

# Agenda Item No. 9

Kirk Patten  
Santa Fe, NM  
January 10, 2025

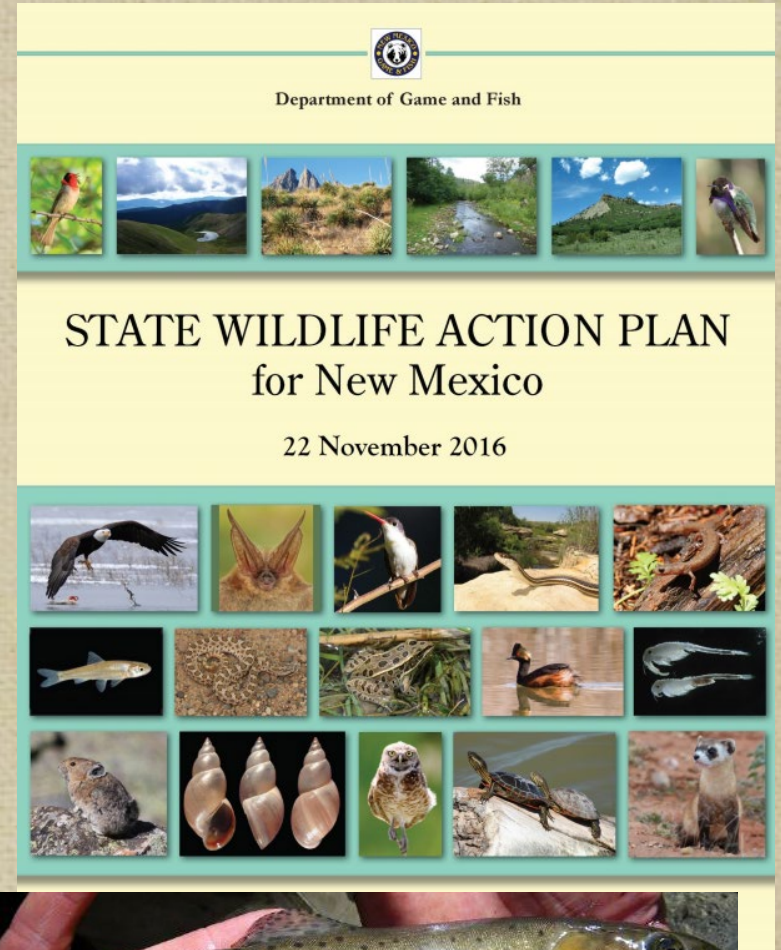
Aquatic Species of Greatest  
Conservation Need Initiatives





# State Wildlife Action Plan - 2016

- Fish – 29 SGCN
- Crustaceans – 30 SGCN
- Aquatic Molluscs – 19 SGCN

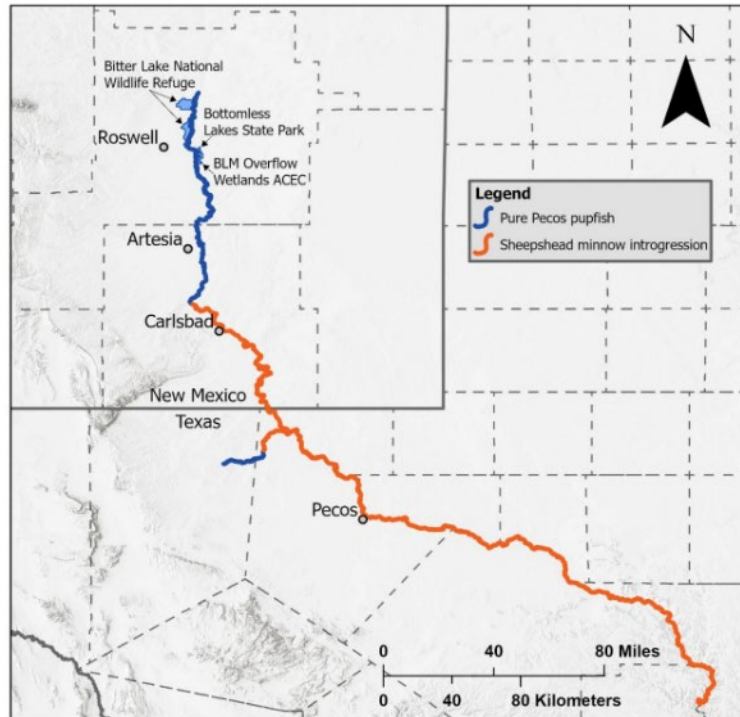




# Pecos Pupfish



- State Threatened - 1988
- ESA Proposed Endangered - 1998
- Conservation Agreement – 1999
- ESA Proposed Threatened - 2024



USFWS





# Pecos Pupfish Conservation Agreement

B. The New Mexico Department of Game and Fish will:

1. Assume lead responsibility for reviewing bait harvest programs in the reach of the Pecos River from Santa Rosa Dam downstream to the New Mexico/Texas State line, providing to the New Mexico Game Commission no later than October 30, 1998, recommendations to promulgate regulations limiting live bait fish use to only fathead minnow (*Pimephales promelas*) and red shiner (*Cyprinella lutrensis*) within the historic range of the Pecos pupfish; and prohibiting the use of live bait on the Bitter Lake National Wildlife Refuge, and the Bottomless Lakes State Park.
2. Conduct the life history investigations described in the attached scope of work.
3. With Service assistance, monitor the status of all proposed off-channel reintroduction and introduction sites within New Mexico.

