Richmond Lake Survey Summary

Richmond Lake, located 5.0 miles north and 4.0 miles west of Aberdeen, is managed as a black crappie, bluegill, and walleye (includes saugeye) fishery; however, other fish species (e.g., channel catfish, northern pike, white bass, etc.) are present and contribute to the fishery.

- **Black crappie.** In 2010, black crappie experienced a large die off in Richmond Lake; since, relative abundance has remained low to moderate. In 2018, the mean frame net CPUE was 6.1. Those sampled ranged in length from 5.5 to 10.6 inches; six year classes (2011, 2013 – 2017) were represented. Black crappies from the 2017 (age-1) cohort, which had mean length of 6.7 inches, were the most abundant.

- **Bluegill.** Bluegill numbers increased in 2017 and 2018. In 2018, relative abundance (36.1/frame net) was considered moderate. Sampled bluegills ranged in length from 3.1 to 9.1 inches; 42% were ≥6.0 inches and 9% were ≥8.0 inches. Six year classes (2011 and 2013 – 2017) were present; those from the 2016 and 2017 cohorts were the most abundant accounting for more than 80% of bluegills in the sample. Growth appears to be good with mean length at capture values that approach or exceed 8.0 inches by age 4. In 2018, the mean length at capture of age-4 fish was 8.3 inches.

- **Channel catfish.** Although not abundant, the opportunity exists for anglers to catch channel catfish from Richmond Lake. In 2018, gill nets sampled four individuals that ranged in length from 24.0 to 27.6 inches.

- **Walleye.** Walleye (includes saugeye) numbers have been low (i.e., <2.5/gill net) in surveys conducted from 2016 – 2018. In 2018, those sampled ranged in length from 7.5 to 22.4 inches; four year classes (2011 and 2016 – 2018) were represented. Of the 14 individuals sampled 10 were members of the 2017 (age-1) cohort, which coincided with a saugeye stocking.

For more detailed results see the computer generated South Dakota Statewide Fisheries Survey for Richmond Lake (below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Richmond, Brown County
UJA-Lake-831-800
2018

Lake Information

Name: Richmond

County: Brown

Surface Area: 741 Acres

Maximum Depth: 23 Feet

Mean Depth: 8 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Aug 07, 2018	4 net-nights
AFS std gill net	Aug 08, 2018	4 net-nights
AFS std gill net	Aug 09, 2018	4 net-nights
fall night EF-WAE	Oct 16, 2018	3600 seconds
frame net (std 3/4 in)	Aug 07, 2018	6 net-nights
frame net (std 3/4 in)	Aug 08, 2018	6 net-nights
frame net (std 3/4 in)	Aug 09, 2018	6 net-nights

Common Fish Species Present

Walleye

Largemouth Bass

Bluegill

Black Crappie

Black Bullhead

Yellow Perch

Common Carp

Green Sunfish

Channel Catfish

Northern Pike

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)
Bigmouth Buffalo	11	28	18	46	24	61	30	76	37	94
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
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Common Carp	11	28	16	41	21	53	26	66	33	84
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Gizzard Shad	7	18	11	28						
Green Sunfish	3	8	6	15	8	20	10	25	12	30
Lake Herring	5	13	8	20	11	28	14	35	17	43
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
Rock Bass	4	10	7	18	9	23	11	28	13	33
Rudd	6	15	10	25	12	30	15	38	19	48
Saugeye	9	23	14	35	18	46	22	56	27	69
Shorthead Redhorse	6	15	10	25	13	33	16	41	20	51
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
White Sucker	6	15	10	25	13	33	16	41	20	51
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	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	15.9	5.4	34	5	0		95	1
	Black Crappie	0.2	0.2	0		0		132	2
	Bluegill	0.6	0.5	14		14		125	6
	Channel Catfish	0.4	0.3	100		100		102	8
	Common Carp	4.1	1.2	16	8	12	7	102	2
	Northern Pike	0.1	0.1	0		0		94	
	Walleye	1.1	0.5	15		8		95	2
	White Bass	0.3	0.2	100		100		109	4
	Yellow Perch	5.0	1.3	80	8	10	6	103	1
fall night EF-WAE*	Walleye	109.0	64.1					92	1
frame net (std 3/4 in)	Black Bullhead	33.1	12.0	46	3	0		85	1
	Black Crappie	6.1	3.3	32	6	7	4	123	1
	Bluegill	36.1	11.7	42	3	9	2	115	1
	Channel Catfish	0.1	0.1	100		50		84	10
	Common Carp	0.7	0.6	25		8		96	3
	Green Sunfish	0.7	0.7	0		0		108	5
	Northern Pike	0.4	0.2	100		43		83	5
	Walleye	0.4	0.3	14		14		93	3
	White Bass	0.3	0.4	100		100		107	1
	White Sucker	0.3	0.2	100		80		91	2
	Yellow Perch	9.6	2.9	81	4	26	5	93	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.

*** Methods/Species that ignore stock length; **AFS std frame nets used in 2016 and 2017**

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std gill net	Black Bullhead								42.5	28.8	15.9	29.1
	Black Crappie								0.6	0.1	0.2	0.3
	Bluegill								0.1	0.3	0.6	0.3
	Channel Catfish								2.2	0.9	0.4	1.2
	Common Carp								2.3	1.1	4.1	2.5
	Northern Pike								0.1	0.2	0.1	0.1
	Walleye								2.4	0.2	1.1	1.2
	White Bass								2.8	1.0	0.3	1.4
	White Sucker								0.0	0.1	0.0	0.0
	Yellow Perch								1.8	8.3	5.0	5.0
fall night EF-WAE*	Walleye	0.0	0.0	34.0	0.0	0.0	0.0	0.0	10.5	36.0	109.0	19.0
frame net (std 3/4 in)**	Black Bullhead	55.8	76.5	39.1	236.3	229.2	99.2	65.2	85.5	196.0	33.1	111.6
	Black Crappie	58.0	0.7	5.9	8.8	8.1	14.3	9.4	9.8	2.2	6.1	12.3
	Bluegill	29.7	60.2	60.7	51.3	20.0	33.6	17.9	4.8	10.6	36.1	32.5
	Channel Catfish	2.2	2.1	0.9	0.1	0.3	0.4	0.7	0.5	0.7	0.1	0.8
	Common Carp	0.4	0.4	0.1	0.4	0.2	0.8	0.6	1.0	0.4	0.7	0.5
	Green Sunfish	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.7	0.1
	Largemouth Bass	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Northern Pike	0.1	0.7	0.6	0.4	0.1	0.2	0.7	0.3	0.4	0.4	0.4
	Pumpkinseed	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Rock Bass	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Smallmouth Bass	0.5	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	Walleye	1.1	1.5	2.2	0.8	1.0	2.2	3.3	2.4	1.4	0.4	1.6
	White Bass	8.1	6.1	17.6	5.2	4.0	2.7	3.7	6.4	6.7	0.3	6.1
	White Sucker	0.2	0.1	0.1	0.2	0.2	0.0	0.2	0.4	0.3	0.3	0.2
	Yellow Perch	0.6	0.2	0.9	1.2	0.3	1.9	0.9	0.3	0.0	9.6	1.6
std exp gill net	Black Bullhead	11.0	12.5	24.7	108.5	109.0	90.7	51.6				58.3
	Black Crappie	13.0	0.2	0.2	1.0	2.2	0.7	1.0				2.6
	Bluegill	0.3	1.5	0.5	1.3	1.0	0.2	0.0				0.7
	Channel Catfish	2.2	1.3	2.2	2.2	1.5	0.2	0.2				1.4
	Common Carp	0.5	0.3	0.2	1.7	1.5	0.8	1.4				0.9
	Northern Pike	0.2	3.7	0.7	0.7	1.0	0.5	0.4				1.0
	Walleye	2.3	5.2	8.3	5.8	4.0	1.8	7.2				4.9
	White Bass	2.8	1.3	1.2	2.0	1.5	0.2	0.2				1.3
	White Sucker	0.0	0.2	0.0	0.2	0.2	0.3	0.2				0.2
	Yellow Perch	3.5	10.7	9.3	11.8	8.3	11.3	8.8				9.1

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.

