

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Leola, McPherson County

UJA-Lake-756-000

2022

Lake Information

Name: Leola **Maximum Depth:** 14 Feet
County: McPherson
Surface Area: 18 Acres

Surveys and Investigations

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

Gear	Date	Effort
frame net (std 3/4 in)	Jun 07, 2022	5 net-nights
frame net (std 3/4 in)	Jun 08, 2022	5 net-nights

Common Fish Species Present

Yellow Perch

Northern Pike

Largemouth Bass

Bluegill

Black Bullhead

Black Crappie

Green Sunfish

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
frame net (std 3/4 in)	Black Bullhead	183	18.3	6.0	33	5	0	95	1
	Black Crappie	10	1.0	0.8	80		60	96	6
	Bluegill	70	7.0	4.5	16	7	0	127	2
	Green Sunfish	1	0.1	0.1	0		0	112	
	Northern Pike	12	1.2	0.6	100		0	95	2
	Yellow Perch	11	1.1	0.8	18		0	88	4

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
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
boat shocker (day)	Largemouth Bass							27.6				27.60
frame net (std 3/4 in)	Black Bullhead				615.9			50.8			18.3	228.3 3
	Black Crappie				0.0			4.7			1.0	1.90
	Bluegill				0.8			11.7			7.0	6.50
	Catfish				0.0			0.0			0.0	0.00
	Channel Catfish				0.0			1.5			0.0	0.50
	Green Sunfish				0.0			17.7			0.1	5.93
	Northern Pike				1.2			0.4			1.2	0.93
	Yellow Perch				0.9			8.1			1.1	3.37

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										
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
boat shocker (day)	Largemouth Bass	PSD									30		
		PSD-P									13		
		Wr									115		
frame net (std 3/4 in)	Black Bullhead	PSD				0				0			33
		PSD-P				0				0			0
		Wr				88				83			95
	Black Crappie	PSD									100		80
		PSD-P									100		60
		Wr								91			96
	Bluegill	PSD				38					42		16
		PSD-P				25					1		0
		Wr				117					108		127
	Green Sunfish	PSD									5		0
		PSD-P									0		0
		Wr									124		112
	Northern Pike	PSD				100					100		100
		PSD-P				0					50		0
		Wr				87					90		95
Yellow Perch	PSD				22					7		18	
	PSD-P				0					1		0	
	Wr				90					88		88	

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		
2020	2	2	100 (5.2)	154 (3.3)										
2017	5	1	106	124	158	176	214							
2016	6	1	82	103	156	178	197	213						
2014	8	5	128 (13)	162 (13.6)	189 (11.8)	219 (10.6)	251 (12.5)	276 (12.9)	303 (14.1)	328 (12.3)				
2012	10	1	130	155	177	208	242	274	302	322	345	367		
Weighted Mean		10	116	150	180	207	239	267	303	327	345	367		
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20		
2020	2	2												
2017	5	1												
2016	6	1												
2014	8	5												
2012	10	1												
Weighted Mean		10												

Species: Bluegill

Year Class	Age	N	Mean back-calculated length (SE) at age											
			1	2	3	4	5	6	7	8	9	10		
2020	2	18	66 (2.7)	90 (2.8)										
2019	3	10	72 (1.8)	93 (2.1)	115 (2.2)									
2018	4	9	76 (3)	104 (3)	123 (3.1)	150 (2.4)								
Weighted Mean		37	70	94	119	150								
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20		
2020	2	18												
2019	3	10												
2018	4	9												
Weighted Mean		37												

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age											
			1	2	3	4	5	6	7	8	9	10		
2019	3	5	106 (7.5)	136 (9.1)	158 (12.9)									
2018	4	4	91 (2.1)	119 (2.4)	145 (5.5)	162 (4.4)								
2017	5	1	88	111	154	197	212							
Weighted Mean		10	98	127	152	169	212							
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20		
2019	3	5												
2018	4	4												
2017	5	1												
Weighted Mean		10												

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+
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

