

Arizona Game and Fish Department

Region III Fisheries Program

Verde River: Granite Creek-Verde Ranch Fish Survey June 2022

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Executive Summary

On June 7-8, 2022, the Arizona Game and Fish Department's Region III Aquatics Program and United States Forest Service personnel surveyed a 13.7 km (8.5 mi) section of the upper Verde River from Granite Creek to Verde Ranch. The purpose of this survey was to continue monitoring species occurrence and abundance in the upper Verde River in compliance with statewide fish sampling protocols (Bryan et al. 2004) and the statewide sportfish stocking consultation conservation measures. A total of 364 fish comprising nine different species were sampled including two native species. Species sampled included Black Bullhead *Ameiurus melas*, Yellow Bullhead *Ameiurus natalis*, Redeye Bass *Micropterus coosae*, Largemouth Bass *Micropterus salmoides*, Mosquitofish *Gambusia affinis*, Red Shiner *Cyprinella lutrensis*, Green Sunfish *Lepomis cyanellus*, Sonora Sucker *Catostomus insignis*, and Desert Sucker *Catostomus clarkii*. Redeye Bass (89.56%) was the highest percentage of the catch followed by Yellow Bullhead (4.67%), Red Shiner (1.92%) and Mosquitofish (1.92%).

Introduction

The Verde River begins below the Sullivan Lake Dam, near Paulden, Arizona and flows for 125 mi (201 km) through private, state, tribal and United States Forrest Service (USFS) lands before the dam at Horseshoe Lake. It then continues for another 57 mi until it meets the Salt River near the community of Fountain Hills east of Phoenix. This trip surveyed the Verde River from the mouth of Granite Creek to Verde Ranch. The purpose of this survey was to continue monitoring species occurrence and relative abundance of the upper Verde River in compliance with statewide protocol standards and the sportfish stocking consultation conservation measures. At the time of our survey, discharge was ~16 cubic feet per second which is below average for June. This survey will be compared to eight surveys completed on the same stretch of river between 2004-2019.

Methods

Five random sites were generated using the "Create Random Points" tool in ArcGIS Pro to minimize sampling bias. Additionally, three historic fixed sites were used for a total of eight sampling sites (Figure 1; Table 1). Arizona Game and Fish Department and USFS staff completed sampling at all eight sites on June 7-8, 2023. Four sites were sampled each day of the trip (Table 2) using a Smith-Root canoe mounted electrofishing unit with a single sphere anode and four cathode tails. All sites were 200 meters in length and sampled with personnel downstream of the shocking canoe. Additionally, two personnel were located at the 200 meter mark with a block seine to ensure fish didn't escape the end of the sampled reach. While sampling from outside the canoe, a deadman switch was operated by hand as the canoe was maneuvered in and around available habitats. If the pool was too deep, personnel would sample from inside the canoes. While sampling from inside of the canoe a control switch was operated by foot and remaining support canoes followed the electrofishing-canoe collecting all fish with dip nets. All personnel wore gloves when electrofishing and PVC coated waders while walking in the water. Settings used on the electrofisher were 300 volts pushing 2-6 amps at 60 pulses per second. At the end of each site fish were identified, measured, and counted.

Results

A total of 364 fish were sampled consisting of nine species (Table 2, 3). Species sampled included Black Bullhead *Ameiurus melas*, Yellow Bullhead *Ameiurus natalis*, Redeye Bass

Micropterus coosae, Largemouth Bass *Micropterus salmoides*, Mosquitofish *Gambusia affinis*, Red Shiner *Cyprinella lutrensis*, Green Sunfish *Lepomis cyanellus*, Sonora Sucker *Catostomus insignis*, and Desert Sucker *Catostomus clarkii*. Redeye Bass (89.56%, 53.71 fish per 15 minutes) was the highest percentage of the catch followed by Yellow Bullhead (4.67%, 2.80 fish per 15 minutes) (Table 3). Only two species of native fish were sampled, Sonora Sucker and Desert Sucker, comprising 1.09% of the total catch (Table 3). Most fish captured were between 100 - 200 mm in total length (Figure 2; Table 4). The highest catch-per-unit-effort at one site was Redeye Bass with 123.75 fish per 15 minutes (Table 5). One Largemouth Bass was encountered during this survey.

