

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Hayes, Stanley County

BAD-Lake-3119-000

2024

Lake Information

Name: Hayes **Maximum Depth:** 17 Feet
County: Stanley **Mean Depth:** 6 Feet
Legal Description: T5-R26-S29
Surface Area: 61 Acres

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (night)	May 20, 2024	3600 seconds
frame net (std 3/4 in)	May 21, 2024	5 net-nights
frame net (std 3/4 in)	May 22, 2024	5 net-nights
rod and reel	Feb 06, 2024	1 minutes
rod and reel	Jan 23, 2024	942 minutes

Common Fish Species Present

Largemouth Bass

Bluegill

Black Bullhead

Black Crappie

Yellow Perch

Northern Pike

Golden Shiner

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.
- **std 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.

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

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.

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

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

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.

$$Wr = \left(\frac{W}{W_s} \right) \times 100$$

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).

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(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**

Gear	Species	Sample Size (n)	Abundance		Stock Density Indices			Condition		
			CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
frame net (std 3/4 in)	Black Bullhead	1819	126.4	80.3	93	1	17	1	108	1
	Black Crappie	27	2.7	1.3	100		52	15	76	3
	Bluegill	180	17.9	5.9	82	4	15	4	103	4
	Golden Shiner	10	0.0	0.0						
	Northern Pike	8	0.8	0.7	100		50		88	6
	Yellow Perch	19	1.9	1.2	5		5		90	7
rod and reel	Black Crappie	2	30.0	92.2	100		50			
	Bluegill	165	2,522.6	7,748.6	81	4	4	2		
	Yellow Perch	6	0.2	0.6	0		0			

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

Gear	Species	CPUE										Avg	
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
boat shocker (night)	Largemouth Bass				69.0	49.0	66.0						61.33
frame net (std 3/4 in)	Black Bullhead				139.8			84.9			126.4	117.0	3
	Black Crappie				0.1			0.0			2.7	0.93	
	Bluegill				34.3			67.3			17.9	39.83	
	Golden Shiner				0.0			0.0			0.0	0.00	
	Green Sunfish				0.0			0.0			0.0	0.00	
	Largemouth Bass				0.2			0.4			0.0	0.20	
	Northern Pike				1.4			2.3			0.8	1.50	
	Sunfish Hybrid				2.0			1.1			0.0	1.03	
	White Crappie				0.0			0.1			0.0	0.03	
	Yellow Bullhead				0.0			0.1			0.0	0.03	
	Yellow Perch				0.0			0.3			1.9	0.73	
rod and reel	Black Crappie										30.1	30.10	
	Bluegill										2,522	2522.	
	Yellow Perch										.6	60	
	Yellow Perch										0.2	0.20	

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.

Gear	Species	Index	Year										
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
boat shocker (night)	Largemouth Bass	PSD				42	44	88					
		PSD-P				25	11	34					
		Wr				112	112	113					
frame net (std 3/4 in)	Black Bullhead	PSD				35				94		93	
		PSD-P				24				14		17	
		Wr				90						108	
	Black Crappie	PSD				100							100
		PSD-P				100							52
		Wr				97							76
	Bluegill	PSD				46					77		82
		PSD-P				13					12		15
		Wr				104					106		103
	Largemouth Bass	PSD				0					75		
		PSD-P				0					50		
		Wr									103		
	Northern Pike	PSD				21					61		100
		PSD-P				0					4		50
		Wr				94					90		88
Yellow Perch	PSD									100		5	
	PSD-P									33		5	
	Wr									102		90	
rod and reel	Black Crappie	PSD											100
		PSD-P											50
	Bluegill	PSD											81
		PSD-P											4
	Yellow Perch	PSD											0
		PSD-P											0

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+
2018	1				253 (1)						

Species: Bluegill

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	325		117 (168)	165 (31)	190 (77)	205 (49)					

Species: Largemouth Bass

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2020	132	229 (5)	244 (7)	303 (11)	343 (24)	370 (43)	388 (12)	400 (13)	450 (13)	474 (4)	512 (2)
2018	159	156 (8)	216 (85)	280 (34)	395 (6)	428 (9)	413 (5)	414 (2)	459 (8)	466 (5)	435 (3)

