

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Waggoner, Haakon County

BAD-Lake-2426-000

2019

## Lake Information

**Name:** Waggoner

**County:** Haakon

**Surface Area:** 95 Acres

## Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 18, 2019	2 net-nights
boat shocker (night)	Oct 08, 2019	3120 seconds
frame net (std 3/4 in)	Jul 18, 2019	8 net-nights

## **Common Fish Species Present**

Bluegill

Black Crappie

Yellow Perch

Northern Pike

Largemouth Bass

Green Sunfish

Black Bullhead

Golden Shiner

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## 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 gill net	Black Crappie	2	1.0	3.1	100		100		108	4
boat shocker (night)	Largemouth Bass	21	24.4	4.8	62	17	33	17	115	3
frame net (std 3/4 in)	Black Bullhead	130	10.4	4.4	10	5	5		106	2
	Black Crappie	168	19.9	9.3	84	4	72	5	100	1
	Bluegill	91	11.3	4.2	90	5	71	7	125	2
	Golden Shiner	507	0.0	0.0						
	Green Sunfish	104	13.0	10.9	18	5	3		127	2
	Yellow Perch	1	0.1	0.2	0		0		105	

## 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
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
AFS std frame net	Black Bullhead								1.5			1.50
	Black Crappie								8.3			8.30
	Bluegill								15.0			15.00
	Golden Shiner								0.0			0.00
	Green Sunfish								0.7			0.70
AFS std gill net	Black Bullhead								0.3	4.5	0.0	1.60
	Black Crappie								2.5	0.0	1.0	1.17
	Golden Shiner								0.0	0.0	0.0	0.00
	Largemouth Bass								0.0	0.5	0.0	0.17
	Northern Pike								0.8	0.0	0.0	0.27
	White Sucker								2.5	1.0	0.0	1.17
	Yellow Perch								0.0	1.0	0.0	0.33
boat shocker (night)	Largemouth Bass	71.4				73.0	45.0	29.0	20.0	44.0	24.4	43.83
	Walleye	0.0				2.0	0.0	0.0	0.0	0.0	0.0	0.29
boat shocker (night, AC)	Largemouth Bass		130.0									130.00
frame net (std 3/4 in)	Black Bullhead	0.9		0.6			1.1			2.8	10.4	3.16
	Black Crappie	21.0		74.3			42.1			2.5	19.9	31.96
	Bluegill	16.9		56.1			72.4			3.5	11.3	32.04
	Golden Shiner	0.0		0.0			0.0			0.0	0.0	0.00
	Green Sunfish	0.0		0.0			0.0			0.3	13.0	2.66
	Largemouth Bass	0.0		0.9			0.0			0.3	0.0	0.24
	Northern Pike	0.9		5.0			2.4			0.0	0.0	1.66
	White Sucker	0.4		0.4			0.4			0.0	0.0	0.24
	Yellow Perch	7.1		1.5			0.6			0.0	0.1	1.86
std exp gill net	Black Bullhead	9.0		4.5			1.0					4.83
	Black Crappie	28.0		4.0			7.0					13.00
	Bluegill	6.0		1.5			3.0					3.50
	Golden Shiner	0.0		0.0			0.0					0.00
	Largemouth Bass	1.0		0.0			0.5					0.50
	Northern Pike	2.0		7.0			2.0					3.67
	White Sucker	0.0		1.0			0.5					0.50
	Yellow Perch	22.0		5.5			0.0					9.17

## 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											
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
AFS std frame net	Black Bullhead	PSD									89			
		PSD-P									56			
		Wr									100			
	Black Crappie	PSD										82		
		PSD-P										0		
		Wr										91		
	Bluegill	PSD										98		
		PSD-P										63		
		Wr										112		
	Green Sunfish	PSD										50		
		PSD-P										25		
		Wr										125		
AFS std gill net	Black Bullhead	PSD									100	100		
		PSD-P									100	33		
		Wr									104	113		
	Black Crappie	PSD										50		100
		PSD-P										10		100
		Wr										98		108
	Largemouth Bass	PSD											0	
		PSD-P											0	
		Wr											121	
	Northern Pike	PSD										100		
		PSD-P										100		
		Wr										88		
	Yellow Perch	PSD											50	
		PSD-P											0	
		Wr											110	
	boat shocker (night)	Largemouth Bass	PSD	6					86	84	48	100	66	62
			PSD-P	6					37	51	28	30	20	33
			Wr	105					104	107	110	109	108	115
boat shocker (night, AC)	Largemouth Bass	PSD		18										
		PSD-P		13										

Gear	Species	Index	Year									
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
boat shocker (night, AC)	Largemouth Bass	Wr		105								
frame net (std 3/4 in)	Black Bullhead	PSD	83		100			100			100	10
		PSD-P	50		60			100			73	5
		Wr	91		99			93			103	106
	Black Crappie	PSD	2		51			93			100	84
		PSD-P	0		0			0			0	72
		Wr	98		103			95			97	100
	Bluegill	PSD	64		92			98			100	90
		PSD-P	0		4			25			93	71
		Wr	106		110			102			118	125
	Green Sunfish	PSD									0	18
		PSD-P									0	3
		Wr									146	127
	Largemouth Bass	PSD			71						0	
		PSD-P			57						0	
		Wr			104						112	
	Northern Pike	PSD	67		55			79				
		PSD-P	0		30			16				
		Wr	86		77			94				
Yellow Perch	PSD	82		75			100				0	
	PSD-P	22		25			100				0	
	Wr	93		97			101				105	
std exp gill net	Black Bullhead	PSD	78		89			100				
		PSD-P	22		89			0				
		Wr	97		106			112				
	Black Crappie	PSD	0		13			29				
		PSD-P	0		0			0				
		Wr	106		104			109				
	Bluegill	PSD	17		67			17				
		PSD-P	0		0			0				
		Wr	109		102			116				
	Largemouth Bass	PSD	100					0				
		PSD-P	100					0				
		Wr	106					101				
	Northern Pike	PSD	100		79			50				
		PSD-P	0		7			0				



Gear	Species	Index	Year										
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
std exp gill net	Northern Pike	Wr	85		87				92				
	Yellow Perch	PSD	73		64								
		PSD-P	0		27								
		Wr	92		95								

## **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+
2015	676	101 (2)	164 (36)	197 (12)	221 (160)	220 (107)	230 (294)	226 (66)			
2010	294		151 (190)	177 (102)		225 (2)					

Species: Bluegill

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2010	220		133 (33)	154 (89)	168 (50)	181 (38)	188 (10)				

Species: Largemouth Bass

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2014	118	213 (16)	244 (8)		341 (23)	365 (63)	395 (8)				
2010	140		220 (110)	238 (27)			421 (2)	466 (2)			

Species: Yellow Perch

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2010	46	100 (2)	162 (6)	200 (10)	222 (10)	229 (14)	233 (4)				

## **Fish Condition**

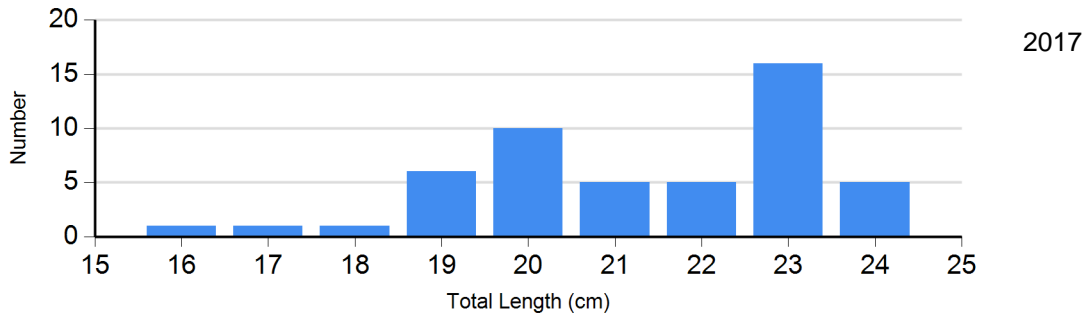
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	2015	0		4	112 (5.4)	0		0	
	2017	0		0		1	104	0	
	2018	0		6	114 (4.4)	3	111 (8.5)	0	
Black Crappie Frame Net	2015	48	102 (0.8)	624	94 (0.3)	2	99 (0.0)	0	
	2017	9	96 (1.5)	41	90 (0.9)	0		0	
	2018	0		10	97 (1.6)	0		0	
	2019	25	109 (1.7)	20		114	96 (0.3)	0	
Bluegill Frame Net	2015	28	108 (1.0)	842	103 (0.4)	288	99 (0.6)	0	
	2017	2		31	115 (1.5)	57	111 (1.1)	0	
	2018	0		1	108	13	119 (2.3)	0	
	2019	9	129 (6.3)	17	131 (2.2)	62	121 (0.9)	2	143
Largemouth Bass Electro Fishing	2015	14	107 (1.9)	30	104 (2.1)	46	109 (1.6)	0	
	2016	30	114 (1.8)	12	109 (2.2)	12	100 (1.9)	4	115 (2.3)
	2017	0		14	110 (3.2)	6	105 (1.4)	0	
	2018	15	111 (2.6)	20	107 (2.5)	9	106 (1.6)	0	
	2019	8	114 (3.8)	6	118 (3.9)	7	115 (3.0)	0	
Northern Pike Gill Net	2015	4	96 (0.7)	4	89 (2.4)	0		0	
	2017	0		0		3	88 (2.6)	0	
Yellow Perch Gill Net	2018	1	109	1	111	0		0	

