Elm Lake Survey Summary

Elm Lake, located 9.0 miles west and 1 mile north of Frederick, is managed as a black crappie and walleye fishery; however, other fish species (e.g., bluegill, channel catfish, northern pike, yellow perch) are present and contribute to the fishery.

- **Black crappie.** The 2024 mean frame net CPUE of 74.9 was the highest recorded in surveys conducted from 2000 – 2024 and suggested high relative abundance. Sampled black crappies ranged in length from 4.7 to 12.2 inches, of those at least 5.0 inches, 96% were ≥ 8.0 inches and 4% were ≥ 10.0 inches. Individuals from four year classes contributed to the catch. Those from the 2022 (age-2) cohort, which had a mean length at capture of 8.4 inches, were the most abundant accounting for 86% of black crappies in the sample.

- **Bluegill.** Although not abundant, bluegills are commonly sampled at Elm Lake. In 2024, frame nets captured 57 bluegills (3.2 per net) from 4.3 to 9.1 inches, 81% were ≥ 6.0 inches and 16% were ≥ 8.0 inches.

- **Channel catfish.** Like bluegills, channel catfish are not abundant but commonly sampled at Elm Lake. In 2024, gill nets caught 18 individuals (1.5 per net) that ranged in length from 23.2 to 29.9 inches, most (94%) were ≥ 24.0 inches.

- **Walleye (includes saugeye).** Walleye numbers were lower in 2024 than in 2022. At 1.1 per gill net, relative abundance was considered low. Sampled walleyes ranged in length from 6.7 to 26.8 inches, of those that were at least 10.0 inches, 69% were ≥ 15.0 and 23% were ≥ 20.0 inches. Seven year classes contributed to the catch, each was represented by four of fewer individuals. Although sample sizes are small, growth appears variable with mean length at captures at age 3 from 10.9 to 16.0 since 2015. In 2024, the mean length at capture for age-3 fish was 16.0 inches.

- **Yellow Perch**. Yellow perch were the second most abundant fish species in the 2024 gill net catch (5.3 per net), behind only black bullhead. Sampled yellow perch ranged in length from 5.9 to 9.1 inches, 77% were ≥ 8.0 inches. Individuals from two year classes (2022 and 2023) comprised the entire sample. Those from the 2022 (age-2) cohort, which had a mean length at capture of 8.3 inches, were the most numerous accounting for 98% of fish in the sample.

For more detailed results see the computer generated South Dakota Statewide Fisheries Survey for Elm (Brown; below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Elm, Brown County
ELM-Lake-5-800
2024

Lake Information

Name: Elm

County: Brown

Surface Area: 1,221 Acres

Maximum Depth: 34 Feet

Mean Depth: 18 Feet

Surveys and Investigations

Survey methods used by gear type, date, and effort.

Gear	Date	Effort
AFS std gill net	Jul 30, 2024	4 net-nights
AFS std gill net	Jul 31, 2024	4 net-nights
AFS std gill net	Aug 01, 2024	4 net-nights
frame net (std 3/4 in)	Jul 30, 2024	6 net-nights
frame net (std 3/4 in)	Jul 31, 2024	6 net-nights
frame net (std 3/4 in)	Aug 01, 2024	6 net-nights

Common Fish Species Present

Walleye

Black Crappie

Black Bullhead

Yellow Perch

White Sucker

Bluegill

Common Carp

Channel Catfish

Northern Pike

Terminology

Catch per unit effort (**CPUE**) refers to the relative abundance of a species. It is defined as the number of fish captured per unit of effort (i.e., number of fish captured per net-night or number of fish captured per hour electrofishing). In this report CPUE is typically given for only stock-length fish (see length categories table for stock lengths).

A statewide effort to help make netting efforts comparable to all waters sampled across the state, occurred in 2017, with a switch to American Fisheries Society gill nets. Past gill netting efforts were completed with different style/types of nets and are not comparable side by side.

- **AFS std gill net** – 80 ft experimental gill net containing eight panels (10 ft each) of varying monofilament meshes of 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25 and 2.50 inches.
- **std experimental gill net for non-Missouri River waters** - 150 ft experimental gill net containing six panels (25 ft each) of varying monofilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.
- s**td experimental gill net for Missouri River reservoirs** – 300 ft experimental gill net containing six panels (50 ft each) of varying multifilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.

$$CPUE = \frac{number\ of\ fish}{effort}$$

Population size structure is quantified using the indices proportional size distribution of quality-length fish (**PSD**) and proportional size distribution of preferred-length fish (**PSD-P**). These indices indicate the proportion of stock-length fish that are equal to or greater than a given length. Minimum lengths for stock, quality and preferred length fish are given in the length categories table.

$$PSD = \left(\frac{number\ of fish \geq quality\ length}{number\ of\ fish \geq stock\ length}\right) \text{x } 100$$

$$PSD - P = \left(\frac{number\ of fish\ \geq preferred\ length}{number\ of\ fish \geq stock\ length}\right) \text{x } 100$$

Relative weight (**Wr**) is used to quantify fish plumpness. Relative weight is the ratio of what a fish weighs (W) compared to a length-specific standard weight (Ws) multiplied by 100. Relative weight values of 95-105 are commonly cited as optimum values, but values in the 80s are common during summer sampling in South Dakota.

$$Wr = \left(\frac{W}{Ws}\right) \text{x } 100$$

Confidence intervals (**CI**) are provided for many of the estimates calculated in this report. The confidence interval provides a range in which the true mean is expected to fall. For example, with an 80% CI we are 80% confident that the interval contains the true value.

Length categories include stock (**S**), quality (**Q**), preferred (**P**), memorable (**M**) and trophy (**T**). Length categories for most species have been defined based on a percentage of the world record length for that species. Some species mentioned in this report do not have defined length categories. Length categories for species used in this report are provided in the following table. Measurements are the minimum total length for each category and are reported in inches (in) and centimeters (cm).

