SAN JUAN RIVER BASIN RECOVERY IMPLEMENTATION PROGRAM

FISCAL YEAR 2010 ANNUAL BUDGET AND WORK PLAN

Approved: September 11, 2009

SJRRIP FY2010 AWP Budget

SOW	Title	Agency	Proposed Funding		
			Base	Capital	Other
	Element 1 - Development, Integration, and Evaluation of Information for Recovery				
5	Database Management	FWS	$37,709		$1,850
6	Peer Review	BOR/FWS	$40,000		
7	Data Integration	FWS	$33,930		$28,390
	Workshops	BOR/FWS	$30,000		
	Subtotal		**$141,639**	**$0**	**$30,240**
	Element 2 - Management and Augmentation of Populations and Protection of Genetic Integrity				
8	Stocking of Fingerling Colorado Pikeminnow	FWS, ABQ	$19,344		
9	Colorado Pikeminnow Fingerling Production	FWS, DNFHTC	$103,037		
10	Rearing Razorback Suckers Dexter	FWS, DNFHTC	$73,904		
11	Razorback Sucker Production Uvalde	FWS, UNFH	$127,272		
12	RBS Augmentation/NAPI Pond Management	FWS/NN	$109,590		
	Subtotal		**$433,147**	**$0**	**$0**
	Element 3 - Protection, Management, and Augmentation of Habitat				
13	Maintenance and Operation of Model	BR, Durango	$143,080		
14	Improve Stream Gaging and Flow Measurements	USGS	$7,400		
	PNM O&M	PNM	$0		
15	Operation of PNM Fish Passage Structure	FWS/NN	$58,057		
4	TNC Conservation/Habitat Planning	TNC	$10,000		
16	Capital Projects Management	BR		$55,600	
	Capital Hogback Canal	BR		$400,000	
	Subtotal		**$218,537**	**$455,600**	**$0**
	Element 4 - Interactions between Native and Non-Native Fish Species				
17	Nonnative Species Control - Upper San Juan River	FWS, ABQ	$322,567		
18	Nonnative Species Control - Lower San Juan River	UDWR	$181,044		
	Subtotal		**$503,611**	**$0**	**$0**
	Element 5 - Monitoring of Fish and Habitat				
19	Sub-Adult/Adult Large-Bodied Fish Comm. Monitoring	FWS, GJ	$122,034		
20	YOY/Small-Bodied Fish Monitoring	NMDGF	$89,479		$40,000
21	RBS/CPM Larval Surveys (Combined SOW)	NMDGF. ASIR	$224,348		
22	Specimen Curation/Identification	UNM	$27,891		
24	Temperature Monitoring	BIA	$17,000		
24	Habitat Mapping	BIA	$62,000		
25	River Videography	BR	$18,000		
27	PIT Tags	BR	$45,000		
	Habitat - detailed reach final analysis report	RFP	$46,000		
	Subtotal		**$651,752**	**$0**	**$40,000**

	Element 6 - Information and Education				
28	Education and Outreach	FWS, ABQ	$23,135		
	Subtotal		**$23,135**	**$0**	**$0**
	Element 7 - Program Coordination				
29	Program Management FWS	FWS, ABQ	$247,670		$206,918
30	Base Fund Management BR	BR, SLC	$137,135		
	Subtotal		**$384,805**	**$0**	**$206,918**
	SJRRIP Total		**$2,356,626**	**$455,600**	**$277,158**
	Estimated Annual 2010 Base Funds (2009 funds - 1.3%)		**$2,412,228**		
	Estimated available 2010 funds to proposed expenditures		**$55,602**		
	Projects Not Included				

2010 WORK PLAN PROJECTS	DELIVERABLES	DATE DUE
ELEMENT 1 - Development, Integration, and Evaluation of Information for Recovery		
10-5		
Database Management Scott Durst U.S. Fish and Wildlife Service 2105 Osuna Road NE Albuquerque, NM 87113 scott_durst@fws.gov 505-761-4739	• Consolidated PIT tag database and other data, dissemined to all committees and availability on website	01-31-10
10-6		
Peer Review Mark McKinstry U.S. Bureau of Reclamation 125 S. State St. Salt Lake City, UT 84138-1147 mmckinstry@uc.usbr.gov 801-524-3835	• Letter or verbal reports from each reviewer.	Upon request
10-7		
Data Integration U.S. Fish and Wildlife Service 2105 Osuna Road NE Albuquerque, NM 87113 david_campbell@fws.gov 505-761-4745 sharon_whitmore@fws.gov 505-761-4753	• Outline for annual data integration • Draft Report • Technical Presentation • Final Report	Jan. 2010 03-31-11 Annual Meeting 06-01-11
ELEMENT 2 - Management and Augmentation of Populations and Protection of Genetic Integrity		
10-8		
Stocking of Fingerling Colorado Pikeminnow Weston Furr, Ernest Teller, and Jason Davis U.S. Fish and Wildlife Service NM Fish and Wildlife Conservation Office 3800 Commons N.E. Albuquerque, NM 87109 Jason_E_Davis@fws.gov 505-342-9900x108 Weston_Furr@fws.gov 505-342-9900x110 eteller@wildblue.net 505-440-5853	• Data Files • Draft Report • Technical Presentation • Final Report	12-31-10 03-31-11 Annual Meeting 06-01-11
10-9		
Colorado Pikeminnow Fingerling Production William Knight and Manuel E. Ulibarri Dexter Natl. Fish Hatchery and Tech. Center U.S. Fish and Wildlife Service PO Box 219, 7116 Hatchery Road Dexter, NM 88230-0219 William_knight@fws.gov 575-734-5910x52 Manuel_ulibarri@fws.gov 575-734-5910x12	• Transport and distribute 300,000 fish age-0 fingerlings and 3,000 age-1 fish from Dexter to the SJR • Draft Report • Final Report	Annually 03-31-11 06-01-11

10-10		
Razorback Sucker Production - Dexter William Knight and Manuel E. Ulibarri Dexter Natl. Fish Hatchery and Tech. Center U.S. Fish and Wildlife Service PO Box 219, 7116 Hatchery Road Dexter, NM 88230-0219 William_knight@fws.gov 575-734-5910x52 Manuel_ulibarri@fws.gov 575-734-5910x12	• Delivery of 20,000, 200mm fish to Uvalde NWR and 10,000 200mm fish to NAPI ponds • Draft Report • Final Report	Annually 03-31-11 06-01-11
10-11		
Razorback Sucker Production – Uvalde Grant L. Webber Uvalde National Fish Hatchery 754 County Road 203 Uvalde, Texas 78801 Grant_Webber@fws.gov 830-278-2419	• Delivery of 12,000, 300mm fish to the San Juan River • Draft Report • Final Report	Annually 03-31-11 06-01-11
10-12		
Razorback Sucker Augmentation at NAPI Ponds Jeffrey Cole, Albert Lapahie, and Viola Willeto Navajo Nation Department of Fish and Wildlife Box 1480 Window Rock, AZ 86515 (928) 871-7068 jcole@navajofishandwildlife.org, alapahie@navajofishandwildlife.org vwilleto@navajofishandwildlife.org	• Harvest ≥ 300 mm fish from 3 NAPI grow-out ponds and transport to San Juan River • Draft Report • Final Report	Annually 03-31-11 06-01-11

ELEMENT 3 - Protection, Management, and Augmentation of Habitat

10-13		
Maintenance & Operation of the San Juan River Basin Hydrology Model Katrina Grantz and Ryan Christianson U.S. Bureau of Reclamation 125 South State Street Salt Lake City, UT 84138-1147 kgrantz@uc.usbr.gov 801-524-3635 rchristianson@uc.usbr.gov 970-385-6590	• Make model modifications • Maintain model • Hydrology model runs of water development scenarios or other scenarios and analysis	As needed Annually Upon request
10-14		
Improve Stream Gaging and Flow Measurements Katrina Grantz and Ryan Christianson U.S. Bureau of Reclamation 125 South State Street Salt Lake City, UT 84138-1147 kgrantz@uc.usbr.gov 801-524-3635 rchristianson@uc.usbr.gov 970-385-6590	• Technical presentation	End of year

10-15

Operation PNM Fish Passage Structure

Jeffrey Cole, Albert Lapahie, and Viola Willeto
Navajo Nation Department of Fish and Wildlife
Box 1480
Window Rock, AZ 86515
(928) 871-7068
jcole@navajofishandwildlife.org,
alapahie@navajofishandwildlife.org
vwilleto@navajofishandwildlife.org

- Monthly Fish Passage Reports — Monthly
- Draft Annual Report — 03-31-11
- Final Annual Report — 06-30-11

10-4

Conservation Action Planning: Ecosystem Restoration Management

Adrian Oglesby
The Nature Conservancy
212 E. Marcy Street, Ste. 200
Santa Fe, Nm 87501
aoglesby@tnc.org 505-280-7958

- Semi-annual progress report — April 2010
- Semi-annual progress report — Sept. 2010

10-16

Capital Improvement Program

Brent Uilenberg
U.S. Bureau of Reclamation
2764 Compass Dr., Suite 106
Grand Junction, CO 81506
builenberg@uc.usbr.gov(970) 248-0641

- Financial reports presented to CC — Every Meeting

ELEMENT 4 - Interactions between Native and Non-Native Fish Species

10-17

Nonnative Species Monitoring and Control in the Upper San Juan River

Jason E. Davis and D. Weston Furr
U.S. Fish and Wildlife Service
NM Fish and Wildlife Conservation Office
3800 Commons N.E.
Albuquerque, NM 87109
Jason_E_Davis@fws.gov 505-342-9900 x 108
Weston_Furr@fws.gov 505-342-9900 x 110

- Data Files — 12-31-10
- Draft Report — 03-31-11
- Technical Presentation — Annual Meeting
- Final Report — 06-01-11

10-18

Nonnative Species Control in the Lower San Juan River

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

- Data Files — 12-31-10
- Draft Report — 03-31-11
- Technical Presentation — Annual Meeting
- Final Report — 06-01-11

ELEMENT 5 - Monitoring of Fish and Habitat

10-19

Sub-Adult & Adult Large-Bodied Fish Monitoring

Dale Ryden
U.S. Fish and Wildlife Service
Colorado River Fishery Project
764 Horizon Drive, Building B
Grand Junction, CO 81506-3946
dryden@fws.gov 970-245-9319

• Data Files	12-31-10
• Draft Report	03-31-11
• Technical Presentation	Annual Meeting
• Final Report	06-01-11

10-20

YOY/Small Bodied Fish Monitoring

David L. Propst and Yvette Paroz
Conservation Services Division
New Mexico Department of Game and Fish
One Wildlife Way, P.O. Box 25112
Santa Fe, NM 87504
dpropst@state.nm.us 505- 476-8103
yparoz@state.nm.us 505- 476-8103

• Data Files	12-31-10
• Draft Report	03-31-11
• Technical Presentation	Annual Meeting
• Final Report	06-01-11

10-21

Larval Colorado Pikeminnow and Larval Razorback Sucker Survey

David L. Propst, NMDGF, and W. Howard Brandenburg and Michael A. Farrington, ASIR
American SW Ichthyological Researchers, LLC
800 Enchino Place NE
Albuquerque, NM 87102-2606
dpropst@state.nm.us 505- 476-8103
howard_brandenburg@asirllc.com 505-247-9337
Michael_farrington@asirllc.com 505-247-9337

• Data Files	12-31-10
• Draft Report	03-31-11
• Technical Presentation	Annual Meeting
• Final Report	06-01-11

10-22

Specimen Curation/Identification

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

• Provide permanent repository for SJR collections/GIS database	Annually
• Draft Report	03-31-11
• Final Report	06-01-11

10-24

Temperature Monitoring/Habitat Mapping

Ron Bliesner
Keller-Bliesner Engineering
78 East Center, Logan, UT 84321
bliesner@kelbli.com 435-753-5651

• Draft Reports	03-31-10
• Final Reports	06-01-10
• Updated temperature database	06-01-10
• GIS/image data	06-01-10

10-25		
SJRIP Videography Bill Goettlicher U.S. Bureau of Reclamation Technical Services Center Bldg. 67 5th Floor MC 86-68211 P.O. Box 25007 Denver, CO 80225 bgoettlicher@usbr.fov 303-445-2275	• Take and maintain HD video and high res. digital stills	Annually
10-27		
Pit Tag and Readers Mark McKinstry U.S. Bureau of Reclamation 125 S. State St. Salt Lake City, UT 84138-1147 mmckinstry@uc.usbr.gov 801-524-3835	• Purchase as necessary	Annually

ELEMENT 7 - Program Coordination

10-28		
Program Outreach Sharon Whitmore/Joann Perea-Richmann U.S. Fish and Wildlife Service 2105 Osuna Road NE Albuquerque, NM 87113 sharon_whitmore@fws.gov 505-761-4753 joann_perea-richmann@fws.gov (505) 761-4712	• Outreach/PR tasks/activities as per SOW, Program Document, and Upper Basin	Annually
10-29		
Program Management – USFWS David Campbell, Program Director U.S. Fish and Wildlife Service 2105 Osuna Road NE Albuquerque, NM 87113 david_campbell@fws.gov 505-761-4745 sharon_whitmore@fws.gov 505-761-4753 scott_durst@fws.gov 505-761-4739 joann_perea-richmann@fws.gov 505-761-4712	• Tasks completed as per SOW and Program Document	Annually
10-30		
Program Management - Reclamation Mark McKinstry U.S. Bureau of Reclamation 125 S. State St. Salt Lake City, UT 84138-1147 mmckinstry@uc.usbr.gov (801) 524-3835	• Funding requests processed • Annual Report	Upon request 06-01-11

San Juan Recovery and Implementation Program
Conservation Action Planning:
San Juan Ecosystem Restoration Management
2010 Project Proposal

October 23, 2009

Principal Investigator:
Adrian Oglesby
The Nature Conservancy
212 E. Marcy Street, Suite 200
Santa Fe, New Mexico 87501
505-280-7958
aoglesby@tnc.org

Background

The goals of the San Juan Recovery River Implementation Program ("SJRIP") Long Range Plan include providing suitable habitat to support recovery of the Colorado pikeminnow and razorback sucker.

