2012 - 2013 Highlights

Upper Colorado River Endangered Fish Recovery Program

San Juan River Basin Recovery Implementation Program

Upper Colorado River Endangered Fish Recovery Program *and* San Juan River Basin Recovery Implementation Program

Implementing Innovative Solutions to Manage Water and Hydropower Resources While Recovering Endangered Species

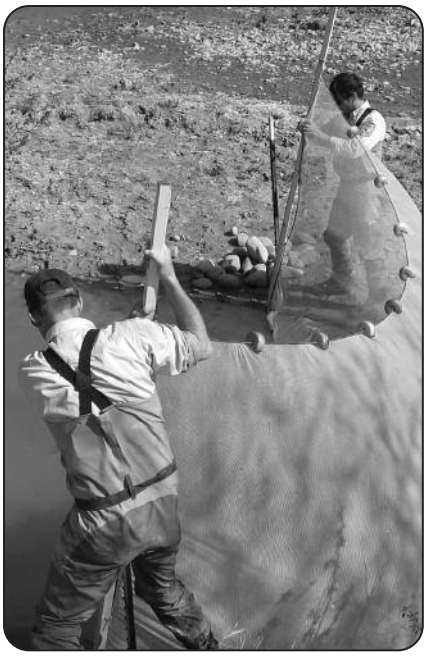
Highlights 2012-2013

The Upper Colorado River Endangered Fish Recovery Program and the San Juan River Basin Recovery Implementation Program are using innovative, cost-effective measures to recover four species of endangered Colorado River fishes. At the same time, water and hydropower resources are being managed within state and federal laws and tribal rights to meet the needs of people in growing western communities.

Program partners represent state and federal agencies, water and environmental organizations, power customers, and American Indian tribes. These diverse interests continue to demonstrate that working cooperatively produces far greater results than independent efforts.

The recovery programs provide Endangered Species Act compliance for 2,354 federal, tribal, and non-federal water projects. The programs use adaptive management to evaluate and revise management actions as new information becomes available.

***Highlights** is produced annually to summarize the recovery programs' progress toward recovery of the endangered fishes. This document is not a publication of the U.S. Department of the Interior or its agencies. All uncredited photographs are courtesy of the recovery programs.*



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Reaching Out to Local Communities

The recovery programs work proactively to ensure the public is informed about endangered fish recovery actions. Information is provided through the news media, public meetings, interpretive exhibits, water festivals and other events, newsletters, fact sheets, and web sites.

Jeremy Wade Shockley, The Southern Ute Drum

Tribal students in southwest Colorado feed endangered Colorado pikeminnow in their classroom aquarium. The students also learn about ecosystems and water resources and develop a conservation ethic.

Linda Du, Mesa State University

Students react to seeing an endangered razorback sucker up close and personal at a Children's Water Festival held annually in western Colorado. They also learn the differences between native and nonnative fishes.

The recovery programs provide education at special events such as the annual Four Corners River Health Workshop held in Farmington, New Mexico. Workshop attendees participate in a tour along the Animas River in southwest Colorado.

Partners' Long-Term Commitment, Collaboration, and Active Participation Key to Recovery Programs' Success

The Upper Colorado River Endangered Fish Recovery and San Juan River Basin Recovery Implementation Programs have a broad range of partners that includes state and federal agencies, water development interests, power customers, American Indian tribes, and environmental organizations. Partners have made long-term commitments to set aside individual interests and work collaboratively to create innovative solutions, helping to achieve the recovery programs' goals of species recovery while water development occurs.

U.S. Department of the Interior
COOPERATIVE CONSERVATION AWARD
2008 RECIPIENTS

Upper Colorado River Endangered Fish Recovery Program

State of Colorado
State of Utah
State of Wyoming
Bureau of Reclamation
Colorado River Energy Distributors Association
Colorado Water Congress
National Park Service
The Nature Conservancy
U.S. Fish and Wildlife Service
Utah Water Users Association
Western Area Power Administration
Western Resource Advocates
Wyoming Water Association

San Juan River Basin Recovery Implementation Program

State of Colorado
State of New Mexico
Jicarilla Apache Nation
Navajo Nation
Southern Ute Indian Tribe
Ute Mountain Ute Tribe
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
The Nature Conservancy
U.S. Fish and Wildlife Service
Water Development Interests

The Upper Colorado River Endangered Fish Recovery Program is recovering humpback chub, bonytail, Colorado pikeminnow, and razorback sucker in the Colorado River and its tributaries in Colorado, Utah, and Wyoming. The Recovery Program was initiated in 1988 with the signing of a cooperative agreement by the Governors of Colorado, Utah, and Wyoming; the Secretary of the Interior; and the Administrator of Western Area Power Administration. The cooperative agreement was extended through September 30, 2023.

The San Juan River Basin Recovery Implementation Program is recovering Colorado pikeminnow and razorback sucker in the San Juan River and its tributaries in Colorado, New Mexico, and Utah. The Recovery Program was established in 1992 with the signing of a cooperative agreement by the Governors of Colorado and New Mexico; the Secretary of the Interior; the Southern Ute Indian Tribe, the Ute Mountain Ute Tribe, and the Jicarilla Apache Nation. The cooperative agreement was extended through September 30, 2023.

State, Tribal, and Federal Leaders Endorse Recovery Program Accomplishments

State, tribal, and federal leaders have supported the recovery programs for their cost-effective and collaborative on-the-ground achievements. They recognize the challenges of meeting the water development and management needs of western communities, while working toward conservation of endangered fish species. The programs are models of successful endangered species recovery efforts.

State Leaders Value Endangered Fish Recovery Programs' Accomplishments:

"The endangered fish recovery programs are models of collaborative, grassroots efforts that leverage cooperation from numerous stakeholders to ensure these remarkable ancient fish continue to swim in the Colorado River System. The programs support millions of people who depend on the river's water to grow food, generate electricity, and serve the needs of cities and towns."

John W. Hickenlooper, Governor, State of Colorado

"The State of New Mexico has a vested interest in the successful outcome of these programs. New Mexico is highly reliant upon continued use of the waters of the San Juan River system for continued economic growth in the state … for power generation, for agricultural purposes, and for municipal and industrial uses …"

Susana Martinez, Governor, State of New Mexico

"The success of the Upper Colorado River and San Juan River Endangered Species Recovery Programs is vital for Utah's continued use and development of Utah's Colorado River apportionment as part of our state's continued progress in providing for the needs of the citizens of Utah."

Gary R. Herbert, Governor, State of Utah

"Wyoming has been an active participant in the Recovery Program, ensuring the recovery of four endangered fish species while allowing for the development of the Compact appropriations. It is imperative that the Recovery Program remains viable and continues to provide reasonable and practical alternatives to assure ESA compliance."

Matthew H. Mead, Governor, State of Wyoming

Tribal Leaders Stress Recovery Programs' Contributions:

"Jicarilla Apache Nation has been a participant in the San Juan River Basin Recovery Implementation Program since its inception in 1992 … The continuation of the Program is of the utmost importance to the Nation and the economic viability of the region."

Levi Pesata, President, Jicarilla Apache Nation

"The Navajo Nation is an active participant in, and strong supporter of, the San Juan River Basin Recovery Implementation Program … These two successful, ongoing cooperative partnership programs involve the States of Colorado, New Mexico, Utah and Wyoming, Indian tribes, federal agencies and water, power, and environmental interests …"

Ben Shelly, President, The Navajo Nation

The Department of the Interior Recognizes the Recovery Programs' Benefits:

"The Upper Colorado program has become a national model for recovering endangered species while addressing the demand for water development to support growing western communities."

Secretary of the Interior Gale Norton, 2005

"These outstanding partnerships and cooperative efforts represent a fundamental way in which our Department provides stewardship for America with integrity and excellence."

Secretary of the Interior Dirk Kempthorne, 2008

"As we chart the future, we can turn around and go back to the ways of river management of the past, where it was too often every state for itself … or we can continue to move forward together down the road of long-term, cooperative river management ... to find creative solutions to tough problems."

Secretary of the Interior Ken Salazar, 2010

"Our recovery programs in the Colorado River are wonderful examples of successful partnerships … These restoration projects also benefit local economies, and they create jobs."