## 1999 Agreement

B. The New Mexico Department of Game and Fish will:

1. enforce bait programs as defined in rule 19.31.10.18 NMAC, for the Pecos River and prohibition of the use of live bait on Bottomless Lakes State Park;
2. with assistance of the cooperating agencies, draft the Pecos pupfish collaboratively-designed monitoring plan, including information on population, habitat, and genetic monitoring by 2011;
3. annually monitor the population status and genetic purity of Pecos pupfish at all sites in New Mexico as described in the collaboratively-designed monitoring plan and determine actions needed to assure security of the population;
4. with cooperation of other agencies, evaluate potential refuges for Pecos pupfish and additional introductions;
5. with cooperation of other agencies, establish and maintain refuge populations of Pecos pupfish to guard against stochastic events, such as fish kills resulting from golden alga blooms, and develop a population and genetic management plan; and

## 2013 Agreement

## 2022 Agreement

B. The New Mexico Department of Game and Fish (NMDGF) will:

1. enforce bait programs as defined in 19.31.10.14 NMAC for the Pecos River and prohibit the use of live bait on Bitter Lake NWR and Bottomless Lakes State Park;
2. restrict the importation of non-native fish species to occupied Pecos Pupfish habitat in accordance with 19.35.7.14 NMAC;
3. lead development of the Pecos Pupfish Conservation Strategy as described

*Pupfish Conservation Agreement 2022*

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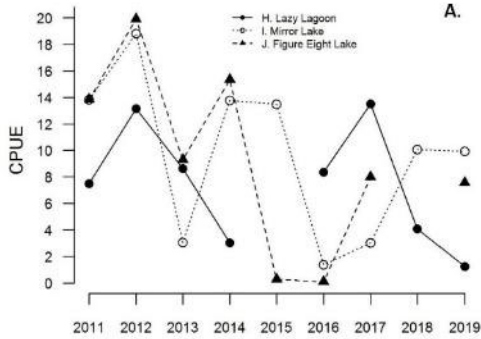
in Section VI with assistance from the other Signatories;

4. lead population monitoring and genetic assessments of Pecos Pupfish at all sites in New Mexico as described in the 2010 monitoring plan and determine actions needed to assure security of the populations;
5. with cooperation of other agencies, establish and maintain refuge populations of Pecos Pupfish to guard against stochastic events, such as fish kills resulting from golden alga blooms; and





# Pecos Pupfish Conservation Activities



- Annual monitoring
- Baitfish Rule and Fish Importation Rule
- Install new fish barriers in BLM wetlands
- Considering population restoration areas

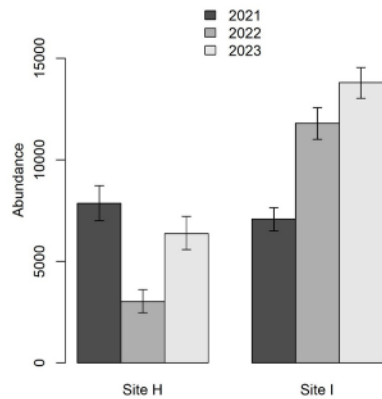


Figure 3. Pecos Pupfish abundance estimates and 95% confidence intervals from sites on the Bottomless Lakes State Park, NM from top N-mixture model for 2021–2023.





# Pecos Pupfish Research

LIFE HISTORY OF PECOS PUPFISH (*CYPRINODON PECOSENSIS*) IN BITTER LAKE NATIONAL WILDLIFE REFUGE, NM

Prepared by:

Michael A. Farrington and W. Howard Brandenburg

Division of Fishes, Museum of Southwestern Biology  
Department of Biology, University of New Mexico  
Albuquerque, New Mexico 87131

Under professional service contract#:  
99-516.75

## Life History

### FINAL REPORT

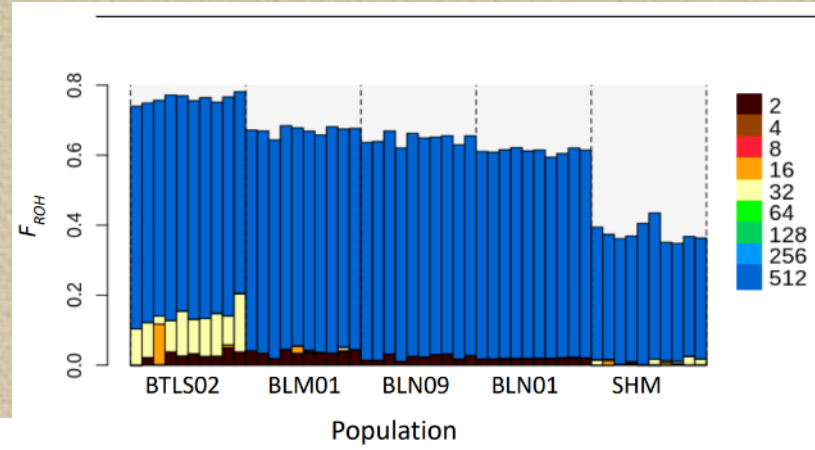
TO: New Mexico Department of Game and Fish, Santa Fe, New Mexico  
U. S. Bureau of Land Management, Las Cruces, New Mexico