	Stock		Quality		Preferred		Memorable		Trophy	
Species Name	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)
Black Bullhead	6	15	9	23	12	30	15	38	18	46
Black Crappie	5	13	8	20	10	25	12	30	15	38
Bluegill	3	8	6	15	8	20	10	25	12	30
Brown Trout	8	20	12	30	16	40	20	50	18	46
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Lake Trout	12	30	20	50	26	65	31	80	39	100
Largemouth Bass	8	20	12	30	15	38	20	51	25	63
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Rainbow Trout	10	25	16	40	20	50	26	65	31	80
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
Smallmouth Bass	7	18	11	28	14	35	17	43	20	51
Walleye	10	25	15	38	20	51	25	63	30	76
White Bass	6	15	9	23	12	30	15	38	18	46
White Crappie	5	13	8	20	10	25	12	30	15	38
Yellow Bullhead	4	10	7	18	9	23	11	28	14	36
Yellow Perch	5	13	8	20	10	25	12	30	15	38

Catch Summary of Stock Length Fish

Catch per unit effort (CPUE), proportional size distribution (PSD), proportional size distribution of preferred length fish (PSD-P), and relative weight (Wr) for species sampled in survey with 80% confidence interval (CI-80).

*** Methods/Species that ignore stock length**

			Abundance		Stock Density Indices				Condition	
Gear	Species	Sample Size (n)	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	228	19.0	4.5	68	4	0		105	1
	Black Crappie	12	1.0	0.6	92		8		113	3
	Channel Catfish	18	1.5	0.6	100		94		110	4
	Common Carp	13	1.1	0.5	92		69		91	3
	Northern Pike	6	0.5	0.3	100		50		88	3
	Walleye	14	1.1	0.5	69		23		83	3
	White Sucker	46	3.8	1.3	100		80	9	99	1
	Yellow Perch	64	5.3	1.6	77	8	0		103	2
frame net (std 3/4 in)	Black Bullhead	1369	76.1	22.5	83	1	0		94	1
	Black Crappie	1357	74.9	22.3	96	1	4	1	109	1
	Bluegill	57	3.2	1.2	81	8	16	7	111	2
	Channel Catfish	35	1.4	0.7	68	15	56	16	103	2
	Common Carp	43	2.4	1.5	98		67	11	84	2
	Green Sunfish	1	0.1	0.1	100		0		108	
	Northern Pike	12	0.6	0.3	90		20		80	3
	Walleye	27	1.2	0.3	19		10		80	1
	White Sucker	11	0.6	0.2	100		91		93	2
	Yellow Perch	122	6.8	1.9	72	6	1		103	1

10-Year Catch Per Unit Effort by Gear and Species

Catch per unit effort (CPUE) and average (Avg) of species across 10 years using different gear types.

*** AFS standard frame nets used in 2016 (Avg excludes 2016)**

		CPUE										
Gear	Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Avg
AFS std gill net	Black Bullhead		32.1		10.8	1.9	1.4		4.6		19.0	11.63
	Black Crappie		0.8		0.8	0.2	1.0		0.1		1.0	0.65
	Bluegill		0.0		0.0	0.0	0.0		0.2		0.0	0.03
	Channel Catfish		1.6		3.3	0.7	1.8		0.8		1.5	1.62
	Common Carp		3.5		3.5	3.2	5.1		1.1		1.1	2.92
	Northern Pike		0.7		0.1	0.2	0.2		0.2		0.5	0.32
	Walleye		1.0		3.3	1.1	3.1		5.3		1.1	2.48
	White Sucker		2.9		3.1	1.0	1.0		3.1		3.8	2.48
	Yellow Perch		0.4		0.6	0.4	0.8		1.8		5.3	1.55
frame net (std 3/4 in)	Black Bullhead		181.2								76.1	76.10
	Black Crappie		10.0								74.9	74.90
	Bluegill		0.0								3.2	3.20
	Channel Catfish		1.6								1.4	1.40
	Common Carp		9.3								2.4	2.40
	Green Sunfish		0.0								0.1	0.10
	Northern Pike		0.8								0.6	0.60
	Walleye		0.3								1.2	1.20
	White Sucker		0.2								0.6	0.60
	Yellow Perch		0.0								6.8	6.80

10-Year Size Structure and Condition Statistics by Gear and Species

Species proportional size distribution (PSD), proportional size distribution of preferred length fish (PSD-P), and relative weight (Wr) collected by different gear types across 10 years. *** AFS standard frame nets used in 2016**

			Year								
Gear	Species	Index	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
AFS std gill net	Channel Catfish	PSD		79		92	100	100		100		100
		PSD-P		26		18	13	23		67		94
		Wr		107		96	102	97		97		110
	Walleye	PSD		100		10	0	30		44		69
		PSD-P		75		10	0	0		3		23
		Wr		88		82	83	84		89		83
	Yellow Perch	PSD		80		100	0	80		90		77
		PSD-P		0		0	0	0		52		0
		Wr		101		103	102	103		101		103
frame net (std 3/4 in)	Black Crappie	PSD		74								96
		PSD-P		1								4
		Wr		105								109
	Bluegill	PSD										81
		PSD-P										16
		Wr										111

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Black Crappie

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2024	1357	154 (35)	213 (1166)	244 (138)					307 (18)		
2016	180	153 (9)	203 (112)	229 (59)							

