

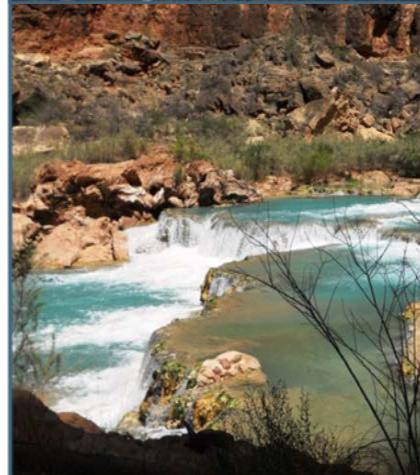
Arizona Fish and Wildlife Conservation Office

Annual Report

2012



Working with others to conserve, protect, and enhance fish and other aquatic organisms and their habitat in Arizona and the Southwest.



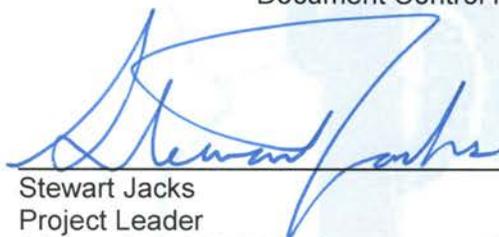
U.S. Fish & Wildlife Service
Arizona Fish & Wildlife Conservation Office
FY2012 Annual Report

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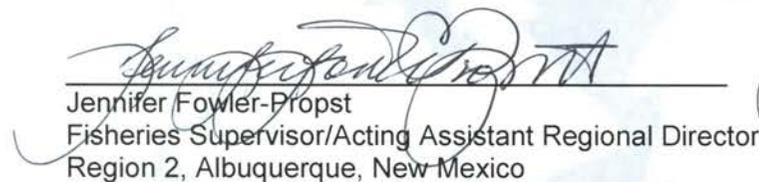
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21 June 2013
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Acknowledgements

We would like to thank those within the Arizona Fish and Wildlife Conservation Office who contributed stories and photos for inclusion in this report. We would like to thank the many partners who made significant contributions towards accomplishments described in this report. All photos within this report are credited as USFWS property.

INTRODUCTION

“Plans to protect air and water, wilderness and wildlife are in fact plans to protect man.”

-Stewart Udall, 1920 – 2010

Arizona is one of the fastest growing states in the country’s fastest growing region. The impact of competing interests on resources here is more evident than ever before, and the importance of conserving the state’s natural heritage is crucial to securing a sustainable future. Indeed, the declining status of so many desert fishes highlights the importance of preserving aquatic habitats so that water is available not only for the native fish, but also for future generations of humans.

Former Secretary of the Interior, and Arizona Congressman and resident, Stewart Udall understood the inextricable link between the fate of nature and the fate of our own species – and he dedicated his life’s work to fostering a greater respect for it. By working toward a better future for our natural resources and, therefore, a better future for our children, we at the Arizona Fish and Wildlife Service Conservation Office are proud to honor this legacy.

Who We Are and What We Do

The Arizona Fish and Wildlife Conservation Office (FWCO) is part of the U.S. Fish and Wildlife Service’s Southwest Region, which encompasses Arizona, New Mexico, Texas, and Oklahoma. We are one of 64 such FWCOs located across the country. Along with 70 National Fish Hatcheries, nine Fish Health Centers, and seven Fish Technology Centers, these stations make up the Service’s Fisheries Program.

Our office is staffed with professionals (Appendix A) who possess expertise in a wide variety of specialties. Individually, we are many parts: biologists, ecologists and ichthyologists; sportfish managers and outreach specialists; cartographers, grant writers and teachers; and budget and finance professionals. Collectively, we are a group of professionals who share the goal of conserving, protecting and enhancing fish and other aquatic organisms and their habitats in Arizona.

Indeed, the conservation of native fish species and their habitat is a top priority for this office. We are the Service’s lead station for recovery of the threatened Apache trout and Little Colorado spinedace. We also work with loach minnow, Gila topminnow, desert pupfish, and the “big river” fish: razorback sucker, humpback chub, and bonytail that inhabit the Colorado River. Our recovery efforts include restoring streams and other aquatic habitats inhabited by nonnative fish species that out-compete and often prey upon native fish. Additional efforts include constructing barriers to prevent upstream migration of nonnative species, replicating native fish populations into suitable habitat, restoring fish passage to previously inaccessible habitat, and monitoring native fish populations.

During Fiscal Year (FY) 2012, a large portion of our annual budget was allocated to these various efforts (Appendix B), and our investments of funding, time, and energy are certainly yielding rewards. We saw signs of success in recovery work for several imperiled native fish and worked productively with partners in restoring valuable habitat on their behalf. We continued our diligent efforts to prevent the spread of invasive species, which pose serious ecological menaces both on land and in water. We also worked with partners in promoting and managing sportfishing in waters on Tribal lands throughout the state. We developed funding requests to continue these types of projects (Appendix C); and we continued to share our findings with our partners and other natural resource managers, the public, and the conservation community at large by conducting scores of presentations (Appendix D) and producing work in a variety of publications (Appendix E).

Why We Do What We Do

For all of our accomplishments over the last year, there's never an end, a "finish line" when it comes to natural resource management and conservation. And Arizona is far from the exception. Here, native fish populations have been on the decline since pioneers first started settling the West in the 1880s. Rivers in Arizona were subjected to dam and diversion projects in the early half of last century, and now barely resemble the waterways they once were. Urbanization, excessive groundwater pumping, agricultural practices, and mismanaged cattle grazing all represent current existing threats to the health of our rivers, streams and lakes – and the aquatic species that historically inhabited them. It is estimated that less than 10% of Arizona's original riparian acreage remains in its natural form (Arizona Riparian Council 2006). In the arid Southwest, 70% of threatened and endangered vertebrate species are listed as riparian obligates (Johnson et al. 1989). In addition, at least 84 species of nonnative fish have been either intentionally or inadvertently introduced into Arizona's waters (Fuller et al. 1999). As a result of habitat fragmentation, destruction, and introductions of nonnative fish, native fish populations are declining (Rinne and Minckley 1991). One of the 35 fish species native to Arizona is extinct and approximately 75% are federally listed as threatened or endangered, proposed for listing, or candidates for listing.

On the other hand, supporting sportfishing programs is another important aspect of the work we do. In 2006, 422,000 people 16 years or older fished in Arizona and spent \$802 million on fishing-related expenses (U.S. Dept. of Interior 2006). Not only is sportfishing an important source of economic revenue, we believe that it helps foster a love of the outdoors that, in turn, promotes the ideals and practices of responsible stewardship and conservation, which are likely to become increasingly important in the coming decades.

Lending even more of a sense of urgency to our work, climate change promises to exacerbate existing ecological problems and add to the challenges we all face in managing water supply, water quality, flood risks, wastewater, aquatic ecosystems, and energy production. According to testimony by the Commissioner of the Bureau of Reclamation before the Senate's Committee on Energy and Natural Resources, these

new stresses are likely to be felt first in the western United States, the fastest growing region of the nation.

