2023 Herrick Lake (Gregory County)

Herrick Lake is located 1 mile south of Herrick, SD. It is an 11-acre impoundment with a mean depth of 6 feet and maximum depth of 14 feet. Access location at Herrick Lake consist of a gravel boat ramp. It is managed as a multi-species fishery consisting of Black Crappie, Bluegill and Largemouth Bass. Sampling occurs every three years, consisting of frame nets targeting all species and fall electrofishing targeting Largemouth Bass.

- **Black Crappie:** The catch rate of Black Crappie in 2023 was 9 fish per frame net. Of the Black Crappie sampled, 87% were 8 inches or longer, with 75% being 10 inches or larger. Black Crappie have a relative weight (Wr) of 94*.

- **Bluegill:** The catch rate of Bluegill in 2023 was 30.36 fish per frame net. Of the Bluegill sampled, 85% were 6 inches or larger, with 4% being 8 inches or larger. Bluegill have relative weight (Wr) of 99*.

- **Largemouth Bass:** The catch rate of Largemouth Bass in 2023 was 76 fish per hour electrofishing. Of the Largemouth Bass sampled, 69% were 12 inches or larger, with 24% being 15 inches or larger. Largemouth Bass have a relative weight (Wr) of 98*.

* 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.

Created 1/29/2024 BV

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Herrick, Gregory County
PON-Lake-75-000
2023

Lake Information

Name:	Herrick	**Maximum Depth:**	14 Feet
County:	Gregory	**Mean Depth:**	6 Feet
Legal Description:	T96-R71-S26		
Surface Area:	11 Acres		

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (night)	Oct 04, 2023	2088 seconds
frame net (std 3/4 in)	Jun 27, 2023	4 net-nights
frame net (std 3/4 in)	Jun 28, 2023	3 net-nights

Common Fish Species Present

Largemouth Bass

Bluegill

Black Crappie

Black Bullhead

Yellow Perch

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.

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

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

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.

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

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 (in)	(cm)	Quality (in)	(cm)	Preferred (in)	(cm)	Memorable (in)	(cm)	Trophy (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
boat shocker (night)	Largemouth Bass	61	76.0	20.8	69	11	24	10	98	2
frame net (std 3/4 in)	Black Bullhead	32	4.6	1.1	97		97		95	2
	Black Crappie	63	9.0	4.9	87	6	75	8	94	1
	Bluegill	214	30.6	13.0	85	3	4	2	99	1
	Yellow Perch	3	0.4	0.4	67		0		90	3

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	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
AFS std frame net	Black Bullhead				1.3							1.30
	Black Crappie				3.9							3.90
	Bluegill				12.4							12.40
	Green Sunfish				0.9							0.90
boat shocker (night)	Largemouth Bass	78.0			180.0			145.0			76.0	119.75
frame net (std 3/4 in)	Black Bullhead	0.6						3.6			4.6	2.93
	Black Crappie	9.8						16.5			9.0	11.77
	Bluegill	10.0						41.5			30.6	27.37
	Green Sunfish	1.3						0.1			0.0	0.47
	Largemouth Bass	0.1						0.3			0.0	0.13
	Yellow Perch	0.6						1.8			0.4	0.93

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	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AFS std frame net	Black Bullhead	PSD				100						
		PSD-P				100						
		Wr				101						
	Black Crappie	PSD				67						
		PSD-P				0						
		Wr				91						
	Bluegill	PSD				55						
		PSD-P				1						
		Wr				92						
boat shocker (night)	Largemouth Bass	PSD	65			51			58			69
		PSD-P	31			17			27			24
		Wr	108			100			101			98
frame net (std 3/4 in)	Black Bullhead	PSD	100						93			97
		PSD-P	83						93			97
		Wr	92						101			95
	Black Crappie	PSD	69						58			87
		PSD-P	1						36			75
		Wr	84						95			94
	Bluegill	PSD	48						44			85
		PSD-P	0						3			4
		Wr	85						102			99
	Largemouth Bass	PSD	100						100			
		PSD-P	100						100			
		Wr	106						99			
	Yellow Perch	PSD	100						71			67
		PSD-P	50						21			0
		Wr	89						91			90