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2024	14	176 (1)	262 (3)	406 (2)	443 (1)	509 (2)	488 (4)				685 (1)
2022	64	246 (3)	331 (8)	364 (26)	397 (19)		453 (4)	443 (1)	419 (2)		630 (1)
2020	42	244 (7)	301 (14)	361 (6)	420 (3)	369 (4)	394 (6)	508 (1)			
2019	20	214 (6)	242 (1)	292 (3)	275 (2)	340 (7)	364 (1)				
2018	46	230 (6)	280 (6)	277 (4)	322 (26)				531 (1)	539 (3)	
2016	29	196 (1)	214 (16)	392 (1)			591 (1)	547 (10)			

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2024	64	159 (1)	210 (63)								
2022	21	185 (2)	229 (6)	265 (8)	271 (5)						
2019	5	163 (5)									
2018	7		222 (5)	247 (1)		247 (1)					
2016	5	154 (1)	202 (1)	225 (3)							

Fish Condition

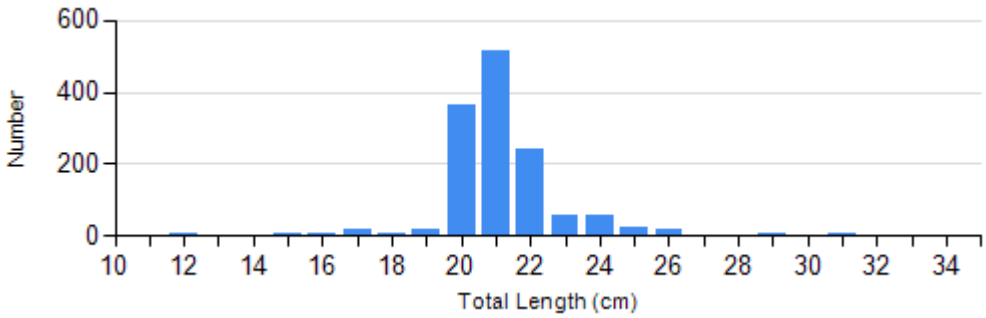
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2024	59	111 (1.2)	1231	109 (0.4)	49	103 (1.6)	9	88
Bluegill Frame Net	2024	11	108 (4.5)	37	113 (1.2)	9	108 (2.5)	0	
Channel Catfish Gill Net	2020	0		17	96 (1.1)	3	99 (5.5)	2	105 (18.6)
	2022	0		3	101 (3.8)	3	93 (2.9)	3	97 (8.1)
	2024	0		1	111	12	112 (3.7)	5	99 (8.2)
Walleye Gill Net	2020	26	83 (0.9)	11	87 (1.3)	0		0	
	2022	35	89 (1.0)	26	89 (1.2)	1	93	1	103
	2024	4	84 (3.2)	6	80 (0.7)	2	79 (3.3)	1	103
Yellow Perch Gill Net	2020	2	114 (1.4)	8	101 (1.7)	0		0	
	2022	2	105 (0.2)	8	99 (2.2)	11	101 (1.8)	0	
	2024	15	108 (1.7)	49	101 (2.2)	0		0	

Length Frequency Distribution

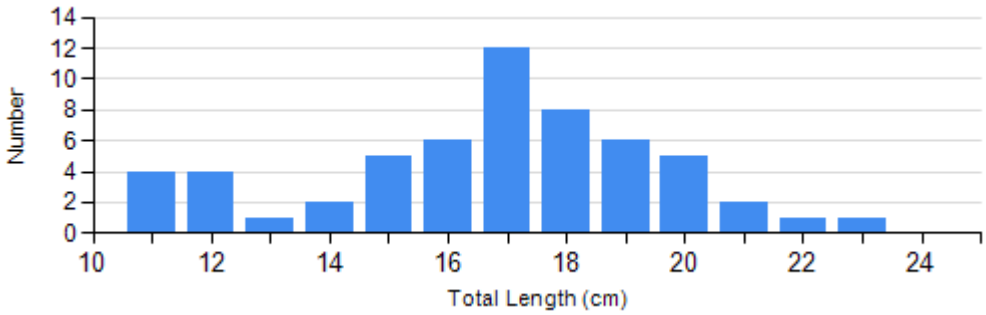
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: frame net (std 3/4 in)



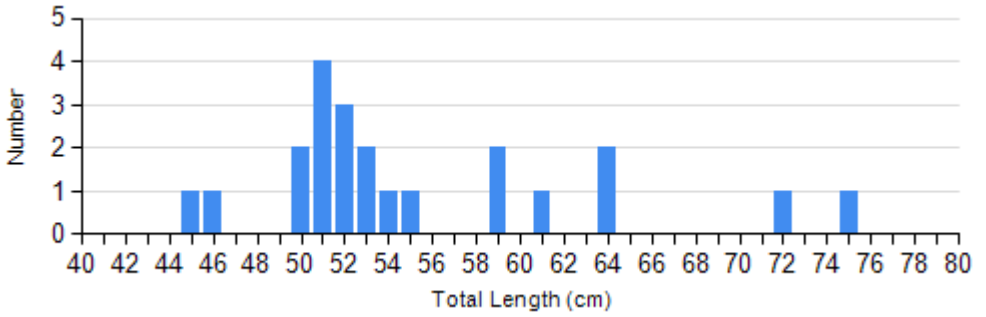
2024

Species: Bluegill
Gear: frame net (std 3/4 in)

