NEW MEXICO DEPARTMENT OF GAME AND FISH
NATIVE FISH CONSERVATION EFFORTS: 2024

Annual Report

Submitted to

Bureau of Reclamation
Gila River Basin Native Fishes Conservation Program

From

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Cooperative Agreement (R21AC10115)

February 28, 2025

EXECUTIVE SUMMARY

This report summarizes the Gila River Basin Native Fishes Conservation Program tasks funded for native fish conservation in New Mexico in 2024. Work in 2024 was conducted under a Cooperative Agreement (21AC10115) between the Bureau of Reclamation and the New Mexico Department of Game and Fish. Three ongoing native fish conservation efforts were conducted in 2024: (1) removal of nonnative fishes from the West Fork Gila River, (2) threatened and endangered (T&E) fish repatriations and monitoring, and (3) remote site inventory in the Gila River Basin. The West Fork Gila River nonnative removal was completed in June 2024. Seven nonnative species were captured and removed. Priority species Loach Minnow *Tiaroga cobitis*, Roundtail Chub *Gila robusta*, and Spikedace *Meda fulgida* were all captured during sampling. Monitoring of repatriation efforts in Bear Creek documented natural reproduction of Loach Minnow, while surveys of Gila Topminnow at Burro Ciénaga suggest the population is extirpated. A remote site inventory of the Lower Box of the Gila River was conducted. Specific details of work completed and results for each native fish conservation task are included within this report.

INTRODUCTION

The Gila River Basin Native Fishes Conservation Program (GRBNFCP) was established to minimize effects on threatened and endangered fishes by the Central Arizona Project (CAP). The United States Fish and Wildlife Service (USFWS) biological opinions in 1994, 2001, and 2008 concluded that operation of the CAP required mitigation for the negative effects on federally listed fish species within the entire Gila River Basin. The GRBNFCP is focused on conservation work for federally listed Gila Chub *Gila intermedia* (now classified as Roundtail Chub *Gila robusta*), Gila Topminnow *Poeciliopsis occidentalis*, Loach Minnow *Tiaroga cobitis*, Razorback Sucker *Xyrauchen texanus,* and Spikedace *Meda fulgida*. In the most recent GRBNFCP Strategic Plan (USFWS et al. 2024), the principal goals are described as: (1) achieve enhanced conservation status of federally listed and candidate fish species in the Gila River basin, and (2) alleviate and diminish threats from nonnative aquatic species that might enter the Gila River basin via the CAP canal or other pathways. The program is funded by the Bureau of Reclamation (BOR) and is directed by the USFWS and BOR in cooperation with the New Mexico Department of Game and Fish (Department) and the Arizona Game and Fish Department (AZGFD). The Department receives funds from the BOR for work fitting these objectives under a Cooperative Agreement (21AC10115 from 2021 to 2025). The Department prepares an annual report for the GRBNFCP which describes the results of the native fish conservation efforts funded during the preceding calendar year. Most New Mexico native fish conservation tasks are completed through a collaborative effort among the Department, the USFWS, and the United States Forest Service (USFS).

For each task funded in 2024, this report lists the GRBNFCP Strategic Plan goal(s) the task addresses (USFWS et al. 2022), followed by associated recovery objective(s) listed in the Loach Minnow and Spikedace Recovery Plans (USFWS 1991, 1991) and the Gila Chub and Gila Topminnow Draft Recovery Plans (USFWS 1999, 2015). Work performed by the Department in 2024 is presented under each task. For each task, a background of the work is included followed by results, recommendations for the future, and work planned for 2025.

REMOVAL OF NONNATIVE FISHES FROM WEST FORK GILA RIVER (TASK NM-2006-1)

Strategic Plan Goals

- Prevent extinction and manage toward recovery
    - Goal 3. Protect native fish populations from nonnative fish invasions.
    - Goal 4. Remove nonnative aquatic species threats.
    - Goal 9. Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats.

Recovery Objectives

- Loach Minnow Recovery Plan (1991)
    - Task 2.5 (priority 1): Monitor community composition including range of natural variation
    - Task 3.1-2 (priority 2): Identify nature and significance of interaction with nonnative fishes
- Spikedace Recovery Plan (1991)
    - Task 2.5 (priority 1): Monitor community composition including range of natural variation
    - Task 3.1-2 (priority 2): Identify nature and significance of interaction with nonnative fishes

Background

The West Fork Gila River supports an intact native fish assemblage, including Federally Endangered and Gila River Basin Native Fishes Conservation Program (GRBNFCP) priority species Loach Minnow and Spikedace. Nonnative fishes including Brown Trout *Salmo trutta*, Flathead Catfish *Pylodictis olivaris*, Smallmouth Bass *Micropterus dolomieu*, and Yellow Bullhead *Ameiurus natalis* are the primary threat to the continued persistence of endangered and other native species in the West Fork Gila River. Since 2006, the Department, US Forest Service, and US Fish and Wildlife Service have annually removed nonnative fishes in an approximately 4 km reach of the West Fork Gila River located on the Department's Heart Bar Wildlife Management Area. The goal of this project is to suppress nonnative species within this reach to benefit Loach Minnow, Spikedace, and other native species. Although this reach of the West Fork Gila River is not protected from reinvasion by nonnatives, continued suppression is thought to provide benefit to native species occupying the reach.

