

Gila River Basin Native Fish Monitoring

2017 Annual Report



Lara J. McCall and Paul C. Marsh

Marsh & Associates, LLC
5016 S. Ash Avenue, Suite 108
Tempe, Arizona 85282



Submitted to

William Stewart, COR
Bureau of Reclamation
Phoenix Area Office
6150 West Thunderbird Road
Glendale, Arizona

In behalf of Reclamation Contract No. R17PC00108

December 2017

Table of contents

Introduction	4
Methods.....	5
Results.....	6
Oak Creek.....	6
Middle reach – Crescent Moon Ranch and Chavez Crossing Campground	7
Lower reach – Bubbling Ponds Fish Hatchery and Willow Point Rd.	9
West Clear Creek.....	11
Blodgett Basin Trail (#17)	12
East Verde River.....	13
Doll Baby Ranch to LF Ranch	13
Deadman Creek	15
Unnamed Drainage #68B	17
Tortilla Creek	19
La Barge Creek	20
Acknowledgements.....	22
Literature cited.....	23
Appendix – site photographs	

List of tables

Table 1: List of species encountered during surveys throughout the Gila River Basin in 2017.....	5
Table 2: Summary of species presence(+)/absence(-) by stream reach.....	6
Table 3: Summary of catch in the middle reach of Oak Creek.....	8
Table 4: Summary of catch in the lower reach of Oak Creek.....	10
Table 5: Summary of catch by hoop net in the lower reach of West Clear Creek.....	12
Table 6: Summary of catch by backpack electrofishing in the lower reach of West Clear Creek.....	12
Table 7: Summary of catch in the lower reach of the East Verde River.	14
Table 8: Summary of catch by backpack electrofisher in the lower reach of Deadman Creek.....	16
Table 9: Summary of catch by minnow trap in Unnamed Drainage #68B.....	18
Table 10: Summary of catch by minnow traps in Tortilla Creek	19
Table 11: Summary of catch by minnow trap in La Barge Creek	21

List of Figures

Figure 1: Major drainages of the Gila River basin, within which stream surveys were conducted in 2017.	4
Figure 2: Location of sampling stations 1-3 on the middle reach of Oak Creek, sampled September 26 th , 2017.	8
Figure 3: Location of sampling stations 1-3 on lower Oak Creek, sampled September 27 th , 2017.	11
Figure 4: Location of sampling station on lower West Clear Creek, sampled October 25 th , 2017.	13
Figure 5: Location of sampling station on lower East Verde River, sampled November 1 st and 2 nd , 2017.	15
Figure 6: Location of sampling stations on lower Deadman Creek, sampled November 7 th , 2017.	17
Figure 7: Location of sampling station on Unnamed Drainage #68B, sampled November 14 th , 2017.	18
Figure 8: Location of sampling station on Tortilla Creek, sampled on November 14 th , 2017.	20
Figure 9: Location of sampling station on La Barge Creek, sampled November 15 th , 2017.	21

Introduction

This report summarizes monitoring activities conducted by Marsh and Associates, LLC (M&A) during calendar year 2017 for the Gila River Basin Native Fish Monitoring project. The purpose of this project is to monitor the status of wild populations of native fishes to better assess the status of federal-listed/candidate fishes within the Gila River Basin. The primary goal of the monitoring program is to detect each native species of interest (focus species) present in each stream and stream reach. Secondly, to estimate relative abundance (assemblage structure) of the focus species compared to co-occurring species (including non-natives); and lastly to delineate the distributional extent of listed species within occupied streams.

Surveys were conducted on pre-selected streams in major drainages throughout the Gila River Basin (Figure 1) which were identified as requiring ongoing surveys that were not currently being performed by others (agencies, institutions, and private contractors). The focus species in each stream is one or more of four native species currently listed as threatened or endangered; Gila topminnow *Poeciliopsis occidentalis*, loach minnow *Tiaroga cobitis*, spikedace *Meda fulgida*, and Gila chub *Gila intermedia*, plus roundtail chub *Gila robusta*.

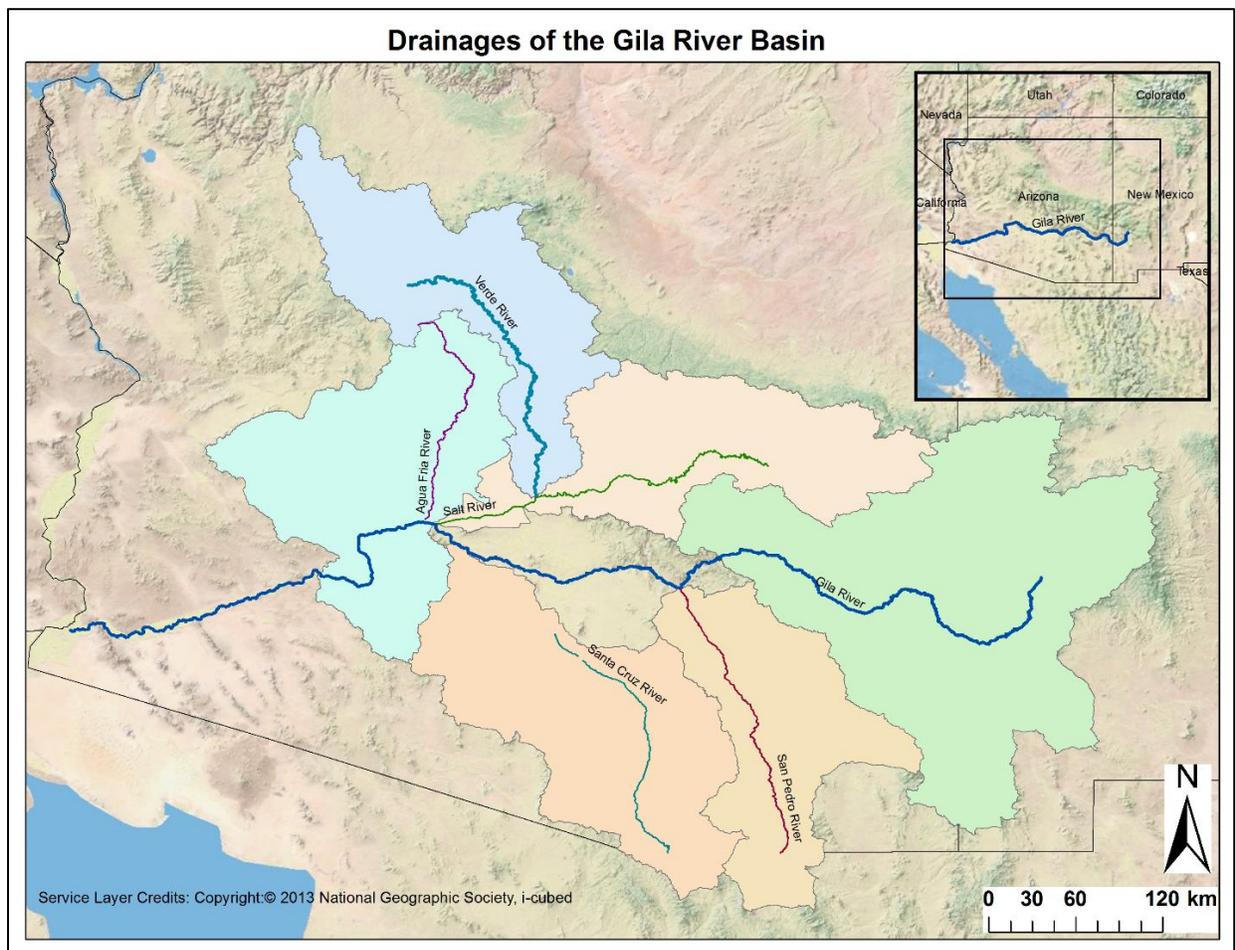


Figure 1: Major drainages of the Gila River basin, within which stream surveys were conducted in 2017.

Methods

Primary methods of sampling employed in data collection were backpack electrofishing (Smith-Root LR-20B Electrofisher), large hoop nets (29 in x 24 in with 0.25 in mesh), Promar collapsible hoop nets (6.5 in x 12.5 in with 0.5 in mesh) and collapsible minnow traps (10 in x 18 in with 0.125 in mesh). Gear selection was based on the focus species at each site as well as local site habitat characteristics.

