SURVEY REPORT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

FISH MANAGEMENT SURVEY AND RECOMMENDATIONS

FOR

Sahoma Lake

2022-2023

SURVEY REPORT

State: Oklahoma

Project Title: Oklahoma Fisheries Management Program

Study Title: Surveys and Recommendations – Sahoma Lake

Period Covered: 1 January 2022 – 31 December 2023

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Date Prepared: November 2023

Sahoma Lake

ABSTRACT

Lake Sahoma was sampled by spring electrofishing in 2022 and 2023 to determine black bass population trends and by fall gill netting in 2023 to determine sport fish population trends. Catch rates for Largemouth Bass slightly increased in 2023 (C/f = 87.7) from 2022 (C/f = 67.33) with fish greater than eight inches being in excellent condition, making Sahoma Lake a quality Largemouth Bass lake. Fall gill netting has shown that small crappie remain in high abundance and are likely stunted with no fish greater than 10 inches captured in the sample. Channel catfish remain at good abundance, but only larger fish greater than 16 inches were sampled, indicating possible poor spawning and recruitment due to recent lake level manipulations for repairing to the dam.

INTRODUCTION

Lake Sahoma impounds Rock Creek 11 km northwest of Sapulpa in Creek County, Oklahoma. Sahoma was constructed in 1947 by the City of Sapulpa. Sahoma Reservoir has a mean depth of 1.45 m and a maximum depth of 16 m, a water exchange rate of 2.22, and a Secchi disc visibility of 34 inches in the main pool in April. Turbidity is primarily from suspended clay. Fish habitat consists primarily of aquatic vegetation, rock, and flooded timber.

Lake levels at Sahoma Lake have been highly variable since about 2012 due to large leaks discovered in the dam. The city has had to drain the lake down almost completely from 2016 to 2018 to make repairs to the dam. Fall gill net surveys and spring electrofishing surveys were done recently in consecutive years to monitor impacts to fish populations in the lake.

Sahoma Lake was sampled in 2022 and 2023 by spring shoreline electrofishing to monitor Largemouth Bass abundance and population trends since the recent lake level manipulations. The lake was also sampled by fall experimental gill netting to monitor population trends and abundance of White Crappie and Channel Catfish. Fall experimental gill netting was also performed to monitor Gizzard Shad populations as a forage base for sportfish within the lake.

Hybrid Striped Bass were stocked into Sahoma Lake from 1997 to 2005 to help control crappie populations and to serve as an additional fishery within the lake. Hybrids have since been proven ineffective at controlling crappie populations, and the drastic lake level manipulations prevented stockings from continuing. No Hybrid Striped Bass have been found in samples since 2011.

Sauger were introduced into the lake in 2022 and 2023 to potentially add an additional fishery, replacing the Hybrid Striped Bass, and to potentially help with the stunted crappie situation through predation.

RESULTS

Largemouth Bass

1. Largemouth Bass abundance from spring boat electrofishing in 2023 (C/f = 87.75) indicates that Sahoma Lake is a quality bass fishery (Table 1).
2. Relative weights for fish larger than eight inches were excellent in 2023, but fish smaller than eight inches had relative weights slightly lower than acceptable.
3. The lower relative weights for smaller fish could be due to increased population and increased competition for food.
4. Since the lake levels have stabilized at closer to normal levels, favorable spawning habitat is available along a good portion of the shoreline.

Crappie

1. Crappie were most recently sampled in 2023 by fall experimental gill netting where catch rates (C/f = 12.14) indicating that that White Crappie continue to be overpopulated and stunted as catch rates were high for small fish, but very low for fish over eight inches, and in 2023, no fish over 10 inches were sampled (Table 5).
2. Relative weights for fish greater than eight inches was less than the acceptable values but were satisfactory for fish less than eight inches which dominated the sample.
3. Stable water conditions since the lake levels have returned to normal provide ample spawning habitat for crappie to reproduce.

Channel Catfish

1. Channel Catfish catch rates in 2023 remain consistent and high enough to indicate a quality fishery (C/f = 5.22; Table 9)
2. All fish caught were larger than 16 inches, indicating poor reproduction and recruitment success in recent years. This could be due to the lake levels having been drawn down drastically from 2016 to 2018 for repairs to be made to the dam.
3. Additional sampling is needed to determine if reproduction and recruitment of Channel Catfish is successful since lake levels have returned to near normal levels.

