

**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**Stockade, Custer County**  
**MCS-Lake-12-000**  
**2020**

**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 frame net	Aug 26, 2020	4 net-nights
AFS std frame net	Aug 27, 2020	4 net-nights
AFS std gill net	Aug 25, 2020	2 net-nights
AFS std gill net	Aug 26, 2020	1 net-nights
AFS std gill net	Aug 27, 2020	1 net-nights
boat shocker (night)	Oct 20, 2020	3600 seconds

## **Common Fish Species Present**

Smallmouth Bass

Northern Pike

Largemouth Bass

Yellow Perch

Bluegill

Black Bullhead

Black Crappie

White Sucker

Green Sunfish

---

## 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	145	18.1	9.6	95	3	0		86	1
	Black Crappie	47	5.9	3.5	40	11	2		97	1
	Bluegill	67	8.4	5.4	52	9	10	6	98	5
	Green Sunfish	2	0.3	0.2	100		50		118	10
	Northern Pike	3	0.4	0.3	100		0		85	1
	White Sucker	1	0.1	0.2	100		100		81	
	Yellow Perch	6	0.8	0.6	33		0		81	3
AFS std gill net	Black Bullhead	45	11.3	9.9	98		0		95	2
	Black Crappie	9	2.3	3.2	11		0		107	3
	Bluegill	20	5.0	5.6	75	16	10		108	3
	Northern Pike	9	2.3	1.8	100		11		91	1
	Smallmouth Bass	1	0.3	0.4	100		100		89	
	White Sucker	3	0.8	0.4	100		100		97	8
	Yellow Perch	1	0.3	0.4	0		0		93	
boat shocker (night)	Largemouth Bass	61	59.0	22.3	53	9	14	7	104	2
	Smallmouth Bass	1	1.0	1.5	100		100		60	

## 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

Gear	Species	CPUE										Avg
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
AFS std frame net	Black Bullhead							0.0			18.1	9.05
	Black Crappie							0.0			5.9	2.95
	Bluegill							0.0			8.4	4.20
	Green Sunfish							0.0			0.3	0.15
	Northern Pike							0.0			0.4	0.20
	White Sucker							0.0			0.1	0.05
	Yellow Perch							0.0			0.8	0.40
AFS std gill net	Black Bullhead									38.5	11.3	24.90
	Black Crappie									0.0	2.3	1.15
	Bluegill									1.5	5.0	3.25
	Channel Catfish									0.3	0.0	0.15
	Golden Shiner									0.0	0.0	0.00
	Northern Pike									1.8	2.3	2.05
	Smallmouth Bass									0.3	0.3	0.30
	White Sucker									0.3	0.8	0.55
	Yellow Perch									2.5	0.3	1.40
boat shocker (night)	Largemouth Bass	97.6	171.0	36.0	121.0	84.0	68.0	66.9	105.0	134.0	59.0	94.25
	Smallmouth Bass	6.0	20.0	4.0	12.0	0.0	9.0	13.7	7.0	26.0	1.0	9.87
	Walleye*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.40
frame net (std 3/4 in)	Black Bullhead	0.0	1.1	0.3	0.9	471.1			91.4			94.13
	Black Crappie	0.9	1.6	0.4	1.6	5.3			2.5			2.05
	Bluegill	2.8	3.1	4.6	3.5	12.8			9.1			5.98
	Bluegill X Gr. Sunfish Hybrid	0.0	0.0	0.0	0.0	0.1			0.0			0.02
	Golden Shiner	0.0	0.0	0.0	0.0	0.0			0.0			0.00
	Largemouth Bass	0.0	0.0	0.0	0.0	0.1			0.0			0.02
	Northern Pike	0.9	0.3	0.9	1.5	0.6			0.8			0.83
	Smallmouth Bass	0.0	0.0	0.0	0.0	0.4			0.6			0.17
	White Sucker	0.4	0.0	0.0	0.3	0.1			0.1			0.15
	Yellow Perch	35.6	67.9	48.0	197.5	3.0			21.0			62.17
std exp gill net	Black Bullhead	0.0	0.0	1.0	0.5	41.0	53.5					16.00
	Black Crappie	3.5	6.5	8.5	10.5	0.5	0.0					4.92
	Bluegill	0.0	2.5	6.5	2.0	1.5	1.0					2.25
	Golden Shiner	0.0	0.0	0.0	0.0	0.0	0.0					0.00

		CPUE										
Gear	Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Avg
std exp gill net	Largemouth Bass	0.0	0.5	0.0	0.0	0.5	1.0					0.33
	Northern Pike	2.5	0.5	1.0	4.5	5.5	4.5					3.08
	Smallmouth Bass	0.0	0.0	0.0	0.5	0.0	0.0					0.08
	White Sucker	0.5	1.0	0.0	1.0	0.5	1.0					0.67
	Yellow Perch	138.5	160.0	218.5	91.0	61.5	63.5					122.1 7

## 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														
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020					
AFS std frame net	Black Bullhead	PSD									100				95		
		PSD-P										0				0	
		Wr										97				86	
	Black Crappie	PSD										67				40	
		PSD-P										0				2	
		Wr										93				97	
	Bluegill	PSD														52	
		PSD-P														10	
		Wr														98	
	Green Sunfish	PSD														100	
		PSD-P														50	
		Wr														118	
	Northern Pike	PSD														100	
		PSD-P														0	
		Wr														85	
	White Sucker	PSD											100			100	
		PSD-P											100			100	
		Wr											100			81	
	Yellow Perch	PSD														33	
		PSD-P														0	
		Wr														81	
AFS std gill net	Black Bullhead	PSD											100		98		
		PSD-P												0	0		
		Wr												88	95		
	Black Crappie	PSD														11	
		PSD-P														0	
		Wr														107	
	Bluegill	PSD												100		75	
		PSD-P													33	10	
		Wr													109	108	
	Northern Pike	PSD													86	100	
		PSD-P														29	11
		Wr														95	91



Gear	Species	Index	Year											
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
AFS std gill net	Smallmouth Bass	PSD									100		100	
		PSD-P									100		100	
		Wr									77		89	
	White Sucker	PSD										100		100
		PSD-P										100		100
		Wr										97		97
	Yellow Perch	PSD										60		0
		PSD-P										10		0
		Wr										84		93
boat shocker (night)	Largemouth Bass	PSD	77	76	72	46	46	72	78	65	66	53		
		PSD-P	22	12	22	10	18	47	19	11	16	14		
		Wr	106	115	111	105	125	75	111	103	105	104		
	Smallmouth Bass	PSD	83	70	100	42	0	33	56	71	73	100		
		PSD-P	67	30	50	8	0	22	19	14	35	100		
		Wr	105	99	64	97		66	100	93	90	60		
frame net (std 3/4 in)	Black Bullhead	PSD		100	100	29	0				79			
		PSD-P		11	100	29	0				0			
		Wr		104	102	81	84				88			
	Black Crappie	PSD	100	77	67	38	69				15			
		PSD-P	0	0	0	0	2				5			
		Wr	91	103	105	106	109				102			
	Bluegill	PSD	55	80	86	79	93				44			
		PSD-P	5	16	19	21	23				16			
		Wr	109	129	122	121	111				103			
	Largemouth Bass	PSD					100							
		PSD-P					0							
		Wr					110							
	Northern Pike	PSD	100	50	71	67	40				50			
		PSD-P	43	50	57	50	0				17			
		Wr	95	96	98	92	81				96			
	Smallmouth Bass	PSD					67				80			
		PSD-P					33				20			
		Wr					95				90			
	White Sucker	PSD	100			100	100				100			
		PSD-P	100			100	100				100			
		Wr	76			93	102				101			

Gear	Species	Index	Year									
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
frame net (std 3/4 in)	Yellow Perch	PSD	52	76	99	97	92				89	
		PSD-P	1	3	26	42	42				4	
		Wr	95	93	96	89	78				76	
std exp gill net	Black Bullhead	PSD			50	0	0	12				
		PSD-P			50	0	0	0				
		Wr			115	113	98	104				
	Black Crappie	PSD	57	0	6	33	0					
		PSD-P	0	0	0	0	0					
		Wr	107	117	109	108	96					
	Bluegill	PSD		100	100	100	100	50				
		PSD-P		0	62	100	100	50				
		Wr		121	113	98	102	123				
	Largemouth Bass	PSD		100			100	100				
		PSD-P		0			0	100				
		Wr		122			131	99				
	Northern Pike	PSD	100	0	100	89	64	78				
		PSD-P	20	0	0	44	9	0				
		Wr	96	98	88	98	90	95				
	Smallmouth Bass	PSD				100						
		PSD-P				100						
		Wr				90						
	White Sucker	PSD	100	100		100	100	100				
		PSD-P	100	100		100	100	100				
		Wr	104	101		105	109	104				
Yellow Perch	PSD	65	74	76	85	62	60					
	PSD-P	2	9	30	21	15	5					
	Wr	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)				

