COLORADO RIVER RECOVERY PROGRAM **Project No.:** 157
FY 2010-2011 PROPOSED SCOPE-OF-WORK for:
The use of a floating weir for removal of nonnative fish on the Duchesne River

Lead Agency: UDWR

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Category:
__Ongoing project
__Ongoing-revised project
__Requested new project
X Unsolicited proposal

Expected Funding Sources:
X Annual funds
__Capital funds
__Other (explain)

I. Title of Proposal:

The use of a floating weir for removal of nonnative fish on the Duchesne 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.

DUCHESNE RIVER 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. 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 in Section 4.3.2 of each species' Recovery Goals (USFWS 2002) document.

Smallmouth bass abundance has dramatically increased 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 and its tributaries. Three years of removal in the mainstem Green River, from 2004-2006, and annual Nonnative Fish Control Workshops have added to the knowledge base of the effort required to increase effectiveness of removal of smallmouth bass. 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 smallmouth bass population.

This dramatic increase translated into additional removal passes in an effort to achieve an estimated target of 65% removal of the smallmouth bass population. Based on a commercial fishery model, researchers at the U. S. Fish and Wildlife Service office in Vernal, Utah suggested that a minimum of 65% exploitation of the adult population was required for nearly 20 years in order to be able to "crash" the population and reduce smallmouth numbers to a level that would not impact the native fishes.

Based on this model, the three removal passes completed in this section of the mainstem Green River in each year between 2004 and 2006 were severely inadequate. Instead, the model showed that a much higher number of removal passes is required in this reach of river (the nine removal passes completed in 2007 were nearly sufficient to attain 65% removal, and the 12 removal passes completed in 2008 fell short of the 65% removal goal due to the apparent influence of high flows on either the success of smallmouth bass spawning or the probability of capture of smallmouth bass). The logistics of and the funding required for this level of effort has been feasible in the short run; however, concerns have been raised about the feasibility of the program in the long run. Because of this, researchers have been encouraged to look to other techniques and

gears in an effort to increase their ability to remove these fish and potentially speed up the process of "crashing" the population.

The use of a weir has been identified in numerous locations as a means for increasing catch rates of target species. Researchers have used this gear type at Bright Angel Creek to remove brown trout; floating weirs have been used in the Klamath Basin to increase catch rates for an endangered sucker and in Alaska to count salmon and Dolly Varden. Weirs have also been used in the Blackfoot River, Idaho to monitor and count the number of Yellowstone cutthroat trout spawning adults going up river to spawn.

The use of a floating weir in the Duchesne River can be an effective tool in the removal of nonnative fish species. Several studies have demonstrated that smallmouth mouth do indeed move long distances. VanArnum et al (2004) studied 39 radio-tagged smallmouth bass and labeled them as either migratory or sedentary. Sixty nine percent of this population of smallmouth bass was migratory, with only 31% being sedentary. Todd and Rabeni (1989) monitored 34 smallmouth bass. The maximum upstream movement that some of these fish traveled was 7.5 km and the maximum downstream movement was 5.7 km. Seasonal movement of smallmouth bass has also been documented. Langhurst and Schoenike (1990) observed adult smallmouth bass > 200mm moving great distances (69-87 km) from one river to another during the fall and Altena (2003) observed smallmouth bass making fall migrations of up to 27 km and spring migrations of up to 29 km to their spawning areas. Other nonnative fish species that can be removed with the use of a weir include channel catfish and carp. Both of these are also commonly known to make many large-scale movements throughout the year. Carp were categorized as semi-mobile and channel catfish as mobile during a movement study in Missouri (Funk, 1957). These two detrimental nonnatives could be removed as well after approval of a nonnative removal plan for these species.

With a live box on both the upstream and the downstream side of the weir, theoretically we should be able to catch both the migratory and sedentary smallmouth bass located within the Duchesne River and those smallmouth bass that are moving into the Duchesne River when the water temperature in the mainstem decreases. It would also be an effective method to catch both the mobile and semi-mobile channel catfish and common carp.

Multiple locations in which a weir will be stable and effective have been located within the Duchesne River and difficulties with positioning a weir in Duchesne River have been discussed and addressed. These difficulties include withstanding high flows with smaller spacing of the PVC pipe, stabilizing the weir on the bottom of the channel, keeping the structure from becoming sedimented in over the course of the season, and keeping the weir clear of debris accumulation.

