SAN JUAN RIVER BASIN RECOVERY IMPLEMENTATION PROGRAM

FISCAL YEAR 2011 ANNUAL BUDGET AND WORK PLAN

Approved: September 23, 2010

SJRRIP FY2011 AWP Budget *(approved Sept. 23, 2010)*

SOW	Title	Agency	Proposed Funding		
			Base	Capital	Other
	Element 1 - Management and Augmentation of Populations and Protection of Genetic Integrity				
7	RBS and CPM Distribution from Dexter and Uvalde	FWS, IDNFH	51,645		
8	Stocking of Fingerling Colorado Pikeminnow	FWS, ABQ	$15,215 *		
9	Colorado Pikeminnow Fingerling Production	FWS, DNFHTC	$93,269 *		
10	Rearing Razorback Suckers Dexter	FWS, DNFHTC	$75,382 *		
11	Razorback Sucker Production Uvalde	FWS, UNFH	$107,000 *		
12	RBS Augmentation/NAPI Pond Management	FWS/NN	$136,670 *		
	Subtotal		**$479,181**	**$0**	**$0**
	Element 2 - Protection, Management, and Augmentation of Habitat				
13	Maintenance and Operation of Model	BR, Durango	$142,800 *		
14	Improve Stream Gaging and Flow Measurements	USGS	$7,400		
15	Operation of PNM Fish Passage Structure	FWS/NN	$84,106 *		
16	Capital Projects Management	BR	$0	$55,600	
	Capital Hogback Canal	BR	$0	$400,000	
	PNM O&M	PNM	$0		$25,000
	Subtotal		**$234,306**	**$455,600**	**$25,000**
	Element 3 - Interactions between Native and Non-Native Fish Species				
17	Nonnative Species Control - Upper San Juan River	FWS, ABQ	$340,363 *		
18	Nonnative Species Control - Lower San Juan River	UDWR	$179,465 *		
	Subtotal		**$519,828**	**$0**	**$0**
	Element 4 - Monitor of Fish and Habitat and Conduct Research in Support of Recovery Actions				
19	Sub-Adult/Adult Large-Bodied Fish Comm. Monitoring	FWS, GJ	$106,910 *		
20	YOY/Small-Bodied Fish Monitoring	NMDGF	$84,588 *		$40,000
21	RBS/CPM Larval Surveys (Combined SOW)	NMDGF. ASIR	$209,493 *		
22	Specimen Curation/Identification	UNM	$29,871 *		
24	Temperature Monitoring	RFP	$16,000		
24	Habitat Mapping RFP Approximate cost	RFP	$62,000		
25	River Videography	BR	$18,000		
27	PIT Tags	BR	$60,000		
28	RBS Survey of SJR Arm of Lake Powel	FWS,GJ; UDWR	$215,115		$25,000
	Workshops (Habitat monitoring)	BR/FWS	$40,000		
	Database Management	FWS	$0		
	Data Integration	FWS	$0		
	Subtotal		**$841,976**	**$0**	**$65,000**

	Element 5 - Program Coordination, Data Integration, and Evaluation for Recovery				
29	Program Management FWS	FWS, ABQ	$220,408 *		$224,673
31	Peer Review	BOR/FWS	$40,000		
33	Base Fund Management BR	BR, SLC	$139,878 *		
	Subtotal		**$400,286**	**$0**	**$224,673**
	Element 6 - Information and Education				
34	Education and Outreach	FWS, ABQ	$24,815 *		
	Subtotal		**$24,815**	**$0**	**$0**
	SJRRIP Total		**$2,500,391**	**$455,600**	**$314,673**
	Estimated Annual 2011 Base Funds (2010 Amount x 2% CPI)		**$2,460,473**		
	Estimated available 2011 funds to proposed expenditures		**-$39,919**		
	Carry over from FY2010		**$80,580**		
	Total Funding Available		**$40,661**		
	Notes				
	* Denotes SOW budgets adjusted for 2% CPI				
	PNM O&M ($25,000 carry-over from 2009)				
	FY 2010 carry over of $80,580 - reflects unobligated funds for habitat and temperature monitoring				

Colorado Pikeminnow and Razorback Sucker Fish Distribution from Dexter NFH&TC and Uvalde NFH to the San Juan River FY-2011

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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 species 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 than 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 species. The Recovery criteria calls for a target of 1,000 sub-adult 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, (Ryden 2003) called for annual stocking of age-0 fish over an eight year augmentation program (2002-2009). The augmentation plan (Phase I) for both age-0 and age-1+ Colorado pikeminnow ended in 2010. Under Phase II, augmentation efforts will focus primarily on culturing and stocking increased numbers of age-0 fish.

Inks Dam NFH and the Regional Distribution Unit (RDU) have been the leader in transporting and distributing endangered, threatened, and sport fish species since the inception of many of these programs. Annually, staff from Inks Dam NFH conduct 20 distribution trips throughout the Southwest region. Each trip generally requires four to five days, and staff have distributed as many as eight different species in one year. Inks Dam NFH has successfully distributed fish for the San Juan River Recovery Program for the past two years.

Inks Dam NFH operates and maintains the RDU, which is a flat-bed semi-truck. The RDU has three 650 gallon tanks with each tank having an associated heat pump, filter, water pump and generator. The bed that supports the tanks is mounted on a scissor lift for easy removal of fish from the tanks. Hatchery staff maintain expertise in the areas of fish culture, fish distribution, equipment troubleshooting, and maintenance.

Stocking will require coordination with New Mexico Fish & Wildlife Conservation Office, Dexter NFH&TC, and Uvalde NFH.

Objectives

1. Distribute 400,000 age-0 Colorado pikeminnow fingerlings (50 mm) from Dexter NFH&TC to the San Juan River. This will require one transport trip

2. Distribute 12,000 Razorback sucker (300 mm) from Uvalde NFH to the San Juan River. This will require two transport trips.

3. Distribute 4,000 Razorback sucker (450 mm) from Uvalde NFH to the San Juan River. This will require two transport trips.

Methods

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. 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.

2. When Colorado Pikeminnow fingerlings and Razorback sucker sub-adults are transported, they will be placed in a .5% salt bath and a 1 ml/gallon stress coat solution to help in osmoregulation and reduce the effects of handling stress.

3. Temperature will be dropped to 5 degrees Fahrenheit lower in the hauling truck than in the river.

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

5. Nets must be functional. Aeration equipment must be in place and must be used. For fingerling CPM aerators will be covered with a fine mesh screen material to prevent entrainment into aerator housing. 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.

6. 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.

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

8. While unloading tempering water pumps will 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.**

Budget

The scope of this project is to distribute Colorado pikeminnow from Dexter NFH&TC and Razorback sucker from Uvalde NFH to the San Juan River. The following costs are associated with all distribution, administration, and maintenance related activities required for one distribution trip from Dexter and four distribution trips from Uvalde.

Budget -Detailed Spending Plan 2011

O&M Labor Costs

The labor costs identified in the 2011 Scope of Work are broken down as follows, and include fringe benefits and payroll additives for each position identified:

Inks Dam National Fish Hatchery

(1) Maintenance Worker (240 hours) – WG-4749-8 @ $28.81/hr = $6,914.40
* distribution, troubleshooting, and equipment maintenance

(1) Maintenance Worker (115 hours Overtime) – WG-4749-8 @ $43.22/hr = $4,970.30
* distribution, troubleshooting, and equipment maintenance

(1) Motor Vehicle Operator (240 hours) – WG-5703-7 @ $24.07/hr = $5,776.80
* distribution, troubleshooting, and equipment maintenance

(1) Motor Vehicle Operator (115 hours Overtime)–WG-5703-7 @ $36.11/hr = $4,152.65
* distribution, troubleshooting, and equipment maintenance

(1) Administrative Technician (80 hours) – GS-0303-7 @ $28.35/hr = $2,268.00
* Budget tracking, purchasing, data base management & reporting, payroll

(1) Project Leader (40 hours) – GS-0482-12 @ $48.97/hr = $1,958.80
***** Supervision, planning & coordinating

Subtotal = $26,040.15

Equipment, Supplies and Fuel:

Liquid oxygen 5 cylinders @ $200.00 = $1,000.00

Diesel fuel – 10 tanks @ $500.00/tank = $5,000.00

Disinfection – 5 trips @ $200.00 = $1,000.00
(steam cleaning, chemicals, equipment)

Cyclical Maintenance for RDU and associated equipment = $7,500.00
(oil change, lubrication, tires, aerators, airstones, etc.)

Subtotal = $14,500

Travel:

Per Diem - 2 employees @ 20 days = $2,000.00

Lodging – 2 employees @ 10 nights = $1,600.00

Subtotal = $3,600.00

Annual Totals (O & M Direst Costs) $44,140.00
17% Administrative Overhead $51,644.00
*per cost recovery rates and policy (d-1 category)

TOTAL REQUESTED FOR 2011 $51,644.00

Out year funding

Expected budget requirements for 2012 is: (@ flat annual inflation rate)
Fiscal Year 2011 $51,644.00

Projected Duration Of Project:

Under Phase II, augmentation efforts will focus on culturing and stocking ≥400,000 age-0 Colorado pikeminnow and 12,000 (300 mm) Razorback sucker annually from 2011-2015 or as directed by the San Juan Recovery Implementation Program.

Reporting

Yearly progress reports detailing fish distribution activities will be completed and synthesized into a final accomplishment report available to the SJRIP by January 31, 2012.

Schedule

Distribution will occur during October and November of each year.

Literature Cited:

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.

Augmentation of Age 0 Colorado pikeminnow in the San Juan River Fiscal Year 2011 Project Proposal

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Background

Colorado pikeminnow (*Ptychocheilus lucius*) is a 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 (*Xyrauchen texanus*) 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 subbasin and at least 700 adults in the upper Colorado River subbasin, as well as a target of 1,000 subadults in the San Juan River subbasin (USFWS 2002). Delisting criteria include a self sustaining population that exceeds 800 adults maintained in the San Juan River subbasin.

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).

The augmentation program for the Colorado pikeminnow population in the San Juan River is 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 CPM.

Task 1.1.1.3 Evaluate and adjust stocking goals of augmentation plan.

Task 1.1.1.4 Review and update CPM 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 1.3— 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 2011

1. Coordinate with Dexter National Fish Hatchery and Technology Center (NFH&TC) to procure and stock fish 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. Identify multiple stocking locations to expand range and reduce potential for catastrophic loss of an entire year class at a single stocking location.
3. 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. New Mexico FWCO will identify various sites upstream of RM 166.6 and determine their suitability for use as stocking locations.

Objective 3. 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

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. 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.

Ryden, D.W. 2003. An augmentation plan for Colorado pikeminnow in the San Juan River. 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.

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.

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 2011 Proposed Budget:

Personnel/Labor Costs (Federal Salary + Benefits)	
Fish Biologist (GS-11-1) –25 days @ $327/day	$ 8,175.00
Age-0 stockings (Objective 1.a): (1 person x 5 days/trip x 1 trip)	
Reporting/Data Management (Objective 2) (1 person X 20 days)	
Bio. Science Technician (GS-9-9) – 5 days @ $342/day	$ 1,710.00
Age-0 stockings (Objective 1.a): (1 person x 5 days/trip x 1 trip)	
Supervisory Fish Biologist (GS-13-1) – 2 days @ $466/day	$ 932.00
(Project oversight and review)	
Sub-total	$ **10,817.00**
Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)	
Hotel Costs – 4 nights	$ 280.00
(4 nights @ $70/night – single occupancy = $280)	
Per Diem (Hotel Rate) – 5 days @ $46/day	$ 230.00
Sub-total	$ **510.00**
Equipment	
Vehicle Maintenance & Gasoline 1,500 miles @ $0.60/mile (includes costs associated with gasoline/diesel fuel vehicle maintenance)	$ 900.00
Sub-total	$ **900.00**
USFWS-NMFWCO Total	$ 12,227.00
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	$ 2,690.00
USFWS Region 2 Total	**$ 14,917.00**

COLORADO PIKEMINNOW Age-0 PRODUCTION
San Juan River
FY-2011

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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**, (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. Under Phase II, augmentation efforts will focus primarily on culturing and stocking increased numbers of age-0 fish. Current facility and broodstock capabilities at Dexter NFH&TC will allow for ≥400,000 age-0 Colorado pikeminnow to be produced and stocked annually. This has been identified as the stocking target for 2011 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 2011.

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 2011 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^{o}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 @ 100,000 fry
Pond 2B- .73 acre @ 100,000 fry
Pond 3B- .82 acre @ 100,000 fry
Pond 6D- .25 acre @ 100,000 fry
Pond 7D- .25 acre @ 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.

FY2010 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 2011. Identified costs also include maintaining 400-500 adult Colorado pikeminnow broodstock for recovery efforts.

FY2011 Budget -Detailed Spending Plan

O&M Labor Costs

The labor costs identified in the 2011 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, .96/lb, 6,000 lbs Nelson & Sons		$5,760.00
Cyclical Maintenance costs for: Tractors, mowers, gators, sweepers used in pond maintenance	$1,450.00	
Subtotal		**$ 18,004.00**

Utilities:

Pumping costs Electrical 200,257 kwh @ .070	$14,018.00	
Heating water for hatching eggs to swim-up Natural gas 1,525 ccf @ .85		$ 1,296.00
Subtotal		**$15,314.00**

Reintroduction Costs:
To be completed by the USFWS Region 2,
Regional Distribution Unit @ Inks Dam, Burnett, TX,
under a separate SOW.