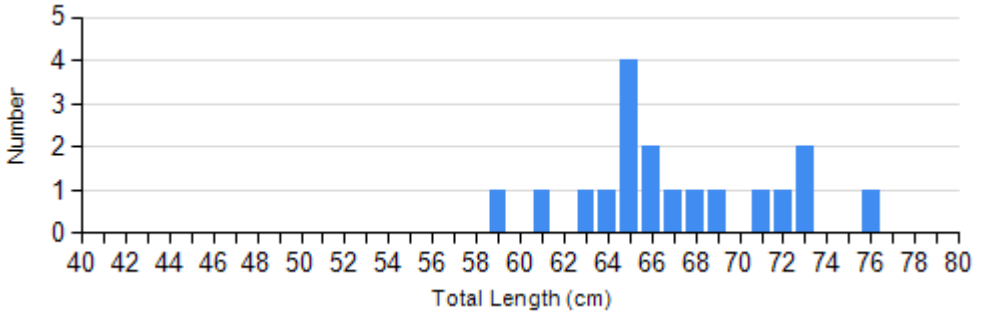


2024

Species: Channel Catfish
Gear: AFS std gill net

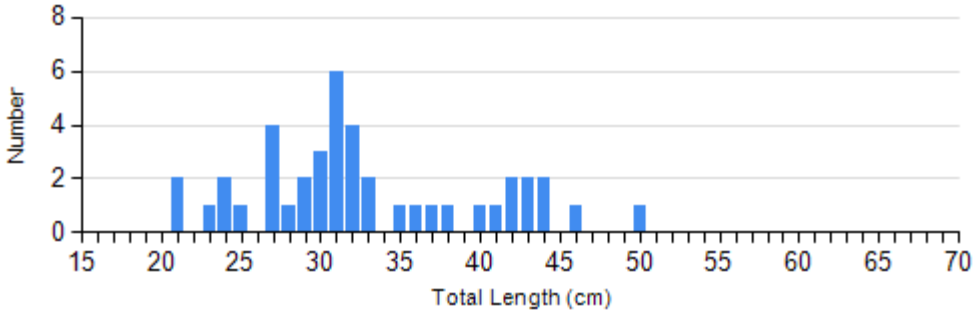


2020

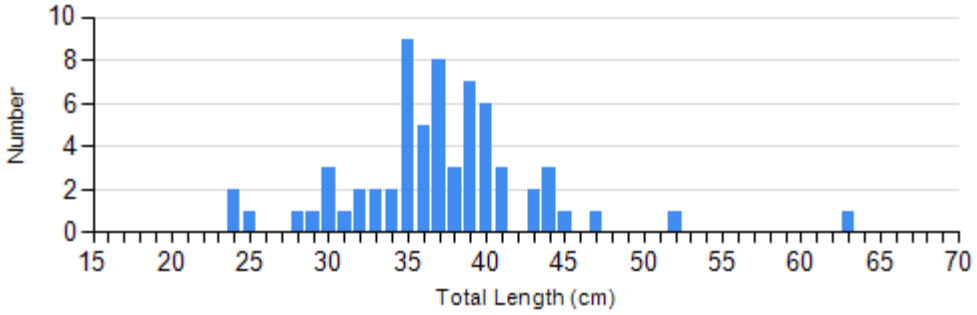


2024

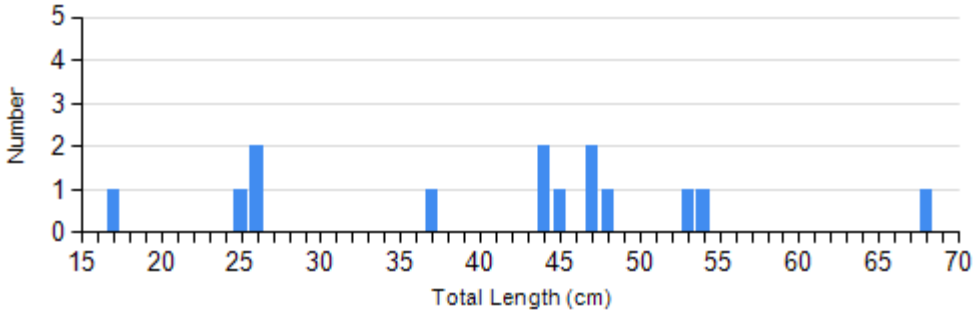
Species: Walleye
