

SURVEY REPORT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION



FISH MANAGEMENT SURVEY AND RECOMMENDATIONS

FOR

WELEETKA LAKE

2022

SURVEY REPORT

State: Oklahoma

Project Title: Weleetka Lake Fish Management Survey Report

Period Covered: Changes in ODWC standard reporting occurred since the 2007 Survey Report. This report discusses survey results from 2007-2022.

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Weleetka Lake

ABSTRACT

Weleetka Lake was surveyed by spring electrofishing (2007, 2018 and 2022), fall gill netting (2007, 2010, and 2019), and fall trap netting (2020) techniques to monitor trends in fish populations. Largemouth Bass abundance increased, relative weights were below desired values for fish smaller than 15 inches, and growth rates were slow. Channel Catfish abundance decreased but remained moderate with a high abundance of quality size fish. Crappie abundance was low with moderate growth. Both White Bass and Gizzard Shad numbers decreased.

Stockings of Florida largemouth bass and Channel Catfish should cease to prevent overcrowding. Harvest of Largemouth Bass less than 16 inches is encouraged. Continued monitoring of fish populations is recommended.

INTRODUCTION

Weleetka Lake impounds a tributary of the North Canadian River, 1.4 miles southwest of Weleetka in Okfuskee County, Oklahoma. Weleetka Lake covers 59 surface acres and was constructed in 1921 by the City of Weleetka. Weleetka Lake has a secchi disc visibility of around 16 inches in the main pool in August. Turbidity is primarily from plankton. Fish habitat consists primarily of aquatic vegetation.

Fish attractor sites have been constructed of brush piles and spider blocks in an effort to improve angler success and are periodically refurbished (Appendix 2). Fish attractor sites were most recently refurbished in 2021.

Previous surveys indicated poor Channel Catfish recruitment and a stunted Crappie population. These surveys have also shown the abundance and size structure of Largemouth Bass population to be good.

Past fish management activities consisted of stocking Channel Catfish fingerlings to increase Channel Catfish abundance and stocking Florida largemouth bass to introduce Florida bass genes into the population. Florida largemouth bass were last stocked in 2015 and have since ceased due to the increased abundance of Largemouth Bass. Channel Catfish were last stocked in 2009 (Appendix 1). There are no special city fishing regulations in effect.

Weleetka Lake was surveyed by spring electrofishing (2007, 2018 and 2022), fall gill netting (2007, 2010, and 2019), and fall trap netting (2020) techniques to monitor trends in fish populations.

RESULTS

Largemouth Bass

Largemouth Bass (LMB) were surveyed in spring of 2007, 2018, and 2022 by means of boat electrofishing. Six randomly selected shoreline units were sampled. Overall LMB abundance, catch per unit of effort (CPUE) increased from 2007 (CPUE = 52) to 2022 (CPUE = 114.0) (Table 1). While abundance of substock, stock and memorable sized fish decreased, a significant increase was observed in both quality and preferred size fish in 2022 compared to 2007. Weleetka Lake is considered a “High Quality” fishery with a high abundance of LMB observed over 14 inches. It is important to note that the standard sampling procedures (SSP) for Largemouth Bass electrofishing surveys changed from 15 minute to 10 minute units in 2015. While this change decreased the amount of time sampled per unit, it is unknown how that would affect catch rates. CPUE’s can vary based on habitat types sampled. It is also important to note that electrofishing systems switched from Smith-Roots to an ETS System in 2022. The two systems differ in design and possibly efficiency. The 2022 results should be viewed as an estimate and not directly comparable to the 2007 or 2018 surveys. Future surveys will be comparable with the 2022 survey.

Relative weights or body condition for the most recent survey in 2022 were below acceptable values for both stock ($W_r = 83$) and quality ($W_r = 86$) size fish. Memorable size fish were in exceptional condition ($W_r = 110$) (Table 1). A noticeable increase in the 12 and 13 inch LMB can be observed in the 2022 length frequency histogram compared to the previous surveys. This is also noted with the significant increase in abundance for quality size fish. Nearly 80% of the LMB surveyed in 2022 were smaller than 16 inches in total length (Figure 1). Proportional size distribution (PSD) values increased for quality size fish (PSD-Q = 86) while a decrease was observed for both preferred (PSD-P = 27) and memorable (PSD-M = 4) size fish compared to both 2007 and 2018 (Table 2). The largest fish sampled was from the 2022 survey and measured 22.4 (in) in total length and 9.24 (lbs.) in weight.

Age data was collected on a subset of LMB from the 2022 survey. LMB growth was slow but steady, taking approximately five years to reach mean length of 14.6 inches (Table 3). Growth rates increased by age six with a mean length of 20.5 inches. The 2022 age frequency indicates strong 2018 (age four) and 2017 (age five) year classes with more than 50% of the LMB surveyed (Figure 2).

Florida Largemouth Bass (FLMB) were first stocked in Weleetka Lake in 1989, and have been periodically stocked since, in an effort to introduce FLMB genetics into the bass population. FLMB will grow quicker and larger than native Northern Largemouth Bass, given enough forage and the right conditions within the system. Largemouth Bass genetics were sampled in 2015 to determine the extent of Florida largemouth bass genetics within the population. Results indicated 31.3% of the fish sampled were either pure FLMB or F1, a first generation cross (Table 4). Of the 39 samples collected, 17.9% were unreadable and 15.6% were pure Northern Largemouth Bass. The most recent stocking of FLMB occurred in 2015 with 75,000 fry (Appendix 1).