Anne Castle, Assistant Secretary for Water and Science, 2011

"In the Upper Colorado River Program, much progress has also been made … in protecting the endangered fish in the Upper Colorado River through significant habitat improvements."

Secretary of the Interior Ken Salazar, 2012

Endangered Species Act Compliance Streamlined for Water and Hydropower Projects

The Upper Colorado River and San Juan River Basin recovery programs respond to the challenge of water management by working with local, state, federal, and tribal agencies to meet the needs of people and endangered fish. The programs' goal is to achieve full recovery (delisting) of the endangered fishes, not just to avoid jeopardy (offset impacts of water project depletions) under the Endangered Species Act (ESA). The recovery programs provide ESA compliance for water development and management activities for federal, tribal, and non-federal water users. This includes Bureau of Reclamation-operated dams and projects across the Upper Colorado River Basin. Responsibilities to offset water project depletion impacts do not fall on individual projects or their proponents.

The recovery programs currently provide ESA compliance for 2,354 water projects depleting more than 3.7 million acre-feet per year. No lawsuits have been filed on ESA compliance for any of these water projects.

Upper Colorado River Endangered Fish Recovery Program
Summary of Endangered Species Act Section 7 Consultations
1/1988 through 12/31/2012

		Historical Depletions	New Depletions	Total
State	Number of Projects	Acre-Feet/Yr	Acre-Feet/Yr	Acre-Feet/Yr
Colorado	1176	1,915,682	206,458	2,122,140
Utah	228	517,670	95,757	613,426
Wyoming	383	83,498	35,635	119,134
CO/UT/WY	238*			
Total	**2,025**	**2,516,850**	**337,850**	**2,854,700**

*Small depletion projects (<100 acre-feet per year) consulted on between July 3, 1994, and October 1, 1997, when the Recovery Program did not track the number of these projects by state. Depletion totals associated with these 238 projects are captured by state under new depletions.

San Juan River Basin Recovery Implementation Program
Summary of Endangered Species Act Section 7 Consultations
1/1992 through 12/31/2012

State	Number of Consultations	Depletions Acre-Feet/Yr
New Mexico	21	653,753
Colorado	293	217,797
Utah	15	9,311
Total	**329**	**880,861**

The Programs Rely on Recovery Goals to Guide Management Actions and Measure Success

The overall goal for recovery of the four endangered fishes is to achieve naturally self-sustaining populations and protect the habitat on which those populations depend. Specific, basin-wide recovery goals for Colorado pikeminnow, bonytail, razorback sucker and humpback chub were approved by the U.S. Fish and Wildlife Service on August 1, 2002, and are currently in revision to incorporate new information. The Upper Colorado and San Juan recovery programs implement actions to achieve the recovery goals in the Upper Colorado River Basin.

The recovery goals describe conditions necessary for downlisting to threatened status and ultimately delisting each of the fish species by:

1) Identifying site-specific management actions* necessary to minimize or remove threats;

2) Establishing objective, measurable criteria that consider demographic and genetic needs for naturally self-sustaining, viable populations (Box 1);

3) Providing estimates of the time to achieve recovery.

Box 1. DEMOGRAPHIC CRITERIA FOR RECOVERY

DOWNLISTING	DELISTING
Colorado pikeminnow	
Over a 5-year monitoring period: •Maintain the Upper Basin metapopulation •Maintain populations in the Green River and Upper Colorado River sub-basins ("no net loss") •Green River sub-basin population >2,600 adults •Upper Colorado River sub-basin population >700 adults •Establish 1,000 age 5+ subadults in the San Juan River	**For 7 years beyond downlisting:** •Maintain the Upper Basin metapopulation •Maintain populations in the Green River and Upper Colorado River sub-basins ("no net loss") •Green River sub-basin population >2,600 adults •Upper Colorado River sub-basin population >1,000 adults OR Upper Colorado River sub-basin population >700 adults and San Juan River population >800 adults
Bonytail	
Over a 5-year monitoring period: •Maintain reestablished populations in the Green River and Upper Colorado River sub-basins, each >4,400 adults •Maintain established genetic refuge of adults in Lower Basin •Maintain two reestablished populations in the Lower Basin, each >4,400 adults	**For 3 years beyond downlisting:** •Maintain populations in the Green River and Upper Colorado River sub-basins, each >4,400 adults •Maintain genetic refuge of adults in Lower Basin •Maintain two populations in the Lower Basin, each >4,400 adults
Razorback sucker	
Over a 5-year monitoring period: •Maintain reestablished populations in Green River sub-basin and EITHER in Upper Colorado River sub-basin or San Juan River, each >5,800 adults •Maintain established genetic refuge of adults in Lake Mohave •Maintain two reestablished populations in Lower Basin, each >5,800 adults	**For 3 years beyond downlisting:** •Maintain established populations in Green River sub-basin and EITHER in Upper Colorado River sub-basin or San Juan River, each >5,800 adults •Maintain genetic refuge of adults in Lake Mohave •Maintain two populations in Lower Basin, each >5,800 adults
Humpback chub	
Over a 5-year monitoring period: •Maintain the six populations ("no net loss") •One core population in Upper Basin > 2,100 adults •One core population in Lower Basin > 2,100 adults	**For 3 years beyond downlisting:** •Maintain the six populations ("no net loss") •Two core populations in Upper Basin > 2,100 adults •One core population in Lower Basin > 2,100 adults

***Habitat Management:** Identify and provide adequate instream flows; **Habitat Restoration:** Restore and maintain habitat; **Nonnative Fish and Sportfishing:** Reduce the threat of certain nonnative fish species while maintaining sportfishing opportunities; **Endangered Fish Propagation and Stocking:** Produce genetically diverse fish in hatcheries and stock them in the river systems; and, **Research, Monitoring, and Data Management:** Provide data on life-history requirements of the endangered fishes, and monitor progress toward recovery.

Recovery Progress Report

The overall goal of the recovery programs is to remove the four Colorado River fishes from Endangered Species Act (ESA) protection (delist) by 2023. For Colorado pikeminnow, recovery can occur solely in the Upper Basin; concurrent efforts in the Lower Basin will be required to recover the other three species. Below is a brief description of each species' life history, major recovery accomplishments to date, and significant challenges that remain.

Colorado pikeminnow: Life history – long-lived (40-50 years); largest minnow in North America; top native predator in system; adults migrate hundreds of miles to discrete spawning areas. **Major accomplishments** – flows are managed in all Upper Basin rivers to benefit all life stages; fish passage provided at all major migration barriers; species is self-sustaining (not stocked) in Green and Colorado rivers and successful reintroduction programs are occurring in the San Juan River; management of nonnative competitors has been underway for more than 10 years. **Remaining challenges** – In 2012, the Colorado Pikeminnow Recovery Team was convened to review new information (documented exchange of adults between the Green and Colorado rivers, survival rates, and threat removal actions) as it pertains to Recovery Plan revisions. The team's preliminary assessment indicates that persistent low numbers of adult Colorado pikeminnow in the Yampa River may be caused by unacceptable densities of nonnative predators. More effective management of nonnative fishes must occur before a change in status. ***The overall goal of the programs is to downlist the species from endangered to threatened status by 2018.***

Humpback chub: Life history – completes life cycle in short stretches of canyon-bound habitat. **Major accomplishments** – flows are managed to benefit most populations; significant nonnative fish management actions benefit populations in Green River sub-basin and Grand Canyon. Grand Canyon population greatly exceeds current demographic criteria. **Remaining challenges** – further study needed to understand declines in Upper Basin populations that occurred in the early 2000s; secure humpback chub from Black Rocks and Westwater populations into hatcheries. The Recovery Team is scheduled to reconvene in 2014 to evaluate the latest information and update / revise the Recovery Plan. ***The overall goal of the programs is to downlist the species by 2020.***

Razorback sucker: Life history – discrete spawning areas have been documented; spawning occurs prior to spring peak flow – larvae utilize floodplain as nursery areas. **Major accomplishments** – recent advances in flow management to benefit larval survival; successful reintroduction programs (e.g., hatchery fish are spawning in the wild) throughout the Upper Basin. A small, but self-sustaining population occurs in Lake Mead. Recent discoveries of razorback sucker in Lake Powell indicate investigations may be warranted. **Remaining challenges** – continue all ongoing actions; all indications suggest both programs are on track to recovery. ***The overall goal of the programs is to downlist the species by 2020.***

Bonytail: Life history – functionally eliminated from the Colorado River before programs began; displays more affinity to floodplain habitats than other native chub species. **Major accomplishments** – the Upper Colorado Program continues to refine hatchery techniques and stocking practices to improve reintroduction success. In recent years, deployment of remote sensing devices (stationary tag readers) is producing encouraging recapture information. Lower Basin researchers continue to stock in predator free, low velocity habitats. **Remaining challenges** – continue to experiment with stocking practices and continue all other recovery actions. ***The overall goal of the programs is to downlist the species by 2020.***

Status of Endangered Fishes

The recovery programs monitor reproduction, growth, survival, and abundance of endangered fishes in the wild. Results are used to track progress toward achieving recovery goals and to assess the effectiveness of management actions.

