SURVEY REPORT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

FISH MANAGEMENT SURVEY AND RECOMMENDATIONS

FOR

SPAVINAW LAKE

2023

SURVEY REPORT

State: Oklahoma

Project Title: Spavinaw Lake Fish Management Report

Period Covered: 2022 and 2023

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Spavinaw Lake

ABSTRACT

Spavinaw Lake was sampled during 2022 using fall experimental gill nets and in 2023 using trap nets. Crappie were collected from trap nets and gill nets and otoliths collected. Trap net data showed a low abundance of Crappie and acceptable body condition values. Crappie were fast growing during age-1 before growth slowed at age-2. Channel Catfish had a higher than desired PSD and should continue to be monitored for recruitment. Largemouth Bass and Walleye should also continue to be monitored and larger sample sizes gathered for a more accurate depiction of the population. White Bass had a moderate abundance. Gizzard Shad were observed during sampling. No management changes or stockings are needed at this time.

INTRODUCTION

Spavinaw Lake is located in Mayes and Delaware County, Oklahoma just south of Spavinaw, Oklahoma. Spavinaw Lake impounds Spavinaw Creek with a surface area of 1548 acres and a shoreline length of 23.3 miles. The lake has a mean depth of 29.8 feet and a maximum of 45.7 feet. Spavinaw Lake was impounded for use as a primary source of drinking water for the City of Tulsa. Several fish species are found in Spavinaw Lake including White Crappie, Black Crappie, Channel Catfish, Flathead Catfish, Largemouth Bass, and Bluegill Sunfish, Redear Sunfish, White Bass, and Walleye. No fishes have been stocked in the past two years.

Spavinaw Lake was sampled in 2022 using fall experimental gill nets and in 2023 using trap nets. Experimental gill nets were 24 m long and 1.8 m deep. Nets are made of monofilament with bar mesh ranging from 1.9 to 6.4 cm. Gill nets were used to examine length frequency and relative abundance. Spavinaw Lake's surface area is within 405 to 2025 hectares so 10 stations were randomly selected and set overnight. Trap nets were set at 7 fixed sites to evaluate age structure, growth rates, and population structure. Netting is made of 13 mm #105-L knotless nylon. Trap nets were set facing the shore on gradually sloping bottoms. Trap nets are run daily, for a total of 21 to 28 net nights depending on catch rates. Due to the Ozark hills topography Spavinaw Lake is in, finding ideal slopes for trap netting is difficult resulting in fairly low catch rates. During fall trap net sampling, Crappie otoliths were collected with a maximum of 20

otoliths per 25 mm length group to determine age structure of the Spavinaw Lake Crappie population.

RESULTS

Several fish species were caught during fall 2022 gill netting on Spavinaw Lake. These include Bluegill, Channel Catfish, Common Carp, Crappie, Flathead Catfish, Largemouth Bass, Gizzard Shad, Spotted Sucker, White Bass Hybrid, Walleye, and White Bass. Surface temperatures averaged 61 degrees during fall 2023 sampling. Several fishes were caught in trap nets including Bluegill, Channel Catfish, Crappie, Redear Sunfish, Rock Bass, Spotted Sucker, White Crappie, and Yellow Bullhead.

ODWC is looking into some different fall crappie netting strategies to use in the future for reservoirs like Spavinaw Lake that lack the ideal slopes for trap nets to fish properly.

Crappie

Black Crappie and White Crappie were sampled on Spavinaw Lake in 2022 and 2023 by using experimental gill nets and trap nets. During fall 2022 gill netting, a total of 55 Crappie were observed with 45 Black Crappie and 10 White Crappie. Black Crappie had a low to moderate CPUE (CPUE = 4.2) and White Crappie had a low CPUE (CPUE = 0.86). Additionally, CPUEs and relative weight values (Wr) for each observed proportional size distribution (PSD) were calculated. The Wr values for all PSD groups for White Crappie and Black Crappie were above acceptable conditions, where acceptable values are greater than or equal to 90 (Table 1; Table 2). Crappie had low individual CPUEs when collected by gill nets.

