

Common Fish Species Present

Yellow Perch

Northern Pike

Black Bullhead

Largemouth Bass

Bluegill

Black Crappie

Bluegill X Gr. Sunfish Hybrid

Golden Shiner

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.
- **std 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.

$$CPUE = \frac{\text{number of fish}}{\text{effort}}$$

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.

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

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

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.

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

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		Quality		Preferred		Memorable		Trophy	
	(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**

Gear	Species	Sample Size (n)	Abundance		Stock Density Indices			Condition		
			CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std frame net	Black Bullhead	186	18.0	12.8	3	2	0	79	2	
	Black Crappie	11	1.1	0.6	0		0	104	4	
	Bluegill	88	8.8	2.4	36	7	3	114	3	
	Bluegill X Gr. Sunfish Hybrid	20	2.0	0.8	35	17	0			
	Northern Pike	4	0.3	0.2	33		33	90	1	
	Yellow Perch	69	6.6	3.5	94		20	7	110	39
AFS std gill net	Black Bullhead	92	46.0	73.9	2		0	81	1	
	Black Crappie	5	2.5	4.6	0		0	102	3	
	Bluegill	5	2.5	7.7	20		20	94	25	
	Golden Shiner	2	0.0	0.0						
	Largemouth Bass	5	1.5	4.6	33		0	105	18	
	Northern Pike	7	3.5	1.5	14		14	82	3	
	Yellow Perch	44	19.5	7.7	82	10	21	10	79	2
boat shocker (night)	Largemouth Bass	25	24.0	8.9	63	16	50	16	117	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.

Gear	Species	CPUE										Avg
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
AFS std frame net	Black Bullhead										18.0	18.0
	Black Crappie										1.1	1.1
	Bluegill										8.8	8.8
	Bluegill X Gr. Sunfish Hybrid										2.0	2.0
	Northern Pike										0.3	0.3
	Yellow Perch										6.6	6.6
AFS std gill net	Black Bullhead										46.0	46.0
	Black Crappie										2.5	2.5
	Bluegill										2.5	2.5
	Golden Shiner										0.0	0.0
	Largemouth Bass										1.5	1.5
	Northern Pike										3.5	3.5
	Yellow Perch										19.5	19.5
boat shocker (night)	Largemouth Bass										24.0	24.0
frame net (std 3/4 in)	Black Bullhead							5.1				5.1
	Bluegill							3.5				3.5
	Green Sunfish							0.5				0.5
	Northern Pike							0.4				0.4
	Yellow Perch							9.4				9.4

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.

Gear	Species	Index	Year													
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018				
AFS std frame net	Black Bullhead	PSD													3	
		PSD-P														0
		Wr														79
	Black Crappie	PSD														0
		PSD-P														0
		Wr														104
	Bluegill	PSD														36
		PSD-P														3
		Wr														114
	Northern Pike	PSD														33
		PSD-P														33
		Wr														90
	Yellow Perch	PSD														94
		PSD-P														20
		Wr														110
AFS std gill net	Black Bullhead	PSD													2	
		PSD-P														0
		Wr														81
	Black Crappie	PSD														0
		PSD-P														0
		Wr														102
	Bluegill	PSD														20
		PSD-P														20
		Wr														94
	Largemouth Bass	PSD														33
		PSD-P														0
		Wr														105
	Northern Pike	PSD														14
		PSD-P														14
		Wr														82
Yellow Perch	PSD														82	
	PSD-P														21	

Gear	Species	Index	Year													
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018				
AFS std gill net	Yellow Perch	Wr													79	
boat shocker (night)	Largemouth Bass	PSD													63	
		PSD-P													50	
		Wr													117	
frame net (std 3/4 in)	Black Bullhead	PSD									47					
		PSD-P									0					
		Wr									82					
	Bluegill	PSD										29				
		PSD-P										3				
		Wr										124				
	Northern Pike	PSD										25				
		PSD-P										0				
		Wr										89				
Yellow Perch	PSD										37					
	PSD-P										26					
	Wr										101					

Back-Calculated Lengths

Mean species back-calculated total length (mm) at age, standard error (SE), and sample size (N).

