Gila River Basin Native Fishes Conservation Program

New Mexico Activities

2011

NEW MEXICO DEPARTMENT OF GAME & FISH

U.S. FOREST SERVICE, GILA NATIONAL FOREST

U.S. FISH & WILDLIFE SERVICE, NM FISH & WILDLIFE CONSERVATION OFFICE

26 SEPTEMBER 2012

Executive Summary:
This is a report summarizing the Gila River Basin Native Fishes Conservation Program (GRBNFCP) funded projects in New Mexico from 1 May 2010 through 30 April 2011. It was a transitional year for personnel at New Mexico Department of Game and Fish (NMDGF). Despite any difficulties this may have caused progress was made toward native fish conservation and nonnative fish removal.

The NMDGF has been working with two landowners to restore fish on private lands. The Pitchfork Ranch is home to a refuge population of Gila topminnow in Burro Ciénega. In 2011 some Gila topminnow were moved to another pond due to drought conditions. Gila topminnow occupy six distinct areas at Burro Ciénega as of 2011. The Nature Conservancy Gila Farm Pond was renovated and stocked with roundtail chub in 2008. The NMDGF conducted a survey in 2011, but did not find roundtail chub. The efficacy of the fish screen at the inlet to the pond needs to be evaluated before restocking.

The NMDGF's Redrock Ciénega was restored in 2009 as a refuge for Gila topminnow and Gila chub. In 2011 NMDGF surveyed the pond and found adult and juvenile chub, but no topmminow. In October 2011, NMDGF and Arizona Game and Fish Department (AZGFD) stocked 174 Gila chub and 2,357 Gila topminnow.

The GRBNFCP is working to restore spikedace to San Francisco River. As part of that effort in 2011 Dexter Fish Health Center evaluated longfin dace *Agosia chrysogaster* and speckled dace *Rhinichthys osculus* from West Fork Gila River. After finding no reportable pathogens, spikedace and loach minnow were collected and transported to Bubbling Ponds Hatchery in Arizona.

The GRBNFCP is working to restore Gila chub to previously occupied streams. In 2011 Mule Creek was surveyed as a potential repatriation site. Habitat features preferred by Gila chub are present in Mule Creek and it was identified as a potential repatriation site for Gila chub.

The GRBNFCP performs removal of nonnative fishes in West Fork Gila River and Little Creek for the benefit of native threatened and endangered fishes. In 2011, one mechanical removal pass was made at the Heart Bar Wildlife Management Area in June. The participating agencies removed 297 nonnative fish. They also captured more loach minnow and spikedace than in any previous year. In Little Creek the participating agencies removed 126 nonnative trout from the lower 5.5 kilometers in June.

Native Fishes Recovery & Conservation (RPA 3)

During the reporting period NMDGF spent $43,000.00 on RPA 3.

Restoration of Native Fishes to Private Lands

New Mexico Department of Game and Fish is currently working with two landowners to restore native fishes on private lands. The Pitchfork Ranch, located 24 miles southwest of Silver City in Grant County, is within the Animas Valley watershed. During 2008, Gila topminnow *Poeciliopsis occidentalis* from Bylas Springs, Arizona were stocked in Burro Ciénega on the Pitchfork Ranch. Despite several high flow events in 2009 and a severe drought in 2011, the species persists and the landowners (A.T. & Cinda Cole) report them common in suitable habitats. The property owners are taking an active role in the recovery of Gila topminnow on their property. Due to drought conditions in 2011, the Patterson Canyon pool in Burro Ciénega dried significantly (Figure 1). Gila topminnow were moved to the O'brian overflow pool and other locations to prevent mortalities from drying. Gila topminnow now occupy six distinct areas at Burro Ciénega.

Figure 1. Gila topminnow salvage from Patterson Canyon pool on the Pitchfork Ranch.

The Nature Conservancy owns property on the Gila River four miles upstream of Gila, NM. The Gila Farm Pond on the property is connected to an irrigation channel, but has no outlet. It had previously been used for agriculture and recreational fishing. After draining and removal of nonnative largemouth bass *Micropterus salmoides*, the pond on The Nature Conservancy's Gila Farm

was stocked with 84 Verde River roundtail chub *Gila robusta* from Bubbling Ponds Hatchery in Arizona in February, 2008. The Nature Conservancy installed a fish screen on the inflow structure from the irrigation ditch to the pond in 2009. The NMDGF observed roundtail chub during snorkel surveys in 2008 and 2009, but no surveys were accomplished during 2010. In June 2011, we surveyed the pond with a trammel net and captured two Sonora suckers *Catostomus insignis*. These fish likely entered the pond before fish screen construction as they were 235 and 255 millimeters (mm) standard length (SL). The survey effort in 2011 was cursory and should not be interpreted as conclusive evidence of the absence of roundtail chub, or of unwanted nonnative fishes. More intensive surveys are warranted to determine roundtail chub persistence in the pond. If absent, The Nature Conservancy and NMDGF may consider draining the pond and restocking with roundtail chub. Before restocking, NMDGF should also determine the effectiveness of the fish screen. Success of roundtail chub stocking should be evaluated only after they have had a chance to occupy the pond without the competition/predation pressures from nonnatives.

Restoration of Redrock Ciénega

Ciénega construction (supported by funds from Gila River Basin Native Fishes Conservation Program, Desert Fishes Habitat Partnership, and US Fish and Wildlife Service) was completed in 2009 (Figure 2). After removal of dense salt cedar (*Tamarix* sp.), NMDGF created an approximately 0.75 acre (0.3 hectare) pond with a central island and variable depth as a refuge site for Gila topminnow and Gila chub. Shortly after completion, Gila topminnow from Bylas Springs were stocked. In October 2010, numerous Gila topminnow were observed along the ciénega margins. Also in October 2010, 150 Gila chub *Gila intermedia* from Dix Creek in Arizona (collected and provided by AZGFD) were stocked in Redrock Ciénega.

Figure 2. Redrock Ciénega, New Mexico Department of Game & Fish Redrock Wildlife Management Area, 2009 on the left and 2011 on the right.

Figure 3. Gila chub stocking, Redrock Ciénega, New Mexico Department of Game & Fish Redrock Wildlife Management Area, October 2011.

New Mexico Department of Game and Fish monitored Redrock Ciénega in June 2011 using minnow traps and seine. Three Gila chub were captured but no Gila topminnow. Two of the chub were juveniles (45 mm SL) indicating that chub reproduced in the ciénega. NMDGF is uncertain why topminnow was not observed. The record cold temperatures during the winter of 2010/2011 may have been a contributing factor. An additional 174 Gila chub and 2,357 Gila topminnow were stocked by NMDGF and AZGFD personnel in October 2011.

Restoration of Spikedace to San Francisco River

In October 2010, about 4,000 age-0 spikedace *Meda fulgida* were stocked into the San Francisco River by NMDGF, USFWS, NMDGF and AZGFD (participating agencies) personnel about 10 river kilometers upstream of US Hwy 180 (Figure 4). These fish were offspring of individuals captured from the Gila River within Gila National Forest Bird Area, New Mexico and were reared at AZGFD Bubbling Ponds Native Fish Conservation Facility. Spikedace were not stocked in 2011.

