COLORADO RIVER RECOVERY PROGRAM Project No.: 110
FY-2009-2010 PROPOSED SCOPE OF WORK

Title: Smallmouth bass control in the lower Yampa River

Lead Agency: U.S. Fish and Wildlife Service

Submitted by: Tildon Jones
U.S. Fish and Wildlife Service
Colorado River Fish Project
1380 S. 2350 W.
Vernal, UT 84078
Office (435) 789-0366 x14 Fax (435) 789-4805
Email tildon_jones@fws.gov

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Category:
__ Ongoing project
x Ongoing-revised project
Requested new projects
Unsolicited proposals

Expected Funding Source:
x Annual funds
Capital funds
Other (explain)

I. Title of Proposal: Smallmouth bass control in the lower Yampa River within Yampa Canyon.

II. Relationship to RIPRAP: Green River Action Plan: Yampa and Little Snake Rivers

A.1.c.(1) Nonnative fish removal in Yampa Canyon.

III. Study Background/Rationale and Hypotheses:

Nonnative fishes have become established in rivers of the upper Colorado River basin, and certain species contribute to reductions in the distribution and abundance of native fishes primarily through predation and competition (e.g., Hawkins and Nesler 1991; Lentsch et al. 1996; Tyus and Saunders 1996). Controlling problematic nonnative fishes is necessary for recovery of endangered humpback chub *Gila cypha*, bonytail *G. elegans*, Colorado pikeminnow *Ptychocheilus lucius*, and razorback sucker *Xyrauchen texanus* in the upper Colorado River basin. One of the five extant wild populations of humpback chub in the upper

Colorado River basin occurs in Yampa Canyon on the lower Yampa River, Colorado (Valdez and Carothers 1998). Here in ways similarly seen nationwide, ictalurids and centrarchids are contributing to their demise (ANSTF 1994).

The nonnative smallmouth bass *Micropterus dolomieu* was first introduced into Colorado in 1951 (Colorado Division of Wildlife NDIS 2009) and has increased in abundance and range throughout much of the upper Colorado River basin. Smallmouth bass have been recognized as the principal predator and competitor affecting humpback chub populations in the upper Colorado River basin. Electrofishing catch rates of smallmouth bass dramatically increased in the Yampa River in 2004 (Fuller 2004). It is our opinion that the increase in smallmouth bass abundance will exacerbate the impacts that nonnatives have on the already distressed native fauna in the Yampa River. Concerns for humpback chub and Colorado pikeminnow susceptibility to smallmouth bass predation have resulted in annual RIP nonnative fish control workshops since 2003. Smallmouth bass may now pose the greatest threat to endangered and native fishes in the lower Yampa River. In light of this, removal efforts were shifted primarily towards bass in 2007. Large catfish ($\leq$400 mm TL) will also be removed since studies have found increased piscivory in channel catfish at mean total lengths greater than about 400mm (Tyus and Nikirk 1990).

IV. Study Goals, Objectives, End Product:

The purpose of this study is to develop an effective control program for smallmouth bass in Yampa Canyon, and to sufficiently reduce the abundance of smallmouth bass such that predatory and competitive impacts on growth, recruitment, and survival of resident humpback chub and Colorado pikeminnow are minimized. We propose to evaluate depletion using a mark-recapture estimate of the annual population and an analysis of catch per effort. The efficiency of removal efforts will be evaluated by comparing catch rates in 10 stratified reaches of approximately equal length. Additionally, five one-mile sub-reaches will be selected within the ten contiguous reaches to monitor large fish composition and determine a native fish response to control. Occasionally, in years when mark/recapture techniques are used (2009) to evaluate depletion, all smallmouth bass will be marked and returned to the river alive in the first pass on the descending limb of the hydrograph (June). Thereafter, marked fish will be collected and removed from the river. The study specific objectives are:

1. To reduce the abundance of smallmouth bass in Yampa Canyon by capture and removal (lethal).

2. Compare the catch rates of smallmouth bass to determine the efficacy of removal efforts.

3. Determine annual sub-adult and adult native and nonnative fish composition.

4. Locate congregated bass expressing pre and post-spawning activity – “hotspots” where spawning can be disrupted with intensive electrofishing.

End Products: Annual reports to the upper Colorado River Endangered Fishes Recovery Program (RIP) for each year of the study and as required throughout the duration of the project. Data describing combined catch rates, catch rates per reach, and length frequencies will be presented for all years of study within each annual report.

V. Study Area:

The lower Yampa River in Yampa Canyon (from Deerlodge Park [river mile 46] downstream to the Green River confluence [river mile 0]). This section of the Yampa River is within the boundary of Dinosaur National Monument and subject to U.S. National Park Service operating regulations.

