

**Gila River Basin Native Fishes Conservation Program:
New Mexico Department of Game and Fish Native Fish Conservation Efforts
2018 Annual Report**



Cooperative Agreement (15AC00046) Between

Bureau of Reclamation

And

New Mexico Department of Game and Fish

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January 2019

Executive Summary

This report summarizes the Gila River Basin Native Fishes Conservation Program (GRBNFCP) tasks funded for native fish conservation in New Mexico in 2018. Work was conducted under a Cooperative Agreement (15AC00046) between the Bureau of Reclamation (BOR) and the New Mexico Department of Game and Fish (Department). In 2018, three ongoing native fish conservation efforts were conducted: removal of nonnative fishes from the West Fork Gila River, Threatened and Endangered (T&E) fish repatriations and monitoring, and remote site inventory. The West Fork Gila River nonnative removal task indicated fish density remained the same or increased for all species captured when compared to last year's removal effort. Under the repatriations and monitoring task, Little Creek was stocked with Loach Minnow (*Tiaroga cobitis*) for the fifth consecutive year. Little Creek, Mule Creek and Burro Cienaga were surveyed to assess the success of repatriation. Also under this task, Turkey Creek and the Gila Farm Pond were surveyed and wild Loach Minnow were brought into the Arizona Game and Fish Department (AZGFD) Aquatic Research and Conservation Center (ARCC) from the West Fork Gila River to supplement the brood stock. Under the remote site inventory task, 15 sites in the upper half of the Middle Fork Gila River and tributaries were surveyed. At these sites, five native fish species and five nonnative fish species were present. Specific details of work completed and results for each native fish conservation task are included within this report.

Introduction

The GRBNFCP was established to minimize impacts 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 five federally listed fishes: Spikedace (*Meda fulgida*), Loach Minnow, Gila Chub (*Gila intermedia*; now classified as Roundtail Chub [*Gila robusta*]), Gila Topminnow (*Poeciliopsis occidentalis*), and Razorback Sucker (*Xyrauchen texanus*). 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 to native fishes 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 AZGFD. The Department receives funds from the BOR for work fitting these objectives under Cooperative Agreement (15AC00046). As a requirement of a 2018 amendment to the agreement, 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 2018, this report lists the recovery objective(s) the task works toward 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 2018 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 2019. Ongoing projects, such as the Middle Fork Gila River Inventory and Assessment, include a summary of this year's findings; more detailed overall results will be included in the 5 year report submitted to the GRBNFCP.

Removal of Nonnative Fishes from West Fork Gila River (Task NM-2006-1)

Strategic Plan Goals

- Build the scientific foundation for recovery efforts
 - Goal 1. Investigate novel methods to control nonnative aquatic biota.
 - Goal 2. Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.
- 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 non-native 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 non-native fishes

Background

The West Fork Gila River supports a largely intact native fish assemblage including federally endangered Spikedace and Loach Minnow as well as state endangered Roundtail Chub (*Gila robusta*; previously known as Headwater Chub [*Gila nigra*]). In addition, federally threatened Gila Trout (*Oncorhynchus gilae*) are stocked in cooler months to provide a recreational fishing opportunity and support Gila Trout recovery efforts. A threat to this native fish community is the presence of nonnative fishes. Ten species of nonnative fishes have been documented in the river including Yellow Bullhead (*Ameiurus natalis*), Smallmouth Bass (*Micropterus dolomieu*), Rainbow Trout (*Oncorhynchus mykiss*), and Brown Trout (*Salmo trutta*). 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 Heartbar 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 habitat. 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, habitat type, and area sampled. Length and weight data 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. Although the same stretch of river is sampled annually, effort is not consistent among years. 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. This effort was evaluated from 2007 to 2012 when it had successfully reduced the biomass of some nonnative species as well as benefited some native species, indicating positive results overall (Propst et al. 2014). With this documented reduction of nonnative species, the GRBNFCP decided to continue the effort. The removal requires a crew of 6 to 9 people and takes 4 to 5 days to complete; it is conducted annually in June.

