

**NEW MEXICO DEPARTMENT OF GAME AND FISH
NATIVE FISH CONSERVATION EFFORTS: 2022**

Annual Report



Submitted to

Bureau of Reclamation
Gila River Basin Native Fishes Conservation Program

From

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EXECUTIVE SUMMARY

This report summarizes the Gila River Basin Native Fishes Conservation Program (GRBNFCP) tasks funded for native fish conservation in New Mexico in 2022. Work in 2022 was conducted under a Cooperative Agreement (21AC10115) between the Bureau of Reclamation (BOR) and the New Mexico Department of Game and Fish (Department). Three ongoing native fish conservation efforts were conducted in 2022: (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 2022. Seven nonnative species were captured and removed. Surveys were conducted to assess a new site for the repatriation of Loach Minnow *Tiaroga cobitis* in Saliz Canyon. Stock tanks at the headwaters of Harden Cienega Creek in New Mexico were surveyed for the presence of nonnative fish species and for evaluation of a possible future fish removal, as it is suspected that Green Sunfish *Lepomis cyanellus* that have been captured downstream in Harden Cienega Creek in Arizona originated in the tanks in this area and spread when monsoons cause the tanks to overflow. Five of the six remaining sites on the West Fork Gila River were surveyed, completing the West Fork Gila River remote site inventory. Specific details of work completed and results for each native fish conservation task are included within this report. All analyses were completed using R 3.6.2 (R Core Team 2019).

INTRODUCTION

The 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, Razorback Sucker *Xyrauchen texanus*, and Spikedace *Meda fulgida*. In the most recent GRBNFCP Strategic Plan (USFWS et al. 2018), 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 BOR and is directed by the USFWS and BOR in cooperation with the 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 between the Department, the USFWS, and the United States Forest Service (USFS).

For each task funded in 2022, this report lists the GRBNFCP Strategic Plan goal(s) the task works toward achieving (USFWS et al. 2018), 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 2022 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 2023.

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.
 - Goal 10. Maintain accurate Program tracking records.

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 Spikedace and Loach Minnow as well as state endangered Roundtail Chub (previously known as Headwater Chub *Gila nigra*). In addition, federally threatened Gila Trout *Oncorhynchus gilae* are stocked in cooler months to provide recreational fishing opportunities and support recovery efforts. Ten nonnative fishes have been documented in the river including Brown Trout *Salmo trutta*, Flathead Catfish *Pylodictis olivaris*, Rainbow Trout *Oncorhynchus mykiss*, Smallmouth Bass *Micropterus dolomieu*, and Yellow Bullhead *Ameiurus natalis*. The Department and partners have been removing nonnative fishes from an approximately 4-km reach of the West Fork Gila River at the Department-owned Heart Bar Wildlife Management Area since 2006. This reach lies in the vicinity of the confluence of the Middle and West Forks of the Gila River, an area also commonly referred to as “The Forks” (Figure 1). Nonnatives are removed from the Little Creek confluence upstream to the NM15 Bridge. The removal effort consists of a single pass of sampling by individual mesohabitat. Pools and runs are electrofished with two shockers simultaneously, riffles are electrofished and kicknetted into a seine, and sandy shoals are seined. Fish and habitat data collected during this removal effort included species, effort (seconds), habitat type, and area (m²) sampled. Total length (to the nearest mm) and weight (to the nearest gram) are collected for the first 50 individuals of each species captured each day. After 50 lengths and weights have been recorded, the remaining fish are enumerated by species and measured for total length. The removal is conducted annually in June, requires a crew of 6 to 9 people, and usually takes 4 to 5 days to complete. The same stretch of river is sampled annually. However, the river has changed considerably since the project began in 2006, including a major shift of the river channel and high variability in the number of braided channels encountered year to year. Propst et al. (2014) evaluated this effort using data from 2007 to 2012. Results suggested that this effort reduced biomass of some nonnative species and increased

Spikedace biomass. The GRBNFCP decided to continue the effort because of the documented reduction of nonnative species.

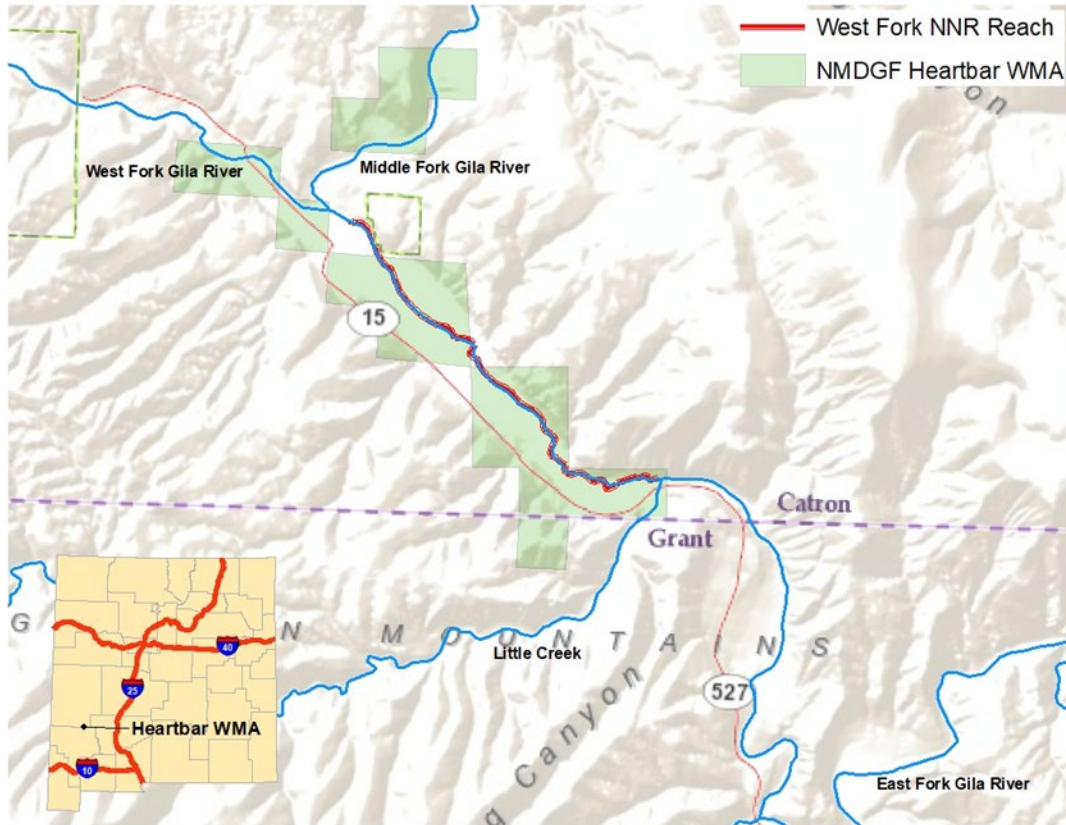


Figure 1. Map showing the location of the West Fork Gila River nonnative fish removal.

Results

Department, USFWS, and USFS staff conducted the West Fork Gila River nonnative removal from June 6 – 9, 2022. Total area sampled was 20,298 m². Sonora Sucker *Catostomus insignis*, Longfin Dace *Agosia chrysoaster*, Desert Sucker *Catostomus clarkii*, and Loach Minnow were the most abundant native species (Table 1; Figures 2 and 3). Western Mosquitofish *Gambusia affinis* was the most abundant nonnative species captured overall. Nonnative species captured in low densities were Common Carp *Cyprinus carpio*, Red Shiner *Cyprinella lutrensis*, and Western Mosquitofish (Figure 4). Roundtail Chub continue to be present in the reach, but at low densities. Flathead Catfish (n = 19) were captured for the first time since the Whitewater Baldy fire in 2012 and were the most abundant large-bodied nonnative captured in 2022. There does not appear to be Flathead Catfish recruitment as the individuals captured ranged in total length from 372 to 900 mm. The densities of priority species have declined over the past three years, as have the densities of most native and nonnative species overall (Figures 2 - 4). The cause of this is unknown but shifting habitat requirements and decreasing suitability of some instream habitat are probable causes.

