

**COLORADO RIVER RECOVERY PROGRAM**  
**FY 2010 PROPOSED SCOPE-OF-WORK for:**  
Nonnative fish control in the middle Green River

**Project No.: 123b**

Lead Agency: UDWR

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Date: December 16, 2009

**Category:**

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

**Expected Funding Sources:**

- Annual funds
- Capital funds
- Other (explain)

I. Title of Proposal:

Nonnative Fish Control in the middle Green River

II. Relationship to RIPRAP:

GENERAL RECOVERY PROGRAM SUPPORT ACTION PLAN

- III. Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
- III.A. Reduce negative interactions between nonnative and endangered fishes.
  - III.A.2. Identify and implement viable active control measures.
  - III.A.2.c. Implement and evaluate the effectiveness of viable active control measures.

GREEN RIVER ACTION PLAN: MAINSTEM

- III. Reduce impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).
- III.A. Reduce negative impacts to endangered fishes from sportfish management activities.
  - III.A.4. Develop and implement control programs for nonnative fishes in river reaches occupied by the endangered fishes to identify required levels of control. Each control activity will be evaluated for effectiveness, and then continued as needed.

III.A.4.a. Northern pike in the middle Green River.

III. Study Background/Rationale and Hypotheses:

The Upper Colorado River Endangered Fish Recovery Program has determined that control of nonnative fish in the upper Colorado River basin is essential to the recovery of the four endangered fish species: Colorado pikeminnow, razorback sucker, humpback chub, and bonytail. This determination has been documented specifically for Colorado pikeminnow, razorback sucker, and bonytail in nursery habitats and in the mainstem middle Green River in Section 4.3.2 of each species' Recovery Goals (USFWS 2002) document.

Smallmouth bass abundance has dramatically increased in the Green River since 2000. This increase resulted in a recommendation from the December 2003 Nonnative Fish Control Workshop (Grand Junction, CO) to attempt control of this species in the Green River. Three years of removal, from 2004-2006 and annual Nonnative Fish Control Workshops have added to the knowledge base of the effort required to successfully remove smallmouth bass from the Green River. During the December 2006 workshop, participants discussed the importance of increasing this removal effort and discussed the need for a dramatic increase to be able to adequately suppress the middle Green River smallmouth bass population. This dramatic increase began in 2007 and will continue at least through 2010.

Northern pike are a significant predatory and competitive threat to the endangered fishes and were rated as one of the six nonnative species of greatest concern by experts on the Colorado River native fish assemblage (Hawkins and Nesler 1991). Northern pike became established in the Yampa River in the early 1980's. Originally introduced as game fish in Elkhead Reservoir in 1977, the species escaped and invaded the upper Yampa River and have expanded their number and range within the Yampa and Green rivers (Tyus and Beard 1990). In previous years, there had been evidence of successful spawning in Stewart Lake near Jensen, Utah and in Old Charlie Wash on the Ouray National Wildlife Refuge (K. Christopherson, Division of Wildlife Northeastern Regional Supervisor, pers. comm.; T. Modde, U.S. Fish and Wildlife Service, Project Leader, pers. comm.). A control program for northern pike in the Yampa River was initiated in 1999 and removal of northern pike in the middle Green River was initiated in 2001. Based on trends in catch rates over subsequent years, removal efforts have been successful at reducing the number of northern pike and maintaining this reduced level in the middle Green River. Effort in 2010 will consist of monitoring northern pike populations (and removing captured individuals) and locating ripe adults.

White sucker are present in the middle Green River and seem to be as successful in younger life stages as the native suckers (Utah Division of Wildlife Resources, unpublished data). In years when native sucker numbers are low, white suckers seem to be just as prevalent. The species is problematic due to its ability to hybridize with native suckers and to compete with native suckers for limited resources. In southwestern Missouri, white suckers become mature around 275

mm (Wakefield and Beckman 2005). Because of this, our goal for removing white suckers is to keep the average total length of the white sucker population less than 275 mm. This may not address their ability to compete with native suckers; however, it should prevent them from spawning with native suckers.

#### IV. Study Goals, Objectives, End Product:

Goal: Sufficiently reduce the abundance of adult smallmouth bass, northern pike, and white sucker in the middle Green River such that their potential to spawn and their predatory and competitive impacts on the growth, recruitment, and survival of endangered and other native fishes is minimized.

#### Objectives:

1. Conduct one tagging pass and eleven removal passes for smallmouth bass in the middle Green River from Split Mountain boat ramp (RM 319.3) to the Tabyago Riffle (RM 206.8).
2. Conduct 16 removal passes for white sucker in the middle Green River from Echo Park (RM 344.5) to the Split Mountain boat ramp (RM 319.3). \*Fifteen of these passes are completed by USFWS/UDWR Moab and one is done by UDWR Vernal (from Whirlpool Canyon to Split Mountain) to monitor the level of white sucker hybridization within this stretch of river.\*
2. Maintain low occurrence of adult northern pike in the middle Green River.
3. Maintain low numbers and smaller sizes of white sucker in the middle Green River.
4. Determine efficiency of smallmouth bass, northern pike, and white sucker removal efforts.
5. Calculate an annual population estimate of smallmouth bass in the middle Green River.
6. Identify the means and levels of smallmouth bass and northern pike control necessary to minimize the threat of predation/competition on endangered and other native fishes.

