SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Leola, McPherson County
UJA-Lake-756-000
2019

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
boat shocker (day)	Sep 05, 2019	3000 seconds
frame net (std 3/4 in)	Jun 25, 2019	5 net-nights
frame net (std 3/4 in)	Jun 26, 2019	5 net-nights

Common Fish Species Present

Yellow Perch

Northern Pike

Largemouth Bass

Bluegill

Black Bullhead

Green Sunfish

Black Crappie

Channel Catfish

Catfish

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
boat shocker (day)	Largemouth Bass	242	27.6	9.5	30	15	13		115	2
frame net (std 3/4 in)	Black Bullhead	512	50.8	18.1	0		0		83	1
	Black Crappie	47	4.7	2.4	100		100		91	3
	Bluegill	117	11.7	7.7	42	6	1		108	2
	Catfish	1	0.0	0.0						
	Channel Catfish	15	1.5	1.0	80		7		88	3
	Green Sunfish	179	17.7	14.8	5	2	0		124	3
	Northern Pike	4	0.4	0.3	100		50		90	3
	Yellow Perch	88	8.1	2.6	7	4	1		88	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.

		CPUE										
Gear	Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg
boat shocker (day)	Largemouth Bass										27.6	27.60
frame net (std 3/4 in)	Black Bullhead							615.9			50.8	333.35
	Black Crappie							0.0			4.7	2.35
	Bluegill							0.8			11.7	6.25
	Catfish							0.0			0.0	0.00
	Channel Catfish							0.0			1.5	0.75
	Green Sunfish							0.0			17.7	8.85
	Northern Pike							1.2			0.4	0.80
	Yellow Perch							0.9			8.1	4.50

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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
boat shocker (day)	Largemouth Bass	PSD										30
		PSD-P										13
		Wr										115
frame net (std 3/4 in)	Black Bullhead	PSD							0			0
		PSD-P							0			0
		Wr							88			83
	Black Crappie	PSD										100
		PSD-P										100
		Wr										91
	Bluegill	PSD							38			42
		PSD-P							25			1
		Wr							117			108
	Channel Catfish	PSD										80
		PSD-P										7
		Wr										88
	Green Sunfish	PSD										5
		PSD-P										0
		Wr										124
	Northern Pike	PSD							100			100
		PSD-P							0			50
		Wr							87			90
	Yellow Perch	PSD							22			7
		PSD-P							0			1
		Wr							90			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
2012	7	6	123 (6.9)	175 (13.3)	213 (12.4)	238 (10.5)	266 (8.6)	284 (7.2)	300 (6.9)			
2011	8	7	120 (5.3)	154 (7.2)	193 (9.3)	219 (11)	241 (10.9)	265 (10.2)	283 (8.9)	300 (8.8)		
2010	9	9	126 (8.6)	166 (8.4)	200 (9.8)	227 (9.1)	252 (11.8)	273 (11.3)	292 (11.8)	308 (11)	321 (9.4)	
2009	10	5	128 (10.6)	184 (14.1)	217 (12.9)	246 (11.3)	273 (11.8)	288 (11.1)	303 (9.6)	316 (9.5)	326 (8.1)	336 (8.2)
2008	11	5	127 (7.6)	173 (9.2)	209 (8.9)	242 (6.5)	277 (6.2)	294 (4.7)	311 (2.3)	324 (3.8)	334 (3.7)	344 (3.7)
2006	13	1	121	164	191	234	247	274	294	304	315	331
Weighted Mean		33	124	169	205	233	259	279	296	310	325	339

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2012	7	6										
2011	8	7										
2010	9	9										
2009	10	5										
2008	11	5	352 (3.8)									
2006	13	1	344	354	362							
Weighted Mean		33	351	354	362							