Historically, suppression efforts were conducted by sampling individual mesohabitats in a systematic fashion until the entire 4 km reach was sampled. Generally, only a single pass through the entire reach was completed during a five-day period due to the amount of time required to survey mesohabitats individually. Conducting only a single pass prevented the ability to fully assess the efficacy of this effort, determine potential effects on native species, or track trends in the abundance of species through time because capture probabilities and abundance estimates cannot be made with these data. Capture probability varies by species, sampling methods, habitat types, and environmental conditions and failure to account for these differences can bias estimates of abundance and lead to incorrect management decisions. To fully assess the efficacy of this project, alterations to the current sampling protocol must be made to increase the number of passes conducted within the reach.

Results

In June 2024, Department, USFWS, and USFS staff employed two-pass depletion methods to evaluate the effectiveness of nonnative removal efforts on the native fish assemblage of the West Fork Gila River (Figure 1). Abundance and capture probabilities were estimated for native fishes in seven newly established Monitoring Reaches and for nonnative fishes across all 21 sampled reaches when capture data were sufficient (Figures 2 and 3). These parameters could not be estimated for Common Carp, Flathead Catfish, *Oncorhynchus* spp., and Western Mosquitofish, but the total catch and percent composition across all reaches are presented below (Table 1). Modeled capture probabilities varied between species and sites, ranging from 0.4–0.9 for nonnative species and 0.18–0.78 for native species.

As in previous years, native fish comprised most species captured in the West Fork Gila River during nonnative removal efforts. Desert Sucker *Catostomus clarkii* and Sonora Sucker *Catostomus insignis* were the most abundant native species (Table 1; Figure 2A). Loach Minnows were present at all seven Monitoring Reaches and depletion model estimates indicated highest abundances downstream (Figure 2A). Spikedace were detected in one Monitoring Reach. Roundtail Chub persist at low densities; they were detected at only five sites and primarily at the upper end of the reach.

Smallmouth Bass and Yellow Bullhead were the most abundant nonnative species captured (Table 1; Figure 3). Flathead Catfish and Yellow Bullhead were detected at Monitoring Reaches 12 and 15 respectively, but capture data were insufficient to model abundance. Though sampling was modified in 2024 and long-term comparisons are not possible, Smallmouth Bass catch appears to be increasing, and their current distribution spans the entire nonnative removal area (Figure 3). Yellow Bullhead abundance estimates were higher in the upper end of the removal reach.

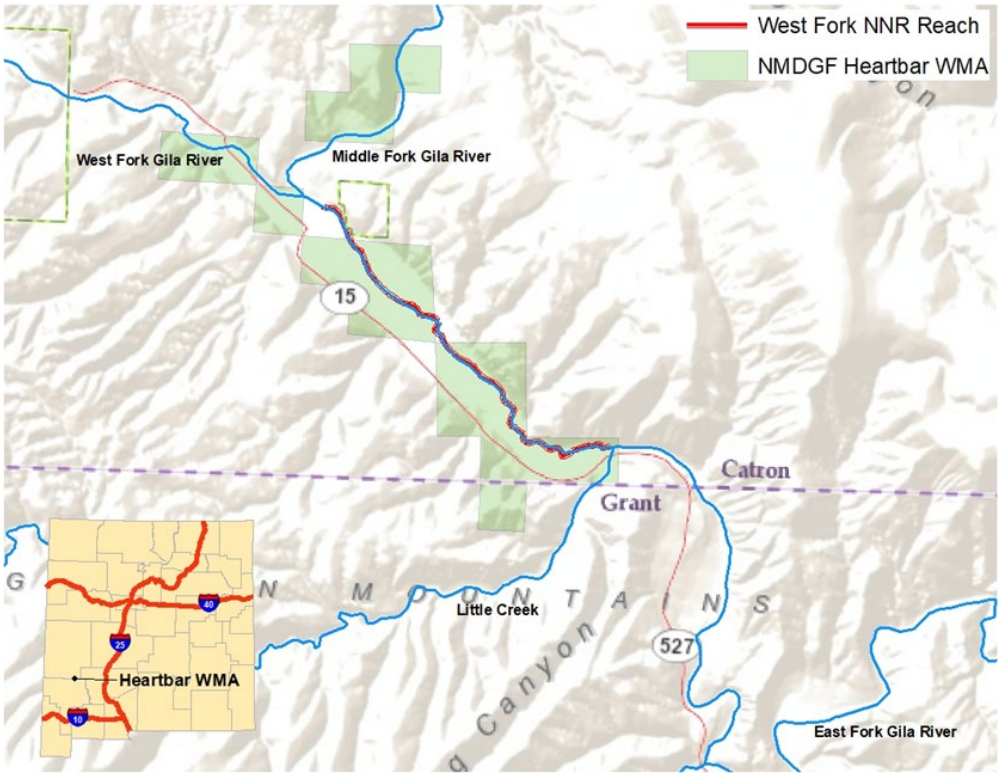

Figure 1. Location of West Fork Gila River nonnative fish removal efforts.

