2024 Leola Lake Survey Summary

Water: Leola Lake

County: McPherson

Legal Description: T126N R67W S17

GPS: 45.728 -98.931

Surface Area: 22.5 acres

Class: Warm Water Marginal

Maximum Depth: 11 feet

Mean Depth: 5 feet

Leola Lake is a 22.5-acre impoundment located on the north edge of the city limits of Leola in east central McPherson County. The dam grade and entire lake is within property owned by the City and maintained as a lake access area, picnic area, and campground. A paved county road north of the junction of Highways 45 and 10 creates the dam grade on the east edge of the lake and provides access to the boat ramp and park area. A concrete plank ramp and dock provide boat access on the north shoreline. A vault toilet, picnic area, and small campground are available for public use at Leola Lake. An artesian well maintains the lake at outlet levels.

Primary game fish managed at Leola Lake are Largemouth Bass, Black Crappie and Channel Catfish. Black Bullhead, Green Sunfish, Northern Pike, Bluegill, Common Carp, and Yellow Perch also have a historical and current presence. A combination of abundant aquatic vegetation, and heavy snow cover during the winter of 2022-23 resulted in fish loss due to insufficient dissolved oxygen levels (winterkill). Electrofishing the following spring revealed numerous Black Bullhead, Common Carp and small panfish present. Largemouth Bass and Channel Catfish were stocked that summer. Walleye were also introduced to provide an additional predator species and increase angling opportunity. Channel Catfish were again stocked in 2024.

Leola Lake was surveyed on June 11-13, 2024, utilizing ¾ inch standard frame net sets. Black Bullhead, Black Crappie, Yellow Perch, Northern Pike, Channel Catfish, Green Sunfish, and Walleye were observed during the 2024 survey. Electrofishing was not completed in 2024 to determine Largemouth Bass stocking success.

- **Black Bullhead:** A high number of small bullheads were present during the 2024 survey. A catch per frame net of 360.0 was recorded. Most fish were between 5 and 7 inches. Due to frequent summer and winter depletion of adult predator fish due to low dissolved oxygen levels, Leola has routinely had high-density bullhead populations with small size structure.

- **Black Crappie:** Catch rates were moderately high with 19.6 individuals sampled in each frame net. Most fish sampled were between 4 and 7 inches. An occasional larger crappie was observed. Condition and growth were near the statewide average.

- **Other Species:** Yellow Perch in Leola would also provide angling opportunity with a catch per net of 5.0 and an average size of 6 to 7 inches. Northern Pike (CPUE 1.8), Channel Catfish (0.6), Green Sunfish (0.4), and Walleye (0.1) were also recorded in the 2024 survey.

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Leola, McPherson County
UJA-Lake-756-000
2024

Lake Information

Name: Leola

County: McPherson

Surface Area: 18 Acres

Maximum Depth: 14 Feet

Surveys and Investigations

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

Gear	Date	Effort
frame net (std 3/4 in)	Jun 12, 2024	5 net-nights
frame net (std 3/4 in)	Jun 13, 2024	5 net-nights

Common Fish Species Present

Yellow Perch

Northern Pike

Largemouth Bass

Bluegill

Black Bullhead

Black Crappie

Channel Catfish

Green Sunfish

Walleye

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
frame net (std 3/4 in)	Black Bullhead	4156	355.8	94.7	22	1	0		81	1
	Black Crappie	136	6.2	4.1	11	6	0		113	2
	Channel Catfish	6	0.6	0.5	100		33		95	6
	Green Sunfish	5	0.5	0.3	40		0		107	7
	Northern Pike	19	1.9	1.1	100		47	18	102	11
	Walleye	1	0.0	0.0	0		0			
	Yellow Perch	48	4.8	2.3	4		0		95	2

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.

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

		CPUE										
Gear	Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Avg
boat shocker (day)	Largemouth Bass					27.6						27.60
frame net (std 3/4 in)	Black Bullhead		615.9			50.8			17.4		355.8	259.98
	Black Crappie		0.0			4.7			1.0		6.2	2.98
	Bluegill		0.8			11.7			7.0		0.0	4.88
	Catfish		0.0			0.0			0.0		0.0	0.00
	Channel Catfish		0.0			1.5			0.0		0.6	0.53
	Green Sunfish		0.0			17.7			0.1		0.5	4.58
	Northern Pike		1.2			0.4			1.2		1.9	1.18
	Walleye		0.0			0.0			0.0		0.0	0.00
	Yellow Perch		0.9			8.1			1.1		4.8	3.73

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.

