

TECHNICAL WORKPLAN

WILD FISH HABITAT INITIATIVE

PHASE II

October 1, 2003 – December 31, 2004

submitted by:
Montana Water Center
Montana State University - Bozeman

submitted to:
Division of Fish and Wildlife Management Assistance
U.S. Fish and Wildlife Service



June 30, 2003



Background and Purpose

Degradation of fish habitat is one of the principal reasons for the listing of wild fish under the Endangered Species Act. In addition, the detrimental effects of exotic competitors and diseases such as whirling disease are exacerbated by habitat degradation. Land values are diminished by habitat degradation and the subsequent loss of wild fish populations. Private landowners forego economic opportunities when land uses are restricted and resources are directed toward fish restoration. In recent years, many techniques of fish habitat enhancement have been implemented, but their long-term efficacy is not well understood because little or no evaluation and monitoring have been conducted.

The Partners for Fish and Wildlife Program, administered by the U.S. Fish and Wildlife Service, is a critical national effort to restore important fish and wildlife habitat. This is a voluntary program that works with private landowners to restore habitat on their lands. *The purpose of the Wild Fish Habitat Initiative is to enhance the success of riparian projects conducted through the Partners for Fish and Wildlife Program.* The Initiative involves two activities: conducting targeted research to assist Partners fish habitat restoration projects, and implementing a vigorous information-transfer program to provide technical results to those who plan and carry out Partners projects. Phase II of the Initiative will expand on the four current projects and introduce one additional project, a study of the effectiveness of a native fish restoration project within the Fan Creek drainage in northwestern Wyoming. Activities for each of the Phase II Initiative projects are outlined below.

Irrigation Diversions Project

Introduction and Scope

Seven lowhead irrigation dams on lower Skalkaho Creek, a tributary to the Bitterroot River in Western Montana, are believed to divert significant numbers of downstream migrant westslope cutthroat trout into eight irrigation canals. Both post-spawn adults migrating back to the Bitterroot River and juveniles emigrating downstream from nursery areas in upper Skalkaho Creek become trapped and die in the irrigation canal system, thereby resulting in a net loss to the population. Private landowners and irrigators in the drainage expressed concern over the number of fish killed annually in the irrigation system and worked with Montana Fish, Wildlife and Parks to successfully request funds from the Fish Restoration and Irrigation Mitigation Act program to install fish screens at the diversions to preclude such losses. The screens will be completed after the end of the 2003 irrigation season. The first phase of our study involves estimation of fish losses during 2003 prior to installation of the screens. It will thereby provide

baseline “before” data for evaluating the efficacy of the screen devices. The second phase of this study, proposed in this workplan, will provide the post-installation “after” data set for comparison. No such evaluations have been conducted and published in the peer-reviewed literature to date, thereby inhibiting private landowners and agencies throughout the Northern Rockies Ecoregion from investing in fish screens as part of their fish habitat management and restoration efforts.

Goal and Objectives

Our goal is to evaluate the efficacy of irrigation diversion fish-screen structures in western Montana. Our specific objectives are: 1) to quantify the proportions and numbers of downstream migrating juvenile and adult westslope cutthroat trout entrained at irrigation diversions on Skalkaho Creek, Montana, before and after fish-screen installation, and 2) to evaluate the efficiency of fish-screen structures in returning entrained fish to the river; excessive return delays can alter migration timing and increase subsequent mortality rates.

Activities

Age-1 juvenile and adult westslope cutthroat trout will be fitted with radio-telemetry transmitters in spawning and nursery areas of upper Skalkaho Creek prior to their respective emigration periods in both 2003 (before screens) and 2004 (after screens). Locations and movements of individuals will be monitored several times per week to determine their success in bypassing the irrigation diversions during their downstream migrations to the Bitterroot River. The final fate of each individual will be determined (i.e., in-river mortality, canal entrainment and mortality, in-river residence, or successful emigration). Success rates and final fates of fish telemetered in 2003 and 2004 will be compared. Entrainment of downmigrating age-0 and age-1 juvenile westslope cutthroat trout too small to be telemetered will be estimated by trapping in drift nets set above and below diversions and within the canals. Entrainment rates in 2003 and 2004 will be compared.

