Arizona Game and Fish Department
Region III Fisheries Program

Verde River: Perkinsville-Sycamore Creek Fish Survey Report

June 13-15, 2023

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Executive Summary

On June 13-15, 2023 the Arizona Game and Fish Department's Region III Aquatics Program led a fisheries community survey of a 20 km (12.5 mi) section of the upper Verde River. The section started approximately 1.5 miles downstream of the Perkinsville Bridge and ended at the Sycamore Creek confluence. A total of 1,415 fish, representing ten species were sampled. Species sampled included Desert Sucker *Catostomus Clarkii*, Sonora Sucker *Catostomus insignis*, Roundtail Chub *Gila robusta*, Speckled Dace *Rhinichthys osculus,* Longfin Dace *Agosia chrysogaster*, Redeye Bass *Micopterus coosae*, Green Sunfish *Lepomis cyanellus*, Yellow Bullhead Ameriurus natalis, Black Bullhead *Ameiurus melas*, and Red Shiner *Cyprinella lutrensis.* A total of 83.75% of all fish captured were native fish. Desert Sucker were the most abundant native fish species and represented 37.24% of the total catch, followed by Sonora Sucker (24.31%), Roundtail Chub (19.58%), Speckled Dace (2.47%), and Longfin Dace (0.14%). Red Shiner were the most abundant non-native fish captured comprising 12.30% of the total catch, followed by Redeye Bass with 3.11%, Yellow Bullhead (0.49%), Green Sunfish (0.28%), and Black Bullhead (0.07%).

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 reaching the dam at Horseshoe Lake. It then continues on for another 57 mi until it meets the Salt River near the community of Fountain Hills east of Phoenix. The purpose of this survey was to continue monitoring species occurrence and abundance in the upper Verde River in compliance with statewide protocol standards and statewide sportfish stocking consultation conservation measures. This survey will be compared to similar surveys completed in 2016 and 2019.

Methods

A total of 11, 200 meter sites were selected, three fixed sites and eight random sights generated using Expert GPS and a random number generator (Figure 1; Table 1). A Smith-Root canoe mounted electrofishing unit with a single sphere anode and four cathode tails was used to sample all sites. A deadman switch was operated by hand on top of the generator as the canoe was maneuvered in and around available habitats. One individual operated a deadman switch and canoe while netters were positioned downstream of the canoe. In areas where the water was too deep, the electrofishing unit was operated from inside the canoes (floated) and followed or mirrored by the remaining support canoes. Nine sites were sampled from outside the canoes and two were sampled from inside the canoes. Of the two sites that were sampled from the canoe, only one was completely sampled from inside the canoe, while the other was sampled half from inside the canoe and half from outside the canoe. Site 1 was not able to be sampled due to landowner/acess issues, so the site 4Alt was sampled instead.

Results

Total trip hours were estimated to be 32 hours with a total distance traveled of 20 km (12 mi) (Table 1). A total of 1,185 native fish were sampled compared to just 230 non-native fish. Native fish species sampled included Desert Sucker *Catostomus Clarkii*,

Sonora Sucker *Catostomus insignis*, Roundtail Chub *Gila robusta*, Speckled Dace *Rhinichthys osculus,* and Longfin Dace *Agosia chrysogaster*. Nonnative fish species sampled included Redeye Bass *Micopterus coosae*, Green Sunfish *Lepomis cyanellus*, Yellow Bullhead *Ameriurus natalis*, Black Bullhead *Ameiurus melas*, and Red Shiner *Cyprinella lutrensis.* Native fish accounted for 83.75% of the total fish captured (Table 3). Desert Sucker were the most abundant native fish species and represented 37.24% of the total catch, followed by Sonora Sucker (24.31%), Roundtail Chub (19.58%), Speckled Dace (2.47%), and Longfin Dace (0.14%) (Table 3). Red Shiner were the most abundant non-native fish captured comprising 12.30% of the total catch, followed by Redeye Bass with 3.11%, Yellow Bullhead (0.49%), Green Sunfish (0.28%), and Black Bullhead (0.07%). The catch-per-unit-effort (fish per 15 minutes) of native fishes was 49.82 for Desert Sucker, 32.52 for Sonora Sucker, 26.19 for Roundtail Chub, 3.31 for Speckled Dace, and 0.19 for Longfin Dace (Table 3). Red Shiner had the highest CPUE (fish per 15 minutes) among non-native species at 16.45 followed by Redeye Bass (4.16), Yellow Bullhead (0.66), Green Sunfish (0.38), and Black Bullhead at (0.09) (Table 3). Desert Sucker, Sonora Sucker and Roundtail Chub were the only species sampled at all eleven sample sites (Table 5). The majority of fish captured were < 200 mm (Figure 2; Table 4).

