2024 Hayes Lake Survey Summary

Hayes Lake is a 61-acre impoundment located one mile east of the town of Hayes in west central Stanley County. The impoundment was created in 1937 when the Works Progress Administration (WPA) with the construction of a rolled earth dam and concrete spillway on the lower end of Frozen Man Creek. It has a mean depth of 6 feet and maximum depth of 17 feet. Hayes Lake is accessible with a concrete boat ramp and dock on the east side of the lake.

The Primary fish species managed in Hayes Lake include Largemouth Bass, Bluegill, Black Crappie, Yellow Perch, Northern Pike, Golden Shiner, and Black Bullhead have historical presence. Hayes Lake was surveyed on Jan 23, 2024, and Feb 6, 2024, with rod and reel through the ice. Black Crappie, Bluegill and Yellow Perch were sampled. Night electrofishing was done on May 20, 2024, to monitor the Bass population. Frame nets (std. ¾ in.) were used on May 20-22, 2024. Yellow Perch, Bluegill, Black Crappie, Black Bullhead, and Golden Shiners were observed.

Bluegill: Bluegill were sampled at a below average rate of 17.9 fish per net. Most of the fish measured were in between 6-8 inches.

Black Crappie: Black Crappie were sampled at an above average rate of 2.7 fish per net. Most of these fish were in between 9.5-10.5 inches.

Largemouth Bass: There were no Largemouth Bass collected during survey. This could partially be from the cold and weather and poor water clarity during the night electrofishing survey. After the surveys, 1259 juvenile bass were stocked into Hayes Lake.

Other Species: During 2024 netting efforts Black Bullhead (CPUE 126.4), Yellow Perch (1.9), Northern Pike (0.8), and Golden Shiners (0.0) were also observed.

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Hayes, Stanley County
BAD-Lake-3119-000
2024

Lake Information

Name: Hayes

County: Stanley

Legal Description: T5-R26-S29

Surface Area: 61 Acres

Maximum Depth: 17 Feet

Mean Depth: 6 Feet

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	1093 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.
- 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	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	3	20.0	37.7	100		33			
	Bluegill	247	1,683.2	3,165.4	82	3	4	2		
	Yellow Perch	6	0.1	0.2	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**

		CPUE										
Gear	Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Avg
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	117.03
	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										20.1	20.10
	Bluegill										1,683.2	1683.20
	Yellow Perch										0.1	0.10

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 (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										33
	Bluegill	PSD										82
		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

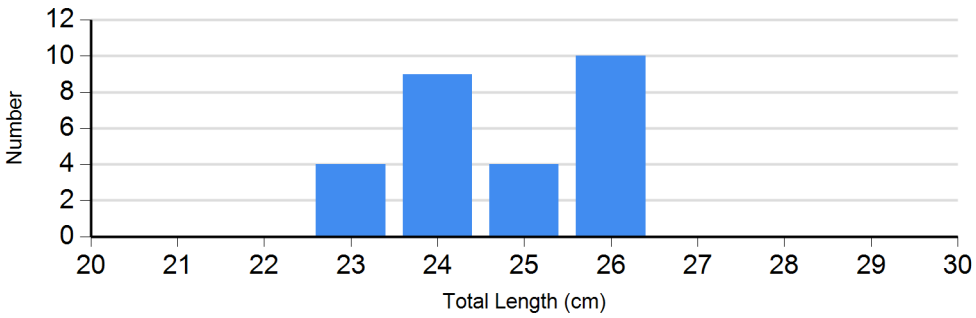
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	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

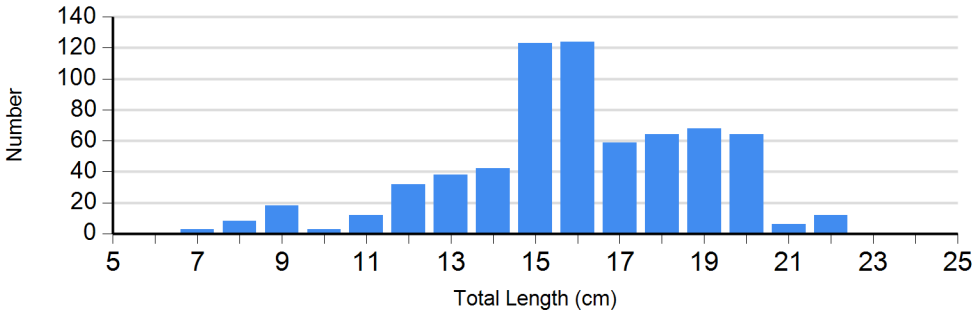
Length frequency histogram of species sampled by year.