Gear: AFS std gill net



2020



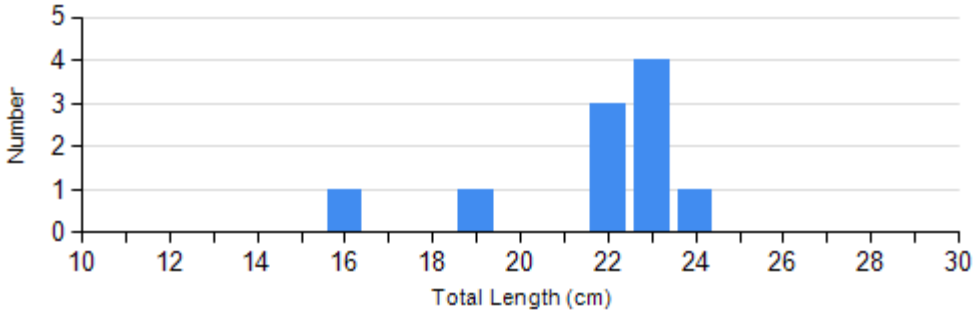
2022



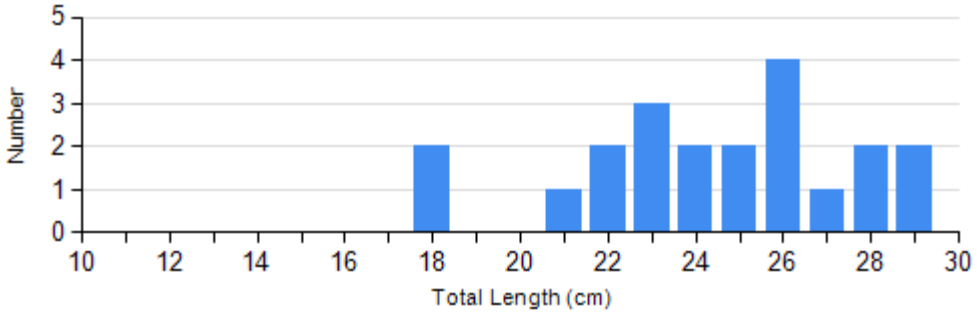
2024

Species: Yellow Perch
Gear: AFS std gill net

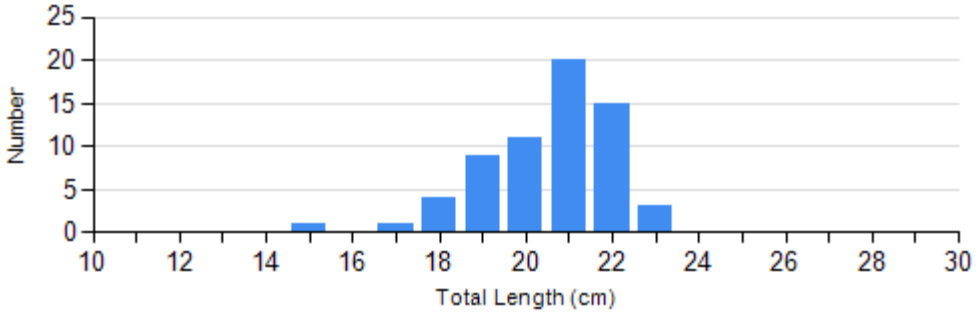
2020



2022



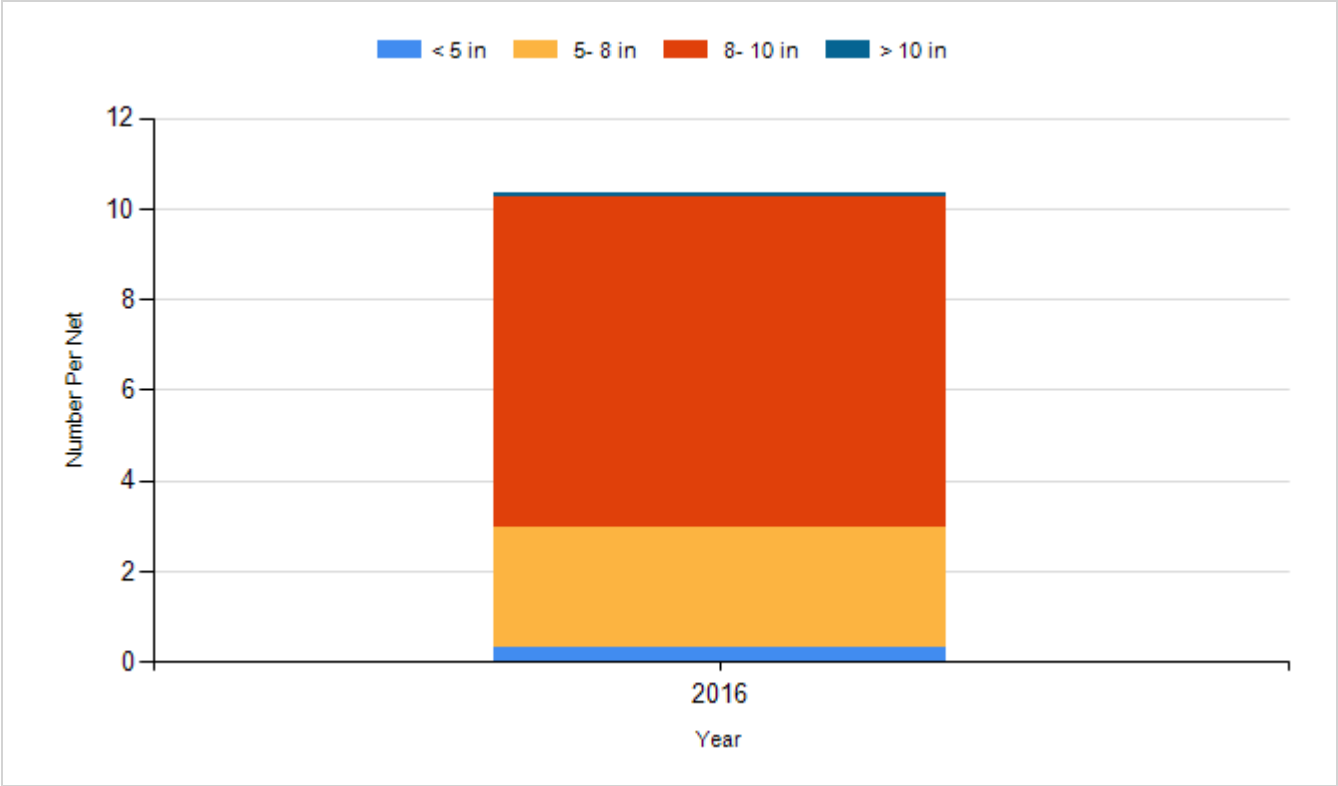
