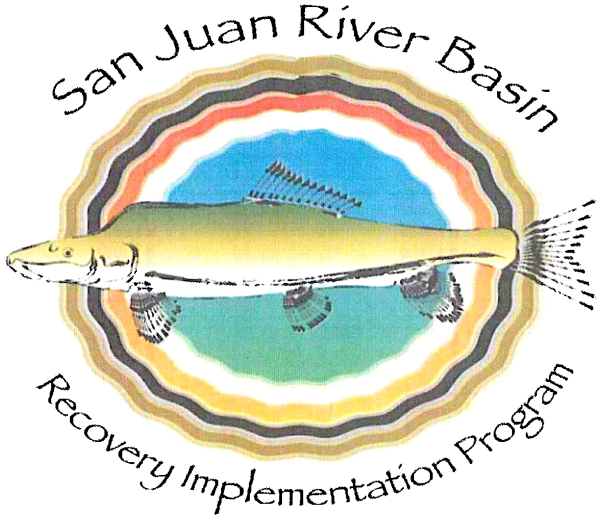
FISCAL YEAR 2012
ANNUAL BUDGET AND
WORK PLAN



Approved Sept 28, 2011

SJRRIP FY2012 AWP Budget Estimate *(Approved September 28, 2011)*

SOW	Title	Agency	Program Base Funding			Other Funding
			Power	Reclamation Funding	Capital	
	Element 1 - Management and Augmentation of Populations and Protection of Genetic Integrity					
8	Stocking & Acclimation of Age-0 CPM & Age-1+ RBS	FWS, ABQ	$38,335			
9	Colorado Pikeminnow Fingerling Production Dexter	FWS, DNFHTC	$109,298			
10	Rearing Razorback Suckers Dexter	FWS, DNFHTC	$83,416			
11	Razorback Sucker Production Uvalde	FWS, UNFH	$148,374			
12	RBS Augmentation/NAPI Pond Management	FWS/NN	$127,113			
	Subtotal		**$506,536**	**$0**	**$0**	**$0**
	Element 2 - Protection, Management, and Augmentation of Habitat					
13	Maintenance and Operation of Model	BR, Salt Lake City	$108,720			
14	Stream Gaging and Flow Measurements	USGS	$7,600			
15	Operation of PNM Fish Passage Structure	FWS/NN	$86,608			
	Capital Projects Management	BR	$0		$56,000	
	Capital Hogback Canal	BR	$0		$400,000	
	PNM O&M	PNM	$0			
	Subtotal		**$202,928**	**$0**	**$456,000**	**$0**
	Element 3 - Management of Non-Native Species					
17	Upper Nonnative Species Control & Rare Fish Monitoring	FWS, ABQ	$0	$321,849		
18	Lower Nonnative Species Control & Rare Fish Monitoring	UDWR	$0	$171,479		
	Subtotal		**$0**	**$493,328**	**$0**	**$0**
	Element 4 - Monitoring and Evaluation of Fish and Habitat in Support of Recovery Actions					
19	Sub-Adult/Adult Large-Bodied Fish Comm. Monitoring	FWS, GJ	$104,814			
20	YOY/Small-Bodied Fish Monitoring	NMDGF	$83,417			$40,000 [1]
21	RBS/CPM Larval Surveys (Combined SOW)	NMDGF. ASIR	$205,430			
22	Specimen Curation/Identification	UNM	$29,900			
25	River Videography	BR	$18,000			
27	PIT Tags	BR	$50,000			
28	RBS Survey of SJR Arm of Lake Powel	FWS,GJ; UDWR	$214,060			
29	Database Management	FWS	$29,626			$8,475 [2]
30	2012 Habitat/Temperature Monitoring	RFP	$88,313			
31	Peer Review	BOR/FWS	$0	$45,000		
	Workshops (Habitat monitoring)	BR/FWS	$0	$40,000		
	Subtotal		**$823,560**	**$85,000**	**$0**	**$48,475**

	Element 5 - Program Coordination and Assessment of Progress Toward Recovery					
32	Program Management FWS	FWS, ABQ	$0	$251,180		$200,079 [2]
33	Base Fund Management BR	BR, SLC	$0	$143,892		
	Subtotal		**$0**	**$395,072**	**$0**	**$200,079**
	Element 6 - Information and Education					
34	Education and Outreach	FWS, ABQ	$0	$26,328		
	Subtotal		**$0**	**$26,328**	**$0**	**$0**
	SJRRIP Total		**$1,533,024**	**$999,728**	**$456,000**	**$248,554**
	2012 Base Funds (2011 Amount x 3.9% CPI)		**$2,533,874**			
	Estimated available 2012 funds to proposed expenditures		**$1,000,850**			
	Carry over from FY2011		**$0**			
	Total Funding Available		**$1,000,850**			
	Notes					
	[1] NMGFD In-kind					
	[2] USFWS Costshare					

Augmentation of Age-0 Colorado pikeminnow and Age-1+ razorback sucker in the San Juan River Fiscal Year 2012 Project Proposal

Principal Investigators: D. Weston Furr, Ernest Teller, Sr. and Jason E. Davis
United States Fish and Wildlife Service
New Mexico Fish and Wildlife Conservation Office
3800 Commons Ave N.E.
Albuquerque, N.M. 87109
(505) 342-9900
Weston_Furr@fws.gov Ernest_Teller@fws.gov Jason_E_Davis@fws.gov

Background

Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) are federally-listed endangered fish found in the San Juan River. The San Juan River Recovery Implementation Program (SJRIP) was initiated in 1992 to protect and recover populations of both Colorado pikeminnow and razorback sucker in the San Juan River Basin while water development proceeds in compliance with all applicable federal, state, and tribal laws (USFWS 2008). Recovery of Colorado pikeminnow, as listed in the recovery goals, is dependent on the maintenance of a wild population of at least 2,600 adults in the Green River sub-basin and at least 700 adults in the upper Colorado River sub-basin, as well as a target of 1,000 subadults in the San Juan River sub-basin (USFWS 2002). Delisting criteria include a self sustaining population that exceeds 800 adults maintained in the San Juan River sub-basin. Razorback sucker recovery criteria are dependent on the establishment of four self-sustaining populations of 5,800 adult fish each; two populations in the Upper Colorado River Basin (one population in the Green River subbasin, the other in either the Colorado River or San Juan River subbasins) and two populations in the Lower Colorado River Basin.

Fish community monitoring during the SJRIP seven year research period, 1991-1997, identified few wild Colorado pikeminnow inhabiting the San Juan River and prompted investigation into the feasibility and implementation of augmenting the population with hatchery reared fish. As a result of these findings, an experimental stocking of Colorado pikeminnow was conducted by Utah Department of Wildlife Resources in 1996 with the purposes of evaluating dispersal and retention of stocked Colorado pikeminnow and determining the availability, use, and selection of habitats by early life stages of Colorado pikeminnow (Ryden 2008). Stockings of larval, sub-adult and adult fish after this initial stocking resulted in the subsequent recapture of stocked fish suggesting that Colorado pikeminnow could survive in the San Juan River. In 2003, *An Augmentation Plan for Colorado Pikeminnow In The San Juan River* was finalized (Ryden 2003). This plan and later amendments called for the annual stocking of ≥ 300,000 age-0 and ≥3,000 age 1+ fish in the San Juan River until 2009. In early 2010 a revised plan, *Augmentation of Colorado Pikeminnow (Ptychocheilus lucius) in the San Juan River: Phase II, 2010-2020* (Furr 2010), was drafted that outlines the continuation of stockings through 2020. Phase II augmentation reflects changes requested by the SJRIP Biology Committee by discontinuing the stocking age-1+ Colorado pikeminnow in exchange for stocking increased numbers of age-0 fish (n≥ 400,000).

Similarly, after the failure to collect any wild razorback sucker in the San Juan River during three years of intensive studies (1991-1993) the SJRIP Biology Committee initiated an experimental stocking

program for razorback sucker in the San Juan River (Ryden and Pfeifer 1994). Experimental stocking was implemented to provide needed insight about recovery potential and habitat suitability for the razorback sucker in the San Juan River between river mile (RM) 158.6 at the Hogback Diversion structure, NM and Lake Powell, UT RM 0 (Maddux et al. 1993). This is the area designated as Critical Habitat for razorback sucker (USFWS 1994). Between March 1994 and October 1996, 942 razorback sucker were stocked into the San Juan River at four stocking sites (RM 158.6, 136.6, 117.5, and 79.6). Data gathered on these fish identified habitat types being used year-round by razorback sucker in the San Juan River, and provided information on movements, survival, and growth rates. Based on the successes of the experimental stocking study, a full-scale augmentation effort for razorback sucker in the San Juan River was initiated with the *Five-Year augmentation plan for razorback sucker in the San Juan River* (Ryden 1997). In February 2003 the SJRIP-BC extended the augmentation effort for razorback sucker with *An augmentation plan for razorback sucker in the San Juan River: An addendum to the five-year augmentation plan for razorback sucker in the San Juan River* (Ryden 2003). However, due to changes in augmentation protocols and difficulties in producing requested numbers of fish the eight-year addendum to the original plan was delayed in initiation until 2009. The current augmentation plan calls for the annual stocking of ≥11,400 razorback sucker from a combination of fish reared in a hatchery and razorback sucker that are grown out in ponds on Navajo Agricultural Products Industry (NAPI) land.

The augmentation programs for the Colorado pikeminnow and razorback sucker populations in the San Juan River are related to the 2010 SJRIP Draft Long Range Plan (LRP). These activities are specifically addressed in the following Elements, Goals, Actions, and Tasks:

Element 1. Management and Augmentation of Populations and Protection of Genetic Integrity

Goal 1.1—Establish a Genetically and Demographically Viable, Self-Sustaining CPM Population.

Action 1.1.1 Develop plans for rearing and stocking for CPM.

Task 1.1.1.3 Evaluate and adjust stocking goals of augmentation plan.

Task 1.1.1.4 Review and update augmentation plan as needed.

Action 1.1.2 Produce, rear, and stock sufficient numbers of CPM to meet stocking goals of augmentation plan.

Task 1.1.2.2 Annually stock >300,000 age-0 CPM**

***Phase II modification:*

Annually stock ≥ 400,000 age-0 Colorado pikeminnow. [2011-2020]

Task 1.1.2.3 Annually stock 3,000 age-1 CPM. **

*** Phase II modification:*

discontinue annual stocking of ≥ 3,000 age-1+ Colorado pikeminnow; except in instances under Task 1.1.2.4. [2011-2020]

Task 1.1.2.4 Opportunistically stock available CPM in excess of those described above.

** indicates that the LRP 2010 DRAFT does not reflect modifications to the augmentation program outlined in Augmentation of Colorado Pikeminnow (*Ptychocheilus lucius*) in the San Juan River: Phase II, 2010-2020 (Furr 2010), modifications are delineated in *italics*.

Goal 1.2--- Establish a Genetically and Demographically Viable, Self-Sustaining RBS Population.

Action 1.2.1 Develop plans for rearing and stocking RBS.

Task 1.2.1.3 Estimate and adjust stocking goals of augmentation plan.

Task 1.2.1.4 Review and update RBS augmentation plan as needed.

Action 1.2.2 Produce, rear, and stock sufficient numbers of RBS to meet stocking goals of augmentation plan.

Task 1.2.2.1 Produce and rear RBS at Dexter NFH for stocking to grow-out facilities.

Task 1.2.2.2 Annually stock three NAPI grow-out ponds with 3,000-3,500 fish per pond (> 200 mm TL) hatchery-reared RBS.

Task 1.2.2.3 Produce 12,000 RBS per year (>300 mm TL) at Uvalde NFH.

Task 1.2.2.4 Stock at least 91,200 RBS (> 300 mm TL) during 2009-2016 or 11,400 per year.

Task 1.2.2.7 Opportunistically stock available RBS in excess of the 11,400 described above. *(i.e. stock all razorback sucker from NAPI grow-out ponds annually)*

Goal 1.3— Monitor and Evaluate RBS and CPM Augmentation Program and Genetic Integrity.

Action 1.3.1 Monitor status and success of stocked RBS and CPM.

Task 1.3.1.1 Determine survival and recruitment of stocked RBS and CPM to assess stocking success

Action 1.3.2 Evaluate factors limiting RBS and CPM population recovery.

Task 1.3.2.1 Identify, describe, and implement strategies for improving survival and retention of stocked razorback sucker and Colorado pikeminnow, including acclimation prior to stocking, size of fish stocked, time and location of stocking, physiological conditioning, and predator avoidance.

Action 1.3.4 Assemble information from population management and augmentation.

Task 1.3.4.1 Use data and information gathered from fish surveys, hatchery augmentation, and survival studies to describe best strategies for establishing wild populations of endangered fish and restoring the native fish community.

In addition to SJRIP Program priorities, the stocking of fish reared at U.S. Fish and Wildlife Service (Service) hatcheries in the Southwest Region (Region 2; New Mexico, Arizona, Texas and Oklahoma) are subject to Regional Policy No. 03-06, "Stocking of fish and other aquatic species". This policy applies to production, transport, and stocking for Service hatchery production and incorporates guidance and requirements from FWS Fish Health Policy (713 FWM 1-5), Policy for Controlled Propagation of Species Listed under the Endangered Species Act (Federal Register 65:183), and goals and objectives of the FWS Strategic Plan for the Fisheries Program. The Service's Fish and Wildlife Conservation Offices are the primary conduit for satisfaction of Policy requirements and ensures compliance with needs relative to fish health, stocking requests and priorities, deviation from approved stocking requests, pre-stocking treatments (e.g. nonnative fish removal from stocking sites), and applicable environmental compliance. The New Mexico Fish and Wildlife Conservation Office is the pertinent field office for the processing of SJRIP stocking requests under this policy directing the change in lead coordination and stocking responsibilities from FWS Region 6 to Region 2.

Objectives for Fiscal Year 2012

1. Coordinate with Dexter National Fish Hatchery and Technology Center (NFH&TC) to procure and stock Colorado pikeminnow according to guidelines set forth in *Augmentation of Colorado Pikeminnow (Ptychocheilus lucius) in the San Juan River: Phase II, 2010-2020* (Furr 2010)
    a. Annually stock ≥400,000 age-0 Colorado pikeminnow.
2. Coordinate with Uvalde National Fish Hatchery and Navajo Nation Department of Fish and Wildlife to procure and stock razorback sucker according to guidelines set forth in *An augmentation plan for razorback sucker in the San Juan River* (Ryden 2003)
    a. Annually stock ≥11,400 age-1+ razorback sucker.
3. Identify multiple stocking locations to expand range and reduce potential for catastrophic loss of an entire year class at a single stocking location. Stock Colorado pikeminnow according to guidelines defined in *Stocking plan and protocol for the augmentation of Colorado pikeminnow (Ptychocheilus lucius) in the San Juan River* (Furr and Davis 2009). Stock razorback sucker according to guidelines defined in *Stocking plan and protocol for the augmentation of razorback sucker (Xyrauchen texanus) in the San Juan River* (in preparation)
4. Provide summarization report on timing and location of individual stockings, numbers, and age classes while relating information to fulfillment of recommended stocking numbers as outlined in the augmentation plan.

Methods and Approach

Objective 1.a. Age-0 Colorado pikeminnow will be annually reared and harvested by Dexter NFH&TC and delivered via standard distribution unit to the San Juan River. Fish will be stocked in the fall of each year, post irrigation season, to eliminate the risk of fish entrainment in irrigation canals. All age-0 Colorado pikeminnow will be acclimatized to a variety of conditions (i.e. flow, temperature, physical/environmental characteristic, etc.) for up to 24 hours prior to release into the San Juan River.

Objective 2.a. At least 11,400 razorback sucker will be reared at Uvalde NFH, implanted with a Passive Integrated Transponder tag (PIT tag), measured for total length and weight, and delivered via standard distribution unit to the San Juan River annually. Dexter NFH&TC will stock approximately 10,500 razorback sucker (≥200 mm total length) into three NAPI ponds (3,500 fish/pond). Grow-out, harvesting, and stocking via standard distribution unit into the San Juan River will be conducted by NNDFW annually with assistance from NMFWCO. When possible, fish will be stocked in the fall of each year, post irrigation season, to eliminate the risk of fish entrainment in irrigation canals. All razorback sucker, or a subset, from Uvalde NFH will be acclimatized to riverine conditions (i.e. flow, temperature, physical/environmental characteristic, etc.) for up to 24 hours prior to release into the San Juan River. A subset of fish that would serve as a control group may

be hard released. Having this control group would aid the Program in comparing survival and retention of acclimatized fish by comparing differences in subsequent recapture rates.

Objective 3. New Mexico FWCO will identify various sites downstream of RM 180 and determine their suitability for use as stocking locations. Site selection criteria for razorback sucker will be defined in *Stocking plan and protocol for the augmentation of razorback sucker (Xyrauchen texanus) in the San Juan River* (in preparation) and reviewed for approval by the SJRIP Biology Committee. Site selection for Colorado pikeminnow will continue under in *Stocking plan and protocol for the augmentation of Colorado pikeminnow (Ptychocheilus lucius) in the San Juan River* (Furr and Davis 2009).

Objective 4. New Mexico FWCO will collate all pertinent stocking information including, but not limited to, timing, location, environmental conditions, size of fish, and numbers stocked. These data will be entered into a standardized database that will be provided to the Program Coordinators office for deposition. These data and subsequent recapture data will be used to evaluate stocking effectiveness.

Products/Schedule

A final draft of the *Stocking plan and protocol for the augmentation of razorback sucker (Xyrauchen texanus) in the San Juan River* will be submitted to the SJRIP BC for approval by September 30, 2011. An electronic data file will be provided for inclusion in the centralized database by 31 March 2012. A draft summary report detailing findings will be submitted to the San Juan River Implementation Program, Biology Committee, by 31 March 2012. Revisions will be completed and a final annual report will be submitted by 1 June 2012.

Literature Cited

Furr, D. W. and J. E. Davis. 2009. Stocking Plan and Protocol for the Augmentation of Colorado pikeminnow (*Ptychocheilus lucius*) in the San Juan River. U.S. Fish and Wildlife Service, San Juan River Recovery Implementation Program, Albuquerque, NM. 13 pp.

Furr, D.W. 2010. Augmentation of Colorado Pikeminnow (Ptychocheilus lucius) in the San Juan River: Phase II, 2010-2020 (DRAFT). U.S. Fish and Wildlife Service, San Juan River Recovery Implementation Program, Albuquerque, NM. 20 pp + appendices.

Maddux, R. H., L. A. Fitzpatrick, and W. A. Noonan. 1993. Colorado River endangered fishes Critical Habitat: Draft Biological Support Document and appendices. U.S. Fish and Wildlife Service, Salt Lake City, UT. 222 pp.

Ryden, D. W., and F. K. Pfeifer. 1994. An experimental stocking plan for razorback sucker in the San Juan River. U.S. Fish and Wildlife Service, Grand Junction, CO. 26 pp.San Juan River Basin Recovery Implementation Program. 2010. Long-range plan (Draft). San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, NM.

Ryden, D. W. 1997. Five-year augmentation plan for razorback sucker in the San Juan River. U.S. Fish and Wildlife Service, Grand Junction, CO. 27 pp.

Ryden, D.W. 2003. An Augmentation Plan for Razorback Sucker in the San Juan River: Addendum to the Five-Year Augmentation Plan for Razorback Sucker in the San Juan River (Ryden 1997).. U.S. Fish and Wildlife Service, San Juan River Recovery Implementation Program, Albuquerque, NM. 63 pp. + appendices.

Ryden, D.W. 2008. Augmentation of Colorado pikeminnow in the San Juan River: 2007. Interim Progress Report (Final) submitted to U.S. Fish and Wildlife Service, San Juan River Recovery Implementation Program, Albuquerque, NM. 6 pp. + appendices.

U.S. Fish and Wildlife Service. 1994. Determination of critical habitat for the Colorado River endangered fishes; razorback sucker, Colorado pikeminnow, humpback chub, and bonytail chub. Dept. of the Interior, U.S. Fish and Wildlife Service, Federal Register, 21 March 1994, 59:13374-13400.

U.S. Fish and Wildlife Service. 2002. Colorado pikeminnow (Ptychocheilus lucius) Recovery Goals: amendment and supplement to the Colorado Squawfish Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, CO.

FY 2012 Proposed Budget:

Personnel/Labor Costs (Federal Salary + Benefits)	
Fish Biologist (GS-11-2) – 46 days @ $338/day	$ 15,548.00
Age-0 Colorado pikeminnow stockings (Objective 1.a):	
(1 person x 3 days/trip x 2 trips)	
Age-1+ razorback sucker stockings (Objective 2.a):	
(1 person x 2 days/trip x 10 trips)	
Reporting/Data Management (Objective 2)	
(1 person x 20 days)	
Bio. Science Technician (GS-8) – 26 days @ $328/day	$ 8,528.00
Age-0 stockings (Objective 1.a):	
(1 person x 3 days/trip x 2 trip)	
Age-1+ razorback sucker stockings (Objective 2.a):	
(1 person x 2 days/trip x 10 trips)	
Supervisory Fish Biologist (GS-13-1) – 2 days @ $496/day	$ 992.00
(Project oversight and review)	
Sub-total	$ **25,068.00**
Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)	
Hotel Costs – 14 nights	$ 1,078.00
(14 nights @ $77/night – single occupancy = $1,078)	
Per Diem (Hotel Rate) – 26 days @ $46/day	$ 1,196.00
Sub-total	$ **2,274.00**
Equipment	
Vehicle Maintenance & Gasoline 8,000 miles @ $0.51/mile	
(includes costs associated with gasoline/diesel fuel vehicle maintenance)	$ 4,080.00
Sub-total	$ **4,080.00**
USFWS-NMFWCO Total	$ 31,422.00
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	$ 6,913.00
USFWS Region 2 Total	$ **38,335.00**

COLORADO PIKEMINNOW Age-0 PRODUCTION
San Juan River
FY-2012

Principal Investigators- William Knight and Manuel E. Ulibarri
Dexter National Fish Hatchery and Technology Center
U.S. Fish and Wildlife Service
P.O. Box 219, 7116 Hatchery Road
Dexter, NM 88230-0219
April 05, 2011

505-734-5910 Work
505-734-6130 Fax
william_knight@fws.gov
manuel_ulibarri@fws.gov

Background

Once very common throughout the Colorado River Basin, Colorado pikeminnow have declined from historic levels and are now found primarily in the Upper basin of the Colorado River. Various factors have contributed to the decline of the specie including alteration of natural stream flows and temperature regimes, loss of habitat and habitat fragmentation as a result of water development and the introduction of nonnative fish species.

Colorado Pikeminnow are native to the San Juan River. Its historic distribution included the entire mainstem San Juan River up to Rosa, New Mexico, located approximately 25 miles upstream from present day Navajo Dam. Currently the species is considered extremely rare and the small population is estimated at less then 20 adults. This small group of fish has persisted in the San Juan River since the closure of Navajo Dam in 1962. Recent studies being conducted by the San Juan Recovery Implementation Program (SJRIP) indicate that the Colorado pikeminnow is reproducing and recruiting in the river to at least a limited degree, however the low numbers collected do not satisfy recovery goal requirements for the specie. The Recovery criteria calls for a target of 1,000 subadult's fish established by the end of a five year down listing period, and 800 adults maintained during the 7 year delisting period. The Upper Colorado River Endangered Fish Recovery Program has recommended that the wild population be increased by augmenting with hatchery produced fish. The **Augmentation Plan For Colorado Pikeminnow In The San Juan River (Phase I)**, (Ryden 2003) called for annual stocking of age-0 fish over an eight year augmentation program (2002-2009). As per the modified work plan, dated 6 April 2005, age-1 fish were produced at Dexter from 2006-2010 to augment the age-0 stockings in the San Juan River, (Ryden 2005, Addendum #1 to Augmentation Plan For Colorado Pikeminnow In The San Juan River). The augmentation plan (Phase I) for both age-0 and age-1+ Colorado pikeminnow ended in 2010. Augmentation efforts identified in the Phase II (2010 – 2020) "*draft*" **Augmentation Of Colorado Pikeminnow (*Ptychocheilus lucius*) In The San Juan River Plan ,** (Furr 2009); focuses primarily on culturing and stocking increased numbers of age-0 fish. Current facility and broodstock capabilities at Dexter NFH&TC allow for ≥400,000 age-0 Colorado pikeminnow to be produced and stocked annually. This has been identified as

the stocking target for 2012 and subsequent years unless further production capacity is identified and/or stocking targets modified by the SJRIP.

Dexter NFH & TC has been the leader in propagating and culturing Colorado pikeminnow (Ptychocheilus lucius) since 1981. The facility maintains several captive stocks as genetic reserves and has successfully produced fish for the Upper and Lower Colorado river basin programs and the SJ RIP. The major emphasis has been on the reproductive biology, broodstock development and culturing age-0, 1 and adults. This work plan proposes the production of 400,000 age-0 fingerlings (50 mm TL) annually for reintroduction in the San Juan River.

Funding requested also covers costs associated with proper care of broodstock necessary to successfully carry out this study for future years and aide in restoration of the species. Stocking will require coordination with New Mexico Fish & Wildlife Conservation Office, New Mexico Department of Game and Fish, Colorado Division of Wildlife and Utah Department of Wildlife Resources.

Objectives

1. Produce 400,000 age-0 fingerlings (50 mm) for stocking in the San Juan River in 2012.

2. Continue data collection on induced spawning of Colorado pikeminnow under controlled conditions.

3. Transport and distribute 400,000 age-0 Colorado pikeminnow from Dexter to the San Juan River.

4. Maintain 400 Colorado pikeminnow broodstock for recovery efforts.

Methods

Broodstock will consist of 400 (F1) adults. These fish are 1991 and 1999 year-class (YC) progeny from wild adults collected from the Yampa, Green and Colorado Rivers, respectively. In 2006 Dexter began culturing a second broodstock of 500 individuals for future use. This stock is referred to as the 06CRDX lot derived from the 1991/1999 broodstock.

In 2012 a maximum of 50 paired matings (1 female X 1 male) will be spawned from the 1991/1999 YC broodstock. Given the past history of hormonal induced ovulation, 38 females (75%) should produce viable eggs during a given year. All members of the broodstock are PIT tagged and records of spawning pairs will be maintained at Dexter.

Spawning

Broodfish will be harvested from the culture pond in early May, males and females sorted and held indoor for spawning. Ovulation will be induced with intraperitoneal injections of common carp pituitary (CCP) at the rate of 4 mg/kg of body weight. When eggs can be expelled using slight pressure, a female will be stripped and milt added from one male. Each individual egg lot will be enumerated, incubated and kept separate in Heath Trays until hatching occurs, approximately 96 hours following fertilization at a constant water temperature of 72°F.

Rearing Ponds

To meet the production goal of 400,000 age-0 (50mm) fish, rearing ponds will be stocked at the following densities:

Age-0 Growth: (June thru October - 150 day growing period)

Pond 1B-	.87 acre	Earthen	@ 100,000 fry
Pond 2B-	.73 acre	Earthen	@ 100,000 fry
Pond 3B-	.82 acre	Earthen	@ 100,000 fry
Pond 6D-	.25 acre	Lined	@ 100,000 fry
Pond 7D-	.25 acre	Lined	@ 100,000 fry

Earthen and plastic lined ponds will be used for production. In earthen ponds, the bottoms will be packed and graded prior to receiving fish. Non-level pond bottoms can hinder fish harvest and aquatic vegetation can entrap fish at harvest time. Fertilization and slow filling of ponds will start 10 to 14 days prior to stocking. Staff will ensure that water quality is monitored. Temperature, dissolved oxygen and pH readings will be taken twice daily at 7:00am and 3:00 pm at the deepest part of the pond.

If the dissolved oxygen drops to < = 3 mg/I, supplemental aeration will be started. All feeding, fertilization and chemical applications will be stopped till adequate oxygen levels are restored. Aerators will be run all night for several days till the oxygen is back up to acceptable levels, (5-7 mg/1). Staff will avoid handling fish for 7 -10 days following a stress related circumstance.

Pond Vegetation Control and Fertilization

Diuron and Barrier will be used in earthen ponds to control rooted aquatic vegetation. Staff will use granular form when possible and broadcast the entire pond bottom at the recommended rates.

Diuron – 2.0 lbs per acre (dry broadcast)
Barrier- 100 lbs per acre (dry broadcast)

Copper sulfate (CUSo4) will be used to control floating filamentous algae blooms. Treatments will began approximately 45 days after fish are stocked into the ponds and repeated every 30 days. Application rates in DNFH&TC ponds are 5 to 8 lbs per acre. A secondary benefit derived from using CUSo4 is its effectiveness in controlling external parasites.

Zooplankton and invertebrate insect populations are cultured with the proper fertilization regime. Four types of fertilizer will be used:

1) Alfalfa meal
2) Alfalfa pellets
3) Cottonseed meal
4) Super phosphate

Initial fertilization rates for earthen ponds are 100 lbs of cottonseed meal, 100 lbs of alfalfa meal or pellets and 3 lbs of super phosphate. Follow up rates are administered on Monday and Thursday with 10 lbs cottonseed meal, and 10 lbs, alfalfa meal or pellets.

Water temperature, dissolved oxygen (DO) and pH readings will be taken in all rearing ponds daily. All readings will be recorded on record charts. If morning DO readings are below 3.0 or above 13.0 all fertilization will be stopped until DO's are brought back to accepted levels. If pH readings are greater than 9.5 fertilization will be terminated.

Feeding Schedule

Fish will be sampled at the end of every month. Size, weight and over all condition will be recorded. Feed amounts will be adjusted and projected for the upcoming month. Trout starter, #1 and #2 feed will be used and purchased from Nelson and Sons, Silver Cup, Murray, Utah. Age-0 fish will be fed three to four times daily at approximately 9:00am, 11:00am, 1:00pm and 3:00pm.

Feeding rates are based on water temperature and fish densities in the ponds and will be calculated as follows:

- water temp > = 80 ^{o}F feed 3 % BW per day, Mon, Wed and Fri.
- water temp 61-78 ^{o}F feed 2 % BW per day, Mon thru Fri.
- water temp < 60 ^{o}F feed 1.5 % BW per day, Mon and Thurs.

Staff will use the following guide to determine the proper particle size to offer the fish. Feed sizes will be mixed at ½ rations of each size when making the transition to the next larger size feed.

Fish Size	Particle Size
Fry	Starter
20mm	#1 crum
40mm	#2 crum
2-3"	1.0 mm

Projected Harvest Dates and Delivery Date

Age -0 fish will reach the target size of 50mm by the end of October of each year. The fish will be harvested from the ponds the final week of October and hauled and distributed into the San Juan River the first full week in November of each year.

Predator Control

Historically, DNFH&TC has not experienced excessive avian or mammal predation on fish stocks. Salamander, crayfish, frog and turtle infestation of ponds are nonexistent. On an annual basis specific ponds are covered with bird netting during the winter months to eliminate predation by migrating birds. During the winter months Colorado pikeminnow reared for this project will be maintained in two outdoor earthen ponds covered with bird netting.

Handling and Transport Protocol

Transport of all fish will follow guidelines described in the USFWS Protocols for Biological Investigations developed by Dr. Gary Carmichael, retired U.S. Fish & Wildlife Service employee. The protocol is as follows:

1. When Colorado Pikeminnow fingerlings, subadults and broodfish are handled they will be placed in a .5% salt bath to help in osmoregulation and reduce the effects of handling stress.

2. Temperature should be 5 degrees Fahrenheit lower in the hauling truck than in the river.

3. Drivers must be informed of and follow a specified route.

4. Transport water will contain 0.5 percent NaCl (18.9 grams per gallon) and 0.26 ml/L Stress Coat7 (1 ml per gallon).

5. Oxygen levels will be greater than 6.0 mg/L as determined with an oxygen meter.

6. Nets must be functional. Aeration equipment must be in place and must be used. A fish holding container will be a minimum of 5 gallons in size and fish densities will not exceed 1 lb of fish per gallon of water. Small delta mesh (1/8") will be present to transfer the fish from one container to another, although it is preferred to have water to water transfer. Oxygenation/aeration equipment will be in place and working.

7. Prior to transfer and after the fish are concentrated, they should be quickly placed in the transport tank. When using nets to place fish in transfer buckets or tanks, nets should not be overloaded. The fish on the bottom will be crushed. Using a wet transfer with buckets is preferable. When emptying the nets and buckets, care will be taken to avoid adding algae and mud to the transport tank. Before loading, dissolved oxygen levels should be at saturation.

8. Immediately after loading, all equipment on the transport vehicle should be re-checked and the vehicle should depart. Oxygen concentrations and temperatures should be monitored at a minimum of every hour.

9. During unloading tempering water should be present and functional, and thermometers should be used to match water temperatures. Hauling water temperatures should be equal to receiving water temperature.

***Acclimatizing the fish to the receiving water temperature will be conducted in increments of 2 degrees towards equalizing per 15 minutes time. Due to the high alkalinity and TDS of DNFH&TC water, staff will temper and acclimate the transported fish to the receiving water quality for a minimum of 1 hour prior to release. This process will allow sufficient time for the fish to osmoregulate to the receiving water quality. Tempering can be accomplished in the shipping tank by adding receiving water to the tank at given intervals.**

Fish Health Monitoring Protocols

All fish should be handled with the best animal husbandry practices available. A feeding schedule will be developed and followed daily. All tanks will be cleaned of uneaten food and feces daily. A daily log recording times of feeding, water temperature and comments on fish health will be maintained. If fish are maintained in a re-circulating system, all filters and pumps will be routinely cleaned and monitored. If fish are held in ponds O2 levels will be closely monitored. At least once a year, a fish health inspection will be conducted to examine fish for bacterial, viral and parasitic infections. Normally 60 fish per lot are sacrificed for an adequate sample. However, in the case of endangered or rare fish of genetic importance, numbers sampled may be less, depending upon availability. Non-lethal methods, if available, will be employed to obtain samples. Wet mounts will be examined for parasites and bacteria. Routine condition exams will be conducted and an examination will be conducted on all lots one month prior to delivery to the San Juan River. Brood and refuge stock will have health checks annually and only when needed to minimize handling stress.

The U.S. Fish and Wildlife Service, Dexter Fish Health Unit will provide bacterial and viral testing for Colorado pikeminnow propagation and rearing activities. Treatment of disease will be the responsibility of the Dexter staff. Fish health experts are available to advise on proper treatment, and to examine fish for infection.

Disposition of Fish

All fish propagated and cultured for this project are made available to the SJRIP for stocking and meeting augmentation requirements of the Phase II (2010 – 2020) "*draft*" **Augmentation Of Colorado Pikeminnow (*Ptychocheilus lucius*) In The San Juan River Plan ,** (Furr 2009). In the case of catastrophic loss (>25% of the stock) at the Dexter NFH&TC, up to 1,000 individuals will be collected for testing and diagnosis to determine (if possible) reason for loss. A written statement describing the loss will be provided immediately to the US Fish and Wildlife Service (Service) Fisheries Division and the SJRIP Coordinator, Albuquerque, NM; followed by a detailed report of the diagnosis once results are available. Excluded from these reporting requirements are gametes and fish lost to natural attrition, including but not limited to non-viable eggs prior to hatch and incidental predation mortalities. As per the guidelines identified in the 2003 Memorandum of Understanding between the Service and University of New Mexico, Division of Fishes, Museum of Southwestern Biology (MSB), fish carcasses (specimens) will be provided to the MSB who serves as the repository for vouchered specimens of native fishes. Any additional mortalities above the 1,000 mark will be recorded in the annual Threatened and Endangered Species report and disposed of by burial onsite or at a local land fill.

If any concerns are identified leading to potential questions about stocking of fish, in the instance of fish having cleared the Service's fish health testing for reportable pathogens and other agents of concern using established Fish Health Center SOPs and those of the American Fisheries Society – Fish Health Section Blue Book, the SJRIP has 30 days to formally respond with recommendations on the disposition of the fish. After 30 days, if no response is provided, in

writing, the disposition action for the fish will be at the discretion of the Service.

Budget

RE: Colorado pikeminnow age-0 production at Dexter National Fish Hatchery and Technology Center. The following costs are associated with producing 400,000 age-0 fingerlings for stocking in the San Juan River in 2012. Identified costs also include maintaining 400-500 adult Colorado pikeminnow broodstock for recovery efforts.

Budget -Detailed Spending Plan 2012

O&M Labor Costs

The labor costs identified in the 2012 Scope of Work are broken down as follows, and include fringe benefits and payroll additives for each position identified:

Dexter National Fish Hatchery & Technology Center

(1) Fish Biologist (1,280 hours -16pay periods) - GS 482-9 @$29.60/hr = $37,888

* Supervision, spawning, fish health and water quality monitoring, feeding, harvest and prep for distribution.

(1) Administrative Officer (240 hours- 3pay periods) - GS 341-9 @$28.95/hr =$ 6,948

* Budget tracking, purchasing, data base management & reporting.

Subtotal = $44,836.00

Equipment and Supplies:	
Liquid oxygen and compressed oxygen 12 cylinders @ 74.50, Airgas	$ 894.00
Spawning Supplies Hormones (CCP 5 vials @ $180 per 10ml/vial)	$ 900.00
Fish health sampling prior to stocking Lab supplies for bacti, viral and parasite testing.	$ 3,000.00
Culture equipment (nets, seines, screens, etc.) Eager, Memphis Net & Twine	$1,000.00
Pond management supplies, Barrier $250/50# bag Van Diest	$5,000.00
Fish feed,1.45/lb, 6,000 lbs Nelson & Sons	$8,700.00
Cyclical Maintenance costs for: Tractors, mowers, gators, sweepers used in pond maintenance	$1,450.00
Subtotal	**$ 20,944.00**
Utilities:	
Pumping costs	
Electrical 200,257 kwh @ .085	$17,022.00

Heating water for hatching eggs to swim-up	
Natural gas 1,525 ccf @ .90	$ 1,372.50
Subtotal	**$18,394.50**
Reintroduction Costs:	
Salaries	
GS-9 Fish Biologist	
24 hrs @ $29.60	710.00
GS-7 Fish Biologist	
24 hrs @ $22.00	528.00
WG-7 Maintenance Worker	
24 hrs @ $20.00	480.00
WG-5 Bio Science technician	
24 hrs @ $15.00	360.00
Lodging &Per Diem $123/day (Dexter to Farmington, NM and return)	
$123.00/trip x 2 trips x 4 employees =	984.00
Fuel costs and truck maintenance 1200 miles @ $5.15	6,180.00
Subtotal	**9,242.00**
Annual Totals (O & M Direst Costs)	**$93,416.50**
17% Administrative Overhead	**$15,881.00**
*per cost recovery rates and policy (d-1 category)	
TOTAL REQUESTED FOR 2012	**$ 109,297.50**

Out year funding

Expected budget requirements for 2013 is: $114,762

Projected Duration Of Project:

Phase I of this project was initiated in 2002 in support of the SJRIP Colorado pikeminnow augmentation effort (2002-2009) identified in the **Augmentation Plan For Colorado Pikeminnow (CPM) In The San Juan River**, (Ryden 2003). As per the modified work plan, dated April 06, 2005 age-1 fish were produced at Dexter and delivered annually from 2006-

2011 to the San Juan River (Ryden 2005, Addendum #1 to Augmentation Plan For Colorado Pikeminnow In The San Juan River). The augmentation plan (Phase I) for both age-0 and age-1+ Colorado pikeminnow ended in 2010. Under Phase II, augmentation efforts focus on culturing and stocking ≥400,000 age-0 Colorado pikeminnow annually from 2011-2020 or as directed by the San Juan Recovery Implementation Program.

Reporting

Quarterly progress reports detailing fish culture and distribution activities will be completed and synthesized into a final accomplishment report available to the SJRIP by January 31, 2013.

Schedule

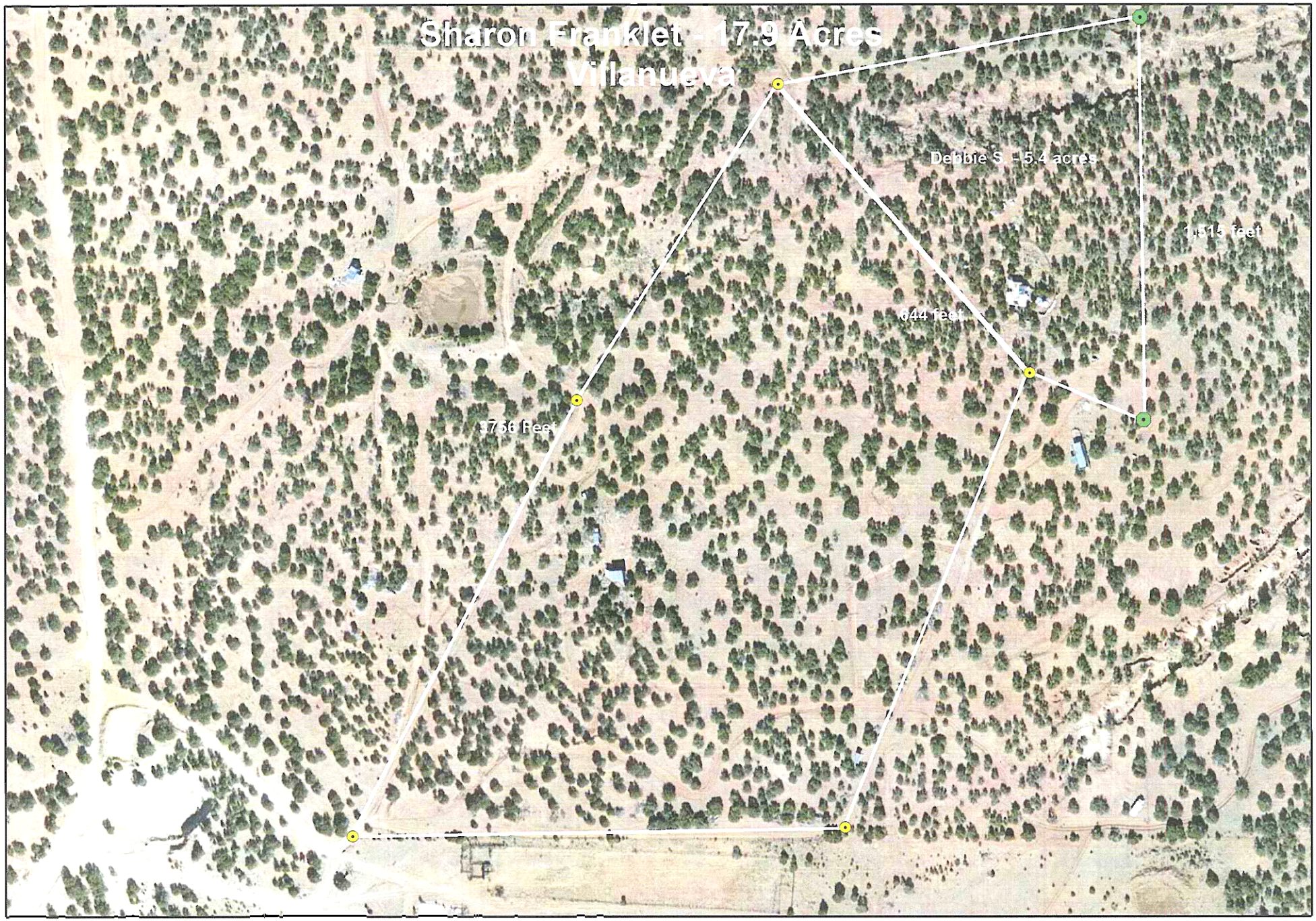
Broodfish will be spawned in May 2012 and age-0 fish reared in earthen and plastic lined ponds from June - October 2012.

