Watershed News
GILA WATERSHED PARTNERSHIP
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Bonita Creek Native Fish Restoration

Native fishes historically found in the Gila River basin have suffered significant declines in abundance and distribution due to habitat loss and destruction, and negative interactions (predation, competition, hybridization, and parasite transmission) with nonnative aquatic organisms. To reverse this trend, nonnative fishes must be segregated from native fishes and the habitat protected to prevent reinvasions. Bonita Creek, Graham County, AZ, is considered a high priority for native fish recovery in the basin due to its assemblage of five native fishes, Gila chub (*Gila intermedia*), longfin dace (*Agosia chrysogaster*), speckled dace (*Rhinichthys osculus*), Sonora sucker (*Catostomus insignis*), and desert sucker (*Pantosteus clarki*) and habitats appropriate for introduction of other federally-listed fishes native to the Gila River basin. To protect 18.2 miles of Bonita Creek's native fishery a fish barrier was constructed and 2.6 miles of stream was chemically treated to remove nonnative fish species in 2008.

Fish Barrier: A fish barrier was constructed across Bonita Creek by the Bureau of Reclamation in 2008 to prevent upstream incursion of nonnative fishes from the Gila River. The barrier is a 160-foot wide concrete-reinforced arched structure with a four-foot tall crest, and is protected against stream scouring with sunken keys and rip-rap emplaced downstream of the apron. To ensure stability against boulders and vegetative debris carried by high magnitude flows, the barrier was anchored to abutment bedrock with anchor bars and keyed into the channel alluvium.

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Aquatic Species Salvage and Holding Operation

Salvage: Native fish were salvaged from Bonita Creek during October 5-7, 2008. To facilitate the salvage, the reach targeted for renovation was delineated into three manageable sub-reaches and 46 beaver dams were temporarily breached to reduce water volume and backwater habitat. A salvage crew led by an experienced fisheries biologist was assigned to each of the three sub-reaches and was responsible for salvaging native fish within their assigned reach. To capture as many native fish as possible all major habitats (*i.e.*, riffles, runs, and pools) were sampled using a variety of different methods including backpack electrofishing, seining, minnow traps, and hoop-nets. Each reach was electrofished throughout its entirety at least once and if native fish were abundant within the reach *(i.e.*, upper and middle reaches) it was electrofished in its entirety three times over the three days. On the third day of the salvage all crews targeted habitat within the upper two reaches; the upper two reaches supported the majority of native fish. Salvage efforts focused on all native fish species with an emphasis on acquiring as many endangered Gila chub as possible. Salvaged native fish were placed into five gallon buckets that were equipped with battery-powered aerators and transported to the temporary holding facility.

Sonora mud turtle (*Kinosternon sonoriense*) were also salvaged from Bonita Creek during October 5-7, 2008. Sonora mud turtles were captured using hoop nets and Promar® collapsible minnow traps that were baited with a 0.25-0.5 full can of sardines. Six to eight traps and 26 hoop nets were set, checked, and reset. Turtles from all nets and traps were combined and processed because of limited number of five gallon buckets. Midline carapace length (mm), plastron length (mm), and mass (g) of each turtle was recorded. After processing, turtles were transported in five gallon buckets to the temporary holding facility.

Holding: A portable fish holding system was developed and set up at Bonita Creek for maintaining native fish salvaged during the chemical renovation. The holding tank system consisted of six circular, six-foot-diameter (500 gallon) collapsible tanks. Each tank was outfitted with a ¼ inch mesh net cover to prevent fish from jumping out. Two air stones provided aeration to each tank. Each tank was fitted with a standpipe made of slotted 1 ½ inch well pipe to maintain consistent water

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level and allow water changes while preventing escapement of fish. One to three gallons per minute of fresh water was continuously piped to each tank from the nearby City of Safford water line; this prevented buildup of fish waste and maintained water temperatures at or near 20°C.

One of the major difficulties with maintaining wild caught fish during salvage operations is the high likelihood of parasite and disease outbreaks. *Ichthiopthirus multifillis* or Ich is prevalent on wild fish and commonly causes high mortality when fish are confined at high densities. To prevent Ich outbreaks fish were treated with salt at three parts-per-thousand (ppt) every night for 8-12 hours. A low-range digital salt meter was used to verify salinities in each tank. Salt treatments were done at night because daytime temperatures were too warm to stop water flow during the day. Salt at three ppt interrupts the life cycle of Ich, reduces fish stress, and decreases nitrite, a byproduct of fish waste. Ammonia and nitrite levels were checked every 4-6 hours in each tank to verify that fish waste products were not becoming toxic during salt treatments. Fish were fed once daily a combination of freeze dried bloodworms and small sinking pellets.

