Project Title: Do Fires Favor Nonnative Fishes?

Project Leader: Michael K. Young
Participating Research Contacts: Jason Dunham
Participating Forests/Grassland Contacts: Mike Jakober and Rob Brassfield, Bitterroot National Forest

Funds

Total Project Cost: $171,000 (all figures approximate)
Timeframe (within 2001-2005): 2001-04
2003: $50,000
2004-2005: (remaining costs): $63,000

Progress from 2002-2003: (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

We completed fish community and habitat sampling of over 20 reaches, about half of which were adjacent to burns that have been historically sampled by personnel from the Bitterroot National Forest and Montana Department of Fish, Wildlife, and Parks. As a companion to this study, these personnel are also sampling another 20 reaches. Sampling of all reaches was completed in 2001, 2002, and 2003.

A presentation based on sampling in the first two field seasons was given at the Annual Meeting of the Western Division of the American Fisheries Society.

Within the anadromous portion, fieldwork was initiated in 2002. This work focused on Panther Creek, which is a major tributary to the main Salmon River near Salmon, Idaho. In late winter to early summer of 2002, we worked with local biologists on the Salmon-Challis National Forest to refine study objectives and select sites for fieldwork in the basin. The objectives for FY 2001-2002 were to develop a foundation for future work (2003-2005). There were four specific objectives tied to this initial effort: 1) acquisition of existing information on aquatic vertebrate populations (fish and amphibians), local habitat and landscape characteristics, including information on fire history; 2) preliminary field sampling in burned and unburned streams for comparison of aquatic vertebrate distribution and diversity; 3) development of sampling methods for aquatic vertebrates; 4) empirical modeling of stream temperature gradients, with special reference to the effects of post-fire stream heating. A progress summary for each objective is listed below.

1) Acquisition of existing information. We have acquired GIS coverages, including data from the Salmon-Challis National Forest to create a base layer of digital elevation maps, streams, roads, and fire histories for the Panther Creek basin. We have also modeled stream characteristics using models from Utah State University to describe basic characteristics of each stream segment in the basin, including elevation, contributing

drainage area, and channel slope. This information played an important role in guiding fieldwork for 2002.

2) Preliminary sampling of aquatic vertebrates in burned and unburned streams. We have collected information on aquatic vertebrates (fish and amphibians) at nearly 20 sites in nine streams with different fire histories. Our focus was on populations in smaller, headwater streams, which are hypothesized to be most vulnerable to the effects associated with fire. This new data will be merged with existing information available within the Panther Creek basin in future efforts. This larger database will allow further evaluation of associations between aquatic vertebrates and fire, and provide a basis for designing future sampling efforts.

3) Development of sampling methods. Sampling at the sites is intensive, involving multiple electrofishing passes and mark-recapture. This is because the objective is to establish baselines for sampling, based on a rigorous assessment of sampling efficiency. In spite of the fact that electrofishing has been used to sample fish populations for several decades, there has been no effort of this kind to understand sampling efficiency, with the exception of bull trout. Work from 2001-2002 will provide an important contribution to population monitoring associated with fire effects and in general for aquatic vertebrates.

4) Empirical modeling of stream temperature gradients. Our work in other regions shows that stream temperatures can be predicted accurately using elevation-based empirical models. The relationship between elevation and stream temperature is a measure of the rate of stream heating. Our hypothesis is that fire history (e.g., time since fire, burn severity, area burned upstream) should have an influence on patterns of stream heating. We predict stream temperatures to increase following fire, due primarily to loss of vegetation and changes in channel structure. Because most aquatic vertebrates in headwater streams depend on cold water, we expect the amount and distribution of suitable habitat to change following fire. Our interest is in quantifying loss of thermal habitat, and understanding how long it takes for burned systems to return (if they do) to pre-fire conditions. Other research on aquatic vertebrates shows the amount and distribution of suitable habitat is a key factor related to population persistence. In Panther Creek, we have deployed over 60 thermographs in seven streams in 2002 to measure stream heating in relation to fire history. We will complement this dataset with existing information collected by the Salmon-Challis National Forest and other agencies.

In 2003, we initiated data summaries and analysis. This work is ongoing. Manuscripts on sampling efficiency, detectability, and monitoring protocols for stream salmonids to be completed and submitted for publication in 2004. Analysis of stream temperature data to be completed in 2004. In 2003, we were only able to spend about $4000 of our allocation. The remainder was returned for fire borrowing. Thus, we were not able to dedicate time to some of the objectives described above. If funds lost in 2003 are recovered, we hope to finish field work and assembly of existing data to fully address the question of fire and influences on invasions of nonnative brook trout in Panther Creek.

Plans for 2004: (Description of work.)

One objective is to complete analyses of data on the Bitterroot National Forest portion of this research.

For the Panther Creek study, we hope to complete analysis of existing data without additional financial support (e.g., we will do this with "in kind" contributions). Collection of new data is contingent on return of "borrowed" funds from FY 2003.

Products and/or tech transfer expected in 2004: (Incl. Web links if you have them)
Master's thesis by Clint Sestrich, Montana State University.
Presentation at the annual meeting of the Oregon Chapter of the American Fisheries Society.
Presentation at Idaho Chapter American Fisheries Society (2003)
Presentation at annual Bull Trout Workshop (2003)

Issues that need discussion with the R1/R4/RMRS Steering Group?: (list)

Fire borrowing again halted portions of the field work. We are uncertain whether these funds will be restored. If not, no further work in 2004, other than completion of the thesis, is anticipated.

For the anadromous portion of this study, we anticipate completion of work to validate fish monitoring protocols in 2004. This work will be completed through "in kind" support from RMRS 4353, if further funds are not available. The purpose of the first field season (2002) was to provide a solid foundation for future work to directly link nonnative trout invasions, native fish occurrence, and habitat to wildfire influences. This work cannot be completed without continued and more secure funding.