## 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).

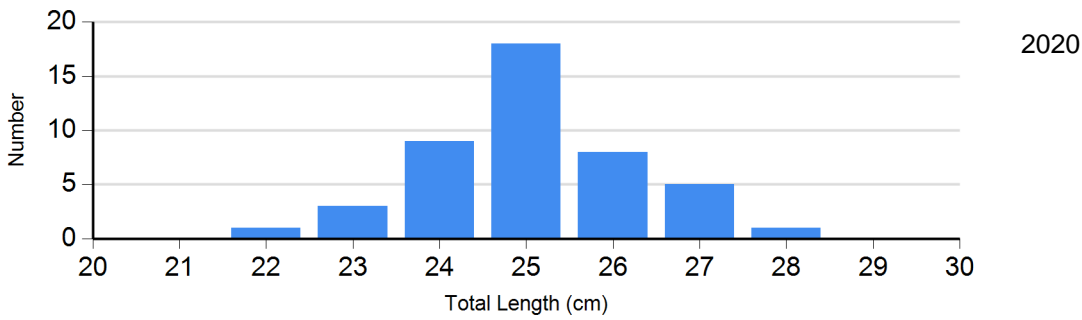
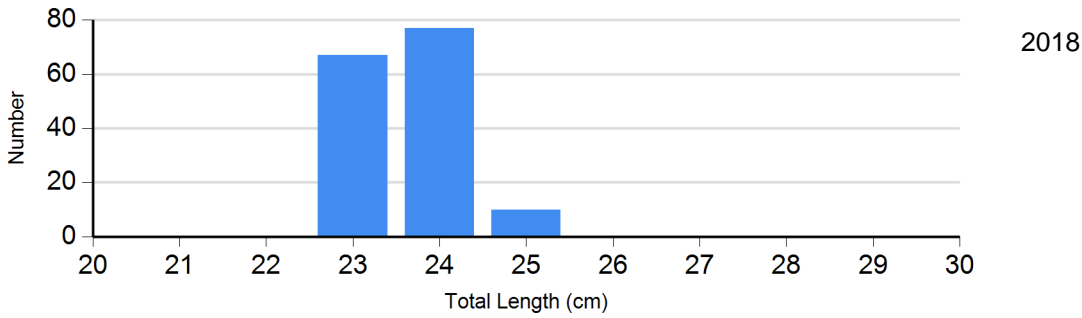
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2016	94	104 (0.7)	13	106 (2.1)	0		0	
	2018	0		154	88 (1.4)	0		0	
	2020	1	89	44	95 (1.4)	0		0	
Black Crappie Frame Net	2017	1	95	2	92 (6.0)	0		0	
	2018	17	103 (1.0)	2	105 (2.9)	1	92	0	
	2020	28	99 (1.2)	18	94 (1.3)	1	77	0	
Bluegill Frame Net	2018	41	106 (1.3)	20	102 (1.0)	12	95 (2.0)	0	
	2020	32	99 (7.4)	28	98 (1.9)	7	91 (1.2)	0	
Largemouth Bass Electro Fishing	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	
	2019	46	104 (1.4)	67	104 (2.7)	21	110 (3.4)	0	
	2020	28	108 (2.4)	23	102 (2.0)	8	96 (3.3)	0	
Northern Pike Gill Net	2016	2	95 (0.0)	7	94 (3.6)	0		0	
	2018	1	95	4	93 (1.4)	2	99 (9.0)	0	
	2020	0		8	91 (1.3)	1	92	0	
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	
	2019	7	89 (2.7)	10	88 (2.6)	8	93 (3.9)	1	84
	2020	0		0		1	60	0	
White Sucker Gill Net	2016	0		0		1	104	1	104
	2018	0		0		0		1	97

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
White Sucker Gill Net	2020	0		0		0		3	97 (6.6)
Yellow Perch Gill Net	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	
	2020	1	93	0		0		0	

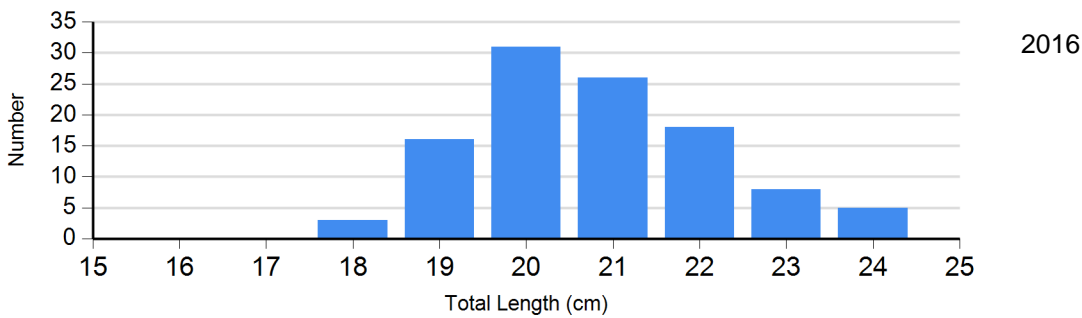
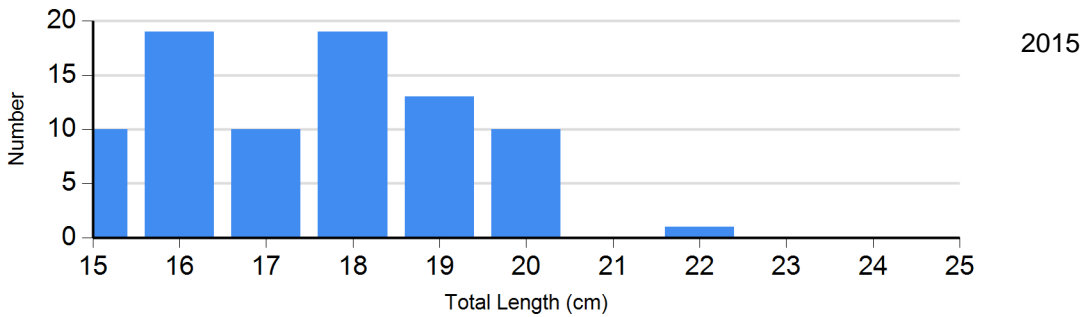
## Length Frequency Distribution

Length frequency histogram of species sampled by year.

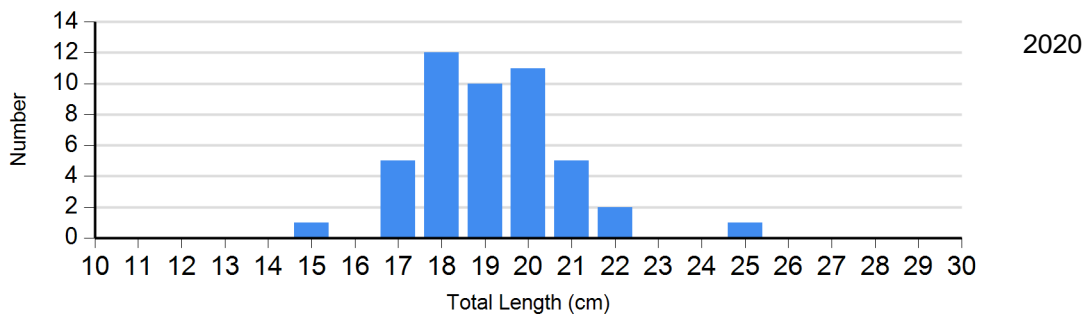
Species: Black Bullhead  
Gear: AFS std gill net



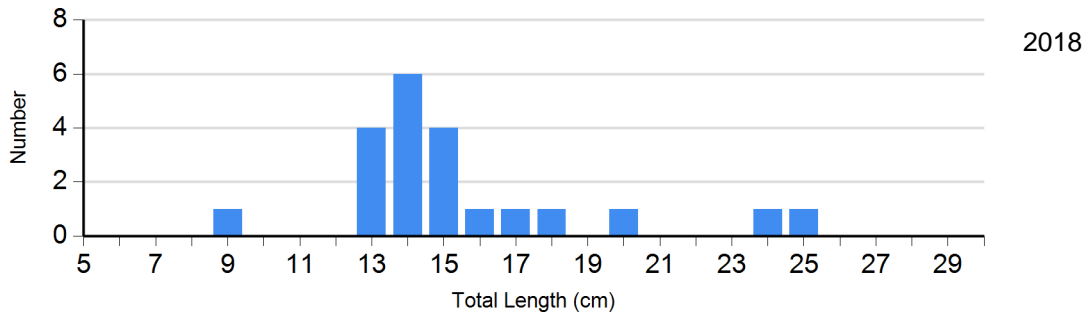
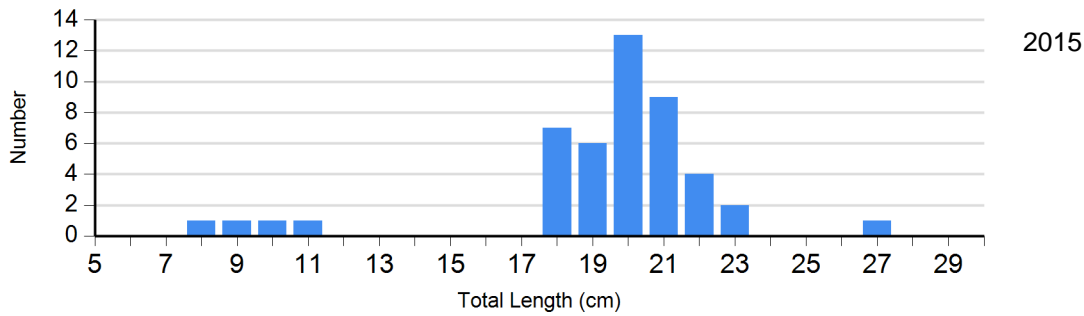
Species: Black Bullhead  
Gear: std exp gill net



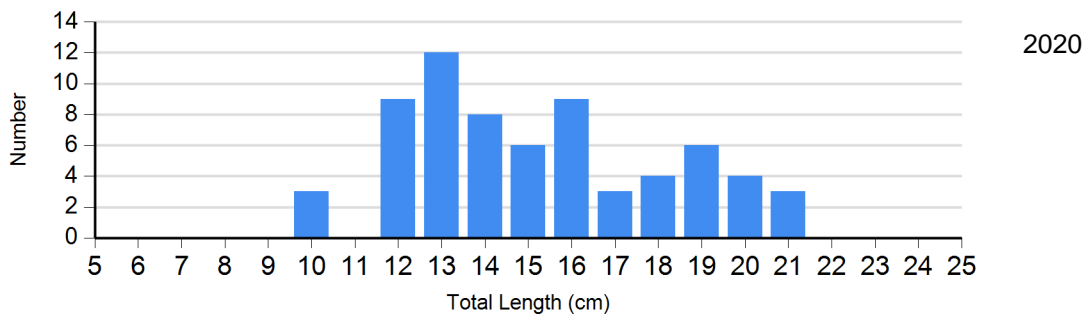
Species: Black Crappie  
Gear: AFS std frame net