			Year									
Gear	Species	Index	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
boat shocker (day)	Largemouth Bass	PSD					30					
		PSD-P					13					
		Wr					115					
frame net (std 3/4 in)	Black Bullhead	PSD		0			0			29		22
		PSD-P		0			0			0		0
		Wr		88			83			95		81
	Black Crappie	PSD					100			80		11
		PSD-P					100			60		0
		Wr					91			96		113
	Bluegill	PSD		38			42			16		
		PSD-P		25			1			0		
		Wr		117			108			127		
	Channel Catfish	PSD					80					100
		PSD-P					7					33
		Wr					88					95
	Green Sunfish	PSD					5			0		40
		PSD-P					0			0		0
		Wr					124			112		107
	Northern Pike	PSD		100			100			100		100
		PSD-P		0			50			0		47
		Wr		87			90			95		102
	Walleye	PSD										0
		PSD-P										0
	Yellow Perch	PSD		22			7			18		4
		PSD-P		0			1			0		0
		Wr		90			88			88		95

Back-Calculated Lengths

Mean species back-calculated total length (mm) at age, standard error (SE), and sample size (N).

Species: Black Crappie

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2023	1	4	76 (10.3)									
2022	2	18	59 (4.8)	88 (6.2)								
2021	3	13	89 (3.9)	130 (5.8)	154 (6.1)							
2020	4	4	87 (3.2)	111 (.7)	156 (2.5)	198 (.8)						
2019	5	2	91 (1.4)	127 (1)	160 (9.7)	189 (16.8)	215 (15)					
2018	6	1	56	56	78	78	111	111				
Weighted Mean		42	74	106	151	178	180	111				

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2023	1	4										
2022	2	18										
2021	3	13										
2020	4	4										
2019	5	2										
2018	6	1										
Weighted Mean		42										

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age 1	2	3	4	5	6	7	8	9	10
2022	2	11	88 (1.3)	136 (2.8)								
2021	3	6	82 (3.1)	128 (3.9)	157 (4.1)							
2020	4	2	91 (4.2)	91 (4.2)	132 (3.8)	132 (3.8)						
2018	6	2	86 (12.1)	86 (12.1)	126 (.6)	126 (.6)	156 (1)	156 (1)				
Weighted Mean		21	86	125	146	129	156	156				

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2022	2	11										
2021	3	6										
2020	4	2										
2018	6	2										
Weighted Mean		21										

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	135	115 (15)	120 (74)	172 (36)	212 (4)	232 (2)	165 (5)				
2022	10		163 (2)			223 (1)	223 (1)		342 (5)		374 (1)
2019	47							311 (6)	317 (9)	333 (16)	348 (16)

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2022	70		103 (38)	123 (21)	160 (11)						
2019	116	112 (8)	122 (3)	134 (34)	143 (20)	157 (18)	159 (24)	166 (10)			
2016	8		127 (5)					195 (1)		202 (1)	210 (1)

Species: Largemouth Bass

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	126	128 (98)	167 (5)		285 (18)	298 (3)				410 (1)	457 (2)

Fish Condition

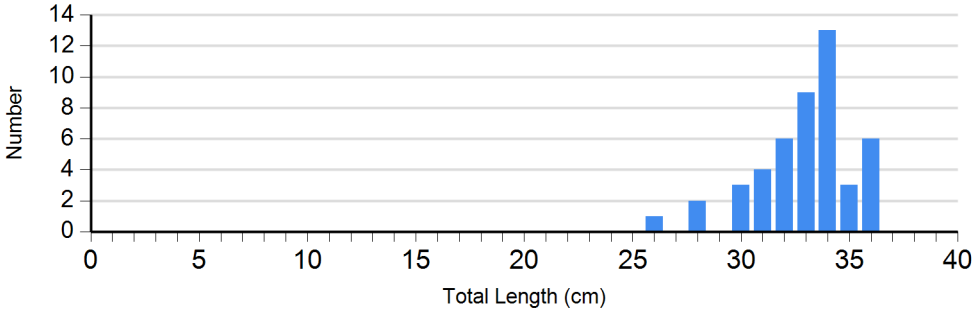
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2022	2	115 (5.1)	2	108 (1.6)	0		6	87 (3.1)
	2024	55	115 (1.5)	7	101 (3.2)	0		0	
Bluegill Frame Net	2022	59	127 (1.7)	11	125 (3.8)	0		0	