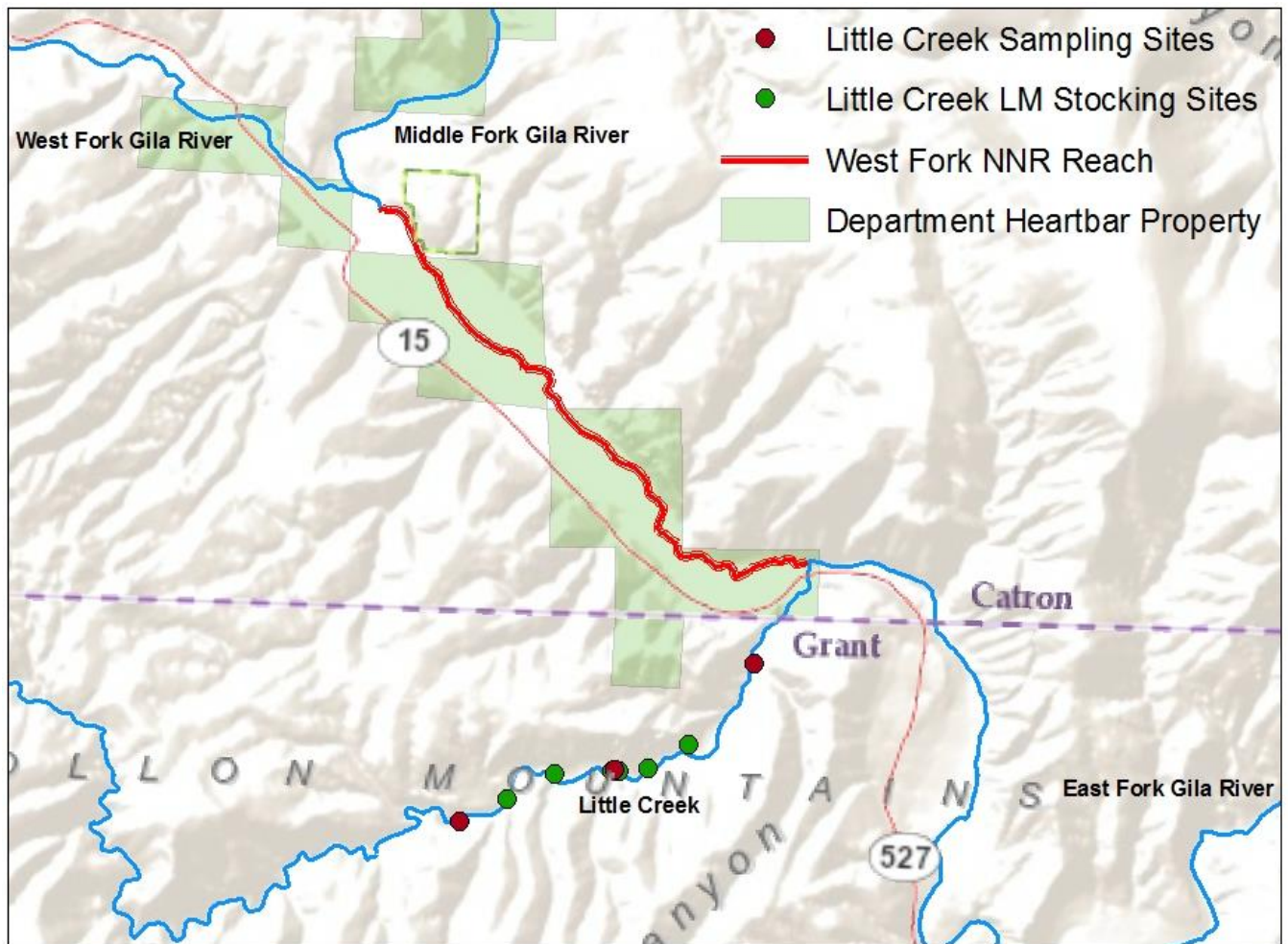


Figure 1. Map showing the location of the West Fork Gila River nonnative fish removal and Little Creek with locations of 2018 surveys and all Loach Minnow (LM) stocking sites.

Results

In 2018, Department, USFWS, and USFS staff conducted the West Fork Gila River nonnative removal from June 25th to June 29th. The effort consisted of 60,485 seconds of shocking and 91 seine hauls. Numbers and densities of fish captured in 2018, excluding unidentifiable Catostomids (<30mm), are shown in Table 1. Relative abundance of each native species as compared to all nonnative species combined is shown in Figures 2 through 9. Relative abundance for the entire project, since 2006, is included for reference. Density in 2018 remained the same or increased for all species compared to 2017 West Fork Gila nonnative removal densities (Ferguson and Ruhl 2018). In 2018 young of the year fish were very abundant and are likely the reason for this increase in overall density (Appendix A).

Table 1. Total number of individuals captured and density of all fishes in the West Fork Gila River nonnative removal in 2018.

Species	Number Caught	Density (fish/m²)
Native		
<i>Desert Sucker</i>	2810	0.110
<i>Gila Trout</i>	1	0
<i>Loach Minnow</i>	2522	0.099
<i>Longfin Dace</i>	2472	0.097
<i>Roundtail Chub</i>	4	0
<i>Sonora Sucker</i>	2316	0.091
<i>Speckled Dace</i>	1326	0.052
<i>Spikedace</i>	1512	0.059
Nonnative		
<i>Green Sunfish</i>	1	0
<i>Rainbow Trout Hybrid</i>	6	0
<i>Smallmouth Bass</i>	6	0
<i>Western Mosquitofish</i>	110	0.004
<i>Yellow Bullhead</i>	384	0.015

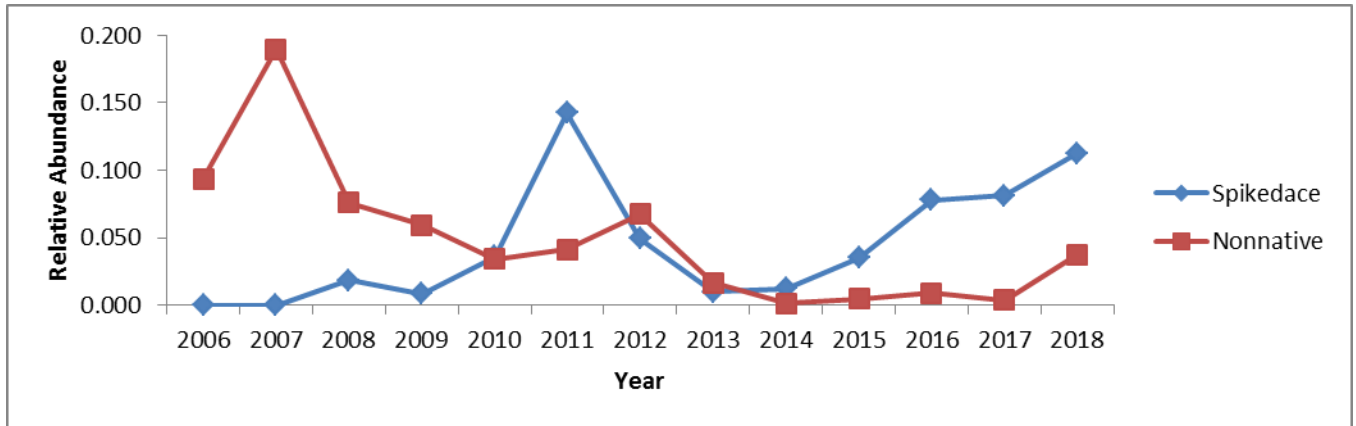


Figure 2. Relative abundance of Spikedace and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

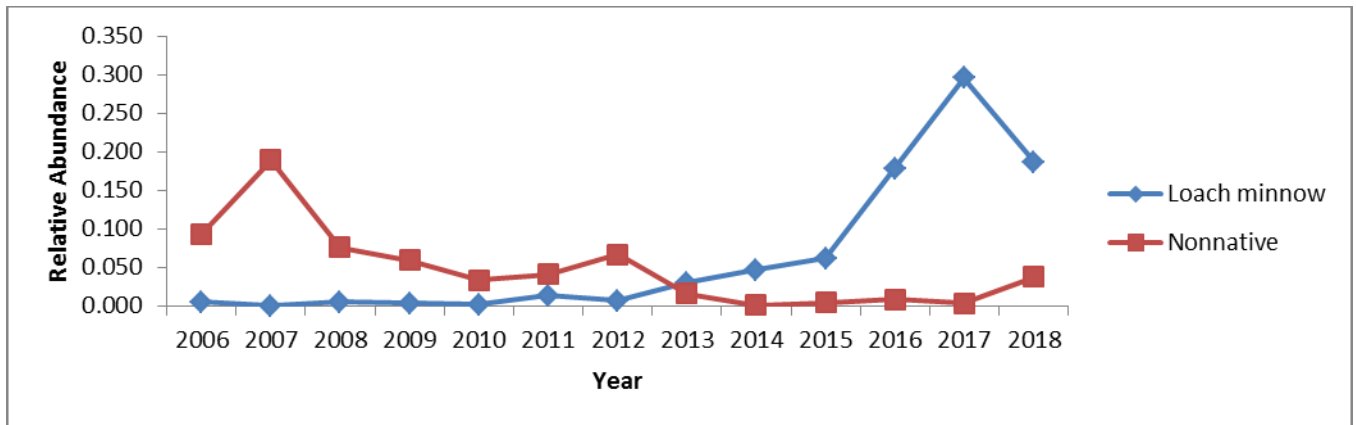


Figure 3. Relative abundance of Loach Minnow and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

