SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Richmond, Brown County
UJA-Lake-831-800
2021

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
fall night EF-WAE	Oct 14, 2021	3000 seconds

Common Fish Species Present

Walleye

Largemouth Bass

Bluegill

Black Crappie

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

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
AFS std frame net	Black Bullhead					85.5	196.0					140.75
	Black Crappie					9.8	2.2					6.00
	Bluegill					4.8	10.6					7.70
	Channel Catfish					0.5	0.7					0.60
	Common Carp					1.0	0.4					0.70
	Northern Pike					0.3	0.4					0.35
	Walleye					2.4	1.4					1.90
	White Bass					6.4	6.7					6.55
	White Sucker					0.4	0.3					0.35
	Yellow Perch					0.3	0.0					0.15
AFS std gill net	Black Bullhead					42.5	28.8	16.2	14.0	26.9		25.68
	Black Crappie					0.6	0.1	0.2	1.3	0.3		0.50
	Bluegill					0.1	0.3	0.6	0.2	0.1		0.26
	Channel Catfish					2.2	0.9	0.4	1.3	0.4		1.04
	Common Carp					2.3	1.1	4.1	4.0	6.2		3.54
	Northern Pike					0.1	0.2	0.1	0.4	0.0		0.16
	Walleye					2.4	0.2	1.1	4.3	1.0		1.80
	White Bass					2.8	1.0	0.3	0.4	0.0		0.90
	White Sucker					0.0	0.1	0.0	0.1	0.3		0.10
	Yellow Perch					1.8	8.3	5.0	15.8	18.9		9.96
boat shocker (night)	Walleye*					10.5	36.0					23.25
fall night EF-WAE*	Walleye							109.0	112.5	3.0	70.8	73.83
frame net (std 3/4 in)	Black Bullhead	236.3	229.2	99.2	65.2			36.4	68.9	4.1		105.61
	Black Crappie	8.8	8.1	14.3	9.4			6.1	31.7	7.6		12.29
	Bluegill	51.3	20.0	33.6	17.9			36.5	20.0	9.3		26.94
	Bluegill X Gr. Sunfish Hybrid	0.0	0.0	0.0	0.0			0.0	0.0	0.0		0.00
	Channel Catfish	0.1	0.3	0.4	0.7			0.1	1.3	0.7		0.51
	Common Carp	0.4	0.2	0.8	0.6			0.7	1.1	2.8		0.94
	Green Sunfish	0.0	0.0	0.0	0.1			0.7	0.1	0.0		0.13
	Largemouth Bass	0.0	0.0	0.0	0.0			0.0	0.0	0.0		0.00
	Northern Pike	0.4	0.1	0.2	0.7			0.4	0.3	0.2		0.33
	Pumpkinseed	0.0	0.0	0.0	0.0			0.0	0.0	0.0		0.00

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
frame net (std 3/4 in)	Smallmouth Bass	0.0	0.0	0.0	0.0			0.0	0.0	0.0		0.00
	Sunfish Hybrid	0.0	0.0	0.0	0.0			0.0	0.0	0.0		0.00
	Walleye	0.8	1.0	2.2	3.3			0.4	1.5	0.7		1.41
	Western Painted Turtle	0.0	0.0	0.0	0.0			0.0	0.0	0.0		0.00
	White Bass	5.2	4.0	2.7	3.7			0.3	4.2	3.1		3.31
	White Sucker	0.2	0.2	0.0	0.2			0.3	0.2	0.1		0.17
	Yellow Perch	1.2	0.3	1.9	0.9			9.5	47.3	21.7		11.83
std exp gill net	Black Bullhead	108.5	109.0	90.7	51.6							89.95
	Black Crappie	1.0	2.2	0.7	1.0							1.23
	Bluegill	1.3	1.0	0.2	0.0							0.63
	Channel Catfish	2.2	1.5	0.2	0.2							1.03
	Common Carp	1.7	1.5	0.8	1.4							1.35
	Northern Pike	0.7	1.0	0.5	0.4							0.65
	Walleye	5.8	4.0	1.8	7.2							4.70
	White Bass	2.0	1.5	0.2	0.2							0.98
	White Sucker	0.2	0.2	0.3	0.2							0.23
	Yellow Perch	11.8	8.3	11.3	8.8							10.05

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std frame net	Black Crappie	PSD					84	82				
		PSD-P					24	26				
		Wr					107	102				
	Bluegill	PSD					97	91				
		PSD-P					38	15				
		Wr					119	121				
	Walleye	PSD					16	28				
		PSD-P					2	12				
		Wr					83	79				
AFS std gill net	Black Crappie	PSD					57	100	0	6	75	
		PSD-P					29	100	0	6	0	
		Wr					112	100	132	115	109	
	Bluegill	PSD					100	100	14	100	100	
		PSD-P					0	67	14	0	0	
		Wr					140	132	125	116	119	
	Walleye	PSD					52	0	15	29	42	
		PSD-P					3	0	8	2	17	
		Wr					87	83	95	86	82	
boat shocker (night)	Walleye	PSD					0	0				
		PSD-P					0	0				
		Wr					94	94				
frame net (std 3/4 in)	Black Crappie	PSD	66	64	85	96			32	14	58	
		PSD-P	0	0	0	5			7	3	1	
		Wr	108	106	99	100			123	110	104	
	Bluegill	PSD	78	98	99	96			50	60	95	
		PSD-P	17	29	35	65			7	2	4	
		Wr	114	112	111	113			115	111	112	
	Walleye	PSD	7	22	8	5			14	7	8	
		PSD-P	0	6	0	0			14	0	8	
		Wr	78	81	85	90			93	86	74	
std exp gill net	Black Crappie	PSD	50	54	100	60						