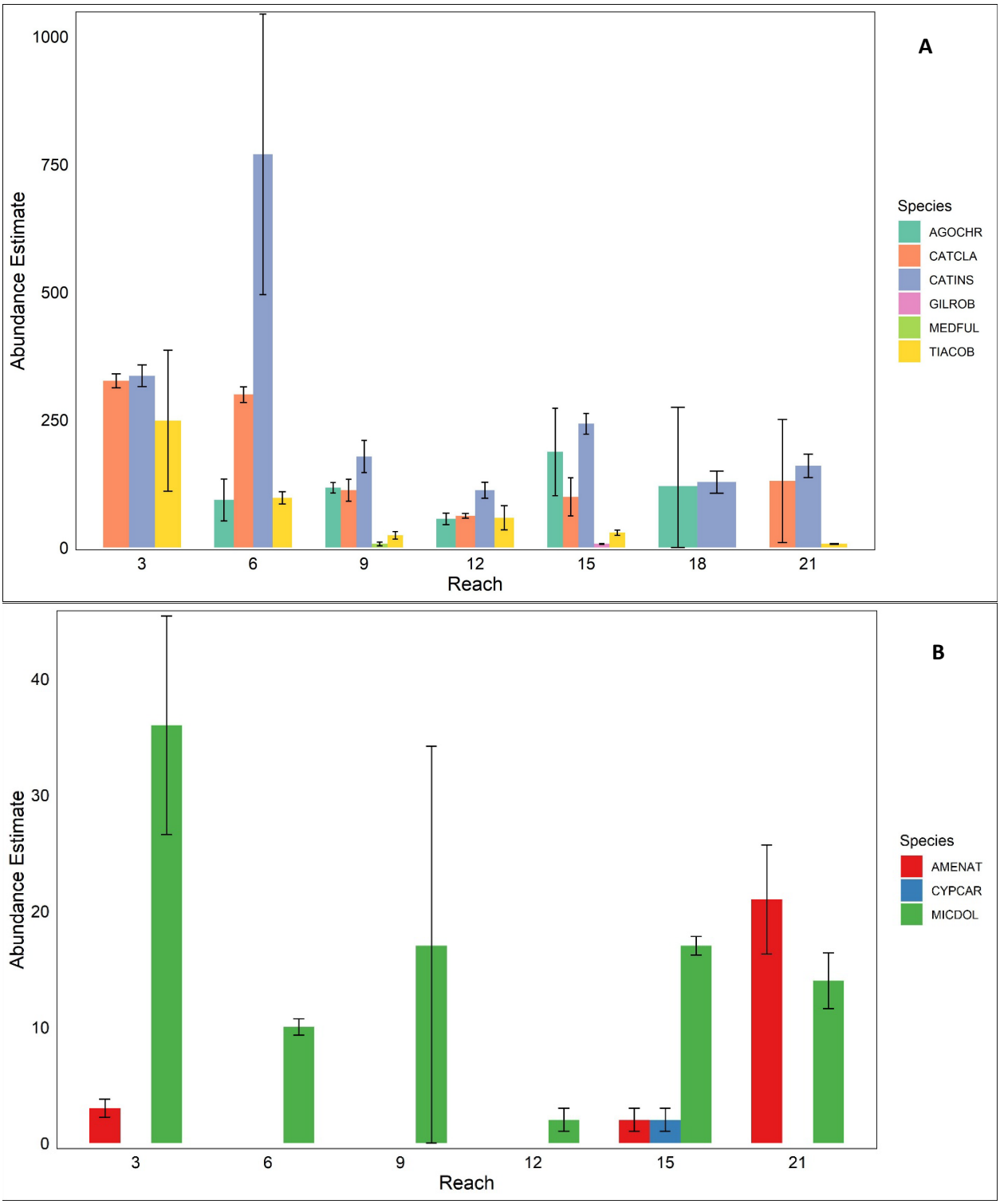

Figure 2. Estimated abundance and standard errors from two-pass depletion models of native (A) and nonnative fishes (B) captured in seven Monitoring Reaches during nonnative removal sampling in the West Fork Gila River in 2024. Note differences in scale of y-axes.