The participating agencies collected fish from the West Fork Gila River in the Heart Bar Wildlife Management Area for a health assessment in April 2011. No significant reportable pathogens were detected by the fish health unit at Dexter National Fish Hatchery and Technology Center. Subsequently, 148 spikedace and 434 loach minnow were collected and transported to Bubbling Ponds Hatchery in Arizona in June 2011. These fish and their offspring will be used for future repatriation efforts.

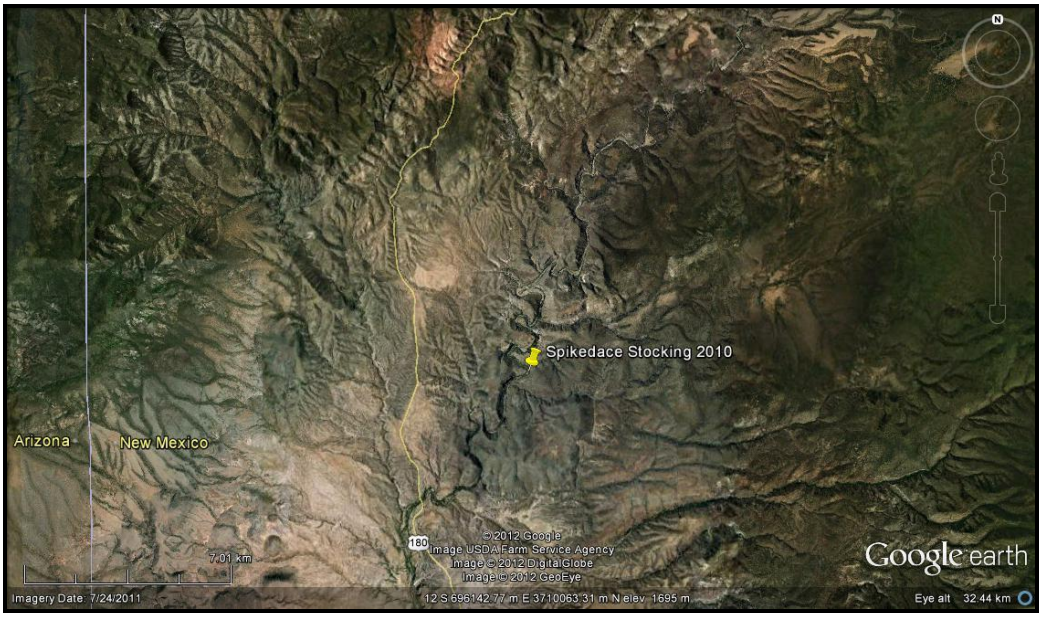

Figure 4. Spikedace release site on San Francisco River, Catron County, New Mexico.

San Francisco River Tributary Survey for Chub Species

In 2007, NMDGF personnel proposed a systematic inventory of tributaries of the San Francisco for restoration of Gila chub *Gila intermedia.* Mule Creek was identified in this proposal as a tributary which was either likely occupied by Gila chub or may have suitable habitat. The proposal stated that if Gila chub was not found but suitable habitat was present, Gila chub from Harden Ciénega would be requested from AZGFD

In early July of 2011, a crew composed of NMDGF, U.S. Fish and Wildlife Service, and U.S. Forest Service sampled the fish community in Mule Creek and assessed its suitability for introduction of Gila chub. The U.S. Forest Service manages the lower portion of Mule Creek (~ 5 km) and above this is private property. Surface water connection between Mule Creek and the San Francisco River was observed early in the morning but drying of the area was complete by mid-afternoon. Consistently flowing water was present in Mule Creek 800 m upstream from its confluence with the San Francisco River. Survey crews hiked up Mule Creek until they reached private property and sampling began about 150 m downstream of private property. Sampling continued downstream until pool habitat was no longer present (1.5 km upstream of the confluence of Mule Creek and the San Francisco River). In total about 3.5 km of stream was sampled (Figure 5).

Fish were collected with a backpack electrofishing unit and dipnets. Since there was a large extent of habitat to sample all fish were collected from all habitats (riffles, shoals, runs and pools) for approximately one km of habitat. These fish were enumerated, measured, weighed and released. Sampling of the remaining 2.5 km of stream consisted of spot shocking pools and runs. Fish were identified within the dipnets and released. This technique was used simply to determine the presence or absence of Gila chub. Although numbers of fish and measurements were not collected,

notes were made on species composition and a general assessment of abundance for each species of fish was noted.

Suitable habitat for Gila chub was defined as plunge pools, scour pools, pools with overhanging vegetation, pools with overhanging boulders or rock cliffs, or slow shoreline runs with overhanging vegetation. This habitat was visually assessed. Large pool habitats and runs were measured.