Based upon an application originally made by the U.S. Bureau of Reclamation, the New Mexico Environment Department ("NMED") is in the process of awarding The Nature Conservancy a $398,070 grant to support restoration of San Juan River channel complexity and native fish habitat. Reclamation was successful in applying for this grant but was unable to accept it based on incompatibility of the NMED grant structure and federal contracting laws. The Nature Conservancy has agreed to assume project management of this grant to avoid delays in improving native fish habitat in the San Juan Basin. While, the original grant application included a cost-share contribution by Reclamation of almost $200,000 for contract administration and oversight, The Nature Conservancy does not have the budget to accommodate this unforeseen administrative burden.

Goals

The primary goal of this scope of work shall be to utilize existing data and analyses of essential habitats, flow-habitat relationships, and endangered fish distributions to identify locations for habitat improvement projects and use mechanical means to assist flows in the creation or improvement of endangered fish habitats.

Deliverable

Semi-annual progress reports will be prepared before October 1st and April 1st of each project year. A final report will be prepared at the completion of the project.

Study Area

San Juan River Basin in New Mexico.

Study Methods/Approach

The requested funding will help The Nature Conservancy accommodate project management and oversight costs related to improvement of native fish habitat conditions in the upper San Juan River near Farmington and Shiprock.

Habitat will be improved utilizing a grant from the NMED to relocate or reconfigure the downstream portions of irrigation return channels where they enter the San Juan River to create and improve backwaters; and, to reconnect secondary channels to the main channel through the lowering of inflow areas and removal of non-native vegetation.

All project activities will be conducted in close coordination with the SJRIP Program Office and the Biology Committee.

Budget

Project oversight related to field work	$3,845
Project coordination	$1,000
Field supplies	$100
Travel	$2,750
Indirect Costs (Overhead)	$2,305
TOTAL	$10,000

Update and Maintenance of San Juan River Basin Recovery Implementation Program Database
Fiscal Year 2010 Project Proposal

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

Background

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

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

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

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

Relevant Long Range Plan Tasks

Task 2.1.3.2 Continue to develop a Standardized Database for all stocked and recaptured Colorado pikeminnow in order to determine the fate of stocked fish.

Task 2.2.3.2 Continue to develop a Standardized Database for all stocked and recaptured razorback sucker in order to determine the fate of stocked fish.

Task 5.3.1.1 Continue to develop a centralized database that incorporates all data from standardized

monitoring and integrate into the Program Database.

Task 7.2.1.4 Establish and maintain a Program Database of information collected under various Program projects.

Study Area

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

Objectives

1. Maintain and incorporate researchers' data into the San Juan River Recovery Implementation Program's Database.
2. Maintain, perform Quality Control, annually update, and distribute current San Juan River Recovery Implementation Program researcher database using appropriate format.
3. Establish electronic archives of the aforementioned database at the ultimate repository for this information (U.S. Fish and Wildlife Service Region 2 Office, Albuquerque, New Mexico).
4. Generate for distribution and maintain a standardized set of hard-copy aerial photos with river mile, 10^{th} of mile, and appropriate landmarks connoted.
5. Maintain and update SJRRIP website with reports, data, and other relevant documents.

Methods

1. Update and Maintain Database in consultation and coordination with Program researchers, the Program Biologist will integrate existing and new data into the existing San Juan River Recovery Implementation Program's Database. Data will be checked for Quality Controlled and updated as necessary.

2. Contact and coordinate with appropriate personnel in the Upper Colorado River Basin and Glen Canyon Environmental Studies offices to investigate the feasibility of linkage of the proposed San Juan River Recovery Implementation Database with other regional fish databases.

3. Generate and Maintain standardized maps. Appropriate base layers, including Digital Orthophoto Quarter Quadrangles (DOQQs) will be obtained and additional layers, including 10^{th} of mile designations will be generated in order to provide researchers with a standardized set of hard copy aerial photo maps for use in the field.

Products

The database will be disseminated to all committee members and be made available via a password-protected project FTP site. The database will reside with the Program Office NMESFO -Region 2 (Albuquerque) of the U.S. Fish and Wildlife Service, the designated repository for the data. A progress report and detailed database management plans will be provided to the Coordinating Committee.

San Juan River Recovery Program Database Management Budget 2007		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Program Biologist (35% time)		$22,034
Database technician (.5% time)		3,995
Program Asst. (.5% time)		2,630
Personnel Subtotal		**$28,659**
Travel		
Travel Subtotal	**$**	
Equipment and Supplies		
General Office Supplies	500	500
ESRI (GIS software) license fees	500	0
GIS Extensions (Spatial Analyst, XTools, etc.)	250	0
FTP software license	100	0
Printer toner cartridges	500	500
Backup media		250
Printer paper		500
Computer Hardware upgrades	500	500
Support Subtotal	**1,850**	**$2,250**
Consultant/ Professional Fees		
		0
Consultant/ Professional Sub-Total		**0**
	USFWS Funding	**Base Funding**
Budget Subtotal		**30,909**
FY 2006 Carry over funds		**0**
Total		**30,909**
Administrative charge (22%)		**6,800**
Grand Total	**$1,850**	**37,709**

Peer Review for 2010
Fiscal Year 2010 Project Proposal

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

Sharon Whitmore
U.S. Fish and Wildlife Service
2105 Osuna Rd NE
Albuquerque, New Mexico 87113
Phone 505-761-4753
FAX 505-346-2535
sharon_whitmore@fws.gov

Background

This proposal provides funding for the San Juan River Recovery Implementation Program's (Program) peer review activities during 2010. Peer review is an important component of the Program and has helped to ensure that projects and management activities are well supported and properly conducted, analyzed and reported.

The current Peer Review Panel (PRP) will remain in place and will continue to review and comment on pre-draft, draft, and final Scopes of Work, workplans, reports, methodologies, integration analyses and reports, and other Program documents. The PRP will be convened under the direction of the Program Office and Reclamation and will report primarily to the Biology Committee although their reviews will also be provided to the Coordination Committee.

Beginning in 2010, the Program will modify the peer review process by creating a separate group of peer reviewers that will provide input and advice on broader programmatic goals and activities and ensure that program activities relate back to recovery actions and goals. This Recovery Science Review Group (RSRG) will consist of primarily managers, researchers, and/or administrators generally familiar with recovery programs. The RSRG would convene at the behest of the Program Office and Reclamation and would provide advice on program activities either ongoing, planned, or that should be undertaken. These reviews would be provided to the Program Office and Reclamation to assist in the development of the annual workplan and would be provided to the Program's Coordination Committee in order to assist them in evaluating and approving applicable workplans.

Goal

The goal of peer review is to provide scientific review assistance to the Program Office on the San Juan River Recovery Implementation Program's recovery activities, technical studies, and reporting. The peer reviewers will work with Program staff and technical committees to produce scientifically credible documents to assist in maintaining a scientific basis for the recovery activities that the Program develops and implements.

Methods

The Program Office will work with Reclamation and the Program committees to develop a list of experts to serve on the RSRG who, under the direction of the Program Office and Reclamation, will be retained on an as needed basis to provide focused review of specific issues, questions, approaches, management activities, research needs, methodologies, and other scientific reviews. These peer reviewers are expected to review Program activities from a broad, recovery-based viewpoint. Under the direction of

the Program Office, individuals with specific expertise on the RSRG panel will provide review and written comments, as requested.

Current PRP members are listed below. These peer reviewers will remain the same until the Program chooses to change one or more panel members or the current panel members decide to step down. Technical committee researchers may call PRP members to ask for advice, and PRP members may call Biology Committee researchers if they have questions concerning Program activities. All correspondence between the Biology Committee and the PRP will be coordinated through either the Program Office or Reclamation.

All peer review experts may be required to meet with the technical committees or Coordination Committee. Their reviews will be provided to the Program through the Program Office and Reclamation in letterform, and through discussions at the committee meetings.

Products

All peer reviewers will provide written reviews, as requested, to the Program Office and Reclamation. These reviews will consist of critiques of research, documents, activities, and overall direction of the Program in its pursuit of recovering the endangered fish.

Primary Contact: Dr. Mark McKinstry
Bureau of Reclamation
125 South State Street, UC-735
Salt Lake City, UT 84106
Phone:801/524-3835 FAX:801-524-5499
Email: mmckinstry@uc.usbr.gov

Budget FY-10:

Payment for serving as a peer reviewer on the RSRG or PRP includes expenses for travel to and from meetings, and an hourly rate for services. It is anticipated that peer reviewers will spend approximately 15-20 days each in 2010.

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

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

Future use of the PRP is not known but they likely will be used each year to provide guidance to the Biology Committee**.**

2010 Peer Review Panel:

Dr. John Pitlick
Department of Geology
University of Colorado
Boulder, CO 80309-0260
Phone: 303-492-5906
Email: pitlick@spot.colorado.edu

Dr. Stephen Ross
Curator Emeritus of Fishes, Department of Biology and Museum of Southwestern Biology MSC 03-2020 University of New Mexico
Albuquerque, NM 87131-0001
Phone: 505-277-3893 Hm: 970-264-0158
Email: stross1@unm.edu

Dr. Mel Warren Jr.
Team Leader and Research Biologist
Center for Bottomland Hardwoods Research
Southern Research Station, USDA Forest Service
1000 Front Street
Oxford, MS 38655
Phone: 662-234-2744, ext. 246
Fax: 662-234-8318
Email: mwarren01@fs.fed.us

Dr. Ron Ryel
Department of Forest, Range, and Wildlife
Utah State University
5230 Old Main Hill
Logan, UT 84322-5230
Phone: 435-797-8119
FAX: 435-797-3796
Email: ron.ryel@usu.edu

Annual Data Integration and Analysis
Program Coordinator's Office
Fiscal Year 2010 Draft Proposal

U.S. Fish and Wildlife Service
2105 Osuna NE Albuquerque, New Mexico 87113
David_Campbell@fws.gov (505) 761-4745
sharon _whitmore@fws.gov (505) 761-4753

Background

Actions and tasks under Elements 1, 5, and 7 of the Long Range Plan (LRP; SJRBRIP 2009) call for synthesis and integration reports to detail ongoing Program activities and evaluate Program progress toward recovery by assessing the current status of native and endangered fish populations and evaluating progress toward minimizing limiting factors. Previous integration efforts summarized research conducted from 1991-1997 and 1998-2002 (Holden 2000 and Miller 2006, respectively).

It has been determined by the Coordination Committee, Biology Committee, and the Service that "data integration" needs to occur on a annual basis. At the February 26, 2009 the Program Office in its report to the Coordination Committee proposed that the Program move to an annual integration process in 2009. The Coordination Committee agreed. The data integration process is also integral to the Service's Sufficient Progress analysis.

In the Program Document, under Service Responsibilities, Item #8 states:

> "annually preparing, in consultation with the Coordination Committee and the Program's technical committees, a report that assesses the preceding year's fish monitoring data, progress toward recovery, and adaptive management recommendations, including recommendations for changes in direction, termination of projects, new projects or other pertinent recommendations;"

To accomplish this, the Long Range Plan states under Element 7, Program Coordination,

"The U.S. Fish and Wildlife Service is responsible for coordinating the San Juan River Basin Recovery Implementation Program. To fulfill this responsibility, the Service has appointed a Program Coordinator who is responsible for overall Program planning and management, information integration and review, and facilitation of contracting funding and management."

To insure the Service can meet its Program obligations defined in the Program Document and Long Range Plan, the Service proposes that annual data integration and synthesis be accomplished by the addition of a senior Recovery Science Biologist to the Program Office. Because the Program Office is now the clearinghouse for all Program data and is responsible for collecting and compiling all Program data each year, integrating the activities of data/database management and data integration into the Program office will facilitate accountability, consistency in approach, efficiency in effort and cost effectiveness. The Service will also be able to better assess progress toward recovery, as required by the Section 7 Principles, if data integration, synthesis, and analysis are done in-house on an annual basis.

Data Integration Tasks

1. At the onset, and annually the Recovery Science Biologist will work with the Biology Committee to develop the analytical framework and methodologies for the data integration.
2. Annually prepare, in consultation with the Service, the Coordination Committee and the Program's technical committees, a report that assesses the preceding year's monitoring data, progress toward recovery, and adaptive management recommendations, including recommendations for changes in direction, continuation of projects and new projects;
    a. Meet with the Service and the Program's technical committees to develop outline for Annual Report; including working with the Biology Committee to develop a data integration process with input from the peer reviewers. This process for integrating individual studies would identify the analyses to be completed by individual researchers from their own data and analysis to be completed by the Program Office. Integration of specific areas of Program data may be assigned to individual researchers or a team of researchers working together. The Program Office would manage the data integration process by ensuring consistency in data format, timeliness in data delivery. This would include working with individual researchers as needed to assist with data analysis.
    b. The Program Office, working with individual researchers, will compile and assimilate the results from all projects. Following the outline developed for the annual report, the Program Office will prepare the draft report. This will include the standard process of preparing a draft report for review and soliciting comments from the Biology Committee and peer reviewers.
    c. Preparation of a Final Report. The report will also include recommendations for updating the Long-Range Plan's research, monitoring and recovery elements and adaptive management recommendations as detailed in the Service's specific responsibility number 8.
3. Be available to work with the Service and the Program's committees to identify and conduct and/or coordinate specific research; conduct analyses and write reports as needed.