During 2004, the efficiency of the fish-screen structures in returning entrained fish to the river will be evaluated. Age-0 juveniles will be collected in the river, implanted with passive integrated transponder (PIT) tags, and released into the upstream sections of irrigation canals between the head gates and the screens. PIT-tag readers affixed to screen bypass pipes will record return of each individual to the river and thereby allow estimation of screen-induced migration delays.

Milestones

Field work began in May 2003 with the telemetrization of adult westslope cutthroat trout and drift netting for juveniles. These activities will continue through the irrigation season until autumn. Precisely comparable work will be conducted in 2004. Screen efficiency experiments will be conducted during summer 2004. Analyses and a final report will be completed by December 31, 2004.

Deliverables

A detailed final report describing the methods, findings, and management implications of the study will be produced. A manuscript will be submitted for publication in a peer-reviewed journal. Results will also be presented at scientific meetings.

Partners

The study is being conducted in close cooperation with Montana Fish, Wildlife and Parks, local ditch/irrigation companies, and local landowners.

Cutthroat Thermal Testing Project**Introduction and Scope**

Westslope cutthroat trout are in decline throughout their native range in the Northern Rockies and are considered at risk for listing under the Endangered Species Act. Habitat degradation and displacement by non-native trout species are the primary causes of the decline. Although increased water temperature contributes to habitat degradation of coldwater salmonids by definition and is widely regarded as a determining factor affecting persistence of native salmonids, specific thermal requirements and limits of the various cutthroat subspecies are largely unknown. Moreover, water temperature may play an important role in the balance of non-native and native trouts, especially as mediated through their hybrids, but the influence of temperature on interactions of westslope cutthroat trout and their non-native competitors have not been investigated. This lack of information precludes effective westslope cutthroat trout reintroduction and habitat restoration programs, development of land-management policies, and hatchery propagation protocols.

Our recent studies of temperature tolerances of bull trout have illustrated the need for well-defined and scientifically-defensible temperature criteria for effective native fish protection and management. The study described in this workplan will provide temperature tolerance and optimum and preferred temperature information for westslope cutthroat trout to minimize the risk of further decline and increase the current range of these fish. Information obtained from this study will enhance habitat protection and restoration efforts, species reintroduction programs, and land management policies in watersheds inhabited by native cutthroat trout. This information will also be helpful in implementing recently developed conservation plans for native cutthroat trout in Montana and Idaho. Intended users of this information include timber and grazing industries, private landowners, and state and federal natural resource agencies.

Goal and Objectives

Our goal is to characterize the thermal biology of westslope cutthroat trout, specifically with respect to lethal and optimal temperatures for this subspecies, and to compare its performance against a non-native competitor and their hybrids in sympatry and allopatry.

The objectives of this study are to define the ultimate incipient upper lethal temperatures, maximum growth temperatures, and preferred temperatures of westslope cutthroat trout, a non-native competitor species, and their hybrids, and evaluate the influence of temperature on competitive interactions among these three taxa.

Activities

Laboratory trials will be conducted in a state-of-the-art thermal testing facility housed at the U.S. Fish and Wildlife Service Bozeman Fish Technology Center. The thermal testing facility

consists of 36 flow-through exposure tanks fed by cold and warm-water springs from which water is combined to allow precise and accurate temperature control over a wide range of test temperatures. We recently completed a four-year study of bull trout thermal requirements using this apparatus and are presently conducting initial tests on westslope cutthroat trout there as described in the workplan for the first phase of this study.

Eyed eggs of westslope cutthroat trout will be obtained from wild broodstock maintained by the Montana Department of Fish, Wildlife and Parks for their reintroduction and restoration programs. Eggs will be reared to the juvenile stage at the Bozeman Fish Technology Center. Growth and survival will be examined at 12 constant temperatures ranging from 8 to 30 °C to span the entire range of temperatures potentially encountered by westslope cutthroat trout during summer throughout their native range.