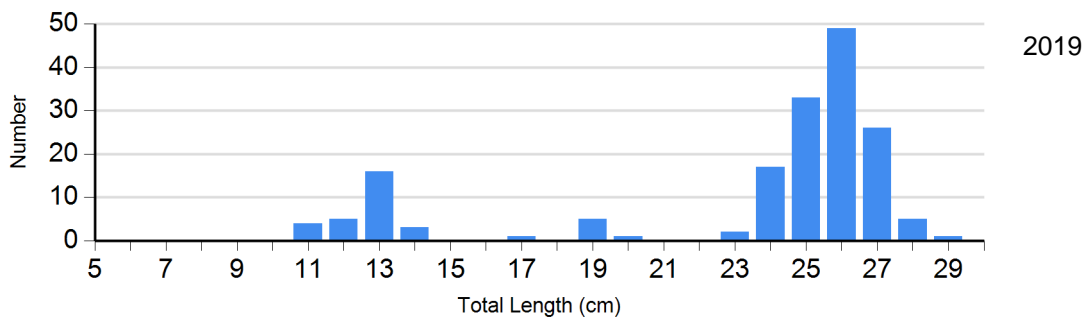
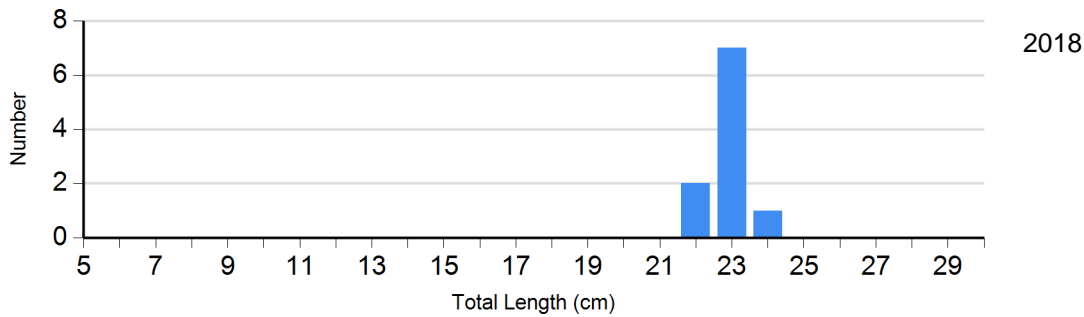
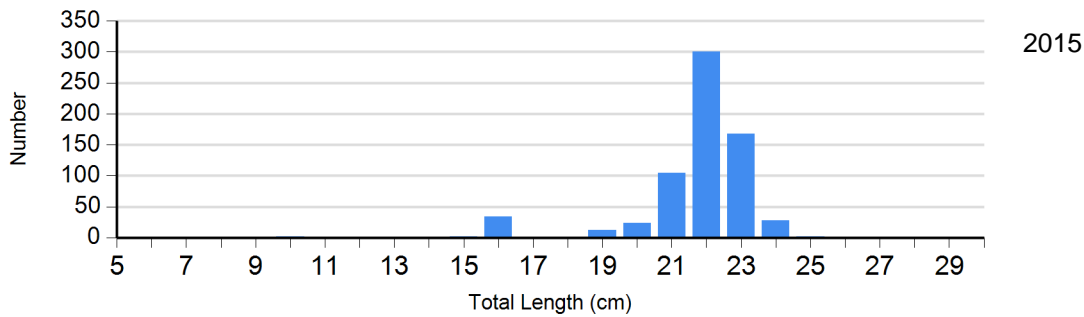
## Length Frequency Distribution

Length frequency histogram of species sampled by year.

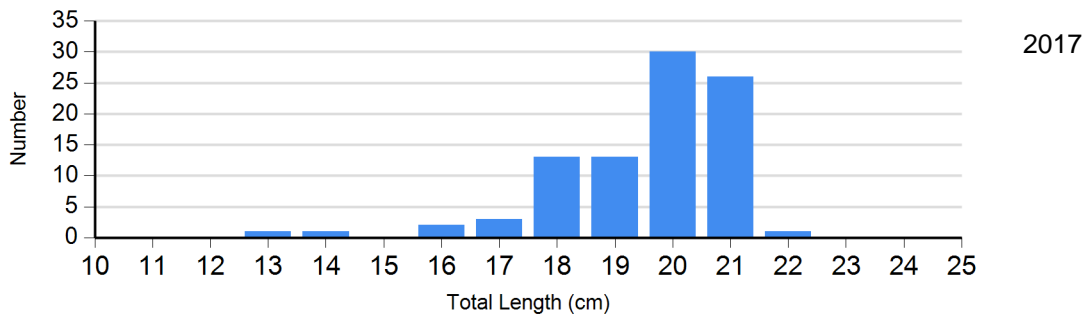
Species: Black Crappie  
Gear: AFS std frame net



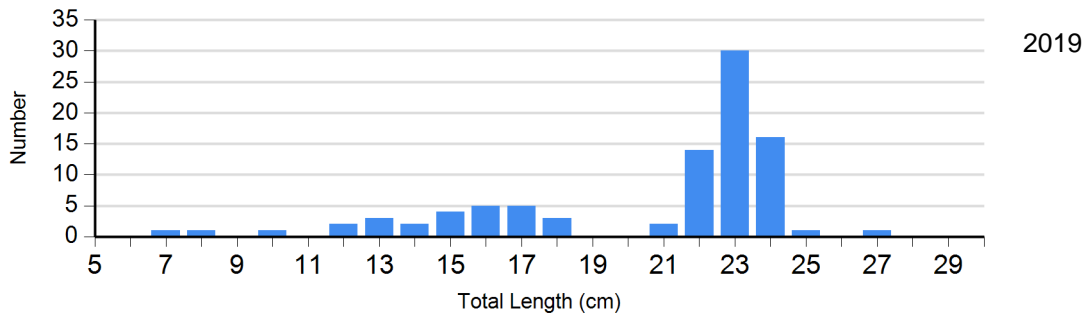
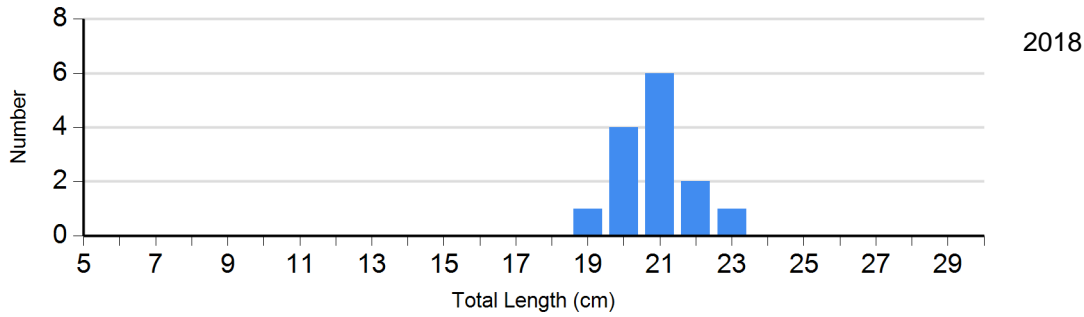
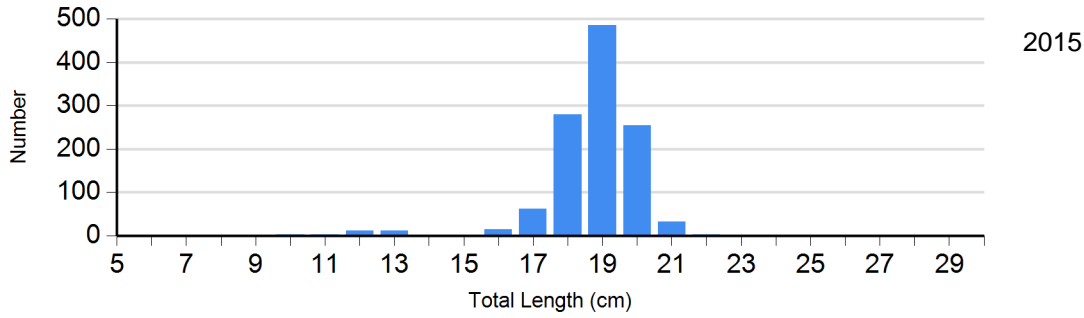
Species: Black Crappie  
Gear: frame net (std 3/4 in)



