

SURVEY REPORT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION



FISH MANAGEMENT SURVEY AND RECOMMENDATIONS

FOR

Wister LAKE

2023

SURVEY REPORT

State: Oklahoma

Project Title: Wister Fish Management Survey Report

Period Covered: 2023

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Date Prepared: January 2024

Wister

ABSTRACT

Wister Reservoir Crappie have good catch rates and maintain an excellent fishery. Growth rates are high and fish are in fairly good condition. Young of year fish were present in good numbers in 2023 after being almost absent in 2017. While most crappie populations fluctuate from year to year Wister has had a strong population for several decades and recent results seem to indicate that the population is still going strong.

INTRODUCTION

Wister Lake is located approximately 2 miles south of the town of Wister in LeFlore County, southeast Oklahoma. The lake is operated by the U. S. Army Corps of Engineers (USACE), Tulsa District. Congress authorized the project with the Flood Control Act of 28 June 1938 for flood control, water supply, low flow augmentation, water conservation, and sedimentation. Construction was completed in May 1949, which impounded the Poteau River and the Fourche Maline Creek. The conservation pool was filled to 471.6 ft. asl (4,000 surface acres) by December 1949. Beginning in 1974, an experimental six foot seasonal (June to December) rise in the normal conservation pool was initiated which impounded an additional 3,300 acres. A water level manipulation plan was passed by Congress on 30 July 1983, which resulted in a permanent 3 ft. rise in the normal conservation pool to 474.6 ft. msl and an additional 3 ft. from June through December to 477.6 ft. msl. In 2002, the normal conservation pool elevation was changed to 478.0 ft. msl year-round. The reservoir contains 47,414 acre feet of water at normal elevation with 6,077 surface acres (2001, OWRB Bathymetric Survey). Elevation at the top of the flood control pool is 502.5 ft. msl with the capacity to store 62,360 acre feet of water with 7,333 surface acres (2007, OWRB Water Atlas). The watershed consists of 993 square miles within Scott County, Arkansas and LeFlore County, Oklahoma.

Wister Lake is oriented west to east, with inflow from the south and west sides of the lake. The dam is located on the far eastern side and the tailrace directs flow to the north where the Poteau River converges with the Arkansas River. The lake is shallow with an average depth of 7.4 ft. and a maximum depth of 39 ft. (2001, OWRB Bathymetric Survey). The Oklahoma Water Resources Board (OWRB) listed Wister Lake as impaired by pH, turbidity, chlorophyll-a, color, low dissolved oxygen (DO), and phosphorus in their 2008 Integrated Report. A number of land-use practices within the watershed cause excessive nutrient loading in effect fertilizing algae. An over abundance of algae will restrict light penetration that drives photosynthesis, a process that replenishes DO concentrations in the surface layer (epilimnion). Anoxic water stresses aquatic organisms and causes taste and odor issues in the

water supply. The Poteau Valley Improvement Authority (PVIA) supplies water to over 40,000 people in surrounding communities. The PVIA has implemented the use of bubble plume diffusers and floating mats of aquatic vegetation in effort to improve water quality at the water intake structures located north of Quarry Island.

The lake and surrounding landscape attracts outdoor enthusiasts of all types. Lake Wister State Park has 3,428 acres with facilities including cabins, tent sites, and RV sites at 5 different locations. Other facilities include comfort stations with showers, picnic tables, group shelters, boat ramps, playgrounds, nature center, miniature golf course, and swimming beach. A handicap accessible fishing area is available at Wister State Park – Quarry Island. The Wister wildlife management area (35,500 acres) and the Coal Creek (130 acres) and Fourche Maline (270 acres) waterfowl development units offer many hunting opportunities to the public. Primitive camping is allowed throughout the management area and two concrete boat ramps are available in the Poteau River portion.

