

**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**Stockade, Custer County**  
**MCS-Lake-12-000**  
**2018**

**Lake Information**

**Name:** Stockade  
**County:** Custer  
**Surface Area:** 129 Acres

**Surveys and Investigations**

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

Gear	Date	Effort
AFS std gill net	Sep 11, 2018	2 net-nights
AFS std gill net	Sep 12, 2018	2 net-nights
boat shocker (night)	May 30, 2018	6 seconds
frame net (std 3/4 in)	Sep 11, 2018	4 net-nights
frame net (std 3/4 in)	Sep 12, 2018	4 net-nights

## **Common Fish Species Present**

Largemouth Bass

Yellow Perch

Smallmouth Bass

Northern Pike

Bluegill

Black Bullhead

Black Crappie

White Sucker

Channel Catfish

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 Bullhead	154	38.5	30.0	100		0		88	2
	Bluegill	6	1.5	1.9	100		33		109	5
	Channel Catfish	1	0.3	0.4	100		0		126	
	Golden Shiner	2	0.0	0.0						
	Northern Pike	7	1.8	1.7	86		29		95	3
	Smallmouth Bass	1	0.3	0.4	100		100		77	
	White Sucker	1	0.3	0.4	100		100		97	
	Yellow Perch	10	2.5	0.5	60		10		84	4
boat shocker (night)	Largemouth Bass	131	63,000.0	8,317.1	65	7	11	5	103	1
	Smallmouth Bass	8	4,200.0	2,536.0	71		14		93	4
frame net (std 3/4 in)	Black Bullhead	731	91.4	47.3	79	2	0		88	1
	Black Crappie	21	2.5	2.4	15		5		102	1
	Bluegill	73	9.1	6.7	44	8	16	6	103	1
	Northern Pike	6	0.8	0.4	50		17		96	4
	Smallmouth Bass	5	0.6	0.5	80		20		90	6
	White Sucker	1	0.1	0.2	100		100		101	
	Yellow Perch	168	21.0	12.6	89	3	4	2	76	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.

Gear	Species	CPUE										Avg
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
AFS std frame net	Black Bullhead									0.0		0.0
	Black Crappie									0.0		0.0
	White Sucker									0.0		0.0
AFS std gill net	Black Bullhead										38.5	38.5
	Bluegill										1.5	1.5
	Channel Catfish										0.3	0.3
	Golden Shiner										0.0	0.0
	Northern Pike										1.8	1.8
	Smallmouth Bass										0.3	0.3
	White Sucker										0.3	0.3
	Yellow Perch										2.5	2.5
boat shocker (night)	Largemouth Bass		67.7	97.6	171.0	36.0	121.0	84.0	68.0	66.9	63,000.0	7079.1
	Smallmouth Bass		6.1	6.0	20.0	4.0	12.0	0.0	9.0	13.7	4,200.0	474.5
boat shocker (night, AC)	Largemouth Bass	146.2										146.2
	Smallmouth Bass	12.2										12.2
frame net (std 3/4 in)	Black Bullhead	1.3	0.3		1.1	0.3	0.9	471.1			91.4	80.9
	Black Crappie	8.8	8.1	0.9	1.6	0.4	1.6	5.3			2.5	3.7
	Bluegill	15.8	58.4	2.8	3.1	4.6	3.5	12.8			9.1	13.8
	Bluegill X Gr. Sunfish Hybrid							0.1				0.1
	Golden Shiner					0.0						0.0
	Largemouth Bass								0.1			0.1
	Northern Pike	1.0	0.6	0.9	0.3	0.9	1.5	0.6			0.8	0.8
	Smallmouth Bass		0.1						0.4		0.6	0.4
	White Sucker	1.9	0.3	0.4			0.3	0.1			0.1	0.5
Yellow Perch	20.4	20.4	35.6	67.9	48.0	197.5	3.0			21.0	51.7	
std exp gill net	Black Bullhead	0.5	1.0			1.0	0.5	41.0	53.5			16.3
	Black Crappie	18.0	4.0	3.5	6.5	8.5	10.5	0.5				7.4
	Bluegill	1.0	0.5		2.5	6.5	2.0	1.5	1.0			2.1
	Golden Shiner							0.0				0.0
	Largemouth Bass				0.5			0.5	1.0			0.7
	Northern Pike	7.0	0.5	2.5	0.5	1.0	4.5	5.5	4.5			3.3
	Smallmouth Bass	0.5	0.5				0.5					0.5
	White Sucker	6.0	1.5	0.5	1.0		1.0	0.5	1.0			1.6

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
std exp gill net	Yellow Perch	87.5	22.0	138.5	160.0	218.5	91.0	61.5	63.5			105.3

## 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										100	
		PSD-P										0	
		Wr										97	
	Black Crappie	PSD										67	
		PSD-P										0	
		Wr										93	
	White Sucker	PSD										100	
		PSD-P										100	
		Wr										100	
AFS std gill net	Black Bullhead	PSD											100
		PSD-P											0
		Wr											88
	Bluegill	PSD											100
		PSD-P											33
		Wr											109
	Channel Catfish	PSD											100
		PSD-P											0
		Wr											126
	Northern Pike	PSD											86
		PSD-P											29
		Wr											95
	Smallmouth Bass	PSD											100
		PSD-P											100
		Wr											77
	White Sucker	PSD											100
		PSD-P											100
		Wr											97
Yellow Perch	PSD											60	
	PSD-P											10	
	Wr											84	
boat shocker (night)	Largemouth Bass	PSD		73	77	76	72	46	46	72	78	65	
		PSD-P		24	22	12	22	10	18	47	19	11	



Gear	Species	Index	Year										
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
boat shocker (night)	Largemouth Bass	Wr		98	106	115	111	105	125	75	111	103	
	Smallmouth Bass	PSD		33	83	70	100	42	0	33	56	71	
		PSD-P		0	67	30	50	8	0	22	19	14	
		Wr		100	105	99	64	97		66	100	93	
boat shocker (night, AC)	Largemouth Bass	PSD	76										
		PSD-P	19										
		Wr	109										
	Smallmouth Bass	PSD	92										
		PSD-P	42										
		Wr	96										
frame net (std 3/4 in)	Black Bullhead	PSD	90	100		100	100	29	0			79	
		PSD-P	20	0		11	100	29	0			0	
		Wr	98			104	102	81	84			88	
	Black Crappie	PSD	39	46	100	77	67	38	69				15
		PSD-P	0	0	0	0	0	0	2				5
		Wr	102	101	91	103	105	106	109				102
	Bluegill	PSD	28	93	55	80	86	79	93				44
		PSD-P	3	2	5	16	19	21	23				16
		Wr	113	115	109	129	122	121	111				103
	Largemouth Bass	PSD								100			
		PSD-P								0			
		Wr								110			
	Northern Pike	PSD	88	60	100	50	71	67	40				50
		PSD-P	13	40	43	50	57	50	0				17
		Wr	91	103	95	96	98	92	81				96
	Smallmouth Bass	PSD		100						67			80
		PSD-P		100						33			20
		Wr								95			90
	White Sucker	PSD	100	100	100				100	100			100
		PSD-P	100	100	100				100	100			100
		Wr	92	100	76				93	102			101
	Yellow Perch	PSD	42	50	52	76	99	97	92				89
		PSD-P	3	1	1	3	26	42	42				4
		Wr		91	95	93	96	89	78				76
	std exp gill net	Black Bullhead	PSD	100	100			50	0	0	12		
			PSD-P	0	50			50	0	0	0		

Gear	Species	Index	Year									
			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
std exp gill net	Black Bullhead	Wr	126	104			115	113	98	104		
	Black Crappie	PSD	25	88	57	0	6	33	0			
		PSD-P	0	0	0	0	0	0	0			
		Wr	107	102	107	117	109	108	96			
	Bluegill	PSD	0	100		100	100	100	100	50		
		PSD-P	0	0		0	62	100	100	50		
		Wr	111	113		121	113	98	102	123		
	Largemouth Bass	PSD				100			100	100		
		PSD-P				0			0	100		
		Wr				122			131	99		
	Northern Pike	PSD	93	100	100	0	100	89	64	78		
		PSD-P	0	100	20	0	0	44	9	0		
		Wr	96	104	96	98	88	98	90	95		
	Smallmouth Bass	PSD	100	100				100				
		PSD-P	100	0				100				
		Wr	96	96				90				
	White Sucker	PSD	100	100	100	100		100	100	100		
		PSD-P	100	100	100	100		100	100	100		
		Wr	100	110	104	101		105	109	104		
	Yellow Perch	PSD	13	48	65	74	76	85	62	60		
		PSD-P	0	0	2	9	30	21	15	5		
	Wr	90	98	99	100	95	98	89	90			

## 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	100		140 (2)	178 (42)	192 (45)	210 (13)	215 (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+
2016	71	366 (71)									
2014	116			228 (38)	255 (30)	322 (7)	351 (24)	375 (13)	360 (4)	365 (2)	
2012	164		180 (10)	179 (25)	244 (21)	313 (36)	334 (30)	343 (22)	354 (24)		
2011	67			182 (2)	225 (3)	295 (17)	342 (30)	384 (10)	345 (3)	354 (2)	

### Species: Smallmouth Bass

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2016	9	302 (9)									
2014	11			211 (6)	292 (2)		376 (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+
2016	127			187 (39)	206 (52)	220 (20)	237 (3)		245 (4)	234 (2)	250 (5)
2014	181		177 (18)	210 (73)	243 (3)	236 (5)	243 (27)	245 (24)	241 (35)		
2013	437		193 (134)	228 (25)	230 (29)	242 (68)	247 (102)	243 (17)	254 (55)	265 (8)	
2012	292	142 (29)	185 (24)	204 (23)	234 (11)	227 (103)	239 (55)	233 (49)			
2011	277		158 (9)	186 (25)	205 (111)	217 (49)	217 (84)				
2010	43			155 (6)	180 (10)	207 (21)	211 (8)				