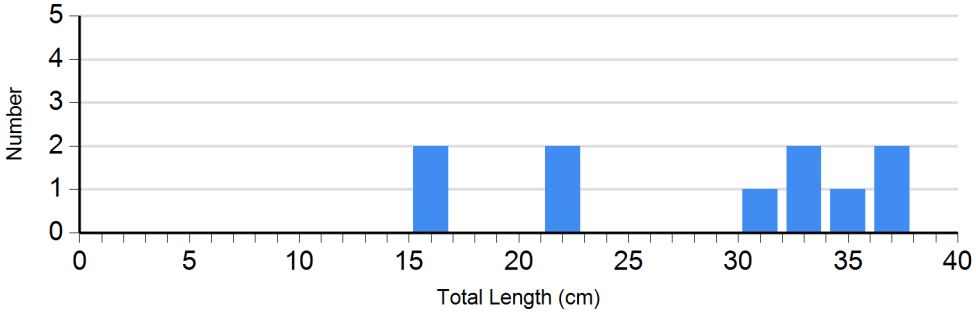
Length Frequency Distribution

Length frequency histogram of species sampled by year.

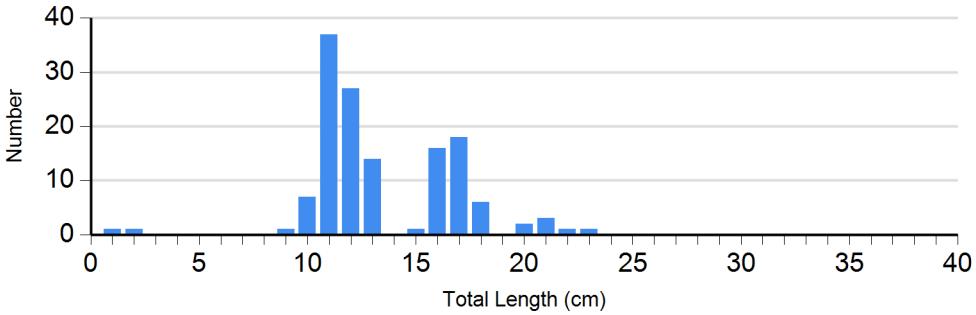
Species: Black Crappie
Gear: frame net (std 3/4 in)