***AFS std frame nets used in 2016 and 2017**

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Channel Catfish	PSD								92	100	100
		PSD-P								54	45	100
		Wr								109	110	102
	Walleye	PSD								52	0	15
		PSD-P								3	0	8
		Wr								87	83	95
frame net (std 3/4 in)*	Black Crappie	PSD	93	67	23	66	64	85	96	84	82	32
		PSD-P	0	8	2	0	0	0	5	24	26	7
		Wr	103	105	101	108	106	99	100	107	102	123
	Bluegill	PSD	82	91	89	78	98	99	96	97	91	42
		PSD-P	19	5	6	17	29	35	65	38	15	9
		Wr	114	118	110	114	112	111	113	119	121	115
std exp gill net	Channel Catfish	PSD	46	100	100	100	56	100	100			
		PSD-P	15	13	8	31	22	0	100			
		Wr	99	91	102	98	89	130	97			
	Walleye	PSD	7	10	30	54	21	27	17			
		PSD-P	0	0	2	6	8	0	0			
		Wr	88	90	90	84	84	84	93			

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	109	169 (74)	222 (11)	241 (18)	269 (2)	264 (1)		275 (3)			
2017	39		195 (10)	225 (11)	240 (2)		251 (11)	258 (6)			
2016	176	157 (17)	203 (46)	228 (8)	250 (7)	247 (76)	244 (20)			234 (3)	
2015	168	136 (4)	201 (6)	234 (19)	231 (114)	242 (26)					
2014	257		143 (1)	184 (1)	205 (151)	221 (81)	218 (24)				
2013	146		192 (51)	217 (95)							
2010	12	139 (2)	190 (2)	217 (1)	235 (1)	239 (6)					
2009	1084	106 (40)	182 (57)	193 (9)	220 (965)	245 (14)					

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	650	120 (347)	162 (206)	198 (52)	212 (34)	217 (6)		233 (6)			
2017	190	111 (15)	166 (91)	191 (64)	208 (10)	227 (2)	217 (2)	213 (6)			
2016	87		163 (24)	183 (36)	220 (4)	223 (18)	220 (4)	232 (2)			
2015	322	98 (8)	162 (56)	182 (14)	206 (160)	219 (24)	218 (20)	216 (41)			
2014	605	95 (1)	149 (8)	183 (170)	196 (271)	201 (115)	221 (40)			241 (1)	
2013	360	122 (1)	166 (114)	186 (114)	207 (121)	195 (8)	226 (3)	226 (3)			
2012	923	120 (193)	172 (391)	190 (56)	200 (240)	204 (40)		220 (4)			
2011	1090	118 (71)	158 (247)	182 (656)	197 (73)	210 (25)	216 (20)				
2010	1084		162 (928)	188 (109)		214 (47)					
2009	534	90 (62)	160 (258)	193 (50)	199 (162)			227 (2)			

Species: Walleye

***Age-0 fish were sampled but are not reported here**

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018*	13	305 (10)	376 (2)					571 (1)			
2017	3	217 (1)		282 (1)	378 (1)						
2016	31		272 (10)	348 (7)	411 (4)	435 (9)	531 (1)				
2015	51	234 (21)	300 (14)	335 (6)	348 (6)	410 (3)		489 (1)			
2014	16	211 (4)	253 (1)	304 (8)	396 (1)	366 (1)	406 (1)				
2013	38	217 (4)	248 (20)	310 (9)	468 (2)	493 (1)	547 (2)				
2012	37	220 (2)	309 (13)		410 (16)	455 (5)					640 (1)
2011	55	249 (8)		361 (37)	380 (7)	426 (2)					637 (1)
2010	31		304 (17)	338 (11)	371 (3)						
2009	27	233 (14)	263 (7)	318 (6)							

Fish Condition

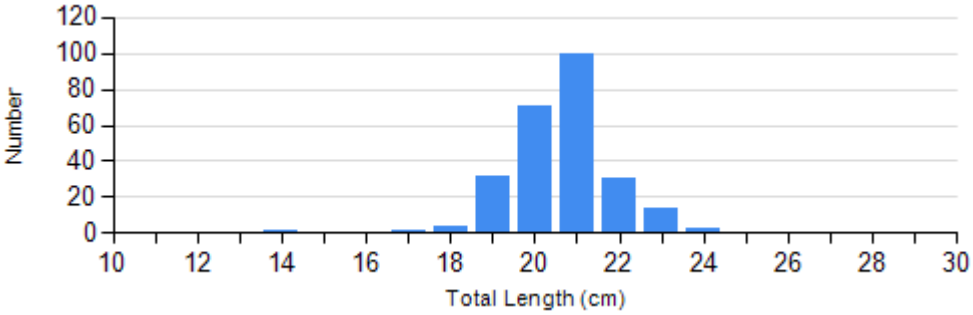
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2014	38	102 (1.2)	219	98 (0.4)	0		0	
	2015	7	112 (3.6)	154	100 (0.5)	9	98 (2.6)	0	
	2016	29	121 (3.0)	105	106 (0.9)	42	100 (1.3)	0	
	2017	7	111 (2.6)	22	103 (1.2)	10	95 (1.9)	0	
	2018	74	125 (1.1)	27	120 (1.3)	8	112 (1.9)	0	
Bluegill Frame Net	2014	5	118 (5.7)	387	111 (0.5)	213	110 (0.6)	0	
	2015	14	118 (3.8)	98	117 (1.1)	209	111 (0.6)	1	111
	2016	3	120 (4.3)	51	124 (1.2)	33	111 (1.5)	0	
	2017	17	124 (5.9)	144	122 (0.9)	29	110 (1.8)	0	
	2018	375	115 (0.7)	217	114 (0.7)	58	117 (1.3)	0	
Channel Catfish Gill Net	2014	0		1	130	0		0	
	2015	0		0		1	97	0	
	2016	2	105 (2.1)	10	111 (5.3)	14	108 (3.5)	0	
	2017	0		6	121 (3.8)	5	98 (3.0)	0	
	2018	0		0		5	102 (6.3)	0	
Walleye Gill Net	2014	8	84 (1.7)	3	83 (2.6)	0		0	
	2015	30	94 (1.8)	6	89 (1.7)	0		0	
	2016	14	86 (2.0)	14	88 (1.0)	1	87	0	
	2017	2	83 (4.6)	0		0		0	
	2018	11	95 (1.8)	1	94	1	96	0	