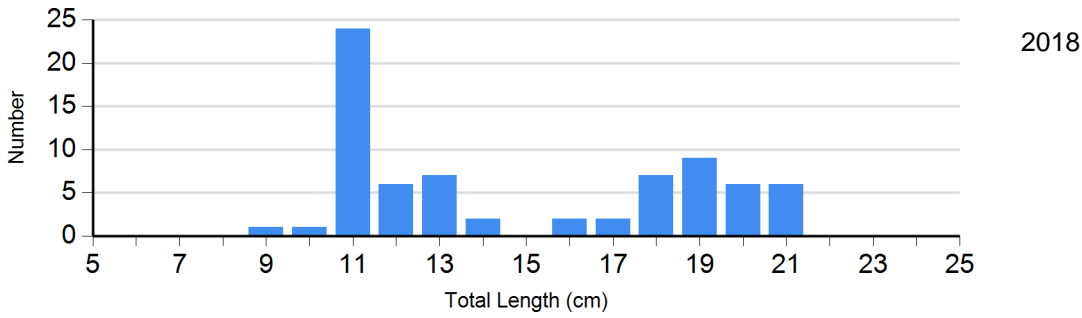
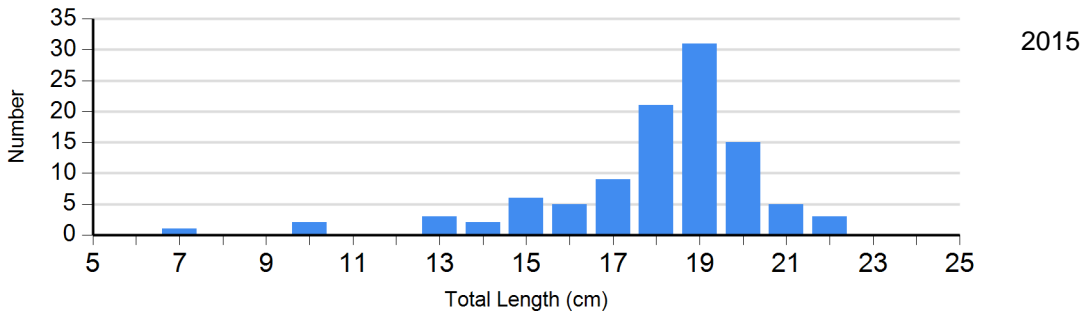
Species: Black Crappie  
Gear: frame net (std 3/4 in)



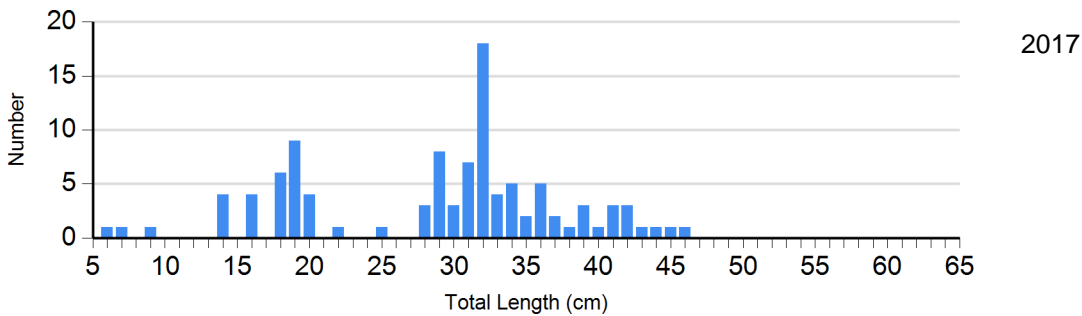
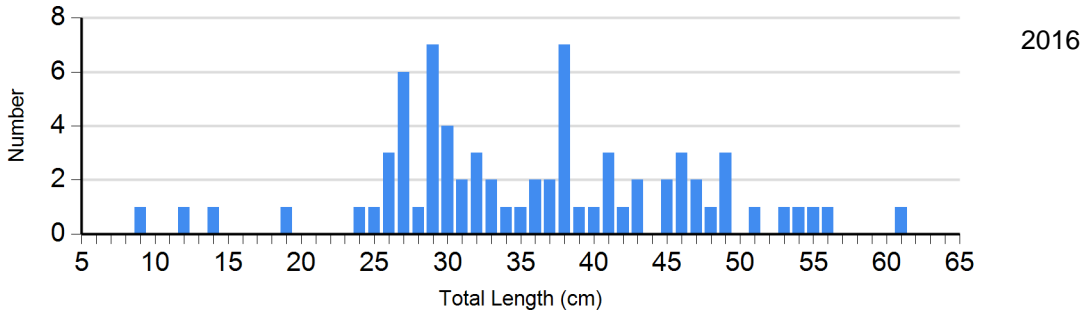
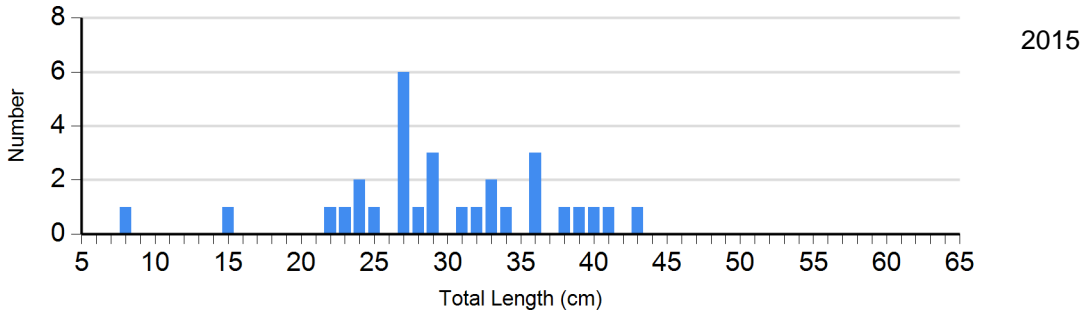
Species: Bluegill  
Gear: AFS std frame net



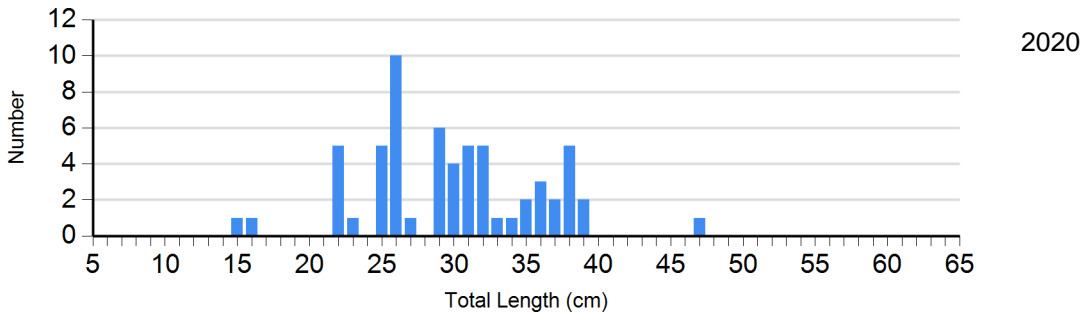
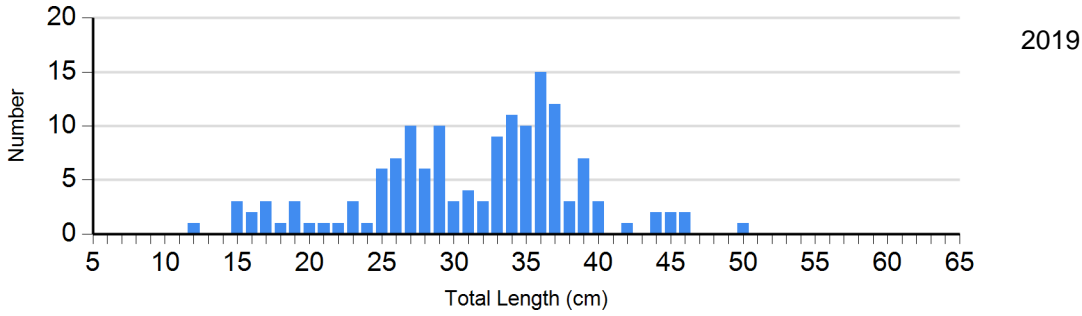
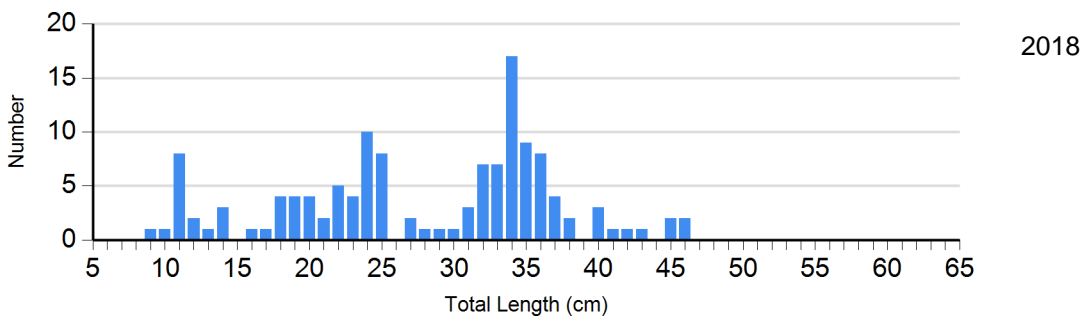
Species: Bluegill  
 Gear: frame net (std 3/4 in)



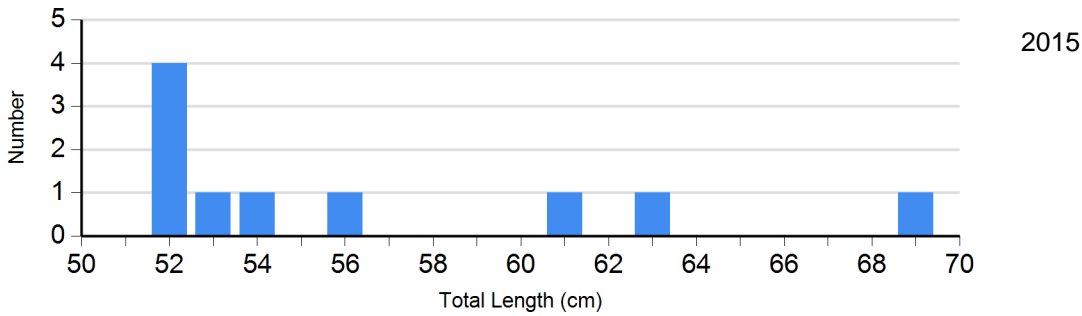
Species: Largemouth Bass  
 Gear: boat shocker (night)