Annual Totals (O & M Direst Costs)	**$78,154.00**
17% Administrative Overhead	**$13,286.00**
*per cost recovery rates and policy (d-1 category)	
TOTAL REQUESTED FOR 2011	**$ 91,440.00**

Out year funding
Expected budget requirements for 2012 is: $91,440

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 2006-2010 to the San Juan River as per (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 will focus on culturing and stocking ≥400,000 age-0 Colorado pikeminnow annually from 2011-2015 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, 2012.

Schedule
Broodfish will be spawned in May 2011 and age-0 fish reared in earthen and plastic lined ponds from June - October 2011.

Literature Cited:

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.

Rearing Razorback Sucker Sub-Adults at Dexter National Fish Hatchery and Technology Center FY 2011

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

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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 2). 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 2). 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 2).

Table 2. Dexter NFH & TC Razorback Sucker Captive Broodstock

Year Class	Origin	Numbers on hand	Represented	Founders Designation	Lot
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, WB-Willow Beach, P- Production.

From 2001-2010 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. Continue data collection on stocking densities in Dexter ponds for optimal growth of razorbacks and evaluate and adjust as necessary to meet required numbers and size.

4. 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/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/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 ^{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 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 2011 marks the sixth year of razorback production at Dexter for distribution to the NAPI ponds. Since 2006, Dexter's staff have stocked a total of 33,733 razorback's averaging 210mm in length into East and West Avocet and Hidden ponds. An additional 11,000 will be stocked into the NAPI ponds in April 2011. 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) 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. 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.

FY2010 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, 2011.

O&M Labor Costs

The labor costs identified in the 2011 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 = $35,461

Materials and Supplies

Cost based on Dexter NFH&TC historical purchases:

Fish Health	
-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) 3000 lbs $ .96 per lb	$ 2,880
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 =	**$ 6,405**

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	$ 4,500
Subtotal =	**$ 9,000**

Travel

- Fish stocking/distribution.

Dexter to Farmington (NAPI) & return- (1640 miles @ 4.50 per mile DX truck)=	$ 7,380
Fuel and routine vehicle maintenance.	
Perdiem- $120 per day X 2 trips X 2 individuals. =	$ 480
Dexter to Uvalde & return- (960miles @ 4.50 per mile X 1 trip)=	$ 4,320
Fuel and routine vehicle maintenance.	
Perdiem- $120 per day X 1 trip X 1 individual. =	$ 120
Subtotal =	**$12,300**

Annual Totals

O&M DIRECT COSTS	$63,166
INDIRECT COSTS (Admin Overhead @ 17%)	$10,738

*per cost recovery rates and policy (d-1 category)

TOTAL REQUESTED FOR 2011 $73,904

Out Year Funding

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

Fiscal Year 2012	$76,269
Fiscal Year 2013	$78,710
Fiscal Year 2014	$81,229

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). 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, 2012.

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) stocked into ponds in March 2011. Target sized fish are available for distribution in spring and fall of each year.

Personnel Qualifications

Manuel E. Ulibarri, Center Director
Education:
B.S. 1985, Biology, Western New Mexico State University
1986 to 1988 Graduate work in Fisheries Science, New Mexico State University

Professional Experience:
Dexter NFH & TC - 2001 to present (EOD at Dexter NFH & TC 11/04/01)
Willow Beach NFH - 1998 to 2001
Uvalde NFH - 1991 to 1998
Mescalero NFH - 1986 to 1991
Rock Lake State Fish Hatchery, Santa Rosa, NM 1981 to 1984

William Knight - Fish Biologist
Education:
B.S. 2005 – Fisheries and Wildlife Science, New Mexico State University

Professional Experience:
Dexter NFH & TC - 2005 to present
Uvalde NFH April – July 2006
NMSU A-Mountain Native Fish Facility 2001 to 2005

Jason Nachtmann, Fish Biologist
Education**:**
B.S. 2001 - Fisheries and Wildlife Biology, Colorado State University

Professional Experience**:**
Dexter NFH & TC - 2007 to present
Saratoga NFH 2003-2006
Medicine Bow-Routt NF and Thunder Basin National Grassland, Wyoming, 2001-2006

Maria Bullard, Administrative Officer
Education:
Undergraduate Studies, Technical Vocational Institute, Pre-Engineering – 15 hrs
U.S. Army Executive Administration Course, Honor Grad, 71C10 – 17 hrs
U.S. Army Administrative Assistant, Top 5%, 71L10 – 8 hrs
Undergraduate Studies, Eastern New Mexico University, Business Admin – 30 Hrs

Professional Experience:
Dexter NFHTC, Dexter, NM – August 2003 to Present
Bureau of Reclamation, Albuquerque, NM – July 1998 to July 2003
Department of Defense, Fort Belvoir, VA – August 1996 to July 1998
Dyncorp, Fort Irwin, CA – April 1994 to November 1995
Local National Government, Berlin, GE – February 1990 to June 1992
U.S. Army – October 1984 – August 1989

Appendix Table 3.

Dexter National Fish Hatchery and Technology Center
Razorback Sucker Spawning Protocols: 2005

Roger Hamman

March 1, 2005
- screen, board and start filling broodstock summer pond.

March 12, 2005
- start draining broodstock pond

March 13, 2005
- continue draining broodstock pond

March 14, 2005
- Harvest pond and bring all broodstock in to Fish Culture Building
- sort males/females and place in separate tanks
- record pit tag numbers, lengths, weights and take genetic samples of each fish
- inject 25 females with 0.1cc HCG/lb in preparation for spawning
- inject 25 males if necessary with 0.3 cc HCG/lb in preparation for spawning
- Move all broodstock not used in spawning activities to summer pond.

March 15, 2005
- inject 25 females with 0.1cc HCG/lb

March 16, 2005
- inject 25 females with 0.1cc HCG/lb
- prepare incubation system to receive eggs
- gather other equipment and supplies needed for spawning trials

March 17, 2005
- spawn razorbacks using 1 female X 1 male spawning procedure
- inventory each individual spawn
- place eggs in incubators

March 18, 2005
- move spawned broodstock to summer pond
- check eggs in incubators
- individual egg lots can be moved at this time
- prepare a minimum of two 12' tanks to receive fry

March 19, 2005
- check eggs in incubators

March 20, 2005
- check eggs in incubators begin filling 12' tanks with heatec water

March 21, 2005
- check incubators (morning and afternoon) and transfer fry to 12' tanks

March 22, 2005
- check incubators (morning and afternoon) and transfer fry to 12' tanks

March 23, 2005
- transfer remaining fry to 12' tanks
- clean incubators

March 24, 2005
- observe fry in 12' tanks

March 25, 2005
- observe fry in 12' tanks

March 26, 2005
- observe fry in 12' tanks

March 27, 2005
- observe fry in 12' tanks
- clean 12' tanks in preparation for stocking fry into rearing ponds

March 28, 2005
- fry stocked into rearing ponds at 20,000 per acre.

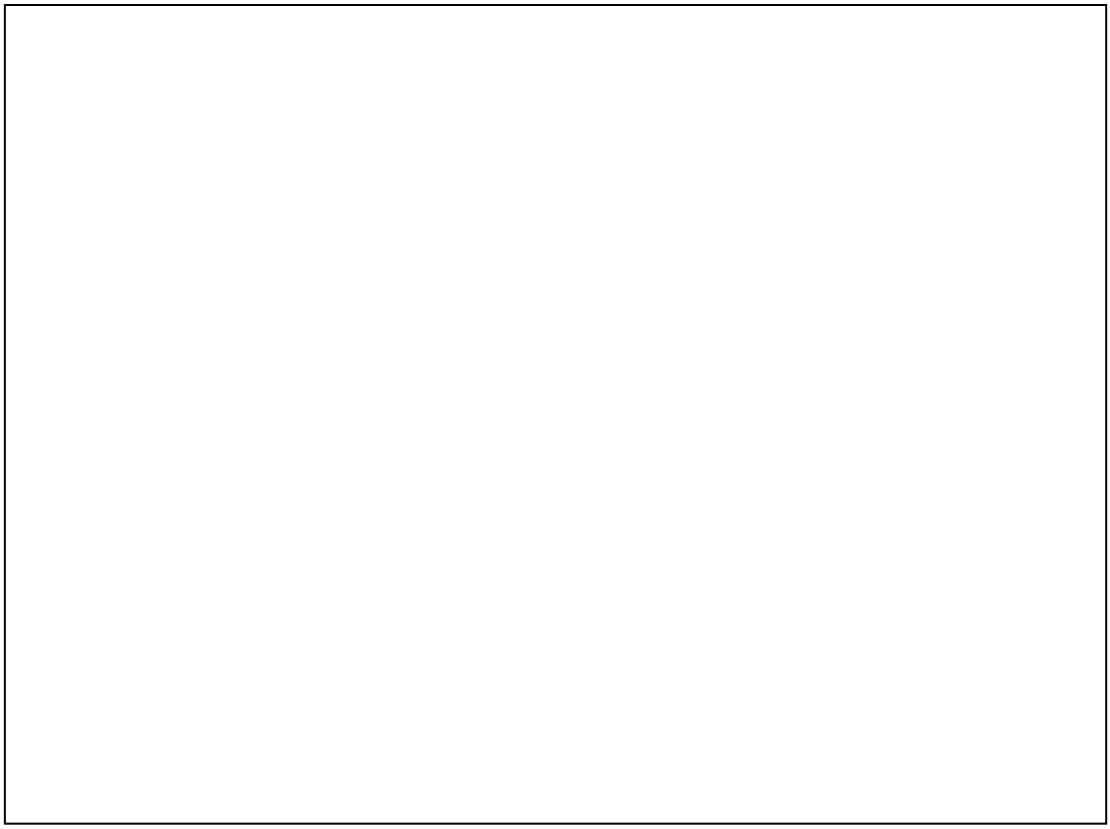
Literature Cited:

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 2011

Rear 12,000-300mm Razorback Sucker and Assess Potential for Rearing Bonytail 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
And
Lower Colorado River Multi-Species Conservation Program

Principal Investigator – Grant L. Webber
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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) and conduct research activities related to rearing 300mm bonytail for the Lower Colorado River Multi–Species Conservation Program (LCRMSCP). The project will use up to 24- 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 and conduct research on bonytail growth and performance. 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 three years of work completed at Uvalde has been incorporated into the current razorback and bonytail 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 Regional Distribution Unit (RDU) stationed at Inks Dam NFH; Burnet, Texas. Based on the number and size of fish to be stocked, when necessary, Uvalde will be available to assist in the transportation of the fishes.

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 and bonytail 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 the second consecutive clean fish health inspection, Uvalde NFH returned to Class A" Fish Health status. In October 2009 and February 2010, a total of 8,000 Razorbacks were stocked into Animas Confluence, Hogback Diversion, and Shiprock Bridge. Approximately 4,000 RBS were stocked into the Animas Confluence, 2,000 RBS into Hogback Diversion (alternate site for scheduled stocking into the Shiprock Bridge site due to inaccessibility issues, related to rain), and 2,000 RBS into Shiprock Bridge. All fish stocked averaged 420 mm in total length.

Facility

This project will utilize up to 24 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. While the lined ponds do not require maintenance activities to receive fish, the earthen ponds are graded, disked, and packed. All ponds are fully functional with two water supply lines (one at shallow end and one at catch basin end), concrete catch basins and drainlines.

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, which is a secure aquifer capable of pumping approximately 1,500 gallons per minute. The well water is a constant 72^{o}F, pH of 7.5-8.05, total hardness of 496 ppm, and alkalinity of 224 ppm. A secondary well (Wilson Well) is now operational and can produce 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^{o}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 all threatened and endangered species utilizing the Edwards water throughout the system, the Service has established a limit on groundwater withdraws from the Edward's Aquifer. That self-imposed water

right for Uvalde is 843 acre-feet per annum (274,775,298 gallons). Since the Spurgeon Well derives its water from a source other than the Edward's Aquifer (Austin Chalk formation), there are no groundwater pumping limits set for withdraws associated with the Spurgeon Well.

Lake Mohave Razorback and Bonytail Broodfish

The DNFH&TC has successfully propagated and maintained razorback sucker and bonytail 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/fingerlings for growout and research purposes.

Uvalde's growing scenario includes receiving fry and fingerlings 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. 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 and tagging. 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 Service's RDU.

Objectives

There are two main objectives of this SOW: 1) propagate 12,000 – 300mm razorback sucker sub-adults annually and deliver them to the San Juan River for Recovery purposes; and 2) determine optimal captive propagation densities for bonytail at UNFH that will enable the consistent production of 300mm fish annually for augmentation programs in the Lower Colorado River (LCRMSCP).

Additional objectives include:

1. Improve, maintain, and staff Uvalde NFH necessary to captively rear and distribute the target # of fish and conduct the target research;

2. Test effects of long distance hauling, water quality differences and elevation on RBS and BTC cultured at the UNFH;

Methods

DNFH&TC will conduct captive propagation activities that include spawning of a minimum of 25 pairs of broodstock, incubation of fertilized eggs, enumeration and providing swim up fry/fingerlings fish to UNFH for the completion of the objectives. UNFH will conduct the propagation and harvest of target sized fish from ponds, enumerate, tag and coordinate the distribution of these fish to the San Juan and Lower Colorado Rivers.

The project will utilize both indoor and outdoor facilities. At Dexter, all spawning and incubation activities will be conducted indoor in the fish culture building. At Uvalde, razorback sucker and bonytail will be reared in extensive culturing ponds and intensive culturing raceways to achieve target numbers and sizes.