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

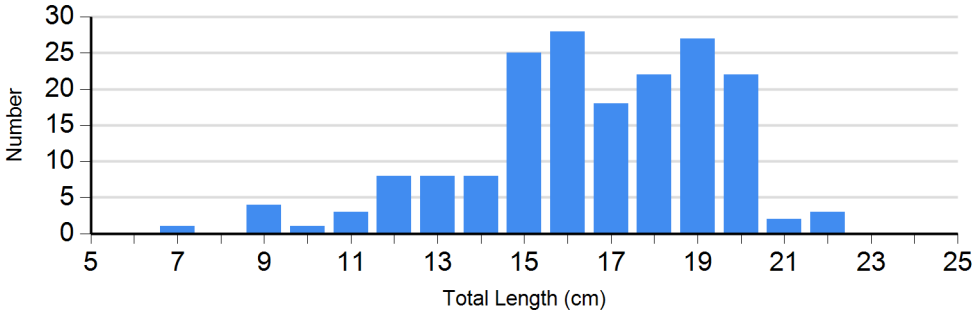


2024

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

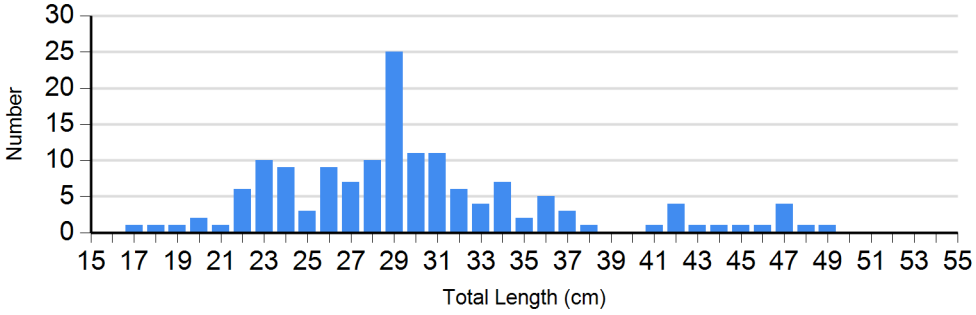


2021

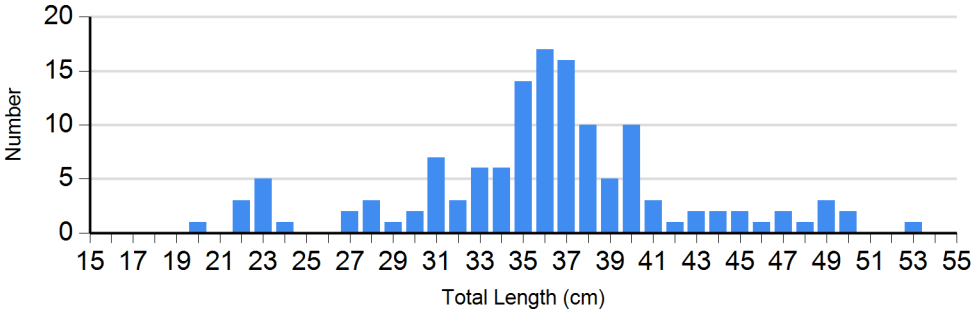


2024

Species: Largemouth Bass
Gear: boat shocker (night)



