)

- **Site rehabilitation/restoration implementation** of several sites identified through previous year's stream surveys include:
 - **Solo Joe Cr.** (Road 6035C), tributary of East Fork, Yaak River—A 0.6 mile long stabilization project by a combination of waterbarring, outsloping, recontouring, and removing a culvert/reestablishing the stream channel, and revegetation at a cost of approximately **\$4000**.
 - **Solo Joe Cr.** (Road 6035), tributary of East Fork, Yaak River—Cutslope stabilization with rock project, at a cost of approximately **\$1000**.
 - **Blacktail Cr.** (Road 5821), tributary of East Fork, Yaak River—Buttressing and ditch rock, at a cost of approximately **\$5000**.
 - **Basin Creek** (Roads 14728, 14161 and 3379) large tributary of East Fork, Yaak River—Ecological restoration/revegetation of 4.2 miles of road that is scheduled to be recontoured by USFS in the summer of 2003 (Note: Federal funding has been secured by USFS for the actual recontouring portion of this project, but does not include native plant revegetation and other soil stabilization activity. For this unfunded portion of the project, costs are being researched and funding sought. Preliminary estimates suggest labor and materials of \$25,000. A detailed plan can begin in the spring when the site is accessible. Planning and implementation of this portion of the project is tentative and will not be included in the "Proposed Budget and Agreement" section of this proposal.
 - Miscellaneous native revegetation for bank stabilization at implementation sites, approximately **\$2700**.

- **Outreach and Publicity** opportunities include:
 - Creating a project brochure that will be distributed by three committed area fly fishing guides to their clients, which may also serve as a fundraising tool;
 - Creating a YVFC website highlighting the issues and activities related to this project;
 - Creating a slideshow focusing on the project area, methodologies being used, etc.
 - Incorporating portions of this project into YVFC's established outdoor education program.

Estimated Costs for Outreach and Publicity Activities Associated with this Request:

• Brochure and slideshow photography and formatting:	\$1000.00
• Brochure printing	\$ 850.00
• Website creation and one year maintenance	\$ 250.00
• Film and developing (for all listed above)	\$ 150.00
• Outdoor Education Program development and implementation	\$ 500.00

Total: **\$ 2750.00**

YVFC costs associated with project coordination and fundraising: **\$10,000.00**
(part time coordinator to organize all aspects of the project discussed
in this document and expenses for one year).

Preliminary Project Budget (totals from above): **\$52,840.00**

Note: This preliminary total does not include the rough estimate of \$25K for Basin Creek
native revegetation project discussed above.

Anticipated results include, but are not limited to the following:

- 1) On-the-ground habitat restoration (stream sediment reduction and restoring fish passage are two of the identified limiting conditions addressed), which will lead to stronger populations of redband rainbow trout as well as other native fish;
- 2) Re-establishing a self-sustaining forest system (referring to the native revegetation project on the 4.2 miles of road to be recontoured), while drastically reducing sediment load from the heavily degraded road bed targeted;
- 3) Providing data collection, monitoring and restoration-based training and local employment in a geographical area with an economy that has historically been extraction based.
- 4) Educational and volunteer opportunities for interested parties through an outdoor education program being coordinated by YVFC to address aspects of this project as well as other issues;
- 5) Model potential for other communities interested in collaboration toward the common goal of improving fisheries habitat and the associated benefits noted above.

Monitoring and Evaluation: In 2003 Quality Control services will be provided by a crew leader with two years experience with this type of stream surveys. The YVFC project coordinator will continue to oversee sediment source surveys, which provide the data that enables project participants to identify sources of sedimentation. This data, once collected and organized by YVFC, is reviewed by Montana Fish, Wildlife, and Parks, and the US Forest Service, and then entered into the agencies' databases. From here, Montana Fish, Wildlife and Parks, as well as the US Forest Service provides fisheries expertise to identify need and utility of proposed rehabilitation projects, as well as monitor and research the effects and appropriateness of fisheries projects in the Yaak River drainage.

Implementation projects are monitored for effectiveness of achieving the objectives specific to each item. Monitoring will consist of a technical review during and immediately after implementation, and each year for at least the following three years after implementation. Photos will be taken during implementation and on successive years. The Headwaters Group will maintain a monitoring file of projects implemented. Monitoring questions to be addressed include: Was the project implemented as designed? Was the design effective at meeting the objectives? Did the implementation of the project minimize the effects of the construction work to the stream and fisheries resource? Could project have been implemented more cost effectively? Is revegetation occurring successfully? Did the improvement function successfully during storm events and spring

runoff? The answers to these questions will be used to shape the design and implementation of future projects. For example, in 2001 the group reviewed our first culvert replacement and determined there were several changes we would make on future installations that would shorten the time it would take to replace the culvert, reducing both costs and resource impacts. In addition, the Headwaters Group is currently looking in to additional statistical and sampling possibilities available to monitor implemented activities.

Project Accomplishments include:

- Throughout 2001 and 2002, YVFC completed sediment source stream surveys on 125 miles of stream in the Upper Yaak River Drainage, from which many problem areas have been identified for future rehabilitation implementation projects that will begin in summer of 2003 now that funding has been secured;
- One culvert replacement completed;
- One project on private property completed that involved providing fish passage where a diversion dam built decades ago fragmented habitat;
- In-depth data has been collected in the project area and is being utilized by numerous groups and agencies;
- YVFC, acting as the lead coordinating organization in the Headwaters Group, has employed numerous local residents during stream survey work and has supported the establishment of a local native plant nursery and restoration company;
- Collaboration and trust between partners has greatly increased, affording all involved increasingly proactive relationships when other resource-based issues are addressed outside of this project focus;
- Awareness of issues regarding sensitive fish species and their habitat is increasing, generating increased support for the project on a local as well as regional level;

Support: Local communities, including the Yaak community, have shown support of a community-based conservation strategy, which potentially could preclude the need for federal listing of the redband. There is strong interest within state and federal agencies and the conservation community to restore native redband habitat in the headwaters area, as demonstrated by the project's partners and funders. Community support for this and other associated projects is strong as well (i.e., YVFC membership is now at sixty-five residents or land owners in this valley of an estimated 150 year-round residents).

Request: YVFC requests **\$3,500** from **Montana Trout Foundation**. If approved, this funding and associated matching amounts with other grantors will be utilized toward stream and fish surveys, as well as field implementation work described in this proposal, with a minor percentage (not to exceed 15%) being utilized for outreach, publicity, and a part time project coordinator and associated direct costs.

CURRICULUM VITAE

Robyn King (Yaak Valley Forest Council) is a seventeen year resident of the Yaak Valley and one of the founders of YVFC. As Executive Director, Robyn manages the group's bookkeeping and serves also as Project Coordinator for the Headwaters Project, coordinating communications and logistics for the group's participants. Robyn's office management consulting firm, Heart River Support Systems, has been in operation for 11 years.

Kris Newgard (US Forest Service) has a B.S. in Civil Engineering from the University of Washington. She has eight years experience as Civil Engineer with Seattle Water Department and U.S. Forest Service, as well as nine years experience as Hydrologist with the U.S. Forest Service. For the last several years Kris' work has focused on reducing impacts of roads on water quality and fisheries. This work has included the assessment, design, and implementation of road decommissioning projects, road-stabilizing projects, and application of best management practices to long-term roads. Specific projects have included recontouring road templates, removing culverts, reconstructing stream channels, stabilizing slide areas, replacing undersized culverts, improving road drainage, and reducing sediment from road surfaces and ditches. Other primary work experience includes conducting watershed condition inventories, performing watershed analyses, and assessing soil and water quality impacts of proposed land management projects.

Mike Hensler (Montana Fish, Wildlife and Parks) earned a B.A. in Biology from Whitman College, a B.S. in Fish and Wildlife Management from Montana State University, and an M.S. in Fish and Wildlife Management from Montana State University. He has worked for the past fourteen years with Montana Fish, Wildlife and Parks as a Fisheries Management Biologist.

Josh Boyd (US Forest Service) earned a B.S. in Fish and Wildlife Management, with an emphasis in fisheries, from the University of Montana, and currently has nine years as a fisheries and hydrologic technician.

