SURVEY REPORT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

FISH MANAGEMENT SURVEY AND RECOMMENDATIONS

FOR

LAKE THUNDERBIRD

2023

SURVEY REPORT

State: Oklahoma

Project Title: Thunderbird Lake Fish Management Survey Report

Period Covered: 2023

Prepared by: OFRL Research Biologists

Date Prepared: January 2024

Lake Thunderbird

ABSTRACT

Lake Thunderbird has been previously surveyed by spring electrofishing (1983, 1987, 1990, 1991, 1992, 2002, 2003, 2004, 2005, 2006, 2007, 2019, 2022), fall nighttime electrofishing (1992, 1993, 1994, 1995, 1996, 1997, 1998, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2010, 2011, 2012, 2017, 2022), low-frequency electrofishing (1994, 1995, 1996, 2002, 2009, 2017), fall gill netting (1983, 2000, 2009, 2021, 2022), and fall trap netting (2014, 2016, 2023) to monitor trends in fish populations. The fishery supports self-sustaining populations of Largemouth and Spotted Bass, Channel, Blue, and Flathead Catfish, Black and White Crappie, White Bass, and a variety of Sunfish species. Florida Largemouth Bass are stocked periodically with the intent to increase Largemouth Bass growth potential. Hybrid Striped Bass fry and Saugeye fingerlings are stocked on a biennial rotation (Hybrid Striped Bass one year, Saugeye the next) at an approximate rate of 100 and 20 per acre, respectively, to provide and maintain additional angling opportunity. Primary forage species consist of Gizzard Shad and Inland Silversides.

INTRODUCTION

Lake Thunderbird is a United States Bureau of Reclamation impoundment located in Cleveland County 12 miles east of Norman, Oklahoma on State Highway 9. The lake is 5,377 acres, has a maximum depth of 58 feet, and has 59.6 miles of shoreline. Impoundment was completed in 1965 for the purpose(s) of providing municipal water supply (cities of Norman, Midwest City, and Del City), flood control, and numerous recreational activities including fishing, boating, swimming, hiking, camping, and hunting. It is classified as hypereutrophic with an average secchi disc visibility of around 59 cm. There are a variety of fish habitats including naturally occurring submerged timber, rock structure, and aquatic vegetation along protected shorelines (primarily water willow), as well as fish attractor sites consisting of natural and artificial brush piles (predominately cedar trees with a few PVC structures around fishing docks). Primary forage species include Gizzard Shad and Inland Silversides.

Special regulations exist for Saugeye (18-inch minimum length limit). All other species are subject to the statewide daily and size limits. Bowfishing, gigging, spearing, spearguns, snagging, and noodling are prohibited within the Little River upstream of Franklin Road ([Fishing Regulations | Oklahoma Department of Wildlife Conservation (wildlifedepartment.com)](#)).

Fish attractor sites have been constructed from brush piles to improve angler success and are periodically refurbished. Sites were most recently refurbished in December 2022. To see locations of fish attractor sites please visit: [Fish Attractors Map (arcgis.com)](#).

Lake Thunderbird has been previously surveyed by spring electrofishing (1983, 1987, 1990, 1991, 1992, 2002, 2003, 2004, 2005, 2006, 2007, 2019, 2022), fall nighttime electrofishing (1992, 1993, 1994, 1995, 1996, 1997, 1998, 2001, 2002, 2003, 2004, 2005, 2006, 2008, 2010, 2011, 2012, 2017, 2022), low-frequency electrofishing (1994, 1995, 1996, 2002, 2009), fall gill netting (1983, 2000, 2009, 2021, 2022), and fall trap netting (2014, 2016, 2023) to monitor trends in fish populations. Hybrid Striped Bass fry and Saugeye fingerlings are stocked on a biennial rotation (Hybrid Striped Bass one year, Saugeye the next) at an approximate rate of 100 and 20 per acre, respectively, to provide and maintain additional angling opportunity (Appendix 1). Florida Largemouth Bass fingerlings are stocked regularly with the intent of increasing growth and maximum size potential of the resident Largemouth Bass population (Appendix 1.)

Aquatic Nuisance Species

There are no known ANS in Thunderbird.

RESULTS

Trap Net (Gear 31)

Overview

Crappie were sampled using trap nets (gear 31) between the dates of October 30 and November 8, 2023. The average water temperature was 16.5° C. Thirty sites were randomly chosen as specified by SSP for a total of 657 hours of effort resulting in the capture of 741 White Crappie and 42 Black Crappie.

Crappie

The mean total length (TL) of White Crappie sampled was 192 mm with a range of 50-337 mm (Figure 1). Black Crappie averaged 222 mm with a range of 110-310 (Figure 1). The mean CPUE of White Crappie was 27.7 with a standard error (SE) of 5.3 and relative standard error (RSE) of 19.1. The upper and lower 95% CI were 38.1 and 17.3 respectively (Table 1). Substock, stock, quality, and preferred sized fish had mean CPUEs ranging from 14.8-2.8 and SE ranging 3.9-0.7 (Table 1). Stock sized fish had the highest mean CPUE (14.8) with a SE of 3.9 and RSE of 26.6 (Table 1).

A total of 330 crappie were aged, ranging from 0-4 years of age. Approximately 80% of fish were ages 1 and 2 years old. The mean TL at age 0 was 94.9 mm, 1 year 179 mm, 2 years 218 mm, 3 years 237mm, and 4 years 389 mm. The overall Wr of crappie in Thunderbird Lake was 97.2 and all Wr for all size categories were good (>90; Table 2). A vonBertalanffy growth curve predicted a theoretical maximum length (L_∞) of 268 mm, a growth coefficient (K) of 0.6, and a t_0 -0.7 (Figure 2). A catch-curve regression calculated an annual mortality (A) of 65% and an instantaneous mortality (Z) of 1.1 (Figure 3).