The first priority upon arrival at a site was to determine the presence of the focus species. Intensive sampling focused on preferred habitat was conducted through a 500-meter (m) station. All fishes encountered during this initial search were identified to species (Table 1), enumerated, and classified by age class (for large-bodied species). Individuals considered to be young-of-year and typically <50mm are designated Age 0. Larger juvenile and adult individuals are designated Age 1. If the target species was not encountered, the effort was repeated at a location within the same reach not immediately adjacent to the initial station, and preferably at a different access point. If the target species was still not detected, a third and final station was surveyed following the same protocol. If the target species was detected, a 100-m station was established at the point of detection and continued upstream. During this survey, mesohabitats (run, riffle, and pool) and dry sections were delineated, and species were counted within each mesohabitat.

Station length was measured using a Garmin 64st GPS unit. The UTM coordinates of the upper and lower boundaries of each reach were recorded in NAD83 datum. Habitat photographs were taken at each site as well as specimen photos of species of interest. At sites where the focus species was detected, photographs were taken at the upper and lower boundaries of both the upstream and downstream view for future site reference.

Table 1: List of species encountered during surveys throughout the Gila River Basin in 2017

Common name	4 letter code	Scientific name
Brown trout	SATR	<i>Salmo trutta</i>
Desert sucker	PACL	<i>Pantosteus clarki</i>
Fathead minnow	PIPR	<i>Pimephales promelas</i>
Flathead catfish	PYOL	<i>Pylodictis olivaris</i>
Gila topminnow	POOC	<i>Poeciliopsis occidentalis</i>
Green sunfish	LECY	<i>Lepomis cyanellus</i>
Largemouth bass	MISA	<i>Micropterus salmoides</i>
Western mosquitofish	GAAF	<i>Gambusia affinis</i>
Rainbow trout	ONMY	<i>Oncorhynchus mykiss</i>
Red shiner	CYLU	<i>Cyprinella lutrensis</i>
Rock bass	AMRU	<i>Ambloplites rupestris</i>
Smallmouth bass	MIDO	<i>Micropterus dolomieu</i>
Sonora sucker	CAIN	<i>Catostomus insignis</i>
Speckled dace	RHOS	<i>Rhinichthys osculus</i>

Results

The planned work to be conducted in 2017 was eight reaches across seven streams, six of which were completed. Two sites, Deadman Creek and West Clear Creek, will require follow-up visits as the full protocol was not able to be completed due to access difficulties and field conditions respectively. These sites will be completed as soon as possible and appropriate in 2018.

Of the eight sites surveyed, the focus species was found at three (Unnamed Drainage #68B, Tortilla Creek and La Barge Canyon) (Table 2). These three sites contained only native species, while the remaining five reaches contained only non-native species.

Table 2: Summary of species presence (+)/absence (-) by stream reach. Target species are highlighted yellow where they were detected. Blue text denotes native species; red text denotes non-native species.

	CAIN	PACL	POOC	RHOS	AMRU	CYLU	GAAF	LECY	MIDO	MISA	ONMY	PIPR	PYOL	SATR
Oak Ck middle	-	+	-	+	+	-	-	+	+	-	-	-	-	+
Oak Ck lower	+	+	-	-	+	+	+	+	+	+	+	-	+	-
West Clear Ck lower	-	-	-	-	-	-	-	-	+	-	+	-	-	-
East Verde River lower	-	-	-	-	-	+	-	-	-	-	-	-	-	-
Deadman Ck	-	-	-	-	-	-	-	+	-	-	-	+	-	-
Unnamed Drainage #68B	-	-	+	-	-	-	-	-	-	-	-	-	-	-
Tortilla Ck	-	-	+	-	-	-	-	-	-	-	-	-	-	-
La Barge Ck	-	-	+	-	-	-	-	-	-	-	-	-	-	-

Oak Creek

Oak Creek is the largest perennial tributary to the Verde River, flowing approximately 82 km south from its headwaters at Sterling Springs (Voeltz 2002). The focus species in Oak Creek is roundtail chub, which was first collected from Oak Creek in 1936 (Voeltz 2002). Surveys conducted in 2013 at Grasshopper Point detected roundtail chub; however, they were not observed downstream of this point at Cathedral Rock or Bubbling Ponds Fish Hatchery (Timmons et al. 2014).

For this contract Oak Creek is divided into three reaches. The upper reach was previously sampled at Grasshopper Point north of Sedona, AZ. This reach was not surveyed this year at the request of Arizona Game and Fish Department (AZGFD) who will be conducting surveys at this location in 2018. The middle reach was established just south of the town of Sedona, covering the Baldwins Crossing, Crescent Moon Ranch and Chavez Crossing areas. The lower reach was established at the Bubbling Ponds Fish Hatchery and continuing downstream. The locations of these sites are similar to the surveys conducted in 2013 by AZGFD although they are not fixed sampling locations.

Middle reach – Crescent Moon Ranch and Chavez Crossing Campground

September 26th, 2017

UTM 12S NAD83 Lower boundary 1: 426021E 3853960N Upper boundary 1: 426362E 3854001N

Lower boundary 2: 426609E 3853857N Upper boundary 2: 426897E 3853731N

Lower boundary 3: 428573E 3855782n Upper boundary 3: 428909E 3855967N

On September 26th, 2017, M&A personnel accessed Oak Creek at Crescent Moon Ranch south of Sedona. An initial 500-m survey station was completed just upstream of the private property boundary (Figure 2). Roundtail chub habitat, which accounted for about 50% of habitat within the 500-m station, was targeted via backpack electrofishing. The station was shocked for 960 seconds, however no roundtail chub were detected (Table 3). A second 500-m station was established about 200 m upstream. Suitable habitat was surveyed by backpack electrofishing for 1,151 seconds and no roundtail chub were detected. A final 500-m station was established about 800 m upstream of the second station and was accessed via the Chavez Crossing Group Campground. Suitable habitat was electrofished for 1,653 seconds. No roundtail chub were detected at this site. Native species captured were desert sucker and speckled dace; these species accounted for 41% of total catch. Non-native species captured were rock bass, largemouth bass, smallmouth bass, and brown trout; these species accounted for 59% of total catch (Table 2). Northern crayfish were also observed.

The level of effort in the current survey was greater than in the previous survey in 2013, when only one 500-m station was surveyed at Crescent Moon Ranch. The ratio of natives to non-natives is similar to the results of the 2013 survey in the middle reach, with non-natives comprising the majority of catch. Species detected in the current survey but not detected in the previous survey were smallmouth bass and brown trout. Species detected in 2013 but not detected in the current survey were Sonora sucker and roundtail chub. The presence of two roundtail chub in the previous survey is likely attributable to a recent stocking that had occurred in the immediate area in December 2012.

Roundtail chub do not appear to be persisting in the middle reach of Oak Creek. The variable habitat throughout this reach is ideal for all life-stages of roundtail chub, and while not specifically tested or surveyed, water quality and prey-base appeared good. The presence of non-native piscivorous species and river otters likely contributed to the failure of stocking efforts and natural recruitment in this location.

Table 3: Summary of catch in the middle reach of Oak Creek. CPUE is calculated from an effort of 3,764 seconds.