Black and White Crappie were collected in 2023 from trap nets. A total of 35 White Crappie were collected and had an abundance of 1.27 CPUE. The individual CPUES were low for the quality (CPUE = 0.36), preferred (CPUE = 0.65), and memorable (CPUE = 0.25) PSD groups (Table 3). No fish were caught from the stock or trophy PSD group. Additionally, body condition sizes for each group were found to be at an acceptable value. A total of 19 Black Crappie were sampled from fall 2023 trap nets. The total (CPUE = 0.7) and separate abundances were low (Table 4). Sampled Black Crappie were observed in the substock (0 – 5.0 in), quality (7.9 in), preferred (9.8 in), and memorable (11.8 in) PSD groups. No Wr value was calculated for substock and healthy body conditions were found for quality (Wr = 99.1) and preferred (Wr = 95.8). Memorable had a slightly lower than expected body condition value (Wr = 89.6).

Length-frequency histograms were created for Black and White Crappie (Figure 1; Figure 2). Black Crappie sampled in the 9-inch length bin were caught the most and contributed to over 40% of the sample. The remaining Black Crappie sampled had a similar distribution with each length bin approximately 10% of the observed fish. Black Crappie had a maximum size of 13 inches and a minimum of 8 inches (Figure 1). Collected fish had a PSD value of 96, PSD-P of 29, and PSD-M of 4. PSD Q-P had a value of 67. A small amount of Black Crappie had been captured in the stock and memorable PSD groups and had a high PSD value.

Similarly, White Crappie were captured the most in 10-inch and 11-inch length groups and individually were 25% of the observations. The remaining observed fish had the same abundance for the rest of the length groups. The smallest White Crappie was found within the 8-inch length group and the maximum size was in the 15-inch length group (Figure 2). White

Crappie collected from fall 2022 gill nets had a PSD value of 100, PSD-P of 75, and PSD-M of 25. A small sample size was obtained, so limited conclusions can be drawn from this sample.

Black Crappie caught in 2023 from trap nets had a minimum size of 4 in and a maximum of 15 in (Figure 3). There was a wide spread of sizes sampled, however, there were no fish collected in the 6-inch to 8-inch length groups. Sampled fish had a relatively similar abundance for observed lengths. White Crappie were only found in length groups 10 in to 14 in. The most frequently captured were within the 11-inch length group at over 40% of the sample and 10-inch Crappie 37% of the sample (Figure 4). Less than 5% of Crappie sampled were within the 12-inch and 13-inch length group. Further sampling from trap nets can be used to compare Crappie abundancy and changes in length frequencies.

A maximum of 20 Crappie otoliths were collected from each inch length group in fall 2023. Most of the Crappie captured were age-1 and were approximately 80% of the observed fish. Only 3 individuals were caught in the age-2 and age-3 groups. One Crappie was captured in the age-4 group (Table 5). Before age-1, Crappie were fast growing and reached an average TL of 10.03 at age-1. At age-2 and following, growth slowed and approached the L-inf value of 14.2 inches (Figure 6). The mean TL for age-2 (TL = 12.45), age-3 (TL= 13.24), and age-4 (TL = 13.98) were relatively similar. Age data suggests high recruitment from the prior year.

		Total CPUE	**Stock 5.1 in**		**Quality 7.9 in**		**Preferred 9.8 in**		**Memorable 11.8 in**	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	45	4.2	0.17	104.3	2.74	101.1	1.03	96.9	0.17	99.8

Table 1. Total number (*n*) and catch per unit effort (CPUE) of Black Crappie collected during fall 2022 experimental gill net sampling. Relative weight (Wr) values for each proportional size distribution was calculated. Acceptable values are greater than or equal to 90.

