COLORADO RIVER RECOVERY PROGRAM Project No.: 163
FY-2011 SCOPE OF WORK

Aspinall-related fish monitoring - Gunnison and Colorado rivers

Lead Agency: Fish and Wildlife Service
Colorado River Fishery Project

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Category:	Expected Funding
Source:	
___ Ongoing	XX Annual funds
___ Ongoing-revised project	___ Capital funds
_X_ _ Requested new project	___ Other (explain)
___ Unsolicited proposal	

I. Title of Proposal: Monitoring multi-life stages of the fish community in the lower Gunnison and upper Colorado rivers, with emphasis on Colorado pikeminnow and razorback sucker populations, in response to reoperation of the Aspinall Unit and implementation of the Selenium Management Plan.

II. Relationship to RIPRAP:

Gunnison River Action Plan: Gunnison River Mainstem,

V. Monitor populations and habitat and conduct research to support recovery actions.

V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

Colorado River Action Plan: Colorado River Mainstem

V. Monitor populations and habitat and conduct research to support recovery actions.

V.A. Conduct research to acquire life history information and enhance scientific techniques required to complete recovery actions.

III. Study Background/Rationale and Hypotheses:

The Programmatic Biological Opinion (PBO) for water depletions in the Gunnison River Basin (USFWS 2009) stipulates that endangered fishes, as well as the entire fish community, be monitored to determine the status of the species before and after the Selenium Management Plan (SMP) is implemented and following reoperation of the Aspinall Unit reservoirs. The PBO calls for multi-life stage monitoring and density estimates of Colorado pikeminnow and razorback sucker in the lower Gunnison and Colorado rivers.

Density estimates can be calculated by first developing population estimates through mark-recapture techniques. The new standard for monitoring populations of Colorado River endangered fishes is to periodically develop population estimates using closed-model capture-recapture methods. Such estimates provide information on population status (abundance), and when repeated periodically over an extended period can also provide information on population trends. Such estimates have been made for Colorado River populations of Colorado pikeminnow and humpback chub.

Because sub-adult and adult Colorado pikeminnow and razorback sucker are few and/or difficult to locate in the Gunnison River (Burdick 1995), the approach used here will be to first see (in the first two years of sampling: 2011 and 2012) if sufficient numbers of each can be captured to allow mark-recapture abundance estimation. This would be accomplished with a limited sampling effort of only two electrofishing passes each year (see protocol below for fish community monitoring). If it appears that sufficient numbers can be caught, annual sampling during 2013, 2014 and 2015 would be increased to five passes. Hence, the first two years can be viewed as a feasibility study for adult density estimation (number of individuals per unit area). If it appears that sufficient numbers cannot be caught to allow density estimation, then monitoring would continue to employ the less reliable index of catch-per-unit-effort (number of fish caught per hour of electrofishing) allowing comparison of catch rates through time. The assumption inherent when using this index as a monitoring tool is that trends in catch rates are indicative of underlying trends in abundance, although the level of actual abundance is never known or estimated. If it appears that sufficient numbers can be obtained to allow development of a population estimate, the SOW in 2013 would be modified to reflect an increased effort in successive years.

The fish assemblage in the Gunnison River will also be monitored, using electrofishing catch-per-effort as an index to track trends in relative abundance of each species. Burdick (1995) conducted four passes of raft-based electrofishing to characterize the Gunnison River fish community in 1992 and 1993. He sampled once during pre-runnoff, once during runoff, and twice during post-runoff. To allow comparison of our results with those of Burdick (1995), collected almost 20

years ago, we propose to use a similar sampling protocol but scale back the number of electrofishing passes to two each year and conduct these only during the post-runoff period. It is during these two electrofishing passes that capture rates of endangered fish will be assessed to determine if mark-recapture abundance estimation will be feasible in subsequent years (see above).

For young-of-the-year (YOY) and small-bodied fish monitoring, we propose to use beach seine sampling of backwaters during fall (late September-early October) using ISMP methodology (see McAda 1994). Burdick (1995) found that Gunnison River backwater habitat was very scarce and therefore he deviated from the ISMP protocol (sampling two backwaters in every five-mile segment) by sampling every backwater encountered. We propose to follow Burdick's modification of the ISMP methodology in this regard.

Concurrent with fish community monitoring in the Gunnison River, tissue samples will be collected to determine selenium concentrations in fish before and after implementation of the SMP. Muscle plug samples will be collected from all adult Colorado pikeminnow, razorback sucker and bonytail encountered. Because numbers of endangered fish are expected to be low, muscle plug samples will also be collected during these and other survey efforts from 30 carp and 30 roundtail chub, and 30 whole-body samples of speckled dace (ubiquitous species) to insure that statistical comparisons can be made regarding selenium in fish tissue before and during SMP implementation. Selenium concentrations will also be analyzed in any larval fish samples collected and confirmed to be either razorback sucker or Colorado pikeminnow. Larvae may need to be composited by species to provide enough biomass for analytical procedures.

In the Colorado River, downstream of the Gunnison River inflow, the Colorado pikeminnow adult population is already being monitored (Project 127) with mark-recapture abundance estimation (see Osmundson and White 2009). During field sampling, razorback sucker capture-recapture data is also collected; we therefore propose here to develop estimates of adult razorback sucker abundance from these data. In 2012, abundance estimates will be developed for adult razorback sucker in the Colorado River for the years 2008, 2009, and 2010. Distribution of running ripe females will also be mapped to help ascertain spawning site locations. The assumption here is that improvement in flow regimes in the Gunnison River will have positive ramifications in the downstream Colorado River as well and hopefully result in benefits to endangered fish populations in both rivers.