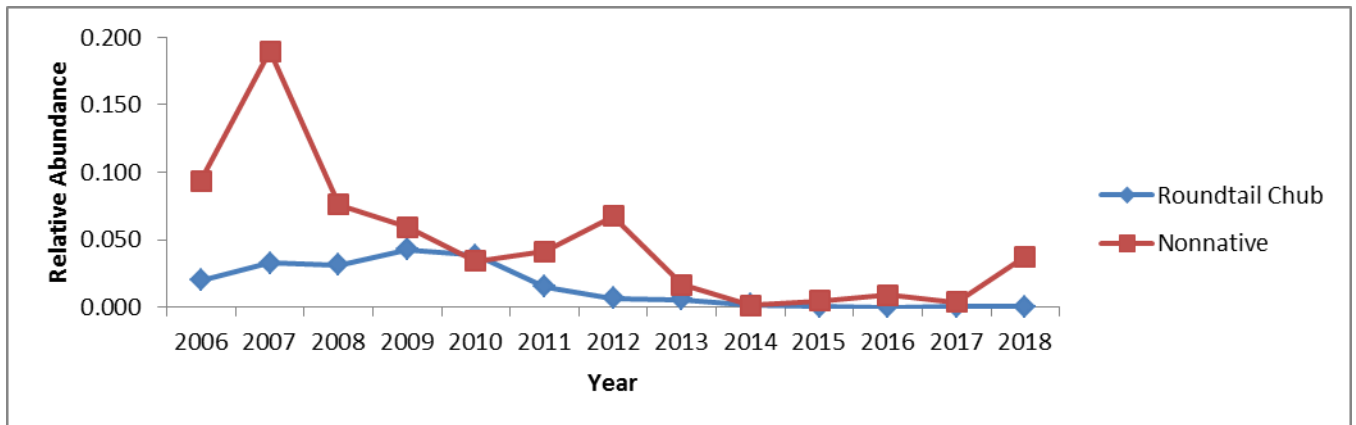


Figure 4. Relative abundance of Roundtail Chub and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

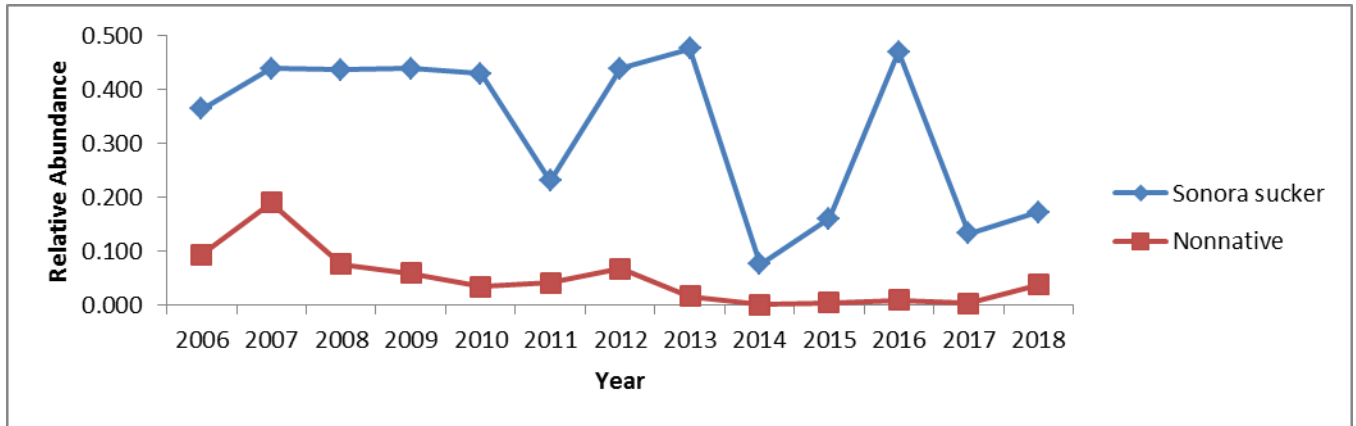


Figure 5. Relative abundance of Sonora Sucker and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

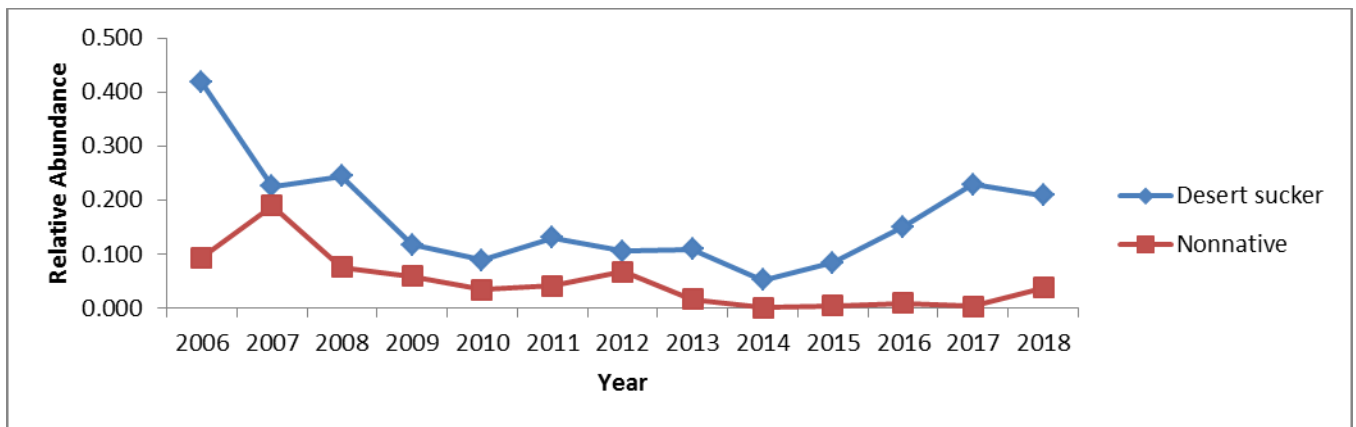


Figure 6. Relative abundance of Desert Sucker and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

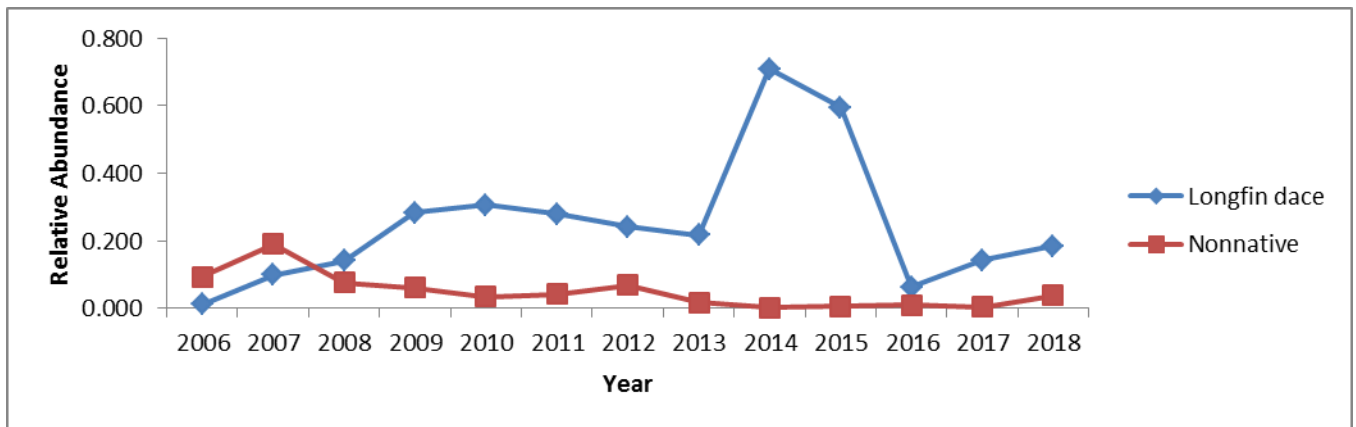


Figure 7. Relative abundance of Longfin Dace and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