Literature Cited:

Furr, W. D. 2009. *Draft* Augmentation Plan, Augmentation of Colorado Pikeminnow (*Ptychocheilus lucius*) In The San Juan River, Phase II 2010-2020. U. S. Fish and Wildlife Service, Albuquerque, NM. 15 pages.

Ryden, D. W. 2003. An Augmentation Plan For Colorado Pikeminnow In The San Juan River. U. S. Fish and Wildlife Service, Grand Junction , Co. 63 pp. + appendices.

Ryden, D. W. 2005. *Draft* Addendum #1, Stocking Age-1 Fish To Supplement Ongoing Augmentation Efforts. An Augmentation Plan For Colorado Pikeminnow In The San Juan River. U. S. Fish and Wildlife Service, Grand Junction , Co. 3 pages.



Source:
Features: Tierra Y Montes SWCD, 2011.
Image: Microsoft/Digital Globe Bing, 2010.

0 125 250 500 750 1,000 Feet

New Mexico Forest and Watershed Restoration Institute

Rearing Razorback Sucker Sub-Adults at Dexter National Fish Hatchery and Technology Center FY 2012

Prepared for:
U.S. Bureau of Reclamation RFP 04-SF-40-2250 and
The San Juan Recovery Implementation Program

Principal Investigators – William Knight, Manuel E. Ulibarri
Dexter National Fish Hatchery and Technology Center
P.O. Box 219, 7116 Hatchery Road
Dexter, New Mexico 88230-0219
505-734-5910
505-734-6130 Fax

William_Knight@fws.gov
Manuel_Ulibarri@fws.gov

Background

The following scope of work identifies the facilities and methodologies that will be used at Dexter National Fish Hatchery &Technology Center (DNFH&TC) to continue producing 11,000, 200+ mm razorback sucker for use by the San Juan River Recovery Implementation Program (SJRIP) to meet its augmentation objectives for the species in the San Juan River. The primary purpose being the distribution of these fish to existing grow-out ponds located on the Navajo Indian Irrigation Project. DNFH&TC has developed production guides for the species based on historical growth rates and produces large numbers of razorback sub-adults (300+mm) for stocking into Lake Mohave, Arizona, Lower Colorado River.

The U.S. Fish and Wildlife Service (USFWS) has developed extensive infrastructure and expertise at DNFH&TC to successfully contribute to recovery programs. The DNFH&TC program has been totally devoted to the maintenance, propagation and culture of threatened and endangered fish species for thirty years. During that period it has successfully cultured razorback sucker, bonytail and Colorado pikeminnow of the Colorado River system. Currently DNFH&TC maintains a large genetically diverse razorback sucker broodstock and over the years has developed successful spawning, culture and distribution methodologies for the species that are still used today. The facility utilizes an abundant water supply to produce over 1.5 million fish annually.

Location

Dexter National Fish Hatchery and Technology Center is located in the Pecos River Valley of southeastern New Mexico, 200 miles southeast of Albuquerque, 20 miles south of Roswell, and one mile east of Dexter on State Road 190. The hatchery was authorized under the White Act of 1930 (46 Stat. 371 - 05/21/30), to meet the demands for warmwater game fish throughout the southwest. The land, originally the property of the New Mexico State Game and Fish Commission, was acquired by the Federal Government on August 31, 1931. The station lands comprise a total of 640 acres in Section 16, T13S, R26E, Chaves County. Construction of the facility started immediately after purchase with assistance of the Public Works Administration and Progress Administration. Operations began in 1932.

Facilities

Situated on the northern fringes of the Chihuahua Desert, the elevation at Dexter is 3,500 feet, average rainfall is 12 inches, and the growing season of 180-200 days. Station facilities include: Administration/Laboratory Building; Fish Culture Building; Visitors Center; Maintenance/Shop Building; Vehicle Storage Building; Equipment Storage Building; Feed Building; General Storage Building.; three government houses; one mobile home, two RVs and one RV space.

Fish culture facilities in operation consist of 71 earthen/lined ponds ranging in size from 0.1-1.0 acres, four (6' X 40') fiberglass raceways, four (8' X 40') concrete raceways, Twenty (2' X 12') rectangular fiberglass tanks, forty (4') fiberglass circular tanks, fifty (3') fiberglass circular tanks and 80 ten-gallon and 20 forty-gallon aquariums. The facility utilizes three water reuse systems in the fish culture building. Phase III Facility Improvement Project was completed on June 5, 2003.

Water

An abundant supply of fish culture water is supplied by five shallow aquifer wells (150 feet in depth) capable of pumping a combined 2,000+ gallons per minute. The well water is a constant 64^0 F, pH of 7.5-8.5, total hardness of 2,100 ppm, and total dissolved solids of 3,500 ppm. Water rights, allocated through the New Mexico State Engineer's Office, total 2,185.5 acre-feet per annum or 10,927.5 acre-feet per five-year water period. Waste water from all fish culture operations collects in two sumps on the southeastern area of the facility and provides year round water to the wetlands.

Lake Mohave Razorback Broodfish

Staff at Dexter National Fish Hatchery and Technology Center successfully propagate and maintain 16 federally listed fish species; and produces over 1.5 million fish annually for recovery and restoration programs throughout the southwest. Razorback sucker have been maintained and cultured at the facility since 1981. Captive broodstock representing the Lake Mohave population exist at DNFH&TC. According to station records, the initial broodstock was founded with progeny from 136 wild adult fish collected from Lake Mohave in 1981.

An additional 147 wild individuals were collected from the lake in 1982, spawned that year, and contributed fry to the stocking efforts in the Gila, Salt and Verde rivers and Lake Mohave, but were not incorporated into the captive broodstock. In 1984, Dexter's RBS captive broodstock consisted of 360 three-year old fish derived from the wild adults spawned at Dexter in 1981. Wild caught adults collected in 1981 and 1982 had expired by the end of 1985. The first captive broodstock of RBS at DNFH&TC is referred to as the '81 broodstock. The '81 broodstock currently contains 75 adult fish (Table 1). Initial spawning of this broodstock occurred in 1984 (Hamman 1985). It should be noted that no progeny of the '81 broodstock are currently held as broodstock at any facility. Since the broodstock's inception, all offspring have been stocked to meet production commitments. Over the past 25 years, offspring from this stock have been stocked into Lake Mohave and Lake Havasu; Gila, Salt, Verde and San Juan rivers; Niland-Imperial Valley Hatchery, California; Page Springs SFH, Arizona; Buenos Aires, Cibola, Imperial, Havasu National Wildlife Refuges; and the Colorado River Fisheries Project (CRFP) at Vernal, Utah. The second broodstock is referred to as the Paired Matings (PM) broodstock. This stock, comprised of approximately 90 unique family groups is the product of paired matings of wild caught adults spawned at Willow Beach NFH from 1994 to 2004. Those efforts resulted in 500 fish currently held as PM future broodstock at DNFH&TC (Table 1). A third broodstock has been developed at DNFH&TC, and consists of six year classes of juvenile wild-caught fish from Lake Mohave. These fish were captured as fry from eight locations throughout Lake Mohave and given the designation of Wild Caught (WC) future broodstock (Table 1).

Table 1. Dexter NFH & TC Razorback Sucker Captive Broodstock

Year Class	Origin	Numbers on hand	Founders Represented	Lot Designation
1981	F_1 Mohave	75	adults / Mohave	'81
1994-2003	Mohave	500	90 / Mohave	PM
1999-2004 WC	Mohave		500	fry /Mohave
2003-2004	F_2 Mohave	400	25/ '81 captive stock	F_2

'81-1981 year class, Mohave-Lake Mohave, AZ, PM-Pair Matings, WC-Wild Caught

From 2001-2012 production of subadult razorbacks at DNFH&TC yielded excellent survival and growth. The overall survival for razorback sucker grown to 450mm was 90.5%, while 85% of the fish achieved the target growout size. DNFH&TC's spawning and growing season consists of fish being spawned in the early spring and fry stocked in to earthen or lined ponds and grown out-door from April to October. Total dissolved oxygen and temperature are monitored daily and fish feed on phyto and zooplankton produced in fertilized ponds for approximately 45 days at which time they are offered a prepared razorback sucker diet. Fingerlings are routinely held and cultured in the Fish Culture building during the months of January - March to prevent mortalities associated with outdoor over wintering. In the fall of the year when the fish reach target size they are harvested from the ponds and transferred to the Fish Culture building for

sorting and tagging. Following a 7 to 10 day rest and recovery period they are loaded into distribution trucks and hauled to their stocking locations.DNFH&TC staff have successfully hauled 300+mm razorbacks and Bonytail to Lake Mohave, Arizona, in the lower Colorado River. These distribution trips log 660 miles (12 hours) of hauling time in one direction.

Production Plan

Objectives:
The main objective of this proposed work is to spawn razorback sucker adults and rear 11,000, 200+mm fish annually and deliver them to existing grow-out ponds located on the Navajo Indian Irrigation Project.
Additional objectives of the work include:

1. Improve, maintain and staff facilities at DNFH&TC to rear and distribute the target # of fish.

2. Bi-annually provide 25,000 RBS larvae to the Uvalde NFH for growout.

3. Maintain razorback sucker captive broodstock for recovery efforts.

Methods
DNFH&TC will conduct captive propagation activities that include spawning of a minimum of 20 pairs of broodstock, incubation of fertilized eggs, enumeration and stocking of swimup fry into DNFH&TC ponds, harvest of target sized fish from ponds, enumeration and distribution to Navajo Indian Irrigation Project.

The project will utilize indoor and outdoor facilities. All spawning and incubation activities will be conducted indoor in the fish culture building. Razorback sucker will be initially reared in 2 earthen or lined ponds and in June of each year transferred to 3 ponds at surface acres of 0.79, 0.89 and 0.98.

Spawning
Broodfish will be harvested from ponds in early March and held indoor for spawning. Razorback sucker spawning protocols developed at DNFH&TC that will be used are listed in Appendix Table 3.

Rearing Ponds
To meet the production goal of 11,000 (200mm) fish, rearing ponds will be stocked at the following densities:

Age 0 Growth: (April thru May - 60 day growing period)

Pond 1- .72 acre @ 12,000 fry
Pond 2- .79 acre @ 12,000 fry

Age I Growth: (June thru October - 150 day growing period)

Harvest Age I fish; enumerate and stock fingerlings into 3 ponds.

Pond 1- .79 acre @ 6,000 fingerlings
Pond 2- .89 acre @ 6,000 fingerlings
Pond 3- .98 acre @ 6,000 fingerlings

Earthen and lined ponds will be used for production. In earthen ponds the bottoms will be packed and graded prior to receiving fish. Non-level pond bottoms can hinder fish harvest and aquatic vegetation can entrap fish at harvest time. Fertilization and slow filling of ponds will start 10 to 14 days prior to stocking. Staff will ensure that water quality is monitored. Temperature, dissolved oxygen and pH readings will be taken twice daily at 7:00am and 3:00 pm at the deepest part of the pond.

If the dissolved oxygen drops to < = 3 mg/l, supplemental aeration will be started. All feeding, fertilization and chemical applications will be stopped till adequate oxygen levels are restored. Aerators will be run all night for several days till the oxygen is back up to acceptable levels, (5-7 mg/l). Staff will avoid handling fish for 7 -10 days following a stress related circumstance.

Pond Vegetation Control and Fertilization

Sonar, Diuron or Barrier will be used in earthen ponds to control rooted aquatic vegetation. Staff will use granular form when possible and broadcast the entire pond bottom at the recommended rates.

Diuron – 2.0 lbs per acre (dry broadcast)
Barrier- 100 lbs per acre (dry broadcast)

Copper sulfate (CUSo4) will be used to control floating filamentous algae blooms. Treatments will began approximately 45 days after fish are stocked into the ponds and repeated every 30 days. Application rates in DNFH&TC ponds are 5 to 8 lbs per acre. A secondary benefit derived from using CUSo4 is its effectiveness in controlling external parasites.

Zooplankton and invertebrate insect populations are cultured with the proper fertilization regime. Four types of fertilizer will be used:

1) Alfalfa meal
2) Alfalfa pellets
3) Cottonseed meal
4) Super phosphate

Initial fertilization rates for earthen ponds are 100 lbs of cottonseed meal, 100 lbs of alfalfa meal or pellets and 3 lbs of super phosphate. Follow up rates are administered on Monday and Thursday with 10 lbs cottonseed meal, and 10 lbs, alfalfa meal or pellets.

Water temperature, dissolved oxygen (DO) and pH readings will be taken in all rearing ponds daily. All readings will be recorded on record charts. If morning DO readings are below 3.0 or above 13.0 all fertilization will be stopped until DO's are brought back to accepted levels. If pH readings are greater than 9.5 fertilization will be terminated.

Feeding Schedule

Fish will be sampled at the end of every month. Size, weight and over all condition will be recorded. Feed amounts will be adjusted and projected for the upcoming month. Razorback grower (0301) feed will be used and purchased from Nelson and Sons, Silver Cup, Murray, Utah. Fish will be fed twice daily, once at 9:00am and at 2:00pm.

Feeding rates are based on water temperature and fish densities in the ponds and will be calculated as follows:

- water temp > = 80 °F feed 3 % BW per day, Mon, Wed and Fri.
- water temp 61-78 °F feed 2 % BW per day, Mon thru Fri.
- water temp < 60 °F feed 1.5 % BW per day, Mon and Thur.

Staff will use the following guide to determine the proper particle size to offer the fish. Feed sizes will be mixed at ½ rations of each size when making the transition to the next larger size feed.

Fish Size	Particle Size
2-3"	1.0 mm
4-6"	2.0 mm
6-8"	3.0 mm

Projected Harvest Dates and Delivery Date

Year 2012 marks the seventh year of razorback production at Dexter for distribution to the NAPI ponds. Since 2006, Dexter staff have stocked a total of 44,233 razorback's averaging 225mm in length into East and West Avocet and Hidden ponds. An additional 11,000 will be stocked into the NAPI ponds in April 2012. Over the past three years DNFH&TC also provided over 300,000 (92,000 in 2009) razorback larvae to the Uvalde NFH for growout and eventual stocking into the San Juan River.

Based on historical growth rates for razorback at Dexter, the production target of 11,000, 200+mm fish is achieved in a fifteen month period. In 2007 a new single cohort fish rearing strategy was adopted by the SJRIP for the NAPI ponds. Fish delivery will be in the spring of each year based on the new rotational production plan (single cohort). Approximately 11,000 fish will be stocked each trip and Dexter staff will coordinate the deliveries with the Navajo Nation Department of Fish and Wildlife, BIA and USFWS FWCO personnel. The estimated duration of the program is scheduled for a total of 15 years (2005- 2020).

Predator Control

Historically, DNFH&TC has not experienced excessive avian or mammal predation on fish stocks. Salamander, crayfish, frog and turtle infestation of ponds are nonexistent. On an annual basis specific ponds are covered with bird netting during the winter months to eliminate predation by migrating birds. An additional strategy employed by the staff is the harvest and hold stocks of fish indoor during the winter months of November to March. Razorback reared for this project will be maintained indoor in two 40,000 gallon systems during the winter months. These systems contain biofiltration, supplemental aeration, temperature control and alarm systems.

Handling and Transport Protocol

Transport of all fish will follow guidelines described in the USFWS Protocols for Biological Investigations developed by Dr. Gary Carmichael, retired U.S. Fish & Wildlife Service employee. The protocol is as follows:

1. When razorback fingerlings, subadults and broodfish are handled they will be placed in a .5% salt bath to help in osmoregulation and reduce the effects of handling stress.

2. Temperature should be 5 degrees Fahrenheit lower in the hauling truck than in the river.

3. Drivers must be informed of and follow a specified route.

4. Transport water will contain 0.5 percent NaCl (18.9 grams per gallon).

5. Oxygen levels will be greater than 6.0 mg/L as determined with an oxygen meter.

6. Nets must be functional. Aeration equipment must be in place and must be used. A fish holding container will be a minimum of 5 gallons in size and fish densities will not exceed 1 lb of fish per gallon of water. Small delta mesh (1/8") will be present to transfer the fish from one container to another, although it is preferred to have water to water transfer. Oxygenation/aeration equipment will be in place and working.

7. Prior to transfer and after the fish are concentrated, they should be quickly placed in the transport tank. When using nets to place fish in transfer buckets or tanks, nets should not be overloaded. The fish on the bottom will be crushed. Using a wet transfer with buckets is preferable. When emptying the nets and buckets, care will be taken to avoid adding algae and mud to the transport tank. Before loading, dissolved oxygen levels should be at saturation.

8. Immediately after loading, all equipment on the transport vehicle should be re-checked and the vehicle should depart. Oxygen concentrations and temperatures should be monitored at a minimum of every hour.

9. During unloading tempering water should be present and functional, and thermometers should be used to match water temperatures. Hauling water temperatures should be equal to receiving water temperature.

***Acclimatizing the fish to the receiving water temperature will be conducted in increments of 2 degrees towards equalizing per 15 minutes time. Due to the high alkalinity and TDS of DNFH&TC water, staff will temper and acclimate the transported fish to the receiving water quality for a minimum of 1 hour prior to release. This process will allow sufficient time for the fish to osmoregulate to the receiving water quality. Tempering can be accomplished in the shipping tank by adding receiving water to the tank at given intervals.**

Fish Health Monitoring Protocols

All fish should be handled with the best animal husbandry practices available. A feeding schedule will be developed and followed daily. All tanks will be cleaned of uneaten food and feces daily. A daily log recording times of feeding, water temperature and comments on fish health will be maintained. If fish are maintained in a re-circulating system, all filters and pumps will be routinely cleaned and monitored. If fish are held in ponds O2 levels will be closely monitored. At least once a year, a fish health inspection will be conducted to examine fish for bacterial, viral and parasitic infections. Normally 60 fish per lot are sacrificed for an adequate sample. However, in the case of endangered or rare fish of genetic importance, numbers sampled may be less, depending upon availability. Non-lethal methods, if available, will be employed to obtain samples. Condition factors will be calculated on an annual basis and data added to a RBS database. Wet mounts will be examined for parasites and bacteria. Routine condition exams will be conducted and an examination will be conducted on all lots one month prior to delivery to the Navajo Indian Irrigation Project, SJRIP. Brood and refuge stock will have health checks annually and only when needed to minimize handling stress.

The U.S. Fish and Wildlife Service, Dexter Fish Health Program will provide bacterial and viral testing for razorback propagation and rearing activities. Treatment of disease will be the responsibility of the Dexter staff. Fish health experts are available to advise on proper treatment, and to examine fish for infection.

Disposition of Fish

All fish propagated and cultured for this project are made available to the SJRIP for stocking and meeting augmentation requirements identified in the **Five-Year Augmentation Plan for Razorback Sucker In the San Juan River** (Ryden 1997, 2003). In the case of catastrophic loss (>25% of the stock) at the Dexter NFH&TC, up to 1,000 individuals will be collected for testing and diagnosis to determine (if possible) reason for loss. A written statement describing the loss will be provided immediately to the US Fish and Wildlife Service (Service) Fisheries Division and the SJRIP Coordinator, Albuquerque, NM; followed by a detailed report of the diagnosis once results are available. Excluded from these reporting requirements are gametes and fish lost to natural attrition, including but not limited to non-viable eggs prior to hatch and incidental predation mortalities. As per the guidelines identified in the 2003 Memorandum of Understanding between the Service and University of New Mexico, Division of Fishes, Museum of Southwestern Biology (MSB), fish carcasses (specimens) will be provided to the MSB who serves as the repository for vouchered specimens of native fishes. Any additional mortalities above the 1,000 mark will be recorded in the annual Threatened and Endangered Species report and disposed of by burial onsite or at a local land fill.

If any concerns are identified leading to potential questions about stocking of fish, in the instance of fish having cleared the Service's fish health testing for reportable pathogens and other agents of concern using established Fish Health Center SOPs and those of the American Fisheries Society – Fish Health Section Blue Book, the SJRIP has 30 days to formally respond with recommendations on the disposition of the fish. After 30 days, if no response is provided, in writing, the disposition action for the fish will be at the discretion of the Service.

Budget

RE: RFP #04-SF-40-2250, Rearing Razorback Sucker Sub-Adults at Dexter National Fish Hatchery and Technology Center, Costs associated with rearing 11,000 – 200mm fish for NAPI ponds and producing 25,000 larvae for Uvalde NFH Bi-annually. Detailed Budget Spending Plan 2012.

O&M Labor Costs

The labor costs identified in the 2012 Scope of Work are broken down as follows, and include fringe benefits and payroll additives for each position identified:

Dexter National Fish Hatchery & Technology Center

(1) Fish Biologist (1,040 hours -13pay periods) - GS 482-9 @ $29.60/hr = $30,784
* Supervision, spawning, fish health and water quality monitoring, feeding, harvest and distribution.

(1) Administrative Officer (160 hours- 2pay periods) - GS 341-9 @$28.95/hr = $ 4,632
* Budget tracking, purchasing, data base management & reporting.

Subtotal = $35,416

Materials and Supplies

Cost based on Dexter NFH&TC historical purchases:

Fish Health

Fish health sampling prior to stocking	
Lab supplies for bacti, viral and parasite testing.	$ 3,000
Wet lab supplies (pipets, petri dishes, slides, probes, markers)	$ 250
Theriputents- salt, furacin, formalin, MS-222, stress coat	$ 600
Liquid and compressed oxygen for fish distribution	$ 200

Feed

Production diet RBS0301 (1.5tons) 3,000 lbs $ 1.45 per lb	$ 4,350

Spawning Supplies

Hormones (HCG 10 vials @ $ 50 per 10ml/vial)	$ 500

Fertilizer

Alfalfa pellets (1,000 lbs) .25/lb	$ 250
Inorganic - Super Phosphate (10 bags) 7.50/bag	$ 75

Chemicals Aquatic Vegetation Control

Barrier- (6 bags) $250/bag	$ 1,500
Diuron -(2 bags) $ 75/bag	$ 150

Subtotal = $10,875

Services

Utilities & Equipment Maintenance	
* Electrical, fuel and phone	$ 3,500
* Boiler system, heat exchanger maintenance	$ 1,000
*#1 well and water tower and pumping station maintenance	$ 6,500

Subtotal = $ 11,000

Travel

- Fish stocking/distribution.

Dexter to Farmington (NAPI) & return- (1640 miles @ 5.15 per mile DX truck)=		$ 8,446
Fuel and routine vehicle maintenance.		
Perdiem- $123 per day X 2 trips X 2 individuals. =		$ 492
Dexter to Uvalde & return- (960miles @ 5.15 per mile X 1 trip)=	$ 4,944	
Fuel and routine vehicle maintenance.		
Perdiem- $123 per day X 1 trip X 1 individual. =		$ 123
Subtotal =	**$14,005**	

Annual Totals

O&M DIRECT COSTS	$71,296
INDIRECT COSTS (Admin Overhead @ 17%)	$12,120
*per cost recovery rates and policy (d-1 category)	
TOTAL REQUESTED FOR 2012	**$83,416**

Out Year Funding

Expected budget requirements for: @ CPI-U (West Region, All items, 1982-1984=100) 3.2%)

Fiscal Year 2013 $86,085
Fiscal Year 2014 $88,840
Fiscal Year 2015 $91,683

Projected Duration Of Project:

This project was initiated in January 2005 in support of the SJRIP razorback augmentation effort (2004-2011) identified in the **Five-Year Augmentation Plan For Razorback Sucker in the San Juan River**

(Ryden 1997- 2003). The rearing of razorback sucker subadults at Dexter NFH&TC could potentially continue till 2020 as per BOR RFP 04-SF-40-2250.

Reporting

Quarterly progress reports detailing fish culture and distribution activities will be completed and synthesized into a final accomplishment report available to the SJRIP by January 31, 2013.

Schedule

Broodfish will be spawned in March and the fish reared in earthen ponds for their first growing season

(April – October); held indoor during winter (November - March) and stocked into the NAPI ponds in April of 2012. Target sized fish are available for distribution in spring and fall of each year.

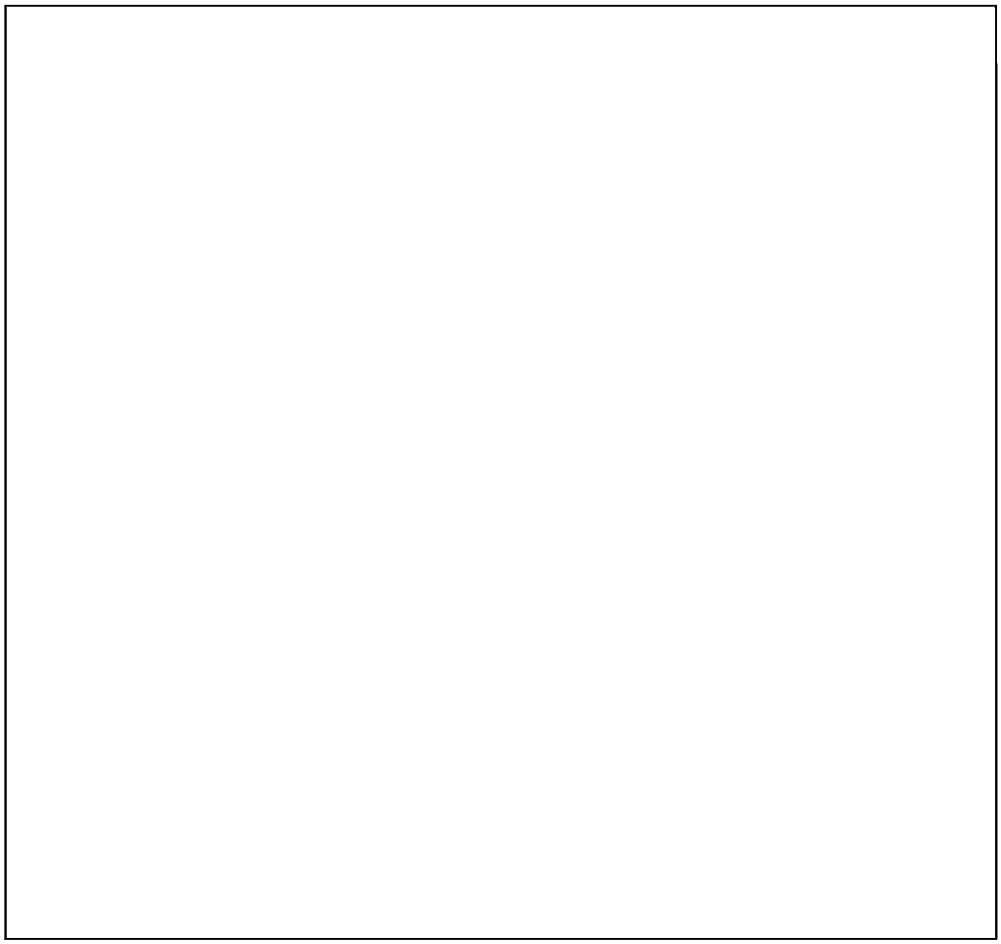
Literature Cited:

Hamman, R. 1985. Induced spawning of hatchery -reared razorback sucker. Prog. Fish-Cult.. 47(3): 187-189

Ryden, D. W. 2003. An augmentation plan for razorback sucker in the San Juan River: An addendum to the five-year augmentation plan for razorback sucker in the San Juan River (Ryden 1997). U. S. Fish and Wildlife Service, Grand Junction, CO. 32 pp.

FY 2012

Rear 12,000-300mm Razorback Sucker at the Uvalde National Fish Hatchery, Uvalde, Texas



Aerial Photo of Uvalde National Fish Hatchery 2001-USFWS

Prepared for:
Biology Committee
The San Juan River Basin Recovery Implementation Program

Principal Investigator – Grant L. Webber
Uvalde National Fish Hatchery
754 County Road 203
Uvalde, Texas 78801
830-278-2419
830-278-6042 Fax

Grant_Webber@fws.gov

Introduction

Uvalde National Fish Hatchery (UNFH) submits the following proposal to rear 12,000 300mm razorback sucker sub-adults annually for the San Juan River Basin Recovery Implementation Program (SJRIP). The project will use a minimum of 15- one acre ponds at the UNFH, Uvalde, Texas. Dexter National Fish Hatchery and Technology Center (DNFH&TC) will provide fry and/or fingerlings of both species to UNFH, as well as technical assistance with fish health and culture methods.

The following scope of work identifies the facilities and methodologies that will be used at UNFH to produce the target number of razorback sucker. An initial production guide was developed for the species based on historical growth rates observed at Dexter, Willow Beach, and Achii Hanyo. The data generated from the past four years of work completed at Uvalde has been incorporated into the current razorback production program. Funding is being requested for operations at UNFH. The UNFH will provide the infra-structure for stability in the production program. Fish hauling will be conducted by the Uvalde NFH.

Background

UNFH is located 3 miles Southwest of Uvalde, Texas on FM 481 and approximately 80 miles West of San Antonio. This is a large warm water fish culture facility that utilizes earthen and lined ponds, and intensive culturing raceways to produce fish.

The hatchery is situated on 100 acres of Mesquite Grasslands, in the Rio Grande Plain of Southwest Texas. There are 47 usable ponds totaling 50 surface acres of water. Five ponds were lined with high density polyethylene in FY 1987, six more in FY 1993, and one in FY 2009 for water conservation purposes. Buildings on the facility were renovated from 2001 to present, following a 100 year flood in 1998. Hatchery facilities include an office/fish culture building, shop/garage, fish holding house/nursery, feed room with cooler, two labs, and four living quarters with two double garages, two pump houses, and four concrete/two fiberglass raceways. Water for fish culture purposes is pumped from two deep wells. Two water towers provide a back up water source for intensive culture purposes.

Station Operations

Historically, UNFH has been one of the top producing warm water fish culture facilities in the nation. During the mid 90's as many as 6 species were cultured producing 2.6 million fish, weighing 60,000 pounds. Over the past 15 years threatened and endangered fish species like Yaqui catfish, paddlefish, Comanche Springs pupfish and fountain darters have all been propagated and maintained successfully at the facility.

The climate in Southwest Texas provides 300 days (10 months) of growing season. Two independent deep wells provide up to 3,000 gallons per minute of excellent water quality, year round.

Razorback sucker have been reared at UNFH, since April 2006. On November 11, 2006, 1,150 PIT tagged 300mm Age-1 razorbacks were stocked in the San Juan River (Hogback diversion area). The fish were marked with 134.2 kHz tags provided by the

SJRIP. In 2006, 16% of all razorbacks stocked into Uvalde ponds reached the 300mm target size in six months. Approximately 75% of the remaining fish were 250+ mm in length. These fish were kept on station for future grow out and eventual stocking in 2007. In 2007, Uvalde stocked approximately 5,000 razorbacks and with additional fish sent to Dexter NFH & TC in March of 2007, exceeding the 6,000 fish commitment. In 2008, the annual commitment of fish was increased from 6,000 fish to 12,000 fish. No fish were stocked in 2008 due to the facility testing positive for Largemouth Bass Virus. In February 2008, all contaminated sources were either destroyed or removed from the hatchery. In July 2008, the station received a clean fish health inspection and became "Suspect", and in July 2009, with its second consecutive clean fish health inspection, Uvalde NFH returned to Class A" Fish Health status. During FY 2010, a total of 8,018-2006 Year Class, PIT tagged Razorback sucker were stocked into Animas Confluence, Hogback Diversion, and Shiprock Bridge. The stocked fish had a total weight of 15,023 pounds and averaged 433 mm in total length. During FY 2011, a total of 16,600 razorback sucker were stocked into Animas Confluence, Animas Park, Hogback Diversion, PNM Wier, and Shiprock Bridge. Fish stocked were from 2006, 2007, and 2009 Year Classes, for a total weight of 21,813 pounds and an average total length of 414mm.

Facility

This project will utilize a minimum of 15 hatchery ponds and an undetermined number of inside raceways/tanks to fulfill the production and research commitments of the proposal. Both lined and unlined (earthen) ponds will be used to captively produce the species. To prepare for the receipt of the fish, any damaged liner material is repaired; and detritus material is removed through the use of specialized equipment. The earthen ponds are graded, disked, and packed prior to receipt of the fish. All ponds are fully functional with two water supply lines (one at shallow end and one at catch basin end), concrete catch basin (kettle) and drain lines. Razorbacks in 11 of the 15 ponds will have the protection of bird deterrent netting. Active predation control occurs throughout the year.

Water

An abundant amount of fish culture water is supplied by two wells on station. The first and primary water supply (Spurgeon Well) derives its water from the Austin Chalk formation, an aquifer which has excellent water quality. The well is capable of pumping approximately 1,500 gallons per minute. The well water is a constant 73°F, pH of 7.5-8.05, total hardness of 496 ppm, and alkalinity of 224 ppm. The station's secondary well (Wilson Well) is capable of producing an additional 1,500 gallons per minute. The Wilson Well derives its water from the Edwards Aquifer, which is a deep water well that has a year round temperature of 75°F, pH of approximately 7.1, total hardness of 380 ppm, and alkalinity of 245 ppm. These water supplies together are capable of providing up to 3,000 gallons per minute to the entire facility. Due to the potential implications to threatened and endangered species utilizing the Edwards Aquifer system, the Service has established a limit on groundwater withdraws from the Edward's Aquifer. That self-imposed water restriction for Uvalde NFH has been determined to be 472 acre-feet per annum (USFWS, Biological Opinion 2010). Since the Spurgeon Well derives its water

from a source other than the Edward's Aquifer (Austin Chalk formation), there are no internal groundwater pumping limits set for its water withdrawals.

Lake Mohave Razorback Broodfish

The DNFH&TC has successfully propagated and maintained razorback sucker broodstock at the facility since 1981. Captive broodstock representing the Lake Mohave population exist at DNFH&TC and will be spawned and their progeny will be transported to Uvalde in the form of fry for grow-out.

Uvalde's typical growing scenario includes receiving fry from DNFH&TC in April. The fish are stocked into earthen or lined ponds and grown outdoors from April to November. Total dissolved oxygen, temperatures, and pH are monitored daily. Fry ponds are fertilized to produce and maintain phyto- and zooplankton for natural forage diet for approximately 45 days, at which time they are offered a prepared razorback sucker diet.

During the spring of the previous Fiscal Year, staff will harvest overwintering ponds and tag over 12,000 razorbacks for the fall stockings (typically October). In the fall of the year when the fish reach target size they will be harvested from the ponds and transferred to the fish culture building for sorting, scanning, and data collection. Following a 7 to 10 day rest and recovery period they will be loaded into distribution trucks and hauled to their stocking locations by the Uvalde NFH staff.

Objectives

The main objective of this SOW is to cultivate 12,000 – 300mm razorback sucker sub-adults annually and distribute them to the San Juan River for Recovery purposes.

Methods

UNFH will conduct extensive and intensive culturing of razorback sucker and harvest the target sized fish from ponds, enumerate, tag and coordinate the distribution of these fish to the San Juan River.

Spawning

Broodfish will be harvested from DNFH&TC ponds in mid March and early April and held indoor for spawning. Over the next week eggs will be incubated and swim up fry/fingerlings shipped to Uvalde for rearing. This scenario will continue till adequate numbers of fingerlings are held at UNFH to rear to the target size. The facility will maintain at least 30,000 age I+ razorbacks in a given year to meet commitments for future years.

Ponds

Razorback Rearing

Approximately up to 50,000 fry will be shipped every other year (or every year depending upon needs) from DNFH&TC to UNFH in order to continue the production

cycle for the future. To meet the production goal of 12,000 (300mm) fish annually, the rearing ponds will be stocked at approximately the following densities:

Age 0 Growth: (April thru October -- approximate 214 day growing period)

3 acres @ 15,000 fry (every other year or when needed)

Age I Growth: (March thru November – approximate 244 day growing period)

Approximately 3,000 fish per acre.

Harvest Age I–fish from the ponds, enumerate and stock into approximately 15 ponds for summer grow out. Individual ponds will be decided upon at time of stocking; however, a minimum of 9 ponds will be used that have the protection of bird deterrent netting.

Fertilization and slow filling of ponds will start 10 to 14 days prior to stocking. Staff will ensure that water quality is monitored. Temperature, dissolved oxygen and pH readings will be taken at 7:00am and, if necessary, again at 3:00 pm at the deepest part of the pond.

If the dissolved oxygen drops to < = 3 mg/L, supplemental aeration will be started. All feeding, fertilization and chemical applications will be stopped till adequate oxygen levels are restored. Aerators will be run all night for several days till the oxygen is back up to acceptable levels, (5-7 mg/L). Staff will avoid handling fish for 7 -10 days following a stress related circumstance.

Pond Vegetation Control, Water Quality and Fertilization

Sonar Q, Diuron, Reward, cutrine plus, and Navigate will be used in earthen ponds to control submersed aquatic vegetation. Staff will use granular form when possible and broadcast the entire pond at the recommended rates. Incremental, partial treatments will be applied when a total treatment regime has a potential of lowering dissolved oxygen levels too rapidly.

Sonar Q- 20 lbs per acre (dry broadcast)
Diuron- 25 lbs per acre (dry broadcast)
Cutrine plus- 60 lbs per acre (dry broadcast)
Navigate- 200 lbs per acre (dry broadcast)

Rodeo (glyphosate) will be used in earthen ponds to control submerged aquatic vegetation, including rushes, sedges, American lotus, and cattails. Both chemicals will be applied at a 2 to 5% solution.

Copper sulfate (CuSo4) will be used to control floating filamentous algae blooms. Treatments will begin approximately 45 days after fish are stocked into the ponds and repeated every 30 days. Application rates in Uvalde ponds are 2 to 3lbs per acre. A

secondary benefit derived from using CuSo4 is its effectiveness in controlling external parasites.

Zooplankton and invertebrate insect populations for razorback Age-0 will be cultured with the proper fertilization regime. Age-I fish are fed a prepared diet.
Different fertilizer types will be used:

1) Wheat middlings
2) Liquid fertilizer 11-37-0
3) Cottonseed meal

Initial fertilization rates for earthen ponds are 100 lbs of cottonseed meal, 100 lbs. of wheat middlings, and 3.0 gallons of liquid fertilizer (11-37-0) per surface acre. Follow-up treatments of 0.5 gallons per surface acre every other day until water clarity is less than 2-feet, measured with a secchi disk. Re-apply 11-37-0 at a rate of 1.0 gallon per acre when water clarity is greater than 2-feet.

Water temperature, dissolved oxygen (DO) and pH readings will be taken in all rearing ponds daily. All readings will be recorded on record charts. If morning DO readings are below 3.0 or above 13.0 all fertilization will be stopped until DO's are brought back to accepted levels. If pH readings exceed 9.5, fertilization will be terminated.

Escapement

Staff will reduce the potential for escapement by installing kettle screens in the ponds prior to the pond's receipt of the fish. Screen mesh size will be 250 micron in Age-0 ponds and ¼" in Age-I ponds. All Age-I fish will be graded prior to being stocked in the rearing ponds. Staff will monitor the ponds daily and insure there are no leaks in the dam boards. Sawdust will be used to stop all leaks that develop in the catch basin. Water levels will adjusted and maintained a minimum of six inches below the over flow mark until the fry average 30mm in length.

Feeding Schedule

Fish will be sampled (or projected if water temps are above 28°C) at the end of every month. Size, weight and over all condition will be recorded. Feed amounts will be adjusted and projected for the upcoming month. In addition to a natural invertebrate diet, the fry and fingerlings will be hand fed a starter/grower diet. Fry will be fed 4 times daily and fingerlings twice daily, once at 10:00am and at 2:00pm.

Feeding rates are based on water temperature and fish densities in the ponds and will be calculated as follows:

- Water temp $\geq$ 70 °F (21 °C) feed 3 % BW per day, Mon thru Fri.
- Water temp 60-70 °F (16-21 °C) feed 2 % BW per day, Mon thru Fri.
- Water temp < 60 °F (16 °C) feed 1.5 % BW per day, Mon, Wed, Fri.

Staff will use the following guide to determine the proper particle size to offer the fish. Feed sizes will be mixed at ½ rations of each size when making the transition to the next larger size feed.

Fish Size	Particle Size
(Fry-2")	starter and #1, 2, & 3 crumbles
2-3"	1.0 mm
4-6"	2.0 mm
7-9"	3.0 mm
9-20"	4.0 mm

Projected Harvest Dates and Delivery Date

Based on previous harvest data the production target of 12,000- 300mm fish can be achieved in approximately eighteen months. Fish will be harvested from the ponds, enumerated, scanned for PIT tags, and stocked into the San Juan River in October/November of each calendar year. In order to establish a consistent long term production cycle UNFH will maintain 30,000 to 36,000 Age–I fish on station in a production year.

Predator Control

During the summer grow-out all ponds are monitored daily by on-site staff and predators are taken by gun and/or traps. Fish remaining outdoors during the winter season will be held in ponds that contain the protection of 2" X 2" block nylon bird predation netting. Approximately 12,000 razorbacks will be maintained under the protection of bird netting and/or intensive raceways during the winter months. The intensive culture raceways contain 72°F flow through water, supplemental aeration, power back-ups, and an automated security alarm system (on water supply and aeration).

Fish Health Monitoring Protocols

All fish will be handled with the best animal husbandry practices available. A feeding schedule will be developed and followed daily. All fish rearing/holding structures on station will have their O_2 levels monitored daily. At least once a year, a fish health inspection will be conducted to examine fish for bacterial, viral and parasitic infections. Typically 60 fish per species, split between individual year classes, are sacrificed to have a statistically valid sample. However, in the case of endangered or rare fish of genetic importance, numbers sampled may be less, depending upon availability. Non-lethal methods, if available, will be employed to obtain samples. Wet mounts will be examined for parasites and bacteria. Routine condition exams will be conducted and an on-site comprehensive examination will be conducted on all lots prior to delivery to the San Juan River. Brood and refuge stock will have health checks annually and only when needed to minimize handling stress.

The Region 2 Fish Health Unit @ Dexter NFH&TC will provide bacterial and viral testing for razorback captive propagation activities. Treatment of disease will be the

responsibility of the Uvalde staff. Fish health experts at Dexter are available to advise on proper treatment and to examine fish for infection.