FISHERIES PROGRAM FOCUS AREAS

The report that follows provides detailed information on our work over the course of FY 2012. For organizational purposes, we are using the following seven focus areas identified by the Service's Fisheries Program in 2002: Aquatic Species Conservation and Management; Aquatic Habitat Conservation and Management; Partnerships and Accountability; Cooperation with Native Americans; Public Use; Leadership in Science and Technology; and Workforce Management. Our office is proud to be able to report accomplishments in each of these categories during FY 2012. Many could easily be categorized under several focus areas simultaneously. For our current purposes however, the seven focus areas provide a simple framework for the arrangement of this report.

Aquatic Species Conservation and Management

The Fisheries Program maintains and implements a comprehensive set of tools and activities to conserve and manage self-sustaining populations of native fish and other aquatic resources. These tools and activities are linked to management and recovery plans that help achieve restoration and recovery goals, provide recreational benefits and address federal trust responsibilities. Sound science, effective partnerships and careful planning and evaluation are integral to conservation and management efforts.

Return of the Natives

Last year, our office continued pursuing our work to return native fish to their rightful homes. Our activities on their behalf have been many and varied. Among them:

- With the help of volunteers, staff conducted native fish monitoring trips in the spring and fall in the Little Colorado River in the Grand Canyon.
- We also worked with U.S. Bureau of Reclamation personnel to conduct population abundance estimates for fish in Beal Lake on Havasu National Wildlife Refuge.
- With assistance from the Bureau of Reclamation and Marsh and Associates, Inc., our staff conducted an annual fall harvest of native fish at Imperial National Wildlife Refuge, capturing, tagging, and releasing razorback suckers and bonytail. Here, we also surveyed a number of native fish grow-out ponds.
- We assisted our partners with a renovation of Fossil Creek to remove nonnative smallmouth bass that had invaded a portion of the stream in 2011 when a large storm deposited rocks and boulders below a fish barrier and enabled them to pass over it. The bass prey on fish native to the creek, including species federally listed as threatened and endangered.

Native Trout: Apache Trout

One of the first species listed under the Endangered Species Preservation Act of 1966, Apache trout have suffered from habitat degradation and hybridization with nonnative trout. Thanks to a cooperative recovery program, the species was downlisted to the status of threatened species in 1975 – and, with continued efforts, may become the first fish to be delisted through recovery.

Objectives for Apache trout recovery include the establishment and maintenance of 30 self-sustaining populations and monitoring of those populations. Toward these ends, we continued to make progress last year. We worked with partners to complete proposals for a suite of recovery projects that are to be funded through the National Fish and Wildlife Foundation’s Apache Trout Keystone Initiative, which will include fish barrier improvements, post-fire monitoring, and the creation of metapopulations that will help expand and improve Apache trout habitat.



Also, our office’s Apache Trout Crew resumed several recovery projects including brown trout removal efforts from Apache trout streams and stream habitat restoration work. Last year, we continued efforts to remove brown trout in streams on the Fort Apache Indian Reservation and monitor Apache trout, closing out the previous year’s efforts on three streams with a total of more than 1,200 brown trout removed and more than 16,000 Apache trout counted. We continued with this work throughout last year. Also, with fish that had been utilized in a pilot study measuring the effects of multiple electro-shocking, we added 135 Apache trout to streams on the Reservation.

We also began mapping habitat and conducting population surveys in eight Apache trout streams using the Basinwide Visual Estimation Technique. And we completed the first phase of barrier evaluations on seven Apache trout streams on the Reservation.

Native Trout: Gila Trout

As with the Apache trout, the Gila trout has been endangered for decades. Thanks to the cooperative work of numerous partners, the species was down-listed to “threatened” in 2006. Our office has been working to further enhance its recovery as well as to establish the first sportfishery in the state. Last year, we worked with partners to stock Gila trout into Frye Mesa Creek and Frye Mesa Reservoir. Staff from this office also facilitated the translocation of 210 Gila trout from Spruce Creek, in New Mexico, into a two-mile stretch of Ash Creek, in Arizona. This effort was extremely important, as the

wild Spruce Creek population may have been lost due to the Whitewater-Baldy Complex Fire in New Mexico, the largest wildfire in that state's history.

Bonytail and Razorback Suckers

If the future for Apache trout and Gila trout looks hopeful, it appears more daunting for two other native fishes: the razorback sucker, once the most abundant native fish in the Colorado River; and the bonytail, one of the most endangered fish in North America. Without intensive management and conservation efforts, these species are likely to continue to decline as a result of habitat loss and competition from and predation by nonnative fish. The most abundant razorback sucker populations, for example, are now mostly comprised of fish stocked from our hatcheries into Lake Mohave and Lake Havasu, where monitoring remains a vital component to survival. Because young razorbacks and bonytails are threatened by predation from other species, another essential component to staving off extinction is the bolstering of existing populations by collecting larval fish, growing them out to fingerlings, stocking them into sites for additional growth, and finally, restocking them into the reservoirs, backwaters, or even the river's mainstem.

Last year, we were involved in various fish harvesting efforts from grow-out sites, returning the smaller fish and releasing adult-sized bonytails and razorbacks to other locations along the river and into Lake Havasu. We helped stock 3,800 bonytail into the Bill Williams River arm of Lake Havasu. We harvested 245 juvenile razorback suckers from the Hualapai Tribal Native Fish Facility and stocked them in the various native fish grow-out sites we help administer.

We also conducted population surveys of razorback suckers in five backwaters along the lower Colorado River. And, in cooperation with the U.S. Bureau of Reclamation, our office was involved in two helicopter surveys of Lake Mohave to locate spawning razorback sucker aggregations.

As part of a preliminary study to see if razorback suckers are utilizing a fire break canal to pass between Lake Havasu and Topock Marsh, we used passive integrated transponder (PIT) tag scanners to discover that 71 razorback suckers were near the opening of the canal closest to Topock Marsh. PIT tag scanners also helped us maintain data on various razorback populations in our grow-out facilities and at release sites.



Additionally, we participated in the Lake Mohave Razorback Roundup, an annual multi-agency effort to monitor the population of razorbacks in the lake. Though numbers are down, razorback suckers are still maintaining a small population in the lake.

Humpback Chub

The Little Colorado River provides important spawning and rearing habitat for four native fish species due to a historical flow pattern along the lower 22 kilometers. One of the species, the humpback chub has been endangered since 1967 and is the focus of intensive monitoring and recovery efforts by the Service and our partners. Historically, humpback chub in the Colorado River system were abundant and widespread. However, factors including habitat fragmentation, lower water temperatures, and predation by nonnative fishes have reduced the native cyprinid to small, fragmented populations within the Colorado River basin. The same factors have been similarly detrimental to flannelmouth sucker, bluehead sucker, and speckled dace.

Last year, this office conducted its annual fall native fish monitoring trip in the Little Colorado River, which helps us to better estimate the abundance of humpback chub in the Little Colorado River. Data from the subsequent spring native fish monitoring trip revealed high catch rates and successful recruitment of age-one humpback chub. During the spring trip, we also collected 100 fin clips of bluehead sucker and 100 fin clips of flannelmouth sucker for genetic analysis.

With assistance from the National Park Service and the Arizona Game and Fish Department, we also conducted a population survey of humpback chub in Havasu Creek, where the species was moved in 2011 and where, we are pleased to report, they appear to remain. We also collected juvenile humpback chub from the lower portions of the Little Colorado River for eventual stocking upstream above Chute Falls and to supplement the refuge population being held at the Southwestern Native Aquatic Resources & Recovery Center (SNARRC) at Dexter (formerly the Dexter National Fish Hatchery and Technology Center).