Shad

1. Gizzard Shad were last sampled by experimental gill netting in 2023 where catch rates were good (C/f = 5.38) but significantly lower than in the most recent samples (Table 11).
2. Gizzard shad populations tend to be highly variable and there are not any real concerns for the low catch rate in 2023. If a trend of low catch rates continues over future samples, then action could be needed to alleviate the problem.

RECOMMENDATIONS

Fish Attractor Structures

1. If enough Shelbyville Cube structures are available, Sahoma Lake may receive a few to enhance fishing near popular areas.

Fish Stockings

1. Continue with stocking sauger fingerlings one more year to determine if fish can successfully recruit to a catchable size.
2. Monitor Channel Catfish populations closely to determine if stockings will be needed to supplement the current population due to recent lake level manipulations impacting natural spawning success.

Fish Surveys

1. With the statewide regulation changes for Largemouth Bass, additional electrofishing surveys should be conducted at least twice within the next five years to monitor changes in the population.
2. Conduct a fall, nighttime electrofishing survey to determine if sauger stockings are successful and fish are recruiting to a catchable size.
3. Continue with fall experimental gill net surveys twice within the next five years to continue monitoring crappie and Channel Catfish populations. This will help determine if supplemental catfish stockings are needed to help the population rebound from the lake level manipulations and determine if crappie populations improve from predation from Sauger.

Fishing Regulations

1. Maintain current statewide regulations for all species as they are the best options for adequately managing the sportfish in Sahoma Lake.
2. Consider more restrictive size and harvest limit regulation options for Channel Catfish should populations not rebound naturally.

Table 1. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of **Largemouth Bass** collected by spring electrofishing from Sahoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total (≥ 40)		< 8 inches (15-45)		8-13 inches (15-30)		≥ 12 inches (≥ 15)		≥ 14 inches (≥ 10)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r	C/f	W_r
2021	57	42.75	12.0	88	12.0	93	21.0	108	15.0	109
2022	101	67.33	17.33	98	24.67	100	32.67	105	22.0	106
2023	117	87.75	23.25	86	27.0	102	47.25	106	30.75	108

Table 2. Total catch per unit effort (CPUE; C/f) for **Largemouth Bass** collected by spring electrofishing from Sahoma Lake, 2021-2023 (OFAT analysis).

Species	**Mean**	**Count**	**RSE**	**SE**	**L 95% CI**	**U 95% CI**	**N RSE = 12.5 (25% range)**	**N RSE = 20 (40% range)**
Largemouth Bass (2021)	47.25	8	17.28	7.39	28.27	57.23	15	6
Largemouth Bass (2022)	67.33	9	8.37	5.64	56.28	78.38	4	2
Largemouth Bass (2023)	87.25	8	9.75	8.56	70.98	104.52	5	2