Species: Bluegill

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2018	1	6	97 (2.6)									
2017	2	2	89 (4.9)	108 (6.1)								
2016	3	9	79 (1.5)	103 (1.9)	124 (2)							
2015	4	4	88 (3.8)	109 (3.2)	127 (1.7)	140 (3.2)						
2014	5	5	84 (5)	107 (4.9)	123 (4.7)	136 (3.8)	150 (2)					
2013	6	8	88 (2.6)	106 (2)	124 (3.2)	142 (3.6)	153 (4)	163 (4.2)				
2012	7	3	96 (4.1)	114 (4.2)	128 (4)	136 (4.4)	147 (6.5)	158 (5.4)	164 (6.3)			
Weighted Mean		37	87	107	125	139	151	162	164			

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2018	1	6										
2017	2	2										
2016	3	9										
2015	4	4										
2014	5	5										
2013	6	8										
2012	7	3										
Weighted Mean		37										

Species: Largemouth Bass

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2018	1	39	105 (2.1)									
2017	2	3	99 (3.3)	144 (4)								
2015	4	9	108 (4.8)	141 (5.7)	175 (7.7)	248 (5.8)						
2014	5	2	116 (13.5)	164 (22.8)	200 (10.2)	242 (8.7)	276 (3)					
2010	9	1	109	140	192	253	279	310	333	381	398	
2009	10	1	117	142	183	232	249	297	337	377	396	409
2007	12	1	136	187	220	241	261	312	329	363	390	413
Weighted Mean		56	106	147	184	246	268	306	333	374	395	411

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2018	1	39										
2017	2	3										
2015	4	9										
2014	5	2										
2010	9	1										
2009	10	1										
2007	12	1	439	464								
Weighted Mean		56	439	464								

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2018	1	9	105 (2.3)									
2017	2	23	107 (1.9)	145 (2.4)								
2016	3	9	110 (2.2)	147 (2.5)	174 (1.6)							
2015	4	2	111 (2.1)	136 (.6)	165 (6.5)	185 (6.4)						
2014	5	1	102	129	154	174	196					
2012	7	2	128 (6.7)	154 (5.2)	183 (6.7)	201 (.4)	211 (2.7)	223 (2.6)	235 (3.7)			
2011	8	1	118	144	165	181	194	207	228	237		
2008	11	1	121	144	175	203	225	244	260	275	291	305
Weighted Mean		48	109	145	172	190	207	224	240	256	291	305

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2018	1	9										
2017	2	23										
2016	3	9										
2015	4	2										
2014	5	1										
2012	7	2										
2011	8	1										
2008	11	1	311									
Weighted Mean		48	311									

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+
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+
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

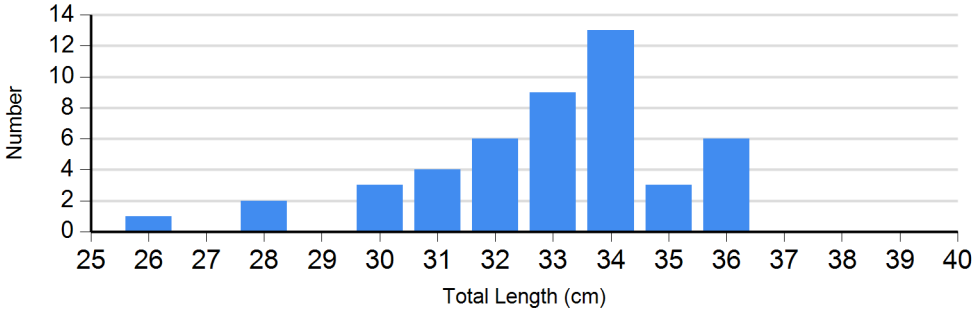
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2019	0		0		3	106 (5.1)	44	90 (2.0)
Bluegill Frame Net	2016	5	119 (2.8)	1	112	2	116 (13.3)	0	
	2019	68	109 (0.9)	48	108 (1.6)	0		1	0
Largemouth Bass Electro Fishing	2019	16	115 (1.4)	4	120 (1.2)	3	108 (5.4)	0	

