SURVEY REPORT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

FISH MANAGEMENT SURVEY AND RECOMMENDATIONS

FOR

GRAND LAKE

2023

SURVEY REPORT

State: Oklahoma

Project Title: Grand Lake Fish Management Survey Report

Period Covered: 2022 and 2023

Prepared by: Grace Carter

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Grand Lake

ABSTRACT

Grand Lake was sampled in 2022 by fall trap netting. In 2023, Grand Lake was sampled by spring electrofishing, trap netting, and gill netting to monitor trends in fish populations. Crappie abundance was high during 2022 fall trap netting and moderate during 2023 gill netting. Other fishes were sampled using 2023 gill netting. Other species sampled (including White Bass, Hybrids, Channel Catfish, Blue Catfish, and Spotted Bass) had low abundance. Sampling should continue to monitor trends in sport fishes and ensure management decisions are benefitting the population. Spring electrofishing will be conducted in 2024 to monitor bass populations, as well as gill and trap netting to monitor White Bass and Crappie.

INTRODUCTION

Grand Lake O' the Cherokees (Grand Lake) is located in Delaware, Ottawa, Mayes, and Craig counties. Grand Lake was created in 1940 when the Pensacola Dam was finished, located between Disney and Langley in Mayes County, OK. Grand Lake impounds the Neosho and Spring Rivers, as well as the Elk River. Some other notable tributaries include Honey, Horse, Duck, and Drowning Creeks. The surface area of the lake is 45,056 acres with 1,300 miles of shoreline and a shoreline development index of 1.74. The watershed includes 10,000 square miles of runoff which flows across Arkansas, Kansas, Missouri, and Oklahoma. Grand Lake is unique with its eastern side being in the Ozark Highlands ecoregion, and the west side being in the Tallgrass Prairie ecoregion. It is currently administered by the Grand River Dam Authority (GRDA) and are responsible for producing hydroelectric power, providing water supply, and flood control. GRDA is an Oklahoma state agency operating under authorization granted in their 1992 license issued by the Federal Energy Regulatory Commission (FERC) and will continue through 2025. Flood control is monitored by the United State Corps of Engineers (USACE).

Grand Lake has a mean depth of 36 ft. and a maximum depth of 133 ft. Secchi disc visibility in 2022 and 2023 had an average of 65 inches. Water exchange rate within Grand Lake has a value of 3.2. Substrate is made up of rock and gravel along the shoreline and additional habitat includes rip-rap, brush piles, and boat docks. Additional substrate within the lake is comprised of limestone, sandstone, chert, and shale. A lack of habitat exists within the lake where vegetation and timber are limited, however, additional PVC structures (Georgia cubes and Shelbyville

cubes) and Mossback habitat were placed in Grand Lake in 2022 and 2023 to make up for this deficit. Structures will continue to be added to supplement the lack of habitat.

The lake supports a renowned black bass fishery composed of Largemouth Bass (LMB) and Spotted Bass. Bass fishing is an important economic aspect of the Grand Lake area and bass anglers. Efforts to provide trophy sized black bass has long been a focus for ODWC. Florida Largemouth Bass (FLMB) have historically been stocked in various Oklahoma reservoirs (including Grand Lake) since 1973. However, in the 1990's, it was determined that the survival of FLMB fingerlings in Grand Lake was too low to continue stocking. In 2020, 950 excess FLMB grow outs (one year olds) from the ODWC Durant Fish Hatchery were stocked in the Horse Creek arm of Grand Lake. Again in 2021, 1,300 FLMB grow outs were stocked in the Horse Creek arm of Grand Lake. In 2022 the ODWC started transitioning from stocking pure FLMB grow outs to a 10-year project stocking F1 FLMB fingerlings. This transition consisted of 93,000 F1 FLMB fingerlings from the American Sportfish Hatchery being stocked in the Duck, Horse, and Honey Creek areas, as well as 1,236 FLMB grow outs being stocked in the Horse Creek area. F1 FLMB stockings continued in 2023 with 93,000 fingerlings divided between Duck, Horse, and Honey Creeks. Additionally, 125,910 hybrid striped bass were stocked in the summer of 2022 from Holdenville State Fish Hatchery. Grand Lake's threadfin shad population is monitored by a presence/absence approach with electro fishing gear during the spring to ensure the preferred forage species for sport fish is available in the lake. In the event that threadfin shad are not encountered during these electro fishing samples, threadfin shad would be obtained from Tenkiller or Eucha Lakes for supplemental stockings. In 2022 and 2023, threadfin shad were observed, and no supplemental stocking was deemed necessary. In May 2023, 700,000 Hybrid Striped Bass fry were stocked at Twin Bridges.

Grand Lake is also an important fishery for Black Crappie, White Crappie, Paddlefish, Blue Catfish, Channel Catfish, Flathead Catfish, and White Bass. The primary forage species include threadfin and gizzard shad. Grand Lake has a special regulation which includes a 15 combined per day and 10-inch minimum for all Crappie. Bowfishing is prohibited below the turbine outlets downstream to State Park and below spillway outlet downstream to the highline crossing. Gigs, spears, and spearguns are prohibited below turbine outlets downstream to State Park bridge and below spillway outlets downstream for one mile. Additionally, noodling is prohibited below the turbine outlets downstream to State Park bridge and below the spillway outlets downstream to highline crossing. However, noodling is legal the day of and two days following the closure of the spillway.

Fall trap net sampling was conducted in 2022. Spring electrofishing was attempted, however, due to inclement weather sampling was unable to be completed. Spring electrofishing, fall trap nets, and gillnets were used in 2023. An angler creel survey is planned for Grand Lake in 2024.

RESULTS

Several fish species were found during fall 2023 experimental gill net sampling. These species include Black Crappie, Blue Catfish, Bluegill Sunfish, Channel Catfish, Flathead Catfish, freshwater Drum, Gizzard Shad, Threadfin Shad, Largemouth Bass, Longear Sunfish, Redear Sunfish, River Carpsucker, Spotted Bass, Striped Bass Hybrid, White Bass, and White Crappie. Additionally, Crappie were found in trap nets in 2022 and 2023. 2022 fall trap nets were set at an average 65° F and at 67.5° F in 2023. Temperatures for 2023 fall gill nets were set at a

minimum of 70° F and a maximum of 74° F with an average of 72.9° F. Gill nets were set perpendicular to shoreline and randomly selected throughout Grand Lake. Five stations were sampled in the upper, middle, and lower region for a total of fifteen stations. Fall trap nets were set in fall 2022 and 2023 to estimate the age structure, growth rates, and population of Crappie. Trap nets are fixed stations and used to compare from previous years.

Crappie

Black Crappie (*Pomoxis nigromaculatus*) and White Crappie (*Pomoxis annularis*) were sampled via fall trap netting in 2022 and 2023. Fixed stations were used to observe age structures, growth rates, and population structure for White Crappie. Trap nets with 13 mm #105-L knotless nylon and 76 cm diameter hoops were placed perpendicular to the shoreline at set stations. 30 net nights were set for both years. Additionally, experimental gill nets were set in fall 2023. Nets have the dimensions of 24 m long x 1.8 m deep. Each net has eight panels ranging in bar mesh and twine size (Appendix 1). Stations were randomly selected with five selected within the lower, middle, and upper sections of Grand Lake for a total of 15 sites.