2019

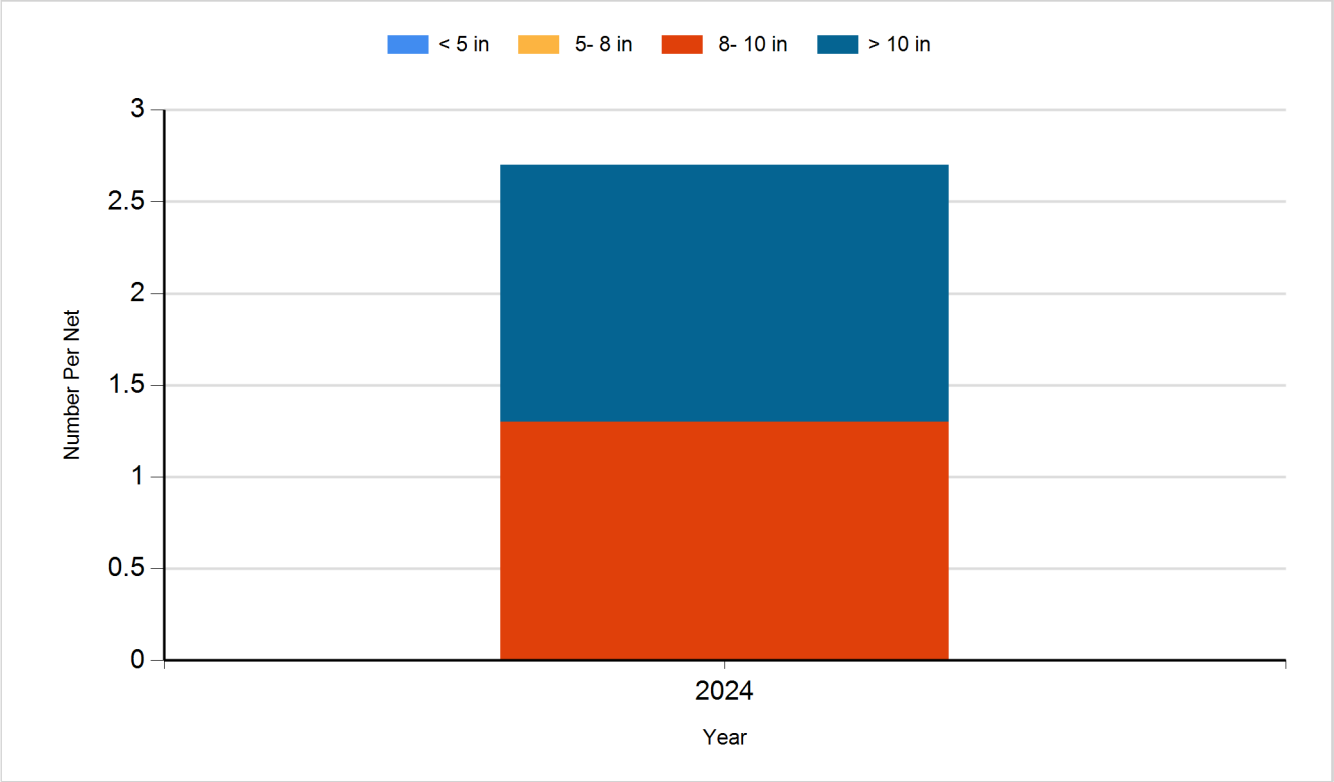

20
15
10
5
0
Number
15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55
Total Length (cm)

2020

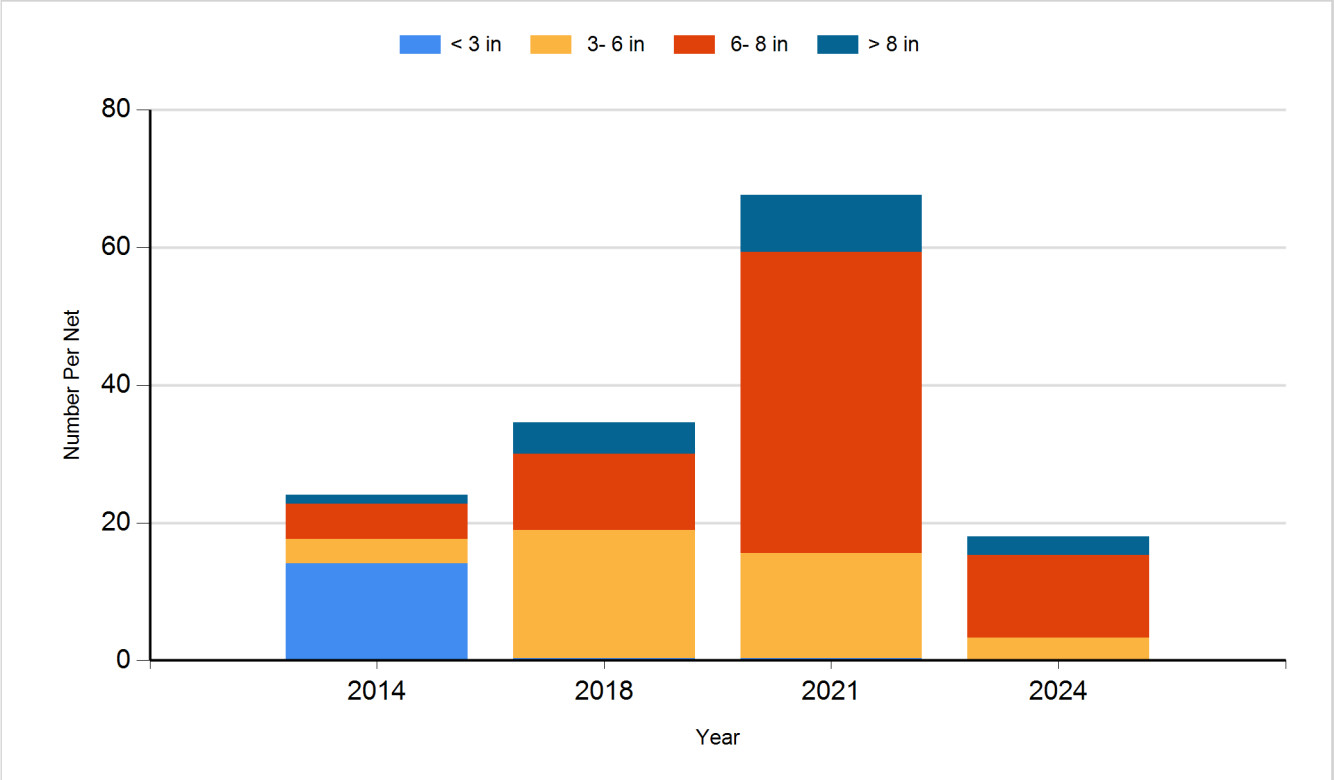
Historic Fish Sizes and Relative Abundance