## 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).

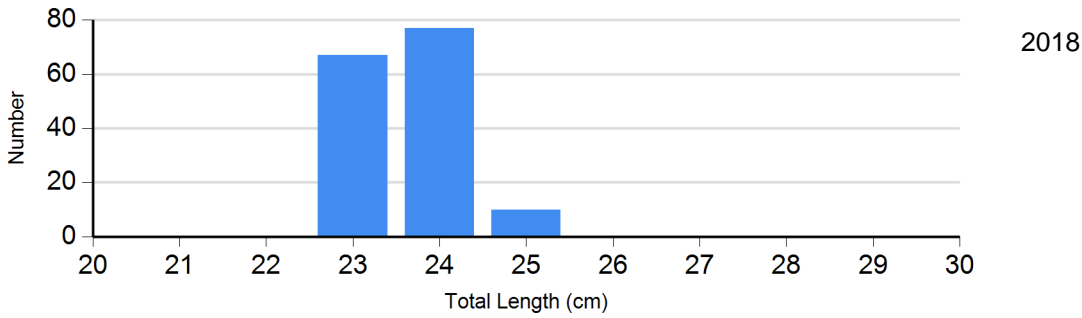
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2014	1	113	0		0		0	
	2015	82	98 (0.8)	0		0		0	
	2016	94	104 (0.7)	13	106 (2.1)	0		0	
	2018	0		154	88 (1.4)	0		0	
Black Crappie Frame Net	2014	8	112 (3.4)	5	97 (5.1)	0		0	
	2015	13	119 (3.5)	28	106 (1.4)	1	63	0	
	2017	1	95	2	92 (6.0)	0		0	
	2018	17	103 (1.0)	2	105 (2.9)	1	92	0	
Bluegill Frame Net	2014	6	128 (4.5)	16	123 (2.7)	6	113 (3.2)	0	
	2015	7	170 (60.2)	72	109 (1.8)	23	102 (1.2)	0	
	2018	41	106 (1.3)	20	102 (1.0)	12	95 (2.0)	0	
Channel Catfish Gill Net	2018	0		1	126	0		0	
Largemouth Bass Electro Fishing	2014	65	104 (1.0)	44	105 (1.0)	12	110 (2.1)	0	
	2015	15	142 (39.8)	8	107 (2.7)	5	103 (5.5)	0	
	2016	19	106 (2.3)	17	84 (7.2)	26	53 (3.6)	6	52 (1.4)
	2017	17	110 (3.3)	46	114 (6.2)	15	105 (4.8)	0	
	2018	37	105 (1.7)	56	101 (1.1)	12	112 (3.4)	0	
Northern Pike Gill Net	2014	1	95	4	101 (1.3)	4	97 (5.4)	0	
	2015	4	88 (2.5)	6	90 (3.6)	1	94	0	
	2016	2	95 (0.0)	7	94 (3.6)	0		0	
	2018	1	95	4	93 (1.4)	2	99 (9.0)	0	
Smallmouth Bass Electro Fishing	2014	7	101 (2.1)	4	91 (2.6)	0		1	86
	2015	0		0		0		0	

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Smallmouth Bass Electro Fishing	2016	6	82 (8.3)	1	38	1	14	1	
	2017	7	102 (2.8)	6	100 (4.0)	1	88	2	94 (0.2)
	2018	2	99 (0.8)	4	94 (2.9)	1	79	0	
White Sucker Gill Net	2014	0		0		0		2	105 (5.6)
	2015	0		0		0		1	109
	2016	0		0		1	104	1	104
	2018	0		0		0		1	97
Yellow Perch Gill Net	2014	27	98 (1.3)	116	99 (0.8)	39	93 (0.9)	0	
	2015	47	91 (0.8)	57	88 (0.9)	19	86 (1.4)	0	
	2016	51	96 (0.8)	70	86 (0.9)	6	77 (3.6)	0	
	2018	4	94 (1.4)	5	79 (2.7)	1	76	0	

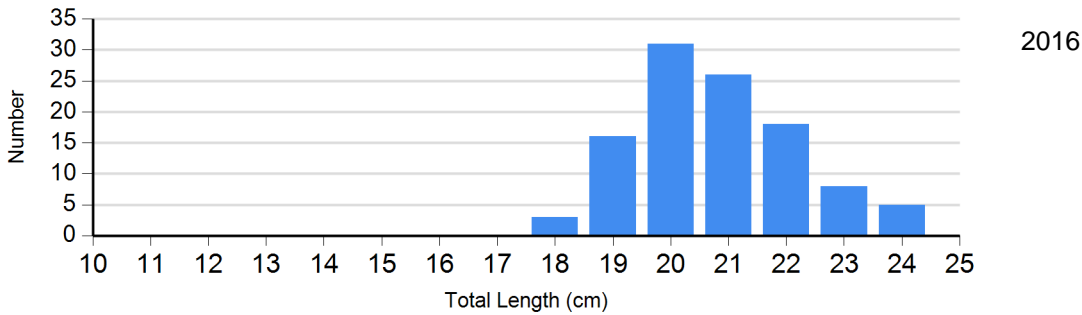
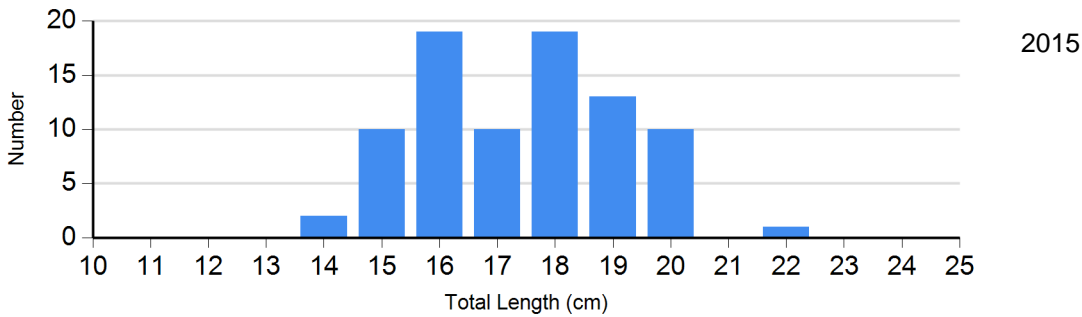
## Length Frequency Distribution

Length frequency histogram of species sampled by year.

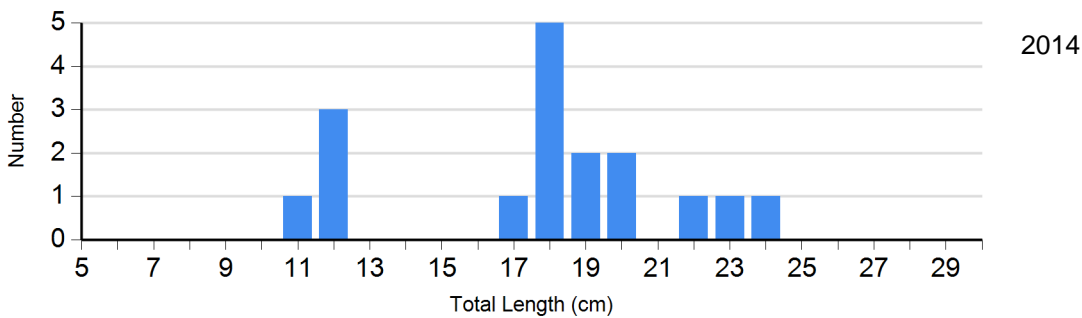
Species: Black Bullhead  
Gear: AFS std gill net

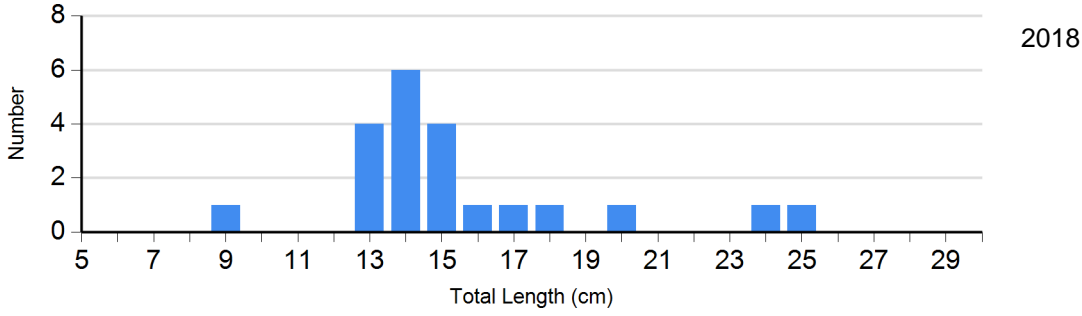
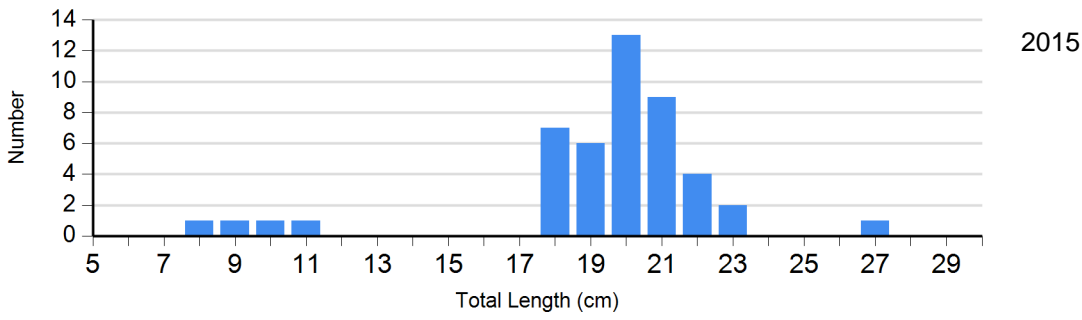


Species: Black Bullhead  
Gear: std exp gill net

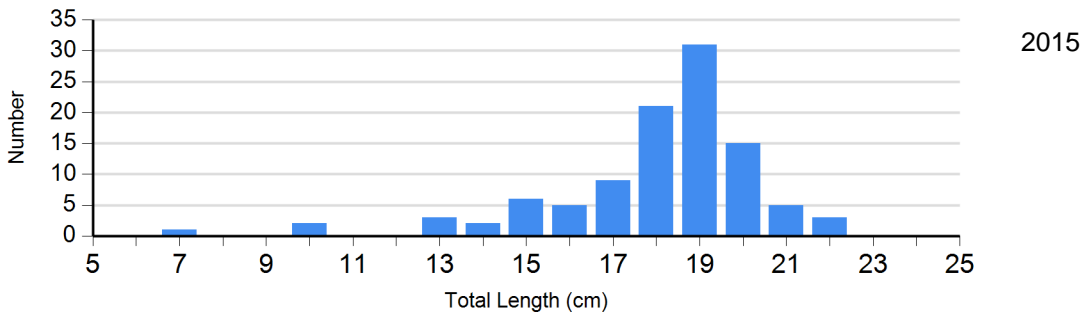
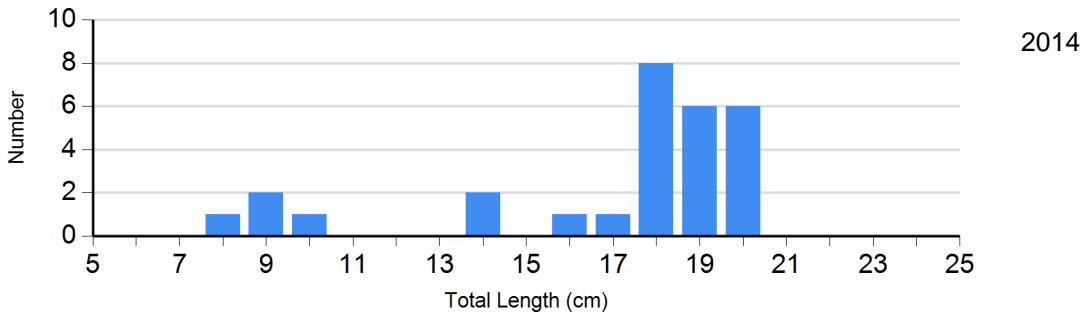
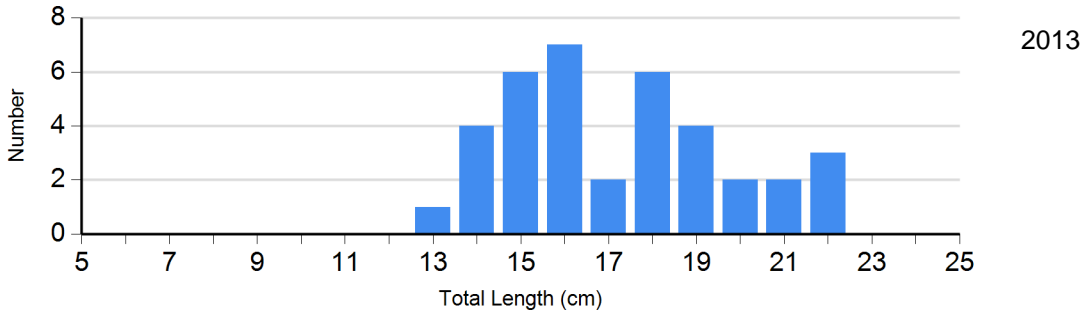