Support anticipated for 2003-2004 includes, but is not limited to the following:

Donor:	Amount:
<u>Trout Unlimited, Flathead Chapter</u>	<u>\$1000.00 (pending)</u>
<u>Montana Trout Foundation</u>	<u>\$3500.00 (deadline for proposal is Feb. 2003)</u>
<u>Weyerhaeuser Family Foundation</u>	<u>\$15,000 (deadline for proposal is spring 2003)</u>
<u>Trout and Salmon Foundation</u>	<u>\$5000.00 (deadline for proposal is summer 2003)</u>
<u>American Fisheries Society, MT Chapter</u>	<u>\$2000.00 (deadline for proposals is summer 2003)</u>
<u>National Forest Foundation</u>	<u>\$20,000.00 (inquiry submitted and is pending)</u>

Support received in 2002 includes the following sources and amounts:

Donor::	Amount
<u>Montana Trout Foundation</u>	<u>\$ 2500.00</u>
<u>Liz Claiborne-Art Ortenberg Foundaiton</u>	<u>\$12,500.00</u>
<u>Trout and Salmon Foundation</u>	<u>\$ 5000.00</u>
<u>American Fisheries Society, MT Chapter</u>	<u>\$ 2000.00</u>
<u>National Forest Foundation</u>	<u>\$15,000.00</u>

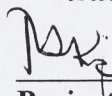
MONTANA TROUT FOUNDATION
Proposed Budget and Agreement

(Itemize)*	MTF Funds	Matching Funds
1. Personnel Project Coordinator	\$210	\$9790
2. Travel		
3. Equipment Implementation Projects (Based on USFS estimates. Note: Figures include materials; at this time no further breakdown is avail.)	\$ 975	\$11,725
4. Materials Included in section 3		
5. Other		
Genetic Lab Work	\$0	\$11,250
Outreach/Publicity	\$ 315	\$2435
Stream Surveys	\$1000	\$6500
Fish Surveys (including equipment)	\$1000	\$7640
Totals	\$3500	\$49,340

TOTAL PROJECT COST \$52,840

AGREEMENT: It is understood that any funds granted as a result of this request are subject to the following conditions:

1. The funds granted your proposal are to be used only for the purpose set forth therein.
2. Thirty percent of this grant will be withheld until you have submitted 1) a concluding report of expenditures and remainders (if any), (2) a detailed evaluation of the project, and 3) a one-paragraph abstract of the evaluation. The concluding report, evaluation, and abstract must be submitted within 30 days of the completion of the work proposed in your application.
3. All publications or news releases relevant to this project must include appropriate acknowledgement of MTF funding.
4. MTF reserves, and you do hereby grant to MTF, the right to copy, reprint, reproduce, publish, republish, disseminate and to otherwise make use of all reports, studies, data findings, conclusions, recommendations, and all other written, graphic, or pictorial material resulting from your project whether or not copyrighted, published, or otherwise protected under a proprietary claim by you or your designee; provided, that if such work be claimed or protected under such proprietary protection, then MTF agrees to provide a disclosure to that effect along with a statement that the work is being used with the permission of its author.
5. You shall pay, indemnify and forever hold MTF harmless from any liability arising out of the contract work, including, but not limited to, any claim arising out of libel, slander or copyright, patent, trademark, trade name or other proprietary infringement.

 - Robyn King Date 2/17/03
 Project Director (signature)

SAME AS ABOVE Date _____
 Person responsible for financial records/reports, if other than Project Director (signature)

**MONTANA TROUT FOUNDATION
GRANT APPLICATION FORM**

1. Individual(s) or organization presenting proposal. Buddy Drake, Drake & Associates
2. Project Title. Sun Ranch Westslope Broodstock Program
3. Project Director. Buddy Drake & Pat Clancey, MFWP
4. MTF funds requested \$5,000 Matching Funds \$18,000
5. Proposed dates of project May, 2003 through October 2003

6. Project participants:

Buddy Drake, Aquatic Biologist
Name/occupation

Pat Clancey, MFWP
Name/ occupation

Scott Barndt, USFS
Name/occupation

Todd Koel, YNP
Name/occupation

7. Experts in the field(s) of the project who have helped plan it:

8.

Ken McDonald, MFWP
Name

Special Projects Coordinator
Professional affiliation

Bob Snyder, MFWP
Name

Native Species Program Coordinator
Professional affiliation

Brad Shepard, MFWP
Name

Cutthroat Restoration Coordinator
Professional affiliation

Dr. Robb Leary,
Name

Univeristy of Motana Fish Genetics Laboratory
Professional affiliation

9. **Executive Summary:** Please attach an executive summary of your project which is complete enough so a reviewer can fully understand the project.

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. This project is a combined effort between the Sun Ranch, MT Fish, Wildlife & Parks, and the U.S. Forest Service..

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 a new status review commenced on September 3, 2002 (Federal Register 2002).

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).

Sun Ranch and FWP are proposing to initiate 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.

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 will be identified as potential sources of eggs. In order to maximize genetic diversity, several drainages will be used as donor sources and a minimum effective population size of 50 (25 unique matings) will be used. Fish from donor streams will be tested for disease status and WCTs will be verified for genetic purity by electrophoresis. Fish throughout the spawning season will be collected and spawned. The fertilized eggs will be taken to the Sun Ranch Hatchery where they will be incubated, eyed and hatched. 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.

To date, the Sun Ranch, LLC has contributed over \$500,000.00 to this program. The costs are directly related to the construction of a three-acre brood pond, and a small hatchery. Additionally, in compliance with the MOU between Montana FWP and the Sun Ranch, the ranch has retained and paid the costs of a project coordinator. We are hoping that these costs will be viewed as in-kind contributions.

In October, 2002, 589 pure westslope cutthroat trout were transferred from the Sun Ranch hatchery to the brood pond. These individuals represent 29 parents of the required minimum effective population size of 50 (25 unique matings).

Activities funded by this grant will included gamete collections, disease sampling, chemical treatment of eggs before transport, transportation of eggs to hatchery, hatchery assistance, equipment maintenance, brood pond testing and monitoring, fry transfer to ponds, and administrative coordination between the Sun Ranch and Montana Fish, Wildlife & Parks.

Our greatest need is for assistance to help cover egg transportation costs. Eggs must be transported in a very timely manner from donor stream collection sites to the Sun Ranch hatchery. Round trip mileage in many instances is over 200 miles.

10. **Evaluation: Include in your proposal narrative, the specific ways that you will assess the results of your project. Your evaluation procedure is a critical section of the application: if funded, a significant portion (30%) of the funding will be withheld until MTF has received your concluding report, budget statement, evaluation, and a one-paragraph abstract of the work done. (see item #2 of the AGREEMENT in Proposed Budget).**

We hope to complete the minimum effective parental population size with this year's sampling. We need to acquire eggs from an additional 21 adults. However, any additional fry added to the broodstock gene pool would be considered a success for the year. Fry numbers, photos, and parental contribution numbers can all be supplied to the Foundation within the required timeframe.

11. **Whenever appropriate and possible, you should include copies of *curriculum vitae* (especially one- or two-person projects) to strengthen and to facilitate judgments of the competence(s) being brought to the project.**
12. **SIX copies of your complete proposal must be submitted. MTF cannot review proposals, which do not meet this requirement. Whether or not you include the original copy is optional. Send all copies to: E. Richard Vincent, Montana Trout Foundation, P.O. Box 3165, Bozeman, MT 59715.**

MONTANA TROUT FOUNDATION
Proposed Budget and Agreement

(Itemize)*	MTF Funds	Matching Funds
Personnel		
Operational Costs		\$3,000.00 MT AFS Chapter \$2,000.00 Fed. of Fly Fishers \$3,000.00 MFWP
2. Travel	\$2,000.00	
3. Equipment	\$2000.00	
4. Materials	\$1,000.00	\$2,000.00 PPL TAC
5. Other Hatchery Operations		\$8,000.00 PPL TAC
Totals	\$5,000.00 (requested)	\$18,000.00

TOTAL PROJECT COST \$55,000.00

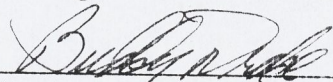
- MTF rates salaries a very low priority and will fund them only when extraordinary justification is presented.

Note: MTF funds may not be used to pay indirect costs. MTF has letters on file with Vice President for Research at Montana State University and the University of Montana which state MTF's position on indirect costs.

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3. All publications or news releases relevant to this project must include appropriate acknowledgement of MTF funding.
4. MTF reserves, and you do hereby grant to MTF, the right to copy, reprint, reproduce, publish, republish, disseminate and to otherwise make use of all reports, studies, data findings, conclusions, recommendations, and all other written, graphic, or pictorial material resulting from your project whether or not copyrighted, published, or otherwise protected under a proprietary claim by you or your designee; provided, that if such work be claimed or protected under such proprietary protection, then MTF agrees to provide a disclosure to that effect along with a statement that the work is being used with the permission of its author.
5. You shall pay, indemnify and forever hold MTF harmless from any liability arising out of the contract work, including, but not limited to, any claim arising out of libel, slander or copyright, patent, trademark, trade name or other proprietary infringement.


_____ Date 2/19/03
Project Director (signature)

_____ Date _____
Person responsible for financial records/reports, if other than Project Director
(signature)

MONTANA TROUT FOUNDATION
GRANT APPLICATION FORM

1. Individual(s) or organization presenting proposal. David Moser, MFWP

2. Project Title. South Fork Judith River Fish Barrier

3. Project Director. David Moser

4. MTF funds requested \$1,500 Matching Funds

5. Proposed dates of project Fall 2003-Summer 2004

6. Project participants:

Mike Enk / USFS Biologist
Name/occupation

Name/ occupation

Anne Tews / MFWP Biologist
Name/occupation

Name/occupation

7. Experts in the field(s) of the project who have helped plan it:

Mike Rotar

INTER-FLUVE, INC

Name

Professional affiliation

Executive Summary:

The project will involve building a fish barrier immediately downstream of Bluff Mountain Creek (see attached photographs) on the South Fork Judith River (Lewis and Clark National Forest) to prevent impacts on westslope cutthroat trout (*Oncorhynchus clarki lewisi*) (WCT) from non-native rainbow (*O. mykiss*) and brook trout (*Salvelinus fontinalis*). The barrier will protect approximately 25 miles of stream and at least seven nearly pure resident cutthroat populations from further genetic introgression and competition with non-native fishes. Additionally, the project will allow fluvial forms of WCT above the barrier the opportunity to freely move between tributaries and preserve the ability for recolonization of resident fish in the event of local extinctions.

