I. Project Title: DETERMINING THE GENETIC PURITY OF NATURALLY-PRODUCED RAZORBACK SUCKER LARVAE COLLECTED FROM THE GUNNISON AND COLORADO RIVERS

II. Principal Investigator(s):

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III. Project Summary:

Restoration stocking of razorback sucker *Xyrauchen texanus* has been ongoing in the Gunnison River since 1994 and in the Colorado River since 1999. By 2007, some 27,400 razorback sucker had been stocked in the Gunnison and 78,700 stocked in the Colorado. In both rivers, successful reproduction by the stocked fish was documented during 2002-2007 by the collection of razorback sucker larvae (Osmundson and Seal 2009). So far, there has been no direct evidence of naturally produced razorback sucker young surviving to later life stages in these two rivers. During the 6-year larval sampling program, 42 razorback sucker larval specimens were collected from the Gunnison River and 34 specimens from the Colorado River. Of the Gunnison River specimens, nine (21%) were positively identified as razorback sucker, while 33 (79%) were only tentatively identified as such. Of the Colorado River specimens, 23 (68%) were positively identified as razorback sucker and eleven (32%) were tentatively identified as such.

Because other species of sucker, both native and non-native, occur sympatrically with the stocked razorback sucker and spawn during the same season (late spring), the possibility of hybridization among suckers exists. Indeed, many hybrids of flannelmouth sucker (*Catostomus latipinnis*) and white sucker (*Catostomus commersoni*) are routinely identified at the fish trap associated with the Redlands Fish ladder at the base of the Gunnison River, as are hybrids of bluehead sucker (*Catostomus discobolus*) and white sucker (Bob Burdick, USFWS, unpublished data). One possible explanation for the high percentage of larval specimens that could not be positively identified as razorback sucker, especially in the Gunnison River, is that the specimens are F_1 hybrids resulting from mixed spawning of razorback sucker and other sucker species. In the Gunnison River, razorback sucker larvae, both positive and tentative specimens combined, made up only one tenth of one percent of all larvae collected over six years. In contrast, white sucker accounted for 47% of all larvae collected, and bluehead sucker, 24%. Similarly, in the Colorado River, flannelmouth, bluehead and white sucker collectively made up 91% of all larvae collected, while razorback sucker made up only 0.13% of all larvae collected during the mid-May-to-late June sampling periods. Hence, small groups of razorback sucker adults may have difficulty remaining separate from the more numerous other sucker

species while attempting to spawn. Whether other suckers intentionally spawn with the stocked razorbacks or gametes simply become mixed inadvertently when spawning overlaps in time and space, the result may be the same.

If real, high rates of hybridization could jeopardize efforts to restore self-sustaining populations of endangered razorback sucker. Because other species of sucker ostensibly have higher survival rates in the river than do razorback sucker, the possibility exists that hybrid larvae may also have a higher survival rate than pure razorback sucker larvae, given that they likely have some phenotypic traits of the other parent. Because recovery will only occur with the establishment of self-sustaining populations of pure forms, management actions may need to be devised that promote reproductive isolating mechanisms. If white sucker are involved, a large scale removal effort of this species may be warranted.

There may be other explanations for the high percent of tentative identifications of putative razorback sucker specimens in the 2002-2007 samples. However, as a first step in resolving this issue we proposed that the purity of the collected specimens be tested genetically.

IV. Study Schedule: 2011.

V. Relationship to RIPRAP:
Colorado River Action Plan: Colorado River (Mainstem and Gunnison River)
IV. Manage genetic integrity and augment or restore populations (stocking endangered fish).
IV. A. Augment or restore populations as needed and as guided by the Genetics Management plan.
IV. A.1. Razorback sucker
IV. A. 3. b (and c Gunnison) Evaluate stocking success as identified in monitoring plan for stocked fish.

VI. Accomplishment of FY 2011 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Tasks

Task 1. Transfer larval specimens from the Larval Fish Lab to Pisces Molecular.
Task 2. Conduct analyses in the lab
Task 3. Report results

Deliverables

Provide a short report summarizing the study findings.

Initial Findings

Twenty-five larval specimens were analyzed. Four specimens were ones positively identified as razorback sucker by the Larval Fish Laboratory at CSU, Fort Collins, Colorado, and the other 21 were ones tentatively identified as razorback sucker or possible

hybrids of razorback sucker and other sucker species. Analyses were performed by Pisces Molecular, a Colorado-based privately owned laboratory.

The alleles present for four microsatellite markers, Xte2, Xte3, Xte4, Xte7, developed for razorback suckers (Turner et al. 2009) were scored in the suspected razorback sucker specimens. Locus Xte3 was used to test the purity of razorback sucker specimens. Turner et al. (2009) reported that this locus failed to amplify in their razorback sucker test panel samples, but did amplify in other *Catostomid* species. Therefore, we hypothesized if any alleles for Xte3 amplified in a razorback sucker specimen, it would indicate that the specimen was not a genetically pure razorback sucker.

Microsatellite analysis indicated six of the 25 specimens tested were either pure or part razorback sucker. The other 19 specimens thought to be razorback sucker or possible hybrids turned out to be other species of sucker. Based on the sample tested here, one of six specimens (17%) identified as pure or partial razorback sucker was definitely a hybrid. In addition to the one hybrid identified, one other of the six specimens was listed as 95% razorback sucker, 4% bluehead sucker and 1% flannelmouth or white sucker. Based on the resolution of the procedures used, this one could fall either way: either as an additional pure form or a hybrid. If we add this as an additional hybrid, the frequency of hybrids among razorback sucker larvae doubles to 33%. This becomes a considerably more worrisome number in terms of hybridization potentially impacting recovery efforts. Perhaps the most significant finding of this preliminary study was that only 2-3 of the 21 specimens tentatively identified (from meristics) as razorback sucker, and only 2 of 4 specimens positively identified as razorback sucker, turned out to be so.

VII. Recommendations: To bring better resolution to results, we recommend that the remaining 31 specimens from the 2002-2007, Gunnison-Colorado River collections be genetically analyzed.

VIII. Project Status: A draft report was prepared and submitted to the Recovery Program Director's Office in October. How to proceed with peer review and the report approval process has not yet been determined.

IX. FY 2011 Budget

A.	Funds Provided:	2,000
B.	Funds Expended:	2,000
C.	Difference:	0
D.	N/A (BR projects)	0
E.	Publication Charges	0

X. Status of Data Submission: Not applicable as no new data was collected.

XI. Signed: *Doug Osmundson*, November 13, 2011.

Literature cited:

Osmundson, D.B., and S. C. Seal. 2009. Successful spawning by stocked razorback sucker in the Gunnison and Colorado rivers, as evidenced by larval fish collections, 2002-2007. Final Report. U. S. Fish and Wildlife Service, Grand Junction, Colorado.