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 50,000 age I+ razorbacks and 30,000 bonytail in a given year to meet commitments for future years.

Ponds

Razorback Rearing

Sufficient numbers of razorback fingerlings were cultured at UNFH during the 2006 and 2007 growing season to meet requirements of a five year production program. Approximately up to 50,000 fry will be shipped every other year (or every year depending upon needs) from Dexter 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)

Harvest Age I–fish from the ponds, enumerate and stock into approximately 18 ponds. Individual ponds will be decided upon at time of stocking; however, a minimum of 7 ponds will be used that have the protection of bird deterrent netting.

Bonytail Research

Stocking densities per pond will be adjusted annually based on the previous year's fish growth and survival. (April thru November - 210 day growing period)

Pond 13- 1 acre @ 1,000 300+ mm subadults
Pond 14- 1 acre @ 1,000 300+ mm subadults
Pond 23- 1 acre @ 1,300 300+ mm subadults
Pond 24- 1 acre @ 1,300 300+ mm subadults

All Bonytail study fish will be placed in earthen ponds. All fish will be a minimum of 300 mm in total length and individually counted prior to being stocked into the ponds. 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, 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 - 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) and Habitat 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 and bonytail 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 1.5 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 0.5 gallons per acre when water clarity is greater than 2-feet.

Colorants such as Aquashade may be used to promote phyto-and zooplankton blooms to provide natural food and rooted vegetation shading when active fertilization does not produce sufficient phytoplankton blooms. Chemical will be applied at a rate of 1ppm, which is 1 gallon of solution per acre volume (average 4-feet deep).

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 drain 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 ≥ 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, PIT tagged (134.2 kHz) and stocked into the San Juan River in October/November of each calendar year. Some fish may also be stocked in the winter or spring months, should some achieve the target size sooner than expected. 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.

All bonytail will be harvested from the study ponds in the fall of each year and transferred to the fish holding house for enumeration. Length/weight, survival and fish health data will be collected, analyzed and adjustments made to the stocking densities for the following year. All fish achieving the target size of 300mm will be available for use in the augmentation effort of the LCRMSCP program. The anticipated date of stocking is November.

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 and 7,000 bonytail reared for this project will be maintained under the protection of bird netting and/or intensive raceways during the winter months. The intensive culture raceways contain 72^{o}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 holding facilities 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. Condition factors will be calculated on an annual basis and data added to a RBS and BTC database. 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 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 Region 2 Fish Health Unit @ Dexter NFH&TC will provide bacterial and viral testing for razorback and bonytail 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 (late fall or as requested by the SJRIP).

Budget 2011 Fiscal Year

Rearing Razorback Sucker at Uvalde National Fish Hatchery; Detailed Budget Spending Plan. Budget reflects a 60% cost share by the San Juan RIP.

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 @ $30.39/hr = $38,400
* On-site fish rearing, water quality monitoring, vegetation treatment, fish tagging and distribution coordination.

(1) Animal Caretaker (6 pp) – WG-5048-3 @ $12.76/hr = $6,100
-General fish husbandry activities such as fish feeding, chemical applications, and water quality data collections

(1) Administrative Technician (3 pp) GS-303-7 @21.62/hr
- payments, budget, purchasing, contracting administration. $5,200

Subtotal = $49,700

Equipment, Materials and Supplies

Cost based on UNFH historical purchases:

Fish Health
-Water quality monitoring supplies (test pillows/strips)
-Therapeutants- salt, formalin, MS-222, Stress Coat, Nitrofurazone, Oxygen $ 1,800

Feed
-Production diet RBS # 350 -28,000 lbs @ $.88 per lb $14,400

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, Citric Acid, Cutrine Plus, Navigate, dimilin, polaris, diquat $11,400

Subtotal = $27,780

Services and Aquaculture supplies		
-Maintenance, fuel, aquaculture supplies		$12,180
	Subtotal =	**$12,180**

TOTALS:

O&M DIRECT COSTS	**$89,660**
INDIRECT COSTS (Admin Overhead @ 17%)	
*per cost recovery rates and policy (d-1 category)	**$15,242**
TOTAL O&M REQUESTED FOR 2010	**$104,902**

Razorback Sucker Augmentation at NAPI Grow-Out Ponds
Fiscal Year 2011 Project Proposal

Principal Investigators: Jeff Cole, Viola Willeto and Albert Lapahie
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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 decided to only utilize three of the nine existing ponds on NAPI beginning in FY 2009.

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 has no siphon, so draining is accomplished by renting a battery of water pumps. A siphon will be installed in Avocet East during FY 2008.

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 Engineering 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 beginning in 2007. The Service assists the NNDFW with pond management and 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)

Cooperatively manage East Avocet, West Avocet, and Hidden ponds to provide an additional source of RBS to supplement the RBS 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) 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. Based on a return rate of 40-60% we anticipate stocking 4,200 to 6,300 razorback sucker.

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

In the spring of 2011 Dexter National Fish Hatchery and Technology Center will deliver 10,500 ≥ 200 mm RBS to the three NAPI grow-out ponds. In the fall of 2011, 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.

The Service, Region 2, will provide overall coordination for management of the grow-out ponds on NAPI. 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 the two

Service Regions and NNDFW. Associated data management and reporting for the project will be handled by staff from the Service, Region 2.

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 2011, East Avocet, West Avocet, and Hidden ponds will be managed for a single cohort of RBS. NNDFW and Service staff will cooperatively trap, tag, and stock RBS into the SJR for several days 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 2011, Dexter National Fish Hatchery will deliver 10,500 ≥ 200 mm RBS to the three NAPI grow-out ponds. In the fall of 2011, 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.

NOTE: These costs DO NOT reflect the actual amount needed to accomplish this work in FY 2011. The following budget is restricted to a 0% increase over the past two years reflective of the Programs annual CPI adjustment. This policy does not account for yearly increases in costs such as gasoline, lodging, equipment purchases and maintenance, employee step increases or federally-mandated per diem costs or cost-of-living allowance raises that are incurred by our office.

Budget Fiscal Year 2011

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 (20,000 x 33.19%)	$ 32,789	$ 26,638
Wildlife Technician .5 FTE NNDFW (11,000 x 33.19%)		$ 14,650
Personnel Subtotal	**$ 32,789**	**$ 41,288**
Travel		
Per Diem Lodging and Meals	$ 4,251	$ 500
Vehicle Mileage and Maintenance	$ 3,450	$ 13,000
Travel Subtotal	**$ 7,701**	**$ 13,500**
Office Supplies and Equipment		$ 500
General Operating Supplies (includes fish transport costs, i.e. oxygen, salt, stress coat, etc.)		$ 2,500
Electricity Costs (Aeration)		$ 2,500
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-**	**$ 14,550**
Total	**$ 40,490**	**$ 69,338**
Administrative charge (22%)	$ 8,908	$ 15,254
USFWS/NNDFW Totals	**$ 49,398**	**$ 84,592**

Grand Total	**$ 133,990**

Itemized budget for USFWS - NMFWCO:

Daily pond management activities	
.30 FTE (GS-8; $75,368*/year)	$ 22,610.00
Active/Passive Harvest	
Fish Biologist (GS-9-1) - 39 days @ $261/day	$ 10,179.00
(passive harvest – 5 days x 3 ponds x 2 trips)	
(active harvest – 3 days x 3 ponds x 1 trip)	
Personnel subtotal	$ 32,789.00
Travel and Per Diem (Based on Published FY-2009 Federal Per Diem Rates)	
Hotel Costs – 39 nights	$ 2,730.00
(39 nights @ $70/night – single occupancy = $2,730)	
Per Diem (Hotel Rate) – 39 days @ $39/day	$ 1,521.00
Travel subtotal	$ 4,251.00
Equipment	
Vehicle Maintenance & Gasoline 5,750 miles @ $0.60/mile (based on GSA rates established on 01 September 2008 and includes costs associated with gasoline/diesel fuel vehicle maintenance)	$ 3,450.00
Equipment subtotal	$ 3,450.00
USFWS – NMFWCO Total	$ 40,490.00
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	$ 8,908.00
USFWS – Region 2 Total	**$ 49,398.00**

*includes 32% overhead for benefits

FY 2011 Project Proposal
San Juan River Basin Hydrology Model Development, Operation and Maintenance

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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 River Basin. The SJBHM actually consists of a series of models including evapotranspiration models, a natural flow model in StateMod, several simulation models in RiverWare, and several calibration and validation models. Revisions and modifications to the models and supporting data have occurred through a multi-year model development and validation phase. In October 2008, it was decided that the functionalities in the StateMod simulation portion of the SJBHM should be implemented in RiverWare. This work is expected to be completed in FY2010. The FY2011scope 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. 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 validating and verifying the recent work to incorporate the StateMod simulation portion of the SJBHM into RiverWare 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. In addition, the

FY2011 request includes funds to continue to provide technical transfer from the model developers to the model users and maintainers.

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 incorporated the simulation functionalities of StateMod into the RiverWare portion of the 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, and climate 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:

Budget Summary FY 2011

Model Development	$49,160
Model Maintenance	$38,560
Model Runs	$25,080
Program Management	$27,200
Grand Total	**$140,000**

FY-2012	**$144,200**	*
FY-2013	**$148,530**	*
FY-2014	**$75,000**	†

* 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	80	$6,400
	WCAO[2] Engineer	$105	160	$16,800
Annual Software Update	UCRO Engineer	$80	160	$12,800

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	240	$19,200
	WCAO Engineer	$105	56	$5,880

Task 4 Program Management Coordination

A) Labor

Task	Position	Salary total/hr	Total Hours	Total Cost
Meetings and Coordination	UCRO Engineer	$80	120	$9,600
	WCAO Engineer	$105	80	$8,400
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	$800	$200	$3,600
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 2011 Project Proposal

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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.

FY-2011 Budget:

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	6,000		
Travel			1,400	
Equipment and supplies				0
Total				$7,400

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

Fiscal Year 2012	$7,700
Fiscal Year 2013	$8,000
Fiscal Year 2014	$8,300

Operation of Public Service Company of New Mexico Fish Passage Structure
Fiscal Year 2011 Project Proposal

Principal Investigators: Jeffrey Cole, Albert Lapahie, Viola Willeto,
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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.

StudyArea

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, 2011. 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 forebay 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' 2009. 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, 2011. 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.

Program staff will attend SJRRIP Biology Committee meetings and provide reports as needed throughout the year. Service staff will assist the NNDFW in preparing presentations for the Biology Committee meetings.

Fiscal Year – 2011 Budget

BUDGET WORKSHEET Operation of San Juan/PNM Fish Passage		
Personnel (salary and benefits)	**USFWS Funding**	**Program Base Funding**
.5 FTE Fisheries Biologist (20,000 X 33.19%)		$26,638
.5 FTE Wildlife Technician (11,000 X 33.19%)		$14,650
Personnel Subtotal		**$41,288**
Travel		
1 Tribal Vehicle		$15,000
Per Diem Lodging and Meals		$2,500
Travel Subtotal	**$**	**$17,500**
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		$ 700
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		$1,000
Support Subtotal	**$**	**$7,800**
Training and Conference Registration		**$1,000**
Consultant/ Professional Sub-Total		**$1,000**
	USFWS Funding	**Base Funding**
Budget Subtotal		**67,588**
FY 2006 Carry over funds		**0**
Total		**67,588**
Administrative charge (22%)		**14,869**
Grand Total	**$**	**82,457**

Capital Improvement Program Management
San Juan River Recovery Program
Fiscal Year 2011 Project Proposal

Principal Investigator: Brent Uilenberg
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Background

The purpose of the San Juan Capital Improvements Program is to implement capital projects which have been identified by the Program as necessary for the recovery of the endangered fish. As defined in Public Law 106-392 capital projects include A...planning, design, permitting or other compliance, pre-construction activities, construction, construction management, and replacement of facilities, and the acquisition of interests in land or water, as necessary to carry out the Recovery Implementation Programs@.

Study Area

San Juan River Basin

Objectives

1. Coordinate the preparation of Federal budget requests.

2. Develop and manage cooperative agreement with the National Fish and Wildlife Foundation which provides the mechanism to utilize non-Federal cost share funds to implement capital projects.

3. Develop and manage contracts and agreements to accomplish construction and acquisition of capital projects.

4. Account for and provide capital project expenditure reports to the Coordination Committee.

5. Coordinate planning, design, permitting, pre-construction, construction and acquisition of capital projects.

Products

Financial reports will be periodically provided to the Coordination Committee documenting the status of Federal appropriations and non-Federal cost sharing contributions.

Budget FY-2011:

Objective	Staff days	Labor	Travel	Equipment and supplies
Objective 1				
Personnel-10 staff days @ $1,000 per day	10	10,000		
Travel			0	
Equipment and supplies				100
Objective 2				
Personnel- 5 staff days @ $1,000 per day	5	5,000		
Travel - 2 trips at $500 per trip			1,000	
Equipment and supplies				200
Objective 3				
Personnel - 20 staff days @ $700 per day	20	14,000		
Travel - 3 trips at $500 per trip			1,500	
Equipment and supplies - communication and computer				200
Objective 4				
Personnel - 10 staff days @ $700 per day	10	7,000		
Travel - 1 trips at $500 per trip			500	
Equipment and supplies				100
Objective 5				
Personnel - 20 staff days @ $700 per day	20	14,000		
Travel - 3 trips at $500 per trip			1,500	
Equipment and supplies				500
Sub-total	105	50,000	4,500	1,100
Total				$55,600

Non-native species Monitoring and Control in the Upper/Middle San Juan River
Fiscal Year 2011 Project Proposal

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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 April 2010). Actions and Tasks associated with this Element encompassed within this scope of work include:

Action 4.1.1 Develop, implement, and evaluate the most effective strategies for reducing problematic nonnative fish.