The greatest threat to the continued persistence of native WCT is hybridization with rainbow trout and competition with brook trout. The South Fork Judith River (SF) has about seven tributary populations of slightly hybridized (94 – 99.7% pure) WCT. These WCT are primarily hybridized with rainbows, although some are slightly hybridized with Yellowstone cutthroat trout (*O. clarki bouvieri*). Continued hybridization with rainbows threatens the existence of WCT in the SF. Reaches of stream just three miles downstream from Bluff Mountain Creek (the proposed project site) contain rainbow trout with very few WCT present. Brook trout are currently rare (but present) in the SF. This project will prevent further

hybridization of WCT in about 25 miles of the upper SF drainage through construction of a barrier to fish passage near Bluff Mountain Creek on the Lewis and Clark National Forest. After the barrier is constructed, rainbow trout and hybridized WCT (estimated to be < 90% pure) in the SF will be removed by electrofishing, the mainstem will then naturally recolonize from purer tributary populations of WCT.

WCT currently occupy less than 5% of their historic habitat in the Upper Missouri drainage (Shepard et. al 1997). Hybridization and competition with non-native fish has created a situation where most remaining pure populations are limited to small (< 3mile) isolated stretches of stream in the headwaters of major drainages. Barriers protect the vast majority of these populations from downstream non-native trout. This isolation does not allow flow of genes between drainages and increases the threat of extinction from natural and human induced catastrophic events (e.g. fire, drought).

The Memorandum of Understanding and Conservation Agreement for WCT (MFWP 1999) outlined the need to maintain at least four interconnected (greater than 50 miles of total habitat) populations of WCT within the Missouri River drainage. Opportunities for protection and restoration of large population aggregates are extremely limited in northcentral Montana because of challenges of controlling or removing firmly established non-native trout and concerns of private landowners related to the potential listing of WCT under the Endangered Species Act. The SF provides a unique opportunity because: 1) the entire SF watershed is on National Forest Land and can be managed by the USFS and MFWP, 2) habitat upstream of the barrier is for the most part good to excellent and will be further protected by the Judith Restoration Project headed by the USFS, 3) the SF contains some of the best remaining WCT habitat in northcentral Montana, 4) this proposed project follows the implementation schedule proposed in the MFWP Memorandum of Understanding and Conservation Agreement (MFWP 1999). That document indicates work to establish a connected population in the "Southern Tributaries" will begin in 2001. The Judith is located in that area and no other sites have been proposed. The Memorandum focuses on 100% pure WCT, but there does not appear to be an area of pure WCT in the southern tributaries where it is currently biologically or socially feasible to connect even 10 – 15 miles of habitat.

The barrier will be constructed of concrete and local natural materials (see Concept Level Design; Interfluve 2002 for details). At low flows, the structure will prevent fish passage with height as the primary barrier. At high flows, the structure will restrict passage with velocity as a barrier. The size of the drainage basin, the potential for high flows and the presence of private landowners downstream of the project site required development of a more complex and sturdy barrier than typical of previous smaller scale projects (see Conceptual Design for details). During the USGS period of record from 1959 – 1979 peak flow exceeded 1000 cfs three times with a maximum flow of 1950 cfs in 1979. The site is accessible by a low standard established road. Project duration will be approximately 2 - 4 weeks. The barrier will be constructed to be 100% effective up to a 50 year flow event and be able to survive a 100-year event. Pre-construction work will involve all necessary MEPA/NEPA compliance and permitting.

Reporting: After project completion a report will be made to all funding entities describing the work done, successes, and failures. The project will also be evaluated and results presented in annual reports drafted by a MFWP biologist. Annual reports will include information on fish population biomass, abundance, and though less frequently, genetics of upstream WCT populations.

MONTANA TROUT FOUNDATION
Proposed Budget and Agreement

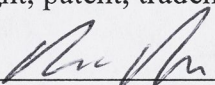
(Itemize)*	MTF Funds	Matching Funds
Mobilization and Demobilization		\$2,500
Dewatering - Diversion Structure/Pump/Diversion Pipe		\$7,500
Construction Sediment and Erosion Control		\$1,000
Site Clearing and Preparation/Equipment Access		\$800
Fish Barrier Const. (incl. upstream & downstream bed treatments)		\$24,000
Adjacent Streambank Stabilization		\$6,000
Site Restoration and Clean-up		\$1,500
Inter-Fluve Const. Oversight (two 2-day trips + travel, lodging, per diem)		\$4,800
Design, plans, specifications and permitting	1,500	8,715 (1,500 from AFS)
Totals	1,500	\$56,815.00

TOTAL PROJECT COST _____ * \$58,315 _____

* A total of \$49,315 was obtained from Future Fisheries Improvement Program (FFIP) for the project (pending commission approval); \$6,000 from MFWP as matching funds. In addition, the Montana AFS Resource Action Fund awarded \$1,500 to the project. Several items were not funded by the FFIP, including permitting costs and a decreased amount for designs, plans and specifications. This \$1,500 dollars will be used along with the \$1,500 from the AFS to pay additional fees related to project design and/or permitting

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4. MTF reserves, and you do hereby grant to MTF, the right to copy, reprint, reproduce, publish, republish, disseminate and to otherwise make use of all reports, studies, data findings, conclusions, recommendations, and all other written, graphic, or pictorial material resulting from your project whether or not copyrighted, published, or otherwise protected under a proprietary claim by you or your designee; provided, that if such work be claimed or protected under such proprietary protection, then MTF agrees to provide a disclosure to that effect along with a statement that the work is being used with the permission of its author.
5. You shall pay, indemnify and forever hold MTF harmless from any liability arising out of the contract work, including, but not limited to, any claim arising out of libel, slander or copyright, patent, trademark, trade name or other proprietary infringement.



Project Director (signature) Date 2/18/03

Date _____
Person responsible for financial records/reports, if other than Project Director (signature)

Literature Cited

- Tews, A., M. Enk, S. Leathe, W. Hill, S. Dalbey and G. Liknes. 2000. Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) in northcentral Montana: status and restoration strategies. Montana Fish Wildlife & Parks and Lewis and Clark National Forest.
- Shepard, B. B., B. Sanborn, L. Ulmer and D.C. Lee. 1997. Status and risk of extinction for westslope cutthroat trout in the upper Missouri River Basin. North American Journal of Fisheries Management 17:1158-1172.



December 13, 2002

Mr. David Moser
Cooperative Cutthroat Restoration Biologist
Lewis and Clark National Forest
Box 869
Great Falls, MT 59403

RE: Revisions to Conceptual Design for South Fork Judith River Fish Barrier

Dear David:

The following materials are being provided in response to comments from yourself, as well as other reviewers, on a conceptual fish barrier design prepared by Inter-Fluve for application on the South Fork Judith River (South Fork). The conceptual design was submitted in a Technical Memorandum dated November 11, 2002. Specifically, two issues are addressed herein: 1) the hydrology developed for conceptual design, and 2) fish barrier configuration and drop height.

Hydrology

Analysis of Historic Gage Data

There is currently no operating stream guage on the South Fork in the vicinity of the proposed barrier location. However, the USGS did operate a stream gage (#06109800) for 21 years (1959-1979) at a site located about one mile downstream of the proposed barrier. During this period of record, the maximum *instantaneous* flow recorded was 1,950 cfs on June 19, 1979. There were two other instantaneous peak flows that exceeded 1,000 cfs during the period of record (1,340 cfs on May 30, 1967 and 1,290 cfs on June 8, 1964). The maximum *daily mean* flow during the period of record was 953 cfs on June 19, 1979.

Flood magnitudes for selected recurrence intervals were determined for this gaging station in a report prepared by the USGS titled "Analysis of the Magnitude and Frequency of Floods and the Peak-Flow Gaging Network in Montana" (Water Resources Investigation Report 92-4048) by R.J. Omang, 1992. A log-Pearson Type III probability distribution was utilized to develop a flood-frequency curve in accordance with guidelines established by the Interagency Advisory Committee on Water Data (1982). The following values were reported (Omang, p.53):

<u>Recurrence Interval</u>	<u>Flow (cfs)</u>
2-year	268
5-year	634
10-year	1030
25-year	1790
50-year	2600
100-year	3680

Flood-frequency characteristics developed from 522 crest-stage and streamflow-gaging stations (including the S. Fork gage) were related to drainage-basin characteristics using multiple-regression techniques to define regional flood-frequency relations. Regression equations expressing flood magnitudes as a function of drainage-basin characteristics were developed for eight regions within the state. The S. Fork gage was located in the Northeast Plains region. Drainage area (A) and mean elevation (E) were identified as the most significant basin characteristics. The following are the regression equations that were developed for each recurrence interval followed by a computation of flood magnitudes utilizing basin characteristics at the S. Fork gage (drainage area = 58.7 sq. miles; mean drainage basin elevation = 6,640 ft.):

<u>Recurrence Interval</u>	<u>Regression Equation</u>	<u>Flow (cfs)</u>
2-year	$Q_2 = 15.4A^{0.69}(E/1000)^{-0.39}$	122
5-year	$Q_5 = 77.0A^{0.65}(E/1000)^{-0.71}$	283
10-year	$Q_{10} = 161A^{0.63}(E/1000)^{-0.84}$	427
25-year	$Q_{25} = 343A^{0.61}(E/1000)^{-1.00}$	619
50-year	$Q_{50} = 543A^{0.60}(E/1000)^{-1.09}$	794
100-year	$Q_{100} = 818A^{0.59}(E/1000)^{-1.19}$	950

The two methods of determining flood magnitudes, statistical analysis of the gage record vs. regression analysis of drainage basin characteristics, result in significantly different flow values. One way to illustrate this difference is to consider the three highest flows recorded at the S. Fork gage (1950 cfs, 1340 cfs, and 1290 cfs) during the period of record. Using the log-Pearson Type III frequency analysis, these flows fall roughly in a range of 10-year to 30-year events. Based on the regional regression analysis, these flows would all be greater than a 100-year event.

