

FY-2001 PROPOSED SCOPE OF WORK for:
Small Nonnative Cyprinid Removal-Colorado

Project #:87B

Lead Agency: Colorado Division of Wildlife

Submitted by: Tom Nesler
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Category:

- Ongoing project
 Ongoing-revised project
 Requested new project
 Unsolicited proposal

Expected Funding Source:

- Annual funds
 Capital funds
 Other (explain)

I. Title of Proposal:

Nonnative fish control in backwater habitats in the Colorado and Gunnison rivers in Colorado.

II. Relationship to RIPRAP:

General Recovery Program Support Action Plan:

- III. Reduce negative impacts of nonnative fishes and sportfish management activities.
III.A.2. Assess options to reduce negative impacts of problem species and assess regulations and options to reduce negative impacts on native fishes from nonnative sportfish.

III. Study Background/Rationale and Hypotheses:

One of the contributing factors to the listed status of the Colorado River endangered fishes is impact of nonnative fish species upon the survival and recruitment of the endangered fishes during their early life stages (Bestgen 1997, Bestgen et al. 1997, Beyers et al. 1994, Muth and Snyder 1995, Karp and Tyus 1990, Lentsch et al. 1996, Tyus and Saunders 1996. Previous research and monitoring have demonstrated nonnative fish species such as red shiner, fathead minnow, and sand shiner predominate in low-velocity riverine habitats such as backwaters (Burdick 1995, Anderson 1996, Osmundson and Kaeding 1988, McAda et al. 1996, McAda et al 1994). These same backwaters provide nursery habitat to larval and young-of-the-year life stages of razorback sucker and Colorado pikeminnow; and are believed to be important for bonytail.

Predation and competition between the small, nonnative cyprinid species and the young of the endangered fishes has been demonstrated in laboratory experiments (Muth and Beyers, unpublished data), and is perceived to be influential in limiting survival and recruitment for razorback sucker and Colorado pikeminnow in the wild. Lentsch et al. (1996) recommended seining of select habitats as a viable mechanical control option for introduced cyprinids such as red shiner, fathead minnow, and sand shiner. It is not anticipated that any control strategy implemented in the field will eliminate prolific nonnative fish species. It is considered feasible to attempt to reduce the abundance of select nonnative fishes like the small cyprinids to evaluate, in time and space, the effectiveness of the control methods used and positive biological responses from the native fish community in general and the endangered fish species in particular. The goal of this approach to nonnative fish control is to create conditions favorable for reproductive and recruitment success for the endangered fishes, thereby increasing the abundance of their adult and spawning populations and contributing to their recovery.

Relevant hypotheses are:

H₀: Seine sampling of backwaters will be effective in depleting numbers of nonnative fish species using these habitats in terms of significantly decreasing catch rate indices within and among sampling efforts.

H₀: Seine sampling removal of nonnative fishes from backwater habitats will be effective in terms of significantly increasing the relative and/or absolute abundance indices for native fishes and the endangered fishes estimated through ISMP fall seine sampling.

IV. Study Goal, Objectives, End Product:

Goal: To reduce abundance and proliferation of small nonnative cyprinid and centrarchid fish species in mainstem Colorado and Gunnison River backwater habitats for the benefit of survival and recruitment of native and endangered Colorado River fish species.

Objectives:

1. To significantly reduce the abundance of small nonnative cyprinid and centrarchid fish species present within and among backwater habitats throughout critical habitat in the Colorado and Gunnison rivers on a per sampling trip and seasonal basis.
2. To significantly increase the survival and abundance of native and endangered fish species using backwater habitats in the Colorado and Gunnison rivers.
3. To evaluate backwater seining as an effective field method for controlling the abundance of small nonnative cyprinid and centrarchid fish species and for inducing a positive biological response within the native fish communities of these rivers.

End Product:

Final report describing effectiveness of removal of nonnative cyprinids from backwater habitats using seining in terms of magnitude and duration of removal effect on target fish species and magnitude and duration of biological response from native and endangered fish species. Recommendations and Program Guidance for continued use of this approach or other options to control nonnative cyprinids in backwater habitats.

V. Study Area: Colorado River, 15 and 18 Mile Reaches

VI. Study Methods/Approach:

In order to cover the study area described and deplete as much backwater habitat of nonnative fishes as possible, the methodology is simple and straightforward for time efficiency. Sampling will be conducted for a 3-4 week period preceding and up to spring runoff in June. This time period was chosen because it precedes spawning by Colorado pikeminnow and the razorback sucker population in these river reaches is virtually nonexistent. Other considerations are described below to minimize seining impact to other native fish species and backwater habitat use by adult Colorado pikeminnow during the sampling time period. All backwaters within each study reach will be sampled. Sampling of each reach will be conducted once per week. Sampling will be conducted with 1/8-inch ace mesh bag seines. Two depth and width sizes of seine will be available for use, depending upon the width and depth of the target backwater. The smaller seine will be identical to the ISMP seine (15 x 4 ft); the larger seine will be 30 x 6 ft.