2024



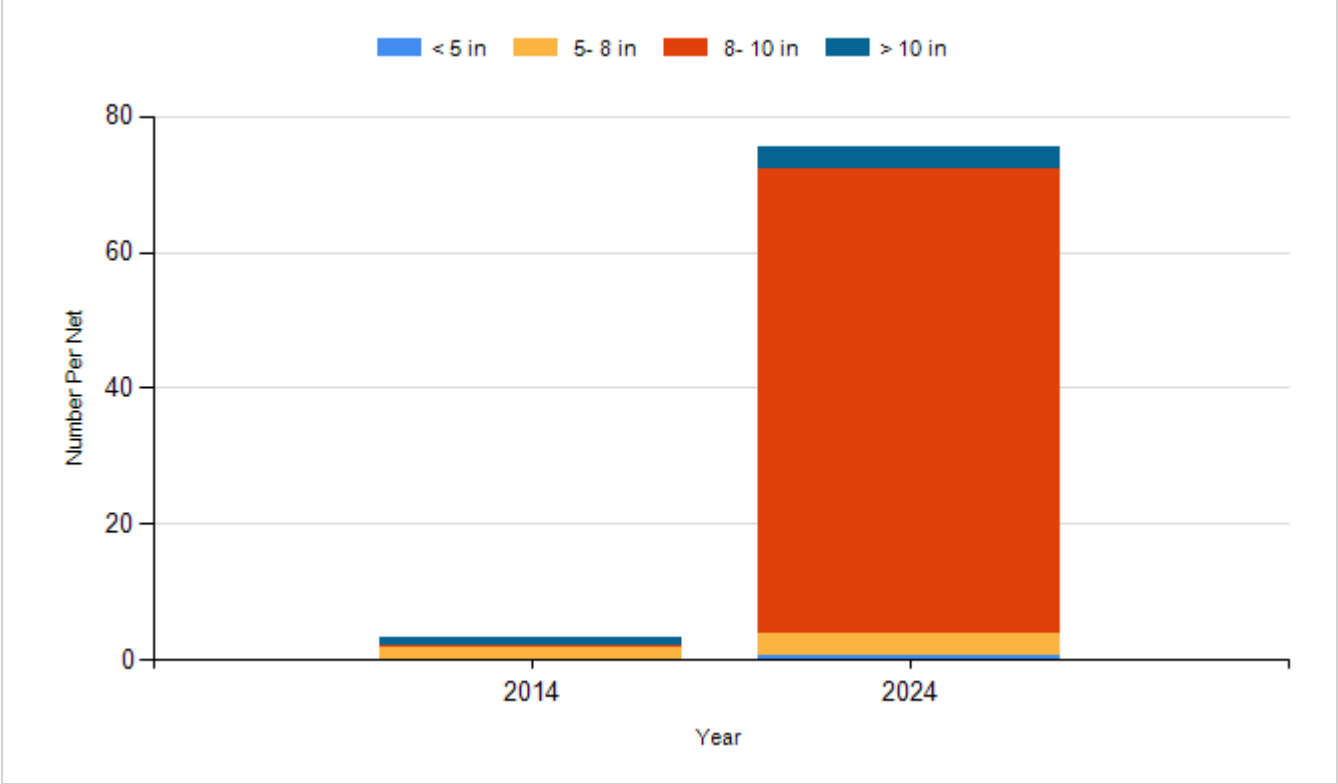
Historic Fish Sizes and Relative Abundance

Size distribution per net by color for species sampled by year.

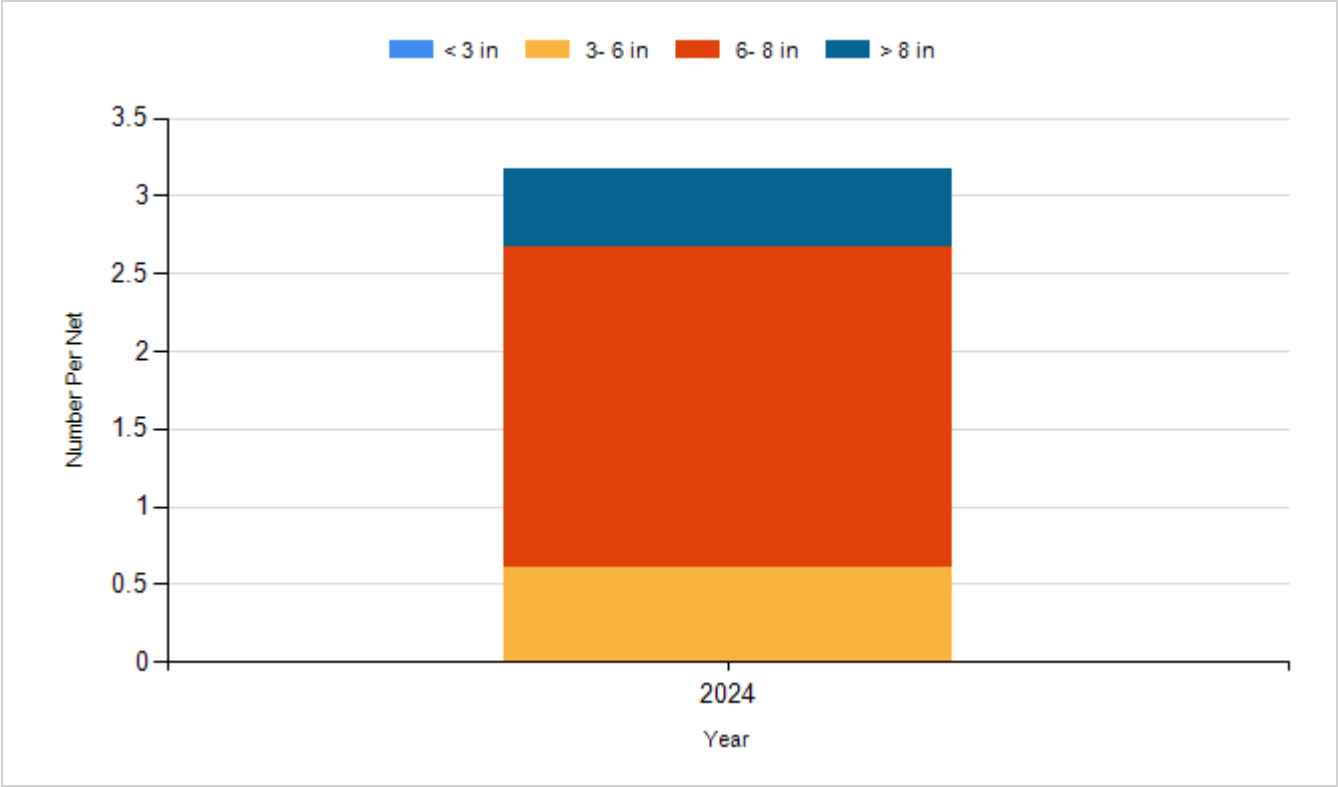
Species: Black Crappie
Gear: AFS std frame net