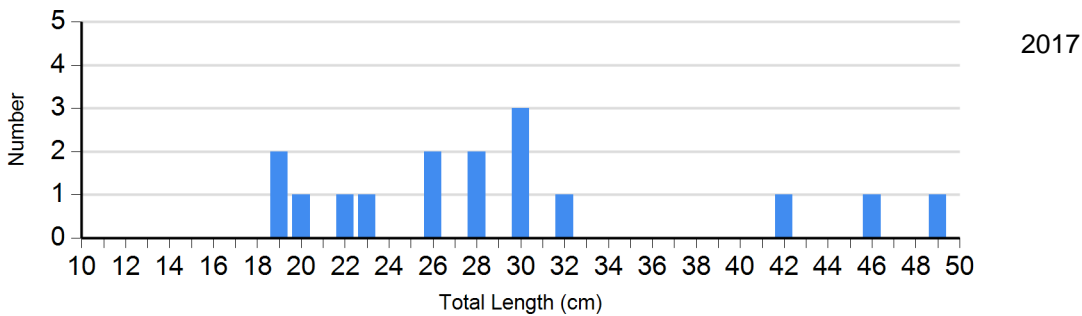


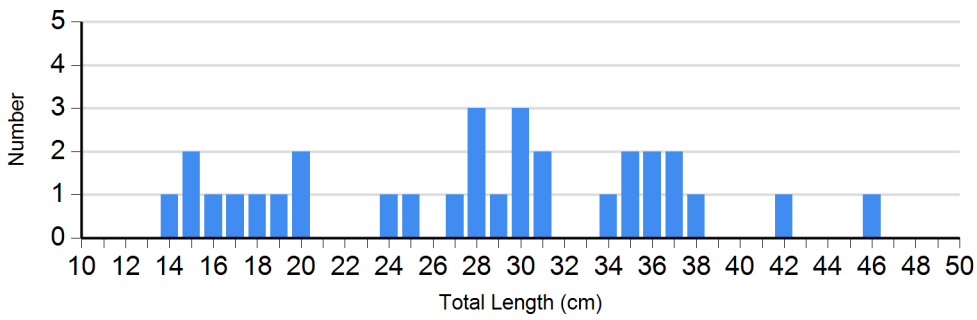


Species: Northern Pike  
Gear: std exp gill net

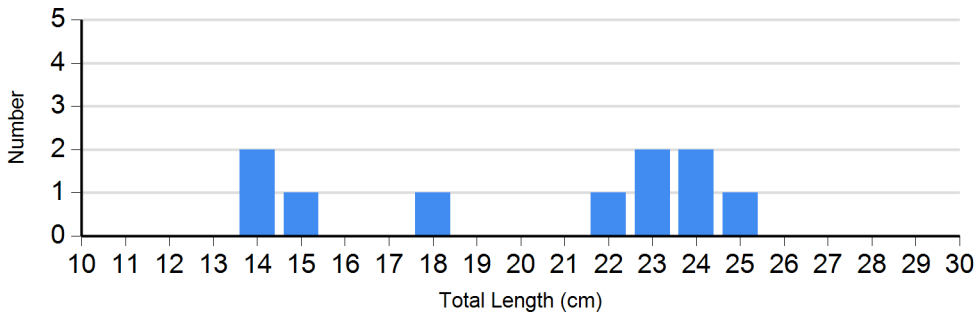


Species: Smallmouth Bass  
Gear: boat shocker (night)

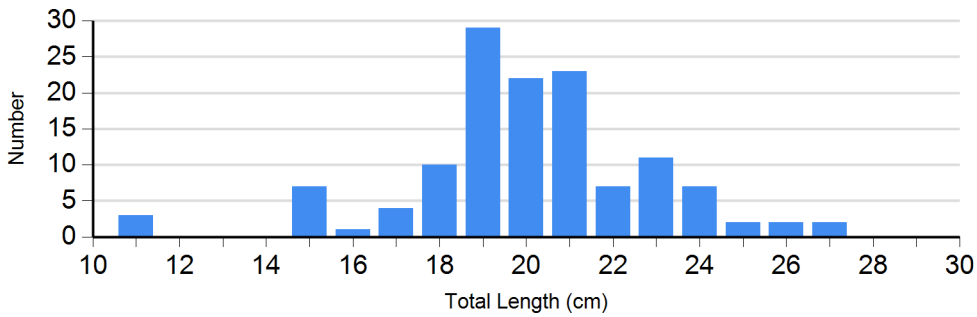
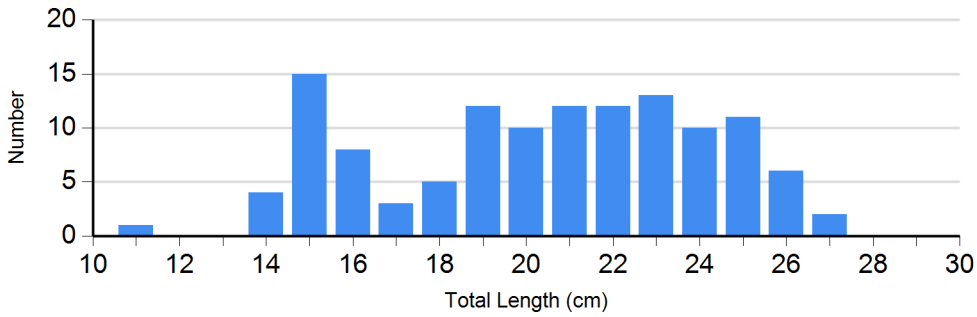




Species: Yellow Perch  
Gear: AFS std gill net



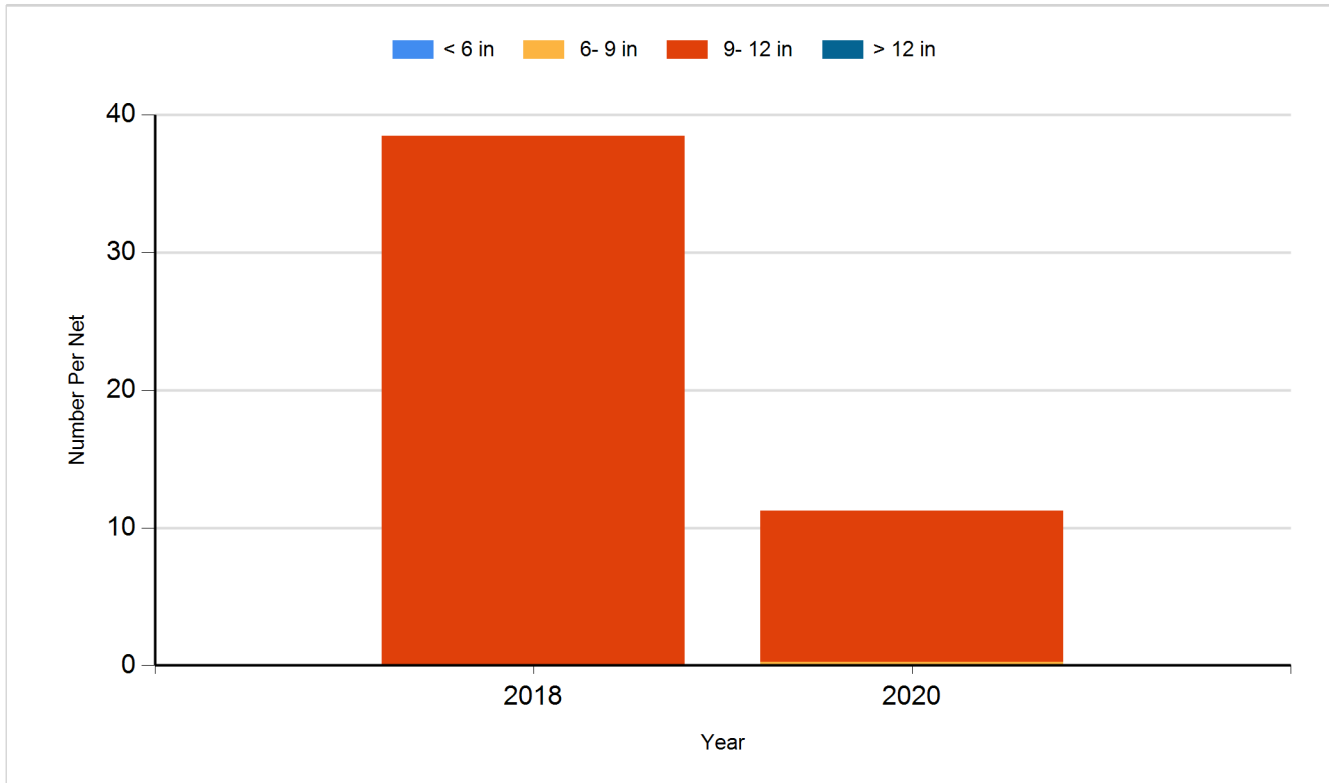
Species: Yellow Perch  
Gear: std exp gill net



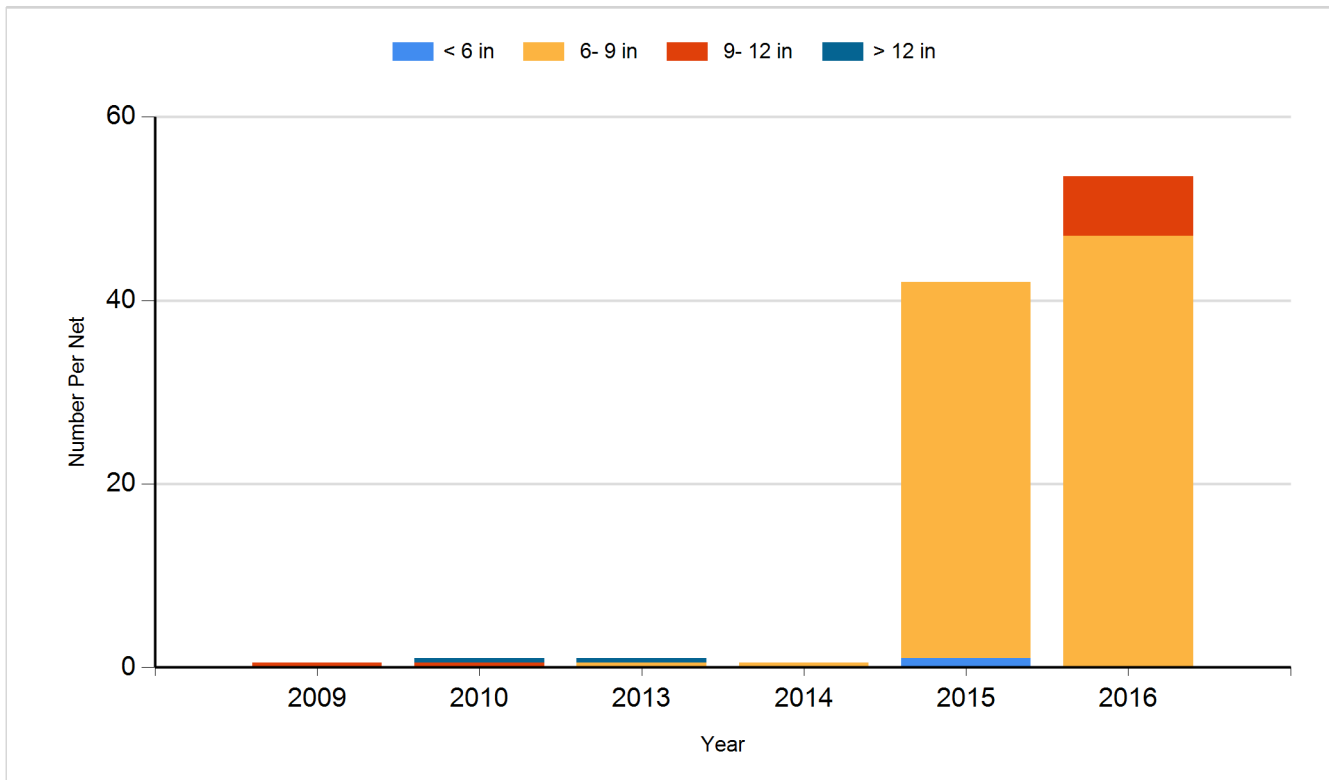
## Historic Fish Sizes and Relative Abundance