2019

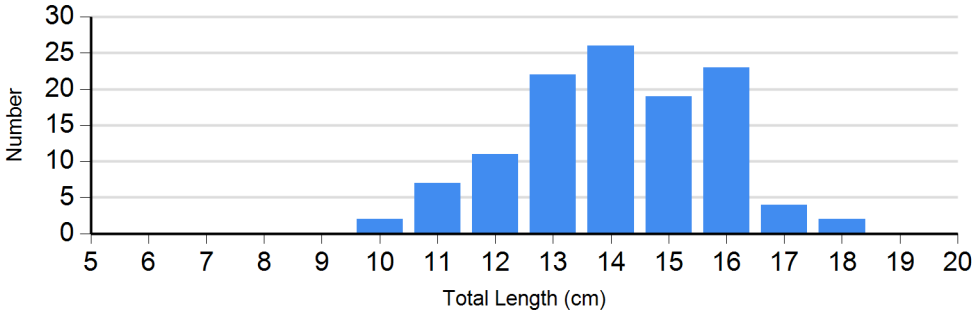


2022

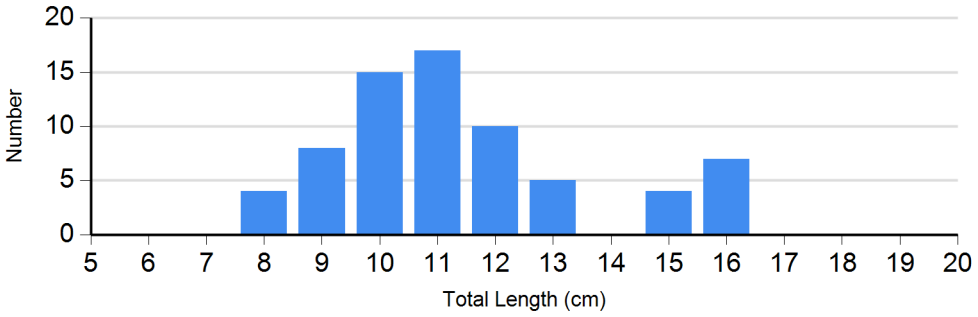


2024

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

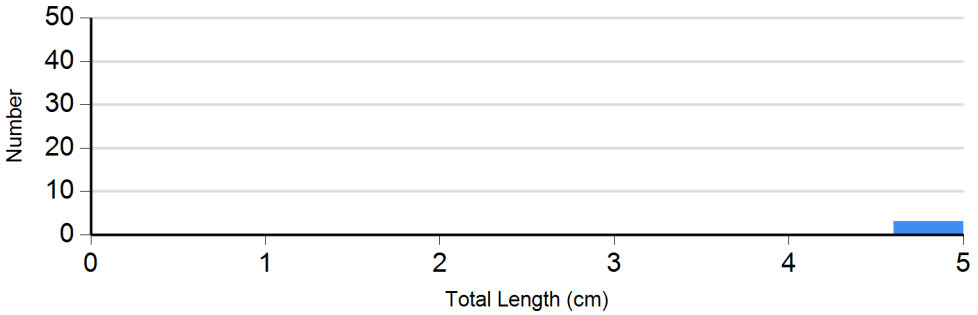


2019



2022

Species: Largemouth Bass
Gear: boat shocker (day)