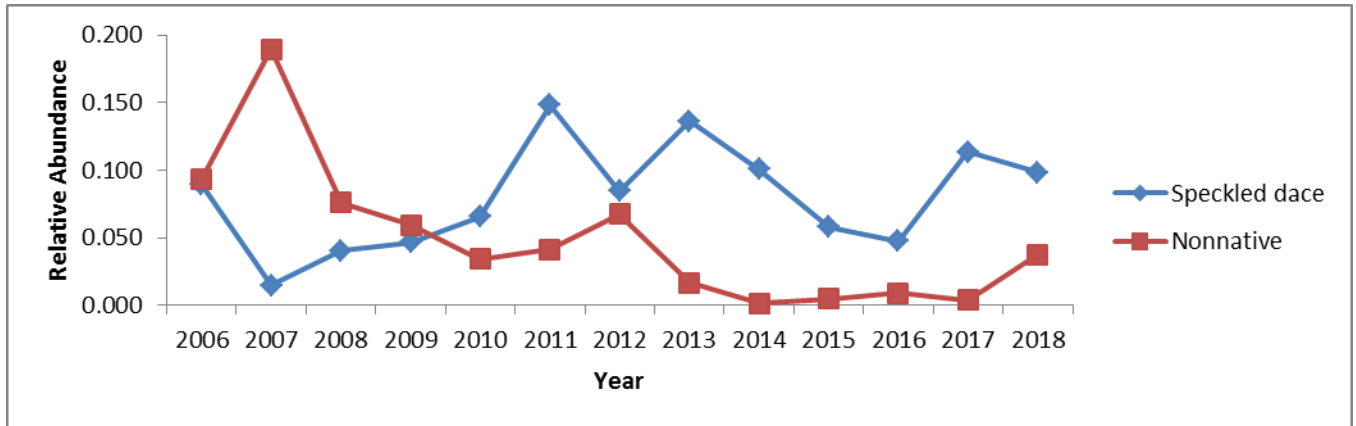


Figure 8. Relative abundance of Speckled Dace and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

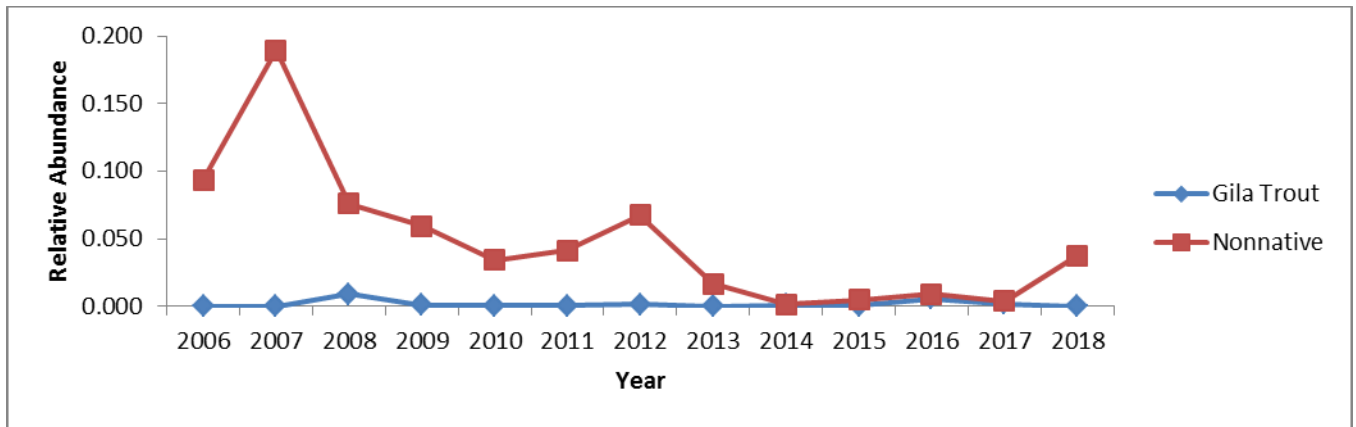


Figure 9. Relative abundance of Gila Trout and all nonnative fishes combined in the West Fork Gila removal reach from 2006 to 2018.

Recommendations

- In 2018, densities of some nonnative fish species increased while densities of native fish remained high. In order to track this increase in nonnatives and benefit the native fishes with nonnative suppression, we recommend continuing nonnative removal efforts on the West Fork Gila River.

Work Planned for 2019

- Conduct West Fork Gila River nonnative removal on 4 km Heartbar Wildlife Management Area reach in June 2019.

New Mexico T&E Fish Repatriations and Monitoring (Task NM-2002-1)

Strategic Plan Goals:

- Build the scientific foundation for recovery efforts

- Goal 2. Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.
- Goal 5. Investigate new stocking strategies to improve survival of repatriated fish.
- 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

- Gila Chub Recovery Plan (2015 Draft)
 - Task 3 (priority 2): Monitor remnant and replicated populations to ensure they are persisting and threats are being managed
- Gila Topminnow Recovery Plan (1999 Draft)
 - Task 2.1 (priority 1): Identify suitable habitats
 - Task 2.2 (priority 1): Reestablish into suitable habitats
 - Task 3.1 (priority 1): Develop standardized population and habitat monitoring protocols and implement them
- 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 streams post-repatriation, and work with hatchery populations as needed. Repatriations consist of multiple stockings into each

repatriation stream successively for 3 to 5 consecutive years or until monitoring of the repatriated 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 NM streams within the Gila River basin that might undergo repatriation attempts. 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

In 2018, several ongoing repatriation projects were continued, including post-repatriation surveys and stockings. On December 13th, 2018, Loach Minnow (n=145) and Spikedace (n=1) were collected from the West Fork Gila River and transferred to ARCC for maintenance of broodstock at the captive facility.