Hydrology at Proposed Barrier Location

Inter-Fluve utilized the regional regression equations to determine hydrology for our conceptual design. Given that the proposed fish barrier is located approximately one-mile upstream of the S. Fork gage, the drainage area and mean drainage-basin elevation were adjusted slightly (drainage area = 47.3 sq. miles; mean drainage basin elevation = 6,650 ft.).

**** It should be noted that the drainage area of 47.3 sq. miles determined by Inter-Fluve originally seemed to be too low when compared with the reported drainage area at the S. Fork gage of 58.7 sq. miles. However, subsequent GIS analysis by the Forest Service indicates a drainage area of 49.8 sq. miles at the S. Fork gage.***

The following flow values were determined from the regression equations:

<u>Recurrence Interval</u>	<u>Flow (cfs)</u>
2-year	106
5-year	247
10-year	373
25-year	543
50-year	697
100-year	835

Additional Hydrologic Data

Provisional peak flow data for the S. Fork gage location (1992-2002) was recently forwarded to Inter-Fluve from the Forest Service (e-mail dated December 12, 2002). The maximum peak flow recorded during this period was 368 cfs (June 9, 1995), and the average annual peak flow for this period is 155 cfs. In contrast, the average annual peak flow for the period 1959-1979 was 456 cfs.

Based on the above analyses and discussion, Inter-Fluve advocates maintaining use of the hydrology that was previously presented with our conceptual design. Given that some uncertainty remains with the hydrology, Inter-Fluve also modeled the proposed barrier at flows of 1000 and 2000 cfs to evaluate its function at extreme flow events.

Fish Barrier Configuration and Drop Height

The conceptual fish barrier design that was submitted in the Technical Memorandum dated November 11, 2002 consisted of a single, reinforced concrete wall extending the width of the channel and with a drop height of 6 feet. This design would provide an elevation barrier to fish migration at flows up to the 25-year event (543 cfs). At the 50-year flow (~700 cfs), a jump height of 4 feet was calculated based on the downstream water surface and the crest elevation of the structure. If one assumes that the maximum fish jump angle is 75 degrees, it is theoretically possible that a fish could reach the top of the barrier. The computed water velocity at the top of the barrier was 8.2 feet/sec at the 50-year flow, which may be negotiable by a jumping fish assuming it reaches the barrier crest. Based on this possibility that a fish could bypass the barrier at the 50-year flow, we investigated an alternate design that utilizes both drop height and flow velocity to prevent upstream passage (Figure 1). We also evaluated this modified design at flows of 1000 cfs and 2000 cfs based on the present uncertainties in design hydrology.

The modified design is very similar to a design that Inter-Fluve proposed a few years ago for a fish barrier in Chamberlain Creek. The structure functions by increasing the channel bed elevation by approximately 5 feet at the upstream end. Flows are then funneled through a 20' wide chute that is formed by constructing concrete abutments along the channel banks. The overall drop through the structure (from upstream to downstream end) remains at 6 feet. However, the total drop occurs via: 1) an upstream chute (10 feet long, 1.5 feet of drop), 2) a vertical drop of 4.15 feet, and 3) a downstream apron (8 feet long, 0.35 feet of drop). The total length of the structure is 18 feet.

Figure 2 is a worksheet that shows the calculated jump heights and velocities at various flow levels for this design. For this analysis we assumed a maximum fish jump angle of 60 degrees which results in a maximum jump height of 3.5 feet. At lower flows (up to the 5-year event), the height of the drop is greater than 3.5 feet and prevents upstream passage. At flows greater than the 5-year event, velocities upstream of the drop are greater than the assumed maximum darting speed of 14 feet/sec.; flow velocities then become the limiting passage factor.

Conceptual Cost Estimate

The conceptual-level cost estimate provided with our Technical Memorandum has been modified to reflect the changes in barrier design (Table 1). The changes from our previous cost estimate occurred in Item 2 – Dewatering, and Item 5 – Fish Barrier Const. Concrete and reinforcing steel quantities increased significantly from our previous design. The more complex structure will also increase the estimated construction duration by a few days. The total conceptual cost estimate for design and construction of the fish barrier is now approximately \$75,000.

Inter-Fluve thanks you for the opportunity to provide conceptual design services for this project. Should you have any further questions or comments please contact me.

Sincerely,

INTER-FLUVE, INC.

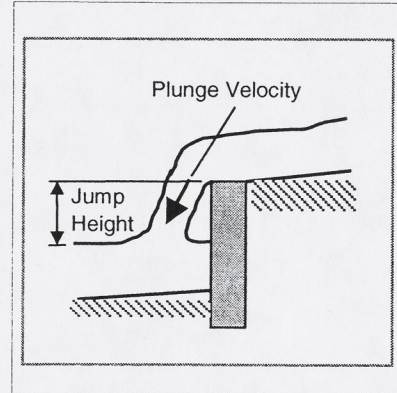
Michael Rotar, PE
Water Resources Engineer

Figure 2. Jump Height and Plunge Velocity
SF Judith River - Fish Barrier Conceptual Design
M. Rotar, 12/13/02

This worksheet calculates the jump height and plunge velocity for flows ranging from 2 cfs - 2000 cfs

Jump Height = vertical distance between the downstream water surface and the crest elevation of the drop structure.

Plunge velocity = average water velocity of the plunging stream as it reaches the base of the drop structure.



Plunge velocity calculation:

Assume that horizontal velocity component of water remains constant as it plunges. This velocity is given by HEC-RAS at the crest of the drop structure.

The vertical component of the plunge velocity depends on the height that the water falls.

$$V(\text{vert}) = (2gs)^{0.5}, \text{ where } g = \text{acceleration due to gravity, and } s = \text{fall distance}$$

Assume that the average fall distance of the water is the jump height + 1/2 of crest depth.

$$\text{Total Plunge Velocity} = [V(\text{horizontal})^2 + V(\text{vertical})^2]^{0.5}$$

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Vel Chnl (ft/s)	Water Depth (ft)	Jump Ht. (ft)	Fall Dist. (ft)	V (vert.) (fps)	Plunge Vel. (fps)
Crest (drop)									
2.5	2	9.5	9.6	1.5	0.1	4.1			
2.5	50	9.5	9.7	11.1	0.2	4.0			
2.5	106	9.5	9.9	12.0	0.4	3.9			
2.5	247	9.5	10.4	13.6	0.9	3.6			
2.5	373	9.5	10.8	14.5	1.3	3.3			
2.5	543	9.5	11.3	15.5	1.8	3.0			
2.5	697	9.5	11.7	16.2	2.2	2.7			
2.5	835	9.5	12.0	16.8	2.5	2.4			
2.5	1000	9.5	12.3	17.4	2.8	2.1			
2.5	2000	9.5	14.1	20.0	4.6	0.3			
Base (drop)									
2.3	2	5.35	5.4	1.6	0.1		4.1	16.3	16.4
2.3	50	5.35	5.5	19.2	0.1		4.1	16.3	19.7
2.3	106	5.35	5.6	19.9	0.3		4.1	16.2	20.2
2.3	247	5.35	5.9	21.1	0.6		4.0	16.1	21.0
2.3	373	5.35	6.2	21.9	0.9		3.9	15.9	21.6
2.3	543	5.35	6.6	22.7	1.2		3.8	15.7	22.1
2.3	697	5.35	6.8	23.3	1.5		3.7	15.5	22.4
2.3	835	5.35	7.1	23.9	1.8		3.6	15.3	22.8
2.3	1000	5.35	7.4	24.3	2.1		3.5	15.0	23.0
2.3	2000	5.35	9.3	25.7	3.9		2.56	12.8	23.8



Barrier site just downstream of Bluff Mountain Creek (looking upstream).



Barrier site just downstream of Bluff Mountain Creek (looking downstream). Tape is at level of floodplain.