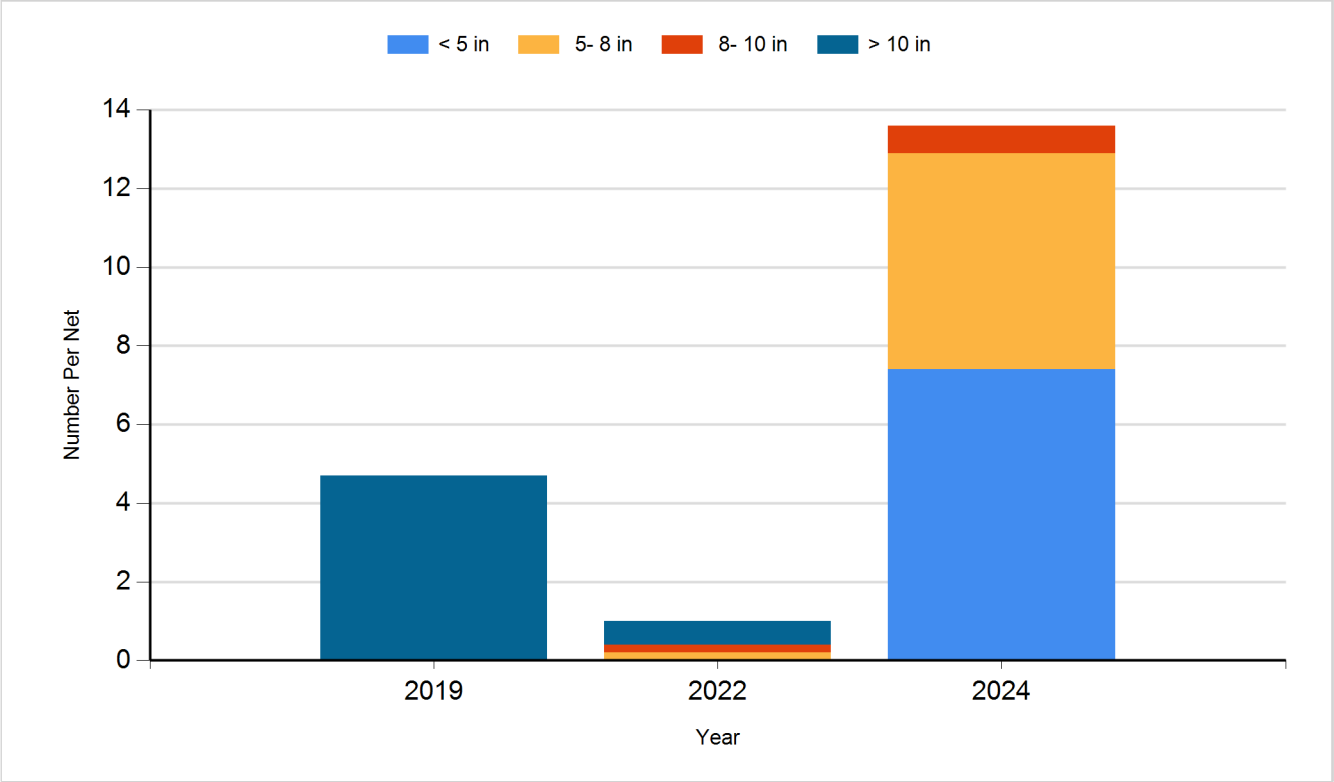


2019

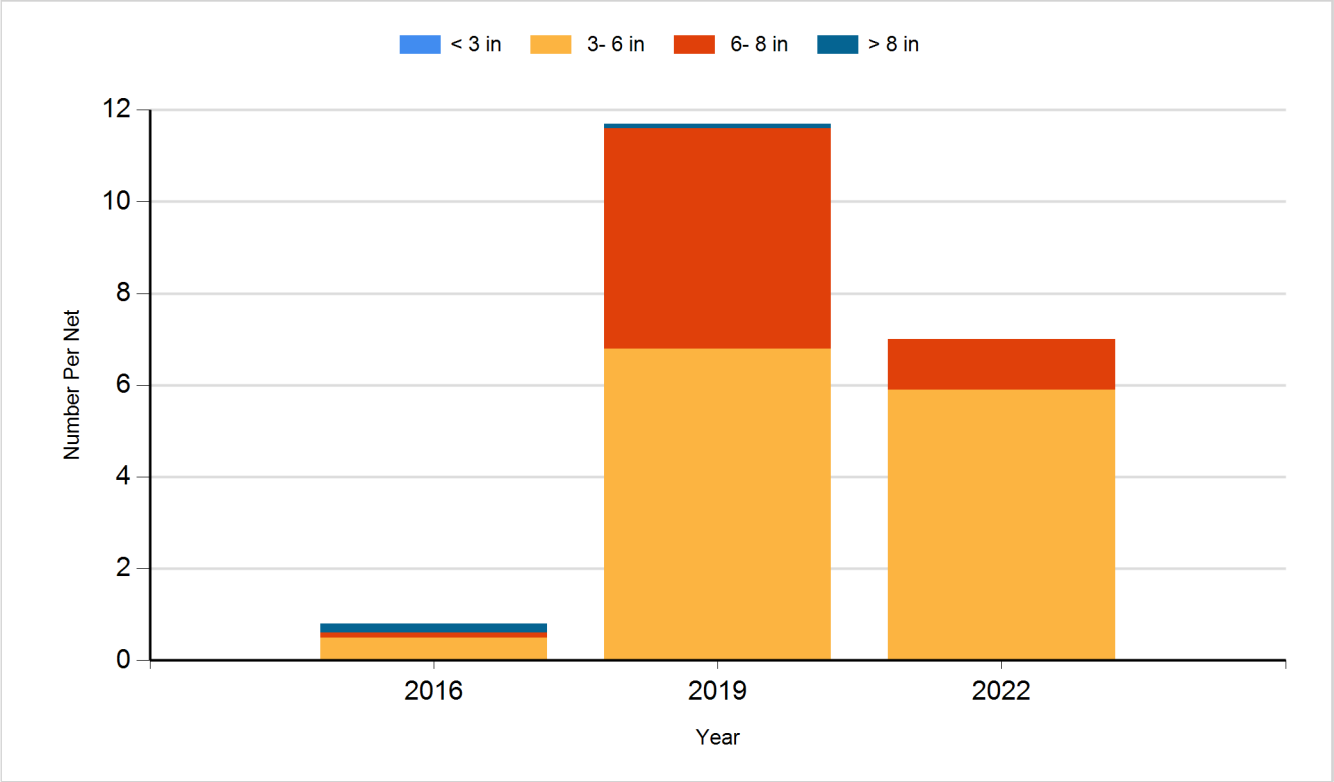
Historic Fish Sizes and Relative Abundance