Table 1. Catch per unit effort (CPUE) of White Crappie in Thunderbird Lake.

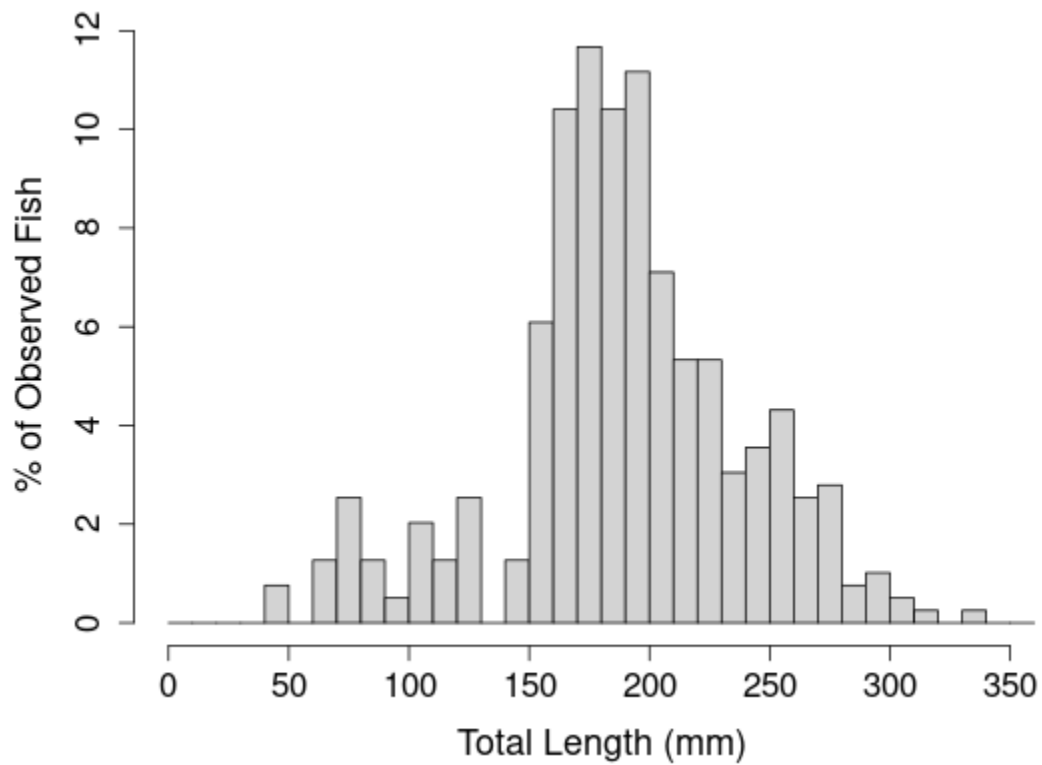|	Mean	Count	RSE	SE	L 95% CI	U 95% CI	N RSE = 12.5 (25% range)	N RSE = 20 (40% range)
Lake Thunderbird								
White Crappie								
Total	27.7	30	19.2	5.3	17.3	38.2	71	28
Substock	3.0	-	41.0	1.2	0.6	5.3	323	126
Stock	14.8	-	26.6	4.0	7.1	22.5	136	53
Quality	6.9	-	14.9	1.0	4.9	9.0	43	17
Preferred	2.8	-	23.9	0.7	1.5	4.2	110	43
Memorable	0.2	-	44.6	0.1	0.0	0.4	382	149

Figure 1. Length-frequency distributions of White Crappie from Thunderbird Lake.

Table 2. Relative Weights (Wr) of White Crappie from Purcell and Thunderbird Lakes.