Production and Distribution Schedule

Broodfish will be spawned in April at the Dexter NFH & TC; when requested, approximately 50,000 Age-0 fry will be hauled to UNFH and stocked into three ponds to continue the production cycle. Age-I fish currently at Uvalde will be stocked into clean ponds in March/April for summer grow-out and available for distribution in October/November.

Budget Fiscal Year 2012
Rearing Razorback Sucker at Uvalde National Fish Hatchery; Detailed Budget Spending Plan.

O&M Labor Costs-Specific to San Juan River RIP
The labor costs identified in this proposal are broken down as follows, and include benefits and payroll additives for each position identified:

Uvalde National Fish Hatchery

(1) Fishery Biologist (16 pp) - GS 482-9 @ $31.59/hr =	$40,435
* On-site fish rearing, water quality monitoring, vegetation treatment, fish tagging and distribution coordination.	
Subtotal =	**$40,435**

Equipment, Materials and Supplies
Cost based on UNFH historical purchases:

Fish Health	
-Water quality monitoring supplies (test pillows/strips/DO caps) -Therapeutants- salt, formalin, MS-222, Stress Coat, Nitrofurazone, Oxygen	$ 1,800
Feed	
-Production diet RBS # 350 -28,000 lbs @ $1.10 per lb (cost increase due to increased fuel charges related to shipping)	$30,800
Fertilizer	
-Wheat Middlings & Cotton Seed meal -Inorganic – 11-37-0 liquid fertilizer	$180
Chemicals- Aquatic vegetation and pesticide control and other water quality	
- Copper Sulfate, Sonar Q, Citric Acid, Cutrine Plus, dimilin,	$11,400
Subtotal =	**$44,180**

Services and Aquaculture supplies	
-Maintenance, fuel, aquaculture supplies	$10,000
Subtotal =	**$10,000**

Distribution

-7 trips @$4,600 per trip (2 drivers; per diem, overtime, fuel, oxygen, vehicle maintenance)

Subtotal= $32,200

TOTALS:

O&M DIRECT COSTS	**$126,815**
INDIRECT COSTS (Admin Overhead @ 17%) *per cost recovery rates and policy (d-1 category)	**$21,559**
TOTAL O&M REQUESTED FOR FY 2012	**$148,374**

Budget increase due to distribution funding (and overhead for distribution) being put back into the Uvalde SOW.

Increased cost for Term Fish Biologist position due to step and cost of living adjustment.

Razorback Sucker Augmentation at NAPI Grow-Out Ponds
Fiscal Year 2012 Project Proposal

Principal Investigators: Jeff Cole, James Morel, Albert Lapahie
Navajo Nation Department of Fish and Wildlife
P.O. Box 1480
Window Rock, AZ 86515
(928) 871-6450

jcole@nndfw.org jmorel@nndfw.org alapahie@nndfw.org

Background

The Long Range Plan for recovery of endangered fishes in the San Juan River calls for propagation and augmentation of razorback sucker (RBS). Nine ponds have been built on Navajo Agricultural Products Industry (NAPI) lands to grow out RBS for stocking into the San Juan River. The Coordination Committee has decided to only utilize three of the nine existing ponds on NAPI during FY 2012.

Avocet Pond was originally a single pond built for watering cattle. On March 2, 1998 Avocet was divided into 2 ponds known as Avocet East and West. Avocet West is 3.4 acres and holds 18 acre-feet of water. Avocet West has a siphon for draining the pond. Avocet East is 3.52 acres and holds 19.6 acre-feet of water. Avocet East had no siphon when the ponds were divided, so draining was accomplished by renting a battery of water pumps. A siphon was installed in Avocet East during FY 2008 and the water can now be managed independent of Avocet West and without the need for pumping.

In October of 1999, Hidden Pond was built to rear razorback sucker. Hidden Pond is 2.83 acres. The dam was breached due to a storm event and the fish were lost. The dam was re-built in FY 2000 and a toe drain and spillway were built to protect the dam. Hidden Pond was lined with bentonite and contoured and a kettle was installed to facilitate fish harvest. A siphon was installed in July 2003. A salamander fence was installed around the Hidden Pond perimeter in August of 2003 to exclude predatory tiger salamanders.

Responsibility for Management of the NAPI ponds was originally shared between the U.S. Fish and Wildlife Service (Service), Bureau of Indian Affairs (BIA), Keller-Bliesner Construction and Ecosystems Research Institute. The Service was responsible for determining which ponds would receive RBS and when. In addition, the Service conducted sample counts and harvested the ponds with the assistance of the BIA. Keller-Bliesner was responsible for design and construction of the Six Pack ponds and re-construction of Hidden Pond. The BIA was responsible for monitoring water quality and Ecosystems Research was responsible for fertilization of the ponds and for developing a pond management plan.

Original pond management was for multiple cohorts to be raised in the ponds. Harvesting would be done passively with fyke nets so that the ponds would not be drained on an annual basis. In FY 2007, it was determined to change pond management direction. All of the ponds would be drained and harvested and single cohort management would replace the multiple cohort approach. During the first harvesting and draining of a Six-pack Pond, high mortality resulted when the number of fish remaining in the pond could not be removed before they succumbed to the rapidly warming water. Adjustments were made to reduce the mortality in future harvesting and draining events. The adjustments consisted of increasing the trapping effort prior to de-watering to reduce the number of fish remaining in the pond. In addition, the final fish removal would be accomplished with a higher pool of water to slow the warming of the water during the time of final harvest. This resulted in less mortality.

The Navajo Nation Department of Fish and Wildlife (NNDFW) was contracted to assume responsibility for daily management of the NAPI ponds in 2007. The Service assists the NNDFW with pond harvest as needed.

The ponds have been fenced and electric lines have been installed at each of the ponds. Aerators have been installed at each of the ponds to improve water quality. Water quality issues have caused fish mortalities in some of the ponds in the past. Water quality issues appear to have been resolved since installation of the aerators.

Objectives

(NAPI Ponds Management)

Manage razorback sucker grow-out in East Avocet, West Avocet, and Hidden ponds to provide an additional source of RBS to supplement the augmentation program. Harvest, Passive Implant Transponder (PIT) tag, and stock razorback sucker from the three grow-out ponds into the San Juan River, in order to assist in fulfilling the tasks and objectives outlined in the current version of *An Augmentation Plan for Razorback Sucker in the San Juan River* (Ryden 2003).

1) Manage three grow-out ponds using a single cohort strategy; including passive and active harvest techniques.

2) Annually stock 3,500 (≥ 200mm) razorback sucker per pond.

3) Harvest all ponds on an annual basis.
    a. Implant all razorback sucker with a PIT tag prior to stocking.
    b. Stock all fish regardless of size at harvest.
    c. Stock ~ 4,200 to 6,300 fish based on 40-60% return.
    3c. Investigate and utilize multiple stocking localities.

4) Experimentally acclimatize, as guided by SRRIP – Biology Committee, razorback sucker from both NAPI ponds and Uvalde National Fish Hatchery.

Location

The RBS grow-out ponds are located in Block III of Region 2 on NAPI lands, south of Farmington, New Mexico. Avocet East and West are located NW of the intersection of N 4062 and N 4087, which is approximately 3 miles southwest of the Ojo Amarillo NHA Housing Subdivision. Hidden Pond is located SE of the intersection of N 4087 and N 4095 approximately 1 mile northwest of the NAPI Region II Complex.

Methods/Approach

The NNDFW will be responsible for overall management of the NAPI ponds regarding daily management duties, harvesting, and stocking. The Service, Region 2, will be responsible for coordinating the stocking of the ponds with Dexter NFH and NNDFW per US Fish and Wildlife Service Region 2 stocking policy. The NNDFW will be responsible for daily management of the three grow out ponds on NAPI with assistance by the Service, Region 2. Harvesting, tagging, and stocking will be conducted by NNDFW, with assistance from the Service if additional personnel are needed. Associated data management and reporting for the project will be handled by staff from the NNDFW.

Pond management requires that staff monitor and record water quality and quantity, and feed the fish on a daily basis. In addition, staff manages water quantity to ensure that water quality is optimal. Maintenance includes operating and repairing valves and aerators, evaluating the pond perimeters for erosion problems, operating the propane cannons to scare away predators, repairing fences, monitoring aquatic vegetation and maintaining a log book and database for management of the ponds.

During FY 2012, East Avocet, West Avocet, and Hidden ponds will be managed for a single cohort of RBS. NNDFW will implement passive harvest using fyke nets to trap, tag, and stock RBS into the SJR for several days or months prior to dewatering the ponds. As the ponds are dewatered, NNDFW and Service staff will work together to do the final RBS removal, tagging, and stocking into the SJR.

Whenever the ponds are drained, they will be evaluated for structural stability. Areas away from ponds that may be impacted by dewatering will also be evaluated. Staff will identify and document any structural damage to the ponds and dewatering areas if necessary. Feasibility will determine whether improvements are made or not. This proposal does not include any maintenance or repair work that is major and requires mobilization of heavy equipment and is outside of the constraints of this budget.

Products/Schedule

In the spring of 2012, Dexter National Fish Hatchery will deliver 10,500 ≥ 200 mm RBS to the three NAPI grow-out ponds. In the fall of 2012, the NAPI ponds will be de-watered and the RBS, which are targeted to be ≥ 300 mm will be harvested and transported to the San Juan River for stocking. A database summarizing numbers of fish, stocking locations and PIT tag numbers will be submitted to the SJRIP Program Coordinators Office by 31 March 2012. A draft report will be submitted by 31 March 2012 and finalized by 1 June 2012.

Budget Fiscal Year 2012

BUDGET WORKSHEET – Program Base Funding		
Razorback Sucker Augmentation at NAPI Grow-Out Ponds		
Personnel (salary/benefits)	**USFWS NMFWCO**	**NNDFW**
Daily Pond Management .30 FTE (GS-9-8) USFWS R2 and active/passive harvesting assistance .5 FTE NNDFW X $41,516.80	$ 28,071	$ 20,758
Wildlife Technician .5 FTE NNDFW X $22,734.40		$ 11,367
Fringe Benefits $32,125 X 42.28%		13,647
Personnel Subtotal	**$ 28,071**	**$ 45,772**
Travel		
Per Diem Lodging and Meals	$ 538	$ 1,000
Vehicle Mileage and Maintenance	$ 2,040	$ 18,000
Travel Subtotal	**$ 2,578**	**$ 19,000**
Office Supplies and Equipment		$ 500
General Operating Supplies (includes fish transport costs, i.e. oxygen, salt, stress coat, etc.)		$ 2,500
Electricity Costs (Aeration)		$ 1,000
Feed Cost ($1.55/lb – 5,000 lbs)		$ 7,750
Uniforms		$ 500
Printing/Binding/Photocopying		$ 100
Fuel – Propane/Cannon Guns		$ 200
Repairs and Maintenance – Paint, sealant, lubricants, plumbing supplies, water quality probes, etc.		$ 500
Support Subtotal	**$ -0-**	**$ 13,050**
Total	**$ 30,649**	**$ 77,822**
Administrative charge (18.5%) $77,822/1.1805 X .1805 = $	$ 6,743	$ 11,899
USFWS/NNDFW Totals	**$ 37,392**	**$ 89,721**
Grand Total		**$127,113**

Razorback Sucker Augmentation at NAPI Grow-Out Ponds
Fiscal Year 2012 Project Proposal

Under the heading "Funding for participation of other agencies." Costs for participation of the U.S. Fish and Wildlife Service, New Mexico Fish and Wildlife Conservation Office, Albuquerque, NM in FY-2012.

Daily pond management activities	
.30 FTE (GS-8; $76,003*/year)	$ 25,081.00
Active Harvest	
Fish Biologist (GS-9-1*) - 5 days @ $270/day	$ 1,350.00
Biological Science Technician (GS-8*) – 5 days @ $328/day	$ 1,640.00
Personnel subtotal	$ 28,071.00
Travel and Per Diem (Based on Published FY-2011 Federal Per Diem Rates)	
Hotel Costs – 4 nights (4 nights @ $77/night – single occupancy)	$ 308.00
Per Diem (Hotel Rate) – 5 days @ $46/day	$ 230.00
Travel subtotal	$ 538.00
Equipment	
Vehicle Maintenance & Gasoline 4,000 miles @ $0.51/mile (based on GSA rates established on 01 January 2011 and includes costs associated with gasoline/diesel fuel vehicle maintenance)	$ 2,040.00
Equipment subtotal	$ 2,040.00
USFWS – NMFWCO Total	$ 30,649.00
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	$ 6,743.00
USFWS – Region 2 Total	**$ 37,392.00**

*includes 32% overhead for benefits

FY 2012 Project Proposal
San Juan River Basin Hydrology Model Development, Operation and Maintenance

Katrina Grantz UC-432
Bureau of Reclamation
125 South State Street
Salt Lake City, UT 84138-1147
Phone 801-524-3635
Fax 801-524-3847
kgrantz@ usbr.gov

Ryan Christianson
Bureau of Reclamation
835 E. 2nd Avenue, Suite #300
Durango, CO 81301
Phone 970-385-6590
rchristianson@usbr.gov

Relationship to SJRIP: Supports Program goals and management by developing, operating and maintaining a hydrology model of the San Juan Basin. The model is key to hydrological analysis of water development scenarios or other scenarios in relation to the flow recommendations.

Background:
The San Juan Basin Hydrology Model (SJBHM) is a hydrologic model of the San Juan Riverbasin. The SJBHM actually consists of a series of models including evapotranspiration models, a natural flow model in StateMod, and a simulation model in RiverWare. Revisions and modifications to the models and supporting data have occurred through a multi-year model development and validation phase. FY2011 activities are expected to complete major model development. The FY2012 scope of work includes model validation through collaborative work with Program participants, the collaborative development of a revised hydrologic baseline and its incorporation into the model, updating model documentation, continued model streamlining, as well as annual operation and maintenance of the model and data management. In addition, at the discretion of the Coordination Committee, work on developing a natural flow model may begin. The Bureau of Reclamation has the primary responsibility for model development and O&M.

Once modified and approved, the model will be available to generate and analyze runs associated with Section 7 Consultations and/or special requests from the Biology or Coordination Committees related to the flow recommendations or other hydrological aspects of the Program.

Objective:
The objective for this work is to ensure that the San Juan Basin Hydrology Model is available for run requests. This will be accomplished by further validating and verifying the model development performed in FY2011 as well as developing and incorporating a revised hydrologic baseline. Adjusting model configurations or operating rules to correct for errors or other changes and evolving the data set forward through time is also necessary. The FY2012 request also includes funds to continue to provide technical transfer from the model developers to the model users and maintainers as well as coordination and interaction with the Hydrologic Baseline

Workgroup and Program participants and their technical designees.

Deliverables:
A report detailing the accomplishments of the model development will be provided at the end of the fiscal year. In addition, data and reports from model runs will be provided throughout the model validation and approval process. The modified model(s) and supporting data and scripts will also be delivered / made available.

Task Descriptions:
Task 1: Model Modifications In collaboration with the Hydrologic Baseline Workgroup, complete and incorporate the modified hydrologic baseline into the model. Validate and verify model modifications that simulate the flow upstream of Navajo within the RiverWare simulation Daily Decision Model. At the Coordination Committee's discretion, begin work on a natural flow model. Document all modifications to the model, communicate changes to Program and interested parties. Continued streamlining of the various models and data loaders.

Task 2: Model Maintenance Includes maintenance of the actual model as well as the supporting data and software. Maintain data to evolve the data set forward through time. This includes an annual update of USGS data, Reclamation data, New Mexico non-irrigation data, New Mexico irrigation data, Arizona and Utah depletions, Colorado depletions, climate data, and natural flow data. Data must be obtained from various sources and processed for compatibility with the multiple data loaders. Load updated data into the model, run and test the new data. Adjust model configuration, methodologies, or assumptions, as needed. Update and expand documentation to reflect current state of model. Update and maintain data management interfaces and other software associated with the data and models. Apply all RiverWare updates and patches as they become available. Provide technology transference to Reclamation's Western Colorado Area Office and Fish and Wildlife Service staff in the details of maintaining the data and models. Technology transfer will take place as model, data and software updates take place to ensure that several people are trained in the maintenance of the model.

Task 3: Model Runs and Analyses Generate and analyze model runs associated with Section 7 consultations or special requests from the Biology and/or Coordination Committees and/or special work groups. A consultation run usually requires model reconfiguration and the implementation of operating criteria. Provide technology transference to Reclamation's Western Colorado Area Office and Fish and Wildlife Service staff in the details of maintaining the data and models, and in operating the models. Technology transfer will take place as model runs and analyses are being executed to ensure that several people are trained in the operation of the model.

Task 4: Program Management and Coordination Attend or provide written reports for Coordination Committee meetings, as needed, to update the committee on the model status and model results. Attend and assist in conducting Hydrologic Baseline Workgroup meetings to provide model status updates, present results, and work on developing the revised hydrologic baseline. Conduct an annual hydrology meeting of Program participants to review and solicit input on accomplishments and activities relating to the model for the previous year, status of the model, and proposed activities for the coming year; and provide a report on the meeting to the Coordination Committee for their review and approval. Develop the FY2012 budget and track FY2011 expenditures.

Budget Summary FY 2012

Model Development	$49,160
Model Maintenance	$13,560
Model Runs	$11,000
Program Management	$35,000
Grand Total	**$108,720**

FY-2013	**$111,980**	*
FY-2014	**$75,000**	*
FY-2015	**$77,250**	†

* Includes ~3% adjustment, assumes future model development and maintenance and additional tech transfer and documentation

† Assumes major model development completed in Sep 2013

Task 1 Model Development

A) Labor

Task	Position	Salary total/hr	Total Hours	Total Cost
Model validation, streamlining, incorporation of new baseline and flow recs	UCRO[1] Engineer	$80	320	$25,600
Documentation	UCRO Engineer	$80	160	$12,800

B) Travel

Purpose	Destination	Trips	Days/ Trip	Airfare/ trip	MI&E, Car, Lodging/day	Total Cost
UCRO meeting w/ CADSWES	Boulder	1	2	$300	$230	$760

C) Other Costs

Task	Total Cost
RiverWare technical support	$10,000

Task 2 Model Maintenance

A) Labor

Task	Position	Salary total/hr	Total Hours	Total Cost
Annual Data Update	UCRO Engineer	$80	40	$3,200
	WCAO[2] Engineer	$115	40	$4,600
Annual Software Update	UCRO Engineer	$80	40	$3,200

B) Travel

Purpose	Destination	Trips	Days/ Trip	Airfare/ trip	MI&E, Car, Lodging/day	Total Cost
WCAO meet for Coordination	Salt Lake City	1	2	$800	$230	$1,260
UCRO meet for Coordination	Durango	1	2	$800	$250	$1,300

Task 3 Model Runs

A) Labor

Task	Position	Salary total/hr	Total Hours	Total Cost
Model Runs and Analyses	UCRO Engineer	$80	80	$6,400
	WCAO Engineer	$115	40	$4,600

Task 4 Program Management Coordination

A) Labor

Task	Position	Salary total/hr	Total Hours	Total Cost
Meetings and Coordination	UCRO Engineer	$80	200	$16,000
	WCAO Engineer	$115	80	$9,200
Budget	UCRO Engineer	$80	40	$3,200

B) Travel

Purpose	Destination	Trips	Days/ Trip	Airfare/ trip	MI&E, Car, Lodging/day	Total Cost
UCRO to Hydro Work Grp Mtg	Albuquerque	3	2	$1,000	$200	$4,200
WCAO to Hydro Work Grp Mtg	Albuquerque	3	2	$400	$200	$2,400

[1] Upper Colorado Regional Office (Salt Lake City)

[2] Western Colorado Area Office (Durango)

Improve Stream Gaging and Flow Measurements
San Juan River Basin Recovery Implementation Program
Fiscal Year 2012 Project Proposal

Katrina Grantz
Bureau of Reclamation
125 S. State St.
Salt Lake City, UT 84138
(801) 524-3635
kgrantz@usbr.gov

Ryan Christianson
Bureau of Reclamation
835 E. 2nd Avenue, Suite #300
Durango, CO 81301
(970) 385-6590
rchristianson@usbr.gov

Background
There are five United States Geological Survey (USGS) streamflow gaging stations on the main stem of the San Juan River that are very important to management of the river and the operation of Navajo dam to implement the San Juan Recovery Implementation Program (SJRIP) flow recommendations. Stream gaging data on the San Juan River are necessary to reliably implement and revise the SJRIP flow recommendations.

Study Area
San Juan River Basin in New Mexico

Objective
Provide funding to the USGS to take additional flow measurements as needed at the four San Juan River gages in New Mexico. The four gages are San Juan near Archuleta, San Juan at Farmington, San Juan at Shiprock, and San Juan at Four Corners. (Note: Base cost for operation of the stations is paid for by non-Program funds.)

Products
1. Improved flow measurement and more accurate gage readings.

2. Technical presentation at the end of the year from USGS summarizing the activities completed and the value of obtaining additional readings.

Budget FY-2012

Objective: Provide funding to USGS for 12 additional flow measurements at the four San Juan River Gages in NM.	Staff days	Labor	Travel	Equipment and supplies
Personnel	7.5	6,200		
Travel			1,400	
Equipment and supplies				0
Total				$7,600

Estimated Outyear Funding (Based on 4% adjustment for inflation)

Fiscal Year 2013	$8,000
Fiscal Year 2014	$8,300
Fiscal Year 2015	$8,660

Operation of Public Service Company of New Mexico Fish Passage Structure
Fiscal Year 2012 Project Proposal

Principal Investigators: Jeffrey Cole, James Morel, Albert Lapahie
Navajo Nation Department of Fish and Wildlife
Box 1480 Window Rock, AZ 86515
(928) 871-6450

jcole@nndfw.org jmorel@nndfw.org alapahie@nndfw.org

Background

The Power Company of New Mexico (PNM) Diversion Dam was constructed in 1971. The 3.25-foot high diversion dam (weir) is located on the San Juan River about 12 miles downstream of Farmington, New Mexico near the town of Fruitland at River Mile 166.6. Facilities at the diversion include a concrete weir, a series of screened intake structures, an intake channel, a settling channel, and a pump house.

Water flows over the dam into a stilling basin created by a concrete apron. The stilling basin is the width of the river. The presence of the dam and the basin creates a barrier to fish moving upstream. As flows increase, the difference in the upstream and downstream water levels is reduced. Although water levels are reduced, water velocities increase and the weir provides an impediment to upstream fish movement. Recovery studies conducted as part of the SJRRIP have shown that some fish are able to move upstream past the weir but their specific method of movement is not known and the number of fish discouraged from upstream movement by the presence of the weir is also unknown. One possible method of upstream movement could occur during high river flows. When the flow in the San Juan River is above 7,000 cfs, some of the flow goes around the dam making it possible for fish to go around the dam at these higher flows.

A need has been identified by the San Juan River Basin Recovery Implementation Program (SJRRIP) to restore endangered fish passage upstream past the PNM Diversion Dam. The purpose of establishing fish passage was to protect and recover native Colorado pikeminnow (*Ptychocheilus lucius)* and razorback sucker (*Xyrauchen texanus*) populations in the San Juan Basin while water development proceeds in compliance with all applicable Federal and State laws, including fulfillment of Federal trust responsibilities to the Southern Ute Indian Tribe, Ute Mountain Ute Tribe, Jicarilla Apache Nation and the Navajo Nation. In addition, other native fish species would benefit from restored passage. The facility has been operated and maintained by the Navajo Nation Department of Fish and Wildlife (NNDFW) since it was built in 2003. The U.S. Fish and Wildlife Service (Service), Bureau of Reclamation (BOR), Bureau of Indian Affairs (BIA), Navajo Indian Irrigation Project (NIIP), Navajo Agricultural Products Industry (NAPI), and PNM have provided the NNDFW with technical assistance, planning assistance, environmental clearance, maintenance and improvements to the facility and its access points.

The fish passage has facilitated movement of pikeminnow and razorback suckers upstream into a 50 mile stretch of river, which is historical habitat of these species.

Study Area

Public Service Company of New Mexico Diversion Dam is located at RM 166.6.

Methods/Approach

The Fish Passage facility will be operated from April 1 to October 31, 2012. The fish passage traps fish attempting to move upstream of the facility. All fish that are caught in the trap are transported to a sorting tray. All fish are identified and enumerated. Non-endangered native fish are released upstream of the

facility. Rare native fishes are scanned for a pit tag, weighed and measured, marked with a pit tag if they do not have one and then released upstream of the facility. All non-native fishes are removed from the river system permanently. When feasible, channel catfish are transported to area fishing lakes that already have channel catfish in their systems to support the sport-fishing program.

Daily operation and maintenance includes cleaning of surface and submerged trash, debris, silt, and river-born algae from the trash racks and bar screens in the fore-bay of the fish passageway, and aluminum conduit screens in the fish trap. The amount of algae, debris, trash, and sediment that accumulates daily at this site is seasonally variable, depending upon flow magnitude and water volume during the water year. Maintenance also includes painting as necessary to control corrosion, lubrication of moving equipment, and checking fluid levels in gearboxes and cooling radiators, as necessary. Representatives from the NNDFW, BOR, PNM and the Service will perform an inspection of the facility every 3 years. In the event of a significant flood event, representatives from the NNDFW will notify BOR, PNM and FWS and appropriate parties will inspect the facility for damage, as necessary.

The Fish Passage Program maintains a database of all fish processed through the facility. Staff that operate this facility also have initiated a public outreach and education program that will continue in FY' 2012. School groups visit the facility to learn about the purpose of the facility and the endangered fish program on the San Juan River.

Objectives of this project are as follows:

1. Determine the use of the fish passage by juvenile and adult native and nonnative fishes.
2. Identify any Colorado pikeminnow congregations that may be related to the spawning period in the San Juan River.
3. Maintain the facility in a manner that assures long-term benefit.

This proposal does not include any maintenance or repair work that is major and requires mobilization of heavy equipment and is outside of the constraints of this budget.

Products/Schedule

The Fish Passage facility will be operated from April 1 to October 31, 2012. Data will include definitive numbers of species, numbers per species, and seasonal use and distribution by species.

NNDFW staff will prepare and submit monthly reports and one draft and final annual report. Service staff will assist NNDFW with data analysis and draft and final report preparation, if needed.

NNDFW staff will attend SJRRIP Biology Committee meetings and provide reports as needed throughout the year.

Fiscal Year – 2012 Budget

BUDGET WORKSHEET Operation of San Juan/PNM Fish Passage		
Personnel (salary and benefits)	**USFWS Funding**	**NNDFW**
.5 FTE Fisheries Biologist X $41,516.80		$20,758
.5 FTE Wildlife Technician X $22,734.40		$11,367
Fringe Benefits $32,125 X 42.48%		$13,647
Personnel Subtotal		**$45,722**
Travel		
1 Tribal Vehicle		$18,000
Per Diem Lodging and Meals		$2,500
Travel Subtotal		**$20,500**
Office Supplies		$ 500
Office Equipment – LCD Projector and screen		$1,500
General Operating Supplies Plumbing supplies, Hardware Supplies, Neoprene Waders, rubber boots, wet suit, landscaping supplies		$2,500
Nenahnezad Phone		$ 800
Uniforms		$500
Printing/Binding/Photocopying		$100
Fuel – Gasoline for water pump		$300
Sewage Services – Fish Passage		$700
Repairs and Maintenance – Paint, sealant, lubricants, water pump repairs		$1,000
Support Subtotal		**$7,900**
Training and Conference Registration		$1,000
Consultant/ Professional Sub-Total		**$1,000**
	USFWS Funding	**Base Funding**
Budget Subtotal		**$75,122**
FY 2011 Carry over funds		**0**
Total		**$75,122**
Administrative charge (18.5%) 75,122/1.1805 X .1805 =		**$11,486**
Grand Total		**$86,608**

Non-native species Monitoring and Control in the Upper/Middle San Juan River
Fiscal Year 2012 Project Proposal

Principal Investigators: Jason E. Davis, B.R. Duran and Ernest Teller Sr.
U.S. Fish and Wildlife Service
New Mexico Fishery Resources Office
3800 Commons N.E.
Albuquerque, NM 87109
(505)342-9900

Jason_E_Davis@fws.gov Bobby_Duran@fws.gov Ernest_Teller@fws.gov

and

Dale Ryden
U.S. Fish and Wildlife Service, Colorado River Fishery Project
764 Horizon Drive, Build B
Grand Junction, CO 81506-3946
(970) 245-9319

dale_ryden@fws.gov

Background

The August 1, 2001 Colorado pikeminnow and razorback sucker Recovery Goals identified predation by and/or competition by nonnative fish species as a primary threat to the continued existence or the reestablishment of self-sustaining populations of these endangered fishes. In addition, reducing the impacts of nonnative fishes has been identified as a critical element in the San Juan River Basin Recovery Implementation Programs Long Range Plan (Draft August 2010). Actions and Tasks associated with this Element encompassed within this scope of work include:

Action 3.1.1 Develop, implement, and evaluate the most effective strategies for reducing problematic nonnative fish.

- Task 3.1.1.4 Evaluate and refine alternative nonnative fish reduction methods.
- Task 3.1.1.7 Evaluate effect of nonnative fish control on distribution, abundance, and demographics (e.g., fish size, age, sexual maturtity) of nonnative fish populations.
- Task 3.1.1.8 Evaluate effect of nonnative fish control on distribution, abundance, and demographics (e.g., fish size, age, sexual maturtity) of the endangered fish populations and native fish community.

Action 3.1.4 Establish criteria for reduction of target nonnative fish populations.

- Task 3.1.4.1 Establish target criteria for reduction of problematic nonnative fish species to estimate time, effort, and cost for controlling nonnative fishes.

Secondarily, nonnative fish removal crews collect both spatial and temporal data on rare fish encountered during sampling efforts. These data have been used in assessing progress towards recovery and to evaluate the augmentation programs for both Colorado pikeminnow and

razorback sucker. Additional Long Range Plan Actions and Tasks associated with this task include but are not limited to the following:

Action 1.3.1 Monitor success and status of stocked razorback sucker and Colorado pikeminnow.

Task 1.3.1.1 Determine survival and recruitment of stocked razorback sucker and Colorado pikeminnow to assess stocking success and to determine when to implement mark-recapture population estimates.

Action 4.1.2 Implement a standardized monitoring plan to track the presence, status, and trends of endangered fish populations.

Task 4.1.2.5 Use mark-recapture population estimators, when feasible and in conjunction with catch rate estimators, to evaluate stocking success for razorback sucker and Colorado pikeminnow.

Intensive removal of non-native fishes, primarily channel catfish and common carp, has occurred in the upper reaches of the San Juan River since 2001. Between 2001 and 2003, removal trips focused on a 7.6 mile reach of river from PNM Weir (RM 166.6) to Hogback Diversion (RM 159.0). Declines in catch rates, seasonal movement by channel catfish, and high abundance of non-native fishes downstream of Hogback Diversion prompted removal efforts to expand in 2003 to include the adjacent downstream reach, Hogback Diversion to Shiprock Bridge (RM 147.9). These efforts are ongoing with a total of eight (three passes/trip) trips divided between both reaches annually.

Multi-pass removal efforts were successful, to a degree, in suppressing non-native numbers within intensive removal reaches (Davis et al. 2009, Davis 2006; Jackson 2006). However, long term trend data collected during annual fall monitoring trips indicate an apparent increase in channel catfish abundance riverwide beginning in 2004. Much of this can be attributed to increased abundance of channel catfish in reaches that are between (RM 147.9 – 52.9) those where intensive removal efforts occur (Ryden 2006). Prior to 2006, non-native fishes within this portion of the San Juan River were only opportunistically removed during spring razorback sucker and fall annual monitoring trips.

Beginning in 2006, U.S. Fish and Wildlife Service (FWS) – New Mexico Fish and Wildlife Conservation Office (NMFWCO) shifted removal efforts to include two trips from Shiprock, New Mexico to Montezuma Creek, Utah (RM 93.6). Removal efforts upstream of Shiprock Bridge were reduced to accommodate non-native removal downstream to Montezuma Creek. In addition, at the direction of the San Juan River Recovery Implementation Program's (SJRIP) Biology Committee, trips specific to non-native removal were initiated in 2006 to encompass the Montezuma Creek to Mexican Hat, Utah portion of the river (22 February 2006 Biology Committee Meeting). Two trips were conducted from Montezuma Creek to Mexican Hat, Utah in 2006 by NMFRO and Utah Division of Wildlife Resources – Moab (UDWR).

It was determined at the February 2007 Biology Committee Meeting to increase efforts of nonnative removal from Shiprock to Mexican Hat to reflect similar efforts to intensively sampled reaches upstream. Therefore, we propose to continue our number of sampling trips to include four trips from Shiprock to Mexican Hat in FY 2011. These additional trips will allow removal

crews to expand removal into areas of increased importance while maintaining sufficient effort in upstream reaches to maintain current accomplishments.

Description of Study Area

Intensive nonnative fishes removal will occur in the San Juan River, New Mexico-Colorado-Utah, including three distinct reaches of the upper and middle portions of the San Juan River. These sections include PNM Weir (RM 166.6) to Hogback Diversion (RM 159.0); Hogback Diversion to Shiprock Bridge (RM 147.9); and Shiprock Bridge to Mexican Hat, Utah (RM 52.9).

Objectives

1. Continue to remove nonnative fishes, primarily channel catfish and common carp, from 113.7 river miles of the San Juan River.

2. Implement riverwide mark/recapture to determine exploitation rates for channel catfish.

3. Evaluate distribution and abundance patterns of non-native species to determine effects of mechanical removal.

4. Characterize distribution and abundance of endangered fish in the upper and middle reaches of the San Juan River.

Methods/Data Analysis

Removal efforts from PNM Weir to Hogback and Hogback to Shiprock will be conducted by two electrofishing rafts and one support raft. Captured channel catfish will be measured (nearest 1 mm) for standard (SL) and total lengths (TL), weighed (nearest 5 g), and, if not sacrificed for study purposes, transported by hatchery truck to isolated recreational angling impoundments. All other nonnative species sampled during these efforts will be sacrificed and appropriate data recorded for location, length, and mass.

Removal efforts from Shiprock to Mexican Hat will be conducted four times a year. Three of these four trips will be stand alone efforts while the fourth removal trip will be in concert with the Sub-adult/Adult Fish Community Monitoring conducted by FWS-GJ. Sampling for nonnative fishes will be conducted by four raft mounted electrofishing units. Two rafts will begin sampling approximately 1-2 hours after the initial two rafts begin essentially accomplishing two sampling passes per trip. Captured channel catfish will be measured (nearest 1 mm) for standard and total lengths, weighed (nearest 5 g), and, if not sacrificed for study purposes, transported by hatchery truck to isolated recreational angling impoundments. All other nonnative species sampled during these efforts will be sacrificed and appropriate data recorded for location, length, and mass.

In addition to nonnative fishes, all rare fishes seen will be netted. Rare fishes will be measured (nearest 1 mm) for standard and total lengths, weighed (nearest 5 g) and checked for the presence of a Passive Implant Transponder (PIT) tag. If no tag is present and fish are $\geq$ 150 mm total length a tag will be implanted. At the time of collection, GPS coordinates will be recorded using a hand held GPS unit. Preliminary population estimates for Colorado pikeminnow > age 2 and

razorback sucker will be generated using data collected during NMFWCO and UDWR nonnative fish removal efforts.

Channel catfish collected during a trip early in the calendar year (i.e. April) will receive a T-bar anchor tag and returned to the river. Each tag will have a unique alphanumeric code for identification of individual fish. Additionally, each tagged fish will receive an adipose fin clip to estimate tag retention. The first 100 channel catfish captured each day will be measured for TL, SL and weight. All other channel catfish collected will be measured for TL only. Channel catfish collected on subsequent trips will be removed from the river. Population estimates will be generated for channel catfish captured during the first pass and recaptured in the second pass. Exploitation rates, u, will be estimated as the rate of recapture of marked fish (Deroba et al. 2005),

$$u = R/M$$

whereas R represents number of recaptured fish and M represents number of marked fish. Exploitation rates will be calculated for various size classes of fish throughout the sampling period (Elevrud 2010).

All available capture data will be analyzed independently by section and project (i.e. PNM to Hogback; Hogback to Shiprock; fall monitoring). To determine trends in distribution and abundance, mean CPUE and standard error will be calculated. Species CPUE represents the total number of fish collected divided by the total effort of sampling (hours of electrofishing). Data will be summarized by type of trip, year, section and by individual trips. If CPUE data meet the assumptions of normality and variance, a One Way Analysis of Variance (ANOVA) will be conducted to determine if significant differences exist. Multiple pairwise comparisons using Bonferroni post hoc tests will be used to determine where specific differences exist. All CPUE data that does not meet the assumptions of an ANOVA and transformations are unsuccessful in normalizing the data will first be analyzed using a non-parametric Kruskal-Wallis rank test. If significant differences are observed, among year comparisons of ranked data will be conducted using a Nemenyi post-hoc test (Sokal and Rohlf 1995). Statistical applications not mentioned here may be utilized if deemed appropriate.

Intensive removal trips by Section (FY 2012):

PNM to Hogback-	2 trips
Hogback to Shiprock-	3 trips
Shiprock to Mexican Hat	4 trips
Shiprock to Sand Island/Mexican Hat	1 trip (tagging trip)
Total # of trips-	**10 trips in FY 2012**

Products/Schedule

An electronic data file will be provided for inclusion in the centralized database by 31 March 2013. A draft summary report detailing findings will be submitted to the San Juan River Implementation Program, Biology Committee, by 31 March 2013. Revisions will be completed and a final annual report will be submitted by 1 June 2013.

Literature Cited

Davis, J.E, D.W. Furr and E. Teller. 2009. *Non-native species monitoring and control in the upper San Juan River, New Mexico: 2008*. Final Report prepared for the San Juan River Recovery Implementation Program. U.S. Fish and Wildlife Service, Albuquerque New Mexico.

Davis, J.E. 2006. *Non-native species monitoring and control in the upper San Juan River, New Mexico: 2005*. Final Report prepared for the San Juan River Recovery Implementation Program. U.S. Fish and Wildlife Service, Albuquerque New Mexico.

Deroba, J.J., M.J. Hansen, N.A. Nate and J.M. Hennessy. 2005. *Evaluating assumptions of mark-recapture studies for estimating angling exploitation of walleyes in northern Wisconsin lakes*. North American Journal of Fisheries Management, (25): 890-896

Elverud, D.S. 2010. *Nonnative control in the lower San Juan River: 2009.* Draft Interim Progress Report for the San Juan River Recovery Implementation Program. U.S. Fish and Wildlife Service, Albuquerque, NM.

Jackson, J.A. 2006. *Nonnative control in the lower San Juan River: 2005*. Final Report prepared for the San Juan River Recovery Implementation Program. U.S. Fish Wildlife Service, Albuquerque, New Mexico.

Ryden, D.W. 2006. *Long term monitoring of sub-adult and adult large-bodied fishes in The San Juan River: 2005*. Prepared for the San Juan River Recovery Implementation Program. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Sokal, R.R. and F.J. Rohlf. 1995. Biometry: the principles and practice of statistics in biological research. 3rd edition. W.H. Freeman and Company, New York.

Fiscal Year 2012 Budget

Labor Costs (Federal Salary and Benefits)

PNM Weir to Hogback Diversion:

Fish Biologist (GS-9-1)-10 days @ $270/day
(1 person X 5 days/trip X 2 trips) ..... $ 2,700.00

Biological Science Technician (GS-8)-10 days @ $328/day
(1 person X 5 days/trip X 2 trips) ..... $ 3,280.00
$ 5,980.00

Hogback Diversion to Shiprock Bridge:

Supervisory Fish Biologist (GS-13-3)-10 days @ $496/day
(1 person X 5 days/trip X 2 trips) ..... $ 4,960.00

Fish Biologist (GS-9-1)-15 days @ $270/day
(1 person X 5 days/trip X 3 trips) ..... $ 4,050.00

Biological Science Technician (GS-8)-15 days @ $328/day
(1 person X 5 days/trip X 3 trips) ..... $ 4,920.00
$ 13,930.00

Shiprock to Mexican Hat:

Supervisory Fish Biologist (GS-13-1)-12 days @ $496/day
(1 person X 6 days/trip X 2 trips) ..... $ 5,952.00

Fish Biologist (GS-9-1)-24 days @ $270/day
(1 person X 12 days/trip X 2 trips) ..... $ 6,480.00

Biological Science Technician (GS-8)-48 days @ $328/day
(1 person X 12 days/trip X 4 trips) ..... $ 15,744.00

Fish Biologist (GS-5-1)-48 days @ $178/day
(1 person X 12 days/trip X 4 trips) ..... $ 8,544.00

Biological Science Technician (GS-4-1)-24 days @ $159/day
(2 people X 12 days/trip X 1 trip) ..... $ 3,816.00
$ 40,536.00

Shiprock to Sand Island (tagging trip):

Supervisory Fish Biologist (GS-13-1)-12 days @ $496/day
(1 person X 12 days/trip X 1 trip) ..... $ 5,952.00

Fish Biologist (GS-9-1)-24 days @ $270/day
(2 people X 12 days/trip X 1 trip) ..... $ 6,480.00

Biological Science Technician (GS-8)-12 days @ $328/day
(1 person X 12 days/trip X 1 trip) ..... $ 3,936.00

Fish Biologist (GS-5-1)-12 days @ $178/day
(1 person X 12 days/trip X 1 trips).....$ 2,136.00
$ 18,504.00

Administrative and Reporting Costs

Administrative Officer (GS-9-8)-10 days @ $296/day.....$ 2,960.00

Supervisory Fish Biologist (GS-13-3)-50 days @ $496/day.....$ 24,800.00

Fish Biologist (GS-9-1)-25 days @ $270/day.....$ 6,750.00
$ 34,510.00

Sub-Total for Labor Costs..... $ 113,460.00

Travel and Per Diem (Based on published FY 2011 Per Diem Rates)

Hotel Costs – 48 nights @ $77/night.....$ 3,696.00

Per Diem (Hotel Rate) – 54 days @ $46/day.....$ 2,484.00

Per Diem (Camp Rate) – 179 days @ $29/day.....$ 5,191.00
Sub-Total for Travel and Per Diem..... $ 11,371.00

Equipment

Removal Trips
PNM Weir to Hogback/Shiprock Diversion
3,000 miles @ $0.51/mile (400 miles/trip X 5 trips + 1,000 shuttling miles).....$ 1,530.00

Shiprock to Mexican Hat
8,400 miles @ $0.51/mile (700 miles/trip X 4 trips X 3 vehicles).....$ 4,284.00

Generator fuel – 320 gallons @ $3.40/gallon
20 gallons/trip X 5 trips; upper SJR trips
110 gallons/trip X 2 trips; camping trips.....$ 1,088.00

Equipment Maintenance, Repair and Replacement
(i.e. life jackets, hip boots, generator repair, rubber gloves, dip nets
aluminum welding, raft repair, etc.).....$ 2,000.00

Tagging Trip
4,000 Floy T-Bar Anchor Tags
(FD-94 tags @ $610/1,000 tags).....$ 2,440.00

Six (6) Replacement Needles @ $10 ea.....$ 60.00

Generator Fuel – 55 gallons @ $3.40/gallon.....$ 187.00

Vehicle Fuel
1,400 miles @ $0.51/gallon (700 miles roundtrip X 2 vehicles) ..... $ 714.00
Sub-Total for Equipment ..... $ 12,303.00

USFWS – New Mexico Fish and Wildlife Conservation Office ..... $ 137,134.00

USFWS– Administrative Overhead (22%) ..... $ 30,169.00

USFWS – Region 2 Total ..... $ 167,303.00

Funding for participating agencies
U.S. Fish and Wildlife Service – Colorado River Fishery Project ..... $ 82,130.00
Utah Department of Wildlife Resources – Moab Field Station ..... $ 23,541.00
New Mexico Department of Game and Fish- Conservation Services Division ..... $ 10,830.00
American Southwest Ichthyological Researcher, LLC ..... $ 34,218.00
Navajo Nation Department of Fish and Wildlife $3,827.00
Sub-Total for participating agencies $154,546.00

Grand Total for FY 2012 ..... $ 321,849.00

Under the heading "Funding for participation of other agencies." Cost for participation of U.S. Fish and Wildlife Service, Colorado River Project – Grand Junction, CO in FY-2012 nonnative removal activities.