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
std exp gill net	Black Crappie	PSD-P	0	0	0	40						
		Wr	123	105	103	121						
	Bluegill	PSD	75	83	100							
		PSD-P	13	33	0							
		Wr	123	114	117							
	Walleye	PSD	54	21	27	17						
		PSD-P	6	8	0	0						
		Wr	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+
2020	136	145 (1)	201 (133)	239 (1)					293 (1)		
2019	563	162 (493)	218 (51)	257 (8)	267 (12)						
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)							

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2020	167		162 (58)	185 (107)	206 (2)						
2019	360	105 (59)	153 (264)	182 (32)	205 (5)						
2018	657	121 (291)	160 (290)	198 (43)	211 (25)	217 (4)		233 (4)			
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)			

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2020	21	231 (9)	297 (7)	488 (4)	552 (1)						
2019	52	294 (37)	419 (9)	462 (4)				482 (1)		574 (1)	

		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)

Fish Condition

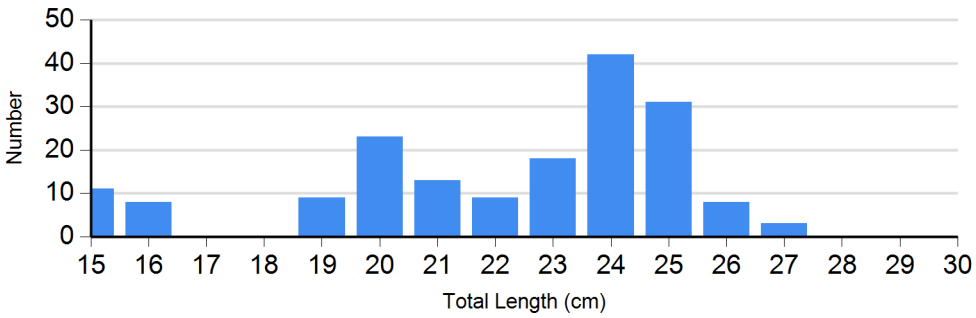
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	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	493	112 (0.4)	58	104 (1.0)	19	101 (1.5)	0	
	2020	57	106 (2.5)	78	103 (0.6)	1	87	0	
Bluegill Frame Net	2017	17	124 (5.9)	144	122 (0.9)	29	110 (1.8)	0	
	2018	330	115 (0.7)	282	114 (0.7)	45	117 (1.4)	0	
	2019	143	113 (0.9)	210	110 (0.6)	7	103 (3.5)	0	
	2020	8	114 (2.5)	153	112 (1.0)	6	112 (5.0)	0	
Walleye Gill Net	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	
	2020	7	78 (1.4)	3	86 (2.7)	2	87 (4.1)	0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net



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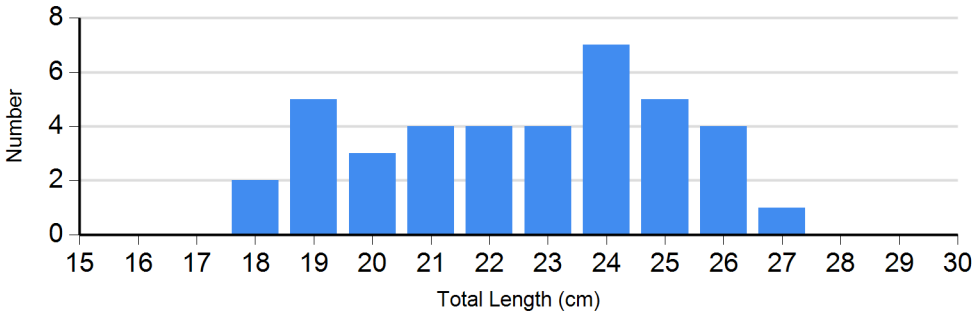
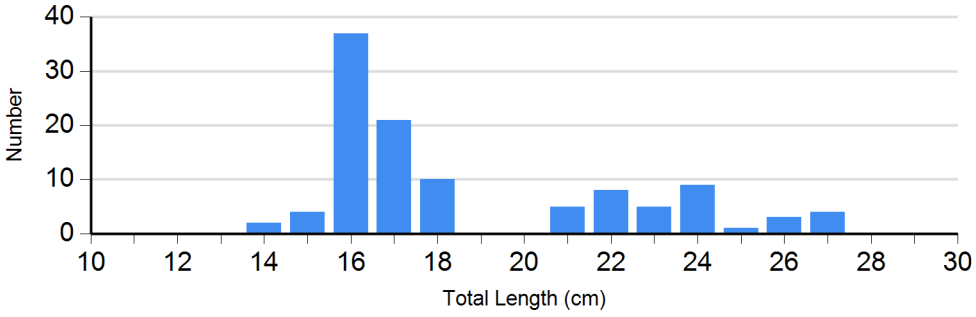