Fish Condition

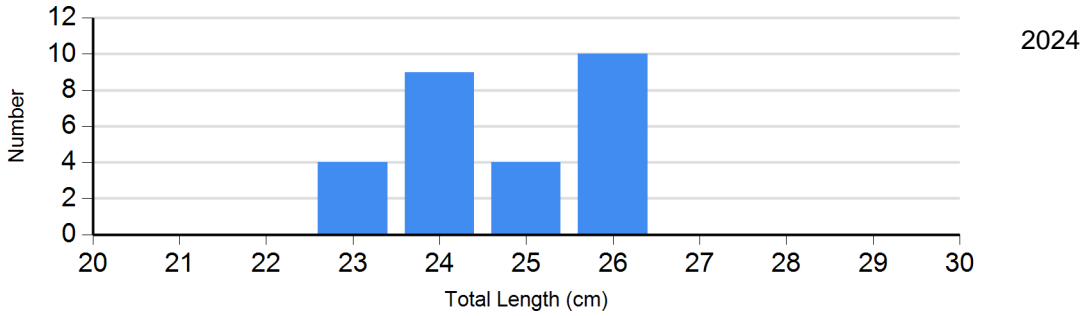
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2024	0		13	74 (3.5)	14	78 (2.2)	0	
Bluegill Frame Net	2021	153	109 (1.8)	438	105 (1.6)	82	101 (1.4)	0	
	2024	32	121 (6.1)	120	104 (4.2)	27	90 (8.2)	0	
Largemouth Bass Electro Fishing	2020	16	111 (2.8)	71	112 (1.0)	44	115 (1.5)	1	130

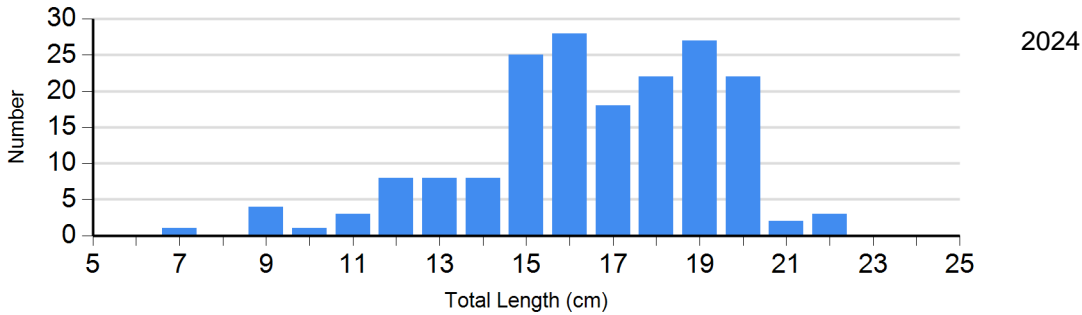
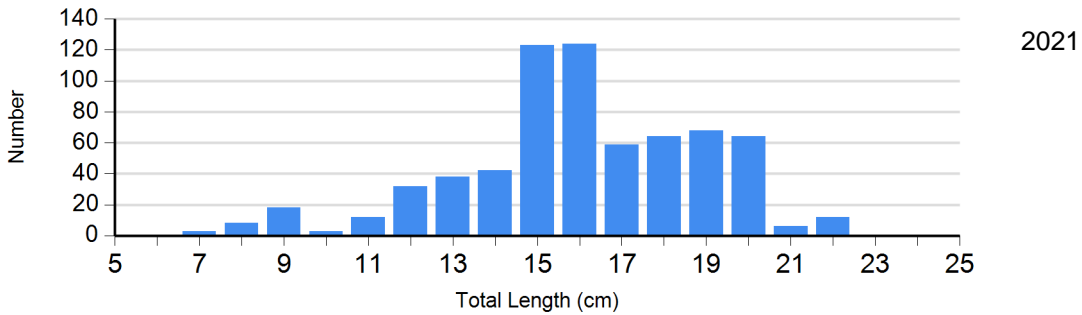
Length Frequency Distribution

Length frequency histogram of species sampled by year.