Overall LMB abundance increased, relative weights were below desired values for fish smaller than 15 inches, and growth rates were slow. While Weleetka Lake, is classified as a high-quality bass fishery,

abundance of LMB is considered too high for the available resources. Harvest of LMB below 16 inches is recommended. Sustained high levels of LMB abundance will continue to hinder body conditions, slow growth rates and eventually stunt the bass population. Future stockings of FLMB should cease to help reduce over crowding potential and increase growth rates. Statewide LMB fishing regulations changed in the fall of 2022 to: A creel limit of six (6) Largemouth Bass of which only one may be larger than 16 inches. These new regulations should be beneficial for Weleetka Lake, assuming anglers are willing to harvest LMB.

Table 1. Total number (No.), catch per unit of effort (CPUE), and relative weights (Wr) by size groups of Largemouth Bass collected by spring electrofishing from Weleetka Lake. Acceptable Wr values are ≥ 90 .

		Total CPUE	Substock 0-7.8 in	Stock 7.9 in		Quality 11.8 in		Preferred 15 in		Memorable 20.1 in		Trophy 24.8 in	
Year	No.	CPUE	CPUE	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr
2007	78	52.0	14.7	18.0	83	6.0	88	8.0	92	5.3	98	.	.
2018	108	108.0	23.0	14.0	79	25.0	91	39.0	106	7.0	106	.	.
2022	114	114.0	12.0	14.0	83	60.0	86	24.0	92	4.0	110	.	.

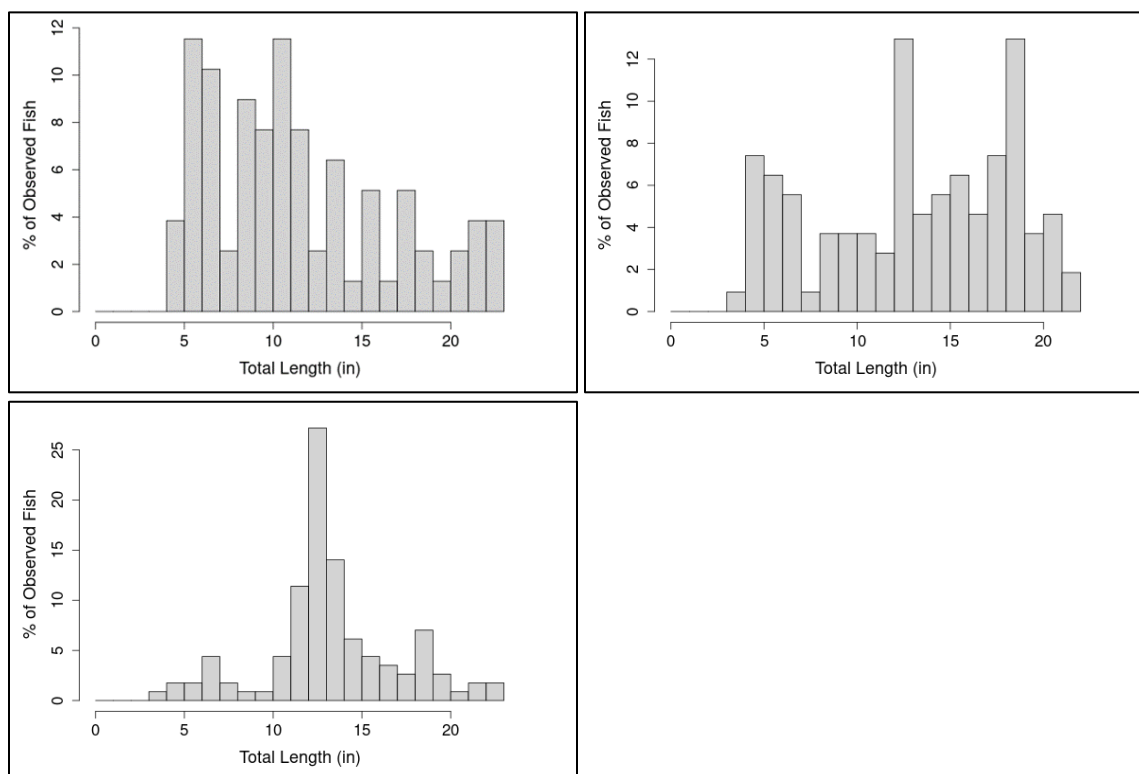


Figure 1. Largemouth Bass Length Frequencies for Weleetka Lake 2007 (top left), 2018 (top right) and 2022 (bottom).

Table 2. Proportional Size Distribution (PSD) of Largemouth Bass_Quality (PSD-Q) preferred (PSD-P) and memorable (PSD-M) lengths. PSD values indicate the proportion of fish in or above the quality, preferred or memorable size classes.

<u>Year Surveyed</u>	<u>PSD-Q</u> <u>(11.8 in)</u>	<u>PSD-P</u> <u>(15 in)</u>	<u>PSD-M</u> <u>(20.1 in)</u>
<u>2007</u>	52	36	14
<u>2018</u>	84	54	8
<u>2022</u>	86	27	4

Table 3. Mean Total Length at age (inches) and L infinity (estimated mean maximum length) for Largemouth Bass from Weleeka Lake.