Stocking and Surveys

Turkey Creek

Turkey Creek supports the most robust population of Roundtail Chub in New Mexico and understanding their genetic makeup is critical for evaluating them as a potential donor population for repatriation sites. On April 10th, 2018 Department, USFS and USFWS staff collected tissue samples for genetic analysis from Roundtail Chub (previously Gila Chub) in Turkey Creek. Genetic samples will be analyzed as part of a range-wide Roundtail Chub genetics study being conducted by the University of Hawaii for the AZGFD. Three pools were sampled by single pass electrofishing with a Smithroot backpack electrofisher (Figure 10). Forty-five Roundtail Chub were captured at a rate of 252.73 fish per hour. Desert Sucker (*Catostomus clarkii*) and Speckled Dace (*Rhinichthys osculus*) were also captured (Table 2).

Table 2. Total number of fishes captured and catch per unit effort (CPUE) of all fishes sampled in Turkey Creek.

Species	Number Caught	CPUE (fish/hour)
Desert Sucker	68	381.90
Roundtail Chub	45	252.73
Speckled Dace	18	101.09

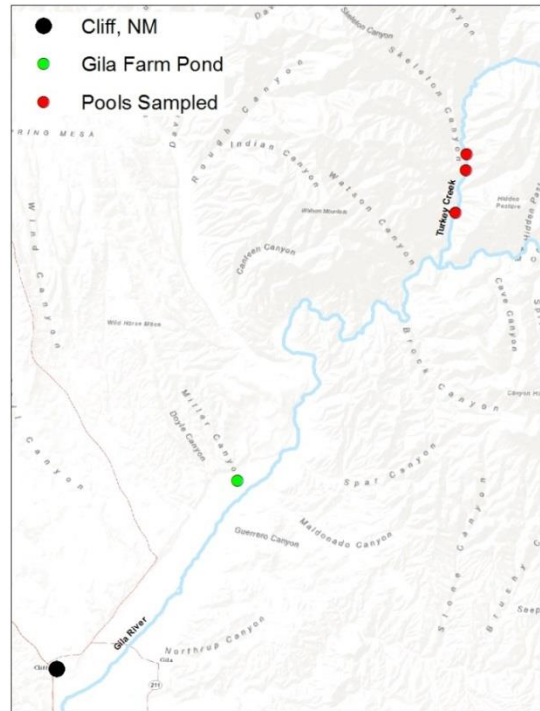


Figure 10. Locations of Gila Farm Pond and Turkey Creek sampling in 2018.

Mule Creek

Mule Creek was stocked with Roundtail Chub (previously Gila Chub) from Harden Cienega Creek in Arizona annually from 2012 to 2014. In this time 299 chub were stocked into Mule Creek from Harden Cienega. In February 2016 Smallmouth Bass, Black Bullhead, and Green Sunfish (*Lepomis cyanellus*) were found within the repatriation area. Stocking efforts were suspended to assess the impact of nonnative fishes (NMDGF 2016). On April 11, 2018, Department, USFS, and USFWS staff surveyed Mule Creek by single pass electrofishing to assess the repatriated Roundtail Chub population (Figure 11). Roundtail Chub (n=16) were captured at a rate of 21.41 fish per hour and evidence of natural reproduction was found with 3 fish under 110 mm total length (Figure 12). Other native fish species captured in Mule Creek include Longfin Dace (*Agosia chrysogaster*), Desert Sucker, Sonora Sucker (*Catostomus insignis*), and Speckled Dace (Table 3). The only nonnative captured was one adult Black Bullhead (*Ameiurus melas*). The 2018 survey indicates low numbers of nonnatives and Roundtail Chub seem to have the ability to persist in Mule Creek.

Table 3. Total number of fish captured and catch per unit effort (CPUE) of all fish sampled in Mule Creek.

Species	Number Caught	CPUE (fish/hour)
Desert Sucker	190	254.28
Black Bullhead	1	1.34
Longfin Dace	19	25.43
Roundtail Chub	16	21.41
Sonora Sucker	230	307.81
Speckled Dace	13	17.40

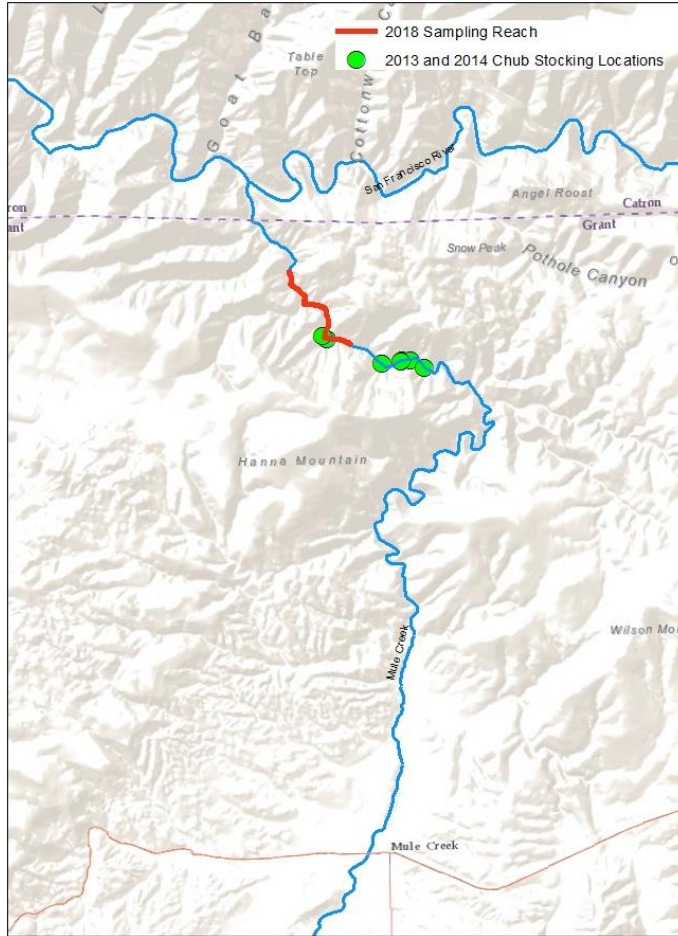


Figure 11. Map of 2018 Mule Creek sampling reach and 2013 and 2014 Roundtail Chub (previously Gila Chub) stocking locations.

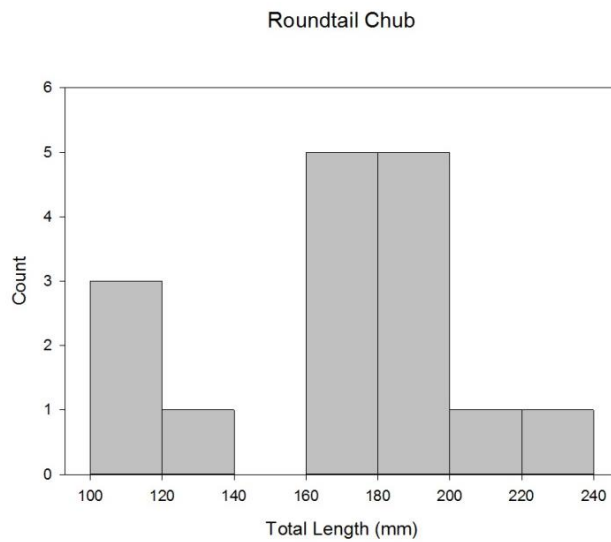


Figure 12. Length frequency histogram of Roundtail Chub captured in Mule Creek in 2018.