Optimum growth and ultimate incipient upper lethal temperatures will be determined in a series of long-term (60 day) temperature trials using the Acclimated Chronic Exposure protocol. Additional trials will be conducted to determine relative growth and survival of westslope cutthroat trout compared to a non-native competitor species and hybrids of the two species. Because differing growth rates of co-occurring species can be a result of differing physiological optima as well as behavioral interactions, we will conduct tests in sympatry and allopatry over a range of temperatures. Fish densities and sizes will be matched to preclude confounding influences.

Milestones

Trials on westslope cutthroat currently being conducted under the first phase of this study will be completed by autumn 2003. Competitor species and hybrid eggs are currently being reared for experiments described in this workplan. These experiments will commence in autumn 2003 and will be completed during 2004. Data analyses and report preparation will follow, with project completion in December 2004.

Deliverables

A detailed final report describing the methods, findings, and management implications of the study will be produced. A manuscript will be submitted for publication in a peer-reviewed journal. Results will also be presented at scientific meetings.

Partners

The study is being conducted in close cooperation with the Montana Department of Fish, Wildlife and Parks, which will provide westslope cutthroat trout eggs for our experiments, and the U.S. Fish and Wildlife Service Bozeman Fish Technology Center, which houses the thermal testing and fish rearing facilities.

Control of Coldwater Disease

Introduction and Scope

Flavobacterium psychrophilum, the causative agent of bacterial coldwater disease (BCD), has become an increasing source of concern among aquaculturists in the last decade as it has spread

worldwide from its apparent original source in the northwestern U.S. The bacterium is now considered one of the most significant pathogens of salmonids worldwide. It causes death if untreated, and its control requires continuous antimicrobial drug administration. Despite its significance, only a few studies have examined its pathogenicity or epidemiology. *F. psychrophilum* apparently can be transmitted both horizontally (among fish) and vertically (from adults to their progeny) by rainbow trout in hatcheries, making it especially difficult to control.

Currently, BCD is the only disease found in State fish hatcheries in Montana, which have long had the unique and enviable reputation of being disease-free. The Washoe Park State Fish Hatchery in Anaconda, Montana, currently is the only State facility producing westslope cutthroat trout suitable for restoration. Because of the severity of the BCD problem there however, the State is unable to fully implement its westslope cutthroat trout restoration program. Fish produced at Washoe Park are to be used in westslope cutthroat trout recovery plans throughout western Montana, but implementation of these plans has been hindered by the presence of BCD at the hatchery. Successful control of BCD at Washoe Park would allow restoration of native westslope cutthroat trout to proceed in Montana.

The source of BCD at Washoe Park was heretofore unknown. During the first phase of this study, we tracked the bacterium back to the warmwater source spring above the hatchery, and found that the bacterium proliferated in the gas desaturation tower where the water enters the hatchery. Modifications to reduce the surface area within the tower have reduced biomass of the bacterium therein. The epidemiology of the bacterium within the hatchery remains unknown, however. To control the bacterium in hatcheries, oxytetracycline (OTC) has been incorporated into fish feed in North America and Europe. Additionally, cutthroat trout at Washoe Park are treated prophylactically with OTC to suppress the disease. Although no resistance to OTC has been documented in North America, resistance of *F. psychrophilum* to OTC has been documented recently in Europe. Therefore, the effectiveness of OTC as a control measure for BCD appears to be limited. Furthermore, the bacterium may not be eliminated by OTC treatment because it may remain dormant in the brain of infected fish, protected by the blood-brain barrier. When fish are taken off the OTC-medicated feed, or subjected to stress as upon stocking, the bacterium may proliferate and elicit disease. New control measures must be developed and tested expeditiously to insure the future success of salmonid restoration projects.

Goal and Objectives

Our goal is to better understand the ecology of *F. psychrophilum* in hatcheries such that control measures for it can be developed and tested, thereby leading to increased and enhanced restoration efforts. Although Washoe Park State Fish Hatchery is the model for our research, our findings will be applicable to hatcheries through Montana and the Pacific Northwest. Specific objectives to be addressed in the second phase of the study are to:

- Determine if *F. psychrophilum* is transmitted vertically in westslope cutthroat trout;
- Determine the efficacy of iodophore for treating *F. psychrophilum* in westslope cutthroat trout eggs; and
- Determine if reducing stress during rearing and transport reduces BCD prevalence and mortality.