<u>Year</u>	<u>Age</u> <u>1</u>	<u>Age</u> <u>2</u>	<u>Age</u> <u>3</u>	<u>Age</u> <u>4</u>	<u>Age</u> <u>5</u>	<u>Age</u> <u>6</u>	<u>Age</u> <u>7</u>	<u>Age</u> <u>8</u>	<u>Age</u> <u>9</u>	<u>Age</u> <u>10</u>	<u>Age</u> <u>11</u>	<u>Age</u> <u>12</u>	<u>L</u> <u>inf.</u>
<u>2022</u>	6.2	10.8	11.9	12.8	14.6	20.5	18.2	14.2	20.4	.	.	.	27.3

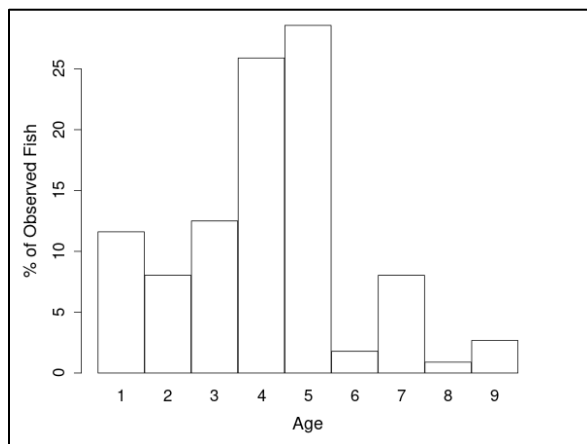


Figure 2. 2022 Age Frequencies of Largemouth Bass.

Table 4. Largemouth Bass Genetic Samples 2015.

Bass DNA Summary									
Year	%FLMB	%NLMB	% F1	% FX-F	% FX-N	% FX	% DNR	% F+F1	# Sampled
2015	15.6%	15.6%	15.6%	6.3%	40.6%	6.3%	17.9%	31.3%	39

<u>Genotype</u>	<u>Description</u>
FLMB	Only Florida Strain Alleles
NLMB	Only Native Strain Alleles
F1	First Cross-Both Alleles present for all markers
FX-F	Hybrid Cross-mostly Florida Alleles
FX-N	Hybrid Cross-mostly Native Alleles
FX	Hybrid Cross-equal number of Alleles for 2 or 3 markers
DNR	Did not run or file unreadable.

Channel Catfish

Channel Catfish were surveyed in 2007, 2010, and 2019 using suspended gill nets. Standard sampling protocols for gill net lengths changed in 2009 to 80 foot nets. Gill net lengths and effort varied prior to

2009. Three stations were randomly sampled for a period of 24 hours during the 2007 and 2010 surveys, five stations were sampled during the 2019 survey. Relative abundance increased from 2007 (CPUE = 8.3) to 2010 (CPUE = 11.3) then decreased during the 2019 (CPUE = 6.4) survey (Table 5). While an overall decrease in abundance occurred, an increase in abundance of quality (16.1 inches) size and larger fish was observed. Body condition varied between size classes and years surveyed. Body conditions during the most recent 2019 survey were considered acceptable for all size classes except for preferred size fish where conditions were less than desired (Wr = 84) (Table 5).

Length frequency histograms (Figure 3) appeared to show an increase in size structure in 2019 compared to 2007 and 2010, with nearly 97% of the fish surveyed were of quality size. The proportional size distribution (PSD) values for 2019 indicated an increase in the proportion of quality size fish (PSD-Q = 100), an increase from both 2007 (PSD-Q = 38) and 2010 (PSD-Q = 40) (Table 6). However, too high PSD-Q indicates poor recruitment with few small fish in the fishery.

Age data was collected on a subset of Channel Catfish in 2019. Growth rates were good. Channel Catfish at Weleetka Lake grew to a mean length of 16.1 inches by age one, 19.2 inches by age four and 24.4 inches by age five. However, older fish in the fishery appeared to have slower growth rates (Table 7). The largest fish sampled measured 27.3 (in) in total length and weighed 8.9 (lbs.) in weight. The oldest Channel Catfish was aged at twelve years old.

The 2019 age frequency indicates poor recruitment, with very few fish under the age of four. A strong 2008 (age 11) year class was present (Figure 5). The most recent Channel Catfish stocking occurred in 2009 (Appendix 1), indicating that natural reproduction is occurring.

Overall, the Channel Catfish population in Weleetka Lake had a moderate overall abundance with a high abundance of quality size fish. Natural reproduction is present, but poor recruitment from year to year has been observed. The high abundance of Largemouth Bass is likely the cause of poor recruitment. No Channel Catfish stockings are recommended at this time. Establishment of a self-sustaining population has been successful.

Table 5. Total number (No.), catch per unit of effort (CPUE), and relative weights (Wr) by size groups of Channel Catfish collected by fall gill netting from Weleetka Lake. Acceptable Wr values are ≥ 90 .

		Total CPUE	Stock 11 in		Quality 16.1 in		Preferred 24 in		Memorable 28 in		Trophy 35.8 in	
Year	No.	CPUE	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr
<u>2007</u>	24	8.3	5.2	80	0.3	127	0.7	105	.	.	.	.
<u>2010</u>	27	11.3	7.1	79	2.1	86	.	.	.	.	.	.
<u>2019</u>	33	6.4	0.2	92	5.6	93	0.4	84	.	.	.	.