The core of the U.S. Fish and Wildlife Service's (USFWS) recovery goals for each species is achieving a sufficient number and size of self-sustaining populations that will persist. This means that wild and re-introduced adults must survive and reproduce. Recruitment of young fish into the adult population must then maintain the minimum population level (demographic criteria) identified in the recovery goals *(see page 6)*.

COLORADO PIKEMINNOW *(Ptychocheilus lucius)*

Upper Colorado Program

◆ Wild Colorado pikeminnow populations occur in the Green and Colorado river sub-basins of the Upper Colorado River.

- The population in the Green River is the largest *(Figure 1)*. The USFWS is re-evaluating recent survival estimates to determine the appropriate numbers of adults needed to downlist. The population in the Colorado River sub-basin is smaller *(Figure 2)*, but appears to be more stable. Several individuals have moved between these two populations indicating more crossover than previously thought.

- Researchers caution that adult numbers in both populations will fluctuate due to natural population dynamics. Preliminary results from recent estimates indicate the Green River population is trending downward. This decline may be due to competition and predation by nonnative fishes.

◆ Young of the year (age-0) Colorado pikeminnow are monitored every fall in two reaches of the Green River and one in the Colorado River.

- Catch of age-0 in the lower reach of the Green River has been variable, with strong year classes seen in 2000, 2007, and 2009. In 2012, catch of age-0 Colorado pikeminnow was moderate *(Figure 3)*.

San Juan Program

◆ Researchers are reestablishing a population of Colorado pikeminnow in the San Juan River. Stocking efforts have been very successful.

- Annual stocking targets for age-0 and juvenile Colorado pikeminnow have been met or exceeded over the last five years.

Figure 1

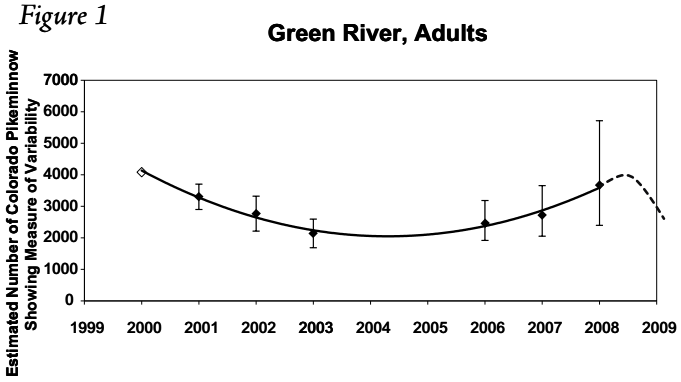


Figure 2

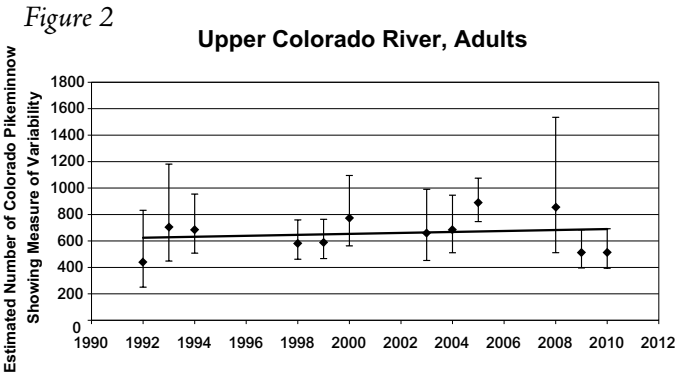
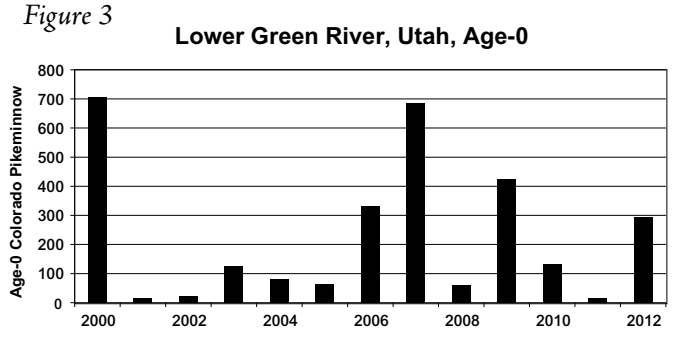


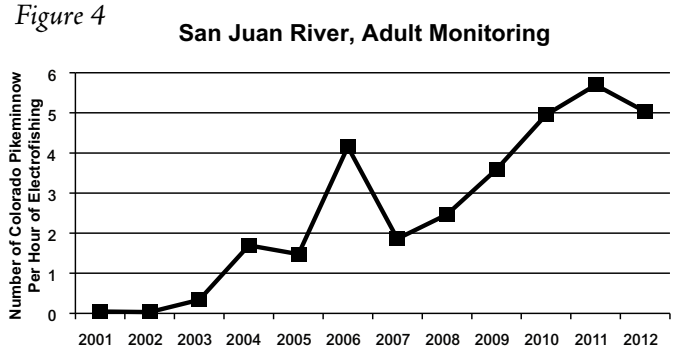
Figure 3



✦ Colorado pikeminnow larvae have been detected infrequently in low numbers since 1993, with a record number of 29 larvae collected in 2011.

✦ Catch rates of stocked juvenile and adult Colorado pikeminnow have increased since the late 1990s, indicating that stocked fish are persisting in the San Juan River *(Figure 4)*.

Figure 4



✦ In recent years, Colorado pikeminnow have been found as far as 20 miles upstream in the McElmo Creek drainage, a tributary of the San Juan River near the Four Corners Region in southwestern Colorado.

Utah Division of Wildlife Resources Technicians Jake Johnson (left) and Rose Fedelleck hold a Colorado pikeminnow captured in the Green River during its annual spring migration.

BONYTAIL *(Gila elegans)*

Upper Colorado Program

◆ Stocking continues to reestablish populations in the Upper Colorado River Basin. When the Upper Colorado Program was established, bonytail had essentially disappeared and little was known about its habitat requirements. Research and monitoring of stocked fish to determine life history needs is key to bonytail recovery.

✦ Survival of stocked bonytail appears to be low. Stocking bonytail at warmer temperatures, i.e., during the late spring or summer months, is thought to give them a better chance to survive after stocking.

Bureau of Reclamation Biologist Dave Speas holds a recaptured bonytail collected in Lodore Canyon of the Green River in September 2012. This fish was stocked downstream at the confluence with the Yampa River.

✦ All stocked fish receive an internal microchip tag before being released in the wild. Since 2009, increasing numbers of bonytail have been detected at locations throughout the Upper Colorado River Basin where stationary tag-reading antennas are used.

Upper Colorado Program's Performance to Meet Annual Bonytail Stocking Goals (%)

	Green River		Colorado River
	Middle	Lower	
2008	143	100	111
2009	101	100	95
2010	53[1]	100	46[1]
2011[2]	255	147	161
2012	53[3]	51[3]	102

Shaded cells indicate years when the stocking goal was not met (i.e., <100%).

[1] Approximately half of these bonytail scheduled for stocking in 2010 were held in the hatchery to ensure they were disease-free. The fish were cleared for release in 2011.

[2] Percentages in 2011 are considerably higher as a result of the fish held over from 2010.

[3] Half of these fish were under 12 inches total length and were transferred to Ouray National Fish Hatchery – Randlett Unit, for an overwinter study and will be stocked in the spring of 2013.