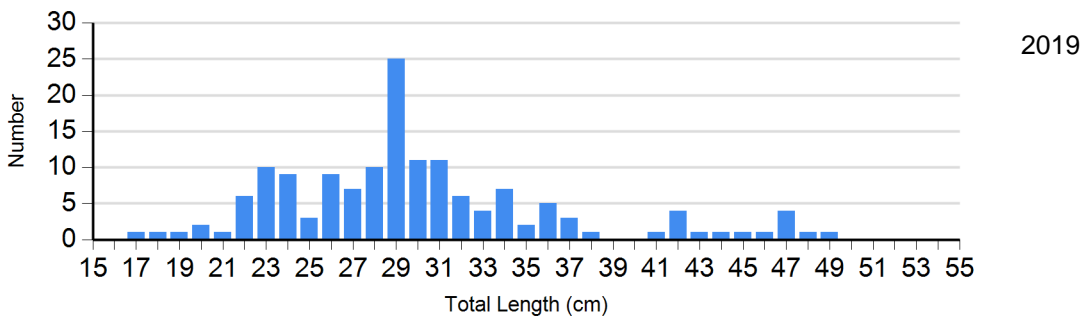
Species: Black Crappie
Gear: frame net (std 3/4 in)

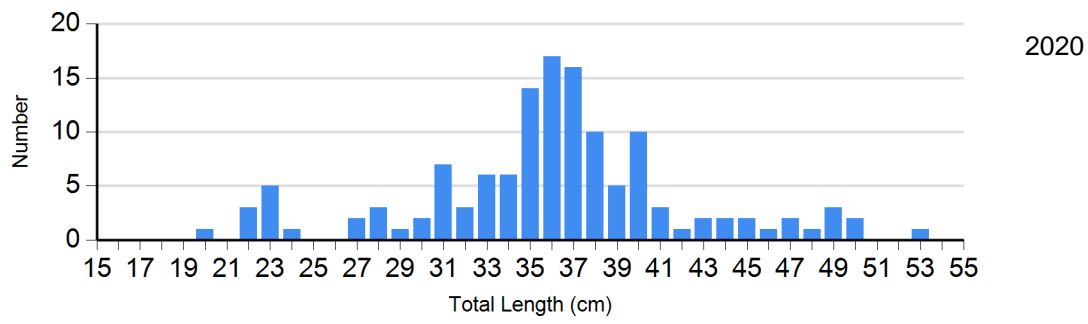


Species: Bluegill
Gear: frame net (std 3/4 in)



Species: Largemouth Bass
Gear: boat shocker (night)