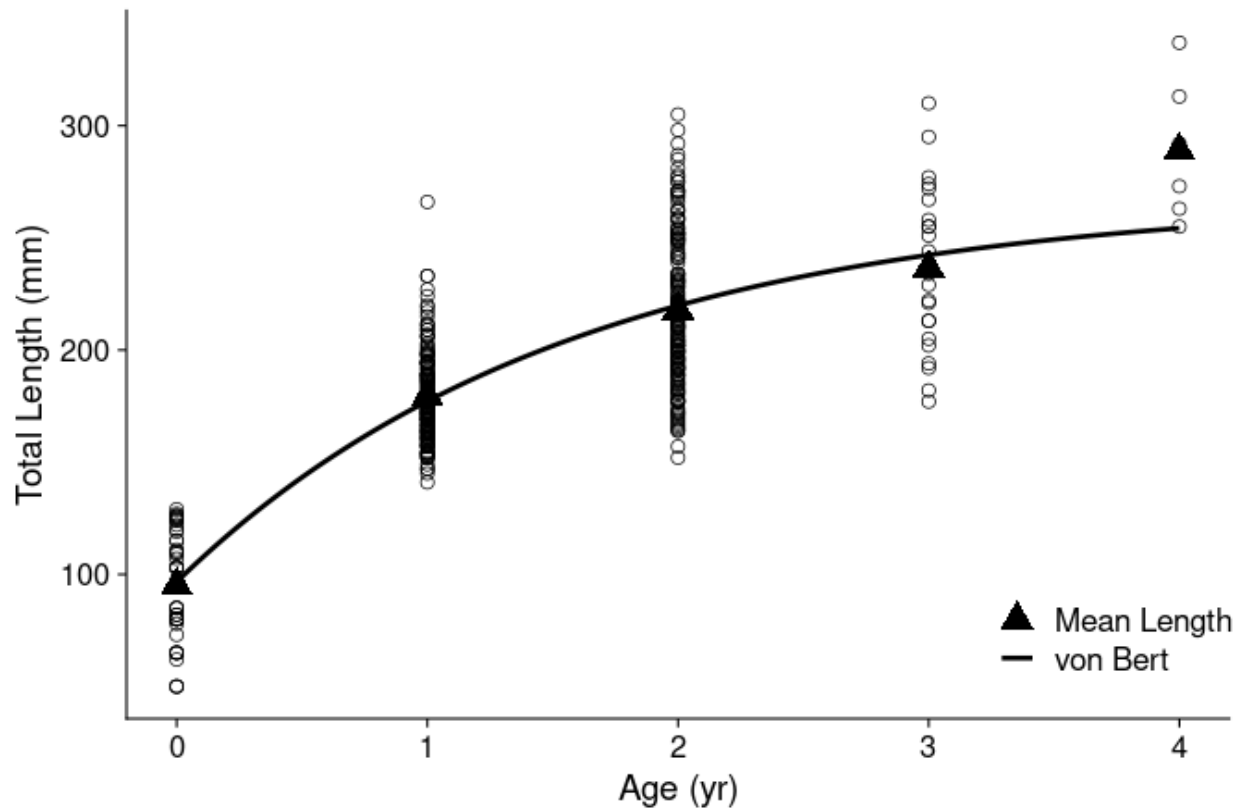|	Mean	Count	CV	SE	L 95% CI	U 95% CI
Lake Thunderbird						
White Crappie						
Overall	97.2	466	14.3	0.6	96.0	98.5
Substock	103.6	29	21.9	4.2	95.3	111.9
Stock	96.2	283	14.8	0.9	94.6	97.9
Quality	94.6	98	10.5	1.0	92.6	96.5
Preferred	103.8	50	8.7	1.3	101.3	106.3
Memorable	102.2	6	4.1	1.7	98.8	105.6

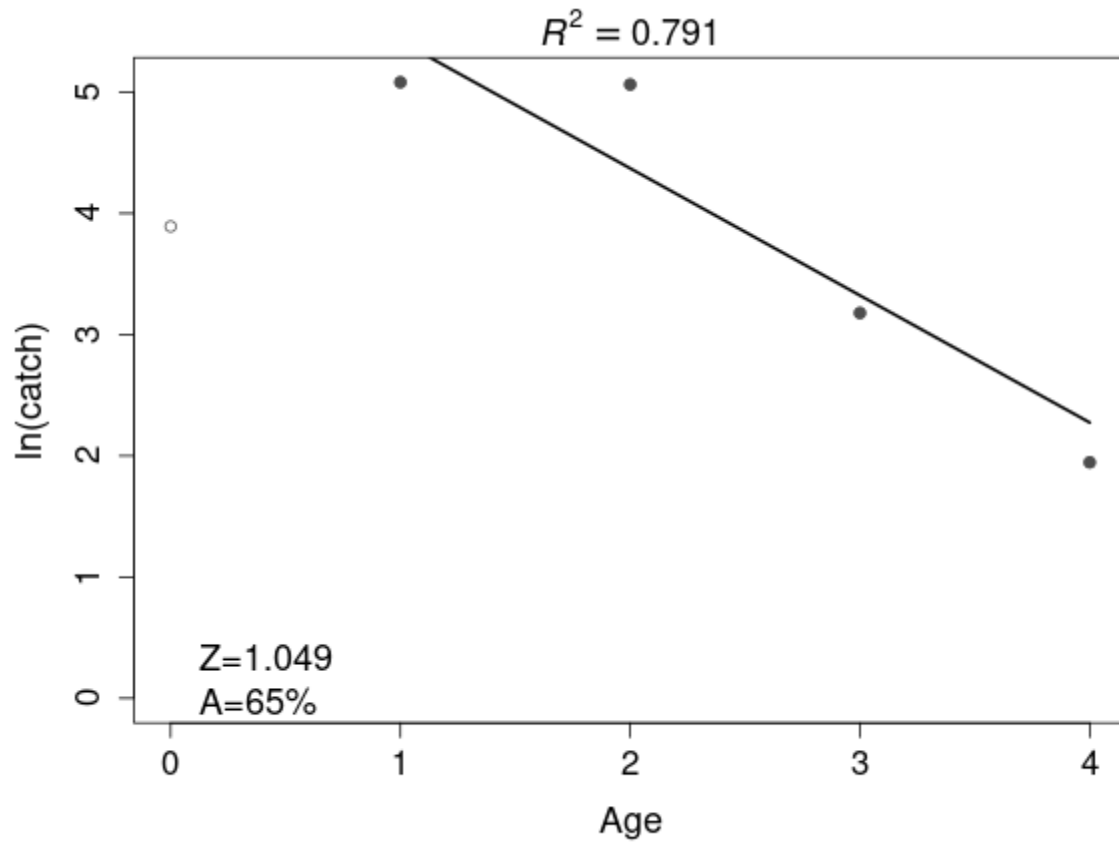**Figure 2.** vonBertalanffy Growth Curve for White Crappie from Lake Thunderbird.

Figure 3. Catch curve for White Crappie from Lake Thunderbird.