Species: Largemouth Bass

Year Class	Age	N	Mean back-calculated length (SE) at age																	
			1	2	3	4	5	6	7	8	9	10								
2017	1	1	77																	
2015	3	8	87 (7)	187 (7.5)	243 (6.2)															
2014	4	4	77 (4.3)	156 (7)	224 (12.9)	280 (19.1)														
2013	5	8	88 (7.4)	220 (16)	297 (15.4)	363 (10.5)	390 (8.7)													
2012	6	2	99 (14.7)	205 (72)	297 (83.3)	371 (47)	403 (38)	424 (33.4)												
2011	7	1	71	139	296	343	379	424	443											
2010	8	1	126	213	278	377	412	448	470	480										
Weighted Mean		25	87	193	266	343	393	430	457	480										
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20								
2017	1	1																		
2015	3	8																		
2014	4	4																		
2013	5	8																		
2012	6	2																		
2011	7	1																		
2010	8	1																		
Weighted Mean		25																		

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age											
			1	2	3	4	5	6	7	8	9	10		
2016	2	1	66	101										
2016	2	3	66 (2.5)	103 (5.7)										
2015	3	5	85 (9.4)	127 (10)	149 (11.9)									
2015	3	5	87 (10.5)	130 (13.3)	150 (16.7)									
2014	4	14	72 (1.4)	133 (4.1)	177 (4.3)	209 (4.9)								
2014	4	14	77 (1.6)	140 (4)	189 (4.9)	217 (5)								
2013	5	3	81 (11.8)	156 (10.4)	216 (11.4)	250 (19.1)	270 (21.5)							
2013	5	7	77 (4.1)	139 (3.5)	187 (5.6)	221 (8.2)	244 (9.8)							
2012	6	2	82 (1.2)	142 (4.4)	199 (2.7)	229 (8.3)	251 (15.4)	262 (16.6)						
2011	7	1	71	159	191	227	249	261	267					
Weighted Mean		55	77	135	180	218	251	262	267					

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2016	2	1										
2016	2	3										
2015	3	5										
2015	3	5										
2014	4	14										
2014	4	14										
2013	5	3										
2013	5	7										
2012	6	2										
2011	7	1										
Weighted Mean		55										

Length at Capture

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

Species: Bluegill

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2015	35		138 (34)			216 (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+
2018	25	173 (1)		287 (8)	314 (4)	414 (8)	440 (2)	454 (1)	489 (1)		

Species: Yellow Perch

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	44		116 (3)	159 (5)	218 (24)	254 (11)	270 (2)				

Fish Condition

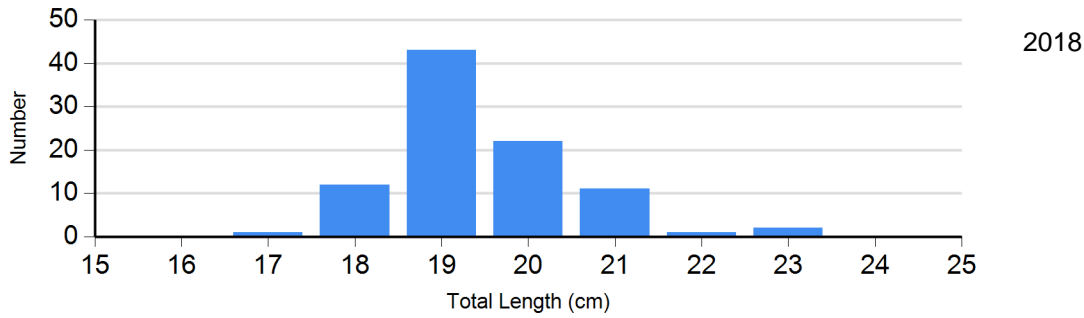
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2018	90	81 (0.8)	2	63 (1.8)	0		0	
Black Crappie Frame Net	2018	11	104 (3.3)	0		0		0	
Bluegill Frame Net	2015	25	122 (3.0)	9	129 (1.7)	1	117	0	
	2018	56	119 (3.6)	29	106 (1.7)	3	98 (3.9)	0	
Largemouth Bass Electro Fishing	2018	9	105 (1.1)	3	120 (8.7)	12	125 (3.0)	0	
Northern Pike Gill Net	2018	6	80 (0.8)	0		1	96	0	
Yellow Perch Gill Net	2018	7	90 (1.6)	24	78 (1.5)	8	73 (4.0)	0	