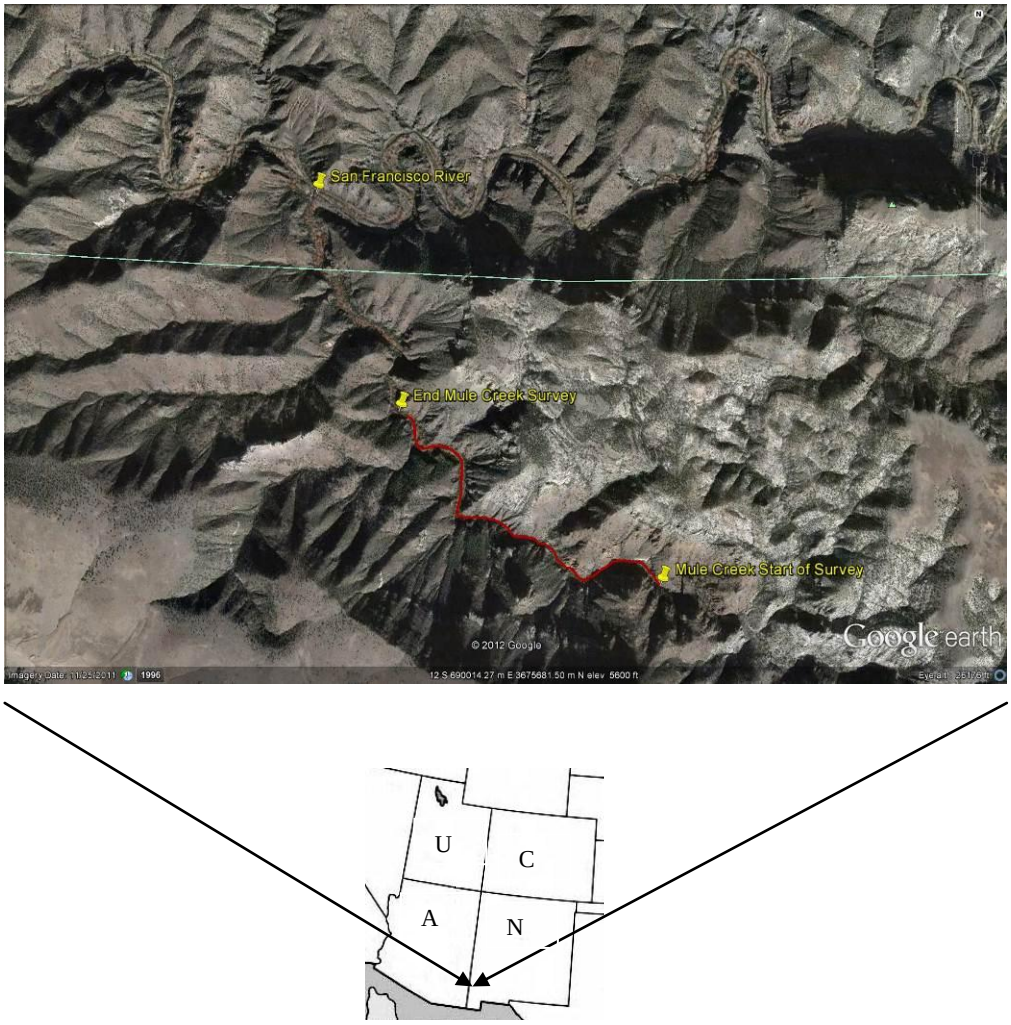

Figure 5. Mule Creek survey location and extent of sampling, 2011.

No chub was found in the section of Mule Creek sampled. Desert sucker *Pantosteus clarkii*, Sonora sucker, speckled dace *Rhinichthys osculus* and longfin dace *Agosia chrysogaster*, were collected and common. The last pool, in the lowest portion of Mule Creek sampled, yielded a single smallmouth bass *Micropterus dolomieu* (total length 160 mm). This was the only nonnative fish collected in Mule Creek. In total, 520 fish were collected in 970 seconds of sampling (Table 1).

Table 1. Fish Captured and Catch per Unit Effort (CPUE) Mule Creek, 2011

Species Common Name	*Total Number Collected*	*CPUE (Number/Second)*
Longfin Dace	248	0.2557
Sonora Sucker	16	0.0165
Desert Sucker	188	0.1938
Speckled Dace	68	0.0701

In 2011, pools were common throughout Mule Creek (Table 2). Pools and runs with overhanging vegetation and large boulders were also present. Substrate consisted of sand and gravel. Sections of the creek also contained submerged woody debris, boulders and overhanging rock. No images of the habitat are available due to a camera malfunction.

Table 2. Observations of Fish Habitat in Mule Creek, 2011

Habitat Type	*Size (meters)*	*Depth(s) (meters)*	*Substrate*	*Other comments*
Pool (3)	large	-	gravel	large boulders
Pool	3.0 x 5.5	0.8, 0.7, 1.0	gravel/sand	-
Pool	3.0 x 3.3	0.2, 0.3, 0.6	gravel	-
Pool	2.5 x 4.0	0.7, 0.3, 0.2	sand/gravel	-
Pool (3)	3.5 x 1.5	0.3	cobble/gravel	runs in between pools
Run	2.5 x 15	0.5	gravel	rock wall paralleling run with some shallow pools
Pool	4.5 x 4	1	-	-
Pool/run	-	-	-	narrow
Pool	2.5 x 1.5	0.7	-	-
Run	1.5 x 7.0	0.4	-	-
Pool	4.0 x 2.5	0.8	-	-
Pool	4.0 x 2.5	0.5	-	-
Riffle	10.0 in length	0.07	-	-
Pool	9.0 x 2.5	1.2	gravel	overhanging cliff; submerged woody debris
Pool	-	-	-	against rock wall with submerged woody debris
Run	4.0 x 1.0	0.3	-	undercut bank with root wads
Riffle	8.0 x 0.8	-	-	-

Although Gila chub were not observed in Mule Creek suitable habitat for Gila chub, such as plunge and scour pools, and runs and pools with either overhanging rock/boulder or vegetation was present. An intact and robust native fish assemblage was observed indicating Mule Creek has and likely will continue to support fish. Given this information, Gila chub should be stocked into Mule Creek.

Nonnative Control (RPA 4)

During the reporting period NMDGF spent $3,000.00 on RPA 4.

West Fork Gila River

New Mexico Department of Game and Fish has been coordinating nonnative removal activities at the Heart Bar Wildlife Management Area since 2006. The removal reach is the West Fork Gila River from its confluence with Little Creek upstream to the NM Highway 15 bridge. Each year in June NMDGF, USFWS, and USFS jointly conduct a comprehensive fish survey including removal of nonnative species and enumeration and measurement of native species by habitat. The first four years of the effort (through 2009) were evaluated and although the effects of all the variables could not be accounted for (e.g., flow regimes, fine sediment excavation, or unknown factors) the results were positive. The GRBNFCP decided to continue the effort based on a demonstrated reduction in piscivorous predators.

The NMDGF experienced personnel change on this project in 2010 and was shorthanded. With limited personnel they were able to perform the June mechanical removal and community assessment, but habitat data was collected differently. That meant CPUE could not be compared directly to previous years. The West Fork Gila River nonnative removal incorporates seining and electrofishing for greatest removal efficacy, but this complicates CPUE reporting. Seining CPUE is recorded as area seined and electrofishing CPUE is recorded by time electrofishing. In the 2009 nonnative removal report, CPUE was calculated by habitat area. That is, the sampled area of each mesohabitat in the river was measured and all fish captured with electrofishing and seining were combined. In 2010 the same protocol was used for fish capture, but effort was recorded as electrofishing seconds and area seined separately (i.e. no area was recorded for electrofishing). In 2011, NMDGF experienced additional changes in personnel and remained shorthanded. The nonnative removal effort in 2011 included one trip in June. The NMDGF considers this the most important of the scheduled efforts because it maintains a continuum of community data that can be used to show a response to mechanical removal. In 2011 NMDGF used the same protocol for fish capture and collected habitat data in the same way as it had been done previous to 2010. A small amount of habitat data was lost before being recorded. Due to the issues with the 2010 and 2011 habitat data the only continuous trend data presented in this report is relative abundance (Figure 10).

Table 3. Number of individuals and relative abundance by year of native and nonnative fishes captured during June in West Fork Gila River Heart Bar reach, New Mexico. Data from 2006 was not included because it was not collected in June of that year. See previous annual reports for 2006 data.

