

**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: Utah Division of Wildlife Resources

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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 two smallmouth bass removal passes in the middle Green River from Split Mountain boat ramp (RM 319.3) to Tabyago Riffle (RM 206.8). Full passes will identify concentration areas that will be focused on for the remainder of the field work.
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 (will not occur in 2013).
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. In 2013, effort will focus on concentration areas identified during the full passes and a tagging pass will not occur. 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 because 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 were performed. However, effort that would encompass eight passes in this reach was allocated in a way that maximized our removal efforts in 2012. Most importantly, the majority of this effort was intended to 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). This approach was effective, however multiple concentration areas were observed during full passes in 2012 in addition to areas below the Duchesne River. Thus, effort in 2012 was reallocated to areas (i.e. Split Mountain and Ouray Refuge sections) that were deemed necessary. A similar approach will be utilized in 2013 and future years, however effort will be allocated as necessary to maximize removal efficiency within a 16-week period.

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. Two full passes will extend from Split Mountain boat ramp to Tabyago Riffle. Effort for the remaining 12 weeks will be allocated to concentration areas identified during complete passes (such as Split Mountain, Refuge and below Duchesne River). 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.

Initial bass removal efforts (i.e., June electrofishing) 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 394 to 381) will be sampled in early spring to target northern pike; specifically, Brown's Park. This effort includes three separate trips: scouting, electrofishing and net setting and fyke net pulling. Removal will primarily be completed with the use of fyke nets and raft 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 Colorado River 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–May 2012 and 2013

Task 2. Smallmouth bass removal 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
<b>Labor</b>		
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
<b>Travel</b>		
1 truck (#10573; 10% of use) <sup>a</sup>		680
Boat gas and oil		1,000
<b>Per diem</b>		
(3 people/day x \$11/person x 18 days)		594
Subtotal		\$2,274
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Task 1 Total		\$24,185

<sup>a</sup> 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
<b>Labor</b>		
Technician II (\$271/day)	115 <sup>b</sup>	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
<b>Travel <sup>a</sup></b>		
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
<b>Per diem</b>		
(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
<b>Equipment</b>		
ETS electrofisher control box (2 x \$5,435 = \$10,870) <sup>c</sup>		
Honda generators (2 x \$2,890 = \$5,780) <sup>c</sup>		
Camp Gear (\$2,930) <sup>d</sup>		
One new motor (\$7,500) <sup>e</sup>		
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

<sup>a</sup> See above note for explanation of how this was calculated.

<sup>b</sup> 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.

<sup>c</sup> 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.

<sup>d</sup> 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.

<sup>e</sup> 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
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**FY 2013 Budget:**

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

	Work days	UDWR-Vernal Cost
Labor		
Technician I (\$195/day)	6	1,170
Technician II (\$271/day)	16	4,336
Technician II (\$250/day)	33	8,250
Biologist (\$342/day)	27	9,234
Leader (\$354/day)	11	3,894
Shuttle Drivers (\$149/day)	4	596
Subtotal		\$27,480

Travel

1 truck (#10573; 11% of use) <sup>a</sup>	748
2 truck (#11192 and #11204; 10% of use) <sup>a</sup>	1,360
Per diem (3 people/day x \$11/person x 18 Days; 7 people x 3 days @ \$38/day)	1,392
Equipment	
Boat gas and oil	1,403
Equipment repair, camping and sampling supplies	1,000
Subtotal	\$5,903

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Task 1 Total \$33,383

<sup>a</sup> 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.

	Work days	UDWR-Vernal Cost
<b>Labor</b>		
Technician II (\$271/day)	100 <sup>b</sup>	27,100
Technician (\$195/day)	192	37,440
Technician II (\$250/day)	64	16,000
Biologist (\$342/day)	10	3,420
Leader (\$354/day)	5	1,770
Shuttle Drivers (\$149/day)	64	9,536
Subtotal		\$95,266
<b>Travel <sup>a</sup></b>		
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
<b>Per diem</b>		
(4 people/day x \$11/person x 16 days)		704
(4 people/day x \$38/person x 3 days/trip x 9 trips)		4,104
Subtotal		\$24,772
<b>Equipment</b>		
ETS electrofisher control box (\$5,435) <sup>c</sup>		
Honda generator (\$2,890) <sup>c</sup>		
Camp Gear (\$1,000)		
One new motor (\$7,500) <sup>d</sup>		

New boat and trailer (\$10,200) <sup>e</sup>  
 3 new lower units (3 x \$1,200 = \$3,600)  
 20 new props (20 x \$150 = \$3,000)  
 miscellaneous repair supplies (\$5,536)

Subtotal	\$39,161
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Task 2 Total	\$159,199

<sup>a</sup> See above note for explanation of how this was calculated.

<sup>b</sup> 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.

<sup>c</sup> 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.

<sup>d</sup> 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).

<sup>e</sup> Due to the age of the boat, the metal is thinning beyond repair and deemed unsafe.

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	\$225,132
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IX. Program Budget Summary

UDWR-Vernal

FY 2012 \$205,734

UDWR providing \$112,446 towards FY2012 activities  
 Request from Program = \$93,288

FY 2013 \$225,132

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.
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