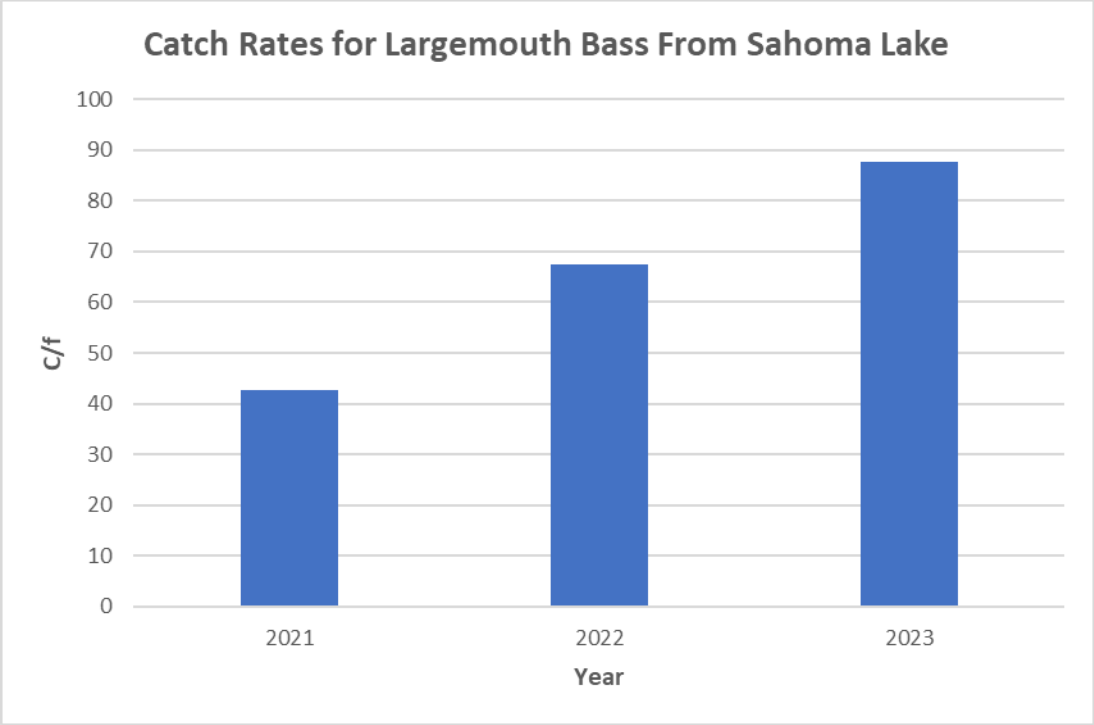

Figure 1. Total catch per unit effort (CPUE; C/f) for **Largemouth Bass** in Sahoma Lake from spring electrofishing surveys from 2021-2023.

Table 3. Catch per unit effort (CPUE; C/f) by size category for **Largemouth Bass** collected by spring electrofishing from Sahoma Lake, 2022 (OFAT analysis).

Species	Size Category	Mean	RSE	SE	L 95% CI	U 95% CI	N RSE = 12.5 (25% range)	N RSE = 20 (40% range)
Largemouth Bass	substock	16.0	25.77	4.12	7.92	24.08	38	15
Largemouth Bass	stock	18.67	15.57	2.91	12.97	24.63	14	5
Largemouth Bass	quality	14.0	20.2	2.83	8.46	19.54	24	9
Largemouth Bass	preferred	17.33	16.76	2.91	0.88	23.03	16	6
Largemouth Bass	memorable	1.33	66.14	0.88	-0.4	3.06	252	98
Largemouth Bass	trophy	0	0	0	0	0	0	0

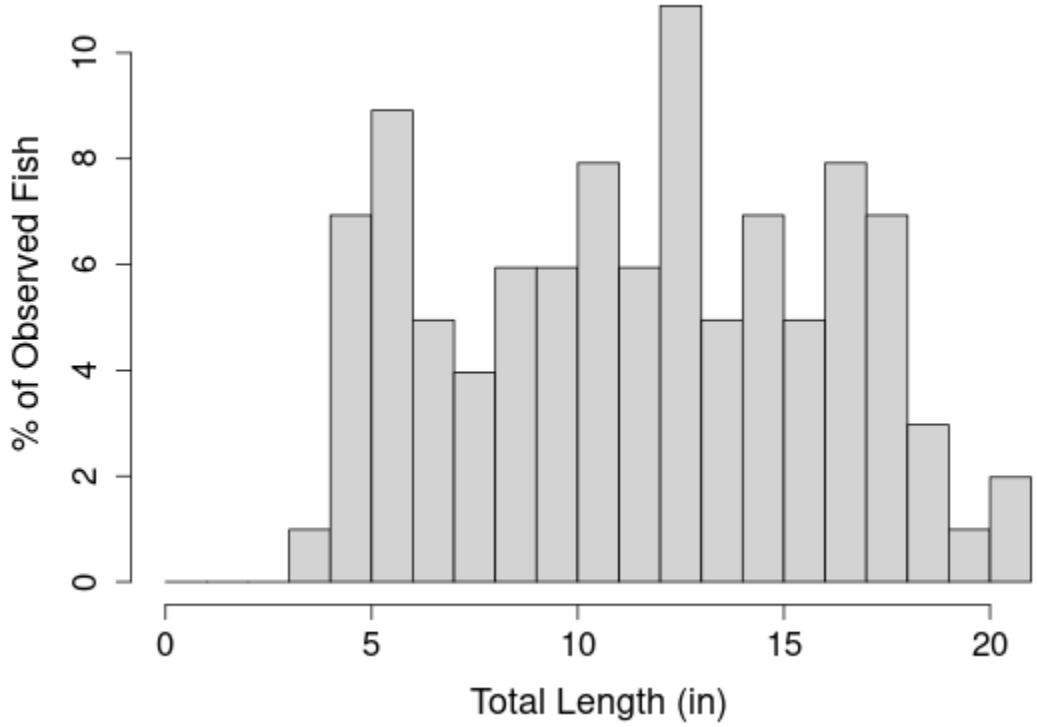

Figure 2. Length frequencies for **Largemouth bass** collected by spring electrofishing in Sahoma Lake, 2022.