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
2022	1	1	106									
2021	2	2	78 (5.4)	136 (5.1)								
2020	3	5	93 (5.1)	161 (6.1)	217 (6.8)							
2019	4	13	81 (4)	140 (4.5)	205 (3.7)	243 (3.5)						
2018	5	3	75 (1.8)	135 (4.4)	177 (3.2)	213 (12.5)	240 (12.4)					
2017	6	2	68 (5.8)	106 (17.1)	151 (18.9)	200 (28.7)	236 (26)	276 (6.9)				
Weighted Mean		26	82	141	199	233	238	276				

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2022	1	1										
2021	2	2										
2020	3	5										
2019	4	13										
2018	5	3										
2017	6	2										
Weighted Mean		26										

Species: Bluegill

| Year Class | Age | N | Mean back-calculated length (SE) at age |
			1	2	3	4	5	6	7	8	9	10
2021	2	14	70 (3.2)	110 (3.4)								
2020	3	7	70 (3.7)	109 (5.6)	150 (5)							
2019	4	17	61 (2.1)	99 (3.3)	137 (3)	168 (2.8)						
2018	5	2	57 (4.9)	100 (13.5)	132 (10.6)	176 (6.5)	193 (8.9)					
Weighted Mean		40	66	105	140	169	193					

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2021	2	14										
2020	3	7										
2019	4	17										
2018	5	2										
Weighted Mean		40										

Species: Largemouth Bass

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2023	0	1										
2022	1	13	91 (3.1)									
2021	2	6	92 (6.1)	161 (6.3)								
2020	3	8	91 (4.4)	160 (7.1)	213 (10.5)							
2019	4	11	93 (3.5)	175 (6.4)	238 (6.8)	288 (6.8)						
2018	5	14	97 (5.4)	173 (8.6)	246 (9.9)	295 (9.2)	334 (7.4)					
2017	6	3	106 (10.4)	181 (21.8)	255 (33.6)	304 (33.3)	354 (23.9)	387 (23.5)				
2016	7	3	79 (6.7)	166 (22.9)	245 (28.5)	297 (25.3)	352 (30.7)	390 (28.8)	420 (27.4)			
Weighted Mean		59	93	170	238	294	340	389	420			

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2023	0	1										
2022	1	13										
2021	2	6										
2020	3	8										
2019	4	11										
2018	5	14										
2017	6	3										
2016	7	3										
Weighted Mean		59										

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Black Crappie

Year	N	Mean Length (expanded sample number) at capture by age

Year	N	1	2	3	4	5	6	7	8	9	10+
2023	58	163 (1)	177 (4)	258 (10)	269 (35)	262 (4)	286 (5)				
2020	129	174 (3)	165 (37)	209 (31)	256 (38)	257 (14)	286 (4)	275 (2)	297 (2)		
2017	27		166 (1)		205 (22)	222 (4)					
2014	100		130 (10)	186 (5)	199 (26)	214 (24)	216 (17)	216 (11)	218 (6)		

Species: Bluegill

Year	N	1	2	3	4	5	6	7	8	9	10+
2023	214		140 (42)	173 (50)	184 (120)	207 (3)					
2020	328		124 (71)	139 (69)	154 (122)	173 (49)	180 (13)		212 (4)		
2017	93		82 (15)	101 (6)	140 (28)	160 (27)	174 (16)	226 (1)			
2014	100		84 (2)	116 (3)	133 (30)	148 (46)	161 (18)	182 (1)			

Species: Largemouth Bass

Year	N	1	2	3	4	5	6	7	8	9	10+
2023	60	119 (15)	199 (6)	242 (8)	319 (11)	364 (14)	415 (3)	446 (3)			
2020	70	184 (5)	230 (20)	293 (15)	356 (11)	397 (12)	443 (2)	521 (1)	465 (3)		394 (1)
2017	138	174 (18)	244 (50)	291 (16)	350 (37)	396 (13)	407 (3)	459 (1)	493 (2)		
2014	30	167 (4)	261 (9)	319 (4)	316 (2)	355 (2)		355 (1)	404 (1)	413 (2)	453 (5)