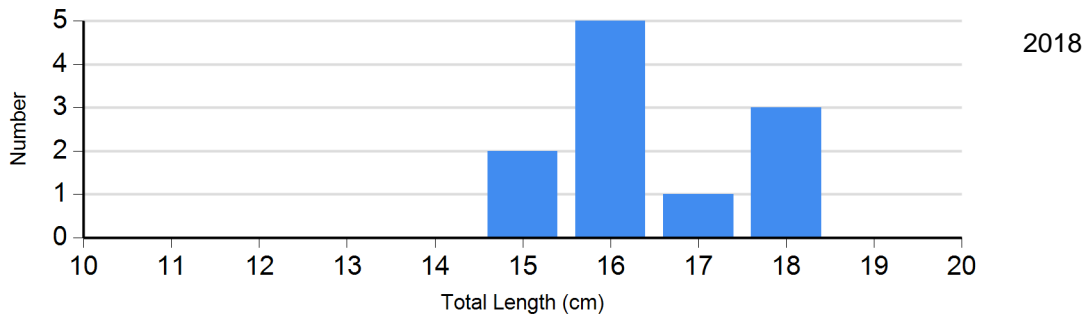
Length Frequency Distribution

Length frequency histogram of species sampled by year.

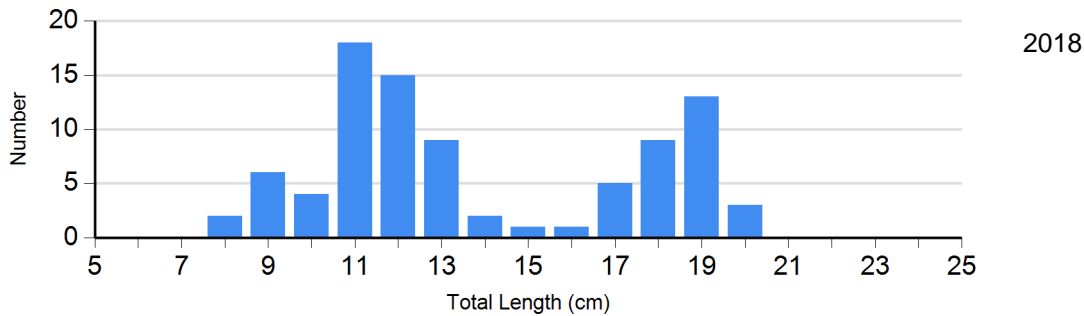
Species: Black Bullhead
Gear: AFS std gill net



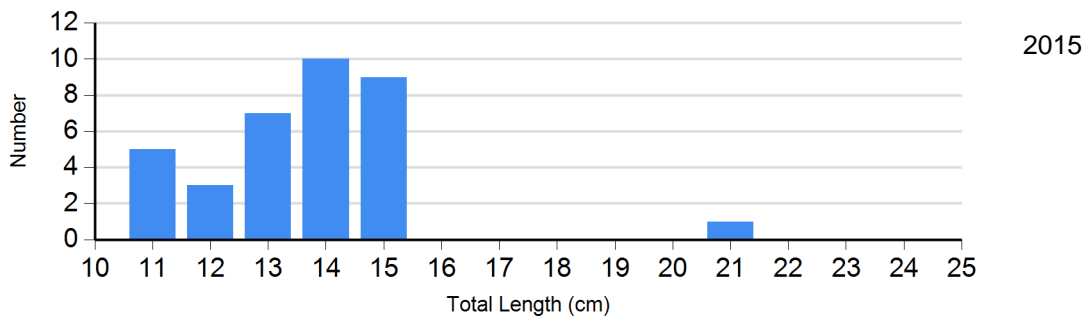
Species: Black Crappie
Gear: AFS std frame net



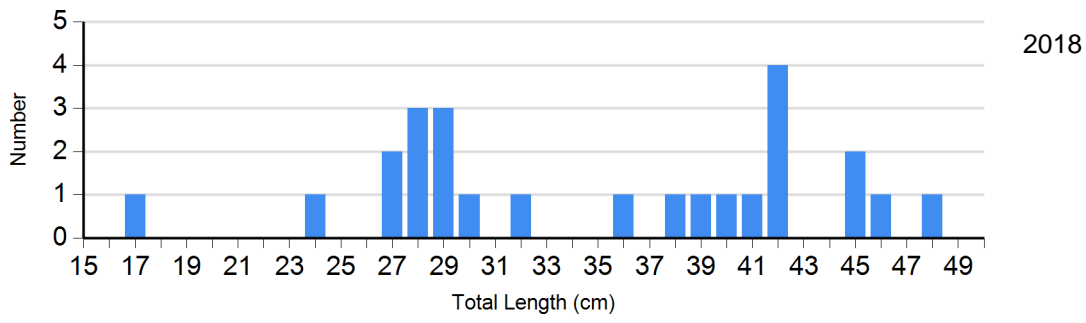
Species: Bluegill
Gear: AFS std frame net