		Total CPUE	**Quality 7.9 in**		**Preferred 9.8 in**		**Memorable 11.8 in**	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	10	0.86	0.17	113.7	0.34	111.6	0.17	101.5

Table 2. Total number (*n*) and catch per unit effort (CPUE) of White Crappie from 2022 gill nets. CPUE and relative weights (Wr) for quality, preferred, and memorable proportional size distributions (PSD) are shown. Acceptable Wr values are greater than or equal to 90.

		Total CPUE	Quality 7.9 in		Preferred 9.8 in		Memorable 11.8 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2023	35	1.27	0.36	99.6	0.65	103.9	0.25	92.5

Table 3. Total number (*n*) and catch per unit effort (CPUE) of White Crappie collected from 2023 trap nets. Relative weights (Wr) for quality, preferred, and memorable proportional size distributions (PSD) show body condition of White Crappie. Acceptable Wr values are greater than or equal to 90.

		Total CPUE	Substock 0 – 5.0 in		Stock 5.1 in		Quality 7.9 in		Preferred 9.8 in		Memorable 11.8 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	19	0.7	0.15	-	-	-	0.15	99.1	0.07	95.8	0.29	89.6

Table 4. Total number (*n*) and catch per unit effort (CPUE) of Black Crappie collected from 2023 trap nets. Relative weights (Wr) for proportional size distributions (PSD) show body condition. Acceptable values are greater than or equal to 90. Only 3 fish were caught within the age-2 and the age-3 group and 1 fish for age-4 (Table 5).

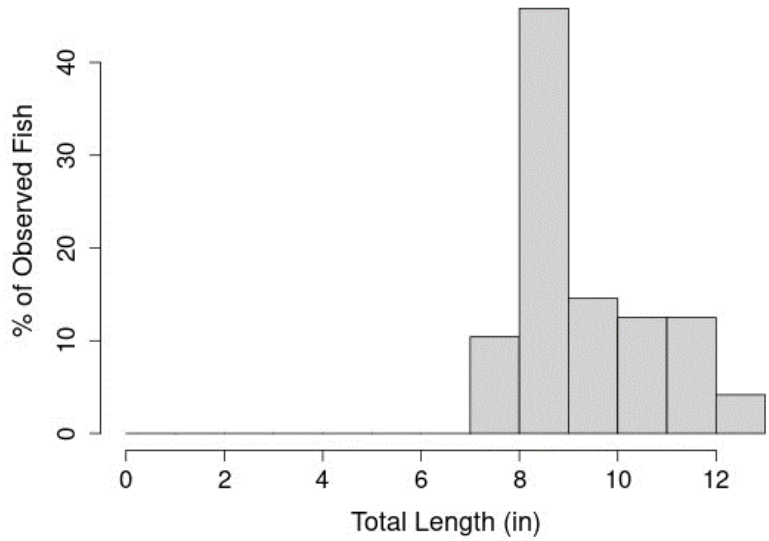

Figure 1. Length-frequency histogram for Black Crappie collected during fall 2022 experimental gill nets.