Fall Experimental Gill Net (Gear 23)

Overview

The lake was sampled using fall experimental gill nets (gear 23) from December 4-6, 2023. Sixteen randomly selected sites were sampled for a total of 367 units of effort. Mean water temperature was 10.2^o C and pool elevation was approximately 0.6 m below normal at 316.4 m. A total of 524 fish were caught with 15 species represented. Channel Catfish (n = 120), White Bass (n=80), Hybrid Striped Bass (n=76), White Crappie (n = 65), Gizzard Shad (n = 56), Blue Catfish (n = 50), and Saugeye (n = 34) were the most encountered species in the sample (Table 1).

Channel Catfish

Channel catfish had a mean TL of 353 mm (range 188-592; Table 1). The relative frequency plot peaks at 330 mm TL with 68% of the sample measuring between 240-430 mm TL (Figure 1). Channel catfish had a mean CPUE of 7.90 (5.91-9.90 95% CI) with a SE of 1.02 (Table 2). The relative standard error (RSE) was 12.89. No preferred, memorable, or trophy sized fish were caught (Table 3). Substock, stock, and quality sized fish had mean CPUEs ranging 2.12-3.49 and standard error (SE) ranged 0.41-0.57 (Table 3). All sizes of fish had a RSE < 25 (Table 3). The overall Wr was fair at 84.95. Substock, stock, and quality sized fish Wr ranged 83.99-85.96. The maximum weight for an individual in this sample was 1972 g and PSD was moderate at 40.

Gizzard Shad

Gizzard Shad had a mean TL of 179 mm (range 133-345; Table 1). The length-frequency distribution for sample shows 86% ranged from 130-200 mm TL (Figure 1). Gizzard Shad had a mean CPUE of 3.77 (2.38-5.17 95% CI) with a SE of 0.71 (Table 2). The RSE was 18.84. Substock, stock and quality size fish were caught, with mean CPUEs of 1.73, 1.89, and 0.15 respectively (Table 3). PSD was low at 7 while PSD-S-Q was high at 93.

Hybrid Striped Bass

Hybrid Striped Bass were present in the sample. However, only two stockings have occurred thus far. As such, age-0 and age-2 fish were the only fish encountered. Hybrid Striped Bass had a mean TL of 365 mm (range 137-543; Table 1). The length-frequency distribution was bimodal, as expected, with peaks at 170 and 460 mm TL (Figure 1). CPUE was 4.92 (3.71-6.14 95% CI) with a SE of 0.62 (Table 2). The RSE was 12.60. Maximum weight for the sample was 2054 g. As we move forward with continued stockings, additional information will be added.

Saugeye

Saugeye had a mean TL of 431 mm (range 382-545) and a mean weight of 900 g (range 320-2680; Table 1). Fish ranging 340-430 mm TL made up 73.5 % of the sample (Figure 1). Saugeye had an overall mean CPUE of 2.20 (1.02-3.38 95% CI) with a SE of 0.60 (Table 1). Mean CPUE increased from 1.17 in 2022 (Figure 2). The RSE was 27.33, slightly above the suggested cutoff of 25 for monitoring population CPUE's (Table 1). No trophy or substock size fish were caught. Stock, quality, preferred, and memorable sized fish CPUE and SE ranged 0.13-1.51 and 0.11-0.47 respectively, although all RSE > 25 (Table 1). The percentage of fish ≥ 457 mm TL decreased from 55 % in 2022 to 26 % in 2023 (Figure 2). However, this fluctuation is likely explained by the fact that stockings occur every other year. The overall mean relative weight (Wr) was 96.21. Stock, quality, preferred, and memorable size fish had a Wr ranging 92-107. PSD was high at 94 and PSD-P was moderate at 26. PSD-M was fair at 12.

In total 34 fish were aged including 26 age-1 fish, 6 age-3 fish, and 2 age-5 fish. The mean TL for age-1, -3, and -5 fish was 392, 553, and 570 mm respectively (Figure 3). von Bertalanffy predicted growth parameters included a theoretical maximum length (L_∞) of 572 mm TL, a growth coefficient (K) of 1.13, and a t_0 of -0.02 (Figure 3). A catch-curve regression calculated an annual mortality (A) of 48.2 % and an instantaneous mortality (Z) of 0.66 (Figure 4). While growth and mortality results were able to be calculated, sample size is small, and results should be accepted with caution as they could be misrepresentative of the Saugeye population.

White Bass

White bass sampled had a mean TL of 267 mm (range 162-380; Table 1). Of the fish sampled, 80 % were between 240-340 mm TL (Figure 1). White bass had a mean CPUE of 5.07 (2.51-7.64 95% CI) with a SE of 1.31 (Table 2). The RSE was 25.81. No substock or trophy sized fish were caught (Table 3). Stock, quality, preferred, and memorable sized fish had mean CPUEs ranging from 0.07-3.34 and SE ranging 0.07-1.04 (Table 3). No size had a RSE ≤ 25 (Table 3). The overall Wr was moderate at 85.61. The maximum weight for this sample was 816 g. PSD was high at 82 and PSD-P was low at 16.

In total, 67 fish were aged with 12 age-0 fish, 37 age-1 fish, 20 age-2 fish, 9 age-3 fish, and 1 age-4 fish. The mean TL for age-0, -1, -2, -3, and -4 were 195, 260, 294, 311, and 369 mm TL respectively (Figure 3). von Bertalanffy growth metrics and mortality metrics were calculated and are reported below. However, due to small sample size, it is possible that this information misrepresents the White Bass population. von Bertalanffy predicted growth parameters included a theoretical maximum length (L_∞) of 346 mm TL, a growth coefficient (K) of 0.54, and a t_0 of -1.56 (Figure 3). A catch-curve regression calculated an A of 57.6 % and a Z of 0.86 (Figure 4).