Discussion

The Verde River fish community composition is highly correlated with the natural flow regime. Sustained high flow events can reduce the number of non-native fish species present allowing the number of native fish species to increase (Poff and Allen 1995). This year native fish accounted for 83.75% of the total catch, which is an increase of 2.75% over the 2019 survey on the same section of the Verde River and represents a 61.75% increase over 2016's survey. Changes in the fish community can occur rapidly in the Verde River (Rinne and Stefferud 1998; Propst et al. 2008). The biggest reason for rapid changes in the fish community of the Verde River is sustained high flow events which can reduce numbers of nonnative speices. As the number of years between sustained high flow events increase, it allows nonnative fish to recover and outcompete native fish (Poff and Allen 1995).

From 2014 - 2016 peak flows were fairly low with no sustained high flow events from winter runoff. This may explain why nonnative species, specifically Redeye Bass, were the most abundant species captured during the 2016 survey. In the winter of 2018-2019 there was a sustained high flow event that flushed out many of the nonnative fish and allowed the native fish to rebound. Then in the winter of 2022-2023 there was another sustained high flow event, again pushing nonnative fish downstream and allowing native fish to rebound.

Literature cited

Poff, N.L., and Allen. 1995. Functional organization of stream fish assemblages in relation to hydrological variability. *Ecology* 76:606-627.

Propst, D.L., K.B. Gido, and J.A. Stefferud. 2008. Natural flow regimes, nonnative fishes, and native fish persistence in arid-land river systems. *Ecological Applications* 18:1236-1252.

Rinne, J.N., and J.A. Stefferud. 1998. Verde River Native Fishes; The impacts of abiotic and biotic factors. Final report for Heritage Project 196002

Acknowledgments

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Table 1. Site number and approximate river mile for sites sampled with a canoe electrofishing unit on the Perkinsville to Sycamore Creek section of the upper Verde River on June 13-15,2023.

Site Number	Approximate River Mile	Date
2 Fixed	26.50	6/13/2023
3	27.30	6/13/2023
4	27.50	6/13/2023
4Alt	28.75	6/13/2023
5	30.50	6/14/2023
6	32.20	6/14/2023
7 Fixed	33.30	6/14/2023
8	33.65	6/14/2023
9 Fixed	36.10	6/15/2023
10	36.50	6/15/2023
11	36.90	6/15/2023

Table 2. Number of survey hours, number of survey sites, total fish per day and daily sampling effort (minutes) for each survey day for the Perkinsville to Sycamore Creek section of the upper Verde River surveyed on June 13-15, 2023.

Date	Trip Hours	Distance Traveled (Approx. Miles)	Number of Sample Sites	Total fish	Total Sampling Effort (minutes)
6/13/2023	11.5	4.5	4	524	47.65
6/14/2023	9.5	5	4	328	60
6/15/2023	11	2.5	3	563	51.02
Total	**32**	**12**	**11**	**1415**	**158.67**

Note: hours reflect actual float time and do not include vehicle shuttle, load and unload time

Table 3. Number of individuals sampled, percent of total catch, catch-per-unit-effort (catch per 15 minutes) and Standard Error of all species captured with canoe electrofishing from the Perkinsville to Sycamore Creek section of the upper Verde River June 13-15, 2023.