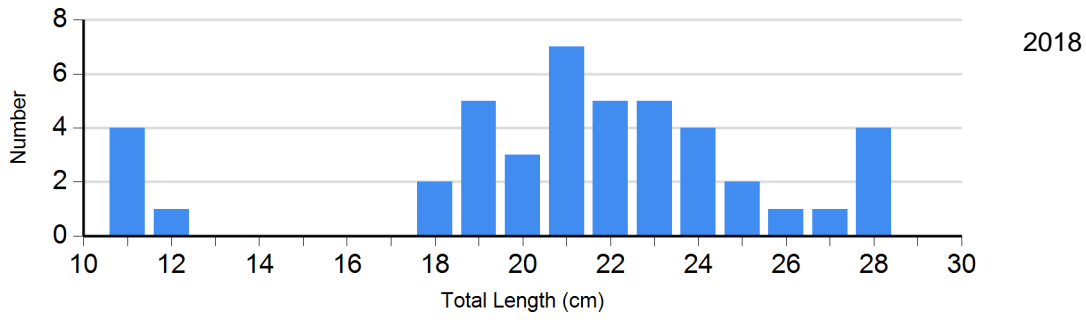
Species: Bluegill
Gear: frame net (std 3/4 in)



Species: Largemouth Bass
Gear: boat shocker (night)



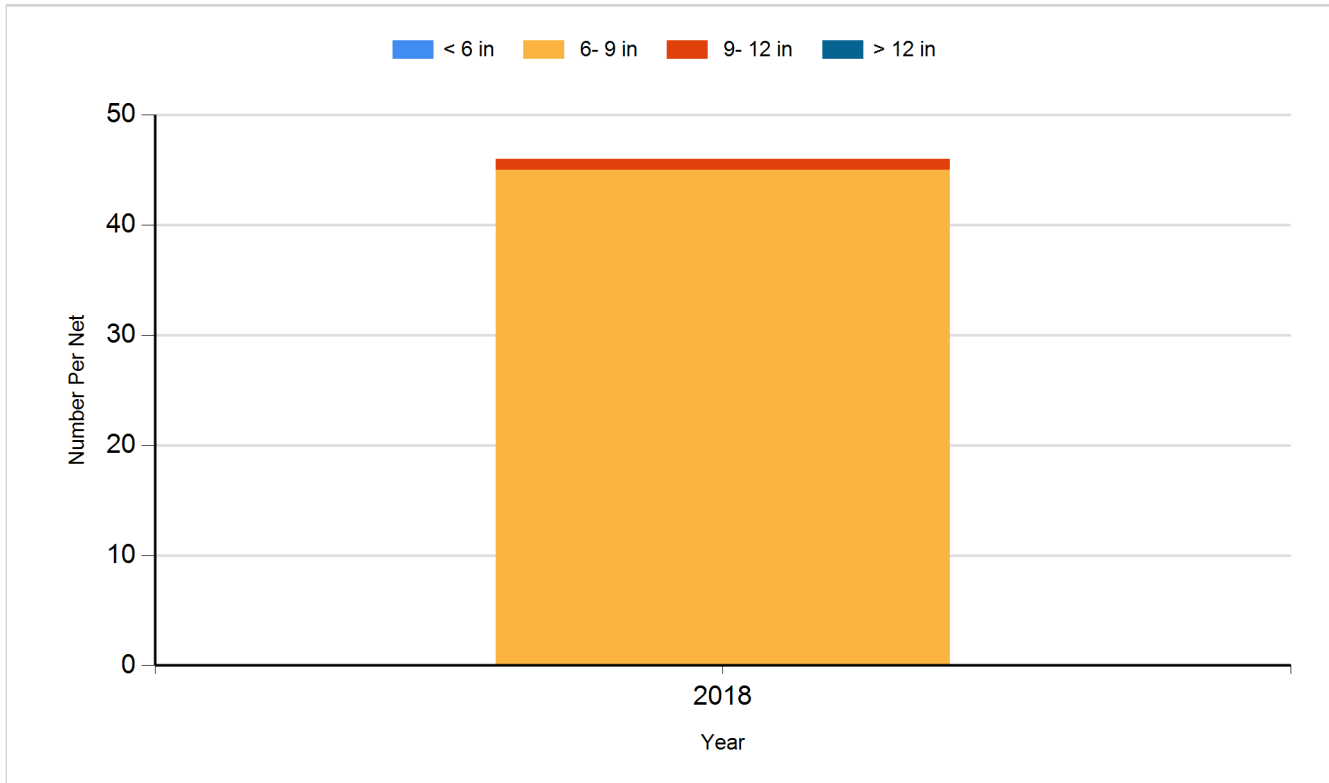
Species: Yellow Perch
Gear: AFS std gill net



