

**COLORADO RIVER RECOVERY PROGRAM
FY 2012-2013 PROPOSED SCOPE-OF-WORK for:**

Project No.: 123b

Nonnative fish control in the middle Green River

Lead Agency: UDWR

Submitted by: Leisa Monroe / Michele Hodge
Utah Division of Wildlife Resources
Northeast Regional Office
152 East 100 North
Vernal, Utah 84078
Phone: 435-781-9453; Fax: 435-789-8343
E-mail: leisamonroe@utah.gov

Date: April 14, 2011

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. Evaluate the effectiveness (e.g., nonnative and native fish response) and develop and implement and integrated, viable active control program.

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.A.4.b. (3) Smallmouth bass in the middle and lower 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 (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*). 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 document (USFWS 2002).

Smallmouth bass (*Micropterus dolomieu*) abundance has 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 through 2013.

Northern pike (*Esox lucius*) 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 has 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. Efforts in 2012-2013 will consist of monitoring northern pike populations, locating ripe adults and, removing captured individuals.

White suckers (*Catostomus commersoni*) 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 abundance is low, white suckers seem to be as prevalent. The species is problematic due to its ability to hybridize with native suckers (McDonald et al. 2008) and to compete with native suckers for limited resources. In southwestern Missouri, white suckers 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 limit their ability to hybridize with native catostomids.

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 complete tagging pass and seven complete 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. Maintain low occurrence of adult northern pike in the middle Green River.
3. Maintain low densities and smaller size classes 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). We will tag smallmouth bass from the Split Mountain boat ramp to the Tabyago Riffle once during the third pass and remove all smallmouth bass captured during passes 1-2 and 4-8. We will also sample off channel habitats for northern pike and white sucker immediately after ice-off to document spawning and remove any ripe adults. All nonnative fish encountered during sampling will be removed except for common

carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), and small-bodied cyprinids.

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. Examples are 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.

Eight electrofishing passes will be conducted beginning in June. 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. Effort will be focused on predetermined concentration areas for smallmouth bass. Each of these concentration areas will be electrofished multiple times and habitat less likely to contain smallmouth bass will be bypassed. GPS locations and fish lengths and weights will be recorded on each pass.

One pass will be a marking pass, and seven passes will focus on removal. Marking smallmouth bass will be conducted on the third pass, and all smallmouth bass will be marked with a red FLOY® anchor tag. The following removal pass will allow the determination of a smallmouth bass abundance estimate using the Lincoln-Peterson estimator. During the seven removal passes, all collected smallmouth bass will be disposed of on site, as will all northern pike and white sucker.

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 during the first two passes; crews will also examine all bass captured in the first few passes for spawning condition. 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 YOY bass. We do not normally see a large number of YOY bass during project #138 YOY pikeminnow monitoring; however, this project will continue in 2012-2013 and all YOY smallmouth bass will be recorded, measured, and removed from backwaters.

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 removal of northern pike and white sucker, which 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 suckers as well. Removal will primarily be done with the use of fyke nets, trammel nets using a block and shock

procedure, and electrofishing. Sampling methods will be adjusted depending on whether difficulties arise (i.e., otters in the fyke nets, high flows, etc.). We will also evaluate white sucker reproductive maturity because of the limited information on these fish specific in the Upper Basin. All white suckers over 120 mm will be collected for dissection to observe their reproductive organs. We will determine the sex of each fish and whether it is reproductively mature and ripe at the time of sampling. Additionally, a fin ray will be collected from each specimen for subsequent age determination analysis (pending future funding).

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. This information will also be provided to the Recovery Program for submission to the Program's database.

Besides the targeted smallmouth bass, white sucker and northern pike, other nonnative species encountered will be removed. These include walleye (*Sander vitreus*), black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), gizzard shad (*Dorosoma cepedianum*), and potentially burbot (*Lota lota*).