Length Frequency Distribution

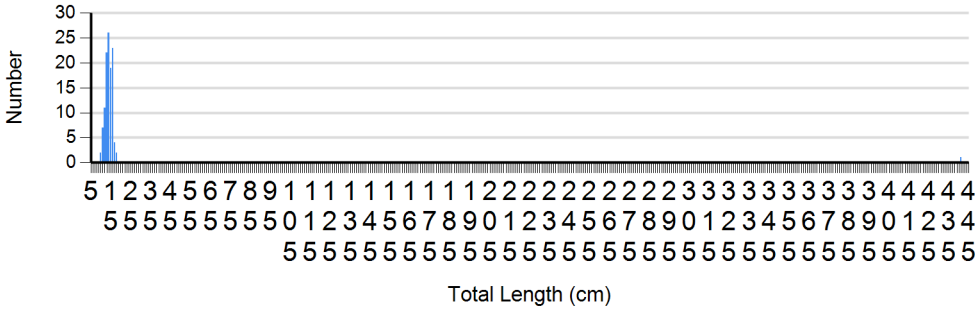
Length frequency histogram of species sampled by year.

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



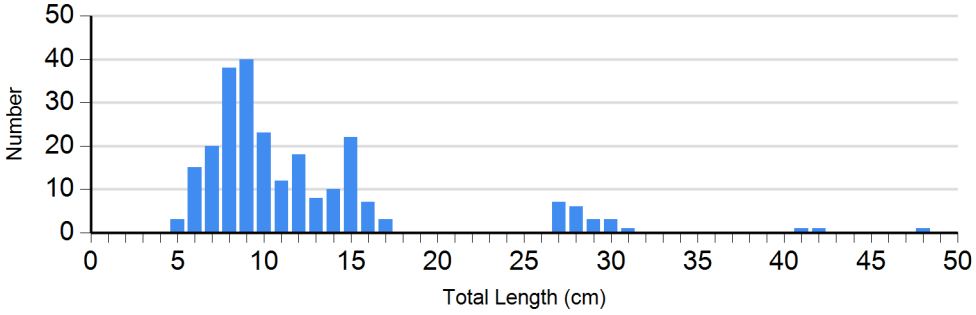
2019

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



2019

Species: Largemouth Bass
Gear: boat shocker (day)