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	2020	56	98 (0.9)	29	96 (0.8)	47	90 (0.6)	0	
	2023	8	101 (2.2)	8	95 (1.6)	46	93 (0.6)	1	86
Bluegill Frame Net	2020	185	102 (0.7)	138	102 (1.3)	9	96 (2.4)	0	
	2023	33	109 (2.4)	172	98 (0.8)	9	95 (2.7)	0	
Largemouth Bass Electro Fishing	2020	25	103 (1.3)	19	100 (1.3)	15	99 (1.6)	1	108
	2023	13	100 (2.3)	19	99 (1.7)	10	95 (2.8)	0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: frame net (std 3/4 in)
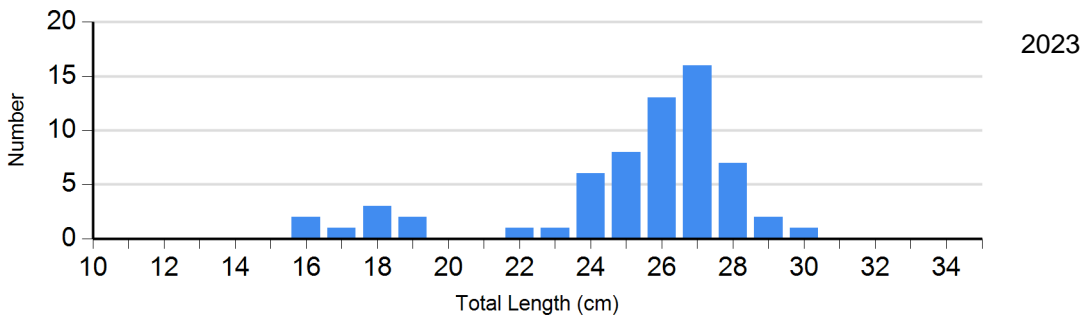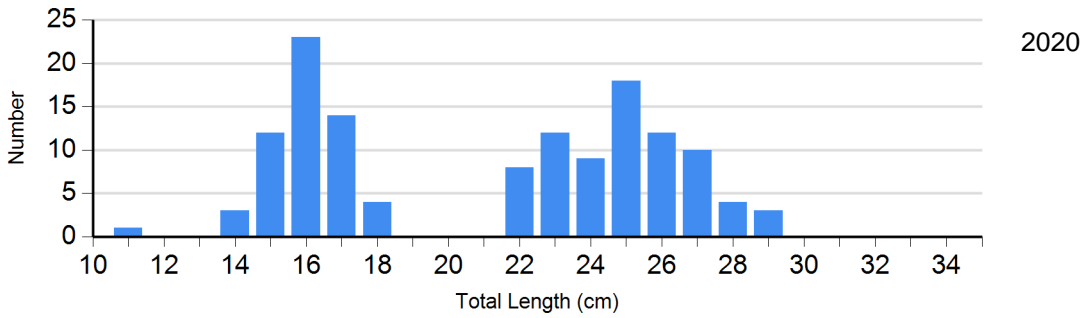