Species	Number Sampled	Percent of Total	CPUE (Fish/15min)	Standard Error
Desert Sucker	527	37.24%	49.82	11.37
Sonora Sucker	344	24.31%	32.52	6.25
Roundtail Chub	277	19.58%	26.19	9.55
Speckled Dace	35	2.47%	3.31	2.23
Longfin Dace	2	0.14%	0.19	0.17
Redeye Bass	44	3.11%	4.16	1.84
Green Sunfish	4	0.28%	0.38	0.19
Yellow Bullhead	7	0.49%	0.66	0.31
Black Bullhead	1	0.07%	0.09	0.09
Red Shiner	174	12.30%	16.45	4.97
TOTAL	1415	100.00%	133.77	3.70

Table 4. Minimum, maximum, and mean total tength and standard error for all species captured with canoe electrofishing and measured from the Perkinsville to Sycamore Creek section of the upper Verde River June13-15, 2023.

	Total Length (mm)			
Species	**Min(mm)**	**Max(mm)**	**Mean (mm)**	**SE**
Desert Sucker	25	381	176.36	0.1
Sonora Sucker	116	430	259.77	0.36
Roundtail Chub	107	357	221.35	0.58
Speckled Dace	72	86	77.75	0.14
Redeye Bass	97	237	158.74	0.29
Green Sunfish	97	136	115	0.32
Yellow Bullhead	152	185	162.86	0.2
Black Bullhead	135	135	135	~

~ indicates only one of that species was measured during the survey.

Table 5. Total number of fish sampled and species composition for each canoe electrofishing site from the Perkinsville to Sycamore Creek section of the Upper Verde River June 13-15 2023.

Site	Minutes	Desert Sucker	%	Sonora Sucker	%	Roundtail Chub	%	Speckled Dace	%	Longfin Dace	%	Redeye Bass	%	Green Sunfish	%	Yellow Bullhead	%	Black Bullhead	%	Red Shinner	%	Site Total	Relative Abundance (CPUE /15min)
2*	15.0	119	45.6%	87	33.3%	1	0.4%	26	10.0%	2	0.8%	1	0.4%	1	0.4%	0	0.0%	0	0.0%	24	9.2%	261	261.9
3	13.5	56	36.8%	44	28.9%	3	2.0%	3	2.0%	0	0.0%	1	0.7%	0	0.0%	1	0.7%	0	0.0%	44	28.9%	152	168.9
4	8.5	1	3.7%	17	63.0%	6	22.2%	1	3.7%	0	0.0%	2	7.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	27	47.9
4Alt	10.8	31	36.9%	16	19.0%	10	11.9%	5	6.0%	0	0.0%	3	3.6%	0	0.0%	0	0.0%	0	0.0%	19	22.6%	84	117.2
5	14.7	10	11.9%	19	22.6%	6	7.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	49	58.3%	84	85.8
6	18.7	19	18.8%	30	29.7%	18	17.8%	0	0.0%	0	0.0%	21	20.8%	0	0.0%	2	2.0%	1	1.0%	10	9.9%	101	81.2
7*	12.2	48	57.8%	15	18.1%	12	14.5%	0	0.0%	0	0.0%	2	2.4%	0	0.0%	0	0.0%	0	0.0%	6	7.2%	83	102.3
8	14.5	21	35.0%	11	18.3%	13	21.7%	0	0.0%	0	0.0%	11	18.3%	2	3.3%	0	0.0%	0	0.0%	2	3.3%	60	62.1
9*	17.3	82	41.4%	32	16.2%	80	40.4%	0	0.0%	0	0.0%	1	0.5%	0	0.0%	3	1.5%	0	0.0%	0	0.0%	198	172.2
10	12.2	32	35.2%	28	30.8%	28	30.8%	0	0.0%	0	0.0%	0	0.0%	1	1.1%	0	0.0%	0	0.0%	2	2.2%	91	112.0
11	21.6	108	39.4%	45	16.4%	100	36.5%	0	0.0%	0	0.0%	2	0.7%	0	0.0%	1	0.4%	0	0.0%	18	6.6%	274	190.4
Total	158.7	527	37.2%	344	24.3%	277	19.6%	35	2.5%	2	0.1%	44	3.1%	4	0.3%	7	0.5%	1	0.1%	174	12.3%	1415	133.8

* indicates that the site was fixed and not random.

