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., yellow perch, 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 and relative abundance remained low to moderate from 2011 to 2018. In 2019, a substantial increase in relative abundance (31.4/frame net) was observed as fish from the strong 2018 (age-1) year class recruited to our gear. The 2018 (age-1) cohort, which had a mean length at capture of 6.3 inches, accounted for more than 90% of black crappies in the sample.

- **Bluegill.** Bluegill numbers were lower in 2019 than 2018; however, at 19.8/frame net, relative abundance remained moderate. Sampled bluegills ranged in length from 3.5 to 8.2 inches, 63% were ≥6.0 inches and 1% were 8.0 inches or longer. Individuals from four year classes (2015 – 2018) contributed to the catch, those from the 2017 (age-2) cohort were the most abundant accounting for more than 75% 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 2019, the mean length at capture of age-4 fish was 8.1 inches.

- **Channel catfish.** Although not abundant, the opportunity exists for anglers to catch channel catfish from Richmond Lake. In 2019, gill nets sampled 15 individuals that ranged in length from 18.9 to 28.3 inches.

- **Walleye.** Walleye (includes saugeye) numbers were higher in 2019 than surveys conducted from 2016 to 2018. The 2019 mean gill CPUE was 4.3 and suggested low to moderate relative abundance. Sampled walleyes ranged in length from 10.6 to 22.4 inches, 29% were ≥15.0 inches and 2% were 20.0 inches or longer. Fish from five year classes produced between 2010 and 2018 were present, those from the 2017 (age-2) and 2018 (age-1) cohorts, which coincided with recent saugeye stockings, were the most abundant accounting for more than 85% of sampled fish. The 2017 year class has experienced fast growth with a mean length at capture at age 2 of 16.5 inches.

- **Yellow Perch**. Yellow perch were the most abundant fish species in the 2019 gill net catch (15.8/gill net). Sampled yellow perch ranged in length from 5.1 to 10.6 inches, 6% were ≥8.0 inches and only 1% were 10.0 inches or longer. Yellow perch from three consecutive year classes (2016 – 2018) comprised the entire catch. Those from the 2018 (age-1) cohort, which had a mean length at capture of 6.1 inches, accounted for >90% of fish in the sample.

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

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Richmond, Brown County
UJA-Lake-831-800
2019

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 05, 2019	4 net-nights
AFS std gill net	Aug 06, 2019	4 net-nights
AFS std gill net	Aug 07, 2019	4 net-nights
fall night EF-WAE	Oct 07, 2019	2400 seconds
frame net (std 3/4 in)	Aug 05, 2019	6 net-nights
frame net (std 3/4 in)	Aug 06, 2019	6 net-nights
frame net (std 3/4 in)	Aug 07, 2019	6 net-nights

Common Fish Species Present

Walleye

Largemouth Bass

Bluegill

Black Crappie

Black Bullhead

Yellow Perch

White Bass

Common Carp

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)
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
AFS std gill net	Black Bullhead	175	13.9	4.2	2		0		95	1
	Black Crappie	16	1.3	0.7	6		6		115	3
	Bluegill	2	0.2	0.2	100		0		116	2
	Channel Catfish	15	1.3	0.4	100		73		98	4
	Common Carp	79	4.0	1.2	46	11	8		93	1
	Northern Pike	5	0.4	0.3	80		20		91	2
	Walleye	52	4.3	1.6	29	9	2		86	1
	White Bass	5	0.4	0.4	80		0		97	3
	White Sucker	1	0.1	0.1	100		100		96	
	Yellow Perch	190	15.8	5.0	6	3	1		102	1
fall night EF-WAE*	Walleye	75	112.5	27.3					81	1
frame net (std 3/4 in)	Black Bullhead	1550	76.0	24.9	42	2	0		88	1
	Black Crappie	565	31.4	15.7	9	2	2	1	110	1
	Bluegill	356	19.8	8.9	63	3	1		111	1
	Channel Catfish	30	1.3	0.8	88		58	16	101	4
	Common Carp	22	1.1	0.5	60	18	40	18	88	1
	Green Sunfish	2	0.1	0.1	0		0		92	8
	Northern Pike	6	0.3	0.2	50		17		87	4
	Walleye	28	1.5	0.7	7		0		86	2
	White Bass	76	4.2	2.0	93	5	32	8	98	3
	White Sucker	3	0.2	0.1	67		67		90	3
	Yellow Perch	849	47.2	23.0	9	1	7	1	91	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 standard nets used in 2016 and 2017**

		CPUE										
Gear	Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg
AFS std gill net	Black Bullhead							42.5	28.8	15.9	13.9	25.3
	Black Crappie							0.6	0.1	0.2	1.3	0.6
	Bluegill							0.1	0.3	0.6	0.2	0.3
	Channel Catfish							2.2	0.9	0.4	1.3	1.2
	Common Carp							2.3	1.1	4.1	4.0	2.9
	Northern Pike							0.1	0.2	0.1	0.4	0.2
	Walleye							2.4	0.2	1.1	4.3	2.0
	White Bass							2.8	1.0	0.3	0.4	1.1
	White Sucker							0.0	0.1	0.0	0.1	0.1
	Yellow Perch							1.8	8.3	5.0	15.8	7.7
fall night EF-WAE*	Walleye	0.0	34.0	0.0	0.0	0.0	0.0	10.5	36.0	109.0	112.5	30.2
frame net (std 3/4 in)**	Black Bullhead	76.5	39.1	236.3	229.2	99.2	65.2	85.5	196.0	33.1	76.0	113.6
	Black Crappie	0.7	5.9	8.8	8.1	14.3	9.4	9.8	2.2	6.1	31.4	9.7
	Bluegill	60.2	60.7	51.3	20.0	33.6	17.9	4.8	10.6	36.1	19.8	31.5
	Channel Catfish	2.1	0.9	0.1	0.3	0.4	0.7	0.5	0.7	0.1	1.3	0.7
	Common Carp	0.4	0.1	0.4	0.2	0.8	0.6	1.0	0.4	0.7	1.1	0.6
	Green Sunfish	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.7	0.1	0.1
	Largemouth Bass	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Northern Pike	0.7	0.6	0.4	0.1	0.2	0.7	0.3	0.4	0.4	0.3	0.4
	Pumpkinseed	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Smallmouth Bass	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Walleye	1.5	2.2	0.8	1.0	2.2	3.3	2.4	1.4	0.4	1.5	1.7
	White Bass	6.1	17.6	5.2	4.0	2.7	3.7	6.4	6.7	0.3	4.2	5.7
	White Sucker	0.1	0.1	0.2	0.2	0.0	0.2	0.4	0.3	0.3	0.2	0.2
	Yellow Perch	0.2	0.9	1.2	0.3	1.9	0.9	0.3	0.0	9.6	47.2	6.3
std exp gill net	Black Bullhead	12.5	8.2	108.5	109.0	90.7	51.6					63.4
	Black Crappie	0.2	0.1	1.0	2.2	0.7	1.0					0.9
	Bluegill	1.5	0.2	1.3	1.0	0.2	0.0					0.7
	Channel Catfish	1.3	0.7	2.2	1.5	0.2	0.2					1.0
	Common Carp	0.3	0.1	1.7	1.5	0.8	1.4					1.0
	Northern Pike	3.7	0.2	0.7	1.0	0.5	0.4					1.1
	Walleye	5.2	2.8	5.8	4.0	1.8	7.2					4.5
	White Bass	1.3	0.4	2.0	1.5	0.2	0.2					0.9
	White Sucker	0.2	0.0	0.2	0.2	0.3	0.2					0.2
	Yellow Perch	10.7	1.8	11.8	8.3	11.3	8.8					8.8

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 standard nets used in 2016 and 2017**

			Year									
Gear	Species	Index	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
AFS std gill net	Walleye	PSD							52	0	15	29
		PSD-P							3	0	8	2
		Wr							87	83	95	86
	Yellow Perch	PSD							82	57	80	6
		PSD-P							50	21	10	1
		Wr							102	106	103	102
frame net (std 3/4 in)*	Black Crappie	PSD	67	23	66	64	85	96	84	82	32	9
		PSD-P	8	2	0	0	0	5	24	26	7	2
		Wr	105	101	108	106	99	100	107	102	123	110
	Bluegill	PSD	91	89	78	98	99	96	97	91	42	63
		PSD-P	5	6	17	29	35	65	38	15	9	1
		Wr	118	110	114	112	111	113	119	121	115	111
std exp gill net	Walleye	PSD	10	30	54	21	27	17				
		PSD-P	0	2	6	8	0	0				
		Wr	90	90	84	84	84	93				
	Yellow Perch	PSD	23	31	61	56	84	93				
		PSD-P	9	3	0	0	9	30				
		Wr	97	98	101	97	103	111				

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	565	161 (513)	215 (40)	256 (7)	263 (5)						
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)					

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	356	104 (52)	154 (273)	180 (27)	205 (4)						
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)					