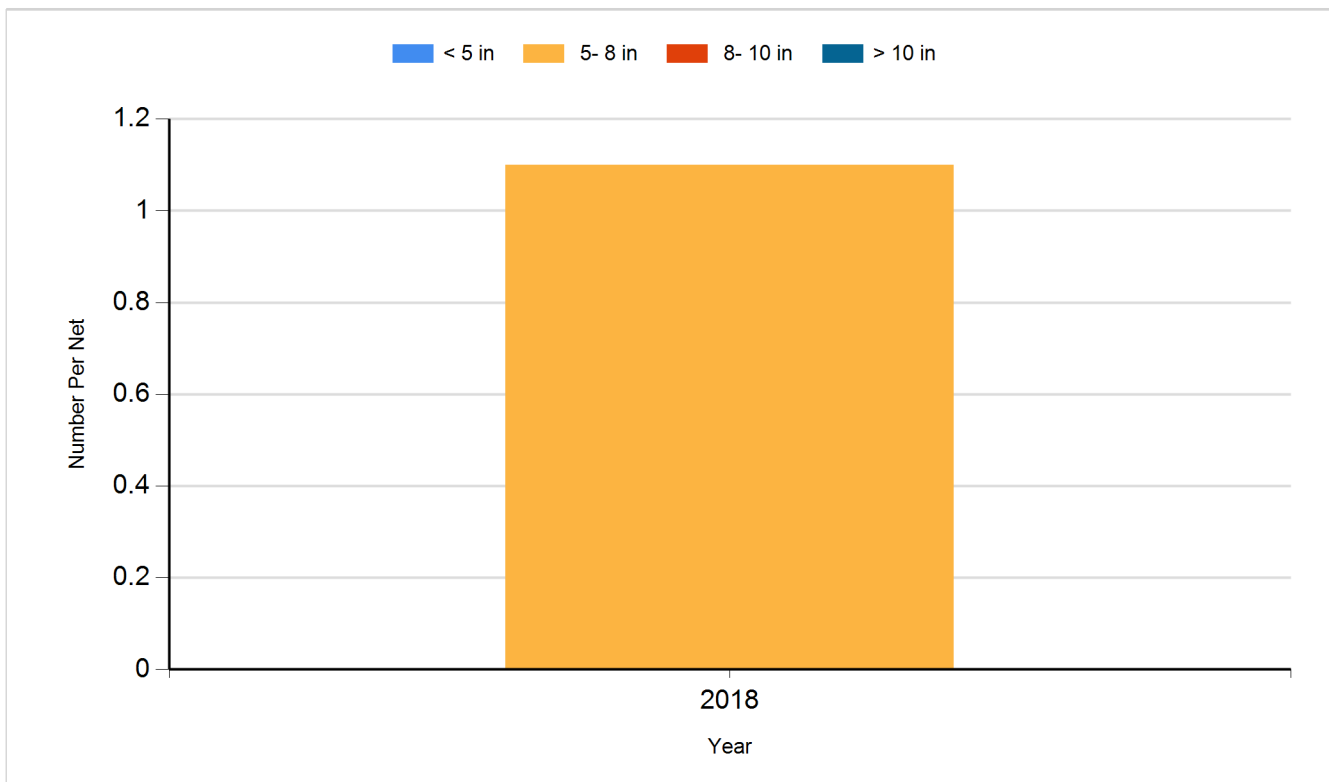
Historic Fish Sizes and Relative Abundance