Osmundson and Seal (2009) found increasing catch rates of razorback sucker larvae in the Colorado River from 2004 to 2007 and an apparent (non-significant) decrease in catch rate in the Gunnison River. We propose to reinitiate hand-seine larval sampling in both rivers and extend the duration of sampling to encompass both the razorback sucker (Mid-May to early-July) and Colorado pikeminnow (mid-June to mid-August) spawning periods. This sampling will provide an index to reproductive success of each species using catch-per-effort (mean

number/sample) of endangered fish larvae. For razorback sucker larvae, results can be compared with those provided earlier (2002-2007) by Osmundson and Seal (2009). Colorado pikeminnow larval catch rates in the Colorado River can be compared with results provided by Osmundson and Burnham (1998) for the years 1986-1994. Because of funding constraints in 2011 and 2012, however, the Colorado pikeminnow portion of this sampling will have to be postponed until 2013. At that time, this SOW will need to be updated to reflect this additional work, once funding is assured.

Trends in large-bodied fish community composition and species relative abundance will also be monitored in the Colorado River in the 18-mile reach immediately downstream of the Gunnison River inflow. As in the Gunnison River, shoreline electrofishing will be used to generate annual catch-per-effort statistics as a monitoring index. The Interagency Standardized Monitoring Program (ISMP) of the 1980s and 1990s included an annual, adult, spring, electrofishing survey, but was designed to detect trends only in endangered species and thus no systematic sampling of the fish community was performed. The only systematic community sampling conducted under the auspices of the Recovery Program that could now serve as a baseline for future monitoring was the electrofishing sampling conducted in 1994 and 1995 as part of the food-availability study, Project No. 48-A (see Osmundson 1999). We propose to replicate that sampling protocol and sample the reaches randomly selected and sampled at that time so results in coming years can be compared to those earlier catch rates.

Population data for endangered fish and other fish community species collected during this four-year monitoring program can later be used to help determine whether reoperation of the Aspinall Unit and selenium remediation efforts have indeed led to significantly improved conditions in the Gunnison and Colorado rivers. The project proposed here will collect and summarize fish data. Catch rates of larval fish and YOY will provide the most immediate or direct indication of how native, as well as non-native, species respond to variation in annual flow and temperature conditions. Numbers of adult fishes respond to favorable or unfavorable annual conditions more slowly because of the lag time between hatching and recruitment, and causal factors can become difficult to discern as a myriad of other forces come into play affecting survival rates as fish grow and mature. Fish community and life stage monitoring results in the Gunnison River after four years will be compared with those of Burdick (1995) from data collected during 1992-1994. Also, flow and temperature regimes during the study period will be presented in the final report, and any associations noted between these environmental variables and the fish monitoring results will be discussed.

If changes in catch rates of endangered fish and sympatric native species are measurable and demonstrable over time, integration with other on-going monitoring programs will be needed to determine whether such changes in fish numbers are indeed responses to changes in environmental variables (flow,

temperature, physical habitat, sediment transport, contaminate levels, etc.) brought about by the reoperation of the Aspinall Unit and the contaminate remediation efforts, i.e., more specific investigations may be needed to link monitoring results to causal factors. Until the monitoring program is underway and preliminary results can be evaluated, it is uncertain whether many conclusions can be drawn after a four-year period given the inherent variation in catch rates and unpredictability of flow regime variability during the study period. The study proposed here sets up an initial monitoring program which may need to be modified or added to in the future and will likely need to be considerably extended in duration. If measureable increases in endangered fish catch rates cannot be demonstrated after four years, it may mean one of three things: 1) reoperation of the Aspinall Unit was insufficient to effect meaningful change to key environmental variables important to fish; 2) other negative factors unrelated to Aspinall operation are over-riding in nature, depressing native fish stocks; 3) the sampling regime was inadequate to detect a change in fish numbers when one may have in fact occurred or could later occur with more time. Hence, although we propose to interpret fish monitoring results in relation to concurrent environmental variables to the extent possible, it is likely that a long-term data set will be required before statistical correlations can be performed. This four-year project should therefore be viewed as a starting point for a more long-term monitoring program.

IV. Study Goals, Objectives, End Product:

Goals

1) Begin a long-term, multi-life-stage, monitoring program for Colorado pikeminnow and razorback sucker populations in the Gunnison and Colorado rivers whereby population responses can be used to evaluate the effectiveness of implementation of Aspinall re-operation and the Selenium Management Program (SMP).
2) Determine selenium concentrations in endangered fish before and after implementation of the Selenium Management Program as a means to assess whether environmental selenium reductions result in concomitant reductions in endangered fish.

Objectives

1) Initiate a long-term monitoring program for sub-adult and adult Colorado pikeminnow and razorback sucker in the lower Gunnison River while simultaneously bolstering existing monitoring efforts in the Colorado River by including abundance estimation of stocked razorback sucker.
2) Evaluate reproductive success of endangered fish in the Gunnison and upper Colorado rivers by re-initiating early-life-phase abundance monitoring through systematic collections of larvae (hand seining) and

young-of-the-year (beach seining).

3) Determine baseline selenium concentrations in Colorado pikeminnow, razorback sucker, and bonytail inhabiting the lower Gunnison River.
4) Initiate monitoring of the fish community in the Gunnison River and 18-mile reach of the upper Colorado River, including both large- (electrofishing) and small-bodied fish (beach-seining) using protocols modeled after Burdick (1995), Osmundson (1999) and ISMP young-of-year sampling (McAda et al. 1994).

End Product

Provide final reports on study findings. Two reports will be produced: 1) results of endangered fish and fish community monitoring, including adult, YOY and larvae catch per unit effort and species composition; 2) results of selenium concentrations found in larvae and tissue samples. Draft contaminants report ready for peer review on August 30, 2013. Draft final report ready for approval consideration October 31, 2013. Report finalized November 31, 2013. Draft fish monitoring report ready for peer review on August 30, 2015. Draft final report ready for approval consideration October 31, 2015. Report finalized November 31, 2015.

