

**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

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Category:

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

Expected Funding Sources:

- X 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 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 adequately suppress the middle Green River smallmouth bass population. The increased removal effort 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 (and removing captured individuals) and locating ripe adults.

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 just 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 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 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 four removal passes for smallmouth bass in the middle Green River from Split Mountain boat ramp (RM 319.3) to Tabyago Riffle (RM 206.8). In addition, conduct one marking pass and eight removal passes from the Duchesne River confluence (RM 248) to Tabyago Riffle.
2. Maintain low occurrence of adult northern pike in the middle Green River.
3. Maintain low densities 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 from the Duchesne River to Tabyago Riffle.
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 Tabyago Riffle (RM 206.8). Removal will focus on the smallmouth bass population below the Duchesne River to maximize our effort and increase our efficiency. We will tag smallmouth bass from the Duchesne River confluence to the Tabyago Riffle once during the third pass and remove all

smallmouth bass captured on all other passes in the middle Green River. We will also sample off channel habitats for northern pike and white sucker just prior to and 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. 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.

In 2011, 12 passes were conducted for smallmouth bass control efforts in the middle Green River from the Split Mountain boat ramp to Tabyago Riffle. In 2012, only eight passes in this reach will be performed. However, effort that would encompass eight passes in this reach will be allocated in a way that maximizes our removal efforts in 2012. Most importantly, the majority of this effort will be concentrated below the Duchesne River confluence given that a large population of sub-adult smallmouth bass was present in 2011 (Skorupski and Breen 2011). It was demonstrated that if efforts would focus on this area, we could greatly increase our efficiency (Skorupski and Breen 2011).

Two electrofishing boats will simultaneously electrofish each shoreline of the river. Electrofishing passes will be conducted when spring peak flows recede below 10,000 cfs. Effort will be focused on shoreline habitat that is likely to contain smallmouth bass. Four of the eight passes will extend from Split Mountain boat ramp to Tabyago Riffle. Effort from the remaining four passes will be completely reallocated to below the Duchesne River. More specifically, four passes in this reach becomes eight passes because it is less than half the sampling distance. One additional tagging pass will be conducted below the Duchesne River for a Lincoln-Peterson population estimate; all smallmouth bass will be double marked with a red FLOY® anchor tag and a PIT tag. PIT tagging will occur to monitor potential movements into the White River to benefit the future installation of a stationary PIT antenna at Bonanza Bridge (scheduled for fall 2012). Altogether, 13 passes will be conducted from the Duchesne River to Tabyago Riffle, whereas only four passes from Split Mountain boat ramp to the confluence of the Duchesne River will be completed. Fish lengths and weights will be recorded on each pass. All collected smallmouth bass will be disposed of on site. All northern pike and white sucker collected during smallmouth bass removal will be removed and disposed of as well.

The first few passes may serve to identify 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. 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. 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.

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) and Ashley Creek (RM 299.0). These areas will be targeted for removal of northern pike and white sucker, which also congregate in these areas in early spring. Other main channel habitats (from RM 319 to 298) will be sampled in early spring as well; specifically, Island to Rainbow Park and Split Mountain boat ramp to Redwash. Removal will primarily be completed with the use of fyke nets, block and shock using trammel nets, and boat electrofishing. Sampling methods will be adjusted depending on whether difficulties arise (i.e., otters in the fyke nets, high flows, etc.). We will also be evaluating white sucker reproductive maturity because of the limited information on these fish specific to the Upper Basin. All white suckers over 120 mm will be dissected to observe their reproductive organs. We will determine the sex of each fish and whether they are 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*). Otolith structures will be collected from specific nonnative species (burbot, walleye, etc.) upon Upper Colorado River Recovery Program request.

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.

VII. Task Description and Schedule:

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

Task 2. Smallmouth bass removal 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)	16	4,336
Technician II (\$250/day)	24	6,000
Biologist (\$342/day)	24	8,208
Leader (\$354/day)	8	2,832
Shuttle Drivers (\$14.87/hr)		535
Subtotal		\$21,911
Travel		
1 truck (#10573; 10% of use) ^a		680
Boat gas and oil		1,000
Per diem		
(3 people/day x \$11/person x 18 days)		594
Subtotal		\$2,274
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Task 1 Total		\$24,185

^a The State of Utah switched to Automotive Resources Inc. for motor pool operations; calculated as the percent of total annual usage that each project requires multiplied by % total annual cost (calculated for each vehicle).