San Juan River Recovery Program Data Integration and Analysis Budget 2010		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Recovery Science Biologist	**26,500**	**79,500**
Personnel Subtotal	**$26,500**	**$79,500**
Travel		
Recovery Science Biologist (10 days@$109 pd) + gas	**1,640**	**1,090**
Travel Subtotal	**$1,640**	**$1,090**
Committee Meeting Support		
General Office Supplies	250	500
Support Subtotal	**$250**	**$500**
	USFWS Funding	**Base Funding**
Budget Subtotal	**$28,390**	**$81,090**
FY 2008 Carry over funds	**0**	**65,000**
Subtotal	**$**	**$**
Administrative charge (22%)	**0**	**$17,840**
Grand Total	**$28,390**	**$33,930**

Augmented Stockings of Age 0 and Age 1+ Colorado pikeminnow into the San Juan River Fiscal Year 2010 Project Proposal – Updated on 06 November 2009

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

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 calls for the annual stocking of ≥ 300,000 age-0 and ≥3,000 age 1+ fish in the San Juan River until 2009. It is anticipated that this augmentation period will be extended to include continued augmentation past 2009.

Augmentation of the Colorado pikeminnow population in the San Juan River is related to the 2008 SJRIP Draft Long Range Plan (LRP). These activities are specifically addressed in the following Elements, Actions and Tasks:

Element 2. Management and Augmentation of Populations and Protection of Genetic Integrity

Action 2.1.2 Produce, rear and stock sufficient numbers of Colorado pikeminnow to meet stocking goals of augmentation plan.

Task 2.1.2.2 Annually stock ≥ 300,000 age-0 Colorado pikeminnow.

Task 2.1.2.3 Annually stock ≥ 3,000 age-1+ Colorado pikeminnow.

Task 2.1.2.4 Opportunistically stock available Colorado pikeminnow in excess to those described above.

Action 2.1.4 Evaluate factors limiting Colorado pikeminnow population recovery

Task 2.1.4.1 Identify strategies for improving survival and retention of stocked Colorado pikeminnow, including but not limited to acclimation, size of

fish stocked, time of stocking, location of stocking, conditioning, and predator avoidance.

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

1. Coordinate with Dexter National Fish Hatchery and Technology Center (NFH&TC) to procure and stock fish according to guidelines set forth in *An Augmentation Plan for Colorado Pikeminnow* (2003) in the San Juan River.
    a. Annually stock 300,000 age-0 Colorado pikeminnow.
    b. Annually stock 3,000 age-1+ Colorado pikeminnow.
2. 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, allowing for settling of blood chemistry) for up to 24 hours prior to release into the San Juan River. In accordance to the augmentation plan, multiple stocking sites will be investigated ranging from Fruitland Diversion Dam downstream to Shiprock Bridge. Although multiple sites will be investigated the primary stocking location will be the PNM Weir located at river mile 166.6.

Objective 1.b. Age-1+ Colorado pikeminnow will be annually reared and harvested by Dexter NFH&TC and delivered via standard distribution unit to the San Juan River. All age 1+ fish will be implanted with a Passive Implant Transponder (PIT) tag by Dexter NFH&TC personnel prior to delivery. Depending on availability, fish will be stocked in both the spring, prior to runoff, and in the fall of each year. At the time of each stocking one-half of all fish delivered will be held in enclosures and acclimatized for up to 24 hours prior to release while one-half will be stocked directly into the river. Non-acclimated fish will be released at the same location and time as acclimatized fish. Subsequent recaptures of stocked fish will provide guidance on relative success of acclimation.

Objective 2. New Mexico FWCO will collate all pertinent stocking information including but not limited to timing, location, size and numbers and enter 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 acclimation effectiveness.

Products/Schedule

An electronic data file will be provided for inclusion in the centralized database by 31 March 2011. A draft summary report detailing findings will be submitted to the San Juan River Implementation Program, Biology Committee, by 31 March 2011. Revisions will be completed and a final annual report will be submitted by 1 June 2011.

Literature Cited

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. 2008. 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 2010 Proposed Budget:

Personnel/Labor Costs (Federal Salary + Benefits)	
Fish Biologist (GS-7-2) –16 days @ $218/day	$ 7,848.00
Age-0 stockings (Objective 1.a):	
(1 person x 4 days/trip x 2 trips)	
Age-1 stockings (Objective 1.b):	
(1 person x 4 days/trip x 2 trips)	
Reporting/Data Management (Objective 2) – 20 days	
Bio. Science Technician (GS-8) – 16 days @ $319/day	$ 5,104.00
Age-0 stockings (Objective 1.a):	
(1 person x 4 days/trip x 2 trips)	
Age-1 stockings (Objective 1.b):	
(1 person x 4 days/trip x 2 trips)	
Sub-total	$ 12,952.00

Travel and Per Diem (Based on Published FY-2008 Federal Per Diem Rates)	
Hotel Costs – 12 nights	$ 840.00
(12 nights @ $70/night – single occupancy = $1,260)	
Per Diem (Hotel Rate) – 16 days @ $39/day	$ 624.00
Sub-total	$ 1,464.00

Equipment

Vehicle Maintenance & Gasoline 2,400 miles @ $0.60/mile (based on Anticipated GSA rates established on 01 September 2008 and includes costs associated with gasoline/diesel fuel vehicle maintenance)	$ 1,440.00
Sub-total	$ 1,440.00

USFWS-NMFWCO Total	$ 15,856.00
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	$ 3,488.00
USFWS Region 2 Total	**$ 19,344.00**

COLORADO PIKEMINNOW Age-0 and Age-1 PRODUCTION
San Juan River
FY-2010

Principal Investigators- William Knight and Manuel E. Ulibarri
Dexter National Fish Hatchery and Technology Center
U.S. Fish and Wildlife Service
P.O. Box 219, 7116 Hatchery Road
Dexter, NM 88230-0219
November 11, 2009

505-734-5910 Work
505-734-6130 Fax
william_knight@fws.gov (Ext. 52)
manuel_ulibarri@fws.gov (Ext. 12)

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) calls 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 have been produced at Dexter and will be delivered annually from 2006-2009 to the San Juan River for stocking, (Ryden 2005, Addendum #1 to Augmentation Plan For Colorado Pikeminnow In The San Juan River). Revisions to the CPM Augmentation Plan were not completed by the time that annual SOW's were due. Fish rearing targets for Dexter in 2010 will be identical to those in 2009. Year 2010 completes the 9th year of the age-0 and 5th year of the age-1 augmentation program.

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 to continue the production of 300,000 age-0 fingerlings (50 mm TL) and 3,000 age-1 (150mm TL) fish annually for reintroduction in the San Juan River. In order to meet the target size and number of age-1 fish, Dexter will maintain approximately 5,000, young-of- year fingerlings annually for growout.

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 FWCO, CRFP-Grand Junction, New Mexico Department of Game and Fish, Colorado Division of Wildlife and Utah Department of Wildlife Resources.

Objectives

1. Produce 300,000 age-0 fingerlings (50 mm) and 3,000 age-1 (150mm) fish for stocking in the San Juan River in 2010.

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

3. Provide staff to PIT tag age-1 fish.

4. Transport and distribute 300,000 age-0 and 3,000 age -1 Colorado pikeminnow from Dexter to the San Juan River.

5. Maintain 400 Colorado pikeminnow broodstock for recovery efforts.

Methods

Broodstock will consist of 400 (F1) adults. These fish are 1991 and 1999 year-class 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 2010 a maximum of 40 paired matings (1 female X 1 male) will be spawned from the 1991/1999 YC broodstock. Given the past history of hormonal induced ovulation, 30 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 300,000 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 4B- .86 acre @ 100,000 fry

Age-1 Growth : (April thru October -240 day growing period)

Harvest age-1 fish from netted over- wintering pond; enumerate and stock fingerlings into 1 pond.

Pond 9B- .32 acre @ 5,000 fingerlings

Earthen ponds will be used for production. Pond 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. Age-1 fish will be fed twice daily, 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 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
4-6"	2.0 mm
6-8"	3.0 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. Age-1 fish reach target size of 200mm in a 15 month period. The fish will be harvested from the ponds in mid October, PIT tagged, length/weight data gathered and allowed to recover for two full weeks prior to shipping to the San Juan River.

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 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. 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.

Budget

RE: Colorado pikeminnow age-0 and age-1 production at Dexter National Fish Hatchery and Technology Center. The following costs are associated with producing 300,000 age-0 fingerlings (50 mm) and 3,000 age-1 (150mm) fish for stocking in the San Juan River in 2010. Identified costs also include PIT tagging age-1 fish and maintaining 400-500 adult Colorado pikeminnow broodstock for recovery efforts.

Budget -Detailed Spending Plan 2010

O&M Labor Costs

The labor costs identified in the 2010 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 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

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 203,125 kwh @ .064	$13,000.00
Heating water for hatching eggs to swim-up	
Natural gas 1,525 ccf @ .85	$ 1,296.00
Subtotal	**$14,296.00**

Reintroduction Costs:

- Age-0 Fish stocking/distribution.

Inks Dam, Burnett, TX to Dexter NFH and Farmington & return (1800 miles @ 4.35 per mile with RDU Semi truck)=	$ 7,830
Fuel and routine vehicle maintenance. 1 trip @ Perdiem- $130 per day X 2 individuals. =	$ 260

-Age-1 Fish stocking/distribution

Dexter to Farmington & return- (860miles @ 3.00 per mile X 1 trip)=	$ 2,580
Fuel and routine vehicle maintenance, Dexter truck. Perdiem- $130 per day X 1 trip X 2 individual. =	$ 260
	$10,930

Annual Totals (O & M Direst Costs)	**$88,066.00**
17% Administrative Overhead	**$14,971.00**
*per cost recovery rates and policy (d-1 category)	

TOTAL REQUESTED FOR 2010 **$103,037.00**

Out year funding

Expected budget requirements for 2010 is: (@ 5% annual inflation rate)
Fiscal Year 2011 $108,188

Projected Duration Of Project:

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 have been produced at Dexter and were delivered annually from 2006-2009 to the San Juan River as per (Ryden 2005, Addendum #1 to Augmentation Plan For Colorado Pikeminnow In The San Juan River). Revisions to the CPM Augmentation Plan are expected to be completed in 2010.

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, 2011.

Schedule

Broodfish will be spawned in May 2010 and age-0 fish reared in earthen ponds from June - October 2010. Age-1 will be cultured in outdoor netted ponds during the winter (November 2009- March 2010), moved to a clean pond in April 2010 and cultured until October 2010, at which time they will be harvested, PIT tagged and stocked into the San Juan River.

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 2010

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

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

William_Knight@fws.gov
Manuel_Ulibarri@fws.gov

Background

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

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

Location

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

Facilities

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

Fish culture facilities in operation during FY-2004 consisted 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	Lot Designation
1981	F_1 Mohave	75		adults / Mohave	'81
1994-2003	Mohave	500		90 / Mohave	PM
1999-2004 WC	Mohave		500	fry /Mohave	
2003-2004	F_2 Mohave	400		25/ '81 captive stock	F_2

'81-1981 year class, Mohave-Lake Mohave, AZ, PM-Pair Matings, WC-Wild Caught, WB-Willow Beach, P- Production.

From 2001-2009 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 2010 marks the fifth year of razorback production at Dexter for distribution to the NAPI ponds. Since 2006, Dexter staff have stocked a total of 23,233 razorback's averaging 170mm in length into East and West Avocet and Hidden ponds. An additional 11,000 will be stocked into the NAPI ponds in April 2010. Over the past two years DNFH&TC also provided over 242,000 (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.

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, 2010.

O&M Labor Costs

The labor costs identified in the 2010 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 2010 **$73,904**

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

Fiscal Year 2011	$76,269
Fiscal Year 2012	$78,710
Fiscal Year 2013	$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, 2011.

Schedule
Broodfish will be spawned in March 2010 and the fish reared in earthen ponds for their first growing season (April - October 2010); held indoor during winter (November 2010- March 2011) 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 heated 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 2010

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
Uvalde National Fish Hatchery
754 County Road 203
Uvalde, Texas 78801
830-278-2419
830-278-6042 Fax

Grant_Webber@fws.gov

Introduction

Uvalde National Fish Hatchery (UNFH) submits the following proposal to rear 12,000 300mm razorback sucker sub-adults annually for the San Juan River Basin Recovery Implementation Program (SJRIP) 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 23- 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 and six more in FY 1993 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 deep wells provide up to 3,000 gallons per minute of 72^{o} water, year round.

Razorback sucker and bonytail have been reared at UNFH, since April 2006. On November 11th, 1,150 PIT tagged 300mm Age-1 razorbacks were stocked in the San Juan River (Hogback diversion area). The fish were marked with 134 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, exceeded the 6,000 fish commitment. No fish were stocked in 2008 due to the facility testing positive for Largemouth Bass Virus. In February 2008, all contaminated sources were destroyed or removed from the hatchery. In July 2009, Uvalde NFH received its second consecutive clean fish health inspection, which allowed it to regain its Class A status. In October 2009, the RDU stocked for Uvalde NFH precisely 3,997-419mm fish into the Animas Confluence (1,997 fish) and Hogback Diversion (2,000 fish).

Facilities

This project will utilize up to 23 hatchery ponds and an undetermined number of inside raceways/tanks to fulfill the production and research commitments of the proposal. The ponds require maintenance earth work to the bottoms and banks and are fully functional with water supplies, catch basins and drains.

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°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°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; 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;

3. Determine survival rates over time of fish hauled from UNFH to DNFH&TC.

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 100,000 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 @ 33,000 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 11 ponds.