Personnel/Labor Costs (Federal Salary + Benefits)		
Principal Biologist (GS-11) – 304 hours @ $42.91/hr		$ 13,045.00
(1 person X 5 days/trip X 1 hotel trip)		
(1 person X 11 days/trip X 3 camping trips)		
Bio. Tech. Crew Leader (GS-6) – 392 hours @ $24.70/hr		$ 9,682.00
(1 people X 5 days/trip X 1 hotel trip)		
(1 person X 11 days/trip X 4 camping trips)		
Biological Technicians (GS-5) – 528 hours @ $17.45/hr		
(3 people x 11 days/trips x 2 trips)		$ 9,214.00
	Sub Total	$ 31,941.00
Administrative Support (Federal Salary + Benefits)		
Administrative Officer (GS-9) – 110 hours @ $39.63/hr		$ 4,359.00
Asst. Project Leader (GS-13) – 82 hours @ $61.38/hr		$ 5,033.00
Project Leader (GS-14) – 35 hours @ $74.16/hr		$ 2,596.00
	Sub Total	$ 11,988.00
Reporting/Data Management (Federal Salary + Benefits)		
Principal Biologist (GS-11) – 308 hours @ $42.91/hr		$ 13,205.00
	Sub Total	$ 13,205.00
Travel and Per Diem (Based on Published FY-2011 Federal Per Diem Rates)		
Hotel Costs – 18 nights		$ 1,386.00
(18 nights @ $77/night – single occupancy = $1,386)		
Per Diem (Hotel Rate) – 16 days @ $46/day		$ 736.00
Per Diem (Camp Rate) – 80 days @ $28/day		$ 2,240.00
	Sub Total	$ 4,362.00
Equipment		
Vehicle Maintenance & Gasoline (GSA lease = $334 + $0.30/mile/truck/trip)		
(600 miles round trip from Grand Junction, CO to		
Farmington, NM + 200 miles of shuttling per trip X 6 trips)		$ 3,444.00
Generator Gasoline (110 gallons/trip x 2 trips @ $4.00/gallon)		$ 880.00
Equipment Maintenance, Repair, & Replacement		
(e.g., spark plugs and oil for electrofishing generators,		
generator repair, life jackets, hip boots, rubber		
gloves, dip nets, aluminum welding, raft repair, etc.)		$ 1,500.00
Cost of purchasing a new 4-wheeel drive pick-up to be used for		
San Juan field work. Cost to be spread across four separate		
San Juan workplans.		$ 6,671.00
	Sub Total	$ 12,495.00
USFWS-CRFP (Grand Junction, CO) Total		$ 73,991.00
USFWS Region 6 Administrative Overhead (11.00%)		$ 8,139.00
USFWS Region 6 Total		$ 82,130.00

Under the heading "Funding for participation of other agencies." Cost for participation of Utah Department of Wildlife Resources – Moab Field Office in FY-2012 nonnative removal activities.

Personnel/Labor Costs (Salary + Benefits)		
Principal Biologist– 35 days @ $265/day		$ 9,275.00
(1 person X 10 days/trip X 3 camping trips		
and 5 office days for trip prep, gear cleaning, etc.)		
Biological Technicians – 35 days @ $185/day		$ 6,475.00
(1 person X 10 days/trip X 3 camping trips		
and 5 office days for trip prep, gear cleaning, etc.)		
Project Leader – 2 days @ $324/day		$ 648.00
	Subtotal	**$ 16,398.00**
Travel and Per Diem (Based on Published FY-2011 Federal Per Diem Rates)		
Per Diem (Camp Rate) – 60 days @ $20/day		$ 1,200.00
Vehicle Rent (1 truck @$250 month for 2 months)		$ 500.00
Vehicle Mileage (1,300 miles @ $0.49 per mile)		$ 637.00
	Subtotal	**$ 2,337.00**
Equipment Maintenance, Repair and Replacement		
Generator Gasoline (30 gallons/trip x 3 trips @ $3.50/gallon)		$ 315.00
Maintenance (spark plugs, air filters, oil, generator repair)		$ 400.00
Data Collection Supplies (spring scales, pencils, measuring boards)		$ 100.00
Camping Gear (tents, sleeping pads, dry bags)		$ 200.00
Rafting Supplies (oars, raft repair, life jackets, straps, pumps)		$ 200.00
	Subtotal	**$ 1,215.00**
UDWR – Moab Total		$ **19,950.00**
UDWR - Moab Administrative Overhead (18%)		$ **3,591.00**
UDWR – Moab Grand Total		$ **23,541.00**

Under the heading "Funding for participation of other agencies." Cost for participation of New Mexico Department of Game and Fish in FY-2012 nonnative removal activities.

Personnel/Labor Costs (State Salary + Benefits)		
Biologists - 20 @ $350/day		
(1 person x 5 days/trips x 4 trips)		$ 7,000.00
		$ 7,000.00
Travel and Per Diem (Based on Published FY-2007 State Per Diem Rates)		
Per Diem – 16 days @ $85/day		$ 1,360.00
		$ 1,360.00
Equipment		
Vehicle Maintenance & Gasoline (@ $0.55/mile)		
(2,700 miles for 4 trips from Albuquerque to Farmington		
and associated shuttling of vehicles)		$ 1,485.00
		$ 1,485.00
NMDGF – Santa Fe	**Total**	**$ 9,845.00**
Administrative Overhead (10%)		**$ 985.00**
NMDGF – Santa Fe – Total Budget		**$ 10,830.00**

Under the heading "Funding for participation of other agencies." Cost for participation of American Southwest Ichthyological Research, LLC in FY-2012 nonnative removal activities.

Personnel/Labor Costs (Salary + Benefits)	
Biologists– 66 days @ $350/day	$ 23,100.00
(2 people x 11 days/trip x 3 trips; camping trips)	
	$ 23,100.00
Travel and Per Diem (Based on State Per Diem Rates)	
Hotel Per Diem	
1 day trip @ $85/day x 2 people x 3 trips = 6 days	$ 510.00
Field Per Diem	
9 days trip @ $45/day x 2 people x 3 trips = 54 days	$ 2,430.00
	$ 2,940.00
Equipment	
Vehicle Maintenance & Gasoline	
500 miles round trip x 3 = 1,500 miles	
(Albuquerque to Farmington and return)	
600 miles round trip x 3 = 1,800 miles	
(Albuquerque to Montezuma Creek and return)	
Total= 3,300 miles @ $0.75/mile	$ 2,475.00
Subtotal	**$ 28,515.00**
Administrative Overhead (20%)	**$ 5,703.00**
ASIR – Total Budget	**$ 34,218.00**

Under the heading "Funding for participation of other agencies." Cost for participation of the Navajo Nation Department of Fish and Wildlife in FY-2012 nonnative removal activities.

Personnel/Labor Costs (Salary + Benefits)		
Fish Biologist – 6 days @ $154.16/day (1 person x 3 days x 2 trips)		$ 924.96
Biological Technician – 6 days @ $84.40/day (1 person x 3 days x 2 trips)		$ 506.40
	Sub-Total	$1,431.36
Fringe Benefits $1,431.36 X 42.48%		$ 608.04
	Total Personnel/Labor	**$ 2,039.40**
Travel (Vehicle shuttling)		
Vehicle Lease/Maintenance & Gasoline $15.13/day X 12 days = $181.56 + 2 X 36miles X .30/mile=$21.60 (36 miles round trip from Fruitland, NM to Shiprock x 6 trips)		$ 203.16
	Total Travel/Per Diem	**$ 203.16**
Equipment		
Equipment Maintenance, Repair, & Replacement (e.g., life jackets, hip boots, generator repair, rubber gloves, dip nets, aluminum welding, raft repair, etc.)		$ 1,000
	Total Equipment	**$ 1,000**
Navajo Nation Fish and Wildlife Total		**$3,242.56**
Navajo Fish and Wildlife Administrative Overhead (18.05%)		**$ 585.28**
Navajo Nation Total		**$3,827.84**

Nonnative Species Control and Rare Fish Monitoring in the Lower San Juan River
Fiscal Year 2012 Project Proposal

Principal Investigator: Darek S. Elverud
Utah Division of Wildlife Resources, Moab Field Station
1165 S. Hwy 191- Suite 4, Moab, Utah 84532
(435) 259-3782
darekelverud@utah.gov

Background

The lower San Juan River is particularly important in the recovery of the Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) since it contains typical nursery habitat similar to what is present on the Green and Colorado rivers. Within the past eight years, collections of endangered fish have been increasing in this section of river. The largest collection of razorback sucker larvae in 2002 was from Reach 2 (RM 21.2; Brandenburg et al. 2003) and the largest single collection of razorback sucker larvae in 2003 came from a backwater in Reach 1 at RM 8.1 (Brandenburg et al. 2004). Additionally, adult razorback sucker were found congregating around Slickhorn Rapid (RM 17.7) in the spring of 2002, apparently using this area for spawning (Jackson 2003). In spring of 2006, another congregation of adult razorback suckers and possible spawning area was located at river mile 23.4. Collections of adult Colorado pikeminnow in the San Juan River have been extremely rare. No wild adults have been collected since 2000 (Ryden 2003). From 2002 to 2004, Colorado pikeminnow adults and subadults, presumably from the 1996-1997 stocking efforts, have been found using the lower canyon (Reaches 1 and 2) of the San Juan River in the spring and summer (Jackson 2005). From 2003 to 2010, young-of-year Colorado pikeminnow stocked in the fall of the previous year near Farmington, NM, were also found using the lower portions of the San Juan River (Golden et al. 2005, Elverud 2009). One of the most encouraging findings from 2004 was the collection of two wild spawned Colorado pikeminnow larvae at RM 46.3 and 18.1 (Brandenburg et al. 2005).

Nonnative fish species remain prevalent in the lower San Juan River. Channel catfish (*Ictalurus punctatus*) and common carp (*Cyprinus carpio*) are typically the most abundant fish species collected during fall monitoring in Reaches 1 and 2 (Ryden 2003). Native and endangered fish are threatened by predation from adult channel catfish (Marsh and Brooks 1989, Brooks et al. 2000), and may compete for food and space with juvenile channel catfish. Additionally, Colorado pikeminnow have been found with channel catfish lodged in their throats in the San Juan (Ryden and Smith 2002, Elverud 2009, personal observation) and Green (McAda 1983, personal observation) rivers. Common carp tend to feed on larval fish and eggs (Cooper 1987). In the spring and summer of 2004, recently stocked razorback sucker and Colorado pikeminnow were found in the stomachs of two different channel catfish (Jackson, 2005).

Since 1995, many nonnative species including striped bass (*Morone saxatilis*) and walleye (*Stizostedion vitreum*) have been able to move into the San Juan River from Lake Powell. From 1988 to 1995, a waterfall at approximately RM 0 acted as a barrier between the San Juan River and Lake Powell, preventing species from moving upstream. During 1995, rising lake levels inundated the waterfall. When lake levels receded in the winter of 1996, the waterfall did not reappear. Striped bass, walleye and threadfin shad (*Dorosoma petenense*), not previously documented in the San Juan River before waterfall inundation, were collected during large bodied fish sampling (Ryden 2001). Since then, striped bass and walleye have been collected periodically until 2000 when large numbers were collected near Farmington, NM (approximately 166 river miles upstream of Lake Powell). Many native suckers were found inside the stomachs of these striped bass (unpublished data from San Juan River database). The San Juan River Recovery Implementation Program (SJRIP) determined in 2001 that control of striped bass and other

nonnative species in the lower river was warranted. Utah Division of Wildlife Resources began nonnative fish control with the goal of removing striped bass and other nonnative species in the lower San Juan River, while documenting river and lake conditions that may correlate to striped bass movement out of Lake Powell. It was anticipated that these correlations would provide information for determining the most effective time to remove striped bass. During 2002, Lake Powell water temperature was positively correlated with the highest catch of striped bass in June, in the lower San Juan River (Jackson, 2003). A new waterfall at RM –0.5 has prevented striped bass and other fish from moving from Lake Powell since 2003. No striped bass or walleye were observed in the lower San Juan River from 2003 to 2009. In 2006, two adult gizzard shad were captured below the waterfall indicating another possible nonnative fish of concern. In 2007, seine sampling below the waterfall collected hundreds of young-of-the-year gizzard shad below the waterfall. Additionally in 2007, 2008 and 2009, adult gizzard shad, striped bass and adult walleye were collected below the waterfall. Colorado pikeminnow and razorback suckers have also been collected during sampling efforts below the waterfall indicating loss of stocked endangered fish over the waterfall and the waterfall acting as a barrier to all fish attempting to move upstream.

Over 86,000 channel catfish and approximately 3,000 common carp were mechanically removed from the lower San Juan River from 2002 to 2010. A decrease in mean total length (TL) of channel catfish was observed between 2002 and 2010, indicating that removal efforts may causing a shift in the population size structure to smaller individuals. Additionally, shifts in sized structure of channel catfish have been reported further upstream (Davis 2005) and on a river-wide scale (Ryden 2005). Catch rate of adult channel catfish also decreased from 4.9 adult catfish per electrofishing hour in 2002 to 2.0 adult catfish per electrofishing hour in 2006 in the lower San Juan. Furthermore, similar shifts in yield and population structure have been observed in sport and commercial fisheries as the rate of exploitation increased (Bennet 1971; McHugh 1984, Pitlo 1997). Continued removal of all size classes of channel catfish in the San Juan River may eventually lead to decreased fecundity and a reduction of the overall population, therefore lessening the impact that these fish have on the native and endangered fish community.

A significant decline in catch rates of common carp was observed from 2002 to 2010. Between 2002 and 2010, catch rate of common carp decreased from over 5 fish per electrofishing hour to < 0.2 fish per electrofishing hour. However, it is unclear if this decline was directly related to removal efforts, the presence of the waterfall, or the low water conditions that have been present over the period of this project. It is probable that a combination of these factors is causative to some extent. The continuation of removal efforts for channel catfish and common carp will aid in the illumination of contributory factors and the evaluation of the success of this project and similar nonnative control efforts.

Over the course of this project, important monitoring information has been obtained on the progress of the endangered fish community as well. We have observed the apparent spawning aggregation of razorback sucker in spring 2002 at Slickhorn Rapid and collected some of the first wild spawned juvenile razorback sucker in 2003 and 2004. Since 2002, we have documented the distribution and abundance of Colorado pikeminnow and razorback sucker in the lower San Juan River stocked from 2002 to 2010. Preliminary population estimates for juvenile Colorado pikeminnow residing in the lower San Juan River were generated from 2004 to 2010 from recapture data. In 2004, we documented the first cases of channel catfish predation on stocked juvenile razorback sucker and Colorado pikeminnow in the San Juan River.

This work plan proposes the continuation of nonnative control, sub-element 4.1 of the Long Range Plan, in the lower San Juan River from Mexican Hat to Clay Hills. This study will serve to determine the most effective time for removal actions. The presence of the waterfall at Piute Farms may provide a rare opportunity to concentrate on removal of other nonnative fish while influx from the lake is eliminated. Continuing monitoring and removal in the lower river above the waterfall will aid in removal efforts being conducted further upstream, and suppress predation and competition impacts on the endangered and native fish community by nonnative fish in the lower San Juan River. In addition, we propose to continue to monitor and document the progress of Colorado pikeminnow and razorback sucker in the lower San Juan

River. Recapture data for juvenile Colorado pikeminnow collected during nonnative monitoring will serve in determining population size, growth and movement of these fish in the lower San Juan River.

Description of Study Area

The study area for this project includes the San Juan River from Mexican Hat (RM 53) to Clay Hills (RM 2.9), Utah. The river from Mexican Hat to RM 16 is part of Geomorphic Reach 2 and is primarily bedrock confined and dominated by riffle-type habitat. River mile 16 down to Clay Hills contains Geomorphic Reach 1 where the river is canyon bound with an active alluvial bed. Habitats within this section are heavily influenced by the shifting thalweg, changing river flow, and reservoir elevations. This section of river has been identified as important nursery habitat for native and endangered fish species.

Objectives

1.) Continue mechanical removal and monitoring of large-bodied nonnative species in the lower portion of the San Juan River from Mexican Hat to Clay Hills.

2.) Generate a population estimate of channel catfish by mark-recapture data from Mexican Hat to Clay Hills.

3.) Monitor distribution and abundance of endangered fish in the lower San Juan River.

4.) Generate a population estimate of juvenile Colorado pikeminnow (>150 mm) by mark-recapture data from Mexican Hat to Clay Hills.

Methods/Approach:

Mechanical removal of nonnative species will be conducted from Mexican Hat to Clay Hills, Utah. Sampling effort will be conducted via two raft mounted electrofishing boats. The entire study area will be electrofished in a downstream fashion with one boat on each shoreline. Each boat will have one netter and one rower. A third boat will follow behind to pick up nonnative fish missed by the electrofishing boats. These fish will not be included in catch rate calculations, so that comparisons can be made between trips and years. Nine five-day trips with 6 people are anticipated, and timing of sampling will be dependent on catch rate from past data. Bimonthly trips will be conducted, which will likely translate into every other week sampling from March through August. Data from the adult fall monitoring conducted by U.S. Fish and Wildlife Service- Grand Junction in October will be incorporated into data analysis. In an average water year, this schedule would allow for sampling a variety of habitat conditions, including variable flows, temperatures, and turbidity.

All nonnative fish collected will be identified, enumerated, measured to the nearest mm for total and standard length, weighed to the nearest gram, and removed from the river. Gender and reproductive status of lacustrine species will be determined and approximate location of capture by river mile recorded. Stomach contents of lacustrine species will be examined. Contents needing microscopic identification will be preserved. Any threatened and/or endangered fish encountered will be collected, identified, enumerated, measured to the nearest mm for total and standard length, weighed to the nearest gram, and scanned for a PIT tag. If a PIT tag is not present, one will be inserted. General condition of the fish will be recorded in addition to any parasites or abnormalities. All threatened and endangered fish collected will be returned to the river at the location in which they were caught. River mile and GPS coordinates will be recorded at the location in which threatened and endangered fish are collected. Catch rates for all fish will be calculated as number of fish caught per hour. Other native fish will not be netted.

Channel catfish collected during the first trip of the year will receive a floy tag and be returned to the river. Channel catfish collected on subsequent trips will be removed from the river. A Lincoln-Peterson population estimate will be generated for channel catfish captured during the first pass and recaptured in the second pass. Captures of channel catfish during subsequent trips will allow us to monitor ratios of

marked to unmarked fish and use these ratios to calculate a rough population estimate thereafter. Ratios of marked fish to unmarked fish will help determine if assumptions of a closed population are being met.

Population estimates will be generated for juvenile Colorado pikeminnow (>150 mm) in the lower San Juan River using closed population models within program CAPTURE. Program CAPTURE will be used to determine confidence intervals around the estimate, the coefficient of variation, and the probability of capture. Population estimates between two passes will be calculated using the Lincoln-Peterson model. Conducting several trips in the lower San Juan River will allow for choosing the "mark" pass and the number of "recapture" passes. Use of different mark and recapture passes will allow for testing of the reality of the results generated. Furthermore, using several combinations of trips will allow for lessening the likelihood of violating assumptions of the models used.

General water quality parameters will be recorded including temperature, conductivity, salinity, and dissolved oxygen. Daily river discharge, temperature and turbidity will be compared to catch rates for striped bass to determine the relationship between river conditions and movement of these fish upstream.

Costs for other cooperating agencies that may provide personnel and equipment as needed are included in this budget.

Products/Schedule

A draft report for the Nonnative Species Monitoring and Control in the Lower San Juan River activities will be prepared and distributed to the San Juan River Biology Committee for review by 31 March 2013. Historical information on nonnative fish species use of the lower San Juan River will be included; to the extent it is available. Upon receipt of written comments, that report will be finalized and forwarded to members of the San Juan River Biology Committee 1 June 2013. Electronic copies of the field and collection data will be transferred to the San Juan River database manager following the successful protocol previously employed.

Literature Cited:

Bennet, G.W., 1971. Management of lakes and ponds, 2nd edition. Van Nostrand Rienhold, New York.

Brandenburg, H.W., M.A. Farrington, S.J. Gottlieb. 2003. Razorback sucker larval fish survey in the San Juan River during 2002. Draft report to the San Juan River Basin Recovery Implementation Program. U.S. Fish and Wildlife Service, Albuquerque NM.

Brandenburg, H.W., M.A. Farrington, S.J. Gottlieb. 2004. Razorback sucker larval fish survey in the San Juan River during 2003. Draft report to the San Juan River Basin Recovery Implementation Program. U.S. Fish and Wildlife Service, Albuquerque NM.

Brandenburg, W.H., M.A. Farrington, S.J. Gottlieb. 2005. San Juan River 2004 Colorado pikeminnow and razorback sucker larval surveys. Draft Report. San Juan River Basin Recovery Implementation Program, USFWS, Albuquerque, NM

Brooks, J.E., M.J. Buntjer, J.R. Smith. 2000. Non-native species interactions: Management implications to aid in the recovery of the Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyruachen texanus*) in the San Juan River, CO-NM-UT. U. S. Fish and Wildlife Service, Albuquerque, NM..

Cooper, E.L. ed. 1987. Carp in North America. American Fisheries Society. Maryland, Bethesda

Davis, J.E. 2005. Non-native species monitoring and control in the Upper San Juan River, New Mexico 2004. Progress Report for the San Juan River Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, NM.

Elverud, D.S. 2009. In press. Nonnative Species Control in the Lower San Juan River (Draft Report). Progress Report for the San Juan River Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, NM.

Golden, M.E., P.B. Holden, S.K. Dahle. 2005. Retention, Growth, and Habitat Use of Stocked Colorado Pikeminnow in the San Juan River: 2002-2003 Draft Annual Report for the San Juan River Basin Recovery Implementation Program. U. S. Fish and Wildlife Service, Albuquerque NM.

Jackson, J.A. 2003. Nonnative control in the lower San Juan River, 2002. Interim Progress Report for the San Juan River Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, NM.

Jackson, J.A. 2005. Nonnative control in the lower San Juan River, 2004. Draft Progress Report for the San Juan River Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, NM.

Marsh, P.C. and J.E. Brooks.1989. Predation by ictalurid catfishes as a deterrent to re-establishment of hatchery-reared razorback suckers. Southwestern Naturalist 34(2):188-195.

McAda, C.W.1983. Colorado squawfish, *Ptychocheilus lucius* (Cyprinidae), with a channel catfish, *Ictalurus punctatus* (Ictaluridae), lodged in its throat. Southwestern Naturalist 28(1):119-120.

McHugh, J.L. 1984. Industrial fisheries, pages 68-80 in R.T. Barber, C.N.K. Mooers, M.J. Bowman, and B. Zeitschel, editors. Lecture notes on coastal and estuarine studies. Springer-Verlag, New York.

Pitlo, J.Jr. 1997. Response of upper Mississippi River channel catfish populations to changes in commercial harvest regulations. North American Journal of Fisheries Management 17: 848-859.

Ryden, D. W. 2001. Long term monitoring of sub-adult and adult large-bodied fishes in the San Juan River, 2000. Interim Progress Report. U.S. Fish and Wildlife Service. Grand Junction, CO. 61 pp.

Ryden, D. W. 2003. Long term monitoring of sub-adult and adult large-bodied fishes in the San Juan River: 1999-2001 Integration Report. U.S. Fish and Wildlife Service. Grand Junction, CO. 68 pp.

Ryden, D. W. 2005. Long term monitoring of sub-adult and adult large-bodied fishes in the San Juan River, 2004. Interim Progress Report. U.S. Fish and Wildlife Service. Grand Junction, CO.

Ryden, D. W. and J.R. Smith. 2002. Colorado pikeminnow with a channel catfish lodged in its throat in the San Juan River, Utah. Southwestern Naturalist 47:92-94.

Budget FY-2012:

Personnel / Labor Costs (State Salary + Benefits)

Lead Biologist @ $265/day for 152 man days total 82 field days (planning and organization, logistics, electrofishing) 70 other days (coordination, data entry, data analysis, administrative support, meeting attendance	$40,280
Technicians @ $185/day for 260 man days total preparation for field trips, equipment and gear maintenance, electrofishing	$48,100
Project Leader @ $290/day for 20 man days total office and administrative support, review of reports, logistical support,meeting attendance, electrofishing	$ 6,4600
Personnel / Labor Costs Subtotal	**$94,840**

Travel and Per Diem

Mileage: Mexican Hat to Clay Hills trips-340 mi @ $.49 per mi for 9 trips	$ 3,165
Shuttle of three vehicles @ $425 per trip (9 trips)	$ 3,825
Vehicle rent (1 x 6 x $250/month)	$ 1,500
Per Diem: Camping rate- Mexican Hat to Clay Hills- 6 people @ $20 per day for 45 days	$ 5,400
Hotel rate- Out-of-state per diem @ $43 x 10 days	$ 430
Hotel Costs 4 meetings per year ($70.00/night for 8 nights)	$ 560
Travel and Per Diem Subtotal	**$14,880**

Equipment Maintenance, Repair and Replacement

	Unit Price	$ Total
Fuel for generators (30 gal/trip x 9 trips = 270 gallons)	$3.50/gallon	$ 945
Wiring replacement for electrofishing systems		$ 100
Repair of electrofishing frame (aluminum welding)		$ 300
Replacement of electrofishing equipment		
Dip nets	$200	$ 200
Foot switch	$200	$ 200
Life jackets	$100	$ 300
First aid supplies	$ 80	$ 80
Waders	$100	$ 200

Data collection supplies		
Paper, pencils, binders, stapes, etc.		$ 136
Measuring boards		$ 100
Spring scales	$ 40	$ 200
Plungers, needles, alcohol for PIT tags		$ 50
Floy tags for marking catfish ($600 per thousand tags/1500 per year)		$ 900
Tools		$ 100
Repair of GPS units		$ 50
Satellite phone charges ($ 33.50/month for 6 months)		$ 201
Repair of GPP		$ 500
Repair of generators		$ 500
Repair of trailers (bearings, tires, lights, tire repair)		$ 1000
Repair and replacement of rafting supplies		
Oarlocks	$ 30	$ 60
Oars	$200	$ 400
River straps	$ 5	$ 125
Pumps	$150	$ 150
Raft repair (valves, d-rings, glue, patches)		$ 100
Carabiners	$ 10	$ 100
Throw bags	$ 50	$ 100
Maintenance of generators (oil, sparks plugs, batteries)		$ 200
Camping Equipment		
Tables	$ 40	$ 40
Tents	$200	$ 200
Drybags	$ 50	$ 200
Cookware		$ 50
Chairs	$ 20	$ 20
Batteries		$ 100
Toilet supplies		$ 100
Charcoal	$ 10	$ 50
Cleaners		$ 50
Food storage boxes		$ 40
Propane		$ 100
Groover disposal		$ 50
Equipment Maintenance, Repair, and Replacement Subtotal		**$ 8,297**
Subtotal of labor, travel, equipment, etc		**$118,017**
Administrative Overhead (18%)		
18% of personnel cost for Salt Lake Office administration indirect cost, building operation costs for Moab Field Station (electricity, phone and computer lines, rent, etc.)		$ 21,243
UDWR TOTAL		**$ 139,260**

Funding for Participating Agencies

New Mexico Game and Fish- Santa Fe Biologist (2 trips, 1 person includes salaries and associated costs)	$ 5,790
Navajo Nation Dept. of Fish and Wildlife (2 trips, 2 people includes salaries and associated costs)	$ 9,124
U.S. Fish and Wildlife Service- Grand Junction Biologist (2 trips, 2 people includes salaries and associated costs)	$17,305
GRAND TOTAL	***$ 171,479***

Nonnative Species Control and Rare Fish Monitoring in the Lower San Juan River
Fiscal Year 2012 Project Proposal

Principal Investigators: Darek Elverud
Utah Division of Wildlife Resources, Moab Field Station
1165 S. Hwy 191 – Suite 4, Moab, Utah 84532
(435) 259-3782
darekelverud@utah.gov

Under the heading "Funding for participation of other agencies." Costs for participation of the New Mexico Game and Fish in FY-2012.

Personnel/Labor Costs (Salary, Benefits, Admin)

Fishery Biologist – 12 days @ $350/day (1 person x 6 days per trip x 2 trips)	$	4,210

Travel and Per Diem

($85 per day per person – 1 person - 6 days per trip x 2 trips)	$	1,020

Equipment

Vehicle & Gasoline ($0.40/mile) (700 miles round trip x 2 trips)	$	560

Total	$	5,790

Nonnative Species Control and Rare Fish Monitoring in the Lower San Juan River
Fiscal Year 2012 Project Proposal

Principal Investigators: Darek Elverud
Utah Division of Wildlife Resources, Moab Field Station
1165 S. Hwy 191 – Suite 4, Moab, Utah 84532
(435) 259-3782
darekelverud@utah.gov

Under the heading "Funding for participation of other agencies." Costs for participation of the Navajo Nation Department of Fish and Wildlife, in FY-2012.

Personnel/Labor Costs (Salary + Benefits)

Fish Biologist – 14 days @ $154.16/day (1 person x 7 days x 2 trips)		$2,158.24
Biological Technician – 14 days @ $84.40/day (1 person x 7 days x 2 trips)		$1,181.60
	Sub-Total	$3,339.84
Fringe Benefits $3,339.84 X 42.48% =		$1,418.76
	Total Personnel/Labor	**$4,758.60**

Travel and Per Diem

Hotel Costs – 4 nights (1 night x 2 rooms x 2 trips @ $70/night; Bluff, UT)	$ 280
Camping Costs – 20 nights @ $29/night (5 nights x 2 people x 2 trips) e.g., food, tents, dry-bags, sleeping gear, etc	$ 580
Vehicle Lease/Maintenance & Gasoline Lease @ $454/month + 2 trips X 260 miles X .30/mi = $156 (260 miles round trip from Farmington, NM to Blanding, UT x 2 trips)	$ 610
Total Travel/Per Diem	**$ 1,470**

Equipment

Equipment Maintenance, Repair, & Replacement (e.g., life jackets, hip boots, generator repair, rubber gloves, dip nets, aluminum welding, raft repair, etc.)	$ 1,500
Total Equipment	**$ 1,500**

Navajo Nation Fish and Wildlife Total	**$7,728.60**
Navajo Fish and Wildlife Administrative Overhead (18.05%)	**$1,395.01**
Navajo Nation Total	**$9,123.61**

Non-native Species Control in the *Lower* San Juan River
Fiscal Year 2012 Project Proposal
17 August 2011

Principal Investigator: Darek Elverud
Utah Division of Wildlife Resources, Moab Field Station
1165 S. Hwy 191- Suite 4, Moab, Utah 84532
(435) 259-3782
darekelverud@utah.gov

FY-2012: Costs for participation of the U.S. Fish Wildlife Service, Colorado River Fishery Project (USFWS-CRFP) office, Grand Junction, CO.

Personnel/Labor Costs (Federal Salary + Benefits)	
Principal Biologist (GS-11) – 80 hours @ $42.91/hr	$ 3,433.00
(1 person X 5 days/trip X 2 trips)	
Bio. Tech. Crew Leader (GS-6) – 80 hours @ $24.70/hr	$ 1,976.00
(1 people X 5 days/trip X 2 trips)	
Biological Technician (GS-5) – 80 hours @ $17.45/hr	$ 1,396.00
(1 people X 5 days/trip X 2 trips)	
Sub Total	$ 6,805.00
Administrative Support (Federal Salary + Benefits)	
Administrative Officer (GS-9) – 23 hours @ $39.63/hr	$ 911.50
Asst. Project Leader (GS-13) -- 17 hours @ $61.38/hr	$ 1,043.50
Project Leader (GS-14) – 13 hours @ $74.16/hr	$ 933.00
Sub Total	$ 2,888.00
Travel and Per Diem (Based on Published FY-2011 Federal Per Diem Rates)	
Hotel Costs – 6 nights	$ 462.00
(6 nights @ $77/night – single occupancy = $420)	
Per Diem (Hotel Rate) - 6 days @ $46/day	$ 276.00
Per Diem (Camping Rate) 30 days @ $28/day	$ 840.00
Sub Total	$ 1,578.00
Equipment	
Vehicle Maintenance & Gasoline (GSA lease = $334 + $0.30/mile/truck/trip)	
(700 miles round trip from Grand Junction, CO to	
Clay Hills, UT X 2 trips)	$ 1,089.00
Generator Gasoline for Electrofishing	
(20 gallons/trip X 2 trips @ $4.00/gallon)	$ 160.00
Equipment Maintenance, Repair, & Replacement	
(e.g., spark plugs and oil for electrofishing generator,	
generator repair, life jackets, hip boots, rubber gloves,	
dip nets, aluminum welding, raft repair, etc.)	$ 1,665.00
Cost of purchasing a new 4-wheeel drive pick-up to be used for	
San Juan field work. Cost to be spread across four separate	
San Juan workplans.	$ 1,405.00
Sub Total	$ 4,319.00
USFWS-CRFP (Grand Junction, CO) Total	$ 15,590.00
USFWS Region 6 Administrative Overhead (11.00%)	$ 1,715.00
USFWS Region 6 Total	$ 17,305.00

Sub-Adult & Adult Large-Bodied Fish Community Monitoring
(a.k.a. Adult Monitoring)
Fiscal Year 2012 Project Proposal
17 August 2011

Principal Investigators: Dale Ryden and Travis Francis
U. S. Fish and Wildlife Service, Colorado River Fishery Project
764 Horizon Drive, Building B
Grand Junction, Colorado 81506
(970) 245-9319
dale_ryden@fws.gov
travis_francis@fws.gov

Background

Studies performed before 1991 documented a native San Juan River fish fauna of eight species, including Colorado pikeminnow (previously known as Colorado squawfish), razorback sucker, and roundtail chub and provided baseline information on distribution and abundance of native and introduced fish species in the San Juan River. These studies indicated that at least one of the two endangered fish species (i.e., Colorado pikeminnow) was still a viable member of the San Juan River fish community.

Between 1991 and 1998, the Main Channel Fish Community Monitoring study (called "Adult Monitoring" for short), greatly refined our understanding of the San Juan River fish community. The main sampling technique employed during the 1991-1997 Adult Monitoring study was raft-borne electrofishing, although radio telemetry was also heavily employed. Data collected during the 1991-1997 Adult Monitoring study provided information on specific habitat usage by rare fish species. In addition, data gathered during the 1991-1997 Adult Monitoring study aided in the selection of specific sites for detailed hydrologic measurements and larval drift sampling. Integration of 1991-1997 Adult Monitoring data along with data from Colorado pikeminnow macrohabitat studies, razorback sucker experimental stocking studies, tributary and secondary channel studies, fish health studies, contaminants studies, habitat mapping studies, and non-native species interaction studies, helped provide a logical framework upon which to make flow recommendations for the reoperation of Navajo Reservoir that would benefit the San Juan River's endangered fishes (as well as other members of the native fish community).

The Sub-Adult & Adult Large-Bodied Fish Community Monitoring study (also referred to as Adult Monitoring), which began in 1999, is a direct offshoot of the 1991-1997 Adult Monitoring study. This study is one of a suite of long-term monitoring efforts detailed in the San Juan River Recovery Implementation Program's (SJRIP) Comprehensive Monitoring Plan (SJRIP 2010) that are designed to help evaluate progress of the two endangered fish species towards recovery under the SJRIP's Long Range Plan (SJRIP 2009). The current Adult Monitoring study incorporates essentially the same monitoring protocols as did its 1991-1997 precursor study (e.g., sampling via raft-borne electrofishing). This allows for data collected during the current Adult Monitoring study to be validly combined with and compared to the older 1991-1997 Adult Monitoring data. The combination of these two data sets provides statistically-powerful, long-term trend data through which the SJRIP's Biology Committee can view changes in the San Juan River's large-bodied fish community over time. This long-term trend data allows the SJRIP Biology Committee to evaluate whether various management actions being implemented are having the desired effects on the San Juan River fish community. In addition, Adult Monitoring has proven to be an effective tool for monitoring populations of both stocked razorback sucker and Colorado pikeminnow.

Relationship to the Recovery Program

Adult Monitoring provides data for or makes possible (at least in part) the following actions under element numbers 1-5 of the Long Range Plan (SJRIP 2009): 1.1.1.1, 1.1.1.3, 1.1.4.3, 1.2.1.1, 1.2.3.1, 2.2.5.1, 2.2.5.2, 3.2.1.2, 4.1.1.4, 4.1.1.8, 4.1.1.9, 5.1.1.2, 5.1.2.3, 5.1.2.4, 5.1.2.5, and 5.1.4.1. The Comprehensive Monitoring Plan is currently undergoing revision. However, the monitoring protocols discussed in the Methods section of this report reflect those that are currently included in the latest draft of the revised Comprehensive Monitoring Plan (SJRIP 2010).

Description of Study Area

As per the latest draft of the Comprehensive Monitoring Plan (USFWS 2010) the study area for Adult Monitoring extends from river mile (RM) 180.0 (just downstream of the Animas River confluence) in Farmington, New Mexico, downstream to RM 76.4 (Sand Island boat launch) just downstream of Bluff, UT.

Objectives

1) Annually, during autumn, document fish community structure, species abundance (presented as catch/time, CPUE) and distribution, and size structure among populations of both native and nonnative large-bodied fishes in San Juan River. Specific emphasis shall be placed upon monitoring the population parameters among the rare San Juan River fish species -- Colorado pikeminnow, razorback sucker, and roundtail chub (both wild and stocked fish).

2) Obtain data that will aid in the evaluation of the responses (e.g., year-to-year survival, reproduction, recruitment, growth, and condition factor) of both native and nonnative large-bodied fishes to management actions.

3) Continue to perform activities that support other studies and recovery actions being implemented by the SJRIP. For example:
    a. Remove nonnative fish species which prey upon and may compete with native fish species in the San Juan River.
    b. Collect GPS waypoints in habitats where endangered Colorado pikeminnow and razorback sucker are collected.
    c. Collect tissue samples from various fish species for stable isotope, genetics, and contaminants studies.

Through the handling of large numbers of fish for other study objectives and because of its long-term dataset, Adult Monitoring provides chances to opportunistically observe and monitor other information on the San Juan River's large-bodied fish community. This includes, but is not limited to: 1) the incidence of disease and abnormalities among fish populations; 2) the distribution and abundance of nonnative white sucker and the rate of hybridization between this species and native sucker species; 3) hybridization rates among native sucker species, specifically the endangered razorback sucker and flannelmouth sucker; 4) negative interactions between channel catfish and native fish species, specifically endangered Colorado pikeminnow and razorback sucker; and, 5) documenting episodic events, such as the invasion of the San Juan River by fish species from Lake Powell or collecting rare but potentially important fish species, such as grass carp.

Methods

Objectives 1-3: One Adult Monitoring trip will take place in the fall of 2012. This trip will sample from near the Animas River confluence in New Mexico (RM 180.0) to Sand Island boat

launch, just downstream of Bluff, UT (RM 76.4). Raft-borne electrofishing will be the primary sampling technique. Sampling will begin in the second to third week of September and will be concluded by the second to third week of October.

Electrofishing will follow the methods set forth above and in the Comprehensive Monitoring Plan (SJRIP 2010). Two oar-powered rafts, with one netter each, will electrofish in a continuous downstream fashion, with one raft on each shoreline. Netters will net all stunned fish that can possibly be collected, regardless of species or body size. Trailing or "chase" rafts will not be used to collect fish. No outboard motors will be used. Sampling crews will consist of approximately 8-10 people (4 for electrofishing, 2-3 for baggage rafts, and 2-3 for other research elements that are being done simultaneously with our sampling). Electrofishing will sample two out of every three miles (approximately 70 total sampled miles). All fish collected will be enumerated by species and life stage at the end of every sampled mile. Every fourth sampled mile (known as a "designated mile" or DM), all fish collected will be weighed and measured. All native fish collected will be returned alive to the river. All nonnative fish collected will be removed from the river. All nonnative predatory fishes (e.g. - walleye, striped bass, largemouth bass, smallmouth bass) collected will be weighed and measured, and may have stomach samples taken, before being removed from the river. Tag numbers, total length, and weight will be recorded on all recaptured, FLOY-tagged fish (both native and nonnative), as well as any rare fish collected. Colorado pikeminnow, razorback sucker, and roundtail chub greater than 200 mm TL will be implanted with 134 kHz PIT (Passive Integrated Transponder) tags. Notes will be kept on any parasites and/or abnormalities observed on collected fishes.

The U.S. Fish and Wildlife Service (USFWS) will assume the lead responsibility for Adult Monitoring trips and other cooperating agencies will provide personnel and equipment as needed. Costs for cooperating agencies are included in this budget.

Products

An interim progress report for Adult Monitoring data collected during 2012 is scheduled to be available by 31 March 2013. The final version of this interim progress report which incorporates comments received, is scheduled to be completed by 1 June 2013. Data files containing PIT tag information on the federally-listed endangered fish species (Colorado pikeminnow and razorback sucker) collected during this Adult Monitoring trip will be submitted for inclusion in the SJRIP's integrated database by 31 December 2012. Data files containing the remainder of the information (e.g., data on common fish species) collected during this Adult Monitoring trip will be submitted for inclusion in the SJRIP's integrated database by 31 March 2013.