V. Study Area:

Large-bodied fish, YOY, and larval fish will be sampled along shorelines and zero-velocity habitats of the lower Gunnison River from Hartland Diversion Dam (RM 59.9) downstream to a point immediately upstream from the Redlands Diversion Dam near Grand Junction (RM 3). In the Colorado River, large-bodied fish will be sampled in sub-reaches of the 18-mile reach extending downstream from the Gunnison River inflow (RM 171) to the Loma boat launch (RM 153). Fall YOY sampling will occur throughout the same 18-mile reach and extend downstream to the Colorado-Utah line to stay consistent with the former ISMP YOY sampling area. Larval sampling in the Colorado River will be conducted from the Gunnison River inflow downstream to Westwater Wash (RM 125).

VI. Study Methods/Approach:

Gunnison River

Colorado pikeminnow and razorback sucker capture rates will be monitored by sampling the entirety of the Gunnison River study area. Two 2-person crews will electrofish right and left shorelines in a downstream direction simultaneously using rafts or hard-bottomed boats. Most reaches (between available launch sites) in the Gunnison River downstream of Delta are long and electrofishing crews will need to camp as they proceed downriver. One week will be required to complete one shocking pass, including one day for sampling the section between Hartland Diversion and Confluence Park in Delta. Two post-runoff electrofishing passes

will be completed annually, one in July, the other in late September or early October. If population abundance estimation appears possible after the first two years, a five-pass mark-recapture effort will be attempted in the third year of study. All fish will be measured for total length (mm), weighed with an electronic balance (nearest gram) and checked for the presence of a PIT-tag. If a PIT tag is not present, the fish will be marked with one.

Larval sampling will be conducted four days per week from early May through the end of August, or about 16 weeks each year. One complete pass can be made through the study area in four days. For seine sampling, the study area will be divided into 5-mile segments and 1-6 sites will be sampled per segment each week, depending on availability of low-velocity habitats, consistent with methods used by Osmundson and Seal (2009). An investigator will spend about five minutes at each site seining with a one-person, two-handled, fine-meshed seine. River-mile location of each site will be noted, as well as presence or absence of larvae. If larvae are found, they will be preserved in individually labeled bottles of 100% ethanol. Larval collections will be sent to the Larval Fish Laboratory at Colorado State University for specimen identification and archival.

For YOY sampling, one trip will be made each fall during the second week in September, consistent with Burdick (1995). In general, the protocol used by the Interagency Standardized Monitoring Program (ISMP) for YOY sampling will be followed (see McAda et al. 1994). However, because backwater habitat is scarce in the Gunnison River, most if not all backwaters encountered will be sampled, rather than hoping to sample two in each 5-mile reach, as stipulated in the ISMP. A 30-foot-long x 6-ft-deep seine with 1/8 inch mesh will be used and two non-overlapping hauls will be made in each backwater. Fish that can be identified in the field will be counted and released; others will be preserved in 100% ethanol and sent to the Larval Fish Lab for enumeration. Area seined at each backwater will be recorded so that catch-per-effort can be calculated in terms of fish per unit area.

Large-bodied fish community sampling will follow the protocol established by Burdick (1995), who followed that of previous FWS investigators (Archer et al. 1980; Miller et al. 1982). The study area will be divided into the four primary study strata described by Burdick (1995) varying in length from 11.3 to 17.9 miles. Burdick selected one 5.5-mile sub-reach (starting mile selected from a random numbers table) within each stratum each time a pass was made; hence, sampling reaches were not consistent through time. Because we will make fewer annual passes than did Burdick, it is possible that such a method may not provide a good annual representation of the fish or habitat of each stratum, making among-year comparisons of catch rate difficult. We therefore propose to deviate from this protocol by sampling smaller sub-reaches within each stratum and spreading them out spatially so as to assure better geographic coverage and representation of each stratum. Three sub-reaches will be selected randomly within each stratum and each will consist of one riffle-run, meander sequence

(approximately 0.5-2.0 miles long); these same three sub-reaches will be sampled each time an electrofishing pass is made. Crews will attempt to collect all stunned fish within these sub-reaches and each fish will be identified and enumerated by life-stage (based on species-specific length classes). Fish will be worked up separately for each sub-reach and shocking time recorded for each. Shocking will continue in the sections of river separating the sub-reaches, and in these sections, only endangered fish will be targeted for capture. This will allow complete coverage for endangered fish sampling (see above).

Muscle plugs will be taken from adult Colorado pikeminnow and razorback sucker following procedures specified by Williamson (1992). Muscle plugs will be taken using a 5-mm biopsy punch. A different punch will be used on each fish and discarded after use. Muscle plugs will be taken 1 to 2 cm below the dorsal fin by inserting the punch with a slight twisting motion. Tilting the punch allows the tissue sample to break off at the end. The sample will be emptied into sterile cryogenic vials, placed on dry (or wet) ice in the field until they are eventually frozen. Wounds will be disinfected using betadine swabs, to decrease the chance of infection. Selenium analyses will be conducted by neutron activation, which is the method of choice for selenium analysis on small biomass samples. In year 1, there will be up to 30 muscle plug (MP) samples taken (10 adult razorback; 10 adult pikeminnow; 10 bonytail), three composite larval razorback samples, and three composite larval pikeminnow samples. In year 2, there will be the same number of samples.

Colorado River

The fish community sampling protocol established during Project 48-A (see Osmundson 1999) will be repeated in the 18-mile reach. At that time, the river from Rifle to Westwater was stratified by geomorphology and tributary input. On aerial photos, each of five strata was divided into multiple reaches, each consisting of one meander (riffle-run) sequence 0.5-1.2 miles long. The reaches were numbered and three study reaches were selected within each stratum using a random numbers table. The 18-mile reach was one of the strata and the three study reaches selected then will be re-visited here. Both shorelines will be sampled with boat electrofishing. To keep effort consistent with the earlier methods, two netters will be stationed at the front of each boat. Fish will be identified, measured for total length, and weighed. Two boats with a crew of three people each will be needed. One deviation from the earlier design, however, will be to reduce costs by sampling only once per year in the fall (Sep-Oct), instead of both spring and fall.