TITLE: Genetic Status of Pecos Pupfish Populations in New Mexico

BY: Alice F. Echelle and Anthony A. Echelle  
Zoology Department  
Oklahoma State University  
Stillwater, Oklahoma 74078

DATE: 29 May 2007

## Hybridization



## Evidence of bottleneck events

Final Report

### ASSESSMENT OF MTDNA AND NUCLEAR DNA INTROGRESSION IN PECOS PUPFISH IN NEW MEXICO

Submitted by:

Evan W Carson  
University of New Mexico  
Department of Biology and Museum of Southwestern Biology  
Albuquerque, New Mexico

30 June 2015





# Rio Grande Chub and Sucker

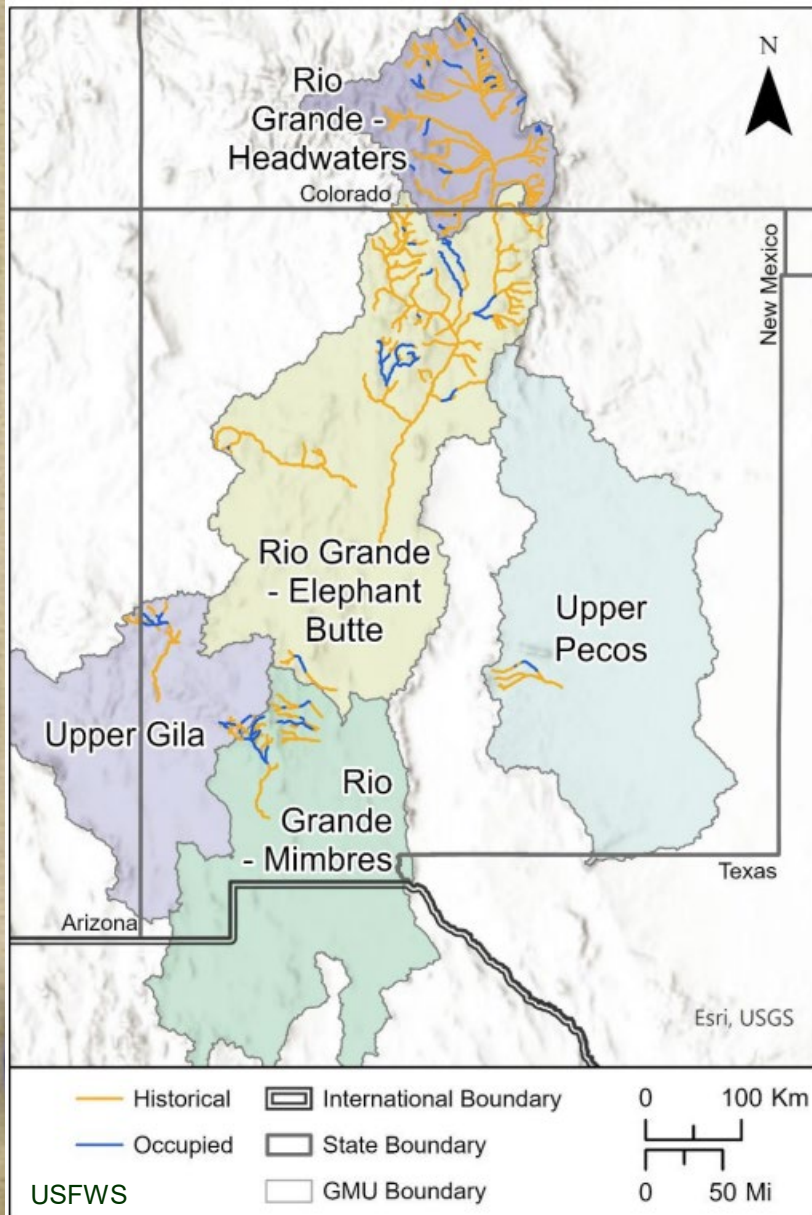


- SGCN – CWCS 2006
- ESA Petition – 2013/2014
- Conservation Agreement & Strategy - 2018
- ESA – Both Species Not Warranted - 2024