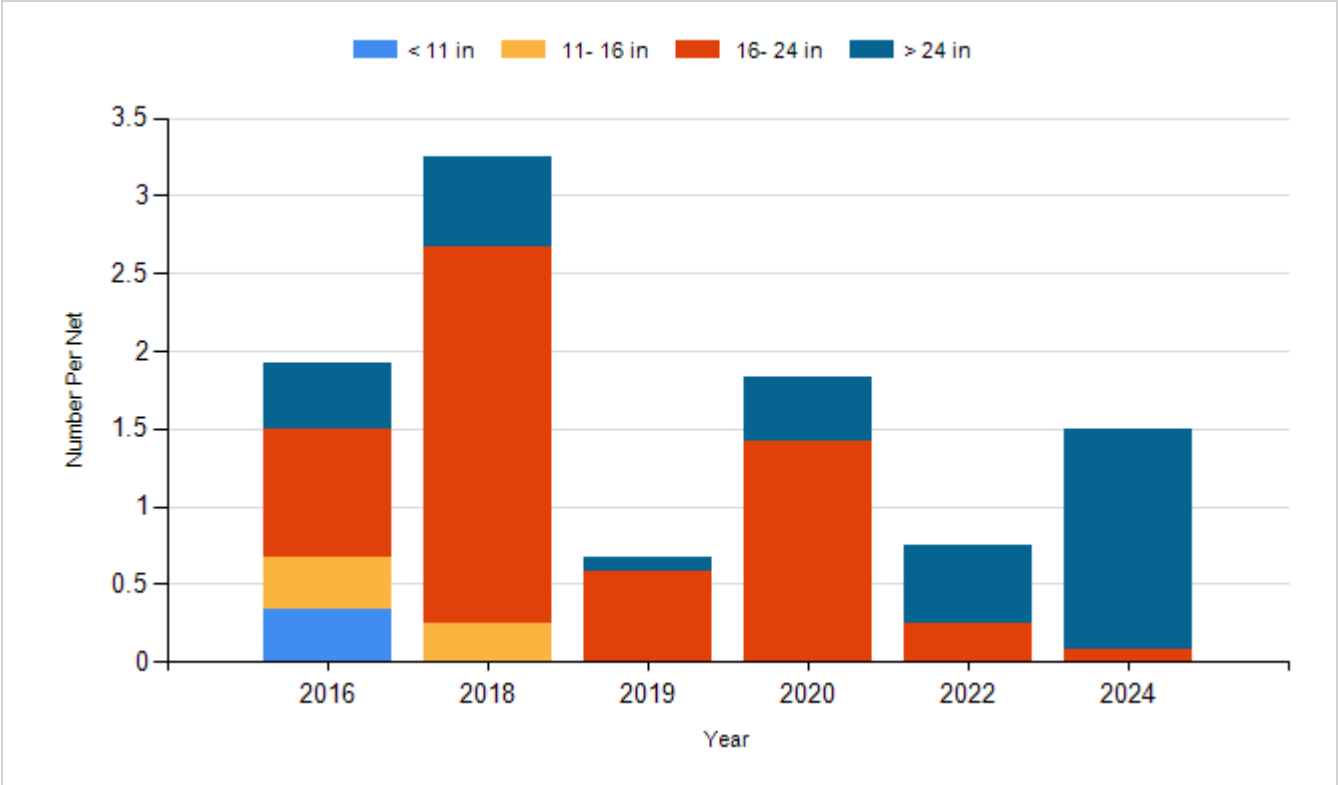
Species: Black Crappie
Gear: frame net (std 3/4 in)



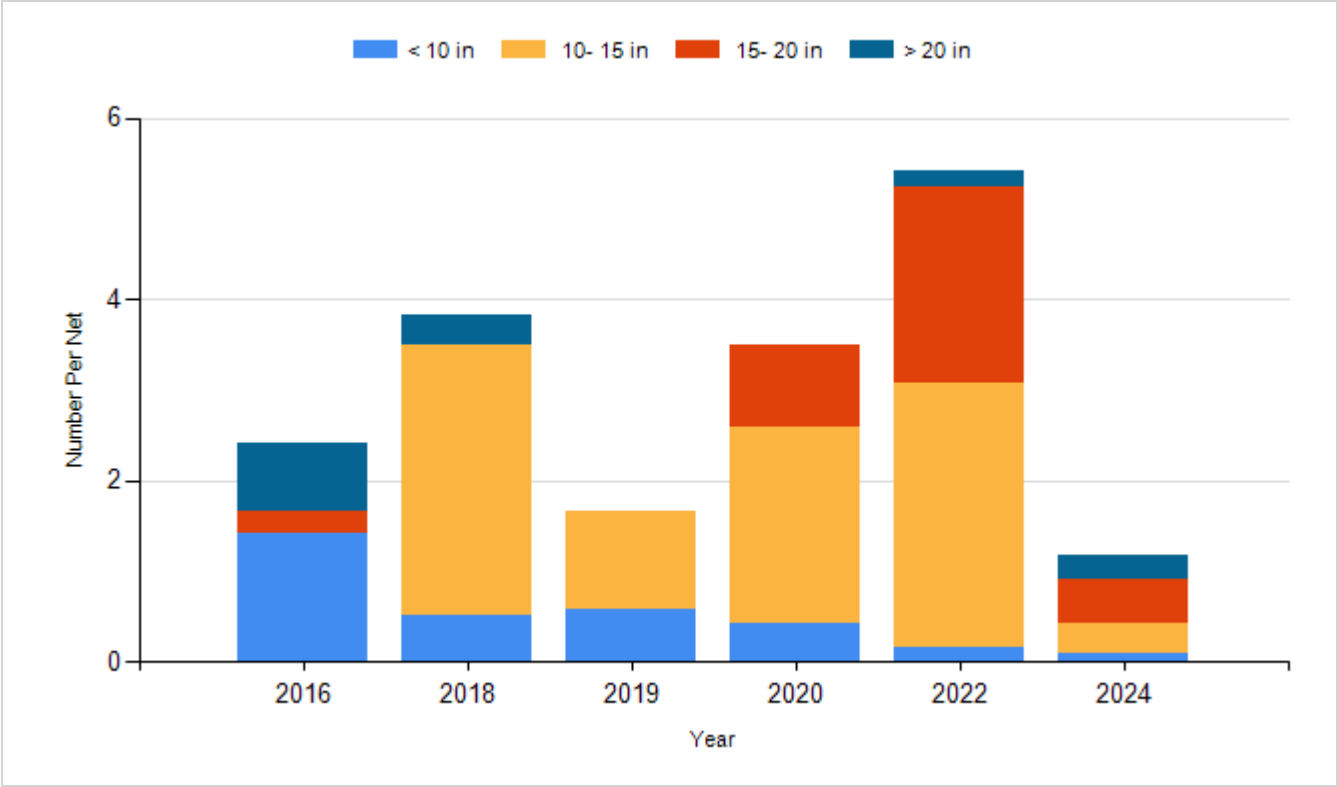
Species: Bluegill
Gear: frame net (std 3/4 in)