All endangered fishes captured during nonnative removal projects will be scanned for a PIT tag, tagged if needed, weighed (g), measured TL (mm), and released alive. In addition, the three target nonnative fish will be removed during other projects, including the Colorado pikeminnow population estimate (Project #128).

VII. Task Description and Schedule:

Task 1. Capture and remove northern pike and white sucker.
March–April 2012 and 2013

Task 2. Eight smallmouth bass collecting passes from Split Mountain boat ramp to Tabyago Riffle.
June–October 2012 and 2013

Task 3. Data entry, analysis, and reporting.
October–December 2012 and 2013

VIII. Deliverables, Due Dates, and Budget by Fiscal Year:

Recovery Program annual progress reports: November 2012 and 2013.

FY 2012 Budget:

Task 1. Capture and remove northern pike and white sucker.

	Work days	UDWR-Vernal Cost
Labor		
Technician II (\$271/day)	7	\$1,897
Technician II (\$250/day)	12	\$3,000
Biologist (\$342/day)	12	\$4,104
Leader (\$354/day)	2	\$ 708
	Subtotal	\$9,709

Travel		
1 truck (#10573; 10% of use)*		\$ 680
Boat gas and oil		\$ 786
	Subtotal	\$1,466

Task 1 Total **\$11,175**

*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 method we use to allocate vehicle costs to each project.

Task 2. Eight smallmouth bass collecting passes from Split Mountain boat ramp to the Tabyago Riffle. One mark and seven removal passes.

	Work days	UDWR-Vernal Cost
Labor		
Technician II (\$271/day)	115*	\$31,165
Technician (\$195/day)	80	\$15,600
Technician II (\$250/day)	60	\$15,000
Biologist (\$342/day)	30	\$10,260
Leader (\$354/day)	10	\$ 3,540
Shuttle Drivers (\$14.87/hr)		\$ 2,848
	Subtotal	\$78,413

Travel**		
1 truck (#11192; 80% of annual use)		\$ 5,440
1 truck (#11204; 50% of annual use)		\$ 3,400
1 truck (#10573; 45% of annual use)		\$ 3,060
Boat gas and oil		\$ 8,064
Per diem		
(4 people/day x \$11/person x 6 days/trip x 8 trips)		\$ 2,112
(4 people/day x \$36/person x 2		

days/trip x 8 trips)	\$ 2,304
Subtotal	\$24,380
Equipment	
One new motor ***	\$ 6,000
3 new lower units (3 x \$1,200)	\$ 3,600
20 new props (20 x \$150)	\$ 3,000
miscellaneous repair supplies	\$ 1,000
Subtotal	\$13,600
Task 2 Total	\$116,393

* Equipment maintenance requires a substantial number of work days. Our technician II is in charge of maintaining the boats, motors, trailers, generators, and electrofishing equipment both before and during the field season.

** 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.

*** One new motor is purchased per year for nonnative fish removal, which allows us to rotate our motors to reduce the amount of wear and tear, and replace motors when needed.

Task 3. Data entry, analysis, and reporting.

	Work days	UDWR-Vernal Cost
Data Entry		
Technician II (\$250/day)	30	\$7,500
Biologist (\$342/day)	20	\$6,840
Report Prep		
Biologist (\$342/day)	25	\$8,550
Leader (\$354/day)	10	\$3,540
Computers (3 x \$170/mo x 12)		\$6,120
Task 3 Total		\$32,550

FY 2012 TOTAL

UDWR – Vernal **\$160,118**

FY 2013 Budget:

Task 1. Capture and remove northern pike and white sucker.

	Work days	UDWR-Vernal Cost
Labor		
Technician II (\$271/day)	7	\$1,897

Technician II (\$250/day)	12	\$3,000
Biologist (\$342/day)	12	\$4,104
Leader (\$354/day)	2	\$ 708
	Subtotal	\$9,709

Travel		
1 truck (#10573; 10% of use)*		\$ 680
Boat gas and oil		\$ 786
	Subtotal	\$1,466

Task 1 Total \$11,175.00

*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 method we use to allocate vehicle costs to each project.

