

Arizona Game and Fish Department

Region III Fisheries Program

Verde River: Verde Ranch- Perkinsville Fish Survey Report

July 2019

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Executive Summary

On July 9-11, 2019, Region III Fisheries Program personnel surveyed a 15.5-mile (24.9 Km) section of the upper Verde River. The section started at Verde Ranch and ended at the Perkinsville Bridge. A total of 940 fish were sampled including 2 native species. Redeye Bass (48%) followed by Red Shiner (30%) dominated the sample's percent of catch. The two species of native fish, Sonora Sucker and Desert Sucker combined for 13% of the total sample. This marked an increase of 12% over the 2016 survey in the same reach of the Verde River.

Introduction

The Verde River begins below the Sullivan Lake Dam, near Paulden, and flows for 125 miles (201 Km) through private, state, tribal and United States Forrest Service lands before reaching the dam at Horseshoe Lake. The Verde River meets the Salt River near the community of Fountain Hills which is east of Phoenix. The purpose was to continue monitoring species occurrence and abundance of the upper Verde River in compliance with statewide protocol standards. This survey will serve as a comparison to similar surveys done in August 2004, June 2005, August 2006, June 2007, June 2010, June 2013, and June 2016 on the same stretch of river.

Methods

A Smith-Root canoe mounted electrofishing unit with a single sphere anode and four cathode tails was used throughout the entire survey. 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 the deadman switch and canoe. Netters were primarily positioned downstream of the canoe, collecting all fish possible. In areas where this was not effective or safe, the electrofishing unit was operated from inside the canoes and followed or mirrored by the remaining support canoes. Due to the variation of water depth and speed within individual sample sites, most were partially sampled from both inside and outside of the canoes. Four of the fourteen sites were floated 100% of the 200 meters. In 2005, AZGFD standardized the site lengths to 200-meter sections randomly selected over the reach being sampled. This was done to avoid some sites being over 400-meters long and others only being 180-meters. Random sites were generated using Expert GPS in order to minimize sampling bias. The standardized lengths, while still retaining enough length to incorporate multiple habitat types, seemed to address the human and physical limitations of the surveys better. Table 1 gives a general summary of trip hours, distance traveled and number of sites.

Results

A total of 14 sites, five of which were fixed, were surveyed within this section of the Verde River (Table 2 and Figure 1.) Catch rates (fish/15 min) ranged from .08 to 34.24 (Table 3). Individual species relative abundance by site is listed in Table 3 and Figure 2 represents the length frequency of the sample. A total of 940 fish were sampled consisting of 10 species; two of which were native (Table 4). Species composition was heavily weighted toward Redeye Bass *Micropterus coosae* (48%) and Red Shiner *Cyprinella lutrensis* (30%) followed by Sonora Sucker *Catostomus insignis* (10%) which combined represented 88% of the sample (Table 4). Fathead Minnow *Pimephales*

promelas (3.9%) and Desert Sucker *Pantosteus clarkii* (3.7%) were the 4th and 5th most abundant species sampled (Table 4). Yellow Bullhead *Ameiurus natalis* (2%), Green Sunfish *Lepomis cyanellus* (2%), Flathead Catfish *Pylodictis olivaris* (1%), Black Bullhead *Ameiurus melas* (0.1%) and Mosquitofish *Gambusia affinis* (0.1%) combined for 5% of the sample (Table 4).

Discussion

The Verde River fishery is directly related to the natural flow regime over any given amount of time. High flow events decrease non-native fish species allowing native fish species to increase (Poff and Allen 1995) and (Prost. Changes in the fish community can occur rapidly based on data AZGFD has collected over the past 10 years (Verde River Survey Reports 2004-2013) and what Rinne and Stefferud suggested in their study of abiotic and biotic factors on the fish community in the Verde River. The 2010 survey on this portion of the Verde River reflected the relationship of high flow events to the percentage of catch between natives and non-natives. This year native fish made up 14% of the total catch compared to 2016's 1%, 2013's 7% and 2010's 37%. Native fish percent of catch follows the trend of high flows positively effecting native fish population. In January of 2010 an 8910 cubic feet per second (cfs) flow moved through the upper Verde River prior to the July survey. The highest flow event since 2010 was 3920 cfs in February of 2019 and 2,330 in February of 2017. The question that remains is what is considered an effective high flow event that benefits native fish. After looking at the Arizona Game & Fish survey summaries from the previous four surveys, the catch data shows the longer the time between high flows, the greater the difference of relative abundance there is in favor of non-native fish over native fish.

