

# Arizona Game and Fish Department

Region III Fisheries Program

## Verde River: Verde Ranch - Perkinsville Fish Survey July 12-14, 2022

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## **Executive Summary**

On July 12-14, 2022, the Arizona Game and Fish Department's Region III Aquatics Program, United States Forest Service, and United States Bureau of Reclamation personnel surveyed a 23 km (14 mi) section of the upper Verde River from Verde Ranch to Perkinsville Bridge. The purpose of this survey was to continue monitoring species occurrence and abundance of the upper Verde River in compliance with state wide protocol standards and the sportfish stocking consultation conservation measures. A total of 1,456 fish were sampled including three native species. Species sampled included Roundtail Chub *Gila Robusta*, Sonora Sucker *Catostomus insignis*, Desert Sucker *Catostomus clarkii*, Red Shiner *Cyprinella lutrensis*, Redeye Bass *Micropterus coosae*, Green Sunfish *Lepomis cyanellus*, Yellow Bullhead *Ameiurus natalis*, Mosquitofish *Gambusia affinis*, Fathead Minnow *Pimephales promelas*, and Flathead Catfish *Pylodictis olivaris*. Red Shiner (64.01%) was the highest percentage of the total catch followed by Redeye Bass (15.38%) and Green Sunfish (6.04%). Sonora Sucker (4.81%) was the highest percentage of the total catch for native species followed by Desert Sucker (3.02%), and Roundtail Chub (1.10%).

## **Introduction**

The Verde River begins below the Sullivan Lake Dam, near Paulden, Arizona and flows for 201 km (125 mi) through private, state, tribal, and United States Forest Service lands before the dam at Horseshoe Lake. From there it continues for another 57 mi until it meets the Salt River near the community of Fountain Hills east of Phoenix. The section surveyed during this trip started at Verde Ranch and ended at the Perkinsville Road Bridge (Figure 1). 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 statewide sportfish stocking consultation conservation measures (Bryan et al. 2004). At the time of our survey, discharge was 14-15 cubic feet per second (CFS) according to the USGS gauge near Paulden, AZ, which is below average for early July. This survey will be compared to other surveys of the same section of the Verde River between 2000-2019.

## **Methods**

Nine random sites were generated using the "Create Random Points" tool in ArcGIS Pro. In addition, five historic fixed sites were used for a total of 14 sites to be sampled (Figure 1: Table 1). Four, six, and four sites were sampled each day of the trip respectively (Table 2). A Smith-Root canoe mounted electrofishing unit with a single sphere anode and four cathode tails was used to sample all sites. 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 at the end of the sampled reach, unless the river was too wide or deep for the seine to be deployed. 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 deadman switch was operated by foot and the 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 canoe electrofishing unit were 300 volts pushing 2-4 amps at 60 pulses per second. At the end of each site fish were identified, measured, and counted.

We excluded small bodied species that don't reach lengths over 99 mm from length frequency analyses. Excluded fish included Red Shiner *Cyprinella lutrensis*, Mosquitofish *Gambusia affinis*, and Fathead Minnow *Pimephales promelas*.

## Results

A total of 1,455 fish were sampled consisting of ten species (Table 2, 3). Species sampled included Roundtail Chub *Gila Robusta*, Sonora Sucker *Catostomus insignis*, Desert Sucker *Catostomus clarkii*, Red Shiner, Redeye Bass *Micropterus coosae*, Green Sunfish *Lepomis cyanellus*, Yellow Bullhead *Ameiurus natalis*, Mosquitofish, Fathead Minnow, and Flathead Catfish *Pylodictis olivaris*. Red Shiner (64.01%) was the highest percentage of the catch followed by Redeye Bass (15.38%) and Green Sunfish (6.04%) (Table 3). Three species of native fish were sampled, Sonora Sucker, Desert Sucker, and Roundtail Chub comprising 8.93% of the total catch (Table 3). Excluding the three small bodied species, most fish captured were between 100-149 mm (~14% of total catch; ~43% of catch excluding small bodied fish) (Figure 2; Table 4). The highest catch-per-unit-effort at one site was Red Shiner with 177 fish per 15 minutes (Table 5).

## 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 and native aquatic species conservation for Spikedace *Meda fulgida*, Loach Minnow *Rhinichthys cobitis*, Roundtail Chub, 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 suggests a high abundance of non-native fish and low numbers of native fish. This is likely a result of a lack of sustained high flow events and the high density of cattails in the upper Verde River. Trends in our data show that years following sustained high flow events ( $\geq 2,000$  cfs) have higher numbers of native fish. Sustained high flow events, typically tied to winter precipitation events, can strip out the vegetation, including cattails, increasing the amount of cobble substrate available, and decreasing the low velocity habitats created by vegetation. Native Fish however, are able to withstand the high flow events better than the non-natives. This allows 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 the riparian vegetation or the non-native fishes in this stretch of the upper Verde.