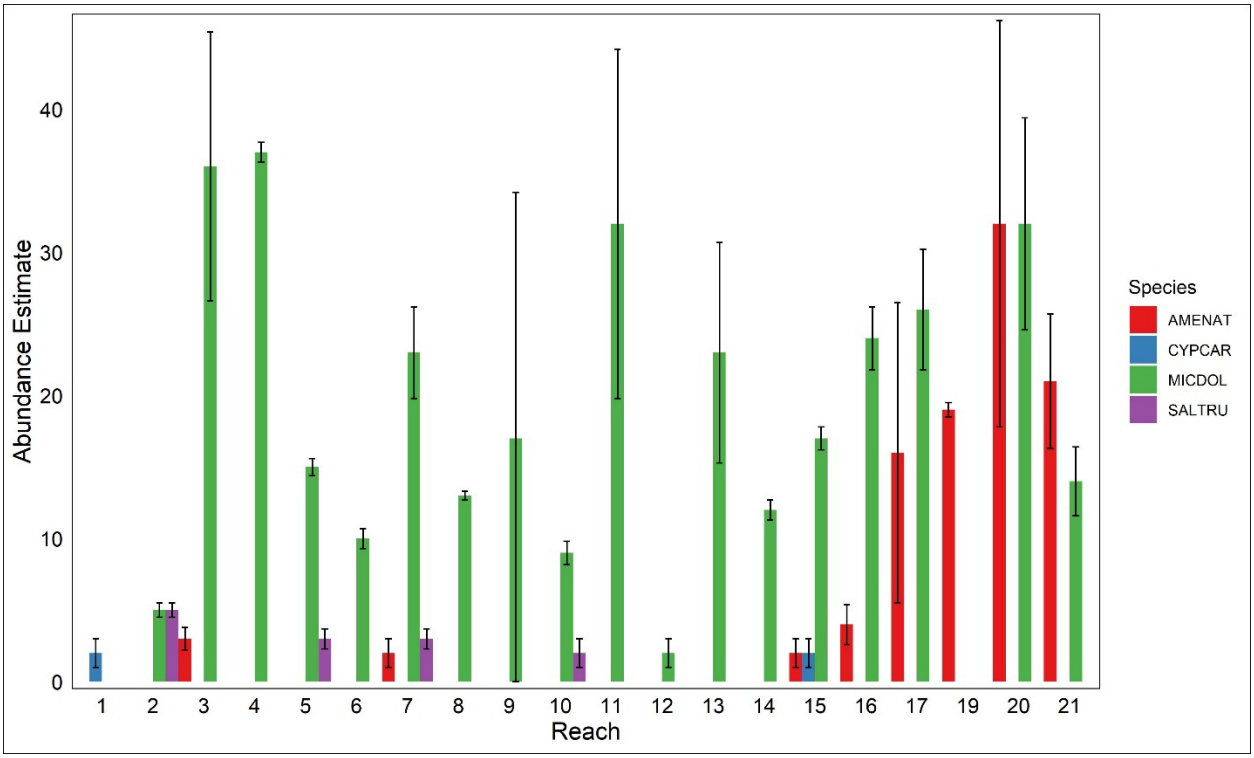

Figure 3. Estimated abundance and standard errors from two-pass depletion models of nonnative fishes captured across all reaches sampled during nonnative removal sampling in the West Fork Gila River in 2024.

Table 1. Number and percent composition of fishes captured in the West Fork Gila River during nonnative removal efforts in 2024.

Species	Number captured	Percent Composition
Native		
Desert Sucker	933	27.3
Loach Minnow	291	8.5
Longfin Dace	392	11.5
Roundtail Chub	19	0.6
Sonora Sucker	1198	35.0
Speckled Dace	113	3.3
Spikedace	6	0.2
Nonnative		
Brown Trout	25	0.7
Common Carp	6	0.2
Flathead Catfish	6	0.2
Oncorhynchus spp.	5	0.1
Smallmouth Bass	323	9.4
Western Mosquitofish	11	0.3
Yellow Bullhead	89	2.6

Recommendations

- We recommend continuing nonnative removal efforts on the West Fork Gila River to reduce nonnatives and potentially benefit the native fishes with nonnative suppression. Continuation of the new protocol that was implemented in 2024 will allow for a better evaluation of removal efforts in the reach.

Work Planned for 2025

- Conduct West Fork Gila River nonnative removal on the 4-km Heart Bar Wildlife Management Area reach in June 2025.

NEW MEXICO T&E FISH REPATRIATIONS AND MONITORING (TASK NM-2002-1)

Strategic Plan Goals:

- Build the scientific foundation for recovery efforts
    - Goal 1. Identify critical streams and populations in need of protection and replication
- Prevent extinction of rare populations and species
    - Goal 1. Acquire and maintain hatchery/pond stocks of critically endangered populations as insurance against extinction in the wild and to provide sources for population replications
    - Goal 6. Replicate rare populations and their associated native fish community into protected streams and other surface waters
- Manage toward recovery
    - Goal 4. Continue and expand repatriations of native fish communities.
    - Goal 7. Monitor on-the-ground activities to quantitatively measure and evaluate programmatic success in improving the status of target species and their habitats.
    - Goal 9. Periodically evaluate the success of species repatriations and surface water renovations.