**MONTANA TROUT FOUNDATION
GRANT APPLICATION FORM**

1. **Individual(s) or organization presenting proposal.** Green Mountain Conservation District
2. **Project Title.** Native Fish Education Project
3. **Project Director.** Jean Dunn, District Administrator, Green Mountain Conservation District
4. **MTF funds requested** \$ 1,600 **Matching Funds:** \$ 3,045
5. **Proposed dates of project** January – December 2003

6. **Project participants:**

Patsy Meredith, Eastern Sanders County Cons. Dist.
Name/occupation

Kathy Krueger, Avista Corporation
Name/ occupation

Don Feist, District Conservationist, NRCS
Name/occupation

Teri Burt, Science Teacher, Noxon High School
Name/occupation

7. **Experts in the field(s) of the project who have helped plan it:**

Chris Crane
Name

Montana Fish, Wildlife & Parks
Professional affiliation

David Martin
Name

Montana Dept. of Natural Resources & Conservation
Professional affiliation

8. **Executive Summary:** Please attach an executive summary of your project which is complete enough so a reviewer can fully understand the project.
9. **Evaluation:** Include in your proposal narrative, the specific ways that you will assess the results of your project. Your evaluation procedure is a critical section of the application: if funded, a significant portion (30%) of the funding will be withheld until MTF has received your concluding report, budget statement, evaluation, and a one-paragraph abstract of the work done. (see item #2 of the AGREEMENT in Proposed Budget).
10. Whenever appropriate and possible, you should include copies of *curriculum vitae* (especially one- or two-person projects) to strengthen and to facilitate judgments of the competence(s) being brought to the project.
11. **SIX** copies of your complete proposal must be submitted. MTF cannot review proposals, which do not meet this requirement. Whether or not you include the original copy is optional. Send all copies to: E. Richard Vincent, Montana Trout Foundation, P.O. Box 3165, Bozeman, MT 59715.

MONTANA TROUT FOUNDATION Proposed Budget and Agreement

(Itemize)* Matching Funds	MTF Funds	Matching Funds
1. Personnel	0	0
N/A		
2. Travel	400.00	
Transportation of students to field event = \$400		
3. Equipment	840.00	1140.00
Video camera system (\$650) cables, shipping (\$190) = \$840		
In-class floor maps (2) (production, paint) and materials for education trunks (2) (props) = \$700		
Water quality test equipment kits (6) = \$300		
Macro-invertebrate tools for stations (6) = \$140		
4. Materials	360.00	500.00
Instruction notebooks: production, printing, binders = \$360		
Fabric for Animal Tracks station = \$100		
Wildlife tracks stamps/ink pads = \$300		
Students "passports", printing = \$100		
5. Other		1405.00
Field day supplies (trash cans/bags, timers, fog horns, first aid kit, station supplies, signage, portable toilets) = \$455		
Instructor supplies, expenses = \$300		
Teacher participation expenses (substitutes) = \$300		
GMCD phone, postage, copies = \$50		
Volunteers' refreshments (station instructors, teachers, high school students and volunteers) = \$300		
Totals	\$1,600.00	\$3,045.00

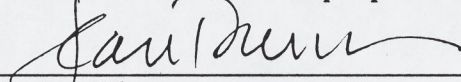
TOTAL PROJECT COST: \$4,645.00

- MTF rates salaries a very low priority and will fund them only when extraordinary justification is presented.

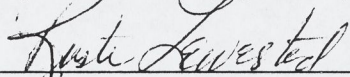
Note: MTF funds may not be used to pay indirect costs. MTF has letters on file with Vice President for Research at Montana State University and the University of Montana which state MTF's position on indirect costs.

AGREEMENT: It is understood that any funds granted as a result of this request are subject to the following conditions:

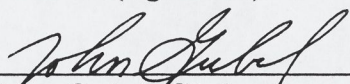
1. The funds granted your proposal are to be used only for the purpose set forth therein.
2. Thirty percent of this grant will be withheld until you have submitted 1) a concluding report of expenditures and remainders (if any), (2) a detailed evaluation of the project, and 3) a one-paragraph abstract of the evaluation. The concluding report, evaluation, and abstract must be submitted within 30 days of the completion of the work proposed in your application.
3. All publications or news releases relevant to this project must include appropriate acknowledgement of MTF funding.
4. MTF reserves, and you do hereby grant to MTF, the right to copy, reprint, reproduce, publish, republish, disseminate and to otherwise make use of all reports, studies, data findings, conclusions, recommendations, and all other written, graphic, or pictorial material resulting from your project whether or not copyrighted, published, or otherwise protected under a proprietary claim by you or your designee; provided, that if such work be claimed or protected under such proprietary protection, then MTF agrees to provide a disclosure to that effect along with a statement that the work is being used with the permission of its author.
5. You shall pay, indemnify and forever hold MTF harmless from any liability arising out of the contract work, including, but not limited to, any claim arising out of libel, slander or copyright, patent, trademark, trade name or other proprietary infringement.



Project Director (signature) Date 2/18/03



Person responsible for financial records/reports, if other than Project Director (signature) Date 2/18/03



John Gubel, Chairman Date 2-18-2003
Green Mountain Conservation District

Montana Trout Foundation Proposal Native Trout Education Project

Executive Summary

The Green Mountain Conservation District and Eastern Sanders County Conservation District are implementing an annual, comprehensive natural resource education program for all fifth-grade students in Sanders County. The Sanders County Water Festival includes in-class activities and culminates in an outdoor event to be held on October 7, 2003 in the Prospect Creek watershed. A key tributary to the lower Clark Fork River in western Montana, Prospect Creek has been selected as the site for the Water Festival because it is a known bull trout spawning stream and therefore can provide students an exceptional opportunity to learn about native trout species. Additionally, Prospect Creek is on the State of Montana's 303(d) list of impaired streams, so students can learn firsthand how water quality, temperature, sediment and other factors can affect fish populations.

To augment information presented by fish biologists at the Water Festival, an underwater video camera system will be used so students can observe actual in-stream fish behavior and aquatic life conditions. Beyond its use at the Festival, this specialized equipment will be used:

- By area high school students to record fish and other in-stream life and stream conditions in the field and utilize the information in the classroom for related science lessons and stream restoration monitoring;
- By Montana Fish, Wildlife & Parks staff to monitor fish abundance, trout spawning redds and fish migration patterns to determine the individual and cumulative results of stream restoration projects and verify improvements to fish populations; and
- By project partners as a unique tool to educate the general public about native trout species in the lower Clark Fork basin.

Funding in the amount of \$1,600 from Montana Trout Foundation would be used:

- To purchase supplies and materials for instruction notebooks for the Sanders County Water Festival;
- To provide transportation of students to the Water Festival field trip in October; and
- To purchase an underwater video camera system to be used at—and beyond—the Festival.

**Montana Trout Foundation Proposal
Native Trout Education Project**

Proposal Narrative

I. Project Description

A. Overview of the Water Festival

The Green Mountain Conservation District and Eastern Sanders County Conservation District are implementing an annual, comprehensive natural resource education program for all fifth-grade students in Sanders County. The Sanders County Water Festival brings together resource experts, high school students, elementary school students, and community volunteers to teach, learn and celebrate the outstanding natural resources of the Lower Clark Fork River and its key tributaries. The Festival's format utilizes science, social studies, math, and creative learning skills taught through a variety of interactive and hands-on activities. Goals are to: (1) build awareness, knowledge, and understanding of our river's resources; (2) foster conservation and stewardship of aquatic resources; (3) provide a geographical and historical perspective of the lower Clark Fork River basin; and (4) involve a cross-section of schools, non-profit organizations, local businesses and agencies in a collaborative and fun educational event.

Modeled after the successful Pend Oreille Water Festival held annually in Idaho and Washington for fifth-graders in the downstream Pend Oreille watershed, the Sanders County Water Festival includes in-class activities and culminates in an outdoor event to be held on October 7, 2003 in the Prospect Creek watershed. This is the first year of the Sanders County event, which will be held each year for all fifth grade students in the county.

Activities associated with the Water Festival include:

- An in-class curriculum, which is prepared for teachers in a master workbook that includes in-class instruction and lesson plans about trout species—especially native trout such as bull trout and westslope cutthroat trout—spawning and rearing areas, stream function and health, and other factors affecting fish and other aquatic resources.
- A unique in-class activity, which is presented to each fifth-grade classroom by a natural resource professional to introduce students to the concepts that they will explore in greater detail on the Festival field trip. The session takes students on a “journey” across the Clark Fork watershed as seen through the perspective of a traveling water drop. Students view the watershed on a colorful 10'x10' floor map and learn about watersheds, topographic features, political vs. watershed boundaries, vocabulary words, impacts to fish populations, and human and animal inhabitants that are discussed and identified with objects that students place on the map.
- An outdoor event held in October in the Prospect Creek watershed. Fifth-grade students learn firsthand about fish, stream health, water quality and related natural resources through interactive and hands-on activities. The fifth-graders are divided into teams containing 10-12 students each, and rotate through five different instructional stations every 30 minutes. Stations currently planned include: Fisheries; In-Stream Life; Water Quality Testing; Watersheds & Water Pollution; and Animal Tracks. Volunteer “guides” lead the teams through the day's activities and review instructional concepts with the fifth-graders between

rotations. Instruction at the Festival is provided by over 20 volunteers from conservation organizations, agencies and businesses as well as high school science students from area high schools.

- A pre- and post-test is administered to students to assess improvements to students' understanding of concepts learned during the Festival. (See Project Evaluation, below.)