Species	*June-07*		*June-08*		*June-09*		*June-10*		*June-11*	
	Number	Rel. Ab.	Number	Rel. Ab.	Number	Rel. Ab.	Number	Rel. Ab.	Number	Rel. Ab.
Native										
Longfin dace	115	9.9%	207	14.1%	3444	28.3%	712	30.5%	2000	27.8%
Headwater chub	38	3.3%	46	3.1%	518	4.3%	90	3.9%	108	1.5%
Spikedace	0	0.0%	27	1.8%	103	0.8%	84	3.6%	1023	14.2%
Speckled dace	17	1.5%	59	4.0%	566	4.6%	153	6.5%	1063	14.8%
Loach minnow	1	0.1%	8	0.5%	50	0.4%	6	0.3%	99	1.4%
Sonora sucker	511	43.8%	641	43.5%	5328	43.8%	1002	42.9%	1654	23.0%
Desert sucker	263	22.6%	360	24.4%	1427	11.7%	208	8.9%	939	13.1%
Gila trout	0	0.0%	13	0.9%	13	0.1%	1	0.0%	1	0.0%
Nonnative										
Red shiner	0	0.0%	0	0.0%	0	0.0%	2	0.1%	1	0.0%
Fathead minnow	0	0.0%	1	0.1%	0	0.0%	19	0.8%	62	0.9%
Bullheads	97	8.3%	30	2.0%	281	2.3%	41	1.8%	150	2.1%
Flathead catfish	0	0.0%	0	0.0%	1	0.0%	0	0.0%	1	0.0%
Rainbow trout	48	4.1%	14	1.0%	47	0.4%	0	0.0%	28	0.4%
Brown trout	36	3.1%	62	4.2%	361	3.0%	11	0.5%	9	0.1%
Western mosquitofish	15	1.3%	0	0.0%	4	0.0%	0	0.0%	6	0.1%
Green sunfish	1	0.1%	0	0.0%	1	0.0%	5	0.2%	3	0.0%
Smallmouth bass	24	2.1%	5	0.3%	29	0.2%	2	0.1%	37	0.5%

In June of each year the participating agencies conduct a comprehensive fish survey in conjunction with mechanical removal. The survey starts at the confluence of Little Creek and works upstream. The samplers use electrofishing, seining, and electrofishing into the seine depending on what is the best method for the circumstances. Habitat type, length, width, and fish data for each habitat are recorded independently allowing for fish density to be calculated per habitat. The most common mesohabitats in the Heart Bar reach of the West Fork Gila are pools, runs, riffles, glides, and shoals. A group recording mesohabitat data follows groups collecting fish. The habitat group records length, width, depth, substrate, and embeddedness for each mesohabitat. The fish groups record morphometric data for all fish and remove nonnative fish. They return native fish to the mesohabitat of capture before proceeding to the next mesohabitat. This allows biologists to calculate CPUE by square meters of each mesohabitat. This provides the best resolution data for comparing fish densities between years. For this reason, NMDGF uses only June removal data to evaluate effects to nonnatives and response of natives to mechanical removal efforts.

The West Fork Gila River Heart Bar reach was electro-fished and seined during June 2011 to remove nonnative fishes and document abundance of all species. Native as well as nonnative fish species previously documented in the Heart Bar reach persisted in 2011(Table 3).

Size-structure of the two most common nonnative predator populations, smallmouth bass (Figure 6) and yellow bullhead (Figure 7), changed markedly between 2006 and 2009. Since 2009 the numbers of larger smallmouth bass has remained depressed. Although size-range of yellow bullhead remained similar across years, the number of intermediate-sized individuals was considerably less since 2009 than in 2006 and 2007. The relative abundance of minnow species that are prey-size for smallmouth bass and brown trout *Salmo trutta* has increased at the same time that relative abundance of nonnative fish has decreased (Figure 10). The relative abundance of loach minnow and the nonnative fathead minnow also reached their highest level in 2011, but are still too rare for trend comparisons.

Size-structure of Sonora sucker and desert sucker populations did not change markedly since 2006 (Figures 8 and 9). The diminished density and altered population size-structure of yellow bullhead and smallmouth bass suggested that mechanical removal was diminishing their effects on native small bodied fish populations. The trends have continued since 2009. The downward trending nonnative line in Figure 10 does not necessarily mean that the density of nonnatives has declined, but it does suggest that the nonnatives that are present are not suppressing the minnow populations, both native and fathead. Smaller sized nonnative predators are likely less piscivorous and would have less of an impact on native small bodied fishes. The relative abundance of the two native suckers was also down in 2011 suggesting that their population is less affected by nonnative removal (Table 3). As the number of total fish increases due to increasing numbers of minnows a stable population of suckers would show a decreasing trend as a proportion of the total. It is still difficult to define to what degree the benefits to native minnows are a result of mechanical removal, but the trends are encouraging.