In 2012, population estimates of razorback sucker will be developed for the years 2008, 2009, and 2010, for which mark-recapture data already exist. This will provide a baseline for adult razorback sucker monitoring. Estimates will again be calculated in 2015 for the years 2013, 2014, and 2015 from data collected during the Colorado pikeminnow monitoring project (Recovery Program Project No.

127)

Larval sampling will follow the protocol outlined above for the Gunnison River, extending from mid-May through the first week of July for razorback larvae and then continue through the end of August for Colorado pikeminnow larvae (as funding permits). Both the 18-mile reach and the Loma-to-Westwater reach downstream will be sampled for comparison with results of Osmundson and Seal (2009).

Fall YOY sampling will be restricted to the 18-mile reach and Loma-to-State line following ISMP protocol with two seine hauls in each of two backwaters within each 5-mile reach (see McAda et al. 1994).

Both rivers

The Principal Investigator will train crew members, act as overall crew leader and actively participate in data collection efforts. Along with annual data collection efforts, additional time will be required prior to field sampling to ready equipment and train new crew members in motor boat operation and field techniques specific to this project and later to input and check data.

The Principal Investigator will work closely with a biostatistician familiar with running program MARK to estimate razorback sucker abundance in the Colorado River and abundance of both Colorado pikeminnow and razorback sucker in the Gunnison River if mark-recapture estimation proves feasible there.

VII. Task Description and Schedule

Description

Task 1. Electro-fish Gunnison River for endangered fish CPE, fish community monitoring, and fish tissue collection; two trips (July and September).
Task 2. Electro-fish Colorado River for fish community monitoring; one trip (late September).
Task 3. Sample fish larvae (Mid-May to early July): Colorado River
Task 4. Sample fish larvae (Mid-May to early July): Gunnison River
Task 5. Sample YOY in the Gunnison River (one pass – September)
Task 6. Sample YOY in the Colorado River (one pass – September)
Task 7. Analyze tissue samples for selenium
Task 8. Develop population estimates of razorback sucker in Colorado River
Task 9. Analyze larval samples (Larval Fish Lab)
Task 10. Analyze data
Task 11. Write annual reports
Task 12. Prepare final contaminants report
Task 13. Prepare final fish monitoring report No. 1 (Large-bodied and

YOY fish)

Task 14. Prepare final fish monitoring report No. 2 (Larval fish)

Schedule

Task 1, 2, 3, 4, 5, 6, 7, 10, 11:	2011
Task 1, 2, 3, 4, 5, 6, 7, 8, 10, 11:	2012
Task 1, 2, 3, 4, 5, 6, 9, 10, 11, 12:	2013
Task 1, 2, 3, 4, 5, 6, 9, 10, 11:	2014
Task 8, 9, 10, 11, 13:	2015
Task 9, 11:	2016
Task 10, 14:	2007

VIII. **FY-2011 Work (first year of multi-year study)**

Deliverables/Due Dates: Annual Report due 12/2011

Budget

Task 1. Electro-fish Gunnison River (two trips)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	96 hrs @ 57.96	5,564
Fishery Technician at GS-6 (1)	96 hrs @ 23.95	2,299
Seasonal technicians at GS-5 (6)	312 hrs @ 17.45	5,444
2. Travel		
field (camp per diem 5 x 2 wks x 4.5 d/wk)	45d @ 28	1,260
3. Equipment		
Maintenance/repair		200
Boat gas 10 @4.00/gal		40
misc. items		50
4. Vehicles		
2-4 @ $ 334 each/mo plus $0.30/mile		765
Task Total $		**15,**

6
2
3

Task 2. Electro-fish Colorado River (one trip)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	16 hrs @ 57.96	927
Fishery Technician at GS-6 (1)	16 hrs @ 23.95	383
Seasonal technicians at GS-5 (4)	26 hrs @ 17.45	454
2. Travel		0
3. Equipment		
Maintenance/repair		200
Boat gas 10 @4.00/gal		64
misc. items		50
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		91
Task Total		**$ 2,169**

Task 3. Sample larvae in the Gunnison River (4 8-hr-days/wk; 8 weeks)

1. Labor (salary and benefits)		
Fishery Technician at GS-6 (1)	256 hrs @ 23.95	6,131
Seasonal technicians at GS-5 (1)	384 hrs @ 17.45	6,701
2. Travel		0
3. Equipment		
Maintenance/repair		150
Boat gas 640 @4.00/gal		1,280
misc. items		50
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		3,297
Task Total		**$ 17,822**

Task 4. Sample larvae in the Colorado River (2 10-hr-days/wk; 8 weeks)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	160 hrs @ 57.96	9,274
Seasonal technicians at GS-5 (1)	256 hrs @ 17.45	4,467
2. Travel		0
3. Equipment		
Maintenance/repair		150
Boat gas 192 @4.00/gal		768
misc. items		50
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		704
Task Total		**$ 15,626**

Task 5. Sample YOY in the Gunnison River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	34 hrs @ 57.96	1,971
Seasonal technicians at GS-5 (6)	114 hrs @ 17.45	1,989
2. Travel		392
3. Equipment		
Maintenance/repair		85
Boat gas 0 @4.00/gal		0
misc. items		50
Ethanol		120
Bottles		40
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		141
Task Total		**$ 4,788**

Task 6. Sample YOY in the Colorado River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	20 hrs @ 57.96	1,159

Seasonal technicians at GS-5 (1)	89 hrs @ 17.45	1,553
2. Travel		0
3. Equipment		
Maintenance/repair		50
Boat gas 52 @4.00/gal		208
misc. items		50
Ethanol		120
Bottles		40
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		57
Task Total		**$ 3,237**

Task 7. Analyze tissue samples for selenium.