As a result of lower annual flows, we observed very high numbers of non-native fish, primarily consisting of Red Shiner, Redeye Bass, and Green Sunfish. Past surveys have indicated that Redeye Bass are 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 the 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 in their native range in the Coosa River watershed.

Despite the majority of fish captured being non-native, we did see higher numbers of native fish in the stretch between Verde Ranch and Perkinsville than we did the month prior from Granite

Creek to Verde Ranch. This is likely due to habitat availability. As we move further downstream the cattails become less dense creating more open water habitat that seems to be more suitable for native species. Sonora and Desert Sucker seem to have healthy populations in this reach as we sampled individuals across multiple size classes, and young-of-year. Despite only making up ~8% of the total catch, the two native suckers accounted for the largest fish captured in the survey with 17 individuals larger than the biggest Redeye Bass captured (Table 3, Table 4). Roundtail Chub, while still present, did not seem to be fairing as well as the suckers species as we only sampled Roundtail Chub between 100-149 mm (Figure 2; Table 4). It is possible that these are fish that have moved upstream from more suitable spawning habitat, or that our gear is not effective at capturing larger adults. However, Roundtail between 100-149 mm provide evidence of natural reproduction over the last 3 years.

This stretch of river is also considered critical habitat for listed native species including Loach Minnow, and Spikedace. However, neither Spikedace nor Loach Minnow have been detected in the Verde River within 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, razorbacks are present in the middle and lower reaches of the Verde River. These razorbacks are likely stocked 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 (Verde Ranch - Perkinsville) from July 12-14, 2022.

Site Number	Approximate River Mile	Date
1	10.5	7/12/2022
2	11.5	7/12/2022
3	11.9	7/12/2022
4*	12.8	7/12/2022
5	15.3	7/13/2022
6	16.8	7/13/2022
7	17.2	7/13/2022
8*	17.8	7/13/2022
9	18.9	7/13/2022
10*	19.5	7/13/2022
11	21.0	7/14/2022
12*	22.9	7/14/2022
13	24.2	7/14/2022
14*	24.5	7/14/2022

**Note:**\* indicates a fixed site.

**Table 2.** Survey hours, distance traveled, sampled sites per day, total fish captured, and total effort in minutes on the Verde River (Verde Ranch - Perkinsville) from July 12-14, 2022.

Date	Trip Hours	Distance traveled (approx. miles)	Number of Sample Sites	Total Fish	Total Sampling Effort (minutes)
7/12/2022	7	4.5	4	243	42
7/13/2022	8	5.5	6	732	77
7/14/2022	5	4.5	4	480	41
<b>Total</b>	<b>20</b>	<b>14.5</b>	<b>14</b>	<b>1455</b>	<b>160</b>

**Table 3.** Species composition, total number, percent of total catch, catch per unit effort (fish per 15 minutes), and standard error of fish sampled with canoe electrofishing from the Verde River (Verde Ranch - Perkinsville) from July 12-14, 2022.

Species	Number Sampled	Percent of Total	CPUE (fish/15min)	Standard Error
Red Shiner	932	64.01%	87.38	10.42
Redeye Bass	224	15.38%	21.00	2.68
Green Sunfish	88	6.04%	8.25	2.29
Sonora Sucker	70	4.81%	6.56	2.21
Desert Sucker	44	3.02%	4.13	1.60
Yellow Bullhead	43	2.95%	4.03	0.65
Mosquitofish	30	2.06%	2.81	0.94
Roundtail Chub	16	1.10%	1.50	0.78
Fathead Minnow	8	0.55%	0.75	0.36
Flathead Catfish	1	0.07%	0.09	0.07
<b>TOTAL</b>	<b>1456</b>	<b>100.00%</b>	<b>9.10</b>	<b>13.13</b>