Fall 2022 trap net sampling showed that stock, quality, preferred, and memorable size categories had relative weight (Wr) values greater than 90 for White Crappie, showing body conditions were healthy for those class sizes (Table 1). White Crappie had a sample size of 466 and had a high abundance with a total CPUE of 38.8. White Crappie were moderately abundant within the quality size category (CPUE = 22.3; Figure 1) while stock (CPUE = 7.6), preferred (CPUE = 6.7), memorable (CPUE = 6.7), and trophy (CPUE = 0.1) had poor abundancy. Black Crappie were sampled less than White Crappie with 11 observed and had low CPUEs in the stock (CPUE = 0.42), quality (CPUE = 0.3), and preferred (CPUE = 0.17) size categories. No Black Crappie were caught in the substock, memorable, or trophy size categories. Relative weights for Black Crappie were above or equal to 90 in all observed size groups.

Abundance of White Crappie was also examined during 2023 gill net sampling. Fifteen gill nets were randomly selected with five in each region – upper, middle, and lower. The CPUE for White Crappie was moderate at 7.9 fish per gill night. CPUE for quality and preferred size categories were 2.5 and 4.5, respectively (Table 1). Additionally, the body condition scores showed acceptable weights in the quality, preferred, and memorable PSD categories. The trophy PSD had a lower than accepted relative weight value (Table 1).

Length-frequency histograms for trap netting in fall 2022 sampling shows 40% of sampled fish at 9 in (Figure 1). Around 25% of Crappie were 8 inches or less. Approximately 35% of sampled fish were larger than 10 inches, which is the current size restricted minimum for Crappie harvest on Grand Lake. The minimum size of Crappie sampled were 7 inches and the maximum 15 inches. This sample has a PSD value of 80 and PSD Q-P of 58.

Fall trap nets were used to sample Grand Lake in fall 2023. Crappie of 11 inches were observed in over 40% of the sample. The remaining sample had a relatively even distribution and is slightly skewed left. The minimum size sampled was within the 3-inch length bin and the maximum size was in the 14-inch length bin. The 2023 sample had a PSD value of 88 compared to the PSD value of 80 in 2022. Additionally, the 2023 sample had a wider spread of total lengths observed, however, less fish were captured that year.

Length-frequency histograms for 2023 gill nets showed a minimum length of 9 inches and a maximum length of 16 inches. Approximately 40% of collected fish were 11 inches or more

(Figure 2). The proportional size distribution (PSD) from these data were 100, where quality size is 7.9 inches. The PSD-P was 69%, where preferred is 9.8 inches.

Age data were collected from White Crappie using otoliths from trap netting in 2022 and 2023. In 2022, approximately 70% of collected fish were at age 1 while 10% were at age 2, and 20% at age 3. Mean total lengths age 1, 2, 3, and 7 were 8.3 in, 8.8 in, 10.84 in, and 15.0 in respectively (Figure 4; Table 3). Additionally, the von Bertalanffy growth curve gives an estimate of age versus total length of Crappie (Figure 3). In 2022, the growth curve begins to approach the asymptote, however, limited data for age 7 Crappie limited an accurate approximation of maximum size.

Ages 0 through 4 were observed from fall 2023 trap nets. The prior year did not have year 0 or year 4 observed. For age-1, age-2, age-3 the mean TL for 2023 was slightly larger than the year prior (Table 3). The age observed the most in fall 2023 was age 2 and had a mean TL of 9.0 inches. When looking at the year prior, age-1 was the most abundant and follows a similar age-frequency to 2023 (Figure 5). 2023 also had an asymptote value of 12.2 inches (Figure 6).

		Total CPUE	**Substock 0 – 5.0 in**		**Stock 5.1 in**		**Quality 7.9 in**		**Preferred 9.8 in**		**Memorable 11.8 in**		**Trophy 15 in**	
Trap	***n***	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	466	38.8	-	-	7.6	96.6	22.3	101.2	6.7	95.7	2.2	97.0	0.1	59.0
2023	300	17.8	0.1	120.7	2.6	108.7	3.0	102.7	11.2	98.4	0.8	92.6	-	-
Gill														
2023	102	7.93	-	-	-	-	2.5	107.6	4.5	106.4	0.9	92.8	0.1	82.1

Table 1. Total number (*n*) of White Crappie, catch per unit effort (CPUE; catch/night), and relative weights (Wr) by size categories from fall trap netting and gill netting on Grand Lake. Acceptable Wr values are ≥90.

		Total CPUE	**Stock 5.1 in**		**Quality 7.9 in**		**Preferred 9.8 in**	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2022	11	0.9	0.4	101.5	0.3	103.2	0.2	100.1
2023	2	0.1	-	-	-	-	0.1	92.4

Table 2. Total number (*n*) of Black Crappie, catch per unit effort (CPUE; catch/night), and relative weights (Wr) by size categories from fall trap netting on Grand Lake. Acceptable Wr values are ≥90.

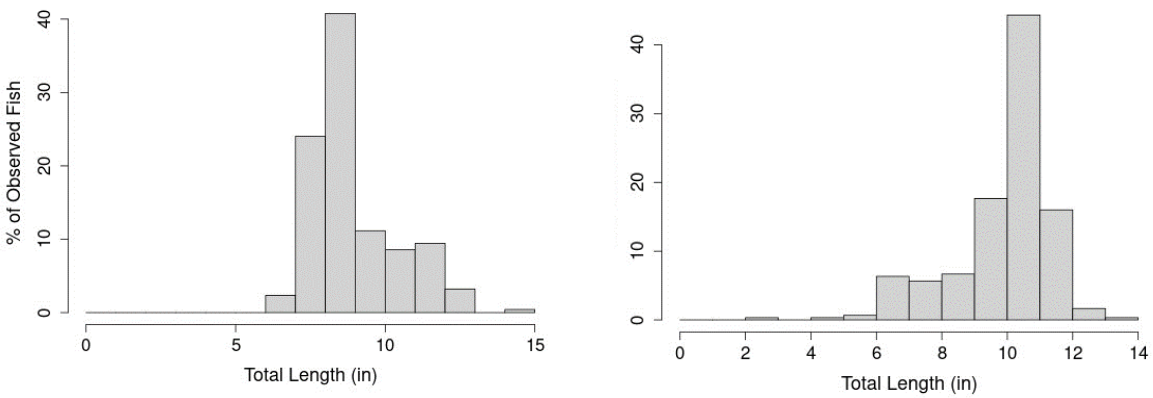

Figure 1. A length-frequency histogram for the 2022 versus 2023 fall Crappie trap netting data.