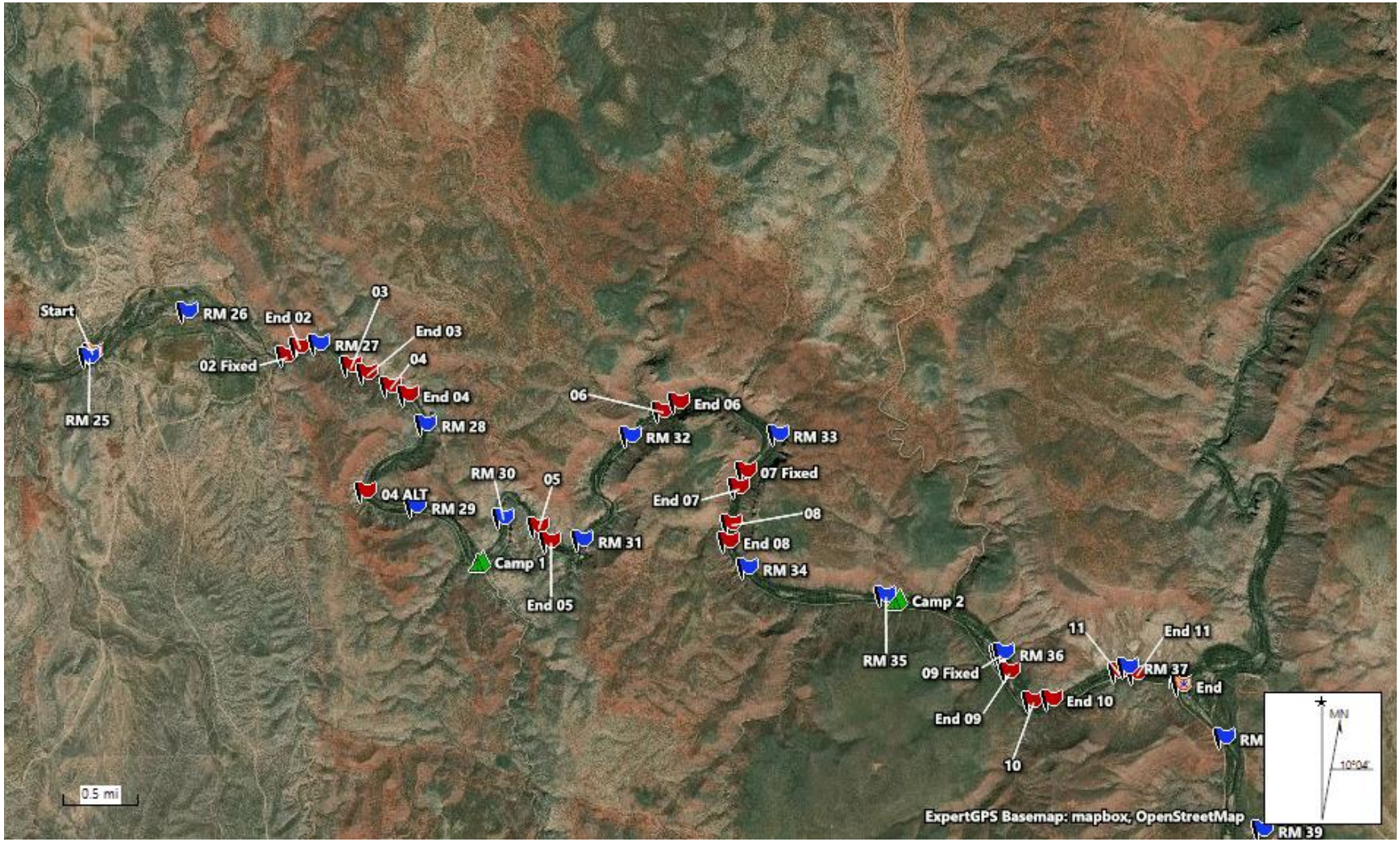

Figure 1. Map of electrofishing sites for the Perkinsville to Sycamore Creek section of the upper Verde River surveyed July 13-15, 2023.