Qualifications of Personnel Included in the Budget

Principal Biologist (GS-12) -- Dale Ryden, USFWS-CRFP

Dale has 20 years experience performing fisheries research and management in the Colorado, Gunnison and San Juan rivers. For the last 19 years, Dale has been the principal fish biologist for Region 6 of the USFWS in charge of performing fisheries research and management associated with the San Juan River Recovery Implementation Program (SJRIP). During his involvement with the SJRIP, Dale's responsibilities have ranged across a number of areas including: 1) initial reintroduction efforts for razorback sucker in the mainstem San Juan River; 2) long-term augmentation and monitoring of the San Juan River's two endangered fish populations; 3) annually monitoring the riverwide distribution and abundance of the entire large-bodied fish community in the San Juan River; 4) determining habitat use and preference and locating spawning areas of stocked razorback sucker and both stocked and wild Colorado pikeminnow via radio-telemetry; and, 5) performing and analyzing the effects of nonnative fish removal operations. Dale has authored two peer-reviewed journal articles on his work in the San Juan River basin, as well as over 30 agency reports, and numerous augmentation plans and addendums. He co-authored a genetics management plan for the endangered Colorado

pikeminnow and razorback sucker in the San Juan River and has been a contributing author to both the flow recommendations report for the reoperation of Navajo Reservoir and the long-term monitoring protocols document currently being used by the SJRIP. During the development of the flow recommendations document, Dale acted as the chairman for the Native Fishes Workgroup. He is the current representative to the San Juan River Biology Committee for Region 6 of the USFWS.

Principal Biologist (GS-11) – Travis Francis, USFWS-CRFP
Travis has 10 years experience performing fisheries research and management in the Colorado, Gunnison and San Juan rivers. For the last 9 years, Travis has been a fish biologist for Region 6 of the USFWS in charge of performing fisheries research and management associated with the Upper Colorado River Recovery Program (UCRRP). During his involvement with the UCRRP, Travis' responsibilities have ranged across a number of areas including: 1) Database manager for the upper basin 2) humpback chub population monitoring in Black Rocks on the Colorado River 3) razorback sucker propagation biologist at the 24 Rd. recirculation hatchery in Grand Junction Colorado and, 4) ran field crews for other projects associated with the UCCRP and San Juan River Basin Recovery Implementation Program (SJRIP). Travis has authored 14 annual agency reports and scopes of work. He authored Population Size and Structure of Humpback Chub, *Gila cypha* and Roundtail Chub, *G. robusta*, in Black Rocks, Colorado River, Colorado, 2007–2008, and an Overview of the Upper Colorado River Recovery Program propagation program with a preliminary assessment of survival of stocked fish in the rivers of the Upper Colorado River Basin. He has served as a member on the UCRRP bonytail ad hoc committee and propagation committee. He is the current alternate representative to the San Juan River Biology Committee for Region 6 of the USFWS.

Biological Technicians (GS-6 and GS-5) – USFWS-CRFP
All have at least a BS degree in biology. Depending upon the individual, they have from 2-3 years experience performing fisheries research and management in the Colorado River Basin. Most have at least one year of experience performing fisheries research and management on the San Juan River. The GS-6 Crew Leader has three years experience performing fisheries research and management on the San Juan River.

Projected Duration Of Project
The Adult Monitoring study began in 1991 (see Introduction for details). It has continued, annually, with a consistent sampling regime every year since that time. This has allowed for the compilation of one of the longest-running and most statistically powerful fisheries databases available to the SJRIP. The Adult Monitoring study was modified with just very slight changes (e.g., a reduction in sampling frequency from every RM to two out of every three RM's) when it was incorporated as an integral part of the long-term San Juan River Monitoring Plan and Protocols (Propst et al. 2000) and a second time (to sample only RM 180.0-76.4) with the development of the SJRIP's Comprehensive Monitoring Plan (SJRIP 2010). The suite of long-term monitoring studies are scheduled to run through the termination of the San Juan River Recovery Implementation Program.

Literature Cited
San Juan River Basin Recovery Implementation Program. 2009. Long-Range Plan. San Juan River Basin Recovery Implementation Program, U. S. Fish and Wildlife Service, Albuquerque, New Mexico.

San Juan River Basin Recovery Implementation Program. 2010. San Juan River Recovery Implementation Program Comprehensive Monitoring Plan (Draft dated 24 February 2010). San Juan River Basin Recovery Implementation Program, U. S. Fish and Wildlife Service, Albuquerque, New Mexico.

Fiscal Year 2012 Budget:

Personnel/Labor Costs (Federal Salary + Benefits)

Objectives 1-3: Logistics, Electrofishing, Removal of Nonnative Fish	
Principal Biologist (GS-11) – 192 hours @ $42.91/hr	$ 8,240.00
(1 person X 10 days planning & organization)	
(1 person X 4 days/trip X 1 trip – work from hotel)	
(1 person X 10 days/trip X 1 trip – camping)	
Biological Technicians (GS-6) - 112 hours @ $24.70/hr	$ 4,620.00
(1 person X 4 days/trip X 1 trip – work from hotel)	
(1 person X 10 days/trip X 1 trip – camping)	
(+ 50 hours overtime at $37.05/hr = $1852.00)	
Biological Technicians (GS-5) – 336 hours @ $17.45/hr	$ 9,790.00
(3 person X 4 days/trip X 1 trip – work from hotel)	
(3 person X 10 days/trip X 1 trip – camping)	
(+ 50 hours overtime each at $26.18/hr = $3,927.00)	
Sub Total	$ 22,650.00

Permitting; Coordination; Data Input, Analysis, Management & Presentation; Report Writing; Office & Administrative Support (Federal Salary + Benefits)

Administrative Officer (GS-9) – 123 hours @ $39.63/hr	$ 4,875.00
Principal Biologist (GS-11) – 326 hours @ $42.91/hr	$ 13,988.00
Asst. Project Leader (GS-13) – 320 hours @ $61.38/hr	$ 19,640.00
Project Leader (GS-14) – 45 hours @ $74.16/hr	$ 3,337.00
Sub Total	$ 41,840.00

Travel and Per Diem (Based on Published FY-2011 Federal Per Diem Rates)

Hotel Costs	
15 nights @ $77/night (in Farmington, NM)	$ 1,155.00
5 nights @ $105/night (in Cortez, CO)	$ 525.00
Per Diem (Hotel Rate)	
3 days X 5 people X $46/day (in Farmington, NM)	$ 690.00
1 days X 5 people X $51/day (in Cortez, CO)	$ 255.00
Per Diem (Camping Rate)	
10 days X 5 people X $28/day	$ 1,400.00
Sub Total	$ 4,025.00

Equipment and Supplies

Vehicle Maintenance & Lease (GSA lease = $334 + $0.30/mile/truck)	
(600 miles round trip from Grand Junction, CO to Farmington, NM + 350 miles of shuttling) X 2 vehicles – for working from hotel	$ 1,240.00
(425 miles round trip from Grand Junction, CO to Bluff, UT + 125 miles of shuttling) X 2 vehicles – for the camping portion	$ 1,000.00
Generator fuel (70 gallons X $4.00/gallon)	$ 280.00
Equipment Maintenance, Repair, & Replacement (e.g., dip nets, oar-blades, PIT tag gear, rafts, raft trailer, generators, electrofishing equipment, life jackets, camping equipment, etc.)	$ 3,000.00

Cost of purchasing a new 4-wheeel drive pick-up to be used for San Juan field work. Cost to be spread across four separate San Juan workplans.	$ 7,337.00
Sub Total	$ 12,857.00
USFWS-CRFP (Grand Junction, CO) Total	$ 81,372.00
USFWS Region 6 Administrative Overhead (11.00%)	$ 8,951.00
USFWS Region 6 Total	$ 90,323.00

Funding For Participation by Other Agencies: (These figures are submitted to USFWS-CRFP by the listed cooperating agencies)

USFWS-NMFWCO - Albuquerque, NM (Region 2)	
See Attached Budget For Line Item Breakdowns	$ 11,819.00
Utah Division of Wildlife Resources - Moab, UT	
See Attached Budget For Line Item Breakdowns	$ 2,672.00
	$ 14,491.00
FY-2012 WORKPLAN TOTAL	**$104,814.00**

Under the heading "Funding for participation of other agencies." Cost for participation of the U.S. Fish and Wildlife Service, New Mexico Fish and Wildlife Conservation Office, NM in FY-2012.

Personnel/Labor Costs (Federal Salary + Benefits)	
Fish Biologist (GS-9-1) – 12 days @ $270/day	$ 3,240
(1 person x 11 days x 1 trip; Hogback to Sand Island)	
Biological Science Tech (GS-8) – 14 days @ $328/day	$ 4,592
(1 person x 11 days x 1 trip; Hogback to Sand Island)	
(1 person x 3 days x 1 trip; Animas to Hogback Diversion)	
Administrative Officer (GS-9-8) – 1 day @ $296/day	$ 296
Sub Total	**$ 8,128**
Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)	
Hotel Costs – 2 nights	$ 172
(1 night x 2 rooms @ $86/night; Cortez, CO)	
Per Diem	
Camping Rate - 20 days @ $29/day	$ 580
(2 people x 10 days x 1 trip)	
Hotel Rate – 2 days @ $46.00/day	$ 92
Sub Total	**$ 672**
Equipment	
Vehicle Maintenance & Gasoline (@ $0.51/mile)	
(660 miles round trip from Albuquerque, NM to Blanding, UT + 100 miles shuttling)	$ 388
Equipment Maintenance, Repair, & Replacement	
(e.g., life jackets, hip boots, generator repair, rubber gloves, dip nets, aluminum welding, raft repair, etc.)	$ 500

Sub Total	**$ 888**
USFWS-NMFWCO (Albuquerque) Total	**$ 9,688**
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	**$ 2,131**
USFWS Region 2 Total	**$ 11,819**

Under the heading "Funding for participation of other agencies." Cost for participation of the Utah Division of Wildlife Resources, Moab Field Station (Moab, UT) in FY-2012.

Personnel/Labor Costs (State Salary + Benefits)		
Principal Biologist– 6 days @ $265/day	$	1,590
Travel and Per Diem (Based on Published FY-2011 State Per Diem Rates)		
Hotel Costs – 1 night	$	70
(1 night @ $70/night)		
Per Diem (Hotel Rate) - 1 day @ $43/day	$	43
(Camp Rate) - 4 days @ $20/day	$	80
Subtotal	$	193
Equipment		
Vehicle Maintenance & Gasoline (@ $0.49/mile)		
(412 miles round trip from Moab, UT to Cortez, CO to Clay Hills, UT)	$	181
Equipment Repair, & Replacement		
(e.g., life jackets, oars, boat patching material, etc)	$	300
Subtotal	$	481
UDWR- Moab Total	$	2,264
UDWR- Administrative Overhead (18%)	$	408
UDWR TOTAL	$	2,672

Small-Bodied Fishes Monitoring
Fiscal Year 2012 Statement of Work and Project Budget

Principal Investigators: Eliza Gilbert and Andrew Monié
Conservation Services Division
New Mexico Department of Game & Fish
One Wildlife Way, P.O. Box 25112
Santa Fe, New Mexico 87504
505-476-0853
eliza.gilbert@state.nm.us
andrew.monie@state.nm.us

Background

In 1991, the San Juan River Seven-Year Research Program was initiated. Subsequently, in 1992, the Research Program was placed under the auspices of the San Juan River Basin Recovery Implementation Program (SJRIP). The Research Program involved a variety of activities designed to characterize the status of the resident fish community (particularly the federally-protected Colorado pikeminnow *Ptychocheilus lucius* and razorback sucker *Xyrauchen texanus)*; to identify and quantify those factors (biotic and abiotic) that may be limiting protected fish species, as well as other native fish species; and to identify management and conservation activities that may contribute to recovery of protected species. Much of the research begun under the Seven-Year Research Program has been completed and a variety of management and conservation activities initiated.

To guide and provide a means of evaluating progress under the SJRIP, the Long Range Implementation Plan was drafted. It was designed to provide for "adaptive management" wherein research and particularly management or conservation activities were modified to reflect new information. To aid in the practice of adaptive management, the Long Range Plan also directed that "A long-term monitoring program be developed and implemented…" (Element 5). The SJRIP Monitoring Plan was initially implemented in 1999 based on protocols developed for specific life stages and abiotic factors (Propst et al. 2000). The monitoring protocols contained herein are the third revision to the monitoring plan and protocols.

The SJRIP has, as one of its two primary goals, the conservation of populations of Colorado pikeminnow and razorback sucker in the San Juan River basin. To aid in the evaluation of achievement of these Program goals, the following Monitoring Plan goals were developed.

1. Track the status and trends of endangered and other fish populations in the San Juan River.
2. Track changes in abiotic parameters, including water quality, channel morphology, and habitat, important to the fish community.
3. Use data collected under Goals 1 and 2 to help assess progress towards recovery of Colorado pikeminnow and razorback sucker.

Meeting these goals will be accomplished by achieving the following objectives. Objectives are listed as they relate to each of the three SJRIP Monitoring Plan goals.

1. Track the status and trends of endangered and other fish species populations in the San Juan River;
   a. characterize relative annual reproductive success of Colorado pikeminnow and razorback sucker and
   b. characterize population trends, including size-structure, of adult and juvenile fishes of the San Juan River.

2. Track changes in abiotic parameters, including channel morphology and habitat, important to the fish community;
   a. document changes in channel morphology and substrate composition,
   b. document trends in quantity of low-velocity habitat,
   c. document trends in habitat diversity and abundance, and
   d. correlate trends in habitat changes to hydrology and channel morphology.

3. Utilize data collected under Goals 1 and 2 to help determine progress towards recovery of the endangered fish species.
   a. produce annual summaries of monitoring results and
   b. provide detailed analyses of data collected to help determine progress towards endangered species recovery annually.

The San Juan River Monitoring Program is comprised of two major components (biotic and abiotic) and each of these is divided into several discrete monitoring activities, each with its specific protocol. Monitoring activities will focus on the reach of the San Juan River between its confluence with the Animas River (River Mile [RM] 180.6) and Clay Hills Crossing (RM 3.0).

The monitoring protocols detailed herein were developed from methodologies used during the Seven-Year Research effort. These methods were based upon published literature, the professional experience of each researcher, peer discussions and review, and project evaluations.

During the Seven-Year Research effort, methods were sometimes modified to meet the exigencies of the San Juan River, to incorporate new information and technologies, or to improve efficiency of data collection and quality of data collected. Modifications of methods were implemented after peer discussion and review. The justification(s) for and explanation of modifications were detailed in annual or project completion reports.

Small-Bodied Fishes Monitoring

Long Range Plan Task 4.1.2.2: Conduct juvenile and small-bodied fish studies to determine if young fish are surviving and recruiting and the areas and habitat used for rearing.

Small-Bodied Fishes Monitoring Goals

Quantitatively document effects of management actions (e.g., natural flow regime mimicry) on survival of post-larval early life stages of native and nonnative fishes and their recruitment into subsequent life stages and use this information to recommend appropriate modifications to recovery strategies for Colorado pikeminnow and razorback sucker in the San Juan River.

Small-Bodied Fishes Monitoring Objectives

1.Annually, during autumn, document occurrence and estimate density of native and nonnative small-bodied fishes in San Juan River.

2.Document primary channel shoreline and near-shoreline, secondary channel, and backwater mesohabitat use by age-0 Colorado pikeminnow, razorback sucker, and roundtail chub, as well as other native and nonnative fishes;

3.Obtain data that will aid in the evaluation of the responses (e.g., reproduction, recruitment, and growth) of native and nonnative fishes to different flow regimes and other management actions (e.g., impediment modification);

4.Document trends in species populations (e.g., abundance, relative condition, and size structure); and

5.Characterize patterns of mesohabitat use by native and nonnative small-bodied fishes (including age-0 Colorado pikeminnow, razorback sucker, flannelmouth sucker, bluehead sucker, common carp, and channel catfish).

Study Area

The study area for small-bodied fishes monitoring extends from River Mile 180.6 (Animas and San Juan rivers confluence, near Farmington, New Mexico) downstream to River Mile 2.9 (Clay Hills Crossing, Utah).

Methods

Small-bodied fishes monitoring is designed to sample efficiently and effectively those habitats having the greatest likelihood of supporting age-0 individuals of large-bodied species and all age classes of small-bodied species. During autumn of each year, primary shoreline and near-shoreline, secondary channel, and backwater habitats of the San Juan River will be sampled at 3-mile intervals from the Animas-San Juan rivers confluence (RM 180.6) to Sand Island (RM 76.4). At each sample location (except backwaters), all mesohabitats present (8 to 10) will be sampled with 3.0 x 1.2 m (3 mm mesh) seine. For backwaters, a minimum of two samples will be obtained; one seine haul will be made across backwater mouth and a second will be made parallel to its long axis. Additional seine hauls may be made if deemed appropriate by sampling crew. All specimens obtained from a mesohabitat will be identified; specimens of uncertain identity will be retained for later identification. After measurement (mm total length), all identified native fishes will be released. If a rare fish is collected, and it is of sufficient length (>150 mm TL), it will receive a uniquely numbered PIT tag. Total (mm TL) and standard (mm SL) lengths and mass (g) will be obtained from each rare fish captured. All nonnative specimens collected from a mesohabitat will be retained or destroyed. Fish data will be recorded by mesohabitat from each sampled area. Sampling effort will be reported as number of individuals captured per unit area. After fish

collection, area, depth, and cover of sampled mesohabitats will be determined. With 8 to 10 samples per site, a total of 280 to 350 primary channel, 160 to 200 secondary channel (assuming 20 side channels are present), and 20 backwater (assuming 10 backwaters are present) samples will be obtained each year.

Geographic coordinates (UTM Zone 12, NAD 83) for each site will be recorded. Basic water quality parameters (water temperature, dissolved oxygen, conductivity, specific conductance, and salinity) will be measured at each site.

The San Juan River between Sand Island (RM 76.4) and Clay Hills Crossing (RM 2.9) will be sampled every fifth year. Sampling procedures in these lower reaches will be the same as those between Animas-San Juan rivers confluence and Sand Island. This lower reach was sampled in 2010 and will be sampled again in 2015.

Annual reports will be primarily a summation of data obtained each year, a synthesis of data across years to document and assess species population responses to environmental variables (mainly discharge), a summary of mesohabitat associations of fishes, and basic characterizations of species demographics (population size and age structure, recruitment, and survival). Regression analysis and MANOVA will be used to characterize biological responses to discharge attributes (e.g., mean spring discharge, mean base summer discharge, and number days summer discharge less than 500 cfs) and ANOVA will be used to compare size structure of populations across reaches within a year and across years in a reach. In addition to annual narrative reports, all data collected will be recorded on electronic spreadsheets and provided to USFWS Program Office in a format determined by the database manager and principal investigator, by June 30 of the year following data collection.

FY 2012 Budget[1]

Field

Personnel

Project Leader (1)

Tasks - Annual monitoring primary channel, secondary channel, and backwater habitats, San Juan River, Farmington to Mexican Hat.

160 hrs	160 hrs
$39.90/hr (base salary) + $13.17 (benefits)	$53.067/hr
TOTAL PROJECT LEADER SALARY	

$8,490.72

Project Biologists (2)

Tasks—Annual monitoring primary channel, secondary channel, and backwater habitats, San Juan River, Farmington to Mexican Hat.

116 hrs ea[2]	232 hrs
$28.35.00/hr (base salary) + $9.36 (benefits)	$37.71/hr
TOTAL PROJECT BIOLOGISTS SALARY	

$8,748.72

Per Diem

12.5 days/project biologist	25 days
$85.00/day (standard NM in-state rate)	$85.00/day
TOTAL PER DIEM	$2,125.00

Travel

4 x 4 vehicles (2) 400 mi (round-trip Farmington) ea.	800 miles
75 mi/day x 5 days ea.	750 miles
500 mi (round-trip Mexican Hat) ea.	1000 miles
$0.32/mile (standard NM rate)	$0.40/mile
TOTAL VEHICLE	

$1,020.00

Field Equipment & Supplies

Seines (6) @ $50.00 ea	$300.00
Whirlpacks (500) @ $50.00/500	$ 50.00
Formalin (30 gal) @ $25/5gal	$150.00
TOTAL EQUIPMENT & SUPPLIES	$500.00

TOTAL FIELD

$20,180.44

Specimen Management

Personnel

Project Biologists (2)

Tasks—processing (sorting, identification, and data-entry) ca. 400 primary channel seining samples, 150 secondary channel seining samples, and 20 backwater seining samples. Since 2000, an annual average of 31,000 specimens (retained and released) have been processed.

320 hrs ea.	640 hrs
$28.35.00/hr (base salary) + $9.36 (benefits)	$37.71/hr
TOTAL SPECIMEN MGMT SALARY	$24134.40

Laboratory Supplies

Ethyl alcohol (50 gal) @ $450.00/50 gal	$450.00
Specimen containers (misc. vials & jars)	$500.00
TOTAL LABORATORY SUPPLIES	$950.00

TOTAL SPECIMEN MANAGEMENT **$25,084.40**

Data Synthesis and Report Preparation

Personnel

Project Leader (1)

Tasks—data analysis, data synthesis, report drafting (primary channel, secondary channel, backwater, and summary sections), report review, and report revision.

120 hrs	120 hrs
$39.90/hr (base salary) + $13.17 (benefits)	$53.067/hr
TOTAL PROJECT LEADER SALARY	

$6,367.68

Project Biologists (2)

Tasks—data management, data QA/QC, data analysis, data synthesis, table and graph preparation, report drafting (primary channel, secondary channel, and backwaters sections), and report revision.

200 hrs ea.	400 hrs
$28.35.00/hr (base salary) + $9.36 (benefits)	$37.71/hr
TOTAL PROJECT BIOLOGISTS SALARY	

$15,084.00

Secretary/Clerk

Tasks—time record keeping & reporting, billing, supply orders, and budget management.

40 hrs.	40 hrs
$21.00/hr (salary) + $6.93 (benefits)	$27.93/hr
TOTAL SECRETARY/CLERK SALARY	

$1117.20

TOTAL DATA SYNTHESIS & RPT PREPARATION
$22,568.88

Reviews and Meetings

Personnel

Project Biologists (1)

Tasks—attendance at 3 Biology Committee meeting annually (28 hrs. ea) and annual report review (excluding NMGF; 24 hrs).

108 hrs	108 hrs
$28.35.00/hr (base salary) + $9.36 (benefits)	$37.71/hr
TOTAL PROJECT BIOLOGIST SALARY	
$4,072.68	

Secretary/Clerk

Tasks—travel arrangements, etc.

20 hrs	20 hrs
$21.00/hr (salary) + $6.93 (benefits)	$27.93/hr
TOTAL SECRETARY/CLERK SALARY	$558.60

Per Diem

Project Biologists (1) (includes 3 Biology & 1 Coordination Committee meetings)

15 days @ $85.00/day (standard NM in-state rate)	$1,275.00
6 days @ $115.00/day (standard NM out-of-state rate)	$690.00
TOTAL PER DIEM	$ 1,965.00

Travel

Vehicle

5 Biology & Coordination Committee meetings (Farmington) @ 400 miles ea.

2000 miles @ $0.40/mile (standard NM rate)	$800.00

2 Biology & Coordination Committee meetings (Durango) @ 500 miles ea.

1000 miles @ $0.40/mile (standard NM rate)	$400.00
TOTAL VEHICLE	
$1,200.00	

TOTAL REVIEWS & MEETINGS	**$ 7,796.28**
TOTAL	**$ 75,834.00**
INDIRECT COSTS (10%)	**$ 7,583.00**
GRAND TOTAL	**$ 83,417.00**

[1]Budget does not include in-kind contributions of about $40,000 per year in salary and benefits, equipment, and some supplies. In-kind includes field time, data analyses and report preparation, and project administration.

[2]16 additional hours per biologist to cover overtime associated with field work

Funding History:

Fiscal Year 2000	$57,200
Fiscal Year 2001	51,700
Fiscal Year 2002	51,700
Fiscal Year 2003	49,775
Fiscal Year 2004	63,545
Fiscal Year 2005	72,645
Fiscal Year 2006	72,885
Fiscal Year 2007	$81,246
Fiscal Year 2008	$91,882
Fiscal Year 2009	$89,479
Fiscal Year 2010	$89,479
Fiscal Year 2011	$82,929
Fiscal Year 2012	**$-**

SAN JUAN RIVER LARVAL RAZORBACK SUCKER AND COLORADO PIKEMINNOW SURVEY FISCAL YEAR 2012 PROJECT PROPOSAL

Principal Investigators: W. Howard Brandenburg and Michael A. Farrington
American Southwest Ichthyological Researchers, L.L.C. (*ASIR*)
800 Encino Place NE
Albuquerque, New Mexico 87102-2606
505.247.9337 (voice) 505.247.2522 (facsimile)
howard_brandenburg@asirllc.com, michael_farrington@asirllc.com

and

Co-Principal Investigator: Andrew Monie
New Mexico Department of Game and Fish
Conservation Services Division
One Wildlife Way
Santa Fe, New Mexico 87505
505.476.8105
Andrew.Monie@state.nm.us

Razorback sucker project history:

The apparent absence of razorback sucker in the San Juan River drainage necessitated experimental stocking of adults (n=672) of this species in 1994 between Hogback, New Mexico, and Bluff, Utah. In their 1995 report of activities, Ryden and Pfeifer (1996) suggested that the majority of the 1994 experimentally stocked razorback sucker would achieve sexual maturity in 1996 and spawning by those individuals might begin a few years afterwards.

At the November 1996 San Juan River Basin Biology Committee integration meeting, it was suggested that the Colorado pikeminnow, *Ptychocheilus lucius*, larval fish drift study (= Passive Drift Netting Study; RM 127.5 and RM 53.3; July-August) be expanded in an attempt to document spawning of the stocked razorback sucker (presumed to be during April-May). In addition to temporal differences in spawning between Colorado pikeminnow and catostomids (suckers), researchers were attempting to document reproduction by hatchery reared razorback sucker whose spawning potential was unknown. Sampling for larval razorback sucker was to be conducted to determine if the stocked population of adult razorback sucker would spawn in this system. Conversely, data from the passive drift-netting study continued to document Colorado pikeminnow reproduction in the San Juan River and, because of this certainty, larval fish sampling efforts for this fish would (initially) be different than those for razorback sucker.

Numerous Upper Colorado River Basin researchers reported light-traps as one of the best means of collecting larval razorback sucker. Most of their light trapping efforts was concentrated in floodplain habitats during high spring flows. Light-trap sampling was employed during the first year (calendar year 1997) of the San Juan River larval razorback sucker survey. The lack of inundated floodplain habitats in the San Juan River, in comparison to the Upper Colorado River Basin, meant that the light-traps would have to be set in low velocity riverine habitats. The only previous San Juan River fish investigations that had employed light-traps were in 1994 and 1995 (conducted by the National Park Service) near the San Juan River-Lake Powell confluence. That sampling effort produced an extremely large number of larval fish (ca. 25,000) from a modest number of samples (n=20), of which over 99% were red shiner. Similar sampling in 1995 yielded 25,455 specimens in 47 light-traps samples and as in 1994, red shiner numerically dominated the catch. Both sampling efforts were conducted during July-August but neither Colorado pikeminnow nor razorback sucker was present in the 1994-1995 light-trap samples.

During the 1997 razorback sucker larval fish survey, light-traps were set nightly in low-velocity habitats between Aneth and Mexican Hat, Utah, from late March through mid-June. The traps were distributed at dusk and retrieved about four hours later. Fish taken in those samples were preserved in the field. Sampling success during the 1997 razorback sucker larval fish study was poor. While there were over 200 light-trap sets, those sampling efforts produced only 297 fish. Of those, about 200 (66%) were larval suckers (either flannelmouth sucker or bluehead sucker). Larval razorback sucker were not present in the 1997 sampling survey. While there were probably several factors to account for the poor light-trap catch rate, a principal factor was the limited access to suitable habitats. We determined that being limited to specific collecting sites was not the most efficient means of collecting large numbers of individuals; a prerequisite for this study.

In 1998 a new study design was developed to allow for the sampling of a greater portion of the San Juan River and the collection of a significantly larger number of larval fish throughout several river reaches. An inflatable raft was used to traverse the San Juan River and allowed us the opportunity to sample habitats that were either not formerly accessible or observable under the constraints of the previous sampling protocol. Six sampling forays were conducted at approximately bi-weekly intervals from 17 April to 6 June 1998 between the Four Corners drift station (RM 127.5) and Mexican Hat, Utah (RM 53.3). Both active (seining) and passive (light-traps) sampling techniques were used to collect larval fish. The primary sampling method was a fine mesh larval seine. If appropriate aquatic mesohabitats could be located, light-traps would be set adjacent to nightly campsites of the sampling crew.

The 1998 sampling protocol resulted in 183 collections containing over 13,000 specimens between river miles 127.5 and 53.3 with the majority of these individuals (n=9,960) being larval catostomids. This 43-fold increase in number of specimens, as compared with 1997, provided substantially better resolution of spawning periodicity of the catostomid community. In addition, the 1998 samples produced enough individuals for us to determine, with a high degree of confidence, if razorback sucker reproduction occurred in the San Juan River during that period. None of the aforementioned information was obtainable from 1997 light-trap samples. In 1998, two larval razorback sucker were collected providing verification of spawning by the hatchery reared stocked population.

The use of active sampling to determine the reproductive success of razorback sucker has proven to be effective. To date, the results of this investigation have provided thirteen consecutive years of unequivocal documentation of reproduction in the San Juan River by razorback sucker that have been stocked as part of the San Juan River Basin Recovery Implementation Program (Table 1). The data collected during the larval razorback sucker survey provide not only valuable data concerning the distribution (spatial and temporal), duration and magnitude of razorback sucker reproduction but also equally informative data on the reproductive efforts of other native catostomids in the San Juan River.

Table 1. Collection information of razorback sucker (Xyrtex) collected during the larval razorback sucker survey, 1998 – 2010.

Year	*Sampling method*	*Study Area (River Miles)*	*River Miles sampled*	*Percent change*	*Specimens collected*	*Xyrtex n=*
1998	Larval seine Light traps	127.5 – 53.3	74.2	na	13,608	2
1999	Larval seine Light traps	127.5 – 2.9	124.6	+ 40.4%	20,348	7
2000	Larval seine Light traps	127.5 – 2.9	124.6	na	11,473	129
2001	Larval seine Light traps	141.5 – 2.9	138.6	+ 10.1%	95,629	50
2002	Larval seine Light traps	141.5 – 2.9	138.6	na	56,164	813
2003	Larval seine Light traps	141.5 – 2.9	138.6	na	41,181	472
2004	Larval seine	141.5 – 2.9	138.6	na	14,648	41
2005	Larval seine	141.5 – 2.9	138.6	na	19,142	13
2006	Larval seine	141.5 – 2.9	138.6	na	25,127	202
2007	Larval seine	141.5 – 2.9	138.6	na	22,093	199
2008	Larval seine	141.5 – 2.9	138.6	na	23,599	126
2009	Larval seine	141.5 – 2.9	138.6	na	5,843	272
2010	Larval seine	141.5 – 2.9	138.6	na	23,385	1,251

Colorado pikeminnow project history:

Beginning in spring 1995, personnel from the Division of Fishes, Museum of Southwestern Biology (MSB), at the University of New Mexico assumed responsibility for the San Juan River larval fish passive drift-netting study. This project, formerly conducted by the Utah Division of Wildlife Resources, continued through 2001 with only minor changes in sampling protocol. Between 1995 and 2001, a total of four larval Colorado pikeminnow were collected using this sampling method at two different collecting locations (Four Corners, NM and Mexican Hat, UT).

The limited number of wild adult Colorado pikeminnow (versus stocked individuals) in the San Juan River was reflected in the extremely low catch rate of larval Colorado pikeminnow. Numerous adult and sub-adult Colorado pikeminnow have now been stocked into the San Juan River in an effort to augment the diminished wild population. The Colorado pikeminnow augmentation plan calls for continued

stocking efforts in the San Juan River over the next 10 years. The San Juan River Basin Biology Committee expects, as was documented with stocked razorback sucker, that reproduction among stocked Colorado pikeminnow will occur and can be documented through the sampling of larval fish.

As the number of adult (reproductively mature) Colorado pikeminnow in the San Juan River increases (due to both stocking and recruitment), so does the probability of elevated levels of spawning by this species. The San Juan River Basin Biology Committee began exploring the possibility of expanding the sampling effort for larval Colorado pikeminnow in fiscal year 2003. One means of accomplishing this task was to include an additional sampling site (increasing from two to three sites) for the passive drift-netting study. Another suggestion was to perform targeted sampling for Colorado pikeminnow similar to that performed for larval razorback sucker. In the case of the latter sampling effort, discussion regarding sampling that would target larval Colorado pikeminnow centered around expanding the duration of the current larval razorback sucker survey (April-June) or development of a discrete (new) project. These and other items were considered and evaluated during the February 2002 San Juan River Basin Biology Committee meeting. The Committee recommended the immediate expansion of the larval razorback sucker survey (April-June) to include the months of July, August, and September with seining efforts to target larval Colorado pikeminnow.

Beginning in July of 2002, using funds from FY 2002 that had been appropriated for use at the two larval drift-netting stations, Museum of Southwestern Biology (MSB) personnel began an active sampling regime that mirrored the sampling protocol successfully used in the larval razorback sucker survey. The results from the temporal expansion of the larval surveys have produced eleven wild larval Colorado pikeminnow to date. Larval Colorado pikeminnow were collected in surveys during 2004, 2007, 2009 and 2010 at nine discrete sites, within the study area. Between 1995 and 2010 the combined sampling methodologies (passive and active) resulted in the collection of fifteen larval Colorado pikeminnow. Back-calculated spawning dates, based on those fifteen individual larvae, range from 10 June to 18 July (Table 2) and are generally associated with the descending limb of spring run-off and mean river temperatures >18°C.

Over 671,000 fish have been collected between 1995 and 2010 under the larval Colorado pikeminnow survey. Of those, about 87% (N=583,407) were collected after 2001 when the sampling protocol switched from passive to active sampling (2002).

Project Modifications:

There have been numerous modifications to the field methodology of the larval fish survey over time as well as changes in reporting priorities, protocol, and format. The extent of the study area and aspects of the longitudinal sampling have been modified to improve spatial comparisons. The study area was expanded in 1999 and 2001 by a total of 46.5% (64.4 river miles) and now includes the downstream half of Reach 5 (Cudei, New Mexico) through Reach 1 (Clay Hills Crossing, Utah; a total of 138.6 miles of critical habitat sampled). Beginning in 2003, the entire study area was sampled in single uninterrupted trips (10-12 field days per trip) rather than in two temporally discrete sections as done in previous years (1998 – 2002). Since greater numbers of larval razorback sucker were collected (as well as detailed information regarding the native fish community), the SJRBRIP Biology Committee voted to elevate the larval fish surveys

Table 2. Summary of larval and YOY Colorado pikeminnow collected in the San Juan River during larval drift-netting/larval seining (1993-2010) and back-calculated dates of spawning.

Field Number	*MSB Catalog Number*	*N=*	*Total Length (mm)*	*Date Collected*	*Calculated Spawn Date*	*River Mile*	*Sample Method*

JPS95-205	26187	1	9.2	02 Aug 1995	15 Jul 1995	53.0	drift netting
JPS95-207	26191	1	9.0	03 Aug 1995	17 Jul 1995	53.0	drift netting
WHB96-037	29717	1	8.6	02 Aug 1996	18 Jul 1996	128.0	drift netting
FC01-054	50194	1	8.5	01 Aug 2001	17 Jul 2001	128.0	drift netting
MAF04-046	53090	1	14.2	22 Jul 2004	24 Jun 2004	46.3	larval seine
MAF04-059	53130	1	18.1	26 Jul 2004	25 Jun 2004	17.0	larval seine
MAF07-139	70144	1	14.9	25 Jul 2007	27 Jun 2007	107.7	larval seine
MAF07-157	70145	1	17.5	27 Jul 2007	27 Jun 2007	74.9	larval seine
WHB07-078	64032	1	15.6	25 Jul 2007	27 Jun 2007	33.7	larval seine
MAF09-072	74264	1	25.2	27 Jul 2009	10 Jun 2009	24.7	larval seine
MAF10-140	Not yet available	1	12.6	23 Jul 2010	27 Jun 2010	58.9	larval seine
WHB10-096	Not yet available	3	19.7-21.4	20 Jul 2010	15-18 Jun 2010	41.5	larval seine
WHB10-106	Not yet available	1	16.2	22 Jul 2010	23 Jun 2010	13.0	larval seine
TOTAL		**15**					

from an "experimental" project to a monitoring program. This change allowed for comparisons of catch per unit effort (CPUE) data with the programs designated river reaches and facilitated integration of the larval survey data with that of the other monitoring activities (i.e., small bodied fish, adult monitoring, habitat, etc).

Conducting the larval razorback sucker and Colorado pikeminnow surveys under this new protocol not only provided discrete reach information but also provided greater temporal resolution in respect to the longitudinal distribution of razorback sucker larvae and the ability to correlate potential environmental cues required by razorback sucker for spawning. These same advantages would also apply to Colorado pikeminnow however, to date, very few larval Colorado pikeminnow have been collected. Disadvantages to this top to bottom approach were that the duration of the monthly sampling trips (10-12 field days) made them more subject to abiotic fluctuations (floods, flow spikes). Large flood events reduce sampling efficiency as many low velocity habitats become flooded by rising water levels thereby transporting larval and early juvenile fish downstream. In addition, large flood events have necessitated premature termination of some survey runs, reducing the temporal resolution of the single-continuous pass effort. Annually, at least one trip (an average) had to be cut short due to large flood events or low water events in the lower canyon. The abbreviated trips were subsequently resumed once conditions improved (usually 1-2 weeks later). Additional costs were incurred because of the need to return to the field to complete the sampling effort for that month.

To reduces the variability of abiotic conditions as well as gain even greater temporal resolution of the longitudinal distribution of razorback sucker larvae, the protocol was modified to survey the upper and lower halves of the study area simultaneously. This effort began in 2007 and utilized two fully equipped

and autonomous crews (Table 3). In 2008, additional participation of our staff with other SJRBRIP projects made the new simultaneous sampling effort a necessity so that our staff could meet obligations to assist the other researchers with their work.

Beginning in 2009, larval fish specimens collected in the field were preserved in 95% ethanol (as opposed to 10% buffered formalin). This change in preservation technique assured that specimens could be used for a variety of purposes, (such as genetic analysis) that were not possible under the formalin preservation protocol. Beginning in 2011, the September sampling trip will be discontinued. The Biology Committee felt that the September survey did not provide enough data with respect to endangered fishes to warrant continuation.

Table 3. Summary of annual projects and project modifications of the larval fish surveys from 1997 to 2010.

Year	*Sampling method*	*Study Area (River Miles)*	*Specimens collected*	*Field modification*	*Laboratory modification*
1997	Light Trap Drift-nets	99 – 75	297		
1998	Larval Seine Light Trap Drift-nets	127.5 – 53.3	13,608	study area expanded; active sampling	
1999	Larval Seine Light Trap Drift-nets	127.5 – 2.9	20,348	study area expanded; upper-lower reaches sampled separately; nonsynchronous	
2000	Larval Seine Light Trap Drift-nets	127.5 – 2.9	20,348		
2001	Larval Seine Light Trap Drift-nets	141.5 – 2.9	95,629	study area expanded; upper-lower reaches sampled separately; nonsynchronous	
2002	Larval Seine Light Trap	141.5 – 2.9	138,601	study period expanded to September. Drift-nets no longer used.	
2003	Larval Seine Light Trap	141.5 – 2.9	112,842	upper-lower reaches sampled monthly in one uninterrupted trip (11-12 day runs)	CPUE data used for integration in reporting
2004	Larval Seine	141.5 – 2.9	160,292		Reports merged Trend data
2005	Larval Seine	141.5 – 2.9	109,368		
2006	Larval Seine	141.5 – 2.9	50,616		

2007	Larval Seine	141.5 – 2.9	53,084	Two rafts-two crews; upper-lower reaches samples synchronous	Analyzed catch with habitat data
2008	Larval Seine	141.5 – 2.9	40,855		
2009	Larval Seine	141.5 – 2.9	72,404	Specimens preserved in 95% ethanol	
2010	Larval Seine	141.5 – 2.9	70,610		

Objectives

This work is being conducted as required by the San Juan River Basin Recovery Implementation Program (Draft) Monitoring Plan and Protocol. The objectives of this specific monitoring effort are identified and listed below. Where applicable, these objectives are related to the specific tasks listed in the Long Range Plan set forth by the San Juan River Basin Recovery Implementation Program (SJRBRIP).

1) Determine if razorback sucker and Colorado pikeminnow reproduction occurred in the San Juan River and estimate the extent of annual reproduction. (Task 4.1.2.1)

2) Determine the spawning periodicity of Colorado pikeminnow and razorback sucker (utilizing back-calculated spawning and hatching formulas) between mid-April and August and examine potential correlations with temperature and discharge.

3) Document and track trends in the use of specific mesohabitat types by larval Colorado pikeminnow and razorback sucker. (Task 4.2.3.2)

4) Quantify attributes of habitats important to each life-stage of endangered fish (Task 4.2.2.1).

5) Collect catch rate statistics to estimate relative abundance of endangered fish populations. (Task 4.1.2.5)

6) Analyze and evaluate monitoring data and produce Annual Fish Monitoring Reports to ensure that the best sampling design and strategies are employed. (Task 4.1.1.2)

7) Provide detailed analysis of data collected to determine progress towards endangered species recovery in the San Juan River.

8) Document and provide a comparative analysis of the reproductive effort of the entire ichthyofaunal community. (Task 4.1.1.1)

Study Area

The study area encompasses the San Juan River between Cudei, New Mexico (RM 141.5) and the Clay Hills Crossing boat landing (RM 2.9) just above Lake Powell in Utah (138.6 river miles). As in all post 1999 sampling efforts, the study will include making collections in reaches of the San Juan River under the jurisdiction of the National Park Service.

Methods:

Field work

Sampling for Colorado pikeminnow and razorback sucker larvae will be conducted in the San Juan River between RM 141.5 and RM 2.9 from mid-April through mid-August using sampling techniques that will provide sufficient numbers of fish necessary to meet study objectives. Access to the river will be gained through the use of inflatable rafts equipped with all of the necessary equipment and provisions needed for trips of up to seven days. The study area will be divided into an "upper" section (Cudei, NM, to Sand Island, UT) and a "lower" section (Sand Island, UT, to Clay Hills crossing, UT). Separate field crews will launch simultaneously in each of the two sections and proceed through their designated study area. The vehicle and raft trailer used by the field crew working in the upper section will be left at the Cudei launch site and subsequently be shuttled to the Sand Island BLM ranger station, UT. The vehicle shuttle (with trailer) for the upper reach sampling effort has typically been performed gratis by personnel from the Farmington Office of the Bureau of Indian Affairs Office. Starting in 2008, this service was performed by personnel from the N.M. Fishery Resources Office stationed in Farmington. At this time, there is no charge for this service.