Sampling of a backwater will occur as follows. Since adult Colorado pikeminnow use spring backwaters prior to migration during the time of this sampling (Nesler 1996, Osmundson and Kaeding 1989, Osmundson and Burnhan 1996, Osmundson et al. 1996, 1997, CDOW unpublished data) an effort will be made to induce any adult pikeminnow present to vacate the backwater. This is probably best done using some combination of wading and disturbance using the outboard motor powered boat within the backwater. This has been a proven technique for capturing adult Colorado pikeminnow when used in conjunction with trammel nets employed to block the backwater mouth (Nesler 1996).

The appropriate size seine will then be extended across the backwater mouth and pulled toward the apex. A second seine will be used to block behind the sampling seine in the event the sampling haul must be interrupted. Two complete sampling efforts of the backwater, from mouth to apex, will be conducted at least. A third or fourth depletion haul will be conducted if catch rates warrant. This will be a judgement call for the field crew, taking into account the magnitude of the previous sample sizes and the size of the backwater.

Upon completion of a seine haul, the seine contents will be examined in the water for a cursory estimation of the presence of native fish young. If the relative abundance of native fish such as roundtail chub, flannelmouth sucker, or bluehead sucker in the sample is estimated to be 50% or more in the first seine haul, further sampling of the backwater will be terminated for that week. Depletion sampling will continue if the relative abundance of nonnative fishes is estimated to be greater than 50%. Depletion sampling refers to the

removal of the fish collected via seine sampling from the backwater habitat in order to deplete the numbers of fish present. Each seine haul made will be weighed to the nearest gm wet weight. A subsample of each seine haul will be taken and preserved in 10% formalin to determine species composition and relative abundance. Length and width of the backwater will be measured to establish area sampled.

This sampling process will be repeated at each backwater encountered in each of the target reaches. Depletion sampling will be conducted in each reach once per week for a total of 3-4 sampling trips. Data analysis will include estimation of species composition and relative abundance per seine haul, per backwater, and per river reach. Estimation of the total numbers and biomass of nonnative fish removed from each backwater and river reach will be extrapolated using subsample numbers and weights, and the total weight of the sample in each seine haul. Significant decreases in the weights and numbers of nonnative fish species captured per reach per week during the depletion sampling will be considered as indices of effective temporary control. Backwater area sampled will be used to establish an index of effort each week and each year for each river reach.

A positive biological response to this depletion sampling will be evaluated using the standard abundance indices estimated from subsequent ISMP seine sampling each September on the Colorado River from Palisade to Westwater. A positive response is defined as (1) increases in the total number of native fishes collected via ISMP, (2) increases in the relative abundance of each native fish species as estimated from ISMP sampling, (3) increases in areal seine catch rates for native fish species as estimated from ISMP collections, and (4) similar increases in numbers collected, relative abundance, or catch rates of Colorado pikeminnow young-of-year within ISMP samples. In the absence of ISMP sampling on the other two reaches, the above sampling protocol will be repeated during September for one trip per reach. Increases in the abundance indices of native fish species and the endangered fish species, as well as significant reductions in the magnitude of catch rates of nonnative fishes will be considered as measurements of effectiveness for periodic control of nonnative cyprinid species, and for positive response from the native fish community. It is clearly understood that effects of other environmental factors may introduce bias, variation, and confounding influences into the interpretation of biological responses described above for the target native and introduced fish species. At this time, no other non-flow-related recovery program project, including pond reclamation, Redlands passage, and flooded bottomland enhancement, are being conducted on the same reach scale, and are not expected to confound interpretation of native or nonnative fish abundance indices. Documented results from these other recovery projects will be assessed for their potential influence on the results of this control project. Significant negative impacts of this sampling upon adult Colorado pikeminnow use of backwaters, adult Colorado pikeminnow body condition, or the development of a razorback sucker population will be cause to consider termination this control strategy.

VII. Task Description and Schedule:

See study approach above.

VIII. FY-2001 Work:

- Deliverables/Due Dates

- 1) Interim progress reports following spring depletion sampling by September 30.
- 2) Annual progress reports following each spring depletion fall ISMP sampling cycle by December 15.
- 3) Voucher fish sample collection available for further life history analyses of nonnative fish species of concern or backwater fish community.