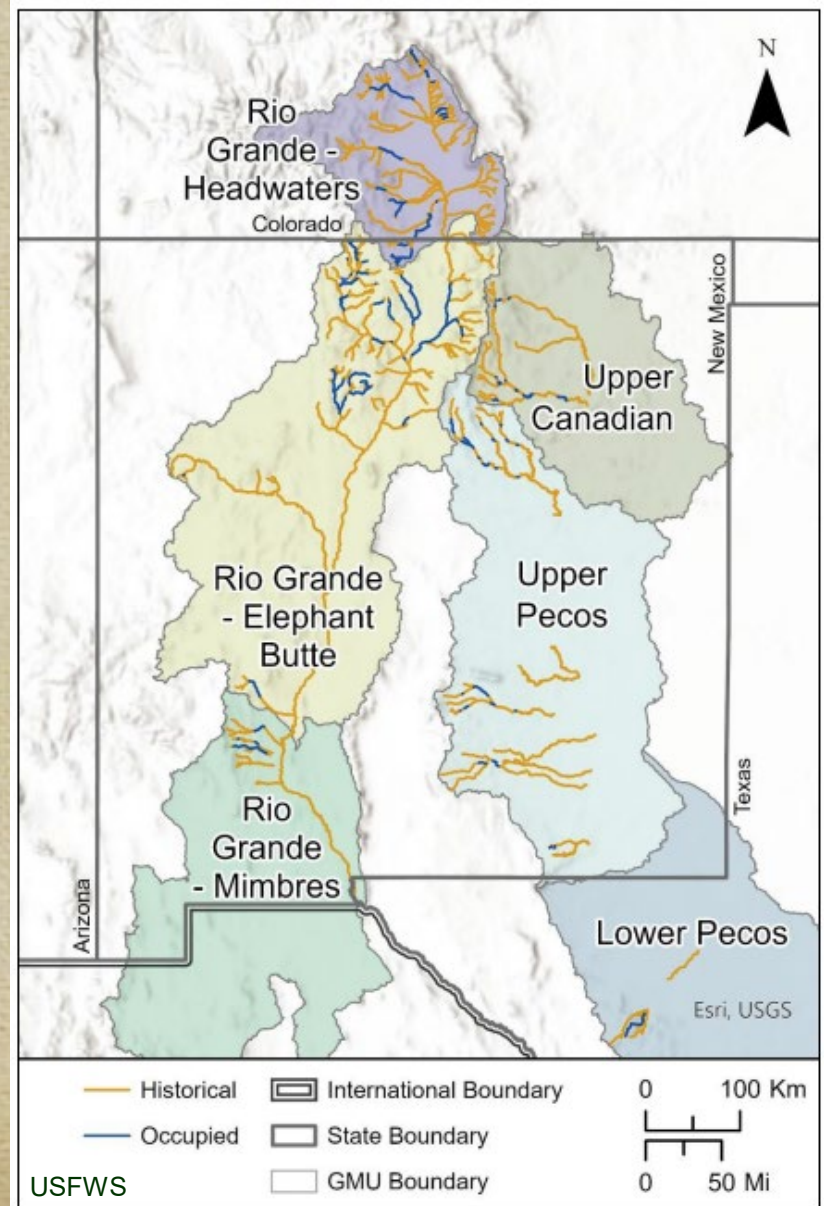




## Rio Grande Sucker



## Rio Grande Chub





# Conservation Agreement/Strategies

## CONSERVATION AGREEMENT

### FOR RIO GRANDE CHUB AND RIO GRANDE SUCKER



September 2018

## 1-Year Plan, 2021, Rio Grande Chub Conservation Strategy

Conservation Approaches		GMU					
		Rio Grande Hdws	Rio Grande-EB	Rio Grande-Mimbres	Upper Pecos	Lower Pecos	Upper Canadian
<b>Objective 1: Identify and characterize all RGC populations and occupied habitat</b>							
1.1	Population and habitat monitoring	Conduct surveys on Rio Grande and Crestone Creek Continue to look for previously undiscovered extant populations	Conduct surveys on Santa Fe River, Upper Rio Grande, Rio Chama	Conduct surveys on Palomas, Seco, and Las Animas Creeks	Monitor Rio Bonito population in BLM's restoration reach	Conduct survey on Little Aguja Creek	Conduct surveys on Sapello River
1.2	Characterize populations (e.g., size, distribution, genetic diversity)	Collect genetics samples in Rio de los Pinos, Rio San Antonio and other locations as appropriate	Surveys to determine current occupancy Analyze genetic samples from Fenton Lake	Determine occupancy on Palomas, Seco, and Las Animas Creeks	eDNA/e-fishing for presence: Rio Hondo, Rio Ruidoso, Eagle Creek, Agua Chiquita, Gallinas River	Survey to determine current occupancy Analyze genetic samples if state funds are available	Collect genetic samples: Sapello River, Cimarron River; determine if populations are aboriginal