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

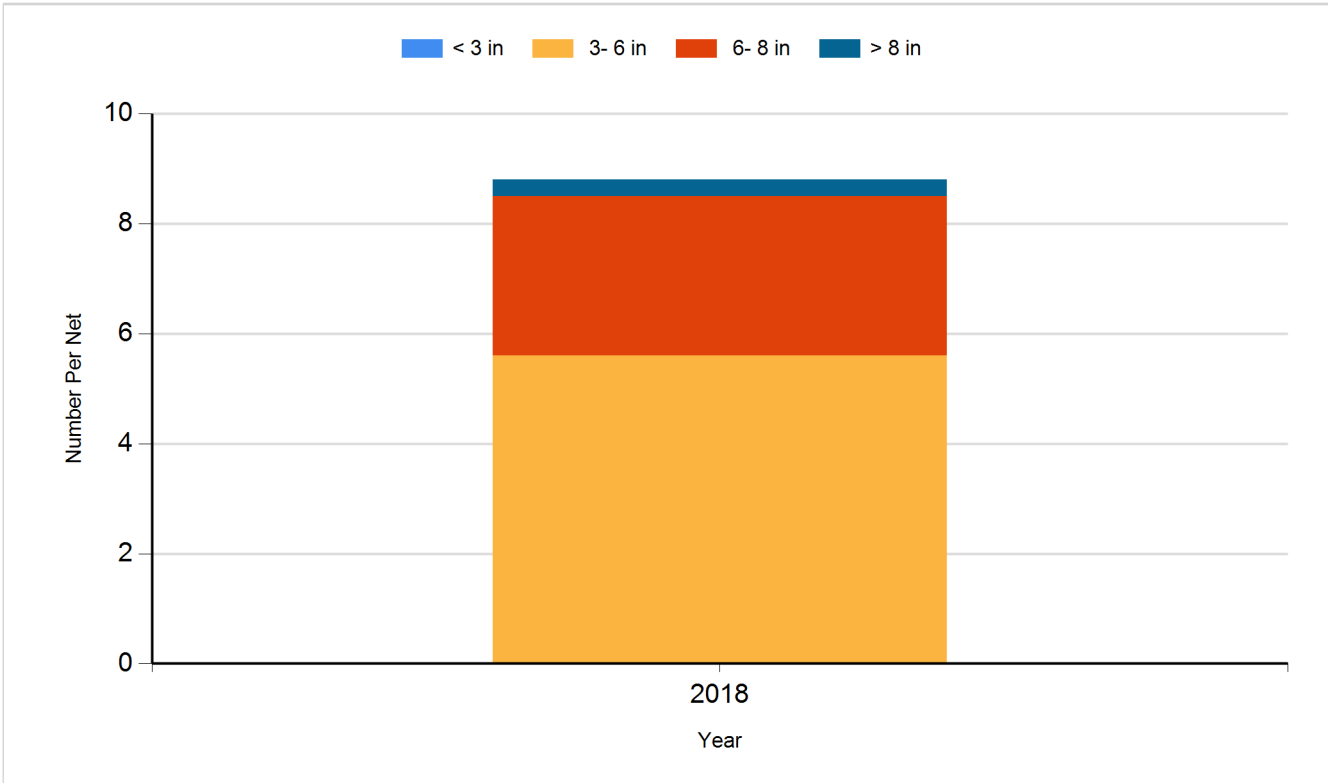
Species: Black Bullhead
Gear: AFS std gill net