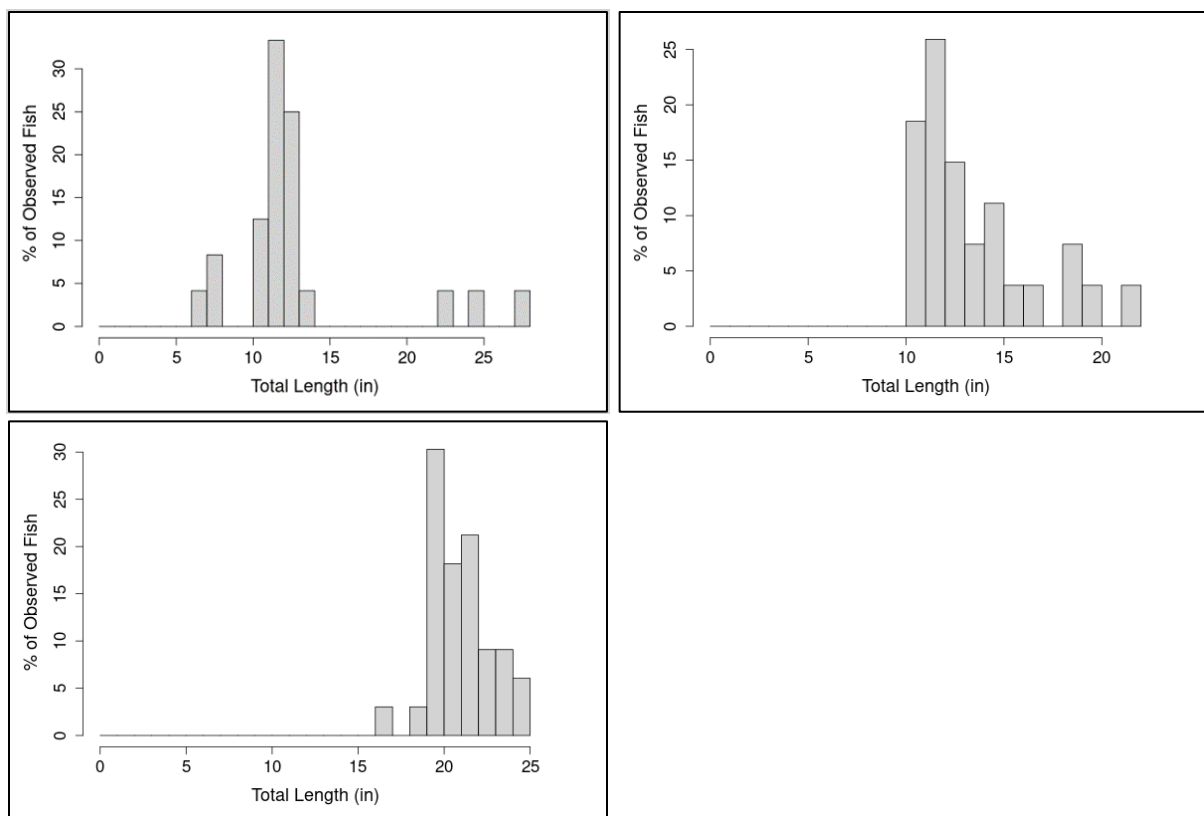


Figure 3. Channel Catfish Gill Net Length Frequency Histogram 2007 (top left), 2010 (top right), 2019 (bottom).

Table 6. Proportional Size Distribution (PSD) of Channel Catfish. Quality (PSD-Q), preferred (PSD-P) and memorable (PSD-M) lengths. PSD values indicate the proportion of fish in or above the quality, preferred or memorable size classes.

<u>Year Surveyed</u>	<u>PSD-Q</u> <u>(16.1 in)</u>	<u>PSD-P</u> <u>(24 in)</u>	<u>PSD-M</u> <u>(28 in)</u>
2007	38	29	.
2010	40	.	1
2019	100	16	.

Table 7. Mean Total Length at age (inches), and L infinity (estimated mean maximum length) for Channel Catfish from Weleetka Lake.

<u>Year</u>	<u>Age</u> <u>1</u>	<u>Age</u> <u>2</u>	<u>Age</u> <u>3</u>	<u>Age</u> <u>4</u>	<u>Age</u> <u>5</u>	<u>Age</u> <u>6</u>	<u>Age</u> <u>7</u>	<u>Age</u> <u>8</u>	<u>Age</u> <u>9</u>	<u>Age</u> <u>10</u>	<u>Age</u> <u>11</u>	<u>Age</u> <u>12</u>	<u>L inf.</u>
2019	16.1	.	.	19.2	24.4	22.6	.	.	19.9	21.8	21.1	20	21.7

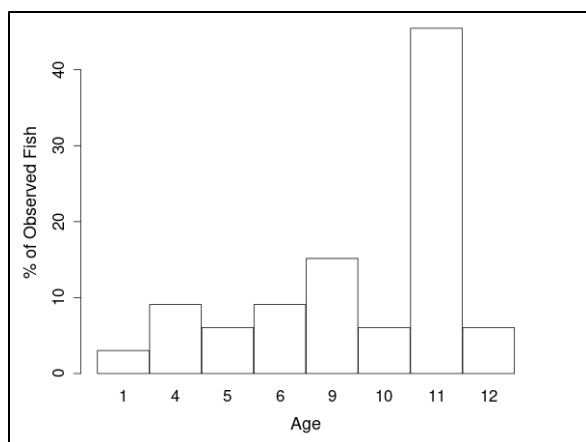


Figure 4. 2019 Age Frequency of Channel Catfish.

Crappie

Crappie were surveyed in 2007, 2010 and 2019 using suspended gill nets. Standard sampling protocols for gill net lengths changed in 2009 to 80 foot nets. Gill net lengths and effort varied prior to 2009. Three stations were randomly sampled for a period of 24 hours during the 2007 and 2010 surveys, five stations were sampled during the 2019 survey. Overall Crappie abundance decreased from 2007 (CPUE = 35.8) to 2019 (CPUE = 8.2) (Table 8). However, a significant increase in abundance of quality size fish was observed in 2019 (CPUE = 7.6) compared to 2007 (CPUE = 1.7). With decreasing abundance, Crappie body conditions improved. Body conditions were acceptable for all size classes during the 2019 survey (Table 8). The largest fish sampled from the three gill net surveys was from 2019 and measured 9.7 (in) in total length and 0.4 (lbs.) in weight.