Species	Age	Count	% of total catch	CPUE (fish/sec)
AMRU	0	12	15.79	0.0032
AMRU	1	11	14.47	0.0029
LECY	1	1	1.32	0.0003
MIDO	0	14	18.42	0.0037
MIDO	1	6	7.89	0.0016
PACL	0	6	7.89	0.0016
PACL	1	9	11.84	0.0024
RHOS	N/A	16	21.05	0.0043
SATR	1	1	1.32	0.0003
Total		76	100.00	0.0202

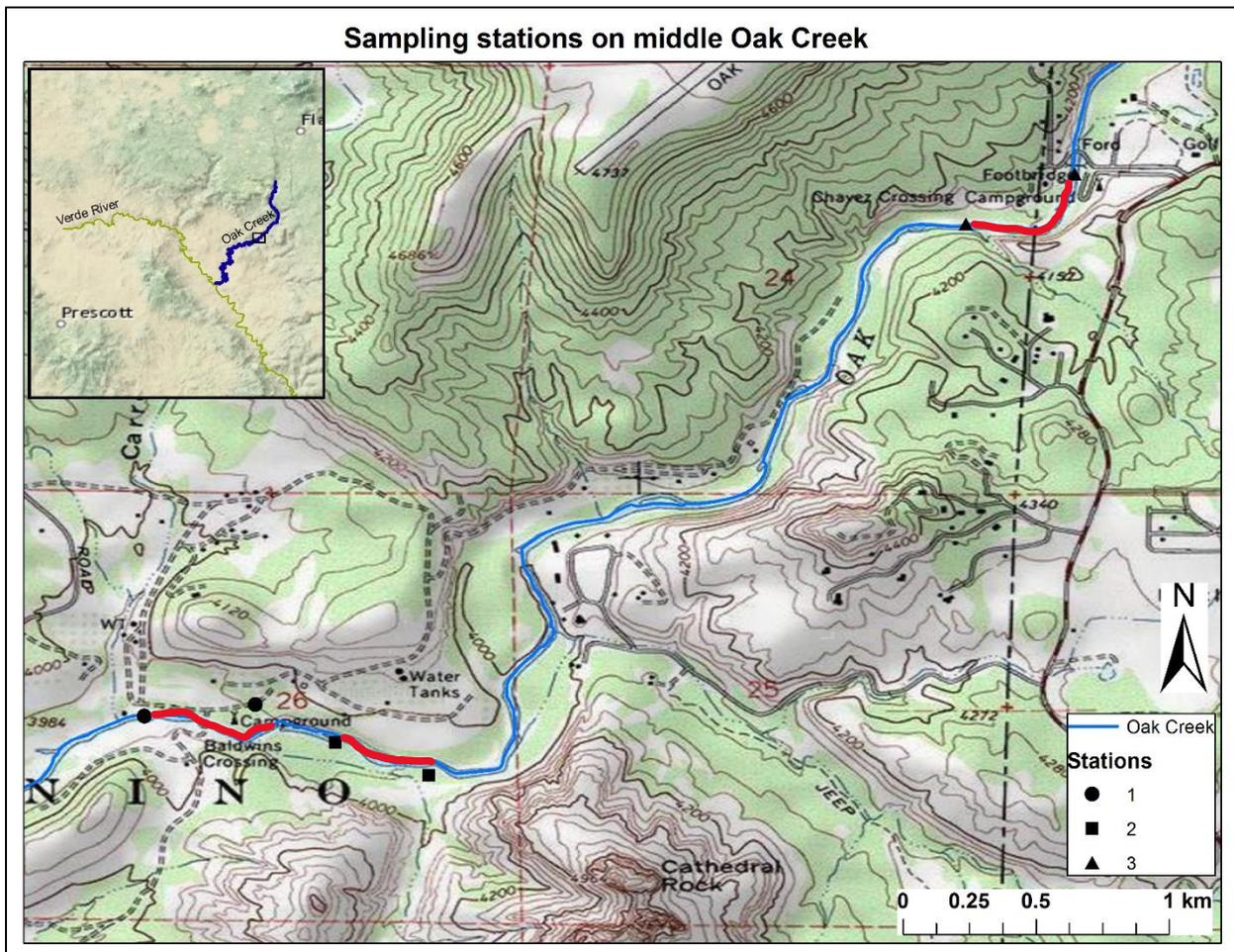


Figure 2: Location of sampling stations 1-3 on the middle reach of Oak Creek, sampled September 26th, 2017.

Lower reach – Bubbling Ponds Fish Hatchery and Willow Point Rd.

September 27th, 2017

UTM's 12S NAD83 Lower boundary1: 418157E 3846670N Upper boundary 1: 418452 3846939N
Lower boundary 2: 417143E 3845348N Upper boundary 2: 417548E 3845403N
Lower boundary 3: 417632E 3845351N Upper boundary 3: 417933E 3845132N

On September 27th, 2017, the lower reach of Oak Creek was accessed at Bubbling Ponds Fish Hatchery. A 500-m station was established just upstream of the private property boundary (Figure 3). Appropriate habitat was targeted by backpack electrofishing and sampled for 1,052 seconds. No roundtail chub were detected in this initial reach (Table 4), so a second 500-m station was established further downstream and accessed via the Willow Point Road. This station was electrofished for 938 seconds and no roundtail chub were detected. A final station was established just upstream of the second station and electrofished for 958 seconds. This station ended up being only about 400m as the electrofisher battery ran out of power. No roundtail chub were detected in this final effort. Native species encountered were desert sucker and Sonora sucker; these species accounted for 12% of total catch. Non-native species encountered were rock bass, largemouth bass, smallmouth bass, green sunfish, flathead catfish, Western mosquitofish, red shiner, and rainbow trout; these species accounted for 88% of total catch.

The level of effort expended in lower Oak Creek during this survey was greater than the previous survey in 2013 when only one 500-m station (at Bubbling Ponds Fish Hatchery) was sampled. The ratio of native to non-native species still favors non-native species and was more pronounced in the current survey. Species detected in the current survey but not in the previous survey were flathead catfish, largemouth bass, Western mosquitofish and red shiner. Species detected in the previous survey but not in the current survey were Sonora sucker and yellow bullhead. Roundtail chub were not detected in either survey.

Habitat throughout all stations in this reach presented good opportunity for roundtail chub. Heavy recreational fishing activity was apparent throughout the lower-most sites of this reach, targeting non-native species. The presence of non-native piscivorous species and predation by river otters are likely the greatest impediment to establishment and recruitment of roundtail chub in this reach.

Table 4: Summary of catch in the lower reach of Oak Creek. CPUE is calculated from an effort of 2,948 seconds.

Species	Age	Count	% of total catch	CPUE (fish/sec)
AMRU	0	1	1.47	0.0003
AMRU	1	12	17.65	0.0041
CAIN	1	1	1.47	0.0003
CYLU	N/A	4	5.88	0.0014
GAAF	N/A	1	1.47	0.0003
LECY	0	5	7.35	0.0017
LECY	1	5	7.35	0.0017
MIDO	0	14	20.59	0.0047
MIDO	1	13	19.12	0.0044
MISA	1	1	1.47	0.0003
ONMY	1	3	4.41	0.0010
PACL	0	1	1.47	0.0003
PACL	1	6	8.82	0.0020
PYOL	1	1	1.47	0.0003
TOTAL		68	100	0.0231