Species: Bluegill
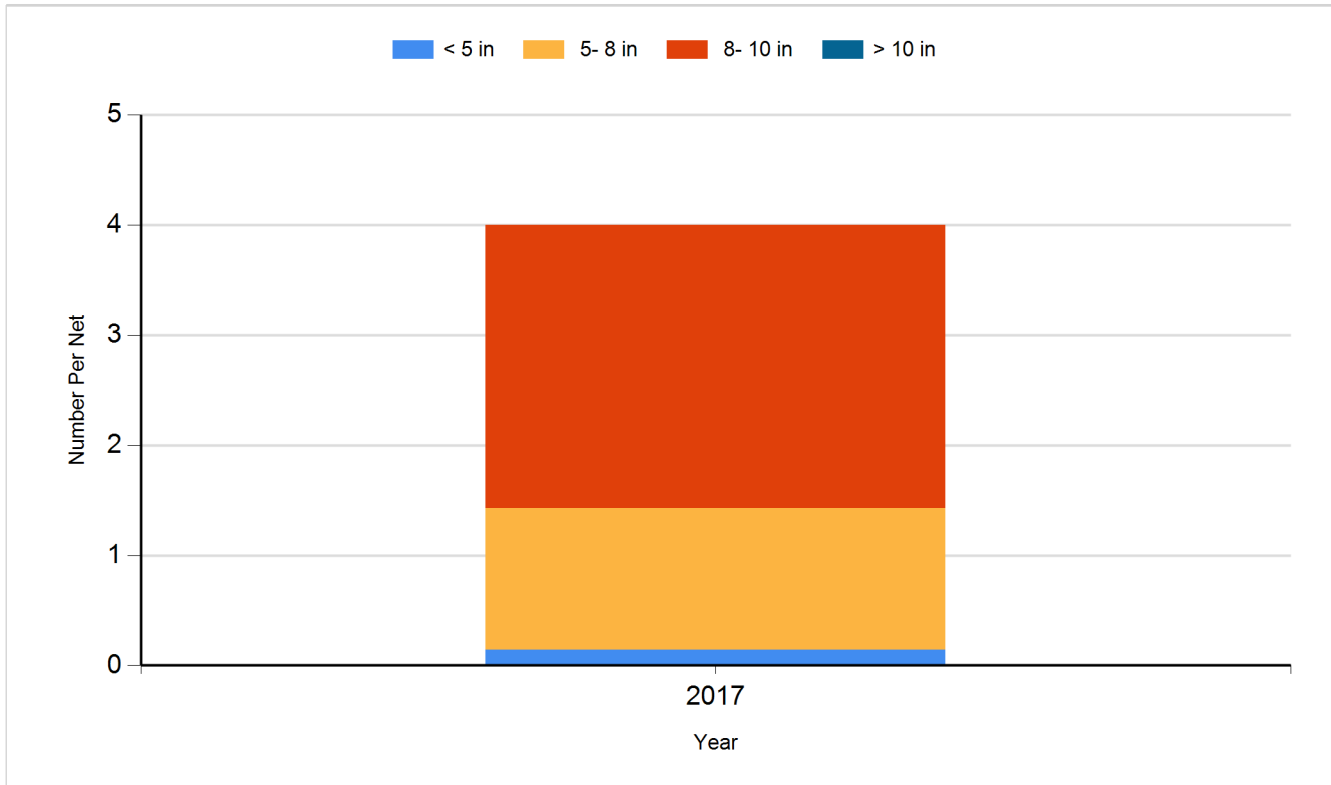Gear: frame net (std 3/4 in)
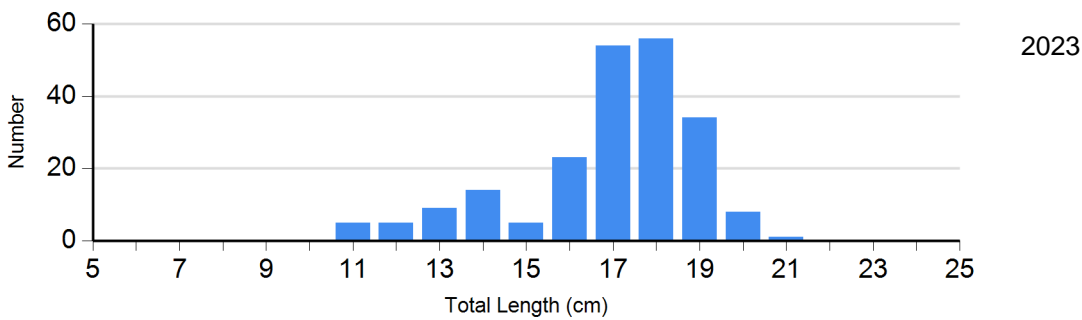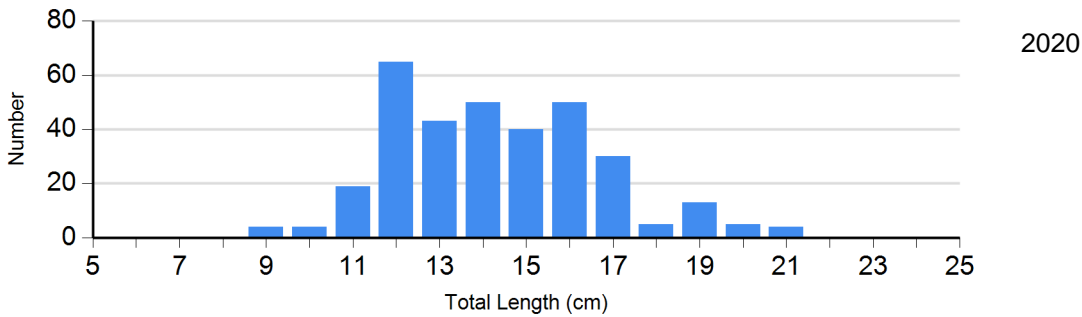
Species: Largemouth Bass
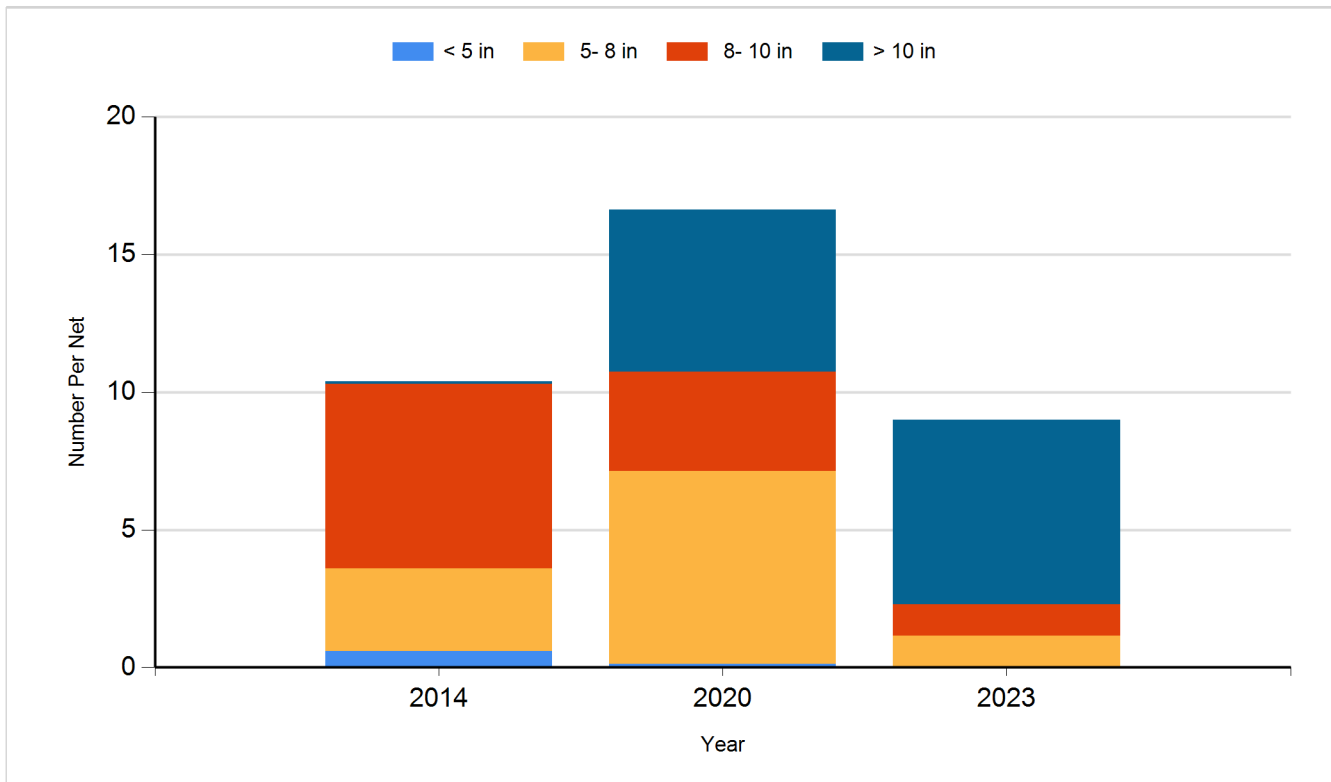Gear: boat shocker (night)