Crappie were also surveyed in 2020 using trap nets. A total of five stations were randomly sampled for a period of 24 hours. Overall abundance was considered low (CPUE = 4.1). The highest abundance was found within the quality size class (CPUE = 2.7) (Table 9). Body conditions were considered acceptable for the quality size fish (Wr = 95) but fell below acceptable levels for the preferred size fish (Wr = 86).

Length frequency histograms from the gill net surveys (Figure 5) and the trap net survey (Figure 6) show an increase in the Crappie size structure during the 2019 and 2020 surveys. Nearly all fish from each survey were greater than eight inches in length, the minimum size most anglers would consider a harvestable fish.

Age data was collected on a subset of Crappie from the 2010, 2019, and 2020 surveys. Growth was considered moderate for all years surveyed but had slightly increased during each survey. Crappie grew to a mean length of 8.8 inches by age two and 9.4 inches by age three during the 2020 survey (Table 10). Age frequency histograms for both 2019 and 2020 surveys indicate poor recruitment of age one fish (Figure 7).

Table 8. Total number (No.), catch per unit of effort (CPUE), and relative weights (Wr) by size groups of White Crappie collected by fall gill netting from Weleetka Lake. Acceptable Wr values are ≥ 90 .

		Total CPUE	Stock 5.1 in		Quality 7.9 in		Preferred 9.8 in		Memorable 11.8 in		Trophy 15.0 in	
Year	No.	CPUE	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr
2007	103	35.8	33	91	1.7	83	.	.	.	.	.	.
2010	26	10.8	10.8	84	.	.	.	.	.	.	.	.
2019	42	8.2	0.6	96	7.6	97	.	.	.	.	.	.

Table 9. Total number (No.), catch per unit of effort (CPUE), and relative weights (Wr) by size groups of White Crappie collected by fall trap netting from Weleetka Lake. Acceptable Wr values are ≥ 90 .

		Total CPUE	Stock 5.1 in		Quality 7.9 in		Preferred 9.8 in		Memorable 11.8 in		Trophy 15.0	
Year	No.	CPUE	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr	CPUE	Wr
2020	20	4.1	.	.	2.7	95	0.8	86	.	.	.	.

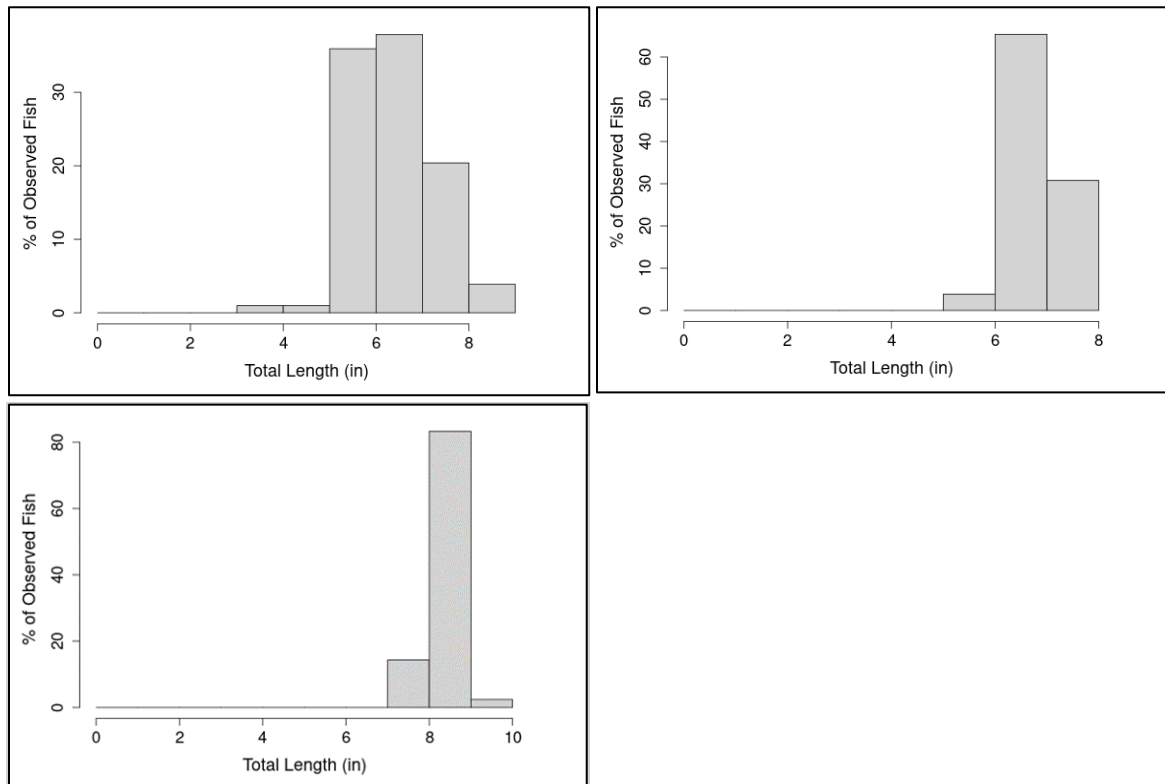


Figure 5. Crappie Gill Net Length Frequency Histogram for 2007 (top left), 2010 (top right), and 2019 (bottom).