◆ When the recovery programs were established, wild razorback sucker had diminished to a few hundred adults in the Green River system and the species was considered lost from the Upper Colorado and San Juan rivers. Hatchery-produced fish are being stocked to re-establish the species in the wild and preferred habitat is being restored and provided through flow management, floodplain protection, and nonnative fish management and control actions.

Programs' Performance to Meet Annual Razorback Sucker Stocking Goals (%)

	Green River		Colorado/Gunnison Rivers	San Juan River
	Middle	Lower		
2008	118	102	130	39[1]
2009	151	51[2]	181	74[3]
2010	110	101	100	250
2011	91	126	121	165
2012	113	103	126	118

Shaded cells indicate years when stocking goal was not met (i.e., <100%).
[1]A portion of these fish were held over at Uvalde National Fish Hatchery to determine if survival could be improved by stocking larger fish in 2009 and 2010.
[2]Permit not in place for Ouray National Fish Hatchery-Grand Valley Unit to stock at Green River, Utah; therefore, fish were stocked into Colorado and Gunnison rivers.
[3]4,021 razorback sucker from this year class were held in the hatchery and stocked in 2010 to experiment with alternative stocking seasons.

- The recovery programs are revising stocking strategies to incorporate recent stocked fish survival information. New data indicates that fall is the best time to stock and that fish should be at least 12 inches in length.

- Fish stocked in the Green, Colorado, and San Juan rivers are recaptured in reproductive condition and often in spawning groups. Captures of larvae in the Green (*Figure 5*), Gunnison, Colorado, and San Juan (*Figure 6*) rivers confirm that reproduction is occurring.

Figure 5

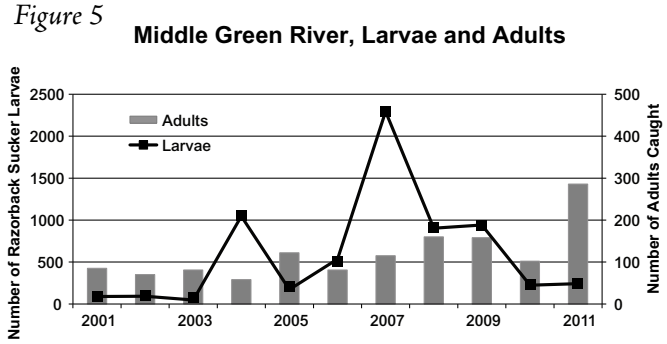
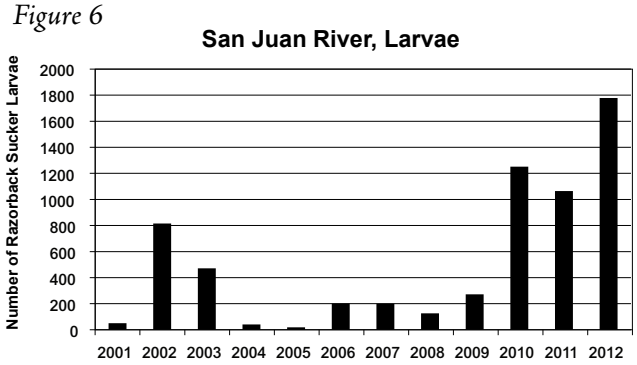


Figure 6



- In 2012, tag-reading antennas were placed on a spawning bar in the middle Green River near Dinosaur National Monument in northeast Utah. A total of 52 unique razorback sucker stocked between 2004 and 2010 were detected. Many of those (88 percent) had not been seen since stocking.

- Some wild-produced larvae are surviving through their first summer; an important step toward recovery.

- The Bureau of Reclamation is experimenting with the timing of spring releases from Flaming Gorge Dam to connect floodplain habitats – important nursery habitat for larval razorback sucker.

- Razorback sucker stocked in the San Juan River have moved into Lake Powell after passing over a waterfall that exists at the interface between the river and lake during low lake levels. The presence of larval and adult life stages suggest razorback sucker are reproducing in the lake.

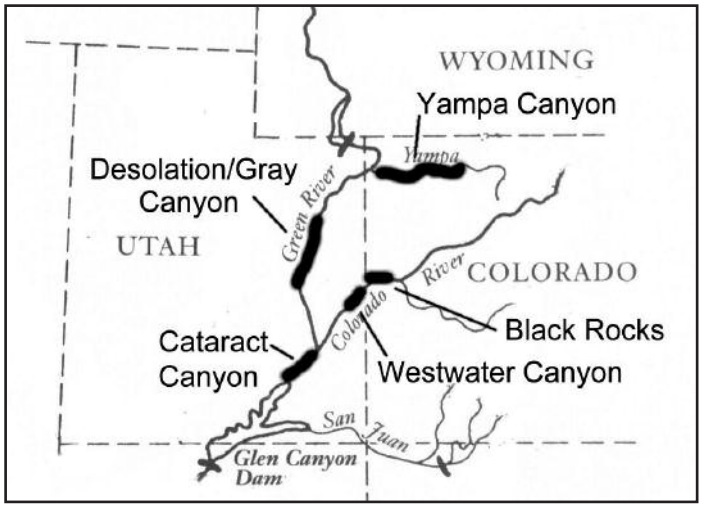
A waterfall formed at the confluence of the San Juan River and Lake Powell in 2003, preventing fish from moving upriver from the lake. During a brief period in July 2011, high lake levels inundated the waterfall. Subsequently, four razorback sucker tagged in Lake Powell were captured 180 miles upstream in the San Juan River. After the lake level receded in 2012, the waterfall reappeared as a barrier to upstream fish movement.

Razorback sucker raised in Navajo Agricultural Products Industry grow-out ponds are removed to stock into the San Juan River.

U.S. Fish and Wildlife Service Biologist Ernie Teller holds a razorback sucker captured in the San Juan River.

HUMPBACK CHUB *(Gila cypha)*

◆ Five wild populations inhabit canyon-bound sections of the Colorado, Green, and Yampa rivers. Downward trends in some populations (particularly Yampa Canyon and in Desolation Canyon of the Green River) have been attributed to increased nonnative fish abundance and habitat changes associated with dry weather and low river flows. Individuals from both populations have been brought into the hatchery system to ensure that genetic diversity is preserved.

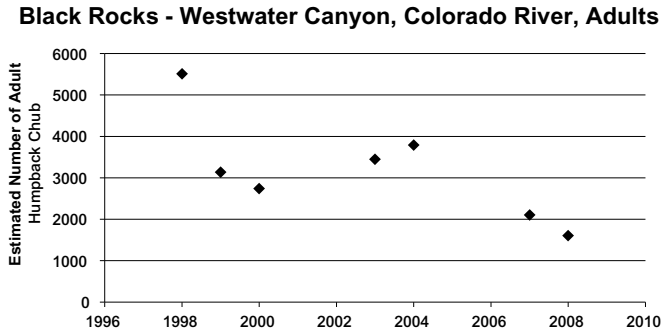


Locations of the five humpback chub populations in the Upper Basin.

✦ The humpback chub population in Cataract Canyon is small and appears to be stable. Sustained improvement over the course of five years in the other four Upper Basin populations will be required before initiating downlisting *(see page 6)*.

✦ The largest population in the Upper Colorado River Basin comprises two groups in Black Rocks and Westwater Canyon *(Figure 7; depicts combined estimate)*. Both populations experienced declines about 13 years ago and have remained relatively stable since.

Figure 7



✦ Population estimates in Westwater Canyon rebounded slightly in 2011 and the total number caught in Black Rocks in 2012 was the highest since 1999. The next combined canyon estimates for 2011 and 2012 should be available later in 2013.

U.S. Fish and Wildlife Service Biologist Ben Schleicher captured this humpback chub in Black Rocks Canyon of the Colorado River in Colorado.

State, Federal, and Tribal Facilities Help Reestablish Endangered Fish Populations

Genetically diverse, hatchery-produced fish are stocked to reestablish naturally self-sustaining populations of razorback sucker and bonytail in the Upper Colorado River system and razorback sucker and Colorado pikeminnow in the San Juan River. Stocked fish will contribute* to meeting the demographic criteria of the recovery goals. The recovery programs monitor survival and reproduction of stocked fish to evaluate and improve stocking strategies. In most cases, the facilities are exceeding their annual production targets *(see pages 9 and 10)*.