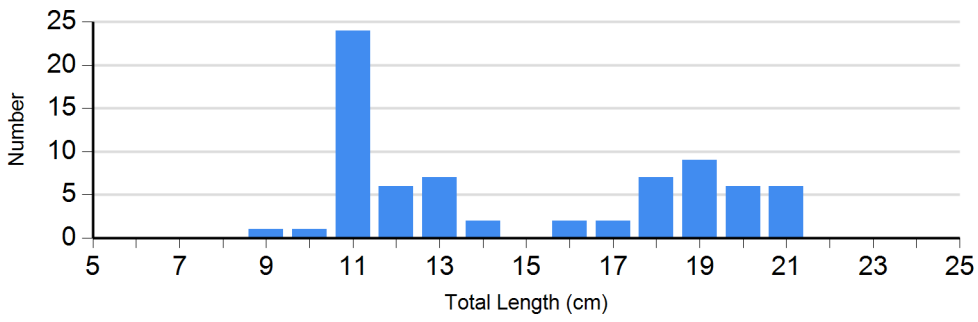
Species: Black Crappie  
Gear: frame net (std 3/4 in)





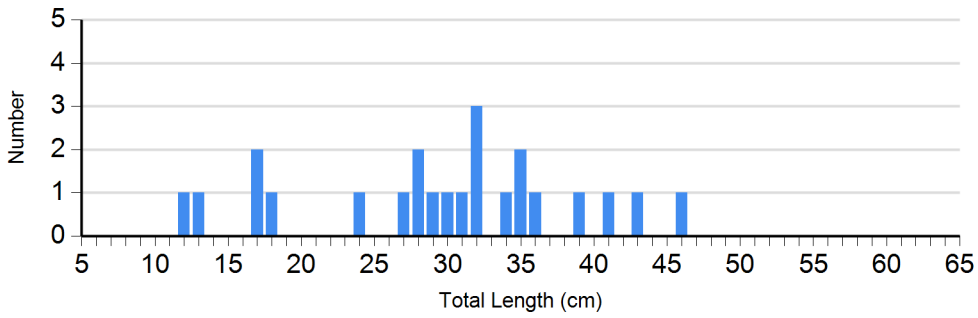
Species: Bluegill  
 Gear: frame net (std 3/4 in)



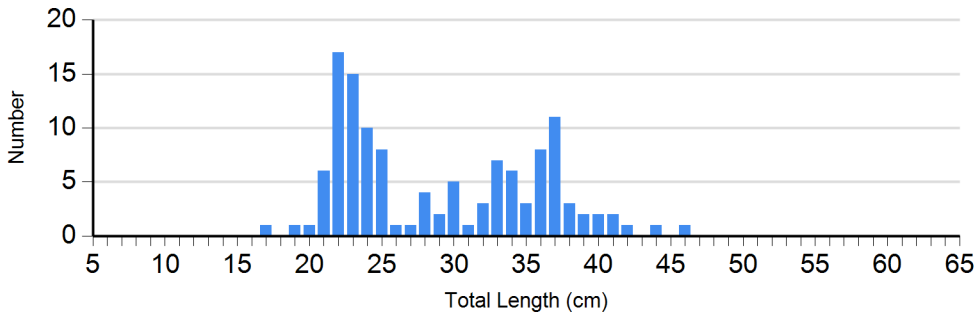


2018

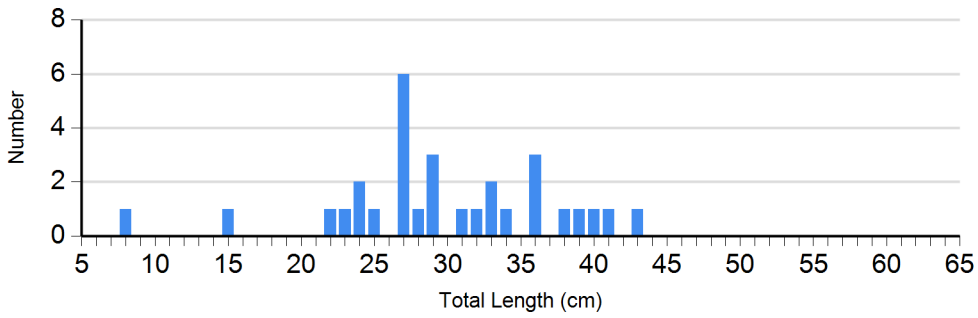
Species: Largemouth Bass  
Gear: boat shocker (night)



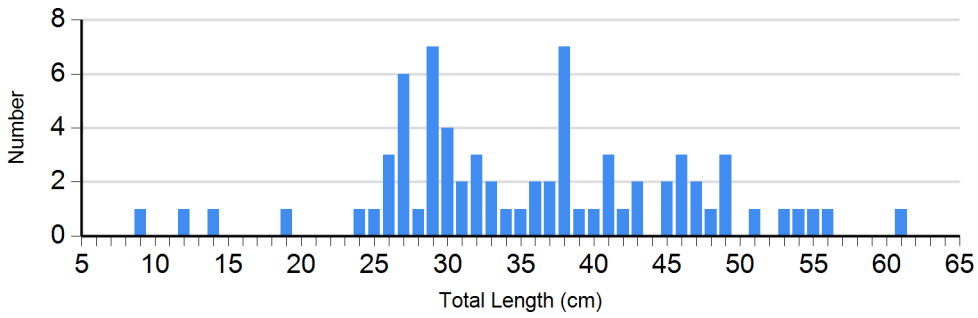
2013



2014

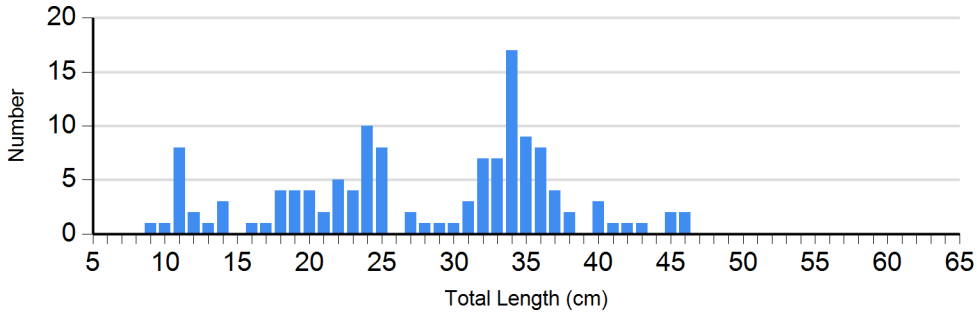
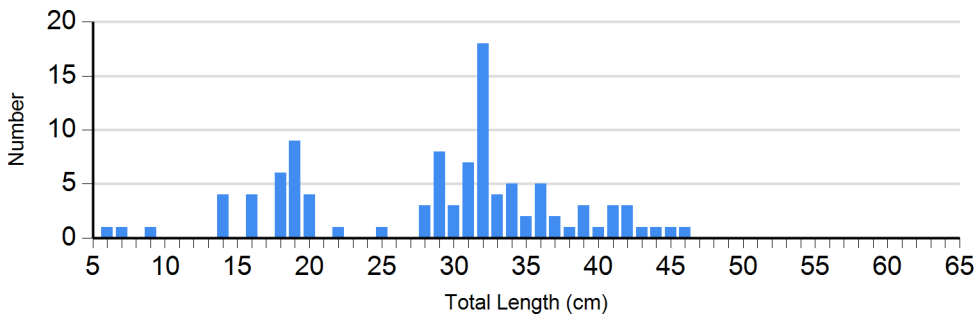


2015

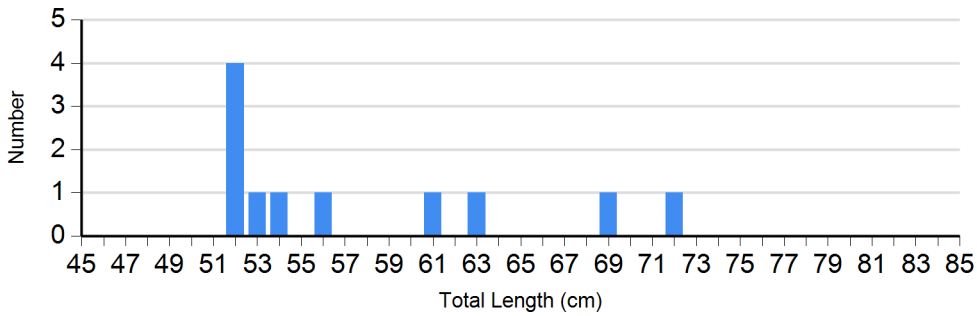


2016

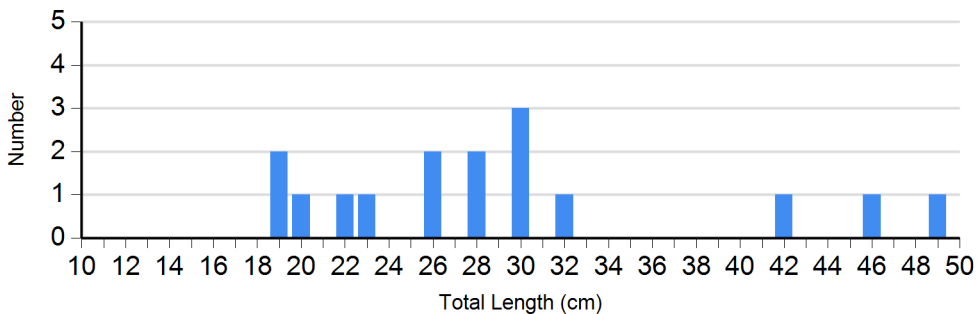
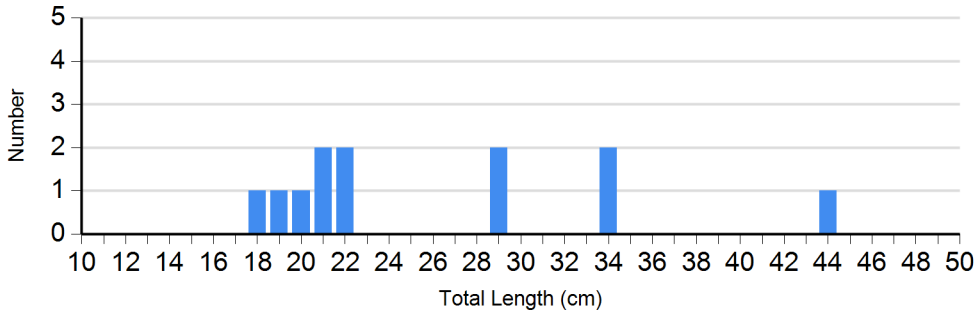