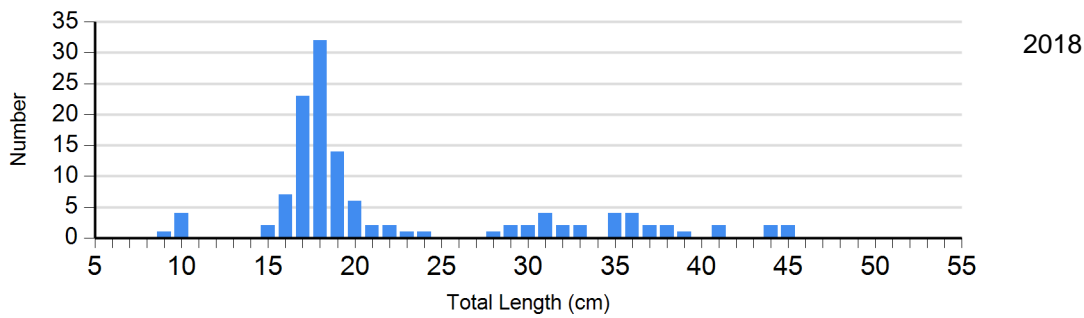
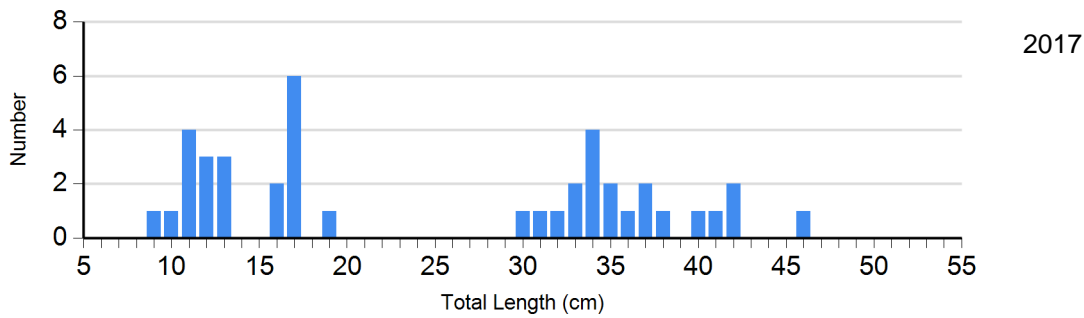
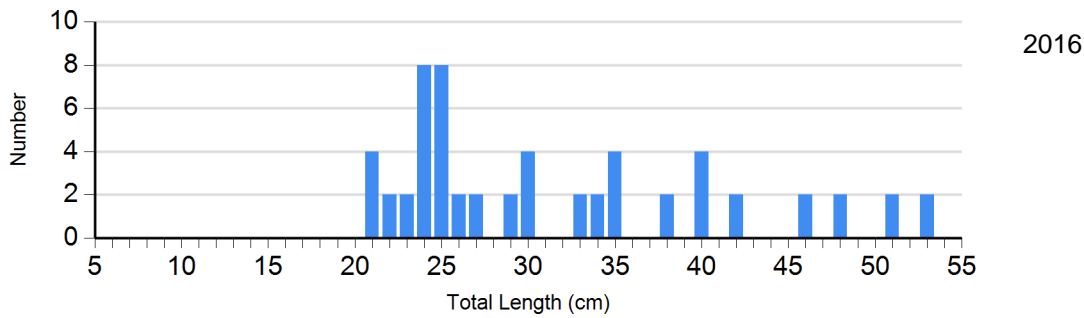
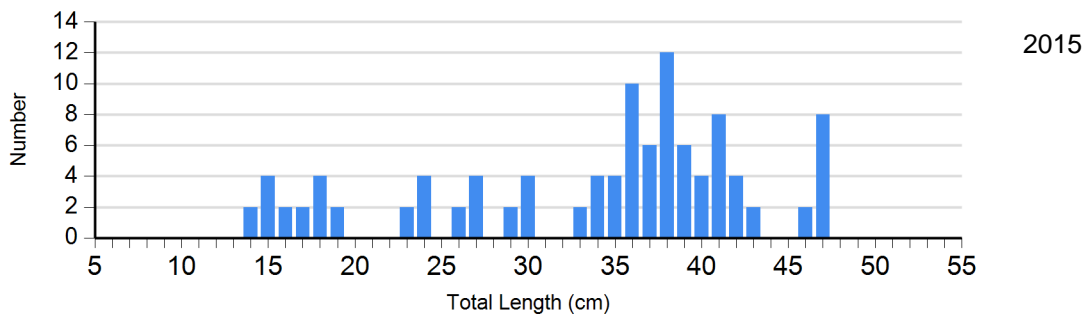
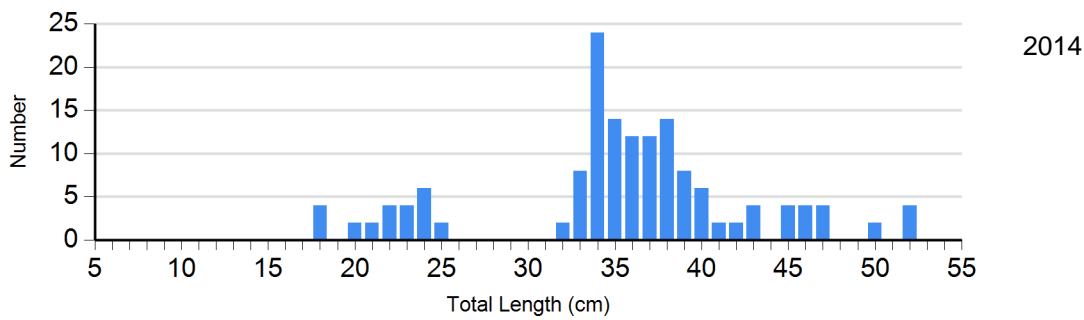
Species: Bluegill  
Gear: AFS std frame net

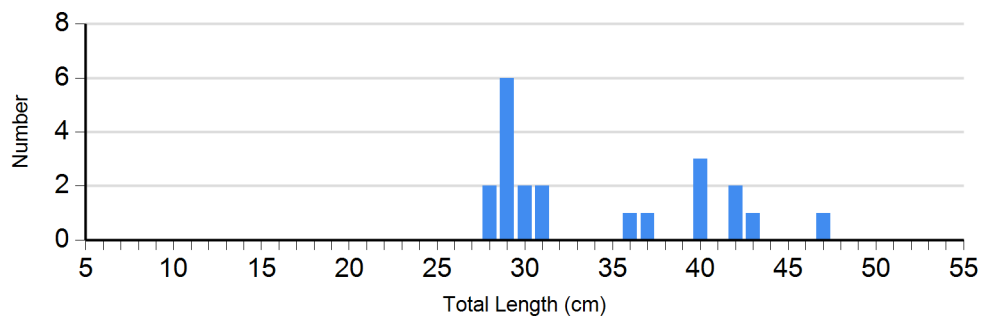


Species: Bluegill  
Gear: frame net (std 3/4 in)