Facility, Location	River, Annual Target Number and Size		
	Green	Colorado	San Juan
Bonytail			
J.W. Mumma Native Aquatic Species Restoration Facility, Alamosa, CO	2,665, 8-inch	2,665, 8-inch	
Wahweap State Fish Hatchery, Big Water, UT	8,195, 8-inch	2,665, 8-inch	
Razorback sucker			
Ouray National Fish Hatchery-Randlett Unit, Vernal, UT	14,895, 12-inch		
Ouray National Fish Hatchery-Grand Valley Unit, Grand Junction, CO	4,965, 12-inch	9,930, 12-inch	
Navajo Agricultural Products Industry Ponds, Farmington, NM			6,000, 12-inch
Uvalde National Fish Hatchery, Uvalde, TX			11,400, 12-inch
Colorado pikeminnow			
Southwest Native Aquatic Resources and Recovery Center, Dexter, NM			400,000, Age-0 fingerlings

Utah Division of Wildlife Resources Biologists Jessica Pierson (left) and Amber King captured this razorback sucker in the San Juan arm of Lake Powell in 2012. Three razorback sucker stocked near the Hogback Diversion Dam in the San Juan River were recaptured two to four years later in the Colorado River between Moab and the Utah-Colorado state line. They moved 404 to 477 miles, including through 138 miles of Lake Powell. The lake is home to numerous nonnative predatory fish (including striped bass and walleye) that prey on the endangered fishes.

The Ouray National Fish Hatchery-Grand Valley Unit operates and maintains 22 new grow-out ponds completed in 2012 at the Horsethief Canyon Native Fish Facility near Fruita, Colorado. The ponds will increase production of razorback sucker for the Upper Colorado and San Juan programs and may be used to raise other endangered fish species in the future.

*All four species of endangered fish are long-lived (up to 40 years). The U.S. Fish and Wildlife Service will include hatchery produced fish in population estimates after those populations have been determined to be self-sustaining, i.e., no longer require stocking to maintain population levels.

Cooperative Water Management Provides Flows for Endangered Fishes

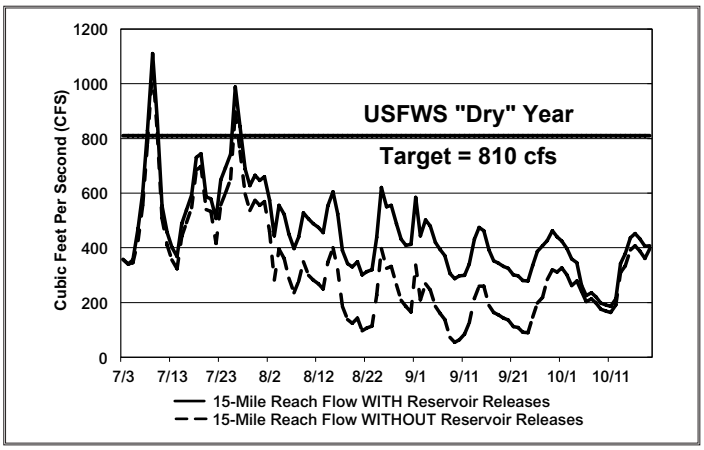
The recovery programs use research, monitoring, and adaptive management to identify, evaluate, and revise flow recommendations to meet the flow-related life-history and habitat requirements of the endangered fishes. Each year program partners provide instream flows in the Yampa, Duchesne, Green, Colorado, and San Juan rivers consistent with state water law and interstate compacts.

Cooperative water management is perhaps best exemplified in the 15-Mile Reach (critical habitat near Palisade, Colorado, that is heavily impacted by historical water development) of the Colorado River. Since 1999, Upper Colorado Program partners conference weekly during the summer to schedule voluntary releases from upstream reservoirs (see table below). During the 2012 drought, this meant avoiding periods of extreme low flow (see graph below). The U.S. Fish and Wildlife Service sent letters of thanks to three privately owned Grand Valley water organizations for their participation in these coordinated efforts, while still meeting their customers' needs.

Coordinated Water Releases (1997-2012) Benefit Endangered Fishes in the Colorado River

Reservoirs	Acre-Feet
Granby	39,914
Green Mountain	532,200
Palisade Bypass	101,208
Ruedi	291,339
Williams Fork	94,423
Willow Creek	9,853
Windy Gap	3,718
Wolford Mountain	142,750
Total	1,215,404

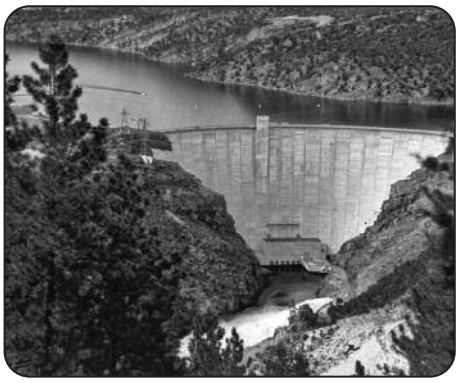
Summer 2012 Flows in the 15-Mile Reach of the Colorado River



Some endangered fish habitat in the Colorado River would have nearly gone dry if not for Recovery Program cooperation.

The Bureau of Reclamation (BOR) operates New Mexico's Navajo Dam under a Record of Decision signed in 2006 to help recovery efforts by providing and protecting instream flows to benefit endangered fishes in the San Juan River.

On May 3, 2012, the BOR released the Record of Decision for the Aspinall Units. Reclamation will operate Blue Mesa, Morrow Point and Crystal dams to provide recommended spring and base flows in the Gunnison River to assist in endangered fish recovery.

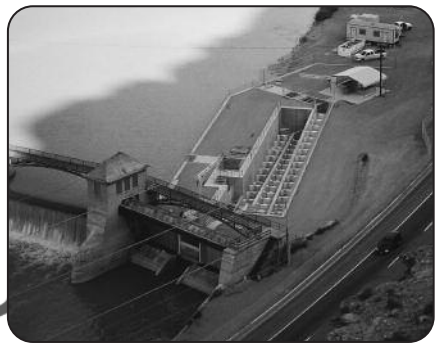


The BOR operates Flaming Gorge Dam in northeastern Utah under a Record of Decision signed in 2006 to help recover the endangered fishes. In 2012, spring releases were timed to connect important Green River floodplain habitats when wild produced razorback sucker larvae were present.

Capital Projects Important to Reconnect Endangered Fish Habitat

The recovery programs work cooperatively with American Indian tribes, water and power customers, and local landowners to improve endangered fish habitat. Habitat restoration and maintenance includes "undoing" habitat fragmentation through construction and operation of fish passages at irrigation diversion dams; preventing fish from entering and becoming trapped in irrigation diversion canals through construction and operation of fish screens; and acquisition, restoration, and management of floodplain habitat to serve primarily as fish nursery areas.