Pond 7-	1 acre @ 4,500	fingerlings
Pond 8-	1 acre @ 3,600	fingerlings
Pond 10-	1 acre @ 3,500	fingerlings
Pond 11-	1 acre @ 3,400	fingerlings
Pond 18-	1 acre @ 2,300	fingerlings
Pond 19-	1 acre @ 3,600	fingerlings
Pond 20-	1 acre @ 3,600	fingerlings
Pond 26-	1 acre @ 6,900	fingerlings
Pond 30-	1 acre @ 5,700	fingerlings
Pond 36-	1 acre @ 3,600	fingerlings
Pond 37-	1 acre @ 3,600	fingerlings

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 18-	1 acre @ 1,500 fingerlings
Pond 19-	1 acre @ 1,500 fingerlings
Pond 28-	1 acre @ 2,000 fingerlings
Pond 29-	1 acre @ 2,000 fingerlings

All study fish will be placed in ponds lined with plastic and covered with bird deterrent netting to control certain variables. All fish will be graded and individually counted prior to being stocked into the ponds. The lined ponds will be cleaned out every other year to reduce the amount of organic material in the ponds which could cause water quality

deterioration. 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/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, Water Quality and Fertilization

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

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

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.
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 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. Fry and fingerlings will receive a starter grower diet purchased from Nelson and Sons, Silver Cup, Murray, Utah. 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
9-14"	4.0 mm

Projected Harvest Dates and Delivery Date

Based on harvest data from 2006 and 2007 the production target of 12,000- 300mm fish can be achieved in an eighteen month period. Fish will be harvested from the ponds and stocked into the San Juan River in October/November of each calendar year. Some fish may also be stocked in the 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 projected 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 rifle and traps. Fish remaining outdoors during the winter season will be under the protection of 2" X 2" block nylon bird predation netting. A minimum of 12,000 razorbacks and 7,000 bonytail reared for this project will be maintained in intensive culture raceways during the winter months. These intensive culture facilities contain 72^{o}F flow through water, supplemental aeration, power back-ups, and a security alarm system.

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. 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 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 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.

2010 Production and Distribution Schedule

Broodfish will be spawned in April, 2010 at Dexter NFH & TC; 30,000 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 2010 and available for distribution in November 2010 (late fall and or as requested by the SJRIP).

Budget 2010 Fiscal Year

Rearing Razorback Sucker and Bonytail Sub-Adults at Uvalde National Fish Hatchery, Detailed Budget Spending Plan, 2009.

O&M Labor Costs

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 (26 pp) - GS 482-9 @ $30.39/hr = $64,000
* On-site fish rearing, water quality monitoring, vegetation treatment, fish marking and distribution coordination.

(1) Animal Caretaker (26 pp) – WG-5048-5 @ $18.73/hr = $39,000
-General fish husbandry activities such as fish feeding, chemical applications, and water quality data collections

Subtotal = $103,000

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

Administrative supplies
- Paper, pens, folders, & miscellaneous office supplies $ 1,500

Fish Health
-Water quality monitoring supplies (probes, meters, test pillows) $ 1,500
-Therapeutants- salt, formalin, MS-222, Stress Coat, Nitrofurazone, Dimilin $ 3,000

Feed
-Production diet RBS # 350 -25,000 lbs @ $.88 per lb $22,000

Fertilizer
-Alfalfa pellets & Cotton Seed meal (4,500 lbs) .21/lb $1,500
-Inorganic - Super Phosphate (15 gallons) $5.00/gal $ 700

Chemicals- Aquatic Vegetation Control and other water quality
- Copper Sulfate, Citric Acid, Cutrine Plus, Navigate $11,000

Subtotal = $41,200

Services
-Utilities & Equipment Maintenance
* Electrical, fuel and phone $27,951
* Well and associated equipment $1,500

Subtotal =	$29,451

Travel

- Fish stocking/distribution Haul tagged fish from Uvalde to Farmington & return to Burnett, Texas. Fuel, routine vehicle maintenance, and salary, overtime and Per diem (2 individuals)	$10,000
Subtotal =	$10,000

TOTALS:

O&M DIRECT COSTS	**$183,651**
INDIRECT COSTS (Admin Overhead @ 17%) *per cost recovery rates and policy (d-1 category)	**$31,220**
TOTAL O&M REQUESTED FOR 2010	**$214,871**

San Juan River RIP portion	**$127,272**
LCRMSCP portion	**$87, 599**

Razorback Sucker Augmentation at NAPI Grow-Out Ponds
Fiscal Year 2010 Project Proposal

Principal Investigators: Jeff Cole, Viola Willeto and Albert Lapahie
Navajo Nation Department of Fish and Wildlife
P.O. Box 1480
Window Rock, AZ 86515
(928) 871-7068
jcole@navajofishandwildlife.org vwilleto@navajofishandwildlife.org
alapahie@navajofishandwildlife.org

and

D.Weston Furr, Ernest Teller, Sr. and Jason E. Davis
United States Fish and Wildlife Service
New Mexico Fish and Wildlife Conservation Office
3800 Commons N.E.
Albuquerque, NM 87109
(505) 342-9900
Weston_Furr@fws.gov eteller@wildblue.net Jason_E_Davis@fws.gov

Background

The Long Range Plan for recovery of endangered fishes in the San Juan River calls for propagation and augmentation of razorback sucker (RBS). Nine ponds have been built on Navajo Agricultural Products Industry (NAPI) lands to grow out RBS for stocking into the San Juan River. The Coordination Committee has decided to only utilize three of the nine existing ponds on NAPI during FY 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 was 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 in 2007. The Service assists the NNDFW with pond harvest as needed.

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

Objectives

(NAPI Ponds Management)

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 2010, 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 2010, 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 2010, 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 2010, Dexter National Fish Hatchery will deliver 10,500 ≥ 200 mm RBS to the three NAPI grow-out ponds. In the fall of 2010, 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 2011. A draft report will be submitted by 31 March 2011 and finalized by 1 June 2011.

Budget Fiscal Year 2010

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**
		$ 20,000
Total	**$ 40,490**	**$ 69,338**
Administrative charge (22%)	$ 8,908	$ 15,254
USFWS/NNDFW Totals	**$ 49,398**	**$ 60,192**
Grand Total		**$ 109,590**

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-2008 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 2010 Project Proposal
San Juan River Basin Hydrology Model Development, Operation and Maintenance

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

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

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

Background

The Third Generation San Juan Basin Hydrology Model (SJBHM) is a daily timestep hydrologic model of the San Juan Riverbasin. The SJBHM actually consists of a series of models including evapotranspiration models, a natural flow model, several simulation models in StateMod and RiverWare, and several calibration and validation models. Although primary model development was essentially completed in FY2004, revisions and modifications have been made throughout a multi-year validation and verification phase. In October 2008, it was decided that the functionalities in the StateMod simulation portion of the SJBHM should be implemented in RiverWare. This scope of work includes this model development in addition to 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 Hydrology, 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 modifying the existing model to incorporate the StateMod simulation portion of the SJBHM into RiverWare. 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 FY2010 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 Modify and enhance the model to incorporate the simulation functionalities of StateMod into the RiverWare portion of the model. Document the changes. The specifics regarding which functionalities should be represented will be conferred with the Hydrologic Baseline Work Group. Additional streamlining of the various models and data loaders is also necessary.

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, Hydrology, and/or Coordination Committees. 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 Hydrologic Baseline Workgroup, Coordination Committee and Hydrology Committee meetings to provide model status updates and present results. Develop the FY2011 budget and track FY2010 expenditures.

Budget

Budget Summary FY 2010

Model Development	$76,320
Model Maintenance	$33,560
Model Runs	$19,320
Program Management	$13,880
Grand Total	**$143,080**

FY-2011	**$147,370** *
FY-2012	**$151,790** *
FY-2013	**$75,000** †

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

† Assumes major model development completed in Dec 2012

Task 1 Model Development

A) Labor

Task	Position	Salary total/hr	Total Hours	Total Cost
StateMod to RW & streamline	UCRO Engineer	$55	360	$19,800
Assist with DMI writing	TSC Engineer	$125	80	$10,000

B) Travel

Purpose	Destination	Trips	Days/ Trip	Airfare/ trip	MI&E, Car, Lodging/day	Total Cost
UCRO meeting w/ CADSWES	Boulder	2	2	$300	$230	$1,520

C) Other Costs

Task	Total Cost
RiverWare enhancements for SJBHM development	$35,000
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	$55	40	$2,200
	WCAO Engineer	$70	160	$11,200
Annual Model Update	UCRO Engineer	$55	160	$8,800
Annual Software Update	UCRO Engineer	$55	160	$8,800

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	$55	280	$15,400
	WCAO Engineer	$70	56	$3,920

Task 4 Program Management Coordination

A) Labor

Task	Position	Salary total/hr	Total Hours	Total Cost
Meetings and Coordination	UCRO Engineer	$55	96	$5,280
	WCAO Engineer	$70	40	$2,800
Budget	UCRO Engineer	$55	40	$2,200

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

[1] Upper Colorado Regional Office (Salt Lake City)
[2] Western Colorado Area Office (Durango)
[3] Technical Services Center (Denver)

Improve Stream Gaging and Flow Measurements

San Juan River Basin Recovery Implementation Program - Hydrology Committee
Fiscal Year 2010 Project Proposal

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

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

Background

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

Study Area

San Juan River Basin in New Mexico

Objective

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

Products

1. Improved flow measurement and more accurate gage readings.

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

Budget FY-2010:

Objective: Provide funding to USGS for 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				
Total				$7,400

Operation of Public Service Company of New Mexico Fish Passage Structure
Fiscal Year 2010 Project Proposal

Principal Investigators: Jeffrey Cole, Albert Lapahie, Viola Willeto, Navajo Nation Department of Fish and Wildlife Box 1480 Window Rock, AZ 86515 (928) 871-7068
jcole@navajofishandwildlife.org, alapahie@navajofishandwildlife.org
vwilleto@navajofishandwildlife.org

Background

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

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

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

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

Study Area

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

Methods/Approach

The Fish Passage facility will be operated from April 1 to October 31, 2009. 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

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, 2009. 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.

Budget Fiscal Year – 2010

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		**$1,000**
	USFWS Funding	**Base Funding**
Budget Subtotal		**67,588**
FY 2009 Carry over funds		**20,000**
Total		**47,588**
Administrative charge (22%)		**10,469**
Grand Total	**$**	**58,057**

Capital Improvement Program Management
San Juan River Recovery Program
Fiscal Year 2010 Project Proposal

Principal Investigator: Brent Uilenberg
Bureau of Reclamation
2764 Compass Dr., Suite 106
Grand Junction, CO 81506
(970) 248-0641 builenberg@uc.usbr.gov

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, "...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." This activity is funded through the San Juan Capital Improvements Program.

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.

San Juan Capital Improvements Program Budget FY-2010:

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				

Objective	Staff days	Labor	Travel	Equipment and supplies
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*

* This activity is funded through the San Juan Capital Improvements Program.

Non-native species Monitoring and Control in the Upper San Juan River
Fiscal Year 2010 Project Proposal – Updated on 06 November 2009

Principal Investigators: Jason E. Davis, D. Weston Furr
U.S. Fish and Wildlife Service
New Mexico Fishery Resources Office
3800 Commons N.E.
Albuquerque, NM 87109
(505)342-9900
Jason_E_Davis@fws.gov Weston_Furr@fws.gov

and

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

Background

The August 1, 2001 Colorado pikeminnow and razorback sucker Recovery Goals identified predation by and/or competition by nonnative fish species as a primary threat to the continued existence or the reestablishment of self-sustaining populations of these endangered fishes. In addition, reducing the impacts of nonnative fishes has been identified as a critical element in the San Juan River Basin Recovery Implementation Programs Long Range Plan (Draft April 2008). 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 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 2010. 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. Evaluate distribution and abundance patterns of non-native species to determine effects of mechanical removal.

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

4. Relate distribution and abundance patterns of both common and uncommon native fishes to nonnative removal.

5. Establish measurable criteria for evaluating removal effectiveness of nonnative fishes in the system to achieve recovery goals.

Methods/Approach

Data Collection:

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 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.

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.

Data Analysis:

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 2010):

PNM to Hogback-	4 trips
Hogback to Shiprock-	4 trips
Shiprock to Mexican Hat	4 trips
Total # of trips-	**12 trips in FY 2010**

Products/Schedule

An electronic data file will be provided for inclusion in the centralized database by 31 March 2011. A draft summary report detailing findings will be submitted to the San Juan River Implementation Program, Biology Committee, by 31 March 2011. Revisions will be completed and a final annual report will be submitted by 1 June 2011.

Literature Cited

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

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

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

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

Budget Fiscal Year 2010

Costs for participation of the U.S. Fish and Wildlife Service, New Mexico Fish and Wildlife Conservation Office in the expanded nonnative removal efforts in FY-2010.