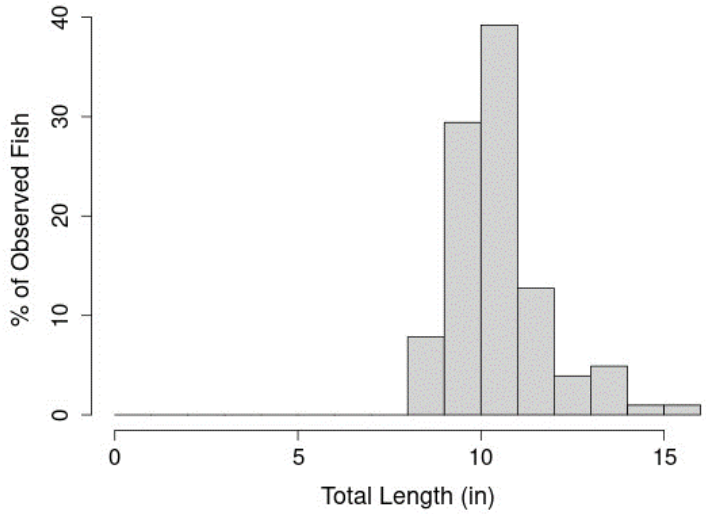

Figure 2. A length-frequency histogram for 2023 White Crappie fall gill netting data.

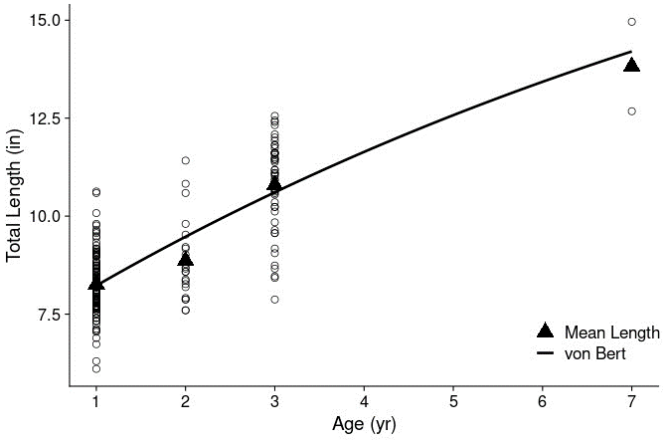

Figure 3. 2022 Crappie data showing the observed age versus total length. Mean lengths are denoted by a triangle and the von Bertalanffy line estimates the growth rate of White Crappie.

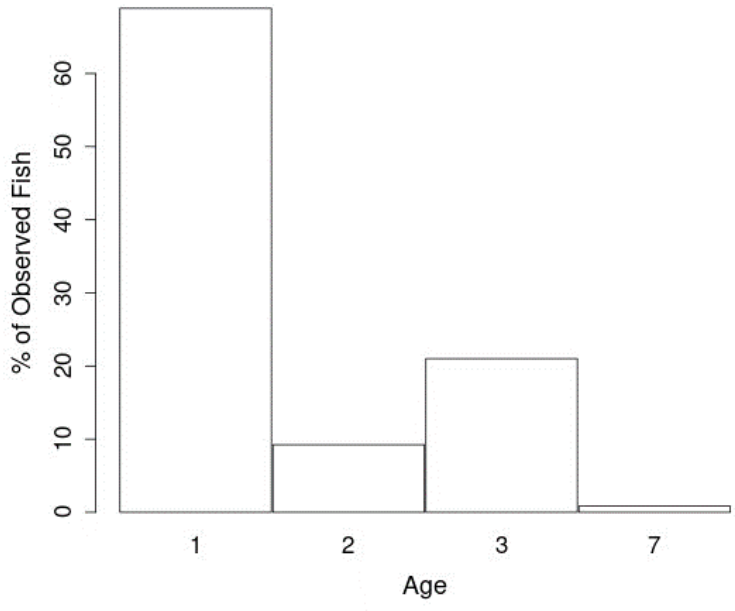

Figure 4. Age-frequency histogram of Crappie collected from trap nets in fall 2022.

	Age 0	**Age 1**	**Age 2**	**Age 3**	**Age 4**
2022	-	8.2 in.	9.0 in.	10.9 in.	-
2023	6.7 in	9.0 in	10.5 in	11.1 in	11.6 in

Table 3. Table showing White Crappie mean total lengths (inches) at each observed age in 2022 and 2023 from trap nets.

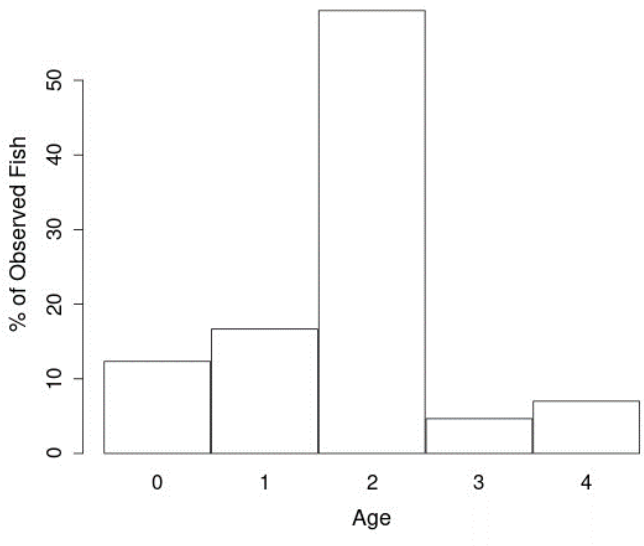

Figure 5. Age-frequency histogram for White Crappie collected from fall trap nets in 2023.

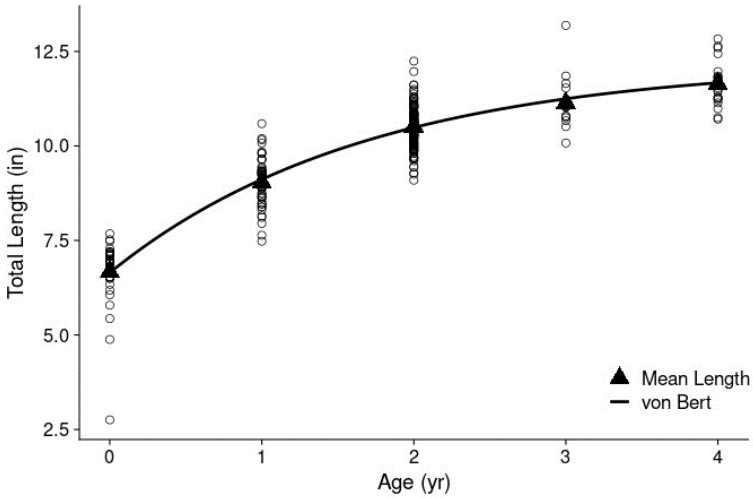

Figure 6. Mean length-at-age and von Bertalanffy growth curve for White Crappie collected from fall 2023 trap net sampling. Triangles denote the mean length of each age and circles are individual's length.

White Bass

White Bass were sampled in 2023 using experimental gill nets. Five nets in the upper, middle, and lower region of Grand Lake were sampled for a total of 15 stations. White Bass abundance was low at 2.7 catch per unit effort (CPUE; White Bass per net night). Stock, quality, preferred, and memorable CPUEs were low at 0.23, 0.39, 1.55, and 0.54. Body conditions in all size classes were acceptable with relative weight values at 90 or above (Table 4).