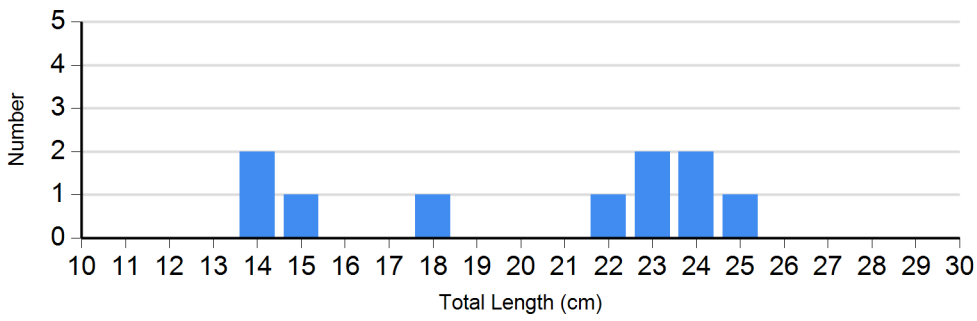
Species: Northern Pike  
 Gear: std exp gill net



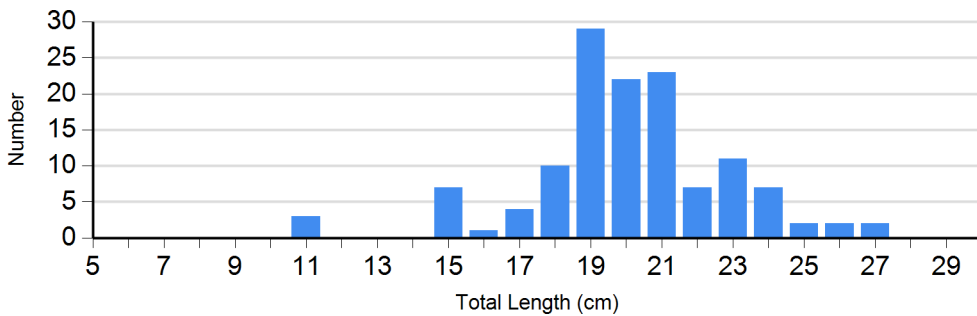
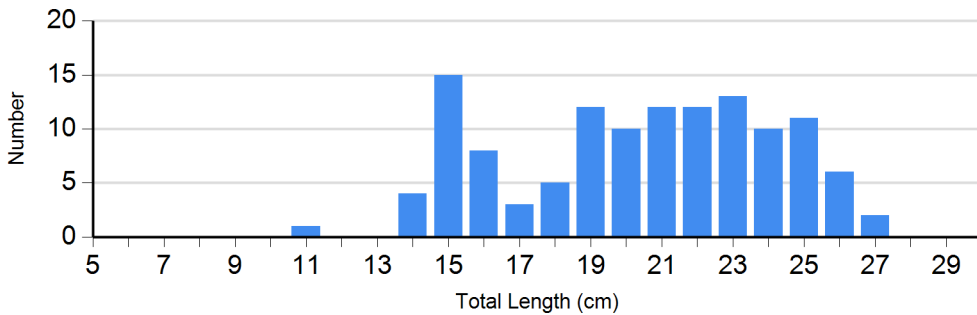
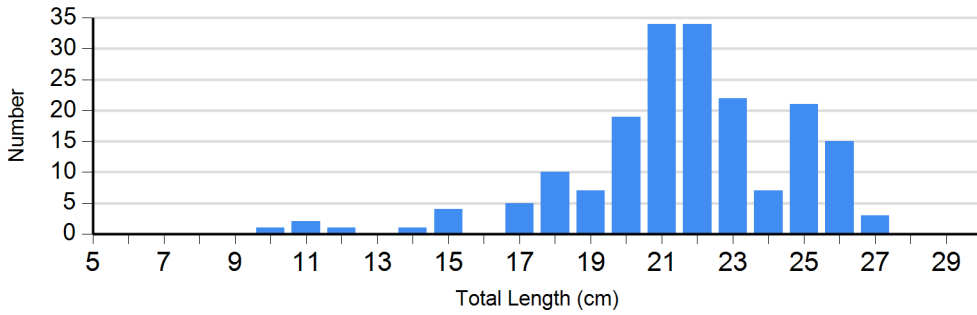
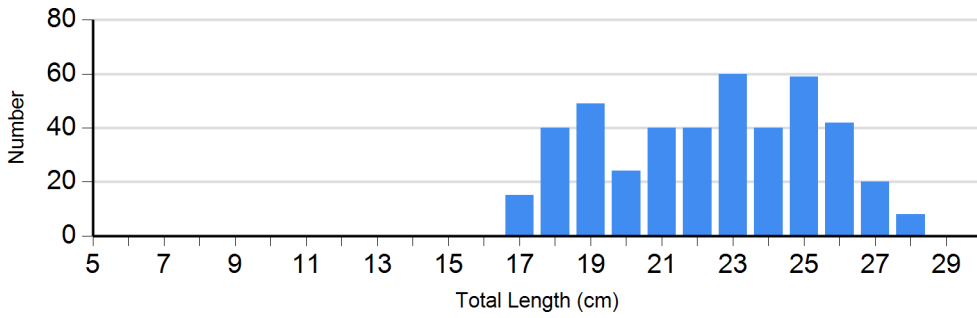
Species: Smallmouth Bass  
 Gear: boat shocker (night)



Species: Yellow Perch  
Gear: AFS std gill net



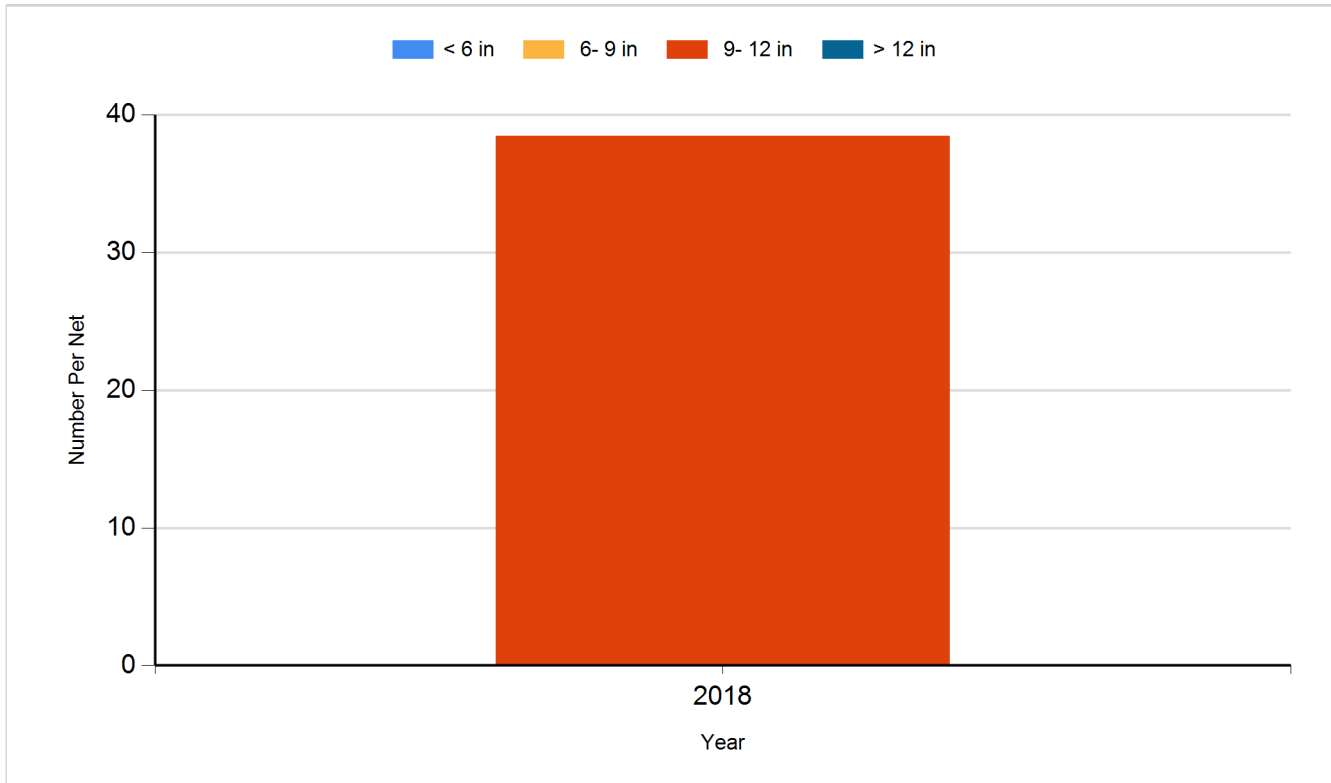
Species: Yellow Perch  
Gear: std exp gill net



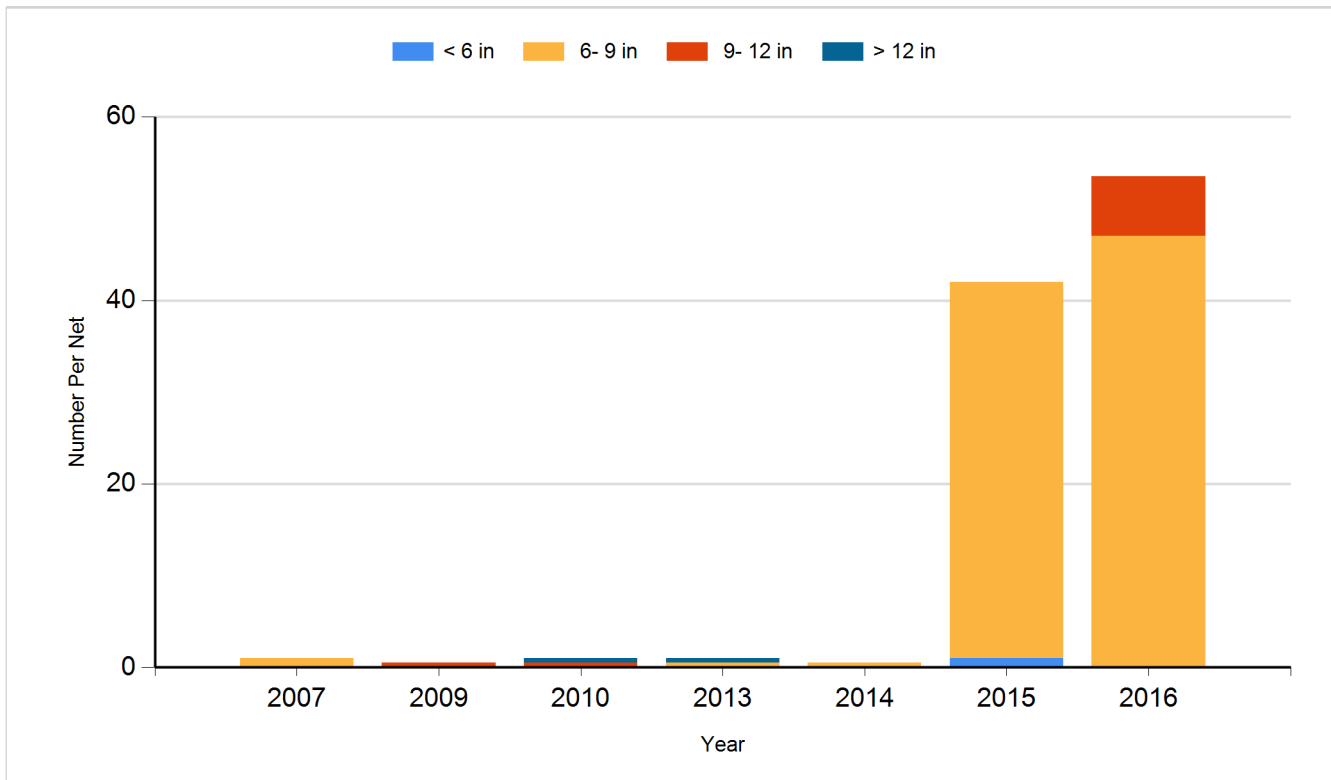
## Historic Fish Sizes and Relative Abundance