1. Columbia Environmental Research Laboratory
   Neutron activation 56 samples @ 100/sample
   Cost covered by other funding source 0

Task Total $ 0

Task 10 & 11. Input and analyze data, apply for collecting-permits, revise SOW, write annual report, etc.

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	120 hrs@ 57.96	6,955
Task Total		**$ 6,955**

Overhead

1. Labor		
Project Leader at GS-14 (1)	26 hrs @ 72.14	1,876
Assistant project Leader GS-13 (1)	61 hrs @ 61.38	3,744
Admin assistant at GS-9 (1)	82 hrs @ 38.54	3,160
Overhead Total:		**$ 8,7**

			8
			0
Subtotal for tasks			
	Task 1		15,623
	Task 2		2,169
	Task 3		17,822
	Task 4		15,626
	Task 5		4,788
	Task 6		3,237
	Task 7		0
	Tasks 10&11		6,955
	Overhead		8,780
		FY 2011 Total	**$**
75,000			
Subtotal for labor:			
	Fishery Biologist at GS-12 (1)	446 hrs @ 57.96	25,850
	Fishery Technician at GS-6 (1)	368 hrs @ 23.95	8,814
	Seasonal technicians at GS-5	1181 hrs @ 17.45	20,608
	Project Leader at GS-14 (1)	26 hrs @ 72.14	1,876
	Assistant project Leader GS-13 (1)	61 hrs @ 61.38	3,744
	Admin assistant at GS-9 (1)	82 hrs @ 38.54	3,160
		Subtotal for labor:	**$**
			6
			4
			,
			0
			5
			2
Subtotal for travel:			
	Per-diem (camping)		
	Task 1		1,260
	Task 5		392
		Subtotal for travel:	**$**
1,652			
Subtotal for Equipment:			
	Maintenance/repair		835
	Boat gas 10 @4.00/gal		2,360

misc. items		300
Ethanol		480
Bottles		266
Vehicles		5,055
	Subtotal for equipment:	**$ 9,296**

Total by category:

Labor	64,052
Travel	1,652
Equipment	9,296
FY 2011 Total:	**$ 75,000**

IX. **FY-2012 Work (second year of multi-year study)**

Deliverables/Due Dates: Annual Report due 12/2012

Budget

Task 1. Electro-fish Gunnison River (two trips)

1. Labor (salary and benefits)

Fishery Biologist at GS-12 (1)	96 hrs @ 57.96	5,564
Fishery Technician at GS-6 (1)	96 hrs @ 24.70	2,371
Seasonal technicians at GS-5 (6)	312 hrs @ 17.45	5,444

2. Travel

field (camp per diem 5 x 2 wks x 4.5 d/wk)	45d @ 28	1,260

3. Equipment

Maintenance/repair	200
Boat gas 10 @4.00/gal	40
misc. items	50

4. Vehicles

2-4 @ $ 334 each/mo plus $0.30/mile

7
6
5

Task Total $

15,694

Task 2. Electro-fish Colorado River (one trip)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	16 hrs @ 57.96	927
Fishery Technician at GS-6 (1)	16 hrs @ 24.70	395
Seasonal technicians at GS-5 (4)	26 hrs @ 17.45	454
2. Travel		0
3. Equipment		
Maintenance/repair		200
Boat gas 10 @4.00/gal		64
misc. items		50
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		91

Task Total

$ 2,181

Task 3. Sample larvae in the Gunnison River (4 8-hr-days/wk; 8 weeks)

1. Labor (salary and benefits)		
Fishery Technician at GS-6 (1)	256 hrs @ 24.70	6,323
Seasonal technicians at GS-5 (1)	384 hrs @ 17.45	6,701
2. Travel		0
3. Equipment		
Maintenance/repair		150
Boat gas 640 @4.00/gal		1,280
misc. items		50
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		3,297

Task Total $

18,014

Task 4. Sample larvae in the Colorado River (2 10-hr-days/wk; 8 weeks)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	160 hrs @ 57.96	9,274
Seasonal technicians at GS-5 (1)	256 hrs @ 17.45	4,467
2. Travel		0
3. Equipment		
Maintenance/repair		150
Boat gas 192 @4.00/gal		768
misc. items		50
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		704
Task Total		**$ 15,626**

Task 5. Sample YOY in the Gunnison River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	34 hrs @ 57.96	1,971
Seasonal technicians at GS-5 (6)	114 hrs @ 17.45	1,989
2. Travel		392
3. Equipment		
Maintenance/repair		85
Boat gas 0 @4.00/gal		0
misc. items		50
Ethanol		120
Bottles		40
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		141
Task Total		**$ 4,788**

Task 6. Sample YOY in the Colorado River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	20 hrs @ 57.96	1,159

Seasonal technicians at GS-5 (1)	89 hrs @ 17.45	1,553
2. Travel		0
3. Equipment		
Maintenance/repair		50
Boat gas 52 @4.00/gal		208
misc. items		50
Ethanol		120
Bottles		40
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		57
	Task Total	

$ 3,237

Task 7. Analyze tissue samples for selenium

1. Columbia Environmental Research Laboratory		
Neutron activation 56 samples @ 100/sample		
Cost covered by other funding source		0

Task 8. Develop population estimate of razorback sucker in Colorado River

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	246 hrs@ 57.96	1,391
2. Bio-statistician	16 hrs @ 125	2,000
	Task Total	

$ 3,391

Task 10 & 11. Input and analyze data, apply for collecting permits, update SOW's, write annual report, etc.