Recovery Objectives

- Loach Minnow Recovery Plan (1991)
    - Task 6.2 (priority 3): Identify and prepare sites for reintroduction
    - Task 6.3-4 (priority 3): Reintroduce into selected reaches and monitor
    - Task 6.5-6 (priority 3): Determine reasons for success/failure and rectify as necessary
    - Task 8.2 (priority 3): Collect hatchery stocks
- Spikedace Recovery Plan (1991)
    - Task 6.2 (priority 3): Identify and prepare sites for reintroduction
    - Task 6.3-4 (priority 3): Reintroduce into selected reaches and monitor
    - Task 6.5-6 (priority 3): Determine reasons for success/failure and rectify as necessary
    - Task 8.2 (priority 3): Collect hatchery stocks
- Gila Topminnow Recovery Plan (1999 Draft)
    - Task 1.1 (priority 1): Maintain refugia populations of natural populations
    - Task 2.2 (priority 1) Reestablish into suitable habitats

Background

The objective of this project is to identify potential repatriation streams and sites, evaluate potential donor populations, conduct repatriation of identified streams, and monitor streams post-repatriation. This project also covers fish salvages and collections for transfer to Arizona Department of Game and Fish (AZDGF) Aquatic Research and Conservation Center (ARCC) for broodstock and refuge population maintenance. This is an ongoing project that needs to be continued across the Gila Basin until species are recovered.

Results

Multiple surveys to inform repatriation efforts were conducted in 2024, including surveys for Loach Minnow in Bear Creek and Gila Topminnow at Burro Ciénaga. Anticipated stocking of Loach Minnow into Saliz Canyon and Spikedace into the Tularosa River was rescheduled to 2025.

Saliz Canyon

Stocking of Loach Minnows into Saliz Canyon began in 2016. Stocking was postponed in 2018 due to habitat degradation resulting from the Owl Fire (Ferguson and Wick 2019). In June 2019, Department and USFWS staff visually assessed the stocking reach of Saliz Canyon. Suitable habitat was found, the substrate was less embedded than in 2018, and other fish species appeared to have recovered. Loach Minnow stocking resumed in 2019. Department and USFWS staff conducted surveys in Saliz Canyon in 2021. Ten Loach Minnows (37–64 mm TL) were captured at the stocking location, however none were captured at an upstream site. The capture of Loach Minnow less than 40 mm TL in 2021 and 2020 indicate that stocked fish have successfully reproduced in Saliz Canyon (Ferguson and Zeigler 2021). Stocking efforts appear to have established Loach Minnows in Saliz Canyon but the repatriated population is spatially limited. An additional access location, approximately 1.0 km upstream from the original stocking location (Figure 5), was identified in 2022. Based on a visual assessment conducted by Department personnel, the location seemed suitable for stocking, with riffle habitat and perennial streamflow present.

On October 10, 2023, one Department and one ARCC staff stocked 205 Loach Minnows in Saliz Canyon at the upstream identified site. Stocking was expected to continue in 2024, however logistical issues prevented the fall stocking. The second stocking will occur in late winter/spring 2025 with a third in fall 2025. Surveys to assess the status of the repatriated population at both sites will occur in 2026. It is recommended that eDNA samples be collected during this sampling to better assess distribution of Loach Minnow in Saliz Canyon.

Bear Creek

Loach Minnows were salvaged from Bear Creek in 2020 and transferred to ARCC after the Tadpole Fire. The progeny (n = 41) of these salvaged fish were restocked into Bear Creek on October 10, 2023. The population was surveyed in cooperation with Marsh & Associates on November 6, 2024. Loach Minnows were detected at all sampled sites and natural reproduction was confirmed. Additional information and results from the survey can be found in Marsh & Associates 2024 monitoring report.

Burro Ciénaga

In 2008, 578 Gila Topminnow were stocked into Burro Ciénaga (Ferguson and Wick 2019). During subsequent sampling, far fewer individuals were captured in 2018 (n=4) than in 2012 (n=300). Department staff assisted Marsh and Associates with sampling Burro Ciénega in 2023, but no Gila Topminnow were captured. Department and USFWS staff conducted additional surveys in Burro Ciénega on July 16, 2024. Seven ponds were sampled with galvanized minnow traps (Figure 4), but no Gila Topminnow were captured or observed. The population of Gila Topminnow in Burro Ciénaga is likely extirpated.