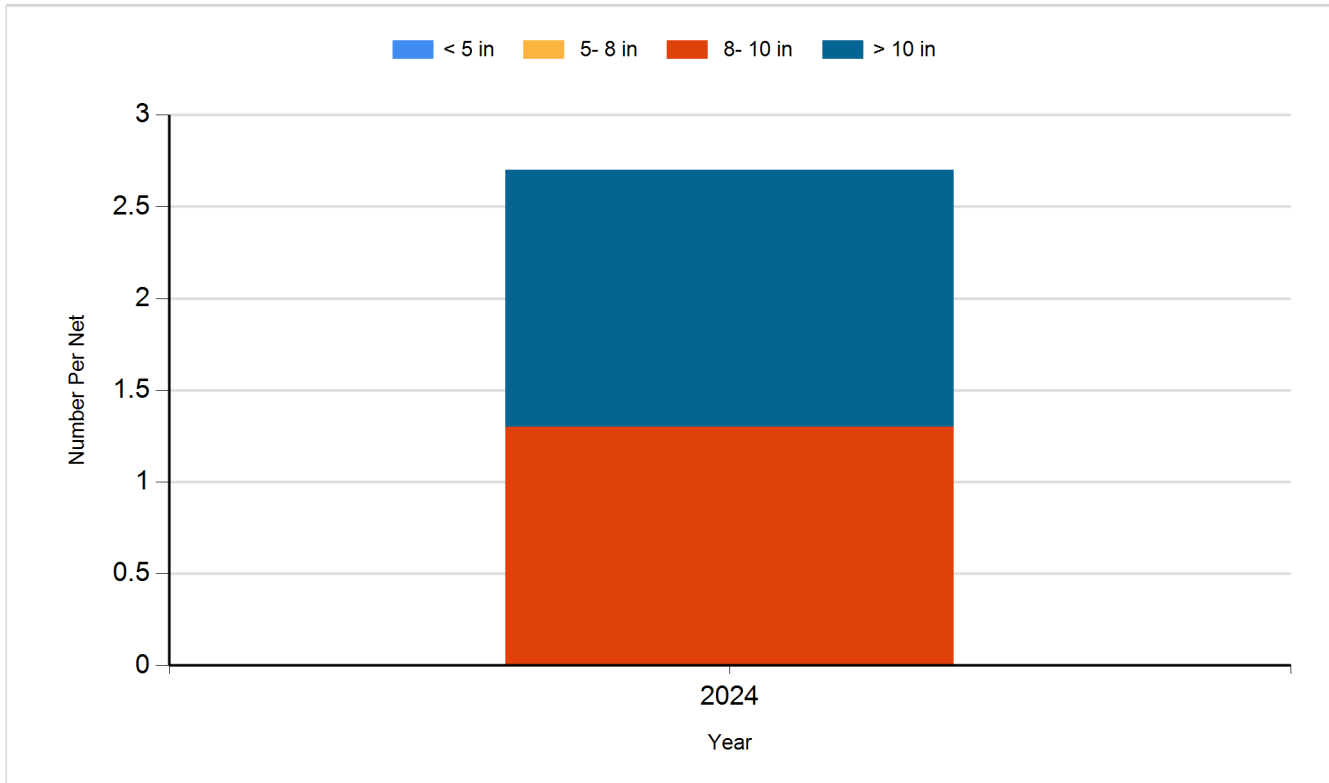




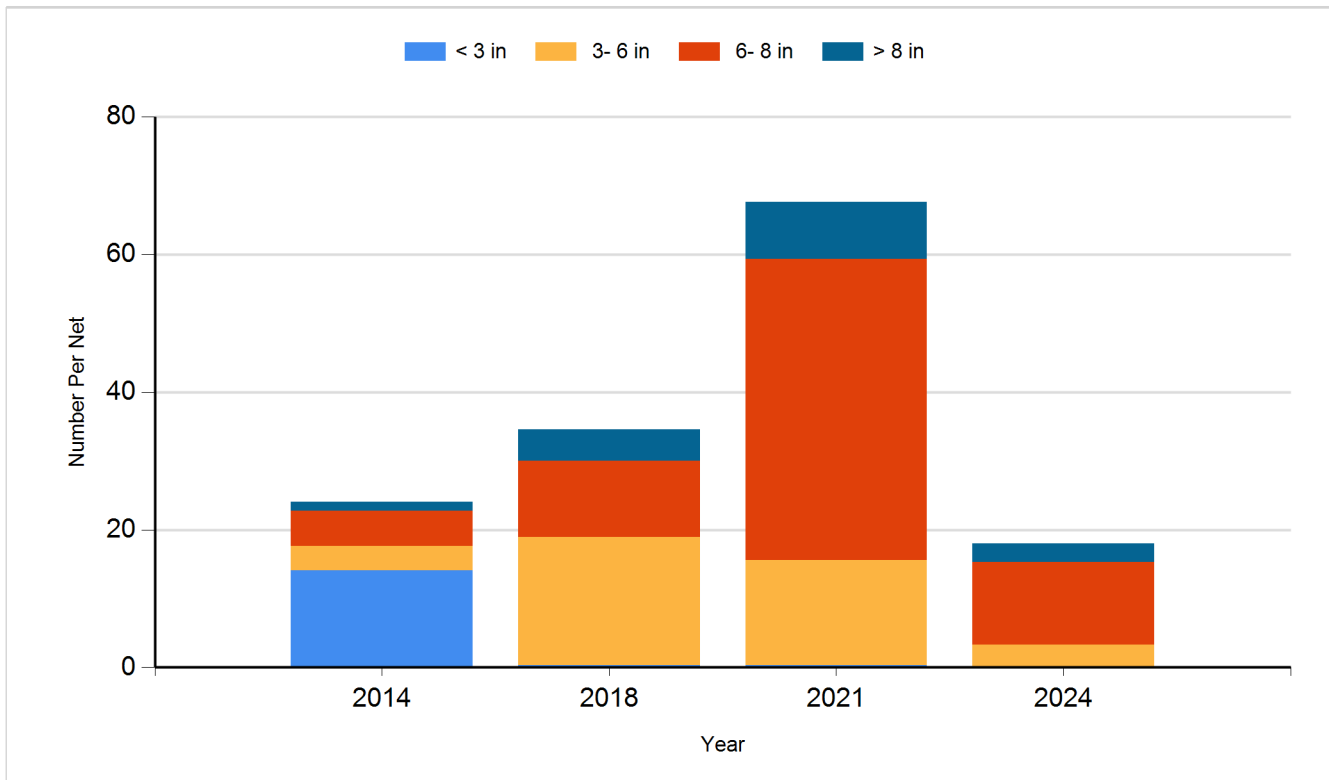
Historic Fish Sizes and Relative Abundance