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	52	294 (37)	419 (9)	462 (4)				482 (1)		574 (1)	
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)						

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	190	156 (179)	209 (3)	240 (8)							
2018	60	166 (3)	216 (40)	239 (9)		256 (5)		249 (2)		293 (1)	
2017	100	166 (42)	225 (29)	195 (1)	254 (15)		273 (11)	295 (1)	275 (1)		
2016	22	168 (3)	174 (1)	242 (6)	238 (2)	275 (7)	274 (3)				
2015	44		205 (8)	216 (6)	240 (27)	272 (1)	272 (2)				
2014	68	169 (4)		216 (45)	237 (12)	248 (8)					
2013	50		191 (22)	221 (18)	229 (10)						
2012	69	147 (11)	193 (20)	216 (38)							
2011	32	149 (3)	194 (26)	233 (2)				297 (1)			

Fish Condition

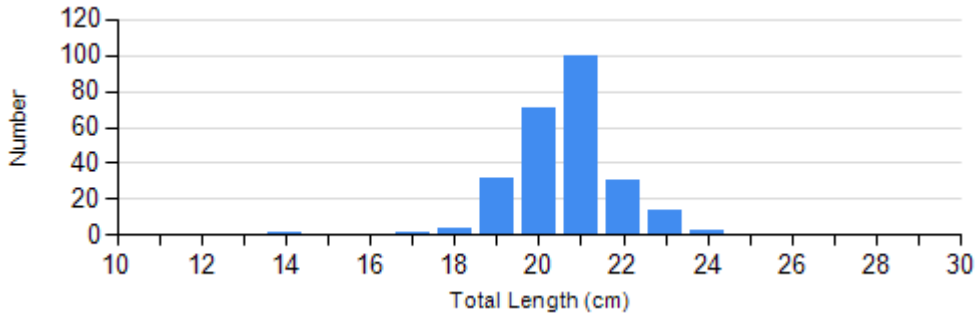
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	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	
	2019	513	112 (0.4)	40	104 (1.3)	12	101 (1.8)	0	
Bluegill Frame Net	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	
	2019	133	113 (0.9)	218	110 (0.6)	5	103 (4.1)	0	
Walleye Gill Net	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	
	2019	37	83 (0.7)	14	94 (2.0)	1	90	0	
Yellow Perch Gill Net	2015	3	108 (1.5)	28	114 (1.7)	13	105 (1.6)	0	
	2016	4	105 (3.8)	7	107 (3.6)	11	98 (1.5)	0	
	2017	43	109 (1.8)	36	105 (1.3)	21	100 (1.6)	0	
	2018	12	110 (2.8)	42	101 (0.8)	6	103 (2.2)	0	
	2019	179	103 (0.7)	9	93 (2.6)	2	88 (2.5)	0	

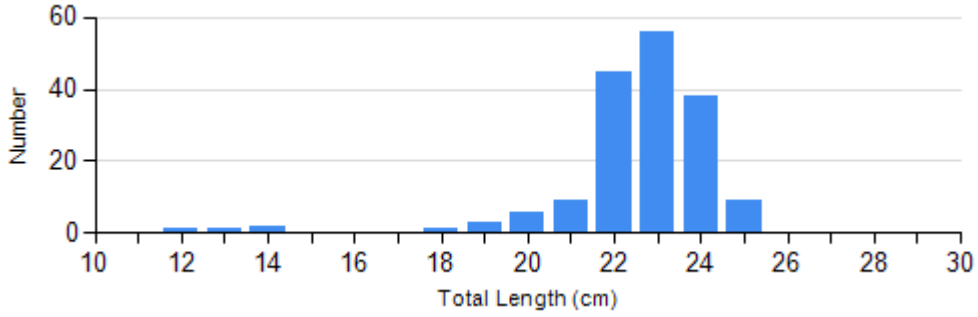
Length Frequency Distribution

Length frequency histogram of species sampled by year.
***AFS standard frame nets used; **AFS standard gill nets used**

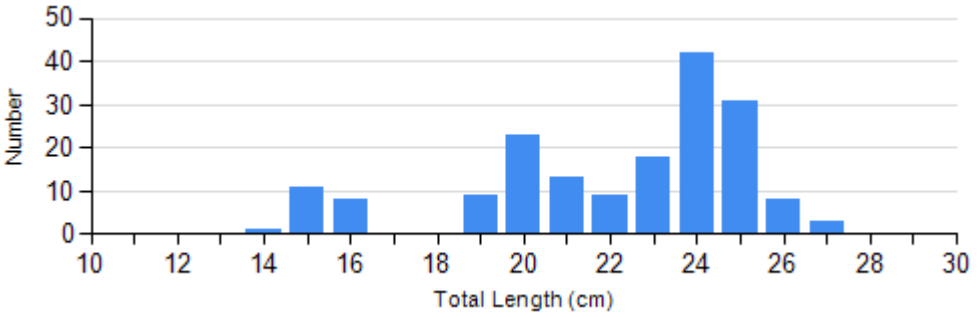
Species: Black Crappie
Gear: frame net (std 3/4 in)



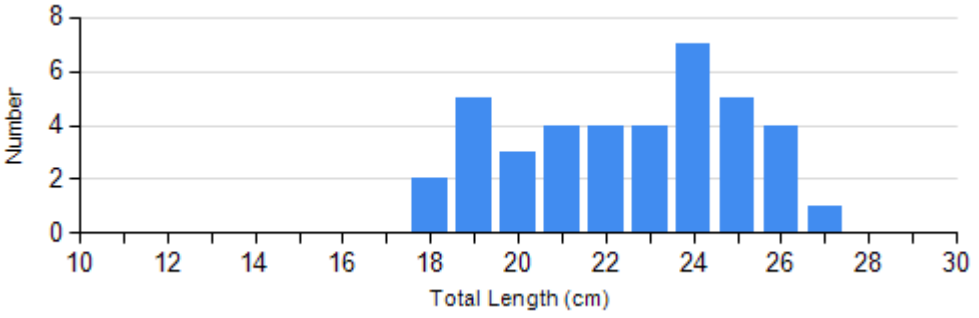
2014



2015



2016*



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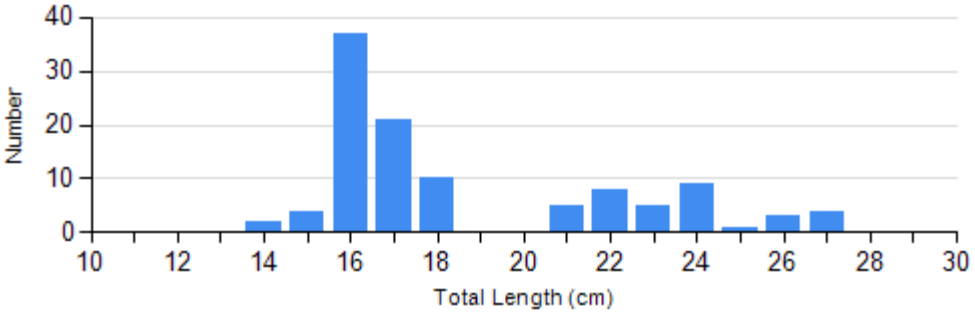
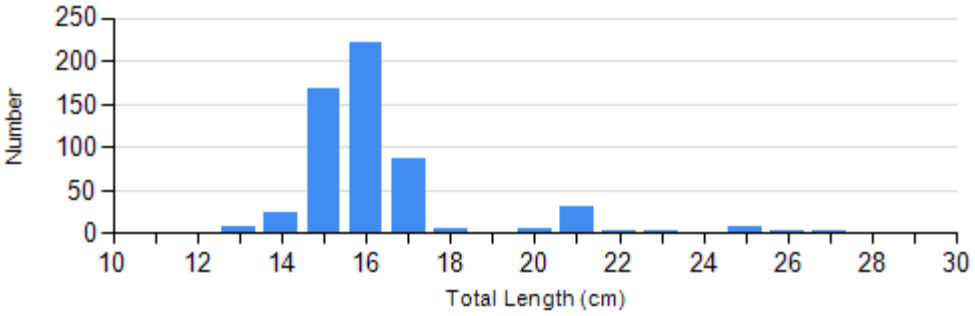
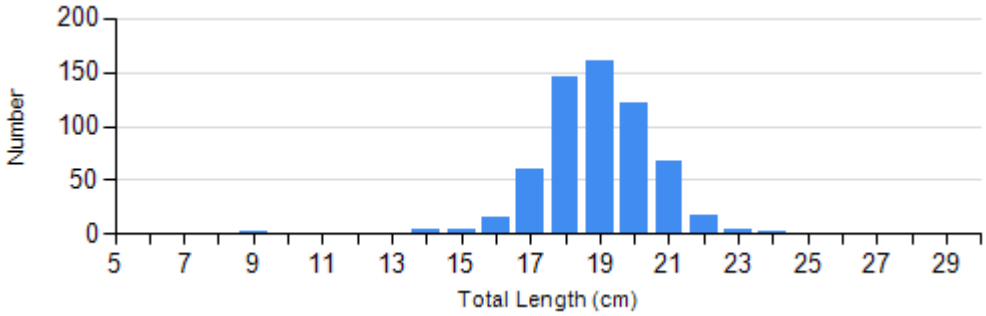


