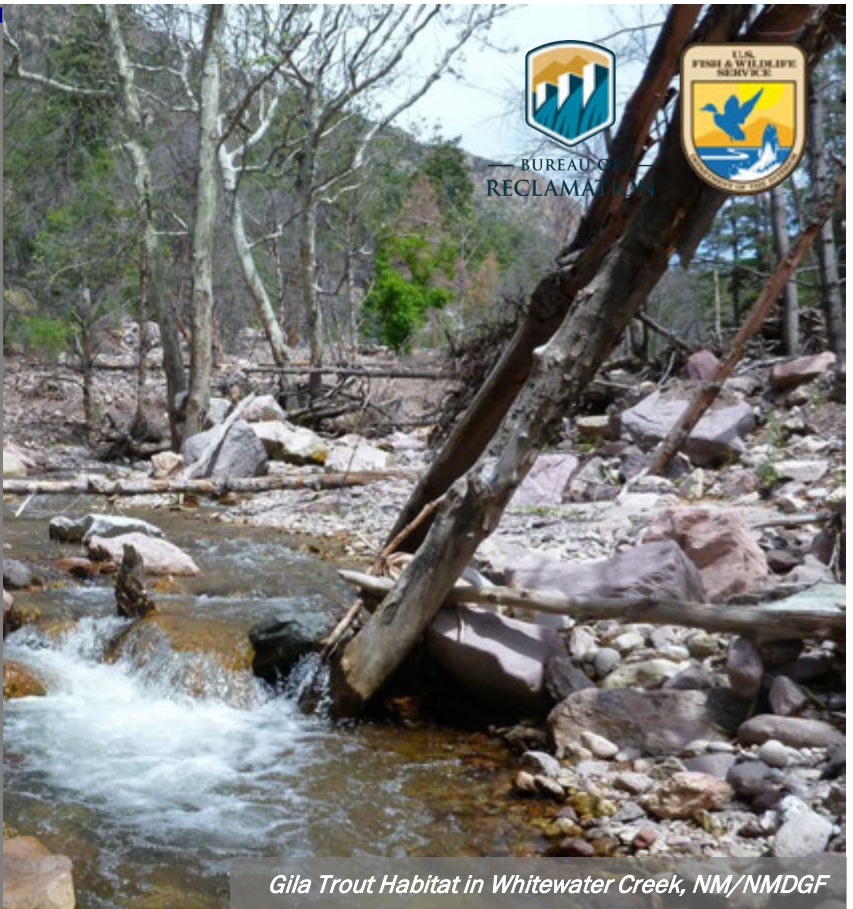


RESTORATION

Back-Crossing for Gila Trout Recovery



Gila Trout (*Oncorhynchus gilae*) are native to the Gila and San Francisco River basins in New Mexico and Arizona. Federally listed as endangered in 1967 and then reclassified as threatened in 2006, Gila Trout have five lineages remaining today (Main Diamond Creek, South Diamond Creek, Whiskey Creek, Iron Creek, and Spruce Creek). Gila Trout populations have decreased mainly due to wildfires and habitat loss. The Spruce Creek lineage has experienced the worst of these impacts, making it a high priority for conservation efforts. Federal, state, and academic partners make up the recovery team that uses the Gila Trout Recovery Plan to guide conservation of this species. Conservation efforts include the use of back-crossing, a form of breeding that introduces new genetic material to a population with low genetic diversity.



Gila Trout Habitat in Whitewater Creek, NM/NMDGF

KEY ISSUES ADDRESSED

Wildfires like the 2012 Whitewater-Baldy Complex Fire in New Mexico are the biggest threat to Gila Trout due to fire impacts on habitat quality, particularly sediment and ash deposits in streams that alter flows and decrease oxygen levels. Post-wildfire water quality issues also make it difficult to find suitable habitat for Gila Trout releases. The Spruce Creek lineage, which was decimated by the Whitewater-Baldy Complex Fire, exhibits low genetic diversity. It is difficult to maintain pure individuals for back-crossing because there are few in the wild and they have low survival rates in captivity. Recovery of this species is a multi-step effort that depends on multiple agencies and hatchery personnel.

PROJECT GOALS

- Maintain all five lineages at Mora National Fish Hatchery while restoring genetic diversity of the Spruce Creek lineage through back-crossing
- Provide Gila Trout to New Mexico and Arizona for recovery and sport fishing programs
- Delist Gila Trout after establishing self-sustaining populations in the wild

UNIQUE ORIGIN

The Spruce Creek lineage's genetic material is unique in comparison to the other four because it is the only lineage originating from the San Francisco River Basin.



Adult Gila Trout/A. Miller/USFWS

PROJECT HIGHLIGHTS

Back-Crossing Spruce Creek Gila Trout: Researchers began back-crossing efforts in 2016. The process begins with breeding Spruce Creek females with Whiskey Creek males that have high genetic diversity. Then, researchers breed Spruce-Whiskey Creek hybrids with pure Spruce Creek individuals. The hybrids are bred yearly for back-crossing.

Returning Gila Trout to Native Streams: Researchers spawn Gila Trout in spring and transport them to native streams in the fall of the same year. Fish must be stocked before they outgrow their small native streams.

Stocking Recreational Waters: Managers provide surplus fish—those not stocked in native streams or kept to maintain hatchery fish populations—for sport fishing.

Multi-Agency Effort: Back-crossing efforts involve Mora National Fish Hatchery and the U.S. Fish and Wildlife Service (USFWS) Southwestern Native Aquatic Resources and Recovery Center. The recovery team received help from the University of New Mexico, USFWS, and others. Finally, New Mexico Department of Game and Fish and Arizona Game and Fish Department implement stocking native streams and recreational waters for fishing.

Collaborators

- Arizona Game and Fish Department
- New Mexico Department of Game and Fish
- U.S. Fish and Wildlife Service: New Mexico Fish and Wildlife Conservation Office
- U.S. Forest Service

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LESSONS LEARNED

Managers must treat each lineage differently due to genetic differences and variability of each lineage to survive in the hatchery and in the wild. Back-crossing efforts for the Spruce Creek lineage are an example of this, as it required a unique recovery approach.

There are few Spruce Creek populations in the wild and keeping a pure Spruce Creek population alive in the hatchery was more difficult than expected.

Researchers should have developed strategies in advance to co-manage populations and maintain pure Spruce Creek populations in both the wild and in the hatchery.

Early generations of Spruce-Whiskey Creek hybrids are exhibiting higher survival rates in the hatchery than pure Spruce Creek trout. These initial results provide hope for future progress and success.

Multi-agency collaboration has been critical to program success. This project requires a multitude of people and agencies working together to move forward with adaptive decision-making. Every person and agency involved has been instrumental to Gila Trout recovery.

NEXT STEPS

- Continue back-crossing efforts with the Spruce Creek lineage to increase genetic diversity and population numbers
- Create strategies to make up for the lack of pure Spruce Creek trout in the hatchery to sustain back-crossing efforts
- Monitor streams in the Apache-Sitgreaves, Gila, and Tonto National Forests to find suitable habitat for Gila Trout reintroductions

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Gila Trout Fry/A. Miller/USFWS