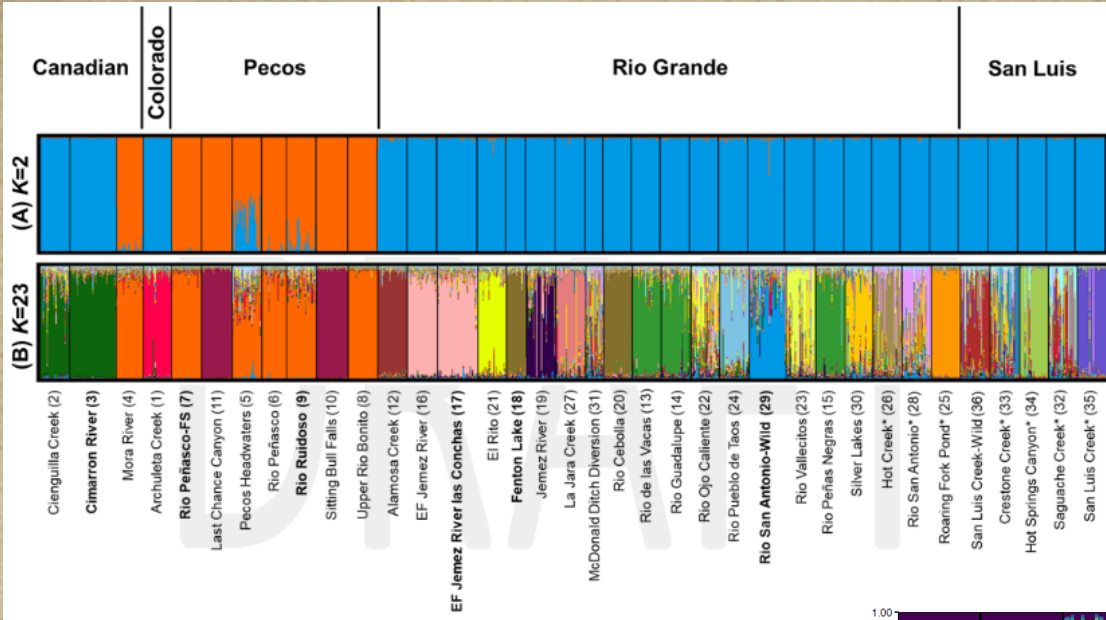
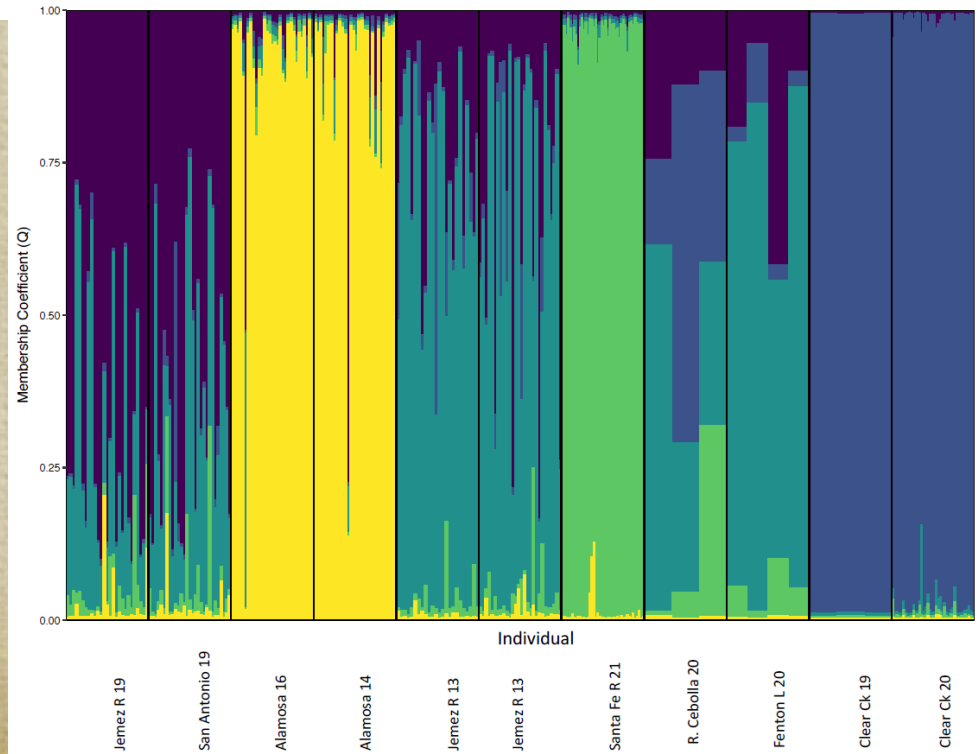
Conservation Approaches		GMU				
		Rio Grande Hdws	Rio Grande-EB	Rio Grande-Mimbres	Upper Gila	Upper Pecos
2.4	Restrict spread of disease and invasive species	Colorado Parks and Wildlife Commission Police D-9; CPW Regulations: Chapter 0, Article VII, #014 NMAC 19.30.14: Providing for the control and prevention of the spread of aquatic invasive species in New Mexico				
2.5	Regulate angling and baitfish enforcement	CPW Regulations: Chapter 1, Article II, #108 Special Regulation Waters NMAC 19.31.4.11: Daily bag, possession limits, and requirements or conditions; NMAC 19.31.10.14 Fishing				
<b>Objective 3: Restore RGS populations</b>						
3.1	Establish new RGS populations	Restore 1-2 populations Evaluate possible new habitats for native fish at Great Sand Dunes (including Sand Creek, Cold Creek, Big and Little Spring Creeks); McIntire Spring	Restore 3-5 populations (in particular replication of Alamosa Creek, Bluewater Creek, and other populations as identified)	Restore at least two populations (e.g., Gallinas Canyon, McKnight Creek, Percha Creek)	Restore at least one population (e.g., Stone Creek, if necessary)	Evaluate possible new habitats for replication of Rio Bonito population
3.2	Ensure genetic diversity is maintained within and among GMUs	Conduct genetic analysis on select populations, replicate populations with known genetic structure (e.g., Alamosa Creek)				







## Rio Grande Sucker Relatedness



## Rio Grande Chub Relatedness



EFFECTS OF HABITAT AND NONNATIVE FISHES ON THE PRESENCE AND RELATIVE ABUNDANCE OF RIO GRANDE CHUB AND RIO GRANDE SUCKER IN NEW MEXICO