Burro Cienaga

Burro Cienaga Creek is northeast of Lordsburg, NM in Grant County (Figure 13). In 2008, 578 Gila Topminnow were stocked into Burro Cienaga from Lower San Pedro River Reserve in Arizona. On July 18, 2018, Department staff surveyed Burro Cienaga to assess the repatriated Gila Topminnow population. Minnow traps (n=10) were set for approximately two hours and four Gila Topminnow were captured. This sampling confirms presence of Gila Topminnow; however we believe very turbid water negatively affected capture rates.

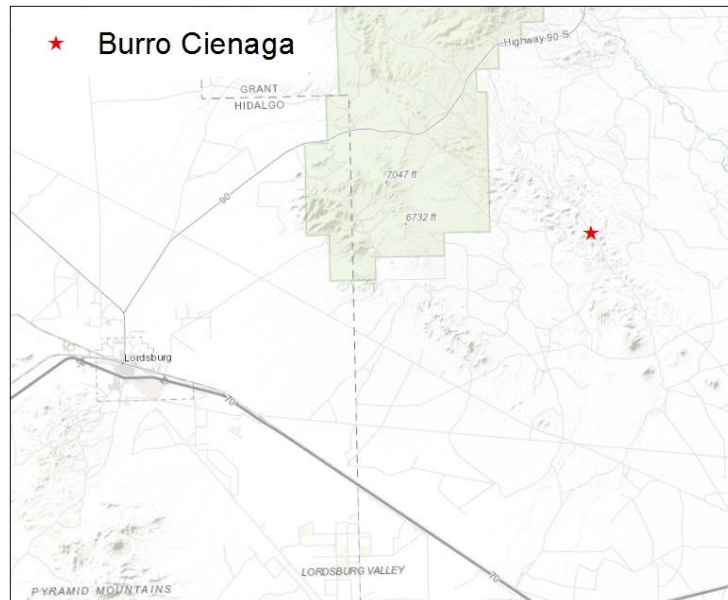


Figure 13. Location of Burro Cienaga Gila Topminnow population.

Gila Farm Pond

The Gila Farm Pond is on Nature Conservancy property outside of Cliff, NM (Figure 10). In February, 2008 the Gila Farm Pond was stocked with 84 Verde River Roundtail Chub from ARCC. Follow up surveys captured several nonnative fishes and no Roundtail Chub (NMDGF 2016). On July 18, 2018, Department staff surveyed The Nature Conservancy's (TNC) Gila Farm Pond to check on the status of nonnative fishes and evaluate the potential of pond restoration. The perimeter of the pond was electrofished at dusk using a raft electrofisher. No native fish species were captured. Nonnative species captured include Yellow Bullhead, Common Carp (*Cyprinus carpio*), Green Sunfish and Largemouth Bass (*Micropterus salmoides*) (Table 4). This survey confirms the abundance of nonnatives and therefore the Gila Farm Pond is not a viable refugia for native species.

Table 4. Total number of fishes captured and catch per unit effort (CPUE) of all fishes sampled in Gila Farm Pond.

Species	Number Caught	CPUE (fish/hour)
Common Carp	25	41.36
Green Sunfish	121	200.18
Largemouth Bass	1	1.65
Yellow Bullhead	2	3.31

Little Creek

Little Creek has been stocked with Loach Minnow annually since 2014 (Table 5). On July 19th, 2018, Department staff surveyed Little Creek to evaluate Loach Minnow repatriation. Three sites were sampled near the stocking locations, the same three sites sampled in 2017 (Figure 1, Ferguson and Ruhl 2018). Suitable Loach Minnow habitat was targeted during the survey and each location was sampled by shocking into a seine. Three Loach Minnow were captured at a rate of 3.82 fish per hour. Loach Minnow captured were 40, 41, and 50 mm total length. Other species captured included Speckled Dace, Longfin Dace, Desert Sucker, Sonora Sucker, Brown Trout and Rainbow Trout (Table 5). Rainbow and Brown Trout occur at locations upstream of where Loach Minnow have been stocked. An additional stocking by the Department, USFWS, USFS, and ARCC staff occurred on December 10th, 2018. ARCC provided 1,187 Gila Forks Loach Minnow for stocking. 2018 is the fifth consecutive year of Loach Minnow stocking into Little Creek (Table 6).

Table 5. Loach Minnow stocked into Little Creek, 2014-2018. For fish stocked from ARCC, lineage is displayed within parentheses.

Date	Number Stocked	Stocking Source
November 18, 2014	267	ARCC (Gila Forks)
September 3, 2015	62	WF Gila River
November 15, 2016	125	WF Gila River
November 30, 2017	159	ARCC (Gila Forks)
November 30, 2017	103	WF Gila River
December 10, 2018	1,187	ARCC (Gila Forks)

Table 6. Total number of fishes captured and catch per unit effort (CPUE) of all fishes sampled in Little Creek.

Species	Number Caught	CPUE (fish/hour)
Brown Trout	13	16.57
Desert Sucker	43	54.80
Loach Minnow	3	3.82
Longfin Dace	28	35.68
Rainbow Trout	1	1.27
Sonora Sucker	10	12.74
Speckled Dace	318	405.24

Saliz Canyon

Saliz Canyon was scheduled to be stocked for the third time with San Francisco Loach Minnow from ARCC in 2018 (Ferguson and Ruhl 2018). Ash flows from the Owl Fire in the summer of 2018 negatively affected fish habitat in Saliz Creek. Visual observations by USFS staff indicated no fish in the main channel and some fish in a small side channel which is fed by subsurface flow. The main channel was very shallow and sandy with very little Loach Minnow habitat remaining. Loach Minnow stocking was

postponed in Saliz Creek until more suitable habitat is found after recovery from the effects of the Owl Fire.

San Francisco

Spikedace and Loach Minnow were scheduled to be stocked in the San Francisco River in 2018. Spikedace have been stocked into the San Francisco River 5 times, beginning in 2008 (Ferguson and Ruhl 2018). Loach Minnow were stocked in 2014 near Glenwood for post-fire repatriation (NMDGF 2016). Since that stocking, Loach Minnow have reestablished in the Glenwood area with consistent catches during annual monitoring. With an abundance of Loach Minnow available at ARCC, the Department proposed to stock Loach Minnow further upstream than previous stockings within the San Francisco River. Therefore, stocking was postponed until a new Section 7 consultation is completed. The stocking has been tentatively scheduled for winter or early spring of 2019.