Discussion

The upper Verde River is comprised of both native and non-native aquatic species. However, primary management objectives are for native sportfish recreation for Roundtail Chub *Gila robusta* and native aquatic species conservation for Spikedace *Meda fulgida*, Loach Minnow *Rhinichthys cobitis*, Northern Mexican Gartersnake *Thamnophis eques megalops*, Western Terrestrial Gartersnake *Thamnophis elegans*, Sonora Sucker, Desert Sucker, Speckled Dace *Rhinichthys osculus*, and Longfin Dace *Agosia chrysogaster*. Despite these management objectives, our data from this survey shows an abundance of non-native fish and low numbers of native fish. This is likely a result of a lack of sustained high flows and the high density of cattails in the upper Verde River. Trends in our data show that in years following sustained high flow events ($\geq 2,000$ cfs) a higher number of native fish are sampled. Sustained high flow events, typically tied to winter rains, can strip out the vegetation, including cattails, increasing the amount of cobble substrate, and decreasing the low velocity habitats created by vegetation. Native fish however, are able to withstand the high flows better than the non-natives fish, thus allowing native fish a window of time in which they have less competition and better habitat conditions. While the upper Verde has had high flows in recent years, they have not lasted for long enough periods of time to reduce riparian vegetation and non-native fishes in this stretch of the upper Verde River.

As a result of lower annual flows, we observed very high numbers of non-native sportfish, mainly consisting of Redeye Bass. Past surveys show this is the most abundant species in the upper Verde River. This will likely continue to be the case until we either have high sustained flows like we saw in the winter of 2005 or until non-native fishes are removed from this section. There is also a very large prey base of Virile Crayfish *Faxonius virilis* present in the Verde for Redeye Bass, which feed primarily on crayfish within their native range in the Coosa River watershed. In addition, a Largemouth Bass was found during this survey, which is the first time a Largemouth Bass has been found this far upstream in the Verde River since two were sampled in Stillman lake in 2005. None have been sampled since the renovation of Stillman Lake in 2009. This was likely the result of a lack of sustained high flow events over the last few years.

Roundtail Chub were not encountered during this survey even though they are known to be present in this section of the Verde River. This, again, is likely tied to the robust Redeye Bass population. Redeye Bass can have a significant effect on Roundtail Chub populations through competition for habitat and predation upon young-of-year.

This stretch of river is also considered critical habitat for listed native species including Razorback Sucker *Xyrauchen texanus*, Loach Minnow, and Spikedace. However, neither Spikedace nor Loach Minnow have been detected in the Verde River in the last two decades, even with targeted surveys and eDNA sampling. It is likely that they are extirpated. Despite not being found in the upper Verde River, Razorback Suckers are present in the middle and lower reaches of the river. These razorbacks are assumed to be from stocking efforts as there is no evidence of successful natural recruitment in this population.

Literature cited

Bryan, S., K. Young, M. Lopez, C. Benedict, A. Clark, B. Jacobson, D. Mitchell, D. Weedman, C. Hiser, T. Robinson, S. Gurtin, and T. Pringle. 2004. Standard fish sampling protocol for state of Arizona waters. Statewide Fisheries Investigations, Federal Aid. Arizona Game and Fish Department, Phoenix, Arizona.

Acknowledgements

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Table 1. Site number and approximate river mile of each sample location on the Verde River (Granite Creek - Verde Ranch) from June 7-8, 2022. Asterisks on site number indicate fixed sites.

Site Number	Approximate River Mile	Date
1*	3.2	6/7/2022
2	4.2	6/7/2022
3*	5.0	6/7/2022
4	5.5	6/7/2022
5*	7.8	6/8/2022
6	8.4	6/8/2022
7	9.5	6/8/2022
8	9.9	6/8/2022

Table 2. Summary of survey hours, distance traveled, sample sites per day, total fish, and total effort in minutes on the Verde River (Granite Creek - Verde Ranch) from June 7-8, 2022.

Date	Trip Hours	Distance traveled (approx. miles)	Number of Sample Sites	Total Fish	Total Sampling Effort (minutes)
6/7/2022	8.0	4.0	4	198	47
6/8/2022	8.5	4.5	4	166	45
Total	16.5	8.5	8	364	92

Table 3. Species composition, total number, percent of total catch, catch-per-unit-effort (CPUE; fish per 15 minutes), and CPUE standard error (fish/15 min), of fish sampled with canoe electrofishing during summer survey of the Verde River (Granite Creek – Verde Ranch) from June 7-8, 2022.

Species	Number Sampled	Percent of Total	CPUE	CPUE Standard Error
Desert Sucker	1	0.27%	0.16	0.12
Largemouth Bass	1	0.27%	0.16	0.12
Redeye Bass	326	89.56%	53.71	9.36
Green Sunfish	1	0.27%	0.16	0.12
Mosquitofish	7	1.92%	1.15	0.48
Red Shiner	7	1.92%	1.15	0.33
Sonora Sucker	3	0.82%	0.49	0.35
Yellow Bullhead	17	4.67%	2.80	0.67
Black Bullhead	1	0.27%	0.16	0.12
TOTAL	364	100%	59.35	9.36

Table 4. Minimum, maximum, mean total length (mm) including standard error (SE) of all fish captured with canoe electrofishing during the summer survey of the Verde River (Granite Creek - Verde Ranch) from June 7-8, 2022.