RESULTS

Crappie

Southeast region fisheries staff collected crappie in fall 2023 using Fyke nets. Catch Per Unit Effort (CPUE), an estimate of relative abundance, for White Crappie was 17.41 (table 1). This is much higher than netting efforts in 2009 but lower than recent efforts in 2017. Most of the fish were between 240-280 mm (figure 1). Relative abundance was higher for all year classes compared to 2009 and only stock and quality size abundance was lower in 2023 compared to 2017 (table 2). Proportional Stock Density, a measure of size structure quality was higher in 2023 at 75 compared to 60 in both 2009 and 2017 (table 3). Proportional stock density for stock size fish declined compared to previous samples while PSD for preferred size fish improved greatly. The relative weight (Wr) value, a measure of body condition, was high on the scale but slightly lower compared to previous samples (table 4). All size classes experienced a decline in Wr but most values only declined a few points which is consistent with general fluctuations in the population. The only size class to experience a large decline was sub-stock fish which declined from 116.55 in 2009 to 84.47 in 2023. As these fish are quite small they tend to fluctuate more and the variability is not a concern unless there is a trend of decline over several years. Age data reveals that 95% of the sample was composed of age-1 and age-2 fish and no fish older than 4 were collected (figure 2). Mean length at age reveals excellent growth rates with fish reaching 260 mm at age-2 and 299 mm at age-3 (table 5). Mean length at age was similar between all years. Mean weight at age was also very good with White Crappie reaching 256 g and 408 g at age-2 and age-3 respectively (table 6). Von Bertalanffy estimates of L infinity were highest in 2023 at 449.31 (table 7). Mortality estimates for White Crappie in 2023 was 70.66% down from 78.91% in 2017 (table 8). While estimates of mortality are high for White Crappie the average rates are moderate for the region.

Black Crappie were also collected in the 2023 trap netting sample. Estimates of abundance were 8.39 CPUE, the highest on record (table 9). Black Crappie frequency peaked around 200 mm (figure 4). Relative abundance estimates were higher compared to previous samples for all age classes (table 10). Size structure also improved from 2009 to 2023 for Black Crappie (table 11). Relative weight was lower overall but a better representation of the Black Crappie body condition as more size categories are represented compared to 2009 when only two sizes were collected and 2017 when only sub-stock Black

Crappie were sampled (table 12). Age data from the 2023 sample reveals that over 50% of Black Crappie were age-2 (figure 4). Mean length at age improved in 2023 compared to 2017 (table 13). Estimates for length at age and weight at age are not available in 2009 due to small sample size. Mean weight at age improved at age-1 in 2023 compared to a 2017 (table 14). Data for older age classes is not available for samples prior to 2023 Black Crappie. Again owing to small sample size estimates are not available for Von Bertalanffy L infinity in 2009 and 2017; and mortality estimates are not available for 2009. Von Bertalanffy estimates for L infinity are 282.16 in 2023 and are much lower than those of White Crappie (table 15). Estimates of Mortality are 20.16% and 44.48 % in 2017 and 2023 respectively and again are much lower compared to White Crappie (table 16).

Recommendations

1. Continue to monitor the crappie population at Wister and investigate ways to increase Wr.

Table 1: White Crappie Catch Per Unit Effort (CPUE) by year.

Total CPUE	2009	2017	2023
Mean	9.13	26.7	17.41
Count	18	30	30
SE	1.82	3.53	3.43
L 95% CI	5.56	19.77	10.69
U 95% CI	12.69	33.63	24.13

Table 2: White Crappie CPUE by size class across time.

CPUE Size	2009		2017		2023	
	Mean	SE	Mean	SE	SE	Mean
Substock	2.06	1.04	0.4	0.16	4.53	2.23
Stock	2.8	0.63	10.06	1.78	3.12	0.68
Quality	2.41	0.55	10.67	1.41	4.67	1.02
Preferred	1.29	0.28	4.4	0.8	4.63	0.9
Memorable	0.45	0.15	0.63	0.31	0.47	0.17
Trophy	0.11	0.08	0	.	.	.

Table 3: White Crappie proportional Stock Density by year.

PSD	2009	2017	2023
PSD	60	60	75
PSD-P	26	19	39
PSD-M	8	2	4
PSD-T	2	.	
PSD S-Q	40	40	25
PSD Q-P	34	41	36
PSD P-M	18	17	36
PSD M-T	6	2	4

Table 4: White Crappie Relative Weight with standard errors across PSD classes by year.

Wr	2009		2017		2023	
	Mean	SE	Mean	SE	Mean	SE
Sub-stock	116.55	13.67	137.24	.	84.47	1.28
Stock	93.37	2.45	98.9	2.12	89.12	1.34
Quality	101.48	1.41	98.42	0.58	99.79	1.09
Preferred	105.59	1.56	100.23	1.27	99.52	0.84
Memorable	100.48	2.65	94.73	2.6	99.17	1.97
Trophy	93.77	1.88	.	.	.	.
Total	99.1	1.21	98.93	0.93	96.68	0.63

Table 5: White Crappie Mean length at age with standard errors.