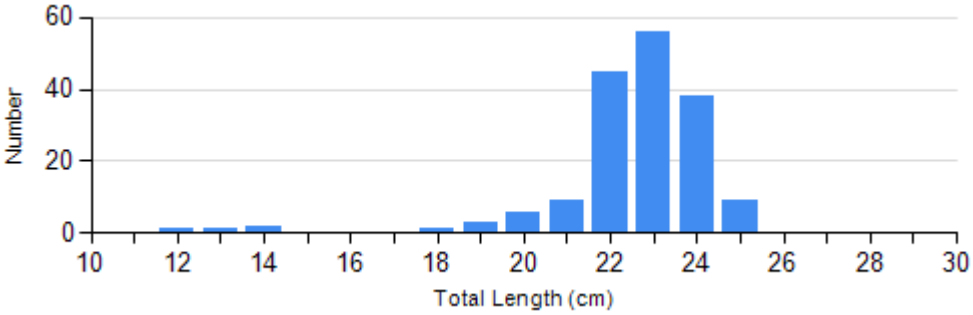
Length Frequency Distribution

Length frequency histogram of species sampled by year.
*__AFS std frame nets used__

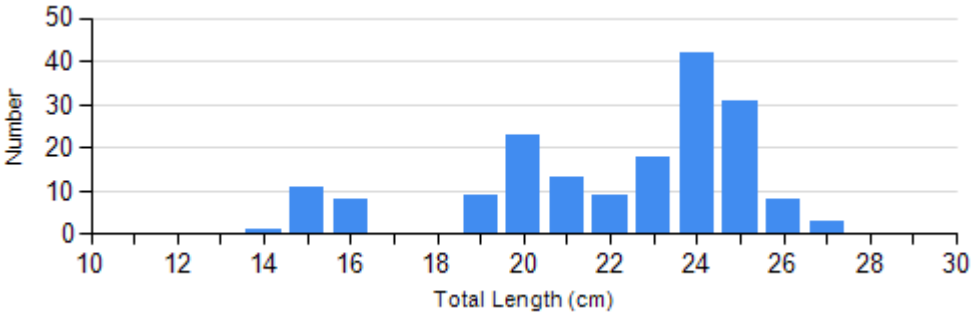
Species: Black Crappie
Gear: frame net (std 3/4 in)



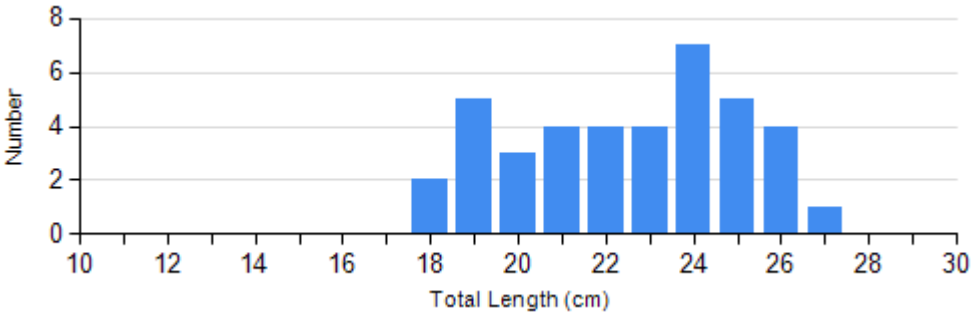
2014



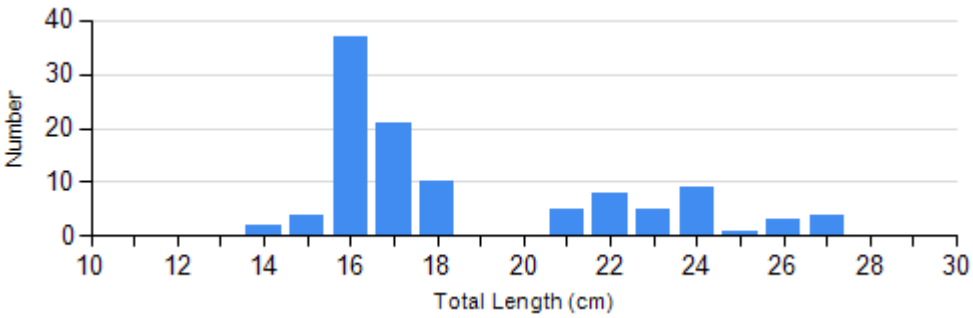
2015



2016*

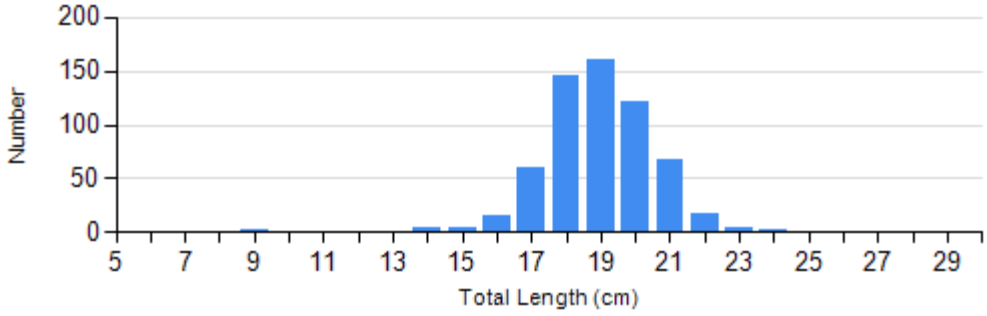


2017*

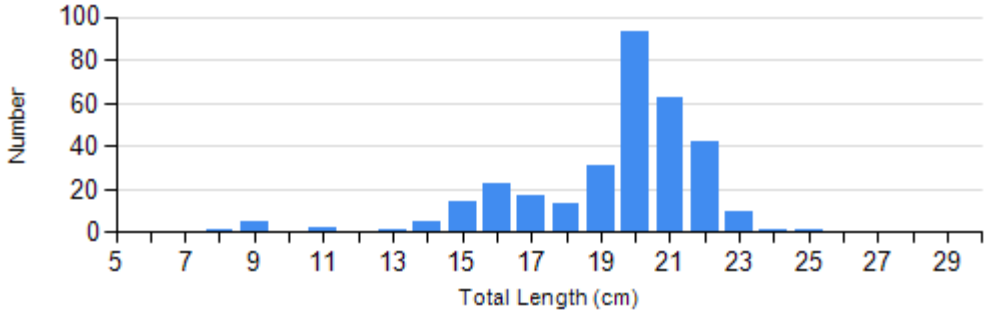


2018

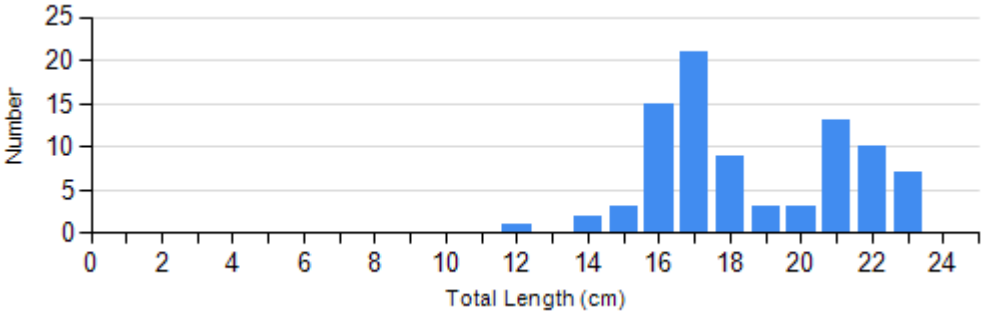
Species: Bluegill
Gear: frame net (std 3/4 in)*