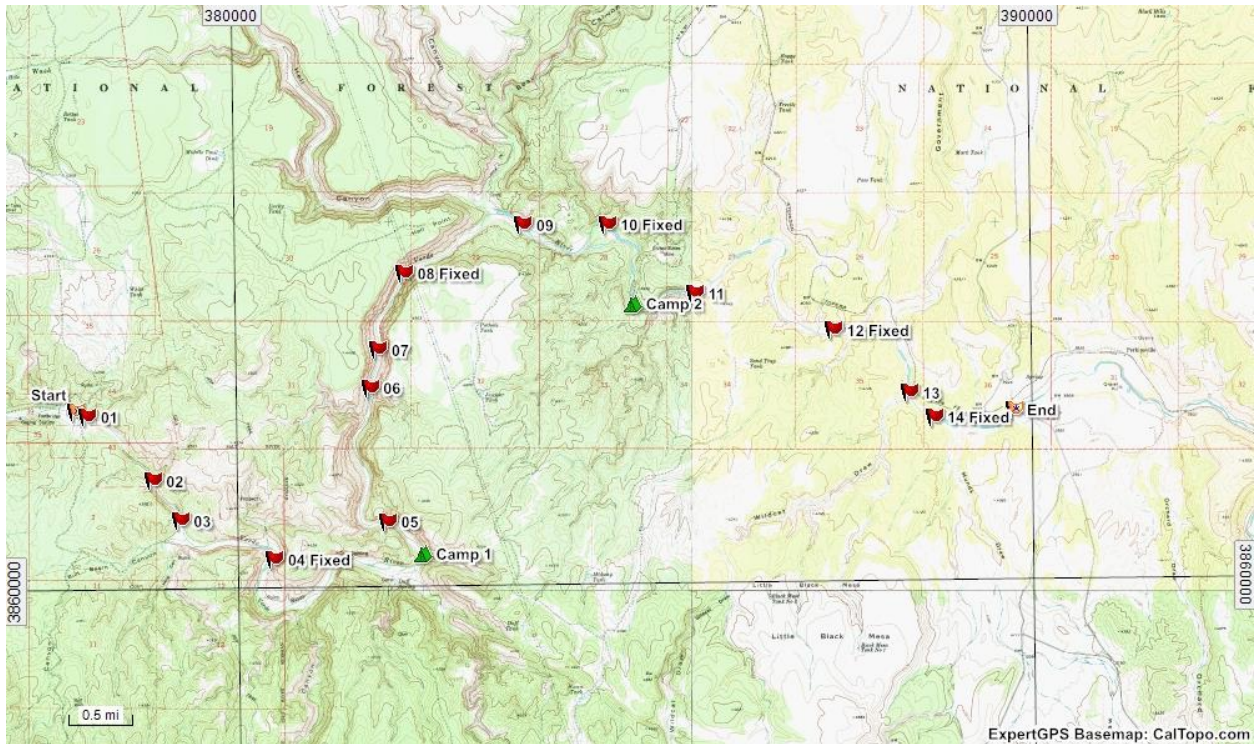
**Table 4.** Minimum, maximum, and mean total length including standard error (SE) of all fish captured with canoe electrofishing from the Verde River (Verde Ranch - Perkinsville) from July 12-14, 2022.

Species	Total Length (mm)			
	Min	Max	Mean	SE
Red Shiner	*	*	*	*
Redeye Bass	32	251	129.43	3.38
Green Sunfish	28	144	99.66	2.25
Sonora Sucker	38	411	129.60	15.82
Desert Sucker	36	272	104.68	12.00
Yellow Bullhead	36	248	172.93	8.02
Mosquitofish	*	*	*	*
Roundtail Chub	102	124	112.38	1.43
Fathead Minnow	*	*	*	*
Flathead Catfish	107	107	107	~

