

**COLORADO RIVER RECOVERY PROGRAM
FY-2009 PROPOSED SCOPE OF WORK**

Project No.: NA

Lead Agency: Larval Fish Laboratory (LFL)

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Date submitted: 24 March 2009
Revised date:

<u>Category:</u>	<u>Expected Funding Source:</u>
<input type="checkbox"/> Ongoing project	<input checked="" type="checkbox"/> Annual funds
<input type="checkbox"/> Ongoing-revised project	<input type="checkbox"/> Capital funds
<input checked="" type="checkbox"/> Requested new project	<input type="checkbox"/> Other (explain)
<input type="checkbox"/> Unsolicited proposal	

I. Title of Proposal: Demographic estimates and monitoring for razorback sucker in the Colorado and Green River basins, Utah and Colorado

II. Relationship to RIPRAP:

Green River Action Plan: Mainstem

V. Monitor populations and habitat and conduct research to support recovery actions (Research, monitoring, and data management).

V.D. Conduct abundance estimate for razorback sucker. Develop plan in FY 09 (based, in part, on recommendations from evaluation of stocked razorback report).

Colorado River Action Plan: Mainstem

V. Monitor populations and habitat and conduct research to support recovery actions (Research, monitoring, and data management).

III. Study Background/Rationale and Hypotheses:

Background.—Demographic parameters that describe birth, movement, and mortality rates, and population abundance are useful to understand status and dynamics of animal populations. Response of populations to biotic or abiotic drivers are of interest to ecologists attempting to understand the fundamental basis for population change. They are also useful to managers attempting to maintain or enhance abundance of free-ranging and rare animal populations in need of conservation.

Razorback sucker *Xyrauchen texanus* is a large, long-lived, and sometimes migratory catostomid endemic to the Colorado River Basin, and it is federally listed as

endangered under the Endangered Species Act of 1973, as amended (U. S. Fish and Wildlife Service 1974). Once widespread and abundant throughout warm-water reaches of the basin, wild razorback suckers are rare throughout the Colorado River Basin and are presently restricted to Lake Mohave and Lake Mead reservoirs and stocked individuals occupy restricted portions of the Upper Colorado River Basin in the San Juan, Colorado, and Green River sub-basins.

Reasons for decline of razorback suckers include negative effects of habitat alteration, river regulation, and nonnative fishes (Minckley 1973; Carlson and Muth 1989; Tyus 1991). Over 140 main-stem and tributary dams and reservoirs and several trans-basin water diversions provide agricultural and municipal water supplies to a rapidly expanding human population in the Colorado River Basin. As a result, the Colorado River Basin is one of the most tightly controlled water supplies in the world (Iorns et al. 1965; Carlson and Muth 1989). Main stem dams have been particularly damaging to biota because they restrict movements of mobile fishes such, reduce seasonal variability of discharge, water temperature and sediment load, and increase daily hydrograph variation (Vanicek and Kramer 1969; Holden 1979; Ward and Stanford 1979; Stanford et al. 1996; Poff et al. 1997). No fewer than 60 nonnative fishes have been established in the Colorado River Basin, many of which prey upon or compete with various life stages of native species (Carlson and Muth 1989; Ruppert et al. 1993; Olden et al. 2006). The outcome of these environmental and biotic changes for the highly endemic fish fauna of the Colorado River Basin has been dramatic: two of the 35 native species in the basin are extinct, an additional 18 including razorback sucker are federally listed as threatened or endangered or are very rare, and most others are listed by one or more basin states as declining (Stanford and Ward 1986; Carlson and Muth 1989; Bezzerides and Bestgen 2002; Mueller and Marsh 2002, Valdez and Muth 2005).

Recovery of razorback sucker requires “a genetically and demographically viable, self-sustaining populations in the Upper Colorado River Basin but status of most populations, which are established largely via repatriation of stocked hatchery individuals, is poorly known. A fundamental requirement of any recovery action, including stocking, is evaluation. A thorough analysis of survival of razorback suckers has recently been completed for a portion of the Upper Colorado River Basin, in the Green and Colorado River subbasins (Zelasko et al. 2009). However, capture-recapture data collected since 2006 will aid evaluation and updating of the stocking plan for the species and assist with evaluating efforts aimed at re-establishing self-sustaining razorback sucker populations (U.S. Fish and Wildlife Service 2002). The goal of this study is to provide an updated, basin-wide assessment of certain assumptions and demographic parameters for razorback sucker in the Green and Colorado River subbasins based on release of hatchery-reared razorback suckers beginning in 2004 and collection of recapture data through 2008. Results will be useful to managers attempting to restore razorback sucker and may also guide future production and stocking strategies for hatcheries.

IV. Study Goals, Objectives, End Product:

Goals: Obtain accurate (unbiased) and reliable (precise) demographic parameter estimates for razorback suckers stocked in the Green and Colorado River basins, 2004-2007 via analysis of capture-recapture records and develop a monitoring plan for razorback suckers in the Upper Colorado River Basin.