Table 4. Catch per unit effort (CPUE; C/f) by size category for **Largemouth Bass** collected by spring electrofishing from Sahoma Lake, 2023 (OFAT analysis).

Species	Size Category	Mean	RSE	SE	L 95% CI	U 95% CI	N RSE = 12.5 (25% range)	N RSE = 20 (40% range)
Largemouth Bass	substock	22.5	23.5	5.29	12.14	32.86	28	11
Largemouth Bass	stock	15.0	29.28	4.39	6.39	23.61	44	17
Largemouth Bass	quality	24.0	21.13	5.07	14.06	33.94	23	9
Largemouth Bass	preferred	25.5	16.49	4.2	17.26	33.74	14	5
Largemouth Bass	memorable	0.75	100.0	0.75	-0.72	2.22	512	200
Largemouth Bass	trophy	0	0	0	0	0	0	0

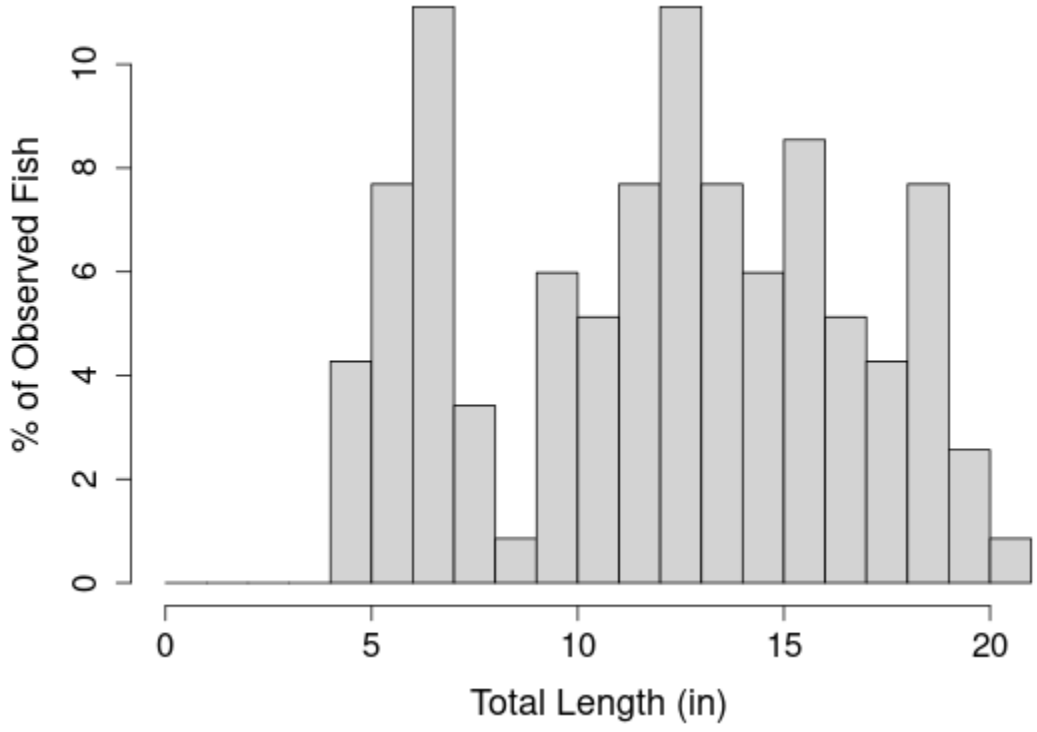

Figure 3. Length frequencies for **Largemouth bass** collected by spring electrofishing in Sahoma Lake, 2023.

Table 5. Total number (No.), catch rates (C/f), and relative weights (Wr) by size groups of **Crappie** collected by fall gill netting from Sahoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable Wr values are ≥90.