Species: Largemouth Bass  
Gear: boat shocker (night)



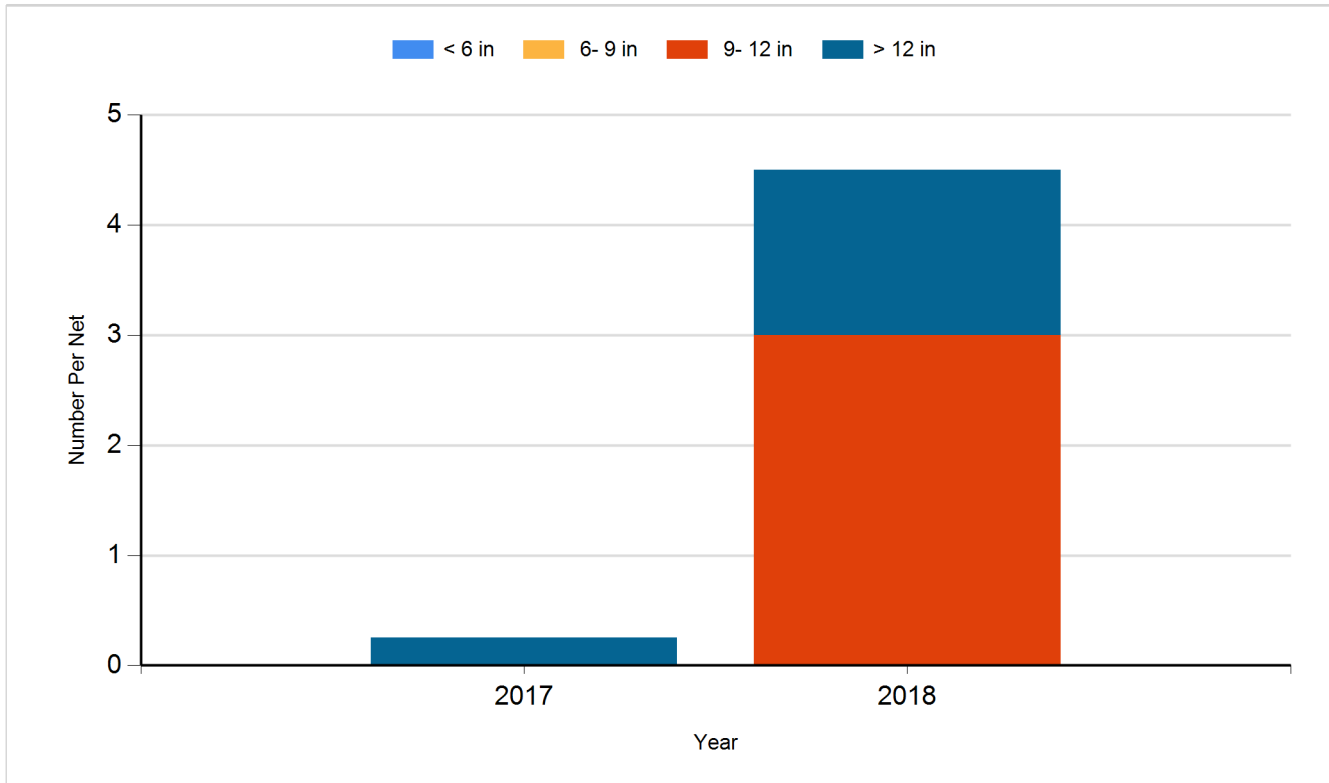


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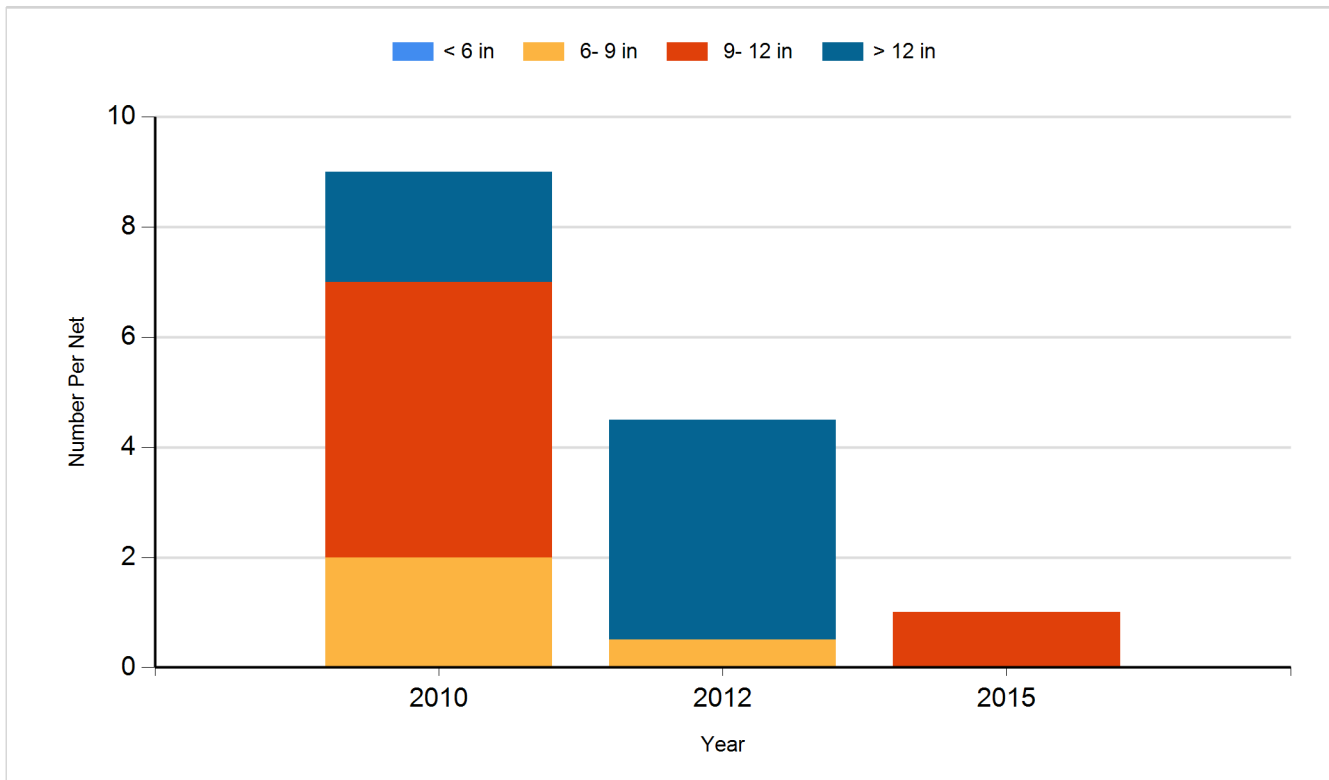
## Historic Fish Sizes and Relative Abundance