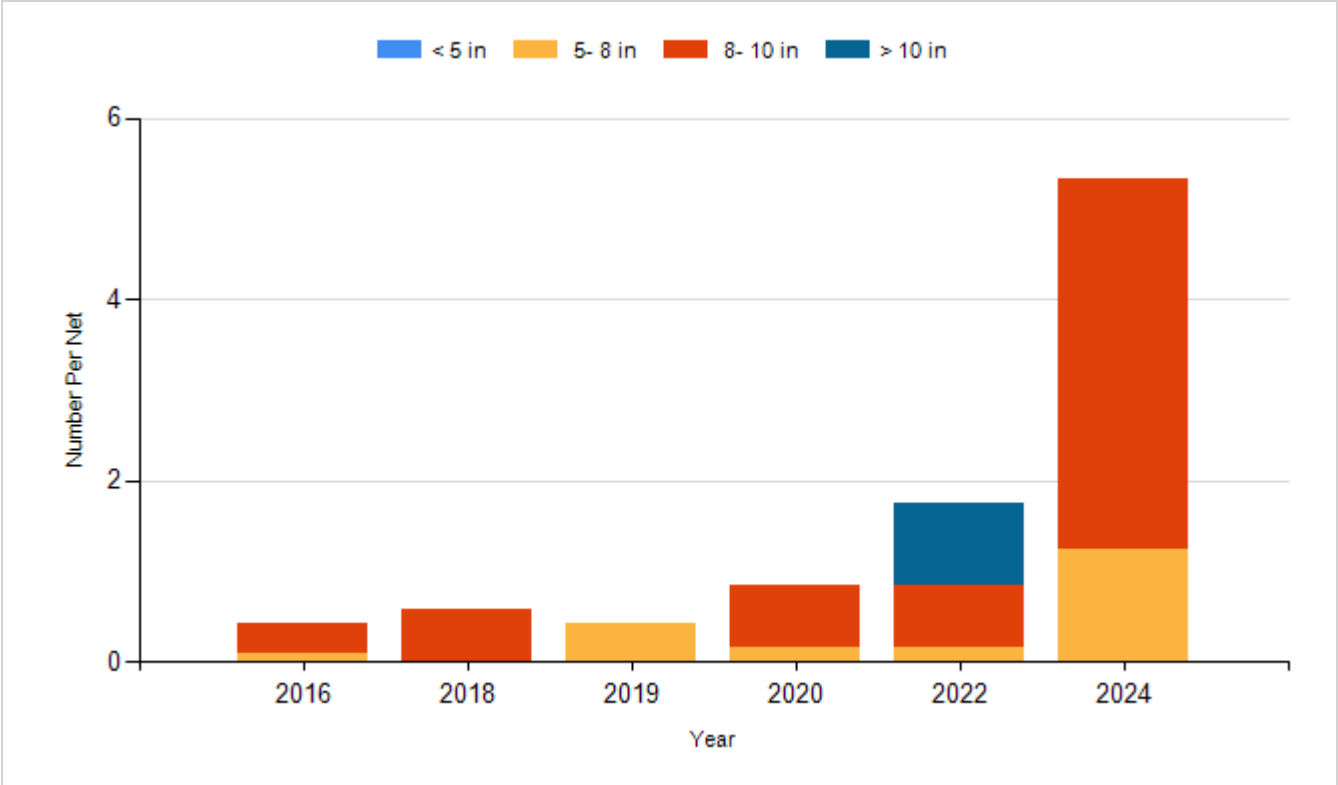
Species: Channel Catfish
Gear: AFS std gill net



Species: Walleye
Gear: AFS std gill net



Species: Yellow Perch
Gear: AFS std gill net



Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2013	Walleye	Large	1,976
2013	Walleye	Large Fingerling	26,619
2014	Walleye	Small Fingerling	121,350
2015	Walleye	Small Fingerling	122,290
2016	Saugeye	Small Fingerling	121,080
2017	Saugeye	Small Fingerling	91,520
2018	Saugeye	Small Fingerling	91,120
2019	Saugeye	Small Fingerling	92,075
2021	Saugeye	Juvenile	91,000
2022	Saugeye	Juvenile	90,470
2023	Saugeye	Juvenile	92,004
2024	Saugeye	Juvenile	100,100