Length-frequency histograms from Grand Lake gill net sampling shows a minimum size of 9 inches with 10% of the catch and a maximum of 17 inches making up 2.5% of the catch (Figure 7). The largest portion of observed fish was 13-inch fish at 30% within the quality PSD. This

sample had a PSD value of 91, where White Bass above 9.1 inches were quality or above. Only 9% of White Bass were stock size. No fish under 8 inches were caught.

Otoliths for White Bass were collected for age data during fall 2023 gill net sampling. Over 50% of the sample is in age-2 where the mean TL was 12.47 inches. Growth was quick for age-1 (TL = 8.86) and age-2 (TL = 12.47) (Table 5). Growth slowed following age-3 where the mean TL was 14.53. The majority of White Bass collected in 2023 were age 2 (Figure 8). No fish were collected from the age-5 group. The L-inf value for this sample was 15.7 with a growth coefficient (K) of 0.799 (Figure 9).

		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**
2023	35	2.7	0.23	103.5	0.39	94.5	1.55	100.8	0.54	96.7

Table 4. White Bass collected during 2023 gill net sampling with the sampled number, total CPUE, proportional size distribution's CPUEs and the relative weight (Wr). Acceptable Wr values are ≥90.

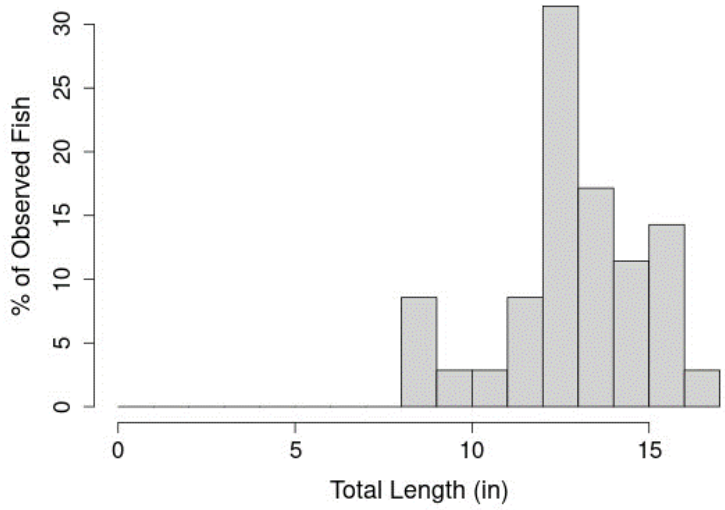

Figure 7. Length-frequency histogram for White Bass collected from 2023 fall gill nets.

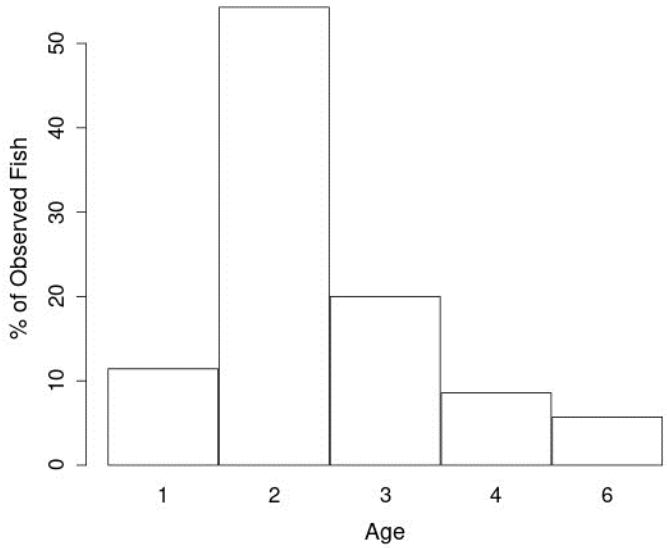

Figure 8. Age-frequency histogram for White Bass collected from fall 2023 gill nets.

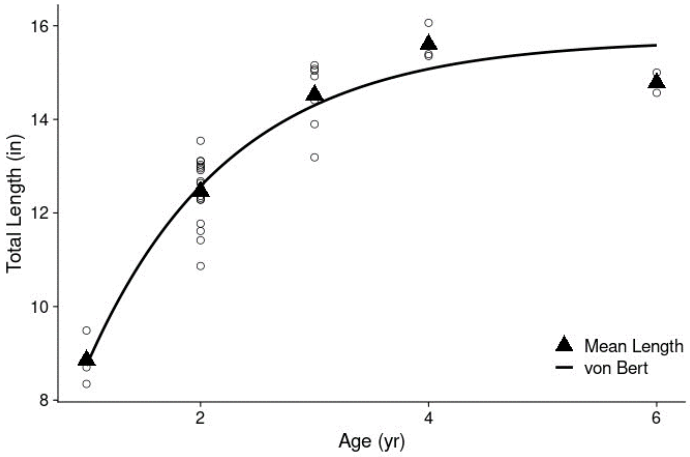

Figure 9. Mean length-at-age and von Bertalanffy growth plot for White Bass in fall 2023. Triangles denote mean length for each age and circles for individual sample points.

Age	Mean Total Length (TL)	Count
1	8.86	4
2	12.47	19
3	14.53	7
4	15.60	3
6	14.78	2

Table 5. The ages collected, mean total length in inches (TL), and count of White Bass collected in fall 2023 from gill nets.

Striped Bass Hybrid

Striped Bass Hybrids (Hybrids) were sampled in fall 2023 experimental gill nets. A total of 18 were caught over 15 net nights. The CPUE for this sample was low at 1.38 Hybrids per net night. Additionally, all CPUEs for fish captured in stock (CPUE = 0.92), quality (CPUE = 0.08), preferred (CPUE = 0.30), and memorable (CPUE = 0.08) were low. Relative weights were acceptable for fish in the stock, quality, and memorable PSD. Hybrids in the preferred group had a poor body condition value (Wr = 81.7; Table 6).

Length-frequency histograms show length groups from 16 to 19 inches were missing from this sample (Figure 11). A minimum size of 12 inches and a maximum of 25 inches was sampled in 2023. The PSD value was 33 where quality size was 16.1 inches. Most fish sampled were 13 inches, making up 28% of the sample. More than half of the sample was 12 to 15 inches in size. No fish were observed within the 16-inch length group to 19-inch length group.

Otoliths were collected from Hybrids during fall 2023 gill net sampling. Hybrids were collected from ages 1 to 4. Over 40% of Hybrids sampled were age-4, 35% were age-2 and age-1 and age-3 individually made 10% of the sample (Figure 12). Growth was slow from age-1 through age-3. Age-1 had a mean TL of 12.30, 13.04 at age-2, and 12.68 in at age-3. There were only 2 individuals sampled for age 3, so the mean TL could have been lower than expected due to the small sample size. Age-4 had a sudden increase in mean TL at 19.82 inches (Figure 13; Table 8).