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

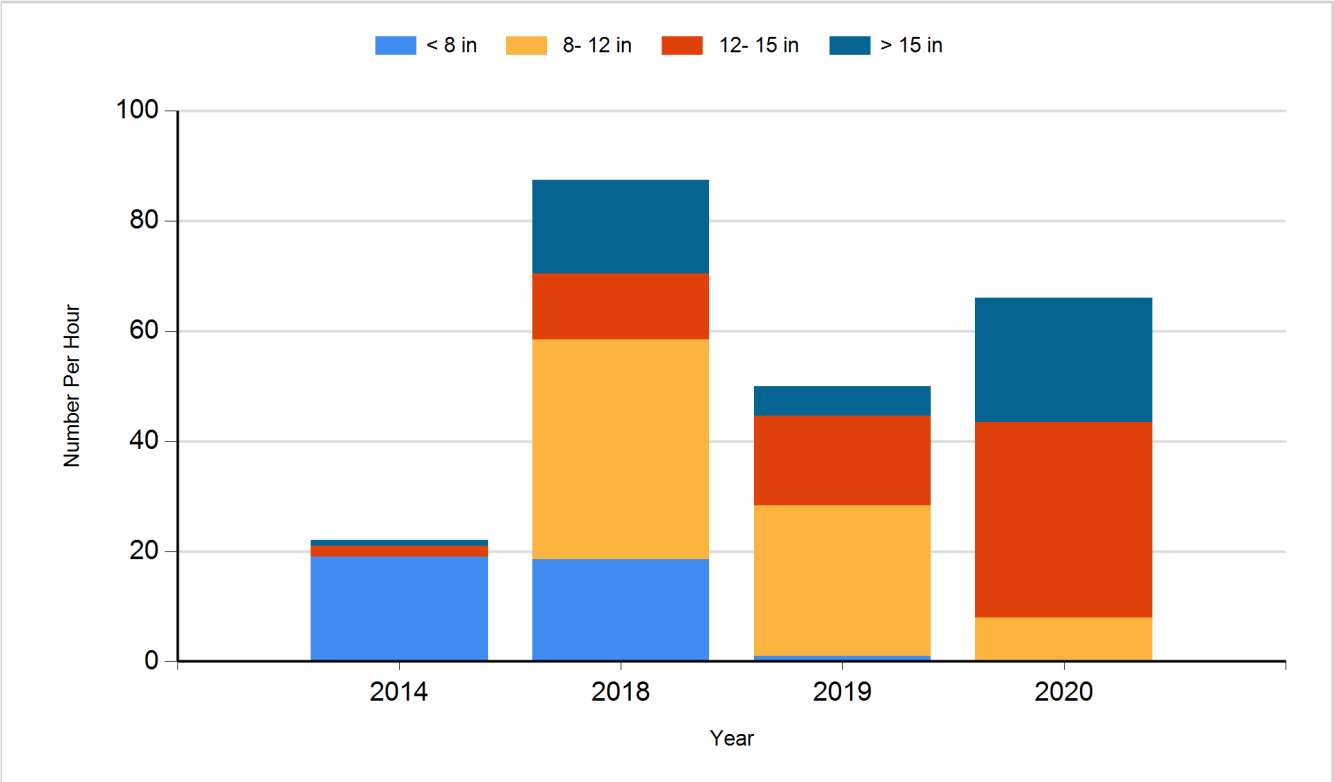
Species: Black Crappie
Gear: frame net (std 3/4 in)



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