Table 1. Total number, percent composition, and density (fish/100 m²) of all fish captured, by species, in the West Fork Gila River during nonnative removal efforts in 2022.

Species	N	Percent composition	Density (fish/100 m ²)
Native			
Desert Sucker	173	10.83	0.85
Gila Trout	1	0.06	0.00
Loach Minnow	130	8.14	0.64
Longfin Dace	193	12.08	0.95
Roundtail Chub	2	0.13	0.01
Sonora Sucker	962	60.20	4.74
Speckled Dace	28	1.75	0.14
Spikedace	13	0.81	0.06
Nonnative			
Brown Trout	1	0.06	0.00
Bullhead species	8	0.50	0.04
Common Carp	4	0.25	0.02
Fathead Minnow	0	0.00	0.00
Flathead Catfish	19	1.19	0.09
Green Sunfish	0	0.00	0.00
Oncorhynchus spp.	0	0.00	0.00
Red Shiner	2	0.13	0.01
Smallmouth Bass	7	0.44	0.03
Western Mosquitofish	55	3.44	0.27

Table 2. Area sampled and percent composition of all habitat types sampled on the West Fork Gila River during nonnative removal in 2022.

Habitat type	Area sampled (m ²)	Percent composition
Pool	8900	43.85
Riffle	2120	10.44
Run	8910	43.90
Slackwater	80	0.40
Zero Velocity	287	1.42

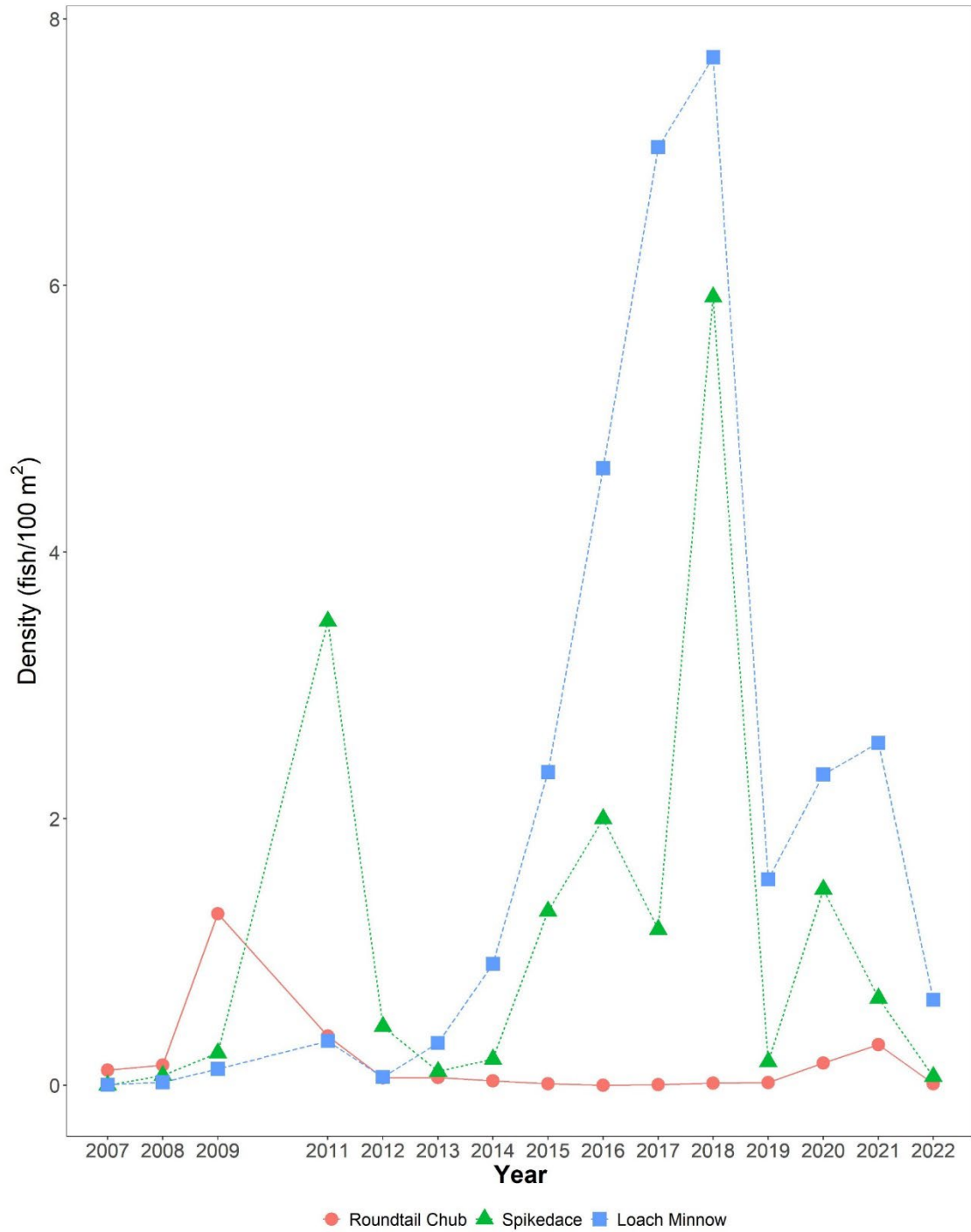


Figure 2. Density (fish/100 m²) of priority native fish species captured in the West Fork Gila River nonnative removal from 2007 to 2022. Data from 2006 and 2010 are excluded because habitat measurements were not recorded.

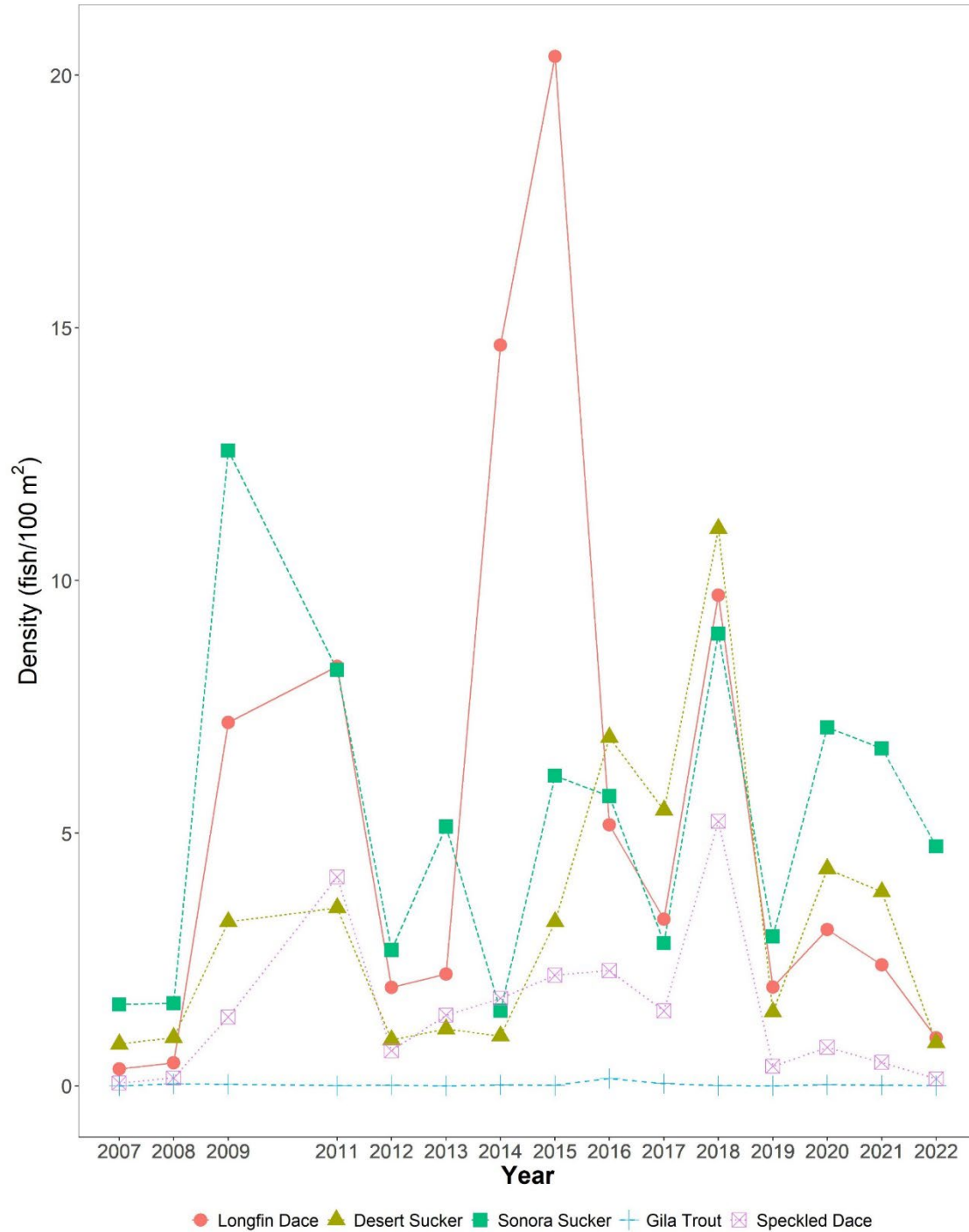


Figure 3. Density (fish/100 m²) of non-priority native fish species captured in the West Fork Gila River nonnative removal from 2007 to 2022. Data from 2006 and 2010 are excluded because habitat measurements were not recorded.