Personnel/Labor Costs (Federal Salary + Benefits)

PNM Weir to Hogback Diversion:

Fish Biologist (GS-7-2) - 20 days @ $218/day (1 person x 5 days/trip X 4 trips)	$ 4,360.00
Bio. Science Tech (GS-8) – 20 days @ $319/day (1 person x 5 days/trip X 4 trips)	$ 6,380.00 $ 10,740.00

Hogback Diversion to Shiprock Bridge:

Principal Biologist (GS-12-3) – 20 days @ $399/day (1 person x 5 days/trip X 4 trips)	$ 7,980.00
Fish Biologist (GS-7-2) - 20 days @ $218/day (1 person x 5 days/trip X 4 trips)	$ 4,360.00
Bio. Science Tech (GS-8) – 20 days @ $319/day (1 person x 5 days/trip X 4 trips)	$ 6,380.00 $ 18,720.00

Shiprock Bridge to Mexican Hat, Utah:

Principal 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
Bio. Science Tech (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 (2 people x 12 days/trip x 4 trips)	$ 8,160.00
Bio. Science Tech (GS-4-1) – 24 days @ $152/day (2 people x 12 days/trip x 1 trip)	$ 3,648.00 $ 41,928.00

Administrative Support (Federal Salary + Benefits)

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

Reporting/Data Management (Federal Salary + Benefits)

Principal Biologist (GS-12-3) – 60 days @ $399/day	$ 23,940.00
Fish Biologist (GS-7-2) – 25 days @ $218/day	$ 5,450.00 $ 29,390.00

Sub-Total for Personnel /Labor Costs **$**104,798.00

Travel and Per Diem (Based on Published FY-2009 Federal Per Diem Rates)

Hotel Costs – 65 nights	$ 4,550.00
(65 nights @ $70/night – single occupancy = $4,550)	
Per Diem (Hotel Rate) – 76 days @ $39/day	$ 2,964.00
Per Diem (Camp Rate) – 120 days @ $29/day	$ 3,480.00
	$ 10,994.00

Equipment

PNM Weir to Hogback/Shiprock	$ 2,880.00
4,800 miles @ $0.60/mile	
(400 miles roundtrip x 8 trips) +(1,600 shuttle miles)	
Shiprock to Mexican Hat, Utah	$ 5,040.00
8,400miles @ $0.60/mile	
(700 miles roundtrip x 4 trips) x 3 vehicles	
Generator fuel	
20 gallons/trip x 8 trips @ $3.00/gallon; upper SJR trips and 110 gallons/trip x 2 trips @ $3.00/gallon; camping trips)	$ 1,140.00
Equipment Maintenance, Repair, & Replacement	
(e.g., life jackets, hip boots, generator repair, rubber gloves, dip nets, aluminum welding, raft repair, etc.)	$ 2,000.00
	$ 11,060.00

USFWS-NMFRO (Albuquerque) Total	$126,852.00
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	$ 27,907.00
USFWS Region 2 Total	**$154,759.00**

Funding for participating agencies:

U.S. Fish and Wildlife Service – Grand Junction, CO	$ 82,130.00
Utah Department of Wildlife Resources – Moab, UT	$ 32,741.00
New Mexico Department of Game and Fish- Santa Fe, NM	$ 52,937.00

Grand Total of FY 2010 **$322,567**

Costs for participation of the U.S. Fish and Wildlife Service, Colorado River Fishery Project (CRFP) office, Grand Junction, CO in the expanded nonnative removal efforts in FY-2010.

Personnel/Labor Costs (Projected Federal Salary + Benefits)

Principal Biologist (GS-12) – 38 days @ $486/day	$ 18,468.00
(1 person X 5 days/trip X 1 hotel trip)	
(1 person X 11 days/trip X 3 camping trips)	
Biological Technicians (GS-7) – 5 days @ $289/day	$ 1,445.00
(1 people X 5 days/trip X 1 hotel trip)	
Biological Technicians (GS-5) – 110 days @ $139/day	$ 15,290.00
(2 people x 11 days/trips x 2 trips)	
(3 people x 11 days/trips x 2 trips)	

(184 hours overtime @ $25.50/hour)	$ 4,678.00
	$ 39,881.00

Administrative Support (Projected Federal Salary + Benefits)

Administrative Officer (GS-9) – 11 days @ $320/day	$ 3,520.00
	$ 3,520.00

Reporting/Data Management (Projected Federal Salary + Benefits)

Principal Biologist (GS-12) – 45 days @ $486/day	$ 21,870.00
	$ 21,870.00

Travel and Per Diem (Based on Published FY-2009 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 & Supplies

Generator Fuel (285 gallons @ $3.00/gallon)	$ 855.00
(5 gallons/day X 3 days sampling X 1 trip X 1 raft = 15 gallons)	
(5 gallons/day X 9 days sampling X 2 trips X 1 raft = 90 gallons)	
(5 gallons/day X 9 days sampling X 1 trip X 4 rafts = 180 gallons)	
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
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
	$ 4,755.00

USFWS-CRFP (Grand Junction) Total	$ 73,991.00
USFWS Region 6 Regional Office Administrative Overhead (11.00%)	$ 8,139.00
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-2009.

Personnel/Labor Costs (Salary + Benefits)

Principal Biologist– 45 days @ $265/day	$ 11,925.00
(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.)	
Biological Technicians - 45 days @ $185/day	$ 8,325.00
(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.)	
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-2010.

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 2010 Project Proposal

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

Background

The lower San Juan River is particularly important in the recovery of the Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*) since it contains typical nursery habitat similar to what is present on the Green and Colorado rivers. Within the past six 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). In 2003 and 2004, 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). 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) 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 2007. 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, two adult gizzard shad, two juvenile striped bass and two adult walleye were collected below the waterfall. Colorado pikeminnow and razorback suckers have also been collected during sampling efforts below the water.

Over 56,000 channel catfish and approximately 2,900 common carp were mechanically removed from the lower San Juan River from 2002 to 2007. A decrease in mean total length (TL) of channel catfish was observed between 2002 and 2004, indicating that removal efforts are 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 2007. Between 2002 and 2007, 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 in the lower San Juan River stocked from 2002 to 2006. Preliminary population estimates for juvenile Colorado pikeminnow residing in the lower San Juan River were generated in 2004, 2005, 2006 and 2007 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, and sampling just below the waterfall at Piute Farms. Since striped bass and other fish are unable to navigate the waterfall, sampling below the waterfall will determine their presence or absence. If they are there,

we can continue to document the riverine and lacustrine conditions related to their movement. This study will serve to determine the most effective time for removal actions, so that more intensive and specific removal efforts may be employed in the future when Lake Powell is once again influencing the lower San Juan River. 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. Furthermore, conducting work below the waterfall will provide information on endangered fish that may be present and unable to move upstream.

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. Additionally, sampling will be conducted just below the waterfall at RM-0.5 and from the waterfall downstream to Lake Powell (approximately 15 to 20 river miles and within critical habitat). 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.

5. Characterize abundance of endangered fish in the San Juan River just below the waterfall.

6. Characterize abundance of reservoir immigrants (striped bass and walleye) moving out of Lake Powell into the San Juan River upstream to the new waterfall.

7. Relate striped bass movement from Lake Powell into the San Juan River to lake and river conditions (including temperature, flows and turbidity).

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. In addition, a variety of sampling methods will be used below the waterfall, including hoop and trammel netting, seining, hook and line, and electrofishing, if possible. Five sampling events will take place directly below the waterfall, most likely between April and August.

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 2011. 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 2011. Electronic copies of the field and collection data will be transferred to the San Juan River database manager following the successful protocol previously employed.

Literature Cited

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Budget Fiscal Year 2010

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 280 man days total preparation for field trips, equipment and gear maintenance, electrofishing	$51,800
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	**$97,880**

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 @ $350 per trip (9 trips)	$ 3,150
Piute Farms- 336 mi @ $.49 per mi for 5 trips	$ 823
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
Piute Farms- 2 people @ $20 per day for 20 days	$ 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	**$15,428**

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	**$ 120,298**

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.)	$ 24,060
UDWR TOTAL	**$ 144,358**

Funding for Participating Agencies

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
New Mexico Game and Fish- Santa Fe Biologist (2 trips, 1 person includes salaries and associated costs)	$ 5,710
GRAND TOTAL	***$*** **181,044**

Outyears

FY-2011 - $ 190,096
FY-2012 - $ 199,601
FY-2013 - $ 209,581

Nonnative Species Control in the Lower San Juan River
Fiscal Year 2010 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-2010.

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

Outyear funding including 5% increase:

Fiscal Year 2011	$ 5,996
Fiscal Year 2012	$ 6,295
Fiscal Year 2013	$ 6,610

Nonnative Species Control in the Lower San Juan River
Fiscal Year 2010 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 U.S. Fish and Wildlife Service, New Mexico Fish and Wildlife Conservation Office Albuquerque, NM in FY-2010.

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-2008 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**

Outyear funding including 5% COLA:

Fiscal Year 2011	$ 14,355
Fiscal Year 2012	$ 15,073
Fiscal Year 2013	$ 15,826

Updated - 28 October 2009

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

Budget FY-2010:

Under the heading "Funding for participating agencies." Costs for participation of the U.S. Fish and Wildlife Service, Colorado River Fishery Project (CRFP) office, Grand Junction, CO in FY-2010.

Personnel/Labor Costs (Projected Federal Salary + Benefits)	
Principal Biologist (GS-12) – 10 days @ $486/day	$ 4,860.00
(1 person X 5 days/trip X 2 trips)	
Biological Technicians (GS-7) - 20 days @ $289/day	$ 5,780.00
(2 people X 5 days/trip X 2 trips)	
(12 hours overtime @ $36.25/hour)	$ 435.00
	$ 11,075.00
Administrative Support (Projected Federal Salary + Benefits)	
Administrative Officer (GS-9) – 4 days @ $320/day	$ 1,280.00
	$ 1,280.00
Travel and Per Diem (Based on Published FY-2009 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 & Supplies	
Generator Fuel (5 gallons/day X 10 days sampling @ $3.00/gallon)	$ 150.00
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.)	$ 800.00
	$ 1,800.00
USFWS-CRFP (Grand Junction) Total	$ 15,590.00
USFWS Region 6 Regional Office Administrative Overhead (11.00%)	$ 1,715.00
USFWS Region 6 Total	$ 17,305.00

Sub-Adult & Adult Large-Bodied Fish Community Monitoring
(a.k.a. Adult Monitoring)
Fiscal Year 2010 Project Proposal
Updated - 28 October 2009

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

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

The Adult Monitoring study provides information directly applicable to the following tasks in the Long Range Plan (dated March 2009): 5.1.1.1, 5.1.1.2, 5.1.2.3, and 5.1.2.4. In addition, the Adult Monitoring study provides information that, when combined with information from other studies and monitoring efforts, is applicable to the following tasks in the Long Range Plan: 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, 4.1.1.8, 5.2.3.1, 5.2.3.2, and 5.2.3.3. The monitoring protocols discussed in the Methods section of this workplan reflect those that are currently detailed in the revised San Juan River Monitoring Plan and Protocols (dated 4 August 2006).

Description of Study Area

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 2.9 (Clay Hills Landing) just upstream of Lake Powell in Utah.

Objectives

1. Monitor the San Juan River's fish community, specifically the large-bodied fish species, to identify shifts in fish community structure, species relative abundance and distribution, and length/weight frequencies that are occurring over time. Determine whether these shifts in fish community parameters correspond to management actions that are being implemented by the SJRIP. These include (but may not be limited to) the following:
   a) Reoperation of water releases from Navajo Reservoir
   b) Mechanical removal of nonnative fishes
   c) Modification or removal of instream water diversion structures
   d) Augmentation efforts for both federally-listed endangered fish species -- Colorado pikeminnow and razorback sucker

2. Monitor population trends (e.g., distribution and abundance) of the rare San Juan River fish species -– Colorado pikeminnow, razorback sucker, and roundtail chub (both wild and stocked fish).

3. Remove nonnative fish species which prey upon and may potentially compete with native fish species in the San Juan River.

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 the entire study area, from near the Animas River confluence in New Mexico (RM 180.0) to Clay Hills Landing in Utah (RM 2.9). 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.

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 120 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.

Electrofishing will follow the methods set forth above and in the SJRIP's long-term monitoring plan (as detailed in Propst et al. 2000). Alternate sampling techniques (e.g., seining, trammel netting, backpack electrofishing, etc.) may be employed, at the principal investigator's discretion, where suitable habitat is available or if low-water conditions preclude the use of raft-mounted electrofishing.

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 2010 is scheduled to be available by 31 March 2011. The final version of this interim progress report which incorporates comments received, is scheduled to be completed by 1 June 2011. 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 2010. 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 2011.

Qualifications of Personnel Included in the Budget

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

Dale has 19 years experience performing fisheries research and management in the Colorado, Gunnison and San Juan rivers. For the last 18 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 3-4 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

Propst, D. L., S. P. Platania, D. W. Ryden, and R. L. Bliesner. 2006. San Juan River Monitoring Plan and Protocols (Revised). San Juan River Basin Recovery Implementation Program, U. S. Fish and Wildlife Service, Albquerque, NM. 19 pp.

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.

2010 Fiscal Year Budget

Personnel/Labor Costs (Projected Federal Salary + Benefits)

Objectives 1-3: Logistics, Electrofishing, Removal of Nonnative Fish		
Principal Biologist (GS-12) - 28 days @ $486/day		$ 13,608.00
(1 person X 10 days planning & organization)		
(1 person X 6 days/trip X 1 trip)		
(1 person X 12 days/trip X 1 trip)		
Fish Biologist (GS-9) - 18 days @ $320/day		$ 5,760.00
(1 person X 6 days/trip X 1 trip)		
(1 person X 12 days/trip X 1 trip)		
Biological Technicians (GS-5) - 48 days @ $139/day		$ 6,672.00
(2 people X 6 days X 1 trip)		
(3 people X 12 days X 1 trip)		
(64 hours overtime @ $25.50/hour)		$ 1,632.00
	Sub Total	$ 27,672.00

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

Principal Biologist (GS-12) – 81 days @ $486/day		$ 39,366.00
Project Leader (GS-14) - 15 days $640/day		$ 9,600.00
Administrative Officer (GS-9) – 18 days @ $320/day		$ 5,760.00
	Sub Total	$ 54,726.00

Travel and Per Diem (Based on Published FY-2009 Federal Per Diem Rates)

Hotel Costs		
20 nights @ $70/night (in Farmington, NM)		$ 1,400.00
10 nights @ $102/night (in Cortez, CO)		$ 1,020.00
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)		
10 days X 5 people X $26/day		$ 1,300.00
	Sub Total	$ 5,045.00

Equipment and Supplies

Vehicle Maintenance & Gasoline (@ $0.60/mile)		
(600 miles round trip from Grand Junction, CO to Farmington, NM and/or Clay Hills + 350 miles of shuttling per trip X 2 trips) X 2 vehicles per trip		$ 2,280.00
(600 miles round trip from Grand Junction, CO to Mexican Hat, UT to resupply gas and food for crew X 1 trip) X 1 vehicle per trip		$ 360.00
Generator fuel (5 gallons/day X 15 days sampling @ $3.00/gallon)		$ 225.00
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	$ 5,865.00

USFWS-CRFP Total	$ 93,308.00
USFWS Administrative Overhead (11.00%)	$ 10,264.00
USFWS Region 6 Total	$103,572.00

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	$ 13,668.00
Utah Division of Wildlife Resources - Moab, UT	
See Attached Budget For Line Item Breakdowns	$ 4,794.00
	$ 18,462.00
FY-2010 WORKPLAN TOTAL	**$122,034.00**

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-2010.