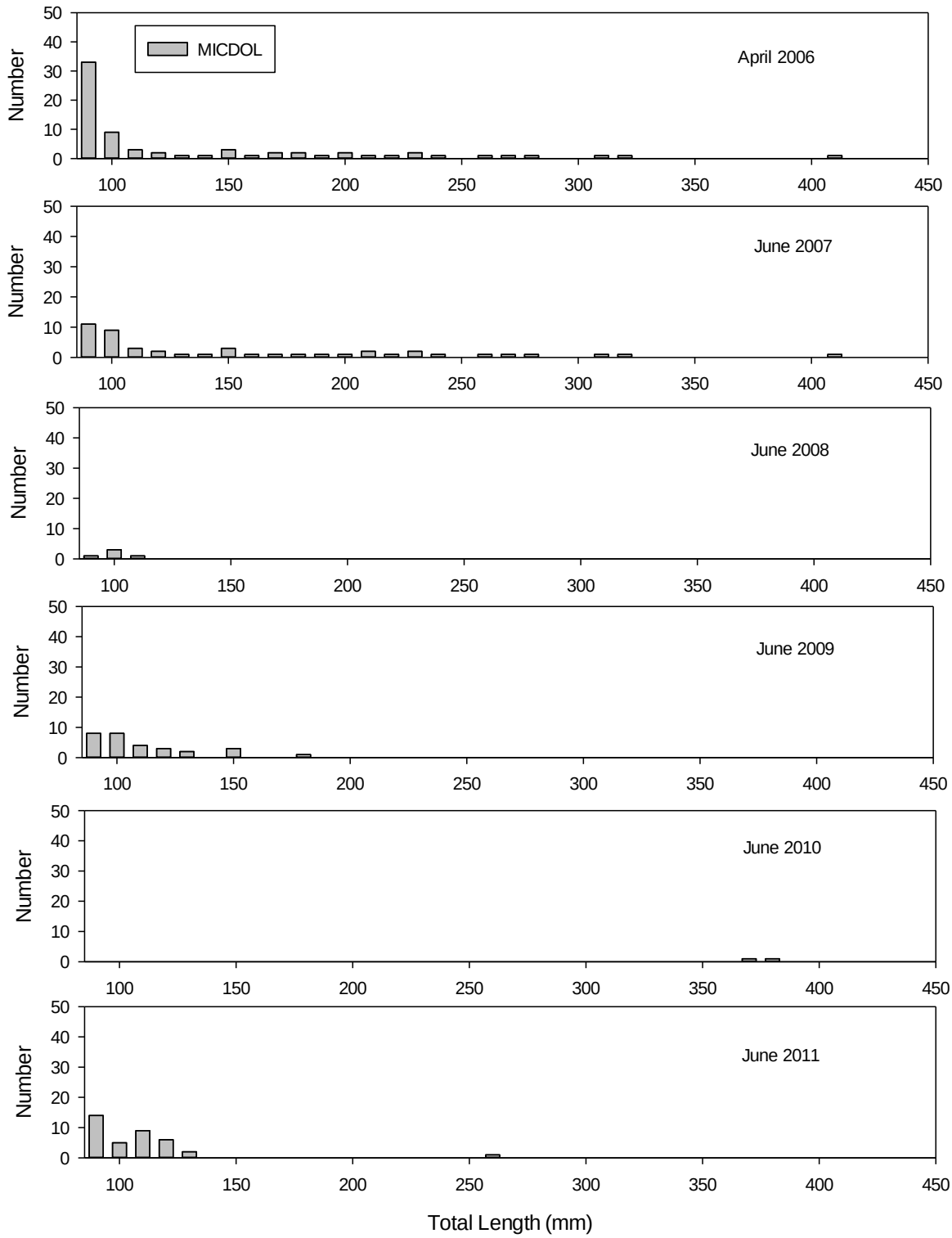

Figure 6. Length-frequency of smallmouth bass captured in Heart Bar reach of West Fork Gila River, New Mexico. The first bar represents all fish up to 90mm total length.

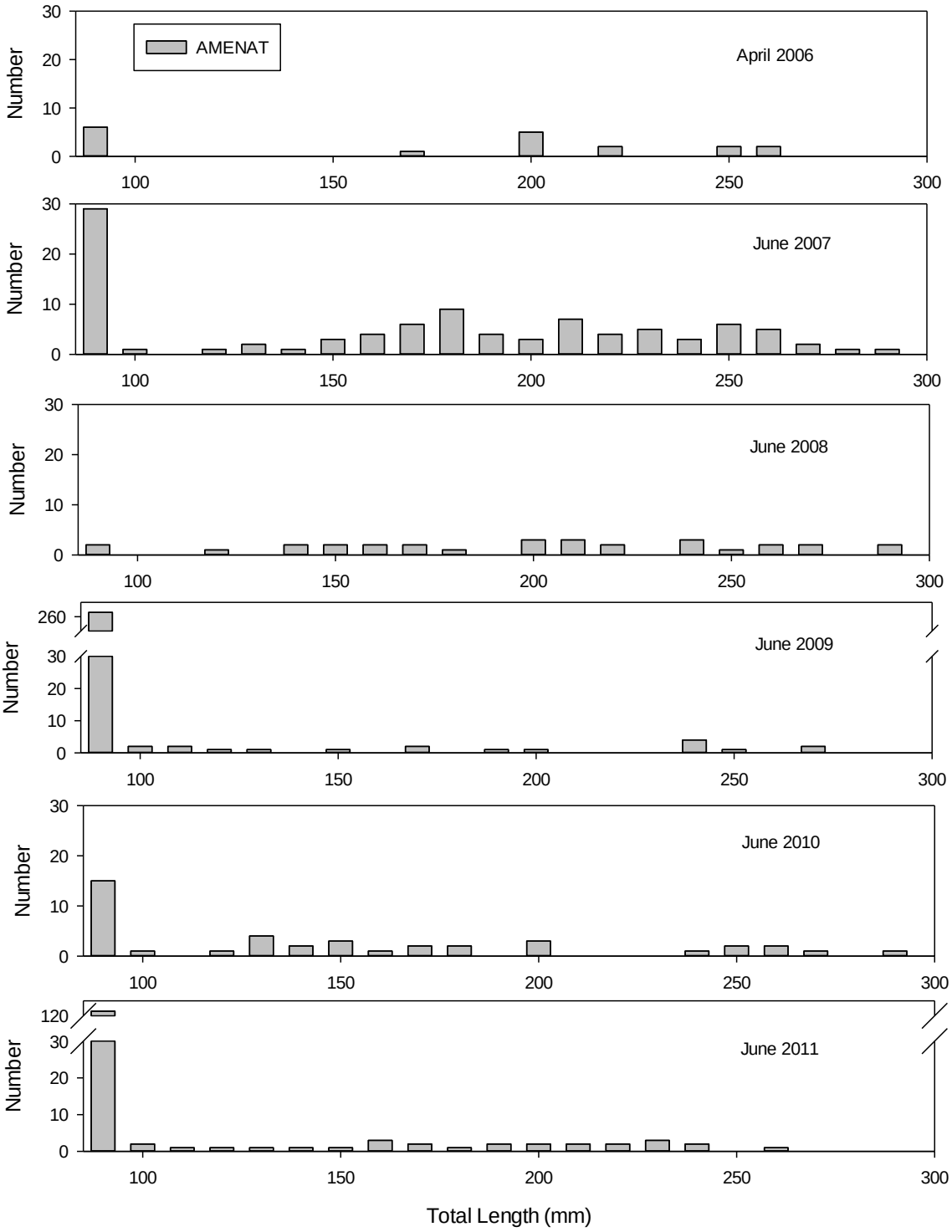

Figure 7. Length-frequency of yellow bullhead captured in Heart Bar reach of West Fork Gila River, New Mexico. The first bar represents all fish up to 90mm total length.