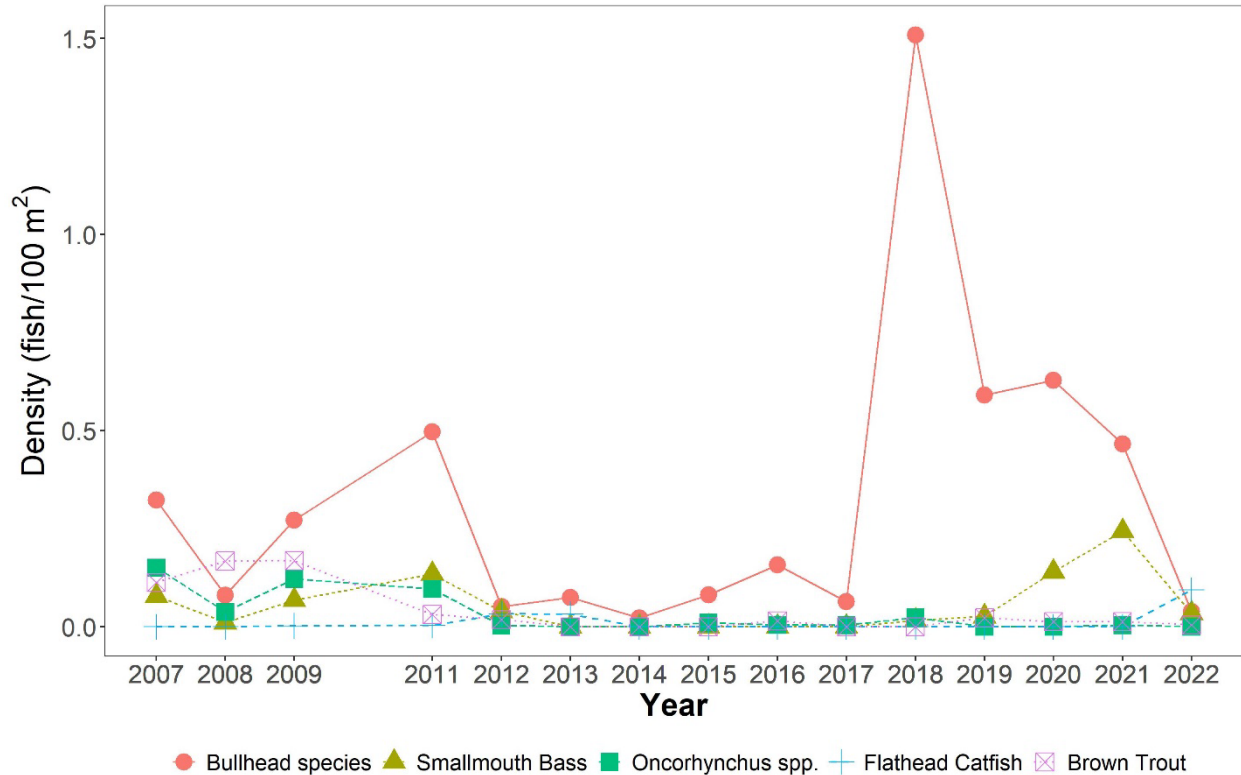


Figure 4. Density (fish/100 m²) of nonnative fish species captured in the West Fork Gila River nonnative removal from 2007 to 2022. Data from 2006 and 2010 are excluded because habitat measurements were not recorded. Note that this plot excludes Common Carp, Red Shiner, and Western Mosquitofish densities, though these species were captured in 2022.

Recommendations

- In order to reduce nonnatives and potentially benefit the native fishes with nonnative suppression, we recommend continuing nonnative removal efforts on the West Fork Gila River. A single pass should continue to be completed until evidence suggests that additional effort is needed.

Work Planned for 2023

- Conduct West Fork Gila River nonnative removal on 4-km Heart Bar Wildlife Management Area reach in June 2023.

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

Strategic Plan Goals:

- Prevent extinction and manage toward recovery
 - Goal 1. Identify critical streams and populations in need of protection and potential replication.
 - Goal 2. Maintain and operate ASU topminnow holding facility and the Aquatic Research and Conservation Center (ARCC) to support the Program's recovery efforts for imperiled fishes in the Gila River Basin through the establishment of refuge populations of genetically distinctive stocks as insurance against extinction in the wild, captive propagation for repatriation, and applied research.
 - Goal 5. Replicate populations and their associated native fish community into protected streams and other surface waters.
 - Goal 9. Monitor to quantitatively measure and evaluate project success in improving the status of species and their habitats.
 - Goal 10. Maintain accurate Program tracking records.

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

Background

This task is used to identify potential repatriation streams, evaluate potential donor populations and repatriation sites, conduct repatriation to identified streams, monitor populations post-repatriation, and supplement hatchery populations as needed. Repatriations consist of multiple stockings into each repatriation stream successively for 3 to 5 years or until monitoring of the streams determines the populations are established or considered unsustainable. Established streams are then surveyed at least once every five years. It is an ongoing effort to find and evaluate new waters where repatriation may be possible. This task encompasses all New Mexico streams within the Gila River basin where repatriation might occur. Repatriation stockings can be direct transfers of fish from a wild population or stocking from a hatchery such as ARCC. This task is also used for collecting live fish for the purposes of direct stocking, quarantine at ARCC, or development and maintenance of brood stock at ARCC.

Results

Several ongoing repatriation projects were continued in 2022, including an evaluation of sites for a potential future nonnative fish removal project in tanks in the headwaters of Harden Cienega and an evaluation of additional repatriation sites in Saliz Canyon.

Harden Cienega Tanks

Department personnel surveyed three stock tanks in the headwaters of Harden Cienega Creek (Figure 5) along with personnel from AZGFD on July 20, 2022. Young-of-year Green Sunfish *Lepomis cyanellus* were captured in Distill Tank (n = 4) and California Tank (n = 9) using dip nets. Ditch Tank had previously dried out but had refilled with water. Department and AZGFD surveyed Ditch Tank with a bag seine. Zero fish were caught but several Tiger Salamanders *Ambystoma tigrinum* were captured. Three additional tanks of interest in the area have been identified on private land but the landowner did not grant Department personnel access to these tanks.