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

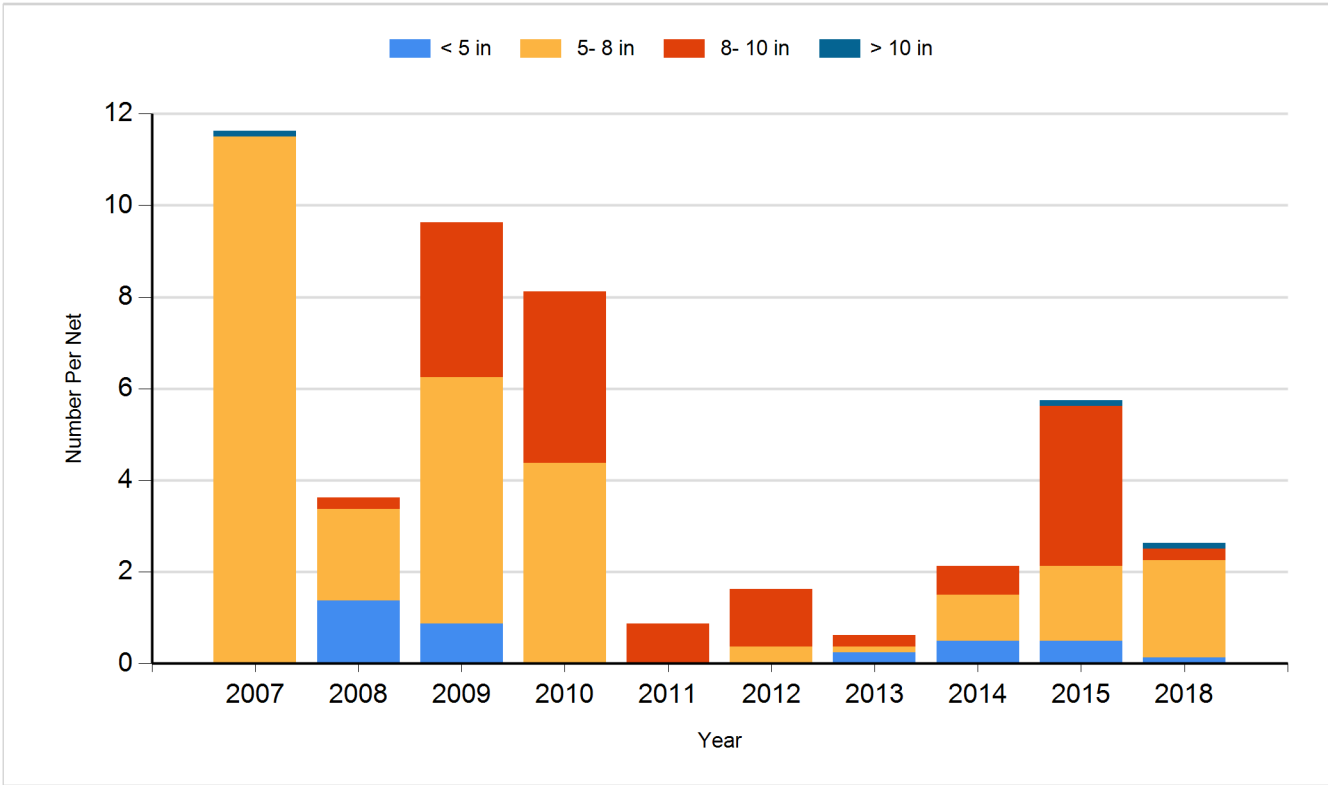
Species: Black Bullhead  
Gear: AFS std gill net



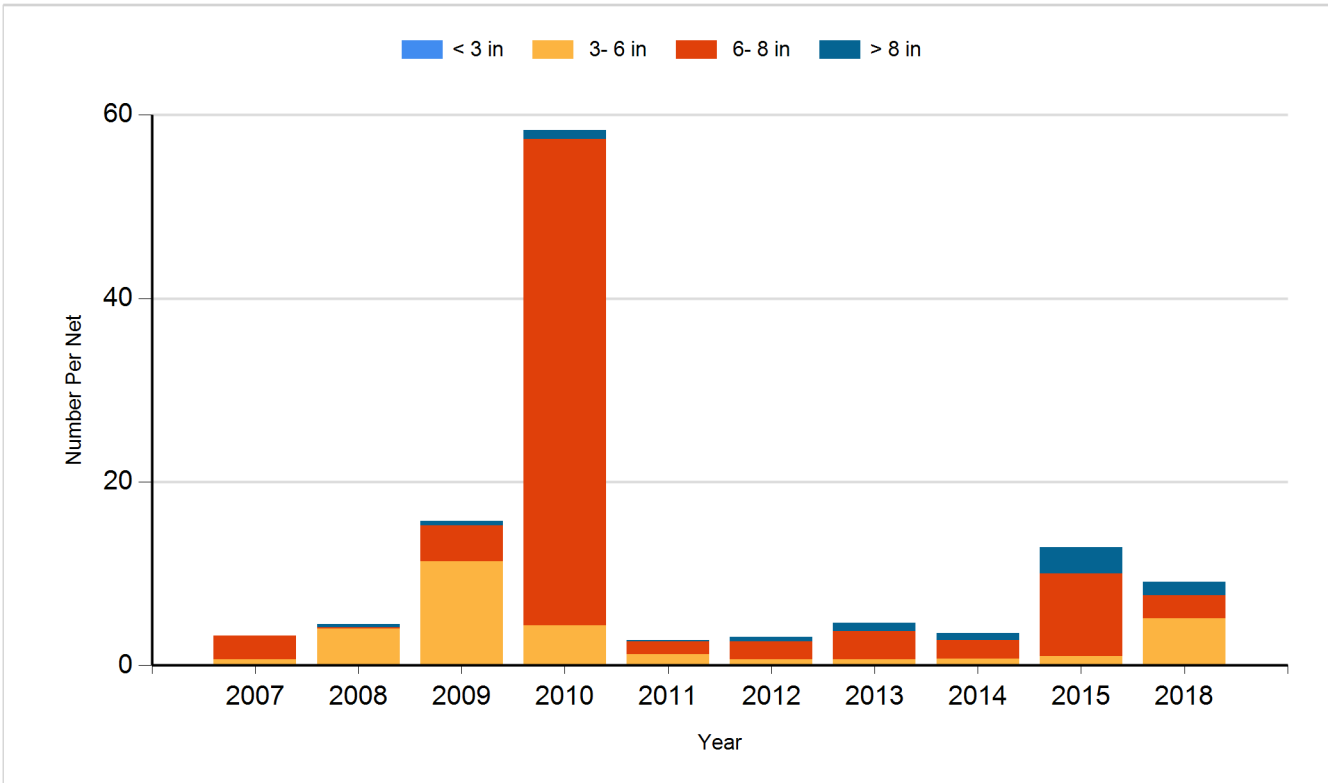
Species: Black Bullhead  
Gear: std exp gill net



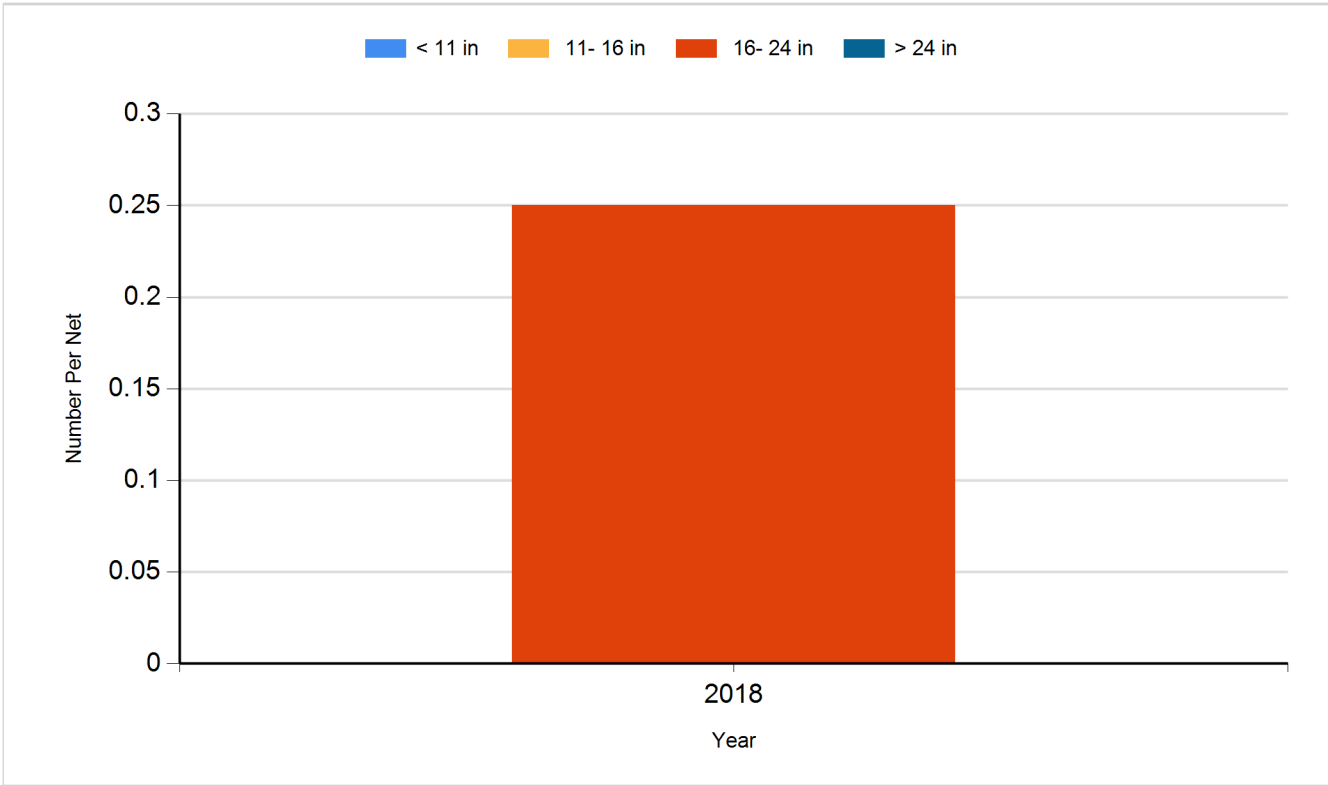
Species: Black Crappie  
Gear: frame net (std 3/4 in)



