COLORADO RIVER RECOVERY PROGRAM Project No.: 29a
FY-20010/2011 PROPOSED SCOPE OF WORK for:
O&M Grand Valley Propagation Facilities

Lead Agency: Fish and Wildlife Service
Colorado River Fishery Project

Submitted by: Thad Bingham (Co Lead)
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Category
__ Ongoing project
xx Ongoing-revised project
__ Requested project
__ Unsolicited proposal

Expected Funding Source
xx Annual funds
__ Capital Funds
__ Other

I. Title of Proposal: **Operation and Maintenance of Grand Valley Endangered Fish Facilities.**

II. Relationship to 2009 RIPRAP:
General Recovery Program Support Action Plan:
IV. Manage genetic integrity and augment or restore populations.
IV.A. Genetics Management.
IV.A.4. Secure and manage genetic stocks in refugia.
IV.A.4.a. Razorback sucker
IV.A.4.a.(2) Upper Colorado River.
IV.C. Operate and maintain facilities.
IV.C.2. Grand Valley Endangered Fish Facility.
Green River Action Plan: Mainstem
IV.A.1.c. Implement (stocking) plan.
Colorado River Action Plan: Mainstem
IV.A.2.a.(2) Implement razorback sucker state stocking plan.
Colorado River Action Plan: Gunnison River
IV.A.3.b. Implement razorback sucker State stocking plan.

III. Study Background/Rationale and Hypotheses

This project is directly related to Section 2.4 IV. " Conserve Genetic Integrity and Augment or Restore Populations in the Recovery Program Recovery Action Plan (USFWS 2003). One of five elements in the Recovery Program is native fish stocking. The goal of this element is to produce sufficient captive-reared endangered fishes for conducting laboratory and field research and to develop brood stocks with genetic diversity similar to the wild stock used as founders (Williamson and Wydoski 1994). The need for captive-reared endangered fish and propagation facilities is identified in Wydoski (1994).

Fishery biologists have cultured and reared endangered fishes in the upper basin since 1987. Propagation began in the Grand Valley in 1991 with construction of Horsethief Refugia Ponds at Horsethief State Wildlife Area. The refugia ponds were constructed to develop and hold broodstock from the last wild razorback suckers captured from the upper Colorado River. Production of razorback suckers began in 1996 when an intensive-rearing hatchery building was built. The hatchery was expanded in 1998 and is currently capable of producing about 28,000 young razorback suckers averaging 8 inches long each year. Construction and leasing of grow-out ponds have produced 30 ponds totaling 92 surface acres suitable for rearing large razorback suckers for stocking into the rivers of the upper basin. Some of these ponds have not produced well and leases will be terminated in FY 2010.

The first young razorback suckers produced in the Grand Valley facility were stocked into the Gunnison River in 1995. More than 100,000 razorback suckers have been stocked into the Gunnison and Colorado rivers since then. The Grand Valley facility currently has a broodstock of about 500 adults, including offspring (f_1s) from wild razorback suckers comprising four year classes. Fish from younger year classes (f_2s) are also being held and will be added to the broodstock as they mature. Accurate records of lineage for all fish are maintained to ensure that the maximum amount of original genetic material is maintained in the broodstock. Spawning is controlled to ensure that equal numbers of offspring (eventually encompassing several generations) from the original, wild broodstock will be stocked into the river system over the duration of the propagation program.

IV. Study Goals, Objectives, End Product:

Goal: To operate a genetically sound captive propagation program for high priority endangered fish species for the RIP in the Upper Colorado River Basin in accordance with the Annual Stocking Plan (Nesler et al. 2003).

Objective: Operate and maintain propagation facilities that are needed to hold, rear, or produce captive-reared endangered fishes for the RIP in the Upper Colorado River Basin in accordance with the Annual Propagation Operation Plan.

End Product: Maintenance of endangered fish in refugia to prevent extinction; development of genetically sound broodstocks for production of young fish for stocking to stabilize or enhance wild stocks; production of captive-reared endangered fish for priority laboratory and field experiments.

V. Study area: Upper Colorado River Basin ─ Propagation facilities in Grand Valley, Colorado.

VI. Methods/Approach:

Conduct all tasks associated with the operation and maintenance of the Grand Valley Endangered Fish Facilities in accordance with the Genetic Management Plan (Williamson and Wydoski 1994; Czapla 1999) and the annual propagation plan.