We also conducted a humpback chub Grand Canyon translocation trip in July, collecting and transporting 694 juvenile humpback chub to SNARRC, for a genetic refuge population and to produce future fish for stocking into Shinumo Creek and Havasu Creek. The crew also collected, tagged, and moved 212 juvenile humpback chub above Chute Falls within the Little Colorado River to continue to manage that population.

Aquatic Habitat Conservation and Management

Loss and alteration of aquatic habitats are principal factors in the decline of native fish and other aquatic resources and the loss of biodiversity. Seventy percent of the nation's rivers have altered flows, and 50 percent of the waterways cannot support the various life stages of fish that require free movement up and downstream.

Restoration Efforts for Native Fish

Last year, staff from this office worked tirelessly to return native fishes to their ancestral habitat, and to improve and restore much of that habitat.

- We worked with partners to formalize the funding of a pond construction project that will provide a much needed refuge for the Little Colorado River spinedace; and we collected stream channel data along a stretch of the Little Colorado River to begin work on a project that will reduce sediment input for the benefit of the same fish.
- We finished applying funding from the American Reinvestment and Recovery Act that had been allocated for Gila trout restoration.
- And we worked with our colleagues in the Arizona Ecological Services office to develop a pond enhancement project in eastern Arizona that will use proven techniques to increase water retention and improve wildlife habitat.

Going with the Flow

After working extensively in 2011 to help develop a Biological Opinion relating to a high-flow protocol for Glen Canyon Dam in the Grand Canyon, this year we were involved in trying to develop alternatives for an Environmental Impact Statement. These alternatives include strategic flows to maximize sediment while simultaneously providing a warm and stable environment for young humpback chub in the mainstem of the Colorado River. High flow events can also be timed to help prevent salt cedar germination.

Fighting a Giant: Giant salvinia

Giant salvinia poses a gargantuan threat to the waters of Arizona. Discovered in the lower Colorado River in 1999, the invasive plant can overtake waters and reduce water quality through reduction of dissolved oxygen, which can decimate both native and sportfish populations. The actual plant biomass can even reduce the ability of boats to use invaded waters. Fortunately, control efforts were started before the plant could become too widespread. Still, diligent control will be required to keep the constant threat in check and last year, our office maintained a rigorous schedule of spraying to control the spread of giant salvinia in the Colorado River downstream of Blythe, California. In several reaches of the river in Arizona, the plant is effectively being eliminated. In others, the plant appears to be suppressed but not eliminated. We also collected water quality measurements in association with the spraying.

Water quality and contaminants testing

Water contamination can pose major problems for fish, natural habitat, and human health, not to mention seriously affect water quality. That's why this office has made water analyses and contaminations testing essential requirements of our work. Last year, we also conducted bi-monthly water quality sampling of native fish grow-out sites at Beal Lake, Emerald Canyon Golf Course, Needles Golf Course, Office Cove, Parker Dam Pond, High Levee Pond, Three Fingers Lake, Alamo Lake, Painted Rock Reservoir, and Topock Marsh.

Fish Passage

Throughout the country, the National Fish Passage Program has helped fish literally pass across formidable obstacles that would otherwise hinder their movement. In Arizona, the program has benefited a number of imperiled native fish. Adding to several existing fish passage projects in Arizona, last year we continued work on a programmatic Environmental Analysis and Endangered Species Act compliance to streamline implementation of future projects.

Going Batty

Our office also worked with Bat Conservation International to identify possible wetland and pond projects in eastern Arizona and met with the U.S. Forest Service and the U.S. Bureau of Land Management to evaluate possible wetland and pond projects on private and federal lands in eastern Arizona.

Partnerships and Accountability

Partnerships are essential for effective fisheries conservation. Many agencies, organizations and private individuals are involved in fisheries conservation and management, but no one can do it alone. Together, stakeholders combine efforts and expertise to tackle challenges facing fisheries conservation. The success of these partnerships depends on strong, two-way communication and accountability.

National Fish Habitat Partnership

Loss or degradation of fish habitat is the number one problem facing fishery managers and affects both sportfish and non-sportfish. Protection and management of aquatic habitats are very important. Without quality fish habitat, valuable fish populations will continue to decline. Established in 2006, the National Fish Habitat Partnership is the first nationally-coordinated effort to restore and protect fish habitat. In order to better coordinate efforts, secure funding, and implement real improvements on the ground, the plan seeks to unite a wide array of partners, including states, federal agencies, tribes, non-governmental partners, and the public.

Last year, our office remained actively involved in this ambitious effort in various ways. We regularly participated in National Fish Habitat Partnership Science and Data National Fish Habitat Assessment meetings and general partnership coordinator teleconferences. We also worked closely with the Desert Fish Habitat Partnership, the Western Native Trout Initiative, and the National Reservoir Partnership to identify key projects for potential funding.

Desert Fish Habitat Partnership

Our office continues to coordinate the Desert Fish Habitat Partnership (DFHP), which will benefit native desert fishes by bringing agencies, organizations, and the public together to work towards the recovery and conservation of these imperiled species and their habitats. The program's primary purpose is to conserve aquatic habitat in the arid west for desert fishes by protecting, restoring and enhancing these unique habitats in cooperation with other federal and state agencies, tribes, conservation groups, local partners, and the public. By partnering across geo-political boundaries, DFHP will

pursue more effective management strategies than are generally achieved on a local, smaller scale to address fish and habitat issues over a broad geographic area that encompasses the entirety of the Great Basin and Mohave deserts, and those portions of the Sonoran and Chihuahuan deserts that lie within the United States. The benefits of aquatic habitat conservation extend beyond desert fishes to include humans and other animal and plant species.



Last year, our office coordinated and facilitated the DFHP annual meeting in Salt Lake City, Utah, where various partners convened to discuss funding issues, evaluate various projects, and determine science and data needs and how the program could be synthesized into other cooperative conservation efforts. We also finalized a 2011 annual report that was distributed to various partners across the country.

Through the Fishery Information System, we submitted FY12 Fishery Operation Needs proposals which required coordination and database work with counterparts in other Service regions for the DFHP. The program coordinator discussed the status of unfunded DFHP projects submitted the previous year with the DFHP steering committee and Service staff in another region. With additional funding from the other region and the National Fish Habitat Partnership, two DFHP projects in Nevada are now possible. The program coordinator also worked with the National Fish Passage Program Coordinator and Desert Fish Habitat Partnership Steering Committee members to obtain funding for a collaborative project with the Western Native Trout Initiative on the Lower Weber River.

Lower Colorado River Multi-Species Conservation Program

Another coordinated, comprehensive, long-term multi-agency effort, the Lower Colorado River Multi-Species Conservation Program (LCMSCP) is aimed at endangered species and the protection of their habitat on the lower Colorado River. The program's primary purposes are threefold: to protect the lower Colorado River environment while ensuring the certainty of existing river water and power operations; to address the needs of threatened and endangered wildlife under the Endangered Species Act; and to reduce the likelihood of listing additional species along the lower Colorado River.

This 50-year long-term effort includes the goal of creating more than 8,100 acres of riparian, marsh, and backwater habitat for four listed species and 16 other species native to the lower Colorado River. It also includes measures to protect and enhance an additional two listed and four non-listed species. The implementation activities are based on adaptive management principles, which allow conservation measures to be adjusted over time based on monitoring and research.