	Total (≥4.8)		<8 inches (1.2-7.2)		≥8 inches (1.9)		≥ 10 inches (>1.0)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1996	43	12.96	11.76	87	1.2	103	1.2	103
1997	100	40.08	40.08	83	0		0	
1998	59	13.68	12.96	90	0.72	97	0.24	133
1999	68	24.72	23.28	88	1.44	102	1.44	102
2000	23	8.88	7.68	92	1.2	92	0.48	104
2001	55	19.92	19.92	94	0		0	
2006	65	16.32	16.08	90	0.24	120	0.24	120
2008	87	20.88	20.40	88	0.48	100	0.24	106
2011	64	9.54	8.35	91	1.19	86	0.15	102
2019	29	7.42	5.99	109				
2020	53	9.50	9.14	93	0.36	85	0.36	85
2021	45	9.08	8.47	97	0.61	112	0.61	112
2023	52	12.14	10.63	96	0.43	85		

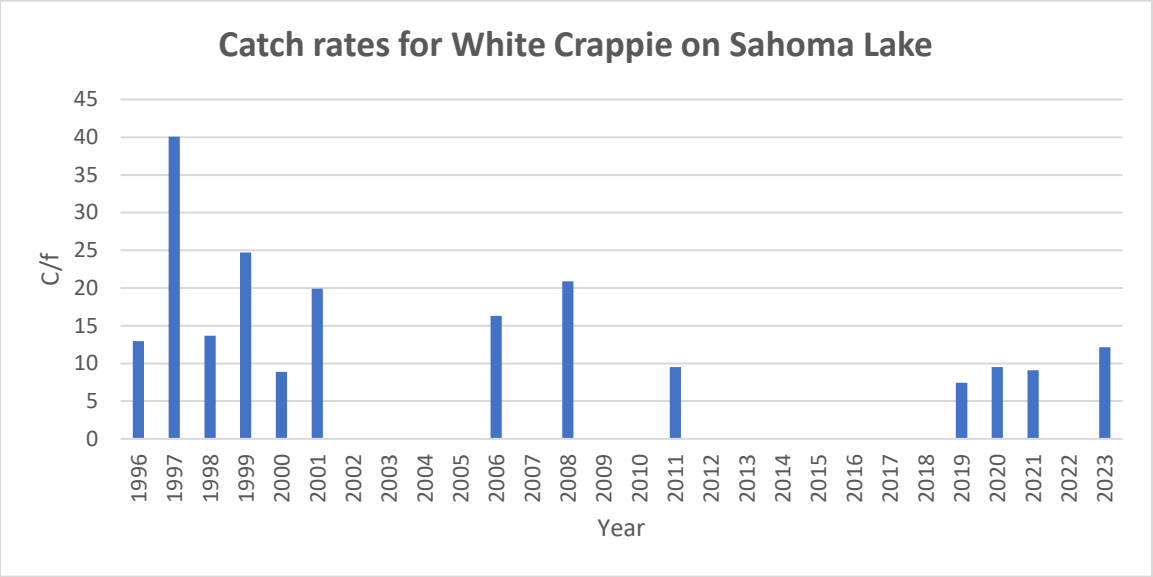

Figure 4. Total catch per unit effort (CPUE; C/f) for **White Crappie** in Sahoma Lake from fall gill net surveys from 1996-2023.