Task 4.1.1.4 Evaluate and refine alternative nonnative fish reduction methods.

Task 4.1.1.7 Evaluate effect of nonnative fish control on distribution, abundance, and demographics (e.g., fish size, age, sexual maturtity) of nonnative fish populations.

Task 4.1.1.8 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 4.1.4 Establish criteria for reduction of target nonnative fish populations.

Task 4.1.4.1 Establish target criteria for reduction of problematic nonnative fish species to estimate time, effort, and cost for controlling nonnative fishes.

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.

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 2011):

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 2011**

Products/Schedule

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

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.

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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 2011 Budget

Labor Costs (Federal Salary and Benefits)

PNM Weir to Hogback Diversion:

Fish Biologist (GS-7-2)-10 days @ $218/day (1 person X 5 days/trip X 2 trips)	$ 2,180.00
Biological Science Technician (GS-8)-10 days @ $319/day (1 person X 5 days/trip X 2 trips)	$ 3,190.00
	$ 5,370.00

Hogback Diversion to Shiprock Bridge:

Supervisory Fish Biologist (GS-12-3)-15 days @ $399/day (1 person X 5 days/trip X 3 trips)	$ 5,985.00

Fish Biologist (GS-7-2)-15 days @ $218/day
(1 person X 5 days/trip X 3 trips) ..... $ 3,270.00

Biological Science Technician (GS-8)-15 days @ $319/day
(1 person X 5 days/trip X 3 trips) ..... $ 4,785.00
$ 14,040.00

Shiprock to Mexican Hat:

Supervisory Fish Biologist (GS-12-3)-24 days @ $399/day
(1 person X 12 days/trip X 2 trips) ..... $ 9,576.00

Fish Biologist (GS-7-2)-24 days @ $218/day
(1 person X 12 days/trip X 2 trips) ..... $ 5,232.00

Biological Science Technician (GS-8)-48 days @ $319/day
(1 person X 12 days/trip X 4 trips) ..... $ 15,312.00

Fish Biologist (GS-5-1)-48 days @ $170/day
(1 person X 12 days/trip X 4 trips) ..... $ 8,160.00

Biological Science Technician (GS-4-1)-24 days @ $152/day
(2 people X 12 days/trip X 1 trip)..... $ 3,648.00
$ 41,928.00

Shiprock to Sand Island (tagging trip):

Supervisory Fish Biologist (GS-12-3)-12 days @ $399/day
(1 person X 12 days/trip X 1 trip)..... $ 4,788.00

Fish Biologist (GS-7-2)-24 days @ $218/day
(2 people X 12 days/trip X 1 trip)..... $ 5,232.00

Biological Science Technician (GS-8)-12 days @ $319/day
(1 person X 12 days/trip X 1 trip)..... $ 3,828.00

Fish Biologist (GS-5-1)-12 days @ $170/day
(1 person X 12 days/trip X 1 trips) ..... $ 2,040.00
$ 15,888.00

Administrative and Reporting Costs

Administrative Officer (GS-9-6)-15 days @ $268/day ..... $ 4,020.00

Supervisory Fish Biologist (GS-12-3)-60 days @ $399/day..... $ 23,940.00

Fish Biologist (GS-7-2)-25 days @ $218/day..... $ 5,450.00
$ 33,410.00

Sub-Total for Labor Costs..... $ 110,636.00

Travel and Per Diem (Based on published FY 2009 Per Diem Rates)

Hotel Costs – 48 nights @ $70/night ..... $ 3,360.00

Per Diem (Hotel Rate) – 54 days @ $39/day ..... $ 2,106.00

Per Diem (Camp Rate) – 179 days @ $29/day ..... $ 5,191.00

Sub-Total for Travel and Per Diem..... $ 10,657.00

Equipment

Removal Trips

PNM Weir to Hogback/Shiprock Diversion
3,000 miles @ $0.60/mile (400 miles/trip X 5 trips + 1,000 shuttling miles) ..... $ 1,800.00

Shiprock to Mexican Hat
8,400 miles @ $0.60/mile (700 miles/trip X 4 trips X 3 vehicles) ..... $ 5,040.00

Generator fuel – 320 gallons @ $3.00/gallon
20 gallons/trip X 5 trips; upper SJR trips
110 gallons/trip X 2 trips; camping trips ..... $ 960.00

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

6,000 Floy T-Bar Anchor Tags
(FD-94 tags @ $590/1,000 tags) ..... $ 3,540.00

Six (6) Tagging Guns
(Mark II Regular Scissor Grip @ $45 ea.) ..... $ 270.00

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

Generator Fuel – 55 gallons @ $3.00/gallon ..... $ 165.00

Vehicle Fuel
1,400 miles @ $0.60/gallon (700 miles roundtrip X 2 vehicles) ..... $ 840.00

Sub-Total for Equipment ..... $ 14,675.00

USFWS – New Mexico Fish and Wildlife Conservation Office ..... $ 165,968.00

USFWS– Administrative Overhead (22%) ..... $ 29,913.00

USFWS – Region 2 Total ..... $ 165,936.00

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 ..... $ 32,741.00
New Mexico Department of Game and Fish- Conservation Services Division ..... $ 52,937.00

Grand Total for FY 2011 .....$ 333,689.00

Costs for participation of the U.S. Fish and Wildlife Service, Colorado River Fishery Project (USFWS - CRFP) office, Grand Junction, CO in the expanded nonnative removal efforts in FY-2011.

NOTE: The line-item costs listed in this budget use figures from the FY-2009 workplan and do not accurately reflect the actual costs that will be incurred by our office to perform this work in FY-2011. The costs listed here have been restricted to 0% increases over the last two years, based on a standard Program policy which states that yearly project costs will reflect the Program's annual CPI adjustment. This policy does not account for yearly increases in costs such as gasoline, lodging, equipment purchases and maintenance, employee step increases or federally-mandated per diem costs or cost-of-living allowance raises that are incurred by our office.

Personnel/Labor Costs (Federal Salary + Benefits)	
Principal Biologist (GS-12) – 38 days @ $449/day	$ 17,060.00
(1 person X 5 days/trip X 1 hotel trip)	
(1 person X 11 days/trip X 3 camping trips)	
Biological Technicians (GS-7) - 49 days @ $236/day	$ 11,565.00
(1 people X 5 days/trip X 1 hotel trip)	
(1 person X 11 days/trip X 4 camping trips)	
Biological Technicians (GS-5) – 66 days @ $131/day	
(3 people x 11 days/trips x 2 trips)	$ 8,645.00
	$ 37,270.00
Administrative Support (Federal Salary + Benefits)	
Administrative Officer (GS-9) – 12 days @ $297/day	$ 3,565.00
	$ 3,565.00
Reporting/Data Management (Federal Salary + Benefits)	
Principal Biologist (GS-12) – 40 days @ $449/day	$ 17,960.00
	$ 17,960.00
Travel and Per Diem (Based on Published FY-2008 Federal Per Diem Rates)	
Hotel Costs – 18 nights	$ 1,260.00
(18 nights @ $70/night – single occupancy = $1,260)	
Per Diem (Hotel Rate) – 16 days @ $39/day	$ 625.00
Per Diem (Camp Rate) – 80 days @ $26/day	$ 2,080.00
	$ 3,965.00
Equipment	
Vehicle Maintenance & Gasoline (@ $0.60/mile)	
(600 miles round trip from Grand Junction, CO to Farmington, NM + 200 miles of shuttling per trip X 5 trips)	$ 2,400.00
Generator Gasoline (110 gallons/trip x 2 trips @ $3.00/gallon)	$ 660.00
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
	$ 4,560.00
USFWS-CRFP (Grand Junction) Total	$ 67,320.00
USFWS Region 6 Regional Office Administrative Overhead (22.00%)	$ 14,810.00

USFWS Region 6 Total		$ 82,130.00

Costs for participation of Utah Division of Wildlife Resources, Moab, UT in the Upper and Middle San Juan nonnative removal FY-2011.

Personnel/Labor Costs (Salary + Benefits)		
Principal Biologist– 45 days @ $265/day (1 person x 5 days/trip X 2 hotel trips) (1 person x 10 days/trip X 3 camping trips and 5 office days for trip prep, gear cleaning, etc.)		$ 11,925.00
Biological Technicians - 45 days @ $185/day (1 person x 5 days/trip x 2 hotel trips) (1 person x 10 days/trip x 2 camping trips and 5 office days for trip prep, gear cleaning, etc.)		$ 8,325.00
Project Leader – 2 days @ $290/day		$ 580.00
	Subtotal	**$ 20,830.00**
Travel and Per Diem		
Hotel Costs – 18 nights @ $70/night		$ 1,260.00
Per Diem (Hotel Rate) – 22 days @ $43/day		$ 946.00
Per Diem (Camp Rate) – 60 days @ $20/day		$ 1,200.00
Vehicle Rent (1 truck @$250 month for 2 months)		$ 500.00
Vehicle Mileage (2,088 miles @ $0.49 per mile)		$ 1,023.00
	Subtotal	**$ 4,929.00**
Equipment Maintenance, Repair and Replacement		
Generator Gasoline (30 gallons/trip x 5 trips @ $3.50/gallon)		$ 525.00
Maintenance (spark plugs, air filters, oil, generator repair)		$ 400.00
Data Collection Supplies (spring scales, pencils, measuring boards)		$ 200.00
Camping Gear (tents, sleeping pads, dry bags)		$ 200.00
Rafting Supplies (oars, raft repair, life jackets, straps, pumps)		$ 200.00
	Subtotal	**$ 1,525.00**
UDWR – Moab Total		$ **27,284.00**
UDWR - Moab Administrative Overhead (20 %)		$ **5,457.00**
UDWR – Moab Grand Total		$ **32,741.00**

Costs for participation of the New Mexico Department of Game and Fish, Sante Fe, N.M. in the expanded nonnative removal FY-2011.

Personnel/Labor Costs (State Salary + Benefits)		
Biologists - 20 @ $350/day (1 person x 5 days/trips x 4 trips)		$ 7,000.00
Biologists– 88 days @ $350/day (2 people x 11 days/trip x 4 trips; camping trips)		$ 30,800.00
		$ 37,800.00
Travel and Per Diem (Based on Published FY-2007 State Per Diem Rates)		
Per Diem – 104 days @ $85/day		$ 8,840.00
		$ 8,840.00
Equipment		
Vehicle Maintenance & Gasoline (@ $0.55/mile) (2,700 miles for 4 trips from Albuquerque to Farmington and associated shuttling of vehicles and 4 trips from Albuquerque to Mexican Hat and all associated shuttling of vehicles)		$ 1,485.00
		$ 1,485.00
NMDGF – Santa Fe	**Total**	**$ 48,125.00**
Administrative Overhead (10%)		**$ 4,812.00**
NMDGF – Santa Fe – Total Budget		**$ 52,937.00**

Nonnative Species Control in the Lower San Juan River
Fiscal Year 2011 Project Proposal

Principal Investigator: Darek S. Elverud
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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 2009, 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 78,000 channel catfish and approximately 3,000 common carp were mechanically removed from the lower San Juan River from 2002 to 2009. A decrease in mean total length (TL) of channel catfish was observed between 2002 and 2004, 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 2009. Between 2002 and 2009, 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 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 2009. Preliminary population estimates for juvenile Colorado pikeminnow residing in the lower San Juan River were generated from 2004 to 2009 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. Sampling also documented the presence of Colorado pikeminnow and razorback sucker below the waterfall.

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

This work plan also proposes to discontinue the sampling at the waterfall. Sampling at the waterfall the past five years has indicated loss of stocked endangered fish over the waterfall and into Lake Powell. Sampling at the waterfall also documented the waterfall being a migration barrier to nonnative reservoir species and endangered species attempting to move upstream. It is the author's opinion that continuing the current level of sampling at the waterfall will not provide additional insight, and therefore it is recommended that the waterfall sampling not be continued in 2011.

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 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. Characterize 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 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 2012. 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 2012. Electronic copies

of the field and collection data will be transferred to the San Juan River database manager following the successful protocol previously employed.

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Budget FY-2011:

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	$ 5,800
Personnel / Labor Costs Subtotal	**$94,180**

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.		$ 150
Measuring boards		$ 100
Spring scales	$ 40	$ 200
Plungers, needles, alcohol for PIT tags		$ 50
Floy tags for marking catfish		$ 200
Tools		$ 100
Repair of GPS units		$ 50
Satellite phone charges ($30/month for 6 months)		$ 180
Repair of GPP		$ 500
Repair of generators		$ 500
Repair of trailers (bearings, axle, tires)		$ 500
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)		$ 100
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		**$ 6,990**
Subtotal of labor, travel, equipment, etc		**$ 116,050**
Administrative Overhead (20%)		
20% of personnel cost for Salt Lake Office administration indirect cost, building operation costs for Moab Field Station (electricity, phone and computer lines, rent, etc.)		$ 23,210
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)	$ 5,710
U.S. Fish and Wildlife Service- Albuquerque Biologist (2 trips, 2 people includes salaries and associated costs)	$13,671
U.S. Fish and Wildlife Service- Grand Junction Biologist (2 trips, 2 people includes salaries and associated costs)	$17,305
GRAND TOTAL	***$ 175,946***

Nonnative Species Control in the Lower San Juan River
Fiscal Year 2011 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-2011.