#### V. Study Area:

The study area encompasses the middle Green River from Split Mountain boat ramp (RM 319.3) to the Tabyago Riffle (RM 206.8). UDWR – Vernal will tag smallmouth bass from the Split Mountain boat ramp to the Tabyago Riffle once during the fourth pass and remove all smallmouth bass captured during passes one, two and three and five through twelve. This section of river is a total of 112.5

miles. UDWR – Vernal will also sample off channel habitats for northern pike and white sucker immediately after ice-off to document spawning and remove any ripe adults. Crew members from UDWR-Vernal will conduct one pass from Whirlpool Canyon to Split Mountain to monitor white sucker/native sucker hybrids because this cannot be done during other removal efforts. All nonnative fish encountered during sampling will be removed from the river (except carp and catfish).

#### VI. Study Methods/Approach:

Smallmouth bass will be removed primarily by electrofishing. Sampling crews will conduct removal activities in a manner that minimizes potential negative impacts to endangered fish as a result of electrofishing activities. This includes discontinuing electrofishing when elevated numbers of endangered fish are known to be present. Situations when this is likely to occur will be when Colorado pikeminnow are staging in tributary mouths or backwater habitats prior to spawning, when razorback sucker are on or near spawning bars and following recent stocking of endangered fish.

Twelve electrofishing passes will be conducted beginning May 31. Two electrofishing boats will simultaneously electrofish each shoreline of the river. Effort will be focused on shoreline habitat that is likely to contain smallmouth bass. All smallmouth bass will be marked with a red FLOY® anchor tag. GPS locations and fish lengths and weights will be recorded on each pass. All collected smallmouth bass will be disposed of on site.

Results of pass four and five will allow the determination of a smallmouth bass abundance estimate using the Lincoln-Peterson approach. If proper training is received, a program MARK estimate will also be attempted. The first few passes may serve to identify smallmouth bass concentration areas as well as concentrations of spawning fish. These areas will receive additional electrofishing effort in subsequent passes. If ripe fish or nesting males are encountered, additional effort will be spent at that time to capture other potential spawning or nesting fish in that area. Further effort may also give an indication as to the presence of young-of-year (YOY) bass. Locations of congregations of YOY bass will be noted and these areas will receive additional electrofishing effort as well in order to displace young-of-year bass. We do not normally see a large number of YOY bass during project #138, YOY pikeminnow monitoring; however, this project will continue in 2010 and all YOY smallmouth bass will be recorded, measured, and removed from the backwater.

All endangered fishes captured during smallmouth bass removal will be scanned for a PIT tag, tagged if needed, weighed (g), measured TL (mm), and released alive.

Two methods will be used in an attempt to identify bass spawning periods and locations. First, crews will examine shoreline areas for nests and destroy any

found; crews will also examine all bass captured in the first few passes for spawning condition.

Known concentration areas for northern pike in the middle Green River during spring include: the mouth of Brush Creek (RM 304.5), Cliff Creek (RM 302.9), Stewart Lake Drain (RM 300.0), Ashley Creek (RM 299.0) and Sportsman Drain (RM 296.6). These areas will be targeted for sampling. White sucker also congregate in these areas in early spring. Due to additional available sampling time, other tributary mouths and backwater habitat will be investigated for northern pike and white sucker populations as well. Removal will primarily be done with the use of fyke nets, trammel nets and electrofishing. Typically, the electrofishing component has been covered partially during the pikeminnow population estimate. In 2008, 44 fyke net nights and only 1.9 hours of electrofishing were devoted to northern pike removal between March 25 and April 15. During this effort, 5 northern pike were removed and 329 white sucker. During the pikeminnow abundance estimate, 124.97 hours of electrofishing were accomplished during April 21 and May 21. This effort accounted for 5 more northern pike being removed from the middle Green River and 70 white suckers. Since the pikeminnow population estimate will not be completed in 2010, additional effort has been allocated to northern pike and white sucker removal which will lead to a substantial increase in electrofishing effort. With the increase in the number of days we will be able to devote to northern pike and white sucker removal, we will also be able to investigate additional backwater habitats and tributary mouths that have not been adequately investigated previous years due to the time constraint caused by the pikeminnow population estimate.

Each of the sampling methods has its issues and we will be ready to change methods depending on whether difficulties arise (i.e., otters in the fyke nets). All northern pike will be taken to the UDWR – Vernal lab for viewing of stomach contents (not a true analysis, just anecdotal observation), determination of ripeness, and subsequent freezing for otolith analysis.

Any endangered fish captured will be scanned for a PIT tag, tagged if needed, weighed (g), measured TL (mm), and released alive.

Nonnative removal and evaluation efforts, which includes tagging and marking of endangered and target nonnative fishes, are also being conducted by other researchers and agencies in other reaches of the Green and Yampa Rivers. Therefore, sampling crews will examine all captured endangered and target nonnative fish for tags or marks and record pertinent information. This information will then be reported to principal investigators as appropriate and included in annual reporting.