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	120 hrs@ 57.96	6,955
	Task Total	

$ 6,955

Overhead

1. Labor

Project Leader at GS-14 (1)	26 hrs @ 74.16	1,928
Assistant project Leader GS-13 (1)	61 hrs @ 61.38	3,744
Admin assistant at GS-9 (1)	82 hrs @ 39.63	3,250

Overhead Total: $ 8,922

Subtotal for tasks

Task 1	15,694
Task 2	2,181
Task 3	18,014
Task 4	15,626
Task 5	4,788
Task 6	3,237
Task 7	0
Task 8	3,391
Tasks 10&11	6,955
Overhead	8,922

FY 2012 Total $ 78,808

Subtotal for labor:

Fishery Biologist at GS-12 (1)	470 hrs @ 57.96	27,241
Fishery Technician at GS-6 (1)	368 hrs @ 24.70	9,090
Seasonal technicians at GS-5	1181 hrs @ 17.45	20,608
Project Leader at GS-14 (1)	26 hrs @ 74.16	1,928
Assistant project Leader GS-13 (1)	61 hrs @ 61.38	3,744
Admin assistant at GS-9 (1)	82 hrs @ 39.63	3,250

Subtotal for labor: $ 65,861

Subtotal for travel:

Per-diem (camping)

Task 1	1,260
Task 5	392

Subtotal for travel: $ 1,652

Subtotal for Equipment:

Maintenance/repair	835
Boat gas 10 @4.00/gal	2,360
misc. items	300
Ethanol	480
Bottles	266
Vehicles	5,055

Subtotal for equipment: $ 9,296

Subtotal for Biostatitician:

Subtotal for biostatistician $ 2,000

Total by category:

Labor	65,861
Travel	1,652
Equipment	9,296
Biostatitician	2,000

FY 2012 Total: $ 78,809

X. **FY-2013 Work (third year of multi-year study)**

Deliverables/Due Dates: Annual Report due 12/2013

Budget

Task 1. Electro-fish Gunnison River (two trips)

1. Labor (salary and benefits)

Fishery Biologist at GS-12 (1)	96 hrs @ 59.65	5,726
Fishery Technician at GS-6 (1)	96 hrs @ 26.17	2,512
Seasonal technicians at GS-5 (6)	312 hrs @ 17.95	5,600

2. Travel

field (camp per diem 5 x 2 wks x 4.5 d/wk)	45d @ 28	1,260

3. Equipment		
Maintenance/repair		1000
Boat gas 10 @4.00/gal		40
misc. items		300
4. Vehicles		
2-4 @ $ 334 each/mo plus $0.30/mile		765
Task Total $		**17,203**
Task 2. Electro-fish Colorado River (one trip)		
1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	16 hrs @ 59.65	954
Fishery Technician at GS-6 (1)	16 hrs @ 26.17	419
Seasonal technicians at GS-5 (4)	26 hrs @ 17.95	467
2. Travel		0
3. Equipment		
Maintenance/repair		500
Boat gas 10 @4.00/gal		64
misc. items		200
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		91
Task Total		**$ 2,695**
Task 3. Sample larvae in the Gunnison River (4 8-hr-days/wk; 8 weeks)		
1. Labor (salary and benefits)		
Fishery Technician at GS-6 (1)	256 hrs @ 26.17	6,700
Seasonal technicians at GS-5 (1)	384 hrs @ 17.95	6,893

2. Travel		0
3. Equipment		
Maintenance/repair		500
Boat gas 640 @4.00/gal		1,280
misc. items		300
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		3,297
Task Total	**$**	**19,183**

Task 4. Sample larvae in the Colorado River (2 10-hr-days/wk; 8 weeks)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	160 hrs @ 59.65	9,544
Seasonal technicians at GS-5 (1)	256 hrs @ 17.95	4,595
2. Travel		0
3. Equipment		
Maintenance/repair		1000
Boat gas 192 @4.00/gal		768
misc. items		300
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		704
Task Total	**$**	**17,124**

Task 5. Sample YOY in the Gunnison River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	34 hrs @ 59.65	2,028
Seasonal technicians at GS-5 (6)	114 hrs @ 17.95	2,046
2. Travel		392
3. Equipment		
Maintenance/repair		200

Boat gas 0 @4.00/gal		0
misc. items		200
Ethanol		120
Bottles		40
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		141
	Task Total	**$ 5,167**

Task 6. Sample YOY in the Colorado River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	20 hrs @ 59.65	1,193
Seasonal technicians at GS-5 (1)	89 hrs @ 17.95	1,598
2. Travel		0
3. Equipment		
Maintenance/repair		200
Boat gas 52 @4.00/gal		208
misc. items		200
Ethanol		120
Bottles		40
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		57
	Task Total	**$ 3,616**

Task 9. Analyze larval samples (Larval Fish Lab)

1. 363 samples anticipated @ $300/sample	**Task Total**	**$108,900**

Task 12. Prepare final contaminates report

1. Cost covered by other funding source		0
	Task Total	**$ 0**

Task 10 & 11. Input and analyze data, apply for collecting-permits,

revise SOW, write annual report, etc.

1. Labor (salary and benefits)
   Fishery Biologist at GS-12 (1) 120 hrs@ 59.65 7,158

Task Total $ 7,158

Overhead

1. Labor
   Project Leader at GS-14 (1) 26 hrs @ 76.34 1,985
   Assistant project Leader GS-13 (1) 61 hrs @ 65.05 3,968
   Admin assistant at GS-9 (1) 82 hrs @ 40.78 3,344

Overhead Total: $ 9,297

Subtotal for tasks
Task 1 17,203
Task 2 2,695
Task 3 19,183
Task 4 17,124
Task 5 5,167
Task 6 3,616
Task 9
Tasks 10&11 7,158
Overhead 9,297

FY 2013 Total $ 190,343

Subtotal for labor:
Fishery Biologist at GS-12 (1) 446 hrs @ 59.65 26,604
Fishery Technician at GS-6 (1) 368 hrs @ 26.17 9,631
Seasonal technicians at GS-5 1181 hrs @ 17.95 21,199
Project Leader at GS-14 (1) 26 hrs @ 76.34 1,985
Assistant project Leader GS-13 (1) 61 hrs @ 65.05 3,968