2018

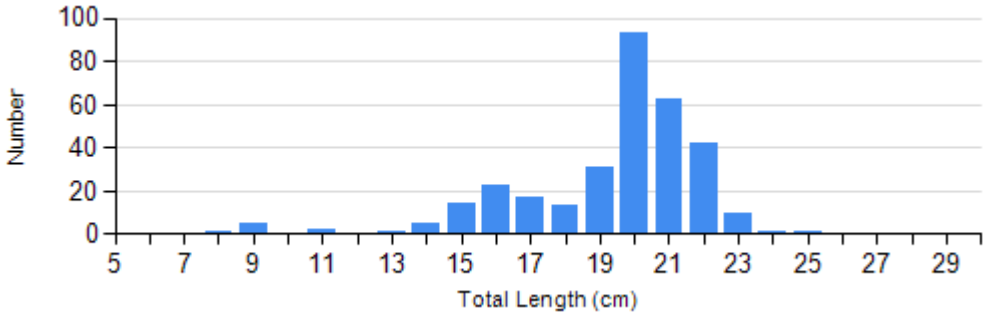


2019

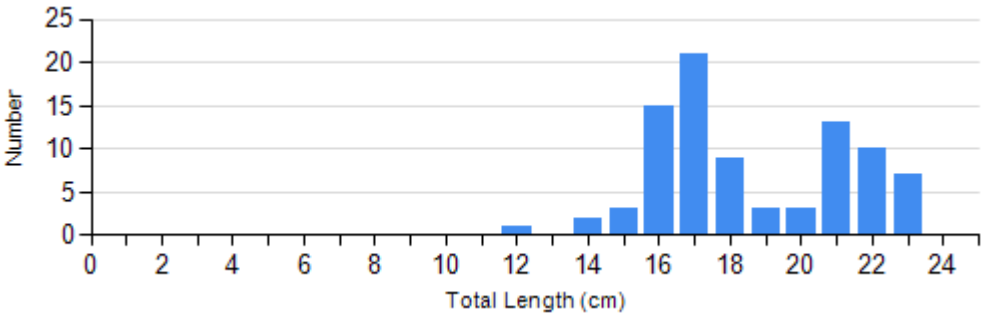
Species: Bluegill
Gear: frame net (std 3/4 in)