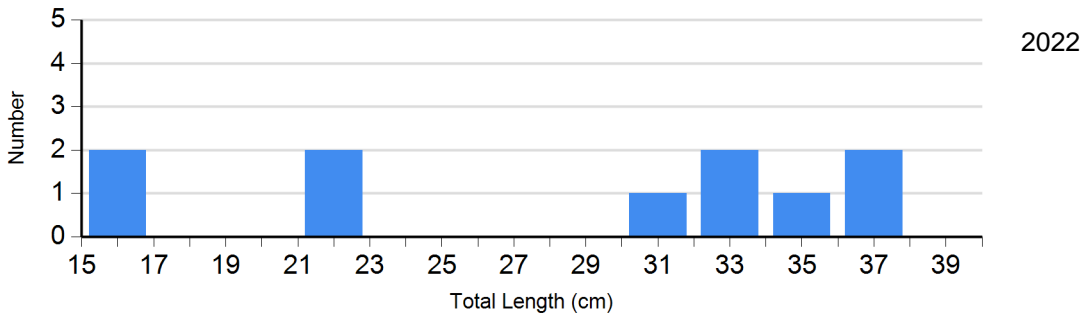
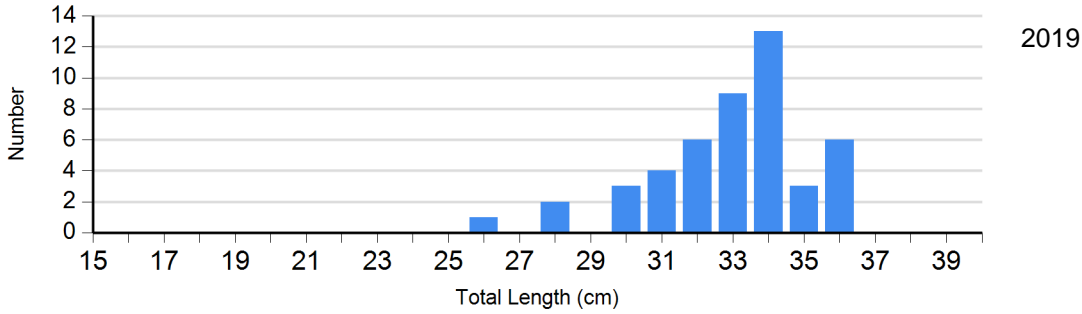
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	2019	0		0		3	106 (5.1)	44	90 (2.0)
	2022	2	115 (5.1)	2	108 (1.6)	0		6	87 (3.1)
Bluegill Frame Net	2019	68	109 (0.9)	48	108 (1.6)	0		1	0
	2022	59	127 (1.7)	11	125 (3.8)	0		0	
Largemouth Bass Electro Fishing	2019	16	115 (1.4)	4	120 (1.2)	3	108 (5.4)	0	

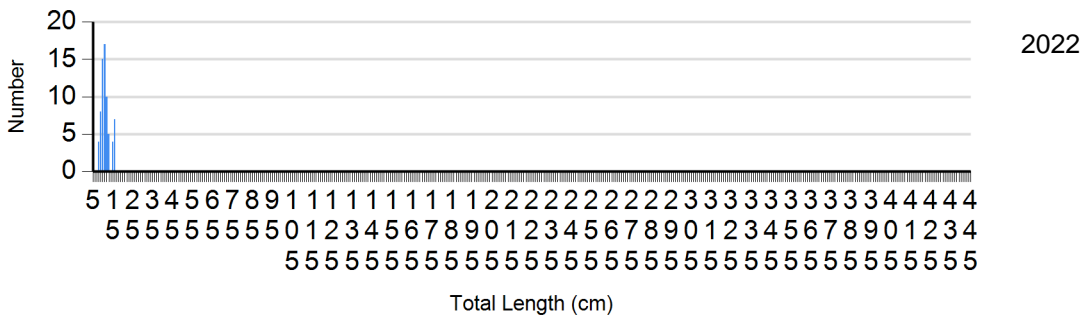
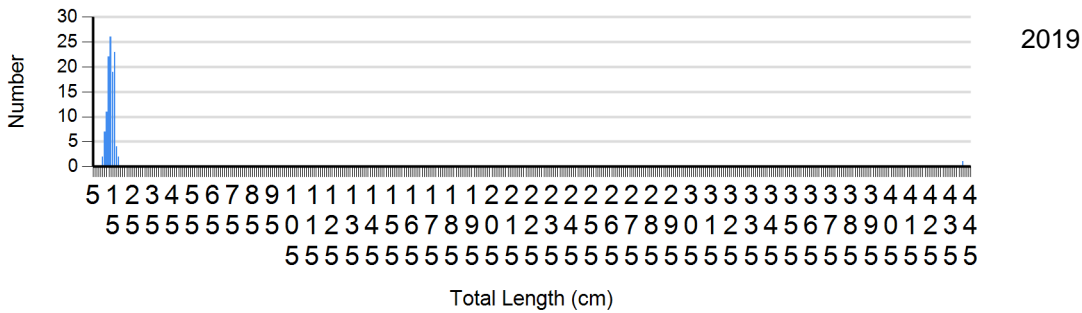
Length Frequency Distribution