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

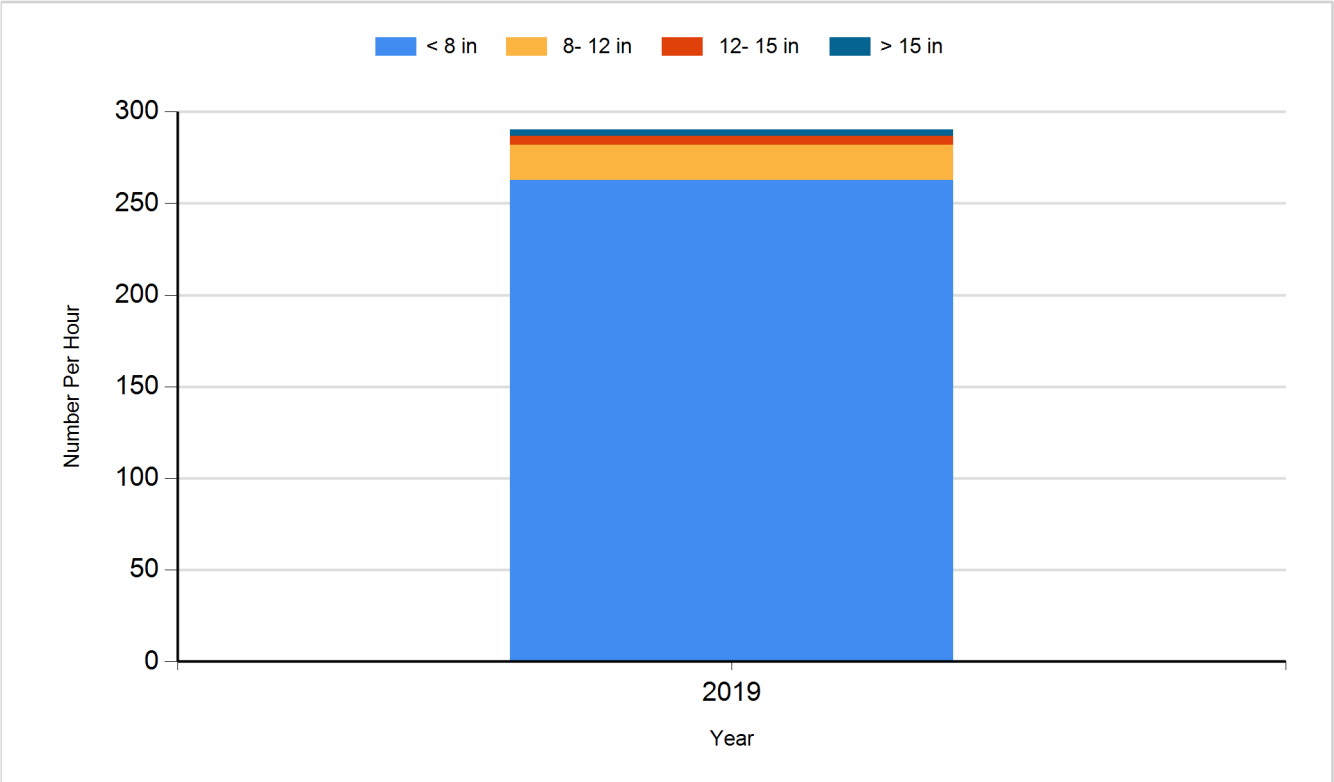
Species: Black Crappie
Gear: frame net (std 3/4 in)



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



Species: Largemouth Bass
Gear: boat shocker (day)



Fish Stocking

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

Year	Species	Size	Number
2017	Largemouth Bass	Adult	115
2018	Black Crappie	Adult	206
2018	Channel Catfish	Adult	154
2019	Black Crappie	Adult	62
2019	Channel Catfish		215
2023	Channel Catfish	Adult	50
2023	Largemouth Bass	Juvenile	100
2023	Walleye	Juvenile	1,438
2024	Channel Catfish	Juvenile	608