2020

2023
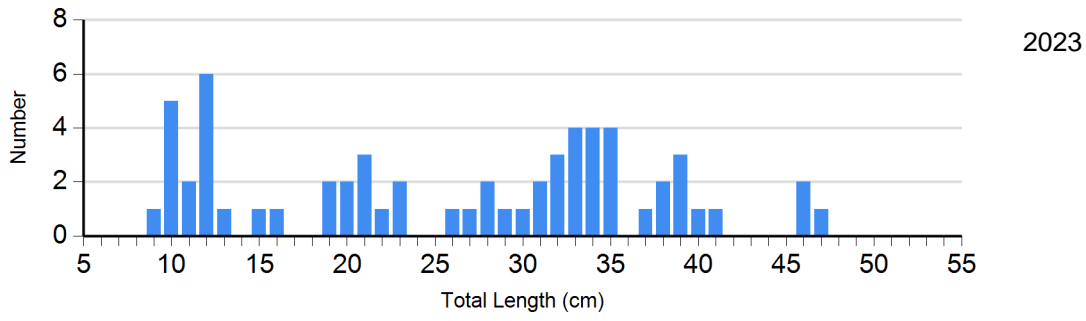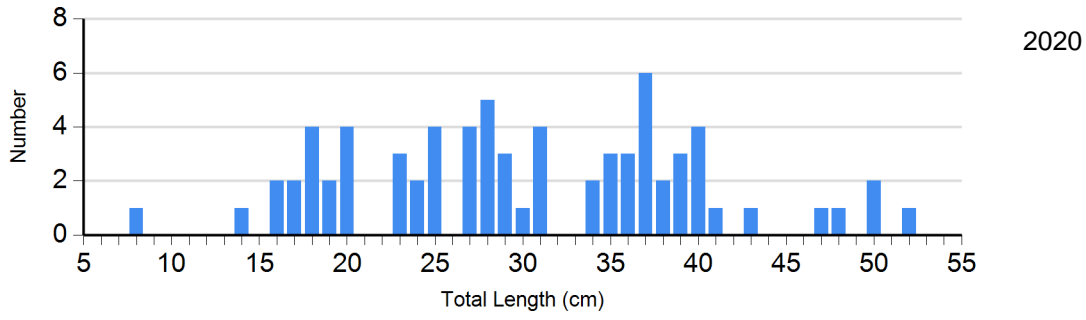
Historic Fish Sizes and Relative Abundance
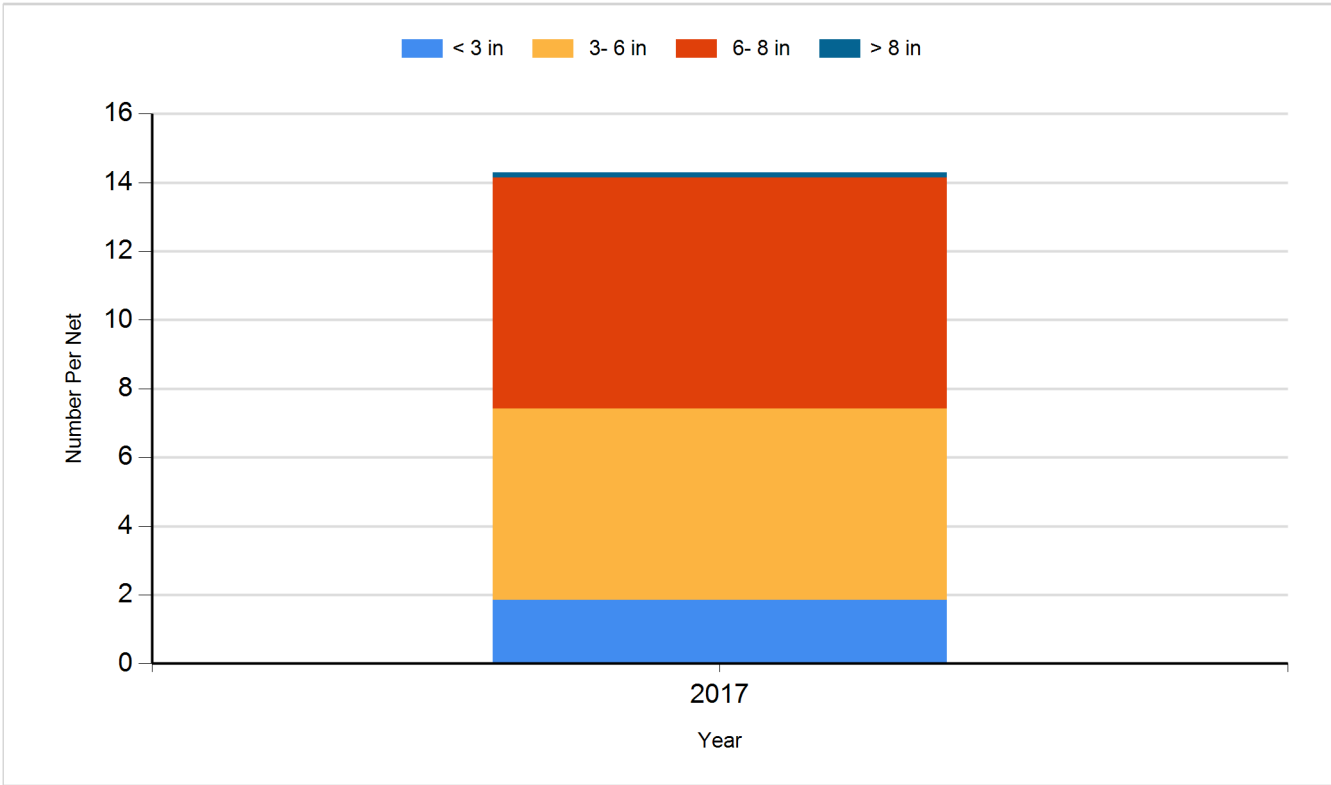
Size distribution per net by color for species sampled by year.