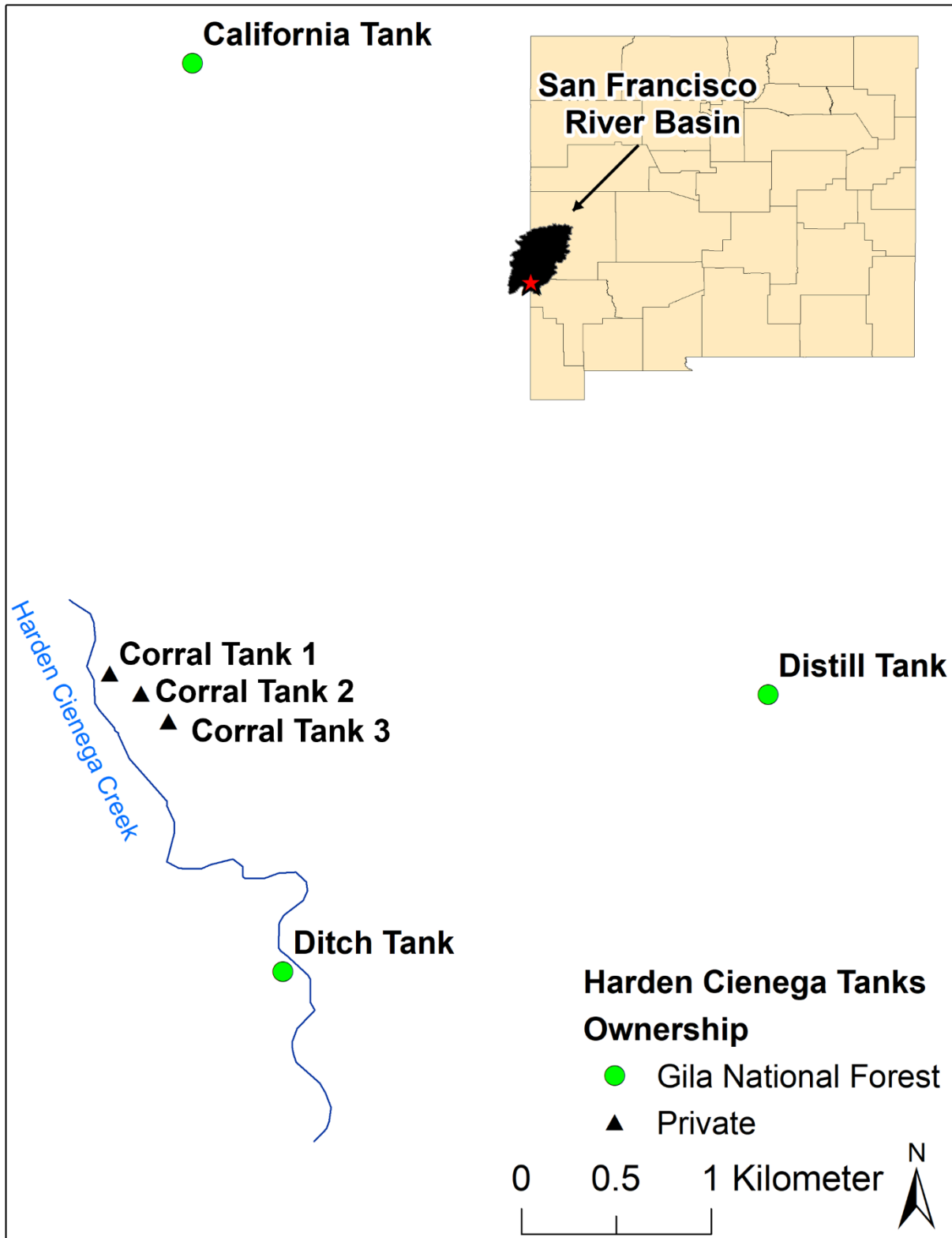


Figure 5. Locations of the stock tanks of interest at the Headwaters of Harden Cienega Creek in New Mexico. Green Sunfish are present in both California and Distill tanks. Ditch Tank appears to dry at certain times and does not have any fish present.

Saliz Canyon

Stocking of Loach Minnow 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 Minnow (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 Minnow in Saliz Canyon but the repatriated population appears to be spatially limited. An additional access location, approximately 1.0 km upstream of the original stocking location (Figure 6), was identified on July 28, 2022. Based on a visual assessment conducted by Department personnel, the location appears suitable for stocking, with riffle habitat and perennial streamflow present.

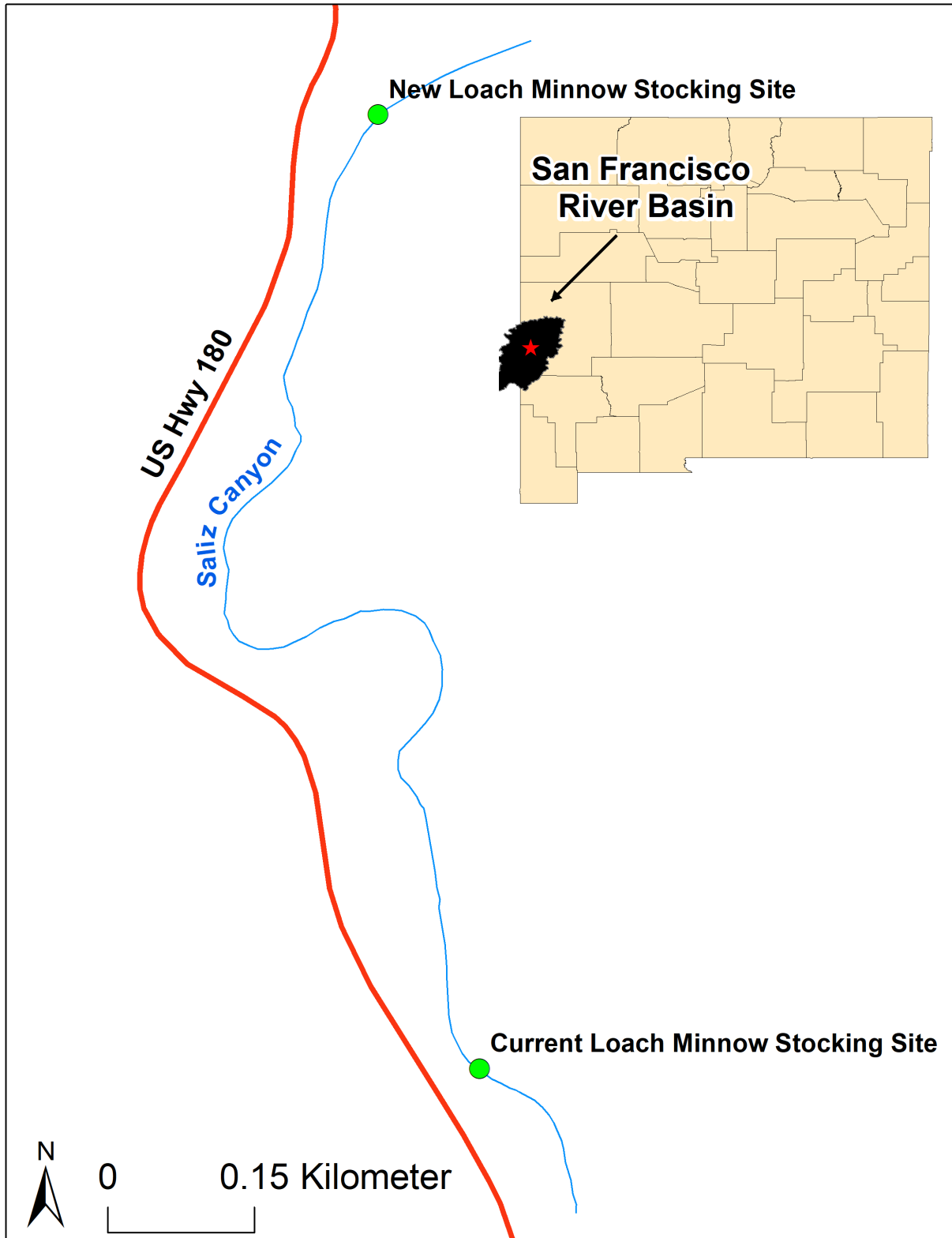


Figure 6. Locations of the current and the proposed new Loach Minnow stocking sites in Saliz Canyon.

Recommendations

- Saliz Canyon should be stocked with Loach Minnow at new suitable locations to expand their range from the original stocking location near Cottonwood Campground.
- Investigations into potentially removing Green Sunfish from stock tanks located in the headwaters of Harden Cienega should continue.
- 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 2026 to assess the success of the stocking effort.
- The Loach Minnow that were salvaged from Bear Creek in 2020 after the Tadpole Fire should be transferred from ARCC and restocked into Bear Creek. The creek should be surveyed at least one-year post-repatriation to assess the success of the repatriation effort.