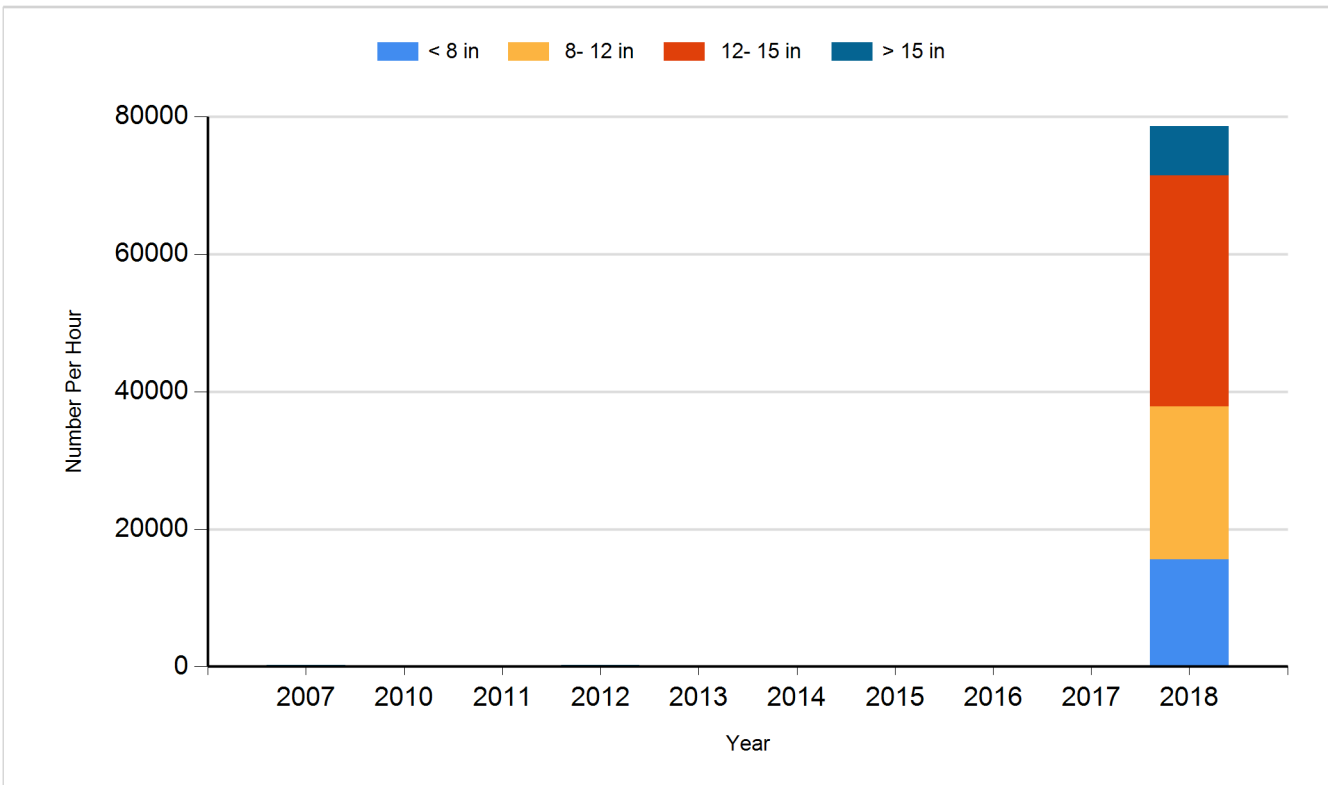
Species: Bluegill  
Gear: frame net (std 3/4 in)



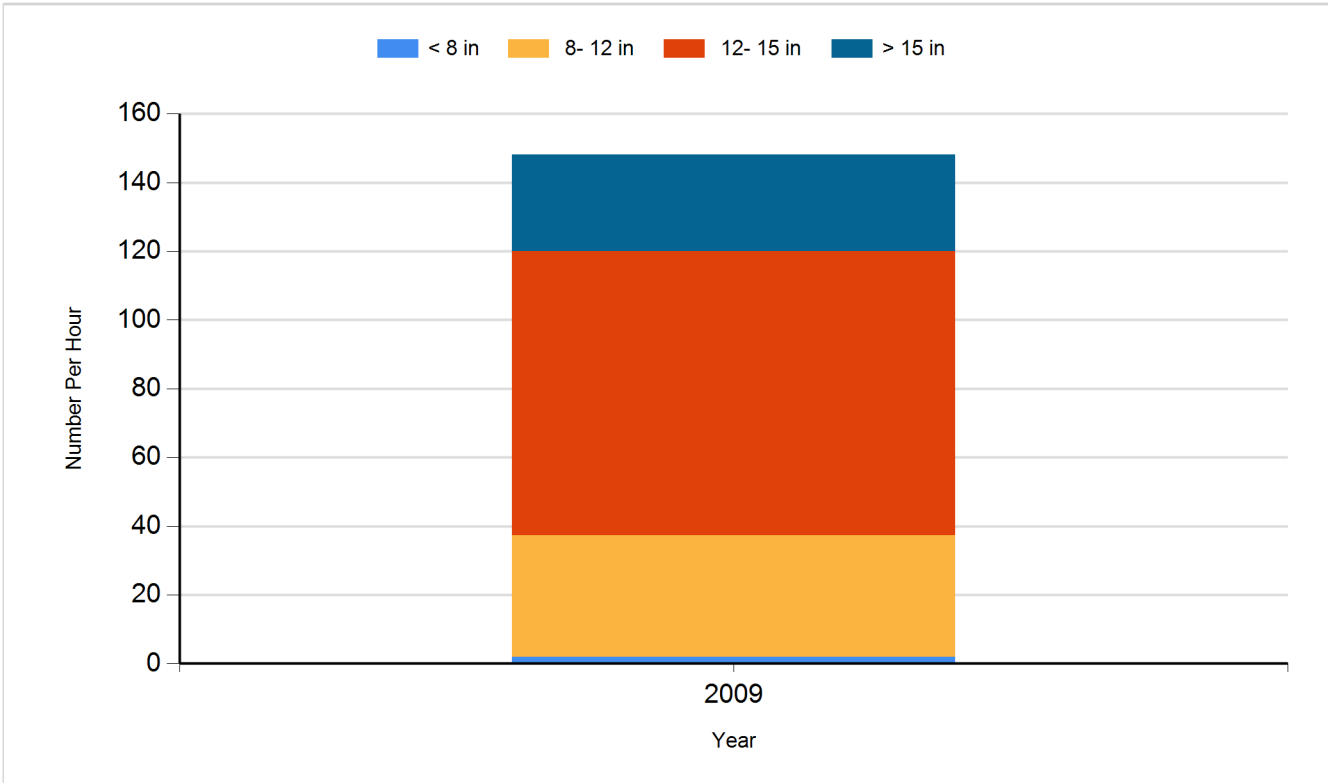
Species: Channel Catfish  
Gear: AFS std gill net



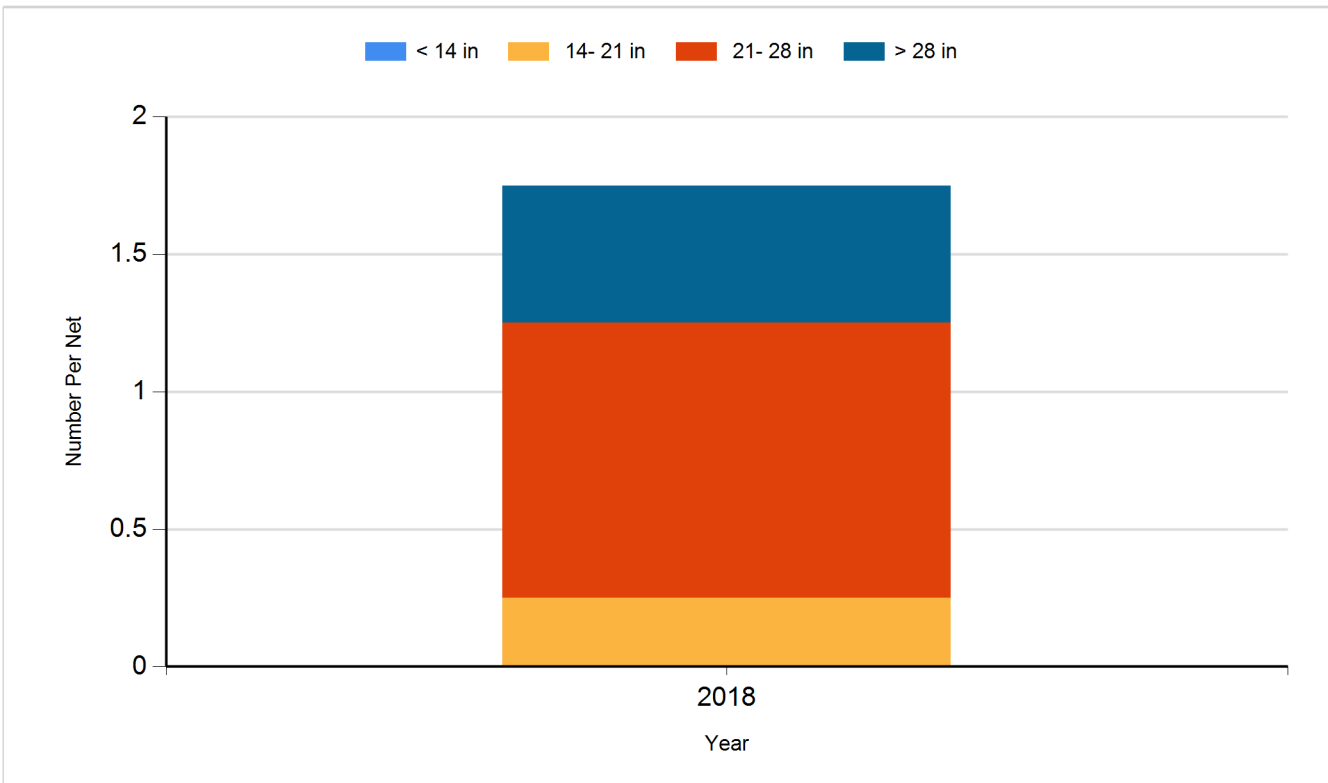
Species: Largemouth Bass  
Gear: boat shocker (night)