VII. Task Description and Schedule:

All tasks are done annually

1. Develop and maintain captive razorback sucker broodstock.
2. Spawn razorback sucker broodstock and produce family lots for culture at the 24 Rd Hatchery.
3. Intensively rear razorback sucker at the 24 Rd Hatchery.
4. Stock 8-inch-long razorback suckers into grow-out ponds in spring.
5. Maintain water level, water quality, and productivity in 30 grow-out ponds totaling 92 surface acres.
6. Harvest, PIT tag, and stock 14,895 12-inch-long razorback sucker into the Gunnison, Colorado, and Green rivers in the following amounts: Colorado River, Rifle to Debeque reach (3,310); Colorado River, Palisade to CO-UT state line (3,310); Gunnison River, Hartland to Redlands reach (3,310); and lower Green River, Green River, UT (4,965).

VIII. FY-2010 Work

Fish and Wildlife Service

Labor for tasks 1-6:	
Project Leader (1 GS 14 @3064/wk for 17.4 weeks)	53,314
Administrative Officer (1 GS 9 @1438/wk for17.4 weeks)	25,021
Fishery Biologist (2 GS 11 full time @1662.84/wk)	172,935
Fishery Biologist (1.5 GS 9 @1343.21/wk)	104,771
Biological Technician (3 GS 5 @697/wk for 15 wks)	31,365
Labor Overtime (at 3.4068%)	13,198
Labor Subtotal	400,604
Bozeman Fish Technology Center (in kind service)	
Grind and sift fish food for larval razorback suckers	<$ 2,500>
Operations	
Fish Food	16,000
Chemicals and Fertilizer	8,000
Hatchery Supplies and Equipment Repair and Replacement	10,000
Office Supplies	1,500
Vehicles	9,800
Electricity (Horsethief, Peters Ponds)	11,000
Travel	8,320
Operations Subtotal	$64,620
FWS Total	$465,224
Bureau of Reclamation	
Utilities, 24 Rd Hatchery (water, gas, electricity, phone)	$ 42,000
Total	$507,224

FY-2011 Work

Fish and Wildlife Service

Labor for tasks 1-6 (actual estimated increase):		3% reduction
Project Leader (1 GS 14 @3155/wk for 12 weeks)	37,860	– 36,724
Administrative Officer (1 GS 9 @1480/wk for 11.5 weeks)	17,020	– 16,509
Fishery Biologist (GS 13 @ 2425.84/wk for 26 weeks)	63,072	– 61,180
Fishery Biologist (1 GS 11 @1767/wk at full time)	91,884	– 89,127
Fishery Biologist (1 GS 11 @1767/wk at full time)	91,884	– 89,127
Biological Tech (1 GS 9 @ 1443/wk)	75,036	-- 72,785
Biological Technician (2 GS 5 @718/wk for 16 wks)	22,976	– 22,287
Labor Overtime (at 3.4068%)	13,564	- 13,157
Labor Subtotal	413,296	400,896
Labor subtotal (3% reduction)	(400,896)	
Bozeman Fish Technology Center (in kind service)		
Grind and sift fish food for larval razorback suckers	<$ 2,500>	
Operations		
Fish Food	$ 16,000	
Chemicals and Fertilizer	$ 8,000	
Hatchery Supplies and Equipment Repair and Replacement	$ 10,000	
Office Supplies	$ 1,500	
Vehicles/fuel & maintenance/repair		$ 10,100
Electricity (Horsethief, Peters Ponds)	$ 11,000	
Travel	$ 8,320	
Operations Sub total	$ 64,920	
Fish and Wildlife Service total	$465,816	
Bureau of Reclamation		
Utilities for 24 Rd Hatchery (gas, electricity, phone)		$ 43,000
Total (original)	$521,216	
Adjusted Total (3% cost of living reduction)	$508,816	

IX. Budget Summary:

FY-2010	$507,224	($465,224 to FWS and $42,000 to BOR)
FY-2011	$508,816	($465,816 to FWS and $43,000 to BOR)

X. Reviewers:

Various Service and Recovery Program staff.

XI. References:

Czapla, T.E. 1999. Genetics Management Plan. Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

USFWS (U. S. Fish and Wildlife Service). 2003. Recovery implementation program for endangered fish species in the upper Colorado River basin. U. S. Department of the Interior, Fish and Wildlife Service, Region 6, Denver, Colorado.

Nesler, T.P., K. Christopherson, J.M. Hudson, C.W. McAda, F. Pfeifer, and T.E. Czapla. 2003. An integrated stocking plan for razorback sucker, bonytail and Colorado pikeminnow for the Upper Colorado River Endangered Fish Recovery Program, Addendum to State stocking plans. Upper Colorado River Endangered Fish Recovery Program, Denver, Colorado.