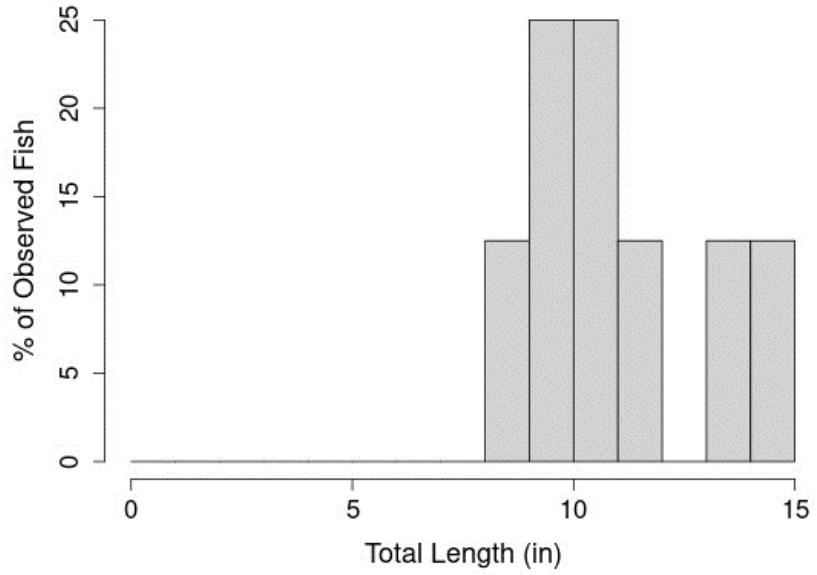

Figure 2. Length-frequency for White Crappie collected during fall 2022 experimental gill nets.

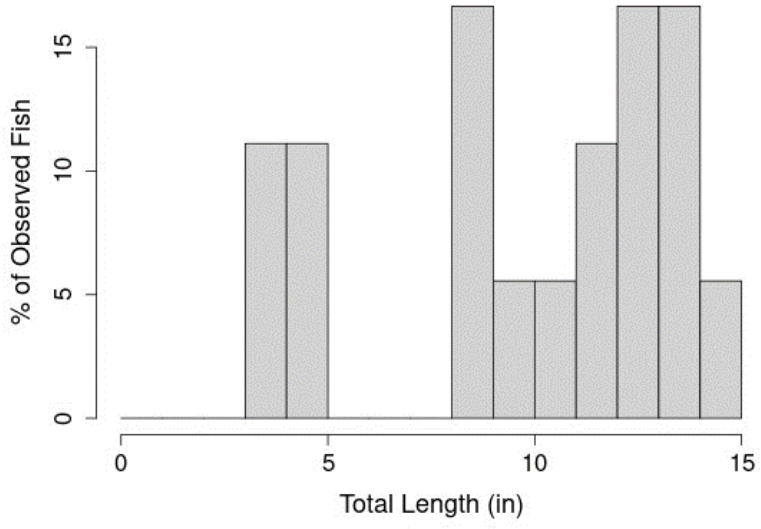

Figure 3. Length-frequency histogram for Black Crappie collected during fall 2023 trap nets.

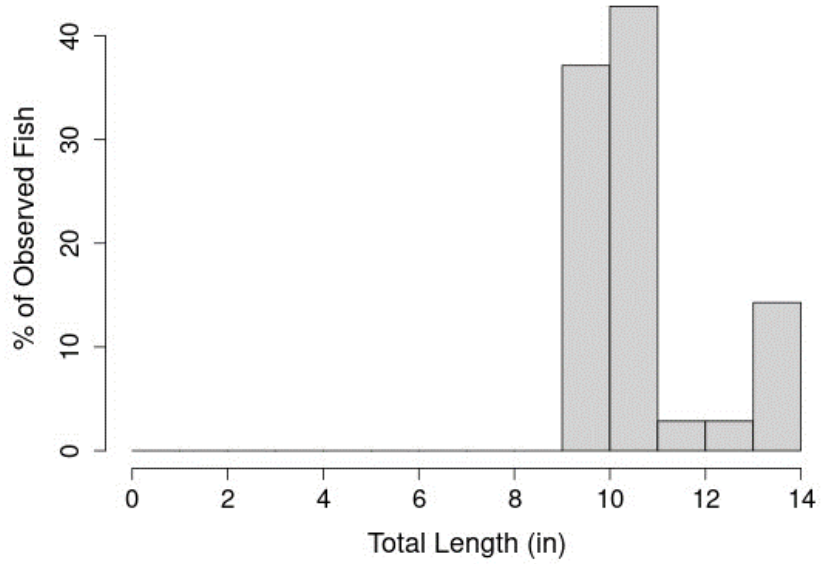

Figure 4. Length-frequency for White Crappie collected during 2023 trap nets.