Task 2. Eight smallmouth bass collecting passes from Split Mountain boat ramp to the Tabyago Riffle. One mark and seven removal passes.

	Work days	UDWR-Vernal Cost
Labor		
Technician II (\$271/day)	115*	\$31,165
Technician (\$195/day)	80	\$15,600
Technician II (\$250/day)	60	\$15,000
Biologist (\$342/day)	30	\$10,260
Leader (\$354/day)	10	\$ 3,540
Shuttle Drivers (\$14.87/hr)		\$ 2,848
	Subtotal	\$78,413
Travel**		
1 truck (#11192; 80% of annual use)		\$ 5,440
1 truck (#11204; 50% of annual use)		\$ 3,400
1 truck (#10573; 45% of annual use)		\$ 3,060
Boat gas and oil		\$ 8,064
Per diem		
(4 people/day x \$11/person x 6 days/trip x 8 trips)		\$ 2,112
(4 people/day x \$36/person x 2 days/trip x 8 trips)		\$ 2,304
	Subtotal	\$24,380
Equipment		
ETS Electrofisher system***		\$ 9,000
One new motor****		\$ 6,000
3 new lower units (3 x \$1,200)		\$ 3,600
20 new props (20 x \$150)		\$ 3,000

Miscellaneous repair supplies	\$ 1,000
Subtotal	\$22,600

Task 2 Total \$125,393

* Equipment maintenance requires a substantial number of work days. Our technician II is in charge of maintaining the boats, motors, trailers, generators, and electrofishing equipment both before and during field season.

** 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.

*** A new electrofishing system is purchased every other year to replace faulty equipment and allow us to rotate our electrofishing equipment and generators to reduce the amount of wear and tear. MBS-1D Electrofishers (ETS Electrofishing, LLC) will be purchased rather than Smith-Root 5.0 GPP electrofishers to reduce costs for the electrofishing control box and generator.

**** One new motor is purchased per year for nonnative fish removal, which allows us to rotate our motors to reduce the amount of wear and tear, and replace motors when needed.

Task 3. Data entry, analysis, and reporting.

	Work days	UDWR-Vernal Cost
Data Entry		
Technician II (\$250/day)	30	\$7,500
Biologist (\$342/day)	20	\$6,840
Report Prep		
Biologist (\$342/day)	25	\$8,550
Leader (\$354/day)	10	\$3,540
Computers (3 x \$170/mo x 12)		\$6,120
Task 3 Total		\$32,550

FY 2013 TOTAL

UDWR – Vernal	\$169,118
---------------	-----------

IX. Program Budget Summary

UDWR-Vernal
 FY 2012 \$160,118
 FY 2013 \$169,118

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 the Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.
- McDonald, D.B., T.L. Parchman, M.R. Bower, W.A. Hubert, and F.J. Rahel. 2008. An introduced and a native vertebrate hybridize to form a genetic Bridge to a second native species. *Proceedings of the National Academy Of the Sciences of the USA* 105:10837–10842.
- Tyus, H.M. and J.M. Beard. 1990. *Esox lucius* (Esocidae) and *Stizostedion vitreum* (Percidae) in the Green River basin, Colorado and Utah. *Great Basin Naturalist* 50(1): 33-39.
- U.S. Fish and Wildlife Service. 2002. Colorado pikeminnow (*Ptychocheilus lucius*) recovery goals: amendment and supplement to the humpback chub recovery plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.
- U.S. Fish and Wildlife Service. 2002. Razorback sucker (*Xyrauchen texanus*) recovery goals: amendment and supplement to the humpback chub recovery plan.
- U.S. Fish and Wildlife Service. 2002. Bonytail (*Gila elegans*) recovery goals: amendment and supplement to the humpback chub recovery plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.
- 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.