Work Planned for 2023

- Investigate additional access points in Saliz Canyon for monitoring and repatriation of Loach Minnow, and stock at any identified suitable location with fish from ARCC.
- Continue assessment of tanks, in particular tanks located on private property, in the Harden Cienega Creek drainage in New Mexico for nonnative fish with AZGFD. Assess the need and feasibility of completing a nonnative removal project.
- Evaluate the pond on the Glenwood property to evaluate water quality and the fish community present to assess the potential for stocking Roundtail Chub (Gila Chub).
- Restock Bear Creek with the Loach Minnow that are currently being held at ARCC.

REMOTE SITE INVENTORY AND ASSESSMENT (TASK NM-2017-1)

Strategic Plan Goals:

- Prevent extinction and manage toward recovery
 - Goal 1. Identify critical streams and populations in need of protection and potential replication.
 - Goal 9. Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats.
 - Goal 10. Maintain accurate Program tracking records.

Recovery Objectives

- Loach Minnow Recovery Plan (1991)
 - Task 1.1 (priority 1): Identify all populations and determine level of protection
 - 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
 - Task 6.2 (priority 3): Identify and prepare sites for reintroduction
- Spikedace Recovery Plan (1991)
 - Task 1.1 (priority 1): Identify all populations and determine level of protection
 - 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
 - Task 6.2 (priority 3): Identify and prepare sites for reintroduction

Background

Much of the Gila River Basin in New Mexico is extremely remote and thus difficult to sample. The distribution of 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 have never been surveyed. The system is dynamic and there have been significant changes in the basin in recent years. 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. The upper West Fork Gila was surveyed in 2022. 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

The remote sites of the West Fork Gila River were last sampled in 2006 and 2007. On May 25 – 27 and June 8, 2021 Department, USFWS, and USFS staff sampled the lower portion of this group of sites. Upper sites were scheduled to be sampled in 2021, but were postponed due to the Johnson Fire. Department and USFWS staff sampled the upper sites on May 24 – 26, 2022 (Figure 7). All of the planned upper sites were sampled except for Site 8, which was not sampled due to logistical constraints. Loach Minnow, Roundtail Chub, and Spikedace were present during 2021 sampling in the lower sites (Table 3), but only Roundtail Chub were present during 2022 in the upper sites (Table 4). The upper sites

are likely above suitable habitat for Loach Minnow and Spikedace, which may explain their absence (Table 4; Figure 8). Common native species were captured in high densities both in the lower and upper sites (Figure 9). Nonnative species were captured in low densities across lower and upper sites (Figure 10). Nonnative fish species captured in 2021 in the lower sites included Brown Trout, Common Carp, Flathead Catfish, *Oncorhynchus* spp., Smallmouth Bass, Yellow Bullhead, and Western Mosquitofish, while the only nonnative fish species captured in 2022 in the upper sites was Brown Trout. Sites sampled both in the 2006/2007 and the 2021/2022 sampling efforts were sites 2, 3, 4, 5, 6, 7, 9, 10, and 11 (Table 5). Among these sites, the number of Roundtail Chub captured increased only at one site (Site 6), and decreased at all other sites but Site 7, where it remained constant. The number of Speckled Dace increased at most of the sites sampled during both sampling efforts. The number of Loach Minnow captured increased at Site 2 but only increased from zero individuals to one individual and remained at zero at the rest of the twice-sampled sites. Similarly, Spikedace numbers only increased slightly at Site 3 from zero to two individuals, and at Site 4 from zero to one individual. Spikedace decreased at Site 2 from 119 to 41 individuals and remained at zero at all other twice-sampled sites. However, both Loach Minnow and Spikedace did increase their upstream distribution compared to previous sampling. There was an overall decrease in the number of nonnative individuals captured across all sites between sampling efforts. The overall decrease or absence of rare native species (i.e., Loach Minnow, Spikedace, and Roundtail Chub) between sampling efforts may signal that overall habitat quality or water quality is decreasing in the area, and these more sensitive species are unable to cope with these changes.

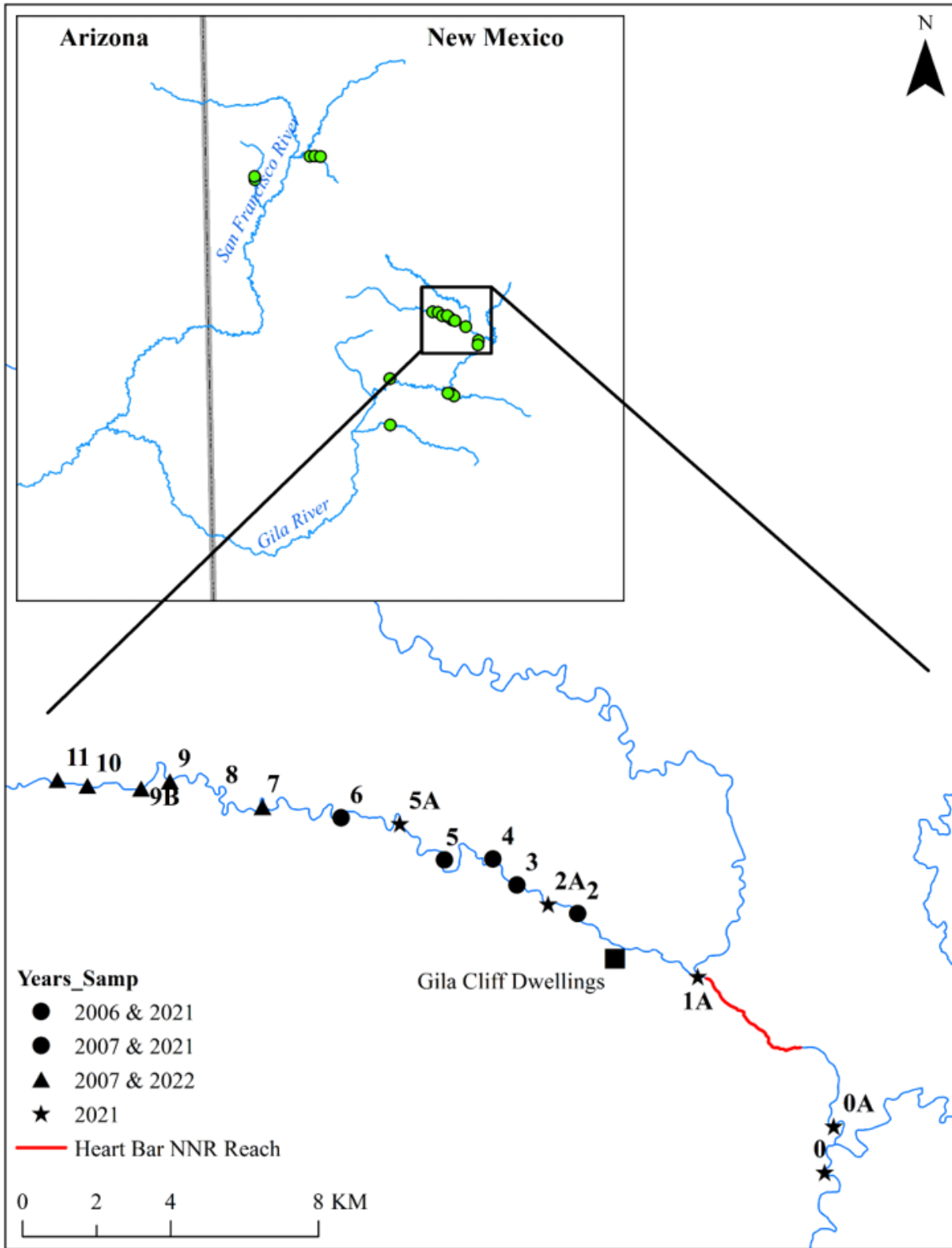


Figure 7. Location of remote inventory sites in the West Fork Gila River sampled in 2006, 2007, 2021, and 2022.

Table 3. Total number of fish, percent composition, and mean density (fish/100 m²) of fish captured, by species, in West Fork Gila River at remote sites sampled in 2021.