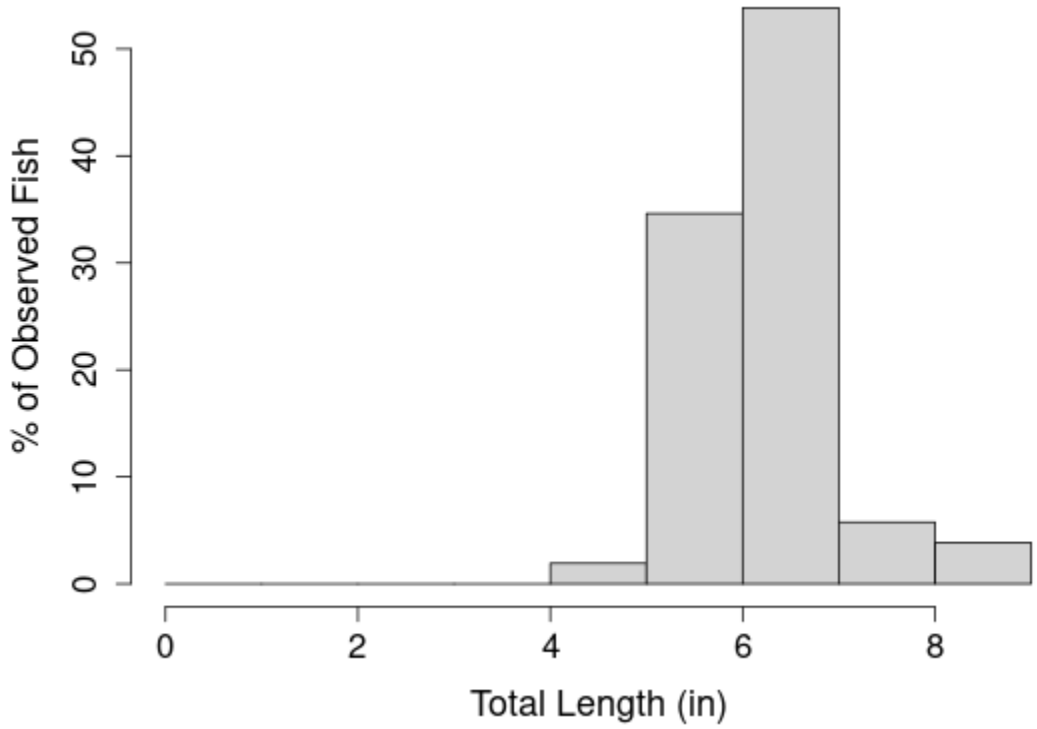

Figure 5. Length frequencies for **White Crappie** collected by 5fall gill netting in Sahoma Lake, 2023.

Table 6. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of **Crappie** collected by fall trap netting from Sahoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total (≥0.2)		**<8 inches (0.05-0.3)**		**≥8 inches (0.08)**		**≥ 10 inches (>0.04)**	
Year	**No.**	**C/f**	**C/f**	**W_r**	**C/f**	**W_r**	**C/f**	**W_r**
2021	590	40.41	39.32	95	1.10	101	0.67	106

Table 7. Mean length at age of **Crappie** collected from Sahoma Lake. Numbers in parentheses represent values for acceptable growth rates.

Year	**Age 1 (≥160mm) (6.3 inches)**	**Age 2 (≥200 mm) (8 inches)**	**Age 3 (≥225 mm) (9 inches)**	**Age 4 (≥250 mm) (10 inches)**
2021	143	163	204	204