White Crappie

White Crappie sampled had a mean TL of 233 mm (range 156-320; Table 1). The length-frequency distribution peaked at 260 mm TL (Figure 1). White Crappie had a mean CPUE of 4.34 (2.69-5.99 95% CI) with a SE of 0.84 (Table 2). The RSE was 19.43. No substock or trophy size fish were caught (Table 3). Stock, quality, preferred, and memorable sized fish had mean CPUEs ranging from 0.19-1.74 and SE ranging 0.10-0.71 (Table 3). All sizes of fish had a RSE > 25 (Table 3). The overall Wr was good at 98.20. The maximum weight for this sample was 490 g. PSD was high at 72. PSD-P was balanced at 45 and PSD-M was low at 5.

RECCOMENDATIONS

1. Continue to stock and monitor Hybrid Stripped Bass and Saugeye population dynamics and growth rates to evaluate stocking success.
2. Continue to stock Florida Largemouth Bass and monitor genetics to determine contribution to resident Largemouth Bass population.
3. Continue to monitor population dynamics for self-sustaining sportfish species (Largemouth and Spotted Bass, Crappie Spp., White Bass, Catfish Spp.).
4. Continue to monitor Gizzard Shad abundance and size distribution to gauge forage availability.
5. No regulation changes are recommended at this time.

Table 1. Sample size, mean TL (mm), mean weight (g), and associated ranges for each species represented.

Species	Number	Mean TL (range)	Mean Weight (range)
Black Crappie	4	242 (173-279)	217 (48-356)
Blue Catfish	50	507 (223-873)	1217 (76-3880)
Bluegill Sunfish	4	157 (142-171)	74 (58-109)
Channel Catfish	120	353 (188-592)	425 (40-1972)
Common Carp	8	410 (274-562)	-
Flathead Catfish	2	494 (398-590)	1493 (720-2266)
Freshwater Drum	19	176 (134-248)	61 (24-168)
Gizzard Shad	56	179 (133-345)	-
Largemouth Bass	4	338 (221-392)	700 (124-1006)
Orangespotted Sunfish	1	93	8
Saugeye	34	431 (342-585)	900 (320-2680)
Striped Bass Hybrid	76	365 (137-546)	885 (28-2054)
White Bass	80	267 (162-380)	239 (50-816)
White Crappie	65	233 (156-320)	200 (52-490)

Table 2. Total catch per unit effort for each species sampled.

Species	Mean	Count	RSE	SE	L 95% CI	U 95% CI	N RSE = 12.5 (25% range)	N RSE = 20 (40% range)
Black Crappie	0.24	16	77.46	0.19	-0.12	0.60	614	240
Blue Catfish	3.36	16	21.59	0.73	1.94	4.78	48	19
Bluegill Sunfish	0.25	16	44.91	0.11	0.03	0.47	206	81
Channel Catfish	7.90	16	12.89	1.02	5.91	9.90	17	7
Common Carp	0.56	16	44.22	0.25	0.07	1.05	200	78
Flathead Catfish	0.14	16	68.63	0.09	-0.05	0.32	482	188
Freshwater Drum	1.31	16	23.84	0.31	0.70	1.92	58	23
Gizzard Shad	3.77	16	18.84	0.71	2.38	5.17	36	14
Largemouth Bass	0.25	16	44.73	0.11	0.03	0.46	205	80
Orangespotted Sunfish	0.06	16	100.00	0.06	-0.06	0.17	1024	400
Saugeye	2.20	16	27.33	0.60	1.02	3.38	76	30
Smallmouth Buffalo	0.06	16	100.00	0.06	-0.06	0.18	1024	400
Striped Bass Hybrid	4.92	16	12.60	0.62	3.71	6.14	16	6
White Bass	5.07	16	25.81	1.31	2.51	7.64	68	27
White Crappie	4.34	16	19.43	0.84	2.69	5.99	39	15

Table 3. Catch per unit effort by size category.