The sampling crew for the lower reach will launch from and store their vehicle and raft trailer at Sand Island, UT, where a commercial shuttle will take the vehicle to Clay Hills crossing, UT. The cost for this service is included under the travel and per diem section of our budget.

Because crews sampling the lower section of the study area will be in a high use recreational area, advance reservations are required. All trips for 2012 must be scheduled by late January 2012 and submitted to the Bureau of Land Management (BLM) Office at Monticello, Utah. Designated camping permits for our lower reach sampling crews will be obtained and must be strictly adhered to in addition to other BLM- San Juan River recreation Area regulations (i.e., low impact and pack-out policies). Low flow conditions often prevalent during the study period make several sections of the river more difficult to navigate (especially in the lower reach). Our field crews are required to render assistance to boaters stuck in rapids or otherwise in distress and report all such encounters to the appropriate BLM personnel.

Sampling efforts for larval fish will be concentrated in low velocity habitats and employ small mesh seines (1 m x 1 m x 0.8mm) to collect fish. Retained specimens will be placed in Whirl-paks containing 95% ethanol and a tag inscribed with unique alphanumeric code that is also recorded on the field data sheet. For seine samples, the lengths (to 0.1 m) of each seine haul and total number of hauls will be measures and recorded. Catch per unit effort for seine samples will be reported as the number of fish per 100 m^2.

Native species large enough to be positively identified will be measured (standard length) and returned to the river. Post-larval endangered fish species collected during this study will be photographed, a small portion of tissue from the fin clipped and retained in 95% EtOH (in the case of potential razorback sucker hybrids) and scanned with a FS2001 PIT tag reader for the presence of a PIT tag. Specimens of sufficient size but lacking a PIT tag will be injected with a tag following the protocols established by the program (Davis 2010). All PIT tag information will be recorded in the field data sheet and subsequently forwarded to the SJRBRIP for integration in the program's PIT tag database.

For each sampling locality, river mile will be determined to the nearest tenth of a mile using the San Juan River Basin Recovery Implementation Program 2009 Standardized Map Set. Universal Transverse Mercator (UTM) coordinates and zone will be determined with a Garmin Navigation Geographic Positioning System Instrument for each sampling locality. Mesohabitat type, length, maximum and minimum depths, water clarity (determined with a Secchi disc), and substrata will be recorded for each sampling locality. Multi-parameter water quality units will be used to determine the following water quality parameters at each site sampled: pH, temperature, salinity, conductivity, specific conductance, and dissolved oxygen. Both dissolved oxygen and pH will be recorded to a hundredth of a unit with all other

parameters recorded to a tenth of a unit. A minimum of one digital photo will also be taken of each specific habitat sampled.

StowAway Tidbit temperature loggers will be set to record water temperatures hourly and deployed at Four Corners bridge (river mile 119.2), in McElmo Creek (river mile 100.5), and at Clay Hills Crossing (river mile 2.9). The data from each temperature recorder will be downloaded monthly during the study period but remain in the river after completion of the annual study effort to record river water temperatures throughout the year.

Field Work, Safety

Personnel participating in field work are required to successfully complete an International Rescue Instructors Association (IRIA) level 2 swiftwater rescue class and American Red Cross CPR/AED training. Type III personal flotation devices (PFD's) will be worn by sampling personnel at all times while working. As PFD's lose flotation capacity due to UV exposure, compression of material, and oil and grit impregnation, and since each crewmember's PFD will be used for approximately 45 days per season, the PFD's will be annually replaced. Simms Guideweight Gore-Tex waders and boots will be issued to all personnel along with 3 mm neoprene gloves (necessary in April and May). In addition to personal camping gear and rain suits, all personnel will be required to provide and use wide brimmed hats, sunscreen, and sunglasses (provided at no cost to the program).

Both rafts used for this project will carry an extensively stocked first aid kit replete with items necessary for most minor medical situation. Additionally, the first aid kit will contain a suite of items (i.e., splints, neck braces, butterfly stitches, snakebite kits) needed to address more serious medical conditions. Because ethanol is used in the preservation of specimens, several vials of eyewash solution will be incorporated into each first aid kit. First aid kits will be inventoried after each sampling trip and used and/or expired items replaced. In the upper reach of the study area, personal cell phones and PDA's will be used (at no cost to the program) to contact outside parties should a medical situation arise. In the lower study area reach (canyon bound; where cell phones do not have service) a Iridium 9505-satellite phone will be provided for sampling crews to be used in case of an emergency.

All preservation fluids will be transported in heavy-duty LPDE carboys. Extensive exposure to UV light makes the carboys susceptible to decomposition and cracking and requires that they be inspected monthly and not used for more than two years. Safety rope throw bags will be similarly inspected and retired from use accordingly. Rafts will be equipped with raft recovery (Z-line) kits, and repair kits, extra oars and oar blades, and two spare hand pumps to help ensure that crews do not become stranded due to raft damage.

Laboratory Work

Samples will be returned to the lab immediately after each field trip is completed and processed following a multi-step procedure. To maintain the larval fish in good condition (necessary to ensure accurate identification) the samples must be transferred from whirl-packs to glass jars and the field fluids replaced with new 95% ethanol. Cyprinid and catostomid larvae are extremely small and transparent especially at early developmental stages. To minimize the potential loss of fish in individual seine hauls, it is best to retain the entire contents of each seine haul. A negative result of this technique is that, in addition to larval fish, whirl-pack samples usually contain considerable debris, detritus, and silt. Another important step in processing of individual samples is to separate fish from the detritus. This necessary portion of the process is labor intensive and can be quite tedious. During this process initial sorting of fish based on age class (age 0 [larvae] and age 1+) occurs. Samples that contain a large number of larval fish, especially proto or mesolarvae, often must be sorted twice to ensure all larvae are located with a sample.

After the fish are separated from the debris, personnel with San Juan River Basin larval fish identification expertise identify individual specimens to species. Stereomicroscopes equipped with transmitted light bases (light and dark field) and polarized filters (that enhance the delineation of myomeres, pterygiophores, and fin rays) are used to assist with the identifications. Larval fish keys are referenced to assist in species specific determinations (e.g., Contributions to a guide to the cypriniform fish larvae of

the Upper Colorado River System [Snyder 1981], Catostomid fish larvae and early juveniles of the Upper Colorado River basin, Morphological descriptions, comparisons, and computer interactive key [Snyder and Muth 2004], and Identifications of larval fishes of the Great Lakes Basin [Auer 1982]). Age-0 specimens are separated from age-1+ specimens using published literature on growth and development (Snyder 1981, Snyder and Muth 2004).

Age classes are enumerated, measured (minimum and maximum size [mm standard length] for each species at each site), and catalogued in the Division of Fishes of the Museum of Southwestern Biology (MSB) at the University of New Mexico (UNM). Both total length (TL) and standard length (SL) of Colorado pikeminnow and razorback sucker are obtained using electronic calipers and stereomicroscope mounted micrometers. The ontogenetic stage of Colorado pikeminnow and razorback sucker obtained in this study is determined based on the definitions provided by Snyder (1981).

Quality Assurance and Quality Control:

The qualifications of the investigators include extensive experience working on large data sets from multiple river systems over several decades. This experience has resulted in the implementation of numerous protocols that assure the quality of the finished data files. The field sampling crew has been kept constant, which ensures that the collection of the raw data is standardized between trips and that errors are minimized. Field notes and raw data sheets will be checked for any errors prior to being entered into spreadsheet data files. Any errors will be corrected by crossing out the original data and writing the correct data on the sheet in pencil (all corrections will include the initials of the person making them). All data will be entered into spreadsheet templates designed for the particular type of data being entered (i.e., site locality and physical conditions data, sample size and habitat data, fish species and age-class data). These template files are customized using drop-down lists to facilitate more efficient data entry while also assuring that the correct values are entered (i.e., eliminates typographical errors) within each field. After all data is imported into the main database, all data values will be checked. Data checking will include cross-referencing the field notes and raw data sheets with the values entered into the main database. Upon completion of the quality assurance and quality control steps listed above, the data will then be analyzed and tabulated. All the computed results will be examined and cross-checked with the original data files. Outlying values will be identified by using advanced sorting features on multiple data fields. Missing or incorrect data will be identified by using advanced sorting features and by running multiple queries written for this purpose. Checking the cross-tabulation of data will ensure that the sum of values is in agreement with the individual values (e.g., total number is equal to the sum of the total number of each age-class). Any corrections to the data will be made directly to individual tables within the main database.

Analysis

The results in our annual report pertain almost exclusively to age-0 fish (i.e., age-1+ are not "larval fish" and are not the focus of this effort, they are not included in analysis). The only exception to this will be age-1+ augmented Colorado pikeminnow. Capture data for all Colorado pikeminnow is analyzed and trend data reported. The number of all other fish age-1+ collected during the study is presented in an Appendix. Differences in mean CPUE are determined by species between years using a one-way Analysis of Variance (ANOVA). A Poisson distribution provided the best fit to the raw data. A variety of transformations (e.g., logarithmic, reciprocal, square root) were applied on the mean CPUE data for between year comparisons. A natural log transformation yielded the best variance-stabilizing qualities and produced a relatively normal distribution. Pair-wise comparisons between years (2003 – 2010) were made for each species and significance (i.e., $p<0.05$) was determined using the Tukey-Kramer HSD test.

Finally, a nonparametric ANOVA (Kruskal–Wallis test) was used on various data sets to compare results to the parametric analyses. While both ANOVA and Kruskal-Wallis were used to analyze data, data transforms enabled use of parametric analysis in all cases. The assumption of homogeneity of variances was assessed using the more conservative variance ratio criterion of <3:1 (Box, 1954), as opposed to <4:1 (Moore, 1995), among years. All species data sets met this more rigorous criterion and in most cases the

variance ratio was <2:1 among years. Additionally, the significance values between parametric and nonparametric techniques were nearly identical and so only the parametric analysis will be presented.

Hatching dates of razorback sucker larvae are calculated by subtracting the average length of larvae at hatching (8.0 mm TL) from the total length at capture (for proto- and mesolarvae) divided by 0.3 mm (Bestgen et al. 2002), which was the average daily growth rate of wild larvae observed by Muth et al. (1998). Hatching dates for larval Colorado pikeminnow are calculated using the formula:

$-76.7105+17.4949(L)-1.0555(L)^2+0.0221(L)^3$ for larvae <22 mm, where L=length (mm TL). For larvae 22-47 mm TL the formula A=-26.6421+2.7798L will be used.

Spawning dates for larval Colorado pikeminnow are then estimated by adding five days to the post-hatch ages to account for incubation time at 20 – 22 °C (Nesler et al. 1988). Hatching and spawning dates for both endangered species are then compared with the discharge and temperature data during that period within the study area.

This study is initiated prior to spring runoff and completed during late summer (August). Daily mean discharge during the study period is acquired from U.S. Geological Survey Gauge (# 09379500) near Bluff, Utah and Four Corners Bridge (#09371010). Water temperatures (mean, maximum, and minimum) are acquired from our temperature loggers and additional data provided by the USGS gauging staging at Mexican Hat, Utah (RM 53.3).

Reporting and permitting:
Beginning in 2004, data from the two San Juan River larval fish surveys (razorback sucker and Colorado pikeminnow) were analyzed collectively and presented in a single report. This created a whole picture of the reproductive activities of the entire ichthyofaunal community in the San Juan River using the same criterion used as the other monitoring programs. The report will be disseminated as outlined by the program office.

In addition to the annual report of the study provided to the SJRBRIP, reports summarizing fish collecting activities and specimens captured are also required annually under scientific collection permits provided by the New Mexico Department of Game and Fish, Navajo Nation, and state of Utah. The aforementioned reports include (at a minimum) site localities, GPS coordinates, and fish collected. An annual report of activities is a BLM (Monticello Field Office) requirement under our access permit to the San Juan River below San Island (Bluff UT) and designated camps in the lower reaches of the river.

Meetings
Researchers are required to attend a minimum of two meetings annually and report on annual monitoring projects. The two meetings (February and May) require researchers present PowerPoint presentations outlining the results and that years findings. Each meeting lasts about three days (which includes travel time).

Products
A draft report of the 2012 larval razorback sucker and Colorado pikeminnow sampling activities will be prepared and distributed to the San Juan River Basin Biology Committee for review by 31 March 2013. Upon receipt of written comments, that report will be finalized and disseminated to members of the San Juan River Basin Biology Committee by 30 June 2013. Electronic copies of the 2012 collection data will be transferred to the San Juan River database manager. Fish collected from this study will be curated in the Division of Fishes, Museum of Southwestern Biology (MSB), Department of Biology, at the University of New Mexico under a MSB contract with the SJRBRIP. Original field notes will be retained in the Division of Fishes and collection information electronically stored in a permanent MSB database program. These data and any maps generated from them will be available to the San Juan River Basin Biology Committee via hard-copy reports and electronically.

Project Title: 2012 San Juan River larval endangered fishes survey

Proposed Budget based on Five Sampling Trips

Personnel		
FIELD WORK		
UPPER REACH (RM 141.5 - 76.4) *Cudei Diversion to Sand Island*		
Research Associate (W.H. Brandenburg or M. A. Farrington)	50 staff days	$ 17,500
Field data collection – 10 days per trip x 5 trips		
Field Assistant	50 staff days	$ 10,000
Field data collection – 10 days per trip x 5 trips		
LOWER REACH (RM 76.4- 2.9) *Sand Island to Clay Hills*		
Research Associate (W.H. Brandenburg or M. A. Farrington)	50 staff days	$ 17,500
Field data collection – 10 days per trip x 5 trips		
Field Assistant	50 staff days	$ 10,000
Field data collection – 10 days per trip x 5 trips		
LAB WORK		
UPPER AND LOWER REACH SAMPLES COMBINED (i.e., not fully differentiated under this task)		
Research Associate (W.H. Brandenburg and M. A. Farrington)	114 staff days	$ 39,900
TASKS: *Laboratory identification, developmental staging, specialized endangered fish processing, data entry, data query and review, database development*		
Research Associate (A.L. Barkalow)	114 staff days	$ 22,800
TASKS: *Post-trip sample processing, juvenile identification, post-identification – processing, measures, review of counts*		
OFFICE WORK (REPORT DEVELOPMENT)		
UPPER AND LOWER REACH SAMPLES COMBINED (i.e., not fully differentiated under this task)		
Research Associate (W.H. Brandenburg and M. A. Farrington)	80 staff days	$ 28,000
Office effort – 40 days staff member (= 40 days per discrete study)		
TASKS: *Data analysis, draft report preparation, post-review redraft and submission, development and submission of formal responses to reviewer comments, development of presentation of study for annual meetings, annual reporting related to state and tribal permitting of sampling activities*		

Personnel (continued)		
PROJECT OVERSIGHT AND ADMINISTRATION		
Senior Research Associate (S.P. Platania or R.K. Dudley)	12 staff days	$ 6,000
Oversight effort – one day per month		
TASKS: *Project coordination, project and data review, data management, report review, scope and budget preparation, project billing and accounting*		
Personnel (Field, Lab, Office, Oversight): Subtotal		$ 151,700
SJRBRIP MEETINGS		
Two meetings/year required; 3 days/meeting		
Research Associates (W.H. Brandenburg and M. A. Farrington)	12 staff days	$ 4,200
2 meetings x 2 people x 3 days = 12 staff days		
Senior Research Associate (S.P. Platania or R.K.Dudley)	6 staff days	$ 3,000
2 meetings x 3 days = 6 staff days		
Personnel (Meetings): Subtotal		$ 7,200
Personnel Total		**$ 158,900**

Materials and Supplies		
FIELD RELATED		
Safety training and dedicated First Aid Gear		
American Red Cross CPR/AED training x 4	$ 75/person	removed
IRIA Level 2 swiftwater rescue class x 2	$ 350/person	removed
Type III Personal Floatation Devices (PFD) x 4	$ 115/person	$ 460
Fire Extinguisher annual recharge x 2	$ 25/unit	$ 50
First Aid Kit item update and replacement x 2	$ 50/unit	$ 100
Light-weight Gore-Tex waders x 2	$ 325/person	$ 650
Iridium 9505A Satellite Phone (five year depreciation)	$ 204/yr	$ 204
Satellite phone monthly service x 5	$ 35/mo	$ 175
Cell phones x 2	not charged	$ 0
Safety training and dedicated first aid gear: Subtotal		$ 1,639
Raft and rafting associated gear		
NRS Raft Supplies (average of $500/raft/year 2008 – 2010)	$ 500/yr	$ 1,000
AIRE 156R sealed floor pocket (self-bailing) x 1	$ 350/yr	$ 350
ThorShield 2250 Tarpaulin x 2 (five year depreciation)	$ 125/yr	$ 250
Sherwin Williams Tile Clad Epoxy Paint (two gallons)	$ 187/yr	$ 187
Trailer (for raft) maintenance x 2	$ 250/unit/yr	$ 500
Raft depreciation x 2	not charged	$ 0
Trailer depreciation x 2	not charged	$ 0
Pit tag reader FS2001 with pass through wand x 2 ($ 6,200)	Program	$ 0
Raft and rafting associated gear: Subtotal		$ 2,287

Fish Sampling Gear		
Larval seines x 4 per year	$ 75/seine	$ 300
Preservation materials (carboys, fluid, tags, whirl paks)	$ 350/crew	$ 700
Open reel coated fiberglass measuring tape (metric) x 2	$ 50/tape	$ 100
Thermometers x 12	$ 12/piece	$ 144
Fish sampling gear: Subtotal		$ 1,244
Water Quality and Electronic Sampling Gear		
GPS Unit (replacement average one per year)	$ 125/unit	$ 125
Digital camera (use, memory card, depreciation) x 2	$ 50/unit	$ 100
YSI Water Quality (calibration solutions, membranes) x 2	$ 90/piece	$ 180
Water temperature data logger x 4	$ 125/piece	$ 500
Water quality and electronic sampling gear Subtotal		$ 905
OFFICE RELATED		
Computer, scanner, and printer use and supplies, software upgrades, electronic storage media, presentation software	project cost	$ 1,000
Office materials and supplies: Subtotal		$ 1,000
Materials and Supplies Total		**$ 7,075**

Travel and Per Diem		
FIELD WORK		
UPPER REACH (RM 141.5 – 76.4) *Cudei Diversion to Sand Island*		
Travel - 4 x 4 pick up truck and raft trailer	$ 0.50/mi	$ 1,500
600 miles round-trip per trip x 5 trips = 3,000 miles		
Per Diem - 6 field days; 0 hotel day	$ 45/day	$ 2,700
6 days x 2 people x 5 trips = 60 field per diem days		
Truck and Trailer Shuttle from Cudei to Sand Island	$ 0/shuttle	$ 0
Shuttle service provided gratis by USFWS – NMFRO		
LOWER REACH (RM 76.4 - 2.9) *Sand Island to Clay Hills*		
Travel - 4 x 4 pick up truck and raft trailer	$ 0.50/mi	$ 1,950
780 miles round-trip per trip x 5 trips = 3,900 miles		
Per Diem - 4 field days; 1 hotel day (combined total from below)		$ 2,750
4 days x 2 people x 5 trips = 40 field per diem days	$ 45/day	$ 1,800
1 day x 2 people x 5 trips = 10 hotel per diem days	$ 95/day	$ 950
Truck and Trailer Shuttle from Sand Island to Clay Hills	$ 325/shuttle	$ 1,625
Valles Trading Post OR Jim Hardin at $325/shuttle x 5 trips		
Travel and Per Diem (Field): Subtotal		$ 10,525

SJRBRIP MEETINGS		
Travel (everybody in one vehicle)	$ 0.50/mi	$ 425
425 miles round-trip per trip x 2 trips = 850 miles		
Per Diem - hotel days	$ 95/day	$1,710
3 days x 2 trips x 3 people = 18 hotel per diem days		
Travel and Per Diem (Meeting): Subtotal		$ 2,135
Travel and Per Diem Total		**$ 12,660**

Personnel Total	$	**158,900**
Materials and Supplies Total	$	**7,075**
Travel and Per Diem Total	$	**12,660**
Project Subtotal	$	**178,635**
IDC (15%)	$	**26,795**
2012 Scope of Work: GRAND TOTAL	$	**205,430**
2011 Scope of Work: GRAND TOTAL	*$*	***205,385***

Literature Cited

Auer, N. A. (ed.). 1982. Identification of larval fishes of the Great Lakes basin with emphasis on the Lake Michigan drainage. Great Lakes Fishery Commission, Ann Arbor, MI 48105. Special Pub. 82-3: 744 pp.

Bestgen, K. R., G. B. Haines, R. Brunson, T. Chart, M. A. Trammell, R. T. Muth, G. Birchell, K. Christopherson, and J. M. Bundy. 2002. Status of wild razorback sucker in the Green River Basin, Utah and Colorado, determined from basin wide monitoring and other sampling programs. Final report. Colorado River Recovery Implementation Program Project No. 22D.

Box, G. E. P. 1954. "Some theorems on quadratic forms applied in the study of analysis of variance problems" *Annals of Statistics* 25:290-302.

Davis, J. E.. 2010. Passive Integrated Transponder (PIT) tagging methodologies for the San Juan River Basin Recovery Implementation Program. San Juan River Basin Recovery Implementation Program, USFWS, Albuquerque, New Mexico.

Moore, D. S. 1995. The basic practice of statistics. NY: Freeman and Co.

Muth, R. T., G. B. Haines, S. M. Meismer, E. J. Wick, T. E. Chart, D. E. Snyder, and J. M. Bundy. 1998. Reproduction and early life history of razorback sucker in the Green River, Utah and Colorado, 1992 - 1996. Final Report of Colorado State University Larval Fish Laboratory to Upper Colorado River Endangered Fish Recovery Program, Denver, CO.

Nesler, T. P., R. T. Muth, and A. F. Wasowicz. 1988. Evidence for baseline flow spikes as spawning cues for Colorado squawfish in the Yampa River, Colorado. *American Fisheries Society Symposium* 5:68-79.

Ryden, D. W., and F. K. Pfeifer. 1996b. Monitoring of experimentally stocked razorback sucker in the San Juan River: 1995 Annual Progress Report. U. S. Fish and Wildlife Service, Grand Junction, CO. 37 pp.

Snyder, D. E. 1981. Contributions to a guide to the cypriniform fish larvae of the Upper Colorado River system in Colorado. U.S. Bureau of Land Management, Biological Sciences Series 3, Denver, CO. 81 pp.

Snyder, D. E. and R. T. Muth. 2004. Catostomid fish larvae and early juveniles of the upper Colorado River Basin- morphological descriptions, comparisons, and computer-interactive key. *Colorado Division of Wildlife Technical Publication* No. 42.

San Juan River Specimen Curation
Fiscal Year 2012 Project Proposal

Principal Investigator: Alexandra M. Snyder, CoPI: Thomas F. Turner
Division of Fishes - Museum of Southwestern Biology
University of New Mexico
Albuquerque, NM 87131
(505) 277-6005
amsnyder@unm.edu
turnert@unm.edu

Background

Personnel with the Division of Fishes, Museum of Southwestern Biology (MSB), at the University of New Mexico (UNM) are responsible for the curation of collections of fishes taken by principle investigators with the San Juan River Basin Recovery Implementation Program (SJRBRIP). The MSB Division of Fishes has been the permanent repository for large numbers of voucher specimens and associated data collected by SJRBRIP researchers since 1991. The numbers processed each year has fluctuated depending on the availability of these collections after the field season. For example, larval and juvenile San Juan River fishes (approximately 200,000) collected in the early 1990's by the Utah Division of Wildlife Resources were not completely processed by MSB staff until 2001. And collections of San Juan River fishes taken by the New Mexico Department of Fish and Game (1991-2007) were received by the MSB in July 2007 and are now in the process of being incorporated into the MSB collections. Other factors such as annual variability of sampling conditions and changes in sampling techniques has affected numbers of specimens processed by MSB staff. For example, between 2001 and 2002 drift net sampling for larval Colorado pikeminnow and razorback sucker was eliminated in favor of larval seine sampling. Given the variability in number of fishes to process, the San Juan River Biology Committee has recommended that the annual budget for the San Juan River specimen curation and larval fish identification reflect an "average" year of sample processing. The Biology Committee recognizes that some years would require more effort from MSB staff than budgeted, while other years might not require the same high level of activity. A relatively stable budget would allow for uninterrupted processing of new collections and yet be sufficient to cover the ongoing work of processing backlogged SJRBRIP collections due to circumstances previously discussed.

To date, 34,356 lots (1,574,460 specimens) collected by the San Juan River research group have been processed, cataloged, and archived at the Museum of Southwestern Biology, Division of Fishes. Associated with these specimens are 5,059 San Juan River collection sites, which have been georeferenced and can be mapped in ArcView. These specimen collections sites have been documented in approximately 15,477 pages of field notes (locality data) and the data entered into the MSB database. Currently, a total of 23,362 pages of San Juan River field notes and data sheets have been digitally captured, cleaned, and saved in tiff and PDF formats for electronic archiving. All original field notes and data sheets are stored in acid free document boxes for long-term conservation, available only by special request.

Incoming collections are typically sorted and identified by the principal investigators of the various projects and retained until annual progress reports have been submitted. Once these collections are received by the MSB, they are accessioned by assigning a project number and noting the condition and curatorial requirements for long-term conservation. Processing collections of fish specimens involves transfers from formalin fixative to ethanol preservative, verification of species identifications, counting the number of individuals in each collection, recording the standard lengths for the largest and smallest specimen in each collection, entering all locality and specimen data into an electronic catalog, digitizing field notes, and filing jars of cataloged San Juan River specimens into the permanent collections. The basic protocol for accessioning specimens of fishes in the MSB is standard for most museums of natural history (e.g., Smithsonian Institution, Carnegie Museum, University of Michigan Museum of Zoology) and prior to incorporation into the MSB collections, species are identified to species by qualified personnel and ambiguous collection information verified. Checking the species determinations and the collection data minimizes misleading information in subsequent reports on San Juan River fish species, particularly for the larval Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) studies. Any such changes are documented and reported to the SJRBRIP principal investigator as soon as possible. For purposes of permitting, original field and specimen data, organized in the museum database, are also provided to the principle investigator in table format. This information includes species identification, catalog number (MSB number), number of specimens and size range per lot.

Study Area

This project involves processing and capturing all collections and information deposited at the Museum of Southwestern Biology in Albuquerque NM by the San Juan River Basin Recovery Implementation Program. The MSB has two offices with a total of five computer workstations for data entry, a fully equipped laboratory for preparation of fish collections, and approximately 1,858 linear meters of compacted shelving for storage of cataloged collections. On average, four UNM students (three undergraduate and one graduate) are employed to process, verify identification, and curate the SJRBRIP collections.

Objectives

1. Provide a secure and organized permanent repository for San Juan River fish collections, field notes, and associated data.
2. Insure that all SJRBRIP species identifications and associated data are verified and correctly represented in the MSB electronic catalog; report discrepancies to SJRBRIP principal investigators.
3. Georeference collection sites for SJRBRIP collections; maintain license for ArcView and make collection data available to SJRBRIP researchers in that format.

Methods

The primary task to be completed under this project is the processing and curation of fish specimens generated by research projects executed under the auspices of the San Juan River Basin Recovery Implementation Program. Specimen collections are deposited with the MSB Division of Fishes by SJRBRIP principal investigators, once their work and reports have been completed. (This usually infers a one year delay between collection of specimens and complete transfer to the MSB Division of Fishes).

Upon receipt of newly collected San Juan River specimens, MSB staff transfer these collections from formalin to ethanol (exceptions can be made per request of PI as in the case of using 95% ethanol for genetic or otolith studies), place all specimens into museum quality jars, verify identifications (qualified staff), count and measure each lot (discrete collection), catalog, label and file the specimens into the permanent MSB Fish Division archives. SJRBRIP collections are organized in the permanent archives by drainage (San Juan River) and taxa. These archives are in a room that is controlled for temperature (18° Celsius) and light (complete darkness to low light levels). All data associated with the specimens are entered and organized in the electronic MSB Division of Fishes database (MS Access 2010) and georeferenced (GeoLocate Version 3). All original field notes and data sheets are digitally captured and archived in acid-free document boxes for permanent storage.

The MSB Division of Fishes has fully incorporated backlogged San Juan River collections from 1987- 2000. Using both SJRBRIP and NMDGF funds, we are still processing a backlog of NM Department of Game and Fish San Juan River collections (1993-2001) received in 2007. At this time, all San Juan River collections received from NMDGF have been unpacked, curated and organized by year and project on the accession (uncataloged collections) shelves. Curation entails transfer to 70% ethanol and standard museum jars. This also includes entering specimen and locality data into Excel spreadsheets in preparation for cataloging.

Products

SJRBRIP fishes and data will be curated in the Division of Fishes, Museum of Southwestern Biology (MSB), at the University of New Mexico. Collection sites will be georeferenced and available in ArcView format. Original field notes will be digitized and archived by the MSB Division of Fishes and collection data electronically stored in a permanent MSB database program. Species verifications and corrections and digital copies (PDF) of their field notes will be made available to SJRBRIP principle investigators. A draft report of the 2012 San Juan River specimen curation and larval fish identification sampling activities will be prepared and distributed by 31 March 2013 to the San Juan River Biology Committee for review. Upon receipt of written comments, that report will be finalized and disseminated to members of the San Juan River Biology Committee by 1 June 2013.

Budget Fiscal Year 2012

Personnel:			
	Graduate student RA (Data manager and GIS)	$	8,000.00
	Graduate student health benefit-summer 2012	$	313.00
	RA Fringe benefits 1%	$	80.00
	RA GPA fee 1 semester 2012	$	25.00
	Undergraduate student Curatorial Assistants (3)	$	12,000.00
	Undergraduate student fringe benefits 1%	$	120.00
	Section Subtotal	$	20,538
Equipment and Supplies:			
	95% ethanol preservative	$	3,000.00
	Specimen jars, Buna-N gaskets, and polypropylene caps	$	2,000.00
	Permanent specimen labels-5 mil polyester paper	$	162.00
	DataMax ® Printer maintenance and calibration costs	$	200.00
	Gaylord document archive boxes for field notes	$	100.00
	Section Subtotal	$	5,462.00
Total (Direct Costs)		$	**26,000.00**
Administrative Overhead (15%)		$	3,900.00
Grand Total		$	**29,900.00**

SJRIP Videography
2012 Project Proposal

Bill Goettlicher, Physical Scientist
U.S. Bureau of Reclamation
Technical Service Center
Bldg 67 5th Floor MC 86-68251
P.O. Box 25007
Denver, CO 80225
(303)445-2275
bgoettlicher@usbr.gov

Background

High definition videography is used in the SJRIP to develop maps of the river and evaluate flow/habitat relationships and provide a database that can be used to predict future conditions. Videography is also used for habitat mapping and developing fish-habitat relationships when requested. The videography is done in the late summer during base-flow conditions in an attempt to standardize the information with flows. Often the video is flown in connection with another trip to control costs.

Methods

Aerial imagery is collected along the river by using a helicopter which enables following the river corridor. The helicopter is equipped with a belly camera port which allows interior mounting of 2 cameras. In this case an HD video camera and a high resolution digital camera, which produces imagery with approx. 7 inch pixels. The imagery is collected at an altitude that produces 5-6 frames per river mile.

TASKS – 2012

1. Fly San Juan River with vertically oriented camera and take HD video and high res. digital stills.
2. Periodically provide specific images that are mosaiked for presentation.
3. Archive video/still frames and provide to researchers as requested.

FY 2012 BUDGET

Funding source	Expenditure in FY2012
FY2012 Annual funding	$18,000
Total	**$18,000**

Projected funding:
FY-2013 $20,000.00
FY-2014 $20,000.00

SJRIP PIT TAGS
2012 Project Proposal

Mark McKinstry UC-735
Bureau of Reclamation
125 South State Street, Room 6107
Salt Lake City, UT 84138-1147
Phone 801-524-3835
FAX 801-524-5499
mmckinstry@uc.usbr.gov

Background

PIT tags are used to individually mark fish for use in movement studies and for mark-recapture estimates in the San Juan River Basin. PIT tags are not specific to any particular project, but are used by several different projects. PIT tags and readers purchased for the SJRIP will be combined with the purchase made for the UCRIP to save money by purchasing larger quantities and save expenses associated with administering the contract. All PIT tags and readers will be shipped to USFWS in Grand Junction C/O Travis Francis at:

U.S. Fish and Wildlife Service
Colorado River Fishery Project
764 Horizon Drive, Building B
Grand Junction, Colorado 81506-3946
Phone: 970-245-9319 (19)

TASKS – 2012

1. Purchase PIT tags and readers and distribute to end-users

In FY2012, $50,000 is allocated in the workplan to purchase 15,000 PIT tags. The purchase of PIT tags and readers is done under a fully competed contract that is being renewed by July 2011 (prior to the development of this SOW). This budget is based on expectations that the new contract will see an increase in price over the old contract due to a different pricing schedule. We also anticipate the use of a different tagging and injector system which has a slightly higher cost than in the previous contract.

FY 2012 BUDGET

Funding source		**Projected expenditure in FY12**
FY2012 Annual funding		$50,000
Total		**$50,000**

Projected funding:
FY-2013 $50,000.00
FY-2014 $55,000.00
FY-2015 $60,000.00

Razorback Sucker Survey of the San Juan River Arm of Lake Powell
Fiscal Year 2012 Project Proposal
17 August 2011

Principal Investigators:
Travis Francis, Ben Schleicher, Dale Ryden
U. S. Fish and Wildlife Service, Colorado River Fishery Project
764 Horizon Drive, Building B
Grand Junction, Colorado 81506
(970) 245-9319
travis_francis@fws.gov, benjamin_schleicher@fws.gov, dale_ryden@fws.gov

--- and ---

Darek Elverud
Utah Division of Wildlife Resources, Moab Field Station
1165 S. Hwy. 191 – Suite 4
Moab, Utah 84532
(435) 259-3782
darekelverud@utah.gov

Background

Razorback sucker (Xyrauchen texanus) is one of three San Juan River native fish species (the Colorado pikeminnow, Ptychocheilus lucius, and the roundtail chub, Gila robusta being the other two) that have become greatly reduced in numbers and range since the mid 1900's (Bestgen 1990, Minckley 1973). Physical alterations of riverine habitats, water impoundment in the form of Navajo Reservoir and Lake Powell and their associated effects on flow and thermal regimes, introduction of nonnative fish species, and contaminants have probably all contributed to the decline of these native species (Platania 1990, Brooks et al. 1993, Ryden and Pfeifer 1994a). Extremely small numbers of wild razorback sucker and the long-term lack of recruitment led to this species being listed as endangered under the Endangered Species Act on 22 November 1991 (U.S. Fish and Wildlife Service {USFWS} 1991). The razorback sucker is also currently protected by state laws in Arizona (AZ), California (CA), Colorado (CO), Nevada (NV), New Mexico (NM), Utah (UT), and by the Navajo Nation. Critical Habitat in the San Juan River has been designated as the area from the Hogback irrigation diversion in New Mexico downstream to Neskahi Canyon in Lake Powell (Maddux et al. 1993, USFWS 1994).

One of the two goals of the San Juan River Recovery Implementation Program (SJRIP) is to protect and recover endangered fishes in the San Juan River Basin with the ultimate goal of establishing self-sustaining populations of razorback sucker and Colorado pikeminnow (SJRIP 2009). Due to the paucity of historic and recent collections of this species, including the failure to collect any wild razorback sucker during three years (1991-1993) of intensive studies on all life stages of the San Juan River fish community (Buntjer et al. 1993, 1994, Lashmett 1993, 1994, Ryden and Pfeifer 1993, 1994b, Gido and Propst 1994) the SJRIP Biology Committee (BC) initiated a stocking program for razorback sucker in the San Juan River (Ryden and Pfeifer 1994a).

The numbers of razorback sucker stocked annually between 1994 and 2010 have varied greatly (from 16 fish in 1995 to >28,000 fish in 2010). However, with the exception of 1999, some level of stocking has occurred in 16 of the last 17 years (Furr 2010, Furr pers. comm.). Post-stocking monitoring of these fish has occurred annually each fall since 1994. The number of sub-adult and

adult razorback sucker collected during any given fall monitoring trip fluctuates in direct relation to the number of fish that were recently stocked into the river (Ryden 2009). In other words, the more fish stocked in the recent past, the greater the number of razorback sucker collected during fall sampling. Thus, most of the fish being collected during fall monitoring efforts have been in the river less than one overwinter period post-stocking and are not a good indicator of the whether the riverine population is increasing or decreasing in number.

Based on the large number of razorback sucker stocked over the last 16 years and the documented persistence of a few individual razorback sucker from 6 to 14 overwinter periods post-stocking (Ryden 2011), one would expect that this population was increasing over time. Comparisons of capture data for razorback sucker that were in the river for 1+ overwinter periods showed that the number of older fish being collected during Adult Monitoring trips had changed little over the last eight-year period from 2002-2009 (range = 16-36 fish; Ryden 2009). However, in 2010, this number essentially doubled to 70 fish (Ryden 2011). In addition, between-year comparisons in scaled CPUE for all razorback sucker that were in the river 1+ overwinter periods showed no significant difference from 2003-2008 (Ryden 2009). Again this trend changed in 2010, with scaled CPUE for all razorback sucker that were in the river 1+ overwinter periods being significantly higher in 2010 than in each of the previous three years (Ryden 2011).

Analysis of razorback stocking data in the San Juan River from 1994 to 2007 by Bestgen et al. (2009) indicated 1st interval apparent survival of < 2% in most years. The low 1st interval apparent survival includes some unknown rate of loss of stocked razorback sucker over the waterfall and into Lake Powell, but the proportion of the stocked fish lost over the waterfall versus mortality from predation or other causes in the San Juan River is unknown. Captures of PIT-tagged razorback sucker in Lake Powell or below the waterfall confirm some level of loss of stocked fish over the waterfall and into Lake Powell.

The numbers of Colorado Pikeminnow stocked annually between 1996 and 2010 have fluctuated widely (from 148 adults in 2001 to 500,000 age-0 "larvae" in 1999) as have the range of sizes and year-classes. Over 3.3 million age-0 and over 37,000 age-1+ (range 1+ to 16 year old) Colorado pikeminnow have been stocked (Furr 2011). Post-stocking monitoring of these fish has occurred annually each fall since 1996. While pikeminnow re-captures have occurred in the river, the expected return has been less than what might be expected. Colorado pikeminnow loss over the waterfall and into Lake Powell versus mortality is unknown. Captures of pikeminnow in Lake Powell should provide information on loss of stocked fish from the river.

The area now inundated by the San Juan River arm of Lake Powell is an extremely isolated and remote area. Because of this, this area has received the least survey and research effort among the UCRB sub-basins, and the historic status of rare fish species, including the razorback sucker, is largely unknown (Bestgen 1990). Yet despite the generalized dearth of repeated or intensive sampling efforts, razorback sucker are known to have inhabitated the San Juan River arm of Lake Powell for many years. In 1987 and 1988 sixteen different wild adult razorback sucker were collected from the south shore of Lake Powell near the concrete boat ramp at Piute Farms Marina (Platania 1990). These fish were collected in March and April each year and the presence of a large number of ripe males as well as gravid females indicated a possible spawning aggregation. In addition, gill net surveys performed by crews from Utah Division of Wildlife Resources Wahweap Hatchery (UDWR-Wahweap) collected six wild razorback sucker in Piute Farms Wash in April 1982 and another three wild razorback sucker from Neskahi Wash, one each in November 1983, 1984, and 1989 (UDWR unpublished data). In April 1990, a multi-agency effort to collect and remove wild adult razorback sucker for use as future broodstock collected a total of 14 adult fish between Mike's Canyon and Copper Canyon (McKay 1990). These fish ranged in size from 557-682 mm TL. Eleven of these fish were removed and transported to

Ouray NFH for use as broodstock (two were mortalities and one escaped back into the lake). Four of these fish (including one of the mortalities) were recaptures from the 1987-1988 collections. While he did not collect any razorback sucker during his 1991-1992 collections in the San Juan River arm of Lake Powell, Lashmett (1993) mentions that "Within the same study area, three adult razorback sucker (Xyrauchen texanus) were sampled from Lake Powell in April 1992 during a separate study in the extreme upper San Juan River arm of Lake Powell." However, the data for the fish to which this reference pertains is unknown. In the spring of 1993 (i.e., one year prior to the initiation of stocking razorback sucker in the riverine portion of the San Juan River), three weeks of sampling between the waterfall and Zahn Bay failed to locate any further wild adult razorback sucker in the San Juan River arm of Lake Powell. In August 1995, UDWR-Wahweap stocked 130 razorback sucker (mean TL = 407 mm) into the San Juan River arm of Lake Powell at Piute Farms (Ryden 2000). Only one of these fish has been recaptured and that was in the San Juan River upstream of Mexican Hat, UT (at RM 58.0 on 21 May 1996). Since 2001, UDWR-Wahweap personnel have conducted the only sampling in the San Juan arm of Lake Powell. From 2006 to 2009, UDWR-Wahweap annual monitoring near Neskahi Wash has shown a catch rate of razorback sucker from 0.05 to 0.2 razorback sucker per net night. While the catch rates are low, they are similar to the lower end of catch rates of razorback sucker observed in Lake Mead from studies specifically targeting razorback sucker (Albrecht et al. 2008a).

Once stocking of razorback sucker into the riverine portion of the San Juan River began (i.e., March 1994), razorback sucker began to once again be collected in the San Juan River arm of Lake Powell. Between March 1995 and November 2009, a total of 49 razorback sucker were collected from the San Juan River arm of Lake Powell by various agencies and researchers. While the origin of many of these fish could not be determined, at least 25 of them were known to have been stocked upstream in the San Juan River. Collections of razorback sucker ranged from just downsteam of Clay Hills take-out downstream to Neskahi Canyon (from RM 2.0 to approximately RM -35.0). Sizes of these razorback sucker indicate that almost all were large, adult fish capable of spawning. At present, the presence of a large waterfall precludes the movement of these fish back upstream into Lake Powell.

In 2011, sampling conducted for this project resulted in the capture of 75 individual razorback sucker in the San Juan Arm of Lake Powell. The razorback sucker captured in 2011 were large, mature adult razorback sucker with total lengths ranging from 429-619 mm. Twenty six (36%) of the 75 razorbacks captured did not have a PIT tag when captured. In 2010, approximately 12% of the razorback sucker captured in the San Juan River upstream of the waterfall did not have a PIT tag. As only one of the 75 razorback sucker captured in 2011 was recaptured during another sampling trip, data from 2011 is insufficient for calculating a reliable population estimate. However, the 75 individuals captured in 2011, compared to just a single recapture would seem to indicate the presence of a large number of razorback sucker in the San Juan River arm of Lake Powell.