2017

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



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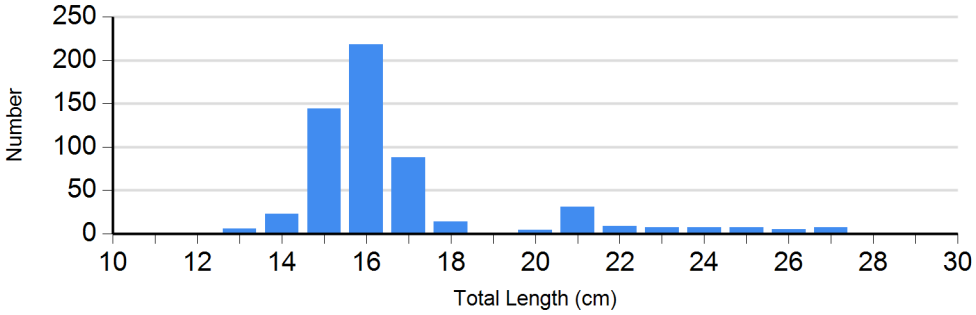

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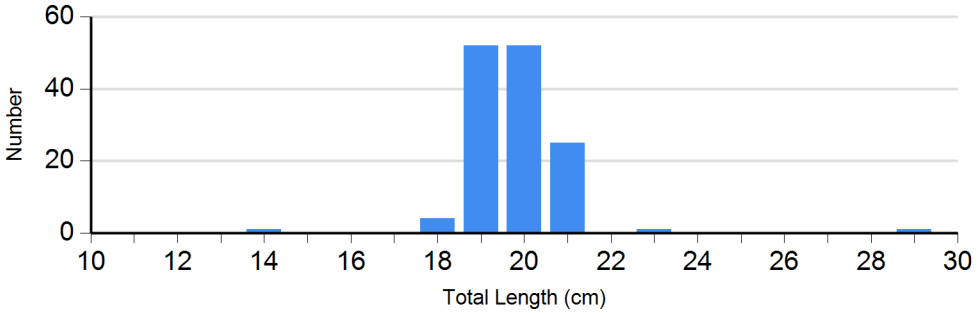
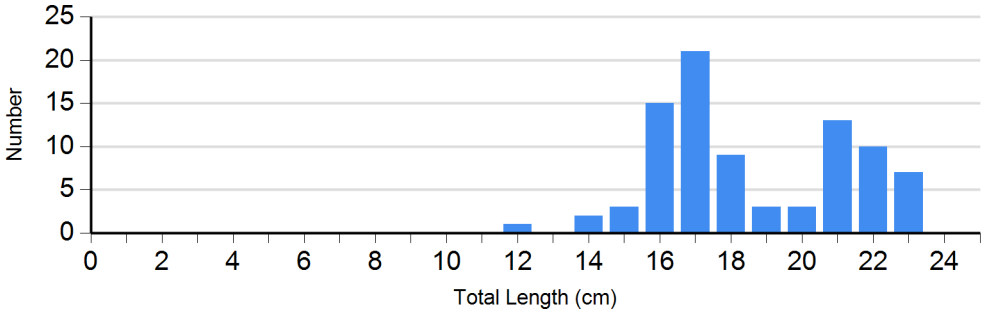


2020

Species: Bluegill
Gear: AFS std frame net



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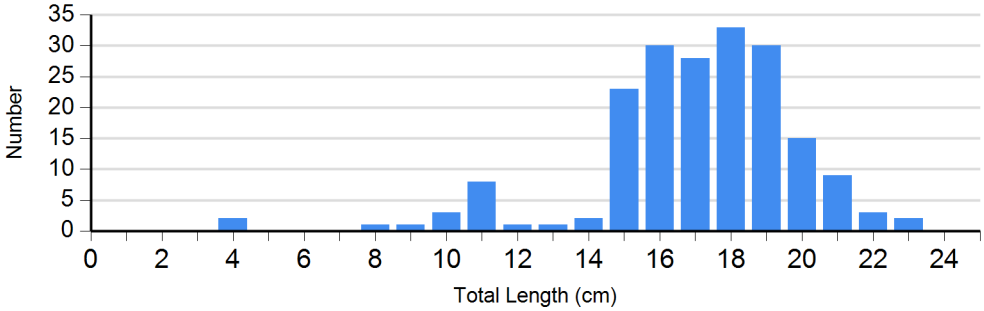
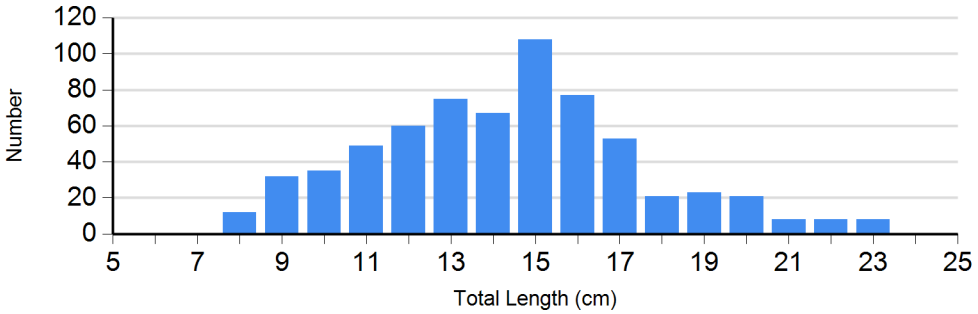