Personnel/Labor Costs (Federal Salary + Benefits)	
Principal Biologist (GS-12-3) – 12 days @ $390/day	$ 4,680
(1 person x 12 days x 1 trip)	
Biological Technician (GS-7-2) – 18 days @ $213/day	$ 3,834
(1 person x 6 days x 1 trip; Farmington to Four Corners)	
(1 person x 12 days x 1 trip; Four Corners to Clay Hills)	
Administrative Officer (GS-9-6) – 1 day @ $262/day	$ 262
Sub Total	**$ 8,776**
Travel and Per Diem (Based on Published FY-2008 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 - 20 days @ $29/day	$ 580
(2 people x 10 days x 1 trip)	
Hotel Rate – 6 days @ $39.00/day	$ 234
Sub Total	**$ 1,336**
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	**$ 11,203**
USFWS Region 2 Regional Office Administrative Overhead (22.00%)	**$ 2,465**
USFWS Region 2 Total	**$ 13,668**

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 – 12 days @ $265/day		$ 3,180
	Subtotal	$ 3,180
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) - 10 days @ $20/day		$ 200
	Subtotal	$ 313
Equipment		
Vehicle Maintenance & Gasoline (@ $0.49/mile)		
(412 miles round trip from Moab, UT to Cortez, CO to Clay Hills, UT)		$ 202
Equipment Repair, & Replacement		
(e.g., life jackets, hip boots, waders)		$ 300
	Subtotal	$ 502
UDWR- Moab Total		$ 3,995
UDWR- Administrative Overhead (20%)		$ 799
UDWR TOTAL		$ 4,794

YOY/Small Bodied Fish Monitoring
Fiscal Year 2010 Project Proposal

Principal Investigators: David L. Propst and Yvette Paroz
Conservation Services Division
New Mexico Department of Game and Fish
One Wildlife Way, P.O. Box 25112
Santa Fe, NM 87504
(505 476-8103)
dpropst@state.nm.us
yparoz@state.nm.us

Background

As set forth in Section 5.7 of the San Juan River Basin Recovery Implementation Program (SJRIP) Long-Range Plan, a long-term monitoring program "to identify changes in the endangered and other native species populations, status, distributions and habitat conditions" was to be developed by the SJRIP Biology Committee. The ichthyofaunal monitoring portion of the San Juan River Monitoring Plan and Protocols (Propst, et al., 2000) was divided into three primary areas, larval fish sampling, young-of-year/small-bodied fishes, and sub-adult and adult/large-bodied fishes. The portion of the San Juan River to be monitored extends from the confluence of the Animas and San Juan rivers (Farmington) to Lake Powell (Clay Hills Crossing). The purposes of small-bodied fish monitoring are to document occurrence and mesohabitat of young-of year Colorado pikeminnow, razorback sucker, and roundtail chub; characterize the fish assemblages of primary channel shoreline and near-shoreline mesohabitats, secondary channels, and backwaters; and document and assess changes in the abundance of common native and nonnative small-bodied fishes (including age 0 flannelmouth sucker, bluehead sucker, common carp, and channel catfish). The following work proposal for 2010 is to conduct the young-of-year/small-bodied fishes monitoring effort per protocols set forth in the San Juan River Monitoring Plan and Protocols (SJRMPP). Beginning in 2003, specimens collected from each mesohabitat were preserved separately, data were recorded in database by mesohabitat, and annual reporting included summary of species occurrences by mesohabitat. During 2004, 2005, and 2006 autumn monitoring, sampling of primary channel near-shore riffle and run mesohabitats was accomplished, on a trial basis, by using a backpack electrofisher to stun fishes and capture them in a bag seine. This sampling was done every six miles in geomorphic reaches 6 through 3. Experimental bag-block seining was conducted in 2007.

In addition to accomplishing work (field, laboratory, data analyses, and report writing) specific to the young-of-year/small-bodied fish monitoring effort, NMGF personnel participate in telemetry studies, native-nonnative interactions studies (upper and lower San Juan), Colorado pikeminnow augmentation evaluation, and larval fish sampling of the San Juan River Basin Recovery Implementation Program. This work and budgeting for NMGF participation in these activities is included with Scopes of Work for each activity and submitted by Principal Investigator(s) for each.

Study Area

The study area for YOY/small bodied fish monitoring extends from river mile RM 180.0 (Animas River confluence) in Farmington, New Mexico, downstream to RM 2.9 (Clay Hills Crossing), just above Lake Powell in Utah.

Collections

Specimens collected will be inspected to determine if any rare fishes (Colorado pikeminnow, roundtail chub, and razorback sucker) are present in a sample or collection. All identifiable rare fish and all other readily identified native fishes will be measured and released. Nonnative fishes are routinely retained. Specimens from each sampled mesohabitat will be counted separately. Retained specimens will be preserved in 10% formalin and returned to the New Mexico Department of Game and Fish Laboratory for identification, enumeration, and measurement (total

length). After processing, all specimens will be accessioned to the UNM Museum of Southwestern Biology, Fish Section.

Objectives

The objectives of this portion of the San Juan River monitoring effort are to document primary channel shoreline and near-shoreline mesohabitat, secondary channel, and backwater use by age-0 Colorado pikeminnow, razorback sucker, and roundtail chub; 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); track trends in species populations (e.g., abundance and relative condition); and characterize patterns of mesohabitat use by common native and nonnative small-bodied fishes (including age 0 flannelmouth sucker, bluehead sucker, common carp, and channel catfish). The data will also be available to all researchers and may be used in conjunction with data obtained in other studies to evaluate future management activities.

Methods

The study reach (Farmington to Clay Hills Crossing) includes geomorphic reaches 6 through 1, with Reach 1 being the most downstream. Primary channel sampling will occur every third mile within the study reach. To the extent possible, all secondary channels will be sampled. Secondary channels are defined as channels having less than 25% of the volume of flow at the time of sampling and are at least 300 m in length. Inflow at the top of a channel is not necessary for it to be classified as a secondary channel. Sample sites within secondary channels will be a sufficient distance from inflow to and outflow from the secondary channel to minimize primary channel faunal and physiochemical influences. Young-of-year/small-bodies fish monitoring will occur in conjunction with the large-bodied fish monitoring effort. Fieldwork will be accomplished in autumn (late-September through mid-October) and involves one foray through each of three macro-reaches (Farmington-Shiprock, Shiprock-Four Corners, and Four Corners-Cray Hills Crossing). In addition to structured primary channel sampling, all backwaters and embayments (>100 m^2) associated with the primary channel will be sampled.

Each mesohabitat (e.g., pool, riffle, riffle-eddy, and shoal) within the site will be sampled in rough proportion to its availability within the site; typically, at least five mesohabitat types will be sampled in each secondary channel with inflow. Each mesohabitat will be sampled separately with 3.2 x. 1.6 m (4 mm mesh) drag seines. A minimum of five seine hauls will be conducted at each primary and secondary sampling site (=> 5 mesohabitats). The number of seine hauls, area (m^2) of seined portion of each mesohabitat, and types of mesohabitats sampled will be recorded on standard field forms. Specimens collected in each mesohabitat will be inspected to determine if any rare fishes (Colorado pikeminnow, roundtail chub, and razorback sucker) are present in the seine. If a rare fish is captured, it will be identified, total length (±1.0 mm) and mass (±1.0g) determined, and released. Any rare fish >150 mm TL will be scanned to determine presence of a PIT tag. If none is present, the specimen will be implanted with a PIT tag having a unique alphanumeric code. All pertinent data (i.e., total and standard lengths, mass, PIT tag code, mesohabitat, water depth, substrate, and cover) on rare fish captured will be recorded. All readily identified native fishes will be identified and counted; all specimens >150 mm TL (flannelmouth and bluehead suckers) will be weighted, measured, and released; all specimens <150 mm TL will be measured and released. All nonnative fishes will be retained and relevant information recorded by mesohabitat of capture. All retained specimens will be preserved separately by mesohabitat in 10% formalin and returned to the New Mexico Department of Game and Fish Laboratory for identification, enumeration, and measurement (total length). Field collection number, habitat number, and river mile will be recorded on a water-proof label and placed in each specimen container. Location of site (UTM) will be determined with a GPS unit. Identification of all retained rare fishes will be confirmed by personnel of the Museum of Southwestern Biology. Preserved specimens will be accessioned to the University of New Mexico Museum of Southwestern Biology.

Backwaters and embayments (>25 m^2) not located within structured primary channel sampling sites, but within each designated mile, also will be sampled. During periods of low flow, secondary channel mouths frequently function as backwaters or embayments. In this monitoring effort, secondary channel mouths without surface inflow from upstream will be treated as backwater/embayment habitat. The maximum number of backwaters or embayments sampled will be one per mile. Two to three seine hauls typically will be made in each backwater or embayment sampled depending on its size. Typically, samples will be across mouth of backwater (or embayment), one in

middle, and one near head of backwater (or embayment). Specimens collected in each seine haul will be preserved separately. All specimens collected, except rare fishes, will be retained and returned to the laboratory for identification and enumeration. All rare fish will be measured and released; those >150 mm will be PIT tagged. Data collection and recording of relevant information (including GPS determined location) will be the same as for secondary and primary channels.

Sampling effort for all seine collections will be number fish/unit area.

Ambient temperature and water quality data (water temperature, dissolved oxygen, conductivity, and salinity) will be measured in each sampled secondary channel, at primary channel sites, and in backwaters/embayments. Secondary channel water quality data will be obtained a sufficient distance from the inflow to the secondary channel to minimize primary channel influences. All water quality data for each sample will be recorded on standard field forms.

Products

Minimally, the annual report will report density per species (number/m^2) per geomorphic reach (primary and secondary channels and backwaters) and rare fishes and the mesohabitats in which each was found. Uni- and multivariate statistics will be used to characterize relationships among species densities and environmental variables, longitudinal patterns of species abundance, and species somatic conditions. River discharge data (Shiprock gage) will be used to assess the effect of discharge volume on species density estimates. All data obtained during 2009 monitoring activities will be electronically recorded in format determined by the SJRIP Biology Committee. The annual report (including electronic database) will be submitted to the SJRIP Biology Committed by 31, March 2011.

Literature Cited

Propst, D.L., S. P. Platania, D.W. Ryden, and R. Bliesner. 2000. San Juan River Monitoring Plan and Protocols. San Juan Basin Recovery Implementation Program. U.S. Fish and Wildlife Service, Albuquerque, NM.

2010 FISCAL YEAR BUDGET—SMALL-BODIED FISHES MONITORING[1]

FIELD

PERSONNEL

PROJECT LEADER (1)

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

196 hrs	196 hrs
$39.90/hr (base salary) + $13.17 (benefits)	$53.067/hr
TOTAL PROJECT LEADER SALARY	$10,401.13

PROJECT BIOLOGISTS (2)

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

152 hrs ea[2]	304 hrs
$28.35.00/hr (base salary) + $9.36 (benefits)	$37.71/hr
TOTAL PROJECT BIOLOGISTS SALARY	$11,463.84

PER DIEM

17 days/project biologist	34 days
$85.00/day (standard NM in-state rate)	$85.00/day
TOTAL PER DIEM	$2,890.00

TRAVEL

4 x 4 vehicles (2) 400 mi (round-trip Farmington) ea.	800 miles
75 mi/day x 5 days ea.	750 miles
600 mi (round-trip Clay Hills) ea.	1200 miles
$0.32/mile (standard NM rate)	$0.32/mile
TOTAL VEHICLE	$880.00

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 **$26,134.97**

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 & 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 BIOLOGIST (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	**$ 81,344.53**
INDIRECT COSTS (10%)	**$ 8,134.45**
GRAND TOTAL	**$ 89,478.98**

[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:

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**

SAN JUAN RIVER LARVAL RAZORBACK SUCKER SURVEY
FISCAL YEAR 2010 PROJECT PROPOSAL

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

and

Co-Principal Investigator: David L. Propst
New Mexico Department of Game and Fish
Conservation Services Division
One Wildlife Way
Santa Fe, New Mexico 87505
505.476.8103
dpropst@state.nm.us

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 (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 128.0 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 eleven 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 reproductive efforts 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 - 2008.

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%	95,628	50
2002	Larval seine Light traps	141.5 – 2.9	138.6	na	56,034	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	14,642	41
2005	Larval seine	141.5 – 2.9	138.6	na	19,139	19
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	200
2008	Larval seine	141.5 – 2.9	138.6	na	23,299	126

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).

Project Modifications

There have been numerous modifications to the original (1997) sampling methodology of the San Juan River larval razorback sucker 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 this project 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) 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 survey 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. 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 of 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 2). In 2008, addition 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 researcher with their work.

Table 2. Summary project and project modification of the larval razorback sucker survey from 1997 to 2008.

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	11,473		
2001	Larval Seine Light Trap	141.5 – 2.9	95,628	study area expanded; upper-lower reaches sampled separately; nonsynchronous	
2002	Larval Seine Light Trap	141.5 – 2.9	56,034		
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	14,642		Reports merged Trend data
2005	Larval Seine	141.5 – 2.9	19,139		
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		

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.

Objectives

1. Conduct larval fish studies to determine if reproduction is occurring, locate spawning and nursery areas, and to gauge the extent of annual reproduction (Task 5.1.2.1).
2. Continue to collect catch rate statistics to estimate relative abundance of endangered fish populations (Task 5.1.2.4).
3. Identify principal river reaches and habitats used by various life-stages of endangered fish (Task 5.2.3.2).
4. Quantify attributes of habitats important to each life stage of endangered fish (Task 5.2.2.1).
5. Monitor other native fish populations (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).