Besides the targeted smallmouth bass, white sucker and northern pike, other nonnative species may be encountered and removed. These include walleye, black crappie, bluegill, gizzard shad, and potentially burbot, although burbot have not yet been captured in this reach. These fish will also be taken back to the UDWR – Vernal Game Farm for freezing.

VII. Task Description and Schedule:

Task 1. Capture and remove northern pike and white sucker (UDWR – Vernal; March – May 2010).

Task 2. Twelve smallmouth bass collecting passes from Split Mountain boat ramp to Tabyago Riffle (UDWR – Vernal; June– October 2010).

Task 3. Data entry, analysis, and reporting – October/December 2010.

VIII. FY 2010 Work:

Deliverables/Due Dates

Recovery Program annual progress report: November 2010. Data will be presented for all years of the study within each annual report.

Budget:

Task 1. Capture and remove northern pike and white sucker (UDWR – Vernal).

	Work days	UDWR-Vernal Cost
<b>Labor</b>		
Technician (\$195/day)	80	15600
Biologist (\$340/day)	40	13600
Leader (\$438/day)	2	876
Subtotal		\$30,076
<b>Travel</b>		
1 truck (#10573; 10% of use)*		680
<b>Per diem</b>		
(3 people/day x \$16/person x 15 days/trip)		720
Subtotal		\$1400
<b>Equipment</b>		
One new lower unit		1200
<b>Echo Park white sucker pass</b>		
<b>Labor</b>		
Technician (\$195/day)	6	1170
Biologist (\$340/day)	2	680
Subtotal		\$1850
<b>Per diem</b>		
(4 people/day x \$36/person x 2 days/trip)		288

Task 1 Total \$34,814.00

\*The State of Utah switched to Automotive Resources Inc. for motor pool operations. We now pay substantially more in vehicle costs. It is now easier to calculate the percent of total annual usage that each project requires and multiply that percent by the total annual cost. This will be the new method we use to allocate vehicle costs to each project.

Task 2. Twelve smallmouth bass collecting passes from Split Mountain boat ramp to the Tabyago Riffle (UDWR – Vernal). One mark and eleven removal passes.

	Work days	UDWR-Vernal Cost
<b>Labor</b>		
Technician (\$195/day)	288	56160
Biologist (\$340/day)	96	32640
Leader (\$438/day)	10	4380
Subtotal		\$93,180
<b>Travel*</b>		
1 truck (#8229; 74% of annual use)		4770
1 truck (#11204; 54% of annual use)		3932
1 truck (#10573; 62% of annual use)		4220
<b>Per diem</b>		
(4 people/day x \$16/person x 6 days/trip x 12 trips)		4608
(4 people/day x \$36/person x 2 days/trip x 12 trips)		3456
Subtotal		\$20,986
<b>Equipment</b>		
One new motor (\$6,000)		
3 new lower units (3 x \$1,200 = \$3,600)		
20 new props (20 x \$150 = \$3,000)		
2 data loggers (2 x \$2,000 = \$4,000)		
miscellaneous repair supplies (\$1000.00)		\$17,600

Task 2 Total \$131,766.00

\* See above note for explanation of how this was calculated. The percentages are based on the different vehicles we use for this project and how much they are used for this project relative to our other projects. This is based on our first year with ARI; however, it is not likely to change much over the next few years. For example, vehicle #8229 is used predominantly during this project. It is the vehicle with 74% of its annual use in this project. The vehicle with 54% of its use for this project was used very heavily during the razorback recruitment project and therefore, less of its mileage was for this project. It's a different way to calculate costs; however, we think it is more accurate than the previous method.

Task 3. Data entry, analysis and reporting. UDWR - Vernal

	Work days	UDWR-Vernal Cost
Data Entry		
Technician (\$195/day)	30	5850
Biologist (\$340/day)	20	6800
Leader (\$438/day)	5	2190
Report Prep		
Biologist (\$340/day)	30	10200
Leader (\$438/day)	5	2190
Computers (3 x \$170/mo x 12)		6120
Task 3 Total		\$33,350
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<b>FY 2010 TOTAL</b>		
UDWR – Vernal		\$199,930

IX. Program Budget Summary

UDWR-Vernal  
FY 2010 \$199,930

X. Reviewers

XI. References

Hawkins, J.A., and T.P. Nesler. 1991. Nonnative fishes of the upper Colorado River Basin: an issue paper. Final Report of Colorado State University Larval Fish Laboratory To Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Tyus, H.M., and Beard, J.M., 1990. *Esox lucius* (Esocidae) and *Stizostedion vitreum* (Percidae) in the Green River basin, Colorado and Utah. Great Basin Naturalist 50(1): 33-39.

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U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

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Wakefield, C.K. and D.W. Beckman. 2005. Life history attributes of white sucker (*Catostomus commersonii*) in Lake Taneycomo and associated tributaries in southwestern Missouri. *The Southwestern Naturalist* 50:423-434.