| Species	Size Category	Mean	RSE	SE	L 95% CI	U 95% CI	N RSE = 12.5 (25% range)	N RSE = 20 (40% range)
Channel Catfish	substock	2.12	24.94	0.53	1.08	3.15	64	25
Channel Catfish	stock	3.49	16.25	0.57	2.38	4.60	27	11
Channel Catfish	quality	2.29	17.76	0.41	1.49	3.09	32	13
Gizzard Shad	substock	1.73	29.16	0.50	0.74	2.72	87	34
Gizzard Shad	stock	1.89	21.12	0.40	1.11	2.68	46	18
Gizzard Shad	quality	0.15	100.00	0.15	-0.14	0.44	1024	400
Saugeye	stock	0.13	68.61	0.09	-0.05	0.31	482	188
Saugeye	quality	1.51	31.37	0.47	0.58	2.44	101	39
Saugeye	preferred	0.31	47.79	0.15	0.02	0.60	234	91
Saugeye	memorable	0.25	44.93	0.11	0.03	0.47	207	81
Striped Bass Hybrid	substock	1.48	18.86	0.28	0.94	2.03	36	14
Striped Bass Hybrid	stock	0.52	43.60	0.23	0.08	0.96	195	76
Striped Bass Hybrid	quality	2.79	18.99	0.53	1.75	3.83	37	14
Striped Bass Hybrid	preferred	0.13	68.49	0.09	-0.05	0.31	480	188
White Bass	stock	0.90	38.47	0.35	0.22	1.58	152	59