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

Species: Black Bullhead  
Gear: AFS std gill net

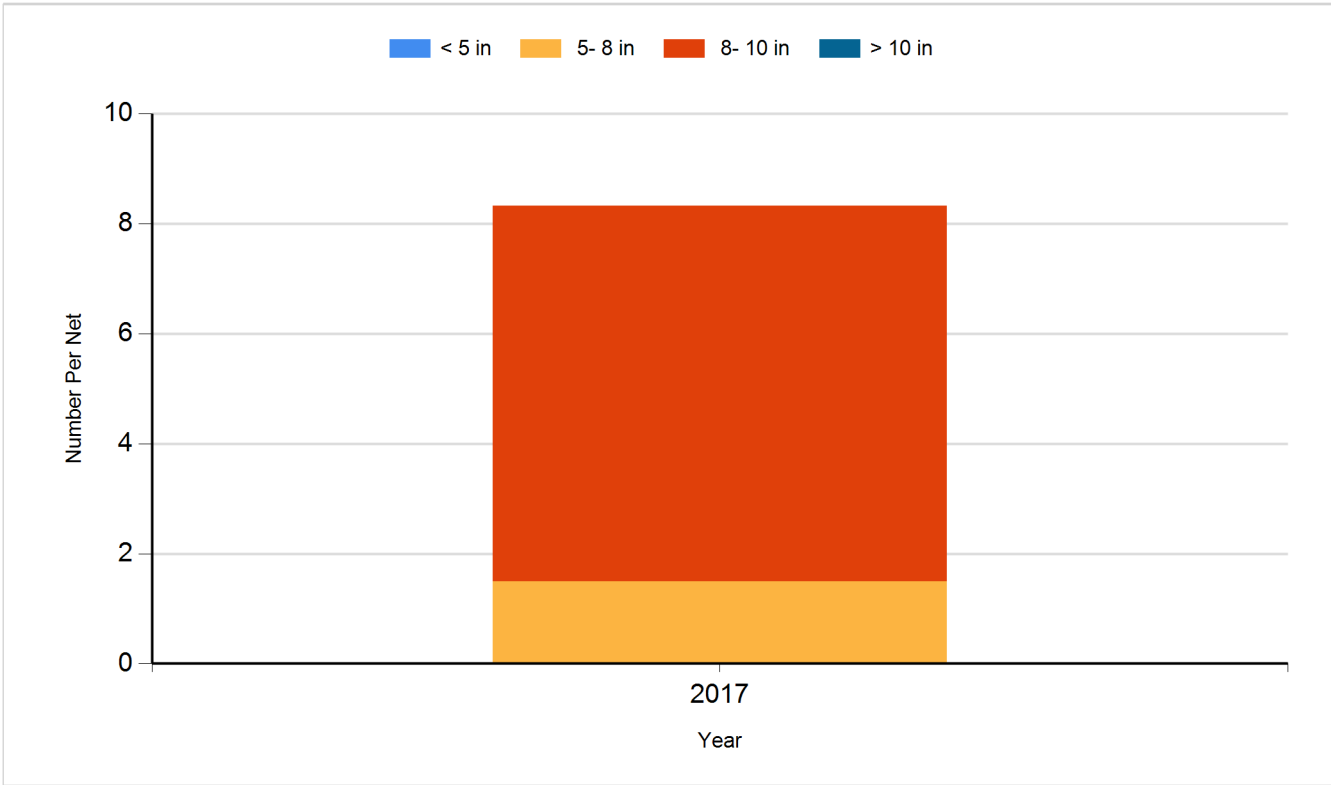


Species: Black Bullhead  
Gear: std exp gill net

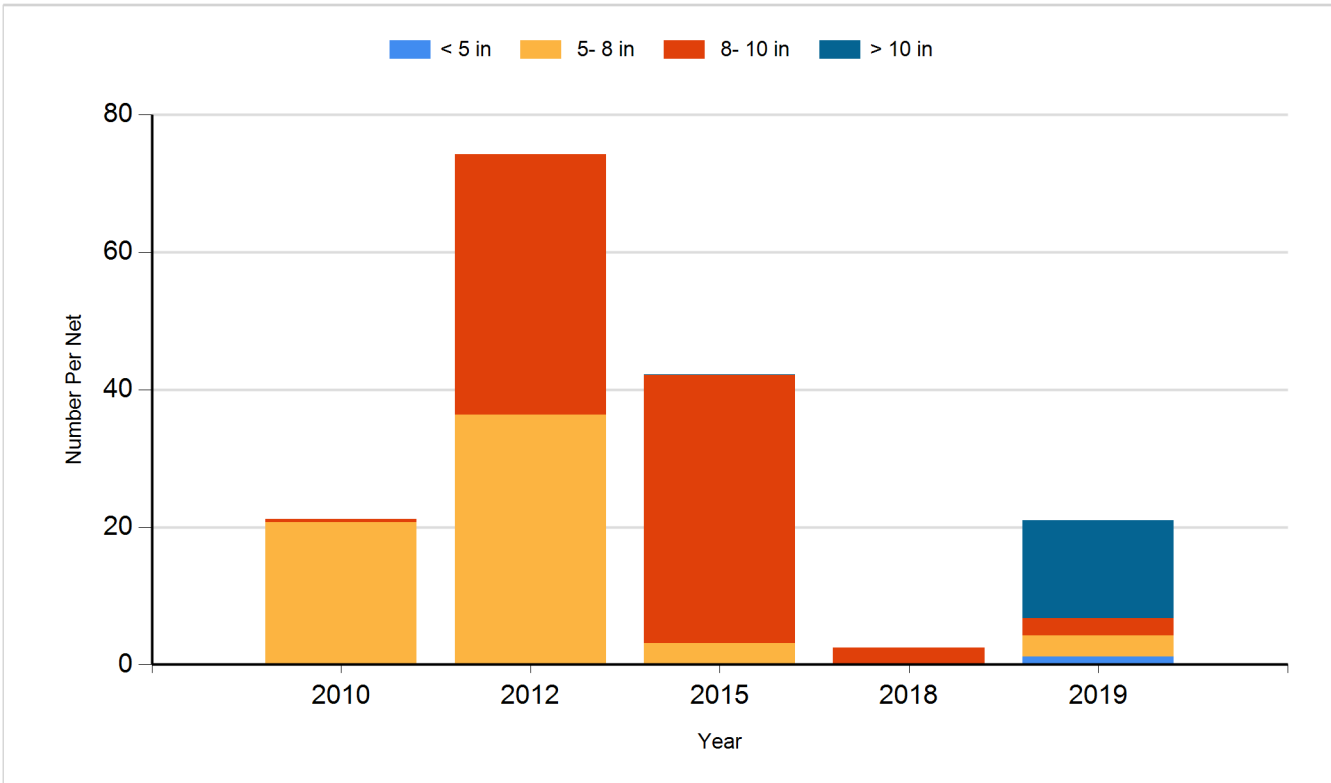




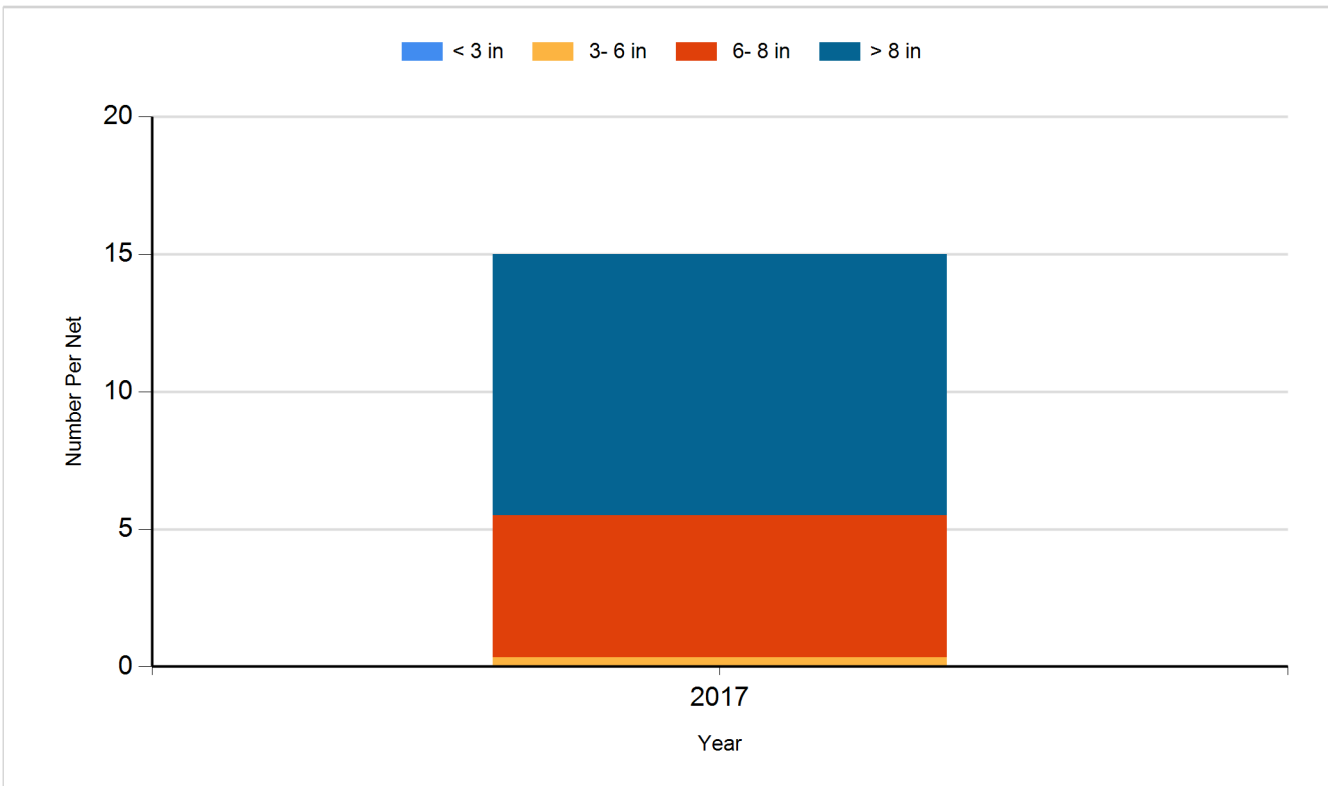
Species: Black Crappie  
Gear: AFS std frame net