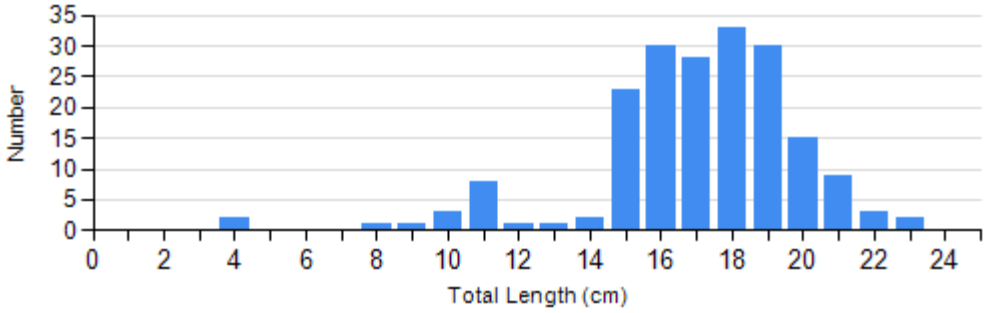
2014



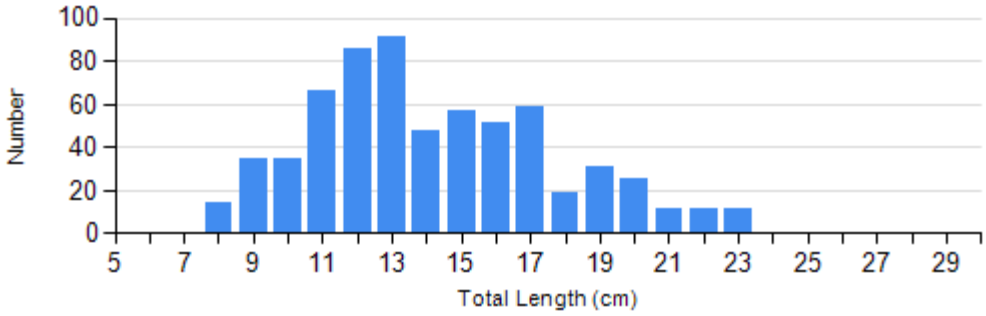
2015



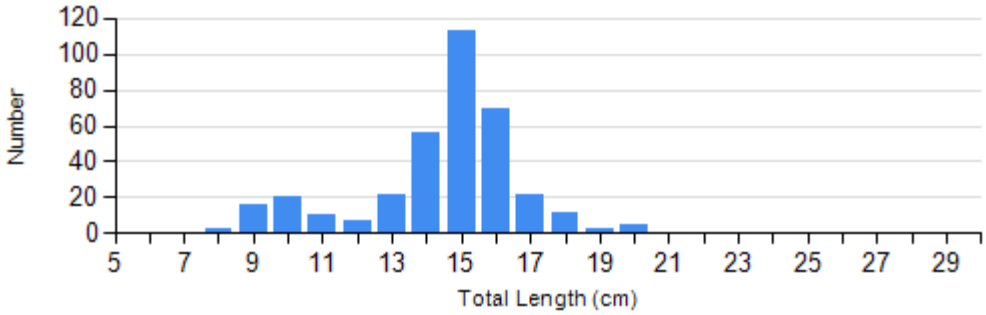
2016*



2017*

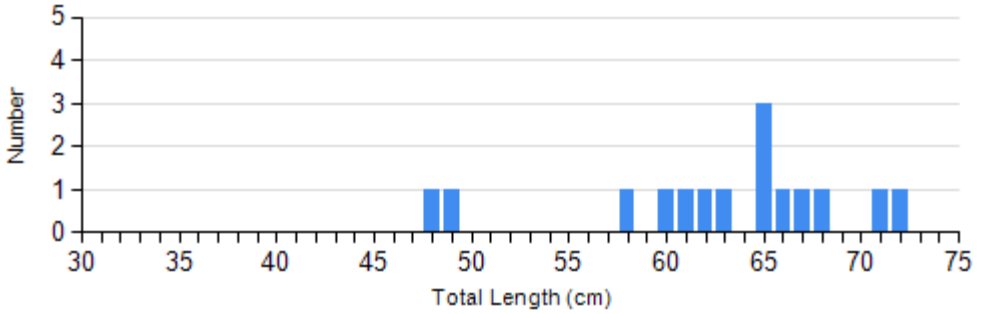


2018



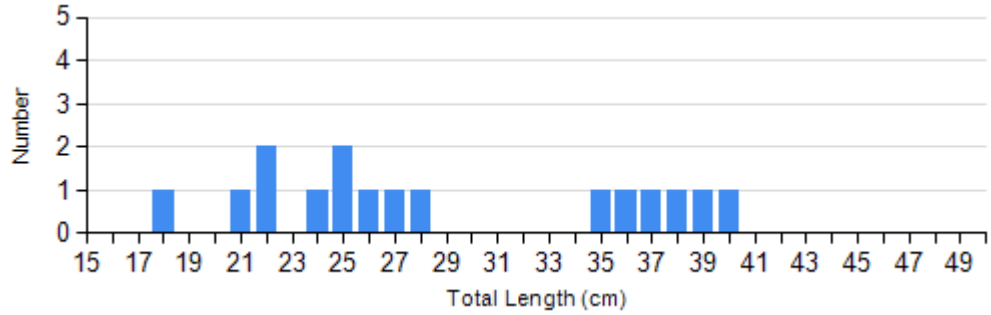
2019

Species: Channel Catfish
Gear: AFS std gill net

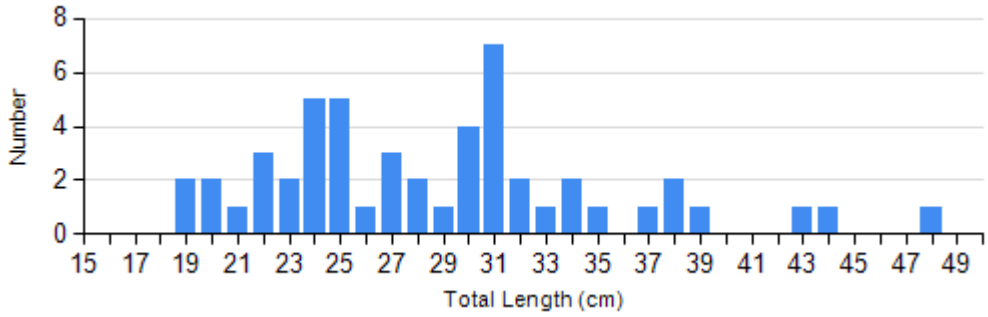


2019

Species: Walleye
Gear: std exp gill net



2014



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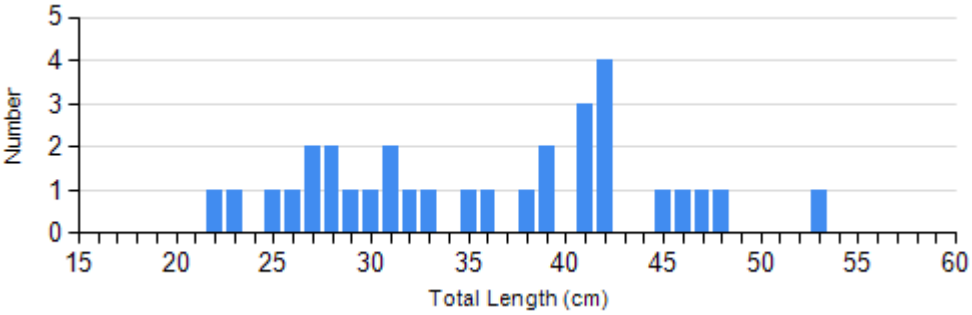
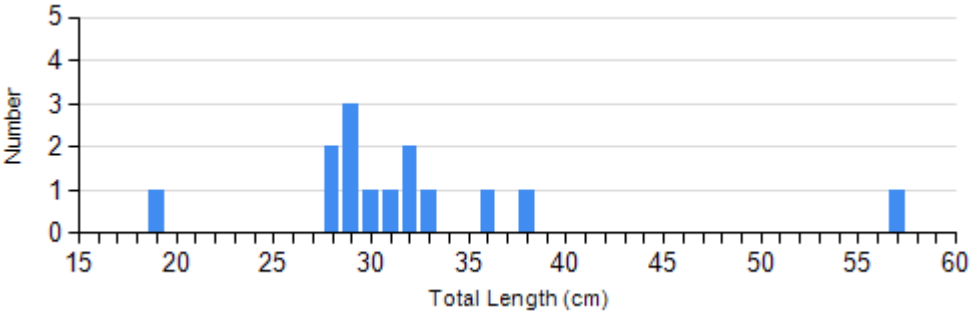


2016**



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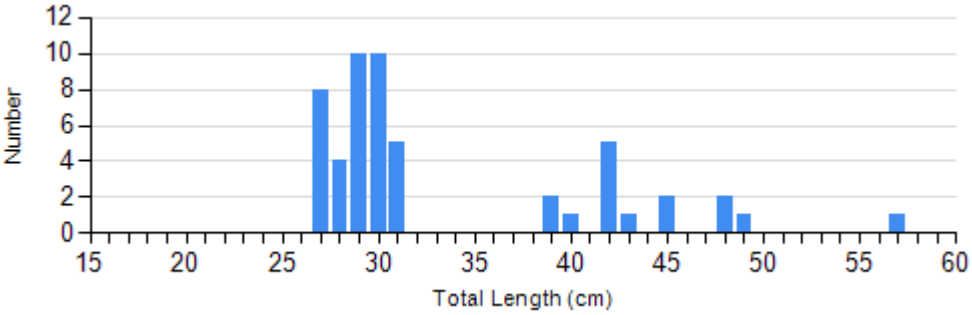
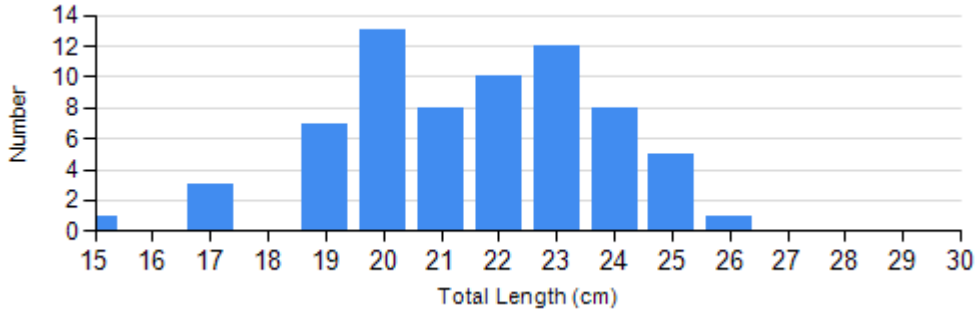


2019**

Species: Yellow Perch
Gear: std exp gill net



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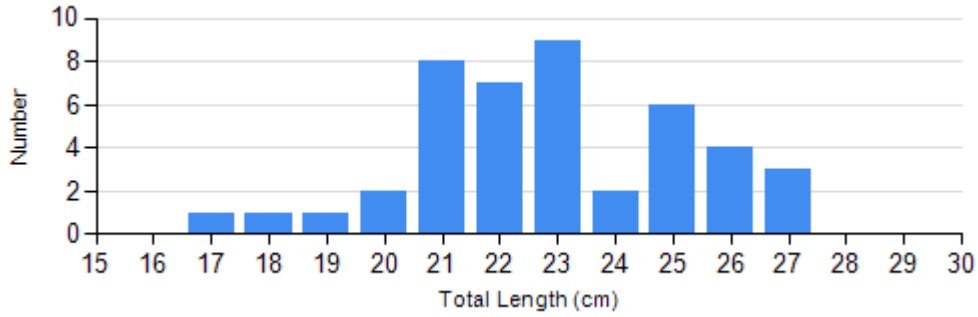
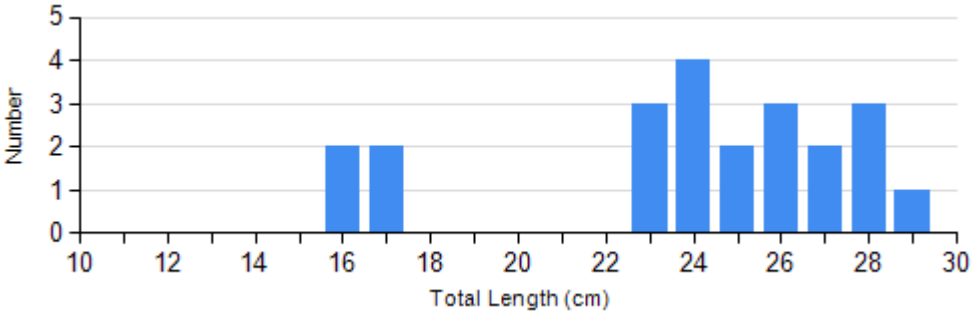
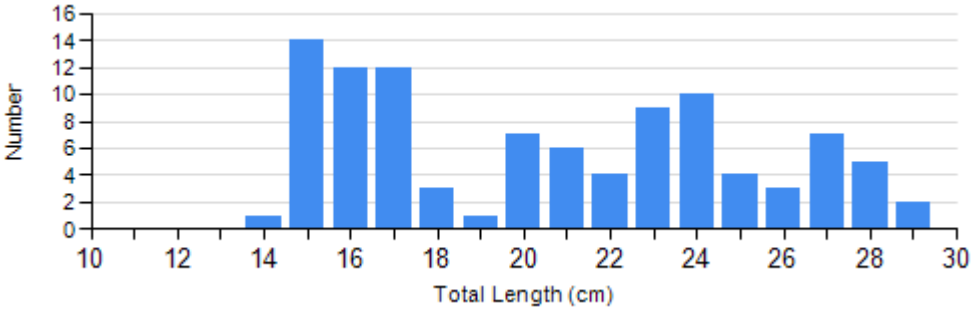