2017

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



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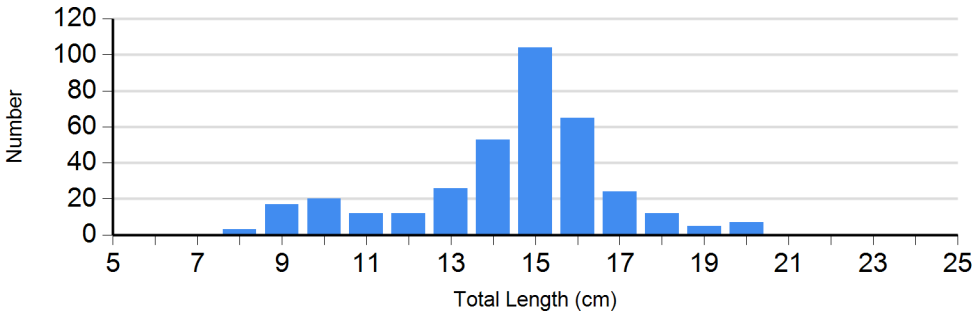

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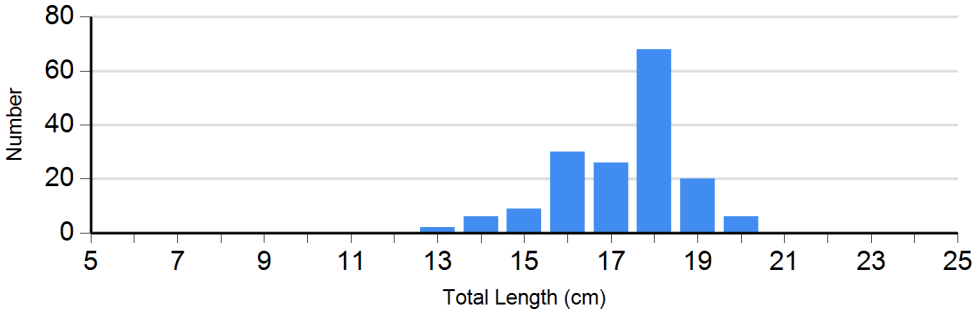
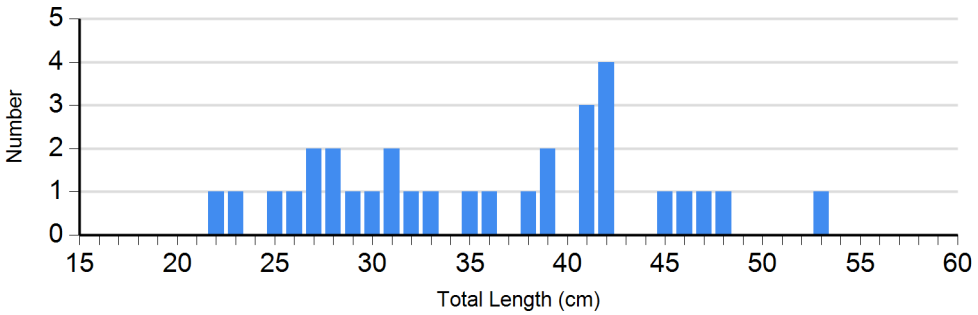


2020

Species: Walleye
Gear: AFS std gill net



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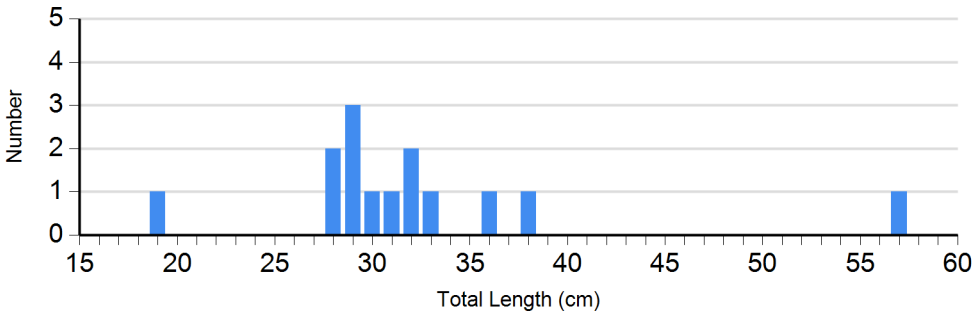
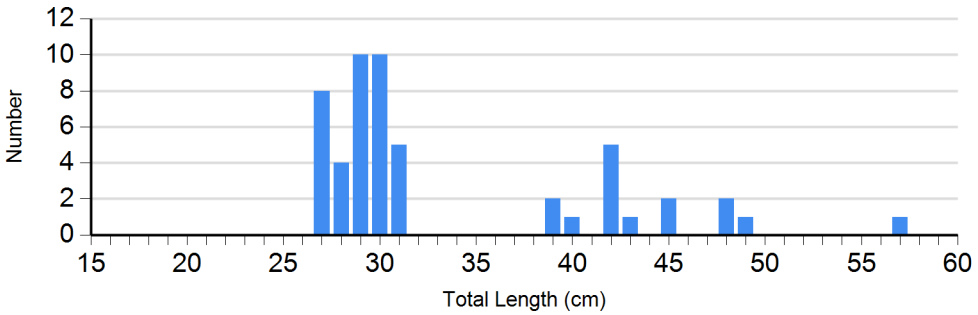
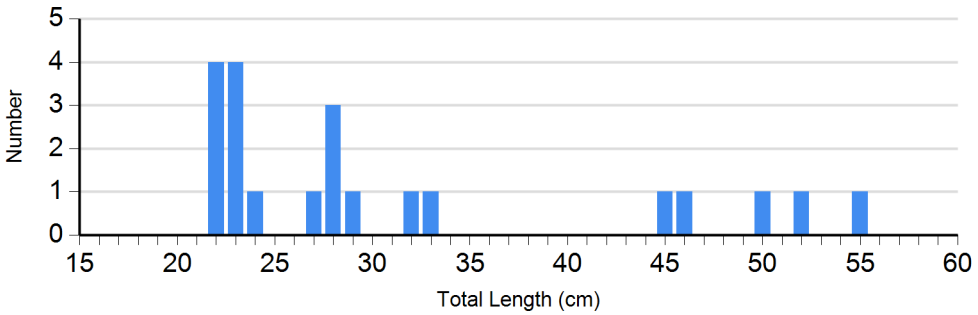