White Bass	quality	3.34	31.23	1.04	1.29	5.38	100	39
White Bass	preferred	0.76	30.71	0.23	0.30	1.22	97	38
White Bass	memorable	0.08	100.00	0.08	-0.07	0.22	1024	400
White Crappie	stock	1.21	32.84	0.40	0.43	2.00	110	43
White Crappie	quality	1.20	32.24	0.39	0.44	1.95	106	42
White Crappie	preferred	1.74	25.05	0.43	0.88	2.59	64	25
White Crappie	memorable	0.19	53.94	0.10	-0.01	0.40	298	116
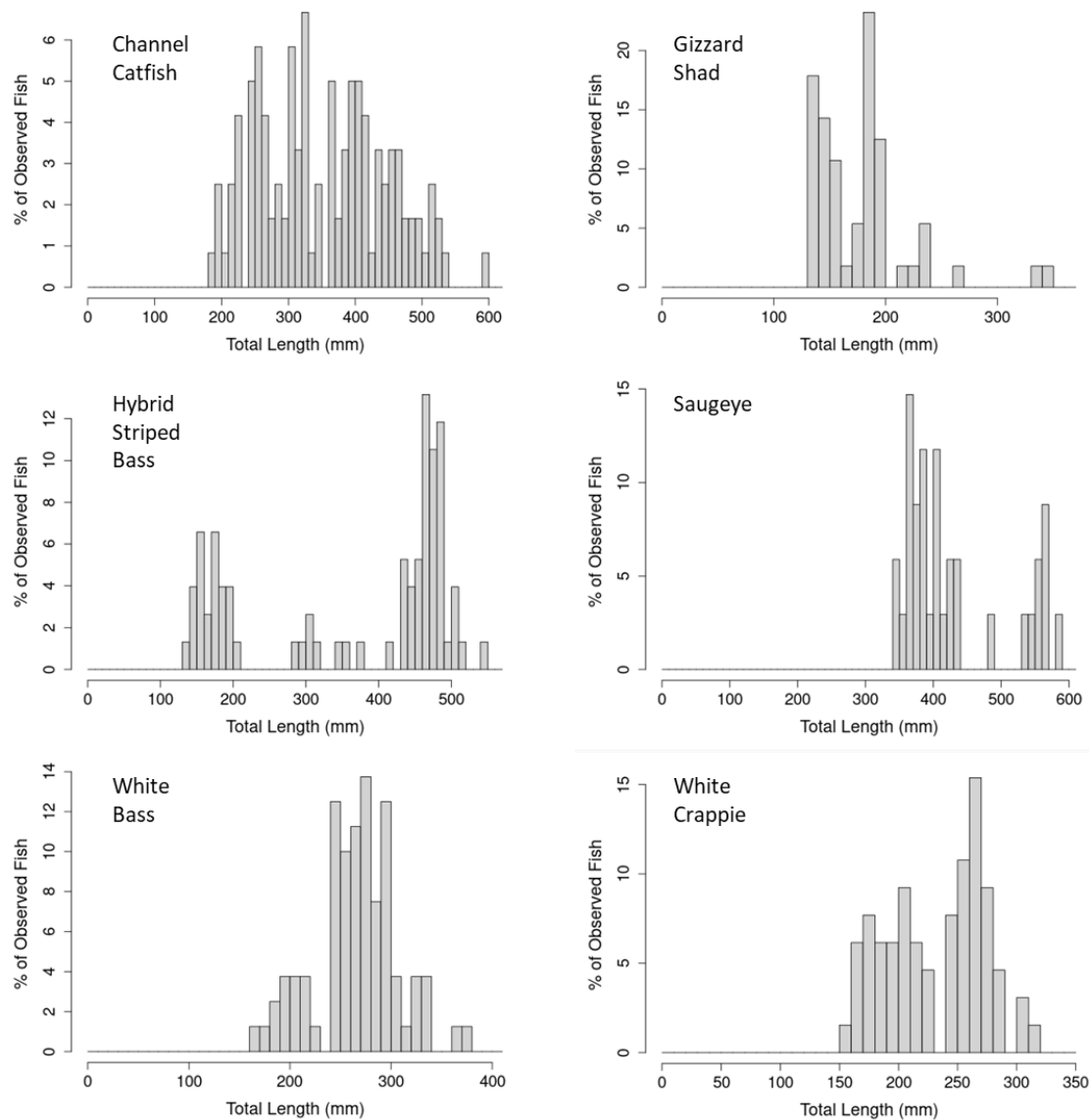
Figure 1. Length-frequency distributions for six fish species from Lake Thunderbird.
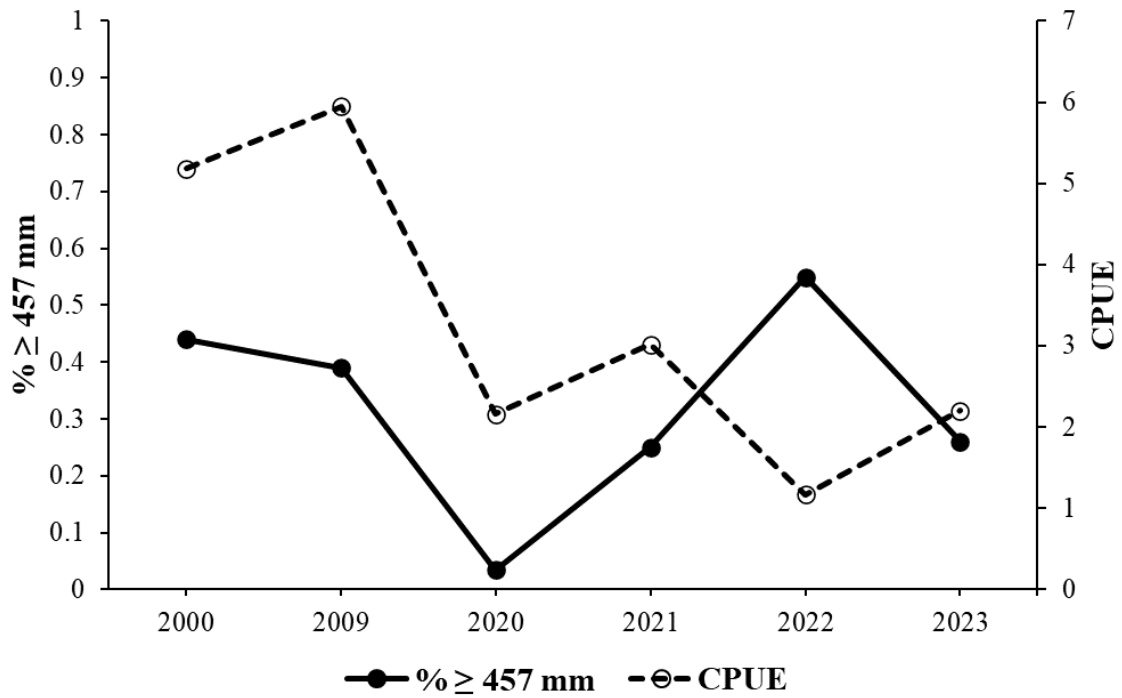
Figure 2. Percentage of Saugeye sampled greater than or equal to the minimum size limit (457 mm TL/18 inches) and catch per unit effort (CPUE) through time for Lake Thunderbird.
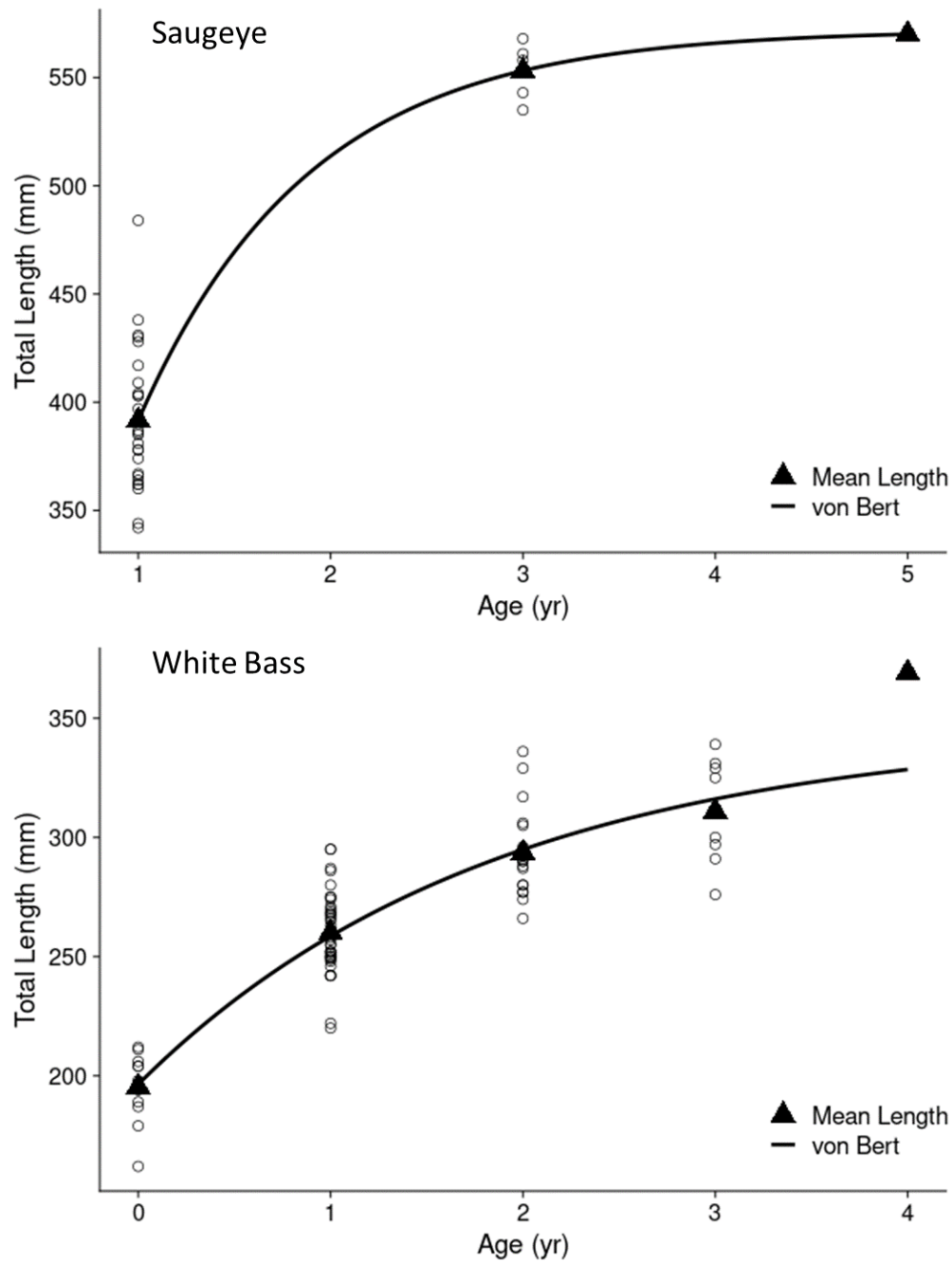
Figure 3. vonBertalnffy growth curve for Saugeye and White Bass collected from Lake Thunderbird. Circles depict individual lengths at age.