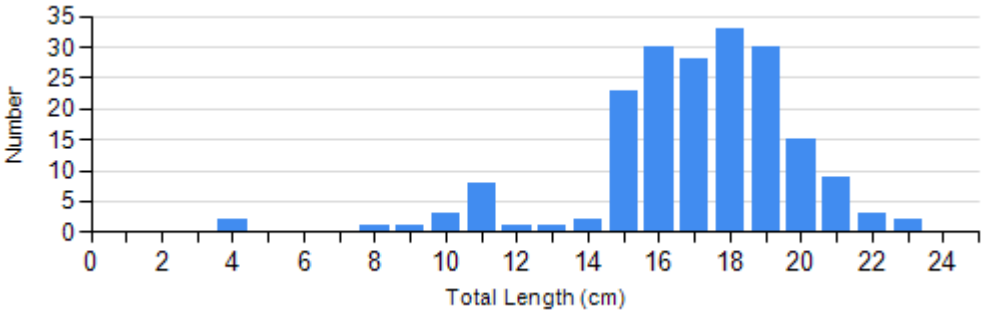
2014



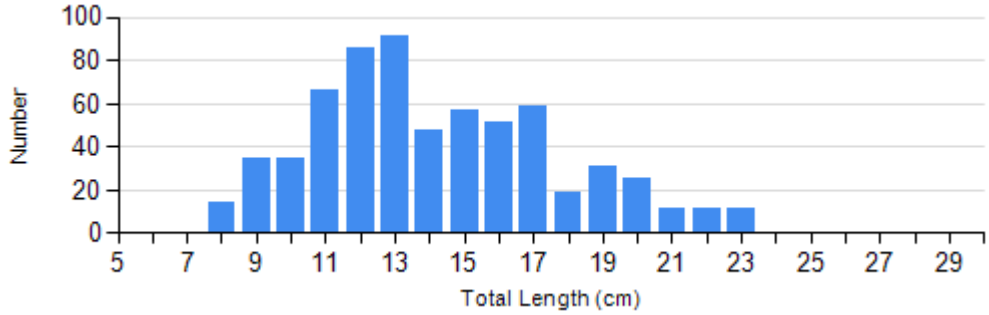
2015



2016*



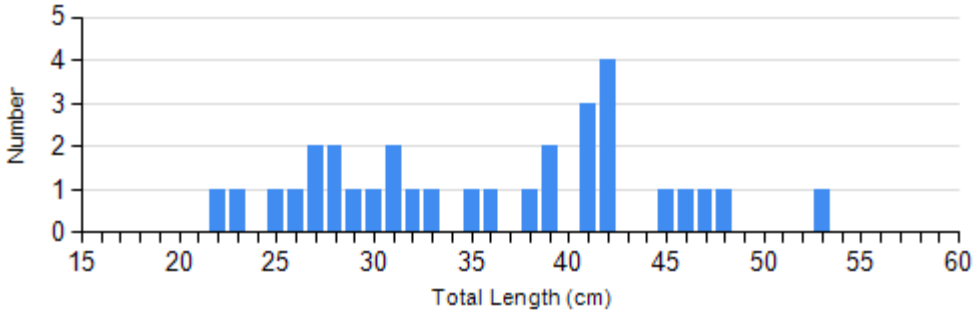
2017*



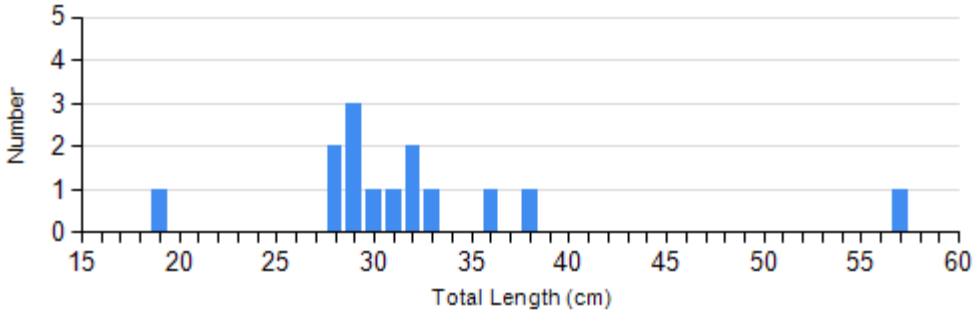
2018

Species: Walleye
Gear: AFS std gill net

2016