	Admin assistant at GS-9 (1)	82 hrs @ 40.78	3,344
		Subtotal for labor:	**$ 66,731**
Subtotal for travel:			
	Per-diem (camping)		
	Task 1		1,260
	Task 5		392
		Subtotal for travel:	**$ 1,652**
Subtotal for Equipment:			
	Maintenance/repair		3400
	Boat gas 10 @4.00/gal		2,360
	misc. items		1500
	Ethanol		480
	Bottles		266
	Vehicles		5,055
		Subtotal for equipment:	**$ 13,061**
Subtotal for Larval Fish Lab :			
	363 samples @ $300/sample		$ 108,900
		Subtotal for Lab work:	**$108,900**
Total by category:			
	Labor		66,731
	Travel		1,652
	Equipment		13,061
	Lab work		108,900

FY 2013 Total: $ 190,344

XI. **FY-2014 Work (fourth year of multi-year study)**

Deliverables/Due Dates: Annual Report due 12/2014

Budget

Task 1. Electro-fish Gunnison River (two trips)		
1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	96 hrs @ 59.65	5,726
Fishery Technician at GS-6 (1)	96 hrs @ 26.17	2,512
Seasonal technicians at GS-5 (6)	312 hrs @ 17.95	5,600
2. Travel		
field (camp per diem 5 x 2 wks x 4.5 d/wk)	45d @ 28	1,260
3. Equipment		
Maintenance/repair		1000
Boat gas 10 @4.00/gal		40
misc. items		300
4. Vehicles		
2-4 @ $ 334 each/mo plus $0.30/mile		765
Task Total $		**17,203**

Task 2. Electro-fish Colorado River (one trip)		
1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	16 hrs @ 59.65	954
Fishery Technician at GS-6 (1)	16 hrs @ 26.17	419
Seasonal technicians at GS-5 (4)	26 hrs @ 17.95	467

2. Travel		0
3. Equipment		
Maintenance/repair		500
Boat gas 10 @4.00/gal		64
misc. items		200
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		91
	Task Total	
$ 2,695		

Task 3. Sample larvae in the Gunnison River (4 8-hr-days/wk; 8 weeks)

1. Labor (salary and benefits)		
Fishery Technician at GS-6 (1)	256 hrs @ 26.17	6,700
Seasonal technicians at GS-5 (1)	384 hrs @ 17.95	6,893
2. Travel		0
3. Equipment		
Maintenance/repair		500
Boat gas 640 @4.00/gal		1,280
misc. items		300
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		3,297
	Task Total	**$**
19,183		

Task 4. Sample larvae in the Colorado River (2 10-hr-days/wk; 8 weeks)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	160 hrs @ 59.65	9,544
Seasonal technicians at GS-5 (1)	256 hrs @ 17.95	4,595
2. Travel		0
3. Equipment		

Maintenance/repair		1000
Boat gas 192 @4.00/gal		768
misc. items		300
Ethanol		120
Bottles		93
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		704
Task Total	**$**	**17,124**

Task 5. Sample YOY in the Gunnison River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	34 hrs @ 59.65	2,028
Seasonal technicians at GS-5 (6)	114 hrs @ 17.95	2,046
2. Travel		392
3. Equipment		
Maintenance/repair		200
Boat gas 0 @4.00/gal		0
misc. items		200
Ethanol		120
Bottles		40
4. Vehicles		
3 @ $ 334 each/mo plus $0.30/mile		141
Task Total	**$**	**5,167**

Task 6. Sample YOY in the Colorado River (one September pass)

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	20 hrs @ 59.65	1,193
Seasonal technicians at GS-5 (1)	89 hrs @ 17.95	1,598
2. Travel		0
3. Equipment		
Maintenance/repair		200
Boat gas 52 @4.00/gal		208
misc. items		200
Ethanol		120

Bottles		40
4. Vehicles		
2 @ $ 334 each/mo plus $0.30/mile		57
	Task Total	**$ 3,616**

Task 9. Analyze larval samples (Larval Fish Lab)

1. 363 samples anticipated @ $300/sample	**Task Total**	**$108,900**

Task 10 & 11. Input and analyze data, apply for collecting-permits, revise SOW, write annual report, etc.

2. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	120 hrs@ 59.65	7,158
	Task Total	**$ 7,158**

Task 12. Prepare final contaminates report

1. Cost covered by other funding source		0
	Task Total	**$ 0**

Overhead

1. Labor		
Project Leader at GS-14 (1)	26 hrs @ 76.34	1,985
Assistant project Leader GS-13 (1)	61 hrs @ 65.05	3,968
Admin assistant at GS-9 (1)	82 hrs @ 40.78	3,344
	Overhead Total:	**$ 9,297**

	Subtotal for tasks				
		Task 1		17,203	
		Task 2		2,695	
		Task 3		19,183	
		Task 4		17,124	
		Task 5		5,167	
		Task 6		3,616	
		Task 9			
108,900		Tasks 10&11			7,158
		Overhead		9,297	
			FY 2014 Total	**$**	
190,343					
	Subtotal for labor:				
		Fishery Biologist at GS-12 (1)	446 hrs @ 59.65	26,604	
		Fishery Technician at GS-6 (1)	368 hrs @ 26.17	9,631	
		Seasonal technicians at GS-5	1181 hrs @ 17.95	21,199	
		Project Leader at GS-14 (1)	26 hrs @ 76.34	1,985	
		Assistant project Leader GS-13 (1)	61 hrs @ 65.05	3,968	
		Admin assistant at GS-9 (1)	82 hrs @ 40.78	3,344	
			Subtotal for labor:	**$**	
				66,731	
	Subtotal for travel:				
		Per-diem (camping)			
		Task 1		1,260	
		Task 5		392	
			Subtotal for travel:	**$**	
1,652					
	Subtotal for Equipment:				
		Maintenance/repair		3400	
		Boat gas 10 @4.00/gal		2,360	
		misc. items		1,500	
		Ethanol		480	
		Bottles		266	