Objectives:

1. Analyze additional razorback sucker data collected from 2004 through 2008 to obtain more robust estimates of survival and other demographic parameters of interest. Specific elements include:
 - a. compile and proof stocking and capture data for stocked razorback suckers,
 - b. identify possible covariates for data analysis including evaluation of effects of hatchery source and rearing (pond vs. tank) techniques,
 - c. analyze data with appropriate parameter estimation software to obtain the most unbiased and precise survival rate estimates possible,
 - d. compare survival rate estimates to those available in other parts of the range of razorback sucker and those assumed in stocking plans,
 - e. recommend revisions to stocking plans, based on results of analyses.
2. Develop a razorback sucker monitoring plan. Specific elements include:
 - a. compile literature and sampling data relevant to understanding early life and adult razorback sucker distribution and ecology,
 - b. conduct analyses appropriate to understanding sampling intensity,
 - c. make recommendations for sampling.

End Products: The budget for FY 2009 and description presented here for Objective 1 will follow up the razorback sucker survival analysis completed by Zelasko et al. (2009) using data collected through 2008. A budget for Objective 2, development of a razorback sucker monitoring plan, is also presented below.

Report Review schedule: An annual report will be submitted in November 2009. A final report on razorback sucker data analysis through 2006 was submitted to the Recovery Program and is under review (Zelasko et al. 2009). A final report on additional razorback sucker data analysis will be submitted 15 May 2010. A final report detailing the razorback sucker monitoring plan will be available summer 2010. Budget for FY 2009 is sufficient to support activities that will continue into FY 2010.

The razorback sucker data analysis report will include: A summary of razorback stocking in each river basin over time, with emphasis on data collected since the 2003 stocking plan was implemented. Fish stocked through 2007 and recaptures gathered through 2008 will be the emphasis of this analysis.

1. A summary of sampling effort in applicable river basins and discussion of issues related to sampling coverage.
2. Survival estimates by river, or river reach and stocking source, if possible.

3. Additional analyses as the data and time permits. This may include analyses of movement patterns related to survival of fish, and covariates such as length or fish condition at time of stocking.

The second portion of this scope of work is to develop a razorback sucker monitoring program. This project will detail sampling needed to estimate demographic parameters of interest for both small-bodied and large-bodied razorback suckers in the Colorado and Green River sub-basins.

V. Study Area

The razorback sucker data analysis and monitoring plan development will include the Colorado and Green River sub-basins.

VI. Study Methods/Approach

FY 2009.—The first objective of the scope of work will be to expand analysis of existing razorback sucker recapture data. We will concentrate analyses on the newest data collected in the period 2004-2008 (fish stocked in 2003-2007), which corresponds to implementation of the razorback sucker stocking plan. This deviates from a previous analysis (Zelasko et al. 2009 draft report) which used all data but only captures through 2005 (stocked fish through 2005). We will also attempt to extract information from a subset of that data to examine effects of rearing razorback suckers in tanks versus in ponds, with a goal to determine if survival differences exist between the groups. Analyses will be patterned after previous work (Zelasko et al. 2009).

The second objective of this scope of work is to develop a razorback sucker monitoring program. This project will detail sampling needed to estimate demographic parameters of interest for both small-bodied and large-bodied razorback suckers in the Colorado and Green River sub-basins. The geographic scope of the sampling will be determined from discussions with various researchers and the literature. Existing data sources (e.g., Bestgen et al. 2007; Zelasko et al. 2009, draft report) will be used to estimate the level of sampling needed to estimate the parameters of interest.

- VII. Task Description and Schedule (FY-2009). We will accomplish all work with FY 09 funding even though the tasks span FY 2009-2010.

Task 1. July2009-April 2010. Analyze additional razorback sucker data and reporting.

Task 2. July2009-April 2010. Monitoring program development.

VIII. FY-2009 Work

- Deliverables/Due Dates. Project annual summary report, November 2009.
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Group/Agency	Reach	Costs by year FY-09
Larval Fish Laboratory 2009	Data analysis and monitoring program development	total \$83,603

Budget by task:

Larval Fish Laboratory, data analysis

FY2009

Includes overhead costs of 17.5%, up from 15% from previous agreements due to renegotiated overhead rates.

Task 1, additional razorback sucker data analysis, 2004-2008 information

Labor	Item	Units	Cost/unit	Cost
Principal investigator (d)		40	511	\$20,440
Biologist (d)		88	310	\$27,280
Technician (d)		15	145	\$2,175
software, computer		1	2200	<u>\$2,200</u>
			subtotal	\$52,095

Task 2, monitoring program development

Labor	Item	Units	Cost/unit	Cost
Principal investigator (d)		53	511	\$27,083
Biologist (d)		10	310	\$3,100
Technician (d)		5	145	\$725
			subtotal	\$30,908
Travel Meeting		1	600	subtotal <u>\$600</u>
			Total	\$31,508

Total tasks 1-2 \$83,603

IX. Budget Summary, includes budget for FY 2009 and 2010 tasks.

FY-2009 \$ 83,603

Total: \$ 83,603

X. Reviewers:

XI. References

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