Recommendations

- Roundtail Chub are persisting in Mule Creek despite low numbers of nonnative fish. Mule Creek should be sampled again in 2019 to assess the Roundtail Chub population and monitor nonnative fish populations.
- Gila Topminnow are persisting in Burro Cienaga. Although any measure of abundance was difficult to report due to poor sampling conditions in 2018, their presence was confirmed. We recommend keeping Burro Cienaga on a 5 year sampling cycle, with the next scheduled sampling in 2023. Burro Cienaga is on private land and can be visually monitored by the landowners. If needed, due to a lack of Gila Topminnow observations or an observation of nonnative fishes, Burro Cienaga should be surveyed sooner.
- The Gila Farm Pond contains a high density of nonnative fishes and no native fishes. There is also no physical barrier present to prevent the movement of fish into the pond, so nonnative fish eradication at the site would likely not be effective. It is recommended that the Gila Farm Pond is no longer considered a viable option for Roundtail Chub at this time.
- Loach Minnow have been stocked in Little Creek for 5 years and are persisting. We recommend ending stocking and continuing monitoring of Little Creek in 2019.
- The San Francisco River should be evaluated and if necessary, Loach Minnow and Spikedace stocking should continue in 2019.
- Saliz Creek should be evaluated for suitable Loach Minnow habitat and stocked with Loach Minnow in 2019 if suitable habitat is found.
- New Loach Minnow repatriation sites should be evaluated for Gila Forks Loach Minnow.

Work Planned for 2019

- Conduct Loach Minnow stocking into Saliz Canyon and Spikedace stocking into the San Francisco River if appropriate.
- Conduct surveys of repatriated Loach Minnow population in Little Creek.
- Prioritize potential repatriation streams for Gila Forks Loach Minnow.
- Transfer Loach Minnow and/or Spikedace to ARCC to supplement hatchery populations if source populations are stable.

Remote Site Inventory and Assessment (Task NM-2017-1)

Strategic Plan Goals:

- Build the scientific foundation for recovery efforts
 - Goal 2. Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.
- 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

Potential habitat for Roundtail Chub (previously Headwater Chub), Loach Minnow, Spikedace, Desert Sucker, Sonora Sucker, Speckled Dace, Longfin Dace, and Gila Trout occur in the Middle Fork Gila River and its tributaries. However, there have been significant changes in the drainage since the GRBNFCP funded an inventory of each of the Gila River forks from 2005-2008 (Paroz et al. 2009). The most significant change was the Whitewater-Baldy Fire that burned large portions of the watershed in 2012 and resulted in catastrophic post-fire flooding in 2013. This fire eliminated nonnative fishes from at least one tributary (Willow Creek) of the Middle Fork Gila River and may have created an opportunity for native fish repatriation. As a result, an inventory was conducted to determine the effects of the Whitewater-Baldy Fire and flooding on fishes of the Middle Fork Gila River. Surveys began in the summer of 2017 with the lower half of the Middle Fork Gila River being surveyed (Ferguson and Ruhl 2018), the upper portion was completed in 2018.

Results

Department, USFWS, USFS, and BOR staff surveyed the upper section of the Middle Fork Gila River and tributaries from June 4th to June 8th, 2018. A total of 15 sites were surveyed on the Middle Fork Gila River and Iron Creek. Canyon Creek and Clear Creek were assessed for fish presence. Four sites were at or near previously established 2008 survey sites and 11 sites filled in gaps at new locations (Figure 14). Staff split into two crews with the upper crew covering sites 11A to 13A on the Middle Fork and sites 1 to 3 on Iron Creek. The lower crew sampled sites 9A through 11 and assessed Clear Creek and Canyon Creek. Sites farther up Iron Creek (Iron Creek 4 through Iron Creek 6) were completed on July 16th and 17th by Department staff. Sites were sampled by habitat using a backpack electrofisher and seine following the same sampling methods as the previous survey in 2008 (Paroz et al. 2009). Numbers captured of each species and density for each site is shown in Table 7. A low proportion of nonnatives were captured in the Middle Fork Gila River (0.94%), but a higher proportion was found in Iron Creek (7.42%), and Canyon Creek (30.95%).

Middle Fork Gila River

Roundtail Chub, Gila Trout, Desert Sucker, Sonora Sucker, Speckled Dace, Common Carp, Fathead Minnow (*Pimephales promelas*), and Smallmouth Bass occupied more of the established sites than in 2008 sampling (Table 8). Common Carp, Fathead Minnow, and Smallmouth Bass were not captured in 2008 surveys but were captured in 2018 surveys. Rainbow Trout and Brown Trout were captured at fewer established sites in 2018 than in 2008 sampling. Roundtail Chub were found in 5 of 9 sites sampled in the Middle Fork Gila River in 2018.

Iron Creek

No Roundtail Chub were captured in Iron Creek. Just above Iron Creek Site 2 is a narrow slot canyon that seems to act as a barrier to warm water fish. Above this point only trout were found, and Brown Trout were the predominant species. Above the Iron Barrier has been recently surveyed by Department staff and only Trout were captured, therefore it was not included in this survey (NMDGF 2015).

Canyon Creek

Canyon Creek was found to be intermittent with several large pools and subsurface flows. Two large pools were sampled and Desert Sucker, Sonora Sucker, Speckled Dace, and Rainbow Trout were found. Rainbow Trout (n=26) were captured in these two pools indicating a thriving population of nonnative trout in Canyon Creek.

Clear Creek

Clear Creek was found to be dry from the Middle Fork Gila River up about a half mile; the assessment was not continued above this point.

Gilita Creek

Gilita Creek has been recently surveyed by Department staff for Gila Trout projects therefore it was not included in this survey. In the survey two Roundtail Chub were captured, along with Desert Sucker, Sonora Sucker, and Speckled Dace (NMDGF 2017).

Recommendations

- The Middle Fork Gila River was assessed for native and nonnative fishes in 2017 and 2018. With this inventory complete, we recommend surveying the East Fork Gila River to update assessments of native and nonnative fishes. The Middle Fork Gila River should be added to a remote site inventory rotation with future monitoring occurring no later than 2028.

Work Planned for 2019

- Survey the East Fork Gila River and perennial tributaries.