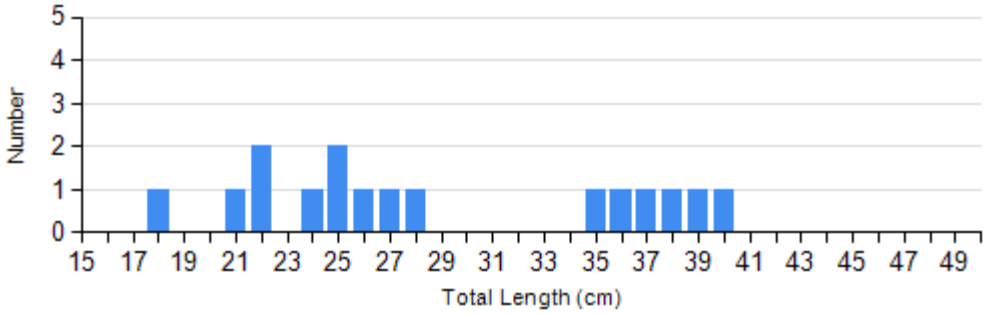


2018

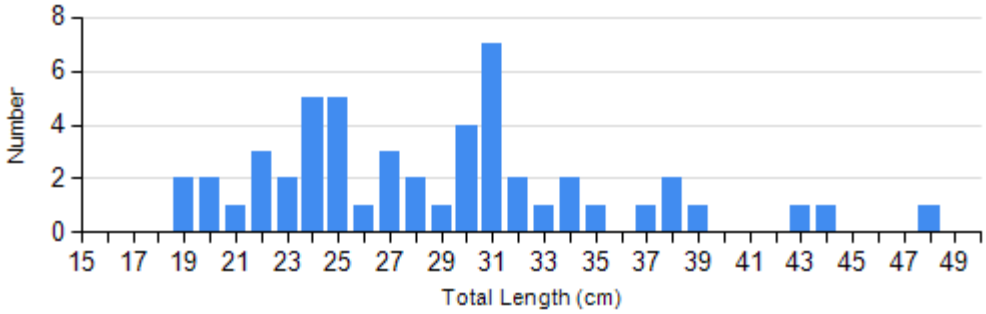


Species: Walleye
Gear: std exp gill net

2014



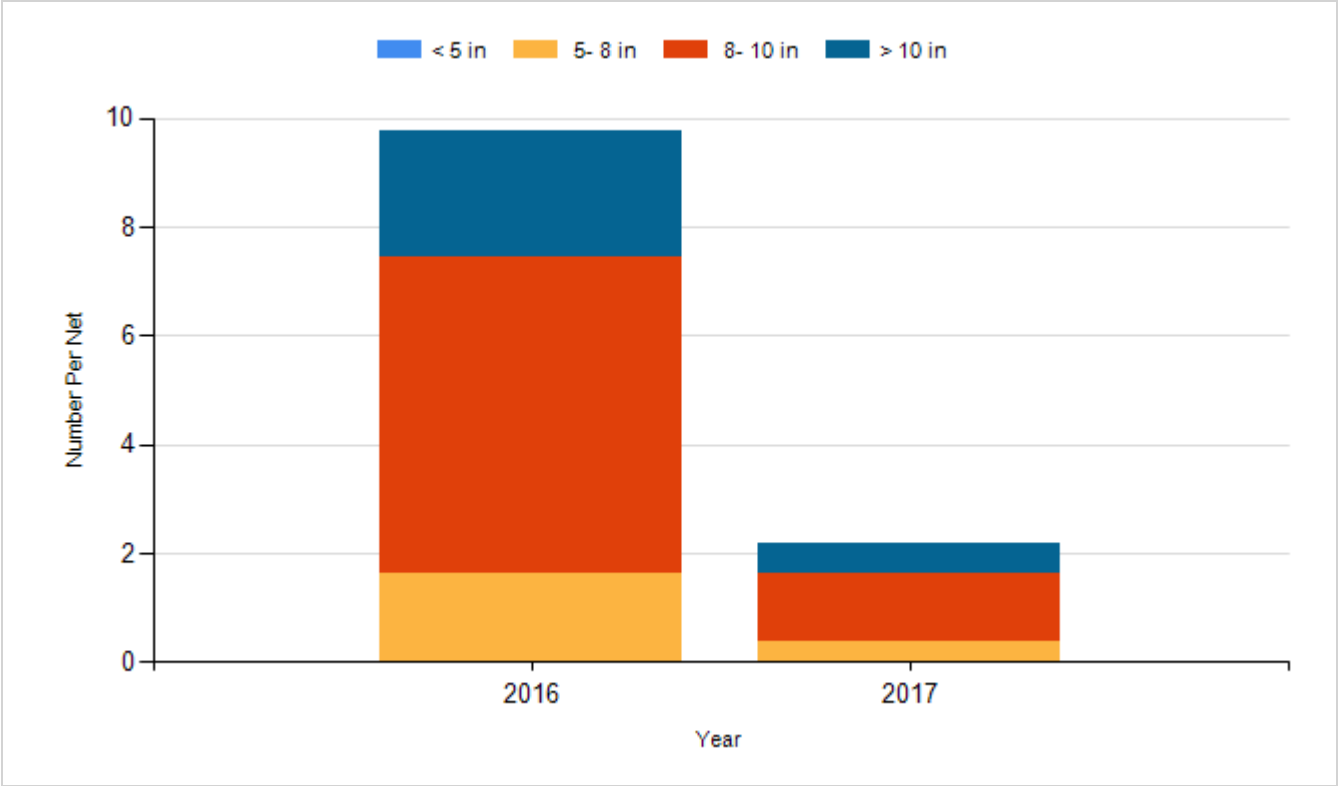
2015



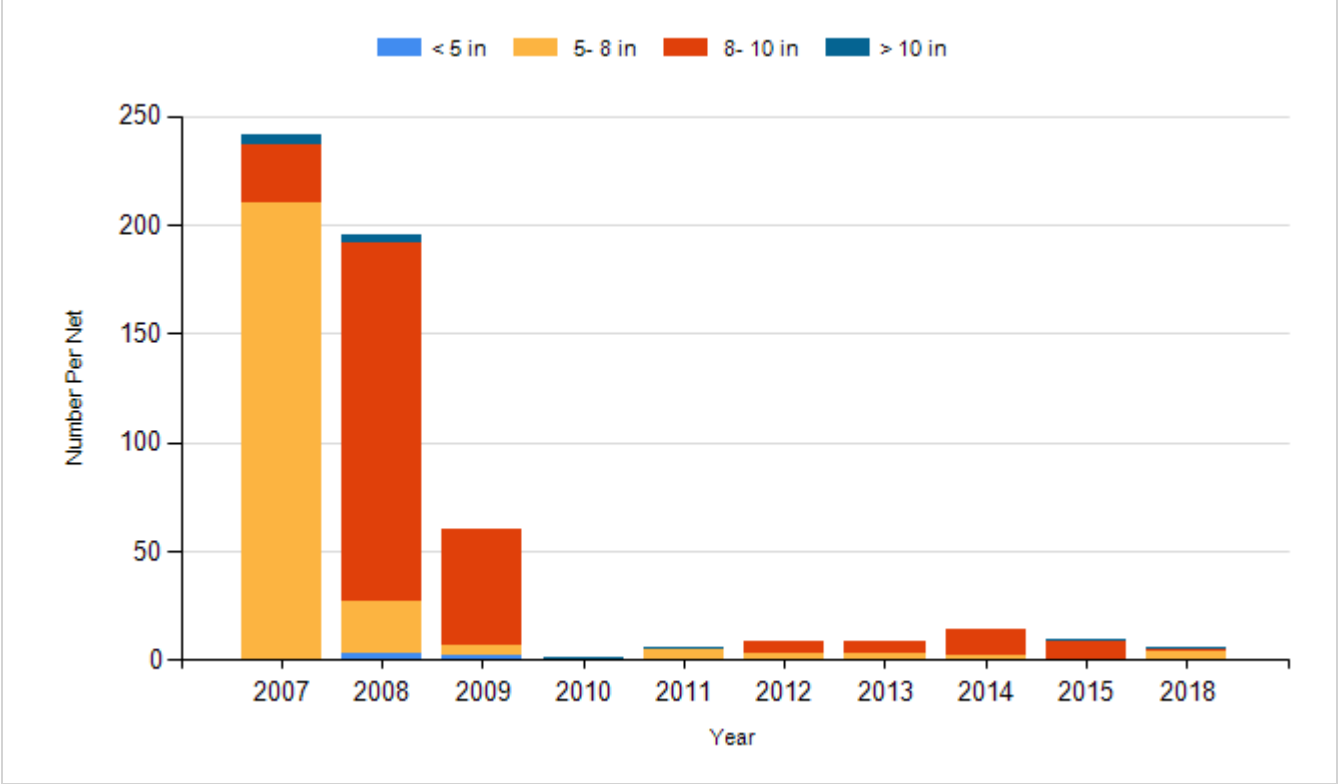
Historic Fish Sizes and Relative Abundance