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 ($0.35/mile) (700 miles round trip x 2 trips)	$	490

Total	$	5,710

Nonnative Species Control in the Lower San Juan River
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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-2011.

Personnel/Labor Costs (Federal Salary + Benefits)		
Fish Biologist (GS-7-2) – 14 days @ $218/day (1 person x 7 days x 2 trips)	$	3,052
Biological Technician (GS-8) – 14 days @ $ 319/day (1 person x 7 days x 2 trips)	$	4,466
Administrative Officer (GS-9-6) – 2 days @ $268/day	$	536
	$	8,054
Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)		
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)	$	580
	$	860
Equipment		
Vehicle Maintenance & Gasoline (@ $0.60/mile) (660 miles round trip from Albuquerque, NM to Blanding, UT x 2 trips)	$	792
Equipment Maintenance, Repair, & Replacement (e.g., life jackets, hip boots, generator repair, rubber gloves, dip nets, aluminum welding, raft repair, etc.)	$	1,500
	$	2,292
USFWS-NMFRO (Albuquerque) Total	**$**	**11,206**
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	**$**	**2,465**
USFWS Region 2 Total	$	**13,671**

Non-native Species Control in the *Lower* San Juan River
Fiscal Year 2011 Project Proposal
Updated - 20 April 2010

Principal Investigator: Darek Elverud
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FY-2011:
Costs for participation of the U.S. Fish and Wildlife Service, Colorado River Fishery Project (USFWS-CRFP) office, Grand Junction, CO.

NOTE: The line-item costs listed in this budget use figures from the FY-2009 workplan and do not accurately reflect the actual costs that will be incurred by our office to perform this work in FY-2011. The costs listed here have been restricted to 0% increases over the last two years, based on a standard Program policy which states that yearly project costs will reflect the Program's annual CPI adjustment. This policy does not account for yearly increases in costs such as gasoline, lodging, equipment purchases and maintenance, employee step increases or federally-mandated per diem costs or cost-of-living allowance raises that are incurred by our office.

Personnel/Labor Costs (Federal Salary + Benefits)	
Principal Biologist (GS-12) – 10 days @ $449/day	$ 4,490.00
(1 person X 5 days/trip X 2 trips)	
Biological Technicians (GS-7) - 20 days @ $236/day	$ 4,720.00
(2 people X 5 days/trip X 2 trips)	
	$ 9,210.00
Administrative Support (Federal Salary + Benefits)	
Administrative Officer (GS-9) – 4 days @ $297/day	$ 1,190.00
	$ 1,190.00
Travel and Per Diem (Based on Published FY-2008 Federal Per Diem Rates)	
Hotel Costs – 6 nights	$ 420.00
(6 nights @ $70/night – single occupancy = $420)	
Per Diem (Hotel Rate) - 6 days @ $39/day	$ 235.00
Per Diem (Camping Rate) 30 days @ $26/day	$ 780.00
	$ 1,435.00
Equipment	
Vehicle Maintenance & Gasoline (@ $0.60/mile)	
(700 miles round trip from Grand Junction, CO to	
Clay Hills, UT X 2 trips)	$ 850.00
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.)	$ 1,500.00
	$ 2,350.00

USFWS-CRFP (Grand Junction) Total	$ 14,185.00
USFWS Region 6 Regional Office Administrative Overhead (22.00%)	$ 3,120.00
USFWS Region 6 Total	$ 17,305.00

Sub-Adult & Adult Large-Bodied Fish Community Monitoring
(a.k.a. Adult Monitoring)
Fiscal Year 2011 Project Proposal
Updated - 29 June 2010

Principal Investigators: Dale Ryden
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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 Monitoring Plan and Protocols (Propst et al. 2000) that are designed to help evaluate progress under the San Juan River Recovery Implementation Program (SJRIP) and the SJRIP's Long Range Plan. 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 2010. 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 2011 is scheduled to be available by 31 March 2012. The final version of this interim progress report which incorporates comments received, is scheduled to be completed by 1 June 2012. 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 2011. 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 2012.

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.

Fish Biologist (GS-9) – USFWS-CRFP
These biologists have BS degrees in biology. Depending upon the individual, they have from 8-10 years experience performing fisheries research and management in the Colorado River Basin. Both individuals have 4-5 years of experience performing fisheries research and management on the San Juan River.

Biological Technicians (GS-5) – USFWS-CRFP
All have at least a BS degree in biology. Depending upon the individual, they have from 1-4 years experience performing fisheries research and management in the Colorado River Basin. Most have 1-3 years of 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). This suite of long-term monitoring studies were initiated in 1999 and 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 2011 Budget

NOTE: The line-item costs listed in this budget use figures from the FY-2009 workplan and do not accurately reflect the actual costs that will be incurred by our office to perform this work in FY-2011. The costs listed here have been restricted to 0% increases over the last two years, based on a standard Program policy which states that yearly project costs will reflect the Program's annual CPI adjustment. This policy does not account for yearly increases in costs such as gasoline, lodging, equipment purchases and maintenance, employee step increases or federally-mandated per diem costs or cost-of-living allowance raises that are incurred by our office.

Personnel/Labor Costs (Federal Salary + Benefits)

Objectives 1-3: Logistics, Electrofishing, Removal of Nonnative Fish	
Principal Biologist (GS-12) – 22 days @ $449/day	$ 9,878.00
(1 person X 10 days planning & organization)	
(1 person X 6 days/trip X 1 trip – work from hotel)	
(1 person X 6 days/trip X 1 trip – camping)	
Biological Technicians (GS-7) - 42 days @ $236/day	$ 9,912.00
(3 people X 6 days X 1 trip – work from hotel)	
(4 people X 6 days X 1 trip – camping)	
Sub Total	$ 19,790.00

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

Principal Biologist (GS-12) – 70 days @ $449/day	$ 31,430.00
Project Leader (GS-14) – 20 days $471/day	$ 9,420.00
Administrative Officer (GS-9) – 18 days @ $297/day	$ 5,345.00
Sub Total	$ 46,195.00

Travel and Per Diem (Based on Published FY-2008 Federal Per Diem Rates)

Hotel Costs	
20 nights @ $70/night (in Farmington, NM)	$ 1,400.00
10 nights @ $75/night (in Cortez, CO)	$ 750.00
Per Diem (Hotel Rate)	
6 days X 4 people X $39/day (in Farmington, NM)	$ 935.00
2 days X 5 people X $39/day (in Cortez, CO)	$ 390.00
Per Diem (Camping Rate)	
5 days X 5 people X $26/day	$ 650.00
Sub Total	$ 4,125.00

Equipment and Supplies

Vehicle Maintenance & Gasoline (@ $0.60/mile)	
(600 miles round trip from Grand Junction, CO to Farmington, NM + 350 miles of shuttling) X 2 vehicles – for working from hotel	$ 1,140.00
(425 miles round trip from Grand Junction, CO to Bluff, UT + 125 miles of shuttling) X 2 vehicles – for the camping portion	$ 660.00
Generator fuel (40 gallons X $3.00/gallon)	$ 120.00

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
	Sub Total	$ 4,920.00
USFWS-CRFP Total	**USFWS-CRFP Total**	$ 75,030.00
USFWS Administrative Overhead (22.00%)		$ 16,507.00
USFWS Region 6 Total		$ 91,537.00

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	$ 10,605.00
Utah Division of Wildlife Resources - Moab, UT	
See Attached Budget For Line Item Breakdowns	$ 2,672.00
	$ 13,277.00

FY-2011 WORKPLAN TOTAL	**$104,814.00**

Under the heading "Funding for participation by other agencies." Costs for participation of the U.S. Fish and Wildlife Service, New Mexico Fish & Wildlife Conservation Office in Albuquerque, NM in FY-2011.

Personnel/Labor Costs (Federal Salary + Benefits)		
Principal Biologist (GS-13-1) – 7 days @ $466/day	$	3,262
(1 person x 7 days x 1 trip)		
Fish Biologist (GS-7-2) – 13 days @ $228/day	$	2,964
(1 person x 6 days x 1 trip; Farmington to Four Corners)		
(1 person x 7 days x 1 trip; Four Corners to Sand Island)		
Administrative Officer (GS-9-7) – 1 day @ $288/day	$	288
Sub Total	**$**	**6,514**
Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)		
Hotel Costs – 7 nights	$	522
(1 night x 2 rooms @ $86/night; Cortez, CO)		
(5 nights x 1 room @ $70/night; Farmington, NM)		
Per Diem		
Camping Rate - 10 days @ $29/day	$	290
(2 people x 5 days x 1 trip)		
Hotel Rate – 6 days @ $46.00/day	$	276
Sub Total	**$**	**1,088**
Equipment		
Vehicle Maintenance & Gasoline (@ $0.60/mile)		
(660 miles round trip from Albuquerque, NM to		
Blanding, UT + 100 miles shuttling)	$	456
Generator fuel (45 gallons X $3.00/gallon)	$	135
Equipment Maintenance, Repair, & Replacement		
(e.g., life jackets, hip boots, generator repair, rubber		
gloves, dip nets, aluminum welding, raft repair, etc.)	$	500
Sub Total	**$**	**1,091**
USFWS-NMFWCO (Albuquerque) Total	**$**	**8,693**
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	**$**	**1,912**
USFWS Region 2 Total	**$**	**10,605**

Under the heading "Funding for participation by other agencies." Costs for participation of the Utah Division of Wildlife Resources office in Moab, UT in FY-2010.

Personnel/Labor Costs (State Salary + Benefits)		
Principal Biologist– 6 days @ $265/day	$	1,590
Travel and Per Diem (Based on Published FY-2007 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 Bluff, 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 2011 Statement of Work and Project Budget

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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 will be sampled in 2011.

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.

Budget FY 2011

Field

Personnel

Project Leader (1)

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

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)	$0.32/mile
TOTAL VEHICLE	$816.00

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 @ $0.32/mile (standard NM rate)	$640.00	
2 Biology & Coordination Committee meetings (Durango) @ 500 miles ea.		
1000 miles @ $0.32/mile (standard NM rate)	$320.00	
TOTAL VEHICLE		$960.00

TOTAL REVIEWS & MEETINGS	**$ 7,556.28**
TOTAL	**$ 75,390.00**
INDIRECT COSTS (10%)	**$ 7,539.00**
GRAND TOTAL	**$ 82,929.00**

[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	**$89,479**

SAN JUAN RIVER LARVAL RAZORBACK SUCKER AND COLORADO PIKEMINNOW SURVEY FISCAL YEAR 2011 PROJECT PROPOSAL

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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 128.0 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 (Upper Colorado River basin researchers) efforts were 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. Light-traps are most effective when set in habitats with little or no water velocity. During our driving survey of riverine habitats in the region (March 1997), we identified numerous locations that appeared to be suitable sites for light-trap sampling. However, high spring flow in the San Juan River eliminated virtually all previously identified low velocity habitats. Further driving reconnaissance failed to yield additional locations to set light- traps. 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 through out 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 twelve 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 razorback sucker (Xyrtex) collected during the larval razorback sucker survey, 1998 - 2009.

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

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

San Juan River over the next 10 years. The San Juan River Basin Biology Committee hopes, as was documented with stocked razorback sucker, that reproduction among stocked 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 sampling for 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 same study area that was being sampled for the larval razorback sucker survey (Cudei, NM, to Clay Hills crossing, UT) was sampled monthly by multiple personnel using inflatable rafts to access suitable habitats. Six wild larval Colorado pikeminnow have been collected between 2002 and 2009, at six discrete sites, within the aforementioned study area.

Between 1995 and 2009 the combined sampling methodologies (passive and active) resulted in the collection of ten Colorado pikeminnow. Back-calculated spawning dates, based on those ten individual larvae, range between 10 June and 18 July (Table 2) and are generally associated with the descending limb of the spring run-off hydrograph and mean river temperatures >18^{o}C.

Table 2. Summary of larval and YOY Colorado pikeminnow collected in the San Juan River during larval drift-netting/larval seining (1993-2009) and back-calculated dates of spawning.

Field Number	MSB Catalog Number	N	Total Length (mm)	Collected	Date Spawned	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	Not yet available	1	25.2	27 Jul 2009	10 Jun 2009	24.7	larval seine
TOTAL		**10**					

Over 624,000 fish have been collected between 1995 and 2009 under the larval Colorado pikeminnow survey. Of those, about 86% (N=536,186) were collected after 2001 when the sampling protocol switched from passive to active sampling (2002).

Project Modifications:

There have been numerous modifications to the original (1997) larval razorback sucker survey sampling methodology and 2002 active sampling methodology of the larval Colorado pikeminnow survey 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 for these projects has been expanded (in 2001) by 46.5% (64.4 river miles) and now includes from the middle of Reach 5 (Cudei, New Mexico) to the downstream-most end of Reach 1 (Clay Hills Crossing, Utah; total of 138.6 miles of critical habitat sampled). Beginning in 2003, the entire 139 river miles of the 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 razorback larval survey from an "experimental" project to a monitoring program. This change allowed for comparisons of catch per unit effort (CPUE) data with the program 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 discreet reach information but also provided greater temporal resolution in respect to the longitudinal distribution of razorback sucker larvae and 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). 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). Large flood events not only disrupted the temporal resolution of the single-continuous pass effort but it also reduces sampling efficiency as many low velocity habitat are flooded by rising water levels thereby transporting larval and early juvenile fish in the drift. Additional costs were incurred because of the need to return to the field to complete the sampling effort for that month.