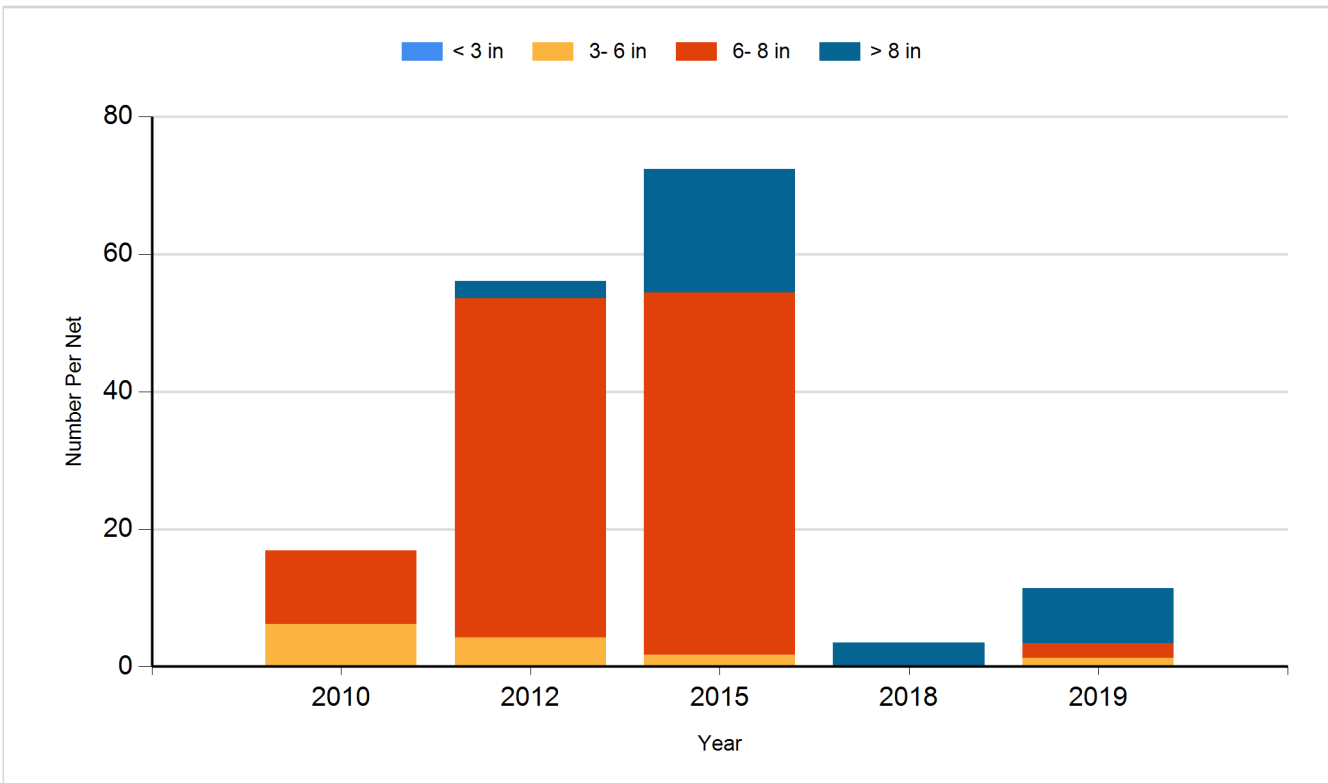
Species: Black Crappie  
Gear: frame net (std 3/4 in)



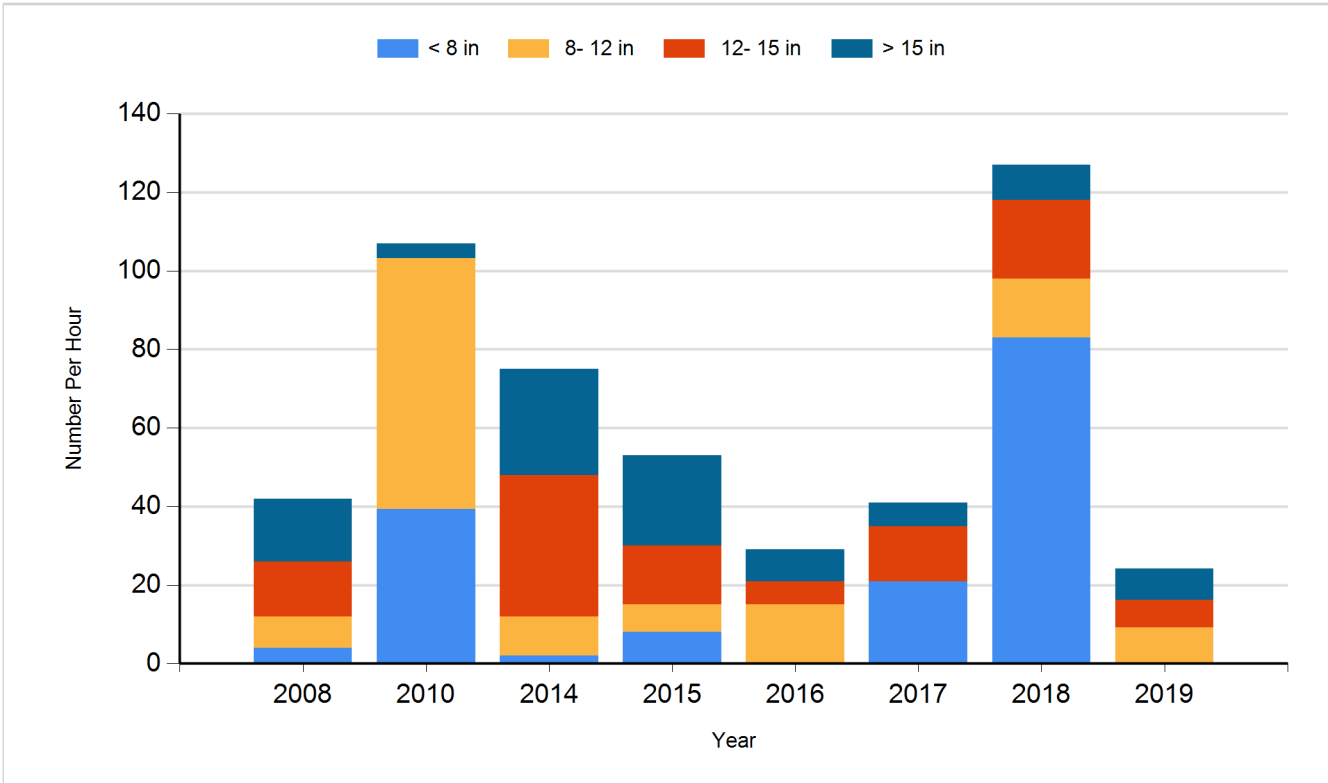
Species: Bluegill  
Gear: AFS std frame net