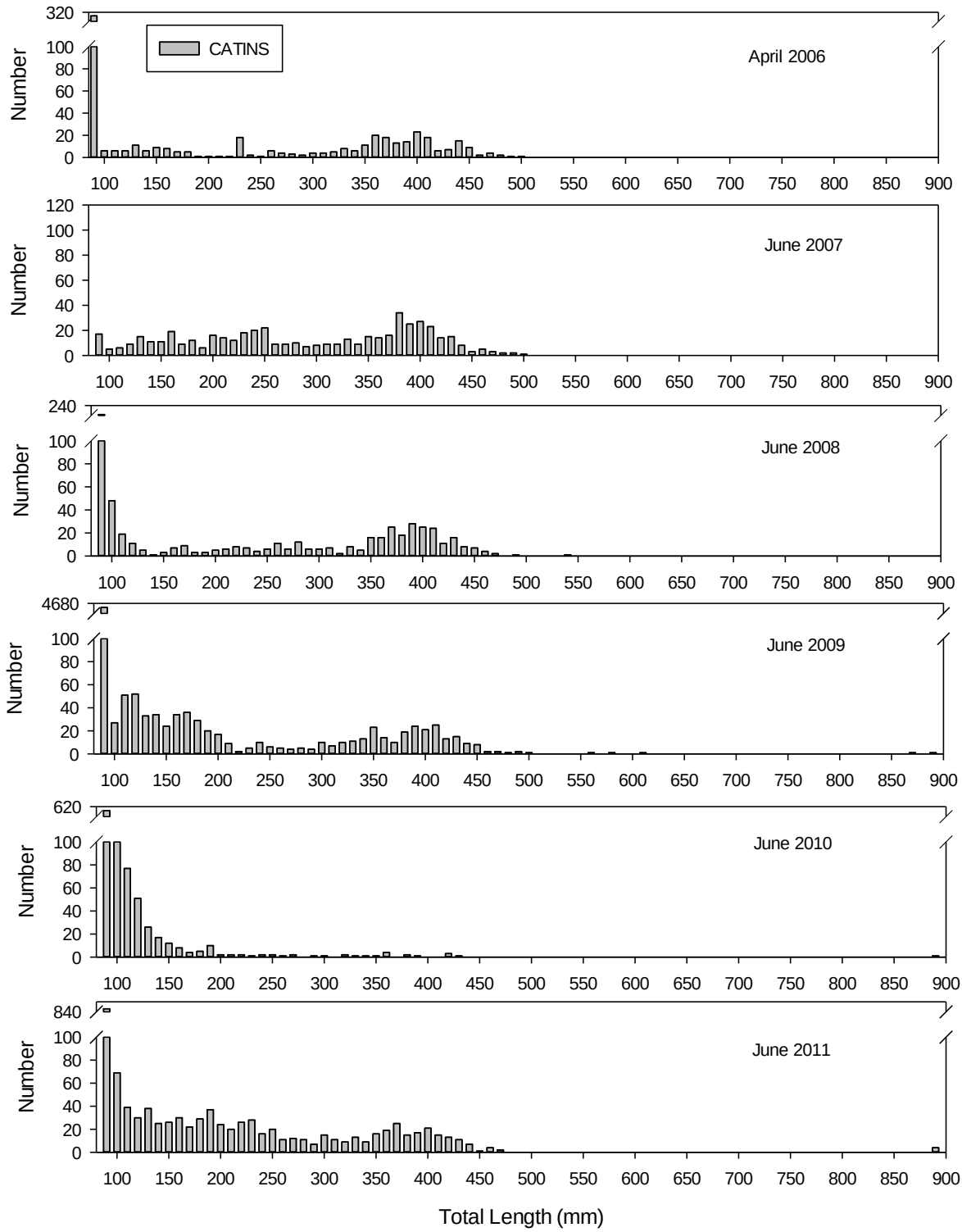

Figure 8. Length-frequency of Sonora suckers captured in Heart Bar reach of West Fork Gila River, New Mexico. The first bar represents all fish up to 90mm total length.

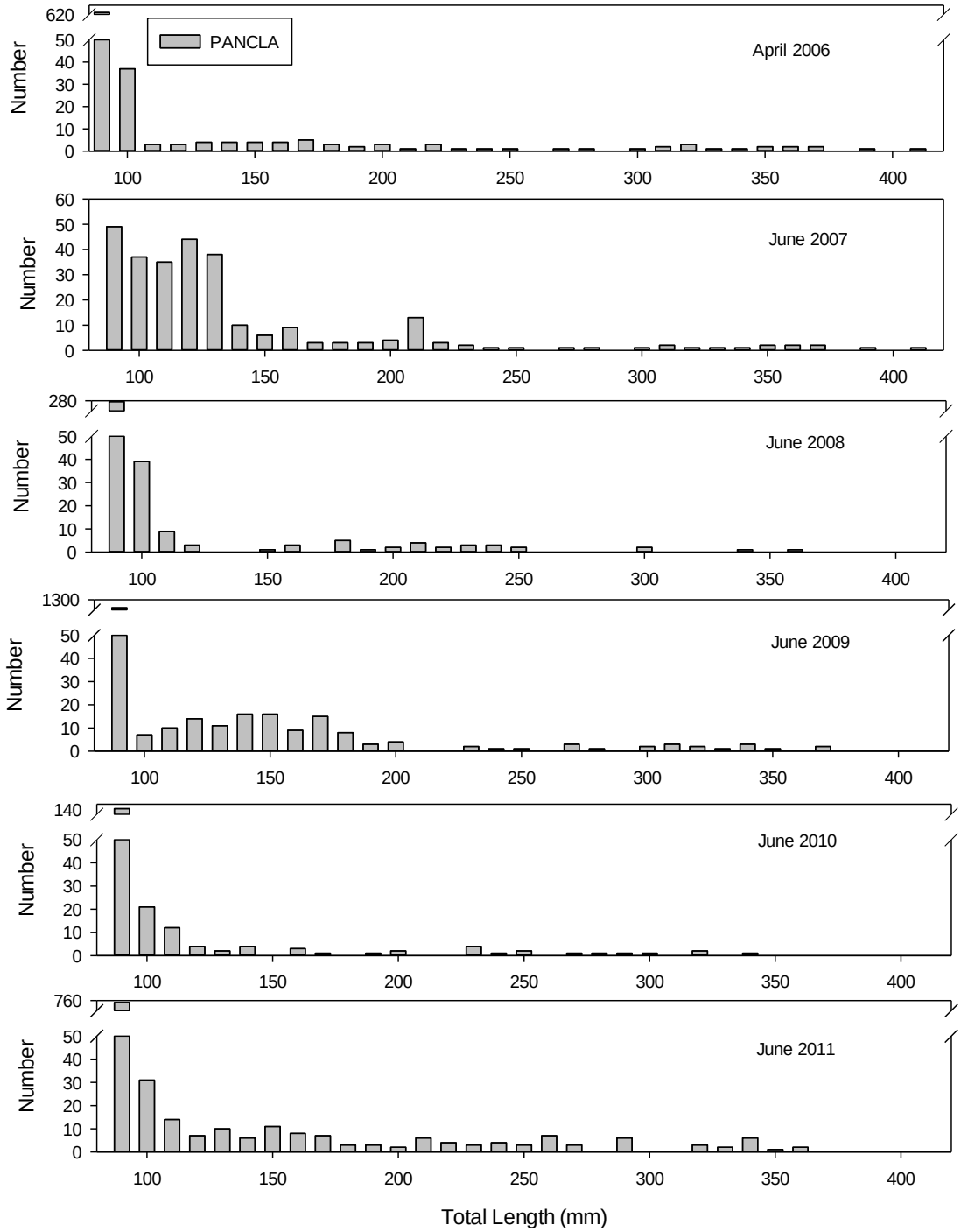

Figure 9. Length-frequency of desert sucker captured in Heart Bar reach of West Fork Gila River, New Mexico. The first bar represents all fish up to 90mm total length.