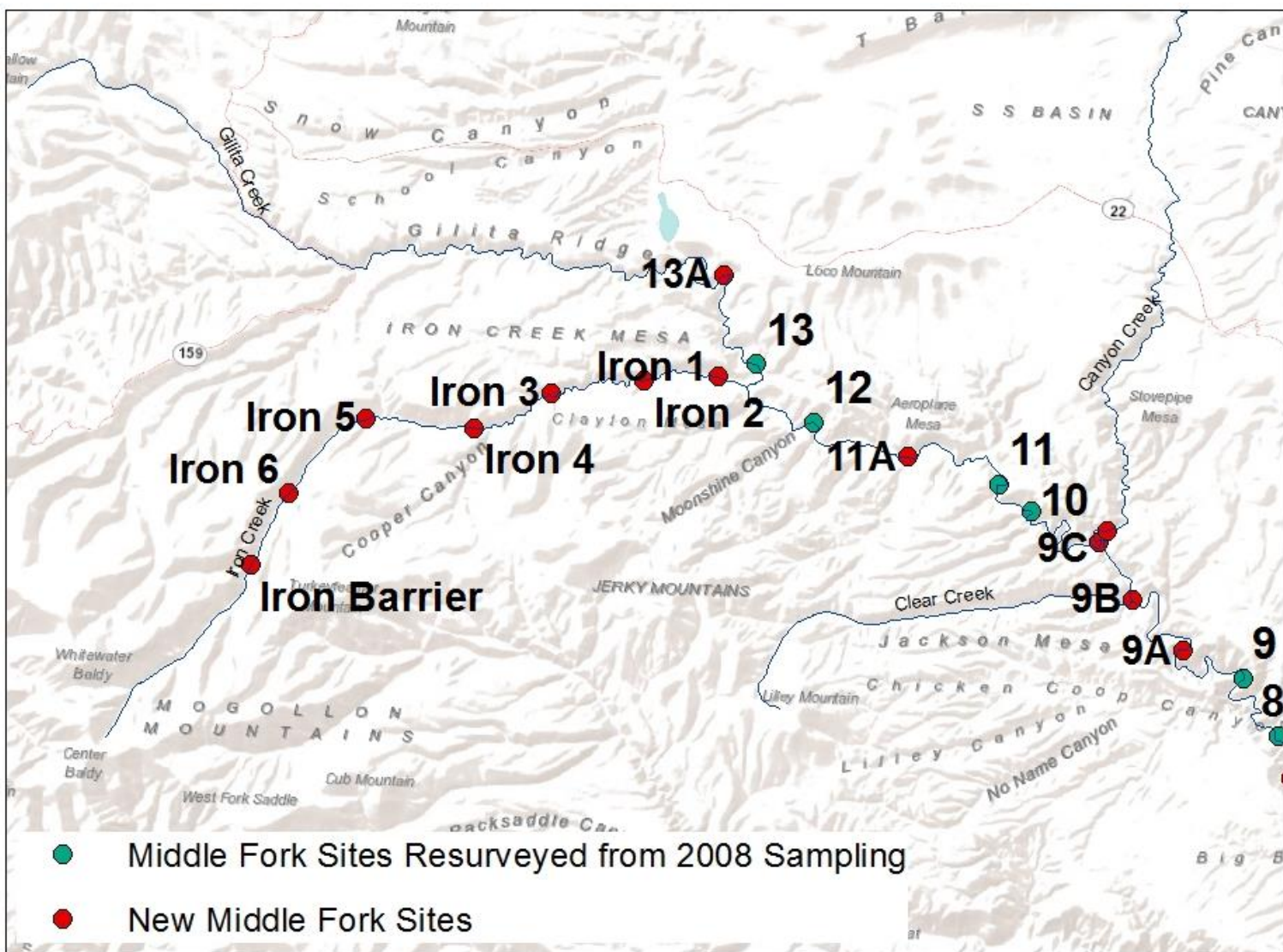


Figure 14. Map of Middle Fork Gila River and tributaries showing location of sites sampled in 2018.

Table 7. Total number of individuals captured and density (fish/m²) of all fishes by site in the Middle Fork Gila River in 2018. Sites with asterisks indicate new sampling locations.

Site	<i>Desert Sucker</i>		<i>Gila Trout</i>		<i>Roundtail Chub</i>		<i>Sonora Sucker</i>		<i>Speckled Dace</i>		<i>Brown Trout</i>		<i>Common Carp</i>		<i>Fathead Minnow</i>		<i>Rainbow Trout/Hybrid</i>		<i>Smallmouth Bass</i>	
	# Captured	Density	# Captured	Density	# Captured	Density	# Captured	Density	# Captured	Density	# Captured	Density	# Captured	Density	# Captured	Density	# Captured	Density	# Captured	Density
9A*	89	0.025	0		5	0.001	14	0.004	25	0.007	0		0		0		0		0	
9B*	98	0.022	0		0		61	0.014	22	0.005	0		0		0		0		0	
9C*	4	0.002	0		12	0.005	23	0.009	28	0.011	0		0		0		8	0.003	0	
10	59	0.020	0		12	0.004	76	0.026	58	0.020	0		4	0.001	0		1	0.000	1	0.000
11	82	0.029	0		10	0.004	69	0.024	37	0.013	0		0		0		0		0	
11A*	40	.026	0		0		30	0.013	61	0.039	0		0		0		0		0	
12	38	0.036	4	0.004	0		19	0.018	144	0.135	0		0		0		0		0	
13	11	0.007	0		0		13	0.008	190	0.118	0		0		0		0		0	
13A*	72	0.049	0		1	0.000	36	0.025	237	0.162	0		1	0.000	1	0.000	0		0	
Iron 1*	63	0.066	0		0		6	0.006	617	0.645	0		0		0		2	0.002	0	
Iron 2*	122	0.102	2	0.002	0		4	0.003	108	0.090	1	0.000	0		0		0		0	
Iron 3*	0		1	0.001	0		0		0		15	0.013	0		0		0		0	
Iron 4*	0		0		0		0		0		37	0.022	0		0		0		0	
Iron 5*	0		0		0		0		0		2	0.001	0		0		0		0	
Iron 6*	0		0		0		0		0		19	0.011	0		0		0		0	

Table 8. Presence of fish species in the Middle Fork Gila River in 2008 and 2018 by site. New sites, indicated by asterisks, were only sampled in 2018.

Site	<i>Desert Sucker</i>		<i>Gila Trout</i>		<i>Roundtail Chub</i>		<i>Sonora Sucker</i>		<i>Speckled Dace</i>		<i>Brown Trout</i>		<i>Common Carp</i>		<i>Fathead Minnow</i>		<i>Rainbow Trout/Hybrid</i>		<i>Smallmouth Bass</i>			
	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018	2008	2018		
	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
9A*	-	X	-		-	X	-	X	-	X	-		-		-		-		-		-	
9B*	-	X	-		-		-	X	-	X	-		-		-		-		-		-	
9C*	-	X	-		-	X	-	X	-	X	-		-		-		-	X	-		-	
10	X	X			X	X	X	X	X	X			X				X	X			X	
11	X	X			X	X	X	X	X	X							X					
11A*	-	X	-		-		-	X	-	X	-		-		-		-		-		-	
12	X	X		X			X	X	X	X							X					
13	X	X					X	X		X												
13A		X				X		X		X				X		X						
Canyon Creek*	-	X	-		-		-	X	-	X	-		-		-		-	X	-		-	
Iron 1*	-	X	-		-		-	X	-	X	-		-		-		-	X	-		-	
Iron 2*	-	X	-	X	-		-	X	-	X	-	X	-		-		-		-		-	
Iron 3*	-		-	X	-		-		-		-	X	-		-		-		-		-	
Iron 4*	-		-		-		-		-		-	X	-		-		-		-		-	
Iron 5*	-		-		-		-		-		-	X	-		-		-		-		-	
Iron 6*	-		-		-		-		-		-	X	-		-		-		-		-	

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Appendix A.

Length frequency of selected species collected during the nonnative removal on the West Fork Gila River in June 2018.