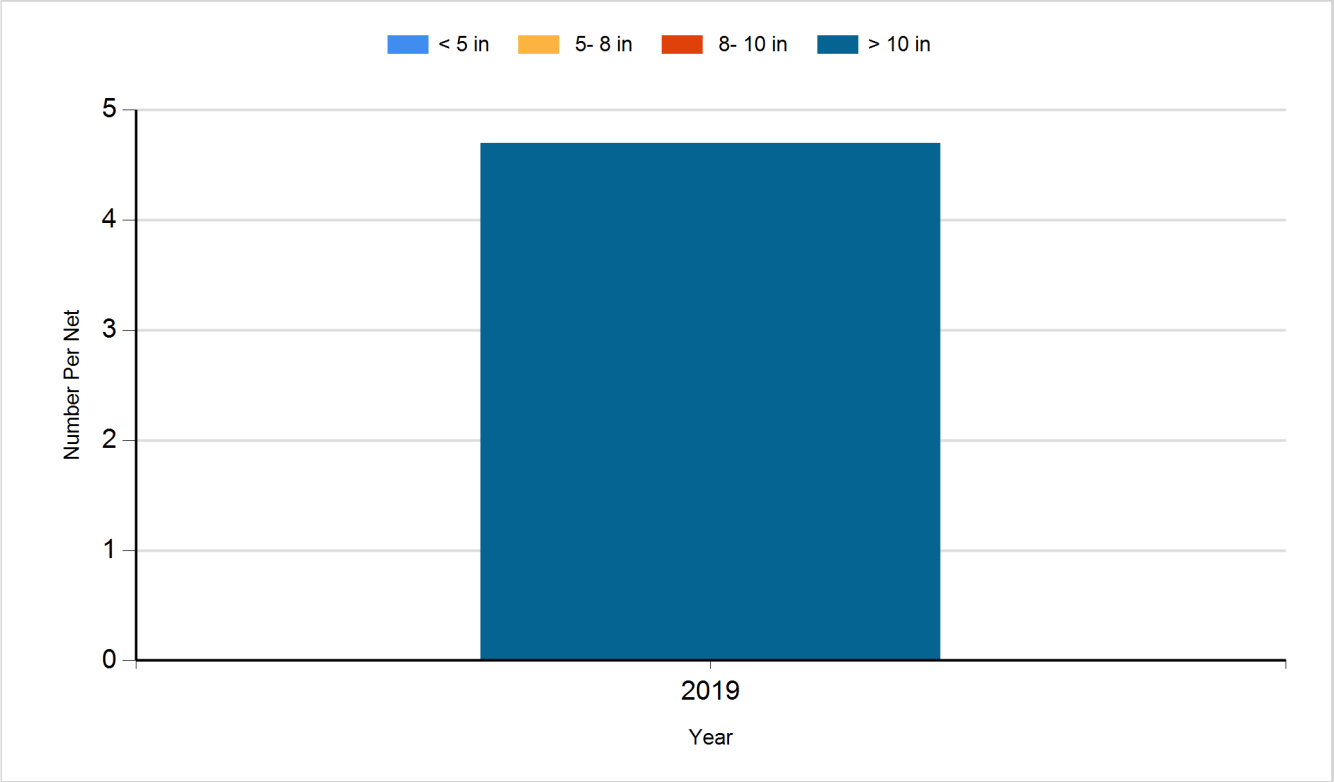


2019

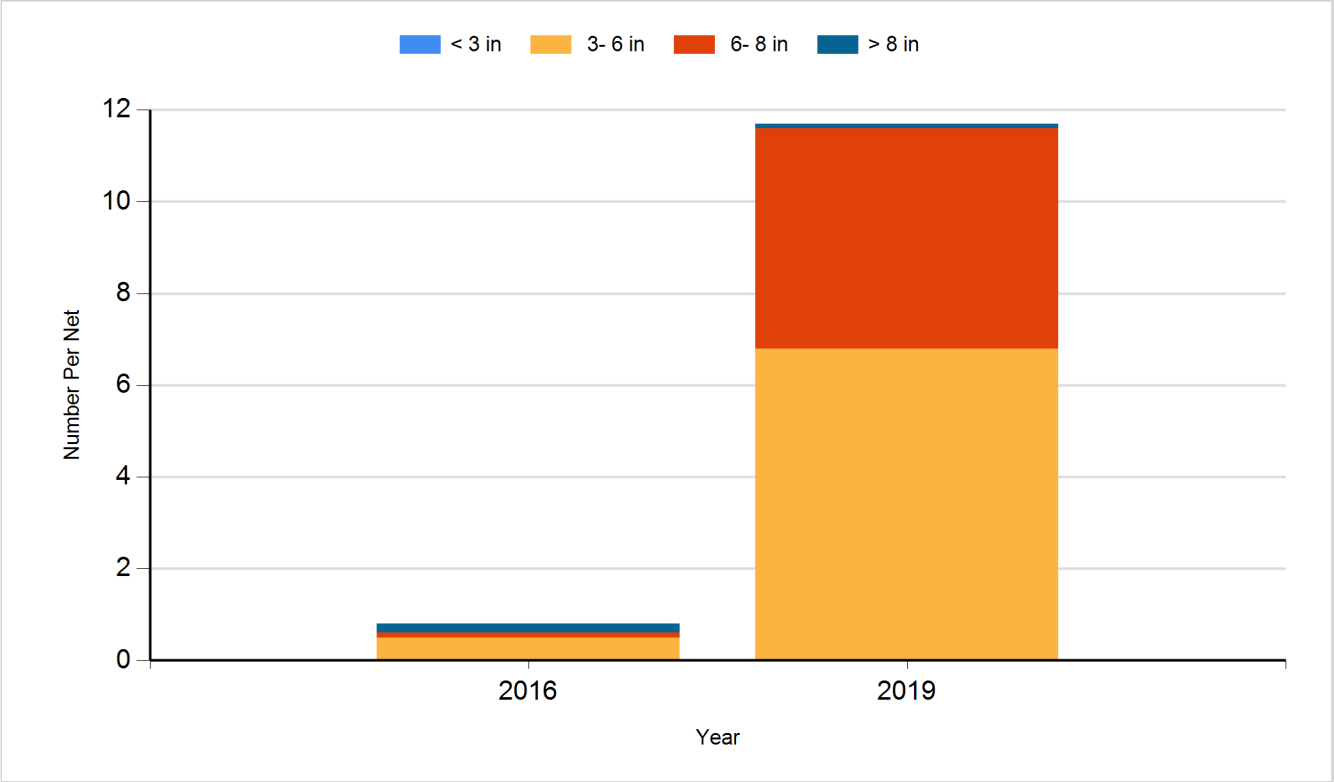
Historic Fish Sizes and Relative Abundance

