COLORADO RIVER RECOVERY PROGRAM Project No.: 110
FY-2007 PROPOSED SCOPE OF WORK

Smallmouth bass control in the lower Yampa River

Lead Agency: U.S. Fish and Wildlife Service

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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 III.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 [CDOW] wildlife report, 2001) 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 have dramatically increased in the Yampa and Green Rivers since 2002 (Anderson and Fuller, 2002 and 2003). It is our opinion that the increase in smallmouth bass abundance will exacerbate the impacts that nonnatives have on the Yampa=s already distressed native fauna. 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 are now implicated to pose the greatest threat to endangered and native fishes in the lower Yampa River.

In 2007, because a positive endangered fish response to depletion efforts is yet to be reached and due to the voracious nature of smallmouth bass, emphasis will be solely directed to removing smallmouth bass.

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 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 (2008) to evaluate depletion, all smallmouth bass will be marked and returned to the river alive in the first pass of that field season. 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 nonative fish composition.
4. Locate congregated bass expressing pre and post-spawning activity - Ahotspots@ 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 zero]). 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: Hudson (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. Modde and Fuller (2000) 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.

The bulk of smallmouth bass diet consists of crustaceans and aquatic insects during the first stages of life and then small fish as they grow larger (Moyle 1976). Young of year (YOY) smallmouth bass are capable of preying on YOY Yampa River native fishes by late summer. Smallmouth bass prefer cool, flowing streams, and commonly avoids sluggish or muddy water but is commonly encountered in clear to slightly turbid, shallow water, over substrates including sand, gravel, rubble, and boulders. The optimum temperature for bass egg deposition is 16.1-18.3 EC (Scott and Crossman 1973). The male guards the nest during incubation, and after hatching until juvenile fish reach about 25 mm TL (Emig 1966). Maturity is reached during their third or fourth year (Moyle 1976); others have reported that the fish mature mostly at age 2 (Emig 1966; Webster 1954). 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. Age 0 and 1 smallmouth bass will still be collected but incidental to sub-adult and adult bass. 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 for possible nesting Ahotspot@targets and to remove adult bass guarding nests. Temperatures will be taken to correlate with spawning activity. Other methodologies and sampling techniques will be implemented on an experimental basis as they become viable means for control i.e. use of electric seines to collect yoy bass, flow manipulations to disrupt spawning behavior, fish traps etc.

Fish handling and disposal: Captures incidental to smallmouth bass including centrarchids (green sunfish, bluegill, and black crappie), northern pike, channel catfish >400 mm and walleye will be removed and reported. Any nonnative species of special concern such as grass carp, gizzard shad or burbot will be removed and reported to the appropriate state agency for permission to remove. During removal passes all fish taken from the river will be identified by species, 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.

Study Approach: Two rafts equipped with Smith-Root 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 who will board all smallmouth bass into a live well for later processing. 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 rmi). Additional 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. These smaller sub-reaches will be sampled by two people per boat, an operator and one netter who will target all fish species for capture. All fish will be kept alive measured and weighed, and afterwards, the natives returned to the river and all targeted nonnatives removed.

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 (2008), a maximum likelihood depletion estimator (Program Mark) will be used. 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: Capture and remove smallmouth bass and capture all species in the four sub-reaches from the lower Yampa River within Yampa Canyon using electrofishing during May**B**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 four sub-reaches. Prepare annual reports that identify the means and level of bass control (removal) achieved and present results in annual meetings.

IX. FY2007:

Deliverables/Due Dates: Synthesis report by March 2007.

Budget: FY 2007

Task Activity	Cost
Task 1	
Labor	
GS-14 Project Leader ($61.61/hr x 8 hrs/day x 5 days/trip x 2 trips)	$4,929
GS-11 Biologist ($37.77/hr x 8 hrs/day x 5 days/trip x 7 trips)	$10,576
GS-11 Biologist trip prep ($37.77/hr x 8 hrs/day x 2 days/trip x 7 trips)	$4,230
6 GS-5 Tech ($21.18/hr x 8 hrs/day x 5 days/trip x 7 trips) + ($31.77/hr x 2 hrs OT/day x 5 days/trip x 7 trips)	$48,925
4 GS-5 Technicians trip prep ($21.18/hr x 8 hrs/day * 3 days/trip x 7 trips)	$14,233
Subtotal	$82,893
Travel, Per Diem, Equipment	
(5 trucks/trip x 100 mi/truck x $0.417/mi x 7 trips) Vernal to Deerlodge	$1,460
(5 trucks/trip x 100 mi/truck x $0.417/mi x 7 trips) Deerlodge to Eco Park	$1,460
(1 truck/trip x 75 mi/truck x $0.417/mi x 7 trips) Eco Park to Vernal	$219
(4 trucks/trip x 75 mi/truck x $0.417/mi x 7 trips) Eco Park to Vernal	$876
Shuttle Drivers (5 drivers/trip x $108/driver x 7 trips)	$3,780
Shuttle Driver Organizer (1 driver/trip x $16/driver x 7 trips) for trip organization	$112
Per diem (8 people/day x $26/person x 5 days/trip x 7 trips)	$7,280
Equipment (raft accessories, maintenance, repair, boat motor, etc.)	$3,090
Subtotal	$18,277
Task 2	
Data Analysis, Annual Report, Synthesis Report	
GS-14 Project Leader ($61.61/hr x 8 hrs/day x 5 days)	$2,464
GS-11 Biologist ($37.77/hr x 8 hrs/day x 65 days)	$19,640
GS-5 Technicians ($21.18/hr x 8 hrs/day x 15 days)	$2,542
GS-9 Admin Assist. ($33.17/hr x 8 hrs/day x 5 days)	$1,288
Supplies (Copies, disks, paper, etc.)	$309
Per diem (1 person/day x $104/person x 2 days/trip x 2 trips) Vernal to Grand Junction	$416
Travel to give presentations and workshops and meetings (1 truck/trip x 275 mi/truck x $0.417/mi x 2 trips)	$229
Subtotal	$26,888
Total	$128,058

IX. Budget Summary (Does not include overhead):

FY 2007 $128,058

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

XI. References:

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