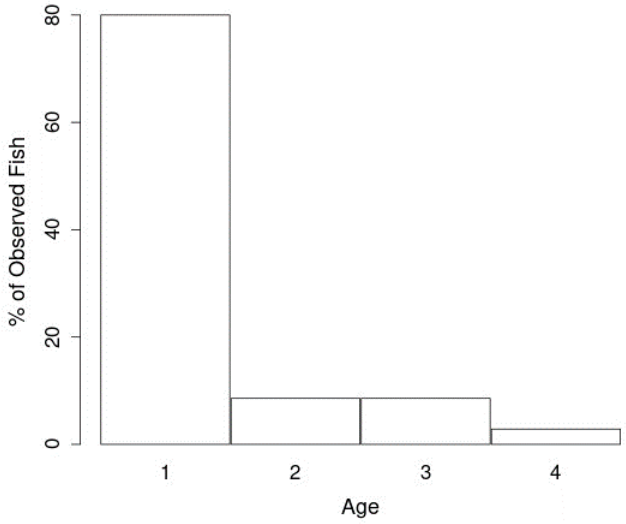

Figure 5. Age-frequency for Crappie collected from trap nets in fall 2023.

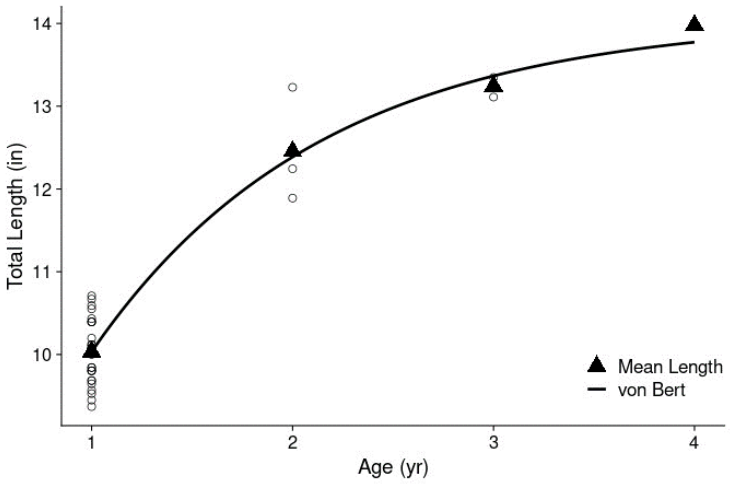

Figure 6. Von Bertalanffy growth curve and mean length-at-age for White Crappie collected from trap nets in 2023. Triangles represent mean length circles individual sample points.

Age	Mean Total Length (TL)	Count
1	10.03	28
2	12.45	3
3	13.24	3
4	13.98	1

Table 5. Ages, mean total length (TL), and count of all Crappie collected from trap nets in fall 2023 from Spavinaw Lake.

Channel Catfish

Channel Catfish were sampled from fall 2022 experimental gill nets. A total of 34 Channel Catfish and a CPUE of 2.91. Fish were observed from the stock (11.0 inches), quality (16.1 inches), and preferred (24.0 inches) PSD. The overall CPUE was low as was individual CPUEs from PSD groups. Wr values showed an adequate body condition score, with each group scoring above a 90 (Table 6). This sample of Channel Catfish had a PSD value of 97 and a PSD-P value of 19. The PSD is higher than desired with a larger amount of quality and preferred sized fish and no fish caught within the memorable or trophy sizes. It is possible the mesh size did not capture smaller fish, thus inaccurately describing the stock size of the population.

Channel Catfish in the 19-inch length bin were sampled in higher abundance than other length groups. A drop in abundance within the 22-inch length group was seen, however, the frequency of observed fish increased in the 24-inch length group. The minimum sampled 13 inches and the maximum size was 28 inches. No fish were collected across the 14-inch to 16-inch length groups (Figure 7).