All fish were sorted by size when placed into the tanks to prevent larger fish from eating or damaging smaller fish. Each tank was filled with several large rocks and root wads to provide places for fish to hide.

Turtles were kept in hard plastic ‘kiddie’ pools (~1.5 m diameter and 0.3 m deep) adjacent to the fish holding tanks. Turtles from each station or pair of stations were kept in separate kiddie pools (labeled with station numbers) so that they could be returned to their respective areas of capture after holding. Chicken wire was attached over the top of the pools to keep predators out.

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Salvage Results: Two-hundred and one adult Sonora sucker, 335 juvenile Sonora sucker, one desert sucker, 53 adult Gila chub, 180 juvenile Gila chub, 107 longfin dace, and 25 speckled dace were salvaged from Bonita Creek. These native fish were held for up to 12 days and then returned to the stream. Several juvenile Gila chub, speckled dace, and juvenile Sonora suckers died while being held. No parasites or pathogens were observed on the fish during holding, but a few small chub had signs of fungus (likely a result of skin injuries during capture that had become secondarily infected in the holding tanks).

Thirty-two turtles were captured over the two days of trapping, all in hoop nets. In addition, two turtles were captured by hand and eight were captured by fish biologists. Forty-one of the captured turtles were adults (17 females and 24 males), and one was a juvenile. There were no mortalities of turtles during the salvage or the holding period. Old injuries were noted on several of the turtles and included two turtles that were missing a hind foot, a turtle with a bulging eye, a turtle with a scar, which likely indicated a crushing injury, and a turtle with a wart-like growth on a hind leg. All of these turtles were otherwise healthy.

Chemical Renovation

Methods: A chemical treatment plan was developed in June 2008 for Bonita Creek. The plan provided chemical and personnel needs and basic treatment strategies for the renovation. A commercial formulation of rotenone was chosen to remove fish in the stream. Rotenone is an EPA-registered piscicide that has seen widespread use in fisheries management for more than 50 years. Rotenone inhibits cellular respiration and is nontoxic to humans and other non-gill-breathing organisms. Under natural conditions, rotenone degrades within several days, depending on water pH, water temperature, alkalinity, ultraviolet light, and dilution by fresh water (Schnick 1974). Rapid neutralization (oxidation) occurs when rotenone is mixed with potassium permanganate or sodium permanganate.

Prior to treatment, stream discharge and volume was calculated using direct measurements. Appropriate calculations and on-site bioassays were made to determine the amounts of rotenone necessary to treat the stream reach. These calculations were double-checked by a certified pesticide applicator. Controlled amounts of rotenone were released at constant-flow drip stations over a 4- to 6-hour time period. Roving crews treated shallow backwaters and poorly-mixed shorelines with backpack sprayers. The stream was treated twice, one six-hour treatment per day over two consecutive days to ensure effectiveness. At the lower end of the treatment area (fish barrier site), a drip station was established to dispense approximately six parts-per-million (ppm) of aqueous sodium permanganate into the stream during the course of each piscicide treatment.

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Chemical Efficacy: Bonita creek was surveyed for live fish two days after the treatment using backpack electrofishers, collapsible minnow traps, and hoop nets. For electrofishing, the entire treated reach was surveyed in a single pass, moving upstream from the barrier to the infiltration gallery. Hoop nets were set for 2-3 nights in three reaches. Eight hoop nets were set in the upper reach for three nights, 14 hoop nets were set in the middle reach for two nights, and 17 hoop nets were set in the lower reach for two nights; all were baited with either Aquamax pellets or dry dog food. No live fish were collected or seen.

Sentinel fish (four Sonora suckers) were also placed into the upper reach of the project area on October 13, 2008 and held for 48 hours to determine if the chemical was still present in the water and toxic to fish. If the sentinel fish survived for 48 hours, the stream was considered safe for restocking. All sentinel fish survived, which indicated that the salvaged native fish and turtles could safely be returned to Bonita Creek.

Post-Renovation-Aquatic Stockings: Salvaged speckled dace, longfin dace, Gila chub, desert sucker, and Sonora sucker were repatriated back to Bonita Creek on October 15, 2008. All fish were released in the uppermost portion of Bonita Creek and allowed to disperse downstream into suitable habitat. All 42 salvaged Sonora mud turtles were released near where they were captured. All turtles behaved normally upon release.