Mean Length at Age	2009		2017		2023	
	Mean	SE	Mean	SE	Mean	SE
0	.	.	99.07	6.43	137	.
1	186.72	3.14	197.85	1.19	199.12	2.27
2	267.28	4.57	233.97	2.01	260.35	1.24
3	349	.	283.12	3.98	298.93	4.82
4	350	.	310	.	343.83	5.8
5	.	.	.	.	.	.
6	.	.	.	.	.	.
7	388.33	6.89	.	.	.	.
8	.	.	.	.	.	.
9	352	.	.	.	.	.

Table 6: White Crappie Mean weight at age with standard errors.

Mean Weight at Age	2009		2017		2023	
	Mean	SE	Mean	SE	Mean	SE
0	.	.	30.5	7.5	26	.
1	89.86	4.87	109.98	2.63	113.02	4.32
2	301.33	16.97	178.22	5.26	256.78	4.66
3	702	.	322.48	16.56	408.43	24.05
4	736	.	.	.	636.33	51.07
5	.	.	.	.	.	.
6	.	.	.	.	.	.
7	915.33	43.76	.	.	.	.
8	.	.	.	.	.	.
9	688	.	.	.	.	.

Table 7: White Crappie Von Bertalanffy metrics.

Von Bert	2009	2017	2023
L inf	298.57	449.31	387.36
K	0.57	0.28	0.52
t0	-0.86	-1.13	-0.25

Table 8: White Crappie mortality estimates.

Mortality Table	2009	2017	2023
Instantaneous	0.65	1.56	1.23
Annualized	47.98	78.91	70.66

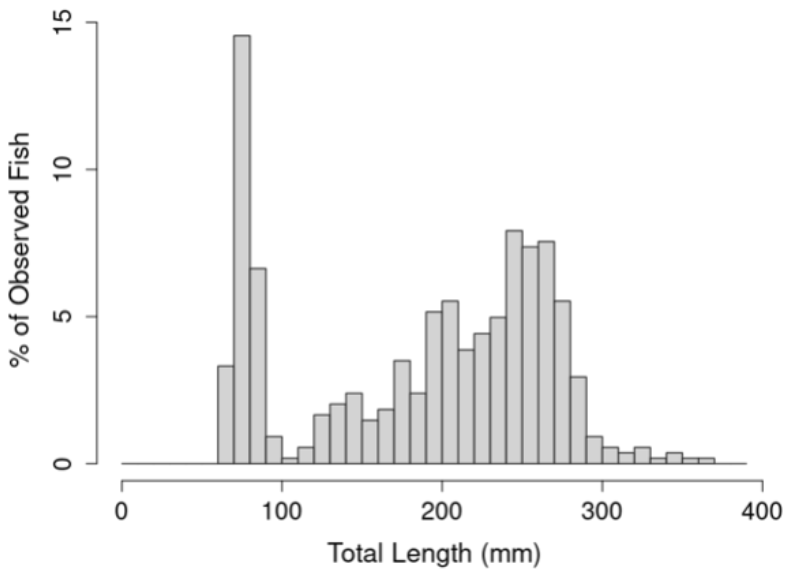


Figure 1: White Crappie 2023 age frequency histogram.

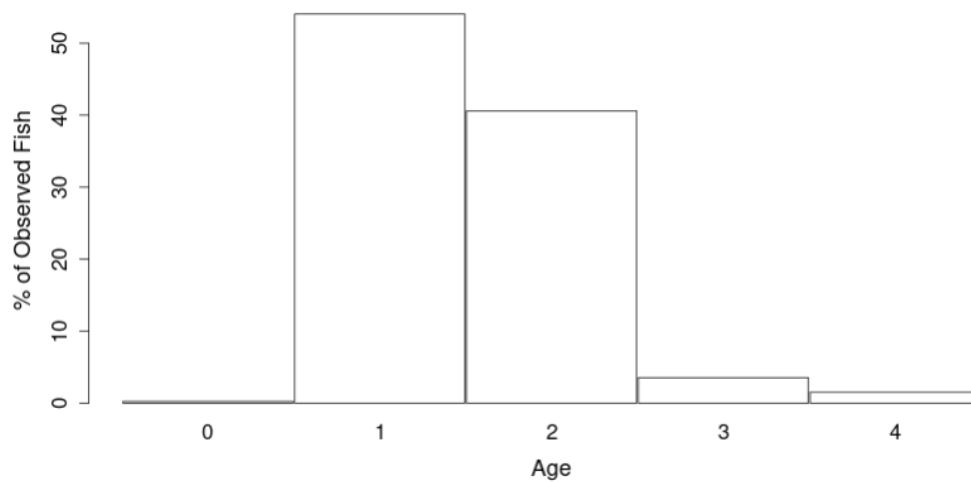


Figure 2: White Crappie 2023 length frequency histogram.