Vehicles	5,055
Subtotal for equipment:	**$ 13,061**
Subtotal for Larval Fish Lab :	
363 samples @ $300/sample	$ 108,900
Subtotal for Lab work:	**$108,900**

Total by category:

Labor	66,731
Travel	1,652
Equipment	13,061
Lab work	108,900
FY 2014 Total: $	**190,344**

XII. FY-2015 Work (fifth year of multi-year study)

Deliverables/Due Dates:

Annual Report due 12/2015

Draft final report (large-bodied fish monitoring) for peer review due 08/30/2015

Draft final report for Biology Committee approval 10/31/2015

Draft finalized 12/31/2015

Budget

Task 8. Develop population estimate of razorback sucker in Colorado River

1. Labor (salary and benefits)

Fishery Biologist at GS-12 (1)	24 hrs@ 59.65	1,432
2. Bio-statistician	16 hrs @ 125	2,000

Task Total

$ 3,432

Task 9. Analyze larval samples (Larval Fish Lab)

1. 363 samples anticipated @ $300/sample		108,900

Task Total $

108,900

Tasks 10, 11 & 13. Input and analyze data, revise SOW, write annual report, and prepare draft and final fish monitoring report No. 1 (large-bodied and YOY).

1. Labor (salary and benefits)		
Fishery Biologist at GS-12 (1)	480 hrs@ 59.65	28,632

Task Total $

28,632

Overhead: Administrative support

1. Labor (salary and benefits)		
Project Leader at GS-14 (1)	14 hrs @ 76.34	1,069
Assistant Project Leader GS-13 (1)	34 hrs @ 65.05	2,212
Admin Assistant at GS-9 (1)	46 hrs @ 40.78	1,876

Overhead Total:

$ 5,157

Total for tasks

Task 8	3,432
Task 9	108,900
Task 10, 11 & 13	28,632

Overhead		5,157
	FY 2015 Total: $	**146,121**

Subtotal for labor		
Fishery Biologist at GS-12 (1)	504 hrs@ 59.65	30,064
Project Leader at GS-14 (1)	14 hrs @ 76.34	1,069
Assistant Project Leader GS-13 (1)	34 hrs @ 65.05	2,212
Admin Assistant at GS-9 (1)	46 hrs @ 40.78	1,876
	Subtotal for labor $	**35,221**

Subtotal for Larval Fish Lab :		
435 samples @ $300/sample		$ 108,900
	Subtotal for Lab work: $	**108,900**
Subtotal for biostatistician:		
16 hrs @ 125/hr		2,000
	Subtotal for biostatistician:	**$ 2,000**

Total for categories:		
Labor		35,221
Lab work		
		108,900
Biostatitician		2,000
	FY 2014 Total: $	**146,121**

XIII. FY-2016 Work (sixth year of multi-year study)

Deliverables/Due Dates:	Annual Report due 12/2016

Budget

Task 9. Analyze larval samples (Larval Fish Lab)

1. 363 samples anticipated @ $300/sample **Task Total $ 108,900**

Total for tasks
Task 9
108,900

FY 2014 Total: $ 108,900

IX. FY-2017 Work (seventh year of multi-year study)

Deliverables/Due Dates:

Annual Report due 12/2017

Draft final report (Larval fish monitoring) for peer review due 08/30/2017

Draft final report for Biology Committee approval 10/31/2017

Draft finalized 12/31/2017

Budget

Tasks 10 & 14. Input and analyze data, write annual report, and prepare draft and final fish monitoring report No. 2 (larval fish).

1. Labor (salary and benefits)

Fishery Biologist at GS-12 (1)	480 hrs@ 59.65	28,632

Task Total $ 28,632

2. Overhead: Administrative support

Project Leader at GS-14 (1)	14 hrs @ 76.34	1,069
Assistant Project Leader GS-13 (1)	34 hrs @ 65.05	2,212
Admin Assistant at GS-9 (1)	46 hrs @ 40.78	1,876

Overhead Total:

$

5
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Total for tasks

Task 10 & 14	28,632
Overhead	5,157

FY 2015 Total: $

33,789

Subtotal for labor

Fishery Biologist at GS-12 (1)	480 hrs@ 59.65	28,632
Project Leader at GS-14 (1)	14 hrs @ 76.34	1,069
Assistant Project Leader GS-13 (1)	34 hrs @ 65.05	2,212
Admin Assistant at GS-9 (1)	46 hrs @ 40.78	1,876

Subtotal for labor $

33,789

FY 2014 Total: $

33,789

XIV. Budget summary

2011	$ 75,000
2012	$ 78,809
2013	$ 190,344
2014	$ 190,344
2015	$ 146,121
2016	$ 108,900
2017	$ 33,789
Total	**$ 823,307**

XIV. Reviewers: Not yet known

XIV. References

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Osmundson, D. B., and K. P. Burnham. 1998. Status and trends of the endangered Colorado squawfish in the upper Colorado River. Transactions of the American Fisheries Society 127:957-970.

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.

Osmundson, D. B., and G. C. White. 2009. Population status and trends of Colorado pikeminnow of the upper Colorado River, 1991-2005. Final Report. U. S. Fish and Wildlife Service, Grand Junction, Colorado.

U.S. Fish and Wildlife Service. 2009. Final Gunnison River basin programmatic biological opinion. Final Report. U.S. Fish and Wildlife Service, Denver, Colorado.

Williamson, J. H. 1992. Colorado pikeminnow genetic survey-tissue sampling protocol 1992. U. S. Fish and Wildlife Service, Denver, Colorado.

**Salaries through 2013 include step increases. No cost of living increase in 2011 and 2012, but a 3% increase in 2013. After 2013, salaries are kept flat and do reflect cost of living increases or step increases.

Aspinall-fish-monitor-SOW-2011-2016.doc