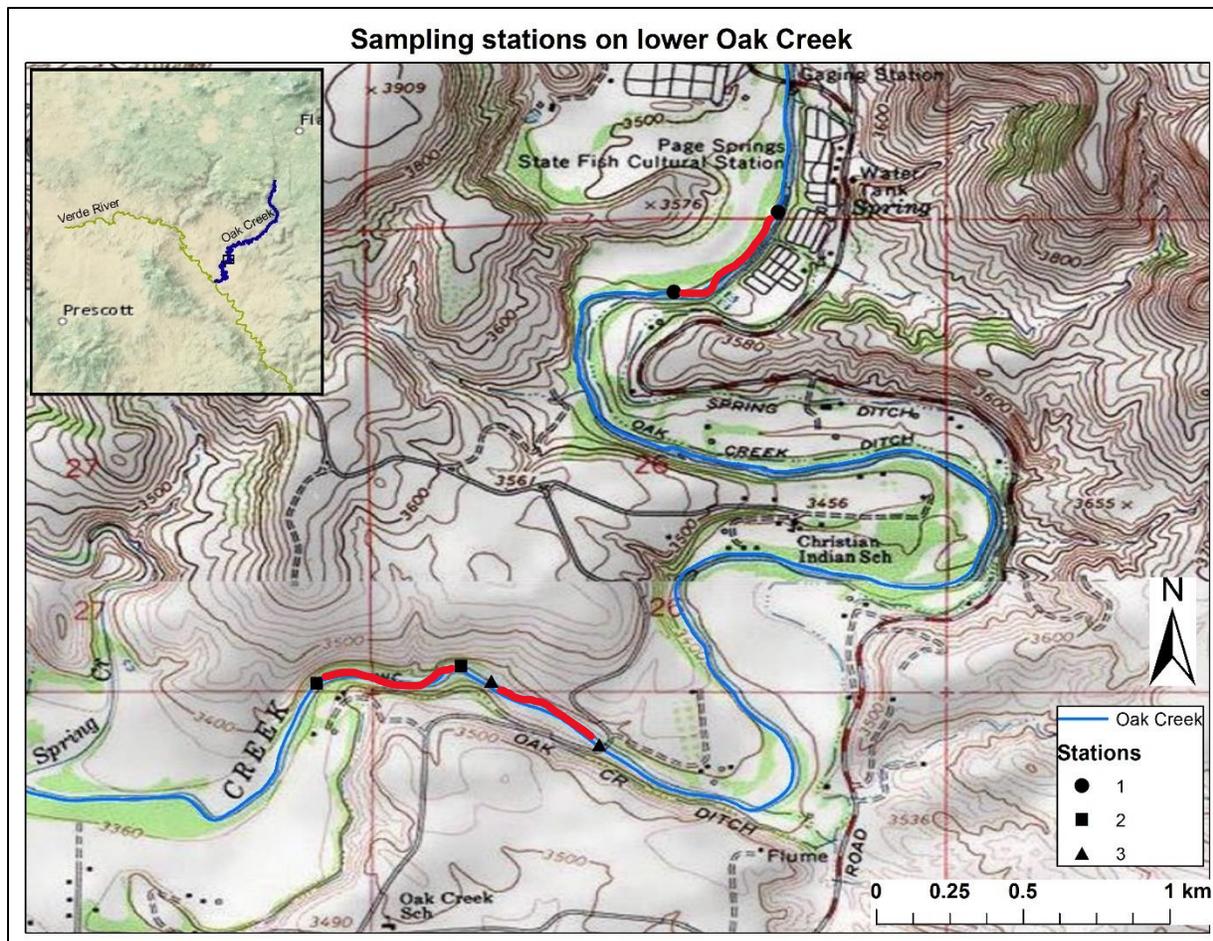


Figure 3: Location of sampling stations 1-3 on lower Oak Creek, sampled September 27th, 2017.

West Clear Creek

West Clear Creek flows generally west and southwest for approximately 60 km from its headwaters (formed by Clover Creek and Willow Valley Spring) to its confluence with the Verde River near Camp Verde, AZ (Bagley 2002). The focus species in West Clear Creek is roundtail chub, which was first collected in 1937 by Tarzwell approximately one mile upstream of its confluence with the Verde River. The last time the species was recorded this far downstream was in 2000 (Bagley 2002); they were not detected in 2013 surveys by Arizona Game and Fish Department (AZGFD) (Timmons et al. 2014). However, the population continues to persist upstream between Home Tank Draw and two miles downstream of Maiden Falls with multiple age classes detected in surveys in 2014 and 2015 (Timmons et al. 2015; Matt Rinker, AZGFD, pers. comm.). Roundtail chub were also detected further upstream, at Cash Tank Trail and FR 142F, during surveys in 2014 by AZGFD. At the request of AZGFD, the middle and upper reaches of West Clear Creek were not surveyed under this contract. The downstream reach was determined as downstream of Maiden Falls, and this was the section targeted. Surveys were not conducted downstream at the Bull Pen day use area as the target species has not been detected there in recent surveys.

Blodgett Basin Trail (#17)October 25th, 2017

UTMs 12S NAD83 Upper boundary: 442751E 3822848N Lower boundary: 442986E 3823351N

On October 25th, 2017, the lower reach of West Clear Creek was accessed via Blodgett Basin Trail from FS road 214A. Upon reaching the creek, it was determined that staff could not proceed upstream due to a deep pool. As a result, eight hoop nets were set throughout the pool and an electrofishing station was established about 500 m downstream of the pool (Figure 4). Pool, run, and riffle habitat were electrofished for 1,239 seconds to detect roundtail chub; none were captured (Table 5 and Table 6). Despite the water being clear, no fish were observed, other than those captured by sampling gear. No further stations were surveyed. To increase the likelihood of detecting fish, additional sampling was scheduled for a warmer time of year, because fish activity can be reduced in the cool water of late October. Also to increase the probability of capturing the target species, sampling will be conducted directly downstream of Maiden Falls. Sampling here will require swimming through at least one pool and a different primary sampling technique.

Non-native species captured were smallmouth bass and rainbow trout; these species accounted for 100% of total catch. Northern crayfish remains were found onshore but not observed in the water. Surveys in 2014 in the lower reach (downstream of Bull Pen) also resulted in a majority catch of non-native species, with desert sucker being the only native species captured.

Table 5: Summary of catch by hoop net in the lower reach of West Clear Creek. Total effort was 16 net hours.

Species	Age	Count	% of total catch	CPUE (fish/net hr)
MIDO	0	2	100.00	0.125
TOTAL		2	100	0.125

Table 6: Summary of catch by backpack electrofishing in the lower reach of West Clear Creek. Total effort was 1,239 seconds.

Species	Age	Count	% of total catch	CPUE (fish/sec)
MIDO	0	3	33.33	0.002
MIDO	1	2	22.22	0.002
ONMY	1	4	44.44	0.003
TOTAL		9	100.00	0.007

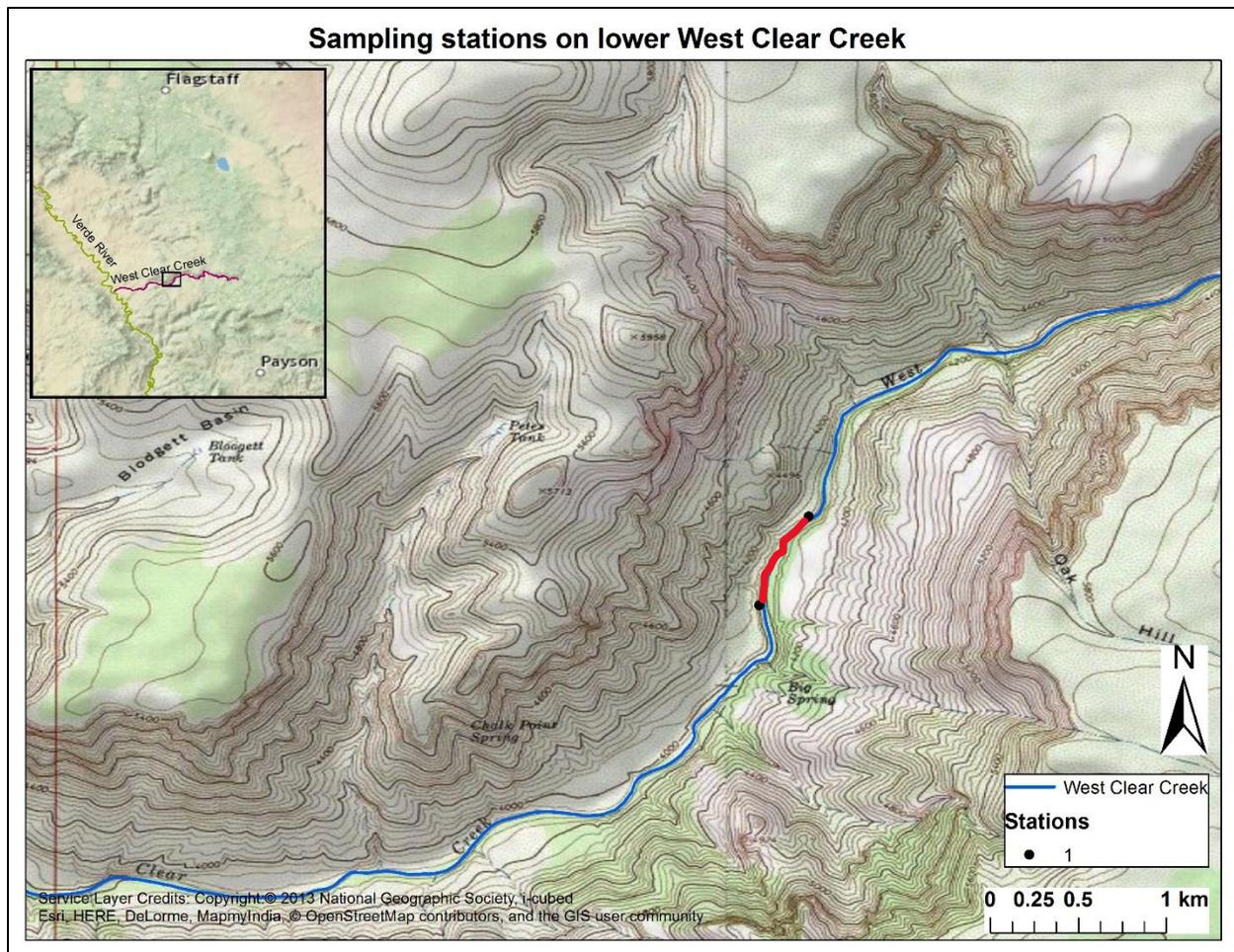


Figure 4: Location of sampling station on lower West Clear Creek, sampled October 25th, 2017.