Methods

Field work:

Sampling for razorback sucker larvae will be conducted in the San Juan River between RM 141.5 and RM 2.9 from mid April through mid June 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 will be 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 2010 must be scheduled by late January 2010 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 YSI units will be used to determine the following water quality parameters at each site sampled: pH, temperature, salinity, conductivity, specific conductance, and dissolved oxygen. A minimum of one digital photo will also be taken of each specific habitat sampled.

StowAway Tidbit temperature loggers will be set to record water temperatures hourly and deployed 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 address more serious medical conditions. Because formalin 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.

Formalin used for fish preservation 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 oar and oar blade, 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 those 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 (Snyder 1981, Snyder and Muth 2004).

Age classes are enumerated, measured (minimum and maximum size [mm standard length] for each species at each site), transferred to 70% ethyl alcohol, 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 for 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 number of 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 – 2008) 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 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). Spawning dates are then calculated by subtracting temperature specific incubation times from the calculated hatch date (Bozac 1990). Hatching and spawning dates 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 mid summer (June). 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 2010 larval razorback sucker sampling activities (combined with 2010 larval Colorado pikeminnow sampling activities) will be prepared and distributed to the San Juan River Basin Biology Committee for review by 31 March 2011. 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 2011. Electronic copies of the 2010 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.

SAN JUAN RIVER LARVAL COLORADO PIKEMINNOW SURVEY
FISCAL YEAR 2010 PROJECT PROPOSAL

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

and

Co-Principal Investigator: David L. Propst
New Mexico Department of Game and Fish
Conservation Services Division
One Wildlife Way
Santa Fe, New Mexico 87505
505.476.8103
dpropst@state.nm.us

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. About

140 river miles of the San Juan River (Cudei, NM, to Clay Hills crossing, UT) was sampled monthly by multiple personnel using inflatable rafts to access suitable habitats within the new study area. Five wild larval Colorado pikeminnow have been collected between 2002 and 2008, at five discrete sites, within the aforementioned study area.

Between 1995 and 2008 the combined sampling methodologies (passive and active) resulted in the collection of nine Colorado pikeminnow. Back-calculated spawning dates, based on those nine individual larvae, range between 24 June and 18 July (Table 1) and are generally associated with the descending limb of the spring run-off hydrograph.

Table 1. Summary of larval and YOY Colorado pikeminnow collected in the San Juan River during larval drift-netting/larval seining (1993-2008) 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
TOTAL		9					

Over 558,000 fish have been collected between 1995 and 2008 under the larval Colorado pikeminnow survey. Of those, about 87% (N=470,004) were collected after 2001 when the sampling protocol switched from passive to active sampling (2002).

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).

Project Modifications

There have been numerous modifications to the 2002 active sampling methodology of the San Juan River 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 this project 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 2002.

Conducting the Colorado pikeminnow survey under this new protocol (single-continuous pass) not only provided discreet reach information but also provided greater temporal resolution in respect to the longitudinal distribution of larval fishes and potential environmental cues required for spawning. Disadvantages to single-continuous pass effort 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). However, numerous problems were associated with cancelled or disrupted trips during the single-continuous pass effort. Designated campsites in the lower canyon (scheduled and coordinated by BLM) would have to be canceled and often new campsites could not be provided. The 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.
Finally, additional costs were incurred because of the need to return to the field to complete the sampling effort for that month.

Besides the threat of weather related cancellation of single-continuous pass effort, concerns arose regarding fatigue and potential compromise to safety of crews on these extended, long-day (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 Colorado pikeminnow 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. In 2008, addition participation of our staff with other SJRBRIP projects made this new simultaneous sampling effort a necessity so that our staff could meet obligations to assist the other researcher with their work.

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 and will include making collections in reaches of the San Juan River under the jurisdiction of the National Park Service.

Objectives

1. Conduct larval fish studies to determine if reproduction is occurring, locate spawning and nursery areas, and to gauge the extent of annual reproduction (Task 5.1.2.1).
2. Continue to collect catch rate statistics to estimate relative abundance of endangered fish populations (Task 5.1.2.4).
3. Identify principal river reaches and habitats used by various life-stages of endangered fish (Task 5.2.3.2).
4. Quantify attributes of habitats important to each life stage of endangered fish (Task 5.2.2.1).
5. Monitor other native fish populations (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).

Methods

Field work:

Sampling for Colorado pikeminnow larvae will be conducted in the San Juan River between RM 141.5 and RM 2.9 from late July through early September 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 gear 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 will be performed by personnel from the N.M. Fishery Resources Office stationed in Farmington, NM. At the time of submittal of this Scope of Work, there was no charge being incurred 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 shuttle 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 for campsites will be required. All trips for 2010 must be scheduled by late January 2010 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 camping policies). Low flow conditions that are 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 (rescues or rendering assistance may add one extra day to the lower reach sampling effort between June and August).

Sampling efforts for larval fish will be concentrated in low velocity habitats and employ small mesh seines (1.2 m x 1.2 m x 0.8 mm mesh) 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. The lengths (to 0.1 m) of each seine haul and total number of hauls per sample site will be measures and recorded. Catch per unit effort for sample site 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; SL) 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 (for purposes of assessing 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 YSI units will be used to determine the following water quality parameters at each site sampled: pH, temperature, salinity, conductivity, specific conductance, and dissolved oxygen. A minimum of one digital photo will also be taken of each specific habitat sampled.

StowAway Tidbit temperature loggers will be set to record water temperatures hourly and deployed near Four Corners bridge, in McElmo Creek, and at Clay Hills crossing. 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 both 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 exposed to intensive use for at least 45 days per season, PFD's will be replaced annually. Simms Guideweight Gore-Tex waders and boots will be issued to all personnel along with 3 mm neoprene gloves (necessary in April and May). Due to cold water conditions, waders are a necessity during early season trips (April and May). As waders are worn throughout the day during these first two trips, they must be light-weight, flexible, and durable. 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 address more serious medical conditions. Because formalin 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.

Formalin used for fish preservation 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 oar and oar blade, 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 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 those with protolarvae 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 body length at specific ages (Snyder 1981, Snyder and Muth 2004).

Age classes are enumerated, measured (minimum and maximum size [mm standard length] for each species at each site), transferred to 70% ethyl alcohol, 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 new format provided a more complete 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 number of 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 – 2008) 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 for larval Colorado pikeminnow are calculated using the formula:
$-76.7105+17.4949(L)-1.0555(L)^2+0.0221(L)^3$, where L=length (mm TL).

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 dates of razorback sucker larvae were calculated by subtracting the average length of larvae at hatching (8.0 mm TL) from the total length at capture 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). Spawning dates are then calculated by subtracting temperature specific incubation times from the calculated hatch date (Bozac 1990). Hatching and spawning dates 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 near the end of summer (late September). 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 2010 larval razorback sucker sampling activities (combined with 2010 larval Colorado pikeminnow sampling activities) will be prepared and distributed to the San Juan River Basin Biology Committee for review by 31 March 2011. 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 2011. Electronic copies of the 2010 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: 2009 San Juan River larval endangered fishes survey

Proposed Budget based on Six 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)	60 staff days	$21,000
Field data collection – 10 days per trip x 6 trips		
Field Assistant	60 staff days	$12,000
Field data collection – 10 days per trip x 6 trips		
LOWER REACH (RM 53.3 - 2.9) *Mexican Hat to Clay Hills*		
Research Associate (W.H. Brandenburg or M. A. Farrington)	60 staff days	$21,000
Field data collection – 10 days per trip x 6 trips		
Field Assistant	60 staff days	$12,000
Field data collection – 10 days per trip x 6 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)	120 staff days	$42,000
Laboratory effort – 10 days per trip per each reach (x 2) x 6 trips		

TASKS: *Laboratory identification, developmental staging, specialized endangered fish processing, data entry, data query and review, database development*		
Research Associate (A.L. Barkalow)	120 staff days	$24,000
Laboratory effort – 10 days per trip per each reach (x 2) x 6 trips		
TASKS: *Post-trip sample processing, juvenile identification, post-identification – processing, measures, review of counts*		

OFFICE WORK (REPORT DEVELOPMENT)		
UPPER AND LOWER REACH SAMPLES COMBINED (i.e., not fully differentiated under this task)		
Research Associate (W.H. Brandenburg and M. A. Farrington)	80 staff days	$28,000
Office effort – 40 days staff member (= 40 days per discrete study)		
TASKS: *Data analysis, draft report preparation, post-review redraft and submission, development and submission of formal responses to reviewer comments, development of presentation of study for annual meetings, annual reporting related to state and tribal permitting of sampling activities*		

Personnel (continued)		
PROJECT OVERSIGHT AND ADMINISTRATION		
Senior Research Associate (S.P. Platania or R.K.Dudley)	12 staff days	$6,000
Oversight effort – one day per month		
TASKS: *Project coordination, project and data review, data management, report review, scope and budget preparation, project billing and accounting*		
Personnel (Field, Lab, Office, Oversight) Subtotal		**$166,000**
SJRBRIP MEETINGS		
Two meetings per year required of researchers; 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		**$173,200**

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	$325/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 6	$35/mo	$210
Cell phones x 2	not charged	$0
Safety training and dedicated first aid gear Subtotal		$1,674
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 1 ($3,100)	Program	
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	**$7,033**

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	$0.505/mi	$1,742
575 miles round-trip per trip x 6 trips = 3,450 miles		
Per Diem - 6 field days; 0 hotel day	$45/day	$3,240
6 days x 2 people x 6 trips = 72 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	$120
Daily storage rate $5/vehicle x 4 days x 6 trips = 24 days		
LOWER REACH (RM 53.3 - 2.9) Mexican Hat to Clay Hills		
Travel - 4 x 4 pick up truck and raft trailer	$0.505/mi	$2,361
780 miles round-trip per trip x 6 trips = 4,680 miles		
Per Diem - 4 field days; 1 hotel day (combined total from below)		$3,300
4 days x 2 people x 6 trips = 48 field per diem days	$45/day	$2,160
1 day x 2 people x 6 trips = 12 hotel per diem days	$95/day	$1,140
Truck and Trailer Shuttle from Mexican Hat to Clay Hills	$325/shuttle	$1,950
Valles Trading Post at $325/shuttle x 6 trips		
Travel and Per Diem (Field) Subtotal		**$12,713**

SJRBRIP MEETINGS		
Travel (everybody in one vehicle)	$0.505/mi	$429
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	**$14,852**

Personnel Total	$	**173,200**
Materials and Supplies Total	$	**7,033**
Travel and Per Diem Total	$	**14,852**
Project Subtotal	$	**195,085**
IDC (15%)	$	**29,263**
GRAND TOTAL	$	**224,348**

San Juan River Specimen Curation
Fiscal Year 2010 Project Proposal

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

Background

Personnel from the Division of Fishes, Museum of Southwestern Biology (MSB), at the University of New Mexico are responsible for two inter-related programs on the San Juan River. The Fish Division is the repository for specimens collected and retained by researchers with the San Juan River Recovery Implementation Program. Fish taken under these programs are initially sorted by the principal investigator, held until they have submitted their yearly-progress report, and then received by MSB personnel. The collection is accessioned, specimens transferred from formalin to alcohol, identifications verified, individuals enumerated, length ranges recorded (largest and smallest specimen in a collection), collection data verified and transferred to wet labels, and incorporated into a database. It is standard policy at all major Natural History museums (i.e., Smithsonian Institution, Carnegie Museum, University of Michigan Museum of Zoology) that, prior to incorporation into the collection, all specimens be examined by qualified personnel (in that particular field of study) in an effort to verify the original identification and collection information. This system provides a final check (safeguard mechanism) to minimize the likelihood of misidentification of San Juan River fish species with particular attention on Colorado pikeminnow and razorback sucker. Any changes in species identifications that are detected are noted and returned to the principal investigator along with the entire data set (listing of collection locality, collectors, date, original field number, species, number of specimens, length ranges, and museum catalog number).

In addition to performing duties associated with collections curation, we are also responsible for complete processing (sorting, identifying, counting, curating, and reporting) of selected San Juan River collections (Colorado pikeminnow larval fish sampling and razorback sucker larval fish sampling). The samples generated by the aforementioned studies resulted in the collection of over 20,000 larval fish during 1999, 15,000 during 2000, and 96,000 during 2001. 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. As in the past, deviations in the identifications of those samples have been noted and forwarded to the principal investigators.

The number of fish processed by the MSB Division of Fishes under the San Juan River Basin Recovery Program can fluctuate greatly between years. One reason for vacillation in number of specimens is that samples sent to MSB by non-MSB researchers are not processed until almost one year following collection. This lag between time of collection and MSB processing is necessary as individual researchers must perform preliminary sorting and require the specimens for preparation of their reports. Other factors such as annual variability of sampling conditions and initiation of new or completion of old projects has resulted in marked changes in the number of samples and specimens (As occurred between 2001 and 2002 when drift sampling for larval Colorado pikeminnow was eliminated in favor of seine sampling).

Discussion of this issue with the San Juan River Biology Committee resulted in the recommendation 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 recognized that some years would require more effort from MSB than budgeted while other years

might not require the same high level of activity. A relatively stable budget allowed for uninterrupted processing of samples and was sufficient to allow the processing of backlogged samples generated during years of exceptionally high fish capture. To date, over 1,000,000 specimens (along with associated locality and ecological data) have been curated into the MSB Division of Fish Collection and are available to researchers.

Study Area

This project does not involve the collection of specimens but instead the processing and curation of samples gathered by the different research components of the San Juan River Research program. The collective sampling area for other researchers will be the San Juan River between the outfall of Navajo Reservoir and the Clay Hills boat landing (RM 2.9) just above Lake Powell in Utah.