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

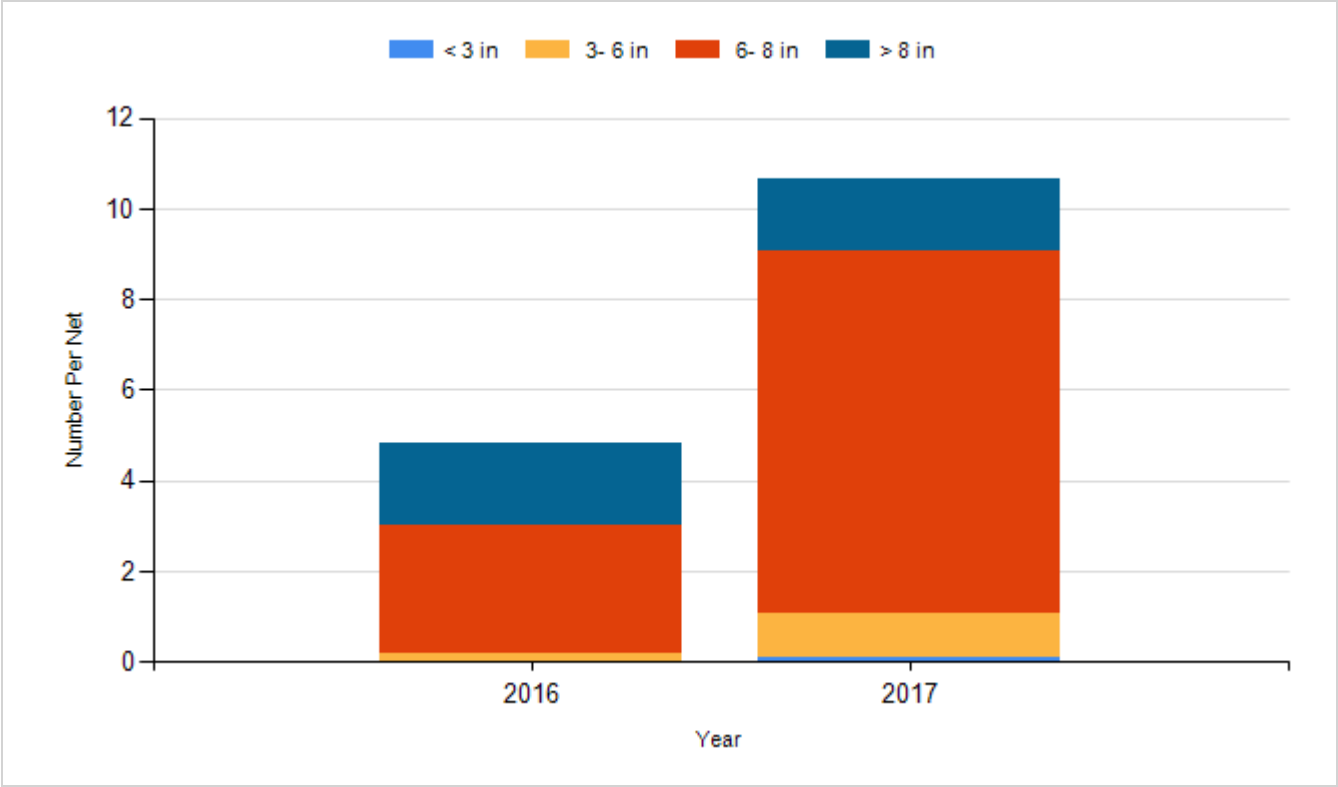
Species: Black Crappie
Gear: AFS std frame net



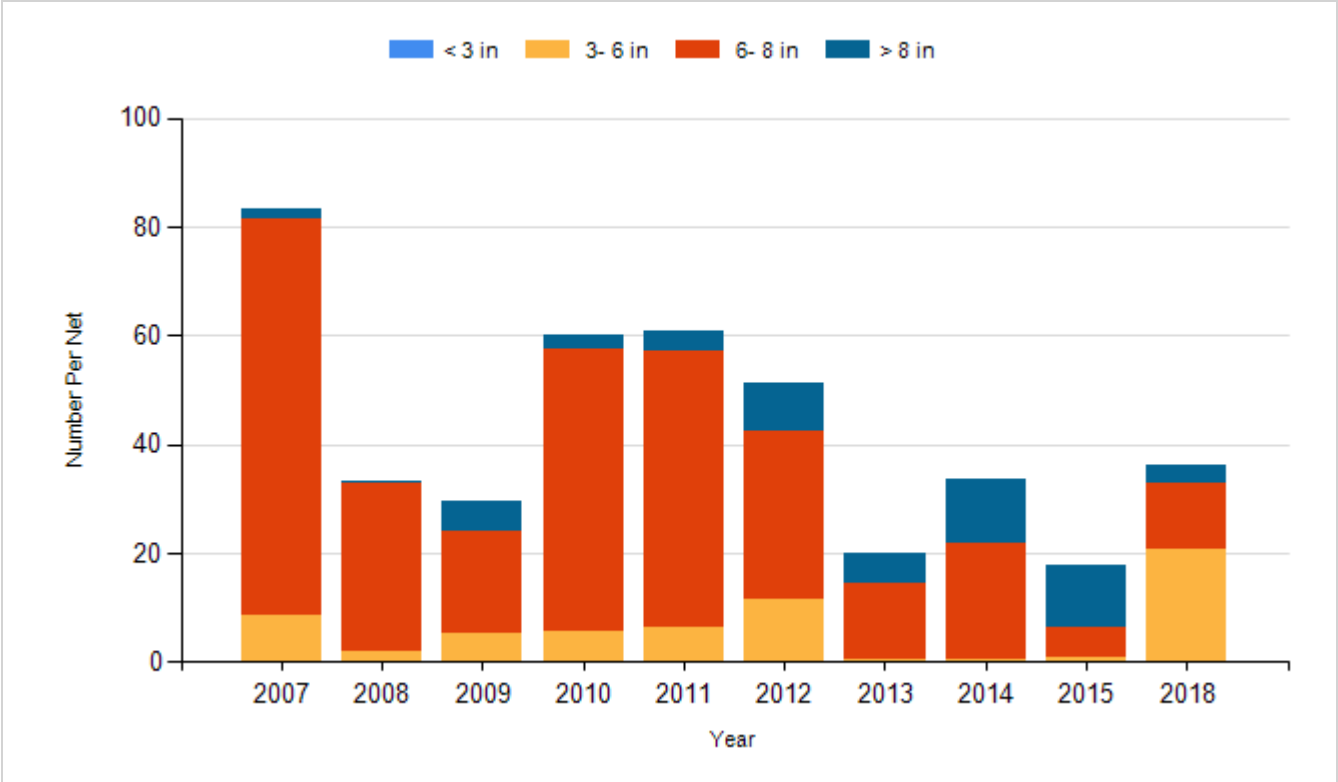
Species: Black Crappie
Gear: frame net (std 3/4 in)