Critical Habitat for razorback sucker in the San Juan River basin extends downstream into Lake Powell as far as Neskahi Canyon. Therefore, any razorback sucker occupying this section of the San Juan River arm of Lake Powell are part of the San Juan River razorback sucker population and contribute towards the demographic recovery criteria. Based on these facts, the following questions regarding razorback sucker in the San Juan River arm of Lake Powell seem to have pertinence to recovery efforts in the San Juan River.

1) Document the size and extent of the population of adult razorback sucker in the San Juan River arm of Lake Powell?
2) Locate and document the extent of the fish spawning in Lake Powell?

3) Document any evidence of recruitment in Lake Powell?
4) Quantify the loss of razorback sucker from the riverine portion of the San Juan River into Lake Powell? This may help to give the SJRIP-BC an indication of what percentage of fish is moving into Lake Powell from each stocking. This information could help the SJRIP adjust its stocking numbers and/or augmentation protocols for future razorback sucker augmentation efforts.
5) Are razorback sucker hybridizing with other sucker species in Lake Powell?

Populations of razorback sucker occupied several large reservoirs in the lower Colorado River Basin (LCRB) after their construction, including Lake Havasu, Lake Mojave and Lake Mead. These populations were originally comprised of adult fish that were thought to have recruited within the first few years of reservoir formation (Albrecht et al. 2008b). These populations of long-lived adult fish began disappearing 40-50 years after the creation of these reservoirs (Minckley 1983). In the most dramatic case, the Lake Mojave razorback sucker population (estimated at 75,000 individuals in the 1980s) had dropped to just 218 individuals by March 2007 (Albrecht et al. 2008b). It has long been known that razorback sucker successfully spawn in large reservoirs. In fact, the main management strategy for the LCRB to augment their populations of razorback sucker is to collect wild-produced larval razorback sucker being produced in these reservoirs, rear them in predator-free environments, and then stock these fish back into the reservoirs and rivers once they have reached sub-adult or adult size (Albrecht et al. 2008b). This management approach was adopted because natural recruitment in most LCRB reservoirs was either very rare or non-existent and it is thought that stocking razorback sucker of larger size (minimum of 8.5 inches) gives them a higher likelihood of avoiding predation, thus increasing their chances of recruiting (Albrecht et al. 2008b). However, in the case of Lake Mead razorback sucker population seems to be a generally young, naturally-reproducing and self-sustaining population that appears to be increasing over time (Albrecht et al. 2008b).

Likewise, wild razorback sucker were known to have occupied the San Juan River arm of Lake Powell, roughly 25 years after its construction. The Lake Powell razorback sucker population has been undergoing regular, if unintentional, augmentation since 1994, as razorback sucker stocked into the San Juan River have moved downstream into Lake Powell. Sampling during spring and summer of 2011 resulted in the documentation of suspected spawning aggregations in this area of Lake Powell.

Relationship to the Recovery Program

While the proposed razorback sucker survey in Lake Powell would take place outside of the riverine portion of the San Juan River, it is still directly applicable to tasks 3.3.2.1 and 3.3.2.2 of the SJRIP Long Range Plan (dated March 2009). It also has the potential to yield data that, when combined with information from other studies and monitoring efforts, is applicable to the following tasks in the Long Range Plan: 2.2.1.2, 2.2.1.3, 2.2.3.1, 2.2.4.1, 2.2.4.2, 2.2.5.1, 2.2.5.2, 4.1.1.1, 5.1.1.1, 5.1.1.2, 5.1.2.3, 5.1.3.3, and 5.1.4.1. What role Lake Powell plays in the overall recovery picture for endangered razorback sucker and Colorado pikeminnow in the San Juan River was the most frequently asked question during the series of monitoring workshops held in spring 2009.

Description of Study Area

The study area for the Lake Powell razorback sucker survey would begin immediately downstream of the current waterfall (RM -1.1) and would extend downstream to approximately Neskahi Canyon (~ LM 24.0) -- a distance of approximately 35 miles.

Objectives

1) Sample and document the overall make-up of the fish community in the San Juan River arm of Lake Powell, with emphasis being placed on collecting the following types of data on endangered razorback sucker:
    a. Presence/absence
    b. Distribution and abundance
    c. Population size structure
    d. Point of origin (based on PIT tag data)
2) Attempt to identify possible spawning aggregations of razorback sucker in the San Juan River arm of Lake Powell.

Objectives that are new for 2012:

3) Collect larval fish samples near locations of suspected spawning aggregations of razorback sucker to determine if razorback sucker are spawning successfully.
4) Collect fin clips from razorback sucker that do not contain a PIT tag when captured. These data will help determine if recruitment may be occurring in Lake Powell.

Secondary objective for incidental catch:

5) Sample the San Juan River arm of Lake Powell and document the following types of data for endangered Colorado Pikeminnow:
    a. Presence/absence
    b. Distribution and abundance
    c. Point of origin (based on PIT tag data)

Methods

The USFWS's Colorado River Fishery Project (USFWS-CRFP) office from Grand Junction, CO, UDWR Moab Field Station (UDWR-Moab) and personnel from various offices of the Navajo Nation Department of Fish and Wildlife will be conducting the field work aspects of this study. Sampling crews will consist of five people to run trammel nets, do sonic telemetry work, perform electrofishing, and collect larval fish samples. USFWS-CRFP and UDWR-Moab will be jointly responsible for data entry, analysis and report writing. All boats and sampling equipment to be used on this project will be decontaminated (following National Park Service protocols) prior to launching and after take-out to insure that no aquatic invasive nuisance species (AIS) are being transported either to or from Lake Powell.

Sonic Telemetry

Work done in Lake Mead from 1996-2007 indicated that one the most efficient ways to locate a natural population of razorback sucker in a reservoir was through the use of sonic telemetry (Albrecht et al. 2008b). They found that artificially-reared razorback sucker that were implanted with sonic tags and stocked into a reservoir would quickly integrate into natural population of razorback sucker (Albrecht et al. 2008). In 2011, the use of this technique also resulted in the capture of numerous razorback sucker in Lake Powell.

Up to 10 large sub-adult or adult razorback sucker (preferably $\geq$ 400 mm TL) will be obtained from USFWS's Ouray National Fish Hatchery. Five of these fish will be surgically implanted with Sonotronics Model CT-82-2 sonic tags with a 14-month battery life (following Albrecht et al. 2008). All 10 fish will be held at the Ouray National Fish Hatchery while those that have undergone surgery recover and heal. The other five fish will be held in reserve in case any of the sonic-tagged fish die following surgery. In all instances of tag insertion, the transmitter will not exceed 2% of the fish's body weight. While at Ouray National Fish Hatchery, these fish will be fed and monitored daily by USFWS fish culturists. At the end of February or beginning of March 2011, all of the remaining razorback sucker will be transported to Lake Powell, tempered, and stocked (following appropriate USFWS protocols) just downstream of the waterfall or at Piute

Canyon ~ 2 miles below Neskahi Canyon. Stocking efforts will be coordinated with the Utah Department of Natural Resources to make sure that all appropriate importation permits and health inspections are obtained prior to stocking. It is anticipated that stocking in this time frame will precede any potential spawning by several weeks to a month, thus allowing newly stocked fish several weeks to acclimate to reservoir conditions and locate resident fish before field sampling commences (B. Albrecht, pers. comm.).

During the initial acclimation period, sonic tracking will be carried out weekly or bi-weekly. Once field sampling begins (i.e., during the suspected spawning season from March to June), sonic telemetry will occur on a nearly weekly basis (or daily basis during sampling trips). This intensive sonic telemetry will help guide researchers to areas in which to set trammel nets. If the SJRIP Biology Committee is interested in possibly extending this sampling effort for an additional season, then after spawning season (i.e., in months during which field sampling is no longer being conducted), sonic telemetry should be conducted on a nearly monthly basis. In such a case, a longer-lived sonic transmitter would be needed (i.e., Sonitronics Model Ct-82-3 with a 48-month battery life). Data for each sonic telemetry contact will be include date, time, temperature (water and ambient), Global Positioning System (GPS) coordinates, and water depth.

Field Sampling

Field sampling will occur during late spring and early summer 2012 and will be focused on attempting to locate possible spawning aggregations of razorback sucker in the San Juan River arm of Lake Powell. Sampling done in Lake Mead from 1996-2007 determined that spawning season is the most efficient time to successfully sample razorback sucker due to the movement and location of fish associated with spawning activity (Albrecht et al. 2008b). Thus sampling for razorback sucker in the San Juan River arm of Lake Powell will take place during the predicted spawning period. Studies done in Lake Mead also determined that the return rate of razorback sucker captured during spawning was similar to that of fish captured during the remainder of the year; thus sampling during spawning season did not appear to have an affect on adult survival (Albrecht et al. 2008b).

Predicting Spawning Season

Larval razorback sucker collections in Lake Mead increase when surface temperatures reach approximately 55˚F (12.8˚C) and peak at surface temperatures in the high 50's to mid 60's (Albrecht et al. 2006). Historical data from Lake Powell indicate surface water temperatures typically reaching 55˚F (12.8˚C) during early to late April. In addition, data obtained from collections of larval razorback in the mainstem San Juan River indicated that over the last five-year period (2005-2009) first hatching dates for larval razorback sucker began between 26 March and 30 April (at water temperatures ranging from 12.9-15.3˚C) and last hatching dates ended between 24 May and 2 July (at water temperatures ranging 14.4-21.8˚C; Brandenburg and Farrington 2009, 2010). Examination of water temperatures (from the Bluff USGS gage) in the 15-day window prior to first and last hatching dates, compared to known razorback sucker egg incubation times (Bozek et al. 1984, Snyder & Muth 1990, USFWS 2002) indicated that, over this same five-year period, date of first spawning likely began between 11 March and 14 April (at water temperatures from 10.1-12.5˚C) and date of last spawning likely ended between 18 May and 26 June (at temperatures from 15.0-21.5˚C). Using the two most extreme values to bracket the entire spawning season window, this yields a period of 107 days (roughly 15 weeks), from 11 March to 26 June, with three of five years having spawning beginning in late March. Brandenburg and Farrington (2008) stated that the mean temperature during hatching was usually just over 15˚C. In addition, the distribution of razorback sucker protolarvae in the San Juan River was significantly higher in May than in any other month (Brandenburg and Farrington 2010). It

is anticipated that spawning season of razorback sucker in the San Juan River arm of Lake Powell should not vary greatly from those of fish in the mainstem river. Spawning may take place just slightly earlier in the San Juan River arm of Lake Powell, because its larger surface area absorbing more ambient heat. Observations during field work in 2011 indicated spawning activity occurring in late May near Neskahi Canyon. Thus, the timing and duration of razorback sucker spawning in the mainstem San Juan River can likely be used as a reasonable surrogate to predict when spawning of this species is likely to occur in the San Juan River arm of Lake Powell.

Trammel Netting

The main sampling technique utilized will be trammel-netting, which has been identified as the most effective method for collecting razorback sucker in Lake Powell (Mueller et al. 2000) and Lake Mead (Albrecht et al. 2006). Trammel nets will be 150 feet long by 6 feet deep. Inner mesh sizes of the trammel nets will be 1 or 2 inches and the outer panels will be 12 inches. Nets will be set perpendicularly to shorelines in the late afternoon/evening before sunset and pulled the following morning shortly after sunrise around the Neskahi site (following Albrecht et al. 2008b). Nets will be set at 2-4 hour intervals in the upstream sample site (around Spencer's Camp below Zahn Bay to the waterfall) in order to reduce potential Colorado Pikeminnow mortality. The total number of nets set each day as well as the total number of hours each net is set will be recorded in order to allow CPUE comparisons to be made between sites and sampling efforts. Global Positioning System (GPS) coordinates, substrate type, and any additional pertinent habitat information (e.g., the presence/absence of emergent or submergent cover, water turbidity) will be recorded for each net set. General water quality parameters will be recorded including temperature, conductivity, salinity, and dissolved oxygen.

All endangered fish encountered will be anesthetized (using MS-222), weighed, measured and checked for the presence of a PIT tag. If no PIT tag is present, or if only an older (400 kHz) PIT tag is present, then a new (134 kHz) PIT tag will be implanted prior to it being released. Up to five razorback sucker may be surgically implanted with additional sonic transmitters prior to release (following Albrecht et al. 2008). Somatic condition and sex will be recorded for all endangered species, when evident. All razorback sucker without a PIT tag present will have a quarter inch fin ray removed from the left pelvic fin for aging via Albrecht's method (2008b). All non-endangered fish collected will be recorded by species and life stage. A representative sub-sample of each non-endangered fish species encountered will be weighed and measured.

Timing and Location of Field Sampling

Given the predicted 15-week spawning window discussed earlier, field sampling in 2011 was spread out to cover as much of the predicted spawning season as possible. However, the relative isolation of the San Juan River arm of Lake Powell, difficulty in accessing this portion of the lake, and need to stay in contact with sonic-telemeterd fish argues for keeping sampling trips relatively close together. Thus 2012 field sampling is proposed to occur for eight weeks, spread across the predicted spawning window. The first sampling effort (7 days) is proposed for 5 April through 11 April, the second (43 days) for 25 April through 11 June. This 50-day sampling effort will allow researchers to cover approximately 50% of the predicted spawning season. Sampling will occur in 8 of the 13 calendar weeks that encompass the core of the predicted spawning period.

In Lake Mead, placement of trammel nets is determined by a combination of factors. Nets are set in locations where adult razorback sucker have been successfully captured in the past, in close proximity to locations where sonic-tagged individuals were found, and near confirmed or

suspected spawning areas (Albrecht et al. 2008b).

It is anticipated that sonic-tagged razorback sucker will survive and guide researchers to appropriate sites to set trammel nets. Additionally, nets will be set in close proximity to possible spawning substrate (gravel or cobble) when this sized substrate can be located during spring sampling and in known capture sites determined in 2011. UDWR-Wahweap personnel will assist us in identifying areas where possible appropriately-sized substrates exist. Additional sites around each of these three sites will be sampled in conjunction with the main site at the principal investigators' discretion and as captured fish lend further insight into where the best sampling locations might be.

Additional Sampling Methods

Due to low lake levels, a large amount of riverine habitat exists downstream of the current waterfall. Sampling this portion of the San Juan River arm of Lake Powell will require the use of electrofishing. Although an unexpected result, 2011 sampling proved that electrofishing available shallow water habitat in the most downstream sections of lacustrine critical habitat is also successful. Electrofishing will take place from a motorized, aluminum jon boat. The electrofishing crew will consist of two netters and one boat operator. Electrofishing crews will sample along shorelines, in coves and embayments, in and around sunken obstacles, flooded tamarisk, or emergent vegetation and in other areas that are generally hard to sample with nets. Mueller et al., 2000 identified electrofishing as the best viable option for sampling flooded tamarisk habitats at the inflow areas of Lake Powell. Data for fish species encountered during electrofishing operations will be handled the same as for trammel-netting. Sampling effort (seconds) will be recorded in order to allow CPUE comparisons to be made between sites and sampling efforts.

When adult razorback sucker are handled in ripe condition, larval samples will be collected during the night near the adult fish capture sites. A sample will consist of suspending two Optronics Fish-N-Lite's ® over the gunwale of a boat, submerging the lights and collecting larval fish with aquaria dip-nets for fifteen minutes. G.P.S coordinates will be recorded, as will effort to determine CPUE. Larvae will be preserved in 100% ethanol. Samples will be sent to American Southwest Ichthyological Researcher's L.L.C. for identification.

Data

A summary of all sonic telemetry, trammel-netting, and any other sampling methods employed will be generated. A summary of the movements and locations of sonic-telemetered fish throughout the sampling period will be produced. In addition, a summary of the overall numbers, size-class distribution and relative abundance of all fish species captured will also be generated. Wherever possible, the history of all endangered species captured from the San Juan River arm of Lake Powell that had originally been stocked into the San Juan River (as determined by PIT tag numbers) will be researched and detailed. Lake Powell elevation and San Juan River inflows during sampling trips will also be summarized.

When appropriate, population estimates will be generated for razorback sucker captured in the San Juan River arm of Lake Powell using closed population models within program MARK if data is sufficient for such estimates. In 2011, a sufficient number of razorback sucker were captured, but the number of recaptures was not sufficient to calculate a reliable estimate. Program MARK will be used to determine confidence intervals around the estimate, the coefficient of variation, and the probability of capture. Separate population estimates will be calculated for discrete sampling areas if data indicates razorback are not moving between sampling areas.

Alternately sampling each area (Neskahi and Spencer's Camp) equally will allow for a multiple pass estimate to be generated. Use of multiple passes will allow for testing of the reality of the results generated. Furthermore, using several combinations of trips will allow for lessening the likelihood of violating assumptions of the models used.

Products

USFWS-CRFP and UDWR-Moab will have joint responsibility for report writing and data presentation for this project. A draft report for the Lake Powell razorback sucker survey is scheduled to be available by 31 March 2013. The final version of this report which incorporates comments received is scheduled to be completed by 1 July 2013. Data files containing PIT tag information on the federally-listed endangered fish species (razorback sucker and Colorado pikeminnow) collected during this study will be submitted for inclusion in the SJRIP's integrated database by 31 December 2012. Data files containing the remainder of the information (e.g., data on common fish species) collected during the Lake Powell razorback sucker survey will be submitted for inclusion in the SJRIP's integrated database by 31 March 2013.

Qualifications of the Principal Investigators

Fish Biologist – Darek Elverud – UDWR-Moab

Darek has 5 years experience performing fisheries research and management in the Green, Colorado, and San Juan rivers and an additional 3 years fisheries experience in other areas. For the last 5 years, Darek has been a fish biologist for UDWR-Moab Field Station in charge of performing fisheries research and management associated with the San Juan River Recovery Implementation Program (SJRIP) funded nonnative removal project on the lower San Juan River.

Fish Biologist (GS-11) – Travis Francis, USFWS-CRFP

Travis has 10 years experience performing fisheries research and management in the Colorado, Gunnison and San Juan rivers. For the last 9 years, Travis has been a fish biologist for Region 6 of the USFWS in charge of performing fisheries research and management associated with the Upper Colorado River Recovery Program (UCRRP). During his involvement with the UCRRP, Travis' responsibilities have ranged across a number of areas including: 1) Database manager for the upper basin 2) humpback chub population monitoring in Black Rocks on the Colorado River 3) razorback sucker propagation biologist at the 24 Rd. recirculation hatchery in Grand Junction Colorado and, 4) ran field crews for other projects associated with the UCCRP and San Juan River Basin Recovery Implementation Program (SJRIP). Travis has authored 14 annual agency reports and scopes of work. He authored Population Size and Structure of Humpback Chub, *Gila cypha* and Roundtail Chub, *G. robusta*, in Black Rocks, Colorado River, Colorado, 2007–2008, and an Overview of the Upper Colorado River Recovery Program propagation program with a preliminary assessment of survival of stocked fish in the rivers of the Upper Colorado River Basin. He has served as a member on the UCRRP bonytail ad hoc committee and propagation committee. He is the current alternate representative to the San Juan River Biology Committee for Region 6 of the USFWS.

Fish Biologist (GS-13) -- Dale Ryden, USFWS-CRFP

Dale has 21 years experience performing fisheries research and management in the Colorado, Gunnison and San Juan rivers. For the last 20 years, Dale has been the principal fish biologist for Region 6 of the USFWS in charge of performing fisheries research and management associated with the San Juan River Recovery Implementation Program (SJRIP). During his involvement with the SJRIP, Dale's responsibilities have ranged across a number of areas including: 1) initial reintroduction efforts for razorback sucker in the mainstem San Juan River; 2) long-term augmentation and monitoring of the San Juan River's two endangered fish populations; 3) annually monitoring the riverwide distribution and abundance of the entire large-bodied fish community in the San Juan River; 4) determining habitat use and preference and locating

spawning areas of stocked razorback sucker and both stocked and wild Colorado pikeminnow via radio-telemetry; and, 5) performing and analyzing the effects of nonnative fish removal operations. Dale has authored two peer-reviewed journal articles on his work in the San Juan River basin, as well as over 30 agency reports, and numerous augmentation plans and addendums. He co-authored a genetics management plan for the endangered Colorado pikeminnow and razorback sucker in the San Juan River and has been a contributing author to both the flow recommendations report for the reoperation of Navajo Reservoir and the long-term monitoring protocols document currently being used by the SJRIP. During the development of the flow recommendations document, Dale acted as the chairman for the Native Fishes Workgroup. He is the current representative to both the Upper Basin and San Juan River Biology committees for Region 6 of the USFWS.

Biological Technician – Crew Leader (GS-6) – Benjamin Schleicher, USFWS-CRFP
Ben has two years with the USFWS-CRFP performing fisheries research and management in the Colorado and San Juan River basins, leading crews on daily and multi-day trips dealing with nonnative removal and endangered species monitoring. He also spent an additional two years with the UDWR-Moab performing the same tasks in the Colorado, Green, and San Juan River basins.

Projected Duration Of Project

The Lake Powell razorback sucker survey is currently scheduled to be a two-year effort. However, given the experimental nature of this effort and the fact that adjustments in timing and location and types of sampling may be indicated after the second year's data is collected, the principal investigators feel that having a review by the SJRIP Biology Committee and a possible third year of data collection may be warranted.

Literature Cited

Albrecht, B., P.B. Holden, and M. Golden. 2006. Lake Mead razorback sucker monitoring recommendations. Prepared for the Department of Resources, Southern Nevada Water Authority, by BIO-WEST, Inc., Logan, UT. PR-977-2.

Albrecht, B., R. Kegerries, R. Rodgers, and P. Holden. 2008a. Razorback sucker studies on Lake Mead, Nevada and Arizona 2007-2008 Annual Report. Prepared for the Department of Resources, Southern Nevada Water Authority, by BIO-WEST, Inc., Logan, UT. PR 1161-1.

Albrecht, B., T. Sanderson, and P.B. Holden. 2008b. Razorback sucker studies in Lake Mead, Nevada and Arizona: 1996-2007 Comprehensive Report. Submitted to the Bureau of Reclamation and Southern Nevada Water Authority, by BIO-WEST, Inc., Logan, UT. PR 1093-2.

Bestgen, K.R. 1990. Status review of the razorback sucker, Xyrauchen texanus. Contribution No. 44, Colorado State University Larval Fish Laboratory, Fort Collins. Submitted to the Bureau of Reclamation, Salt Lake City, UT.

Bestgen, K.R., K.A. Zelasko and G.C. White. 2009. Survival of hatchery-reared razorback sucker *Xyrauchen texanus* in the San Juan River Basin, New Mexico, Colorado, and Utah. Report submitted to the Recovery Implementation Program for Endangered Fishes in the San Juan River Basin. Contribution 160 of the Larval Fish Laboratory, Colorado State University.

Bozek M.A., L.J. Paulson, and J.E. Deacon. 1984. Factors affecting reproductive success of bonytail chubs and razorback sucker in Lake Mohave. Technical Report No. 12. Lake Mead Limnological Research Center, Department of Biological Sciences, University of Nevada, Las Vegas.

Brandenburg, W.H., and M.A. Farrington. 2008. Colorado pikeminnow and razorback sucker larval fish survey in the San Juan river during 2007. American Southwest Ichthyological

Researchers, L.L.C. Albuquerque, NM.
Brandenburg, W.H., and M.A. Farrington. 2009. Colorado pikeminnow and razorback sucker larval fish survey in the San Juan river during 2008. American Southwest Ichthyological Researchers, L.L.C. Albuquerque, NM.
Brandenburg, W.H., and M.A. Farrington. 2010. Colorado pikeminnow and razorback sucker larval fish survey in the San Juan river during 2009. American Southwest Ichthyological Researchers, L.L.C. Albuquerque, NM.
Brooks, J.E., L. Crist, L.A. Ahlm, R. Bliesner, M.J. Buntjer, W.P. Goettlicher, K. Lashmett, W.J. Miller, D.L. Propst, and D.W. Ryden. 1993. San Juan River Seven Year Research Program: Summary Report 1992. San Juan River Recovery Implementation Program, Dexter, NM.
Buntjer, M.J., T. Chart, and L. Lentsch. 1993. Early life history investigations. Utah Division of Wildlife Resources, Salt Lake City, UT.
Buntjer, M.J., T. Chart, and L. Lentsch. 1994. Early life history fishery survey of the San Juan River, New Mexico and Utah. Utah Division of Wildlife Resources, Salt Lake City, UT.
Furr, D.W. and J.E. Davis. 2009. Augmentation of the San Juan River razorback sucker population: 2008. Final Interim Progress Report. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
Furr, D.W. 2011. San Juan River Razorback Sucker Population Augmentation: 2010. Draft Annual Report. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
Furr, D.W. 2011. Augmentation of Colorado Pikeminnow (*Ptychocheilus Lucius*) in the San Juan River: 2010. Draft Annual Report. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
Gido, K.B., and D.L. Propst. 1994. San Juan River secondary channel community studies permanent study sites: 1993 Annual Report (Final). New Mexico Department of Game and Fish, Santa Fe, NM.
Lashmett, K. 1993. Fishery survey of the lower San Juan River and the upper Arm of Lake Powell (RM 4.0-[-]11.0) 1991/1992. Bureau of Reclamation, Durango, CO.
Lashmett, K. 1994. Fishery survey of the lower San Juan River and the upper Arm of Lake Powell (RM 4.0-[-]0.8) 1993. Bureau of Reclamation, Durango, CO.
Maddux, R.H., L.A. Fitzpatrick, and W.A. Noonan. 1993. Colorado River endangered fishes Critical Habitat: Draft Biological Support Document and appendices. U.S. Fish and Wildlife Service, Salt Lake City, UT.
McKay, T.S. 1990. Razorback sucker capture and transport in Lake Powell, April 1990. Utah Division of Wildlife Resources, Salt Lake City, UT.
Minckley, W.L. 1983. Status of the razorback sucker, Xyrauchen texanus (Abbott), in the Lower Colorado River Basin. Southwestern Naturalist 28;165-187.
Minckley, W.L. 1973. Fishes of Arizona. Arizona Game and Fish Department, Phoenix, AZ.
Mueller, G., M. Horn, Q. Bradwisch, and L. Boobar. 2000. Examination of native fish recruitment and description of the fish communities found in the San Juan and Colorado River interface zones of Lake Powell, Utah. U.S.D.I., U.S. Geological Survey. Open File Report 01-159.
Platania, S.P. 1990. Biological summary of the 1987-1989 New Mexico-Utah ichthyofaunal study of the San Juan River. Report to the New Mexico Dept. of Game and Fish, Santa Fe, NM, and the U.S. Bureau of Reclamation, Salt Lake City, UT.
Ryden, D.W. 2000. Monitoring of experimentally stocked razorback sucker in the san Juan River: March 1994 through October 1997. U.S. Fish and Wildlife Service, Grand Junction, CO.
Ryden, D.W. 2009. Long term monitoring of sub-adult and adult large-bodied fishes in the San Juan River: 2008. U.S. Fish and Wildlife Service, Grand Junction, CO.
Ryden, D.W. 2011. Long term monitoring of sub-adult and adult large-bodied fishes in the San Juan River: 2010. U.S. Fish and Wildlife Service, Grand Junction, CO.

Ryden, D.W, and F.K. Pfeifer. 1993. Adult fish collections on the San Juan River (1991-1992): Annual Progress Report. U.S. Fish and Wildlife Service, Grand Junction, CO.

Ryden, D.W., and F.K. Pfeifer. 1994a. An experimental stocking plan for razorback sucker in the San Juan River. U.S. Fish and Wildlife Service, Grand Junction, CO.

Ryden, D.W., and F.K. Pfeifer. 1994b. Adult fish community monitoring on the San Juan River: 1993 Annual Progress Report. U.S. Fish and Wildlife Service, Grand Junction, CO.

San Juan River Basin Recovery Implementation Program. 2009. Long-Range Plan. San Juan River Basin Recovery Implementation Program, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Snyder, D.E., and R.T. Muth. 1990. Descriptions and identification of razorback, flannelmouth, white, Utah, bluehead, and mountain sucker larvae and early juveniles. Colorado Division of Wildlife, Technical Publication No. 38.

U.S. Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants: the razorback sucker (Xyrauchen texanus) determined to be an endangered species. Dept. of the Interior, U.S. Fish and Wildlife Service, Federal Register, 23 October 1991, 56:54957-54967.

U.S. Fish and Wildlife Service. 1994. Determination of critical habitat for the Colorado River endangered fishes; razorback sucker, Colorado pikeminnow, humpback chub, and bonytail chub. Dept. of the Interior, U.S. Fish and Wildlife Service, Federal Register, 21 March 1994, 59:13374-13400.

BUDGET

USFWS-CRFP - Fiscal Year 2012 Budget:
For 7+ weeks of field sampling, data analysis & report writing

Personnel/Labor Costs (Projected Federal Salary + Benefits)	
Acquiring, Tagging, & Stocking Razorback Sucker	
Principal Biologist (GS-11) – 48hrs @ $42.91/hour	$ 2,060.00
Crew Leader (GS-6) – 48hrs @ $24.70/hour	$ 1,186.00
(2 person X 3 days transport of fish)	
(2 person X 3 days of implanting sonic tags)	
Field Sampling: Logistics	
Assistant Project Leader (GS-13) – 48hrs @ $61.38/hour	$ 2,947.00
Principal Biologist (GS-11) – 48hrs @ $42.91/hour	$ 2,060.00
(1 person X 12 days rigging/planning/organization)	
Crew leader (GS-6) – 96hrs @ 24.70/hour	$ 2,372.00
Biological Technicians (GS-5) – 96hrs @ $17.45/hour	$ 1,675.00
(2 people X 12 days rigging/organization/clean-up)	
Field Sampling: Trammel-Netting, Electrofishing, Sonic Telemetry	
Principal Biologist (GS-11) – 264hrs @ $42.91/hour	$ 11,329.00
Crew Leader (GS-6) – 136hrs @ $24.70/hour	$ 3,360.00
Overtime (1 ½ times GS-6) – 75hrs @ $37.05/hour	$ 2,779.00
(1 person X 50 days)	
Biological Technicians (GS-5) – 400hrs @ $17.45/hour	$ 6,980.00
Overtime (1 ½ times GS-5) – 225hrs @ $26.18/hour	$ 5,891.00
(1 person X 50 days)	
Sub Total	$ 42,639.00

Permitting; Coordination; Data Input, Analysis, & Management; Report Writing; Office & Administrative Support (Projected Federal Salary + Benefits)	
Assistant Project Leader (GS-13) – 112hrs @ $61.38/hour	$ 6,875.00
Principal Biologist (GS-11) – 312hrs @ $42.91/hour	$ 13,388.00
Administrative Officer (GS-9) – 120hrs @ $39.63/hour	$ 4,756.00
Sub Total	$ 25,019.00

Travel and Per Diem (Based on Published FY-2011 Federal Per Diem Rates)	
Hotel Costs	
6 nights @ $77/night (in Vernal, UT)	$ 462.00
Per Diem (Hotel Rate)	
6 days X 2 people X $46/day	$ 552.00
Per Diem (Camping Rate)	
50 days X 2 people X $28/day	$ 2,800.00
Sub Total	$ 3,814.00

Equipment and Supplies	
Vehicle Maintenance & Gasoline (@ $330/month lease $0.30/mile)	
Acquiring & Stocking Fish	
(470 miles round trip from Grand Junction, CO to Ouray National Fish Hatchery X 1 trip) X 1 vehicle	$ 224.00
(1,226 miles round trip from Grand Junction, CO to ONFH to Piute Farms boat launch X 1 trip) X 1 vehicle	$ 451.00
Trammel Netting, Electrofishing, Sonic Telemetry	

(450 miles round trip from Grand Junction, CO to Bullfrog X 2 trips) X 2 vehicles per trip	$ 2,520.00
(650 miles round trip from Grand Junction, CO to Piute Canyon, UT to trade out crew members and do resupply X 7 trips) X 1 vehicle per trip	$ 2,355.00
Boat Gas	
Trammel Netting & Sonic Telemetry	
(800 gallons for 2 boats used for 66 days X $4.25/gallon)	$ 3,400.00
Trammel Nets (10 nets @ $400 per net + $35 shipping/net)	$ 4,350.00
Equipment Maintenance, Repair, & Replacement (e.g., outboard motors, dip nets, PIT tag gear, aluminum jon boats, trailers, generators, electrofishing equipment, life jackets, camping equipment, telemetry equipment, etc.)	$ 6,000.00
Cost of purchasing a new 4-wheeel drive pick-up to be used for San Juan field work. Cost to be spread across four separate San Juan workplans.	$ 8,996.00
Sub Total	$ 28,296.00
USFWS-CRFP (Grand Junction, CO) Total	$ 99,768.00
USFWS Region 6 Administrative Overhead (11%)	$ 10,974.00
USFWS Region 6 Total	$110,742.00

UDWR-Moab Fiscal Year 2012 Budget:

Personnel/Labor Costs (Salary + Benefits)	
Acquiring, Tagging, & Stocking Razorback Sucker	
Principal Biologist – 6 days @ $340/day	$ 2,040.00
Logistics	
Project Leader - 6 days @ $438/day	$ 2,628.00
Principal Biologist - 12 days @ $340/day	$ 4,080.00
(1 person X 3 days rigging/planning/organization per trip)	
Biological Technicians - 12 days @ $195/day	$ 2,340.00
(2 people X 3 days rigging/organization/clean-up per trip)	
Trammel-Netting, Electrofishing, Sonic Telemetry	
Principal Biologist - 30 days @ $340/day	$ 10,200.00
Biological Technicians - 72 days @ $195/day	$ 13,650.00
Sub Total	$ 34,938.00
Data Input, Analysis, & Management; Report Writing	
Project Leader - 6 days @ 438/day	$ 2,628.00
Principal Biologist – 39 days @ $340/day	$ 13,260.00
Sub Total	$ 15,888.00
Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)	
Hotel in Vernal, UT	
3 nights @ $77/night	$ 231.00
Hotel per diem	
6 days @ $36/day	$ 216.00
Per Diem (Camping Rate)	
2 people X 50 days @ $25/day	$ 2,500.00
Sub Total	$ 2,947.00

Equipment and Supplies

Vehicle mileage and rent[a]	
(3 trucks for 10% of fleet expence)	$ 4,250.00

[a] Calculated as the total percentage of annual fleet costs based on the number of trucks, days used, and total miles driven. Annual fleet costs for the Moab Field Station FY12 is estimated to be $42,500 for 7 vehicles. Moab fleet vehicles are not assigned to specific projects; instead they are rotated through all projects in the UCRRP & SJRRP.

Boat Gas	
Trammel Netting & Electrofishing	
(2 boat for 66 days of sampling)	$ 2,550.00
Sonic Telemetry Equipment	
Sonic tags (10 tags @ $310/tag)	$ 3,100.00
Repair of sonic receiver and hydrophone	$ 500.00
Equipment Maintenance, Repair, & Replacement (e.g., larval sample bottles, ethanol of sample preservation, dip nets, PIT tag gear, boat trailers, outboard motor repair, generators, electrofishing equipment, life jackets, camping equipment, etc.)	$ 6,000.00
Sub Total	$ 16,400.00
UDWR-Moab Total	$ 70,173.00
UDWR-Moab Administrative Overhead (20%)	
18% of personnel cost for Salt Lake Office administration indirect cost, building operation costs for Moab Field Station (electricity, phone and computer lines, rent, etc.)	$ 12,631.00
UDWR Total	$ 82,804.00

Navajo Nation Department of Fish and Wildlife - Fiscal Year 2012 Budget:

Personnel/Labor Costs (Salary + Benefits)	
Fish Biologist – 25 days @ $159.68/day	$3,992.00
(1 person x 7 days x 1 trip)	
(1 person x 6 days x 3 trips)	
Biological Technician – 25 days @ $87.44/day	$2,186.00
(1 person x 7 days x 1 trip)	
(1 person x 6 days x 3 trips)	
Sub-total	$6,178.00
Fringe Benefits $6,178.00 x 42.48%	$2,624.00
Total Personnel/Labor	**$ 8,802.00**
Travel and Per Diem	
Camping Costs – 50 nights @ $29/night	$1,450.00
(25 nights x 2 people)	
e.g., food, tents, dry-bags, sleeping gear, etc	
Vehicle Lease Maintenance & Gasoline	
Lease @ $454/month x 2 + 8 trips x 436 miles x .30/mi	$1,954.00

Total Travel/Per Diem	**$3,404.00**

Equipment

Equipment Maintenance, Repair, & Replacement (e.g., life jackets, hip boots, work wear, gloves, coolers, etc)	$800.00
Total Equipment	**$800.00**

Navajo Nation Department of Fish and Wildlife Total	**$13,006.00**
Administrative Overhead (18.05%)	**$ 2,348.00**
$13,006.00/1.1805 X .1805 = $2,348.00	
Navajo Nation Total	**$15,354.00**

American Southwest Ichthyological Researchers - Fiscal Year 2012 Budget:

LARVAL FISH IDENTIFICATION PROPOSAL FOR THE LAKE POWELL ICHTHYOFAUNAL SURVEY

Principal Investigators:
Steven P. Platania, W. Howard Brandenburg, and Michael A. Farrington
American Southwest Ichthyological Researchers, L.L.C. (*ASIR*)
800 Encino Place NE
Albuquerque, New Mexico 87102-2606
505.247.9337 (voice) 505.247.2522 (facsimile)
steven_platania@asirllc.com, howard_brandenburg@asirllc.com,
michael_farrington@asirllc.com

This proposal is in response to a request from the Utah Division of Wildlife Resources (UDWR) and the United States Fish and Wildlife Service (USFWS) for assistance in the identification of larval fishes collected from the San Juan River arm of Lake Powell. Larval fish will be collected in light-traps and it is anticipated that the total number of individuals collected during this one-year investigation will be about 2,000. This proposal is for work that UDWR and USFWS will be conducting through the SJRBRIP during the 2013 fiscal year (2012 calendar year).

Personnel from American Southwest Ichthyological Researchers (ASIR) with expertise in the identification of San Juan River Basin larval fish will identify individual specimens to species. Stereomicroscopes equipped with transmitted light bases (light and dark field) and polarized filters (that enhance the delineation of myomeres, pterygiophores, and fin rays) are used to assist with the identifications. Larval fish keys are referenced to assist in species specific determinations (e.g., Contributions to a guide to the cypriniform fish larvae of the Upper Colorado River System [Snyder 1981], Catostomid fish larvae and early juveniles of the Upper Colorado River basin, Morphological descriptions, comparisons, and computer interactive key [Snyder and Muth 2004], and Identifications of larval fishes of the Great Lakes Basin [Auer 1982]).

In addition to identifying each specimen to species, all federally endangered species (i.e.,Colorado pikeminnow, *Ptychocheilus lucius* and razorback sucker, X*yrauchen texanus*) will be measured (both total and standard length) and ontogenetic life stage determined. At the conclusion of the identification process, all data will be entered into a spreadsheet format (e.g., Microsoft Excel) and both electronic and hard copies sent to UDWR and the USFWS.

LITERATURE CITED

Auer, N. A. (ed.). 1982. Identification of larval fishes of the Great Lakes basin with on the Lake Michigan drainage. Great Lakes Fishery Commission, Ann Arbor, MI 48105. Special Pub. 82-3: 744 pp.

Snyder, D. E. 1981. Contributions to a guide to the cypriniform fish larvae of the Upper Colorado River system in Colorado. U.S. Bureau of Land Management, Biological Sciences Series 3, Denver, CO. 81 pp.

Snyder, D. E. and R. T. Muth. 2004. Catostomid fish larvae and early juveniles of the upper Colorado River Basin- morphological descriptions, comparisons, and computer-interactive key. *Colorado Division of Wildlife Technical Publication* No. 42.

PROPOSED BUDGET

Laboratory Processing and Identification		
Research Associate (W.H. Brandenburg and M. A. Farrington)	12 staff days	$ 3,900
TASKS: *Laboratory identification, developmental staging, specialized endangered fish processing*		
Data Entry		
Research Assistant (J.L. Hester)	2 staff days	$ 400
TASKS: *Data entry and review.*		
Project Subtotal		$ 4,300
G & A (20%)		$ 860
ASIR TOTAL		$ **5,160**

Combined Budget Costs for All Involved Agencies - Fiscal Year 2012 Budget:

U.S. Fish & Wildlife Service	**$110,742.00**
Utah Division of Wildlife Resources	**$ 82,804.00**
Navajo Nation Department of Fish and Wildlife	**$ 15,354.00**
American Southwest Ichthyological Researchers	**$ 5,160.00**
OVERALL WORKPLAN TOTAL	**$ 214,060.00**

Update and Maintenance of San Juan River Basin Recovery Implementation Program Database Fiscal Year 2012 Draft Project Proposal

Principal Investigators: Scott Durst
U.S. Fish and Wildlife Service, SJRRIP Program Office
2105 Osuna NE Albuquerque, New Mexico 87113
(505) 761-4739
scott_durst@fws.gov

Background

San Juan River research efforts that preceded the establishment of the San Juan River Basin Recovery Implementation Program (SJRRIP), in combination with those that have subsequently resulted from that program, form the basis of the suite of decisions already made and those to be made regarding biologic and hydrologic issues. An immense amount of information has been gathered through the San Juan River research activities that have been conducted over the last 15 years. Most of this information has been synthesized and made available in the form of reports or publications. For example, in 2003 and 2004 researchers consolidated and analyzed data from their individual long-term research projects and presented it as an integrated report of five years of research (1999-2003). Likewise, the flow recommendation report released in 1999 represented a synthesis between biological, hydrological, and habitat research activates.

Preparation of integration reports was difficult due to the absence of an updated, standardized, and easily accessible SJRRIP database. Keller-Bliesner Engineering, LLC, was originally responsibility for maintaining the database and produced and distributed CDs containing the updated SJRRIP database to the researchers until 1998. In 2002, responsibility for maintaining the database was transferred to UNM They initiated a project to develop and maintain a web-based system. This project was been terminated in 2006. In 2007, the responsibility for maintaining the SJRRIP data was transferred to USFWS-NMESFO.

A great deal of effort was required to inspect, transfer, and integrate UNM's GIS Database into existing and new SJRRIP data housed in the NMESFO SJRRIP database. Between 2007 and 2008, USFWS-NMESFO IT staff transferred and incorporated a myriad of researchers' data into the SJRRIP's database; maintained, performed quality control, annually updated, and distributed GIS researcher database using appropriate format as necessary; and established electronic archives of the aforementioned database at the repository for this information (U.S. Fish and Wildlife Service Region 2 Office, Albuquerque, New Mexico).