Table 9: Black Crappie Catch Per Unit Effort (CPUE) by year.

Total CPUE	2009	2017	2023
Mean	2.75	2.5	8.39
Count	3	30	30
SE	0.71	0.89	2.9
L 95% CI	1.36	0.76	2.7
U 95% CI	4.15	4.24	10.69

Table 10: Black Crappie CPUE by size class across time.

CPUE Size	2009		2017		2023	
	Mean	SE	Mean	SE	SE	Mean
Substock	0	.	1.4	1.16	1.11	0.4
Stock	2.41	0.93	0.67	0.48	2.75	0.92
Quality	0.35	0.35	0.4	0.29	2.29	0.92
Preferred	0	.	0.03	0.07	2.01	1.07
Memorable	0	.	0	.	0.22	0.12
Trophy	0	.	0	.	.	.

Table 11: Black Crappie proportional Stock Density by year.

PSD	2009	2017	2023
PSD	12	39	61
PSD-P	.	3	30
PSD-M	.	.	3
PSD-T	.	.	.
PSD S-Q	88	61	39
PSD Q-P	12	36	31
PSD P-M	.	3	27
PSD M-T	.	.	3

Table 12: Black Crappie Relative Weight with standard errors across PSD classes by year.

Wr	2009		2017		2023	
	Mean	SE	Mean	SE	Mean	SE
Sub-stock	.	.	115.6	8.44	85.67	1.86
Stock	91.4	4.8	.	.	82.23	1.32
Quality	98.6	.	.	.	89.62	1.22
Preferred	.	.	.	.	89.8	1.45
Memorable	.	.	.	.	88.04	3.41
Trophy	.	.	.	.	.	.
Total	92.3	4.25	115.6	8.44	86.73	0.76

Table 13: Black Crappie Mean length at age with standard errors.

Mean Length at Age	2009		2017		2023	
	Mean	SE	Mean	SE	Mean	SE
0	.	.	106.19	2.14	.	.
1	.	.	127.57	6.76	155.2	3.73
2	.	.	197.92	4.78	219.03	3.33
3	237.64	9.35
4	267.55	5.12
5

Table 14: Black Crappie Mean weight at age with standard errors.

Mean Weight at Age	2009		2017		2023	
	Mean	SE	Mean	SE	Mean	SE
0	.	.	18.19	1.74	.	.
1	.	.	19	.	47.44	4.39
2	156.46	7.79
3	199.64	25.07
4	310.2	20.61
5

Table 15: Black Crappie Von Bertalanffy metrics.

Von Bert	2009	2017	2023
L inf	.	.	282.16
K	.	.	0.68
t0	.	.	-0.17

Table 16: Black Crappie mortality estimates.

Mortality Table	2009	2017	2023
Instantaneous	.	0.23	0.59
Annualized	.	20.16	44.48