To address the high flows issue, the weir will be placed during low flow periods. If flows do increase, the resistance boards can be removed so that flows can continue over the lowered weir structure. The weir will be stabilized on the bottom of the channel using long pins driven into the sediment. Anchoring mechanisms will be located on each bank as well. The issue of sedimentation will be dealt with by the use of sand bags placed in strategic locations at the bottom of the weir to promote a scouring effect. Cleaning of the weir will be performed on a daily basis during the time that the fish trap is being checked. Floating weirs are meant to pass large woody debris and can be built with attachments to allow for upstream and downstream boat travel, so many issues are minimized with the actual design of the structure.

IV. Study Goals, Objectives, End Product:

Goal: Use of a floating weir in the Duchesne River to remove nonnative species, specifically targeting smallmouth bass.

Objectives: Order, construct and place a floating weir structure in the Duchense River.

End Product: The removal of the majority of nonnative fish species within the Duchesne River.

V. Study Area:

The study area encompasses the Duchesne River. In the future, if successful, the study area may expand to include the mainstem Green River from Split Mountain boat ramp (RM 319.3) to Sand Wash (RM 215.8).

VI. Study Methods/Approach:

A weir will be placed within the Duchesne River with a fish trap on both the upstream and downstream sides of the weir. The Duchesne River will be actively sampled with electrofishing. In addition to looking at whether the weir will increase catch rates during active removal, we will also evaluate passive capture rates for smallmouth bass in the trap portion of the weir on the days when removal is not occurring in the Duchesne. We will determine the best strategy for removing nonnative fish through the use of the weir after analyzing the results of this first year.

VII. Task Description and Schedule:

Task 1. Place order of one floating weir through FISHBIO.

Task 2. Install floating weir on the Duchesne River (July, after pikeminnow spawning has ended)

Task 3. Empty live boxes and clean weir each day, recording all nonnative and native fish present (July – October).

VIII. FY 2010 Work:
Deliverables/Due Dates
November 2010. Annual report will be made available to the Biology Committee.

Budget:

Task 1. Place order of one floating weir through FISHBIO.

	Work Days	UDWR Vernal Cost
Ordering		
Biologist ($340/day)	4	$1360.00
Weir		$29,000.00
Task 1 Total		**$30,360.00**

Task 2. Install floating weir on the Duchesne River.

	Work Days	UDWR Vernal Cost
Installation		
Technician ($195/day)	6	$1170.00
Biologist ($340/day)	6	$2040.00
Leader ($438/day)	6	$2628.00
Travel		
Vehicle		
(1truck/day x 50 mi/truck x 0.505/mi x 6 days)		$151.50
Maintenance (oil, tires, cleaning)		$500.00
Boats		
(12 gal gas/boat x 1 boat/day x $4.00/gal x 6 days)		$288.00
Per Diem		
(4 people/day x $15/person x 6 days)		$360.00
Task 2 Total		**$7137.50**

Task 3. Empty live boxes each day, recording all nonnative and native fish present (July – October).

	Work Days	UDWR Vernal Cost
Empty live boxes		
Technician ($195/day)	120	$23,400.00
Biologist ($340/day)	60	$20,400.00
Leader ($438/day)	10	$4380.00
Travel		
Vehicle		
(1 truck/day x 50 mi/truck x 0.505/mi x 120 days)		$3030.00
Maintenance (oil, tires, cleaning)		$1000.00
Boats		
(12 gal gas/boat x 1 boat/day x $4.00/gal x 120 days)		$5760.00

Per Diem	
(2 people/day x $15/person x 120 days)	$3600.00
Task 3 Total	**$61,570.00**

IX. Program Budget Summary

	UDWR-Vernal
FY 2010	$99,067.50

X. Reviewers

XI. References:

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Funk, J.L. 1957. Movement of stream fishes in Missouri. Transactions of the American Fisheries Society 85:39-57.

Langhurst, R. W., and D. L. Schoenike. 1990. Seasonal migration of smallmouth Bass in the Embarrass and Wolf Rivers, Wisconsin. North American Journal of Fisheries Management 10:224-227.

Todd, B.L., and C.F. Rabeni. 1989. Movement and habitat use by stream-Dwelling smallmouth bass. Transactions of the American Fisheries Society 118:229-242.

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, Mountain-Prairie Region (6), Denver, Colorado.

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.

VanArnum, C. J. G., G. L. Buynak, and J. R. Ross. 2004. Movement of smallmouth bass in Elkhorn Creek, Kentucky. North American Journal of

Fisheries Management 24:311-315.