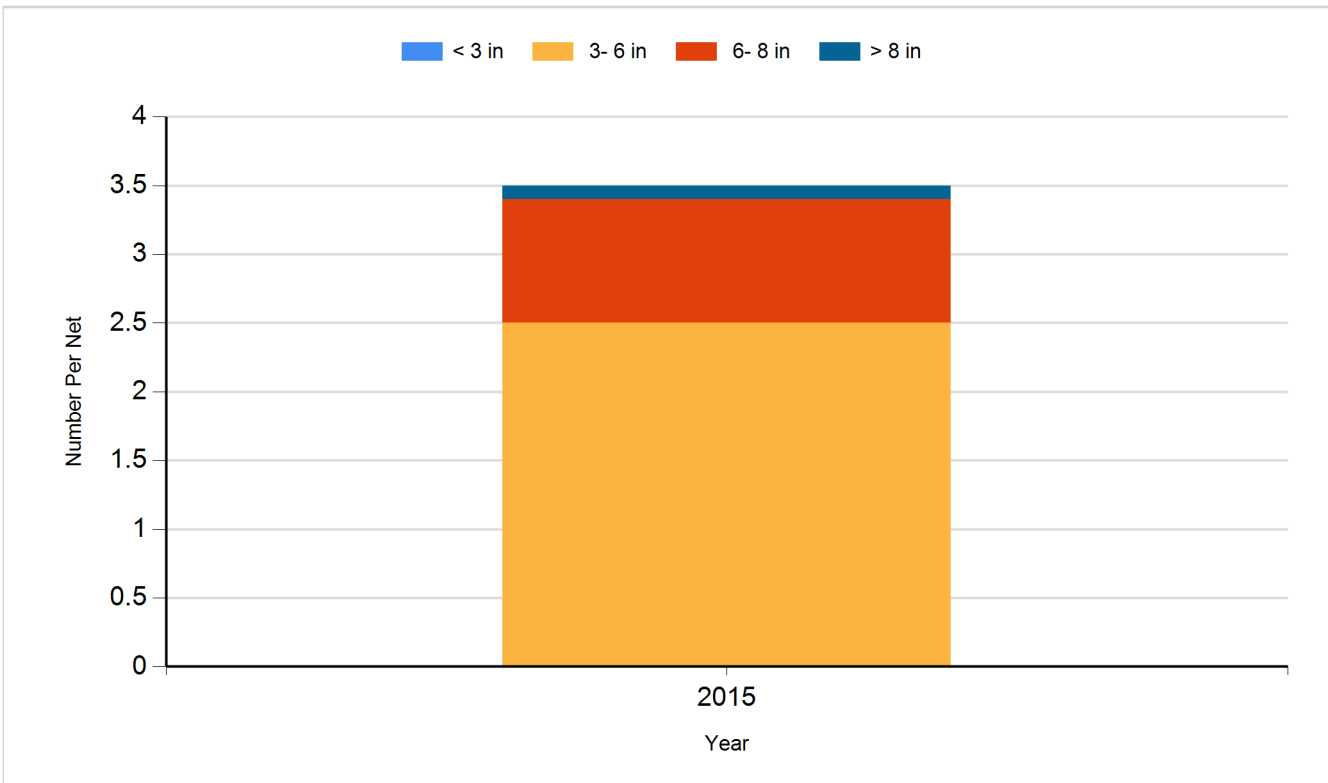
Species: Black Crappie
Gear: AFS std frame net



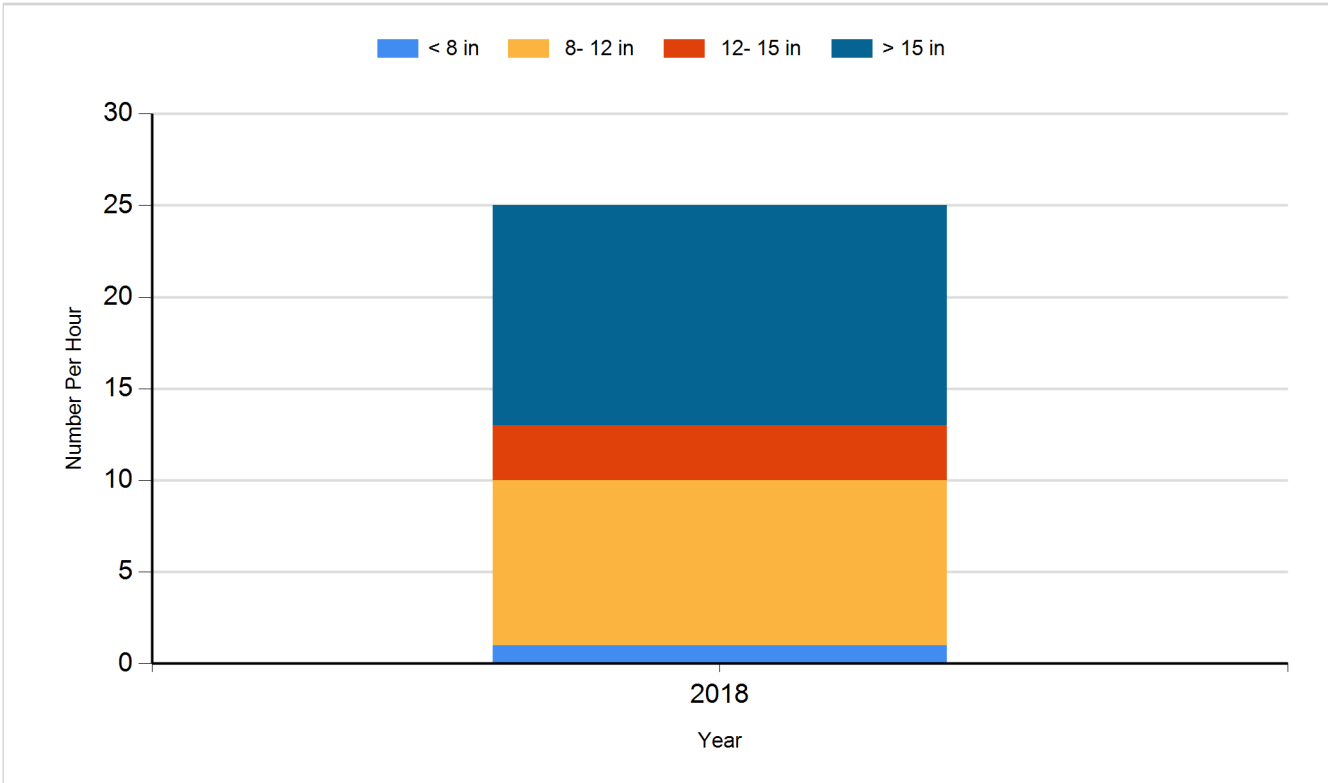
Species: Bluegill
Gear: AFS std frame net