VI. Study Methods/Approach:

Study Methods: Jackson and Badame (2002) demonstrated that electrofishing was the most effective method for capturing centrarchids in the nearby middle Green River, and found that smallmouth bass catch rates were highest during September and October. Badame et al. (2008) also experienced catch rates to be greatest in late summer, but, because opportunities to access the canyon become limited as early as July (by water levels), sampling will begin as soon as April. Ideally, sampling occasions will be implemented strategically to match optimal sampling conditions particularly when environmental and biological cues are known to improve catch rates, e.g. to disrupt spawning, and following storm events and periods of high turbidity.

Targeting age 2 and older smallmouth bass has been determined an advantage to control using electrofishing techniques. This allows capture of multiple cohorts during single sampling events. Presence of YOY bass, especially as a congregation at a nest site, during post-spawning activity may help pinpoint bass nest areas which could then be subjected to more focused electrofishing to force YOY bass out of nests and into unprotected areas.

Smallmouth bass spawning/nesting periods and locations will be determined if possible. Spawning habitats will be identified when nests, pairing and other spawning behaviors are observed. All adult bass will be examined for spawning status e.g. expression of gametes, and location of spawning bass congregations, which will then be targeted to remove adult bass guarding nests. Temperatures will be taken to correlate with spawning activity. Other capture methodologies and techniques will be implemented on an experimental basis (e.g. electric seines to collect YOY bass, fish traps, etc).

Fish handling and disposal: Nonnative fish captures incidental to smallmouth bass including (green sunfish, bluegill, and black crappie), northern pike, channel catfish $\geq$400 mm and walleye will be removed and reported. Other less common nonnative species encountered (e.g. grass carp,gizzard shad or burbot) will be removed and reported to the appropriate state agency. During removal passes all nonnative fish taken from the river will be identified, measured and weighed, and deposited along off-shore river banks. Deposition of fish will not occur in high use areas. High use areas include designated campgrounds, picnic areas and points of interest frequented by commercial and private river runners. Any endangered fish captured will be scanned for a PIT tag, tagged if needed, weighed (g), measured TL (mm), and released alive.

Endangered fish data will be reported and stored in a database in the U.S. Fish and Wildlife Service CRFP Grand Junction office. In 2009, all unidentified juvenile chubs and all adult roundtail chubs will be measured for total length and weight, scanned for PIT tags, and PIT tagged if no existing tag is detected.

Study Approach: Two rafts equipped with Smith-Root GPP 5.0 electrofishing units will be used to shock the entire length of study area (one per shoreline) for up to seven 4-5-day trips. All reaches will be sampled by two people per raft, an operator and one netter. To allow for statistical comparisons of removal efficiency and fish movement, the lower 46 miles of the Yampa River will be stratified into ten contiguous reaches of approximately equal length (4-5 river miles). Five one-mile sub-reaches will be selected within the ten contiguous reaches to monitor large fish composition and to identify the native fish response to control efforts. In these smaller sub-reaches all fish (native and nonnative) will be captured measured and weighed; the natives will be returned to the river and all targeted nonnatives removed.

Sampling will begin in early April as river discharge permits. All smallmouth bass captured during two April sampling passes will be removed. Following spring runoff, a marking pass will be conducted in early-mid June. The marking pass will be determined based on historic catch rates of bass related to flow, and coordinated with UDWR marking passes in Whirlpool Canyon and the Uintah Basin. In summary, we anticipate conducting 2 removal passes in early April before high flows, and one marking pass and four removal/recapture passes following peak flows in June. Bass will be held alive, marked with individually numbered, blue Floy® tags, and released near their site of capture to the extent practical. Any subsequent passes will be removal/recapture passes, with the pass immediately following marking being the primary recapture pass used for population estimation. Total numbers of smallmouth bass and other nonnative fish collected and catch per unit of effort will be available for each reach per trip. The experimental unit will consist of the average number of target species captured per hour. Length and weight data will be used to determine the size structure of smallmouth bass removed. Estimates of weight, together with size and removal numbers, will be used to calculate total biomass of smallmouth bass. In years that population estimates using mark-recapture are used to track the effectiveness of removal efforts (2009), a Lincoln-Petersen estimate with Chapman's correction will be used, and other models may be explored in the Program MARK. Changes in length frequency distribution of smallmouth bass will be analyzed. Year end analysis will summarize the biomass estimates and numbers of smallmouth bass removed from the Yampa River; determine if differences occurred between numbers and sizes removed among reaches; and determine any changes in size structure of smallmouth bass associated with removal.

To be effective and to maintain public understanding and support, it will be critical to initiate an active public relations campaign. We will assist the RIP staff, CDOW, and the National Park Service in their research and I&E efforts on nonnative removal projects.

VII. Task Description and Schedule:

Task 1: Conduct one marking pass for smallmouth bass after spring runoff; remove smallmouth bass on all subsequent trips as well as on two pre-runoff trips conducted in April. Monitor fish

community (all species; primarily with boat based electrofishing) in five, one-mile long sub-reaches throughout Yampa Canyon. [April; June – September].