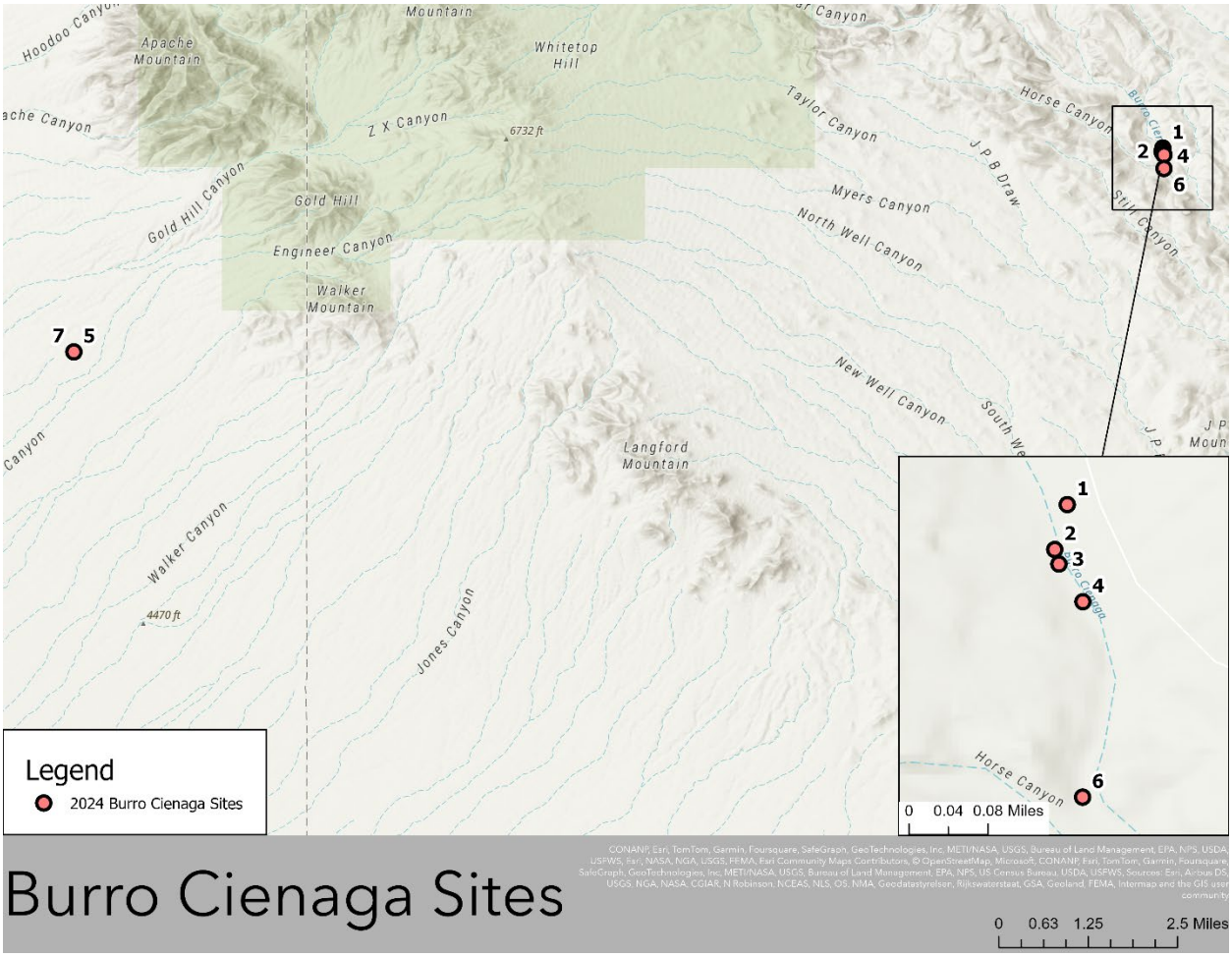

Figure 4. Locations of surveys conducted for Gila Topminnow at Burro Ciénega in 2024.

Tularosa River

The Tularosa River currently supports Loach Minnow but not Spikedace. However, recent work by Crosby (2020) indicated that the river is suitable for the species. Planned stocking of Spikedace into the Tularosa River in fall 2024 was postponed until late winter/spring 2025. Additional stockings are expected to occur in the fall of 2025 and 2026.

Allred Pond

Further investigation into the Allred Pond in Glenwood, NM revealed that it was hydrologically connected to multiple other ponds owned by private landowners. Given the potential invasion of nonnatives from outside sources, the pond is not presently considered a suitable stocking location for Gila Topminnow or Roundtail Chub (formerly Gila Chub).

Recommendations

- Saliz Canyon should continue to be stocked with Loach Minnows at the new upstream site to expand their distribution within the watershed.
- Spikedace should be stocked in the Tularosa River, as it currently supports Loach Minnow but not Spikedace. Stocking should occur annually for three years and will be followed by surveys in 2027 to assess the success of the stocking effort.

Work Planned for 2025

- Multiple stockings of Loach Minnow into Saliz Canyon are anticipated in 2025.
- Spikedace will be stocked in the Tularosa River in March and fall 2025.
- Follow-up surveys will be conducted in Little Creek to determine if Loach Minnow persist.

REMOTE SITE INVENTORY AND ASSESSMENT (TASK NM-2017-2)

Strategic Plan Goals:

- Build the scientific foundation for recovery efforts
    - Goal 1. Identify critical streams and populations in need of protection and replication.
    - Goal 5. Survey poorly studied stream systems to document existing fish communities.