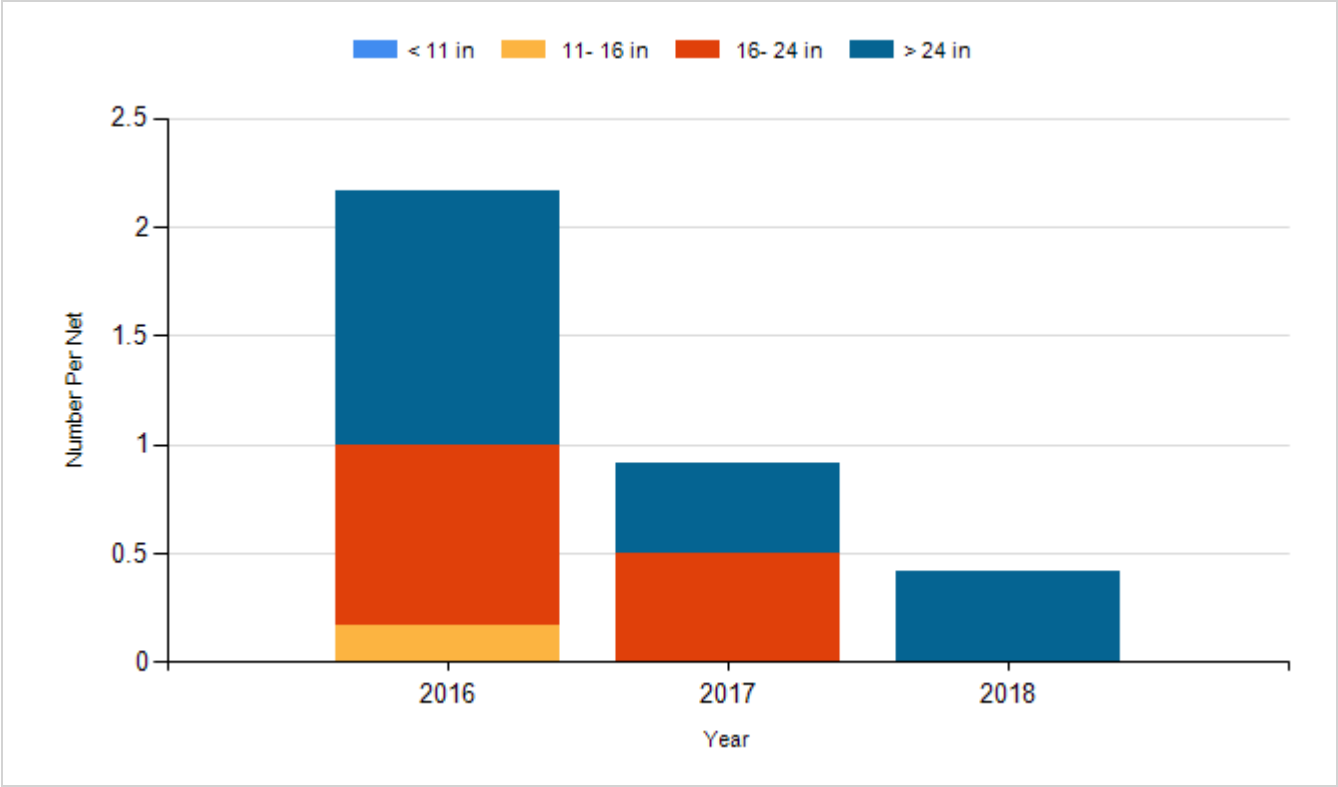
Species: Bluegill
Gear: AFS std frame net



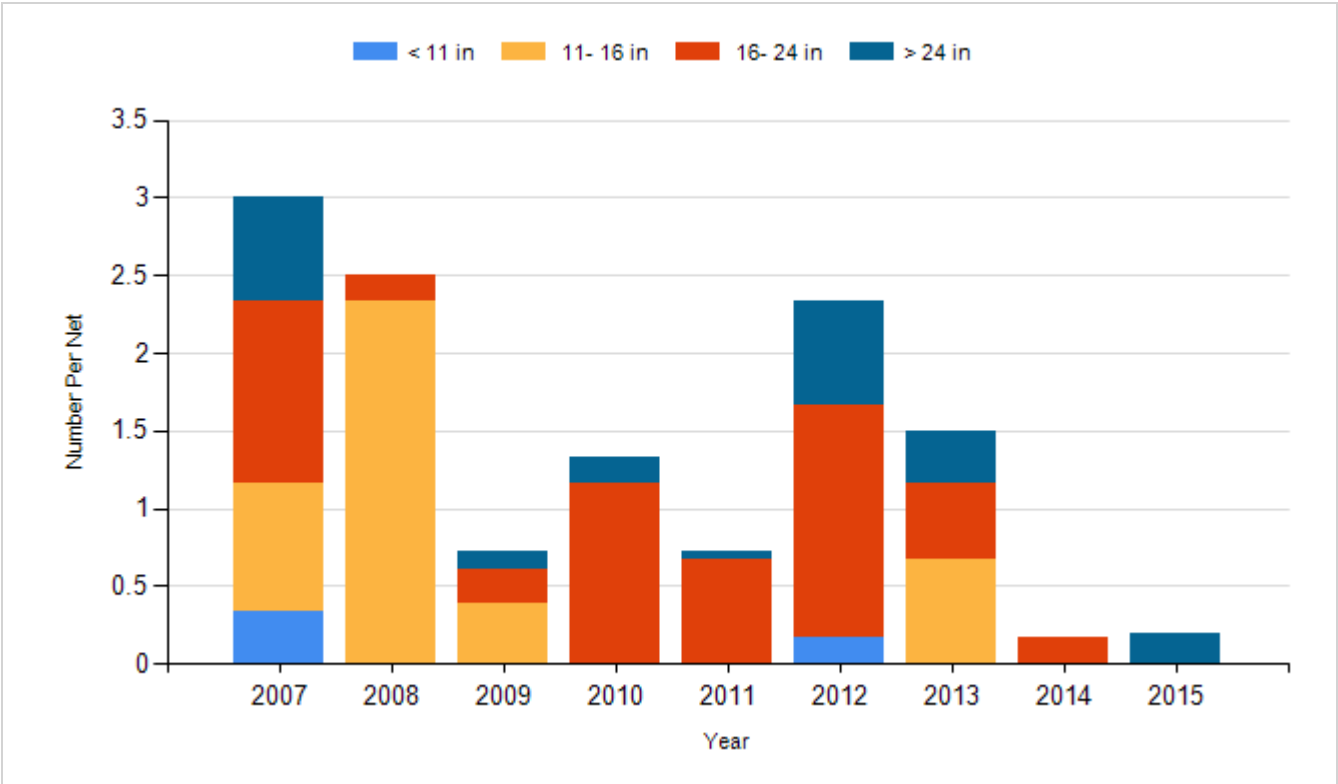
Species: Bluegill
Gear: frame net (std 3/4 in)