In addition to repatriating the five native fish that were salvaged from Bonita Creek, four additional fish species including spikedace (*Meda fulgida*), loach minnow (*Tiaroga cobitis*), Gila topminnow (*Poeciliopsis occidentalis*), and desert pupfish (*Cyprinodon macularius*) were also stocked. Although no records of collections exist for spikedace, loach minnow, Gila topminnow, or desert pupfish from Bonita Creek all historically had access through the Gila River. Desert pupfish and Gila topminnow were stocked into pool habitat on October 31, 2008. Desert pupfish and Gila topminnow were stocked into separate locations, approximately 3.3 km apart (Gila topminnow downstream of pupfish) to obviate any potential immediate competition between the two species.

Monitoring: Bureau of Land Management will continue to monitor the Bonita Creek fishery at least annually to: 1) detect any nonnative fishes, 2) verify persistence of native fish species since stocking, 3) detect recruitment of young into the population, 4) evaluate if relative abundance changes over time, and 5) determine if species have dispersed throughout the treated reach.

Annual monitoring by the Bureau of Land Management in 2008 and 2009 has documented reproduction for several of the fish species, persistence of all nine species, and

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dispersal outside of the stocking locations.

Acknowledgements: The Bonita Creek native fish restoration project was a success due to the involvement and support of many partners. The following is an alphabetical list of partners who participated in this project: Arizona Game and Fish Department, Arizona State University, Bureau of Land Management, Bureau of Reclamation, City of Safford, The Nature Conservancy of Arizona, Northern Arizona University, United States Fish and Wildlife, University of Arizona, and volunteers.

References:

Schnick, R. A. 1974. A review of the literature on theuse of rotenone in fisheries. USDI Fish and Wildlife. La Crosse, Wisconsin.

RAIN WATER HARVESTING

Rain Water Harvesting is capturing and storing rainfall to irrigate plants or to supply people and animals. It is one of the oldest known gardening methods, dating back to the beginnings of agriculture. Water harvesting methods are still used by the Tohono O'odham and Hopi tribes, who traditionally plant after the onset of summer and winter rains. Did you ever play in rainwater as a child, building earth dikes and letting them go? This is what water harvesting is all about.

Water harvesting will help you save money on monthly water bills and reduce your dependence on municipally-supplied water. A well-designed system will also decrease your landscape maintenance needs.

All you need for a water harvesting system is rain, and a place to put it. Your system can be simple, using contoured areas so that water flows directly to planted areas; or sophisticated, featuring storage systems that can contain captured water for later use.

A “catchment” is any large surface that can capture and/or carry water to where it can be used immediately or stored. Where are your catchment surfaces? Everybody has at least one catchment on their property, such as a roof, patio or driveway. You can direct water runoff from these surfaces to plants, trees or lawns by using dikes, berms, or contouring. Rain gutters and pipes can move water to storage containers. You can use this stored water as an alternative watering source during sparse rain periods.

Acknowledgements & Sources: This article and additional information on rainwater harvesting can be found on the City of Tucson Website at:

http://www.ci.tucson.az.us/water/harvesting.htm

You must be the change you wish to see in the world.

-Mahatma Gandhi

Calendar of Events

Wednesday, September 2, 2009, 5 p.m. – 8 p.m. Master Watershed Steward Program led by Bill Brandau
For more information click here

Wednesday, September 9, 2009, **7 p.m**. September's meeting will be held at the Graham County General Services Building, 921 Thatcher Blvd., Safford, AZ

Wednesday, October 14, 2009, **7 p.m**. October's meeting will be held at the Graham County General Services Building, 921 Thatcher Blvd., Safford, AZ

Our partners include:

The Office of Congressman Rick Renzi
Arizona Department of Agriculture
Arizona Department of Environmental Quality
Arizona Department of Transportation
Arizona Department of Water Resources
Arizona Game and Fish Department
Arizona Geological Survey
Arizona State Land Department
Bureau of Land Management
City of Safford
Town of Thatcher
Town of Pima
Town of Duncan
Coronado RC&D
Gila Valley NRCD
Discovery Park
Farm Bureau
Graham County
Greenlee County
Gila Valley Irrigation District
Natural Resource Conservation Service
Phelps Dodge Mining Company
University of Arizona Cooperative Extension
University of Arizona NEMO Project
U.S. Fish and Wildlife Service
U.S. Forest Service – Apache Sitgreaves and Coronado Forests
U.S. Bureau of Reclamation
And many community members

Get involved in your watershed

For more information, contact Jan Holder at the Gila Watershed Partnership, 711 S. 14th Avenue, 85546, 520-419-0374, email-watershedholder@yahoo.com