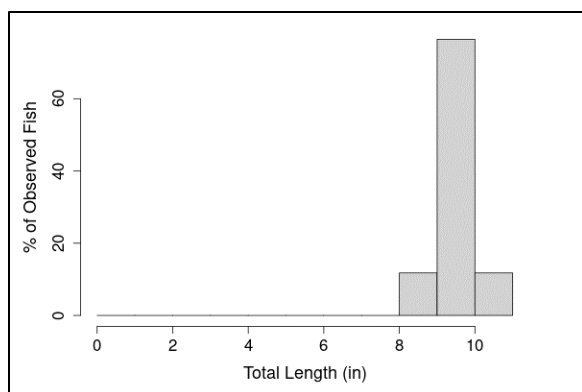


Figure 6. Crappie Trap Net Length Frequency Histogram for 2020.

Table 10. Mean Total Length at age (inches), and L infinity (estimated mean maximum length) for White Crappie from Weleetka Lake.

<u>Year</u>	<u>Age 1</u>	<u>Age 2</u>	<u>Age 3</u>	<u>Age 4</u>	<u>Age 5</u>	<u>Age 6</u>	<u>Age 7</u>	<u>Age 8</u>	<u>L inf.</u>
2010	5.6	6.7	7.2	6.9	.	.	.	.	7.1
2019	.	8.1	8.6	8.5	8.7	8.1	.	.	.
2020	.	8.8	9.4	.	9.5	9.2	9.8	.	.

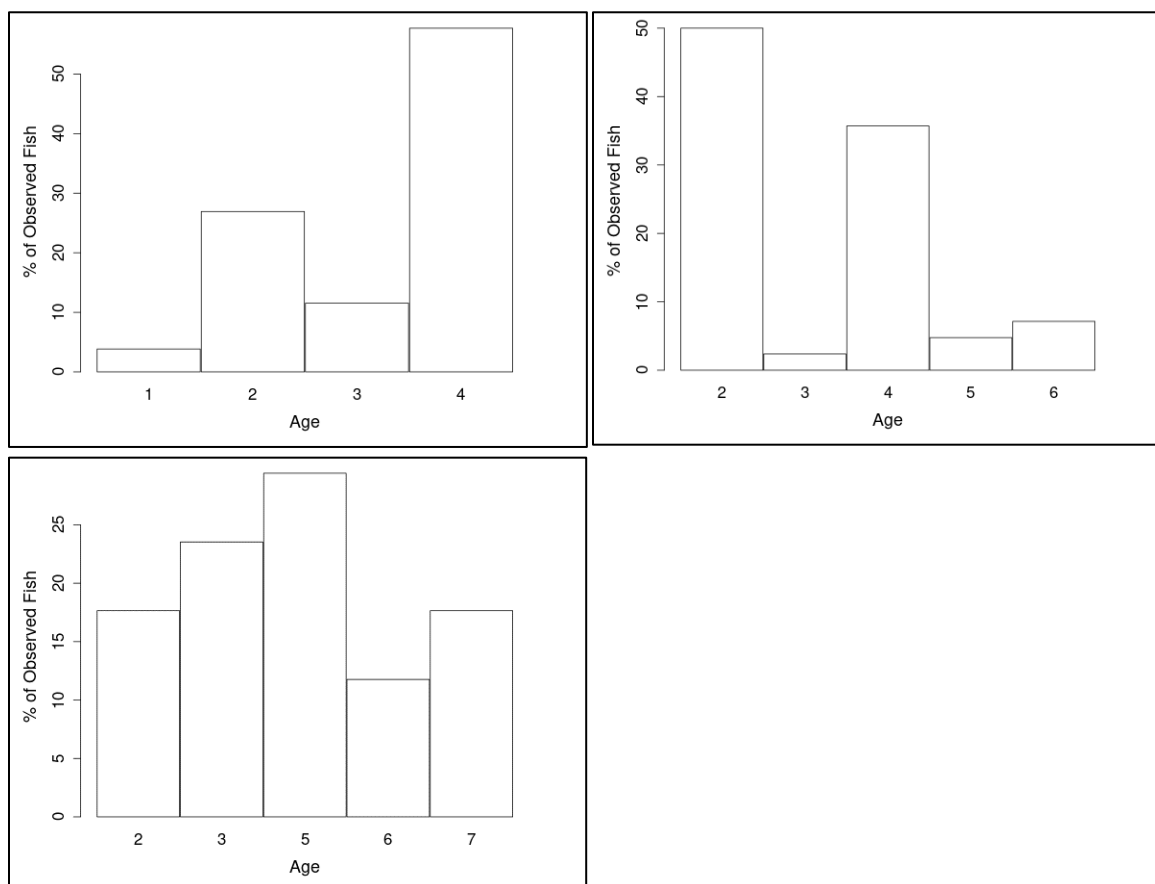


Figure 7. 2010 (top left), 2019 (top right), and 2020 (bottom) White Crappie Age Length Frequency.

White Bass

White bass were surveyed in 2007, 2010 and 2019 using suspended gill nets. Standard sampling protocols for gill net lengths changed in 2009 to 80 foot nets. Gill net lengths and effort varied prior to 2009. Three stations were randomly sampled for a period of 24 hours during the 2007 and 2010 surveys, five stations were sampled during the 2019 survey. Overall abundance had decreased from 2007 (CPUE = 2.8) to 2019 (CPUE = 0.8) and was considered low for all years surveyed. No White Bass were collected during the 2010 survey. Body conditions during the most recent 2019 survey, were considered acceptable for both stock (Wr = 106) and preferred (Wr = 100) size classes, while memorable size class were in poor condition (Wr = 77) (Table 11). The largest fish sampled out of the three surveys measured 16.5 (in) in total length and 1.8 (lbs.) in weight.