East Verde River

The East Verde River originates north of Payson, AZ below the Mogollon Rim and flows in a southwesterly and westerly direction where it eventually enters the Verde River roughly 7 km downstream of Fossil Creek. The river maintains about 64 km of perennial flow, which is supplemented by water pumped from Blue Ridge Reservoir and varies greatly. The earliest collection of unspecified “chubs” from the East Verde River was in 1904 by F. W. Chamberlain, roughly 13 km north of Payson. Sections of the stream upstream of Doll Baby Ranch are surveyed regularly by AZGFD, and roundtail chub are found with varying success. Due to these ongoing surveys, only the lower reach was available for surveys under this contract. Due to limited access to the lower East Verde River, which is mostly within a wilderness area, surveys were conducted at similar access points to previous surveys in 2014

Doll Baby Ranch to LF Ranch

November 1st, 2017

UTMs 12S NAD83 Upper boundary 1: 454494E 3786908N Lower boundary: 454987E 3786853N

Upper boundary 2: 455195E 3786691N Lower boundary 2: 455499E 3786292N

Upper boundary 3: 452966E 3786980N Lower boundary 3: 453309E 3786875N

On November 1st, 2017, the East Verde River was accessed via Doll Baby Trailhead at the Mazatzal Wilderness boundary. No fish were observed for 1.5 km downstream to the Pine Creek confluence. At this point the canyon narrows and several large, deep bedrock pools are present. The initial 500-m reach was established within this section (Figure 5). Habitat encountered included deep riffles, slow shallow glides, and moderately deep runs with some under-cut bank habitat (up to 3 ft deep). Seven collapsible Promar hoop nets and two large hoop nets were set throughout the 500-m station targeting suitable roundtail chub habitat. No fish were captured or observed throughout this station (Table 7), so a second 500-m station was established 250 m upstream. Four collapsible Promar hoop nets and two large hoop nets were set throughout. This station offered minimal habitat aside from a deep pool about 40 m long and no fish were captured or observed. Two Sonora mud turtles were captured in collapsible hoop nets and released.

On the following day, a third station was established 1.5 km downstream of the first station and was accessed via the Tub Draw Trail off the road leading to LF Ranch. Habitat throughout the 500-m station was largely comprised of shallow glides, a few small, deep pools, and cut banks with minimal riffle habitat. Eight Promar collapsible hoop nets and 3 large hoop nets were set throughout. The only fish captured or observed were three red shiners. Previous surveys in 2014 detected yellow bullhead, fathead minnow and green sunfish in addition to red shiner. No natives were captured previously.

The presence of piscivorous non-native species (captured in the previous survey) threatens the persistence of native species throughout this reach. Although much of the habitat is simple and shallow, some habitat throughout this reach is ideal for roundtail chub. As they have not been detected in this section of the river during previous surveys in 2014 (Timmons et al 2015), it is recommended that the next survey be conducted further downstream, near the confluence with Gorge Creek and towards the confluence with the Verde River. Access to this section of the river will require more time and preparation than has previously been allocated.

Table 7: Summary of catch in the lower reach of the East Verde River. Total effort was 52 net hours.

Species	Age	Count	% of total catch	CPUE (fish/net hr)
CYLU	N/A	3	100	0.058
TOTAL		3	100	0.058

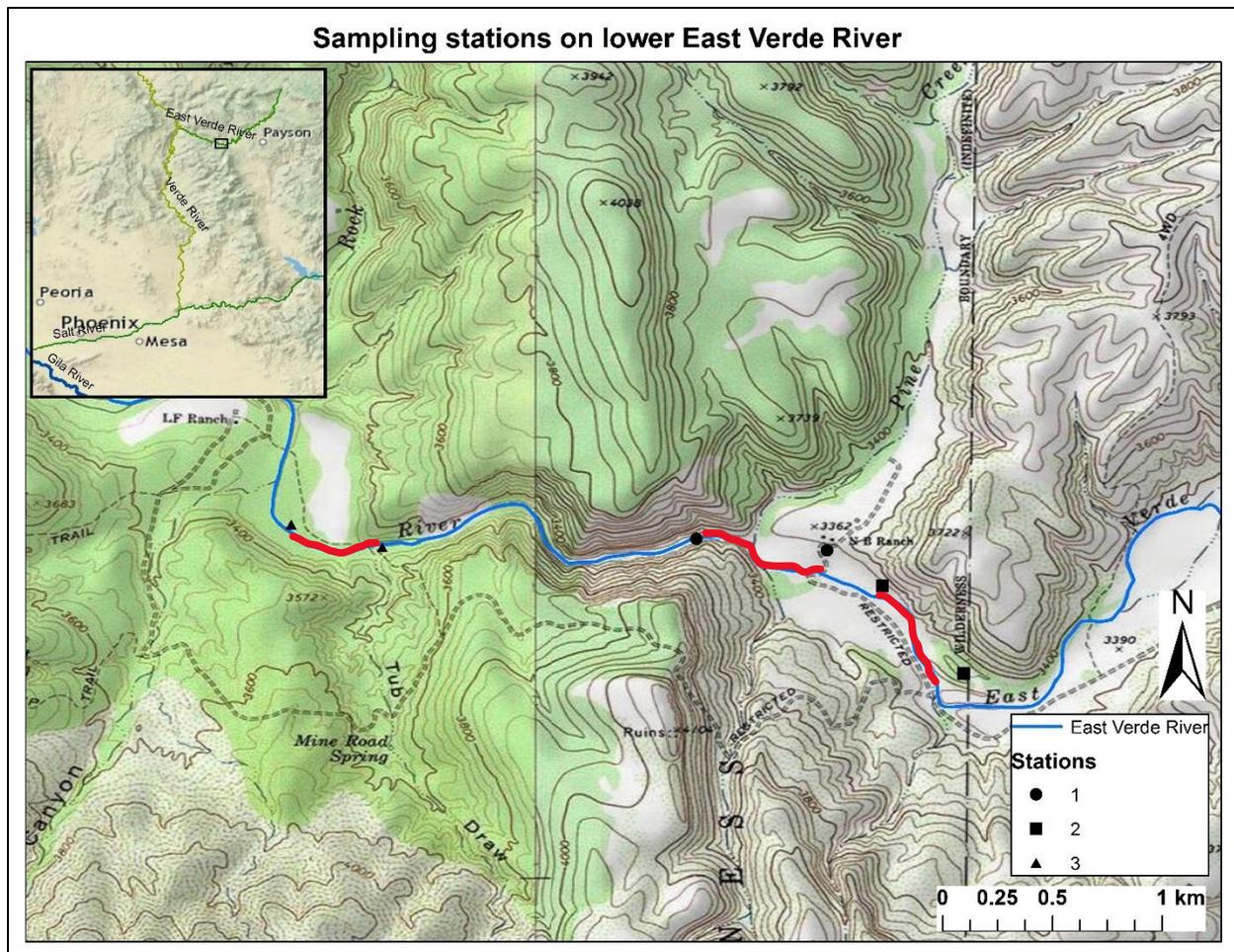


Figure 5: Location of sampling station on lower East Verde River, sampled November 1st and 2nd, 2017.

Deadman Creek

October 17th & November 7th, 2017

UTMs 12S NAD83

Upper boundary 1: 440138E 3765292N Lower boundary 1: 440473E 3765522N

Upper boundary 2: 440839E 3765554N Lower boundary 2: 441212E 3765784N

Tributary to the Verde River, Deadman Creek is fed by Maverick Basin and is formed by flows from the North and South Forks of Deadman Creek. It is encompassed by the Mazatzal Wilderness for most of its length to Horseshoe Reservoir on the Tonto National Forest. Chub were first detected in South Fork Deadman Creek in 1991. A later survey in 1993 detected them downstream in Deadman Creek, where they were found to be common (Voeltz 2002). Roundtail chub were detected two miles upstream from Table Mountain in 2000 and increased in abundance with available habitat towards the confluence with the South Fork (Bagley 2002). None were detected during a 2014 survey conducted by AZGFD (Timmons et al 2015), however this survey began at the confluence and did not extend far downstream. No fish were detected in the 2014 survey.