FY-2002 Work:

- Deliverables/Due Dates

- 1) Final report following analysis of September 2001 ISMP fall seine sampling data.
Due date-March 30, 2002

IX. Budget Summary:

FY 2001:

Labor:	\$ 40,000
Travel:	8,000
Vehicle operation	3,000
Boat operation	1,000
Equipment (seines, tapes, jars, formalin)	<u>2,000</u>
Total year	\$ 54,000

FY 2002:

Labor:	\$ 20,000
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X. Reviewers (original proposal):

Dr. Kevin R. Bestgen, Larval Fish Laboratory, Colorado State University, Fort Collins
Keith Rose, U.S. Fish and Wildlife Service, Grand Junction, Colorado
William E. Davis/Robert Forrest, Eco Plan Associates, Mesa, Arizona

XI. References:

Anderson, R. 1997. An evaluation of fish community structure and habitat potential for Colorado pikeminnow and razorback sucker in the unoccupied reach (Palisade to Rifle) of the Colorado River, 1993-1995.

Bestgen, K. R. 1997. Interacting effects of physical and biological factors on recruitment of age-0 Colorado squawfish. Ph.D. dissertation, Colorado State University, Fort Collins.

- Bestgen, K. R., D. W. Beyers, G. B. Haines, and J. A. Rice. 1997. Recruitment models for Colorado squawfish: tools for evaluating relative importance of natural and managed processes. Final report. Larval Fish Laboratory Contribution 95. Colorado State University, Fort Collins.
- Beyers, D. W., R. T. Muth, and M. S. Farmer. 1994. Experimental evidence of competition between larvae of Colorado squawfish and fathead minnow. Final report. Larval Fish Laboratory, Colorado State University, Fort Collins.
- Burdick, B. D. 1995. Ichthyofaunal studies of the Gunnison River, Colorado 1992-1994. Final report. Colorado River Fishes Recovery Program, U. S. Fish and Wildlife Service, Grand Junction, Colorado.
- Lentsch, L. D., R. T. Muth, P. D. Thompson, B. G. Hoskins, and T. A. Crowl. 1996. Options for selective control of nonnative fishes in the upper Colorado River Basin. Final Report. Utah Division of Wildlife Resources Publication No. 96-14. Utah Division of Wildlife Resources, Salt Lake City.
- McAda, C. W., T. E. Chart, M. A. Trammell, K. S. Day, P. A. Cavalli, and W. E. Elmlad. 1996. Interagency standardized monitoring program, summary of results, 1995. Colorado River Endangered Fishes Recovery Program, U.S. Fish and Wildlife Service, Denver.
- McAda, C. W., J. W. Bates, J. S. Cranney, T. E. Chart, W. E. Elmlad, and T. P. Nesler. 1994. Interagency standardized monitoring program, summary of results, 1986-1992. Final report. Colorado River Endangered Fishes Recovery Program, U.S. Fish and Wildlife Service, Denver.
- Muth R. T., and D. E. Snyder. 1995. Diets of young Colorado squawfish and other small fish in backwaters of the Green River, Colorado and Utah. *The Great Basin naturalist* 55(2): 95-104.
- Nesler, T. P. 1996. Interactions between endangered fishes and introduced gamefishes in the Yampa River, Colorado, 1987-1991. Federal Aid Project SE-3. Colorado River Recovery Implementation Program Project No. 91-29. Colorado Division of Wildlife, Fort Collins.
- Osmundson, D. B., and L.R. Kaeding. 1988. Studies of Colorado squawfish and razorback sucker use of the '15-mile reach' of the upper Colorado River as part of conservation measures for the Green Mountain and Ruedi Reservoir water sales. Final report. U.S. Fish and Wildlife Service, Grand Junction.
- Osmundson, D. B., M. Tucker, B. D. Burdick, W. R. Elmlad, and T. E. Chart. 1997. Non-spawning movements of sub-adult and adult Colorado squawfish in the upper Colorado River. Final report. Colorado River Recovery Implementation Program Project No. 14(Part III). U. S. Fish and Wildlife Service, Grand Junction, Colorado.

- Osmundson, D. B, and K. P. Burnham. 1997. Status and trends of the Colorado squawfish in the upper Colorado River. Final report. Colorado River Recovery Implementation Program Project No. 14(Part II). U. S. Fish and Wildlife Service, Grand Junction, Colorado.
- Osmundson, D. B, R. J. Ryel, and T. E. Mourning. 1997. Growth and survival of Colorado squawfish in the upper Colorado River. Final report. Colorado River Recovery Implementation Program Project No. 14(Part I). U. S. Fish and Wildlife Service, Grand Junction, Colorado.
- Tyus, H. M., and J. F. Saunders, III. 1996. Nonnative fishes in the upper Colorado River Basin and a strategic plan for their control. Final report. Colorado River Endangered Fishes Recovery Program, U. S. Fish and Wildlife Service, Denver.