Activities

Vertical transmission will be evaluated by testing for *F. psychrophilum* using standard bacteriological culture techniques on ovarian fluids, egg surfaces, egg contents, and milt of westslope cutthroat trout broodstock from Washoe Park. Identifying routes of transmission of the pathogen is essential to the control and management of the disease. If *F. psychrophilum* is determined to be vertically transmitted maternally, water hardening with iodophore will be used to attempt to eradicate the bacteria from within eggs.

Clinical BCD is known to be induced by stress in other salmonids. We will evaluate the effect of reducing chronic stress induced by hand feeding by replacing conventional, periodic hand-feeding with continuous, automated belt-feeders and covering rearing troughs. Mortality and BCD-incidence rates will be compared between hand-fed and belt-fed troughs. Effects of acute stress on BCD intensity resulting from transport and stocking will be examined by comparing mortality and BCD-incidence rates among treatment groups exposed to simulated stocking events or control conditions.

Milestones

Ongoing field work at Washoe Park and related laboratory assessments will be completed during Summer 2003. Data analyses will be conducted during the latter part of 2003 and the final report will be prepared in 2004.

Deliverables

A detailed final report describing the methods, findings, and management implications of the study will be produced. A manuscript will be submitted for publication in a peer-reviewed journal. Results will also be presented at scientific meetings.

Partners

The Montana Department of Fish, Wildlife and Parks will provide use of the Washoe Park State Fish Hatchery, including laboratory and culture facilities, technical assistance, and westslope cutthroat trout.

Technology Transfer**Introduction and Scope**

Partners projects can benefit from lessons learned in previous habitat restoration work. However, a great deal of useful design and monitoring information is never shared by restoration workers, or exists only in "gray literature" where it is difficult to access. Therefore, the technology transfer project of the Initiative will collate resource information and detailed descriptions of methods and results of various fish habitat restoration projects within the intermountain west (Idaho, Montana, Nevada, Wyoming, Utah, Colorado, Eastern Washington, Eastern Oregon, and Eastern California). Information will be organized in a searchable bibliography and case history database accessible through the Initiative website.

Goals and Objectives

The overall project goal is to provide useful bibliographic and case-history data to those responsible for fish-habitat projects within the Partners Program. Specific objectives for Phase II of the project are to: collaborate with Partners biologists and assist them with their information transfer needs; provide an up-to-date web-accessible bibliography of pertinent fish habitat literature; provide a web-accessible clearinghouse for literature on fish habitat topics; provide a web-accessible case history database of fish habitat projects pertinent to Partners activities in the northwestern U.S.; and actively publicize the website to enhance information exchange among Partners Program personnel, land managers, and other fish habitat professionals.

Activities

Four general types of activities will be carried out. First, we will collaborate with Partners Program personnel, fisheries biologists, and habitat specialists to gain additional information regarding current gaps in information transfer and ways in which the Initiative website can address those needs. Second, we will continue to update and enhance resource information on the Initiative website by including an expertise directory, adding an option in the bibliography to export and add selected references, and developing a section within the case histories database documenting common problems in restoration projects. Third, we will continue to collect restoration project information either through remote access or site visits. Finally, resource and case history information will be presented to Partners Program personnel and fishery biologists for formal review, and the final website will be publicized vigorously. The specific anticipated activities are to:

- Update the searchable bibliography and the acquired literature in PDF format on the web;
- Continue communication with university researchers, state wildlife and fish experts, federal agency researchers, private habitat specialists, and private and non-profit organizations to find information on fish habitat projects;
- Acquire needed photographs and documentation for featured case studies;
- Finalize the case history database after external review, and
- Actively publicize the website through meetings, conferences, and online marketing.

Milestones

At least seven completed case histories from Montana, Idaho, Oregon and Washington will be posted on the Initiative website by January 2004. At least seven completed case histories from each of the remaining states in the region (Wyoming, Nevada, Utah, California and Colorado) will be posted by August 2004. Projects from each state will be added, edited, or removed as needed. Information on potential problems with restoration projects and an expertise directory will be added to the website by September 2004. Formal external review of the website will occur during September 2004. The website will be publicized at several meetings, including national and regional Partners Program meetings, the American Fisheries Society Western Division Conference during January 2004, and the North American Association of Fish and Wildlife Agencies annual meeting during March 2004.