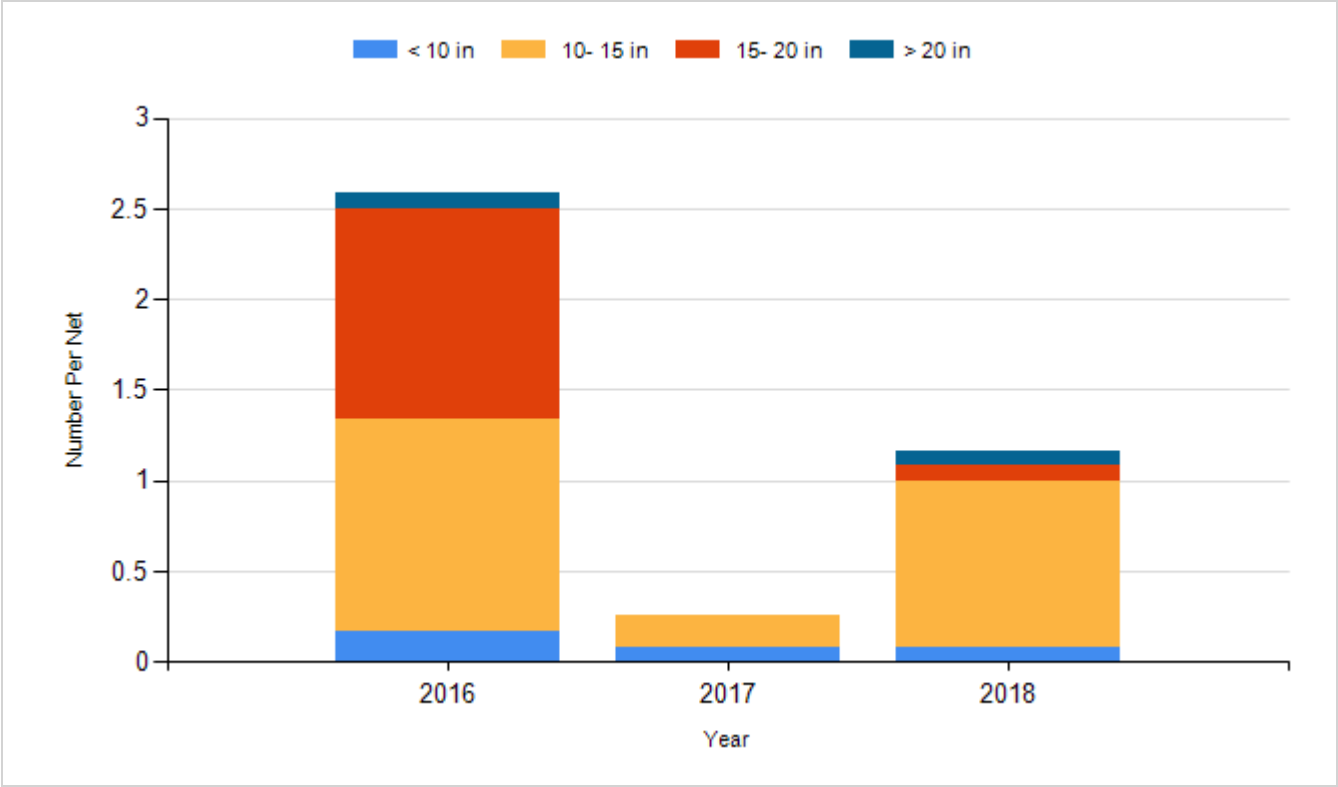
Species: Channel Catfish
Gear: AFS std gill net



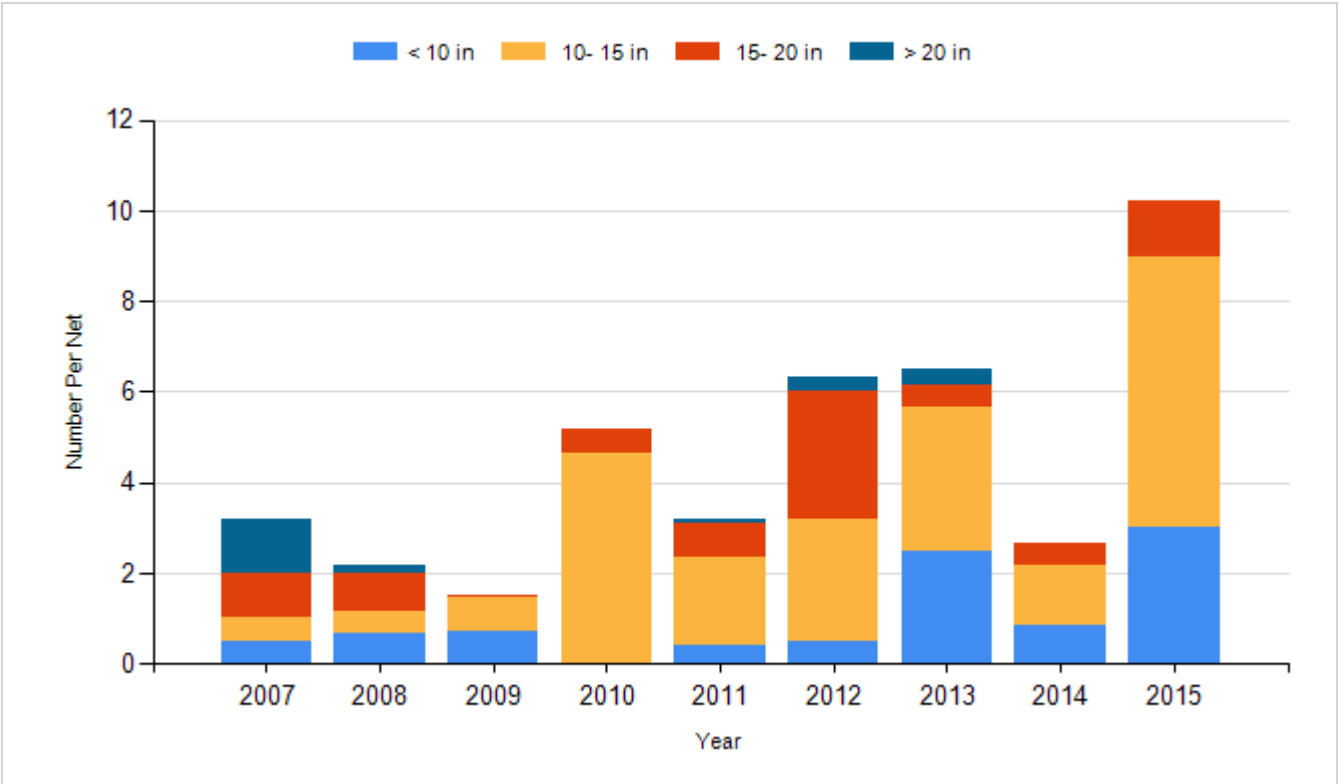
Species: Channel Catfish
Gear: std exp gill net



Species: Walleye
Gear: AFS std gill net



Species: Walleye
Gear: std exp gill net



Fish Stocking

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

Year	Species	Size	Number
2010	Walleye	Large Fingerling	11,788
2011	Walleye	Large Fingerling	15,240
2012	Walleye	Large Fingerling	10,173
2013	Walleye	Large Fingerling	27,344
2014	Walleye	Large Fingerling	18,420
2016	Saugeye	Large Fingerling	6,030
2017	Saugeye	Small Fingerling	60,320
2018	Saugeye	Small Fingerling	62,640