Table 11. Total number (No.), catch per unit of effort (CPUE), and relative weights (Wr) by size groups of White Bass collected by fall gillnet from Weleetka Lake. Acceptable Wr values are ≥ 90 .

		Total CPUE	<u>Stock</u> 5.9 in		<u>Quality</u> 9.1 in		<u>Preferred</u> 11.8 in		<u>Memorable</u> 15 in		<u>Trophy</u> 18.1 in	
<u>Year</u>	<u>No.</u>	<u>CPUE</u>	<u>CPUE</u>	<u>Wr</u>	<u>CPUE</u>	<u>Wr</u>	<u>CPUE</u>	<u>Wr</u>	<u>CPUE</u>	<u>Wr</u>	<u>CPUE</u>	<u>Wr</u>
<u>2007</u>	8	2.8	1.4	90	.	.	1.1	95	0.3	86	.	.
<u>2010</u>	.	.	.	.	.	.	.	.	.	.	.	.
<u>2019</u>	4	0.8	0.2	106	.	.	0.4	100	0.2	77	.	.

Shad

Gizzard shad were surveyed in 2007, 2010 and 2019 using suspended gill nets. Standard sampling protocols for gill net lengths changed in 2009 to 80 foot nets. Gill net lengths and effort varied prior to 2009. Three stations were randomly sampled for a period of 24 hours during the 2007 and 2010 surveys, five stations were sampled during the 2019 survey. Both 2007 (CPUE = 22.0) and 2010 (CPUE = 11.7) surveys showed high abundance of Gizzard Shad, while 2019 abundance (CPUE = 2.3) had decreased to less than desired levels (Table 12). Length frequency histograms (Figure 8) and CPUE's for the 2010 and 2019 surveys showed the majority of Gizzard Shad were larger than six inches in length or optimal forage size. No Gizzard Shad less than six inches in length were collected during the 2019 survey.

Table 12. Total number (No.) and catch per unit of effort (CPUE) by size groups of Gizzard Shad collected by fall gill netting from Weleetka Lake.

<u>Gizzard Shad</u>				
<u>Year</u>	<u>No.</u>	Total CPUE	<6 inches	≥ 6 inches
<u>2007</u>	63	22	8.7	13.2
<u>2010</u>	28	11.7	1.2	10.4
<u>2019</u>	12	2.3	.	2.3

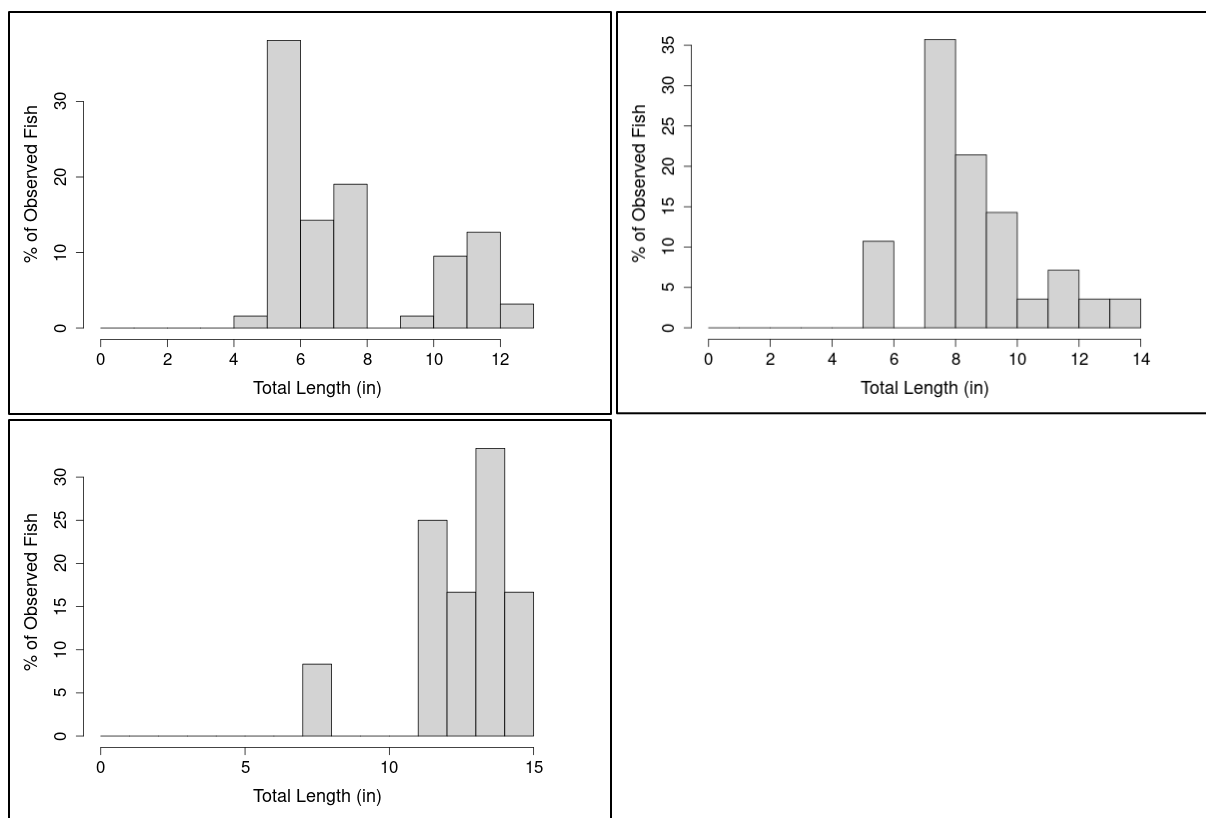


Figure 8. Gizzard Shad Length Frequency Histogram from suspended gill nets 2007 (top left), 2010 (top right), and 2019 (bottom).