Deliverables

There are three deliverables for this project: a web-based bibliography of fish habitat literature in the selected region; a PDF-format literature compilation concerning fish habitat in the selected

region; and web-based case studies of completed habitat projects. Case histories of various types of projects, from around the Northwest, will include narrative descriptions, data tables, photographs, engineering diagrams, and project cost information, insofar as this information can be collected for each case.

Potential Partners

Project information will be collected from a number of sources, including university researchers, state fish and wildlife biologists in the selected states, Federal agency personnel, and fishery biologists employed by private and non-profit organizations in the region.

Fan Creek Westslope Cutthroat Trout Restoration Project

Introduction and Scope

Westslope cutthroat trout currently occupy a small portion of their historical range in the upper Missouri River drainage. Introduced trout species have contributed to this decline, especially through loss of genetic integrity arising from hybridization with rainbow trout. The Aquatic Resources Center, Yellowstone National Park, has been working to restore westslope cutthroat trout to headwater tributaries of Yellowstone National Park in the upper Missouri River drainage. Goals of the program include: 1) gather information on the genetics, biology, abundance, life history, and status of westslope cutthroat trout; 2) stream restoration; and 3) develop techniques for removing non-native species. As part of this effort, Aquatic Resources Center staff collected genetic samples from putative westslope cutthroat trout in streams of the Gallatin River and Madison River drainages in the northwest region of Yellowstone National Park. Of all the streams sampled, only the North Fork of Fan Creek was found to contain a genetically pure population. Introgression was present among fish collected in the East Fork. The apparent genetic purity of the North Fork population was surprising because the site is not isolated downstream from invasion by non-native fishes. These findings suggested that the North Fork population was reproductively isolated either temporally or spatially. That is, westslope cutthroat trout in the North Fork population either spawn in different places or at different times than rainbow trout and hybrids in this system.

A recently completed telemetry study by the Montana Cooperative Fishery Research Unit, in collaboration with the Aquatic Resources Center, characterized seasonal movements of the genetically pure westslope cutthroat trout in the North Fork of Fan Creek and compared these movements to nearby hybridized populations in the mainstem of Fan Creek. No evidence was found to suggest that hybrids entered the North Fork of Fan Creek or the upper portions of the mainstem. Movements of most westslope cutthroat trout tagged in the North Fork were limited; most of the fish stayed in the North Fork. Westslope cutthroat trout tagged in the upper mainstem either made short spawning migrations upstream within the mainstem or made longer migrations to the North Fork. Overall these findings suggested that spatial reproductive isolation is responsible for maintaining the genetic purity of westslope cutthroat trout in the North Fork of Fan Creek.

Unfortunately, continued isolation of this population cannot be assured due to the presence of introgression in the East Fork. Therefore, it was recommended that the genetically pure North

Fork population be protected from introgression by the placement of a semi-permanent artificial barrier on the lower North Fork. Although such a barrier will prevent westslope cutthroat trout residing in the mainstem from returning to the North Fork to spawn, relatively few fish make such a migration. The greater danger is from a single hybrid entering the North Fork, and the installation of an artificial passage barrier will prevent such an occurrence. Chemical reclamation of the East Fork and part of the mainstem of Fan Creek also was recommended to increase the amount of habitat occupied by genetically pure westslope cutthroat trout. This will improve the long-term viability and abundance of the population. Stepwise downstream reclamation, in conjunction with temporary barriers, will allow practicable-sized stream segments to be exterminated entirely. These segments then will be restocked with fish from the North Fork. After complete reclamation, the barrier on the North Fork will be removed and a permanent barrier will be installed in the mainstem, thereby restoring pure westslope cutthroat trout throughout the upper Fan Creek drainage.