Recommendations

This is the fifteenth year the standardized protocol has been used for the upper Verde River. This survey can be directly compared to surveys done in 2004, 2005, 2006, 2007, 2010, 2013 and 2016 (Chmiel et al. 2004-2016) with only slight differences in sampling procedures (i.e. site length, anode type, date). Site lengths in the 2004 surveys were derived from stream measurements and generated from a simple formula. The standardized lengths, while still retaining enough length to incorporate multiple habitat types, seemed to address the human and physical limitations of the surveys better. The Fisheries Program recommends these surveys to be performed every three years in order to provide adequate data for management purposes.

Literature cited-

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

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

Chmiel, M., Clark, D., and Cummins, G., 2004-2016, Verde River Survey data, Arizona Game & Fish Department.

Acknowledgments

Arizona Game & Fish would like to thank the Verde Ranch for their continued support by providing access to the Verde River through their ranch. Without this cooperation surveying the upper Verde River would be extremely difficult.

Figures

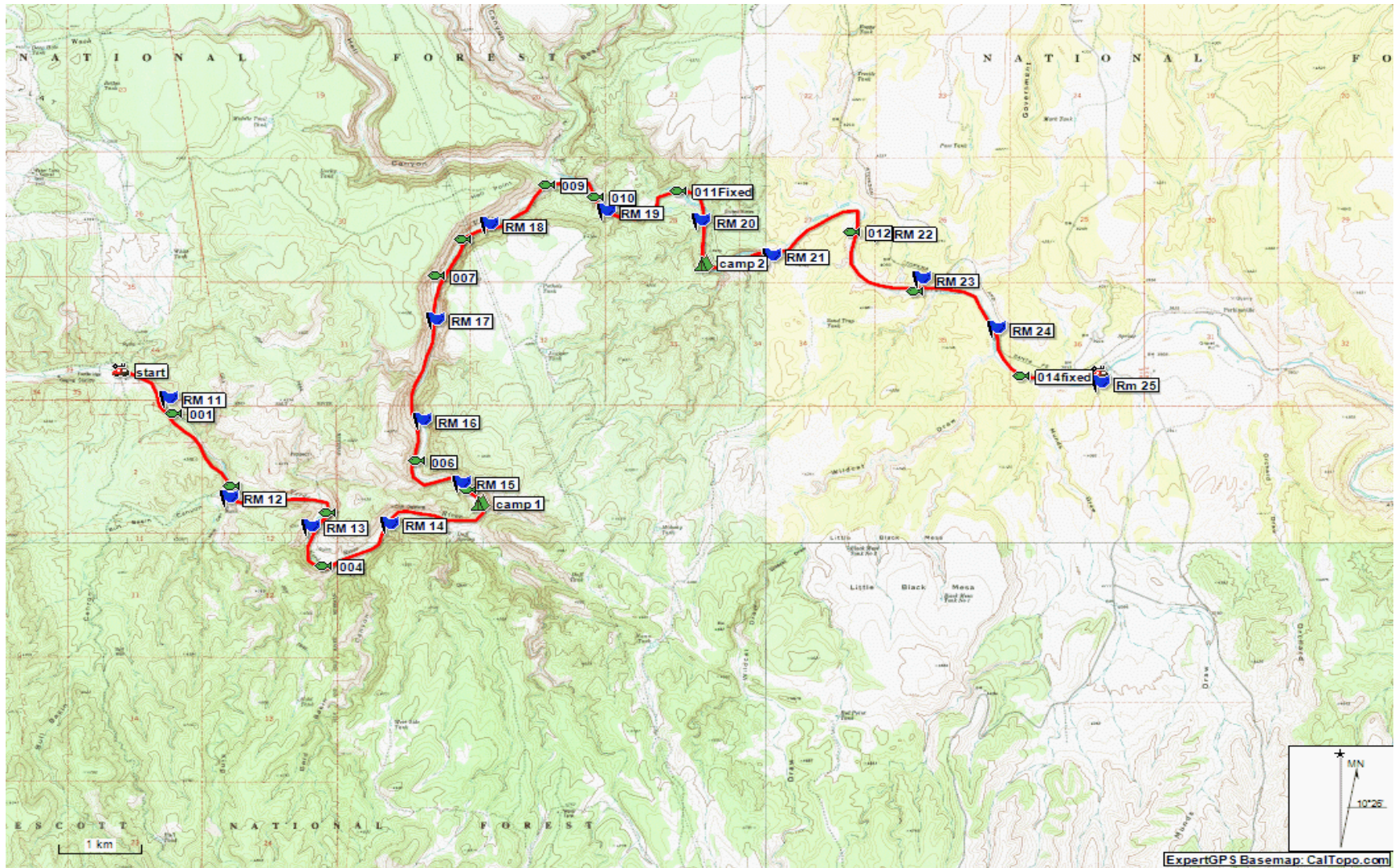


Figure 1. Map of electrofishing sites from Verde Ranch to Perkinsville section of the upper Verde River surveyed July 9-11, 2019.