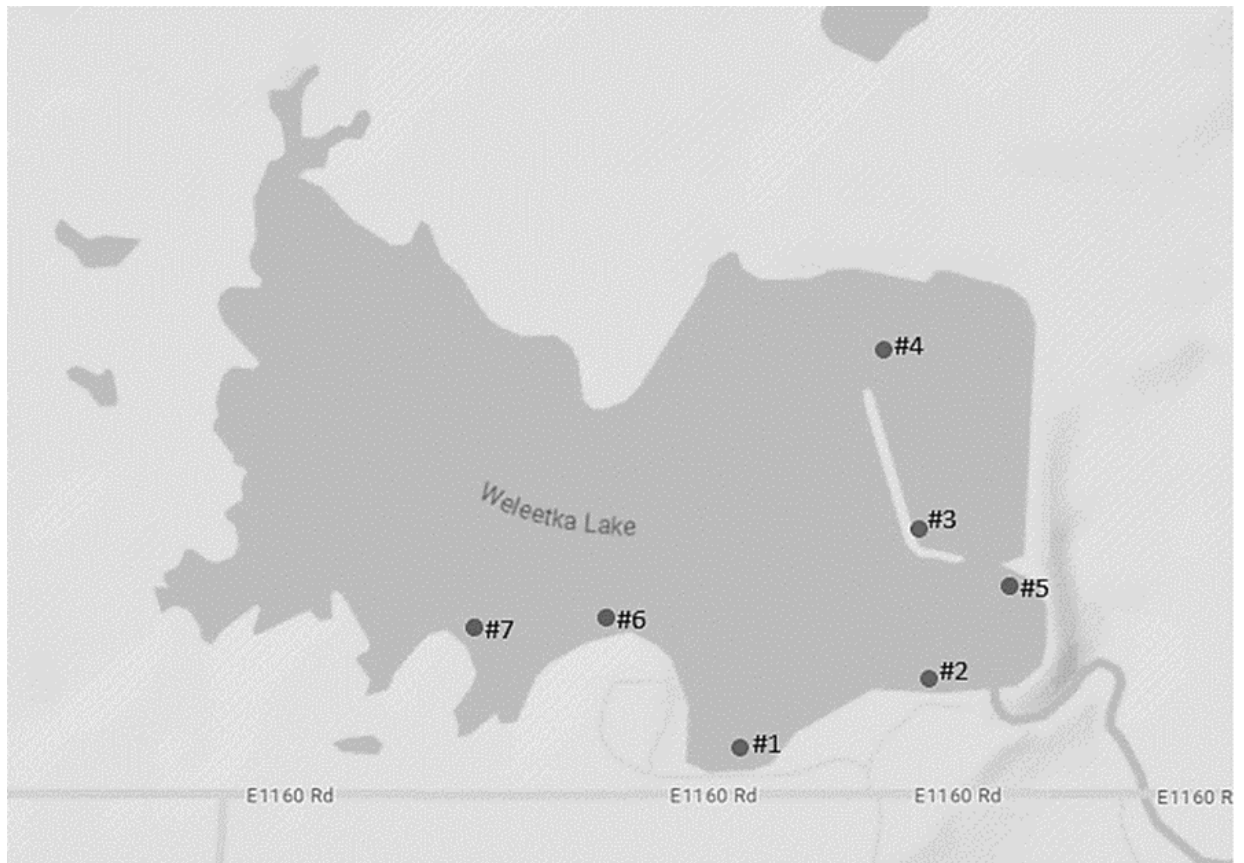
RECCOMENDATIONS

1. Cease stockings of Florida largemouth bass to prevent overcrowding and potential stunting.
2. Harvest is encouraged of Largemouth Bass less than 16 inches in length.
3. Cease all stockings of Channel Catfish. Establishment of a self-sustaining population has been successful.

Appendix 1. Species, number, and size of fish stocked in Weleetka Lake since 2000.

Date	Species	Number	Size (inches)
2006	Channel Catfish	2,397	7
2007	Channel Catfish	3,712	7
2008	Channel Catfish	3,600	7
2009	Channel Catfish	3,613	11
2012	Florida Largemouth Bass	5,611	1.5
2013	Florida Largemouth Bass	83,000	0.5
2014	Florida Largemouth Bass	71,712	1
2015	Florida Largemouth Bass	75,000	0.75

Appendix 2. Weleetka Lake Fish Attractor Locations



Fish Attractor Site Information for Weleetka Lake.

Area Name	Site #	Latitude	Longitude	Habitat Type	Marked	Bank Access	Date
Cove by entrance road	1	35.33375	-96.1664	Brush,SpiderBlocks	Y	Y	3/2/2021
Spillway	2	35.33435	-96.164466	Brush,SpiderBlocks	Y	Y	3/2/2021
Corner of old dam	3	35.33555	-96.164717	Brush,SpiderBlocks	Y	N	3/2/2021
North end of old dam	4	35.336816	-96.16515	Brush,SpiderBlocks	Y	N	3/2/2021
Dam site	5	35.335017	-96.163533	Brush Pile	N	Y	3/2/2021
Pavillion Point	6	35.3348	-96.167767	Brush Pile	N	Y	3/2/2021
East of Pavillion	7	35.33485	-96.169	Brush Pile	N	N	3/2/2021