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

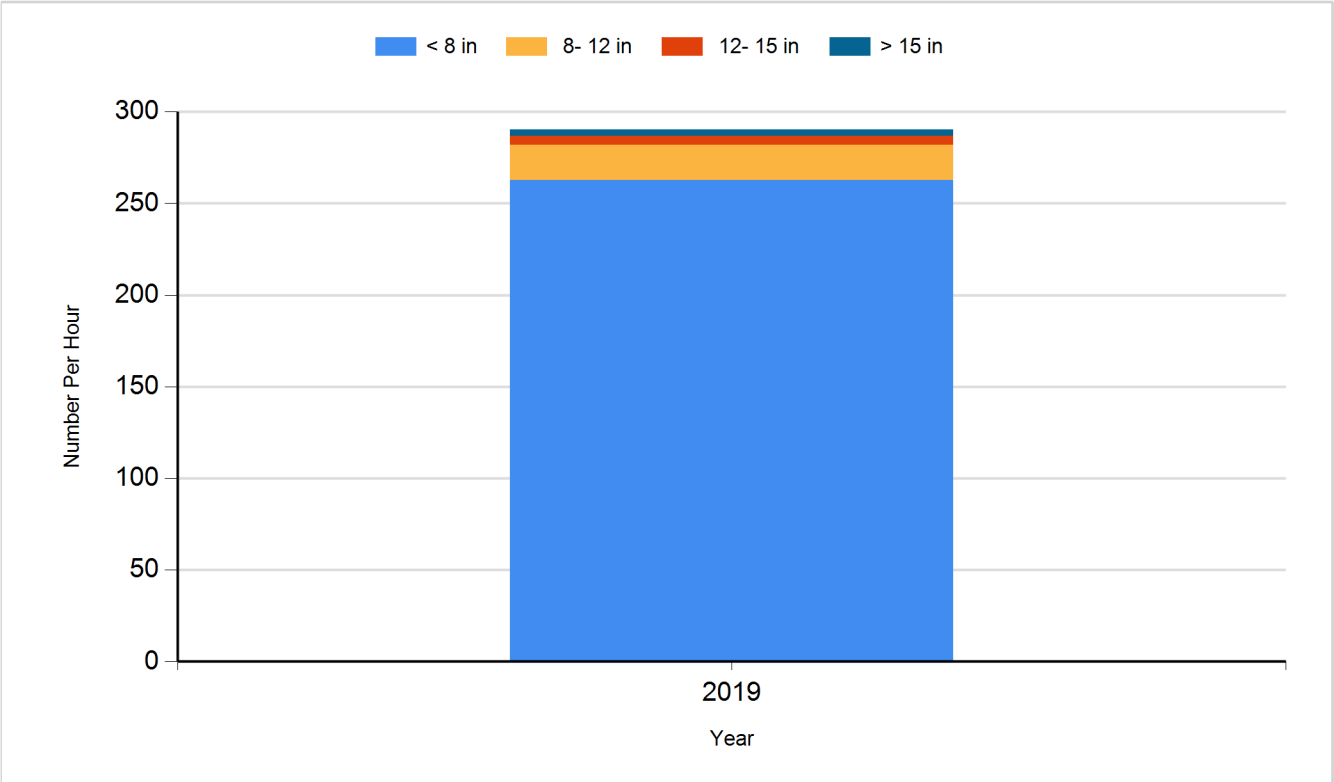
Species: Black Crappie
Gear: frame net (std 3/4 in)



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
2010	Bluegill	Adult	950
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