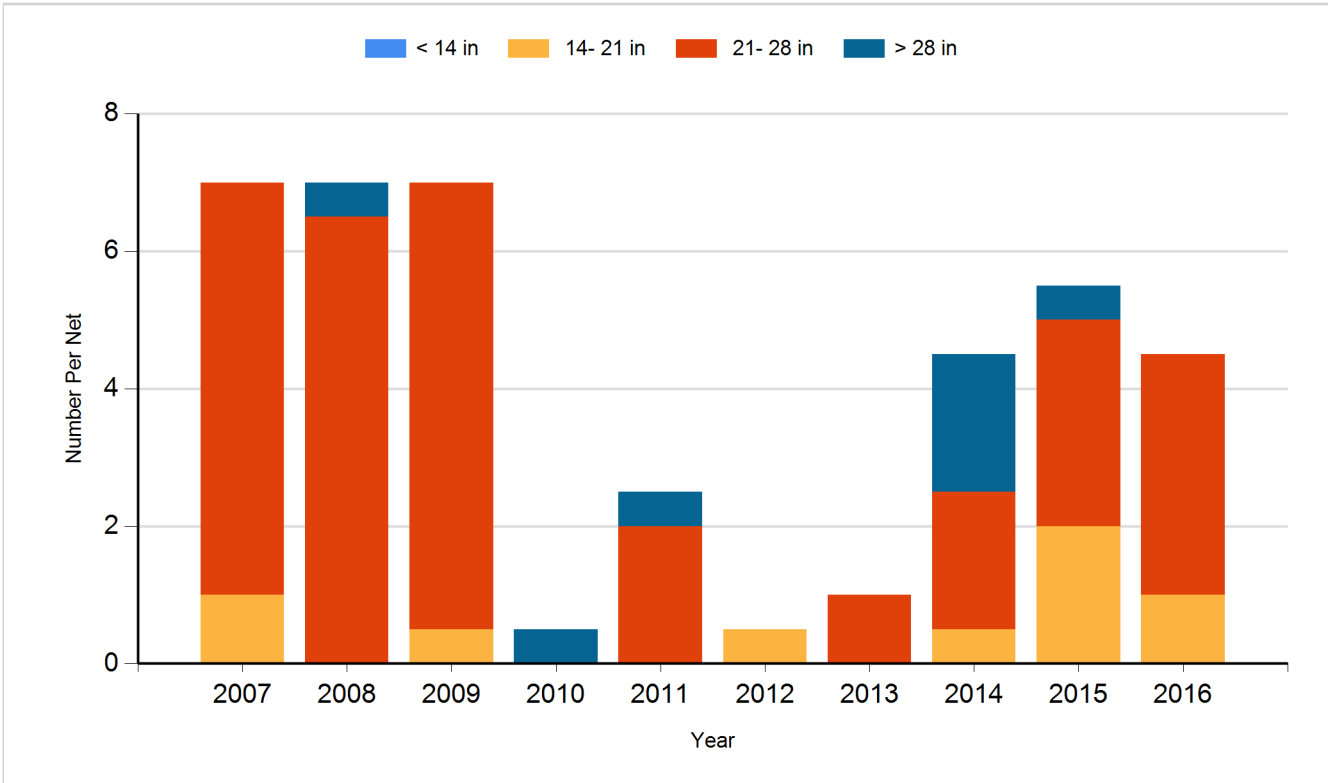
Species: Largemouth Bass  
Gear: boat shocker (night, AC)



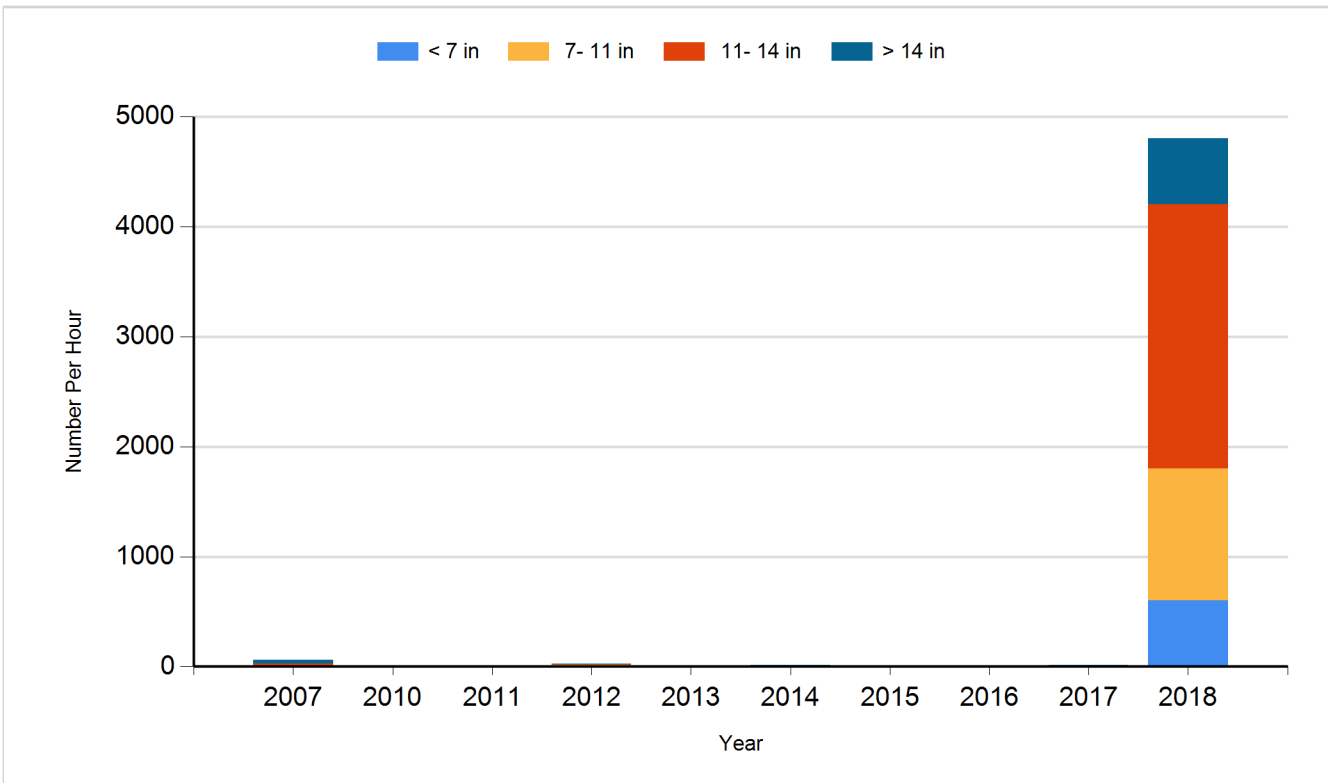
Species: Northern Pike  
Gear: AFS std gill net



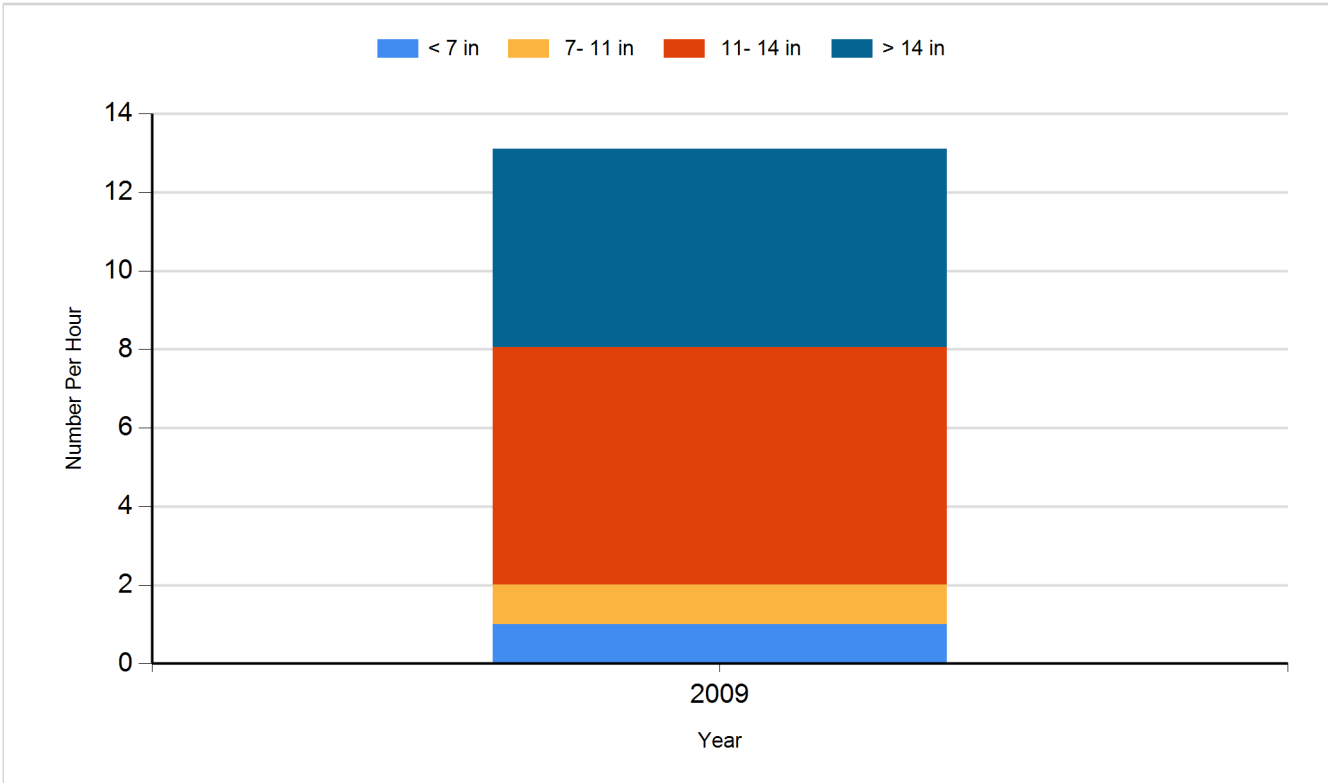
Species: Northern Pike  
Gear: std exp gill net



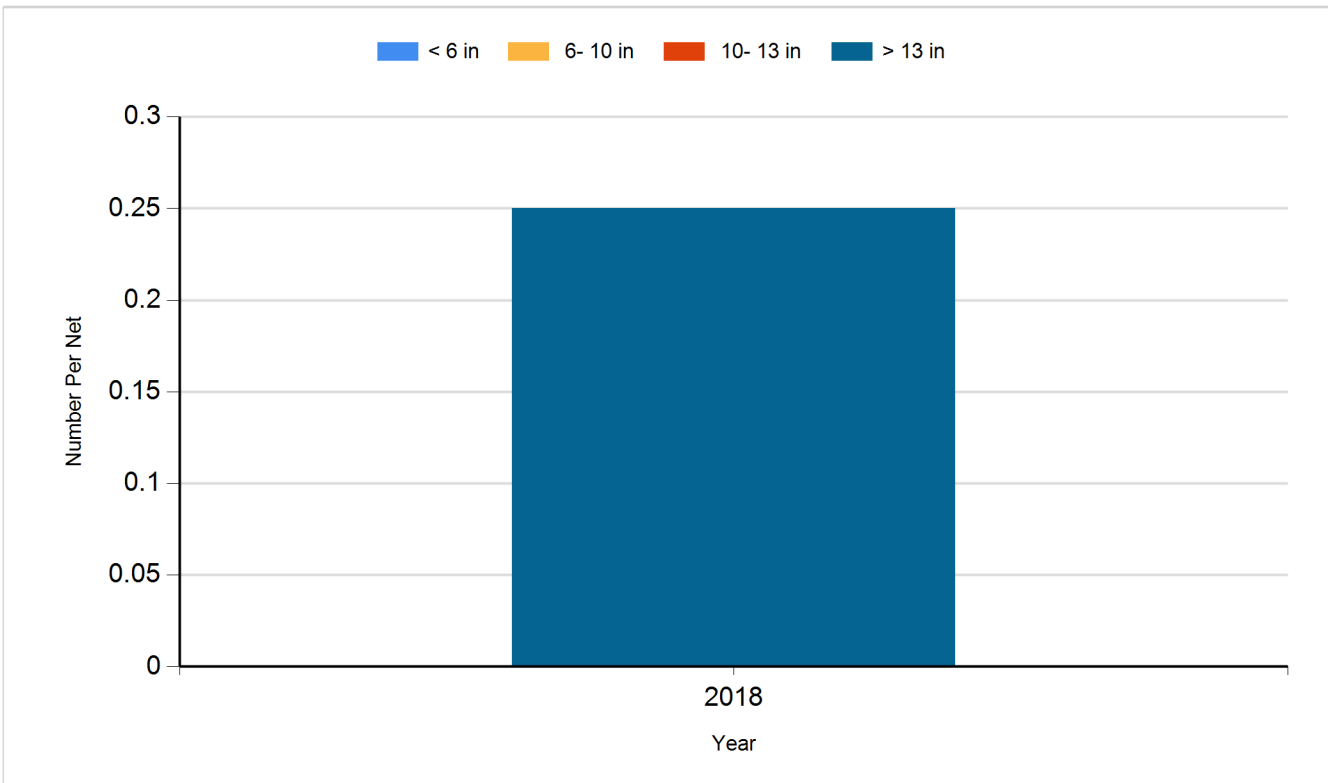
Species: Smallmouth Bass  
Gear: boat shocker (night)