Objectives

1. Provide a permanent repository for San Juan River fish collections, field notes, and associated data
2. Verify species identifications, enumerate specimens, and report to principal investigators
3. Maintain a GIS reference database for current material
4. Assist principal investigators with secondary collection sorting and identifications as time and resources permit

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. Samples are transferred to the Division of Fishes, by the principal investigator of a project, once that individual has completed their work and prepared the necessary reports. (This usually infers a lag-time of one year between collection of specimens and transference to the Division of Fishes). Collections are matched with the appropriate data-sheet, transferred from formalin to alcohol, stored in museum quality jars, re-identified, counted, measured (range), labeled, and catalogued into the permanent MSB Fish Division collection and placed on the shelves in the light and temperature controlled collection room. All data associated with the specimens are entered into the database of the Division of Fishes and subsequently copied to the San Juan River database.

In addition to the aforementioned responsibilities, the Division of Fishes is available and has frequently assisted principal investigators by taking on the added responsibility of processing (a limited number) of their unsorted collections (without requesting additional funding). Specimens are sorted, identified, counted, measured, catalogued, and data submitted to the principal investigator for inclusion in reports. In cases where the amount of backlogged material in the possession of the principal investigator was beyond our capabilities, supplemental funds have been sought so that additional personnel can be hired (under the supervision of the permanent staff) to process the excess material.

Products

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. 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. Original field notes will be retained in the Division of Fishes and collection information will be electronically stored in a permanent MSB database program. Electronic copies of the field and collection data will be transferred to the San Juan River database manager following the successful protocol previously employed.

Budget Fiscal Year 2010

Personnel:			
	Graduate student RA (Data manager and GIS)	$	8,000.00
	Graduate student health benefit	$	712.00
	RA Fringe benefits 1%	$	80.00
	RA Tuition 1 semester	$	2,487.00
	RA GPA fee 1 semester	$	25.00
	Undergraduate student Curatorial Assistants (2)	$	7,920.00
	Undergraduate student fringe benefits 1%	$	80.00
	Section Subtotal	$	19,304.00
Equipment and Supplies:			
	95% ethanol preservative	$	2,100.00
	Specimen jars, Buna-N gaskets, and polypropylene caps	$	1,550.00
	Permanent specimen labels-5 mil polyester paper	$	1,000.00
	DataMax ® Printer maintenance and calibration costs	$	299.00
	Section Subtotal	$	4,949.00
Total (Direct Costs)		$	**24,253.00**
Administrative Overhead (15%)		$	3,638.00
Grand Total		$	**27,891.00**

San Juan River Basin Recovery Implementation Program
Habitat Monitoring 2010 Scope of Work

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.

Workshop recommendations during 2009 recommended installation of two additional stations: McElmo Creek and Mancos River at the confluence with the San Juan River. These stations have been added to this proposal.

Objective

- 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. New installations will be required at the mouths of the Mancos River and McElmo Creek.

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.

Deliverables

- An annual draft report prepared and submitted by March 31, 2011
- A final report submitted by June 1, 2011.
- An updated temperature database with all data collected to date, updated through September 2010 by June 1, 2011.
- 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
McElmo Creek at confluence with San Juan	n/a	None – new site

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/ Tech.**
1	Install instruments & read data	8			40		40
2	Analyze data and post to website	20			30		10
	Total staff hours	28	0	0	70	0	50
	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	$6,936		$400	$800	$1,401	$0	$9,537
2	Analyze data and post to website	$6,700					$0	$6,700
	Subtotal	$13,636	$0	$400	$800	$1,401	$0	$16,237
	NM Gross Receipts tax							$477
	NN sales tax							$286
	TOTAL							$17,000

Equipment rental is one-year lease on temperature monitors (10 recorders)
Misc supplies covers telephone, copies, field installation of 2 devices, 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 2010.

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. 2007 photography and mapping will be used to calibrate photo-interpretation. A selection of approximately10% of the frames will be used to calibrate the procedure and an additional 10% to verify the results prior to full analysis of the 2010 aerial videography. This is a one-time task that will be required only in the first year of video interpretation.

Once the digital frames have been registered, ArcGIS will be used to digitize the boundaries of the wetted channel, backwaters, embayments and islands. The data will be processed and summarized by river-mile to match existing datasets.

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 2010 (flow permitting). Frame capture and rectification will be completed by October 2010 and photo-interpretation by February 2011. The draft annual report will be completed by March 31, 2011 with the final report due June 1, 2011.

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

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/ Tech.
3	Download and extract video frames	2			4		60
4	Register 180 miles of video frames	2			16		140
	Identify and digitize habitat polygons	8			40		300
5	Interpretation and Analysis	60			32		100
	Subtotal	72			92	0	600
	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
3	Download and extract video frames	$3,650				$300	$0	$3,950
4	Register 180 miles of video frames	$8,638				$100	$0	$8,738
	Identify and digitize habitat polygons	$19,676	$5,000			$100	$500	$25,276
5	Interpretation and Analysis	$18,368	$5,000			$168	$500	$24,036
	Subtotal	$50,332	$10,000	$0	$0	$668	$1,000	$62,000
	NM Gross Receipts tax							$0
	TOTAL							$62,000

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

Total Project Costs

The total proposed cost for Elements 1 and 2 is $79,000.

SJRIP Videography
2010 Project Proposal

Bill Goettlicher
Physical Scientist
U.S. Bureau of Reclamation
Technical Service Center
Bldg 67 5th Floor MC 86-68211
P.O. Box 25007
Denver, CO 80225
(303)445-2275
bgoettlicher@usbr.gov

Background

High definition videography is used in the SJRIP to develop maps of the river and evaluate 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 – 2010

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 2010 BUDGET

Funding source	Expenditure in FY2010
FY2009 Annual funding	$18,000
Total	**$18,000**

Projected funding:
FY-2011 $20,000.00
FY-2012 $22,000.00

SJRIP PIT TAGS
2010 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 Dale Ryden 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 – 2010

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

In FY2010, $45,000 is allocated in the workplan to purchase 17,000 PIT tags. The purchase of PIT tags and readers is done under a fully competed contract with BioMark in Boise, ID.

2010 Fiscal Year Budget

Funding source		**Projected expenditure in FY10**
FY2010 Annual funding		$45,000
Total		**$45,000**

Projected funding:
FY-2011 $50,000.00
FY-2012 $51,000.00
FY-2013 $52,000.00

Program Coordinator's Office Outreach
Fiscal Year 2009 Draft Proposal

Project Lead: Sharon Whitmore
U.S. Fish and Wildlife Service
2105 Osuna NE Albuquerque, New Mexico 87113
sharon_whitmore@fws.gov (505) 761-4753

Background

The San Juan River Recovery Implementation Program (SJR Program) is designed to simultaneously address endangered fish species recovery and development of water resources within the Basin. The Program includes representatives from not only Federal agencies, but also the States of Colorado and New Mexico, the Jicarilla Apache Nation, the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, the Navajo Nation and the water development interests, most of which have legal mandated responsibilities to the endangered fish and/or the water resources. The parties extended the Cooperative Agreement through 2023.

The SJR Program works jointly with the Upper Colorado River Recovery Program (UCRRP) to conduct outreach activities for both Recovery Programs. Both programs operate under similar recovery elements with management actions that are consistent with the recovery goals for humpback chub, bonytail, Colorado pikeminnow and razorback sucker. These goals are reviewed and revised every five years.

The Recovery Programs' continued success depends on coordinated efforts. Communication and outreach are areas where it makes sense to coordinate efforts. Using a shared approach will help ensure that common audiences receive accurate, consistent information about the endangered fish species and efforts to recover them. Both programs reach out to the general public, elected officials, American Indian tribes, landowners, anglers, river rafter and guides, environmental organizations, water and power developers, teachers, students and Recovery Program participants. Geographic reach of some of these audiences differ by Recovery Program.

Mission

To support the SJR Program's success in recovering the endangered fishes by assuring that the public understands what is being done and why, and has confidence that the process is honest, open, sensitive, clear, and understandable. Outreach efforts will be coordinated with the UCRRP.

Goals

- To develop public involvement strategies at the beginning of any and all projects.
- To educate target audiences about endangered fish and to increase their understanding of, and support for, the recovery of these fish species at local, state, and national levels.
- To provide opportunities for the public to actively participate in activities that support recovery.
- To improve communication within the Recovery Program.

Target Audiences

- General public
- Elected Officials
- Land and pond owners
- Anglers
- River rafters and guides
- Environmental organizations
- Water users
- Power user interests
- Educators
- Recovery program participants (includes local, state and federal agencies)

Tasks

1. Coordinate SJR Program activities with the Upper Basin Recovery Implementation Program.
2. Coordinate outreach activities with the Upper Basin Recovery Implementation Program; disseminate information on Program activities to the public through brochures, newsletters and/or the website.
3. Coordinate outreach activities with Water Users Student Fairs and local schools fairs.

San Juan River Recovery Program **Program Management Outreach Budget 2010**		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Program Assistant - Outreach Program		0
Personnel Subtotal		**0**
Travel		
St. George (6 days@$109 pd)		654
Airfare		1,500
Denver, 3 days @ $198		594
Travel Subtotal		**$2,748**
Equipment and Supplies		
Outreach Materials		2,000
Registration Fees		300
Equipment and Supplies		**3,100**
	USFWS Funding	**Base Funding**
Budget Subtotal		**$5,848**
Administrative charge (22%)	**0**	**$1,287**
Direct expenses to UCRRIP		**$16,000**
Grand Total		**$23,135.00**

Program Coordinator's Office
Fiscal Year 2010 Draft Proposal

U.S. Fish and Wildlife Service
2105 Osuna NE Albuquerque, New Mexico 87113
David_Campbell@fws.gov (505) 761-4745
sharon _whitmore@fws.gov (505) 761-4753

Background

The San Juan River Recovery Implementation Program (Program) is designed to simultaneously address endangered fish species recovery and development of water resources within the Basin. The Program includes representatives from not only Federal agencies, but also the States of Colorado and New Mexico, the Jicarilla Apache Nation, the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, the Navajo Nation and the water development interests, most of which have legal mandated responsibilities to the endangered fish and/or the water resources.

The Service is responsible for directing and coordinating the Program. As stated in the Program Document, the Service will appoint a Program Coordinator who will be responsible for overall Program coordination and dissemination of information about Program activities. Element 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, Hydrology 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 and Hydrology Committees 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 2009		
Personnel (salary and benefits)	USFWS Funding	Program Base Funding
Coordinator	82,139	27,380
Assistant Program Coordinator	64,814	64,814
Program Biologist	0	43,754
Program Assistant	24,985	24,985
IT-Support	6,000	0
USFWS Hydrologist	10,000	5,000
Personnel Subtotal	**$187,938**	**$165,933**
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	2,000
DC, 10 days @ $273	0	2,730
CRWUA, 10 days @ $190 + Airfare	0	2,900
Travel to UCRRIP	0	2,000
Hydrologist Support	0	5,000
Travel Subtotal	**$14,980**	**$26,075**
Committee Meeting Support		
General Office Supplies	2,000	2,000
Meeting space	0	0
Farmington@ $100/day	0	1,200
Durango @$300/day	0	300
Mailings	0	500
Public Notices - ($80/meeting)	0	2,500
Printing/publication	0	2,500
Gas	1,500	1,500
Misc	500	500
Support Subtotal	**$4,000.00**	**$11,000.00**
	USFWS Funding	**Base Funding**
Budget Subtotal	**$206,918**	**$203,008**
FY 2008 Carry over funds	**0**	**0**
Subtotal	**$206,918**	**$203,008**
Administrative charge (22%)	**0**	**$44,662**
Grand Total	**$206,918**	**$247,670**

Fiscal Year 2010 Reclamation Program Management

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

Relationship to SJRIP: Supports Program goals and management by supporting approved activities

Study Goals, Objectives, and End Product: Program Management funds support Reclamation staff involved in program management. Funds are used for the administration of funding agreements, including issuing requisitions for program supplies, and the preparation and oversight of work conducted under interagency agreements, cooperative agreements, contracts, and grants. The funds are also used for formation and participation of the technical and peer-review committees, implementation of committee assignments not specifically identified in a scope of work, reporting, and coordination of water operations. Management support for Capital fund projects, including technical oversight, budgeting, preparation of bids and funding agreements is covered in a separate scope of work. Participation in Hydrology and Biology Committee meetings and business is paid for separately by Reclamation with funds unrelated to the SJRIP.

Task Description and Schedule

Task 1: Manage and administer funding for Recovery Program projects related to the Biology Committee activities. Funding Recovery Program projects requires establishment or modification of approximately 50—60 Reclamation funding agreements or contracts each year. Each financial agreement requires multiple steps and activities, including: submission of requests for Federal assistance for Recovery Program-approved projects; working with Recovery Program's office on funding issues; reviewing and approving (if warranted) project budgets; writing SOWs for RFPs, requesting obligations to cover funding agreement or contract awards; awarding agreements or contract funding to recipients; maintaining agreement and contract filing system including agreement instruments, invoices, and accruals; reviewing and tracking budgets; participating in audits; reviewing and approving invoices; performing periodic site visits to monitor project performance and progress; filing advanced procurement reports; organizing and participating on TPECs; drafting requests for proposals (RFPs); evaluating proposals and awarding contracts; performing agreement closeouts; answering agreement inquiries from auditors, assistance recipients, and the Recovery Program; recording project performance and status of deliverables; and filing recipient performance reports.

Deliverables/Due Dates: Requests from the Recovery Program for funding are processed as they are received. Other deadlines for committee activities are set by the Recovery Program participants during the development of the annual workplan. An annual report on program management activities will be delivered during the annual meeting each year (usually February/March).

2010 Fiscal Year 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.*

B) Travel

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

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

Budget Summary
FY-2009

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 FY2009 budget.**