Another problem that resulted from cancelled or disrupted trips during the single-continuous pass effort was that designated campsites in the lower canyon (scheduled and coordinated by BLM) had to be canceled and often new campsites could not be provided. Logistically, a single raft could not carry

enough supplies for a crew of two/three for 11-12, so food and water and fuels for cooking had to be transported to and stored at Mexican Hat for re-supply. Concerns were also made regarding the safety and fatigue to crews due to the long days (10-12 hours) and labor-intensive trip schedules. To mitigate these effects as well as gain even greater temporal resolution of the longitudinal distribution of razorback sucker larvae, the protocol was changed to allow sampling of the upper (RM 142 – 53) and lower (RM 53 – 3) sections of the San Juan River simultaneously. This effort began in 2007 and utilized two fully equipped and discrete crews (comprised of 2 people per crew) with one crew sampling the upper and the other sampling the lower portion of the study area simultaneously (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, specimens collected 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. Additional changes for 2011 include the removal of the September sampling effort. To date, little endangered species data has been obtained from the September sampling trip.

Table 3. Summary project and project modification of the larval razorback sucker survey from 1997 to 2009.

Year	*Sampling method*	*Study Area (River Miles)*	*Specimens collected*	*Field modification*	*Laboratory modification*
1997	Light Trap	99 – 75	297		
1998	Larval Seine Light Trap	127.5 – 53.3	13,608	study area expanded; active sampling	
1999	Larval Seine Light Trap	127.5 – 2.9	20,348	study area expanded; upper-lower reaches sampled separately; nonsynchronous	
2000	Larval Seine Light Trap	127.5 – 2.9	20,348		
2001	Larval Seine Light Trap	141.5 – 2.9	95,629	study area expanded; upper-lower reaches sampled separately; nonsynchronous	
2002	Larval Seine Light Trap	141.5 – 2.9	56,164	study period expanded to September	
2003	Larval Seine Light Trap	141.5 – 2.9	41,181	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	14,648		Reports merged Trend data

2005	Larval Seine	141.5 – 2.9	19,142		
2006	Larval Seine	141.5 – 2.9	25,127		
2007	Larval Seine	141.5 – 2.9	22,093	Two rafts-two crews; upper-lower reaches samples synchronous	Analyzed catch with habitat data
2008	Larval Seine	141.5 – 2.9	23,599		
2009	Larval Seine	141.5 – 2.9	5,843	Specimens preserved in 95% ethanol	

This work is being conducted as required by the **31 March 2000 San Juan River Basin Recovery Implementation Program 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).

Objectives

1. Determine if razorback sucker and Colorado pikeminnow reproduction occurred in the San Juan River and estimate the extent of annual reproduction. (Task 5.1.2.1)

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 5.2.3.2)

4. Quantify attributes of habitats important to each life-stage of endangered fish (Task 5.2.2.1).

5. Document and provide a comparative analysis of the reproductive effort of the entire ichthyofaunal community in the San Juan River. (Task 5.1.4.1).

6. Analyze and evaluate monitoring data and produce Annual Fish Monitoring Reports to ensure that the best sampling design and strategies are employed. (Task 5.1.1.2)

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

8. Document habitat availability (particularly backwaters) for larval razorback sucker during the spring run-off period. (Task 5.2.2.2)

Study Area

The study will be 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. 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 ten days. The study area will be divided into an "upper" section (Cudei, NM, to Mexican Hat, UT) and a "lower" section (Mexican Hat, UT, to Clay Hills crossing, UT). Separate field crews will launch their rafts 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 Valles Trading Post in Mexican Hat, UT, where it will be placed in paid storage. 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 Valles Trading Post in Mexican Hat, UT, where a commercial shuttle (from Valles) will take the vehicle to Clay Hills crossing. The cost for this service is included under the travel and per diem section of our budget. Cold storage facilities are also available at Valles Trading Post and will be used on an as needed basis.

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 2011 must be scheduled by late January 2011 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 (will add one extra day to the lower reach sampling effort).

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 be 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. 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.

During the spring run-off period, sampling crews will document habitat availability (i.e. backwaters) for larval razorback sucker. The backwater habitat area will be delineated and mapped at the water/land interface using GPS equipment capable of a post processing accuracy of 20 cm. GPS points will be logged at the rate of 1 point per second and saved as line generic files. From these files, surface area of each of the mapped habitats will be generated using ArcInfo GIS software.

StowAway Tidbit temperature loggers will be set to record water temperatures hourly and deployed upstream Four Corners bridge (river mile 127.5, Reach 4), 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 jackets, 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) 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, well stocked supply 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.

After the fish are separated from the debris, personnel with San Juan River Basin larval fish identification expertise identify individual specimens to species. Bottom-lit stereomicroscopes equipped with 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 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).

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 results in our annual report pertain almost exclusively to age-0 fish (i.e., as fish > age-0 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-0 augmented Colorado pikeminnow. Capture data for all Colorado pikeminnow is analyzed and trend data reported. The number of all other fish >age-0 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 – 2009) 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 larval Colorado pikeminnow are then estimated by adding five days to the post-hatch ages to account for incubation time at 20 – 22 ^{o}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 loggers (maintained by Keller-Bliesner Engineering) at the Colorado State Highway 160 bridge crossing (RM 119.2) and Mexican Hat, Utah (RM 53.3).

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 2011 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 2012. Upon receipt of written comments, that report will be finalized and disseminated to members of the San Juan River Basin Biology Committee by 1 June 2012. Electronic copies of the 2011 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: 2011 San Juan River larval endangered fishes survey

Proposed Budget based on Five Sampling Trips

Personnel		
FIELD WORK		
UPPER REACH (RM 141.5 - 53.3) *Cudei Diversion to Mexican Hat*		
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 53.3 - 2.9) *Mexican Hat 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*		
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 – 2009)	$ 500/yr	$ 1,000
AIRE 156R sealed floor pocket (self-bailing) x 1	$ 305/yr	$ 350
ThorShield 2250 Tarpaulin x 2 (five year depreciation)	$ 125/yr	$ 250
Sherwin Williams Tile Clad Epoxy Paint (two gallons)	$ 110/yr	$ 110
Trailer (for raft) maintenance x 2	$ 250/unit/yr	$ 500
Raft depreciation x 1	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		$ 2,210
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		**$ 6,998**

Travel and Per Diem		
FIELD WORK		
UPPER REACH (RM 141.5 - 53.3) *Cudei Diversion to Mexican Hat*		
Travel - 4 x 4 pick up truck and raft trailer	$ 0.50/mi	$ 1,438
575 miles round-trip per trip x 5 trips = 2,875 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 Mexican Hat	$ 0/shuttle	$ 0
Shuttle service provided gratis by USFWS – NMFRO		
Truck and Trailer Storage at Valles Trading Post	$ 5/day	$ 100
Daily storage rate $5/vehicle x 4 days x 5 trips = 20 days		
LOWER REACH (RM 53.3 - 2.9) *Mexican Hat 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 Mexican Hat to Clay Hills	$ 325/shuttle	$ 1,625
Valles Trading Post at $325/shuttle x 5 trips		
Travel and Per Diem (Field): Subtotal		$ 10,563

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		$ 2,139
	Travel and Per Diem Total		**$ 12,698**

Personnel Total	$	**158,900**
Materials and Supplies Total	$	**6,998**
Travel and Per Diem Total	$	**12,698**

Project Subtotal	$	**178,596**
IDC (15%)	$	**26,789**
2011 Scope of Work: GRAND TOTAL	**$**	**205,385**

2010 Scope of Work: GRAND TOTAL	***$***	***224,348***

San Juan River Specimen Curation
Fiscal Year 2011 Project Proposal

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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 Recovery Implementation Program (SJRRIP). The MSB Division of Fishes has been the permanent repository for voucher specimens and associated data retained by SJRRIP researchers since 1991. For example, the collections generated by SJRRIP research has resulted in the collection of over 20,000 larval fish in 1999; 15,000 in 2000; and 96,000 in 2001. Some collections were held by the agency and accessioned a few years after the collections were taken. For example, in 1999 and 2001, we processed almost 200,000 larval and juvenile fishes collected by the New Mexico Department of Game and Fish and Utah Division of Wildlife Resources in the early 1990's.

Initially, incoming collections are sorted and identified by the projects' principal investigators and retained until annual progress reports have been submitted. These collections are then deposited with the MSB and formally accessioned (assigned a project number, condition noted, and placed on shelves for processing). 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 (field number), measuring the standard lengths of the largest and smallest specimen in each collection, entering locality and specimen data into an electronic catalog, and filing labeled jars of cataloged specimens in the permanent collections. The basic protocol for accessioning specimens of fishes in the MSB is standard for all 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 verified by qualified personnel as well as any ambiguous collection information. Having a final check for species and data minimizes the misrepresentation of 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 changes in species identifications are documented and reported to the 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.

The number of fish processed by the MSB Division of Fishes under the San Juan River Basin Recovery Program can fluctuate between years. For example, the 1993-2001 SJRRIP collections from New Mexico Department of Game and Fish (NMDGF) were received in 2007 and are now being processed by MSB staff. These collections were retained by NMDGF until the MSB settled into a new museum facility. 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.

In discussion of this issue with the San Juan River Biology Committee, the recommendation has been that the annual budget for the San Juan River specimen curation and larval fish identification reflect an "average" year of sample processing. Almost all MSB-San Juan River Basin archived samples are the result of collections made under the San Juan River Basin Recovery Implementation Program Monitoring Plan and Protocol. The Biology Committee has recognized 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 SJRRIP collections due to circumstances previously discussed.

To date, 31,313 lots (1,533,004 specimens) collected by the San Juan River research principle investigators have been processed, cataloged, and archived at the Museum of Southwestern Biology, 1,917 San Juan River collection sites have been georeferenced and can be mapped in ArcView. Approximately 14,725 pages of field notes (locality data) have been entered into the MSB database and 22,986 pages of San Juan River field notes and data sheets have been digitally captured, cleaned, and saved in pdf format for the electronic archives. All original field notes and data sheets have been archived in acid free document boxes for long-term storage.

Study Area

This project involves processing and data basing the San Juan River Recovery Implementation Program collections and information at the Museum of Southwestern Biology on the main campus of the University of New Mexico, Albuquerque. The MSB Division of Fishes 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 SJRRIP 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 SJRRIP species identifications and associated data are verified and correctly represented in the MSB electronic catalog; report discrepancies to SJRRIP principal investigators.
3. Georeference collection sites for SJRRIP collections; maintain license for ArcView and make collection data available in that environment.

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 SJRRIP 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), place specimens into museum quality jars, verify identifications (qualified staff), count and measure each lot (discrete collection), catalog, label and file the specimens in the permanent MSB Fish Division archives. SJRRIP 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 2003) 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 some of the 2010 SJRRIP funding and funds from other sources (UNM and NMDGF), we are still processing the backlogged NM Department of Game and Fish San Juan River collections (1993-2001). At this time, these collections are being organized by year and project on the accession (uncataloged) shelves; if necessary, they are transferred to ethanol and standard museum jars and the species identifications verified, especially for larval fishes.

Products

SJRRIP 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 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 SJRRIP principle investigators. A draft report of the 2010 San Juan River specimen curation and larval fish identification sampling activities will be prepared and distributed by 31 March 2011 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 2011.

Budget Fiscal Year 2011

Personnel:			
	Graduate student RA (Data manager and GIS)	$	8,000.00
	Graduate student health benefit-summer 2011	$	313.00
	RA Fringe benefits 1%	$	80.00
	RA GPA fee 1 semester 2011	$	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%)		$	3,285.00
Grand Total		$	**29,285.00**

San Juan River Basin Recovery Implementation Program
Habitat Monitoring
2011 Scope of Work
Ron Bliesner

Technical Approach

Element 1. Water Temperature

Background

Eight temperature recorders have been in place since summer of 1992 at the locations shown in Table 1. From 1992-1999, OMNIDATA DP-230 data pod 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. They record water temperature every 15-minutes. Table 1 also shows the periods of record at each site. The missing data were caused by equipment problems or vandalism.

In 2010 two additional stations were added: McElmo Creek and Mancos River at their confluence with the San Juan River.

Objective

1. Obtain daily water temperature data at key locations in the San Juan River for use by all researchers and to allow future assessment of the impact of releases from Navajo Dam on water temperature in the critical habitat for Colorado pikeminnow and razorback sucker.

Proposed Methods

Task 1. Data Collection

Onset Corporation HOBO Water Temp Pro loggers with built-in thermocouple temperature sensors will be installed in the locations described in Table 1. Loggers will be installed in existing enclosures that have been used over the past 15 years for the first eight sites in Table 1. Where enclosures are deteriorated, missing or badly placed, they will be upgraded as necessary to provide protection to the equipment. The installations at the mouths of the Mancos River and McElmo Creek were new in 2010. These sites will be maintained as described above.

The recorders will be inspected and read twice each year, once in the spring and once in the fall. Battery condition will be monitored and loggers changed out when the battery life falls below that required to continue until the next reading point.

Following each download, data will be quality checked and bad data removed. As noted in the background, 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 will be inevitable. Data integrity similar to that in the existing database will be provided.

Task 2. Data Storage, Analysis and Reporting

The records will be maintained in a Microsoft Access database. The main data table will store the 15-minute data and will be constructed as shown in Table 2. Data tables summarizing daily maximum, minimum and average temperatures will be generated for each of the eight sites by query of the main data table and stored in the database in the format shown in Table 3. Table 4 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. A report of the 2011 hydrology will also be included, presenting hydrographs and summarizing the flow statistics.