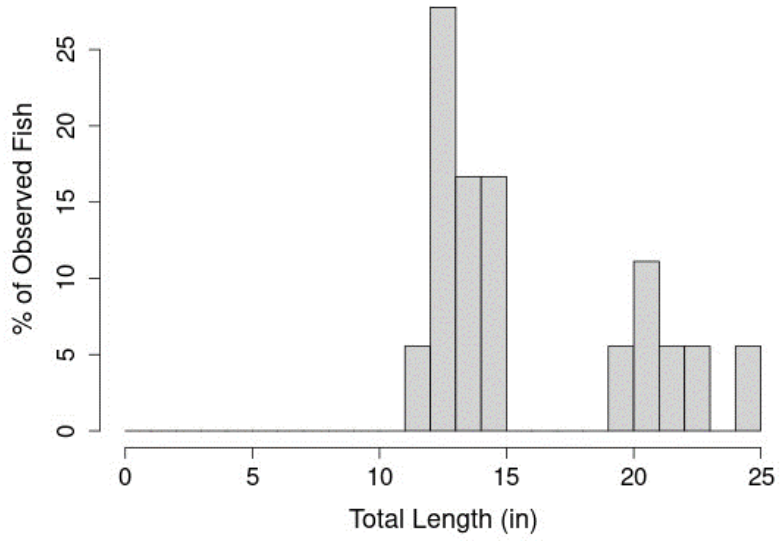

Figure 11. Length-frequency histogram for Striped Bass Hybrids sampled from 2023 fall gill nets.

		Total CPUE	Stock 9.8 in		Quality 16.1 in		Preferred 20.1 in		Memorable 24.0 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2023	18	1.38	0.92	95.15	0.08	99.9	0.30	81.71	0.08	105.04

Table 6. Total number of Striped Bass Hybrid (*n*) and total catch per unit effort (CPUE; Striped Bass x White Bass Hybrid per net night) shown for 2023 fall gill nets. CPUE and relative weight (Wr) are also shown and separated by proportional size distribution. Acceptable Wr values are ≥90.

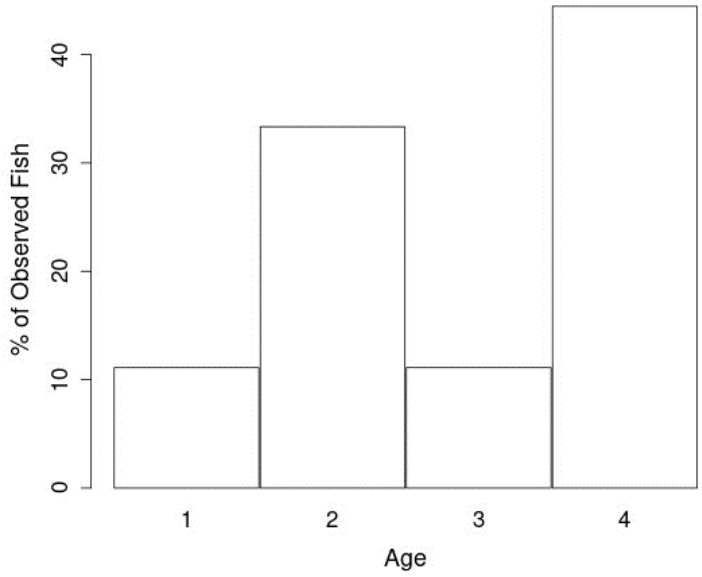

Figure 12. Age-frequency histogram for Hybrids collected during 2023 gill net sampling.

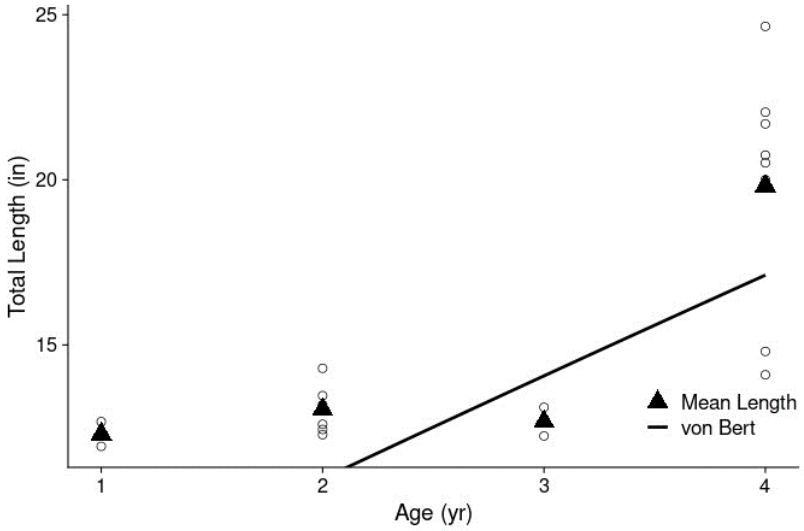

Figure 13. Mean length-at-age and von Bertalanffy growth plot for Hybrid Bass sampled from fall 2023 gill nets. Triangles denote mean length for each age group and circles are individual lengths.

Age	Mean Total Length (TL)	Count
1	12.30	2
2	13.04	6
3	12.68	2
4	19.82	8

Table 8. Table with the ages collected, mean total lengths in inches (TL), and the count of Hybrids collected in fall 2023.

Spotted Bass

Spring electrofishing was conducted in 2023. A total of 55 Spotted Bass were collected with a moderate abundance of 13.75 CPUE (Table 9). Additionally, abundance was measured through CPUE within each PSD group. The individual CPUEs were low to moderate for the individual PSDs. Spotted Bass were found within the substock (CPUE = 0.50), stock (CPUE = 2.75), quality (CPUE = 5.25), and preferred (CPUE = 5.25). Relative weights were calculated with a high body condition scored for each PSD group.

Spotted Bass were sampled during the fall 2023 experimental gill net sampling. A total of 37 were sampled over 15 net nights. The total CPUE was low at 2.8 Spotted Bass per net night. CPUE were low for all PSD groups sampled including substock (CPUE = 0.08), stock (CPUE = 1.30), quality (CPUE = 0.62), preferred (CPUE = 0.54), and memorable (CPUE = 0.30) (Table 9). Relative weights were acceptable for all PSD groups except for memorable where Wr = 61.8 (Table 10).

Length-frequency histogram for spring electrofishing showed data skewed left (Figure 14). The length group most observed was 15 inches making approximately 25% of the total catch. The least abundant was the 11-inch length group (Figure 14). The maximum size caught was 17

inches and the minimum was 7 inches. The PSD for this sample was 79 where quality size is 11.0 inches. Additionally, the PSD-P was 40 with preferred size for Spotted Bass at 13.8 inches.

Length-frequency histograms from 2023 experimental gill net data showed a large length class at 11 inches making up 35% of observed catch (Figure 15). Besides the 11-inch length group, other observed length groups had a similar distribution. The minimum length caught from gill nets were 7 inches and the maximum 20 inches. The PSD value was 53 where quality size is 11 inches. Of the captured fish, 47% of Spotted Bass were stock or quality size.

		Total CPUE	**Substock 0-7.0 in**		**Stock 7.1 in**		**Quality 11.0 in**		**Preferred 13.8 in**	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2023	55	13.75	0.50	126.6	2.75	109.5	5.25	104.0	5.25	99.8

Table 9. Total number of Spotted Bass (*n*) and total catch per unit effort (CPUE; Spotted Bass per night) for 2023 spring electrofishing. CPUE and relative weights (Wr) are also shown by proportional size distributions. Acceptable Wr values are ≥90.