Final Report

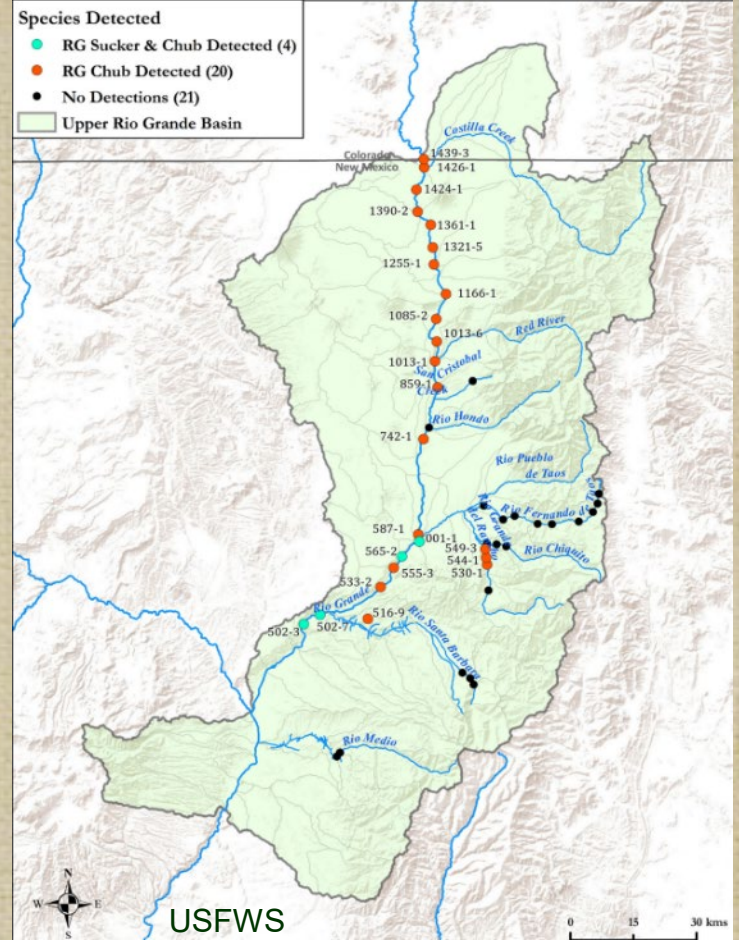


NEW MEXICO DEPARTMENT OF GAME AND FISH  
SHARE WITH WILDLIFE PROGRAM  
PROFESSIONAL SERVICES CONTRACT #22-516-0000-00039

STEPHANI L. CLARK BARKALOW, ANDREA D. URIOSTE, AND AARON C. WEDEMEYER

AMERICAN SOUTHWEST ICHTHYOLOGICAL RESEARCHERS, L.L.C.  
800 ENCINO PLACE NE, ALBUQUERQUE, NM 87102-2606

## eDNA Technology



Habitat and Fish  
Community Associations





# Habitat Restoration





# Fish Passage





# Species Restoration



Both Rio Grande Sucker and Chub reproduced in Costilla basin in 2024!





# Captive Rearing

ABQ BIOPARK

ONE  
ALBUQUE  
RQUE

ABQ BioPark Home

- > Zoo
- > Botanic Garden
- > Aquarium
- > Tingley Beach
- > BioPark Events
- > BioPark News

[HOME](#) > [ARTS & CULTURE](#) > [ABQ BIOPARK](#) > [CONSERVATION](#) > [AQUATIC CONSERVATION FACILITY](#)

## Aquatic Conservation Facility

Scientists are working behind-the-scenes to save species native to NM's rivers and streams.

### Species at the ACF include:

- Rio Grande Silvery Minnow
- Socorro Isopod
- Blue Sucker
- Gray Redhorse
- Zuni Bluehead Sucker

Working to expand rearing capacity to assist with Rio Grande Sucker and Rio Grande Chub