Length frequency histogram of species sampled by year.

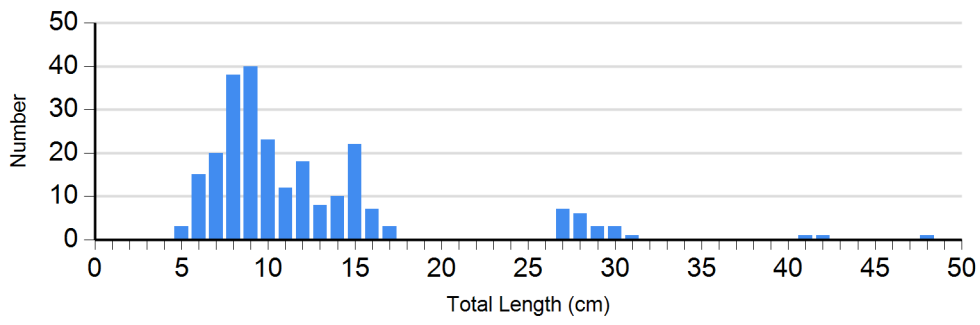
Species: Black Crappie
 Gear: frame net (std 3/4 in)



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



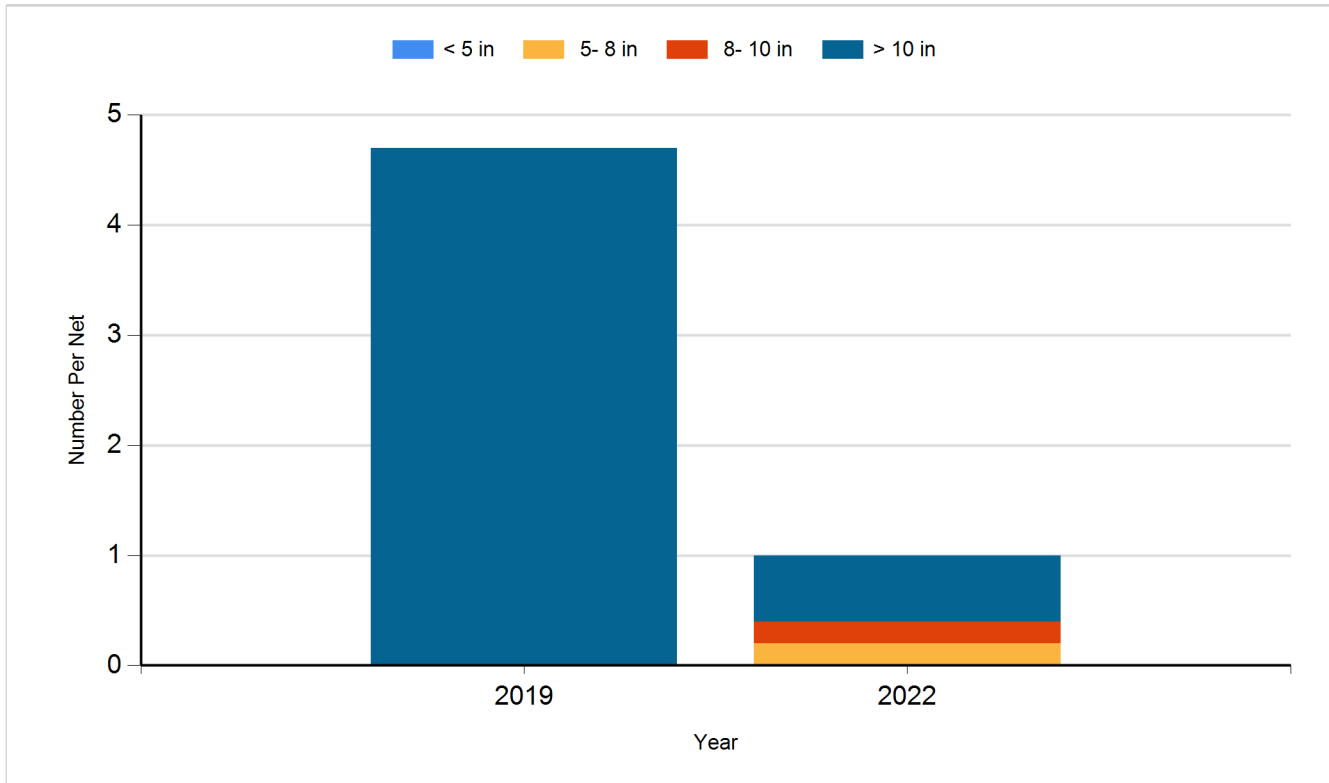
Species: Largemouth Bass
Gear: boat shocker (day)