Deliverables

- An annual draft report prepared and submitted by March 31, 2012
- A final report submitted by June 1, 2012.
- An updated temperature database with all data collected to date, updated through September 2010 by June 1, 2012.
- Attendance at the annual report meeting and one additional Biology Committee meeting

Budget

Work will be completed on a time and expenses basis at the rates shown in the attached rate sheet. Table 5 lists the time required to complete the tasks listed by staff category. The proposed cost to complete these tasks is $17,000, the details of which appear in Table 6.

Table 1. Water temperature monitoring locations and period of record

Location	RM	Period of Record
Active Temperature Recording Sites		
Near Navajo Dam	225.0	7/9/1999 to 9/15/06
Archuleta - San Juan at USGS Gage Location	218.6	7/23/92 to 9/15/06
Farmington - San Juan at USGS Gage Location	180.1	8/5/92 to 1/16/96, 7/8/99 to 11/4/01, 10/3/02 to 9/15/06
Shiprock - San Juan at USGS Gage Location	148.0	7/8/99 to 9/16/06
Four Corners - San Juan at USGS Gage Location	119.4	10/7/94 to 3/11/96*, 7/9/99 to 10/19/06
Montezuma Creek - San Juan at Montezuma Creek Bridge	93.6	8/9/92 to 1/11/93, 2/25 to 3/14/93, 4/14 to 5/10/93, 5/28/93 to 3/11/05, (sensor stolen. Replaced 10/31/05) 10/31/05 to 9/16/06
Mexican Hat - San Juan near Bluff Gage Location	52.1	7/9/99 to 3/27/02 , 9/18/02 to 8/1/06
Farmington - Animas at USGS Gage Location	n/a	8/5/92 to 4/14/97, 5/7/97 to 8/26/97, 10/15/97 to 6/4/98, 7/8/99 to 9/15/06
Mancos River at confluence with San Juan	n/a	None – new site in 2010
McElmo Creek at confluence with San Juan	n/a	None – new site in 2010

Table 2. Temperature database main table format

Temp			
ID	**RecDate**	**RecTime**	**DegC**
4C	7/9/1999	4:04:27 PM	23.48
4C	7/9/1999	4:49:27 PM	23.74

Table 3. Daily temperature summary table format

AnimasFarminton				
ID	**RecDate**	**Tmax**	**Tmin**	**Tavg**
AF	7/8/1999	22.11	18.36	19.2225580437239
AF	7/11/1999	20.13	15.81	17.9729165037473

Table 4. Temperature station description database table

StationID					
ID	**Location**	**Notes**	**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

Table 5. Time summary for temperature monitoring tasks

		- - Professional Time - Man-hrs - - - - -					
Task	**Description**	**Principal Engineer**	**Prof. Eng Grade I**	**Staff Eng Grade I**	**Grad Eng Grade II**	**Tech Cons Grade II**	**Clerical**
1	Install instruments & read data	2	4		32		40
2	Analyze data and post to website	4	30		32		10
	Subtotal	6	34	0	64	0	50
	NM Gross Receipts tax						
	NN sales tax						
	TOTAL						
	Rates:	$177.00	$126.00	$99.00	$89.00	$80.00	$49.00

Table 6. Cost summary for temperature monitoring tasks

Task	Description	Estimated Direct Costs: Direct Labor	Sub-Contract	Travel	Equip Rental	Misc. Supplies	G&A	Total
1	Install instruments & read data	$5,666		$400	$1,000	$450	$0	$7,516
2	Analyze data and post to website	$7,826				$57	$0	$7,883
	Subtotal	$13,492	$0	$400	$1,000	$507	$0	$15,399
	NM Gross Receipts tax							$376
	NN sales tax							$225
	TOTAL							$16,000

Equipment rental is one-year lease on temperature monitors (10 recorders)
Misc supplies covers telephone, copies, field repairs

Travel Cost breakdown:	unit cost	use		total
Airfare	550	0	$	-
Car Rental	60	0	$	-
4x4 mileage	0.8	500	$	400
Per Diem	31		$	-
Lodging w/tax	70		$	-
Shuttle	86	0	$	-
Total Travel Cost			$	400

Element 2. Habitat Mapping

Background

Habitat mapping completed during the period 1992 - 1997 has been used to develop flow/habitat relationships used in the flow recommendation process (Holden, 1999). Annual habitat mapping was included in the San Juan River Basin Recovery Implementation Program (SJRIP) long-term monitoring program in 1998 and was continued through 2007. Results from 1998 through 2002 were used to evaluate the flow recommendations, resulting in a recommendation to examine modification of operating rules to focus more heavily on the high flow portion of the recommendations (Miller, 2005). River-wide mapping was conducted in autumn each year through 2007 with interpretation completed in 2008. Evaluation of the response of habitat with time indicates that since 1996 changes have been small with the most critical changes being backwaters and island count. Changes to the long-term habitat monitoring protocol are pending biology committee review and approval. In the interim, a reduced-scope habitat mapping plan is proposed for 2011.

Since backwaters, Islands and river channel wetted area can be mapped by photo-interpretation, an annual cycle using late-summer videography flown at base flow between 500 and 1,000 cfs is proposed. This provides the minimum information required to determine response of habitat to individual antecedent hydrology.

Objectives

Habitat mapping by photo-interpretation has the following objectives:

- Provide a continuation of the annual dataset for total wetted area, backwaters, embayments and islands to analyze long-term trends in response to hydrology and other factors.
- Provide a metric to determine the effectiveness of specific antecedent hydrology on backwaters and channel complexity to assess effectiveness of flow recommendations to maintain habitat.

Proposed Methods

Task 1. Base Photography Preparation

USBR will acquire digital videography of the San Juan River from the San Juan River at the Animas River confluence (RM 180) downstream to below Clay Hills Crossing (RM 0). Coordination with USBR is required to acquire the videography at a flow of 500 to 1,000 cfs in late July or early August. Digital single frames will be captured from this videography to provide full coverage of the river with about 20% overlap.

Task 2. Photo Rectification

The digital images will be rectified to 2005 digital orthographic quads (DOQ's) prior to photo-interpretation and will be archived to DVD.

Task 3. Habitat Polygon Identification and Digitization

Photo-interpretation will be completed to map backwaters, embayments, islands and total wetted area for RM 0 to RM 180. 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.

Task 4. Data Analysis and Reporting

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 5th year (if this study is continued) 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 2011 (flow permitting). Frame capture and rectification will be completed by October 2011 and photo-interpretation by February 2012. The draft annual report will be completed by March 31, 2012 with the final report due June 30, 2012.

Deliverables

The following deliverables are associated with this task:

- Archived rectified digital image files
- GIS coverage of backwaters, embayments, islands and total wetted area
- Database file with backwater area and count by river mile
- Draft and final reports
- Attendance at the annual report meeting and one additional Biology Committee meeting

FY 2011 Budget

Work will be completed on a time and expenses basis at the rates shown in the attached rate sheet. Table 7 lists the time required to complete the tasks listed by staff category. The proposed cost to complete these tasks is $62,000, the details of which appear in Table 8.

Table 7. Time summary for habitat tasks

		- - Professional Time - Man-hrs - - - - -					
Task	**Description**	**Principal Engineer**	**Prof. Eng Grade I**	**Staff Eng Grade I**	**Grad Eng Grade II**	**Tech Cons Grade II**	**Clerical**
1	Download and extract video frames	2			4		60
2	Register 180 miles of video frames	2			16		140
3	Identify and digitize habitat polygons	8			40		20
4	Interpretation and Analysis	8			32		40
	Subtotal	20			92	0	260
	Rates:	$177.00	$126.00	$99.00	$89.00	$80.00	$49.00

Table 8. Cost summary for habitat tasks

Task	Description	Estimated Direct Costs - Direct Labor	Sub-Contract	Travel	Equip Rental	Misc. Supplies	G&A 10%	Total
1	Download and extract video frames	$3,650				$300	$0	$3,950
2	Register 180 miles of video frames	$8,638				$100	$0	$8,738
3	Identify and digitize habitat polygons	$5,956	$18,000			$100	$1,800	$25,856
4	Interpretation and Analysis	$6,224	$15,500			$182	$1,550	$23,456
	Subtotal	$24,468	$33,500	$0	$0	$682	$3,350	$62,000
	NM Gross Receipts tax							$0
	TOTAL							$62,000

Notes:
Misc supplies covers the cost of storage media, binders, telephone, copies, fed-ex for digital video files

Total Project Costs

The total proposed cost for Elements 1 and 2 is $78,000.

SJRIP Videography
2011 Project Proposal

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Denver, CO 80225
(303)445-2275
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Background

High definition videography is used in the SJRIP to develop maps of the river and evaluate habitat relationships and provide a database that can be used to compare 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. The imagery is collected at an altitude that produces 5-6 frames per river mile.

TASKS – 2011

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 rectified for detailed mapping.
3. Archive video/still frames and provide to researchers as requested.

FY 2011 BUDGET

Funding source	Expenditure in FY2011
FY2011 Annual funding	$18,000
Total	**$18,000**

Projected funding:
FY-2012 $20,000.00
FY-2013 $22,000.00

SJRIP PIT TAGS
2011 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 – 2011

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

In FY2011, $60,000 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, but in FY2011 this contract is being renewed. This budget is based on expectations that the new contract will see an increase in price 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 2011 BUDGET

Funding source		**Projected expenditure in FY11**
FY2011 Annual funding		$60,000
Total		**$60,000**

Projected funding:
FY-2012 $60,000.00
FY-2013 $62,000.00
FY-2014 $64,000.00

Razorback Sucker Survey of the San Juan River Arm of Lake Powell
Draft Fiscal Year 2011 Project Proposal
Updated: 29 June 2010

Principal Investigators:
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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 non-native 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 Neskahai 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 2009 have varied greatly (from 16 fish in 1995 to >22,000 fish in 2007). However, with the exception of 1999, some level of stocking has occurred in 15 of the last 16 years (Table 1; Furr and Davis 2009, 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 12 overwinter periods post-stocking, one would expect that this population was increasing over time. However, 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 has changed little over the last eight years (range = 16-36 fish; Ryden 2009). 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). 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 suckers in Lake Powell or below the waterfall confirm some level of loss of stocked fish over the waterfall and into Lake Powell.

The area now inundated by the San Juan River arm of Lake Powell is an 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 Neskahai 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 suckers (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 (Table 2). 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 Neskahai 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 (Table 2). At present, the presence of at least one large waterfall precludes the movement of these fish back upstream into Lake Powell.

As stated earlier, the riverine population of razorback sucker is not increasing as fast as had been hoped for. At the same time, large, mature adult razorback sucker continue to be collected in Lake Powell on a relatively regular basis. Additionally, Critical Habitat for razorback sucker in the San Juan River basin extends downstream into Lake Powell as far as Neskahai 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. 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) Is there a population of adult razorback sucker in the San Juan River arm of Lake Powell?
2) If so, are these fish spawning in Lake Powell?
3) If there is a spawning population, is there any evidence of recruitment in Lake Powell?
4) If razorback sucker are spawning, but no recruitment is evident, would the composition of the sympatric fish community indicate that this may be what is precluding recruitment? For example, the presence of a large number of predatory lacustrine species may make recruitment impossible.
5) If no recruitment is evident, are enough adult razorback sucker present in the San Juan River arm of the lake to make translocation back to the river an endeavor worth undertaking?
6) Is it possible to 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 are 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.
7) 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 81-2 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. However, the size of the Lake Powell razorback sucker population, whether or not these fish aggregate to spawn in the San Juan River arm of Lake Powell are both unknown.

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 most downstream waterfall currently in place (RM -1.1) and would extend downstream to approximately Neskahai Canyon (~ RM -35.0).

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.

Methods:

The USFWS's Colorado River Fishery Project (USFWS-CRFP) office from Grand Junction, CO and the UDWR Moab Field Station (UDWR-Moab) will have joint responsibility for all field aspects of this study. Sampling crews will consist of six to eight people, to run trammel nets, do

sonic telemetry work, and perform electrofishing. 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 invasive aquatic nuisance species 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).

Up to 25 large sub-adult or adult razorback sucker (preferably $\geq$ 400 mm TL) will be obtained from either the USFWS's Uvalde National Fish Hatchery (NFH) or 24-Road Hatchery. Fifteen 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 25 fish will be held at the 24-Road Hatchery while those that have undergone surgery recover and heal. The other ten 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 24-Road 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. 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

All field sampling will take place during spring 2011 and will be dedicated to 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 mid 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. However, being at the terminal end of the San Juan River, with no major water inflows other than the San Juan River, and being at a more northerly latitude than upstream sections of river in which razorback sucker spawning is known to occur (Figure 1) probably mitigates this effect somewhat. 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 suckers 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, 1.5 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 (following Albrecht et al. 2008b). 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 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 should be 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 field sampling is proposed to occur for ten weeks, spread across the predicted spawning window. The first sampling effort (12 days) is proposed for 21 March through 1 April, the second (19 days) for 11-29 April, the third (3 weeks, 19 days) for 8-26 May, and the last (12 days) for 6-17 June. This 62-day sampling effort will allow researchers to cover approximately 58% of the predicted spawning season. Sampling will occur in 10 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).