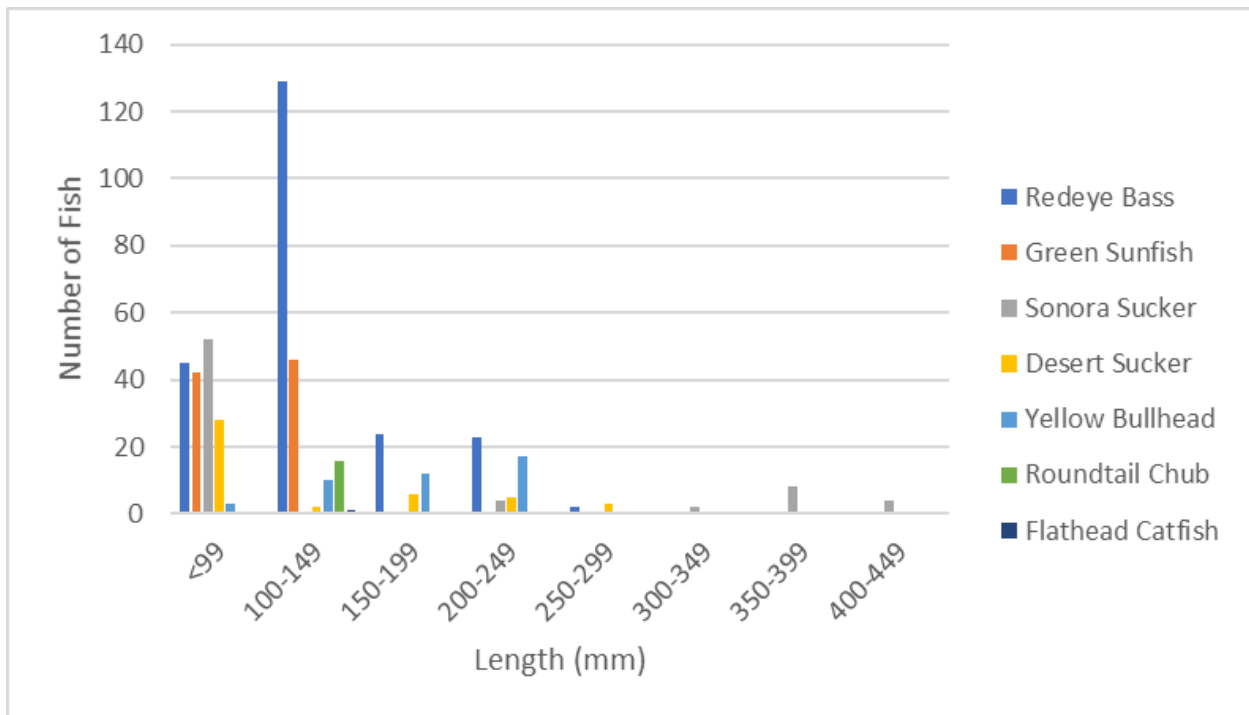
Note: ~ denotes only one fish was sampled. \* denotes species for which only counts were taken.

**Table 5.** Species composition, total minutes per site, catch per unit effort (fish per 15 minutes) of each species by site, total fish per site, and the total catch per unit effort (fish per minute) for each site sampled on the Verde River (Verde Ranch to Perkinsville) from July 12-14, 2022. Asterisks on site numbers indicate fixed sites.

Site	Minutes	CPUE (fish/15min)										Site Total	Total CPUE (fish/1min)
		Red Shiner	Redeye Bass	Green Sunfish	Sonora Sucker	Desert Sucker	Yellow Bullhead	Mosquitofish	Roundtail Chub	Fathead Minnow	Flathead Catfish		
1	13	6.92	42.69	0.00	3.46	3.46	4.62	0.00	0.00	0.00	0.00	53.00	4.08
2	10	46.50	30.00	0.00	4.50	1.15	3.00	0.00	0.00	0.00	0.00	57.00	5.70
3	9	25.00	18.33	0.00	1.66	0.00	0.00	15.00	0.00	0.00	0.00	36.00	4.00
4*	10	127.50	16.50	0.00	0.00	0.00	1.50	0.00	0.00	0.00	0.00	97.00	9.70
5	9	53.33	46.67	0.00	0.00	1.67	10.00	6.67	0.00	0.00	0.00	71.00	7.89
6	14	51.43	20.36	11.79	0.00	5.36	7.50	11.79	0.00	5.36	0.00	106.00	7.57
7	13	78.46	27.69	1.15	0.00	2.31	9.23	1.15	0.00	0.00	0.00	104.00	8.00
8*	13	77.31	31.15	1.15	1.15	0.00	3.46	0.00	0.00	0.00	1.15	100.00	7.69
9	14	133.93	4.29	32.14	34.29	0.00	1.07	4.29	11.79	0.00	0.00	207.00	14.79
10*	14	117.86	5.36	13.93	5.36	5.36	2.14	0.00	4.29	0.00	0.00	144.00	10.29
11	13	108.46	12.69	17.31	0.00	5.77	5.77	0.00	1.15	0.00	0.00	131.00	10.08
12*	9	45.00	5.00	1.67	6.67	1.67	1.67	0.00	0.00	1.67	0.00	38.00	4.22
13	9	176.67	28.33	6.67	15.00	0.00	3.33	0.00	0.00	0.00	0.00	138.00	15.33
14*	10	177.00	9.00	18.00	18.00	31.50	1.50	1.50	0.00	3.00	0.00	173.00	17.30



**Figure 1.** Map of canoe electrofishing sites of the upper Verde River (Verde Ranch-Perkinsville) from July 12-14, 2022.



**Figure 2.** Length frequency of species captured on the upper Verde River survey (Verde Ranch-Perkinsville) from July 12-14, 2022. Red Shiner, Mosquitofish, and Fathead Minnow were not included in this analysis.