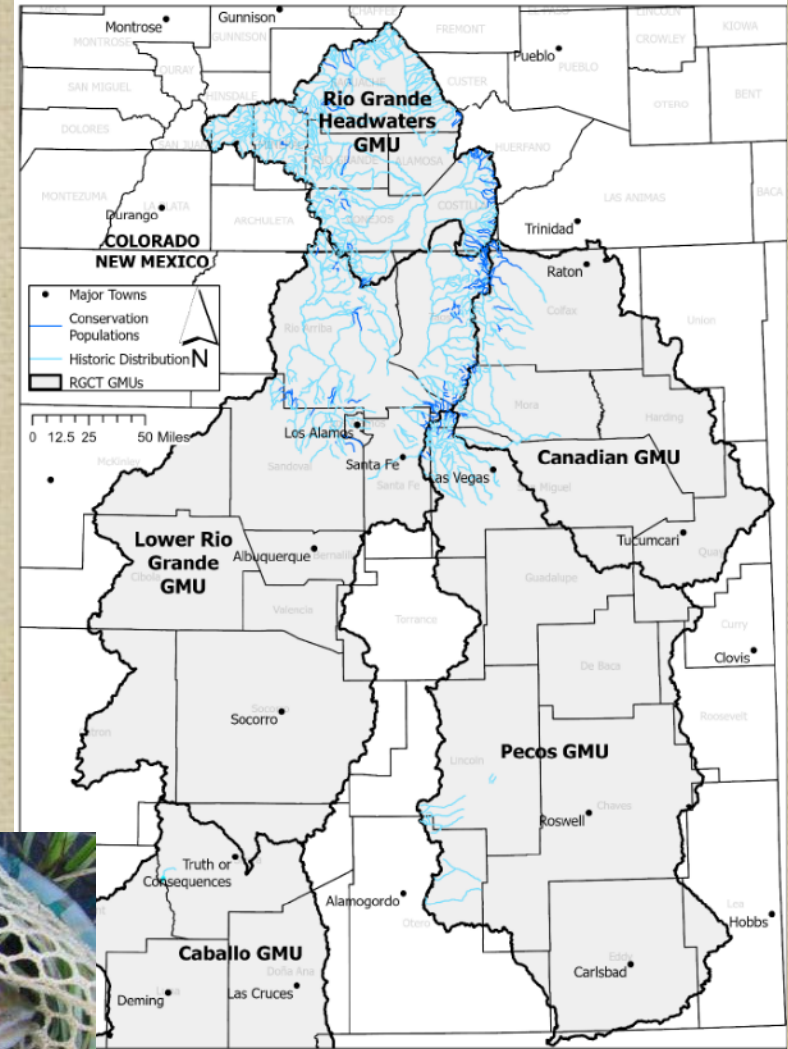


# Rio Grande Cutthroat Trout

- ESA Petition - 1998
- SGCN and non-SGCN
- Conservation Agreement – 2003, 2009, 2013, 2023
- Conservation Strategy – 2013, 2023
- ESA – Not Warranted - 2024

### III. CONSERVATION GOALS AND OBJECTIVES

*This Conservation Strategy's goal is to develop and implement the necessary conservation measures for the Rio Grande cutthroat trout to have sufficient resiliency, representation, and redundancy to provide for long-term viability.*





# Conservation Strategies

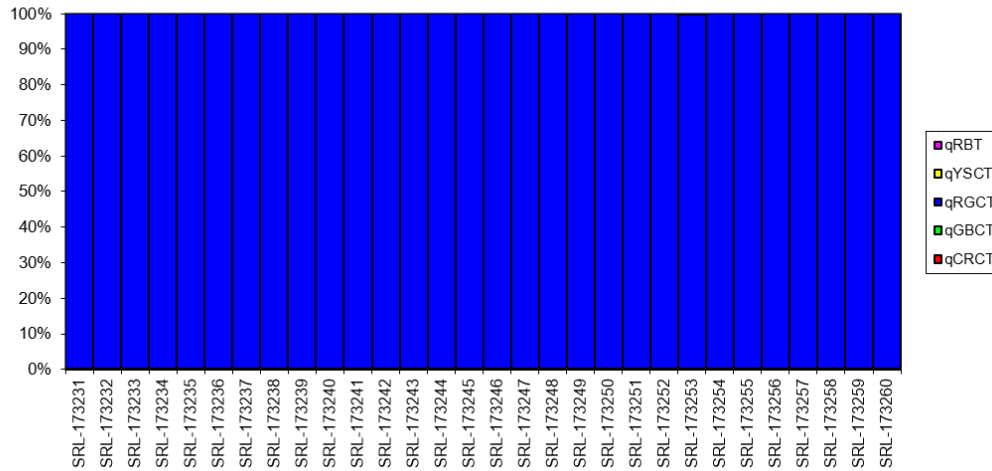
Conservation Actions		GMU				
		Rio Grande Hdws.	Lower Rio Grande	Pecos	Canadian	Caballo
2.5	Constructing in-channel barriers	Improve or install barriers to facilitate possible restoration projects				
2.6	Maintaining sources of genetically pure RGCT	Maintain genetic purity of broodstocks	Continue field and hatchery spawn operations	Continue field and hatchery spawn operations	Conduct field spawn operations as needed	
<b>Objective 3: Restore RGCT Populations</b>						
3.1	Establishing and/or maintaining RGCT populations (Table 4)	Restore 3-5 conservation populations	Restore 3-5 conservation populations	Restore 1-3 conservation populations	Restore 1-3 conservation populations	Restore conservation population as needed
3.2	Conduct genetic analysis on selected populations, continued use of triploid rainbow trout statewide in NM, broodstock developed to maintain basin-scale lineages					
<b>Objective 4: Secure and enhance watershed conditions</b>						
4.1	Enhancing and protecting instream and riparian habitat	Habitat enhancement on up to 5 miles of RGCT stream, continue culvert & barrier assessments, repairs, and replacements	Habitat enhancement on 5 miles of RGCT stream; 20 acres of watershed/riparian protection	Habitat enhancement on 5 miles of RGCT stream; 20 acres of watershed/riparian protection		





# Population Monitoring

SF Rio la Casa Individual Sample Admixture Proportions



## New Mexico - RGCT

Number of conservation populations  
 Current distribution (km)  
 Historic distribution (km)  
 Percent of historic distribution  
 Mean patch length (km)  
 Lake area occupied (km<sup>2</sup>)

2006	2022	% Change
84	85	+ 1.1
638	760	+ 16.1
5,521	5,527	+ 0.1
11.6	13.8	+ 15.9
7.6	8.9	+ 14.6
0.18	1.50	+ 88.0