Last year, our office remained active in communicating about cooperative projects with our various partners in this program, including the Bureau of Reclamation, Arizona Game and Fish Department, California Department of Fish and Wildlife, among others, and discussed interagency agreements pertinent to work through 2014. Additionally, much of our backwater management and monitoring work for razorback sucker and bonytail is done in conjunction with this program.

Habitat Conservation Plans

Many of Arizona's native fishes occur on private lands, but landowners can be hesitant to assist with recovery efforts for fear of the implications of having endangered species on their properties. That's why a suite of innovative partnerships geared toward protecting the interests of both landowners and the species on their properties has been developed. Habitat Conservation Plans have been extremely successful in Arizona, where El Coronado Ranch set the stage for the first completion of such a plan in the state, enhancing conservation and recovery efforts for Rio Yaqui native fishes.

Partners for Fish and Wildlife

So much important habitat for threatened and endangered species exists on non-federal lands, and the Endangered Species Act alone is not always sufficient in recovering species or restoring habitat. That's why there are various innovative programs that help put the tools for recovery into the hands of landowners. The Partners for Fish and Wildlife (PFW) Program is a longstanding example that has been important in conservation efforts throughout Arizona. Last year, through the auspices of this program, our office completed and pursued many exciting projects.

We worked with the City of Sedona to start drafting a cooperative agreement for the Sedona Wetland Creation Project, which will create 28 acres of wetland habitat for waterfowl and migratory birds using treated effluent water. We also worked with the Town of Pinetop-Lakeside to complete the Wetland Creation and Interpretation Project, which created approximately half an acre of wetland habitat. We also met with the National Park Service's Rivers, Trails, and Conservation Assistance Program and the City of Holbrook to discuss riparian habitat enhancement. The City of Holbrook is using treated wastewater to establish approximately 60 acres of riparian habitat that will benefit migratory birds. Also, we met with the City of Show Low and the Show Low Municipal Airport personnel to discuss a possible wetland restoration project that would restore approximately 10 acres of wetland habitat on the Colorado Plateau. Each of these projects may serve as a showcase for the importance of wetland conservation in these communities.



Staff also completed final reimbursement for the Old Camp Spring Grassland Restoration Project, an effort that restored approximately 150 acres of Plains and Great Basin grasslands.

Likewise, we completed final reimbursement for the Zeniff Road Grassland Restoration Project, which restored more than 400 acres of Plains and Great Basin grasslands. We also worked with another landowner and a contractor to identify similar grassland restoration opportunities on private property in the Little Colorado/Chevelon Focus Area in eastern Arizona.

Along the Little Colorado River, we completed stream channel data collections and worked with Arizona Game and Fish Department to complete an archaeological survey of a project that will reduce sediment input in the water for the benefit of the federally threatened Little Colorado River spinedace.

In order to manage brush and reduce the threat of fire, the program will fund efforts to remove juniper from riparian areas and mesquite in upland areas on private land along Eagle Creek. Junipers adjacent to sycamores and cottonwoods in riparian areas could act as fuel ladders and increase fire impact.

Our Program coordinator also was involved in reaching prospective new landowners throughout the year. For instance, he presented information on the program to participants of the Landsward Institute's New Ranchlands Economy Workshop in Flagstaff, where participants learned about sustainable futures for ranching and other rural operations, government programs, marketing, and other ranching considerations.

We Get by with a LOT of Help from Our Friends

So much of the work we do would not be possible without the partners and friends who help us in so many ways. To offer an idea of how far our network extends, Appendix F. includes a list of the partners we have worked with recently.

Cooperation with Native Americans

Conserving the nation's fish and other aquatic resources cannot be successful without the partnership of tribes; they manage or influence some of the most important aquatic habitats both on and off reservations. In addition, the Fish and Wildlife Service has distinct, unique obligations toward tribes based on trust responsibility, treaty provisions, and statutory mandates. The Fisheries Program plays an important role in providing help and support to tribes as they exercise their sovereignty in the management of their fish and wildlife resources on more than 55 million acres of Federal Indian trust land and in treaty reserved areas.

Trout Production, Stocking and Conservation

In any given year in Arizona, state and federal hatcheries produce approximately 4.9 million trout, and anglers spend an estimated \$831.5 million. A portion of this total, through permits to fish on tribal lands, represents a significant source of income for tribes in the state. Limited in budget and staff, the tribes benefit from the help of

partners in managing their fisheries resources, including the four million sportfish annually stocked through coordination by our office in conjunction with the National Fish Hatchery System. We also assist tribes with development of sportfishing opportunities, technical assistance such as creel surveys, provide management recommendations, and provide advice on law enforcement issues related to sportfish management

Colorado River Indian Tribes Tribal Assistance

A long-time partner of the Service, the Colorado River Indian Tribes (CRIT) own and manage lands that contain important habitat in the lower Colorado River ecosystem. However, the tribes do not have the staff, equipment, or training to pursue all of the conservation work that they would like.

Last year, we continued to provide assistance to the tribes in managing approximately 45 miles of the Colorado River, 60 miles of canals, and five impoundments. We met with representatives from the Tribe concerning native fish stockings and were given approval to stock razorback sucker and bonytail in Tribal waters over the next three years. We also developed a draft study plan for a native fish project in the Tribes' waters to be funded by the U.S. Bureau of Reclamation. Additionally, we met with the Colorado River Indian Tribes' Game and Fish Department staff to discuss a native fish telemetry study that we later conducted on the Colorado River along tribal lands.

HELPING APACHE FISHERIES

White Mountain Apache

With more than 800 miles of streams and 2,300 acres of lakes, the Fort Apache Indian Reservation features more than one third of the cold-water fishery resources in the state of Arizona. These waters provide an important economic resource for the White Mountain Apache Tribe via the sale of fishing permits. Our office is proud to be able to routinely provide technical assistance to White Mountain Apache Tribe to aid in managing their fishery resources.

With assistance from the Tribe, we conducted an electrofishing survey of Earl Park Lake and collected large brook, brown, and rainbow trout to evaluate the impacts of a fishing regulation change.

Also, with assistance from Alchesay-Williams Creek National Fish Hatchery, we stocked 60,000 channel catfish – fish raised and delivered by two other National Fish Hatcheries -- into lakes and ponds on the Reservation.

San Carlos Apache

Like their White Mountain Apache neighbors, the San Carlos Apache Tribe hosts a variety of recreational fishing opportunities that represent an important source of economic revenue for them. Last year, working closely with the San Carlos Recreation and Wildlife Department, we conducted annual lake electrofishing surveys on the reservation. Also, with staff from the Tribe's Wildlife and Recreation Department, we toured San Carlos



Lake, which has dropped to less than half of a percent of its capacity because of ongoing drought and continuing irrigation use; together, we are monitoring water levels and quality to gather information that may prove useful during a significant fish kill.

Other work with Tribes

Our work with Tribes continues in other areas as well:

- Last year, we worked with the Hualapai Native Fish Rearing Facility to harvest large razorback suckers from the Tribal Native Fish Facility. Together, we collected and tagged 254 fish that we later stocked into Lake Havasu.
- We also worked with Willow Beach National Fish Hatchery to stock rainbow trout on the Fort Mojave Indian Reservation.
- Our office was involved in genetic analyses for the Chuska Mountains trout project on the Navajo Nation. Results showed that the trout populations in Tsaile Creek and Wheatfields Creek contained only the rainbow trout haplotype, indicating it is unlikely that a native trout still occurs in the Chuska Mountains. Project partners are considering conducting genetic analyses of museum specimens captured in the Chuska Mountains during the 1960s and 1970s to see if a native trout haplotype existed then. Additionally, we assisted the Navajo Nation Department of Fish and Wildlife in conducting a fishery survey of Assayi Lake.
- We are also exploring the potential of a cooperative project with partners and with the Havasupai Tribe to initiate fishery surveys upstream of Beaver Falls in order for the Tribe to gain better insight into its natural resources.