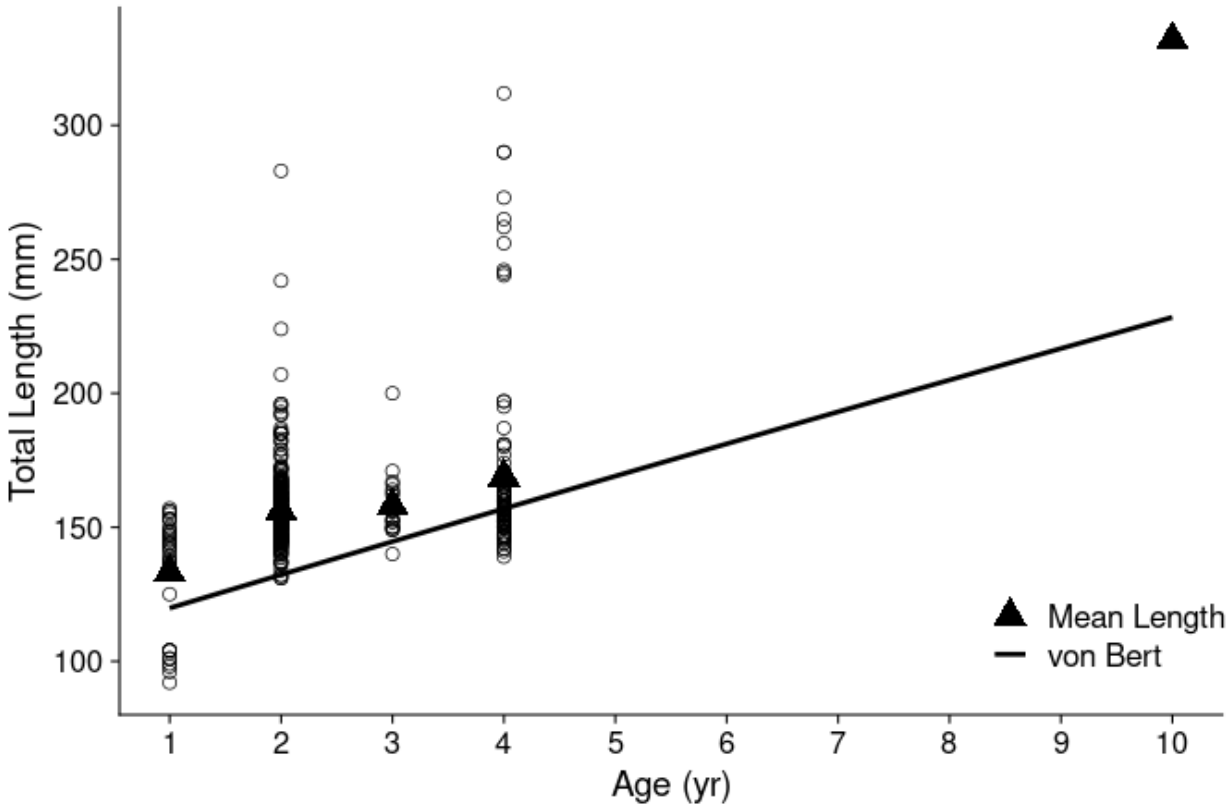

Figure 6. Von Bertalanffy plot for **White Crappie** aged from Sahoma Lake, 2021.

Table 8. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of **White Bass** collected by fall gill netting from Sahoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total (≥4.8)		**<8 inches (1.2-7.2)**		**8-12 inches (1.2-7.2)**		**≥ 12 inches (>2.4)**	
Year	**No.**	**C/f**	**C/f**	**W_r**	**C/f**	**W_r**	**C/f**	**W_r**
1996								
1997								
1998								
1999								
2000								
2001								
2006	1	0.24					0.24	97
2008	31	7.44	6.96	88	0.48	96		
2011								
2019								
2020	2	0.36			0.18	100	0.18	104
2021								
2023								

Table 9. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of **Channel Catfish** collected by fall gill netting from Sahoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total (≥4.8)		<12 inches (≥2.4)		≥12 inches (≥2.4)		≥ 16 inches (≥1.2)	
Year	No.	C/f	C/f	W_r	C/f	W_r	C/f	W_r
1996	43	12.96	6.24	90	6.72	76	1.44	93
1997	16	6.48	4.08	76	6	84	2.88	83
1998	18	4.32	0.72	91	1.92	91	1.92	86
1999	14	5.04	2.16	78	2.88	84	1.44	81
2000	25	9.36	7.2	84	2.4	90	1.44	93
2001	31	1.2	4.32	83	6.96	80	3.36	81
2006	19	4.8	2.88	106	1.92	86	1.68	86
2008	61	14.64	8.64	102	6.0	90	4.56	91
2011	37	5.52	0.15	105	5.37	95	4.77	83
2019	46	9.41	0.41	96	9.0	92	8.38	92
2020	19	3.41	0.18	64	3.23	91	2.88	90
2021	28	5.78	1.45	121	4.33	95	3.91	94
2023	24	5.22			5.22	90	5.22	90