2018



2019

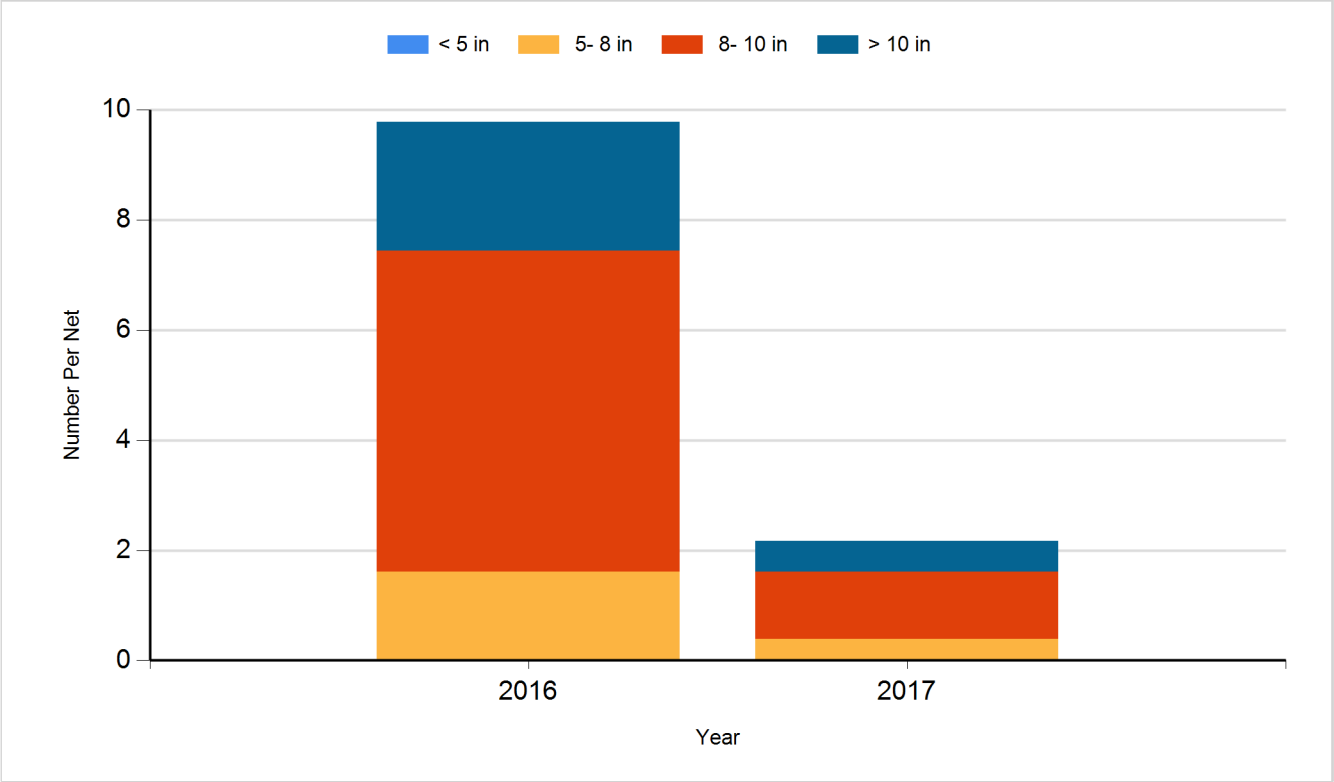


2020

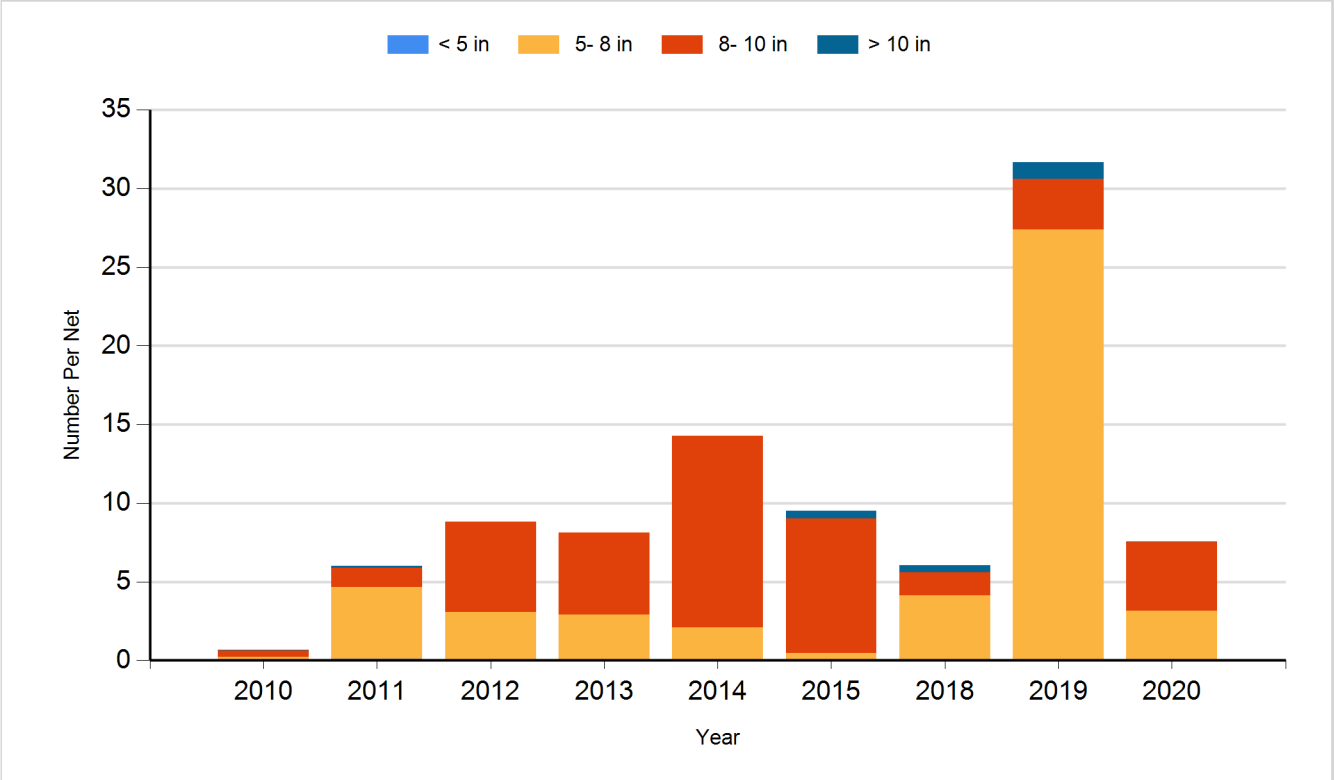
Historic Fish Sizes and Relative Abundance