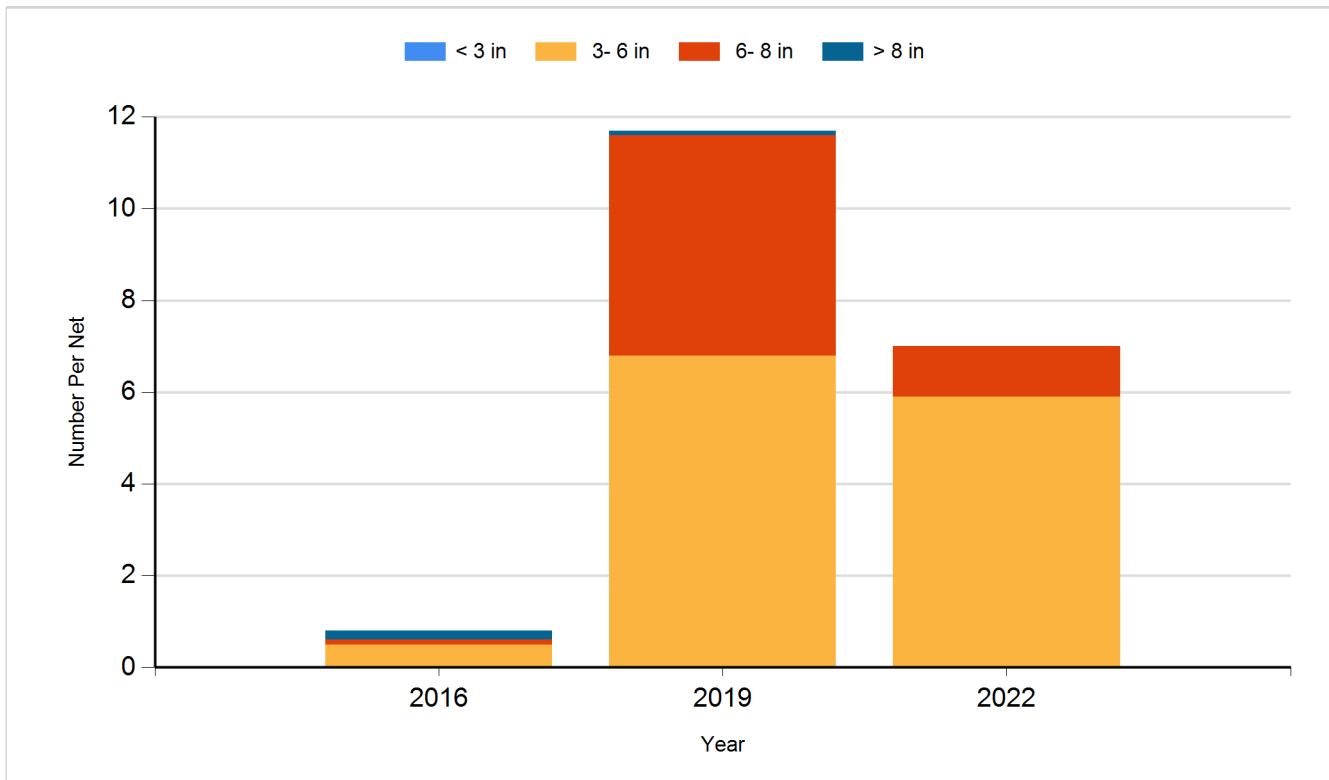
Historic Fish Sizes and Relative Abundance