Public Use

As the population in the United States continues to grow, the potential for adverse impacts on aquatic resources, including habitat will increase. At the same time, demands for responsible, quality recreational fishing experiences will also increase. The Service has a long tradition of providing opportunities for public enjoyment of aquatic resources through recreational fishing, habitat restoration, education programs, and through mitigating impacts of Federal water projects.

Outreach: In Class, In Print, Online, and Outdoors

Individuals within our own agency don't always know about the work we do. It's little surprise then that the significance of our work is lost on a majority of the general public. Without an educated public, we can expect little public support in achieving our goals. For people to be willing to support the conservation goals of the Service, it requires that they become informed of our mission and how they can be a part of it. That's why outreach is a high priority for this office.

In Class and Other Outreach

- Working with teachers from three area schools, our office initiated four "Trout in the Classroom" projects. Each of the four schools that participated raised Apache trout in aquariums for the remainder of the school year. Raising trout in the classroom is a hands-on activity that engages students and helps to connect them to real-life water quality, fish and wildlife issues and problems, and inspires them to seek solutions.
- Along with two National Fish Hatcheries, our office sponsored an archery outreach program for more than 160 children from three different schools.
- Staff participated in Native Vision's spring mini-camp in Cibecue, teaching some 150 students from Kindergarten through 8th grade about native fish and careers in fish biology. Native Vision's initiative is designed to promote healthy minds, bodies, and families for Native American children.
- Staff delivered a "Biologist in Training" program for the U.S. Forest Service's "Kids in the Woods" summer program at the Boys and Girls Club of Round Valley. Participants learned about native fish and how to identify, measure, weigh, and tag fish.
- Staff members also spent a morning with a summer school biology class from Alchesay High School, providing hands-on lessons in electrofishing, collecting macroinvertebrates, and collecting water quality data. After the field portion of the morning, students were given a tour of Alchesay National Fish Hatchery. After the session, one student signed up to become a volunteer at our office and has already participated in a backpack electrofishing trip.
- We also presented information about fish and their habitat to the Whiteriver Chapter of the Boys and Girls Club.
- Our office also responded to letters written by 21 first graders from Iowa who wanted to know more about Apache trout and how they were affected by the Wallow Fire.



Online and In Print

Our office continued to publish the “Currents,” the quarterly newsletter highlighting accomplishments of the Service’s Southwest Fisheries Program that is widely distributed within the agency and to external partners.

Since 2010, our office has been maintaining a Facebook page where we post information on our staff, upcoming projects, educational events, and volunteer opportunities across the state. We currently have more than 260 fans from 20 countries. Check us out at www.facebook.com/AZFWCO

Likewise, our DFHP Coordinator developed and continues to manage a Facebook page for the Desert Fish Habitat Partnership.

Also, our office finalized production of a video aimed at providing information on jobs at our office for youth and posted it on YouTube. The video is linked to both the Service’s Fisheries Facebook page and our own office’s Facebook page and can be viewed at <http://youtu.be/HOYeHXwEP6Y>

Outdoors

Of course, the larger point of our outreach work is to get people away from their computers and televisions and to embrace the great outdoors and learn about the challenges associated with conserving a healthy environment. To that end, we were involved in a number of events in 2012:

With assistance from Alchesay-Williams Creek National Fish Hatchery, staff from our office participated in the 6th Annual Woodland Wildlife Festival in Pinetop. Here, we displayed a “Living Stream” with live Apache trout and presented children with the opportunity to complete a matching game of native and nonnative fishes.

We also hosted a booth at the Arizona Game and Fish Department’s Annual Outdoor Expo in Phoenix, which included live Apache trout and razorback sucker, native fish trivia, chances for youth to try their hand at being fish biologists, and lots of brochures and handouts. More than 38,000 people participated in the event.

A staff member presented information on our work in the Little Colorado River at a Lees Ferry Angling Guides meeting hosted by the National Park Service.

Another member assisted with the Post Wallow Fire-Turkey Sciences Field Workshop and Junior Turkey Hunters Camp hosted by the Arizona Game and Fish Department, the National Wild Turkey Federation, and Youth Outdoors Unlimited, Inc. near Springerville. He volunteered as one of the guides and helped two junior hunters harvest their first turkey.



Approximately 20 junior hunters participated and three turkeys were harvested during the weekend event.

A staff member from our office gave a presentation on the Apache trout recovery program to members of the White Mountain Fly Fishing Club and talked about the impacts of the 2011 Wallow Fire to recovery efforts.

Our office donated 15 fishing poles and 10 fishing and boating manuals for the First Annual Greer Family Fishing Derby. We also donated 15 fishing poles to the Round Valley Boys and Girls Club for their youth fishing events.

At the Petsense Adopt-A-Thon, we hosted a booth that featured live Apache trout and promoted responsible consumer behaviors while limiting the spread of potential aquatic invasive species.

Leadership in Science and Technology

Science and technology form the foundation of successful fish and aquatic resource conservation and are used to structure and implement monitoring and evaluation programs that are critical to determine the success of management actions. The Service is committed to following established principles of sound science.

Projects, Publications and Presentations

Members of this office are respected leaders in various areas of natural resource management expertise. At any given time, we are actively involved in many cutting edge research projects. In 2012, staff were involved in various efforts including: examining the effects of electroshocking on the growth of Apache trout; conducting stable isotope analyses for a food-base research project on humpback chub; writing for publication about anthropogenic changes to the Colorado River and Rio Grande, with emphasis on the status and life history of several native fishes and about spatio-temporal variations in age structures of a partially re-established population of Northern River Otters.

Additionally, we routinely avail ourselves to both resource managers and the public in order to share scientific findings, train others in management techniques, and educate the public on important conservation issues. Last year staff offered 31 presentations at professional meetings, schools, and non-governmental group functions (Appendix D.), and we produced 22 scientific reports, non-technical reports, and stories in the media (Appendix E.).