The Park Service plans to begin implementing these management actions in 2005, with pre-project planning and permitting occurring during 2003 and 2004. These plans provide an excellent opportunity to evaluate the efficacy of the reclamation procedures and monitor the long-term effectiveness of restoring westslope cutthroat trout in this drainage. Relatively few reclamation efforts of this kind have been undertaken in the past and objective evaluations thereof are uncommon. Accordingly, specific guidelines for successful reclamation projects are needed. Our evaluation of the Fan Creek reclamation effort will fill this information gap and enable land managers and land owners to make informed management decisions.

Goal and Objectives

Our goal is to use the Fan Creek Restoration Project as a demonstration of a native fish restoration project involving chemical removal and movement inhibition of an exotic competitor. The specific objectives of this phase of the project are: 1) to assess the current fishery characteristics of Fan Creek to provide a pre-treatment baseline condition against which the success of the management program can be judged; and 2) to guide project management incorporating state-of-the-art stream reclamation techniques. Future objectives will include assessment of post-treatment conditions

Activities

Abundance, distribution, and genetic composition of westslope cutthroat trout and hybrid trout throughout the Fan Creek system will be assessed during summer before and after reclamation work is conducted. Recently collected data and samples of relevance have not been fully analyzed; we will complete the analyses in addition to conducting a comprehensive survey of existing salmonid populations in the system. Surveys will be repeated after reclamation efforts to assess the effectiveness of the project. The primary sampling tool will be multiple-pass electrofishing of isolated stream reaches to allow estimation of absolute fish abundances therein. All captured fish will be weighed, measured, and tissue-sampled for genetic analyses. Comparison abundance, size, and genetic integrity of fishes before and after the reclamation will determine the effectiveness of restoration activities. Efficacy of barriers installed to prevent upstream migration of exotics will be evaluated through tagging experiments. Project activities will be fully documented to assist in the planning of subsequent restoration efforts.

Milestones

Planning and pre-project data analyses will commence in October 2003. Field work will be conducted from late June through early October 2004. The final report will be completed in December 2004.

Deliverables

A final report detailing the pre-treatment fishery characteristics of Fan Creek will be prepared. The report will also include a management plan describing preferred techniques for restoring the integrity of the Fan Creek westslope cutthroat trout population through removal of exotics and installation of protective barriers preventing intrusion of exotics from downstream.

Partners

The study will be conducted in close cooperation with the Dr. Todd Koel of the Aquatic Resources Center, Yellowstone National Park. The Aquatic Resources Center will install the barriers and conduct the chemical reclamation; we will evaluate the efficacy of those actions in restoring westslope cutthroat trout to the entire Fan Creek system.

Program Administration**Goals and Objectives**

The overall goal of program administration activities will be to support the investigators in carrying out the four projects described above, and meet the needs of the USFWS Project Officer regarding the Initiative. Specific objectives are to:

- Assure fiscal transfers are timely, clear and appropriate;
- Identify and enter into formal relationships with additional project partners, as appropriate;
- Keep the USFWS well-informed about the progress and results of the program; and,
- Publicize the projects and results to interested parties.

Activities

Administrative personnel will manage the USFWS contract and any subcontracts, process invoices and track the fiscal status of each project, invoice the USFWS periodically, submit progress reports to USFWS, submit a single compiled final project report to USFWS, respond to USFWS requests for information or assistance, and support the researchers in acquiring information, supplies and facilities, in contractual or hiring matters, and in other ways as needed.

Milestones

The administrative milestones are shown on the milestone chart. They chiefly consist in reporting to the Fish & Wildlife Service and consummating contractual matters.

Deliverables

The deliverables for the project as a whole are two interim progress reports, regular invoices to the Fish & Wildlife Service, the compiled final project report and the final financial report.

Project Personnel

Dr. Alexander Zale will serve as Principal Investigator. Dr. Zale is the Cooperative Fishery Research Unit Leader for Montana and an Affiliate Associate Professor in the Department of Ecology at Montana State University. Besides exercising overall leadership, he will be the leader of the Irrigation Diversions project, the Fan Creek project, and co-leader for the Bacterial Coldwater Disease project. Dr. Zale's research interests center on applied aquatic ecology and fisheries management. A brief curriculum vita for Dr. Zale accompanies this proposal.

Dr. Thomas McMahon will serve as Project Biologist. Dr. McMahon is an Associate Professor in the Ecology Department at Montana State University whose principal research interests are wild trout management, fish-habitat relationships, winter ecology, and conservation biology of salmonids. He will lead the Westslope Cutthroat Thermal Testing project.