		Total CPUE	**Substock 0 – 7.1 in**		**Stock 7.1 in**		**Quality 11.0 in**		**Preferred 13.8 in**		**Memorable 16.9 in**	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2023	37	2.8	0.08	99.1	1.30	106.7	0.62	95.8	0.54	104.3	0.30	61.8

Table 10. Total number of Spotted Bass (*n*) and total catch per unit effort (CPUE; Spotted Bass per net night) for 2023 fall gill nets. CPUE and relative weights (Wr) are also shown by proportional size distributions. Acceptable Wr values are ≥90.

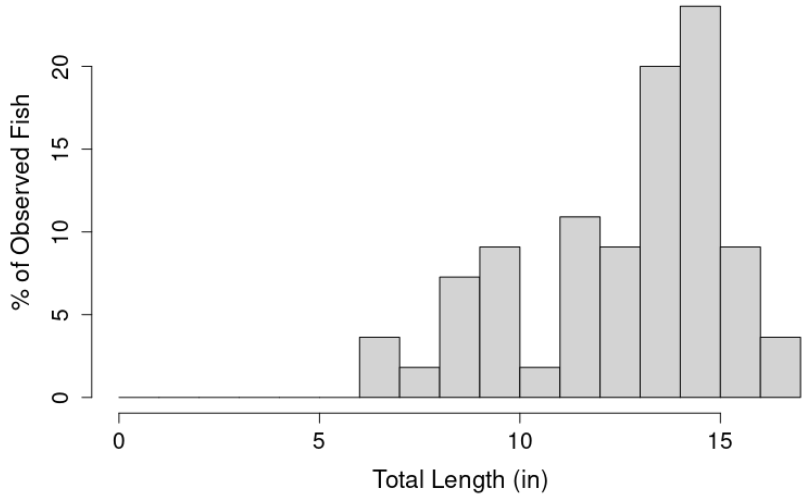

Figure 14. Length-frequency histogram for Spotted Bass collected from 2023 spring electrofishing on Grand Lake. Total length is shown in inches.

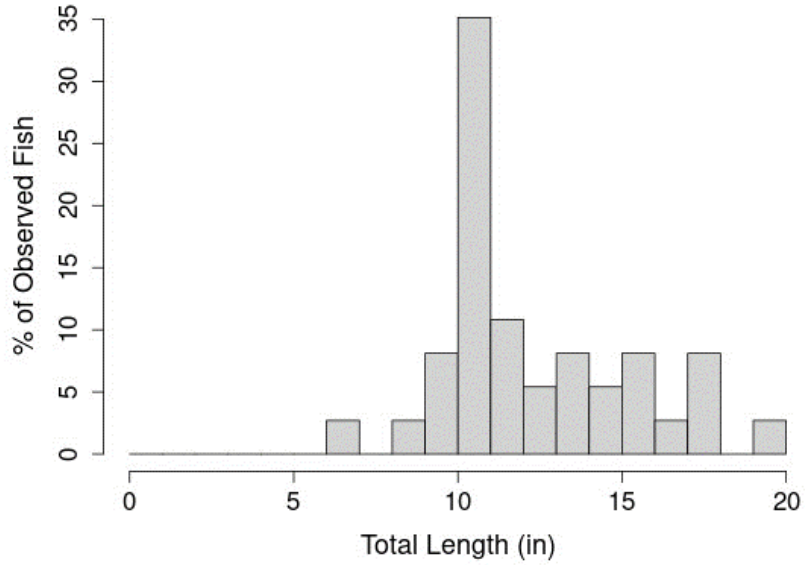

Figure 15. Length-frequency histogram showing percent of observed fish grouped by their total length (in) for Spotted Bass sampled during 2023 experimental gill net sampling.

Largemouth Bass

Spring electrofishing for black bass was conducted on Grand Lake in 2023. A total of 625 Largemouth Bass (LMB) were sampled and had a high total abundance of 156.25 CPUE. Individual abundances within each PSD group were calculated. The abundances in the substock (CPUE = 33.8), stock (CPUE = 46.5), quality (CPUE = 38.3), and preferred (CPUE = 36.8) were high while memorable (CPUE = 1.0) had a low abundance (Table 11). Additionally, relative weights were calculated to determine the body conditions of sampled LMB. All sampled PSD groups had above the acceptable Wr value (≥90).

LMB were sampled from the 4-inch length group to the 23-inch length group. The most abundant size of LMB were 8 inches and was approximately 12% of the sample. There was a wide spread of sizes throughout this sample. The least abundant as well as the largest fish sampled were within the 23-inch length group (Figure 16). The PSD value for this sample was 62, where quality size LMB are 11.8 inches. Additionally, 31% of the sample were preferred or larger LMB and 1% memorable.

		Total CPUE	Substock 0 – 7.8 in		Stock 7.9 in		Quality 11.8 in		Preferred 15.0 in		Memorable 20.1 in	
	n	CPUE	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr
2023	625	156.25	33.8	102.7	46.5	101.8	38.3	105.2	36.8	104.8	1.0	108.2

Table 11. Total number (*n*) and catch per unit effort (CPUE) of Largemouth Bass sampled during spring electrofishing in 2023. Individual CPUEs and relative weights (Wr) for each PSD group is also shown. Acceptable Wr values are ≥90.

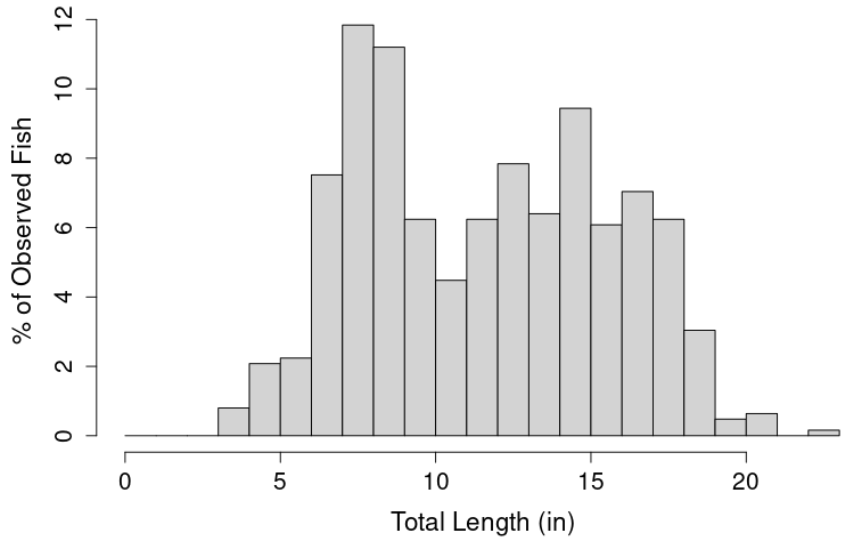

Figure 16. Length-frequency histogram for Largemouth Bass from spring electrofishing.

Channel Catfish

Channel Catfish were sampled during 2023 fall gill net sampling. Experimental gill nets were used and set out at 15 different sites with five sites at the upper, middle, and lower region. A total of 45 Channel Catfish were sampled. Total CPUE calculated was low at 3.5 Channel Catfish per net night. Channel Catfish sampled had low CPUEs in each of the PSD seen in the sample – substock (CPUE = 0.7), stock (CPUE = 1.3), quality (CPUE = 1.3), and preferred (CPUE = 0.2) (Table 12). Body conditions for the substock (Wr = 110.8) and preferred (Wr = 102.5) were considered health, however, stock (Wr = 88.5) and quality (Wr = 86.5) body conditions were below the acceptable level (Table 12).