Task 2: Analyze data and determine the smallmouth bass rates of removal. Track smallmouth bass density in the ten river reaches and species composition in the five sub-reaches. Prepare annual reports that identify the means and level of bass control (removal) achieved and present results in annual meetings.

IX. Budget Summary

FY2009:

Deliverables/Due Dates: Annual Report by November 2009.

Task Activity	Days	Cost
Task 1		
Labor		
GS-11 Biologist ($397/day)	28	$11,116
GS-11 Biologist trip prep	14	$5,558
GS-8 Fish Tech ($356/day)	28	$9,968
GS-8 Fish Tech trip prep	14	$4,984
3 GS-5 Tech ($175/day)	28	$14,700
(+1 person for low flow trips x 2 trips)	8	$1,400
3 GS-5 Technicians trip prep	14	$7,350
Subtotal		$55,076
Travel, Per Diem, Equipment		
(3 trucks/trip x 275 mi/truck x $0.505/mi x 7 trips) Vernal to Deerlodge to Echo, round trip (+1 truck for low flow trips x 2)		$3,194
Shuttle (3 trucks/trip x $150/truck x 7 trips) Deerlodge to Echo Park (+1 truck for low flow trips x 2)		$3,450
(12 gal gas/boat x 3 boats/trip x $3.50/gal x 7 trips)		$882
(2 qts motor boat oil/boat x 3 boats/trip x $3.00/qt x 7 trips)		$126
GSA truck	2	$5,400
Vehicle maintenance (oil chgs, tires, cleaning, etc.)		$2,000
Per diem (5 people/day x $30/person x 4 days/trip x 7 trips) (+1 person for low flow trips x 2)		$4,440
1 outboard motor		$2,500
GS-8 Fish Tech maintenance work	20	$7,120
Maintenance/replacement of rafting gear, sampling nets, electrofishing gear, etc.		$7,000
Subtotal		$36,112
Task 2		
Data Analysis, Annual Report, Synthesis Report		
GS-14 Project Leader ($535/day)	10	$5350
GS-11 Biologist ($397/day)	60	$23,820
GS-9 Admin Assist. ($271/day)	10	$2,710

Supplies (Copies, disks, paper, etc.)		$3,000
Per diem (1 person x $140/day) Vernal to Grand Junction	3	$420
Travel to give presentations at workshops and meetings (1 truck/trip x 275 mi/truck x $0.505/mi x 1 trip)		$139

Subtotal	$35,439

Total	$126,627

FY2010:

Deliverables/Due Dates: Annual Report by November 2010.

Task Activity	Days	Cost
Task 1		
Labor		
GS-11 Biologist ($417/day)	28	$11,676
GS-11 Biologist trip prep	14	$5,838
GS-8 Fish Tech ($364/day)	28	$10,192
GS-8 Fish Tech trip prep	14	$5,096
3 GS-5 Tech ($175/day)	28	$14,700
(+1 person for low flow trips x 2 trips)	8	$1,400
3 GS-5 Technicians trip prep	14	$7,350

Subtotal	$56,252

Travel, Per Diem, Equipment		
(3 trucks/trip x 275 mi/truck x $0.505/mi x 7 trips) Vernal to Deerlodge to Echo, round trip (+1 truck for low flow trips x 2)		$3,194
Shuttle (3 trucks/trip x $150/truck x 7 trips) Deerlodge to Echo Park (+1 truck for low flow trips x 2)		$3,450
(12 gal gas/boat x 3 boats/trip x $3.50/gal x 7 trips)		$882
(2 qts motor boat oil/boat x 3 boats/trip x $3.00/qt x 7 trips)		$126
GSA truck	2	$5,400
Vehicle maintenance (oil chgs, tires, cleaning, etc.)		$2,000
Per diem (5 people/day x $30/person x 4 days/trip x 7 trips) (+1 person for low flow trips x 2)		$4,440
1 outboard motor		$2,500
GS-8 Fish Tech maintenance work	20	$7,280
Maintenance/replacement of rafting gear, sampling nets, electrofishing gear, etc.		$7,000

Subtotal	$36,272

Task 2		
Data Analysis, Annual Report, Synthesis Report		
GS-14 Project Leader ($535/day)	10	$5,350
GS-11 Biologist ($417/day)	60	$25,020
GS-9 Admin Assist. ($271/day)	10	$2,710
Supplies (Copies, disks, paper, etc.)		$3,000

Per diem (1 person x $140/day) Vernal to Grand Junction	3	$420
Travel to give presentations at workshops and meetings (1 truck/trip x 275 mi/truck x $0.505/mi x 1 trip)		$139

Subtotal	$36,639

Total	$129,163

IX. Budget Summary (Does not include overhead):

FY 2009 $126,627
FY 2010 $129,163

X. Reviewers: T. Nesler, R. Valdez, K. Christopherson

XI. References:

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