Eileen Ryce, Post-Doctoral Associate in the Ecology Department at Montana State University, will co-lead the Bacterial Coldwater Disease project. Dr. Ryce specializes in fish health issues.

William C. Fraser will direct the Technology Transfer project. Mr. Fraser is a fishery biologist who serves as Manager of the Wild Trout Research Laboratory at the Montana Water Center. His chief professional interests are salmonid ecology and culture.

Michelle White is a Water Quality Specialist with the Montana Water Center. She has degrees in general biology and marine science, and manages water quality projects for the Center. She will serve as project administrator for the Wild Fish Habitat Initiative.

Molly Boucher is a Program Specialist with the Montana Water Center. She has a degree in environmental studies and develops websites and databases for the Center. She is the website developer for the Wild Fish Habitat Initiative and works with William Fraser and Michelle White on the Technology Transfer project.

Beth Bear is a Graduate Research Assistant with the Montana Cooperative Fishery Research Unit at Montana State University. She is working with Dr. Thomas McMahon on the Westslope Cutthroat Thermal Testing project.

Steve Gale is a Graduate Research Assistant with the Montana Cooperative Fishery Research Unit at Montana State University. He is working with Dr. Alexander Zale and Dr. Thomas McMahon on the Irrigation Diversions project.

WILD FISH HABITAT INITIATIVE – PHASE II
Milestones

PROJECT / TASKS	2003		2004					
	Oct	Nov Dec	Jan Feb	March April	May June	July Aug	Sept Oct	Nov Dec
<i>IRRIGATION DIVERSIONS</i>								
• Telemetry / Monitoring	■				■ ■	■ ■	■ ■	
• Abundance Estimate Downmigrating Juveniles	■	■			■ ■	■ ■	■ ■	
• Screen Efficiency Experiments					■	■ ■		
• Data Analyses		■ ■	■ ■				■ ■	■ ■
<i>CUTTHROAT THERMAL TESTING</i>								
• Thermal Trials	■	■						
• Competition Experiments		■ ■	■ ■	■ ■	■ ■			
• Data Analyses						■ ■	■ ■	
<i>BACTERIAL COLDWATER DISEASE</i>								
• Identify Transmission Routes	■	■						
• Acute Stress Experiments		■ ■	■ ■					
• Data Analyses				■ ■	■ ■			
<i>TECHNOLOGY TRANSFER</i>								
• Update Bibliography and Literature	■	■						
• Collate Information on Demonstration Projects	■	■ ■	■ ■	■ ■	■ ■	■ ■		
• External Review of Website							■	
• Attend Meetings			■	■		■		
• Publicize Website							■ ■	■ ■
<i>FAN CREEK</i>								
• Initial Data Analyses	■	■ ■						
• Salmonid Surveys					■ ■	■ ■		
• Data Analyses							■ ■	■ ■
<i>ADMINISTRATION</i>								
• USFWS / MSU Contract	■							
• Interim Reports to USFWS			■			■		
• Final Report								Mar 2005

Budget Notes

- a. Fringe benefit rates are 29% for professionals, 25% for faculty, and 37% for support staff.
- b. Awards are given to graduate research assistants working on the project that have exemplary academic records and work ethics; they are used to help defray the cost of out-of-state tuition.
- c. Travel expenses include mileage for state and personal vehicles, per diem, and airfare.
- d. Supplies include software, books and manuals, office supplies and CD-ROMS, field equipment, and communication costs associated solely with this project.
- e. Vehicle gasoline for federally owned vehicles is not considered a travel item by Montana State University; it is considered a supply item (object code 62216). Because both federal and state vehicles will be used for Initiative research projects, vehicle gasoline has been specified in the supply budget. All expenses for state vehicles are included in the travel budget.
- f. Miscellaneous field supplies include items such as pencils, paper, coin envelopes, tape, rubber bands, etc., that are used in the field and mistakenly may be construed to be office supplies.
- g. The F & A (IDC) return rate negotiated between the Federal government and Montana State University for activities of this type is 26%.