Species	Total Length (mm)			SE
	Min	Max	Mean	
Desert Sucker	150	150	150.00	-
Largemouth Bass	370	370	370.00	-
Redeye Bass	21	285	147.15	2.94
Green Sunfish	141	141	141.00	-
Mosquitofish	13	52	28.57	5.20
Red Shiner	62	85	75.00	2.85
Sonora Sucker	152	197	177.67	13.37
Yellow Bullhead	150	240	198.76	6.04
Black Bullhead	102	102	102.00	-

Note: ~ denotes only one fish was sampled

Table 5. Species composition, total minutes per site, catch-per-unit-effort (CPUE; fish per 15 minutes) of each species by site, total fish per site, and the total CPUE (fish per minute) for each site sampled on the Verde River (Granite Creek - Verde Ranch) from June 7-8, 2022. Asterisks on site numbers indicate fixed sites.

Site	Minutes	CPUE (fish/15min)									Site Total	Total CPUE (fish/min)
		Desert Sucker	Largemouth Bass	Redeye Bass	Green Sunfish	Mosquitofish	Red Shiner	Sonora Sucker	Yellow Bullhead	Black Bullhead		
1*	13	0.00	0.00	68.08	1.15	0.00	0.00	0.00	1.15	0.00	61	4.69
2	12	0.00	0.00	123.75	0.00	0.00	0.00	0.00	6.25	0.00	104	8.67
3*	12	0.00	0.00	18.75	0.00	2.50	0.00	0.00	3.75	0.00	20	1.67
4	10	0.00	0.00	19.50	0.00	0.00	0.00	0.00	0.00	0.00	13	1.30
5*	12	0.00	0.00	45.00	0.00	0.00	2.50	0.00	1.25	0.00	39	3.25
6	12	0.00	1.25	60.00	0.00	5.00	2.50	0.00	0.00	0.00	55	4.58
7	9	1.67	0.00	38.33	0.00	1.67	3.33	0.00	3.33	1.67	30	3.33
8	12	0.00	0.00	41.25	0.00	0.00	1.25	3.75	6.25	0.00	42	3.50