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

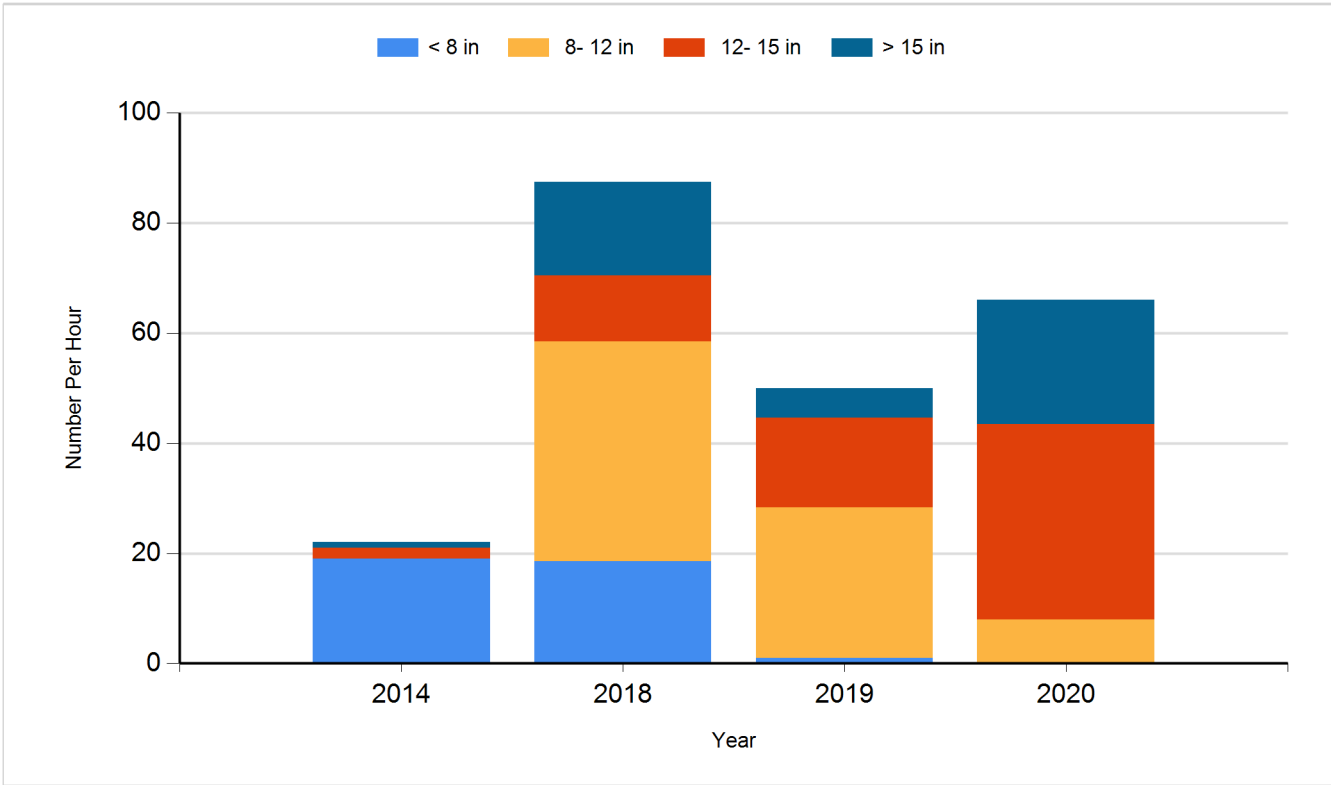
Species: Black Crappie
Gear: frame net (std 3/4 in)



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



Species: Largemouth Bass
Gear: boat shocker (night)



Fish Stocking

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

Year	Species	Size	Number
2015	Largemouth Bass	Juvenile	500
2018	Black Crappie	Adult	50
2018	White Crappie	Adult	25
2023	Black Crappie	Adult	883
2023	Largemouth Bass	Adult	100
2024	Largemouth Bass	Juvenile	1,259