Recovery Objectives

- Loach Minnow Recovery Plan (1991)
    - Task 6.2 (priority 3): Identify and prepare sites for reintroduction
    - Task 6.3-4 (priority 3): Reintroduce into selected reaches and monitor
    - Task 6.5-6 (priority 3): Determine reasons for success/failure and rectify as necessary
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    - Task 1.1 (priority 1): Maintain refugia populations of natural populations
    - Task 2.2 (priority 1): Reestablish into suitable habitats

Background

Much of the Gila River Basin in New Mexico is extremely remote and thus difficult to sample. The distribution of the priority and nonnative species in the remote sections of the Gila River and its forks were last surveyed in the mid-2000s and Department records indicate that the remote lower canyons of the San Francisco River in New Mexico have never been surveyed before. Remote surveys in the middle and east forks of the Gila River have been completed with funding from GRBNFCP. The lower Middle Fork Gila River was surveyed in the summer 2017 and the upper reaches were surveyed in the summer 2018. The East Fork Gila River and tributaries, excluding Black Canyon Creek were surveyed in 2019. Black Canyon Creek was surveyed in 2020 and the lower West Fork Gila River was surveyed in 2021 and the upper West Fork Gila River was surveyed in 2022. Remote reaches of the lower San Francisco River in New Mexico were surveyed in 2023 and the Lower Box of the Gila River was the focal area for 2024 sampling This is an ongoing project with plans to monitor at least one remote site location per year until the assessment is complete, and then update status approximately every ten years.

Results

In May 2024, Department, USFS, and USFWS staff surveyed 10 sites spaced at 1-km intervals across 10 km of habitat in the Lower Box (Figure 5). Few native fishes were detected during surveys; Longfin Dace was the only native species captured (Table 2). Loach Minnow, Roundtail Chub, and Spikedace were not captured at any site. By contrast, nonnative fishes were observed at all sites and in higher densities than native fishes. Channel Catfish *Ictalurus punctatus* and Red Shiner *Cyprinella lutrensis* were captured at all sites (Figure 6). The absence of native fishes may be attributed to the presence of large-bodied predatory nonnative fishes including Channel Catfish and Flathead Catfish. Additionally, high flow conditions during surveys likely affected sampling efficiency, as few pools were available to be sampled.