The length frequency histogram shows a wide spread of fish sizes with a minimum of 6 inches and a maximum of 28 inches (Figure 17). The largest proportion of Channel Catfish caught were 15 inches at 15% of observed fish. Proportional size distribution (PSD) had a value of 53 where quality size is 16.1 inches. 47% of Channel Catfish captured were under the quality size category.

		Total CPUE	Substock 0-11.0 in		Stock 11.0 in		Quality 16.1 in		Preferred 24.0 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2023	45	3.5	0.7	110.8	1.3	88.5	1.3	86.5	0.2	102.5

Table 12. Total number (*n*) of Channel Catfish and total catch per unit effort (CPUE). Separate CPUE and relative weight (Wr) for proportional size distributions are shown. Acceptable Wr values are ≥90.

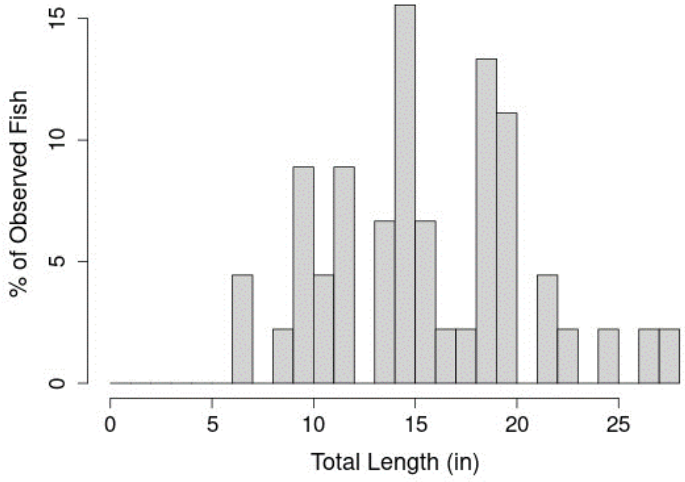

Figure 17. Length-histogram for Channel Catfish sampled from 2023 gill net sampling.

Flathead Catfish

A total of 4 Flathead Catfish were caught over 15 net nights in gill nets from fall 2023. The abundance was low with a total CPUE of 0.32. Additionally, the quality and preferred PSD had low abundances with CPUEs of 0.24 and 0.08, respectively. Body condition scores were calculated, and the quality PSD was lower than acceptable (Wr = 84.7) while the preferred PSD was above the acceptable amount (Wr = 106.7; Table 13).

The length-frequency histogram shows the distribution of sampled Flathead Catfish from experimental gill nets in 2023. Due to the small sample size, the population may not be accurately described. Of the 4 Flathead Catfish caught, two were in the 21-inch length group, one in the 23-inch group, and one in the 28-inch length group (Figure 18). Sampling to

supplement these data will be conducted in future years to better understand the population's size distribution.

Non-normal sampling was conducted in 2023 investigating the growth and age structure of Flathead Catfish within Grand Lake. Abundance was not observed from these data. Due to low catch numbers when sampling via electrofishing, Flathead Catfish were sampled through noodling for this dataset. In 2023, a total of 175 Flathead Catfish were sampled. Otoliths were collected and aged. The total lengths observed greatly varied from 5.7 inches to 45 inches (Figure 19). The most abundant length was 28-inches and made approximately 10% of the catch. When looking at the age structure, age-9 (mean TL = 25.2 inches) was the most abundant and age-14 (mean TL = 29.9 inches) was the second most abundant (Figure 20). Only 2 age-2 fish were sampled using this method.

Additionally, the sample varied within each age group. Mean length-at-ages varied from each age, showing an almost uniform distribution (Figure 21). Due to the uniform distribution, the L-infinite was 32.2 inches despite mean total lengths larger in younger age groups. The growth coefficient K was 0.20. Flathead Catfish growth slowed at age 9, however, average total length varied following this age.

		Total CPUE	**Quality 20.1 in**		**Preferred 28.0 in**	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**
2023	4	0.32	0.24	84.7	0.08	106.7

Table 13. Total number (*n*) and catch per unit effort (CPUE) of Flathead Catfish sampled during experimental gill net samples in fall 2023. CPUE and relative weight (Wr) are shown by proportional size distributions. Acceptable Wr values are ≥90.

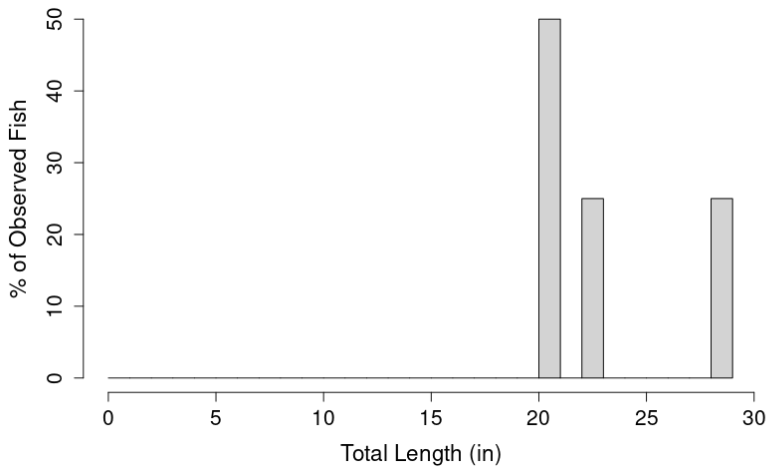

Figure 18. Length-frequency histogram for Flathead Catfish collected from experimental gill nets during fall 2023 sampling.

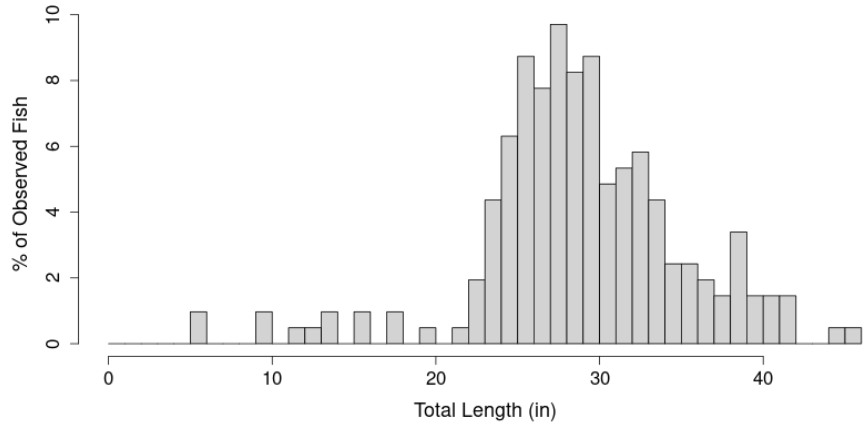

Figure 19. Length-frequency histogram for Flathead Catfish collected during non-normal SSP sampling in 2023.