Williamson, J. H., and R. S. Wydoski. 1994. Genetics management guidelines. Recovery implementation program for endangered fish species in the upper Colorado River basin. U. S. Department of the Interior, Fish and Wildlife Service, Region 6, Denver, Colorado.

Wydoski, R. S. 1994. Coordinated hatchery facility plan: need for captive-reared endangered fish and propagation facilities. Recovery implementation program for endangered fish species in the upper Colorado River basin. U. S. Department of the Interior, Fish and Wildlife Service, Region 6, Denver, Colorado.

COLORADO RIVER RECOVERY PROGRAM Project No.: 29a-addendum

FY-2011 SCOPE OF WORK

Razorback sucker larval genetic purity – Gunnison and Colorado rivers

Lead Agency: U. S. Fish and Wildlife Service
Colorado River Fishery Project

Submitted by: Michelle Morgan, Program Administrator
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(Lead)

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Date: December 14, 2010

Category:
___Ongoing
_XX_ Ongoing-revised project
____ Requested new project (explain)
____ Unsolicited proposal

Expected Funding Source:
XX Annual funds
___ Capital funds
___ Other

I. Title of Proposal: Determining the genetic purity of naturally-produced razorback sucker larvae collected from the Gunnison and Colorado rivers.

II. 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.

III. Study Background/Rationale and Hypotheses:

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. Osmundson and Seal (2009) provided an estimate of 1,066 adults present in the Colorado River in 2005 but no estimate has been made of surviving razorback sucker in the Gunnison River. In both rivers, successful reproduction by the stocked fish was documented during 2002-2007 by the collection of razorback sucker larvae. 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 F1 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 propose that the purity of the collected specimens be tested genetically.

IV. Study Goals, Objectives, End Product:

Goal

Our goal is to test the hypothesis that difficulty in making positive identifications of some razorback sucker larvae collected from the Gunnison and Colorado rivers is from them having phenotypic traits of other sucker species that the parents hybridized with, i.e., hybridization of razorback sucker and other sucker species is occurring in the wild.

Objectives

1. Genetically test specimens of razorback sucker larvae collected from the Colorado and Gunnison rivers during 2002-2007 to see if any are of hybrid origin.

End Product

Provide a short report summarizing the study findings. The report will be provided to the Biology Committee but because of its anticipated length will not warrant the normal peer review process. We hope to have results and a report by March 30, 2011.

V. Study Area:

Samples were already collected during completed Project 121 (see Osmundson and Seal 2009). Larval specimens were collected from the Gunnison River (RM 3-57) and from the Colorado River (RM 125-185).

VI. Study Methods/Approach:

Twenty-five larval specimens will be analyzed: 13 from the Gunnison River; 12 from the Colorado River. Within each group, two specimens will be ones positively identified as razorback sucker by the Larval Fish Laboratory at CSU, Fort Collins, Colorado, and the other 10-11 will be ones tentatively identified as razorback sucker. Analyses will be performed by Pisces Molecular, a Boulder, Colorado laboratory.

Microsatellite Xte3 will be used to test the purity of razorback sucker specimens. This marker is known to not amplify any fragments in razorback sucker. If any fragments are amplified, it will demonstrate that the specimen is not a genetically pure razorback sucker. Xte4 will be used as a control to demonstrate that DNA was obtained from each specimen as it will amplify fragments in all sucker species that inhabit the two rivers within the study area, i.e., white, flannelmouth, bluehead, longnose and razorback sucker. If F1 hybrids are detected, the species of sucker with which the razorback parent crossed will not be ascertained with this method. At present there are no markers that have been developed that amplify only in razorback sucker. Development of such a marker would entail a much larger project than what is proposed here. However, this project will answer the basic question as to whether stocked razorback suckers are hybridizing with other wild sucker species. A negative answer will settle the issue and no additional testing will be warranted. A positive answer will suggest that additional studies may be needed to determine which species of sucker the stocked razorbacks are crossing with.

VII. Task Description and Schedule

Description

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

Schedule

Task 1	January 2011
Task 2	February 2011
Task 3	March 2011

VII. **FY-2011 Work**

Deliverables/Due Dates: Summary Report due 03/2011

Budget

Tasks 1 & 3

1. Labor	no cost

Task 2

1. Laboratory analyses 25 samples @ $80/sample	$2,000
Total	$2,000

IX. Budget summary

2011	$ 2,000
Total	$ 2,000

X. Reviewers: Not applicable

XI. References

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