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

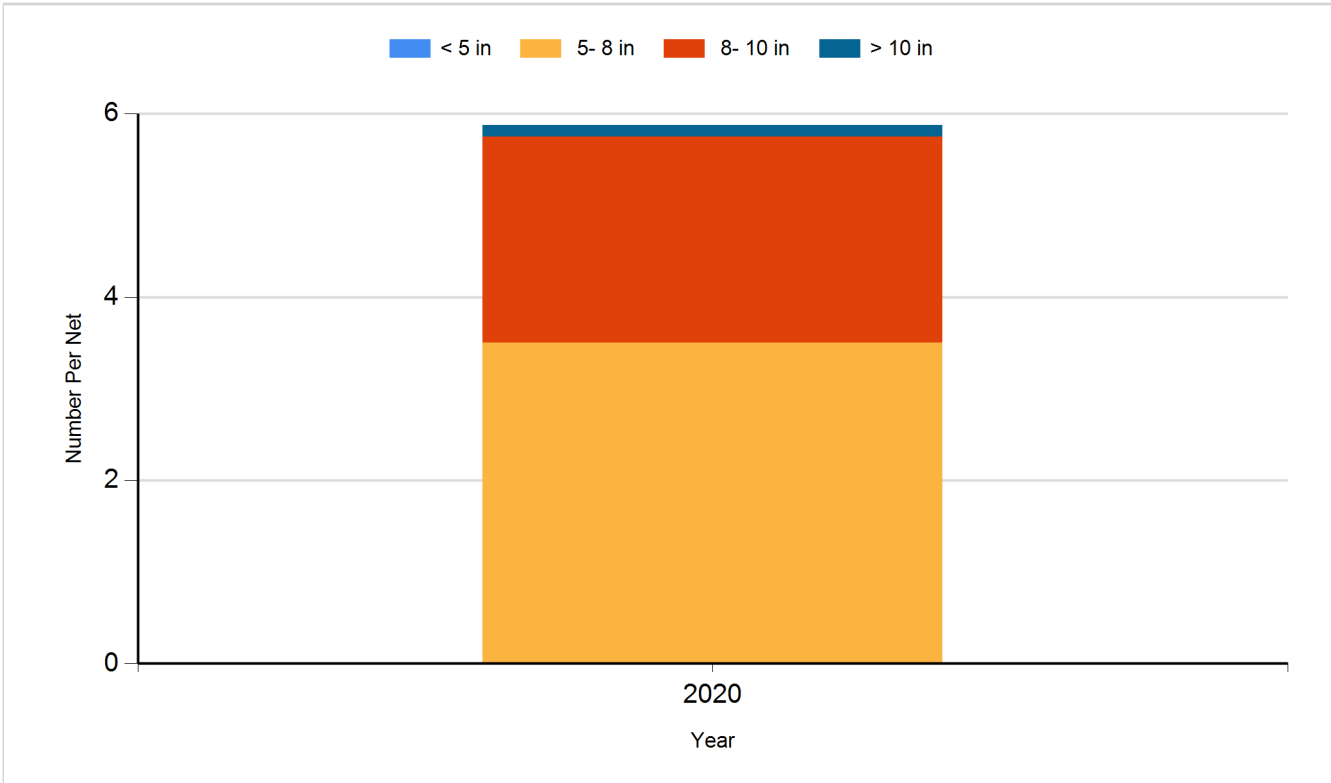
Species: Black Bullhead  
Gear: AFS std gill net



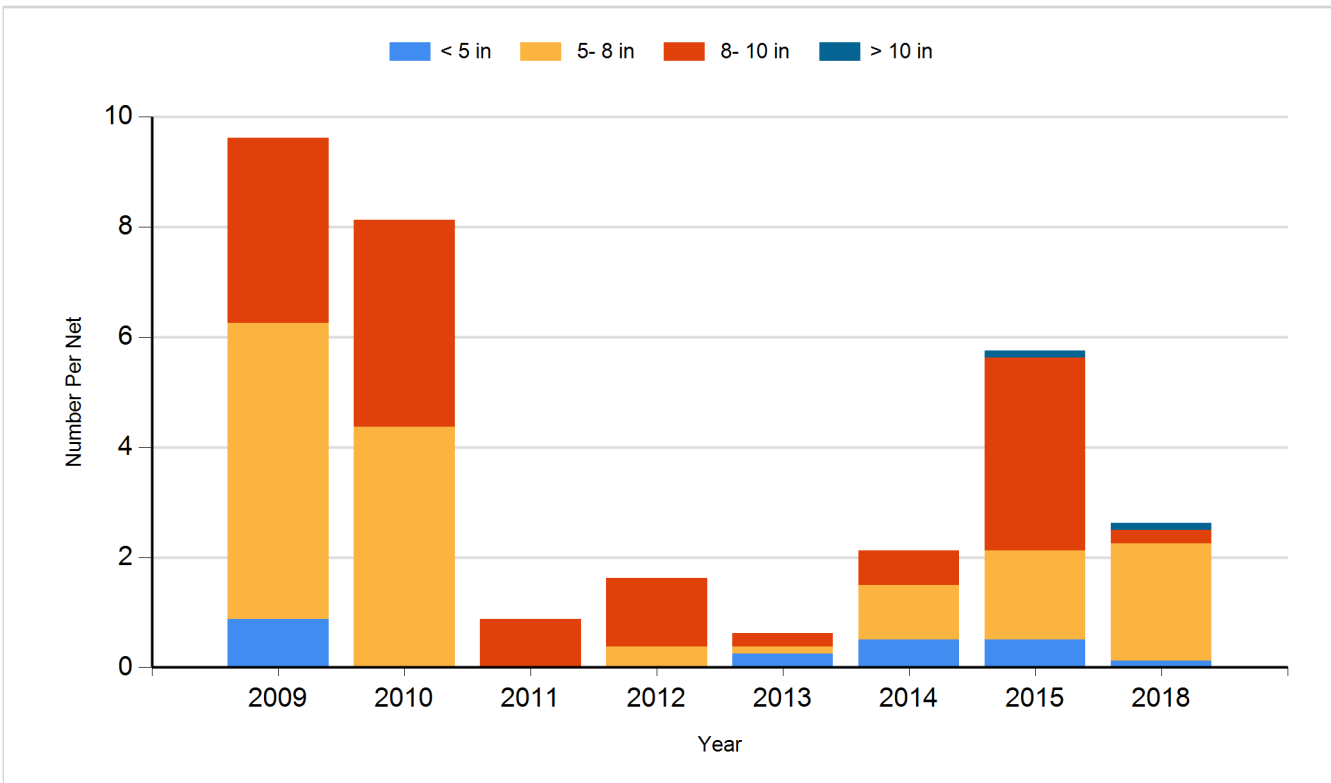
Species: Black Bullhead  
Gear: std exp gill net



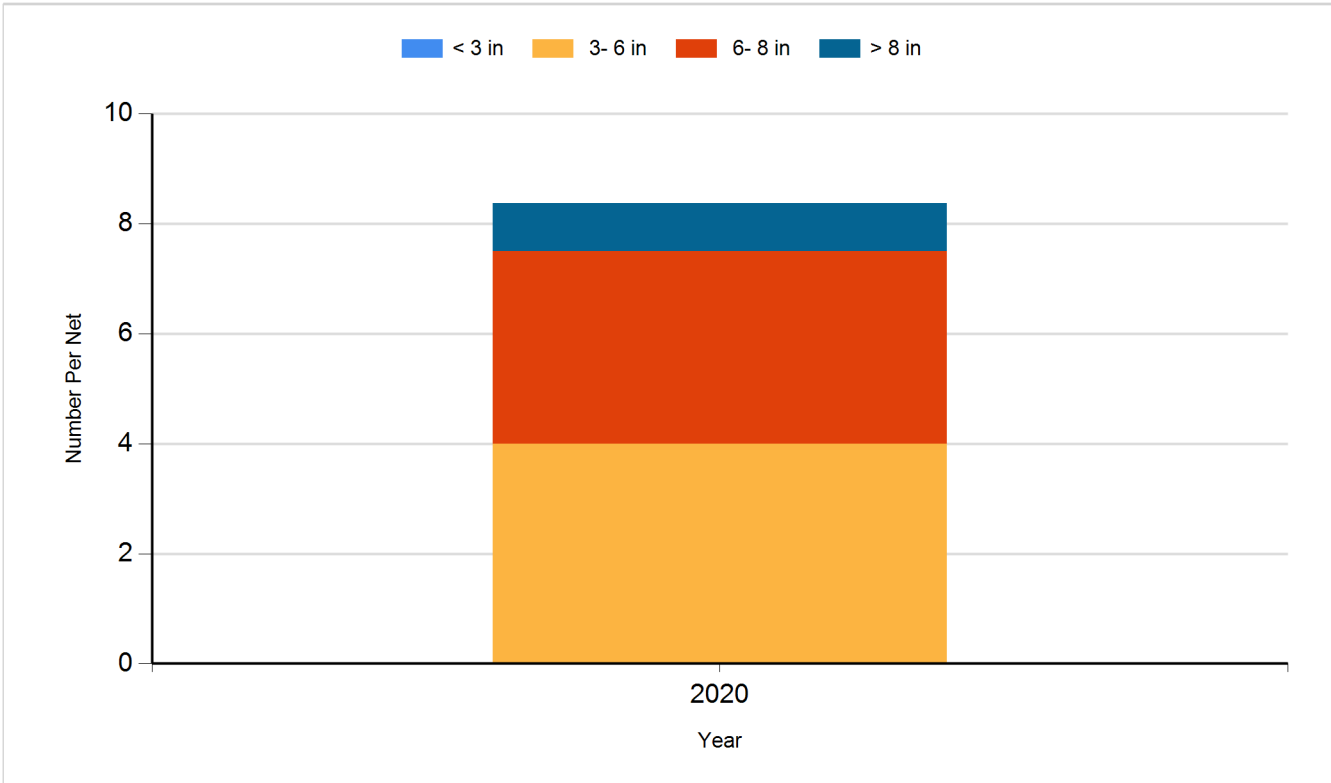
Species: Black Crappie  
Gear: AFS std frame net