Workforce Management

The Fisheries Program relies on a broad range of professionals to accomplish its mission: biologists, managers, administrators, clerks, animal caretakers, and maintenance workers. Without their skills and dedication, the Fisheries Program cannot succeed. Employees must be trained, equipped, and supported in order to perform their jobs safely, often under demanding environmental conditions, and to keep current with

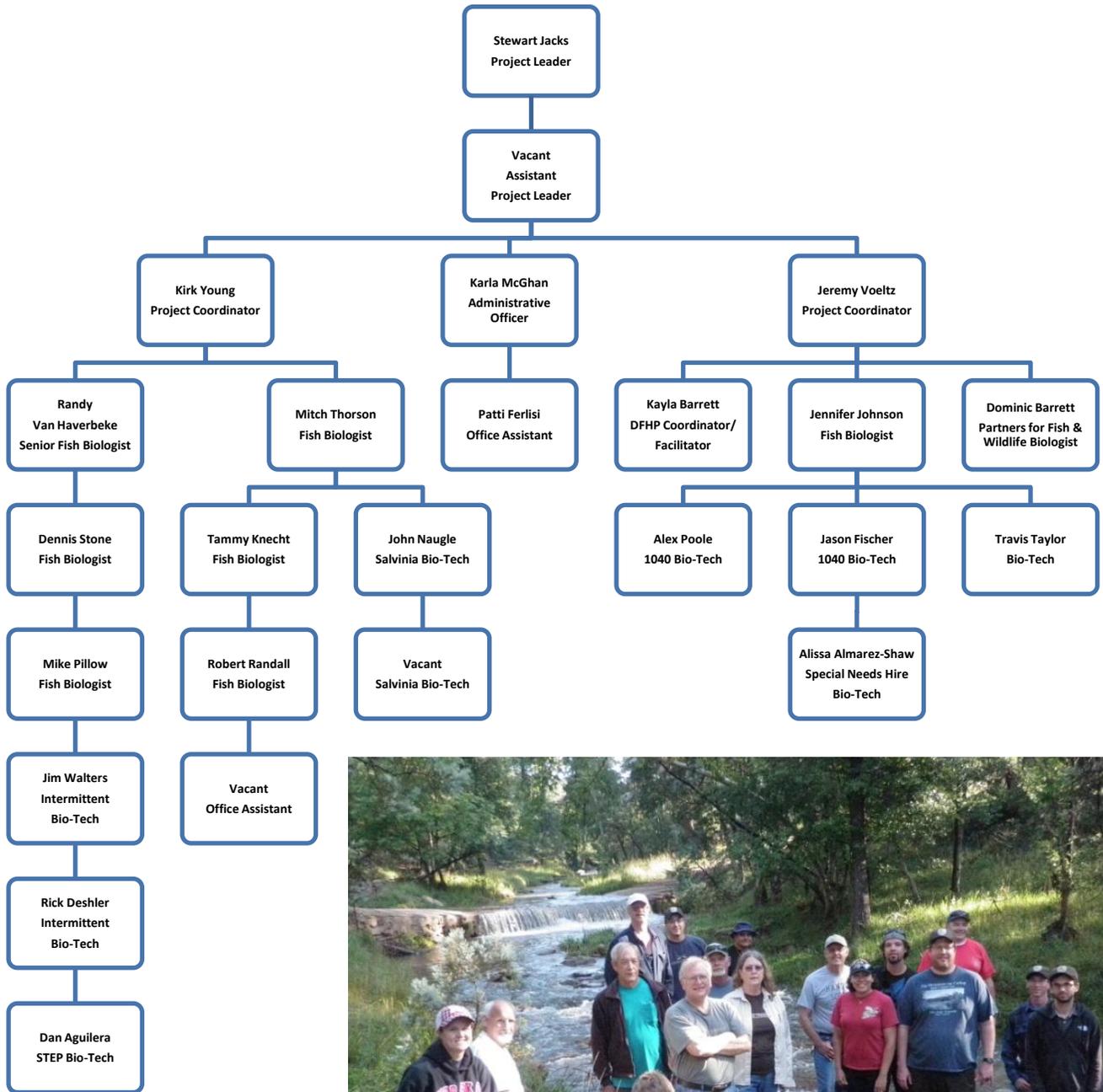
the constantly expanding science of fish and aquatic resource management and conservation.

Job Training and Career Development

Because natural resource management sciences encompass ever-changing and developing fields, and because safety lessons bear repeating at designated intervals, workforce training is a constant process. This office is devoted to furnishing its staff, and its partners, with the necessary training. That training has been extensive and varied, from EEO, diversity, and veteran employment training and motorboat operator certification courses to advanced wildlife biology courses on field techniques to Congressional operations seminars. We also continue to recruit and train volunteers who are instrumental to our work.



Appendix A. AZFWCO Organization Chart: August 30, 2012



Appendix B. AZFWCO Budget

Fiscal Year 2012 Budget: Total \$1,888,204

Reimbursables \$905,117
Partners for Fish & Wildlife* \$247,654
Fisheries** \$735,433

Fiscal Year 2011 Budget: Total \$1,825,008

Reimbursables \$833,789
Partners for Fish & Wildlife* \$220,411
Fisheries** \$770,808

Fiscal Year 2010 Budget: Total \$1,721,950

Reimbursables \$624,685
Partners for Fish & Wildlife* \$224,324
Fisheries** \$872,941

Fiscal Year 2009 Budget: Total \$1,713,565

Reimbursables \$777,390
Partners for Fish & Wildlife* \$169,012
Fisheries** \$767,163

Fiscal Year 2008 Budget: Total \$1,498,484

Reimbursables \$607,190
Partners for Fish & Wildlife* \$220,044
Fisheries** \$671,250

*Partners for Fish & Wildlife funding includes \$130,000 of on-the-ground, pass-through project money for FY 2012, \$100,000 for FY2011, \$100,000 for FY 2010, \$56,000 for FY 2009, and \$112,000 for FY 2008.

**Fisheries funding includes \$68,000 of on-the-ground, pass-through project money for Fish Passage and National Fish Habitat Action Plan projects for FY 2012, \$116,000 for FY 2011, \$308,797 for FY 2010, \$252,000 for FY 2009, and \$165,000 for FY 2008.

Appendix C. AZFWCO Fisheries Operations Needs (FONS)

<u>Project Title</u>	<u>Cost</u>
Education and Outreach	
Youth Fishing Derbies - Connecting Kids with Nature	\$18,000
Kids in the Creeks - Connecting Kids with Nature.....	\$23,000
Trout in the Classroom - Connecting Kids with Nature	\$12,000
Biologist in Training - Connecting Children with Nature	\$45,000
Boy Scout Fishing Badge – Connecting Children with Nature	\$6,000
“Go Fish Girl” - Connecting Children with Nature.....	\$6,000
Linking Girls to the Land Patch - Connecting Children with Nature	\$6,000
Native Fish Showcase - Connecting Children with Nature.....	\$168,000
Arizona Rivers - Riparian Research Experience - Connecting Children with Nature	\$12,000
Total	\$296,000
Habitat	
Desert Fish Habitat Partnership: Desert Stream Environmental Flow Management.....	\$59,000
Desert Fish Habitat Partnership: National Wildlife Refuges Desert Pupfish Pond	\$7,000
Management of Backwater Habitats on the Lower Colorado River	\$112,000
Lake Havasu Fish Habitat Improvement Project.....	\$90,000
Improvement of the Topock Marsh Sportfishery in Lake Havasu.....	\$50,000
Cienega Restoration on San Bernardino NWR.....	\$75,000
Sharp Spring Gila Topminnow and Gila Chub Restoration	\$80,000
Aquatic Nuisance Species Prevention and Control in Arizona	\$84,000
Total	\$557,000
Tribal	
Tribal Hatchery Product Evaluation.....	\$112,000
Conduct Tribal Fishery Training Workshops	\$84,000
Colorado Cutthroat Trout Restoration in the Navajo Nation.....	\$75,000
Installation of a Stream Gage to Protect and Enhance Flows in Havasu Creek	\$65,000
Total	\$336,000
Native Fish	
Translocation of Humpback Chub into Havasu Creek on the Havasupai Reservation..	\$140,000
Improvement of Flow Conditions for Razorback Sucker in Three Fingers Lake	\$80,000
Is Climate Change Affecting Small-Stream Desert Native Fishes?.....	\$112,000
Total	\$332,000
Total FONS.....	\$1,521,000