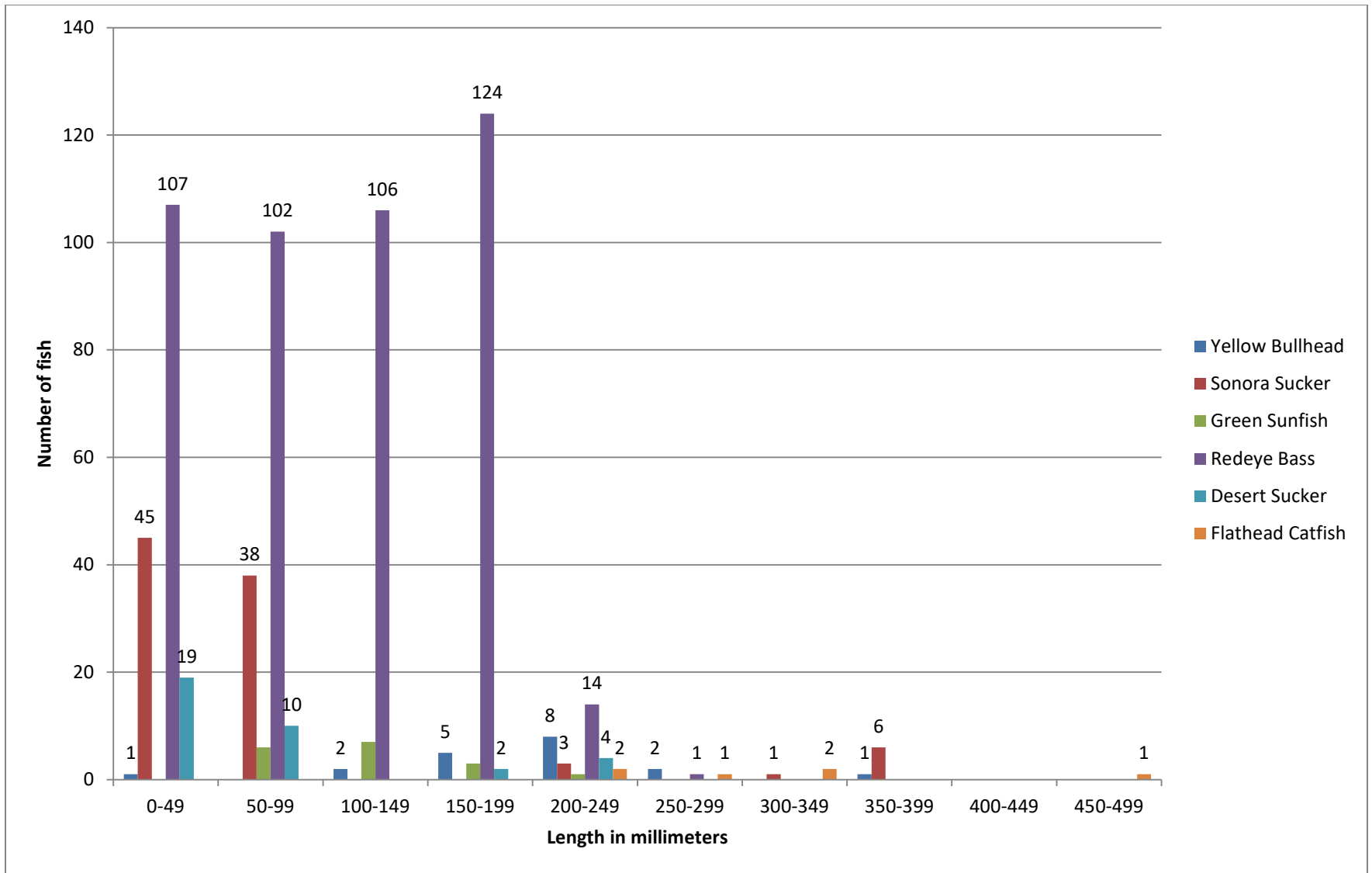


Figure 2. Length frequency of fish sampled electrofishing from the Verde Ranch to Perkinsville section of the upper Verde River surveyed July 9-11, 2019.