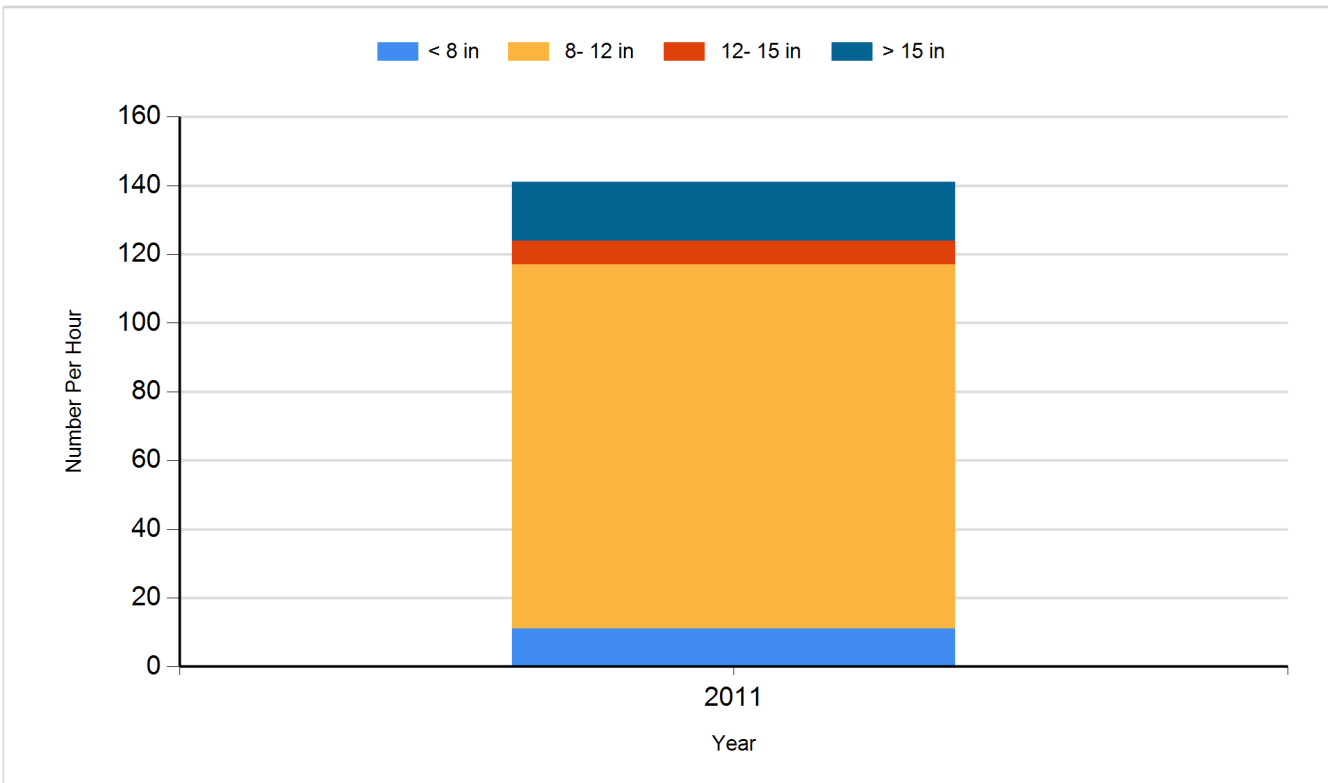
Species: Bluegill  
Gear: frame net (std 3/4 in)



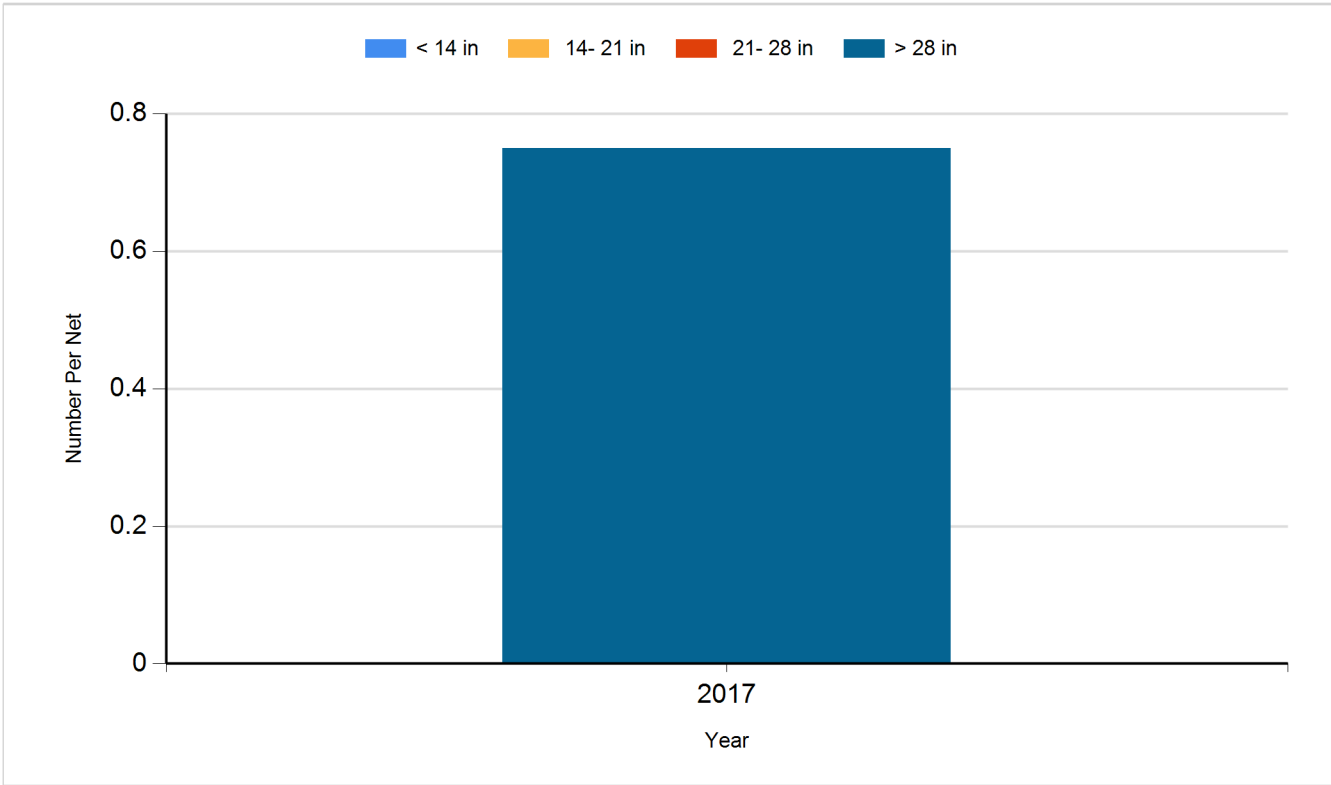
Species: Largemouth Bass  
Gear: boat shocker (night)



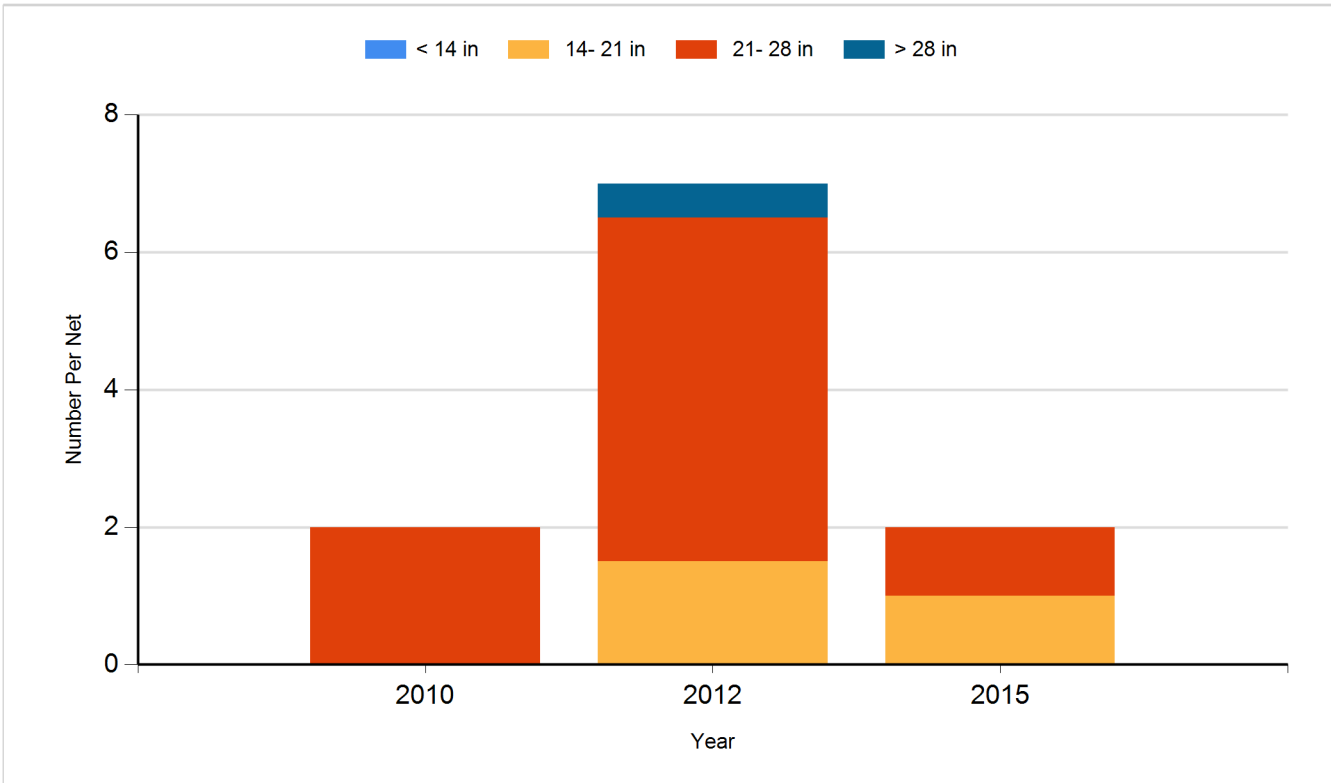
Species: Largemouth Bass  
Gear: boat shocker (night, AC)