Task 2. Smallmouth bass removal passes from Split Mountain boat ramp to the Tabyago Riffle.

	Work days	UDWR-Vernal Cost
Labor		
Technician II (\$271/day)	115 ^b	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^a		
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 16 days)		704
(4 people/day x \$36/person x 3 days/trip x 9 trips)		3,888
	Subtotal	\$25,156
Equipment		
ETS electrofisher control box (2 x \$5,435 = \$10,870) ^c		
Honda generators (2 x \$2,890 = \$5,780) ^c		
Camp Gear (\$2,930) ^d		
One new motor (\$7,500) ^c		
Juniper systems data loggers (2 x \$3,200 = \$6,400)		
3 new lower units (3 x \$1,200 = \$3,600)		
20 new props (20 x \$150 = \$3,000)		
Miscellaneous repair supplies (\$5,350)		
	Subtotal	\$45,430
	Task 2 Total	\$148,999

^a See above note for explanation of how this was calculated.

^b 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 before, during and after the field season.

^c The Upper Colorado River Recovery Program fleet is switching from Smith Root to ETS Electrofishing systems; we are purchasing two new electrofisher control units and generators.

^d Due to changes within the scope of work (additional passes below Duchesne R. – remote area), we will be required to do extensive amounts of camping, thus initial purchasing of equipment is necessary.

^e 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. Sampling conditions in the middle Green River are extremely rough on outboard motors (we are unable to operate jet boats within this reach).

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 \$205,734

FY 2013 Budget:

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

	Work days	UDWR-Vernal Cost
Labor		
Technician II (\$271/day)	16	4,336
Technician II (\$250/day)	24	6,000
Biologist (\$342/day)	24	8,208
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Shuttle Drivers (\$14.87/hr)		535
Subtotal		\$21,911
Travel		
1 truck (#10573; 10% of use) ^a		680
Boat gas and oil		1,000
Per diem		
(3 people/day x \$11/person x 18 days)		594
Subtotal		\$2,274

Task 1 Total	\$24,185
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^a The State of Utah switched to Automotive Resources Inc. for motor pool operations; calculated as the percent of total annual usage that each project requires multiplied by % total annual cost (calculated for each vehicle).

Task 2. Smallmouth bass collecting passes from Split Mountain boat ramp to the Tabyago Riffle.

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Labor		
Technician II (\$271/day)	115 ^b	31,165
Technician (\$195/day)	80	15,600
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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 16 days)		704
(4 people/day x \$36/person x 3 days/trip x 9 trips)		3,888
Subtotal		\$25,156
Equipment		
ETS electrofisher control box (\$5,435) ^c		
Honda generator (\$2,890) ^c		
Camp Gear (\$1,000)		
One new motor (\$7,500) ^d		
3 new lower units (3 x \$1,200 = \$3,600)		
20 new props (20 x \$150 = \$3,000)		
miscellaneous repair supplies (\$5,175)		
Subtotal		\$28,600

Task 2 Total	\$132,169
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^a See above note for explanation of how this was calculated.

^b 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 before, during and after the field season.

^c The Upper Colorado River Recovery Program fleet is switching from Smith Root to ETS Electrofishing systems; we are purchasing one new electrofisher control units and generators.

^d 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. Sampling conditions in the middle Green River are extremely rough on outboard motors (we are unable to operate jet boats within this reach).

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		\$188,904

IX. Program Budget Summary

UDWR-Vernal

FY 2012 \$205,734 **UDWR providing \$112,446 towards FY2012 activities**
Request from Program = \$93,288

FY 2013 \$188,904

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.
- Skorupski, J.A. and M.J. Breen. 2011. Nonnative fish control in the middle Green River. Annual Report submitted to the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin. U.S. Fish and Wildlife Service, Denver, CO.
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- 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.