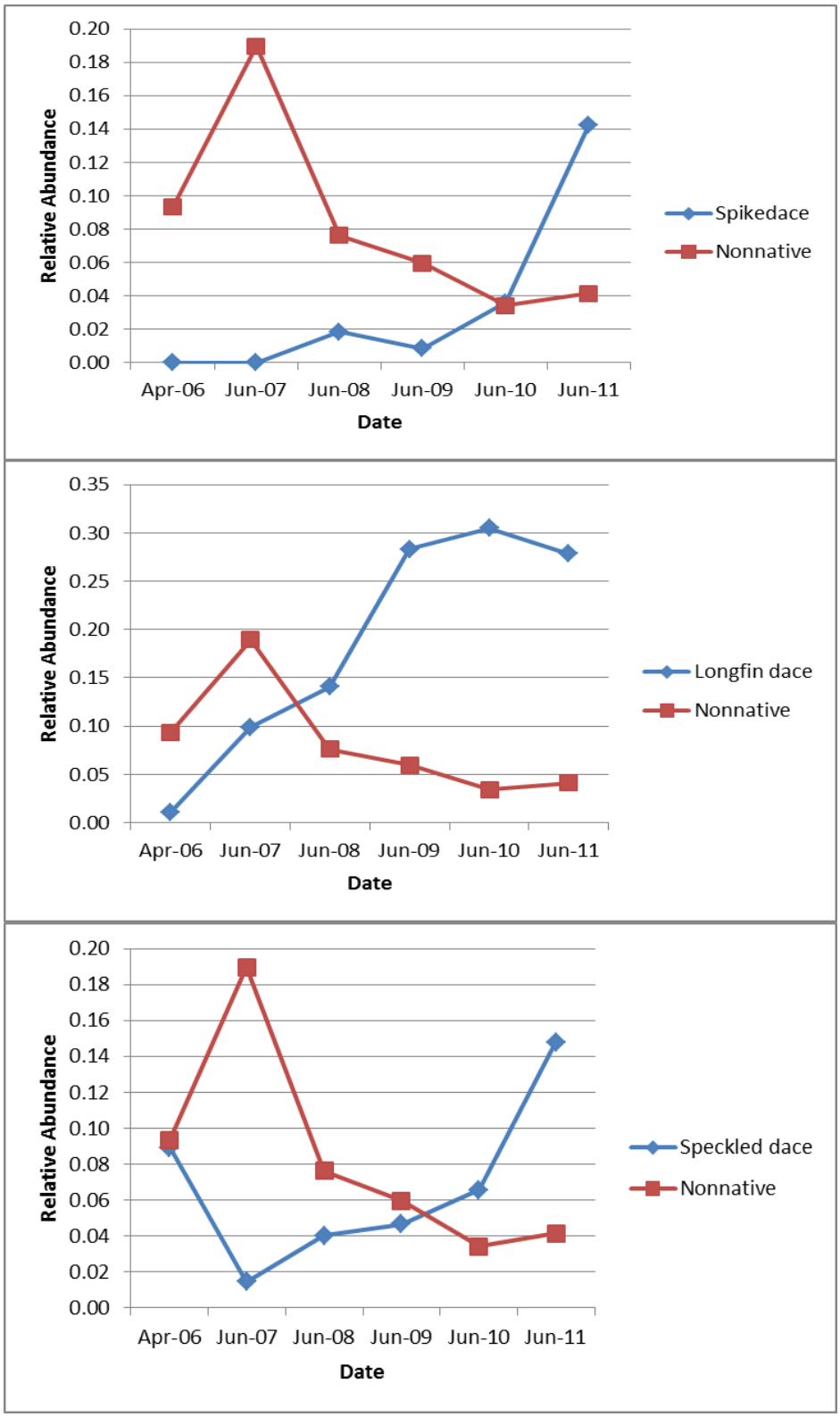

Figure 10. Relative abundance of three minnow species in relation to relative abundance of all nonnative fishes captured in Heart Bar reach of West Fork Gila River, New Mexico. The remainder of the total proportion is made up of native fishes.

Little Creek

The GRBNFCP initiated nonnative removal on Little Creek with the intent of creating a location for repatriation of loach minnow. Mechanical removal of nonnatives is accomplished by electrofishing. The effort is focused on nonnative removal and does not have a community survey component in the protocol. Native fishes are captured and measured on the first pass as time permits. The methods call for three passes three times per year for a total of nine passes per year.

The USFWS, USFS, and NMDGF completed a baseline survey and nonnative removal on six km of Little Creek working upstream from NM 15 bridge during two efforts in June and July, 2010. These agencies also conducted a nonnative removal in the lower 5.5 km of Little Creek in June 2011. Due to a personnel shortage at the lead agency (NMDGF) nonnative removal efforts in Little Creek were reduced from what was proposed. Native species that were captured in 2010 and 2011 include longfin dace, speckled dace, desert sucker, Sonora sucker, and Gila trout. Nonnative species in Little Creek were limited to rainbow trout *Oncorhynchus mykiss* and brown trout as well as one smallmouth bass captured in 2011. Catch rates in Table 4 show the total number of the two target nonnatives by total effort each year. The length frequency histograms for brown trout and rainbow trout (Figures 12 and 13) provide a starting point for future comparison.

The proposal for nonnative removal in Little Creek calls for stocking native fishes after a functional absence (≤1 per km) of nonnatives is accomplished. There are a lot of fish to remove to get to those numbers (Table 4). In 2011, the participating agencies had not conducted removal all the way to the barrier (Figure 11). A full effort needs to be performed in 2012 so that the efficacy can start to be evaluated.

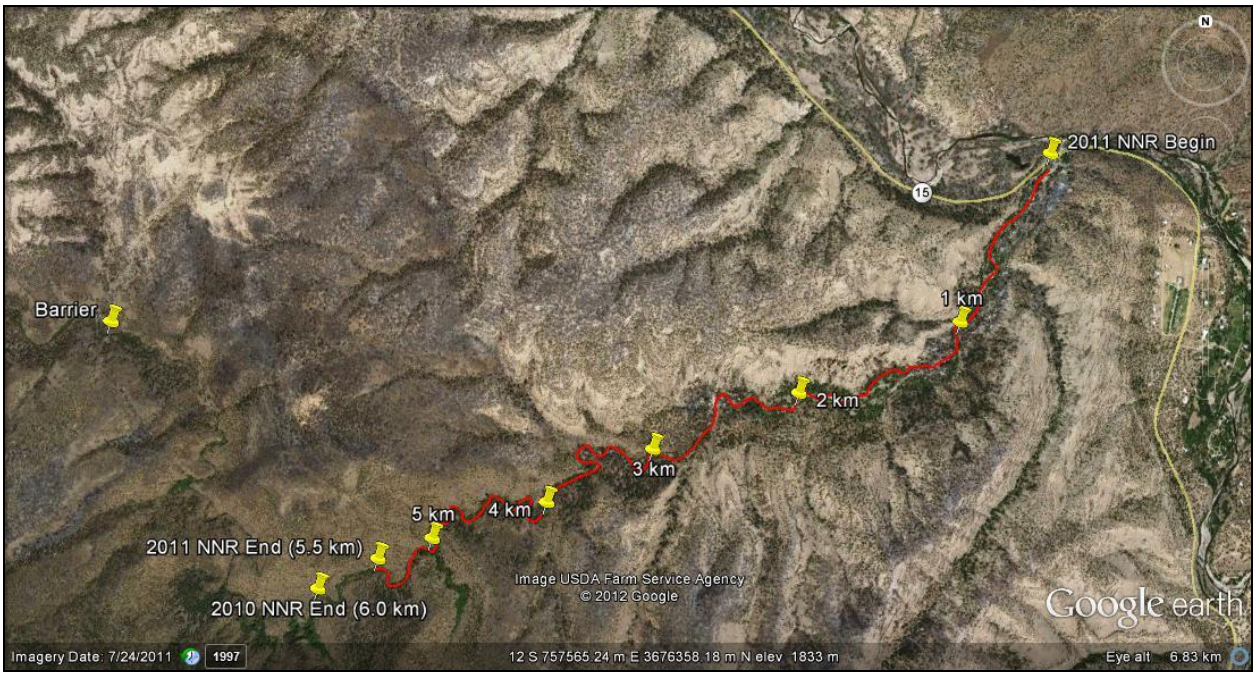

Figure 11. Aerial photograph of Little Creek showing 2010 and 2011 nonnative removal reaches.