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

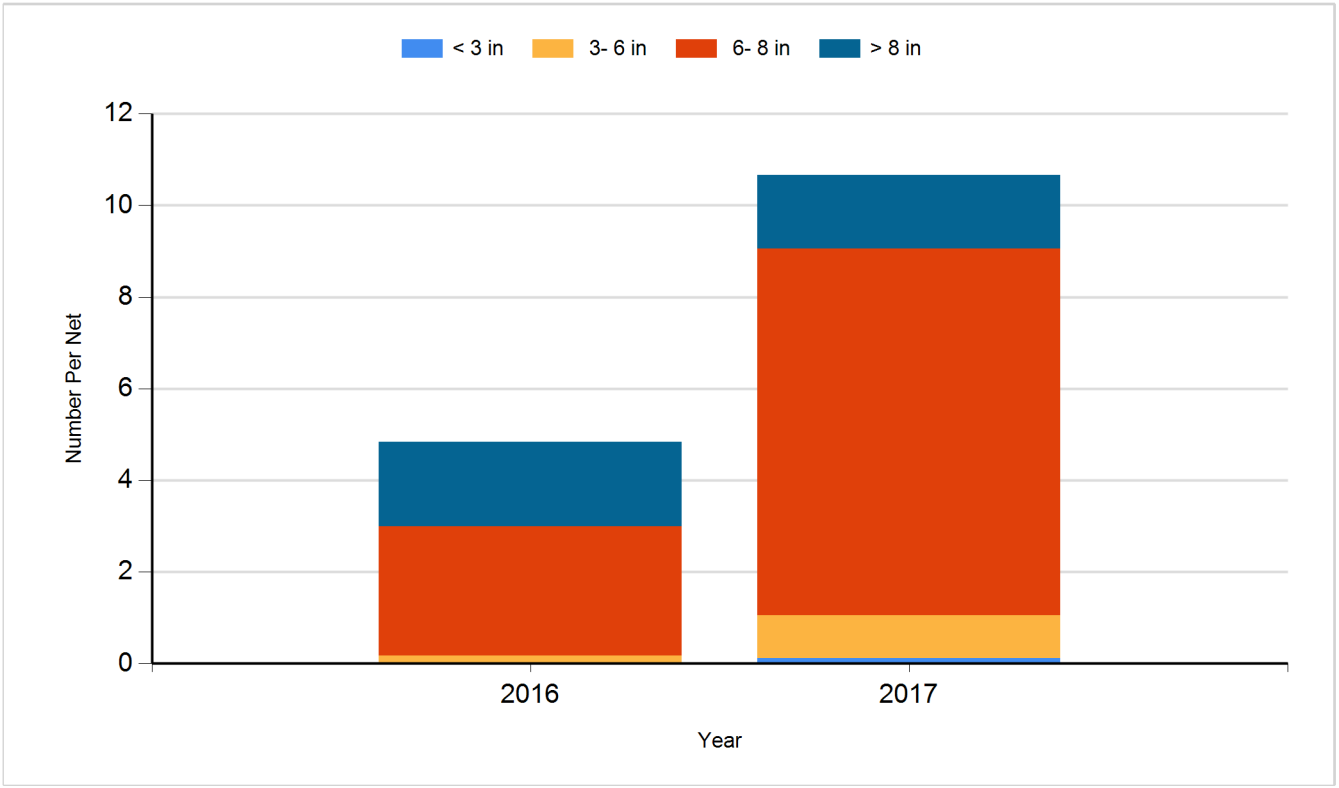
Species: Black Crappie
Gear: AFS std frame net