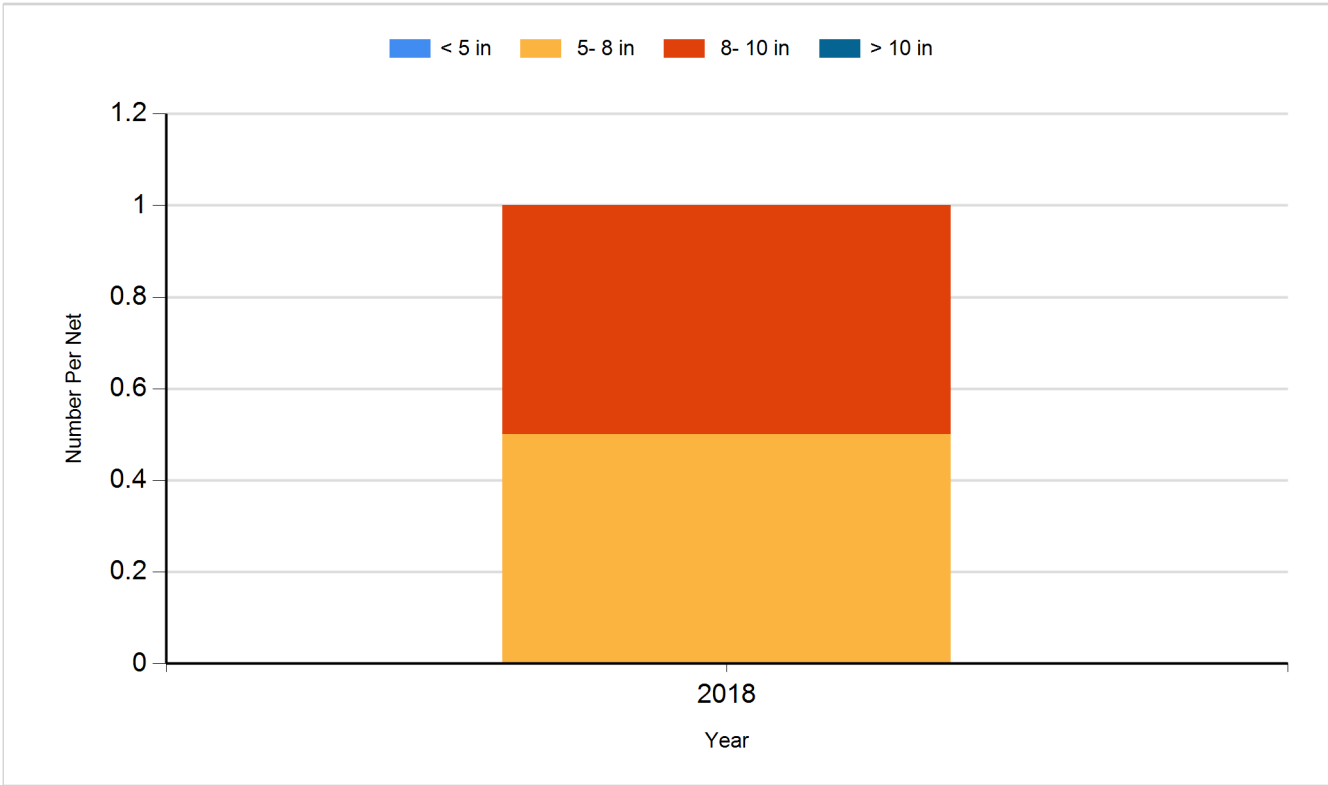
Species: Northern Pike  
Gear: AFS std gill net



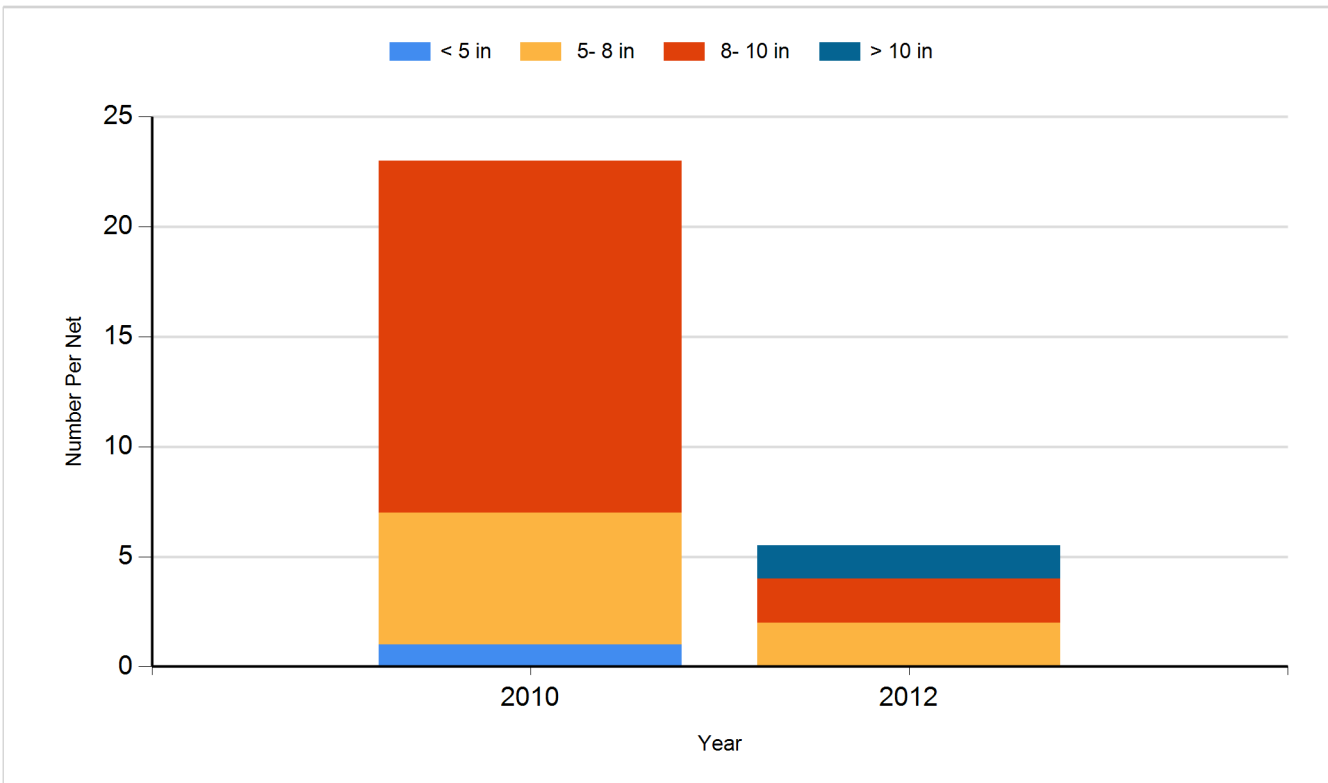
Species: Northern Pike  
Gear: std exp gill net



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
2017	Largemouth Bass	Fingerling	18,000
2017	Largemouth Bass	Fry	44,500
2018	Largemouth Bass	Juvenile	300