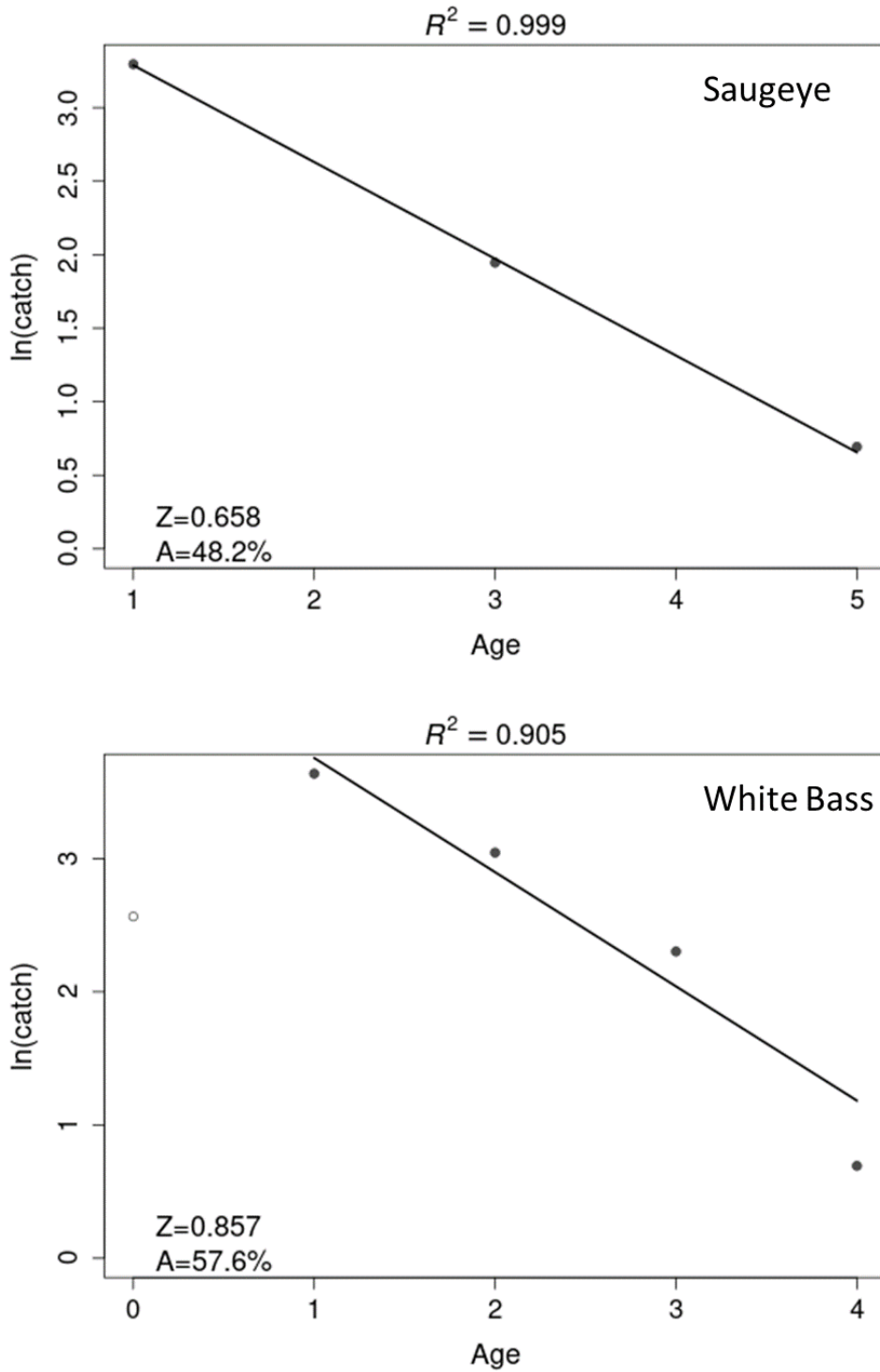
Figure 4. Catch-curves, instantaneous mortality (Z), and annual mortality (A) for Saugeye and White Bass collected from Lake Thunderbird.

Appendix 1. Species, number, and size of fish stocked in Lake Thunderbird since 2012.

Date	Species	Number	Size (inches)
2012	Florida Largemouth Bass	242,854	1.5
2012	Saugeye	246,270	2
2013	Florida Largemouth Bass	100,050	1.5
2014	Florida Largemouth Bass	60,000	1.5
2014	Saugeye	126,648	1.3
2015	Florida Largemouth Bass	106,858	1.5
2016	Florida Largemouth Bass	60,000	1.5
2016	Saugeye	269,200	1.5
2017	Florida Largemouth Bass	60,000	1.5
2017	Saugeye	246,230	1.5
2018	Florida Largemouth Bass	60,337	1.5
2018	Saugeye	103,346	1.7
2019	Saugeye	123,000	1.6
2020	Florida Largemouth Bass	99,286	1.5
2020	Saugeye	119,480	1.6
2021	Hybrid Striped Bass	604,396	1.5
2022	Saugeye	120,657	1.5
2023	Florida Largemouth Bass	121,711	1.5
2023	Hybrid Striped Bass	621,883	1.5