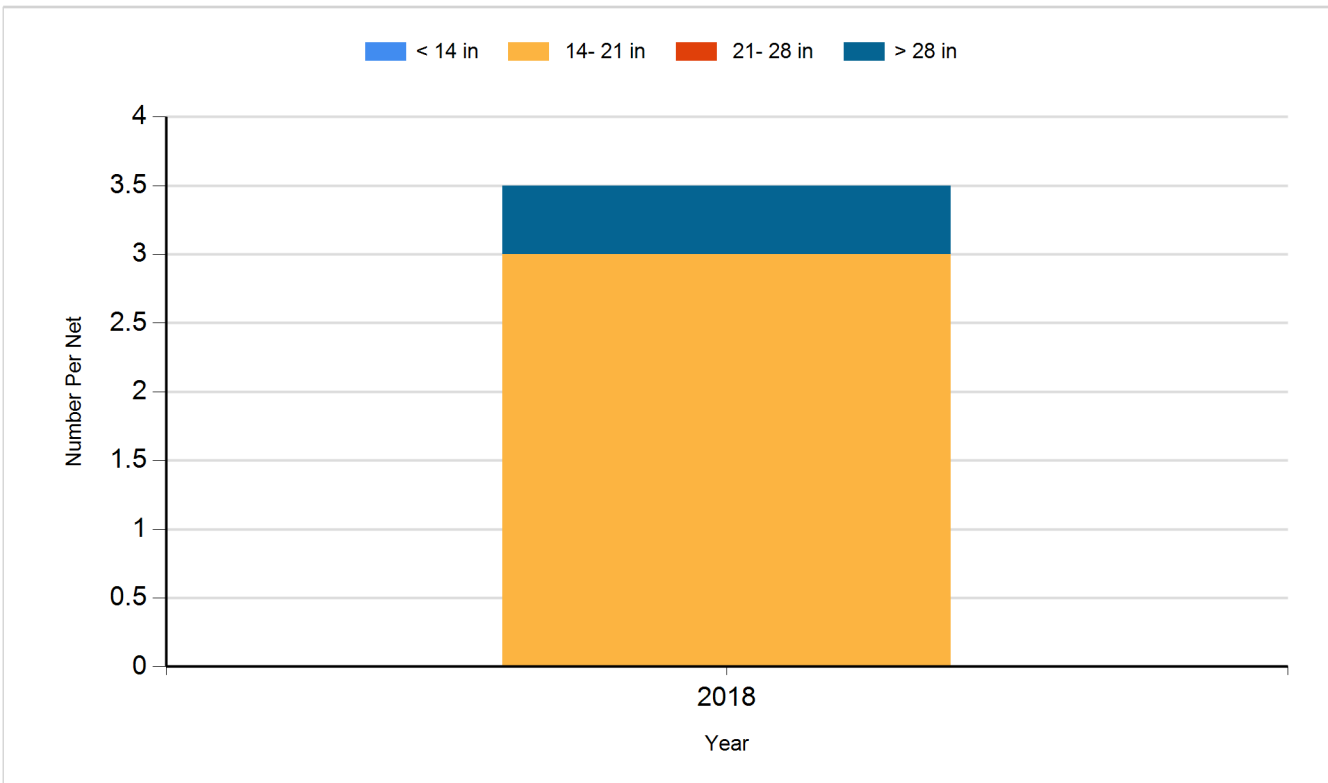
Species: Bluegill
Gear: frame net (std 3/4 in)



Species: Largemouth Bass
Gear: boat shocker (night)



Species: Northern Pike
Gear: AFS std gill net



Species: Yellow Perch
Gear: AFS std gill net