In 2008, the SJRRIP created a full-time biologist position. One of the tasks of the position is to take over the responsibility of maintaining the SJRRIP database. During 2009, the Program biologist developed a data management system and performed Program data management activities. Continuation of funds to cover the cost of maintenance, updates, and distribution of the database are requested.

Relevant Long Range Plan Tasks

Task 1.2.1.1 Continue to develop a Standardized Database for all stocked and recaptured Colorado pikeminnow and razorback sucker in order to determine the fate of stocked fish.

Task 4.3.2.1 Continue to develop a centralized database that incorporates all data from standardized monitoring and integrate into the Program Database.

Task 5.2.1.1 Establish and maintain a Program Database of information collected under various Program projects.

Study Area

This project will encompass the San Juan River Basin downstream of Navajo Reservoir but may ultimately be expanded to include the entire San Juan River Basin.

Objectives

1. Maintain and incorporate researchers' data into the San Juan River Recovery Implementation Program's Database.
2. Maintain, perform Quality Control, annually update, and distribute current San Juan River Recovery Implementation Program researcher database using appropriate format.
3. Establish electronic archives of the aforementioned database at the ultimate repository for this information (U.S. Fish and Wildlife Service Region 2 Office, Albuquerque, New Mexico).
4. Maintain and update SJRRIP website with reports, data, and other relevant documents.

Methods

1. Update and Maintain Database in consultation and coordination with Program researchers, the Program Biologist will integrate existing and new data into the existing San Juan River Recovery Implementation Program's Database. Data will be checked for Quality Controlled and updated as necessary.
2. Contact and coordinate with appropriate personnel in the Upper Colorado River Basin and Glen Canyon Environmental Studies offices to investigate the feasibility of linkage of the proposed San Juan River Recovery Implementation Database with other regional fish databases.

Products

The database will be disseminated to all committee members and be made available via a password-protected project website. The database will reside with the Program Office NMESFO -Region 2 (Albuquerque) of the U.S. Fish and Wildlife Service, the designated repository for the data.

San Juan River Recovery Program **Database Management Budget 2012**		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Program Biologist (35% time)		$22,034
Database technician (.5% time)	3,995	
Program Asst. (.5% time)	2,630	
Personnel Subtotal	**6,625**	**$22,034**
Travel		
Travel Subtotal	**$**	
Equipment and Supplies		
General Office Supplies	500	500
ESRI (GIS software) license fees	500	0
GIS Extensions (Spatial Analyst, XTools, etc.)	250	0
FTP software license	100	0
Printer toner cartridges	500	500
Backup media		250
Printer paper		500
Computer Hardware upgrades	500	500
Support Subtotal	**1,850**	**$2,250**
Consultant/ Professional Fees		
		0
Consultant/ Professional Sub-Total		**0**
	USFWS Funding	**Base Funding**
Budget Subtotal		**24,284**
FY 2011 Carry over funds		**0**
Total		**5,342**
Administrative charge (22%)		
Grand Total	**$8,475**	**29,626**

Ecosystems Research Institute, Inc.
Miller Ecological Consultants, Inc.

San Juan River Basin Recovery Implementation Program Habitat Monitoring

Technical Proposal

September 6, 2011

Executive Summary

In 1998, flow recommendations were developed by the SJRIP for the San Juan River below the confluence with the Animas River (River Mile 180). The details of the flow recommendations were heavily based upon river channel and habitat response to flows determined from a 7-year research study of channel morphology and habitat. In 1999, long-term monitoring was established to monitor channel and habitat response to flows. The protocols were continuations of those established during the 7-year research period and continued through 2004. All river wide habitat mapping was conducted by ERI staff from 1992 to 2007.

During the data integration process of 2004–2005, it became evident that backwater habitat types during base flow periods (800-1200 cfs) have been reduced in number and surface area since September 1995. Backwater surface areas between River miles 180 to 2 have decreased from 140,000 m2 in September 1995 to less than 20,000 m2, river wide by October 2003. From 2005 to 2007, backwater surface areas have stabilized at approximately 40,000 m2.

The data integration analysis in 2005 also indicated that complex channel reaches (those with high habitat diversity, islands, multi-threaded channels and complex channel margins) correlate to native fish abundance. Furthermore, capture of Young-of-year (YOY) endangered fish also tends to be correlated with channel complexity. Finally, backwater and low velocity habitats are more likely to occur in these reaches with high complexity.

Standardized habitat monitoring for the San Juan River was included in the 2000 monitoring plan and was reviewed and revised for the 2011 version. The plan is designed to monitor and evaluate habitat changes through time. The data and information from habitat monitoring will be integrated with different monitoring activities to assess the effectiveness of management actions, such as flow management, fish population estimates, and nonnative fish population abundances.

Water temperatures have been recorded in the San Juan River at 15 different locations for various periods of record. Using the 1999—2003 integration studies, the Biology Committee (BC) decided to collect temperatures at 8 locations to be used for long-term monitoring. The BC decided that temperatures should be recorded every 15 minutes with a daily maximum, minimum and average calculated.

This proposal by Ecosystems Research Institute (ERI) and Miller Ecological Consultants (MEC) is based in part on the current San Juan Recovery Program monitoring protocols. The team has amassed a significant amount of experience on the physical, chemical and biological conditions in the San Juan River. The data collections in each of these areas over the last 15 plus years makes the ERI and MEC team unique.

Within the major goals of the SJRIP montoring program, the results of this proposed project will in part meet goal number (2) "Track changes in abiotic parameters, including water quality, channel morphology, and habitat, important to the fish community in particular and the aquatic community in general" Specifically, the major tasks to be undertaken are:

Task 1) Annual Habitat Mapping

Task 2) Field Habitat Mapping (River-Wide Survey in 2014)

Task 3) Water Temperature Monitoring

The proposal time frame is for one year with four option years.

1.0 INTRODUCTION

In 2011 the San Juan Recovery and Implementation Program (SJRIP) developed water temperature and habitat monitoring protocols that form the basis for this Request For Proposal (RFP). During the period of time that habitat and temperatures have been collected in the San Juan River, the river has experienced a wide variety of flows. Habitat monitoring started in the San Juan River in 1991 and 1992 with work being conducted by the BOR. That mapping, which only looked at total wetted area and backwaters, was taken directly from videography without any field inspections. In the fall of 1992, Ecosystems Research Institute (ERI) started mapping the San Juan River using the current river wide mapping methodologies and habitat types. Between 1992 and 2007, base flow river wide habitat has been mapped by ERI 18 times.

Habitat Monitoring Status

In 1998, flow recommendations were developed by the SJRIP for the San Juan River below the confluence with the Animas River (River Mile 180). Flow recommendation details were heavily based upon river channel and habitat response to flows determined from a 7-year research study of channel morphology and habitat. In 1999, long-term monitoring was established to monitor channel and habitat response to flows. The protocols were continuations of those established during the 7-year research period and continued through 2004. All river wide habitat mapping was conducted by ERI staff.

During the data integration process of 2004–2005, it became evident that backwater habitat types during base flow periods (800-1200 cfs) had reduced in number and surface area since September 1995. Backwater surface areas between RM 180 to 2 decreased from 140,000 m^2 in September 1995 to less than 20,000 m^2 by October 2003. From 2005 to 2007, backwater surface areas stabilized at approximately 40,000 m^2.

Several hypotheses have been proposed as possible causes, including channel simplification, secondary channel abandonment, or lack of high runoff flows. Additionally, the channel morphology-monitoring program (specifically the across-stream transects) indicated a slightly narrower, deeper channel, which can lead to channel simplification as a potential mechanism. However, review of a limited data set from the 1960s appears to support the lack of high flows as a probable cause.

The data integration analysis in 2005 also indicated that complex channel reaches (those with high habitat diversity, islands, multi-threaded channels and complex channel margins) correlate to native fish abundance. Furthermore, capture of young-of-year (YOY) endangered fish also tends to be correlated with channel complexity. Finally, backwater and low velocity habitats are more likely to occur in reaches with high complexity. As a result, two detailed reaches were identified for long-term monitoring in the San Juan River during the summer of 2006 through 2010. The goal of this study was to better understand the mechanism or process for creation and maintenance of these complex reaches and to understand the processes resulting in the loss or creation of backwater habitat important for the rare and native fishes in the San Juan River.

To the extent possible, habitat monitoring is closely coordinated and integrated with fish community monitoring to allow assessment of changing habitat availability and fish use in response to management actions and population recovery. Standardized habitat monitoring for the San Juan River was included in the 2000 monitoring plan and was reviewed and revised for the 2011 version. The plan is designed to monitor and evaluate habitat changes through time. The data and information from habitat monitoring will be integrated with different monitoring activities to assess the effectiveness of management actions, such as flow management, fish population estimates, and nonnative fish population abundances. A focused habitat monitoring workshop is planned for 2011 to evaluate, refine, and improve habitat monitoring and mapping work on the San Juan River to insure the program implements methodologies that are conducive to answering outstanding questions and provide the data necessary to evaluate and revise the SJRIP's flow recommendations.

Water Temperature Monitoring

Water temperatures have been recorded in the San Juan River at 15 different locations for various periods of record. Using the 1999-2003 integration studies, the Biology Committee (BC) decided to collect temperatures at eight locations to be used for long-term monitoring. The BC decided that temperatures should be recorded every 15 minutes, with a daily maximum, minimum and average calculated.

Project Justification

The SJRIP has, as one of its two primary goals, the conservation of populations of Colorado pikeminnow and razorback sucker in the San Juan River basin. To aid in the evaluation of achievement of these program goals, the following monitoring plan goals were developed (San Juan Draft Monitoring Protocols, 2010):

1) Track the status and trends of endangered and other fish populations in the San Juan River;
2) Track changes in abiotic parameters, including water quality, channel morphology, and habitat, important to the fish community in particular and the aquatic community in general;
3) Utilize data collected under Goals 1 and 2 to help assess progress towards recovery of endangered fish species; and,
4) Assess effectiveness of management actions, implemented flows, and intra- and inter-annual variability in flows on recovery of Colorado pikeminnow, razorback sucker and population status of other fish species.

Relative to this proposal, SJRIP goal (2) above will be met in part. Specifically, achievement of this goal will occur through the tracking of species important backwaters (numbers and areas), as well as channel complexity necessary for all life stages of the two rare fish in the San Juan River. Updating the existing database and comparing the current information will provide a status and trends.

Project Objectives

The specific objectives of this RFP correspond to the overall objectives of the draft monitoring protocols (2010). Specifically the direct linkage of objectives between this RFP and protocol objectives (by number) that are in common include:

Objective 1) Annually, following spring runoff, document abundance and distribution of key habitats and geomorphic features (backwaters, embayments, islands and total wetted area) that indicate the response of the river channel and habitat to antecedent runoff conditions and specific management actions.

Objective 2) Maintain continuous water temperature recorders at key locations from Navajo Dam to Mexican Hat, Utah to examine the influence of artificial manipulation of water releases from Navajo Dam on water temperature.

Objective 4) Periodically (e.g. every 5 years) map river-wide habitat abundance and distribution in the San Juan River from the Animas River confluence (RM 180) to Clay Hills Crossing (RM 2) to track long-term trends in habitat.

Objective 8) Develop relationships between habitat availability and antecedent flow conditions. Use key habitats for this analysis.

Objective 9) Track long-term trends of habitat availability ...

PLAN OR STUDY DESIGN

There are three major tasks included in the proposed study design. They include:

Task 1. Annual Habitat Mapping

Task 2. Field Habitat Mapping (river-wide survey scheduled in 2014)

Task 3. Water Temperature Monitoring

Each of the above tasks are described in detail in the following sections and cover methods, data analysis, schedule and deliverables.

Task 1. Annual Habitat Mapping General Methods

1) Using the habitat categories backwaters, embayments, islands, and total wetted area, map aquatic habitat at a scale of 1" = 200', using digital video files provided to the contractor by the Bureau of Reclamation (Reclamation); and,
2) Examine the relationships between hydrology (especially recent antecedent hydrology conditions) and habitat conditions throughout the river, especially backwater habitats and habitat complexity.

Proposed Specific Methods for Annual Habitat Mapping

Digital videography of the San Juan River from the Animas River confluence (RM 180) downstream to below Clay Hills Crossing (RM 0) will be acquired from Reclamation at a flow of from 500 to 1,000 cfs in late July or early August each year. Digital single frames will be captured from this videography to provide full coverage of the river with about 20% overlap. The digital images will be rectified to 2005 (or

the latest available) digital orthographic quads (DOQs) prior to photo-interpretation and will be archived to DVD.

Photo-interpretation will be completed to identify backwaters, embayments, islands, and total wetted area annually for RM 0 to RM 180. In the first year, 2012 photography and mapping will be used to calibrate photo-interpretation. A selection of approximately 10% of the frames will be used to calibrate the procedure and an additional 10% to verify the results prior to full analysis of the first year of aerial videography. This is a one-time task that will be required only in the first year of video interpretation. Once the digital frames have been registered, ArcGIS will be used to digitize the boundaries of the wetted channel, backwaters, embayments and islands. The data will be processed and summarized by river-mile to match existing datasets.

Proposed Data Analysis

Data analysis is the same whether photo-interpreted or field mapped, except that the number of habitats analyzed will be different. Trend analysis will be performed on all habitat types mapped to assess trend with time and flow at mapping. Trends with time will be analyzed with raw data (habitat count and area by river-mile with time) and with data normalized for flow at mapping. Every fifth year, all data will be integrated to examine the relationship between habitat abundance and antecedent spring flow conditions for individual and multiple years.

Schedule

Base photography will be acquired in late July or early August 2012 (flow permitting). Frame capture, rectification, and photo-interpretation will be completed by February 2013 The draft annual report will be completed by March 31, 2013 with the final report due June 1, 2013.

Deliverables

Annual tasks

1) Videography of channel at flow between 500 and 1,000 cfs.
2) Rectified digital images from the videography
3) Polygon area, perimeter and geo-referenced location of backwaters, embayments, islands, and channel margins
4) Flow at mapping (flight date) for each USGS gage
5) Distribution and abundance (area and density) of backwaters, embayments and total wetted area in response to antecedent runoff conditions and other management actions. Channel complexity (e.g. island count and total wetted area per river mile
6) Date of mapping
7) Antecedent runoff hydrograph
8) Data summarized by river mile, geomorphic reach and full range
    - An annual draft report prepared and submitted by February 28 of each year
    - A final report submitted by June 1 of each year
    - Attendance at the annual report meeting and one additional Biology Committee meeting

Task 2. Field Habitat Mapping (River-Wide Survey in 2014) General Methods

1) Using seven general habitat categories and 27 sub-types of habitat (Table 1), map aquatic habitat at a scale of 1" = 200', using digital video files provided to the contractor by Reclamation; and,
2) Examine the relationships between hydrology (especially recent antecedent hydrology conditions) and habitat conditions throughout the river, especially backwater habitats and habitat complexity.

Proposed Specific Methods for River-Wide Survey in 2014 Habitat Mapping

In 2014, base photography maps will be prepared at a scale of approximately 1 inch = 150 feet for river-wide mapping from the videography described above. The frames will be printed on 8.5 x 11 inch pages with the river-mile marks and provided in sheet protectors for field mapping.

Seventeen aquatic habitat types and seven associated terrestrial types (Table 1) will be delineated on the base photographs (1 inch = 200 ft scale) by visual inspection in the field through floating the river. Each polygon delineated will be marked with its corresponding code as noted in Table 1. The date of mapping and the mapper's name will be recorded on the first map sheet for each day's mapping. All mappers used by ERI have direct experience in mapping the San Juan River using the proposed methodology. In as much as the mapping process is interpretive, annual reviews will be conducted among the mapping crews prior to mapping to assure the best possible reproducibility in interpretation among mappers. Following field mapping, the field sheets will be reviewed and missing codes or non-closed polygons corrected prior to processing.

Once the field mapping sheets are reviewed and edited, they will be scanned at a resolution of 300 dpi and then rectified to the latest available 2007 DOQs to remove distortion. After rectification, the habitat polygons will be digitized and coded in ArcGIS to produce a shape file and database with habitat perimeter and area by type and river mile. The data will then be extracted and summarized by count and area per river mile for analysis. Average flow at mapping for each detailed reach will also be extracted from USGS gage data, using the gage or gages most representative of the reach.

Data Analysis for Every Fifth Year Habitat Mapping (2014)

Data analysis will be the same whether photo-interpreted or field mapped, except that the number of habitat types analyzed will be different. Trend analysis will be performed on all habitat types mapped to assess trend with time and flow at mapping. Trends with time will be analyzed with raw data (habitat count and area by river-mile with time) and with data normalized for flow at mapping. In 2014/2015, all data will be integrated to examine the relationship between habitat abundance and antecedent spring flow conditions for individual and multiple years.

River-wide mapping schedule

The river-wide mapping will occur in the fall of 2014 with July/August 2014 videography. In 2014 when river-wide mapping is completed, there will be a one-year lag in interpretation due to the lateness of the data collection and the time required to scan and digitize the field maps.

Table 1. Categories of habitat types on the San Juan River with mapping codes (mapping codes shown in parenthesis).

Backwater Types	**Slackwater Types**
(1) Backwater	(20) Slackwater
(2) Embayment	(35) Pocketwater
Other Low Velocity Types	**Vegetation Types**
(3) Pool	(34) Inundated Vegetation
(6) Eddy	
	Other Wet Types
Run Types	(21) Isolated Pool
(10) Run	(39) Diverted Water
	(33) Irrigation Return
Riffle Types	(29) Tributary
(15) Riffle	
(19) Chute	**Dry Types**
(32) Rapid	(28) Sand Bar
(37) Waterfall	(31) Island
(41) Plunge	(26) Rootwad Pile
	(38) Bridge Pier
Shoal Types	(40) Diversion Structure
(9a) Sand Shoal	(25) Cobble Bar
(9b) Cobble Shoal	(36) Boulder

Deliverables

River-Wide Habitat Mapping in 2014

1) Rectified habitat map
2) Polygon area, perimeter and geo-referenced location of 17 habitat types
3) Date of mapping for each daily segment
4) Flow at mapping for each geomorphic reach
5) Antecedent runoff hydrograph for all years between mappings
6) Data summarized by river mile, geomorphic reach, and full range
1) Distribution and abundance of other habitat categories (long-term trend analysis)
2) Distribution and abundance of suitable gravels in association with other required spawning habitat characteristics for endangered fishes
3) Track long term trends of habitat availability, temperature, and water quality
   - An draft report prepared and submitted by February 28, 2016
   - A final report submitted by June 1, 2016
   - Attendance at the annual report meeting and one additional Biology Committee meeting

Task 3. Water Temperature Monitoring

Eight temperature recorders have been in place since the summer of 1992 at locations shown in Table 2. From 1992-1999, OMNIDATA DP-230 datapod loggers sampled water temperature every 10 minutes and stored maximum, minimum and mean temperature for each day. Optic StowAway temperature loggers from Onset Corporation were utilized from 1999-2006. In 2006, these recorders were replaced with Onset Corporation HOBO Water Temp Pro loggers, which record water temperature every 15 minutes.

The HOBO Water Temp Pro logger is accurate to +0.2° C and has a factory replaceable battery. These loggers can be quickly read by either the HOBO Optic Shuttle or OPTIC base station. The HOBOware Pro software is used to deploy and download the data from the logger. This software has built-in capability to summarize data into daily values from the individual 15-minute measurements. The following objectives are proposed for the project.

Annual Temperature Monitoring General Method

1) Monitor water temperature at 8 existing locations plus two new locations in the San Juan River, NM and UT (Table 2); and,
2) Create a database of water temperatures that can be posted and accessed at the SJRIP website.

Proposed Specific Methods for Water Temperature Monitoring

At the request of Reclamation, Onset Corporation HOBO Water Temp Pro loggers with built-in thermocouple temperature sensors will be installed at the locations described in Table 2. While the existing enclosures may be suitable for deployment of the loggers, we are proposing to install new enclosures at each location. Based on extensive experience in a variety of locations, we have developed a small enclosure that is secure and hard to detect by individuals without knowledge of the deployment location. This system has been used in locations with high public use without loss of the logger or enclosure. These enclosures consist of a steel post driven flush with the streambed and a PVC protective housing for the logger attached to the steel post by steel cable (Figures 1 and 2). These housings can withstand streambed movement and protect the logger from stream debris. If Reclamation prefers, loggers will be installed in existing enclosures that have been used over the past 15 years for the first eight sites in Table 2. Where enclosures are deteriorated, missing or badly placed, they will be

Figure 1. Example data logger housing (open) showing HOBO tidbit logger in housing.

Figure 2. Example data logger housing closed ready for deployment.

upgraded as necessary to provide protection to the equipment. New installations will be required at the mouth of the Mancos River and McElmo Creek. We also propose to install redundant loggers at each location as insurance against malfunction, vandalism and data loss. The cost of the loggers is low (approximately $125 per logger), which makes redundant deployment feasible. We would designate one logger as the primary with the redundant logger listed as secondary. The primary logger would be used in the data base unless the primary logger malfunctions or is lost. The data from both the primary and secondary logger would be provided to the Recovery Program each year.

Table 2. Water Temperature Monitoring Locations

Location	RM
Near Navajo Dam	225
Archuleta - San Juan at USGS Gage Location	218.6
Farmington - San Juan at USGS Gage Location	180.1
Shiprock - San Juan at USGS Gage Location	148
Four Corners - San Juan at USGS Gage Location	119.4
Montezuma Creek - San Juan at Montezuma Creek Bridge	93.6
Mexican Hat - San Juan near Bluff Gage Location	52.1
Farmington - Animas at USGS Gage Location	n/a
Mancos River at confluence with San Juan	n/a
McElmo Creek at confluence with San Juan	n/a

Water Temperature Data Analysis

We propose to inspect and read the loggers four times each year on an approximate three month time interval (fall, winter, prior to spring runoff, and summer). This is more frequent than the existing data set, but helps to minimize data loss. Battery condition will be monitored and loggers changed out when the battery life falls below that required to continue until the next reading point.

The data from each logger will be checked at the deployment location to verify data download prior to proceeding to the next download location. The data will be transferred to computer at MEC's office after each field visit. Following each download, data will be quality checked and bad data removed. Vandalism, natural causes or equipment malfunction can cause loss of data that are beyond our control. Every attempt will be made to assure quality data within the scope described, but some missing data is likely inevitable. Data integrity similar to that in the existing database will be provided.

Schedule

The records will be maintained in a Microsoft Access database. The main data table will store the 15-minute data and include date, time and temperature associated with each record. Data tables summarizing daily maximum, minimum and average temperatures will be generated for each of the eight sites through querying of the main data table. Table 3 shows the information stored to describe each session, including geo-spatial data to allow importation into a geographic Information System. After the fall logger download, data for the water year will be compiled and the daily average temperatures plotted along with the daily hydrograph of the San Juan River at Four Corners, New

Mexico. A summary report will be prepared that will include presentation of the daily average temperature data with a discussion of data collection procedures, data quality and repair requirements during the season. Anomalous data, if any, will also be discussed.

Table 3. Temperature station description database table.

Station ID	Location	Location Details	Lat	Lon	Datum
4C	Four Corners	Located at the Four Corners USGS gage	37.00195	-109.0311	NAD83
AF	Animas at Farmington	Located an the Animas at Farmington USGS gage	36.72154	-108.2017	NAD83
AR	Archuleta	Located at the Archuleta USGS gage	36.80278	-107.699	NAD83
FM	Farmington	Located at the Farmington USGS gage	36.72221	-108.2251	NAD83
MC	Montezuma Creek	Located left bank at sheet piling upstream side of the Mont. Ck bridge	37.2579	-109.3096	NAD83
MH	Mexican Hat	Located right bank near the USGS mini-monitor enclosure upstream of Mex Hat bridge	37.15059	-109.8669	NAD83
ND	Navajo Dam	Base of Navajo Dam on river left immediately downstream of outlet	36.80484	-107.6148	NAD83
SR	Shiprock	Located at the Shiprock USGS gage	36.781	-108.6899	NAD83
MA	Mancos R. at S.J. confluence	Site to be field located near the confluence with the San Juan	TBD	TBD	NAD83
ME	McElmo Cr. At S.J. confluence	Site to be located near the confluence with the San Juan	TBD	TBD	NAD83

Deliverables

Annual

1) Daily 15-minute, maximum, minimum, and average water temperature at 10 locations
2) Daily mean flow at each USGS gage
   - An annual draft report prepared and submitted by February 28 of each year
   - A final report submitted by June 1 of each year
   - An updated temperature database with all data collected to date, updated through September 2012 by June 1, 2013
   - Attendance at the annual report meeting and one additional Biology Committee meeting

Schedule

A schedule for each task has been provided under each subtask in Section 2.1, 2.2, and 2.3 above.

Principal Investigator

Organization: Ecosystems Research Institute, Inc.

Name: Dr. Vincent A. Lamarra

Title: Director

Address: 975 South Highway 89/91, Logan, UT 84321

Email: vincel@ecosysres.com

Phone: 435-752-2580

SJRRIP Habitat and Temperature Monitoring 5-Year Budget

Description	Start Date to End Date	Cost
Base Year	09/20/2011 to 09/19/2012	$ 89,970.00
Option Year 1	09/20/2012 to 09/19/2013	$ 88,313.00
Option Year 2	09/20/2013 to 09/19/2014	$199,983.18
Option Year 3	09/20/2014 to 09/19/2015	$ 91,743.78
Option Year 4	09/20/2015 to 09/19/2016	$ 93,459.74

Peer Review for 2012
Fiscal Year 2012 Project Proposal

Mark McKinstry, Ph.D. UC-735
Bureau of Reclamation
125 South State Street, Room 6107
Salt Lake City, UT 84138-1147
Phone 801-524-3835
FAX 801-524-5499
mmckinstry@uc.usbr.gov

Background

A Peer Review Panel was established in 1997 to assist the SJRIP with reports and plans for future studies. The four members of the panel participate in meetings and comment on pre-draft, draft, and final Scopes of Work, Workplans, reports, Integration analyses and reports, and other Program Documents.

This proposal provides for funding for the Peer Review Panel activities during 2012. It is anticipated that the Panel will meet with the Biology Committee at three meetings during the year; the December 2011 Planning meeting, the February/March, 2012 Researcher's meeting (combined with the Coordination Committee), and a May, 2012 meeting to finalize 2013 SOWs. Additionally, the Peer Reviewers will likely be asked to attend an additional meeting in conjunction with the Annual Researcher's meeting whereby they are asked to comment as a group on all aspects of the Program and Workplan. At this meeting the Peer Reviewer's will be tasked to review all activities of the SJRIP and possibly assist in the development of a Sufficient Progress Report.

Goal

The goal of peer review is to provide additional scientific oversight over San Juan River Recovery Implementation Program technical studies and reporting. The Peer Review Panel will work with the Biology Committee and Program Staff to produce scientific credible documents and will assist the Biology Committee in maintaining a scientific basis for the Program.

Methods

The Peer Review Panel will meet with the Biology Committee in FY2012 three times to review monitoring and research progress and to discuss scopes of work for 2013. They will provide verbal input during the meetings and provide written reviews of the progress of the Program. Their reviews will be provided to the Biology Committee through Mark McKinstry and David Campbell in letter form, or on the Biology Committee list server, and through discussions at the Biology Committee meetings. Biology Committee researchers may call Peer Review Panel members to ask for advice, and Peer Review Panel members may call Biology Committee researchers if they have questions concerning Program activities. All correspondence between the Biology Committee and the Peer Review Panel will be coordinated through either Mark McKinstry or David Campbell.

Products

Peer review participation at 3 Biology Committee meetings, letter or verbal reports from each peer reviewer on an as-requested basis.

Primary Contact: Dr. Mark McKinstry

Bureau of Reclamation
125 South State Street, UC-735
Salt Lake City, UT 84106
Phone:801/524-3835 FAX:801-524-5499
Email: mmckinstry@uc.usbr.gov

Personnel:

Dr. John Pitlick
Department of Geology
University of Colorado
Boulder, CO 80309-0260
Phone: 303-492-5906
Emial: pitlick@spot.colorado.edu

Dr. Stephen Ross
Curator Emeritus of Fishes, Department of
Biology and Museum of Southwestern
Biology MSC 03-2020 University of New Mexico
Albuquerque, NM 87131-0001
Phone: 505-277-3893 Hm: 970-264-0158
Email: stross1@unm.edu

Dr. Mel Warren Jr.
Team Leader and Research Biologist
Center for Bottomland Hardwoods Research
Southern Research Station, USDA Forest Service
1000 Front Street
oxford, MS 38655
Phone: 662-234-2744, ext. 246
Fax: 662-234-8318
Email: mwarren01@fs.fed.us

Dr. Ron Ryel
Department of Forest, Range, and Wildlife
Utah State University
5230 Old Main Hill
Logan, UT 84322-5230
Phone: 435-797-8119
FAX: 435-797-3796
Email: ron.ryel@usu.edu

Budget FY-12

Payment for serving on the Peer Review Panel includes expenses for travel to and from meetings, and an hourly rate for services. It is anticipated that Panel Members will spend approximately 25-40 days each in 2012.

The total budget is distributed among the four peer reviewers through individual Services Contracts with Reclamation.

Salaries:	$30,000
Travel:	$15,000
Total	**$45,000**

Future use of the Peer Review Panel is not known but they likely will be used each year to provide guidance to the Biology Committee.

Estimated Outyear Funding:

2013 $45,000

Program Coordinator's Office
Fiscal Year 2012 Draft Proposal

U.S. Fish and Wildlife Service
2105 Osuna NE Albuquerque, New Mexico 87113
David_Campbell@fws.gov (505) 761-4745
sharon _whitmore@fws.gov (505) 761-4753

Background

The San Juan River Recovery Implementation Program (Program) is designed to simultaneously address endangered fish species recovery and development of water resources within the Basin. The Program includes representatives from not only Federal agencies, but also the States of Colorado and New Mexico, the Jicarilla Apache Nation, the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, the Navajo Nation and the water development interests, most of which have legal mandated responsibilities to the endangered fish and/or the water resources.

The Service is responsible for directing and coordinating the Program. As stated in the Program Document, the Service will appoint a Program Coordinator who will be responsible for overall Program coordination and dissemination of information about Program activities. Element 5 of the Program's Long Range Plan identifies Goals, Actions, and Tasks that the Program Office will undertake to administer the Program. The Program Office staff includes a Program Coordinator, Assistant Program Coordinator, Program Biologist, and part-time Program Assistant.

The Program's current authorization, Public Law 106-392, specifically authorizes the use of power revenues to fund program management through fiscal year 2011. Starting in FY2012, use of this annual base funding for recovery program actions is limited to "operation and maintenance of capital projects and monitoring." ***Placeholder for what happens to fund Recovery Program management in FY2012.***

Tasks

Specific Service responsibilities for Program coordination are described in the September 23, 2010 Program Document and listed below. It is recognized in the Program Document that some of these responsibilities will be carried out with the assistance from Program committees as more specifically defined in the sections entitled. "Biology Committee," "Long Range Plan Development and Annual Revision Process," and "Annual Work Plan Development Process" of the Program Document.

1. coordinating the activities of the Coordination Committee and the Program's technical committees, including providing notices, agendas, information packets, and providing draft and final summaries for committee and subcommittee meetings and conference calls as per the committee meeting procedures described in this document;

2. preparing and updating the LRP with research, monitoring, and recovery elements and goals;

3. ensuring consistency of the LRP with Service-approved species Recovery Plans;

4. prioritizing projects based on the LRP, and preparing AWPs, annual budgets, and annual progress reports;

5. ensuring the approved recovery activities as defined in the LRP and species Recovery Plans are implemented;

6. evaluating project accomplishments and shortcomings and providing an annual report to the Program;

7. monitoring implementation of all Program actions, including those Program actions identified as RPAs and RPMs in BOs, and reporting results to the Service on an annual basis;

8. developing an annual integration report that assesses the preceding year's monitoring data, progress toward recovery, and adaptive management recommendations, including recommendations for changes in direction, termination of projects, new projects, or other pertinent recommendations;

9. coordinating and overseeing development of any revisions to the Program's flow recommendations;

10. maintaining records showing the distribution and expenditures of all annual base and capital funds expended under AWPs by each funding source, and providing to the Coordination Committee at the end of each federal fiscal year an accounting of funds expended during the preceding year;

11. reporting to the Coordination Committee at each of its meetings the status of Program activities, the accomplishment of milestones or delays in meeting milestones, and any problems with maintaining Program work schedules along with recommendations for solving the problems;

12. disseminating information to state, federal, and tribal agencies;

13. ensuring that appropriate collecting permits are provided to each principal investigator;

14. advising Program participants of requests for initiation of consultation;

15. maintaining a list of interested parties as described in the committee meeting procedures provided in this document;

16. managing and maintaining the Program's data, central database, library, website, and listserves;

17. coordinating activities among the Program, the Upper Colorado Program, and the Colorado River Fishes Recovery Team, including participating in the five-year status review and in the updating of recovery goals for Colorado pikeminnow and razorback sucker;

18. implementing Coordination Committee recommendations to resolve problems or issues that may arise with regard to accomplishing Program activities;

19. providing materials and technical support to the non-federal participants for briefings with the members and committees of the U.S. Congress and state legislatures;

20. reviewing BOs for consistency with the Program's Principles;

21. preparing on a biennial basis a written "Sufficient Progress" assessment of the Program's progress towards recovery, the Program's ability to provide ESA compliance for water development and management activities, and any corrective actions needed to ensure future ESA compliance, in accordance with the Program's Principles;

22. working with Reclamation and other Program participants to improve, maintain, and utilize the Hydrology Model; and

23. implementing other activities needed to ensure the success of the Program as assigned by the Service or by the Coordination Committee.

San Juan River Recovery Program Program Management Budget 2012		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Coordinator (80/20%)	97,266	24,317
Assistant Program Coordinator (50/50%)	65,594	65,594
Program Biologist (65%)	0	48,943
Program Assistant (17.5/17.5%)	11,519	11,519
IT-Support	6,000	0
USFWS Hydrologist	10,000	5,000
Personnel Subtotal	**$190,379**	**$155,373**
Travel		
Coordinator/Asst. Coordinator (70 days@$109 pd)	0	7,630
Coordinator/Asst. Coordinator (35 trips @400 miles) $0.55/gal	7,700	0
Program Biologist (35 days@$109 pd)	0	3,815
Program Biologist (12 trips @400 miles) $0.55/gal	0	2,640
Program Assistant (12 trips @400 miles) $0.55/gal	0	2,640
Senior Biologist Travel to Farmington (12 days@$109 pd) + gas	2,000	0
Airfare to DC	0	2,000
DC, 10 days @ $273	0	1,500
CRWUA, 10 days @ $190 + Airfare	0	3,900
Travel to UCRRIP	0	3,000
Hydrologist Support	0	5,000
Travel Subtotal	**$9,700**	**$32,125**
Committee Meeting Support		
General Office Supplies	0	5,500
Meeting space	0	0
Farmington@ $100/day	0	1,200
Durango @$400/day	0	1,200
Mailings	0	500
Public Notices - ($118/meeting)	0	2,500
Printing/publication	0	4,000
Gas	0	3,000
Misc	0	1000
Support Subtotal	**$ 0.00**	**$18,900.00**
	USFWS Funding	**Base Funding**
Budget Subtotal	**$200,079**	**$206,398**
FY 2011 Carry over funds	**0**	**0**
Subtotal	**$200,079**	**$206,398**
Administrative charge (22%)	**0**	**$45,408**
Grand Total	**$200,079**	**$251,180**

FY 2012 Reclamation Program Management

Mark McKinstry UC-735
Bureau of Reclamation
125 South State Street, Room 6107
Salt Lake City, UT 84138-1147
Phone 801-524-3835
FAX 801-524-5499
mmckinstry@uc.usbr.gov

Relationship to SJRIP: Supports Program goals and management by supporting approved activities

Study Goals, Objectives, and End Product: Program Management funds support Reclamation staff involved in program management. Funds are used for the administration of funding agreements, including issuing requisitions for program supplies, and the preparation and oversight of work conducted under interagency agreements, cooperative agreements, contracts, and grants. The funds are also used for formation and participation of the technical and peer-review committees, implementation of committee assignments not specifically identified in a scope of work, reporting, and coordination of water operations. Management support for Capital fund projects, including technical oversight, budgeting, preparation of bids and funding agreements is covered in a separate scope of work. Participation in Hydrology and Biology Committee meetings and business is paid for separately by Reclamation with funds unrelated to the SJRIP.

Task Description and Schedule

Task 1: Manage and administer funding for Recovery Program projects related to the Biology Committee activities. Funding Recovery Program projects requires establishment or modification of approximately 50—60 Reclamation funding agreements or contracts each year. Each financial agreement requires multiple steps and activities, including: submission of requests for Federal assistance for Recovery Program-approved projects; working with Recovery Program's office on funding issues; reviewing and approving (if warranted) project budgets; writing SOWs for RFPs, requesting obligations to cover funding agreement or contract awards; awarding agreements or contract funding to recipients; maintaining agreement and contract filing system including agreement instruments, invoices, and accruals; reviewing and tracking budgets; participating in audits; reviewing and approving invoices; performing periodic site visits to monitor project performance and progress; filing advanced procurement reports; organizing and participating on TPECs; drafting requests for proposals (RFPs); evaluating proposals and awarding contracts; performing agreement closeouts; answering agreement inquiries from auditors, assistance recipients, and the Recovery Program; recording project performance and status of deliverables; and filing recipient performance reports.

Deliverables/Due Dates: Requests from the Recovery Program for funding are processed as they are received. Other deadlines for committee activities are set by the Recovery Program participants during the development of the annual workplan. An annual report on program

management activities will be delivered during the annual meeting each year (usually April/May).

Budget FY12

Task 1: Biology Committee Annual Funding Administration

A) **Labor**

Position	Salary total/hr	No. persons	Total Hours	Total cost
Reclamation Acquisitions Manager	$110.00	1	30	$3,300.00
Biology Committee Technical Representation for Contracts and Agreements*	$80.00	1	600	$48,000.00
Lead contract officer	$110.00	1	40	$4,400.00
Agreement/Contract Specialist	$65.00	1	600	$39,000.00
Agreement specialist	$50.00	2	800	$40,000.00
Total				$134,700.00

* *Funding for Reclamation to participate in the Biology Committee is funded by Reclamation and not the SJRIP.*

B) Travel

Position	Destination	Purpose	Days	Lodging per day/total	Per diem per day/total	Other*	Airfare total	Total
Reclamation Technical representative	Farmington, Durango, or Albuquerque	Contract support for CC meetings, program funding meetings	3 trips @ 2 days/trip	$90/$540	$45/$270	$300	$2,000	$3,110.00
Reclamation Technical representative	Farmington	Project evaluation or field trips	2 trips @ 6 days/trip	$77/308	$45/$540	$300	$800	$1948.00
Reclamation Technical representative	Boise, ID; Kennewick, WA; various	Contract administration with suppliers	2 trips @ 3 days/trip	$77/$154	$40/$200	$400	$800	$1554.00
Lead contract officer	Farmington, Durango	CC/BC mtg., or contract admin	2 trips @ 2 days	$90/$180	$45/$135	$50	$1,600	$1,965.00
Lead contract officer	Various locations	Contract Admin	1 trip @ 2 days	$125	$65/$130	$60	$300	$615.00
Total								$9,192.00

*Taxi $20; Parking $10; Rental car $100/trip

Budget Summary
FY-2011

Total labor	$134,700.00
Total travel	$9,192.00$9,192.00
Grand total	**$143,892.00**[1]

[1] **This total budget represents a 4.9% increase over the FY2010 budget.**

Program Coordinator's Office Outreach
Fiscal Year 2010 Draft Proposal

Project Lead: Sharon Whitmore
U.S. Fish and Wildlife Service
2105 Osuna NE Albuquerque, New Mexico 87113
sharon_whitmore@fws.gov (505) 761-4753

Background

The San Juan River Recovery Implementation Program (SJR Program) is designed to simultaneously address endangered fish species recovery and development of water resources within the Basin. The Program includes representatives from not only Federal agencies, but also the States of Colorado and New Mexico, the Jicarilla Apache Nation, the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, the Navajo Nation and the water development interests, most of which have legal mandated responsibilities to the endangered fish and/or the water resources. The parties extended the Cooperative Agreement through 2023.

The SJR Program works jointly with the Upper Colorado River Recovery Program (UCRRP) to conduct outreach activities for both Recovery Programs. Both programs operate under similar recovery elements with management actions that are consistent with the recovery goals for humpback chub, bonytail, Colorado pikeminnow and razorback sucker. These goals are reviewed and revised every five years.

The Recovery Programs' continued success depends on coordinated efforts. Communication and outreach are areas where it makes sense to coordinate efforts. Using a shared approach will help ensure that common audiences receive accurate, consistent information about the endangered fish species and efforts to recover them. Both programs reach out to the general public, elected officials, American Indian tribes, landowners, anglers, river rafter and guides, environmental organizations, water and power developers, teachers, students and Recovery Program participants. Geographic reach of some of these audiences differ by Recovery Program.

Mission

To support the SJR Program's success in recovering the endangered fishes by assuring that the public understands what is being done and why, and has confidence that the process is honest, open, sensitive, clear, and understandable. Outreach efforts will be coordinated with the UCRRP.

Goals

- To develop public involvement strategies at the beginning of any and all projects.
- To educate target audiences about endangered fish and to increase their understanding of, and support for, the recovery of these fish species at local, state, and national levels.
- To provide opportunities for the public to actively participate in activities that support recovery.
- To improve communication within the Recovery Program.

Target Audiences

- General public
- Elected Officials
- Land and pond owners
- Anglers
- River rafters and guides
- Environmental organizations
- Water users
- Power user interests

- Educators
- Recovery program participants (includes local, state and federal agencies)

Tasks

1. Coordinate SJR Program activities with the Upper Basin Recovery Implementation Program.
2. Coordinate outreach activities with the Upper Basin Recovery Implementation Program; disseminate information on Program activities to the public through brochures, newsletters and/or the website.
3. Coordinate outreach activities with Water Users Student Fairs and local schools fairs.

San Juan River Recovery Program Program Management Outreach Budget 2012		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Program Assistant - Outreach Program		0
Personnel Subtotal		**0**
Travel		
St. George, UT (6 days@$116)		696
Airfare		1,500
Denver, CO (3 days @ $198)		594
Farmington, NM (3 days@116)		348
Durango, CO (2 days@194)		388
Travel Subtotal		**$3,526**
Equipment and Supplies		
Outreach Materials		3,000
Registration Fees		300
Equipment and Supplies		**3,300**
	USFWS Funding	**Base Funding**
Budget Subtotal		**$6,826**
Administrative charge (22%)	**0**	**$1,502**
Direct expenses to UCRRIP		**$18,000**
Grand Total		**$26,328.00**