# Habitat Restoration





# Fish Barriers



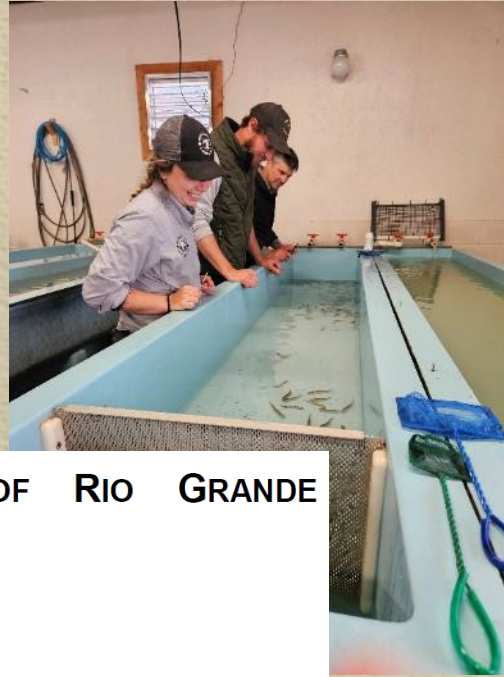


# Fire Response(s)





# Captive Rearing and Broodstock



## CONSERVATION GENETIC STATUS OF RIO GRANDE CUTTHROAT TROUT COMPOSITE BROOD

Final report for New Mexico Department of Game and Fish  
August 21, 2023

Prepared by: Ryan Kovach – Confluentus Consulting, LLC





# Rio Grande Cutthroat Trout Research

Conserv Genet  
DOI 10.1007/s10592-008-9652-8

RESEARCH ARTICLE

## Population structure and genetic management of Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*)

V. L. Pritchard · J. L. Metcalf · K. Jones ·  
A. P. Martin · D. E. Cowley

Molecular Ecology Notes (2007)

doi: 10.1111/j.1471-8286.2007.01695.x

PRIMER NOTE

## Characterization of tetranucleotide microsatellites for Rio Grande cutthroat trout and rainbow trout, and their cross-amplification in other cutthroat trout subspecies

V. L. PRITCHARD,\*K. JONES,†J. L. METCALF,‡A. P. MARTIN,‡P. WILKINSON§and D. E. COWLEY\*  
\*Department of Fishery & Wildlife Sciences, New Mexico State University, Las Cruces, NM 88003, USA, †Genetic Identification Services, Chatsworth, CA 91311, USA, ‡Department of Ecology and Evolutionary Biology, N122 Ramaley, University of Colorado, Boulder, CO 80309, USA, §New Mexico Department of Game and Fish, PO Box 25112, Santa Fe, NM 87504, USA

Conserv Genet (2007) 8:1311–1329  
DOI 10.1007/s10592-006-9280-0

ORIGINAL ARTICLE


## Estimation of introgression in cutthroat trout populations using microsatellites

Victoria L. Pritchard · Ken Jones · David E. Cowley

## Streamwide Evaluation of Survival and Reproduction of $M_{YY}$ and Wild Brook Trout Populations

**Benjamin A. W. Armstrong\***

Department of Fish, Wildlife, and Conservation Ecology, New Mexico State University, 2980 South Espina Street, Las Cruces, New Mexico 88003, USA

**Colleen A. Caldwell** 

U.S. Geological Survey, New Mexico Cooperative Fish and Wildlife Research Unit, 2980 South Espina Street, Las Cruces, New Mexico 88003, USA

**Michael E. Ruhl**

New Mexico Department of Game and Fish, 1 Wildlife Way, Santa Fe, New Mexico 87507, USA

*Trans Am Fish Soc.* 2018 May ; 147(3): 480–496. doi:10.1002/tafs.10051.

## Effects of Temperature and Spatial Scale on Rio Grande Cutthroat Trout Growth and Abundance

**Brock M. Huntsman**<sup>a</sup>, **Roy W. Martin**<sup>b</sup>, and **Kirk Patten**<sup>c</sup>

<sup>a</sup>Department of Fish, Wildlife and Conservation Ecology, New Mexico State University, Las Cruces, NM 88003, U.S.A.

<sup>b</sup>USEPA Office of Research and Development, Cincinnati, OH 45268 U.S.A.

<sup>c</sup>New Mexico Department of Game and Fish, Fisheries Management Division, Santa Fe, NM 87507, U.S.A.

*North American Journal of Fisheries Management* 39:819–848, 2019  
© 2019 American Fisheries Society  
ISSN: 0275-9947 print / 1548-8675 online  
DOI: 10.1002/nafm.10320

FEATURED PAPER

## Predicting Persistence of Rio Grande Cutthroat Trout Populations in an Uncertain Future

**Matthew P. Zeigler**

New Mexico Department of Game and Fish, Fisheries Management Division, 1 Wildlife Way, Santa Fe, New Mexico 87507, USA



# Species Status

- Pecos Pupfish – Proposed Threatened w/ CH\* – 2024
- RG Sucker – Not Warranted – 2024
- RG Chub – Not Warranted – 2024
- RG Cutthroat – Not Warranted – 2024





# Questions