On October 17th, 2017, Deadman Creek was accessed via the Deadman Creek wash approximately 6 km upstream from its inflow into Horseshoe Reservoir. Several pools were observed throughout this lower reach but were not surveyed as the goal was to sample upstream Deadman Creek at the confluence with the South Fork. Due to the lack of surface water available on the long hike to the confluence, the attempt was abandoned at Table Mountain.

On November 7th, 2017 the pools previously observed in the lower reach were sampled using a backpack electrofisher. A 500-m station was established at the start of the pools (Figure 6) and only green sunfish and fathead minnow were detected (Table 8). A second 500-m station was established approximately 500 m upstream and contained the remaining pools. Again, no roundtail chub were captured or observed.

Due to the remote and rugged location of the South Fork Deadman Creek confluence, sampling here presents a logistical challenge. Following experience from the previous attempts and newly established contacts in the region, it may be possible to follow a shorter route beginning within the wilderness boundary. This attempt will be made in April 2018.

Table 8: Summary of catch by backpack electrofisher in the lower reach of Deadman Creek. Total effort was 1,006 seconds.

Species	Age	Count	% of total catch	CPUE (fish/sec)
LECY	0	83	22.93	0.083
LECY	1	31	8.56	0.031
PIPR	N/A	248	68.51	0.247
TOTAL		362	100.00	0.360

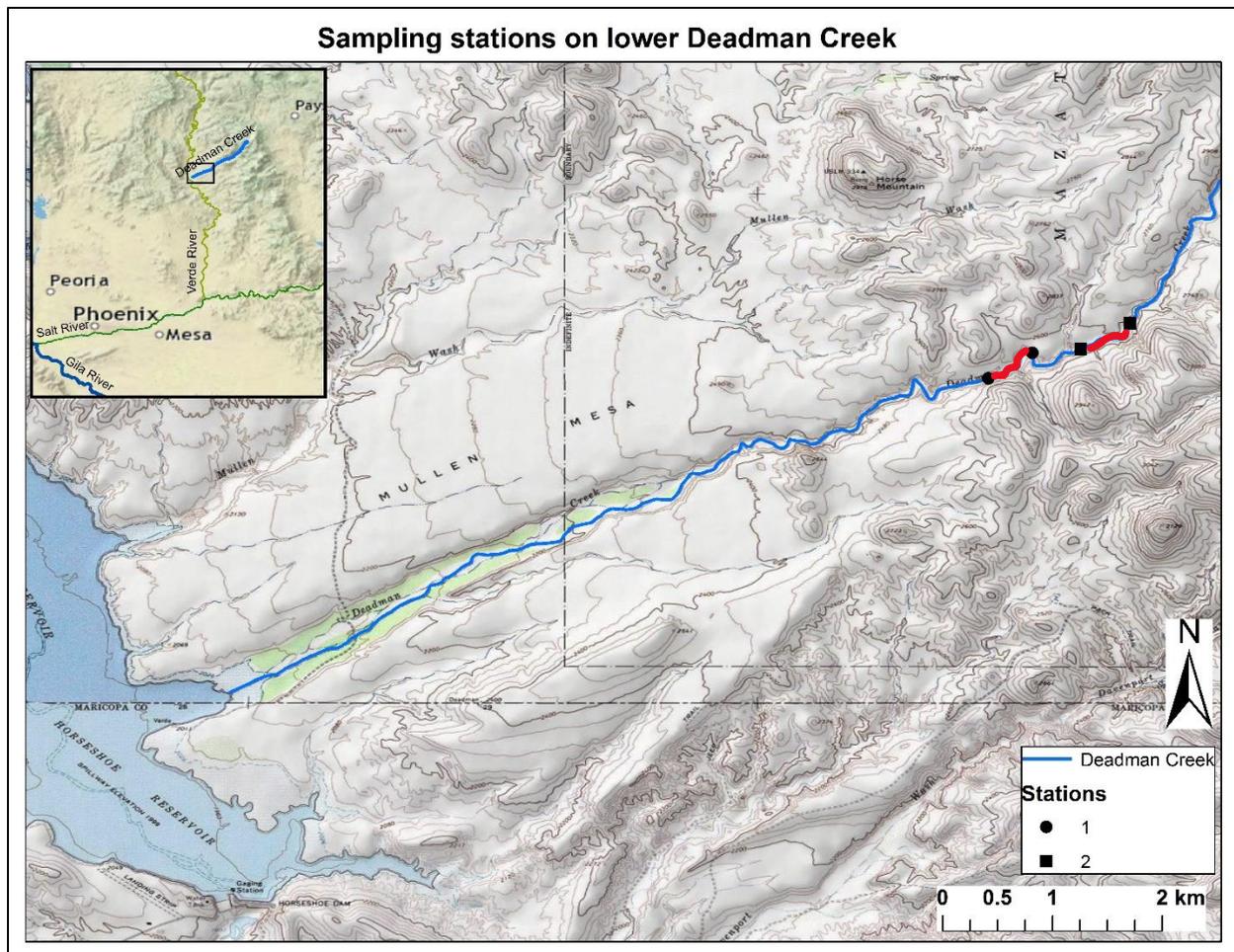


Figure 6: Location of sampling stations on lower Deadman Creek, sampled November 7th, 2017.

Unnamed Drainage #68B

November 14th, 2017

UTMs 12S NAD83 Upper boundary: 464852E 3711148N Lower boundary: 464838E 3711246N

Unnamed Drainage #68B is an intermittent, small desert canyon located on Tonto National Forest. It is mostly dry except for a series of tinajas in the lower drainage. During seasonal flooding, it enters Mesquite Creek, a tributary of Tortilla Creek which drains into the Salt River. Gila topminnow were first reported at this site in 1985, dispersing from an upstream stock tank where they were stocked in 1982 (Weedman & Young 1997). They were detected in surveys by AZGFD in 2013 and 2015 (Timmons & Paulus 2016), which were conducted in the same, fixed location.

On November 14th, 2017, this site was surveyed at the only existing water that was found in the lower drainage (Figure 7). A series of three tinajas were sampled. They were disconnected from each other with the uppermost being the largest and most shaded, with no vegetation. The middle pool was the smallest, located in a deep hole in the rock with no vegetation. The lower pool was long and narrow, with a rock overhang on one side and a grassy bank on the other. Gila topminnow were positively identified via a dip-net sweep before eight collapsible minnow traps were deployed, distributed among

each of the pools. After a two-hour set, they were retrieved, and fish were enumerated (Table 9). Male and female fish were represented across a variety of size classes. More Gila topminnow were captured during this sampling than in the previous effort in 2015, when a total of 361 individuals were captured with a comparable but slightly greater effort. As that survey was conducted in June, pools may have been smaller in size with a reduced fish population due to dry summer conditions.

While occurrences of drought may affect their long-term persistence, the population of Gila topminnow at this site appears to be thriving. They are not currently threatened by non-native species and are somewhat well protected by extensive reaches of dry creek-bed. Recreational activity in the area does not currently pose any negative impact on the fish.

Table 9: Summary of catch by minnow trap in Unnamed Drainage #68B. Total effort was 16 net hours.