		Total CPUE	Stock 11.0 in		Quality 16.1 in		Preferred 24.0 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	34	2.91	0.09	104.3	2.14	101.1	0.51	96.9

Table 6. Total number (*n*) and catch per unit effort (CPUE) of Channel Catfish sampled from fall 2022 experimental gill nets. CPUE and relative weights (Wr) for the stock, quality, and preferred proportional size distribution (PSD) groups are also shown. Acceptable values for Wr are greater than or equal to 90.

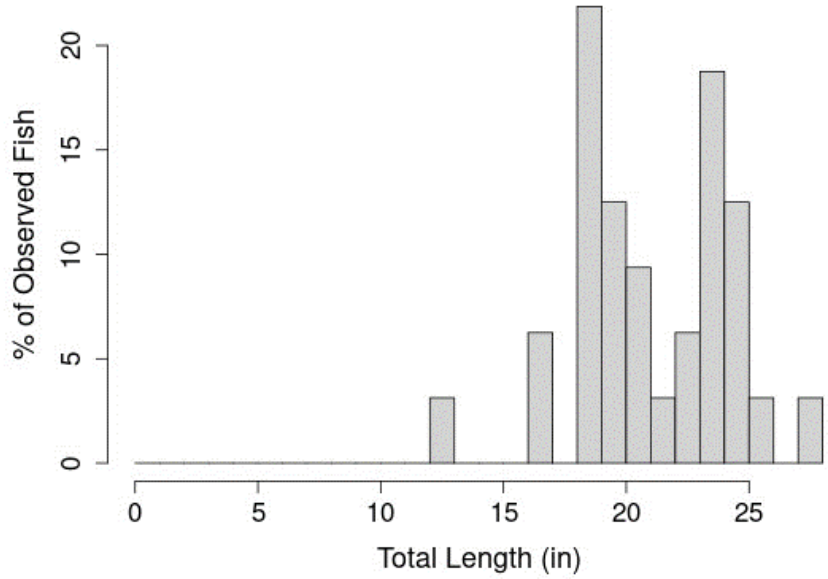

Figure 7. Length-frequency histogram for Channel Catfish from fall 2022 experimental gill net sampling.

Walleye

Walleye were sampled from experimental gill nets during fall 2022. A total of 12 were caught with a low CPUE of 1.03. Additionally, CPUE for the observed quality (15.0 inches) and preferred (20.1 inches) were calculated at 0.86 and 0.17, respectively. Additionally, Wr values were calculated to determine Walleye body condition. Both quality (Wr = 87.1) and preferred (Wr = 87.5) were lower than the acceptable value (≥90) but are relatively close to healthy conditions (Table 8).

The length-frequency histogram shows the percentage of observed Walleye by the observed lengths. The distribution was the same for lengths in the 18-inch to 20-inch length groups. Each bin individually was 24% of observed Walleye. The minimum length of Walleye observed was 17-inches and the maximum 21-inches (Figure 9). The PSD-P value was 17 and PSD Q-P value was 83. Despite an overall high PSD value (PSD = 100), only 17% of the catch was in the

preferred category and the remainder was within the quality size. Further sampling should be done to accurately describe population trends.

		Total CPUE	Quality 15.0 in		Preferred 20.1 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	12	1.03	0.86	87.14	0.17	87.45

Table 8. Total number (*n*) and catch per unit effort (CPUE) of Walleye collected during fall 2022 experimental gill nets. Relative weight values (Wr) were calculated to show body condition. Acceptable values are greater than or equal to 90.

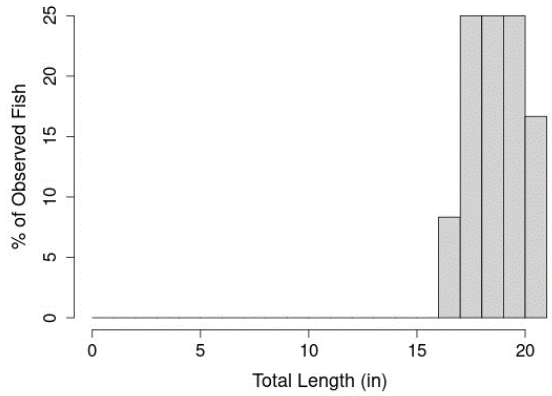

Figure 9. Length-frequency histogram for Walleye from fall 2022 experimental gill nets.