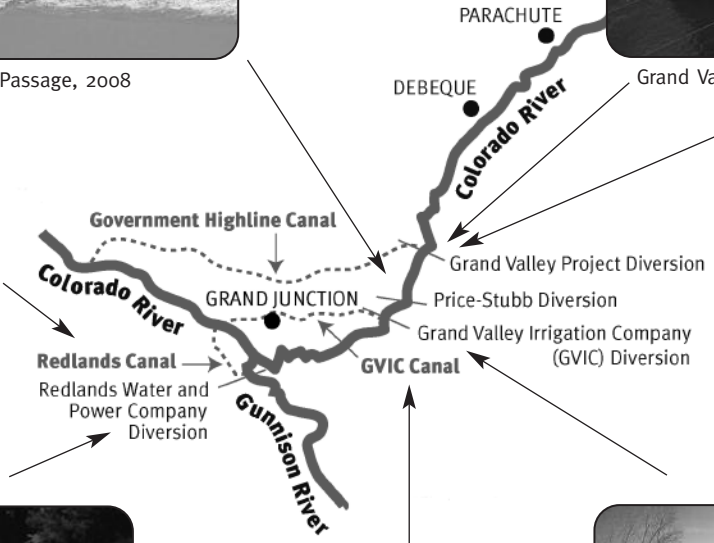
Price-Stubb Fish Passage, 2008



Grand Valley Project Fish Passage, 2004

Redlands Fish Screen, 2005

Grand Valley Project Fish Screen, 2007



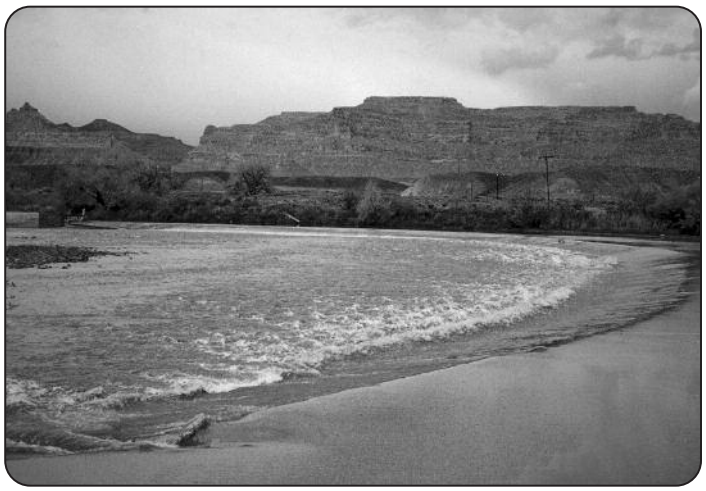
Redlands Fish Passage, 1996

GVIC Fish Screen, 2002

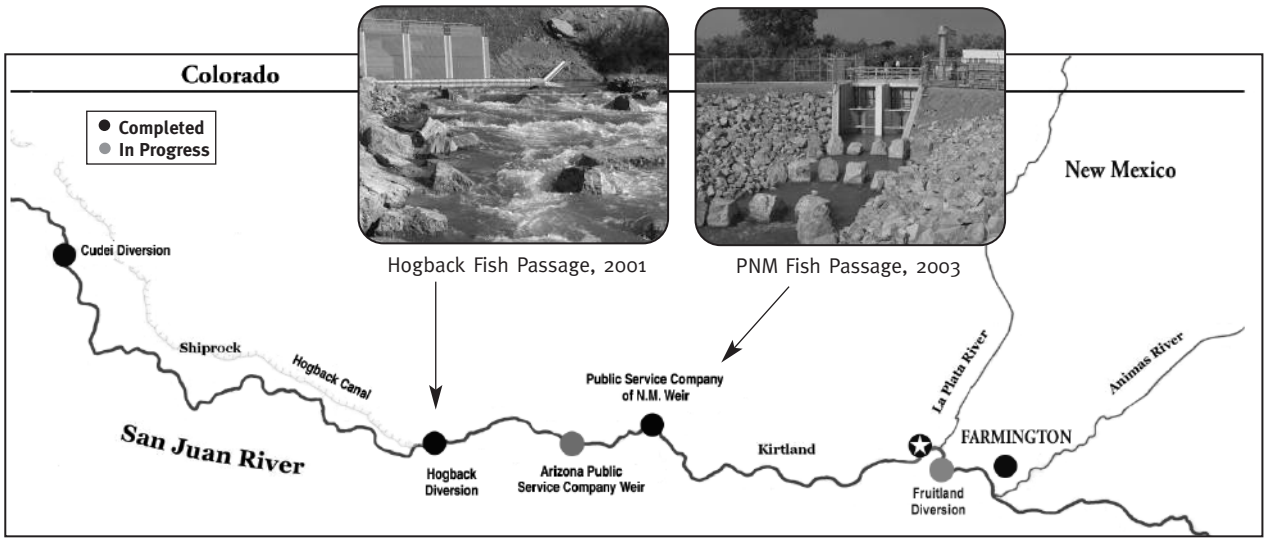
GVIC Fish Passage, 1998

The majority of the Upper Colorado Program's construction projects needed to recover the endangered fishes are complete. Located in western Colorado, these fish passages and screens contribute to unimpeded access to about 340 miles of designated critical habitat in the Colorado and Gunnison rivers. The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) will rehabilitate the Tusher Wash Diversion Dam on the Green River in eastern Utah starting in the fall of 2013. The Upper Colorado Program will work with NRCS to install an electrical barrier to prevent endangered fishes from entering and becoming trapped in the canal.

About 2,700 acres of restored floodplain habitat in the Upper Colorado River Basin are being managed for all life stages of endangered fish.



Construction of an electrical barrier at the Tusher Wash Diversion Dam and Canal in eastern Utah is the last major capital project currently identified in the recovery goals for the Upper Colorado River system.



Fish access has been restored to an additional 36 miles of critical habitat on the San Juan River with the construction of passages at the Public Service Company of New Mexico (PNM) Weir and the Hogback Diversion Dam, and removal of the Cudei Diversion Dam. ✪Capital funds will also be used to permanently repair unstable rock formations at the Farmers Mutual Irrigation Ditch that could impact critical habitat.

Navajo Engineering Construction Authority will complete construction on a weir wall at the Hogback Diversion Dam on the San Juan River in early 2013. The fish weir will prevent endangered fish from becoming trapped in the canal.

The Nature Conservancy monitors restored backwater and side channel habitats along the San Juan River and will pursue fish habitat restoration at more sites during 2013-2015. The New Mexico Environment Department's River Ecosystem Restoration Project funded the first phase of these projects.

A remote sensing antenna will be constructed at the Public Service Company of New Mexico fish passage and weir in 2013. An antenna was installed in 2012 at the mouth of McElmo Creek near the Colorado/Utah border. Others will be constructed at the Hogback Diversion Dam and near Mexican Hat, Utah.

Programs Increase Efforts to Remove Threats of Nonnative Fishes

Predation or competition by nonnative fish species is a serious threat to the endangered fishes and perhaps the most challenging to manage. Currently, nonnative smallmouth bass and northern pike are the principal target species for management in the Green and Upper Colorado River systems. Nonnative channel catfish and common carp are targeted in the San Juan River.

U.S. Fish and Wildlife Service Biologist Tildon Jones holds a nonnative smallmouth bass collected in the Yampa River in northwestern Colorado. This species poses a significant threat to endangered fishes.

U.S. Fish and Wildlife Service Biologist Bobby Duran and other researchers are capturing fewer large, adult channel catfish in the San Juan River due to removal efforts begun in 2001.

Progress to reduce the abundance of the target nonnative fish species since 2000 is summarized below.

River	Species	History and Current Status
Colorado (112 miles)	Smallmouth bass	• Increases in abundance first observed in 2003; removal began in 2004. • Strong year classes of smallmouth and largemouth bass produced in western Colorado's Grand Valley in 2012.
	Northern pike	• In 2012, northern pike were more abundant than ever in the river near Rifle, Colorado, and in a nearby gravel pit.
Green (198 miles)	Smallmouth bass	• Increases in abundance first observed in 2003; removal began in 2004. • Densities generally in decline, but increased slightly in some reaches in 2012. • Low flows in 2012 increased time period for spawning and growth.
	Northern pike	• Since removal began in 2001, abundance has been greatly reduced; however, numbers of adults captured increased markedly in 2012.
Yampa (134 miles)	Smallmouth bass	• Increases in abundance first observed in 2001; removal began in 2004. • Little Yampa Canyon supports the highest densities of adult smallmouth bass. Escapement from Elkhead Reservoir in northwest Colorado undermines control efforts. • Despite persistent densities of smallmouth bass in some areas, native fish continue to rebound.
	Northern pike	• Abundance steadily increased during the 1980s and 1990s; removal began in 1999. • Ongoing removal has shifted the size to smaller individuals, but densities remain excessive. • Future action – increase control efforts at upstream sources in river, floodplain, and reservoirs.
San Juan (164 miles)	Channel catfish	• Removal since 2001 has shifted channel catfish distribution and population structure. The population is now dominated by juveniles, which indicates some success.
	Common carp	• Removal since 2001 has reduced abundance to a level where Colorado pikeminnow and razorback sucker now outnumber common carp.