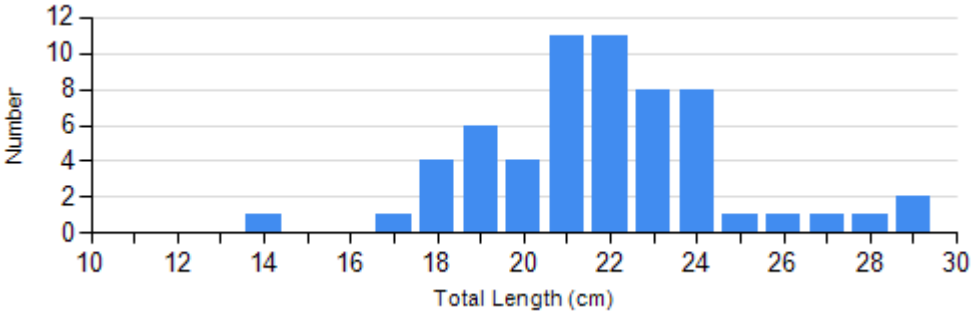
2015



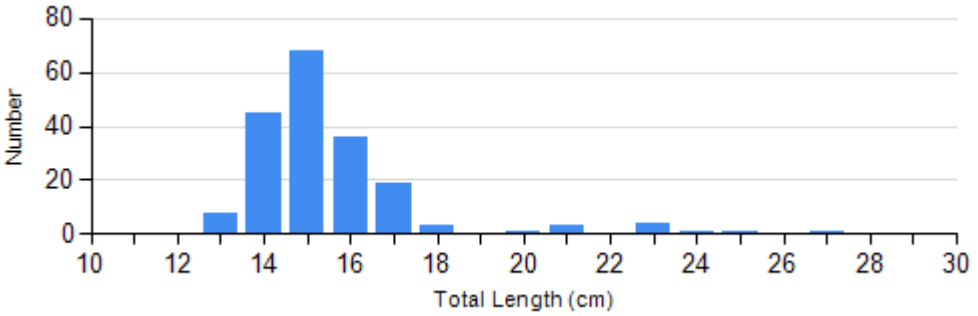
2016**



2017**



2018**

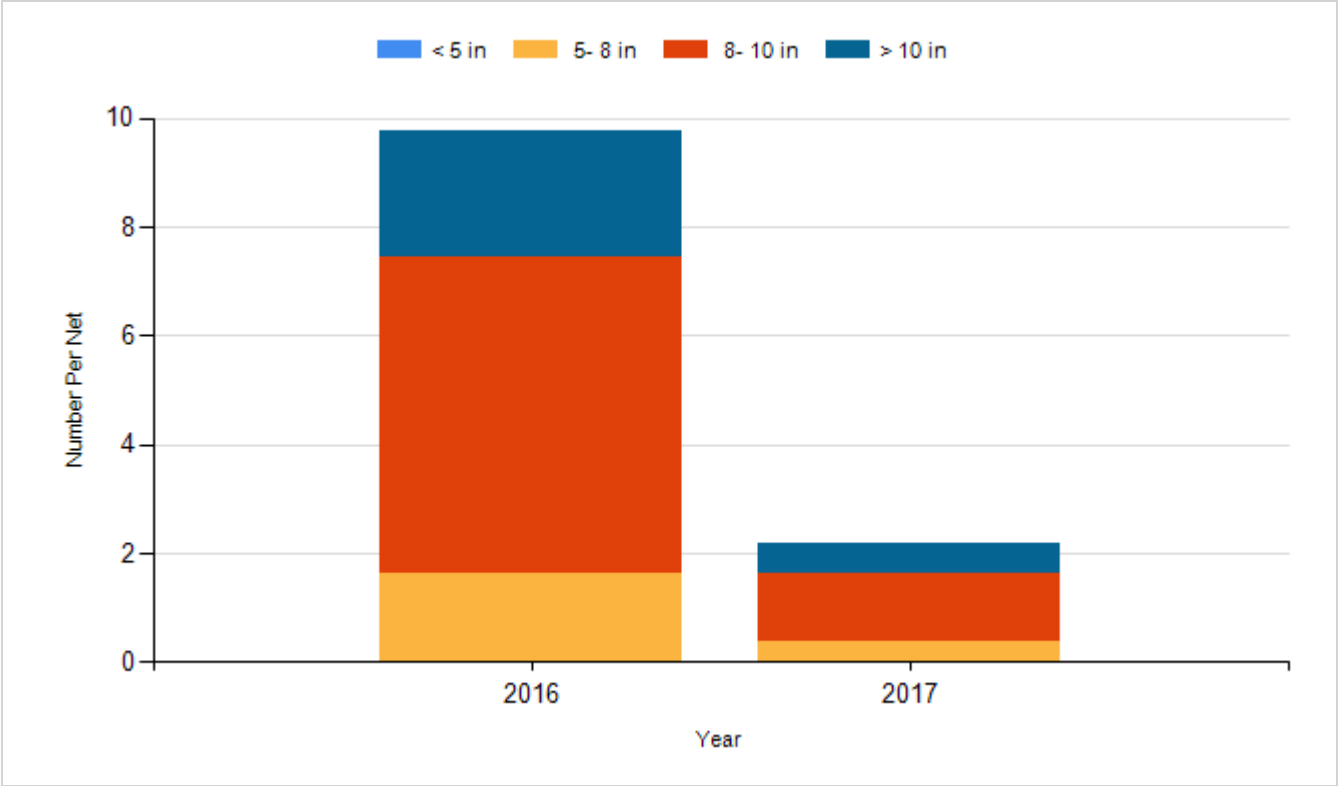


2019**

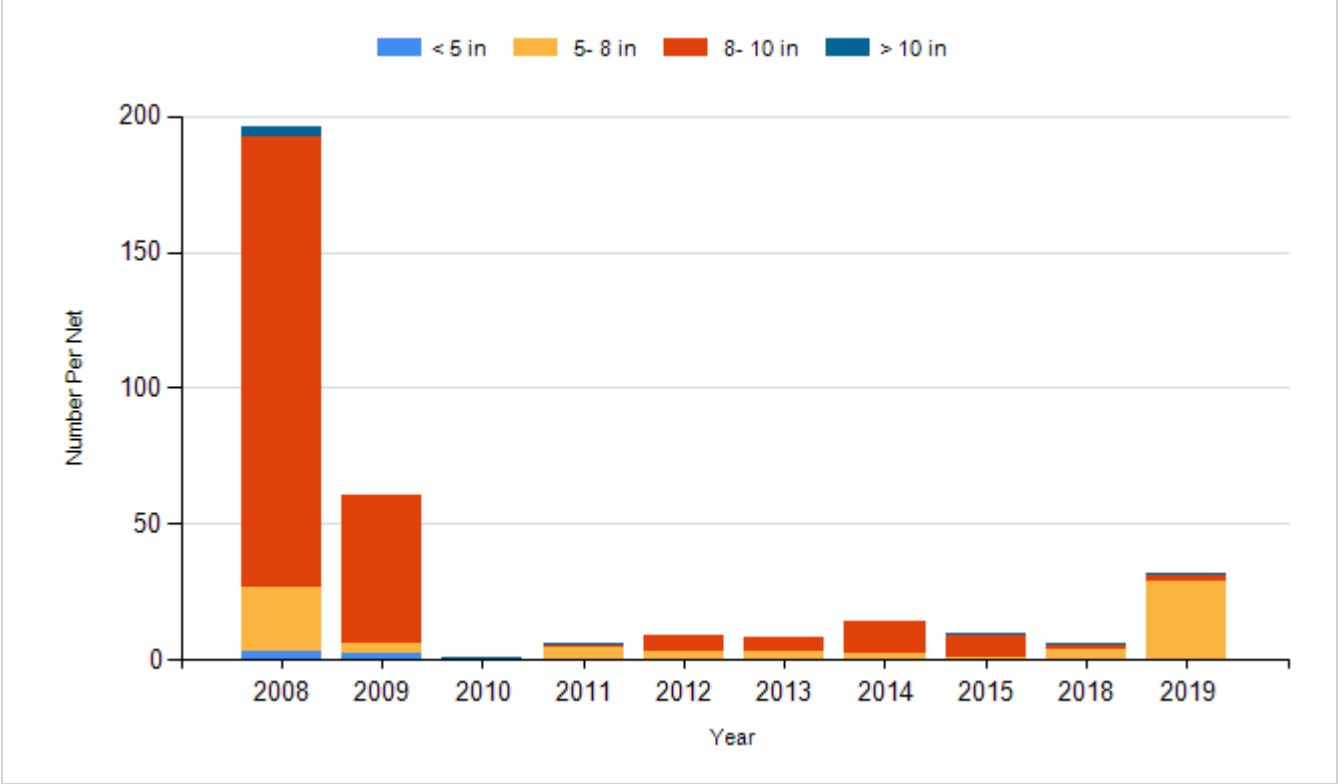
Historic Fish Sizes and Relative Abundance