Species	Site 0			Site 0A		
	N	Percent composition	Density (fish/100 m ²)	N	Percent composition	Density (fish/100 m ²)
Native						
Desert Sucker	1	3.3	0.3	2	3.0	1.1
Loach Minnow	3	10.0	0.5	15	22.7	8.1
Longfin Dace	0	0	0	0	0	0
Roundtail Chub	0	0	0	0	0	0
Sonora Sucker	24	80.0	6.4	36	54.6	4.7
Speckled Dace	0	0	0	0	0	0
Spikedace	0	0	0	0	0	0
Nonnative						
Brown Trout	0	0	0	0	0	0
Common Carp	0	0	0	5	7.6	0.6
Flathead Catfish	0	0	0	1	1.5	0.1
Oncrohynchus sp.	0	0	0	0	0	0
Smallmouth Bass	1	3.3	0.3	7	10.6	1.1
Western Moquitofish	0	0	0	0	0	0
Yellow Bullhead	1	3.3	0.2	0	0	0
Species	Site 1A			Site 2		
	N	Percent composition	Density (fish/100 m ²)	N	Percent composition	Density (fish/100 m ²)
Native						
Desert Sucker	0	0	0	116	30.5	36.6
Loach Minnow	0	0	0	1	0.3	0.5
Longfin Dace	31	51.7	10.1	42	11.1	12.2
Roundtail Chub	1	1.7	0.2	1	0.3	0.1
Sonora Sucker	22	36.7	12.0	30	7.9	4.8
Speckled Dace	2	3.3	1.8	148	39.0	69.4
Spikedace	3	5.0	3.6	41	10.8	16.0
Nonnative						
Brown Trout	0	0	0	0	0	0
Common Carp	0	0	0	0	0	0
Flathead Catfish	0	0	0	0	0	0
Oncrohynchus sp.	0	0	0	0	0	0
Smallmouth Bass	0	0	0	0	0	0
Western Moquitofish	1	1.7	0.4	0	0	0
Yellow Bullhead	0	0	0	1	0.3	0.1

Table 3 continued.

Species	Site 2A			Site 3		
	N	Percent composition	Density (fish/100 m ²)	N	Percent composition	Density (fish/100 m ²)
Native						
Desert Sucker	116	29.9	36.3	64	30.5	9.7
Loach Minnow	0	0	0	0	0	0
Longfin Dace	13	3.4	3.4	0	0	0
Roundtail Chub	7	1.8	2.3	10	4.8	2.9
Sonora Sucker	68	17.5	23.0	48	22.9	13.2
Speckled Dace	165	42.5	47.8	85	40.5	35.8
Spikedace	19	4.9	5.1	2	1.0	2.2
Nonnative						
Brown Trout	0	0	0	0	0	0
Common Carp	0	0	0	0	0	0
Flathead Catfish	0	0	0	0	0	0
Oncrohynchus sp.	0	0	0	1	0.5	2.2
Smallmouth Bass	0	0	0	0	0	0
Western Moquitofish	0	0	0	0	0	0
Yellow Bullhead	0	0	0	0	0	0

Species	Site 4			Site 5		
	N	Percent composition	Density (fish/100 m ²)	N	Percent composition	Density (fish/100 m ²)
Native						
Desert Sucker	66	28.8	19.8	16	16.2	4.5
Loach Minnow	0	0	0	0	0	0
Longfin Dace	4	1.8	0.2	7	7.1	1.0
Roundtail Chub	2	0.9	0.9	0	0	0
Sonora Sucker	37	16.2	11.4	11	11.1	2.9
Speckled Dace	113	49.3	54.3	65	65.7	24.0
Spikedace	1	0.4	0.2	0	0	0
Nonnative						
Brown Trout	3	1.3	1.3	0	0	0
Common Carp	0	0	0	0	0	0
Flathead Catfish	0	0	0	0	0	0
Oncrohynchus sp.	3	1.3	0.8	0	0	0
Smallmouth Bass	0	0	0	0	0	0
Western Moquitofish	0	0	0	0	0	0
Yellow Bullhead	0	0	0	0	0	0

Table 3 continued.

Species	Site 5A			Site 6		
	N	Percent composition	Density (fish/100 m ²)	N	Percent composition	Density (fish/100 m ²)
Native						
Desert Sucker	15	14.2	3.1	18	17.1	4.3
Loach Minnow	0	0	0	0	0	0
Longfin Dace	0	0	0	0	0	0
Roundtail Chub	8	7.6	0.6	18	17.2	5.0
Sonora Sucker	30	28.3	3.1	36	34.3	7.5
Speckled Dace	49	46.3	44.0	27	25.7	5.8
Spikedace	0	0	0	0	0	0
Nonnative						
Brown Trout	1	0.9	0.1	2	1.9	0.4
Common Carp	0	0	0	0	0	0
Flathead Catfish	0	0	0	0	0	0
Oncrohynchus sp.	3	2.8	0.4	4	3.8	0.9
Smallmouth Bass	0	0	0	0	0	0
Western Moquitofish	0	0	0	0	0	0
Yellow Bullhead	0	0	0	0	0	0

Table 4. Total number, percent composition, and mean density (fish/100 m²) of fish captured, by species, in West Fork Gila River at remote sites sampled in 2022.

Species	Site 7			Site 9		
	N	Percent composition	Density (fish/100 m ²)	N	Percent composition	Density (fish/100 m ²)
Native						
Desert Sucker	14	1.7	0.5	16	1.9	0.6
Gila Trout	0	0	0	0	0	0
Loach Minnow	0	0	0	0	0	0
Longfin Dace	0	0	0	9	1.1	0.3
Roundtail Chub	1	0.1	0.0	0	0	0
Sonora Sucker	39	4.6	1.4	10	1.2	0.4
Speckled Dace	40	4.8	1.5	188	22.4	6.9
Spikedace	0	0	0	0	0	0
Nonnative						
Brown Trout	6	0.7	0.2	0	0	0
Bullhead species	0	0	0	0	0	0
Common Carp	0	0	0	0	0	0
Flathead Catfish	0	0	0	0	0	0
Oncorhynchus spp.	0	0	0	0	0	0
Smallmouth Bass	0	0	0	0	0	0
Western Mosquitofish	0	0	0	0	0	0
Yellow Bullhead	0	0	0	0	0	0

Species	Site 9B			Site 10		
	N	Percent composition	Density (fish/100 m ²)	N	Percent composition	Density (fish/100 m ²)
Native						
Desert Sucker	24	2.9	0.9	55	6.6	2.0
Gila Trout	0	0	0	3	0.4	0.1
Loach Minnow	0	0	0	0	0	0
Longfin Dace	7	0.8	0.3	0	0	0
Roundtail Chub	0	0	0	0	0	0
Sonora Sucker	36	4.3	1.3	42	5.0	1.6
Speckled Dace	68	8.1	2.5	56	6.7	2.1
Spikedace	0	0	0	0	0	0
Nonnative						
Brown Trout	1	0.1	0.0	3	0.4	0.1
Bullhead species	0	0	0	0	0	0
Common Carp	0	0	0	0	0	0
Flathead Catfish	0	0	0	0	0	0
Oncorhynchus spp.	0	0	0	0	0	0
Smallmouth Bass	0	0	0	0	0	0
Western Mosquitofish	0	0	0	0	0	0
Yellow Bullhead	0	0	0	0	0	0

Table 4 continued.