B. Native Trout Education

The Festival provides an exceptional opportunity to teach students about native trout species. A key tributary to the lower Clark Fork River in western Montana, Prospect Creek has been selected as the site for the Festival because it is a known bull trout spawning stream and therefore can provide students an exceptional opportunity to learn about native fish species. Additionally, Prospect Creek is on the State of Montana's 303(d) list of impaired streams, so students can learn firsthand how water quality, temperature, sediment and other factors can affect fish populations. Students will learn about bull trout, westslope cutthroat trout and other fish species in two important ways:

- At the "**Fisheries**" station, students will work with fish biologists to learn about the life stages of fish, spawning, migration, food and eating habits, and survival needs, and also observe how a biologist works. Native fish are displayed and students learn how to tell them apart, with special emphasis on endangered bull trout identification and the special needs of this species.
- An "**In-Stream Life**" demonstration, given by high school students utilizing an underwater video camera system, will give fifth graders a unique opportunity to observe fish, macro-invertebrates, other aquatic life and stream conditions as they are actually occurring. High school students will be trained in underwater equipment use and the video images will be displayed on a laptop computer screen for fifth graders to observe and learn. Fish biologists from Montana Fish, Wildlife and Parks will be present to explain the in-stream life forms and activities as they occur. Students will also learn to identify macro-invertebrates present in the stream and discover what bugs reveal about water quality and habitat health.

In addition to its use at the Festival, the underwater video camera system will be used in other applications by area high school science students, Montana Fish, Wildlife & Parks and project partners.

- High school science students will use the camera system to record fish populations and other in-stream life and stream conditions and then go back to the classroom and utilize the information for stream restoration monitoring. Science students at Noxon High School are currently involved with Montana Fish, Wildlife & Parks, U. S. Forest Service, Pilgrim Creek Watershed Council, Sanders County and Green Mountain Conservation District in the development of a stream restoration project on Pilgrim Creek. Currently in the planning stages, the project will include stream channel repair, bank stabilization, erosion control and riparian re-vegetation. The goal of the project is to improve stream conditions and increase native trout populations in the creek. The camera will be a very important pre-project and post-project assessment tool; recordings of pre-project (baseline) conditions and post-project conditions can be compared to evaluate the success of the stream project and determine if fish populations have improved.

- Montana Fish, Wildlife & Parks staff will utilize the camera conduct pre- and post-project monitoring to assess the success of stream restoration projects in key tributaries to the lower Clark Fork River. A comprehensive effort is currently underway to restore key native salmonid streams in the lower Clark Fork system including Bull River, Prospect Creek, Whitepine Creek and Vermilion River. Agency staff will use the underwater tool to monitor fish abundance, trout spawning redds and fish migration patterns to determine the individual and cumulative results of stream restoration projects and verify improvements to fish populations.
- Along with other project partners, Montana Fish, Wildlife & Parks staff will include use of the camera in presentations and displays for general public education about native trout species in the lower Clark Fork basin. The agency is currently implementing the Bull Trout Protection and Public Education Project which seeks to protect bull trout in the lower Clark Fork through a combination of enhanced law enforcement and a comprehensive public education outreach campaign. Components of the program that could be augmented by recordings from the underwater camera include: the Hooked on Fishing Program in area schools; native trout and fish identification displays at county fairs and other public events; increased media coverage (television public service announcements and news releases;) and presentations to sporting clubs, civic groups, businesses and other community groups.

II. Tasks Associated with Request for Funding

WHEN	TASK	MTF REQUEST
Jan – Oct '03	Festival planning and coordination of activities	
April-May and Sept '03	Purchase supplies and materials for in-class instruction notebooks.	\$360.00
May '03	Purchase underwater camera system, cables for computer.	\$840.00
Oct '03	Transportation of students to the Festival.	\$400.00
Spring – Fall '03	MFWP staff utilize camera on stream restoration projects and for public education about native trout.	
Oct-Nov '03	Project Evaluation	
Dec '03	Report to MTF	

III. Project Evaluation

Evaluating the Water Festival: To evaluate the educational effectiveness of the Water Festival, students will be given a pre-test prior to the in-class activities. The pre-test contains questions specially developed to correspond with the in-class curriculum and instruction stations at the outdoor event. After the Festival, teachers administer a post-test that is identical to the pre-test. Through test comparisons, a marked improvement is expected in the students' understanding of fish, water quality, and other natural resources. Using the Pend Oreille Water Festival as an example of expected results, an average improvement of over 70% has been seen to date between pre- and post-test scores. Additionally, Festival instructors and teachers will provide feedback on the Festival's instruction topics, logistics and effectiveness through evaluation forms

that will be mailed out and completed shortly after the Festival. The committee will review these evaluations and use the comments and evaluation results for planning the 2004 event.

Evaluation of Underwater Camera System: The value of the underwater system will be gauged by its effectiveness in monitoring changes to fish numbers and the success of stream restoration projects. Information recorded from the camera will be compared to current field methods of monitoring fish abundance (electrofishing,) spawning rates (redd counts,) and juvenile fish migration (screw traps and radio tagging.) By comparing information recorded with the camera system and in-field data collected by agency staff, an evaluation can be made regarding the applicability of the camera system as a tool to be used for the future to evaluate the success of stream projects on fish populations.

IV. Project Partners

Along with Green Mountain Conservation District and Eastern Sanders County Conservation District, partners in this project include: Montana Department of Fish, Wildlife and Parks; science teachers and their students from Noxon, Thompson Falls and Plains High Schools; U. S. Forest Service; State of Montana Dept. of Natural Resources and Conservation, and Avista Corporation. In addition to these financial and technical supporters, members of the Water Festival committee—comprised of agency, school and local community representatives—meet monthly to undertake specific tasks related to the Festival. At the outdoor event in October there will be at least 10 station instructors who are natural resource professionals and an additional 20 volunteers who will be providing various levels of assistance.

**MONTANA TROUT FOUNDATION
GRANT APPLICATION FORM**

1. **Individual(s) or organization presenting proposal.** Whirling Disease Foundation
2. **Project Title.** Development of a Whirling Disease Risk Assessment Model
3. **Project Director.** David L. Kumlien, Executive Director
4. **MTF funds requested** \$3,000.00 Matching Funds \$10,500.00
5. **Proposed dates of project** March 1, 2003-February 29, 2004
6. **Project participants:**

Dr. Jerri Bartholomew, Science Coordinator Whirling Disease Foundation, Sr. Fisheries
Researcher-Oregon State University

Name/occupation

Dr. Jim Winton, Chief Fisheries Researcher, Western Fisheries Research Center, Seattle, WA

Name/occupation

Dr. Stuart MacDiarmid, National Manager, Agricultural Security, MAF Regulatory Authority
International Risk Assessment Expert, Wellington, New Zealand

Name/occupation

Dr. Ron Hedrick, School of Veterinary Medicine, University of California-Davis

Name/occupation

Dr. Billie Kerans, Associate Professor, Ecology Department, Montana State University

Name/occupation

Ms. Beth MacConnell, Fish Pathologist, US Fish and Wildlife Service Fish Health Center,
Bozeman, Montana

Name/occupation

Mr. Mike Stone, Chief of Fisheries, Wyoming Game and Fish Department, Cheyenne, WY

Name/occupation

Mr. Dick Vincent, Whirling Disease Research Coordinator, Montana Department of Fish,
Wildlife, and Parks, Bozeman, MT

Name/occupation

7. Experts in the field(s) of the project who have helped plan it:

Dr. Jerri Bartholomew, Science Coordinator Whirling Disease Foundation, Sr. Fisheries
Researcher-Oregon State University

Name

Professional affiliation

David L. Kumlien, Executive Director Whirling Disease Foundation, Bozeman, MT

Name

Professional affiliation

8. **Executive Summary:** Please attach an executive summary of your project which is complete enough so a reviewer can fully understand the project.
9. **Evaluation:** Include in your proposal narrative, the specific ways that you will assess the results of your project. Your evaluation procedure is a critical section of the application: if funded, a significant portion (30%) of the funding will be withheld until MTF has received your concluding report, budget statement, evaluation, and a one-paragraph abstract of the work done. (see item #2 of the AGREEMENT in Proposed Budget).
10. Whenever appropriate and possible, you should include copies of *curriculum vitae* (especially one- or two-person projects) to strengthen and to facilitate judgments of the competence(s) being brought to the project.
11. **SIX** copies of your complete proposal must be submitted. MTF cannot review proposals, which do not meet this requirement. Whether or not you include the original copy is optional. Send all copies to: E. Richard Vincent, Montana Trout Foundation, P.O. Box 3165, Bozeman, MT 59715.