Nonnative Aquatic Species - an Increasing Concern for the Upper Colorado Program

River	Presence of Invasive Aquatic Species	
	1988	Today
Colorado		
Gunnison		
Green		
White		
Yampa		

Legend

Burbot

Channel catfish

Gizzard shad

Northern pike

Rusty crayfish

Smallmouth bass

Striped bass

Virile crayfish

Walleye

White sucker

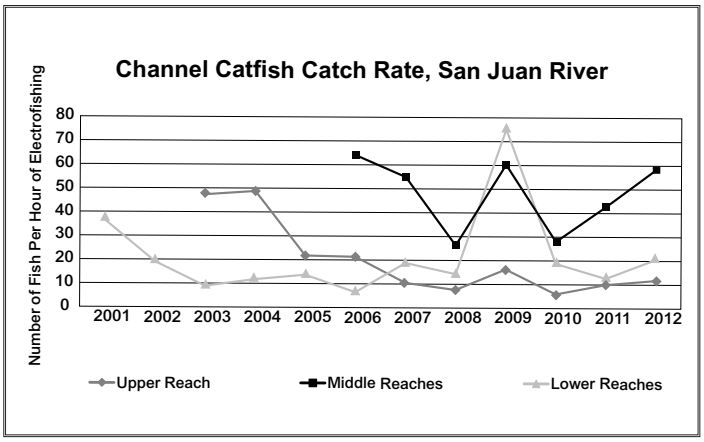
The Threat to Recovery

The Upper Colorado Program has expended significant effort to control nonnative predators throughout hundreds of miles of river habitat. Despite success in some areas, this illustration clearly indicates that this threat to recovery of the endangered fishes is on the rise. During the past three decades, nonnative species have been illegally introduced into new bodies of water, continue to escape from off-channel sources, or have expanded beyond historically low density, main channel habitats.

To address this complex issue, Upper Colorado Program partners are developing a Basin-wide Strategy to Control Nonnative Aquatic Invasive Species. The strategy emphasizes: 1) working with state partners to reduce the incidence of illegal introductions via changes in policy and regulation; 2) focusing control efforts on known sources (e.g spawning areas in upstream reservoirs and preferred riverine habitats; and 3) conserving native species strongholds (e.g. the Gunnison and lower White rivers). Implementing this strategy is the highest priority in the Upper Colorado Program.

Nonnative fish control is one of the San Juan Program's highest priorities. Although there are fewer nonnative aquatic species in the San Juan River than in the Upper Basin to date, the San Juan Program closely tracks the fish community to identify potential problems with invasive species and to implement preventive actions.

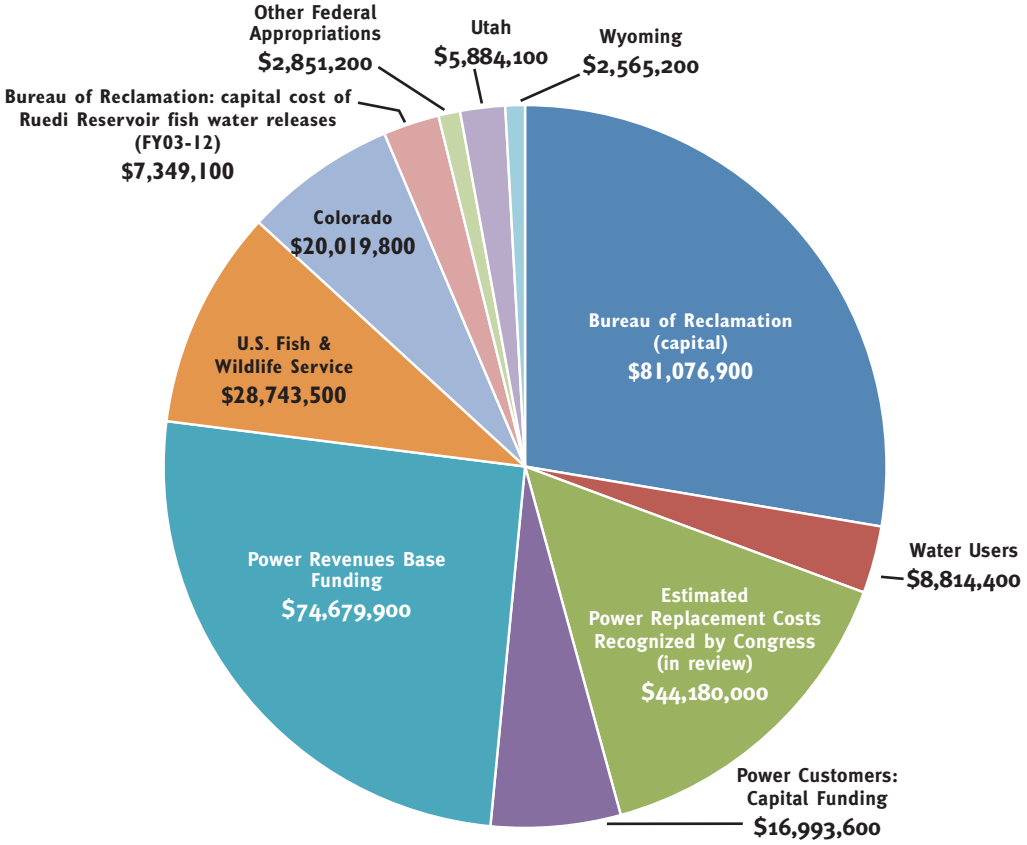
Nate Cathcart, Kansas State University (right) and Elliot Broder, Alabama Cooperative Fish and Wildlife Research Unit, prepare to tag a channel catfish as part of a study on fish distribution and movements in tributaries of the San Juan River.



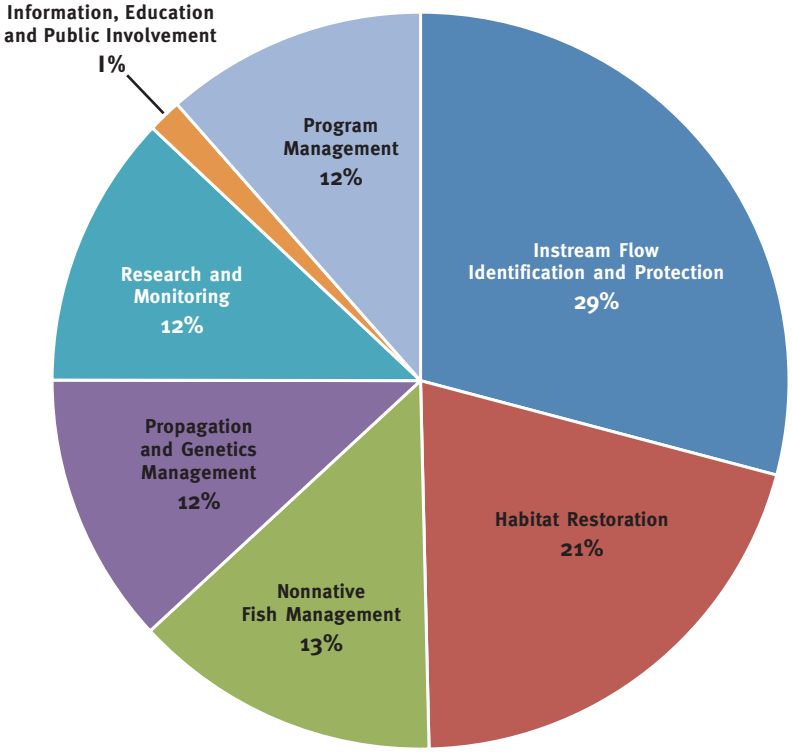
Catch rates for channel catfish in the upper San Juan River reaches remained low in 2012. Increased catch rates in the middle and lower reaches may be due to increased channel catfish reproduction in response to removal efforts.