Species	Age	Count	% of total catch	CPUE (fish/net hr)
POOC	N/A	731	100	45.69
TOTAL		731	100	45.69

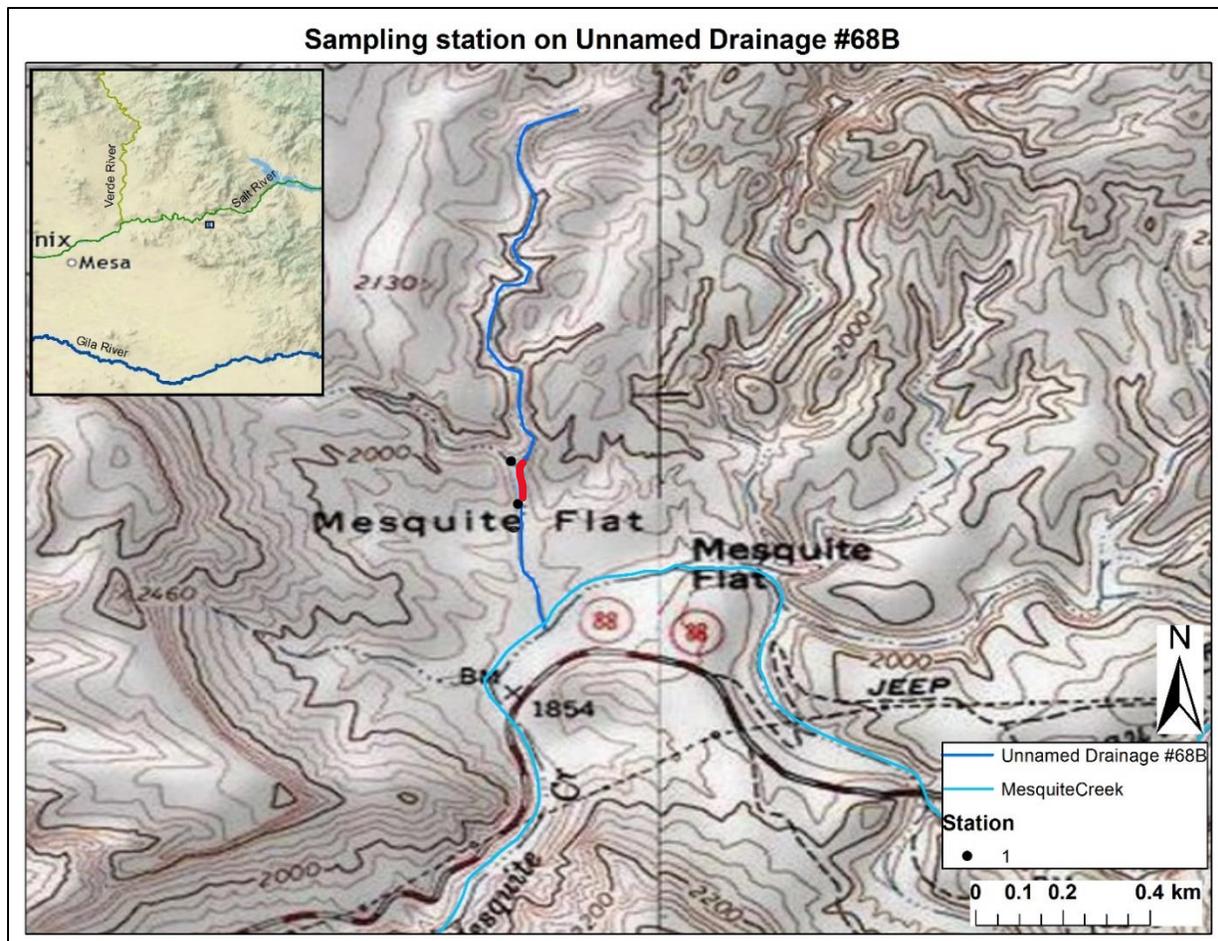


Figure 7: Location of sampling station on Unnamed Drainage #68B, sampled November 14th, 2017.

Tortilla Creek

November 14th, 2017

UTMs 12S NAD83 Upper boundary: 464467E 3709967N Lower boundary: 464437E 3709871N

Tortilla Creek is a desert stream on the Tonto National Forest comprised of isolated bedrock and gravel pools. Water in the upper and middle reaches is intermittent, with perennial flow in the lower drainage as it enters Canyon Lake on the Salt River. Sometime after the establishment of Gila topminnow in Unnamed Drainage #68B, they appeared to have made their way downstream into lower Mesquite and Tortilla Creeks where they were observed in 2014 and 2015 surveys respectively (Timmons & Paulus 2016). Gila topminnow were stocked into upper Tortilla Creek for the first time by AZGFD in 2017. Tortilla Creek has not previously been surveyed under this contract. Previous observations and surveys have identified them in Mesquite Creek, and lower Tortilla Creek where green sunfish are also present

On November 14th, 2017, this site was surveyed upstream of the confluence with Mesquite Creek. Standing water was found in an isolated pool approximately 200 m upstream of the confluence; the remaining bedrock habitat in the 100 m station was recently dried (Figure 8). Four minnow traps were set in the pool after Gila topminnow were positively identified with a dip-net sweep and retrieved two hours later. Gila topminnow of varying size classes were present in abundance (table 10).

As the pools in Tortilla Creek are typically isolated by stretches of dry creek, Gila topminnow are somewhat protected from green sunfish in the lower section of the creek. The area receives minimal recreational activity and the greatest danger facing the population in these isolated pools is drought.

Table 10: Summary of catch by minnow traps in Tortilla Creek. Total effort was 8 net hours.

Species	Age	Count	% of total catch	CPUE (fish/net hour)
POOC	N/A	1782	100	222.75
TOTAL		1782	100	222.75

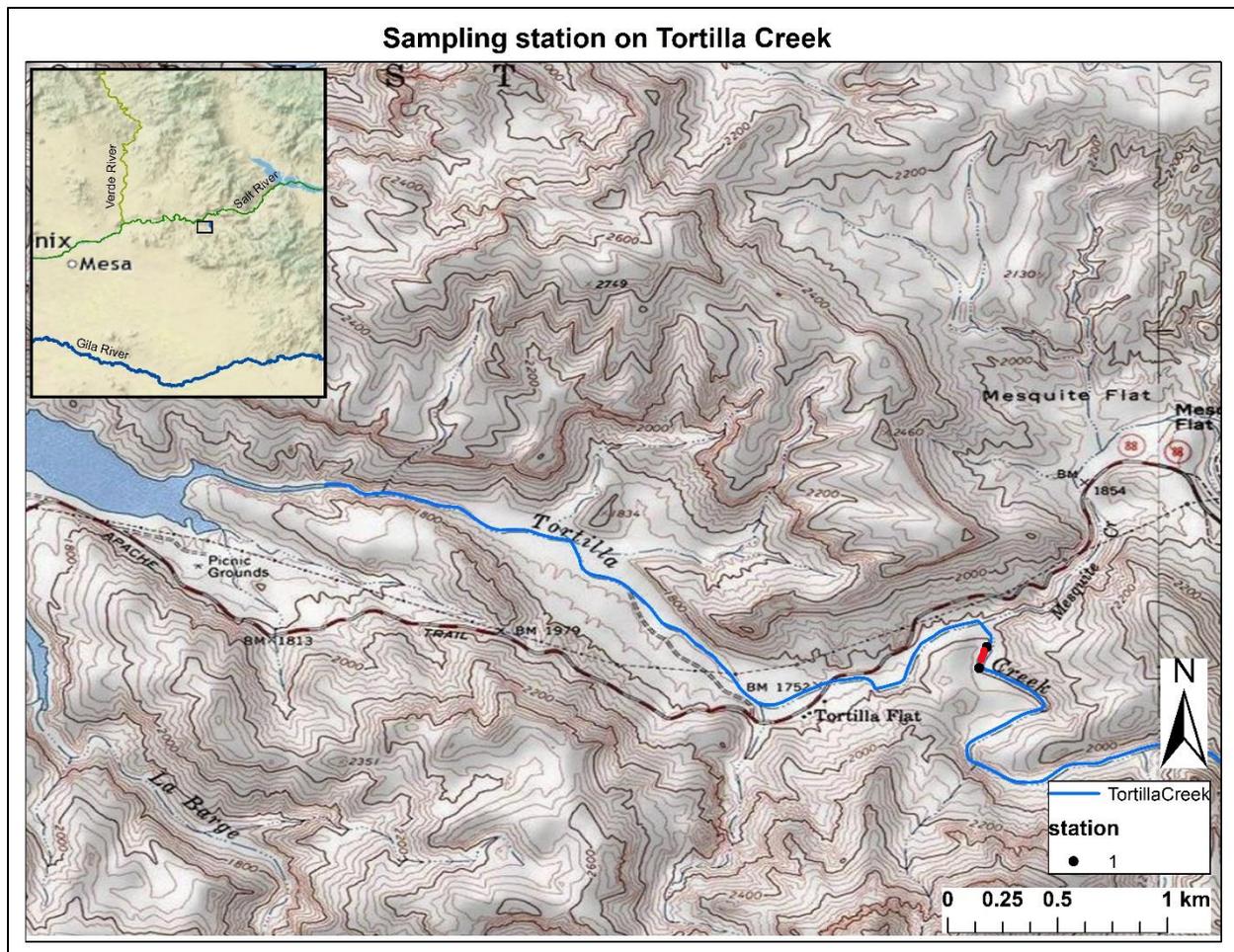


Figure 8: Location of sampling station on Tortilla Creek, sampled on November 14th, 2017.

