

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Stockade, Custer County

MCS-Lake-12-000

2022

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	Aug 31, 2022	4 net-nights
boat shocker (day)	Sep 29, 2022	3588 seconds

Common Fish Species Present

Smallmouth Bass

Northern Pike

Largemouth Bass

Bluegill

Yellow Perch

Black Bullhead

Black Crappie

White Sucker

Walleye

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	61	15.3	9.9	100		7			
	Black Crappie	22	5.5	3.7	77	15	0			
	Bluegill	46	11.5	6.6	98		33	10		
	Northern Pike	8	2.0	1.5	88		13			
	Smallmouth Bass	4	1.0	1.6	100		100			
	Walleye	1	0.3	0.4	100		100			
	White Sucker	1	0.3	0.4	100		100			
	Yellow Perch	66	16.5	9.9	5		0			
boat shocker (day)	Largemouth Bass	165	86.0	32.1	59	8	8	5	109	1
	Smallmouth Bass	5	2.0	1.9	0		0		99	6

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
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
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	16.5	15.3	20.40
	Black Crappie						0.0		2.3	7.3	5.5	3.78
	Bluegill						1.5		5.0	20.5	11.5	9.63
	Channel Catfish						0.3		0.0	0.3	0.0	0.15
	Golden Shiner						0.0		0.0	0.0	0.0	0.00
	Largemouth Bass						0.0		0.0	0.3	0.0	0.08
	Northern Pike						1.8		2.3	3.3	2.0	2.35
	Smallmouth Bass						0.3		0.3	1.5	1.0	0.78
	Walleye						0.0		0.0	0.8	0.3	0.28
	White Sucker						0.3		0.8	1.8	0.3	0.80
	Yellow Perch						2.5		0.3	7.0	16.5	6.58
boat shocker (day)	Largemouth Bass										86.0	86.00
	Smallmouth Bass										2.0	2.00
boat shocker (night)	Largemouth Bass	36.0	121.0	84.0	68.0	66.9	105.0	134.0	59.0	64.0		81.99
	Smallmouth Bass	4.0	12.0	0.0	9.0	13.7	7.0	26.0	1.0	4.0		8.52
	Walleye*	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	1.0		0.56
frame net (std 3/4 in)	Black Bullhead	0.3	0.9	471.1			91.4					140.93
	Black Crappie	0.4	1.6	5.3			2.5					2.45
	Bluegill	4.6	3.5	12.8			9.1					7.50
	Bluegill X Gr. Sunfish Hybrid	0.0	0.0	0.1			0.0					0.03
	Golden Shiner	0.0	0.0	0.0			0.0					0.00
	Largemouth Bass	0.0	0.0	0.1			0.0					0.03
	Northern Pike	0.9	1.5	0.6			0.8					0.95
	Smallmouth Bass	0.0	0.0	0.4			0.6					0.25
	White Sucker	0.0	0.3	0.1			0.1					0.13
	Yellow Perch	48.0	197.5	3.0			21.0					67.38

CPUE

Gear	Species	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
std exp gill net	Black Bullhead	1.0	0.5	41.0	53.5							24.00
	Black Crappie	8.5	10.5	0.5	0.0							4.88
	Bluegill	6.5	2.0	1.5	1.0							2.75
	Golden Shiner	0.0	0.0	0.0	0.0							0.00
	Largemouth Bass	0.0	0.0	0.5	1.0							0.38
	Northern Pike	1.0	4.5	5.5	4.5							3.88
	Smallmouth Bass	0.0	0.5	0.0	0.0							0.13
	White Sucker	0.0	1.0	0.5	1.0							0.63
	Yellow Perch	218.5	91.0	61.5	63.5							108.6 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											
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
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			
	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	100	100	
		PSD-P							0		0	2	7	
		Wr							88		95	95		
	Black Crappie	PSD										11	93	77
		PSD-P										0	0	0
		Wr										107	110	
	Bluegill	PSD								100		75	94	98
		PSD-P								33		10	10	33
		Wr								109		108	106	
	Largemouth Bass	PSD											100	
		PSD-P											100	
		Wr											116	
	Northern Pike	PSD								86		100	85	88
		PSD-P								29		11	38	13
		Wr								95		91	96	

Gear	Species	Index	Year										
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
AFS std gill net	Smallmouth Bass	PSD							100	100	100	100	
		PSD-P							100	100	67	100	
		Wr							77	89	102		
	Walleye	PSD										67	100
		PSD-P										0	100
		Wr										88	
	White Sucker	PSD								100	100	100	100
		PSD-P								100	100	100	100
		Wr								97	97	102	
Yellow Perch	PSD								60	0	0	5	
	PSD-P								10	0	0	0	
	Wr								84	93	108		
boat shocker (day)	Largemouth Bass	PSD											59
		PSD-P											8
		Wr											109
	Smallmouth Bass	PSD											0
		PSD-P											0
		Wr											99
boat shocker (night)	Largemouth Bass	PSD	72	46	46	72	78	65	66	53	83		
		PSD-P	22	10	18	47	19	11	16	14	19		
		Wr	111	105	125	75	111	103	105	104	101		
	Smallmouth Bass	PSD	100	42	0	33	56	71	73	100	75		
		PSD-P	50	8	0	22	19	14	35	100	0		
		Wr	64	97		66	100	93	90	60	88		
	Walleye	PSD								0	0		
		PSD-P								0	0		
		Wr								104	102		
frame net (std 3/4 in)	Black Bullhead	PSD	100	29	0				79				
		PSD-P	100	29	0				0				
		Wr	102	81	84				88				
	Black Crappie	PSD	67	38	69				15				
		PSD-P	0	0	2				5				
		Wr	105	106	109				102				
	Bluegill	PSD	86	79	93				44				
		PSD-P	19	21	23				16				
		Wr	122	121	111				103				