Appendix D. Presentations

The following is a list of presentations given by AZFWCO personnel in FY 2012:

- Barrett, D.A. 2012. Developing a Resume and Pursuing a Career as a Biologist. Career Explorations & Enhancement Workshop. Pinetop, AZ.
- Barrett, D.A. and Morel, J. 2012. "Native Cutthroat Trout of the Chuska Mountains – Fact or Myth?" with the Navajo Nation Department of Fish and Wildlife. 3rd Annual Arizona Native Trout Workshop. Phoenix, AZ.
- Barrett, K.D. 2012. The Desert Fish Habitat Partnership. Presentation to the National Fish Habitat Action Plan board.
- Barrett, K.D. 2012. The Desert Fish Habitat Partnership. AZ/NM Chapter of the American Fisheries Society, Phoenix, AZ.
- Barrett, K.D. and J.B. Voeltz. 2012 Fish and their habitat. Presentation to the Whiteriver Chapter of the Boys and Girls Club, Whiteriver, AZ.
- Jacks, L.S. The Service's SCEP Program, and how to compete for federal jobs. Phoenix, AZ.
- Jacks, L.S. 2012. Aquatic Nuisance Species Prevention and Control. DOI-Motorboat Operator Certification Course. Lake Havasu, AZ.
- Jacks, L.S. 2012. Career and Personal Development in the U.S. Fish & Wildlife Service. Career Explorations & Enhancement Workshop. Pinetop, AZ.
- Jacks, L.S. 2012. Generations in the U.S. Fish & Wildlife Service. Apache Trout Crew Workshop. Pinetop, AZ.
- Johnson, J.L. 2012. Response of Apache Trout to Mechanical Removal of Brown Trout. AZ/NM Chapter of the American Fisheries Society, Phoenix, AZ.
- Johnson, J.L. 2012. Native Fish Management in Arizona. 6th Annual Woodland Wildlife Festival. Pinetop, AZ.
- Johnson, J.L. 2012. Native Fish Management in Arizona. Arizona Game & Fish Department Annual Outdoor Expo. Phoenix, AZ.
- Johnson, J.L. and K.D. Barrett. 2012. Native fish and careers in fish biology. Presentation to the Native Vision's spring mini-camp, Cibecue, AZ.
- Knecht, T. 2012. Bismarck Brown as a Marking Technique for *Cyprinodon macularius* desert pupfish. Colorado River Aquatic Biologists Meeting, Laughlin, NV.

- Pillow, M.J. 2012. Humpback Chub (*Gila cypha*) Translocations and Monitoring Above Lower Atomizer Falls, Little Colorado River, AZ. AZ/NM Chapter of the American Fisheries Society, Phoenix, AZ.
- Randall, R. 2012. Population Estimates and Water Quality Summary for Native Fish in Backwater Habitats (2010-2011). Colorado River Aquatic Biologists Meeting, Laughlin, NV.
- Sponholtz, P.S. 2012. Threatened and Endangered Species Recovery on the Lower Colorado River. Colorado River Aquatic Biologists Meeting, Laughlin, NV.
- Sponholtz, P.J. 2012. Translocation and Monitoring of Humpback Chub in Havasu Creek, Grand Canyon National Park. AZ/NM Chapter of the American Fisheries Society, Phoenix, AZ.
- Taylor, T. 2012. Experiences and Advice of a Biological Technician. Career Explorations & Enhancement Workshop. Pinetop, AZ.
- Thorson, M.S. 2012. Summary of Giant Salvinia Spraying Activities on the Palo Verde Irrigation Drain, 2011. Colorado River Aquatic Biologists Meeting, Laughlin, NV.
- Thorson, M.S. 2012. Population Estimates and Water Quality Summary for Native Fish in Backwater Habitats (FY 2011). Colorado River Aquatic Biologists Meeting, Laughlin, NV.
- Van Haverbeke, D.R. 2012. Status of Humpback Chub in the Little Colorado River. Colorado River Aquatic Biologists Meeting, Laughlin, NV.
- Van Haverbeke, D.R. 2012. Population Estimates of Humpback Chub, Bluehead Sucker, and Flannelmouth Sucker in the Little Colorado River, Grand Canyon, AZ. AZ/NM Chapter of the American Fisheries Society, Phoenix, AZ.
- Van Haverbeke, D.R. 2012. Arizona Fish & Wildlife Conservation Office Activities in the Little Colorado River in the Grand Canyon. Lees Ferry Angling Guides meeting, AZ.
- Van Haverbeke, D.R. 2012. Learning by Doing: The Glen Canyon Dam Adaptive Management Program and Protecting the Dynamic River Resources in the Grand Canyon. 27th Annual Southwestern Region of the Native American Fish and Wildlife Society Meeting, Ignacio, CO.
- Voeltz, J.B. 2012. The Wallow Fire and Its Impacts to the Apache Trout Recovery Program. AZ/NM Chapter of the American Fisheries Society, Phoenix, AZ.

Voeltz, J.B. 2012. Status of Apache Trout Recovery. Presentation to the 2012 Apache trout field crew, Whiteriver, AZ.

Voeltz, J.B. 2012. Status of Apache Trout Recovery. Presentation to the White Mountain Fly Fishing Club, Pinetop, AZ.

Voeltz, J.B.. Experiences and Advice of a Fisheries Biologist. Career Explorations & Enhancement Workshop. Pinetop, AZ.

Voeltz, J.B. 2012. Status of Apache Trout Recovery. 3rd Annual Arizona Native Trout Workshop. Phoenix, AZ.

Appendix E. Publications

The following is a list of publications, reports, and stories published in FY 2012 by AZFWCO personnel. Copies of these publications can be obtained by contacting

Arizona Fish & Wildlife Conservation Office
P.O. Box 39
Pinetop, AZ 85935
928-338-4288

- Barrett, D.A., and Leslie, D.M. 2012. Spatio-Temporal Variations in Age Structures of a Partially Re-established Population of Northern River Otters (*Lontra canadensis*). *The American Midland Naturalist*, Volume 168, Issue 2, p. 302-314.
- Barrett, K.D. 2011. Desert Fish Habitat Partnership Newsletter, Volume 2 Number 3. USFWS-AZFWCO-PT-12-006.
- Barrett, K.D. 2012. Desert Fish Habitat Partnership, 2011 Annual Report. USFWS-AZFWCO-PT-12-021.
- Barrett, K.D. 2012. Desert Fish Habitat Partnership Newsletter, Volume 3 Number 1. USFWS-AZFWCO-PT-12-011.
- Barrett, K.D. 2012. Desert Fish Habitat Partnership Newsletter, Volume 3 Number 2. USFWS-AZFWCO-PT-12-015.
- Jacks, L.S. and B. Ikenson. 2012. Arizona Fish and Wildlife Conservation Office 2011 Annual Report. USFWS-AZFWCO-PT-017.
- Johnson, J.L. 2011. Brown Trout Removal from Apache Trout Streams on the Fort Apache Indian Reservation 2003-2011 Summary Report. USFWS-AZFWCO-PT-12-003.
- Johnson, J.L. 2011. Apache Trout Stream Barrier Evaluations on the Fort Apache Indian Reservation 2008-2010 Report. USFWS-AZFWCO-PT-12-004.
- Johnson, J.L. 2011. Apache Trout Population Assessments on the Fort Apache Indian Reservation 2007-2010 Summary Report. USFWS-AZFWCO-PT-12-005.
- Johnson, J.L. 2012. San Carlos Lake Water Quality Report. USFWS-AZFWCO-PT-12-010.
- Knecht, T. 2012. Twelfth Annual Native Fish Roundup on Lake Havasu, AZ. USFWS-AZFWCO-PA-12-003.