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

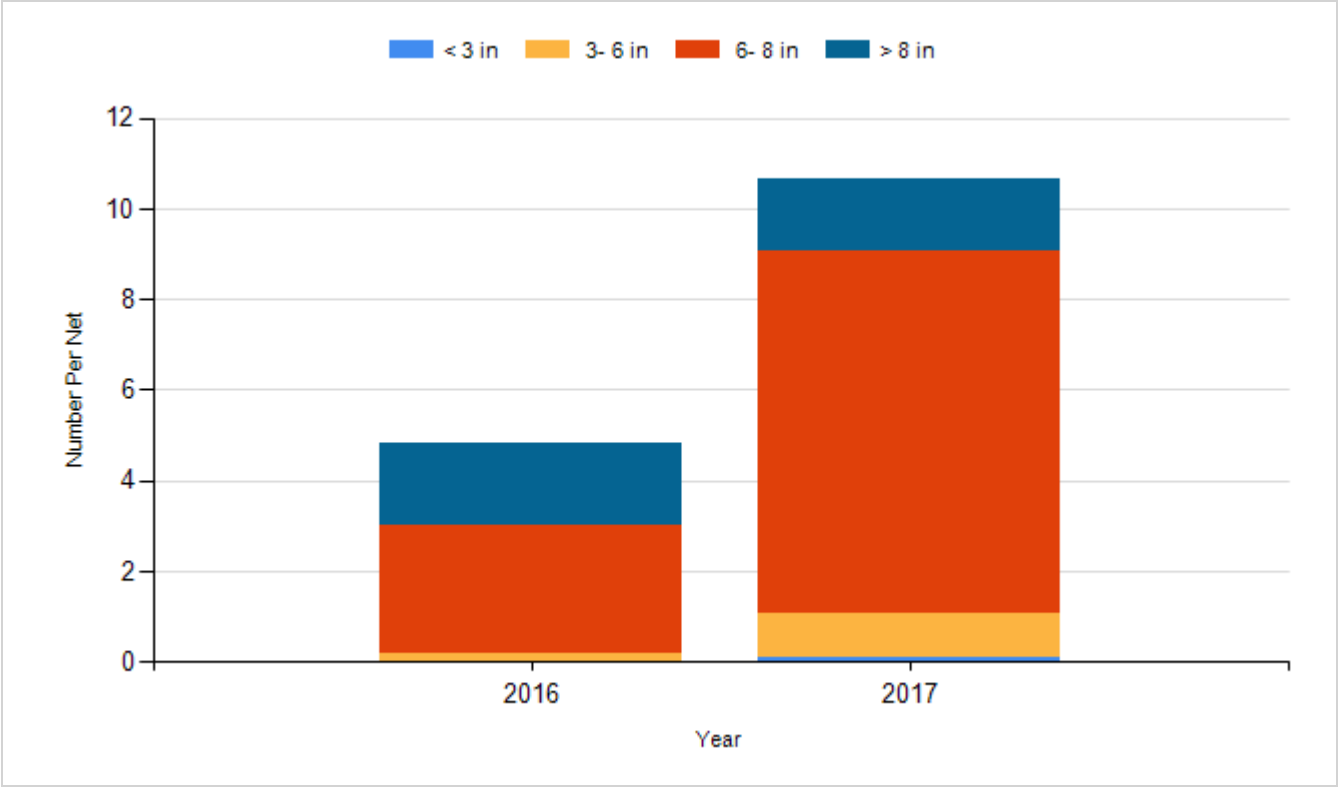
Species: Black Crappie
Gear: AFS std frame net



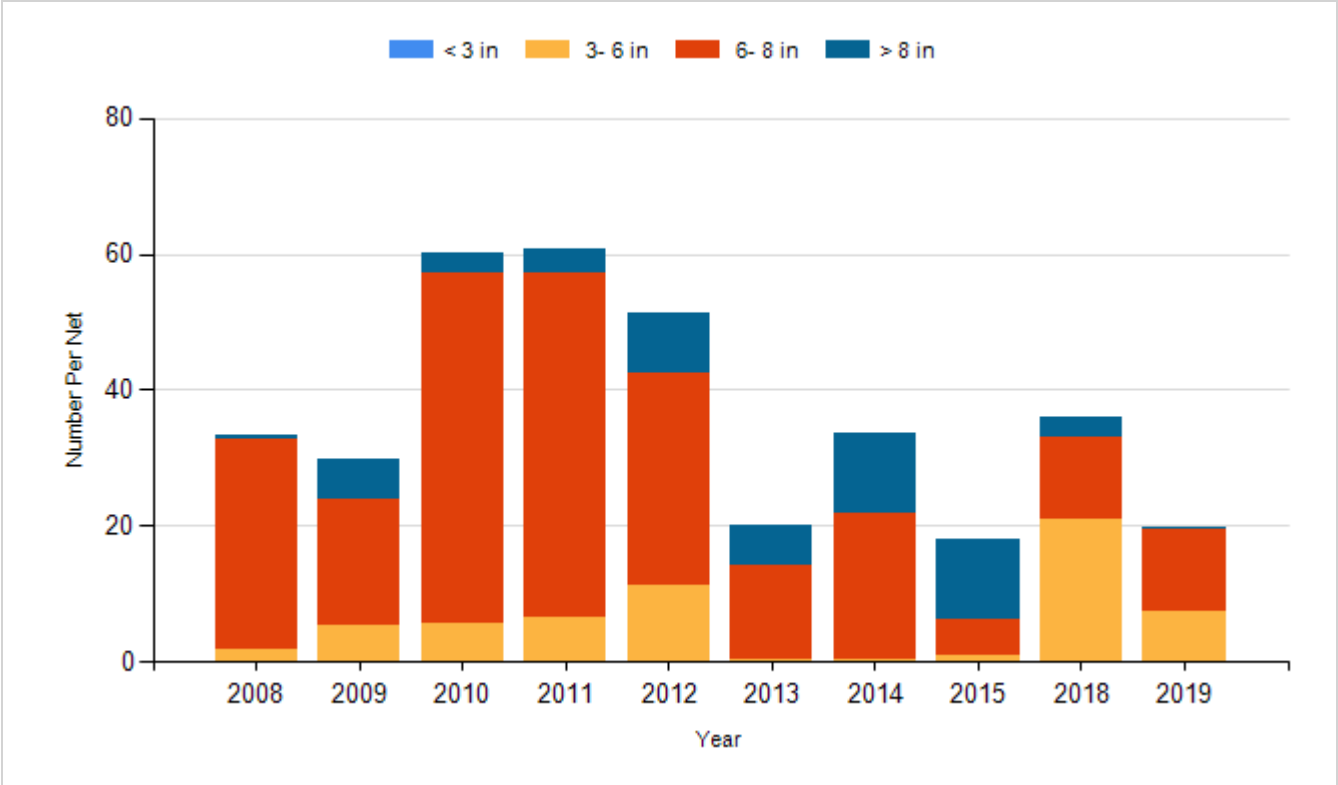
Species: Black Crappie
Gear: frame net (std 3/4 in)



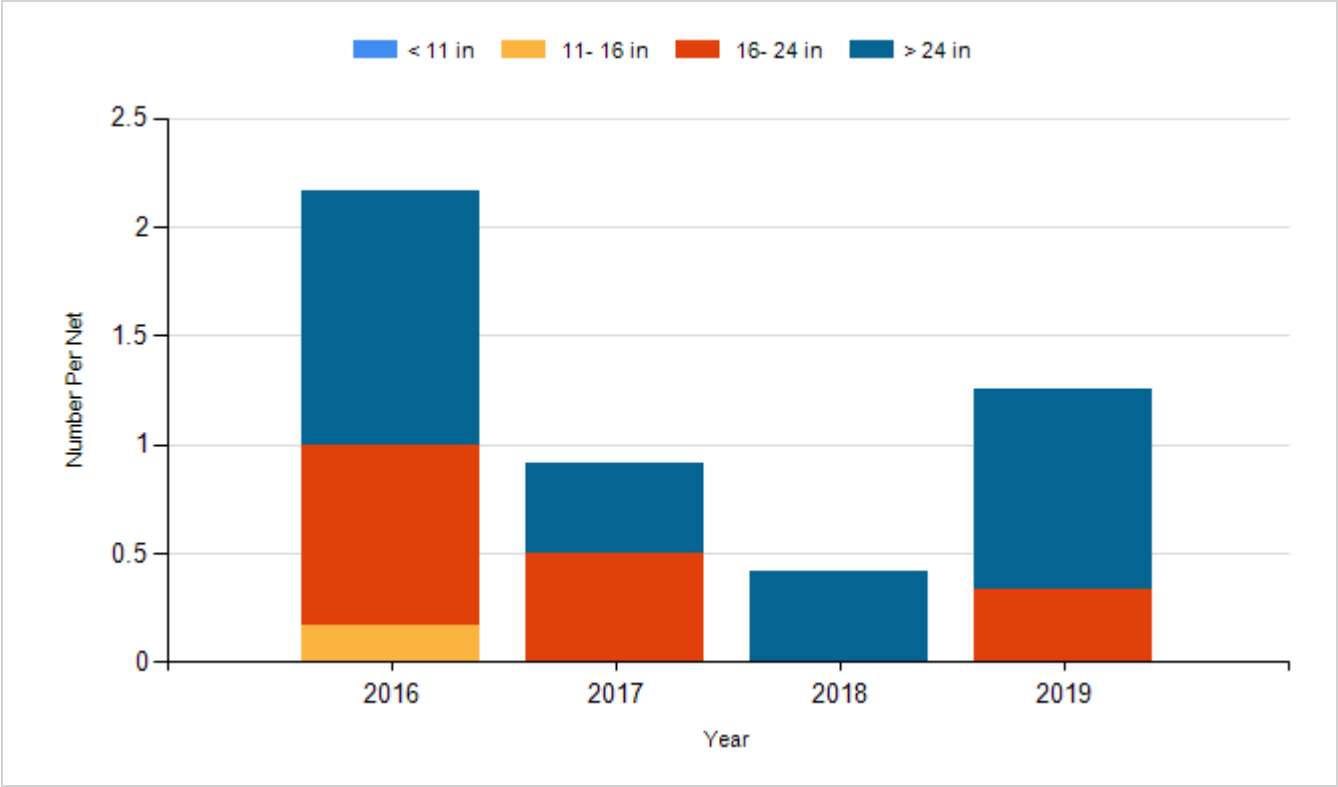
Species: Bluegill
Gear: AFS std frame net