AGREEMENT: It is understood that any funds granted as a result of this request are subject to the following conditions:

1. The funds granted your proposal are to be used only for the purpose set forth therein.
2. Thirty percent of this grant will be withheld until you have submitted 1) a concluding report of expenditures and remainders (if any), (2) a detailed evaluation of the project, and 3) a one-paragraph abstract of the evaluation. The concluding report, evaluation, and abstract must be submitted within 30 days of the completion of the work proposed in your application.
3. All publications or news releases relevant to this project must include appropriate acknowledgement of MTF funding.
4. MTF reserves, and you do hereby grant to MTF, the right to copy, reprint, reproduce, publish, republish, disseminate and to otherwise make use of all reports, studies, data findings, conclusions, recommendations, and all other written, graphic, or pictorial material resulting from your project whether or not copyrighted, published, or otherwise protected under a proprietary claim by you or your designee; provided, that if such work be claimed or protected under such proprietary protection, then MTF agrees to provide a disclosure to that effect along with a statement that the work is being used with the permission of its author.
5. You shall pay, indemnify and forever hold MTF harmless from any liability arising out of the contract work, including, but not limited to, any claim arising out of libel, slander or copyright, patent, trademark, trade name or other proprietary infringement.

David S. Kowalik
Project Director (signature)

Date February 19, 2003

Date _____
Person responsible for financial records/reports, if other than Project Director
(signature)

A Proposal to the Montana Trout Foundation

Submitted by the
Whirling Disease Foundation
P.O. Box 327
Bozeman, Montana 59771
(406) 585-0860 (phone) (406) 585-0863 (fax)
whirling2@mcn.net (e-mail)
www.whirling-disease.org (web page)
Contact: David Kumlien, Executive Director

"Development of a Whirling Disease Risk Assessment Tool"

Total Budget: \$13,500

Requested from Montana Trout Foundation: \$3,000

Executive Summary

This project will complete the development of a Whirling Disease Risk Assessment Model (WDRAM) begun at the 2003 Whirling Disease Symposium. Work on the much-needed model began during the two-day annual Whirling Disease Symposium in February 2003 in Seattle, but due to time limitations and the complexity of the exercise, the model was not completed. However, the consensus of the scientists and researchers involved with the model development was that completion of the WDRAM and subsequent publication and dissemination of the information would be extremely useful in the battle against the disease. The Whirling Disease Foundation will accomplish this task by convening a Risk Assessment Panel (RAP) of experts to work on completing the WDRAM framework developed at the Symposium. The RAP will meet and work via a series of conference calls. The draft model produced by the RAP will be distributed to interested parties for comments and suggestions. The final product will be published and distributed in to Whirling Disease Symposium participants, published in the American Fisheries Society magazine *Fisheries*, and distributed to 23 state fisheries chiefs and fish health pathologists. The model will be made available in electronic form on the Whirling Disease Foundation website, www.whirling-disease.org. We will also create a version written on DVD and CD ROM to be distributed to the same group. In addition to the professional version of the WDRAM, a modified version suitable for use by public organizations, conservation groups, and schools will be created and distributed. Funds sought from Montana Trout Foundation and matched 3 to 1 by the Whirling Disease Foundation will be used to underwrite the costs of a series of RAP conference calls, and the printing and mailing expenses incurred in the WDRAM development.

Proposal Narrative

Background

Whirling disease (WD), a parasitic infection of trout, salmon, steelhead, and char is responsible for large declines in wild trout populations in many prized fisheries in Montana and the West. In large part due to the publicity in 1994 surrounding the identification of whirling disease as the cause of trout population declines in the Madison River, the whirling disease problem achieved national recognition. This kicked off federal and private funding that has supported intensive, high-end research on the nature of the disease and its causative pathogen, *Myxobolus cerebralis*.

In just a few years, much has been accomplished by a cadre of trained field and laboratory scientists from throughout the country who meet annually at the Whirling Disease Symposium to share their findings. The progress in whirling disease has been quite remarkable, and has been acknowledged by fisheries professionals as unprecedented in the history of cold-water fish health. However, a serious information and education (I & E) gap has developed between whirling disease research and fish health professionals and fisheries managers. At the October 2002 meeting of the National Partnership for Cold Water Fisheries Management, the organization which distributes federal funding for WD research, this I & E gap became the focus of much of the meeting discussion. Several participants including Montana's Whirling Disease Research Coordinator Dick Vincent pointed out that fisheries managers were becoming apathetic toward whirling disease research. The managers expressed concern that although all of the research was wonderful, there had been no effort to interpret the research and provide them, the managers, with any useful tools to help them make management decisions. The development of the WDRAM represents a significant step in address this problem.

In response to concerns voiced at the National Partnership meeting and by other Whirling Disease Foundation partners, the Foundation addressed the I & E problem through the annual 2003 Whirling Disease Symposium. The Whirling Disease Foundation and the Symposium Co-Chairs Dr. Jerri Bartholomew of Oregon State University and Dr. Jim Winton of the USGS Western Fisheries Research Center invited Dr. Stuart MacDiarmid, international risk assessment expert from New Zealand, to come to the 2003 Symposium in Seattle and direct the development of a risk assessment model.

The Whirling Disease Risk Assessment Model (WDRAM) development sessions at the Symposium were very interesting. The task set before the 111 scientists participating was formidable, and there was much spirited discussion. As the development of the WDRAM progressed, several things became clear. First, it was apparent that even though most of the participants had taken part in several symposia, there was a great deal of previously presented research information that was not known. Second, it was clear that the WDRAM would have to have the flexibility to allow adjustments to suit the needs and interest of different fisheries programs, and third, the task of developing a model was too great to be completed in two days! However, the consensus of all involved was that continuation of work on the development of the WDRAM model was very important.

The Whirling Disease Foundation is in the ideal position to continue the WDRAM model development effort. The Foundation raises funds for cutting edge whirling disease research and is responsible for conducting the annual scientific meetings. The Foundation has gained the

reputation of being an unbiased facilitator of careful science and is in a position to interpret the message without bias.

Project Description

Utilizing the risk assessment model framework developed at the 2003 Whirling Disease Symposium, a Risk Assessment Panel (RAP) of leading whirling disease scientists and fish health experts guided by international risk assessment expert Dr. Stuart MacDiarmid of New Zealand will meet through a series of conference phone calls to continue work on the development of the whirling disease risk assessment model. Upon the completion, a draft of the model will be distributed to fish pathologists, chiefs of fisheries, and fish health experts in the appropriate state and federal fisheries programs for comment and suggestion. This input will be distributed to RAP members, and additional conference call meetings will assimilate the comments and suggestions into the final model.

Upon completion, the WDRAM will be produced in a variety of media and distributed to a number of different groups. The model will be published in *Fisheries*, the American Fisheries Society magazine, and printed copies of the model will be distributed to state fish and game agencies, to the US Fish and Wildlife Service and to other appropriate federal agencies such as the United State Geological Survey (USGS) and Invasive Species Council. The WDRAM will also be produced in DVD and CD-ROM formats utilizing PowerPoint, the Microsoft presentation software program, and the CD and DVD versions will be distributed to the same group of agencies. In addition to the model developed for the professional fisheries community, a version suitable for utilization by the public including conservation groups and trout and salmon organizations will be produced and distributed. Both the professional fisheries version and the public version of the model will be made available on the Whirling Disease Foundation website www.whirling-disease.org

It has been made clear that in order to effectively reach the river biologists and managers, personal, small group, presentations are most effective. An important part of this project will be to "take the show on the road." Key presenters from the Risk Assessment Panel will travel to selected state fisheries meetings to present and explain the WDRAM. It is our belief that utilization of the variety of media and the use of multiple methods of distribution will insure a high degree of exposure for the Whirling Disease Risk Assessment Model.

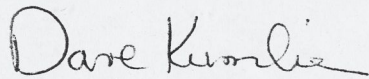
Evaluation

Evaluation of the success of the project will be based on accomplishing the following goals:

- 1) Completion of the WDRAM
- 2) Publication of the WDRAM in *Fisheries* magazine
- 3) Publication and distribution of the WDRAM to state fish and game and federal fisheries agencies
- 4) Production and distribution of CD ROM and DVD versions to state and federal agencies and public organizations
- 5) Posting both professional and public versions of WDRAM on the Whirling Disease Foundation website
- 6) Presentation and explanation of the model at selected state fish and game fisheries meetings including the states of Montana, Idaho, Wyoming, Utah, Colorado, New Mexico, and Arizona.

An important method of evaluation of the success of the project will be the continued work of scientists and researchers on the development of the WDRAM. In his opening presentation to the 2003 Whirling Disease Symposium, Dr. MacDiarmid explained that development of a risk assessment model is akin to the development of the map of the world. He showed several early examples of world maps that were clearly incomplete. As he advanced through to more modern world maps, more accurate depictions and more complete information was available, and he ended his presentation with the powerful, attention grabbing view of the earth from space. Ultimately, the success of this project will be the comparison of what the WDRAM will look like at the completion of this project to what the WDRAM looks like in the future. It is our hope that WDRAM will develop, as did the map of the world.