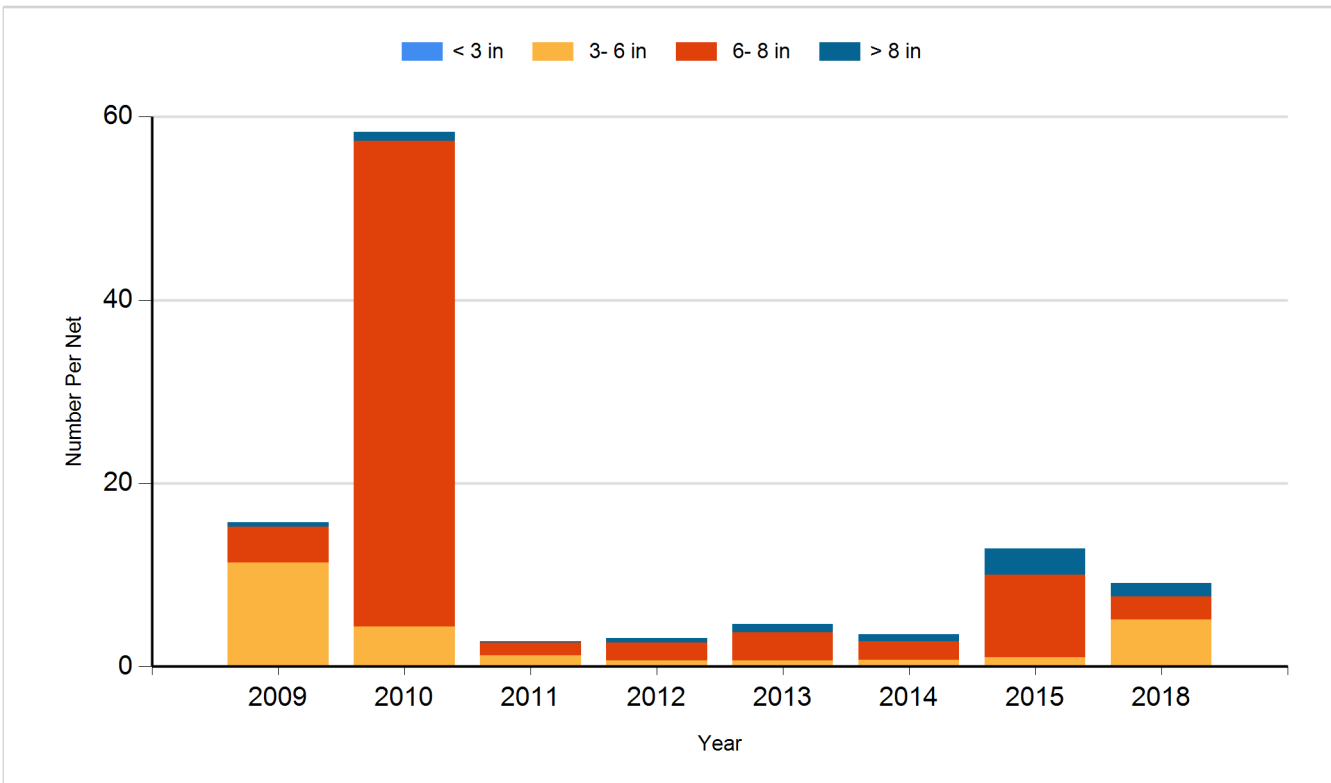
Species: Black Crappie  
Gear: frame net (std 3/4 in)



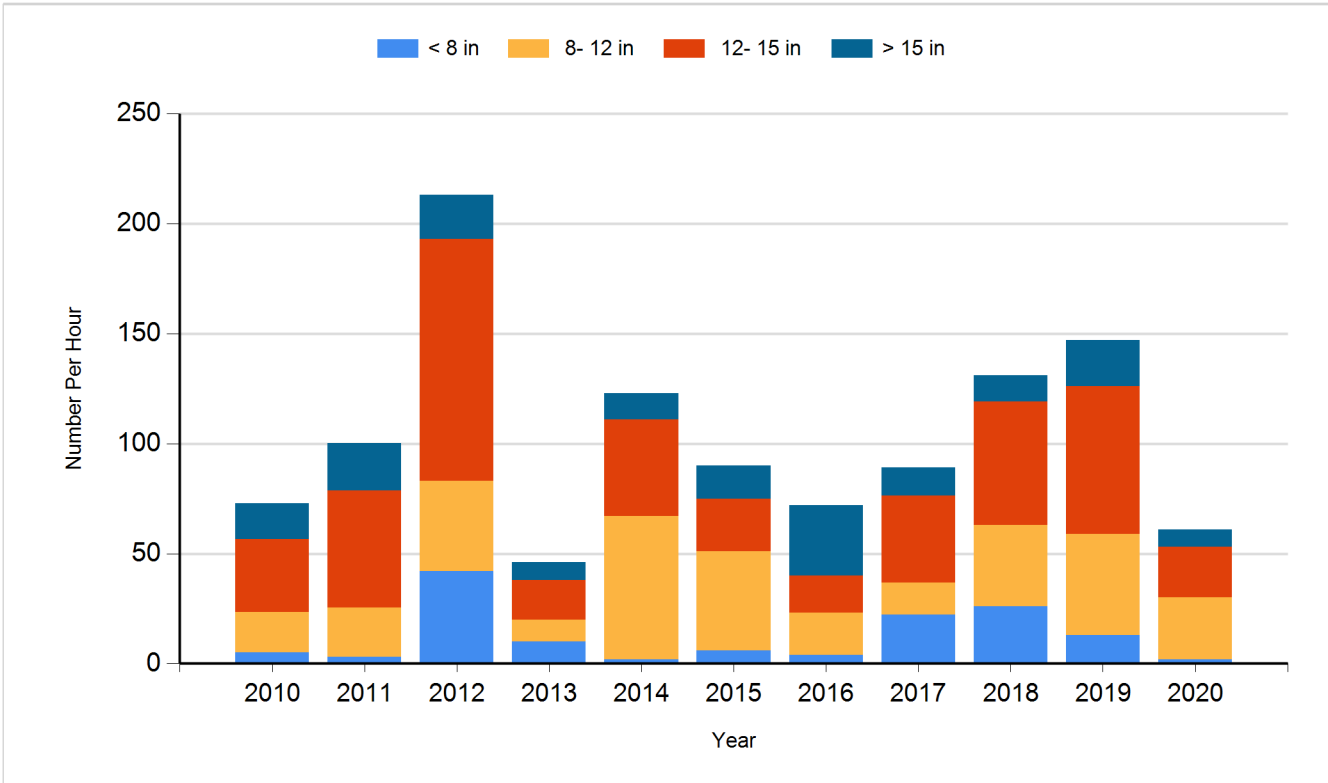
Species: Bluegill  
Gear: AFS std frame net



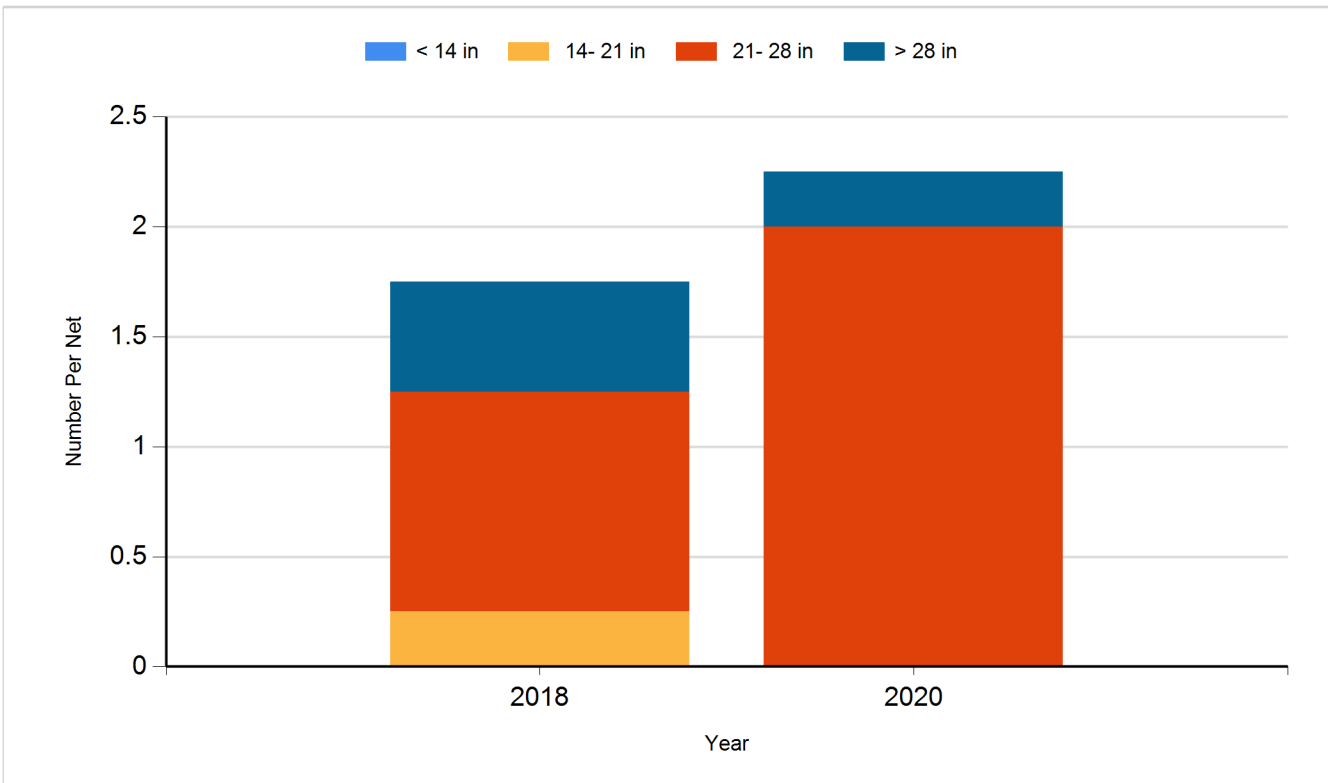
Species: Bluegill  
Gear: frame net (std 3/4 in)



