MONTANA FISH, WILDLIFE & PARKS
FINAL PERFORMANCE REPORT

STATE:	**MONTANA**
GRANT TITLE:	**Native Trout Threats and Spawning Investigations**
AGREEMENT:	**T -30-R-1**
PERIOD COVERED:	**May 27, 2005 through December 31, 2008**

Objective

The objective of this grant is to determine the distributions and abundances of existing native cutthroat trout and fluvial bull trout populations through radio telemetry and analysis of existing habitat condition assessment data.

(Later amendments identified the use of genetic analyses to answer some of the information on bull trout that radio telemetry was not effective in answering).

Location

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Bull trout radio telemetry activities (and genetic sampling) will focus in the drainages of the East Fork Bitterroot River. The habitat assessment will include data that has already been collected in the upper Missouri River basin, upper Yellowstone River and Clark Fork River drainages.

Results

Cutthroat Trout

Inland native cutthroat trout subspecies have declined throughout their ranges, including the two subspecies (westslope, *Oncorhynchus clarkii lewisi*, and Yellowstone, *O. c. bouvieri*) that occur in Montana. Two major reasons for these declines include loss or degradation of suitable habitats and interactions with nonnative trout species, particularly brook trout. Our goal for this study was to identify habitat conditions that promote persistence of westslope and Yellowstone cutthroat trout in the Northern Rocky Mountains. Specific objectives were to: (1) determine if nonnative brook trout and native cutthroat trout occupy similar habitat niches in Northern Rocky Mountain headwater tributaries; (2) illustrate whether stream habitat restoration strategies commonly used in Montana are effective in increasing abundance of cutthroat trout; (3) evaluate how habitat condition interacts with brook trout presence and abundance to affect the abundance and distribution of cutthroat trout; and (4) assess the effect of presence of non-native fishes on success of cutthroat trout habitat restoration projects. We also investigated whether nonnative brook trout and native cutthroat trout consumed the same prey items during the summer.

We investigated whether 75 mm and longer westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) occupied a niche similar niche to 75 mm and longer brook trout (Salvelinus fontinalis) by comparing biomasses, population densities, and individual fish condition factors prior to and following total removal of brook trout in reaches (2.3 to 3.0 km) of three headwater streams in

Montana. We present a new method for estimating standing crops and their associated errors using depletion estimators. Total trout biomass did not change significantly after brook trout removal indicating that these two species have similar niches in these streams. Densities of juvenile westslope cutthroat trout were significantly and negatively affected by densities of juvenile brook trout and positively related to densities of adult westslope cutthroat trout, based on linear model testing ($R2=0.482$; F-ratio=15.415; $P<0.001$). Including densities of westslope cutthroat trout or brook trout from the previous year did not measurably improved model performance. We found that densities of juvenile brook trout negatively affected body condition of juvenile westslope cutthroat trout using two separate analyses. We found evidence for size-asymmetric competition in one stream, but not in the other stream where size-asymmetry was tested. Our results indicated that interspecific competition between brook trout and westslope cutthroat trout was nearly as strong as intraspecific competition within westslope cutthroat trout, especially among juveniles, providing insight into one mechanism by which brook trout displace westslope cutthroat trout.

We found 440 habitat restoration projects in the Montana FWP database that had been started and completed between 1995 and 2006. Of these projects 55 involved some type of stream channel restoration that included construction of pool habitats and 35 projects had instream cover additions associated with them. Our analyses of fish abundance estimates in habitat restoration treatment and nearby control sections indicated that while habitat restoration often increased densities of both cutthroat and brook trout, the proportion of brook trout was often higher within habitat restoration sections than in control sections, especially when instream cover (usually woody debris) was added as part of the restoration project. These findings were more obvious in streams where brook trout had become well established. We also found that habitat restoration projects generally increased average individual body condition of both brook and cutthroat trout, but that these results varied across different projects and streams.

Food habits data suggested that westslope cutthroat trout in allopatry consumed relatively higher proportions of Ephemeropterans than cutthroat trout in sympatry with brook trout. Cutthroat in sympatry with brook trout fed more heavily on terrestrial adult insects off the water's surface. We speculate that brook trout might be displacing cutthroat trout from deeper water benthic positions and forcing them higher in the water column where they fed on surface insects and might also be more vulnerable to predation.

Detailed Report enclosed on CD.

<u>Bull Trout</u>

An amendment was requested to add an additional methodology to accomplish the projects goal of identifying sources of fluvial bull trout in the Bitterroot River Drainage. Radio telemetry proved not to be effective in the Bitterroot River system due to the low density of bull trout and the problems encountered with the feasibility of tracking fish (e.g., forest fires). Genetic methods were proposed as a method to answer questions about bull trout origins in the Bitterroot River. Population ecology theory predicts that isolated populations would demonstrate loss of rare alleles (reduced genetic diversity), reduced recruitment with loss of large highly fecund individuals, and subsequently at a higher risk of extirpation due to these influences. During the summer and fall of 2008, we sampled three tributaries along the Bitterroot River that have lost

their migratory life history due to man-made barriers. Funds from this grant were used to process genetic samples. In the future, these isolated populations will be compared with populations of known connected and disconnected populations to examine whether the loss of fluvial fish in a "connected" tributary results in a system that has the characteristics of a disconnected tributary. Finally, the genetic information cataloged through this project will become useful in the future to assign bull trout sampled in the main stem Bitterroot River to their natal stream, genetically.

Variances: None

Expenditure Recap:

Proposed:

	Federal Share		Match		Total
Direct Costs	14,760.00		5,800.00		20,650.00
Indirect Costs	2,637.61				2,637.61
Total	17,397.61	75.0%	5,800.00	25.0%	23,387.61

Actual:

	Federal Share		Match		Total
Direct Costs	14,730.10		5,799.20		20,529.30
Indirect Costs	2,658.48				2,658.48
Total	17,388.58	75.0%	5,799.20	25.0%	23,187.78

Current Expenditure Summary (Direct Costs):

Operations	14,730.1
Personal Services	5,799.20
Total	20,529.30

Project Personnel

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