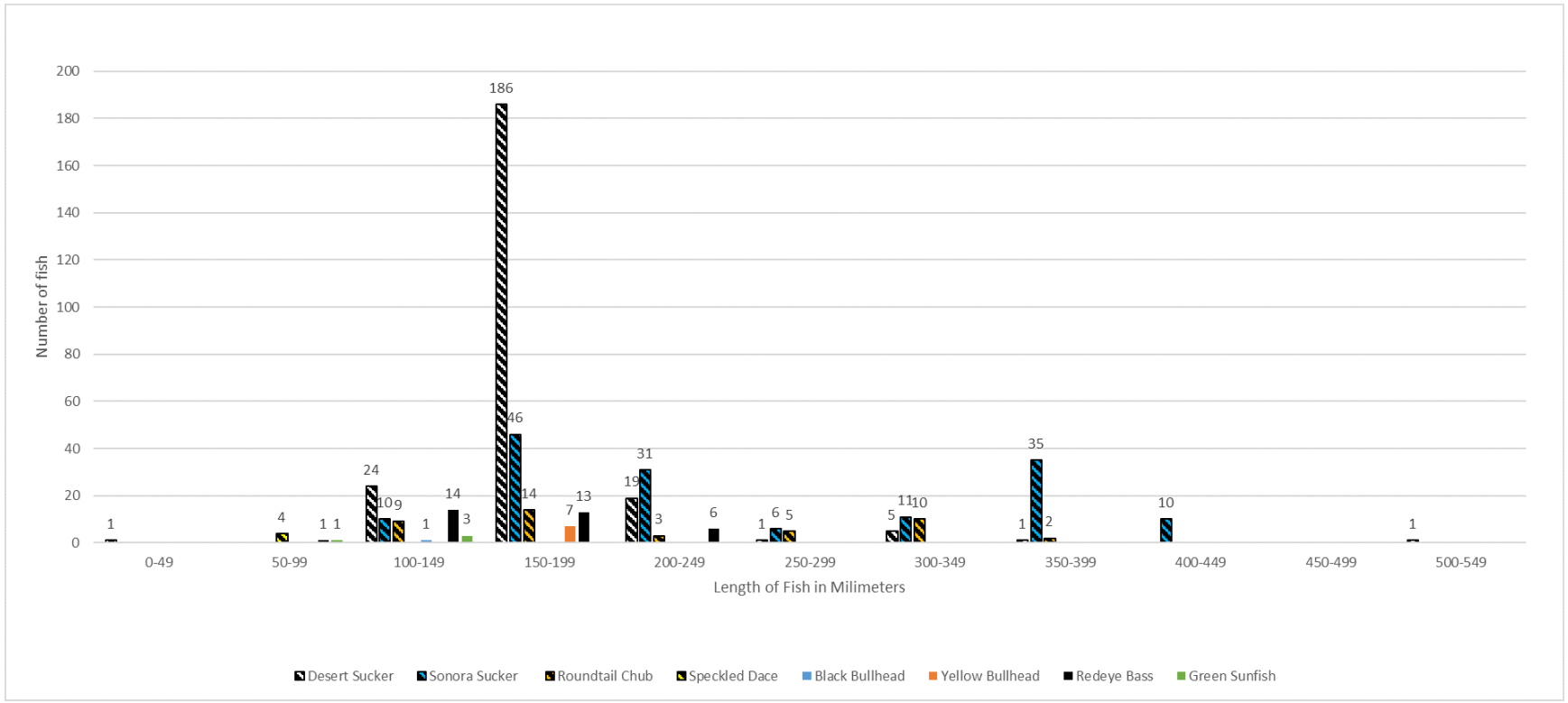

Figure 2. Length frequency of selected species captured from the Perkinsville to Sycamore Creek section of the upper Verde River with canoe electrofishing on July 13-15, 202