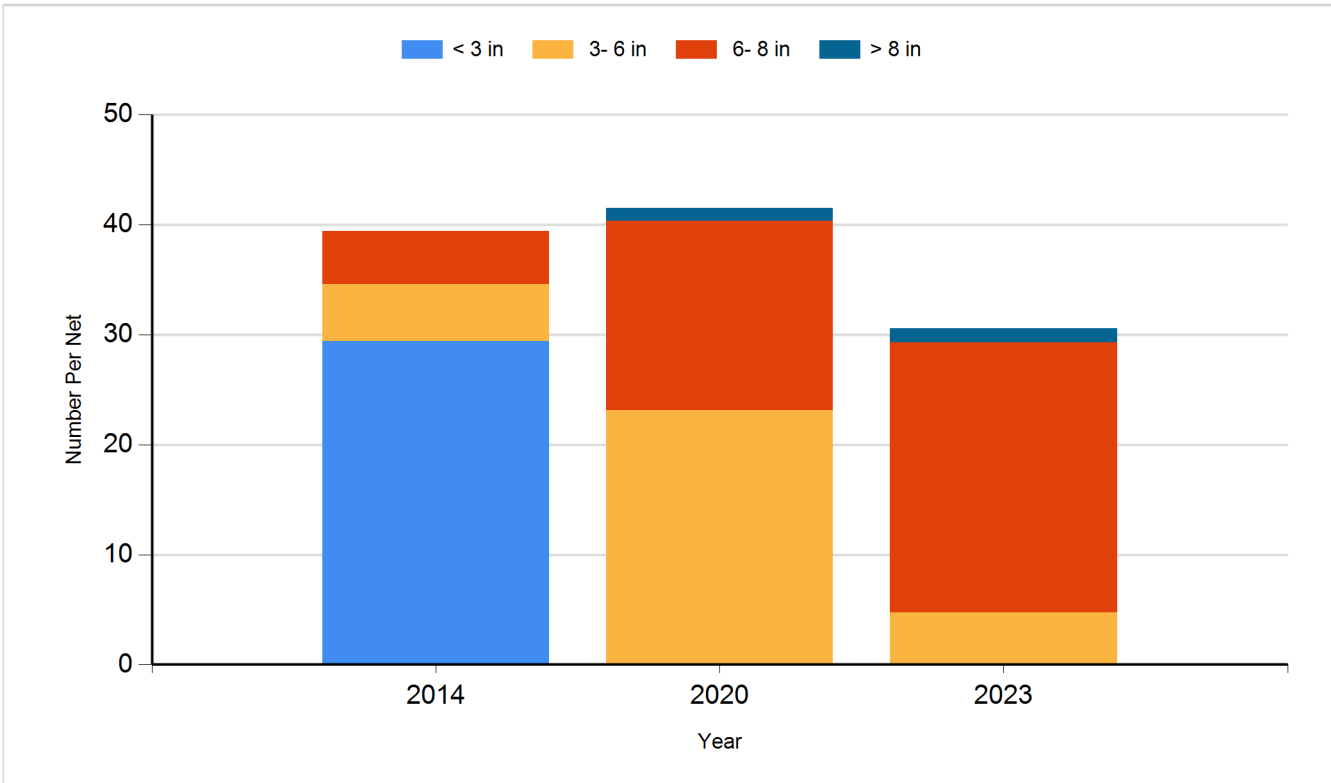Species: Black Crappie
Gear: AFS std frame net

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

Species: Bluegill
Gear: AFS std frame net

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