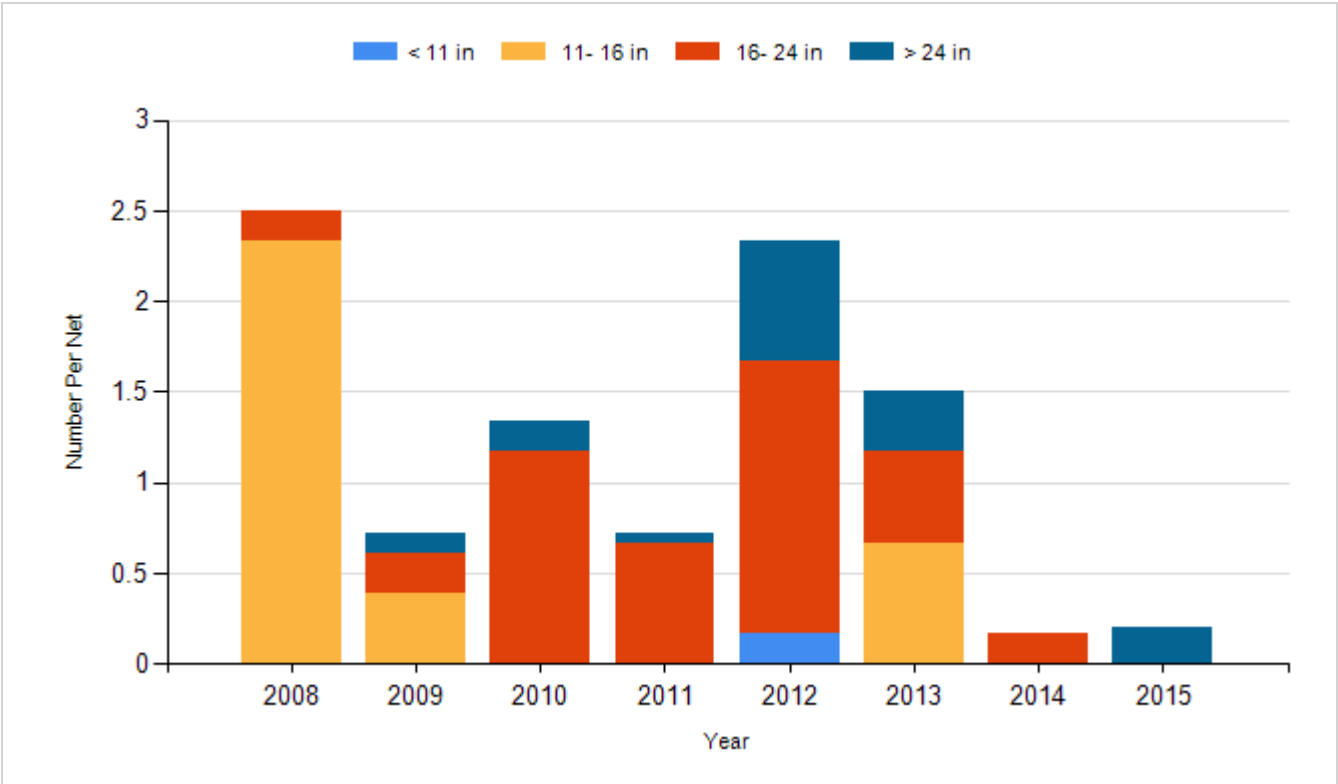
Species: Bluegill
Gear: frame net (std 3/4 in)



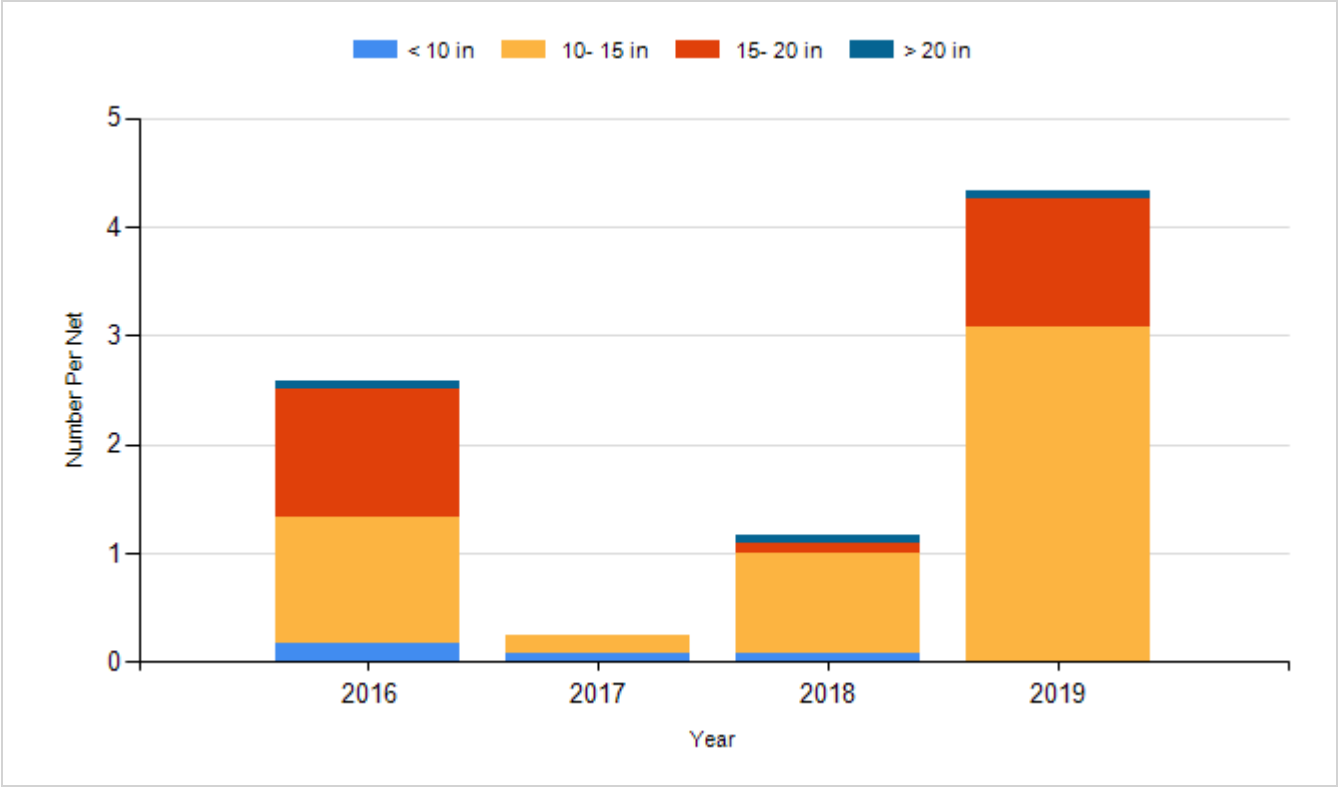
Species: Channel Catfish
Gear: AFS std gill net