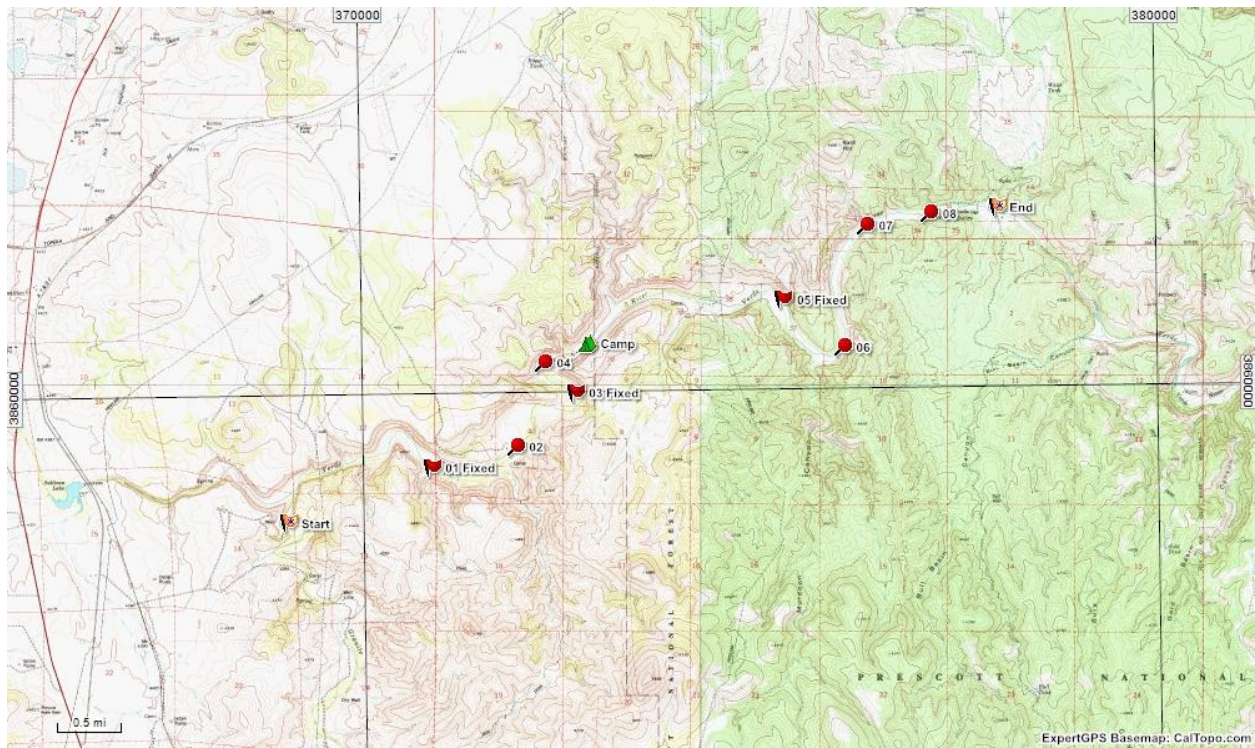


Figure 1. Map of electrofishing sample sites of the upper Verde River (Granite Creek - Verde Ranch) from June 7-8, 2022.

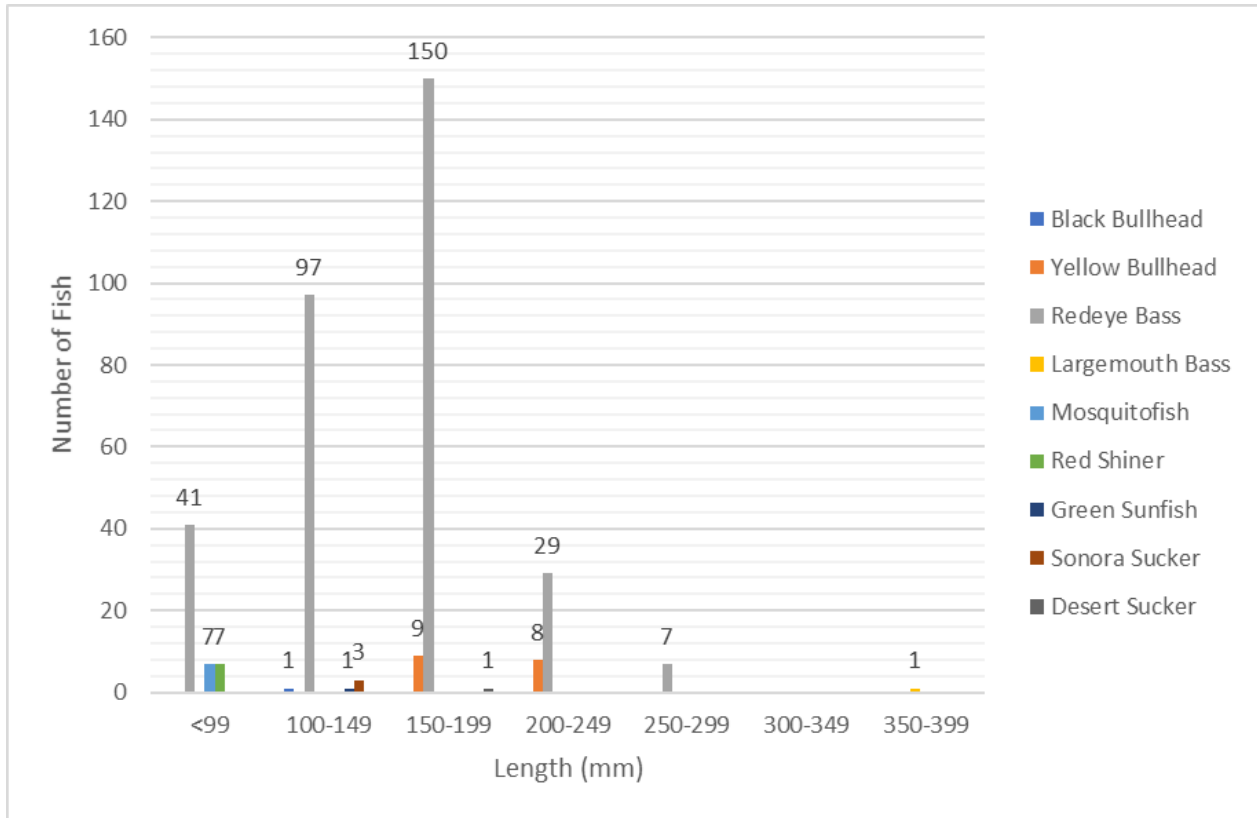


Figure 2. Length frequency of species captured on the upper Verde River survey (Granite Creek - Verde Ranch) from June 7-8, 2022.