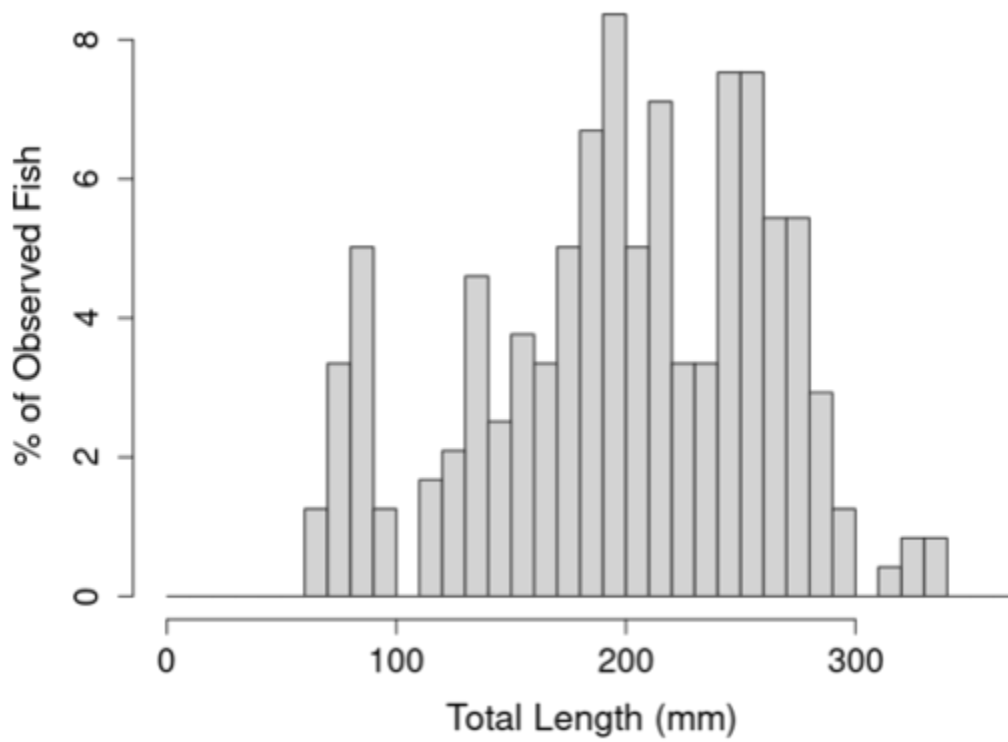


Figure 3: Black Crappie 2023 age frequency histogram.

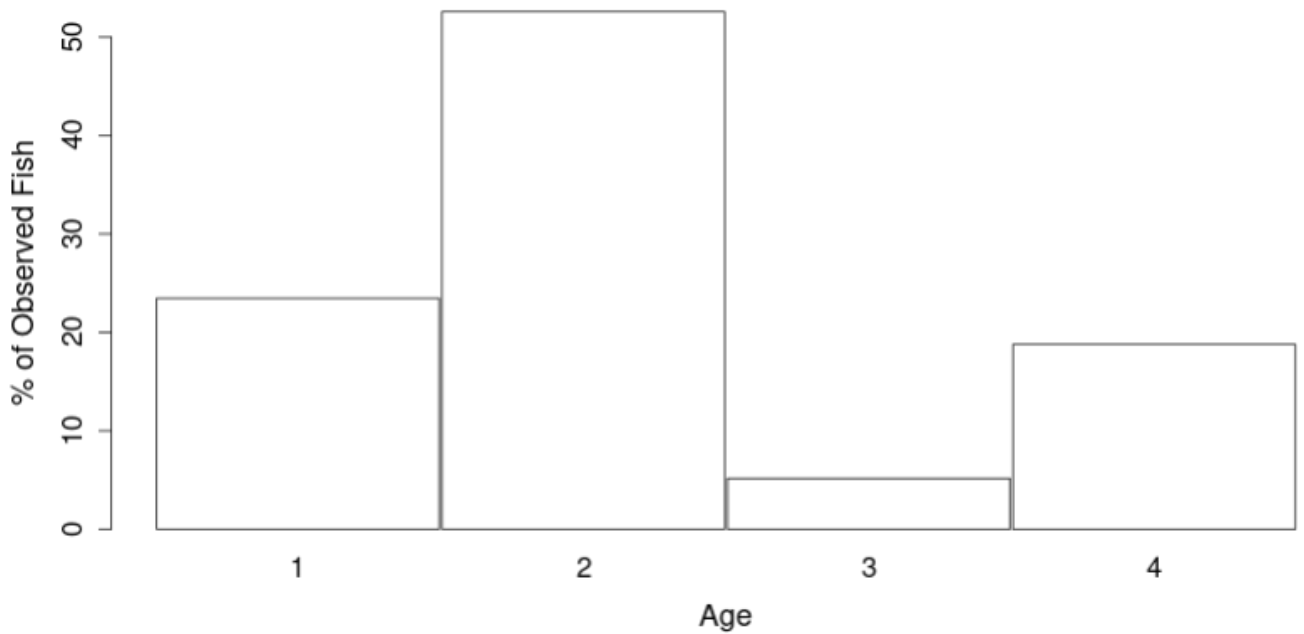


Figure 4: Black Crappie 2023 length frequency histogram.