Thank you for the opportunity to submit this proposal,



Dave Kumlien

Governing Board of Directors, Whirling Disease Foundation

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Montana Trout Foundation

Proposed Budget and Agreement

Itemize*	MTF Funds	Matching Funds from Whirling Disease Foundation
1. Personnel	\$ -	
Pro-rated salary for Jerri Bartholomew		\$ 2,000.00
WDF Science Coordinator salary		
Pro-rated salary for ED Dave Kumlien		\$ 1,250.00
Pro-rated salary for WDF Office Manager, Wanda McCarthy		\$ 750.00
2. Travel	\$ -	
Travel for presentation of risk assessment tool to 7 state fish and game agencies		\$ 3,500.00
3. Equipment		
Computer with DVD and CD ROM writing capabilities		\$ 2,500.00
4. Materials		
CD's and DVD's		\$ 500.00
5. Other		
10 one hour conference calls for 6 domestic participants and 1 international participant with call taping service	\$ 2,790.00	
Printing and mailing of conference call meeting results	\$ 210.00	
Totals	\$ 3,000.00	\$ 10,500.00
Total Project Cost	\$ 13,500.00	
*MTF rates salaries a very low priority and will fund them only when extraordinary justification is presented.		
*Note: MTF funds may not be used to pay indirect costs. MTF has letters on file with Vice President for Research at Montana State University and the University of Montana which state MTF's position on indirect costs.		

CURRICULUM VITAE

Jerri L. Bartholomew

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Department of Microbiology
Oregon State University
Nash Hall 220
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Education:

Ph.D. in Microbiology - Oregon State University, 1989
M.S. in Fisheries and Wildlife - Oregon State University, 1985
B.S. in Biology, minor in Marine Sciences - Pennsylvania State University, 1980

Professional Experience

2000-present Science Advisor, Whirling Disease Foundation
1995-present Assistant Professor, Senior Research, Dept. Microbiology, Oregon State University, Corvallis, Oregon
1994-1995 Instructor, Dept. Microbiology, Oregon State University, Corvallis, Oregon
1992-1993 Microbiologist, USFWS, National Fishery Research Center, Seattle, Washington
1990-1991 Research Associate, Department of Microbiology, Oregon State University, Corvallis, Oregon
1988-1990 Fishery Biologist, USFWS, National Fishery Research Center, Seattle, Washington
1982-1988 Graduate Research Assistant, Department of Microbiology, Oregon State University, Corvallis, Oregon

Honorary and Professional Societies

American Fisheries Society
Fish Health Section of the American Fisheries Society
American Society of Parasitologists
Sigma Xi, Scientific Research Society
Phi Kappa Phi, Honor Society

Professional Activities

Oregon Invasive Species Technical Advisory Committee
President, Fish Health Section of the American Fisheries Society - current
Associate editor, Journal of Aquatic Animal Health, present
Conference chair, 2001, AFS/Fish Health Section National Meeting, Victoria, B.C., Canada, June 26-29
Conference chair, 1999 - 2002 Whirling Disease Symposium,
Plenary speaker, Third International Symposium on Aquatic Animal Health, Baltimore, MD, 1998
Publication Awards Committee, American Fisheries Society - 1998
Secretary/Treasurer of the Fish Health Section of the American Fisheries Society - 1996 -1999
Consultant for HARZA Northwest Inc. on fish disease problems related to FERC relicensing projects on the Cowlitz and Deschutes Rivers
Organizing Committee - Pathogens and Diseases of Fish in Aquatic Ecosystems - Pacific Northwest Fish Health Protection Committee Symposium, June 1997
Session co-chair - Western Division meeting of the American Fisheries Society - July, 1996

Peer-Reviewed Publications (selection of recent related publications)

Lowers, J. M. and J. L. Bartholomew. Detection of Myxozoan Parasites in Oligochaetes Imported as Food for Ornamental Fish. *Journal of Parasitology*. In press.

Bartholomew, J. L. and P. W. Reno. 2002. The History and Dissemination of Whirling Disease. Pages 3-24 in J. L. Bartholomew and J. C. Wilson, editors, Whirling disease: reviews and current topics. American Fisheries Society Symposium 29, Bethesda, Maryland.

Whipple, M. J., A. L. Gannam and J. L. Bartholomew. 2002. Lack of a Prophylactic Effect of Orally Administered Glucan and Fumagillin on Naturally Acquired Infection with *Ceratomyxa shasta* in Juvenile Rainbow and Steelhead Trout (*Oncorhynchus mykiss*). *North American Journal of Aquaculture* 64:1-9

Sollid, S. A., H. V. Lorz, D. G. Stevens and J. L. Bartholomew. Relative Susceptibility of Selected Deschutes River, Oregon, Salmonid Species to Experimentally Induced Infection by *Myxobolus cerebralis*. Pages 117-124

in J. L. Bartholomew and J. C. Wilson, editors, Whirling disease: reviews and current topics. American Fisheries Society Symposium 29, Bethesda, Maryland.

Sandell, T. A., H. V. Lorz, S. A. Sollid and J. L. Bartholomew. 2002. Effects of *Myxobolus cerebralis* Infection on Juvenile Spring Chinook Salmon in the Lostine River, Oregon. Pages 135-142 in J. L. Bartholomew and J. C. Wilson, editors, Whirling disease: reviews and current topics. American Fisheries Society Symposium 29, Bethesda, Maryland.

Kent, M. L., K. B. Andree, J. L. Bartholomew, M. El-Matbouli, S. S. Dessler, R. H. Devlin, S. W. Feist, R.P. Hedrick, R. W. Hoffman, J. Khattra, S. L. Hallett, R. J. G. Lester, M. Longshaw, O. Palenzuela, M. E. Siddall, C. Xiao. 2001. Recent Advances in Our Knowledge of the Myxozoa. The Journal of Eukaryotic Microbiology. 48:395-413

Sandell, T. A., H. V. Lorz, D. G. Stevens and J. L. Bartholomew. 2001. Dynamics of *Myxobolus cerebralis* in the Lostine River, Oregon: Implications for Resident and Anadromous Salmonids. Journal of Aquatic Animal Health. 13:142-150

Bartholomew, J. L. 1998. Host resistance to infection by the myxosporean parasite *Ceratomyxa shasta*: a review. Journal of Aquatic Animal Health. 10:112-120.

Bartholomew, J. L., M. J. Whipple, D. G. Stevens and J. L. Fryer. 1997. The life cycle of *Ceratomyxa shasta*, a myxosporean parasite of salmonids, requires a freshwater polychaete as an alternate host. American Journal of Parasitology. 83:859-868.

Other Publications (recent)

Bartholomew, J. L. and J. C. Wilson, eds. 2002. Whirling Disease Reviews and Current Topics. American Fisheries Society Symposium Number 29, Bethesda, MD.

Palenzuela, O. and J. Bartholomew. 2002. Molecular tools for the diagnosis of *Ceratomyxa shasta* (Myxozoa) Pages 285-298 in C. Cunningham ed., Molecular Diagnosis of Fish Diseases, Kluwer Academic Publishers, Netherlands

Bartholomew, J. L., editor. 2001. Standard Protocols for Whirling Disease Research, Version 1. Standardized Protocols Advisory Committee, Whirling Disease Foundation and Fish Health Section, American Fisheries Society. Whirling Disease Foundation, Bozeman, MT.

Bartholomew, J. L., M. J. Whipple and D. Campton. 2001. Inheritance of Resistance to *Ceratomyxa shasta* in Progeny From Crosses Between High- and Low-Susceptibility Strains of Rainbow Trout (*Oncorhynchus mykiss*). Bulletin of the National Research Institute of Aquaculture. Supplement 5:71-75

Bartholomew, J. L. 2001. Salmonid ceratomyxosis. in: ed. J Thoesen, Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens. Blue Book 4th Edition. Fish Health Section, American Fisheries Society.

Peters, K. K., O. Palenzuela and J. L. Bartholomew. 1999. Applicability of a polymerase chain reaction for detection of *Ceratomyxa shasta* in field diagnostics and surveillance. Fish Health Newsletter 27:4-6

Curriculum Vitae

David L. Kumlien

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Born in Janesville, Wisconsin, Dave graduated in 1972 from Macalester College in St. Paul Minnesota with a BA in Political Science. After moving to Bozeman in 1973, he opened Wild Wings Orvis Shop, Bozeman's first fly-fishing specialty shop, running the highly successful fly shop and guide service for 20 years, and selling the business in 1998.

Long active in outfitter and conservation issues, Dave was a founding director and the first President of Montana's fishing outfitter organization, Fishing Outfitters Association of Montana (FOAM). He represented FOAM on fishing outfitter and conservation issues in several Montana legislative sessions, and he was appointed to serve on Montana Governor Tom Judge's river use study commission. Dave has also served several terms on the Board of Directors of the Madison-Gallatin Chapter of Trout Unlimited including two terms as Chapter President. In 1995, Dave helped found the Whirling Disease Foundation and served 3 years as a Board member. In 1998, following the sale of his shop, Montana Troutfitters, Dave began part-time work as Development Director for WDF. Following a successful fundraising effort, he was hired as the full-time Development Director in 1999, and in October of 2001, was promoted to Executive Director. In October of 2001, Dave received the prestigious Outdoor Life Magazine Conservation Award recognizing his work and the accomplishments of the Whirling Disease Foundation. The Outdoor Life award, established in 1923, includes a list of notable conservationists including Aldo Leopold and President Jimmy Carter. Dave shared the 2001 award with public sector winner Governor John Kitzhaber of Oregon. In January of 2003, Dave was invited to attend the first ever National Fisheries Leadership Conference held in Washington, DC and sponsored by the Department of Interior and the US Fish and Wildlife Service.

Dave, his wife Karyn and two sons, Kristopher and Kevin live in Bozeman.