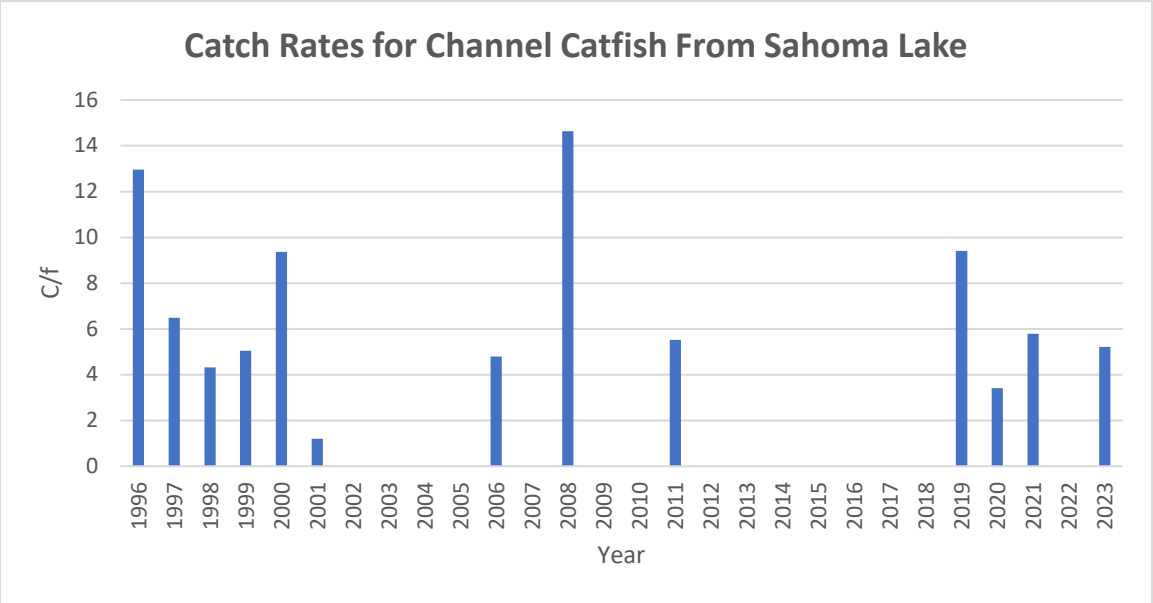

Figure 7. Total catch per unit effort (CPUE; C/f) for **Channel Catfish** in Sahoma Lake from fall gill net surveys from Sahoma Lake, 1996-2023.

Table 10. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of **Hybrid Striped Bass** collected by fall gill netting from Sahoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total		**<12 inches**		**12-20 inches**		**≥20 inches**	
Year	**No.**	**C/f**	**C/f**	**W_r**	**C/f**	**W_r**	**C/f**	**W_r**
1996								
1997								
1998								
1999								
2000								
2001								
2006	21	0.22			0.16	94	0.06	103
2008	12	2.88	2.88	92				
2011	35	5.22			4.47	90	0.75	83
2019								
2020								
2021								
2023								

Table 11. Total number (No.), catch rates (C/f), and relative weights (W_r) by size groups of **Gizzard Shad** collected by fall gill netting from Sahoma Lake. Numbers in parentheses represent acceptable C/f values for a quality fishery. Acceptable W_r values are ≥90.

	Total (≥4.8)		<6 inches (>2.4)		>6 inches	
Year	No.	C/f	C/f	W_r	C/f	W_r
1996		31.2				
1997		13.68				
1998		16.8				
1999		63.36				
2000		3.12				
2001		15.36				
2006	54	13.68	12.0		1.68	
2008	185	48.24	9.12		35.28	
2011	86	25.04	5.81		7.01	
2019	12	2.9			2.50	
2020	41	7.36	0.36		7.01	
2021	75	17.02	6.74		8.64	
2023	16	5.38	1.51		1.92	

Table 12. Species, number, and size of fish stocked in Sahoma Lake from 1983-2005.

Date	Species	Number	Size
1980	Largemouth Bass	666,000	Fingerlings
1981	Florida LMB	444,000	Fingerlings
1981	Channel Catfish	33,000	Growouts
1981	Walleye	789,000	Fry
1982	Blue Catfish	45	Adults
1983	Smallmouth Bass	198	Sub-adults
1983	Northern LMB	26,300	2.5
1983	Channel Catfish	10,000	3”
1984	Channel Catfish	25,075	Fingerlings
1984	Florida LMB	26,600	2”
1985	Florida LMB	5,400	3”
1985	Channel Catfish	23,958	4”
1986	Florida LMB	5,000	1”
1986	Channel Catfish	24,864	
1987	Florida LMB	9,750	Fingerlings
1987	Channel Catfish	24,200	5”
1988	Florida LMB	9,744	3”
1988	Florida LMB	24,200	5”
1989	Northern LMB	9,690	2.75”
1990	Northern LMB	19,000	2.5”
1990	Northern LMB	20,500	4.2”
1996	Hybrid Striped Bass	4,200	1.25”
1996	Threadfin Shad	250	
1997	Threadfin Shad	250	
1997	Hybrid Striped Bass	4,200	Fingerlings
1998	Hybrid Striped Bass	4,200	2”
1999	Hybrid Striped Bass	4,050	4.5”
2001	Hybrid Striped Bass	3,120	2”
2002	Hybrid Striped Bass	3,120	2”
2005	Hybrid Striped Bass	158	6”
2022	Sauger		Fingerlings
2023	Sauger		Fingerlings