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

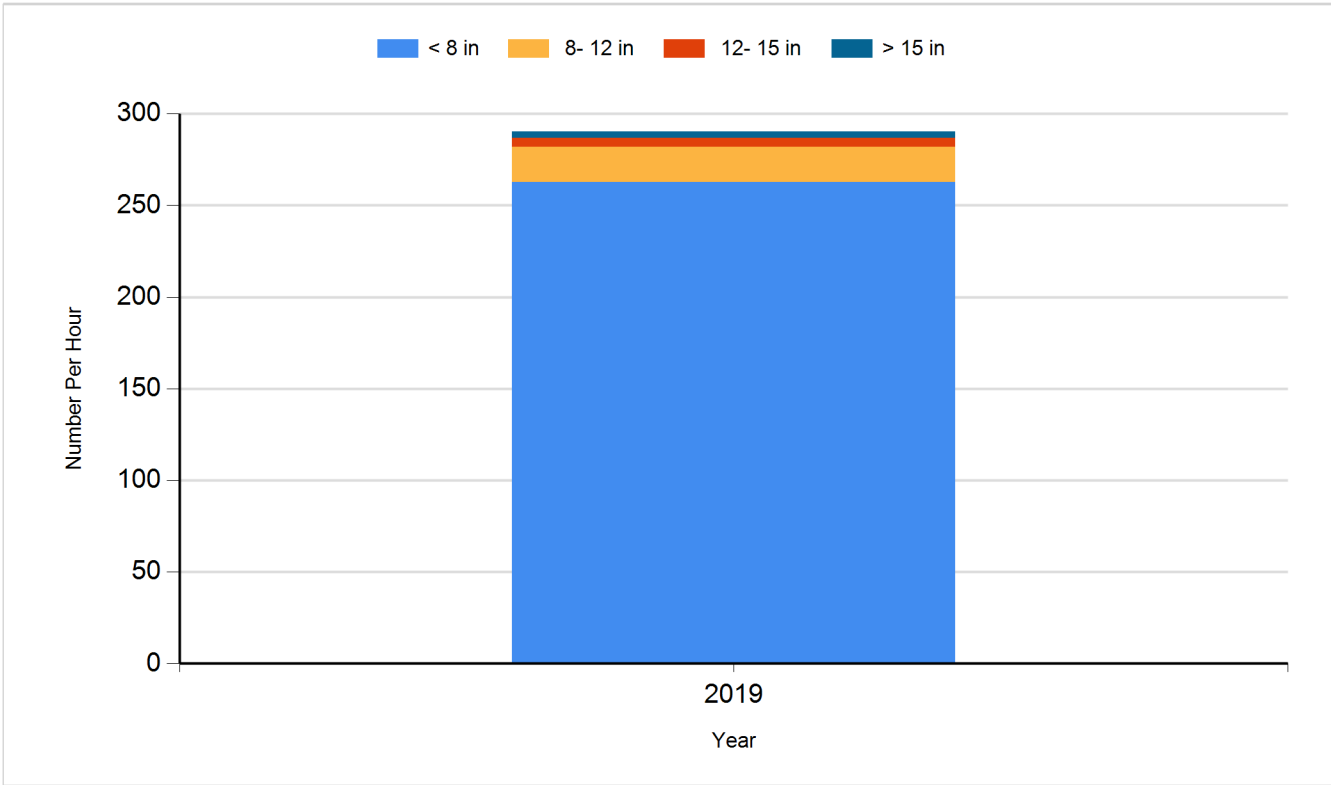
Species: Black Crappie
Gear: frame net (std 3/4 in)



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
2012	Largemouth Bass	Fingerling	2,400
2017	Largemouth Bass	Adult	115
2018	Black Crappie	Adult	206
2018	Channel Catfish	Adult	154
2019	Black Crappie	Adult	62
2019	Channel Catfish		215