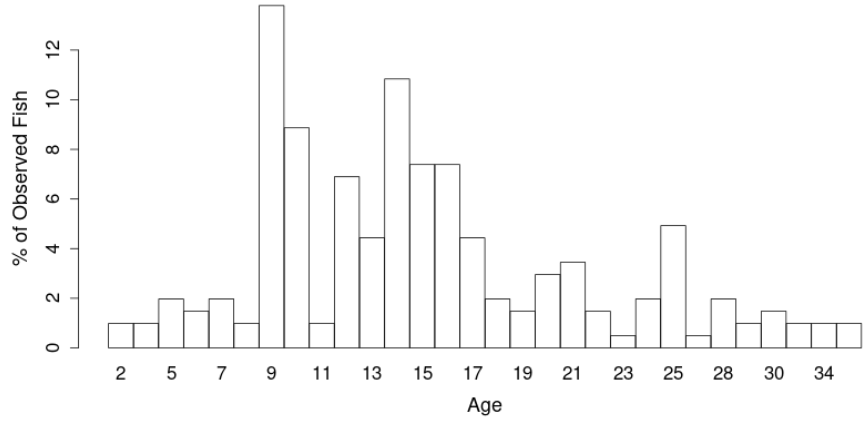

Figure 20. Age-frequency histogram for Flathead Catfish collected during non-normal SSP sampling in 2023.

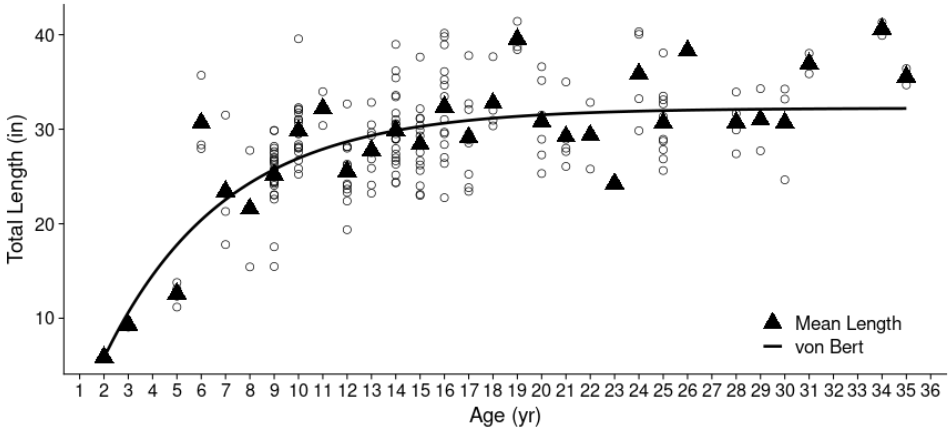

Figure 21. Von Bertalanffy growth equation and mean length-at-age graph for Flathead Catfish from 2023 non-SSP sampling. Triangles denote mean length at each age and circles each individual sampled.

Blue Catfish

Blue Catfish were sampled from experimental gill nets in fall 2023. A total of 12 Blue Catfish were caught over 15 net nights with a low abundance of 0.93 CPUE. Abundances for each PSD group show low CPUEs in all groups. Fish were observed from the substock, stock, and quality PSD groups. The body condition score for substock was considered greater than acceptable (Wr = 116.8) while the stock (Wr = 79.3) and quality (Wr = 85.9) groups were below the acceptable relative weight score (Table 14).

There was a low sample size of Blue Catfish during 2023 gill netting. The data available from this sample may not accurately describe the population due to the small sample. Most Blue Catfish were found in the 9-inch and 27-inch length groups. No fish were caught in the length groups from 15 inches to 20 inches (Figure 22). The PSD value was 75 and the PSD-Q was 25.

		Total CPUE	Substock 0 - 11.7 in		Stock 11.8 in		Quality 20.1 in	
	n	**CPUE**	**CPUE**	**Wr**	**CPUE**	**Wr**	**CPUE**	**Wr**
2023	12	0.93	0.31	116.8	0.15	79.3	0.47	85.9

Table 14. Total number (*n*) and catch per unit effort (CPUE) for Blue Catfish from experimental gill nets used in fall 2023. Abundances and relative weights (Wr) are shown for each proportional size distribution (PSD). Acceptable Wr values are greater than or equal to 90.

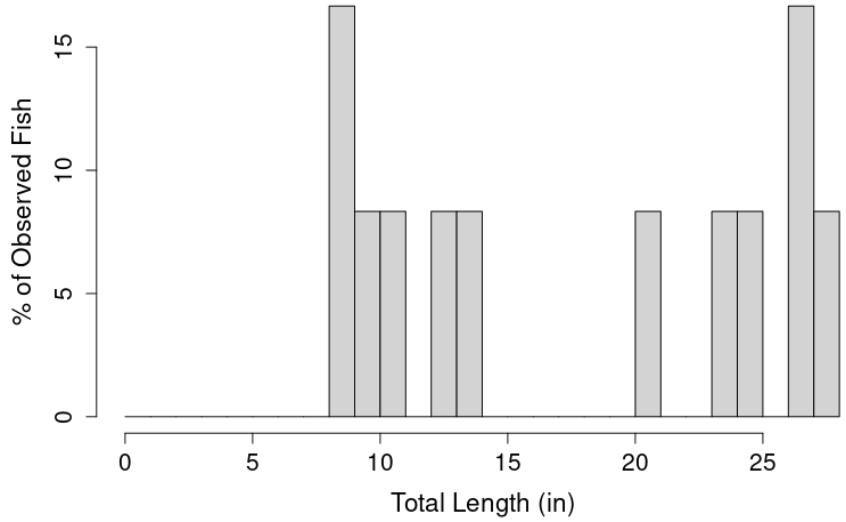

Figure 22. Length-frequency histogram for Blue Catfish from experimental gill net sampling in fall 2023.

Shad

Gizzard and Threadfin Shad were collected during 2023 gill net sampling. Five nets in the upper, middle, and lower region of Grand Lake were sampled for a total of 15 stations. A total of 189 Gizzard Shad and 35 Threadfin Shad were sampled. Gizzard Shad had a catch per unit

effort (CPUE) of 14.8 per net night and Threadfin Shad had a CPUE of 2.7 per net night. Total Shad abundance was high.

Shad are an important part of sports fish diet. Current abundance in Grand Lake is high and abundance should continue to be monitored to ensure this large foraging species for sports fish are available.

RECOMMENDATIONS

1. No Shad stocking is needed for the following year.
2. Crappie limit should remain to ensure recruitment remains stable.
3. Conduct angler creel to determine angler usage and opinions.
4. Continue to closely monitor the White Bass population.

Appendix

Gill net webbing:

a. 3.8 cm bar mesh - size 104 twine
b. 5.7 cm bar mesh - size 139 twine
c. 2.5 cm bar mesh - size 69 twine
d. 4.5 cm bar mesh - size 104 twine
e. 1.9 cm bar mesh - size 69 twine
f. 6.4 cm bar mesh - size 139 twine
g. 3.2 cm bar mesh - size 69 twine
h. 5.1 cm bar mesh - size 104 twine