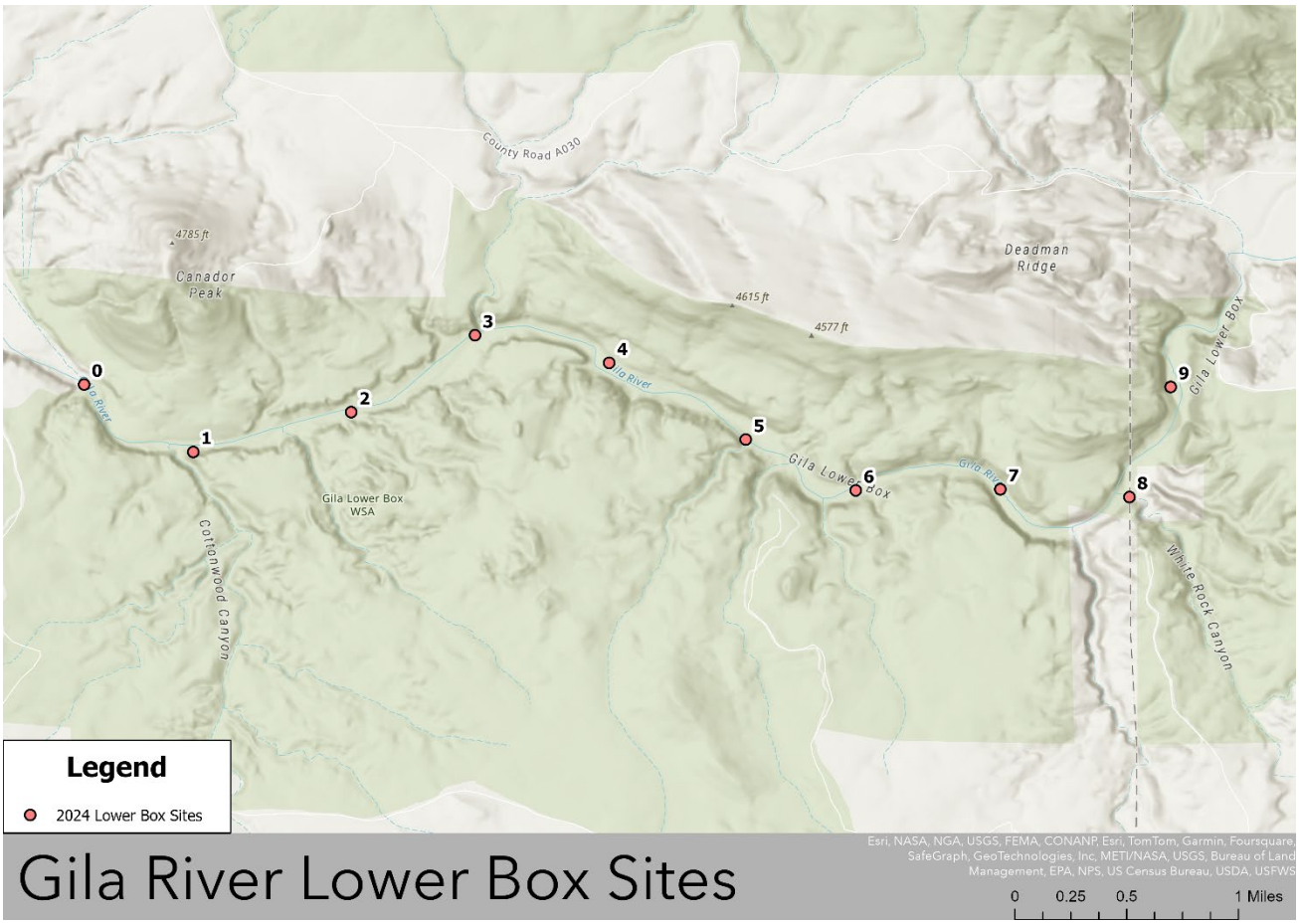

Figure 5. Location of remote inventory sites in the Lower Box of the Gila River sampled in 2024.

Table 2. Number and percent composition of native versus nonnative fishes captured at remote sites in the Lower Box of the Gila River during surveys conducted in May 2024.

Site Name	Native fishes captured	Native Percent Composition	Nonnative fishes captured
Gila Lower Box 0	47	41.9	65
Gila Lower Box 1	2	3.1	63
Gila Lower Box 2	0	0	15
Gila Lower Box 3	2	5.7	33
Gila Lower Box 4	1	3.7	26
Gila Lower Box 5	0	0	57
Gila Lower Box 6	0	0	138
Gila Lower Box 7	0	0	130
Gila Lower Box 8	4	12.1	29
Gila Lower Box 9	2	4.0	47

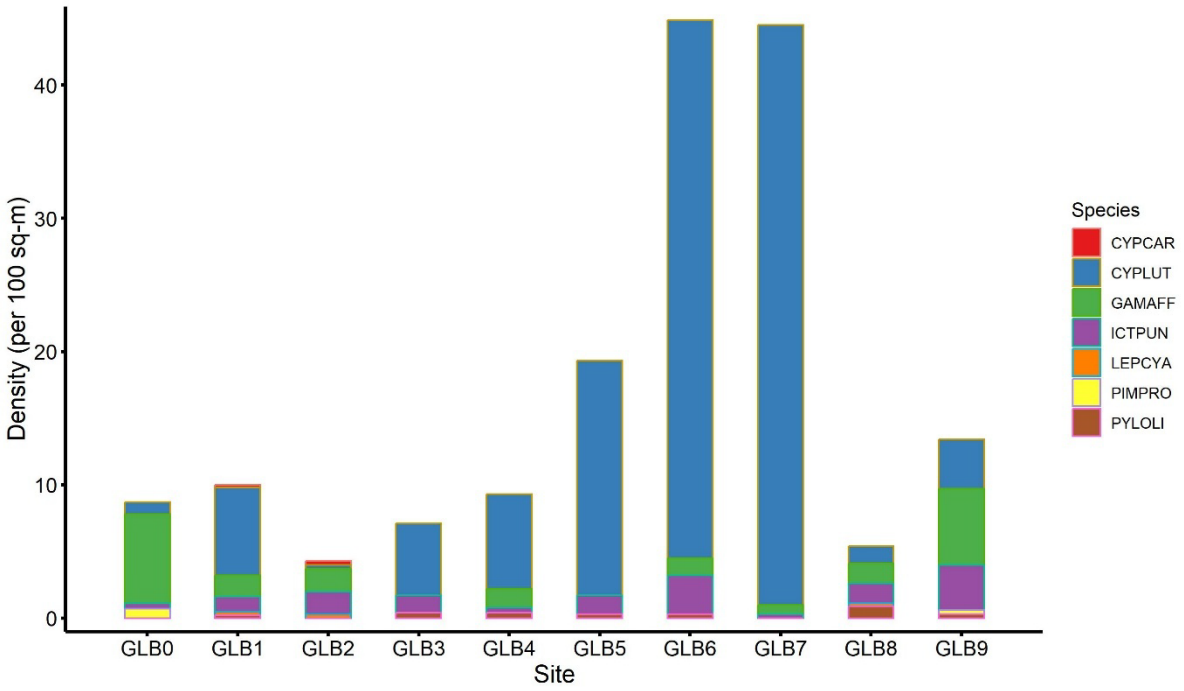

Figure 6. Density (fish per 100 m^2) of nonnative fishes captured at sites sampled during remote site inventory of the Lower Box of the Gila River in 2024. Note that sites are oriented from downstream (GLB0) to upstream (GLB9) on the x-axis.

Recommendations

- The fish assemblage of the Lower Box of the Gila River is largely dominated by nonnative species. This reach appears unsuitable for repatriation because of the presence of predatory nonnative fish and limited suitable habitat for native species.

Work Planned for 2025

- None. No work under this project was funded for in 2025.

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