- Pillow, M.J. 2011. Spring 2011 Monitoring of Humpback Chub (*Gila cypha*) and other Fishes in the Lower 13.57 km of the Little Colorado River, Arizona. USFWS-AZFWCO-FL-11-007
- Pillow, M.J. 2011. Fall 2011 Monitoring of Humpback Chub (*Gila cypha*) and other Fishes in the Lower 13.57 km of the Little Colorado River, Arizona. USFWS-AZFWCO-FL-12-002.
- Randall, R. 2011. Population Estimates and Water Quality Summary for Native Fish Backwater Habitats (2010-2011). USFWS-AZFWCO-PA-12-001.
- Randall, R. 2012. Lake Mohave Razorback Roundup Summary Report. USFWS-AZFWCO-PA-12-002.
- Stone, D.M. and D.R. Van Haverbeke. 2011. June 2011 Monitoring of Humpback Chub (*Gila cypha*) and other Fishes above Lower Atomizer Falls in the Little Colorado River, Arizona. USFWS-AZFWCO-FL-11-006.
- Voeltz, J.B. 2011. "Arizona's Largest Wildfire Poses Challenges and Opportunities for Rare Aquatic Species." *Endangered Species Bulletin*. November-December 2011. <http://www.fws.gov/endangered/news/bulletin-NovDec2011.html>
- Voeltz, J.B. (ed.). 2011. *Currents* – Region 2 Fisheries Accomplishments: Volume 7 Number 4 (4th Quarter FY 2011).
- Voeltz, J.B. (ed.). 2012. *Currents* – Region 2 Fisheries Accomplishments: Volume 8 Number 1 (1st Quarter FY 2012).
- Voeltz, J.B. (ed.). 2012 *Currents* – Region 2 Fisheries Accomplishments: Volume 8 Number 2 (2nd Quarter FY 2012).
- Voeltz, J.B. (ed.). 2012 *Currents* – Region 2 Fisheries Accomplishments: Volume 8 Number 3 (3rd Quarter FY 2012).
- Van Haverbeke, D.R., D.M. Stone, L.G. Coggins Jr. and M. J. Pillow. In press. Long-term monitoring of an endangered desert fish and factors influencing population dynamics. *Journal of Fish and Wildlife Management*.

Appendix F. AZFWCO Partners

Below is a list of recent Partners that the Arizona Fish & Wildlife Conservation Office is actively working with.

State Agencies

- Arizona Game & Fish Department
- Arizona State Parks

Tribes

- White Mountain Apache Tribe
- San Carlos Apache Tribe
- Colorado River Indian Tribes
- Navajo Nation
- Hopi Tribe
- Hualapai Tribe
- Kaibab-Paiute Tribe
- Havasupai Tribe
- Fort Mojave Tribe
- Chemehuevi Tribe
- Fort Yuma

Federal Agencies

- U.S. Forest Service
- U.S. Bureau of Reclamation
- National Park Service
- U.S. Geological Survey
- Bureau of Land Management
- Grand Canyon Monitoring & Research Center

Non-Governmental Organizations

- Trout Unlimited
- Federation of Fly Fishers
- University of Arizona
- Arizona State University
- Northern Arizona University
- Anglers United

U.S. Fish & Wildlife Service Field Stations

- Alchesay National Fish Hatchery
- Willow Beach National Fish Hatchery
- Inks Dam National Fish Hatchery
- Uvalde National Fish Hatchery
- Mora National Fish Hatchery
- Southwestern Native Aquatic Resources & Recovery Center
- New Mexico Fish & Wildlife Conservation Office
- Arizona Ecological Services Field Office
- Bill Williams River National Wildlife Refuge
- San Bernardino National Wildlife Refuge
- Havasu National Wildlife Refuge
- Cibola National Wildlife Refuge
- Imperial National Wildlife Refuge

Appendix G. References

- Arizona Riparian Council. 2006. Arizona Riparian Council Newsletter. Volume 19, Number 2.
- Fuller, P.L., L.G. Nico, and J.D. Williams. 1999. Nonindigenous Fishes Introduced into Inland Waters of the United States. Special Publication 27. American Fisheries Society, Bethesda, MD. 613 pp.
- Johnson, R. R., P. S. Bennett, and L. Haight. 1989. Southwestern woody riparian vegetation and succession: an evolutionary approach. Pp 135 - 139. In: Proceedings of the California Riparian Systems Conference. D.L. Abell (ed.). USDA Forest Service General Technical Report PSW - 110.
- Rinne, J.N. and W.L. Minckley. 1991. Native fishes in arid lands: dwindling resources of the desert Southwest. USDA Forest Service, General Technical Report RM-206, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.
- U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2006. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

Arizona Fish & Wildlife Conservation Office

Our Mission:

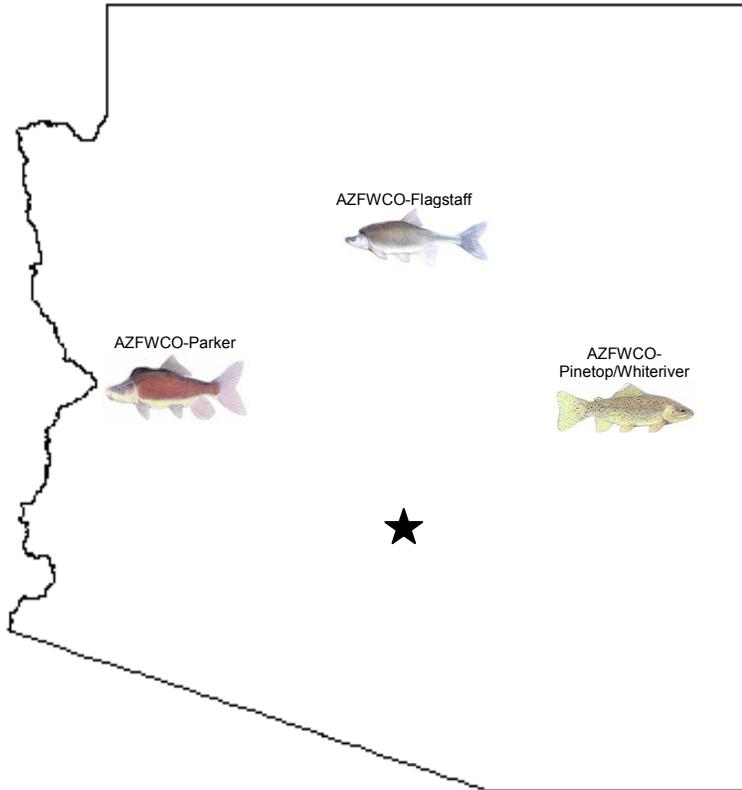
“Working with others to conserve, protect, and enhance fish and other aquatic organisms and their habitats in Arizona and the Southwest”

For additional information regarding the Arizona Fish and Wildlife Conservation Office or any of the accomplishments highlighted within this report, please feel free to contact us at one of our three Arizona locations:

AZFWCO-
Pinetop/Whiteriver
PO Box 39
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