Tables

Table 1. Summary of number of survey hours, number of sites and total effort (minutes) for each survey day from Verde Ranch to Perkinsville section of the upper Verde River surveyed on July 9-11, 2019.

Date	Trip Hours	Distance traveled (approx. miles)	Number of Sample Sites	Total Fish	Total Sampling Effort (minutes)
7/9/2019	10	5.5	6	498	77.2
7/10/2019	8	4.6	5	332	77.4
7/11/2019	4	4.5	3	115	44.4
Total	22	14.6	14	945	199

Note: hours reflect actual float time and do not include shuttle or load/unload time.

Table 2. Site number and approximate river mile for sites sampled on the upper Verde River, Verde Ranch to Perkinsville on July 9-11, 2019.

Site Number	Approximate River Mile	Date
1	11.1	7/9/2019
2	11.9	7/9/2019
3 fixed	12.9	7/9/2019
4	13.3	7/9/2019
5	14.9	7/9/2019
6	15.5	7/9/2019
7	17.3	7/10/2019
8 fixed	17.7	7/10/2019
9	18.5	7/10/2019
10	18.9	7/10/2019
11 fixed	19.5	7/10/2019
12	22	7/11/2019
13 fixed	23	7/11/2019
14 fixed	24.5	7/11/2019

Table 3. Total number of fish collected and species composition for each site electrofished on upper Verde River survey, Verde Ranch to Perkinsville July 9-11, 2019.

Site	Minutes	Black Bullhead	%	Yellow Bullhead	%	Sonora Sucker	%	Red Shiner	%	Mosquitofish	%	Green Sunfish	%	Redeye Bass	%	Desert Sucker	%	Fathead Minnow	%	Flathead Catfish	%	Site Total	Relative Abundance (CPUE)
1	17.1	0	0	2	2	17	13	31	23	0	0	0	0	77	58	6	5	0	0	0	0	133	117
2	11.4	0	0	0	0	3	5	6	10	0	0	0	0	51	81	2	3	1	2	0	0	63	83
3F	12	0	0	1	1	0	0	43	48	0	0	0	0	45	51	0	0	0	0	0	0	89	111
4	12.8	0	0	0	0	3	4	5	7	1	1	0	0	67	88	0	0	0	0	0	0	76	89
5	12.4	1	1	2	3	2	3	0	0	0	0	0	0	65	88	0	0	0	0	4	5	74	89
6	11.4	0	0	3	1	1	0	3	24	0	0	1	4	53	69	1	0	1	0	0	0	63	83
7	15.9	0	0	0	0	0	0	8	17	0	0	1	2	36	78	1	2	0	0	0	0	46	43
8F	13.9	0	0	3	31	0	0	22	1	0	0	0	0	15	55	0	0	0	0	0	0	40	43
9	14.8	0	0	1	2	0	0	31	63	0	0	3	6	6	12	0	0	8	16	0	0	49	49
10	17.2	0	0	0	0	24	24	36	36	0	0	4	4	6	6	16	16	14	14	0	0	100	87
11F	15.6	0	0	7	7	3	3	70	72	0	0	5	5	4	4	7	7	0	0	1	1	97	93
12	17.9	0	0	0	0	9	21	10	24	0	0	1	2	14	33	0	0	7	17	1	2	42	35
13F	16.1	0	0	0	0	19	51	9	24	0	0	1	3	5	14	1	3	2	5	0	0	37	35
14F	10.3	0	0	0	0	12	0	8	71	0	0	1	17	10	8	1	0	4	5	0	0	36	52
Total=	198.8	1	0	19	2	93	10	282	30	1	0	17	2	454	48	35	4	37	4	6	1	945	71

Table 4. Number sampled, percent of total sample, CPUE (catch per 15 minutes) and Standard Error of all species sampled on upper Verde River survey, Verde Ranch to Perkinsville July 9-11, 2019.

Species	Number Sampled	Percent of Total	CPUE	Standard Error
Black Bullhead	1	0	0.08	0.07
Yellow Bullhead	19	2	1.44	0.51
Sonora Sucker	93	10	6.82	2.11
Red Shiner	282	30	21.36	5.13
Mosquitofish	1	0	0.08	0.07
Green Sunfish	17	2	1.29	0.42
Redeye Bass	454	48	34.24	6.87
Desert Sucker	35	4	2.65	1.16
Fathead Minnow	37	4	2.8	1.09
Flathead Catfish	6	1	0.45	0.28