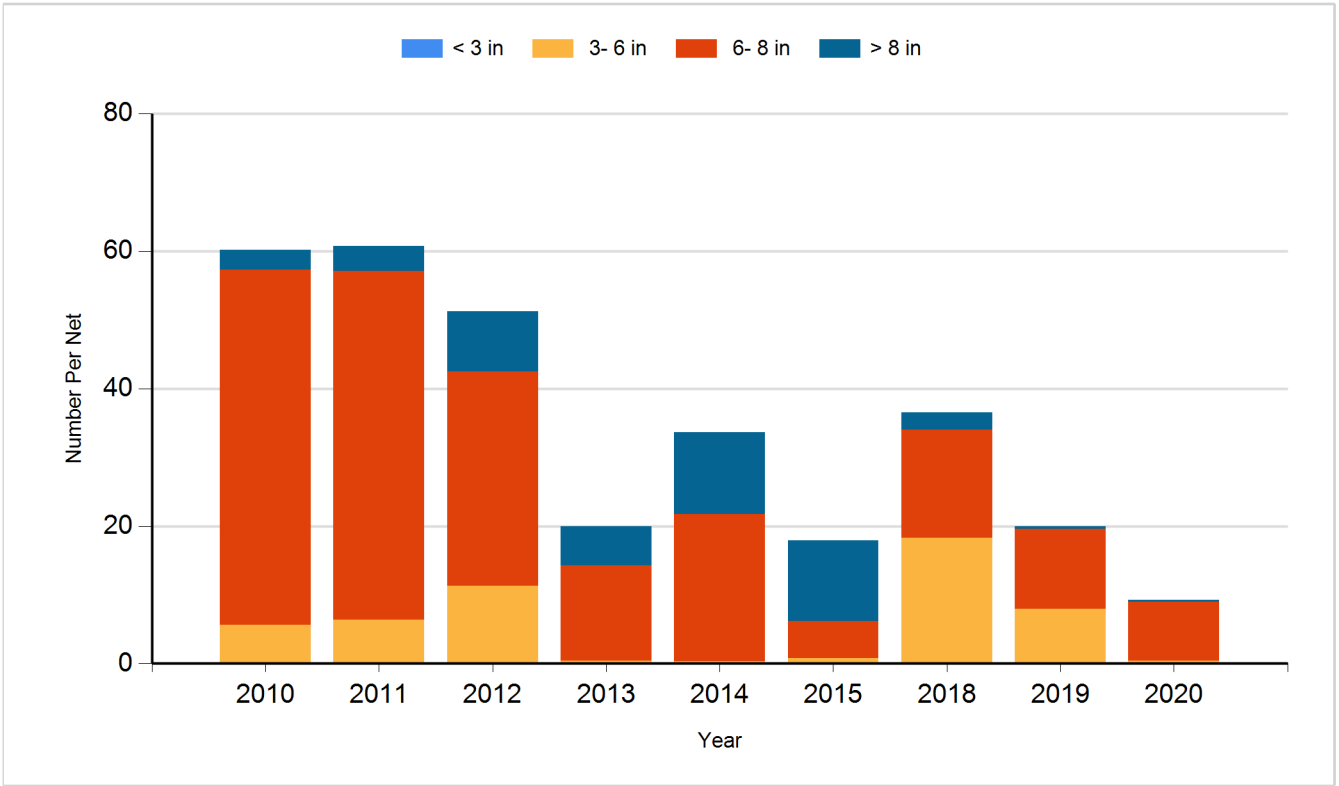
Species: Black Crappie
Gear: frame net (std 3/4 in)



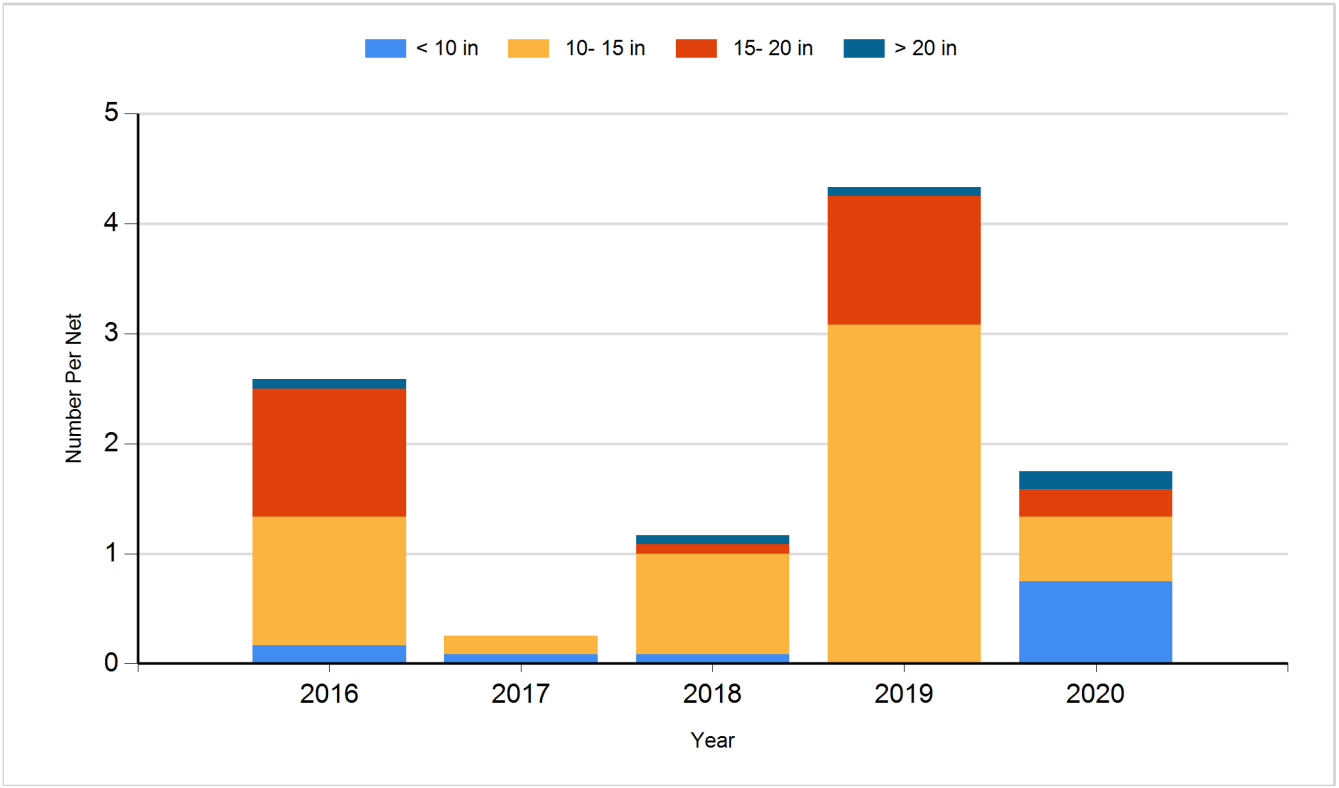
Species: Bluegill
Gear: AFS std frame net