White Bass

A total of 58 White Bass were collected from fall 2022 experimental gill nets. The abundance of White Bass was moderate with a value of 4.97 CPUE (White Bass/net night) and individual CPUEs for the stock, quality, preferred, and memorable PSD size categories were calculated. The individual CPUEs were low for each size category. Stock (CPUE = 2.23) and preferred (CPUE = 1.54) groups had the highest abundance within the sample. Additionally, body condition was measured through relative weight values. The stock (Wr = 109.5), quality (Wr = 105.6), preferred (Wr = 101.9), and memorable (Wr = 94.4) were acceptable values (Table 9).

PSD values for White Bass were calculated following gill net sampling. White Bass had a PSD value of 55, PSD-P of 50, and PSD-M of 19. A length-frequency histogram shows a similar distribution for most of the observed fish, however, White Bass in the 9-inch length group was observed over 40% of the time. In addition to the 9-inch length group being most observed, it

was also the minimum size observed. The maximum size of sampled fish was 18 inches (Figure 10).

		Total CPUE	Stock 5.9 in		Quality 9.1 in		Preferred 11.8 in		Memorable 15.0 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	58	4.97	2.23	109.52	0.26	105.61	1.54	101.90	0.94	94.35

Table 9. Total number (*n*) and catch per unit effort (CPUE) of White Bass collected from fall 2022 experimental gill nets. Individual CPUE for each proportional size distribution (PSD) categories and relative weights (Wr) were also calculated. Acceptable Wr values are greater than or equal to 90.

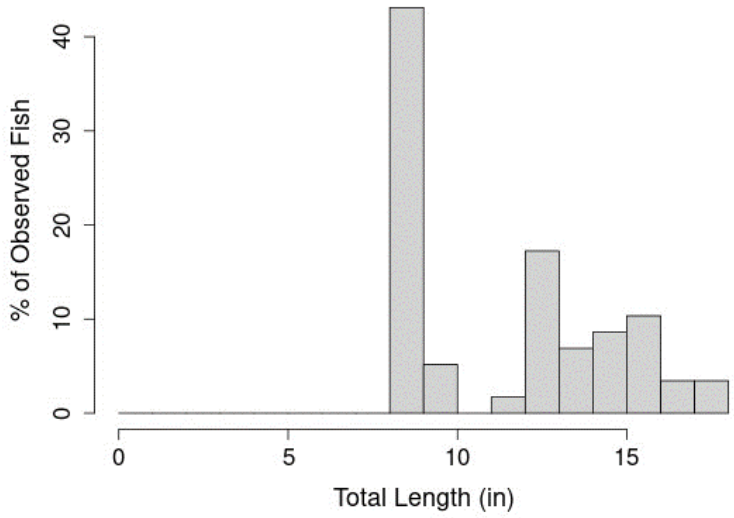

Figure 10. Length-frequency histogram for White Bass collected from gill nets in fall 2022.

Shad

A total of 44 Gizzard Shad were collected from fall 2022 experimental gill nets and had a low to moderate abundance of 3.77 CPUE. Gizzard Shad are important prey species for fishes in Lake Spavinaw, and thus are necessary to maintain healthy populations. No Threadfin Shad were sampled in 2022. Threadfin Shad will be looked for during 2024 Spring SSP electro fishing to verify presence/absence. If no Threadfin Shad are encountered during this sampling, then a supplemental stocking from Eucha Lake may be necessary.

Recommendations

1. Continue monitoring Shad populations, specifically Threadfin Shad.
2. Continue to monitor trend data of both Crappie species.
3. Look into other ways of sampling Crappie more effectively in steep banked reservoir such as Spavinaw.
4. No management changes needed at this time.