La Barge Creek

November 15th, 2017

UTMs 12S NAD83 Upper boundary: 463662E 3706083N Lower boundary: 463705E 3706039N

La Barge Creek is a tributary to the Salt River on Tonto National Forest. It is fed from a spring in the Superstition Mountains and holds perennial water intermittently throughout its course (Jones et al 2016). Gila topminnow were positively identified in a canyon bound reach known as The Box in 2015 (Jones et al 2016), but unidentified fish in the drainage were reported as early as 2001. The fish in this section of La Barge Creek likely originated from Charlesbois Spring, where they were originally stocked in 1983 by AZGFD (Jones et al 2016). La Barge Creek has not previously been surveyed under this contract.

On November 15th, 2017, this site was accessed via the Boulder Canyon Trail from the Canyon Lake Marina. The trail intersects La Barge Canyon approximately 2 km downstream of The Box. The first water was found approximately 1 km upstream of the trail crossing and Gila topminnow, identified with a dip-net sweep, were observed in several pools dispersed throughout the remaining 1 km. The Box area contained several bed-rock pools of varying size in a 200-m canyon-bound reach, which appeared to be mostly perennial. Gila topminnow were observed in each of the pools and a 100-m station was

established within The Box (12S 463662E 3706082N to 463706E 3706038N) (Figure 9). Three separate pools were sampled with nine minnow traps and Gila topminnow of varying size classes were captured (Table 11).

The population of Gila Topminnow in this location is well protected from many of the typical threats. Its isolated location provides protection from non-native species which occur far downstream at the confluence with the Salt River. As the pools appear perennial, drying is of little concern in this location, and the minimal recreational activity it receives does not pose a threat to the population.

Table 11: Summary of catch by minnow trap in La Barge Creek. Total effort was 18 net hours.

Species	Age	Count	% of total catch	CPUE (fish/net hour)
POOC	N/A	364	100	20.22
TOTAL		364	100	20.22

Sampling station on LaBarge Creek

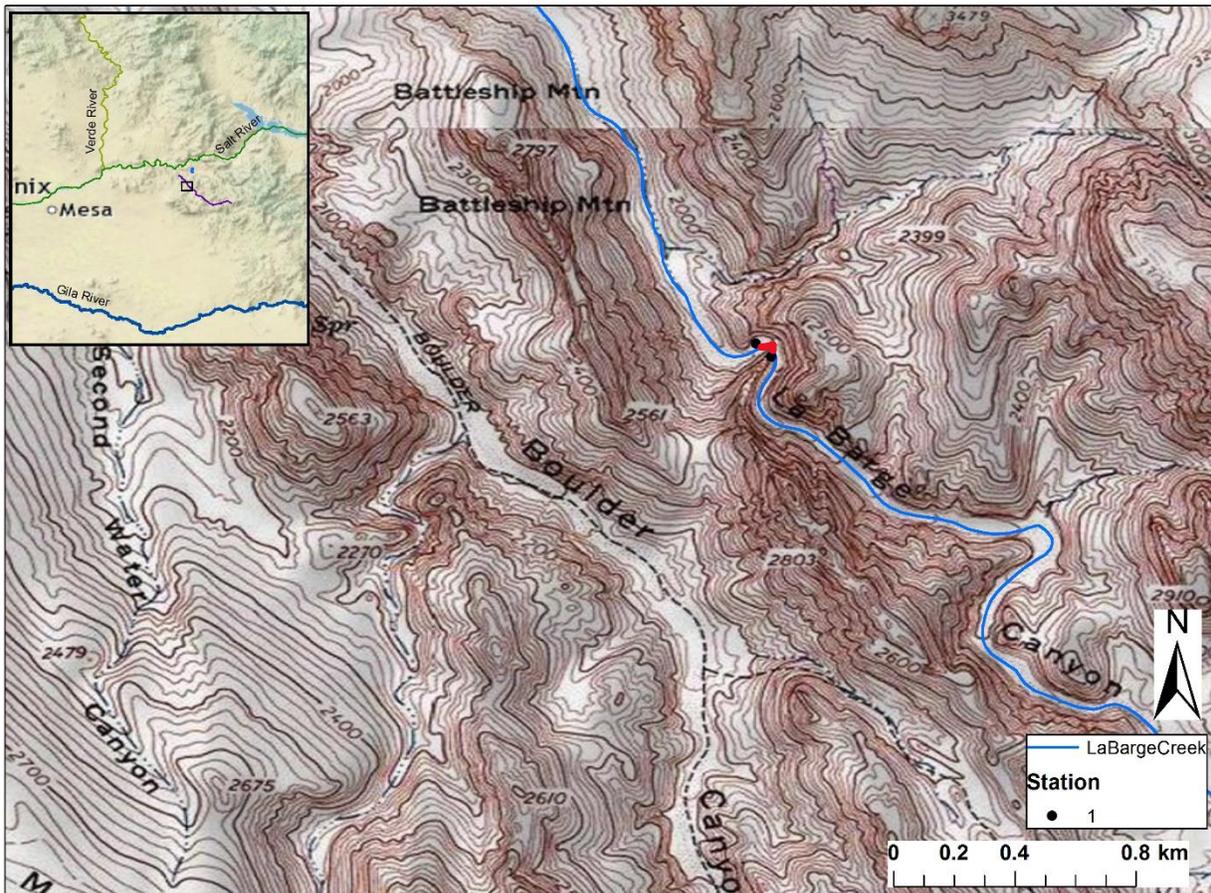


Figure 9: Location of sampling station on La Barge Creek, sampled November 15th, 2017.

Acknowledgements

We would like to acknowledge the following people for their assistance in varying capacities: Nichole Carmack, Taylor Haas, Brian Kesner, and Jamie Leavitt (Marsh & Associates); Edie Johnson and Chris Stratton (KA Ranch); Marc Wicke (Salt River Project); Janie Agyagos (U.S. Forest Service); John Dickson; Curtis Gill, Sharon Lashway, Matt Rinker, Tony Robinson, Scott Rogers, Ross Timmons, and Josh Walters (Arizona Game & Fish Department) & Kent Mosher (USBR, formerly AZGFD).

Literature cited

Bagley, B. 2002. Survey of Verde River Drainage, Arizona for Loach Minnow (*Tiaroga cobitis*). Report, U.S Fish and Wildlife Service, Phoenix, AZ. Contract No. 24410-0-M525. 118 pages

Jones, Alexander C., Mosher, Kent R and C. Crowder. 2016. Description of a previously unknown population of an endangered desert fish, *Poeciliopsis occidentalis occidentalis*. The Southwestern Naturalist 61(4): 329-331.

Timmons, Ross J., L. J. Upton and A. H. McCall. 2014. Fish monitoring of selected streams within the Gila River basin, 2013. In Partial fulfillment of: Bureau of Reclamation Contract No. R12PC32007. Arizona Game and Fish Department, Nongame Wildlife Branch, Phoenix, AZ. 130 pp.

Timmons, Ross J., S. A. Paulus and L. J. Upton. 2015. Fish monitoring of selected streams within the Gila River Basin, 2014 Annual Report. Annual Report to Bureau of Reclamation, Contract No. R12PC32007. Arizona Game and Fish Department, Nongame Branch, Phoenix, AZ. 51 pp. + Appendices.

Timmons, R. J. and S. A. Paulus. 2016. Fish monitoring in selected streams within the Gila River Basin, 2015. Annual report in partial fulfillment of: Bureau of Reclamation Contract No. R12PC32007. Arizona Game and Fish Department, Aquatic Wildlife Branch, Phoenix, AZ. 40 pp. + appendices.

Voeltz, Jeremy B. 2002. Roundtail chub (*Gila robusta*) status survey of the Lower Colorado River basin. Nongame and Endangered Wildlife Program Technical Report 186. Arizona Game and Fish Department, Phoenix, Arizona.

Weedman, D.A. and K.L Young. 1997. Status of the Gila topminnow and desert pupfish in Arizona. Nongame and Endangered Wildlife Program Technical Report 118. Arizona Game and Fish Department, Phoenix, Arizona.