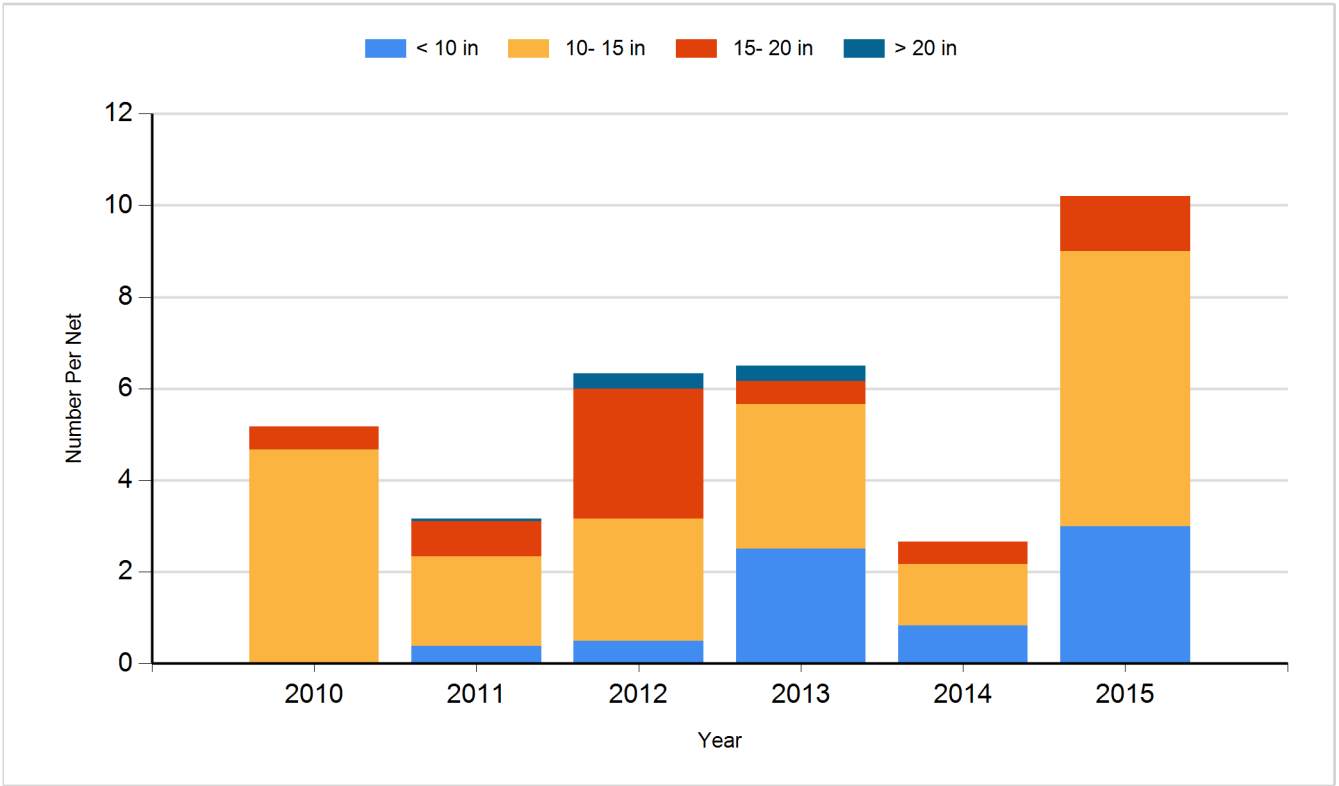
Species: Bluegill
Gear: frame net (std 3/4 in)



Species: 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
2019	Saugeye	Small Fingerling	62,350
2021	Saugeye	Juvenile	63,700