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

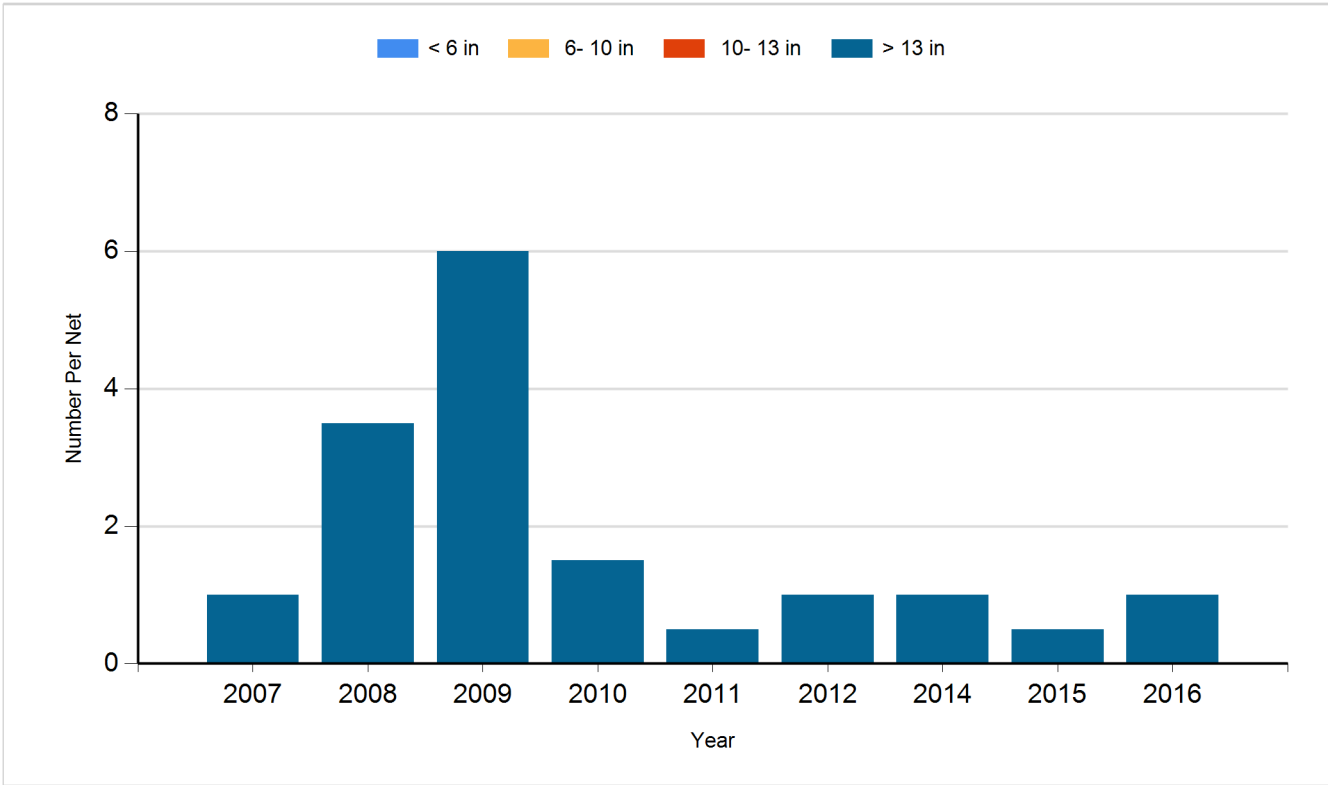


Species: White Sucker  
Gear: AFS std gill net

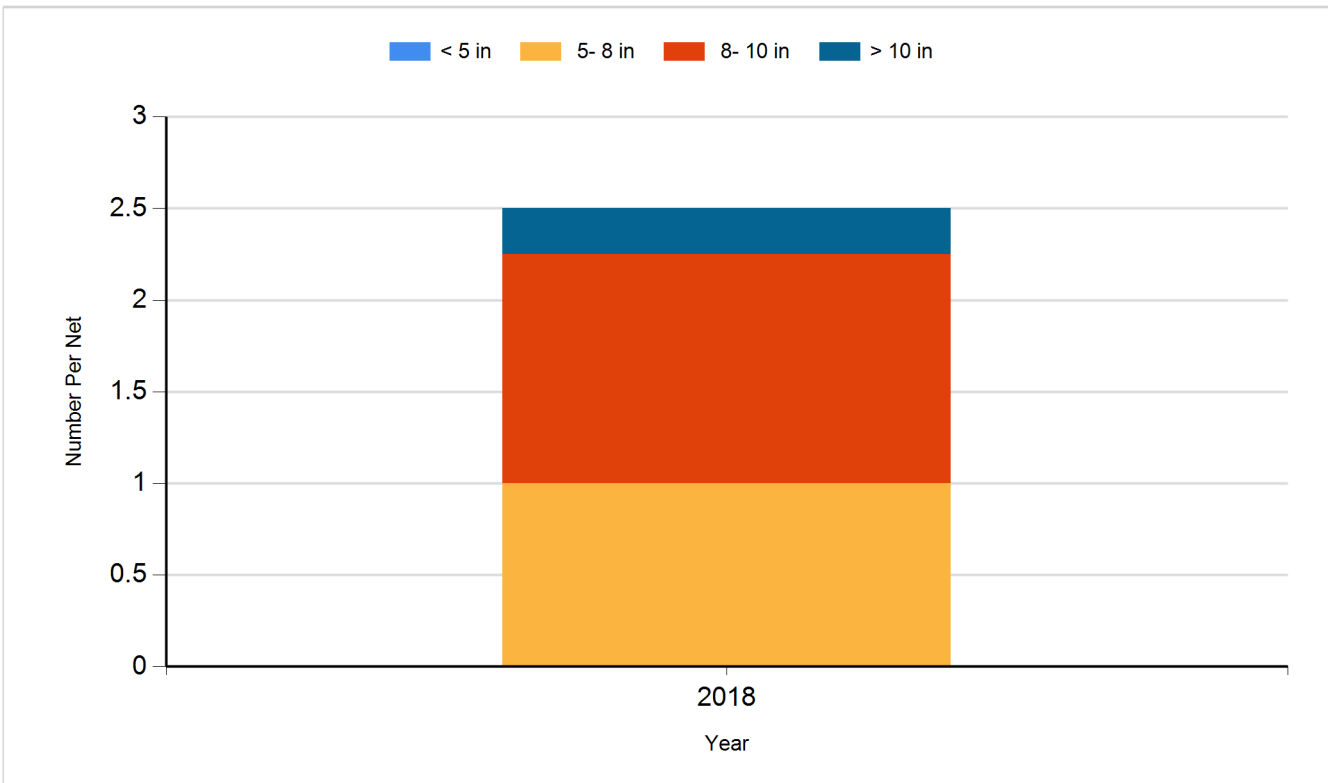




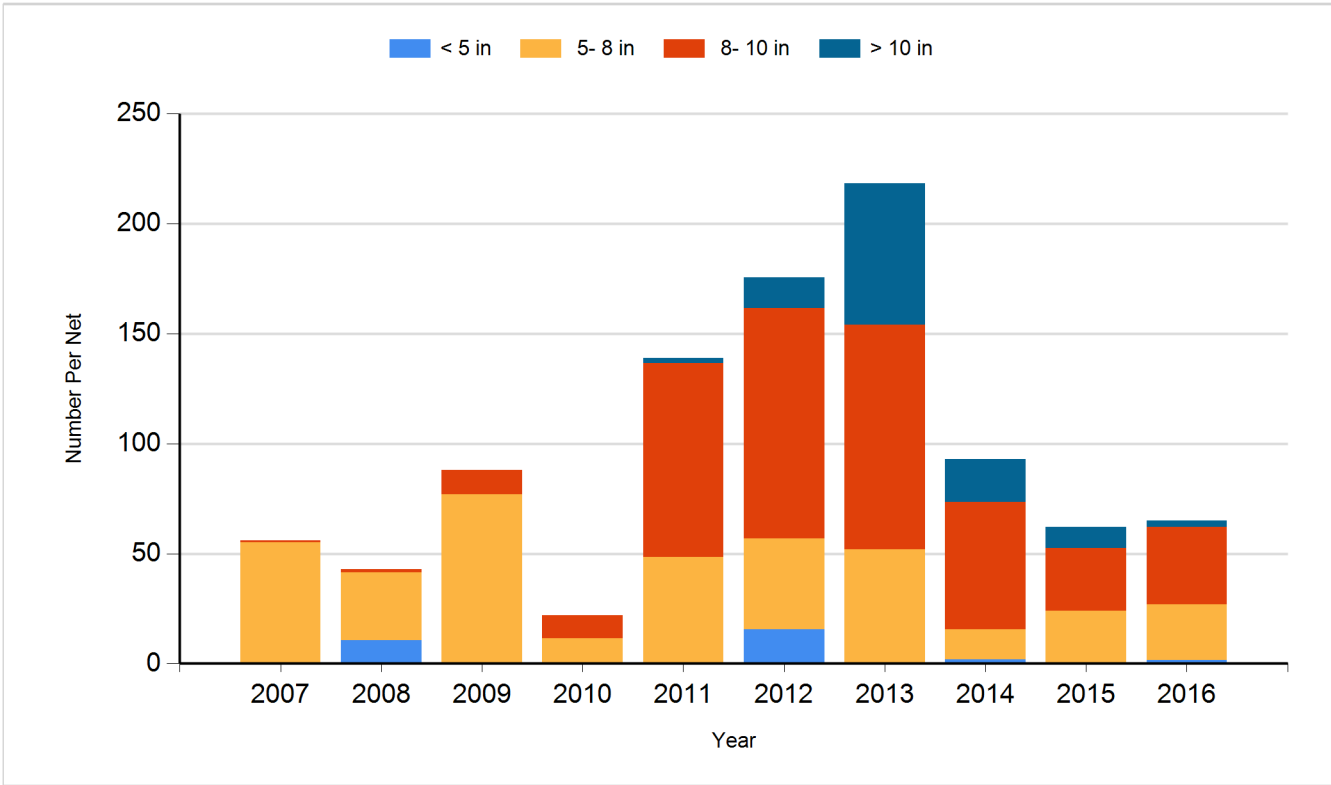
Species: White Sucker  
Gear: std exp gill net



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
2009	Rainbow Trout (McConaugRainbow Trout	Fingerling	1,500
2013	Smallmouth Bass	Fingerling	4,770
2016	Smallmouth Bass	Juvenile	300
2017	Walleye	Large Fingerling	9,500