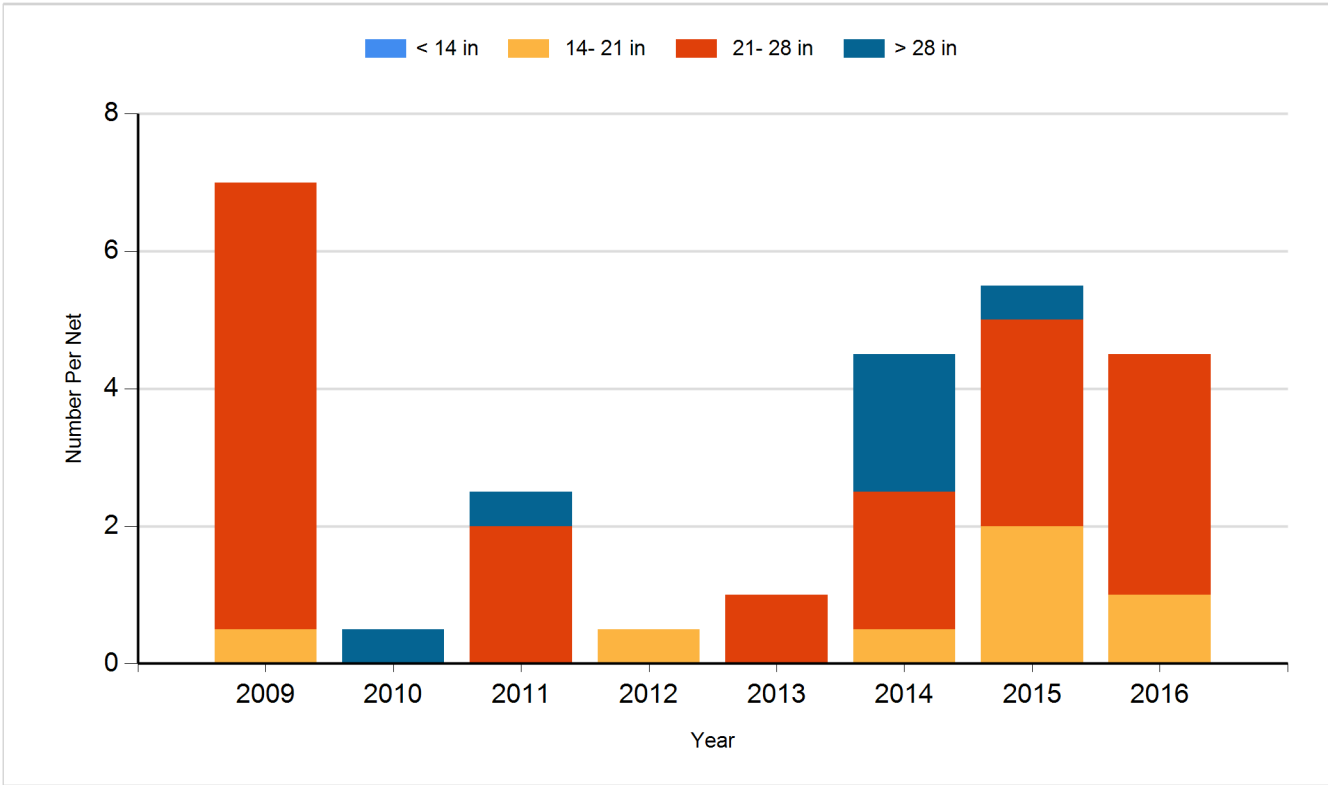
Species: Largemouth Bass  
Gear: boat shocker (night)



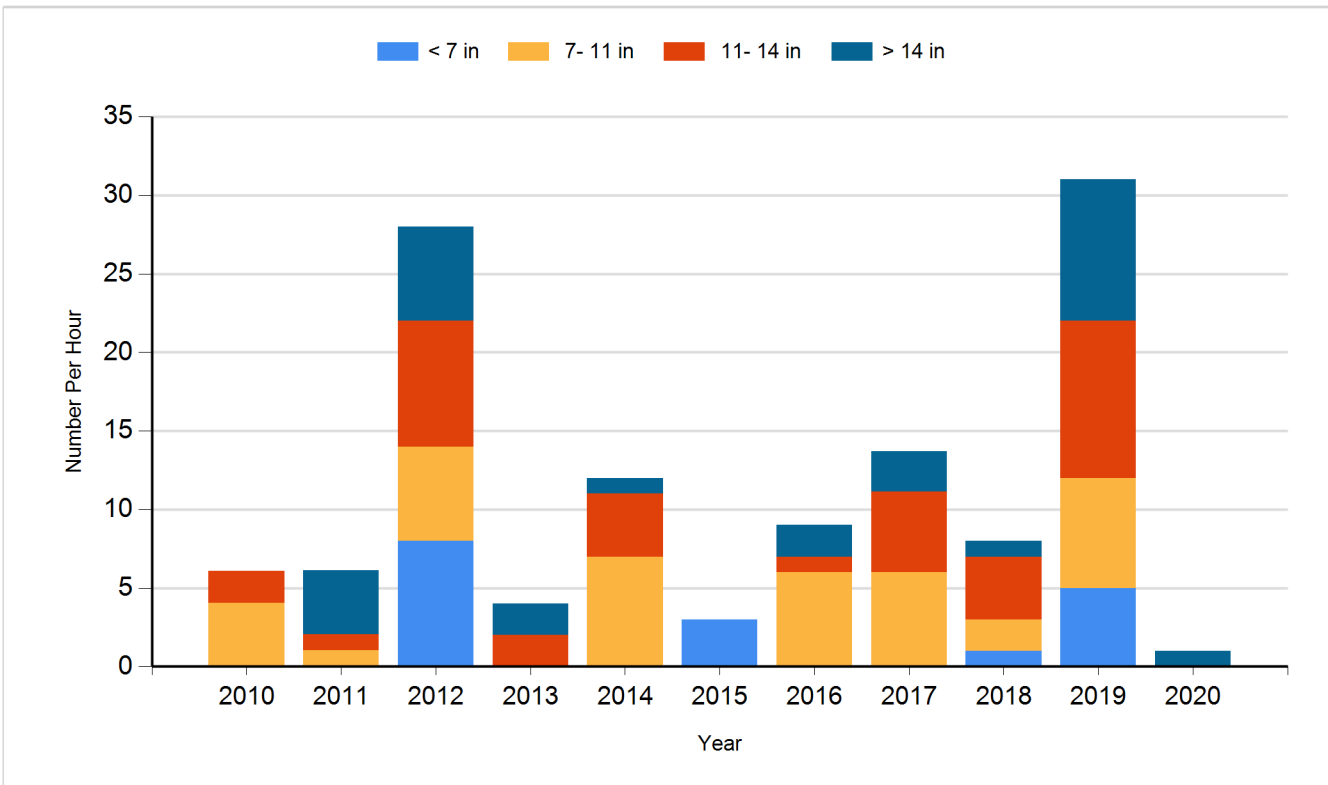
Species: Northern Pike  
Gear: AFS std gill net



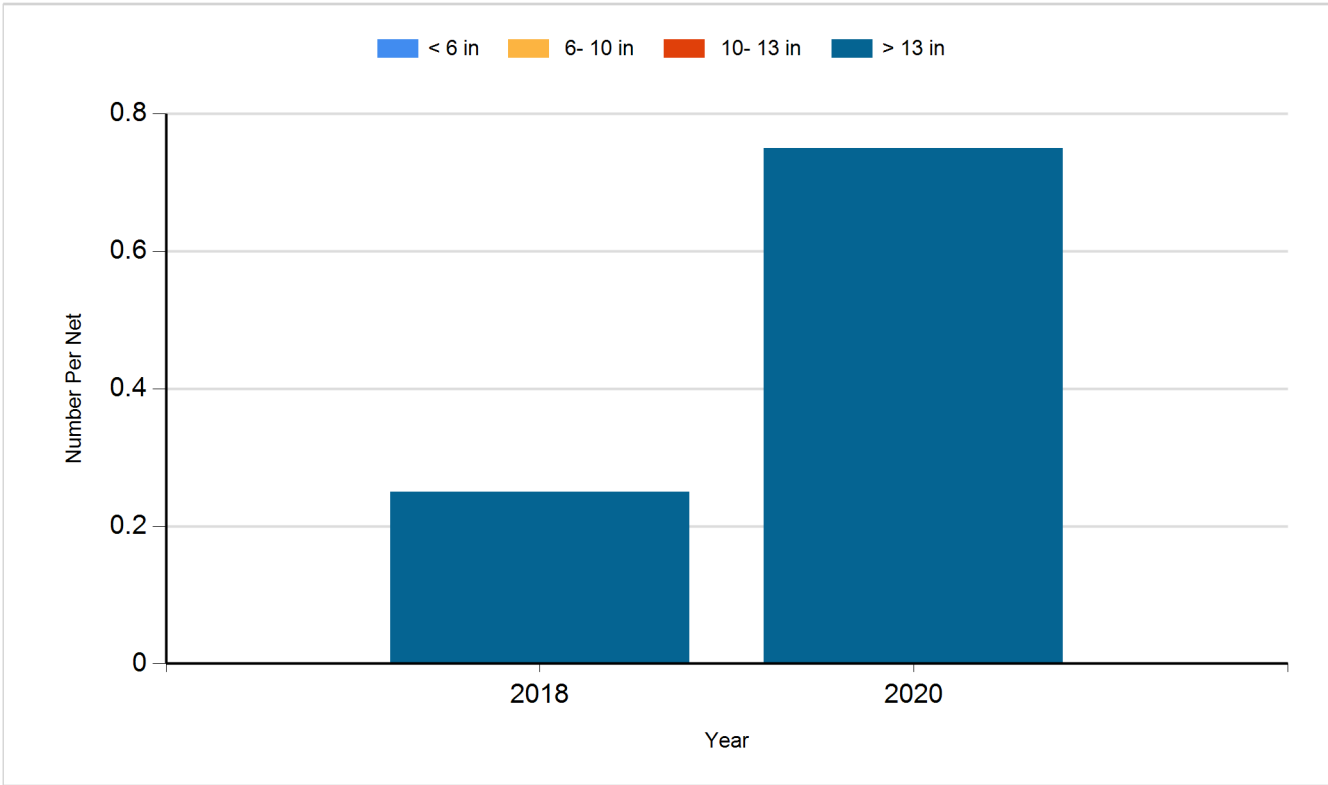
Species: Northern Pike  
Gear: std exp gill net



