

2015 Sport Fish Restoration Project Award Program Nomination
Research and Surveys

State: Colorado

Project No. F-394-R9

Project Title: Sport Fish Research Studies
Period Covered: July 1, 2013 – June 30, 2014

Project Objective: Investigate methods to improve spawning, rearing, and survival of sport fish species in hatcheries and in the wild.

Need: Loss of wild rainbow trout populations in Colorado due to whirling disease has resulted in reduced angling opportunities throughout the State. This loss of quality and diversity of fishing opportunities in Colorado has both biological and economic implications. This project is designed to improve methods for rearing and producing rainbow trout in hatchery settings as well as improve or re-establish self-sustaining populations in the wild.

Objective: The overarching objective of this project is to improve hatchery stocks of rainbow trout to better cope with the whirling disease parasite, identify variety to optimize hatchery production, evaluate post-stocking survival and return to creel in harvest-oriented fisheries, and to re-establish rainbow trout populations in the wild. Several objectives exist under each Job described in this Federal Aid Project including:

1. Rearing and maintaining stocks of whirling disease resistant rainbow trout.
2. Improving methods for hatchery and wild spawning and rearing of sport fish species.
3. Identifying and propagating whirling disease resistant domestic strains that are useful for catchable put-and-take or fingerling put-grow-and-take fisheries management applications.
4. Conducting experiments designed to establish, develop, and evaluate “wild” strain whirling disease resistant rainbow trout for reintroduction into areas where self-sustaining populations have been lost due to whirling disease.
5. Providing information on impacts of fish disease on wild trout populations to the Management and Hatchery Sections of Colorado Parks and Wildlife and other resource agencies. Providing specialized information or assistance to the Hatchery Sections. Contributing editorial assistance to various professional journals and other organizations upon request.

Procedures and Evaluations: Numerous procedures and approaches are outlined in the Federal Aid Report Project No. F-394-R9, many of which would qualify as stand-alone Federal Aid Grant projects.

Rearing and maintenance of resistant rainbow trout stocks included standard fish husbandry techniques, as well as individual marking of select brood fish to delineate specific lots of rainbow trout maintained at the Colorado Parks and Wildlife Research Hatchery.

An experiment conducted to help improve methods for hatchery and wild spawning of sport fish species was designed and implemented to determine sensitivity of various strains and crosses of whirling disease resistant trout to formalin. Known concentrations of formalin were used to

challenge egg, fry, and fingerling life stages of resistant strains of rainbow trout and their crosses to establish comparative sensitivity to the treatment.

Comparisons of resistance and genetic composition of rainbow trout reared from eggs collected at locations where resistant strains had been previously stocked were evaluated as laboratory experiments. Resistance experiments were conducted by exposing fingerling fish of known parentage to triactinomyxons (the stage of *Myxobolus cerebralis* infective to fish), and reared for a period of nine months. Each of the laboratory experiments conducted included treatment and control groups, and results were analyzed using valid statistical techniques.

Comparisons of various strains of rainbow trout were also conducted in hatchery evaluations and field studies to quantify growth rates, survival, whirling disease infection severity, and return to creel. These studies were all conducted with proper experimental design and attention to detail.

Studies to evaluate re-establishment of wild rainbow trout populations included appropriate mark-recapture and/or multiple pass removal estimates.

Results: The results of these studies are extensive, with some key highlights including:

1. Production of over 300,000 resistant strain rainbow trout eggs for both Colorado parks and Wildlife and Utah brood fish replacement.
2. Experimental results demonstrated that some life stages and resistant strains are less sensitive to formalin than others, guiding use of formalin treatment with these strains, including effects of crowding, flows, and feeding regime.
3. Growth evaluations in hatchery trials demonstrated higher growth rates among resistant strain fish compared to other rainbow trout strains commonly used in Colorado.
4. Field trials for put-grow-and-take fisheries demonstrated higher post-stocking survival and lower whirling disease infection levels among resistant strains and crosses, particularly among Hofer-Snake River cutthroat crosses (cutbows), compared to other rainbow trout strains used for that purpose in Colorado.
5. Recruitment of wild rainbow trout arising from resistant rainbow trout stocking events has become evident in many locations throughout Colorado.

Benefits: The results of this project have led to a greater understanding of the mechanisms of whirling disease resistance in rainbow trout. This work has enhanced production potential of hatchery-reared fish, demonstrated a more efficient use of resistant strains and crosses of fish in harvest-oriented fisheries, and has led to the re-establishment of wild rainbow trout populations in Colorado. The outcomes of this work have increased recreational opportunity for anglers in areas where rainbow trout had previously been extirpated due to whirling disease.