In the San Juan River arm of Lake Powell, razorback sucker have been collected from just downstream of the current waterfall location downstream to Neskahi Wash. Specifically groups of razorback sucker have been collected near the concrete boat ramp at Piute Farms (Platania 1990) and between Mike's Canyon and Copper Canyon (McKay 1990). It is anticipated that sonic-tagged razorback sucker will survive and guide researchers to appropriate sites to set trammel nets. However, should this not be the case, trammel nets will initially be set just downstream of the waterfall, at Zahn Bay, and at Neskahai Canyon, with an equal amount of sampling days scheduled for all three main sites. Nets will then be set in close proximity to possible spawning substrate (gravel or cobble) when this sized substrate can be located during spring sampling. 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. Electrofishing will take place from a motorized, aluminum jon boat or inflatable sport boat. The electrofishing crew will consist of one netter 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.

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 in 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.

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. 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. Population estimates between two sampling 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.

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 2012. The final version of this report which incorporates comments received, is scheduled to be completed by 1 June 2012. 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 2011. 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 2012.

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.

Fish Biologist (GS-9) – USFWS-CRFP
These biologists have BS degrees in biology. Depending upon the individual, they have from 7-9 years experience performing fisheries research and management in the Colorado River Basin. Both individuals have 4-5 years of experience performing fisheries research and management on the San Juan River.

Biological Technicians (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.

Principle Biologist – Darek Elverud – UDWR-Moab
Darek has 4 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 4 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.

Wildlife Technicians – UDWR-Moab
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.

Projected Duration Of Project:

The Lake Powell razorback sucker survey is currently scheduled to be a one-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 first year's data is collected, the principal investigators feel that having a review by the SJRIP Biology Committee and a possible second year of data collection may be warranted.

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USFWS-CRFP Fiscal Year 2011 Budget:

For 10 weeks of field sampling, data analysis & report writing

Personnel/Labor Costs (Projected Federal Salary + Benefits)

Acquiring, Tagging, & Stocking Razorback Sucker	
Principal Biologist (GS-12) - 6 days @ $505/day	$ 3,030.00
(1 person X 4 days transport of fish)	
(1 person X 2 days of implanting sonic tags)	
Sonic Telemetry (outside of the field sampling period)	
Principal Biologist (GS-12) – 8 days @ $505 day	$ 4,040.00
(1 person X 5 days/trip X 2 trips)	
Biological Technicians (GS-5) - 8 days @ $145/day	$ 1,160.00
(1 person X 5 days/trip X 2 trips)	
Field Sampling: Logistics	
Principal Biologist (GS-12) - 12 days @ $505/day	$ 6,060.00
(1 person X 3 days rigging/planning/organization per trip)	

Biological Technicians (GS-5) - 24 days @ $145/day	$ 3,480.00
(2 people X 3 days rigging/organization/clean-up per trip)	
Field Sampling: Trammel-Netting, Electrofishing, Sonic Telemetry	
Principal Biologist (GS-12) - 62 days @ $505/day	$ 31,310.00
(1 person X 12 days/trip X 2 trips)	
(1 person X 19 days/trip X 2 trips)	
Biological Technicians (GS-5) - 124 days @ $145/day	$ 17,980.00
(2 people X 12 days/trip X 2 trips)	
(2 people X 19 days/trip X 2 trips)	
(overtime wages = $73.00, for 26 days at 1½ times salary)	$ 1,898.00
Sub Total	$ 68,958.00

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

Principal Biologist (GS-12) – 50 days @ $505/day	$ 25,250.00
Project Leader (GS-14) – 8 days $748/day	$ 5,990.00
Administrative Officer (GS-9) – 15 days @ $320/day	$ 4,800.00
Sub Total	$ 36,040.00

Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)

Per Diem (Camping Rate)	
62 days X 3 people X $28/day	$ 5,208.00
Sub Total	$ 5,208.00

Equipment and Supplies

Vehicle Maintenance & Gasoline (@ $0.60/mile)	
Acquiring & Stocking Fish	
(600 miles round trip from Grand Junction, CO to Farmington, NM X 1 trip) X 1 vehicle	$ 360.00
(650 miles round trip from Grand Junction, CO to Piute Farms boat launch X 1 trip) X 1 vehicle	$ 390.00
Sonic Telemetry (outside of the field sampling period)	
(520 miles round trip from Grand Junction, CO to Halls Crossing X 2 trips) X 1 vehicle per trip	$ 625.00
Trammel Netting, Electrofishing, Sonic Telemetry	
(520 miles round trip from Grand Junction, CO to Halls Crossing X 4 trips) X 2 vehicles per trip	$ 2,500.00
(650 miles round trip from Grand Junction, CO to Piute Farms boat launch, UT to trade out crew members and do resupply X 4 trips) X 1 vehicle per trip	$ 1,560.00
Boat Gas	
Sonic Telemetry (outside of the field sampling period)	
(50 gallons/boat/trip X 1 boat X 2 trips X $3.00/gallon)	$ 300.00
Trammel Netting & Sonic Telemetry	
(50 gallons/boat/trip X 2 boats X 4 trips X $3.00/gallon)	$ 1,200.00
Trammel Nets (12 nets @ $400 per net + $35 shipping/net)	$ 5,220.00
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
Sub Total	$ 18,155.00

USFWS-CRFP Total	$128,361.00
USFWS Administrative Overhead (11%)	$ 14,119.00
USFWS Region 6 Total	$142,480.00

UDWR-Moab Fiscal Year 2011 Budget:

Personnel/Labor Costs (Salary + Benefits)

Logistics	
Project Leader - 4 days @ $325/day	$ 1,300.00
Principal Biologist - 12 days @ $245/day	$ 2,940.00
(1 person X 3 days rigging/planning/organization per trip)	
Biological Technicians - 24 days @ $200/day	$ 4,800.00
(2 people X 3 days rigging/organization/clean-up per trip)	
Trammel-Netting, Electrofishing, Sonic Telemetry	
Principal Biologist - 62 days @ $245/day	$ 15,190.00
(1 person X 12 days/trip X 2 trips)	
(1 person X 19 days/trip X 2 trips)	
Biological Technicians - 124 days @ $200/day	$ 24,800.00
(2 people X 12 days/trip X 2 trips)	
(2 people X 19 days/trip X 2 trips)	
Sub Total	$ 49,030.00

Data Input, Analysis, & Management; Report Writing

Principal Biologist – 40 days @ $245/day	$ 9,800.00
Sub Total	$ 9,800.00

Travel and Per Diem (Based on Published FY-2010 Federal Per Diem Rates)

Per Diem (Camping Rate)	
62 days X 3 people X $28/day	$ 5,208.00
Sub Total	$ 5,208.00

Equipment and Supplies

Receiver, Hydrophone, tow-behind hydrophone, 20 sonic tags	$ 10,000.00
Vehicle Maintenance & Gasoline (@ $0.60/mile)	
(405 miles round trip from Moab, UT to	
Halls Crossing X 4 trips) X 2 vehicles per trip	$ 1,945.00
Boat Gas	
Trammel Netting & Electrofishing	
(50 gallons/boat/trip X 2 boats X 4 trips X $3.00/gallon)	$ 1,200.00
Electrofishing Generator Fuel	
Electrofishing	
(15 gallons/trip X 1 boat X 4 trips X $3.00/gallon)	$ 180.00
Equipment Maintenance, Repair, & Replacement	
(e.g., dip nets, PIT tag gear, boat trailers, outboard motor repair, generators, electrofishing equipment, life jackets, camping equipment, etc.)	$ 4,000.00
Sub Total	$ 17,325.00

UDWR-Moab Total	$ 81,363.00
UDWR-Moab Administrative Overhead (20%)	
20% of personnel cost for Salt Lake Office administration indirect cost, building operation costs for Moab Field Station (electricity, phone and computer lines, rent, etc.)	$ 16,272.00
UDWR-Moab Total	$ 97,635.00
OVERALL WORKPLAN TOTAL	**$ 240,115.00**

OPTION - If only the field work were to be funded in FY-2011 (i.e., if data analysis & report writing were performed in FY-2012), the budget totals would be as follows:

Agency	**Reduction From The FY-2011 Budget (Presented Above)**	**Total Amount To Be Obligated In FY-2011**	**Approximate Amount To Be Obligated To This Agency In FY-2012 For Data Analysis And Report Writing**
USFWS-CRFP	- $15,100 30 days @ $505/day	$127,380	$15,100 + agency overhead
UDWR-Moab	- $4,900 20 days @ $245/day	$92,735	$4,900 + agency overhead
Total Savings In FY-2011	-$20,000	$220,115	$20,000 + agency overhead

Program Coordinator's Office
Fiscal Year 2011 Draft Proposal

U.S. Fish and Wildlife Service
2105 Osuna NE Albuquerque, New Mexico 87113
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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 7 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 Program Assistant.

Public Law 106-392 specifically authorizes the use of base funding to fund program management.

Tasks

1. Coordinate the activities of the Biology and Coordination Committees.
2. Insure that approved recovery activities are implemented.
3. Disseminate information to involved state, federal, and tribal agencies.
4. Coordinate Program activities with the Upper Basin Recovery Implementation Program.
5. 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.
6. Forward plans and recommendations to the Coordination Committee for review and approval.
7. Annual Work Plan:
    a. Work with the Biology Committee to identify and expedite individual projects that are needed to accomplish the long range plan for each of the recovery elements.
    b. Draft an annual work plan consisting of high priority individual projects, formulated within the available funding.
    c. Forward the work plan to the Coordination Committee for review and approval.
8. Coordinate an annual assessment of the Program's recovery progress as outlined in the Program Document.
9. Maintain a list of interested parties and provide those parties with the meeting dates, times, locations, and agendas for Program meetings.
10. Provide draft and final summaries of meetings to committee members.
11. Report to the Coordination Committee at each meeting the status of Program activities and research projects, and accomplishment of milestones; report any problems with maintaining schedules and provide recommendations for solving those problems; implement the recommendations of the Coordination Committee to resolve scheduling problems.
12. Provide support materials for annual funding efforts with the U.S. Congress and state legislatures.

San Juan River Recovery Program Program Management Budget 2011		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Coordinator	91,187	30,396
Assistant Program Coordinator	65,594	65,594
Program Biologist	0	48,943
Program Assistant	32,912	32,912
IT-Support	6,000	0
USFWS Hydrologist	10,000	5,000
Personnel Subtotal	**$205,693**	**$182,845**
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	2,640	0
Program Assistant (12 trips @400miles) $0.55/gal	2,640	0
Senior Biologist Travel to Farmington (12 days@$109 pd) + gas	2,000	0
Airfare to DC	0	4,000
DC, 10 days @ $273	0	2,730
CRWUA, 10 days @ $190 + Airfare	0	3,900
Travel to UCRRIP	0	3,000
Hydrologist Support	0	5,000
Travel Subtotal	**$14,980**	**$30,075**
Committee Meeting Support		
General Office Supplies	2,000	3,500
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	1,500	1,500
Misc	500	500
Support Subtotal	**$4,000.00**	**$14,900.00**
	USFWS Funding	**Base Funding**
Budget Subtotal	**$224,673**	**$227,820**
FY 2010 Carry over funds	**0**	**50,700**
Subtotal	**$224,673**	**$177,120**
Administrative charge (22%)	**0**	**$38,966**
Grand Total	**$224,673**	**$216,086**

Peer Review for 2011
Fiscal Year 2011 Project Proposal

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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 2011. It is anticipated that the Panel will meet with the Biology Committee at three meetings during the year; the December 2009 Planning meeting, the February/March, 2011 Researcher's meeting (combined with the Coordination Committee), and a May, 2011 meeting to finalize 2012 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 FY2011 three times to review monitoring and research progress and to discuss scopes of work for 2012. 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.

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FY-2011Budget:

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 2011.

The total budget is distributed among the four peer reviewers through individual Services Contracts with Reclamation.

Salaries:	$25,000
Travel:	$15,000
Total	**$40,000**

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:

2012 $45,000

Reclamation Program Management
FY 2011 Draft SOW

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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).

FY2011 Budget
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*	$70.00	1	600	$42,000.00
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				$128,700.00

** Funding for Reclamation to participate in the Biology Committee is funded by Reclamation and not the SJRIP.*

Position	Destination	Purpose	Days	Lodging per day/total	Per diem per day/total	Other*	Airfare total	Total
Reclamation Technical representative	Farmington	Contract support for CC meetings or field trips	3 trips @ 2 days/trip	$90/$540	$45/$270	$200	$2,000	$3,010.00
Reclamation representative	Denver	Program mtg.	1 trip @ 2 days	$125/$250	$65/$130	$60	$300	$740.00
Acquisitions Manager	Farmington	CC mtg.	1 day	$90	$45	$50	$800	$985.00
Lead contract officer	Farmington	CC/BC mtg.	2 trips @ 2 days	$90/$180	$45/$135	$50	$1,600	$1,965.00
Lead contract officer	Denver	Program mtg.	1 trip @ 2 days	$125	$65/$130	$60	$300	$615.00
Agreement specialist	Farmington	MC mtg.	1 trip @ 2 days	$90/$180	$45/$90	$50	$800	$1120.00
Total								$8,435.00

B) Travel

*Taxi $20; Parking $10; Rental car $50/trip

Budget Summary
FY-2011

Labor		
	Task 1	$128,700.00
Total labor		$128,700.00
Total travel		$8,435.00$8,435.00
Grand total		**$137,135.00**[1]

[1] **This total budget represents a 0.0% increase over the FY2010 budget.**

Program Coordinator's Office Outreach
Fiscal Year 2010 Draft Proposal

Project Lead: Sharon Whitmore
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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 2011**		
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		**$16,000**
Grand Total		**$24,328.00**