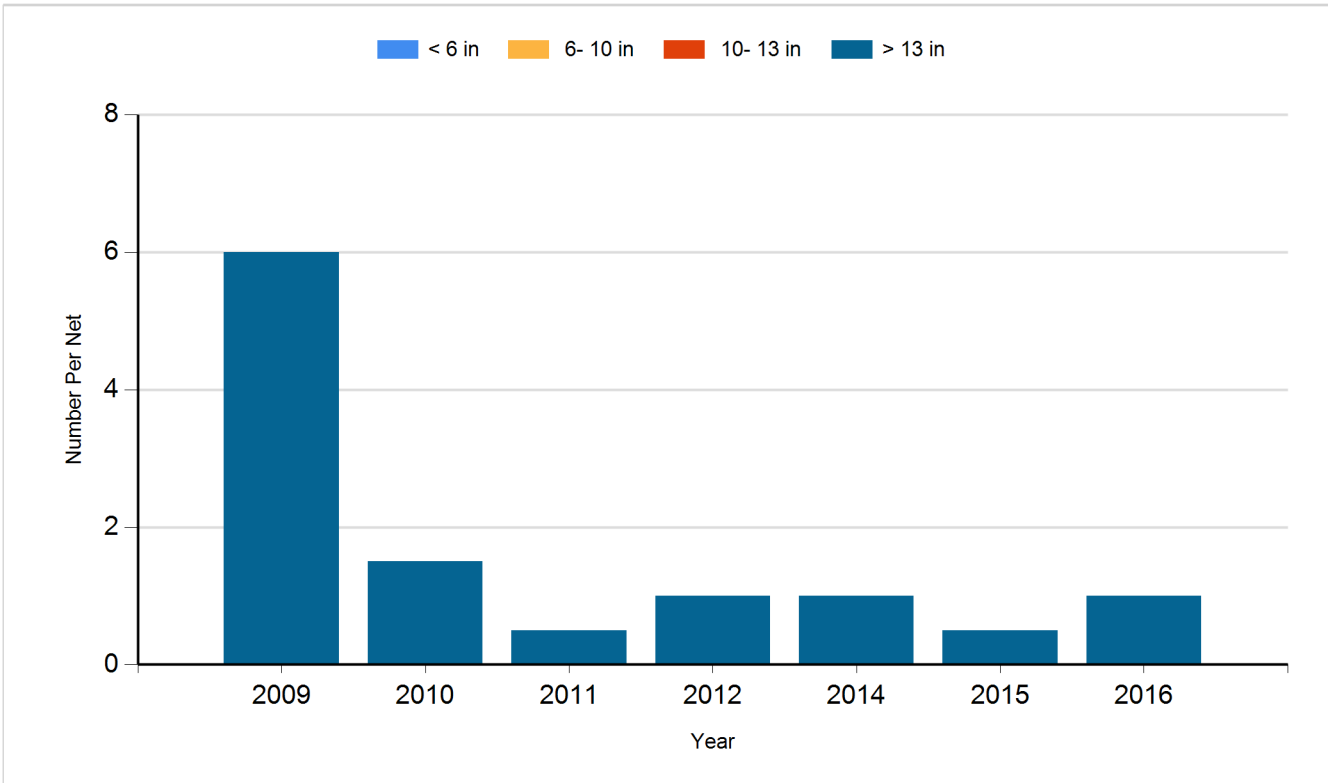
Species: Smallmouth Bass  
Gear: boat shocker (night)



Species: White Sucker  
Gear: AFS std gill net

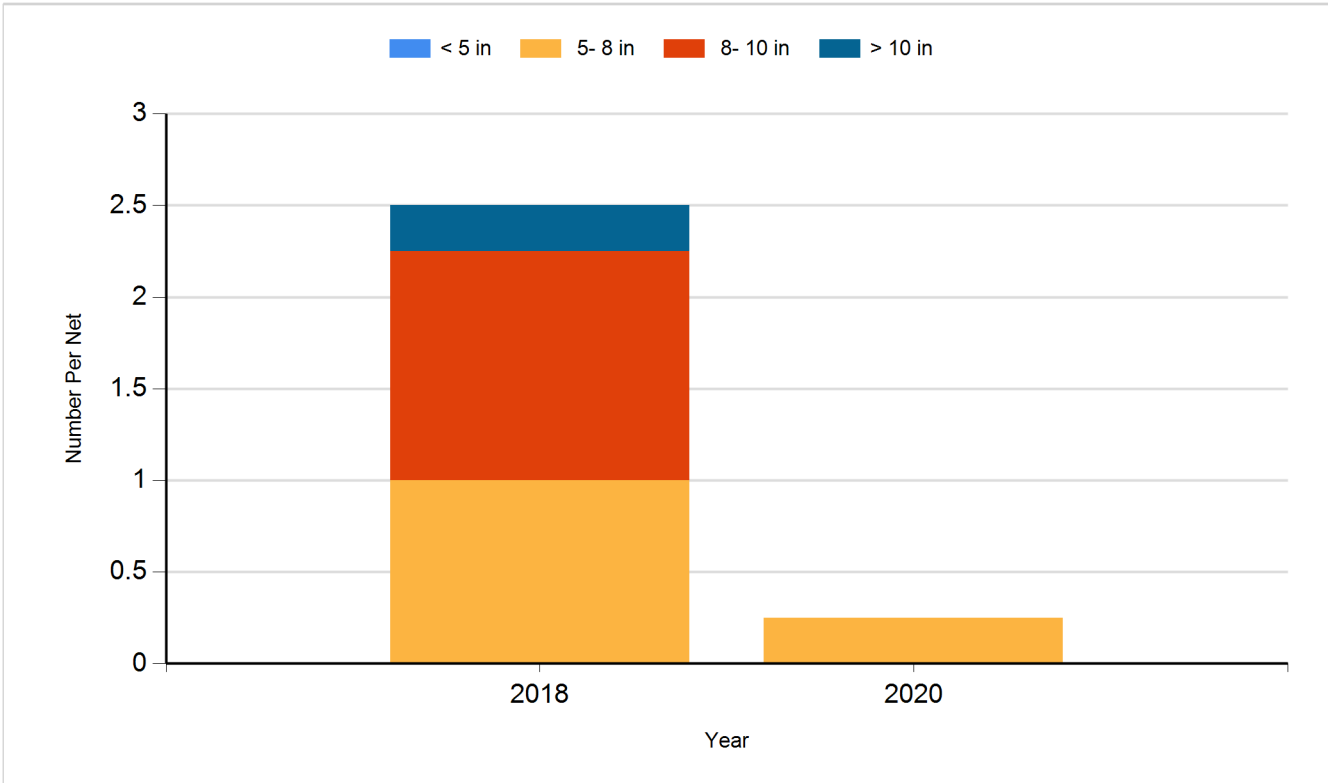


Species: White Sucker  
Gear: std exp gill net

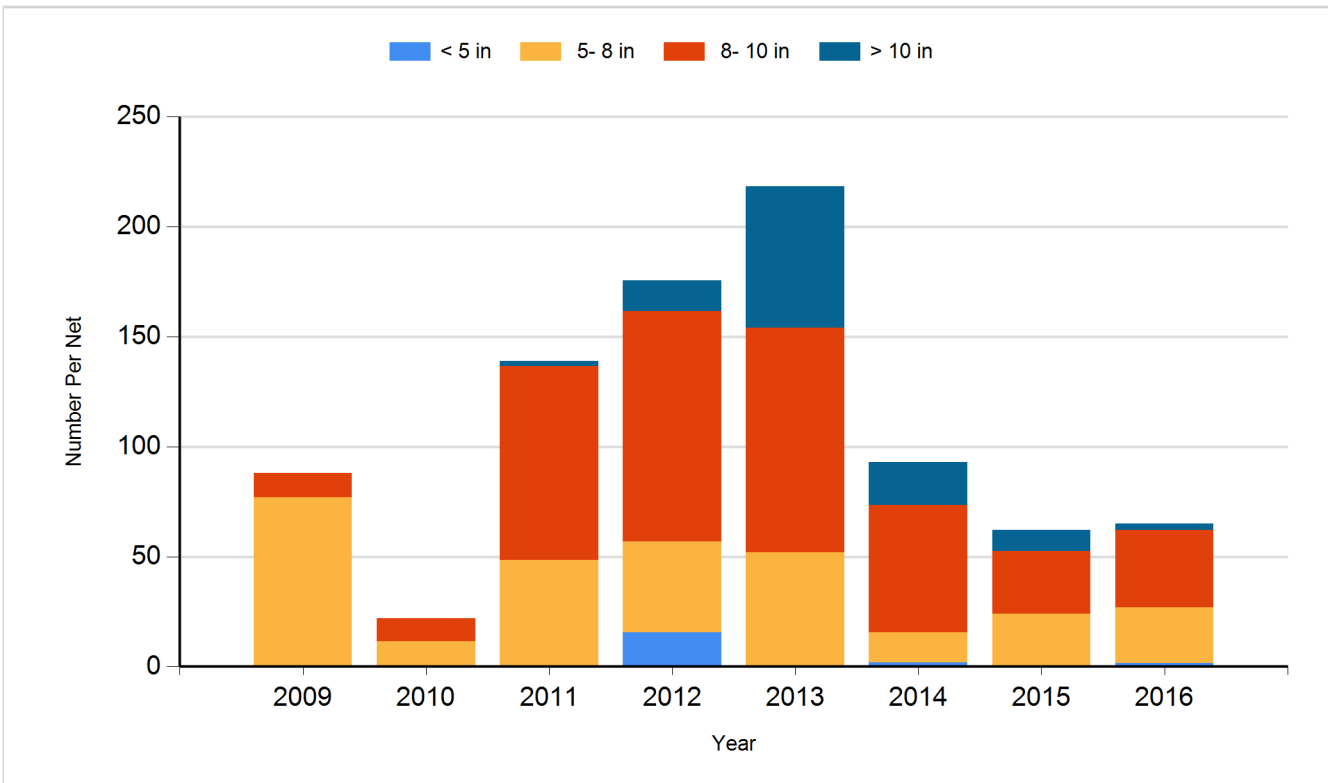




Species: Yellow Perch  
Gear: AFS std gill net



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
2019	Walleye	Small Fingerling	12,240