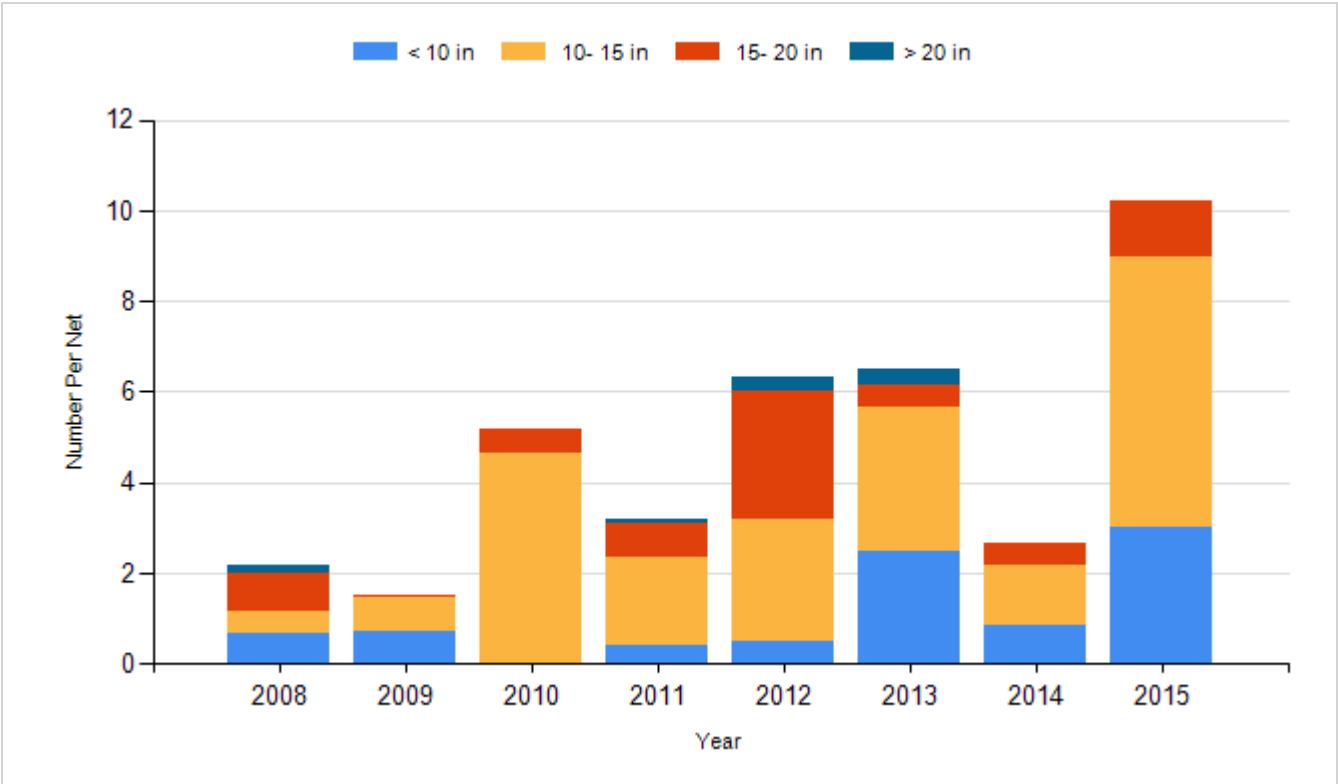
Species: Channel Catfish
Gear: std exp gill net



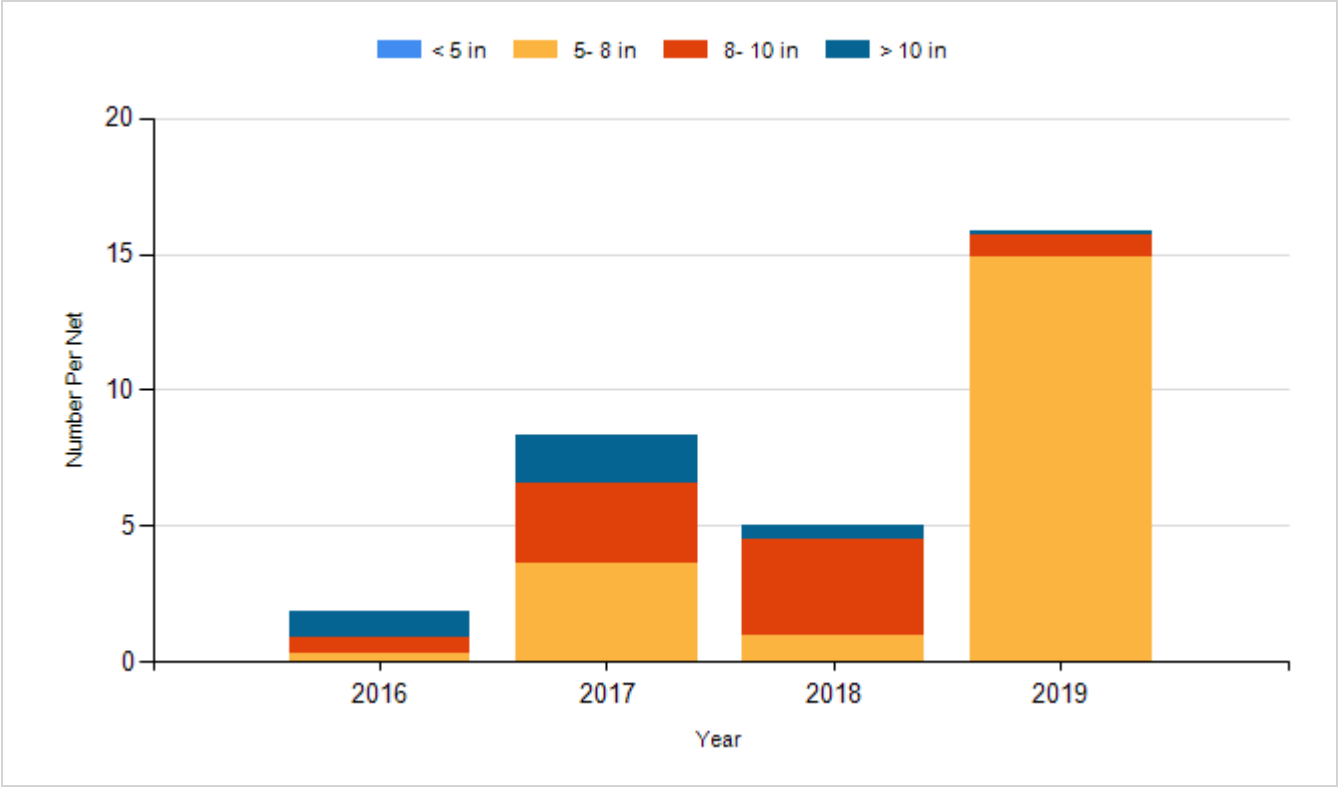
Species: Walleye
Gear: AFS std gill net



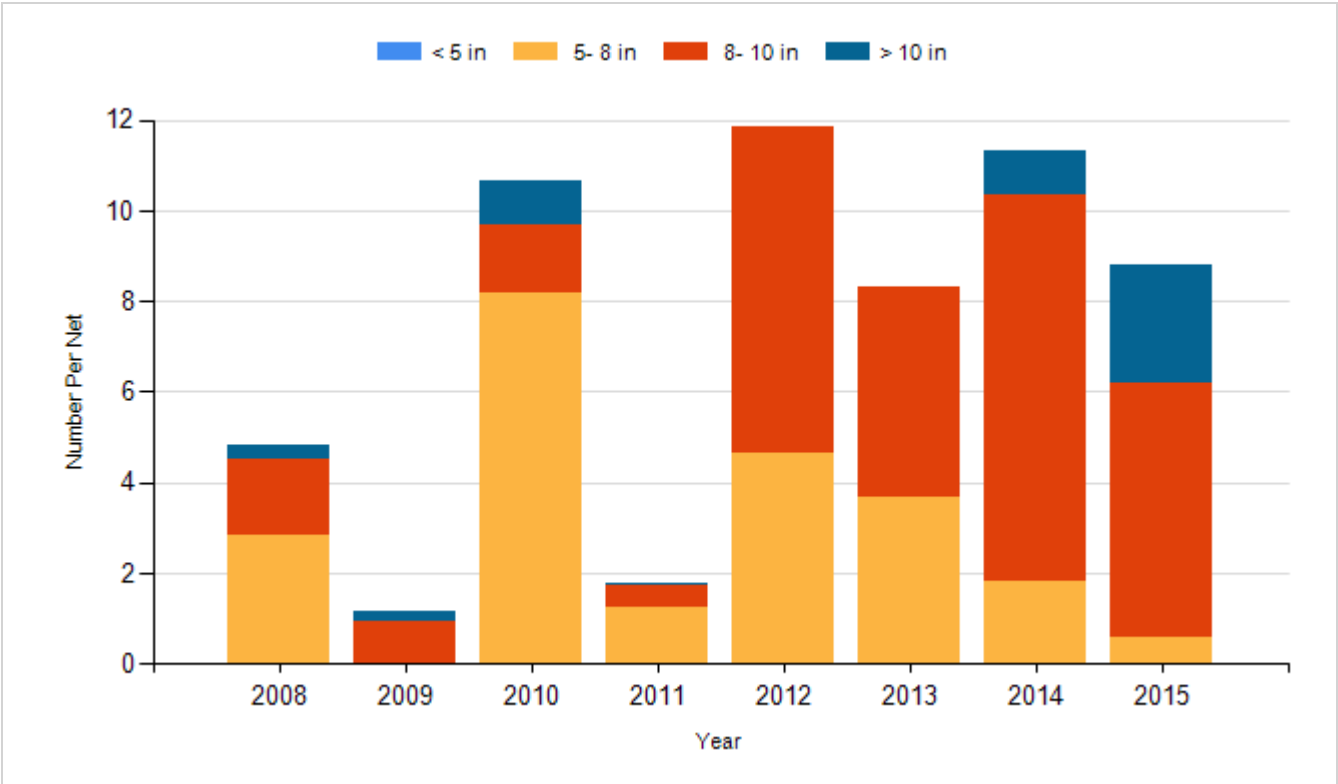
Species: Walleye
Gear: std exp gill net



Species: Yellow Perch
Gear: AFS std gill net



Species: Yellow Perch
Gear: std exp gill net



Fish Stocking

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

Year	Species	Size	Number
2008	Walleye	Large Fingerling	4,218
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
2019	Saugeye	Small Fingerling	62,350