Site 11			
Species	N	Percent composition	Density (fish/100 m ²)
Native			
Desert Sucker	69	8.2	2.5
Gila Trout	2	0.2	0.1
Loach Minnow	0	0	0
Longfin Dace	0	0	0
Roundtail Chub	0	0	0
Sonora Sucker	46	5.5	1.7
Speckled Dace	102	12.2	3.8
Spikedace	0	0	0
Nonnative			
Brown Trout	2	0.2	0.1
Bullhead species	0	0	0
Common Carp	0	0	0
Flathead Catfish	0	0	0
Oncorhynchus spp.	0	0	0
Smallmouth Bass	0	0	0
Western Mosquitofish	0	0	0
Yellow Bullhead	0	0	0

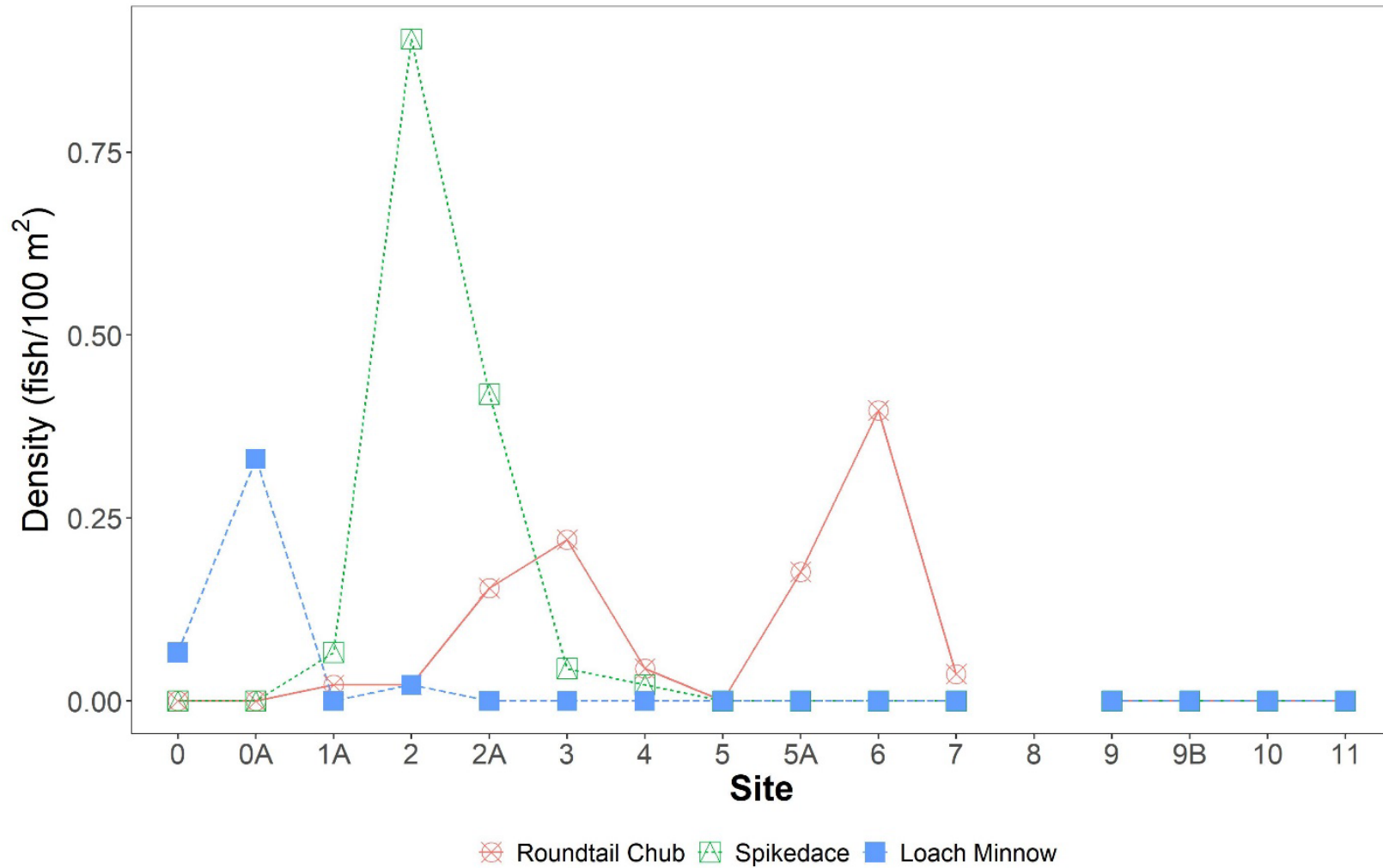


Figure 8. Densities (fish/100 m²) of rare native species captured at each site sampled during remote site inventories of the West Fork Gila River in 2021 and 2022. Note that sites go from downstream to upstream on the x-axis.

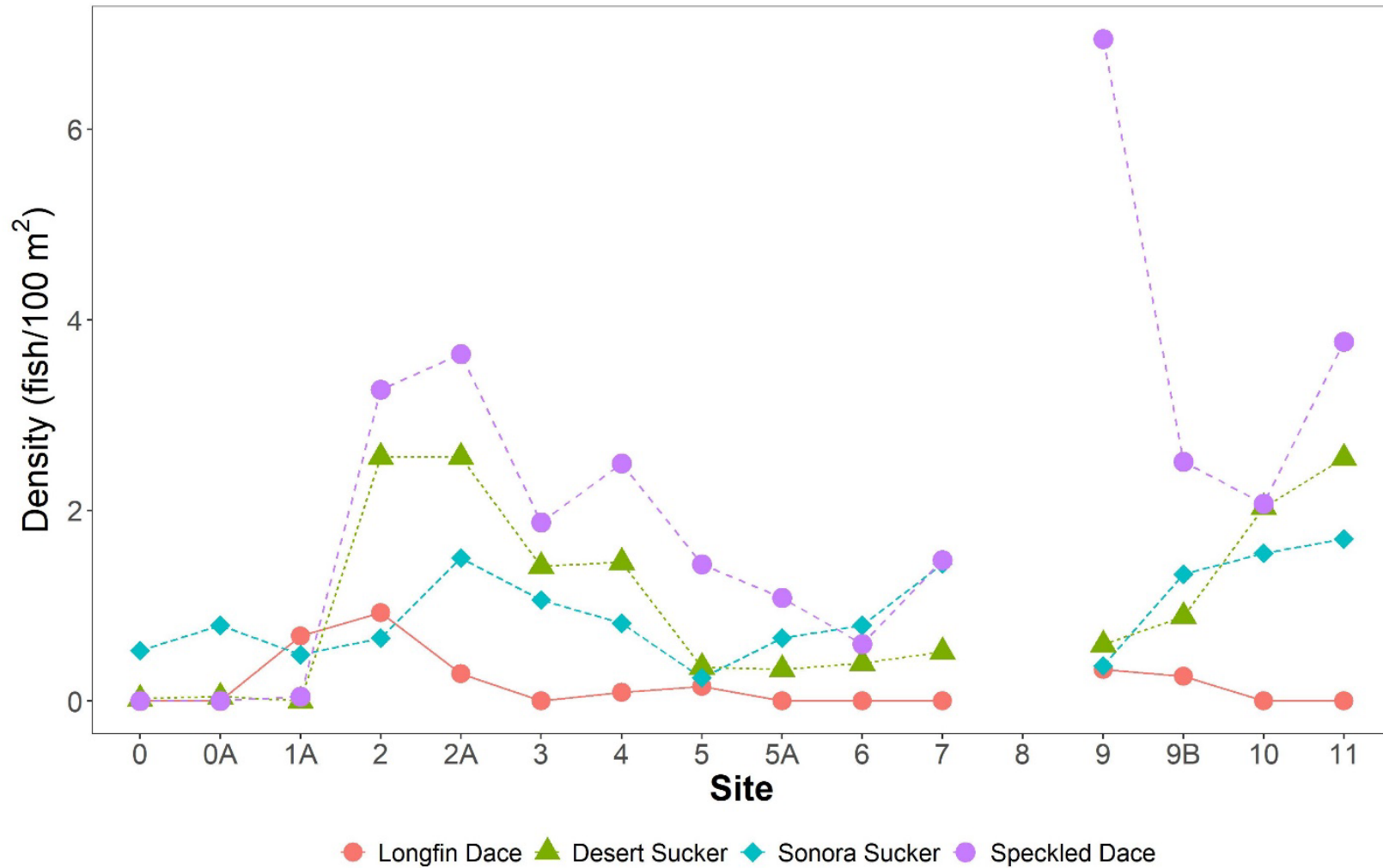


Figure 9. Densities (fish/100 m²) of common native species captured at each site sampled during remote site inventories of the West Fork Gila River in 2021 and 2022. Note that sites go from downstream to upstream on the x-axis.