Table 4. Number and catch rates (CPUE in fish/minute electrofishing) of nonnative fishes captured in Little Creek, New Mexico.

Species	*2010*	*2011*	*2010 CPUE*	*2011 CPUE*	*2010 #/km*	*2011 #/km*
Brown trout	201	92	.309	.340	33.5	16.7
Rainbow trout	2	34	.003	.126	0.3	6.2

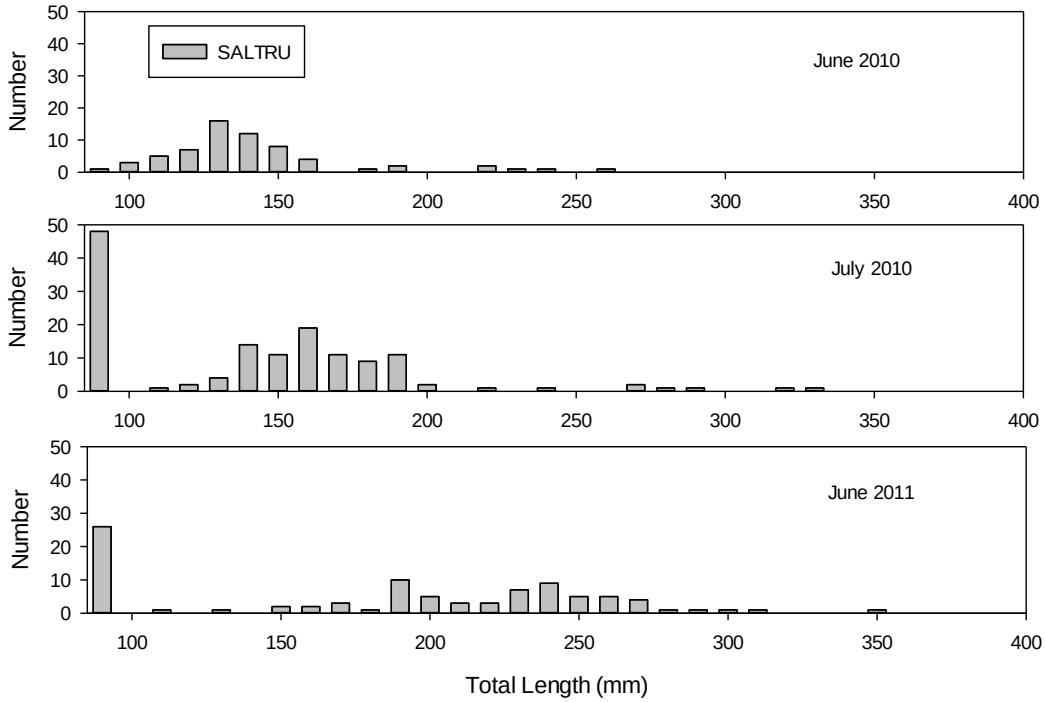

Figure 12. Length-frequency of brown trout captured in Little Creek, New Mexico. The first bar represents all fish up to 90mm total length.

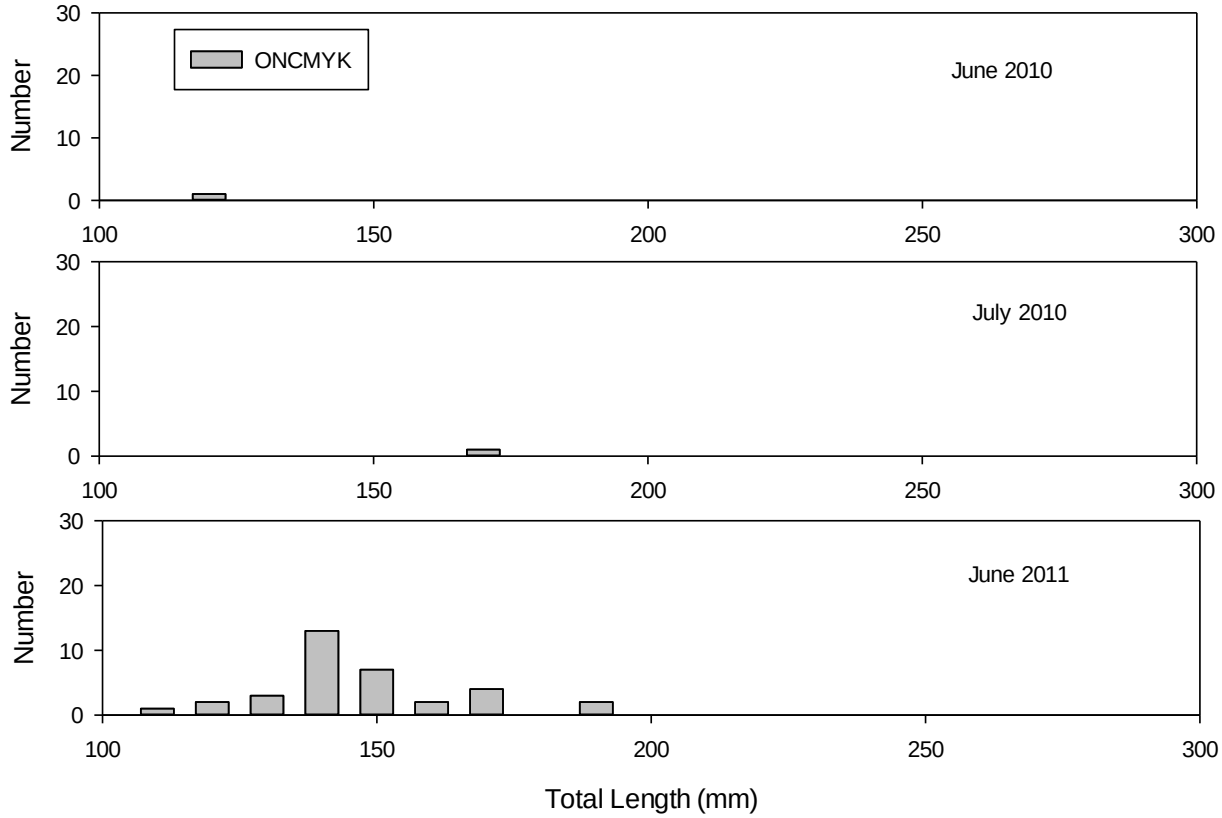

Figure 13. Length-frequency of rainbow trout (may include hybrids) captured in Little Creek, New Mexico.