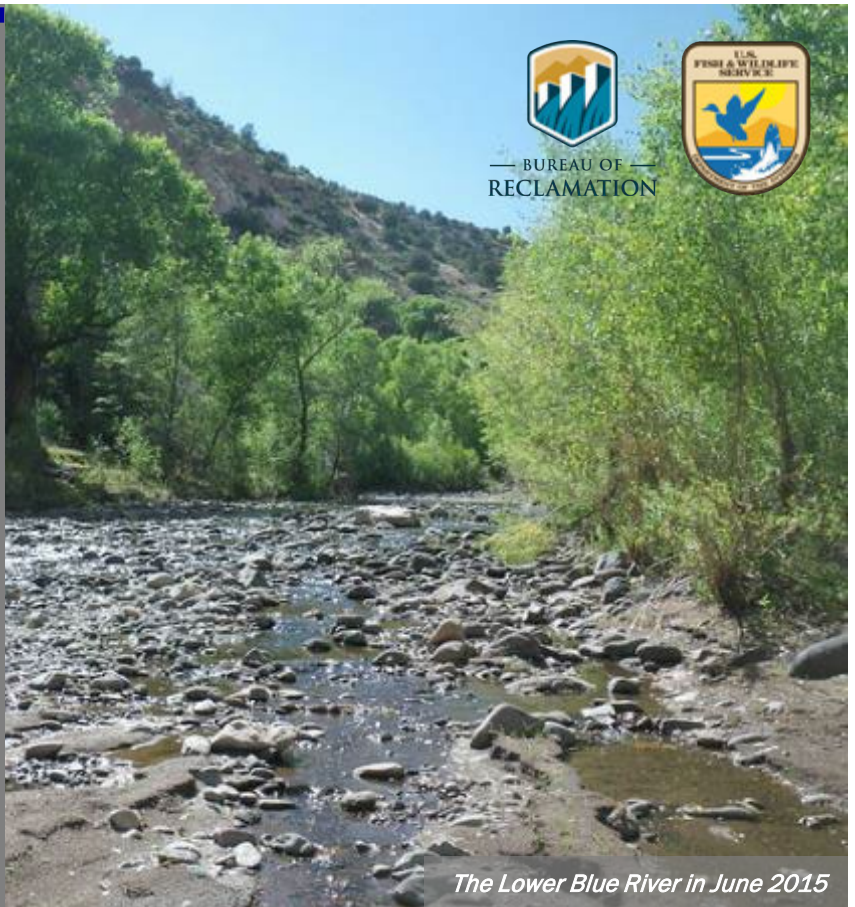


RESTORATION

Restoration of a Native Fish Assemblage in the Blue River, Arizona



The Blue River, located in the upper Gila River Basin of eastern Arizona, is within the historical range of several species of native fish, including federally endangered Spikedace (*Meda fulgida*) and Loach Minnow (*Rhinichthys cobitis*), and Roundtail Chub (*Gila robusta*), a Species of Greatest Conservation Need in Arizona and New Mexico. These species face declines from competition and predation from non-native fish and are now considered extirpated throughout much of their native range. In 2012, Arizona Game and Fish Department and other partners initiated the Blue River Native Fish Restoration Project to establish populations of native fishes. The project involved: 1) building a fish barrier, 2) eliminating non-native fish, and 3) translocating and monitoring native species in the lower Blue River.



KEY ISSUES ADDRESSED

The primary threat to native species in the lower Blue River is that non-native piscivorous Channel Catfish (*Ictalurus punctatus*) and Green Sunfish (*Lepomis cyanellus*) were moving upstream into native fish habitat. This created competition for food and habitat, and provided opportunities for non-natives to prey upon native species.

Biologists commonly re-introduce or augment native fish populations. However, translocation efforts often fail because factors leading to a species' initial decline, such as the presence of non-native species, have not been addressed. For this reason, in addition to translocating native species, biologists needed to eradicate non-native fish and prevent reinvasion.

PROJECT GOALS

- Construct a fish passage barrier to prevent upstream movement of non-native fishes
- Utilize mechanical techniques to eradicate non-native fish that already reside above the barrier
- Establish and secure populations of Spikedace, Loach Minnow, and Roundtail Chub via translocation and monitoring

WALLOW FIRE

In 2011, ash and debris from the Wallow Fire decreased the abundance of native and non-native fish which subsequently reduced resource competition for newly translocated species.



Adult Roundtail Chub From the Blue River

PROJECT HIGHLIGHTS

Fish Passage Barrier: In 2012, the Bureau of Reclamation constructed a fish passage barrier that spanned the width of the river channel using reinforced concrete.

Native Fish Stockings: From 2012 to 2016, biologists stocked Spikedace, Loach Minnow, and Roundtail Chub. They obtained fish from the AZGFD Aquatic Research and Conservation Center and translocated some Roundtail Chub from nearby Eagle Creek.

Non-Native Aquatics Treatment Techniques: Biologists conducted mechanical non-native fish removal from 2012-2019. They removed Channel Catfish using pole spears, spear guns, and nets. To remove Green Sunfish, biologists used a combination of nets and traps, and occasionally backpack electrofishing. Biologists successfully removed 10 Channel Catfish, with the last individual captured in 2013, and 148 Green Sunfish, with the last individual captured in 2016.

Monitoring Efforts: Biologists monitored the fish assemblage annually from 2012 to 2019. In 2012, nearly half of the assemblage was comprised of non-native species and in 2019 the assemblage consisted of exclusively native fishes with Spikedace, Loach Minnow, and Roundtail Chub being the most abundant.

Collaborators

- Arizona Game and Fish Department
- Bureau of Reclamation
- See online for full list of collaborators

CCAST Author: Krystie Miner, University of Arizona, February 2022.

Photos courtesy of AZGFD.

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LESSONS LEARNED

Different methods were successful for removing the two targeted non-native species. Spearfishing was the only effective method for eliminating catfish in this system, while trapping and electrofishing worked particularly well for removing Green Sunfish.

Successful removal of non-natives using mechanical techniques is rare. However, in this case, biologists were successful because they began removal efforts when non-native abundance was low and prevented reinvasion by constructing the barrier. Biologists have not seen non-native fish for multiple consecutive years and collected eDNA samples to verify that they achieved eradication.

This project demonstrates the feasibility of removing non-native fish and restoring native fish assemblages in a large river system. However, it is important to be patient and plan ahead; the compliance process can take several years and it also takes time to gain an understanding of the distribution of non-native species. Once the project begins, it can take several years to implement. It is also critical to monitor the system several years after final stocking efforts to determine success.

NEXT STEPS

- Analyze eDNA samples to confirm non-native eradication
- Continue monitoring the lower Blue River annually
- Translocate and monitor Spikedace and Roundtail Chub in reaches further upstream of the barrier
- Respond and adapt to changes in the system (i.e., fire salvage and restocking if necessary)

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Non-Native Fish Removal Using a Speargun