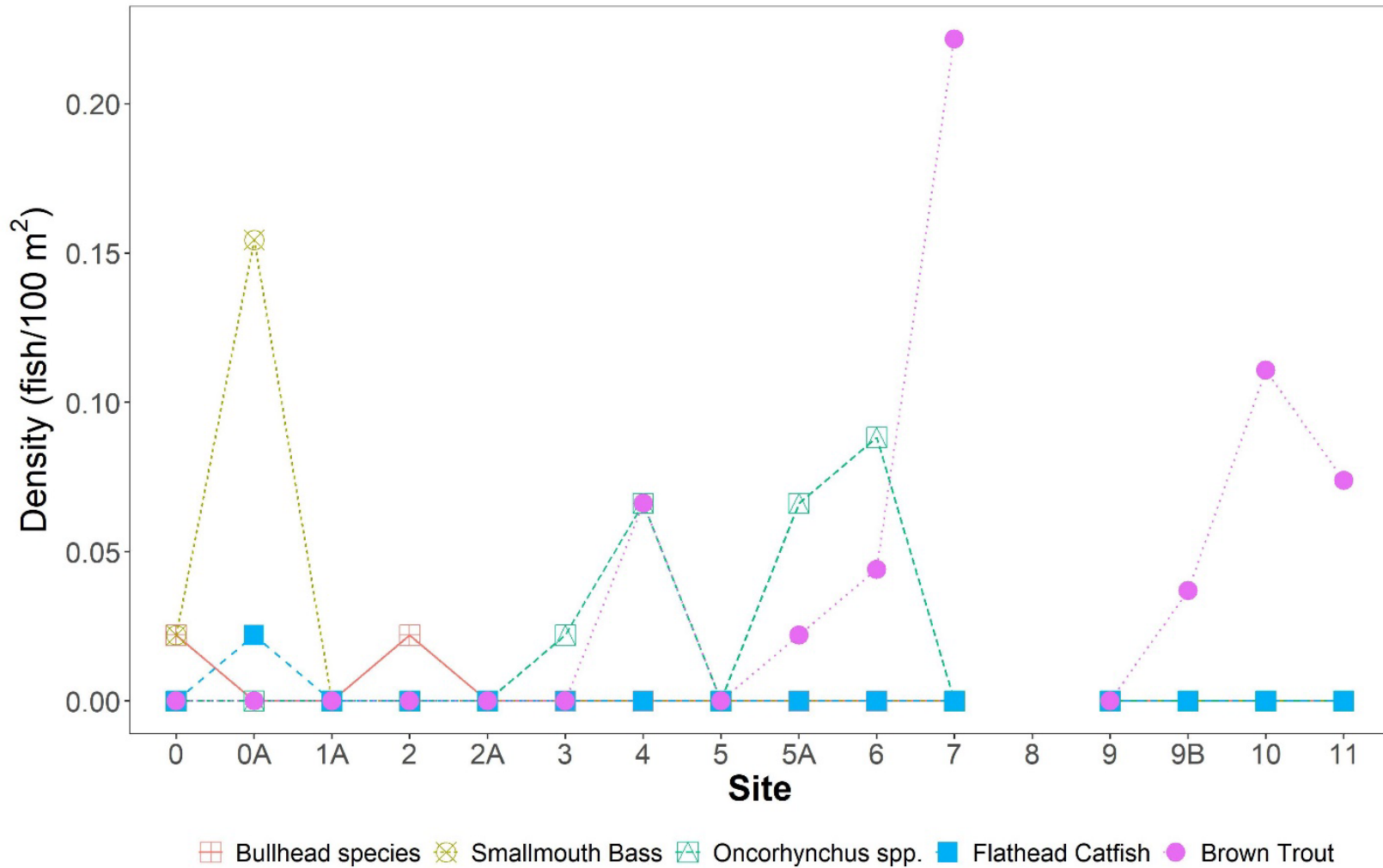


Figure 10. Densities (fish/100 m²) of nonnative species captured at each site sampled during remote site inventories of the West Fork Gila River in 2021 and 2022. Note that sites go from downstream to upstream on the x-axis.

Table 5. Numbers of fish, by species, captured at West Fork Gila River lower remote sites in 2006, 2007, and 2021. Grey bars indicate that sampling did not occur that year at that site.

Species	Site 0		Site 0A		Site 1		Site 1A		Site 2		Site 3		Site 4		Site 5		Site 5A		Site 6	
	2006	2021	2006	2021	2006	2021	2006	2021	2006	2021	2006	2021	2006	2021	2006	2021	2006	2021	2007	2021
Native																				
Desert Sucker		1		2	63			0	39	116	31	64	17	66	31	16		15	32	18
Gila Trout		0		0	0			0	0	0	0	0	0	0	0	0		0	0	0
Loach Minnow		3		15	0			0	0	1	0	0	0	0	0	0		0	0	0
Longfin Dace		0		0	4			31	0	42	0	0	0	4	0	7		0	0	0
Roundtail Chub		0		0	3			1	88	1	23	10	25	2	10	0		8	3	18
Sonora Sucker		24		36	36			22	188	30	45	48	63	37	49	11		30	22	36
Speckled Dace		0		0	1			2	36	148	53	85	35	113	126	65		49	45	27
Spikedace		0		0	0			3	119	41	0	2	0	1	0	0		0	0	0
Nonnative																				
Brown Trout		0		0	0			0	7	0	54	0	1	3	12	0		1	205	2
Bullhead Species		0		0	0			0	0	0	0	0	0	0	0	0		0	0	0
Common Carp		0		5	0			0	0	0	0	0	0	0	0	0		0	0	0
Fathead Minnow		0		0	0			0	0	0	0	0	1	0	0	0		0	0	0
Flathead Catfish		0		1	0			0	0	0	0	0	0	0	0	0		0	0	0
Oncorhynchus spp.		0		0	0			0	0	0	0	1	0	3	0	0		3	0	4
Rainbow Trout		0		0	1			0	1	0	18	0	10	0	21	0		0	5	0
Smallmouth Bass		1		7	5			0	2	0	8	0	1	0	0	0		0	0	0
Western Mosquitofish		0		0	0			1	0	0	0	0	0	0	0	0		0	0	0
Yellow Bullhead		1		0	24			0	0	1	0	0	0	0	0	0		0	0	0

Table 6. Numbers of fish, by species, captured at West Fork Gila River upper remote sites in 2007 and 2022. Grey bars indicate that sampling did not occur that year at that site.

Species	Site 7		Site 8		Site 9		Site 9A		Site 9B		Site 10		Site 11	
	2007	2022	2007	2022	2007	2022	2007	2022	2007	2022	2007	2022	2007	2022
Native														
Desert Sucker	21	14	25		19	16	2			24	10	55	12	69
Gila Trout	0	0	0		0	0	0			0	0	3	0	2
Loach Minnow	0	0	0		0	0	0			0	0	0	0	0
Longfin Dace	0	0	0		0	9	0			7	0	0	0	0
Roundtail Chub	1	1	5		0	0	3			0	0	0	0	0
Sonora Sucker	17	39	26		43	10	17			36	34	42	18	46
Speckled Dace	10	40	30		14	188	3			68	24	56	7	102
Spikedace	0	0	0		0	0	0			0	0	0	0	0
Nonnative														
Brown Trout	8	6	11		2	0	6			1	4	3	11	2
Bullhead Species	0	0	0		0	0	0			0	0	0	0	0
Common Carp	0	0	0		0	0	0			0	0	0	0	0
Fathead Minnow	0	0	0		0	0	0			0	0	0	0	0
Flathead Catfish	0	0	0		0	0	0			0	0	0	0	0
Oncorhynchus spp.	0	0	0		0	0	0			0	0	0	0	0
Rainbow Trout	3	0	4		2	0	4			0	19	0	7	0
Smallmouth Bass	0	0	0		0	0	0			0	0	0	0	0
Western Mosquitofish	0	0	0		0	0	0			0	0	0	0	0
Yellow Bullhead	0	0	0		0	0	0			0	0	0	0	0

Recommendations

- The West Fork Gila River drainage still retains the complete assemblage of native fish species including Loach Minnow and Spikedace. The West Fork Gila River should be surveyed again in approximately 10 years to assess the distribution of native priority species.
- The lower San Francisco River has rarely been sampled below the Glenwood permanent monitoring site and Department records indicate that the remote lower canyons have never been sampled. These surveys should be conducted to assess distribution of priority and native species in the area.

Work Planned for 2023

- Sample remote reaches of the lower San Francisco River.

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