Expenditures
Upper Colorado River Endangered Fish Recovery Program

Total Partner Contributions = $293,157,700 (FY 1989-2013)



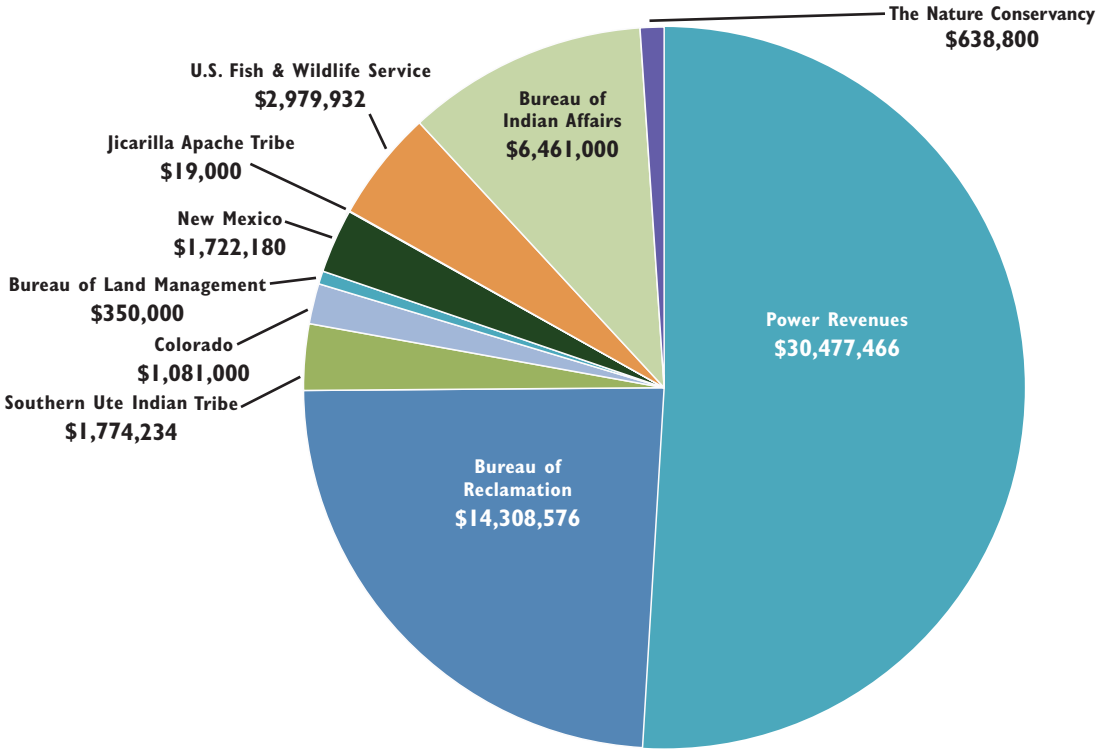
Projected Expenditures by Category (FY 2013 only)



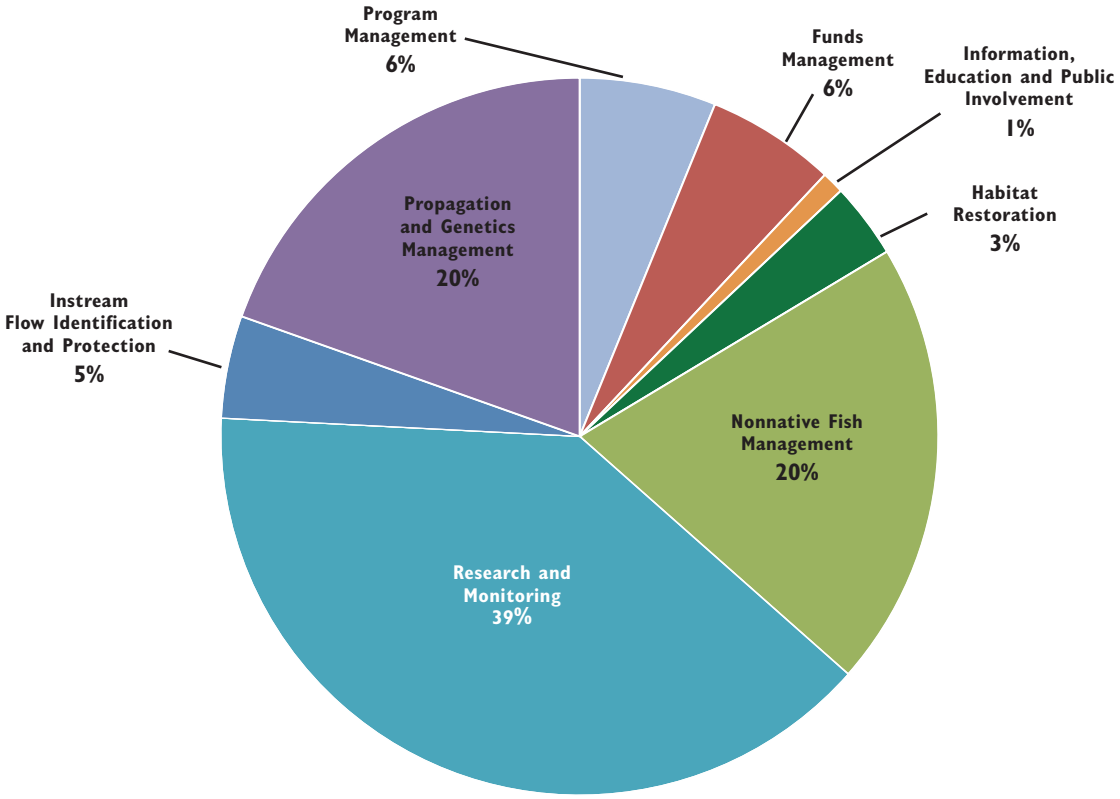
Expenditures
San Juan River Basin Recovery Implementation Program

Total Partner Contributions = $59,812,188 (FY 1992-2013)

(Not including in-kind contributions)



Projected Expenditures by Category (FY 2013 only)



Cost-Sharing Commitments and Power Revenues Support Species Recovery

Continuing the successes of the recovery programs depends on obtaining sufficient funding to conduct diverse and expensive recovery actions. Continuation of annual base funding from Colorado River Storage Project (CSRP) hydropower revenues at currently authorized levels is essential to provide continuing Endangered Species Act compliance and to recover the endangered fish species in the two basins. The recent enactment of Public Law (P.L.) 112-270 extended this authority through the end of fiscal year 2019.

ANNUAL FUNDS

P.L. 112-270 extended the authorization to expend up to $6 million per year (adjusted annually for inflation) of CRSP power revenues for base (non-capital) funding for the two programs through fiscal year 2019. P.L. 106-392 (2000) established statutory authority to use up to $4 million for the Upper Colorado Program and up to $2 million for the San Juan Program for facility operation and maintenance expenses, endangered fish population and habitat monitoring, nonnative fish management, public involvement, and program administration activities.

The states, U.S. Fish and Wildlife Service, water users, and CRSP power customers contribute substantial base funding to both programs each year.

CAPITAL FUNDS

P.L. 106-392, as amended, authorizes the Bureau of Reclamation to cost-share capital construction projects for both recovery programs. Water users, CRSP power customers, and the states of Colorado, New Mexico, Utah, and Wyoming provide non-federal cost-sharing funds.

Capital funds have been used to construct hatchery facilities *(see page 12)*, **fish passages and screens** *(see pages 14-15)*; **complete water acquisition projects** *(see page 13)*; **and restore floodplain habitat** *(see page 15)*.

Power Revenues Cost-Share ($17 Million)

CRSP power revenues, totaling $17 million, have been expended for capital construction projects. Consistent with authorization provided in P.L. 106-392, as amended, these revenues were treated as a non-federal contribution and are reimbursable costs assigned to power for repayment under Section 5 of the CRSP Act.

States Cost-Share ($17 Million)

- **Colorado's** 2000 legislature created a Native Species Conservation Trust Fund. Its "Species Conservation Eligibility List" is annually funded by a joint resolution of the State's General Assembly.

- **New Mexico's** legislature appropriated funds to meet the state's cost-share contributions.

Capital Construction Cost-Sharing for Upper Colorado and San Juan Programs

Upper Colorado Recovery Program	$179 million
San Juan Recovery Program	$30 million
Total	**$209 million***

***Sources of Revenue**

Federal	Non-Federal	
Congress: **$88 million**	Power Revenues:	$17 million
	States:	$17 million
	Water and Power:	$87 million
		$121 million

- **Utah's 1997** legislature created a Species Protection Account within the General Fund which receives Brine Shrimp Royalty Act-created revenue. In 2000, Utah dedicated 1/16th of a one cent general sales tax to water development projects and directed funding to the Upper Colorado Program.

- **Wyoming's** legislature appropriated its funding share during its 1998 and 1999 sessions.

Capital Project Cost-Sharing by the States

	Total Amount	Upper Colorado Program	San Juan Program
Colorado	$9.146 M	$8.065 M	$1.081 M
New Mexico	2.744 M	0.000 M	2.744 M
Utah	3.422 M	3.422 M	0.000 M
Wyoming	1.688 M	1.688 M	0.000 M
Total	**$17.000 M**	**$13.175 M**	**$3.825 M**