Gear	Species	Index	Year															
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022						
frame net (std 3/4 in)	Largemouth Bass	PSD			100													
		PSD-P			0													
		Wr			110													
	Northern Pike	PSD	71	67	40				50									
		PSD-P	57	50	0				17									
		Wr	98	92	81				96									
	Smallmouth Bass	PSD			67				80									
		PSD-P			33				20									
		Wr			95				90									
	White Sucker	PSD		100	100				100									
		PSD-P		100	100				100									
		Wr		93	102				101									
	Yellow Perch	PSD	99	97	92				89									
		PSD-P	26	42	42				4									
		Wr	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	6	33	0													
		PSD-P	0	0	0													
		Wr	109	108	96													
Bluegill		PSD	100	100	100	50												
		PSD-P	62	100	100	50												
		Wr	113	98	102	123												
Largemouth Bass		PSD			100	100												
		PSD-P			0	100												
		Wr			131	99												
Northern Pike		PSD	100	89	64	78												
		PSD-P	0	44	9	0												
		Wr	88	98	90	95												
Smallmouth Bass		PSD		100														
		PSD-P		100														
		Wr		90														
White Sucker		PSD		100	100	100												
		PSD-P		100	100	100												
		Wr		105	109	104												
Yellow Perch		PSD	76	85	62	60												

Gear	Species	Index	Year										
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
std exp gill net	Yellow Perch	PSD-P	30	21	15	5							
		Wr	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)	

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)	

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).

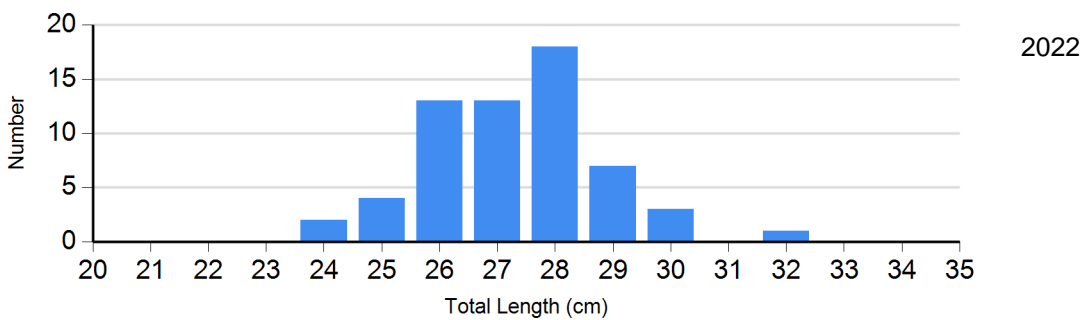
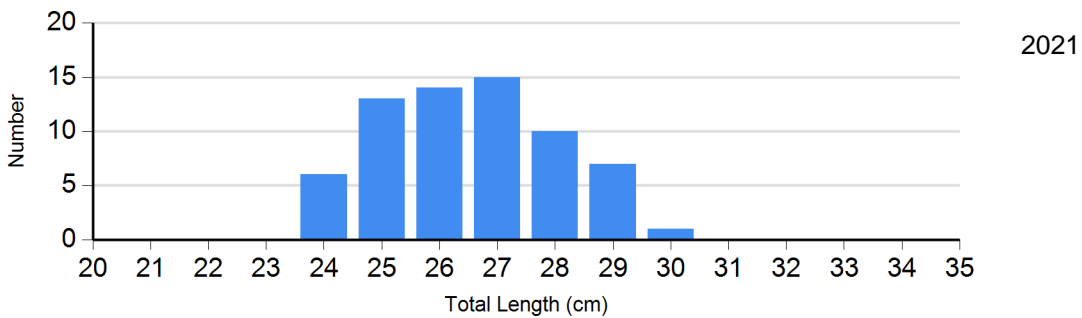
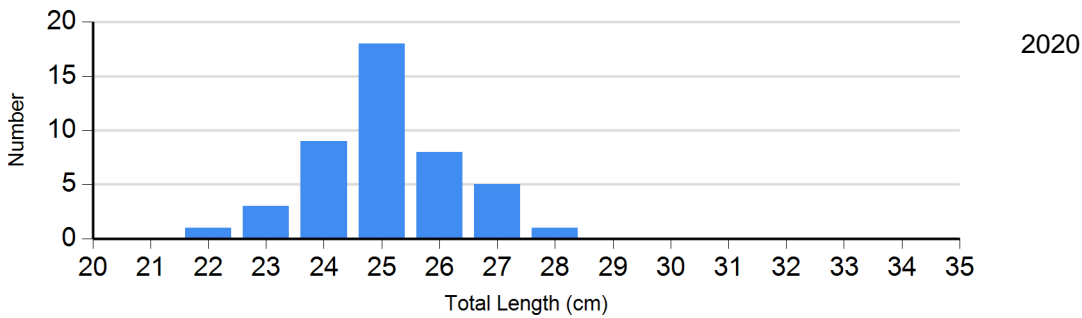
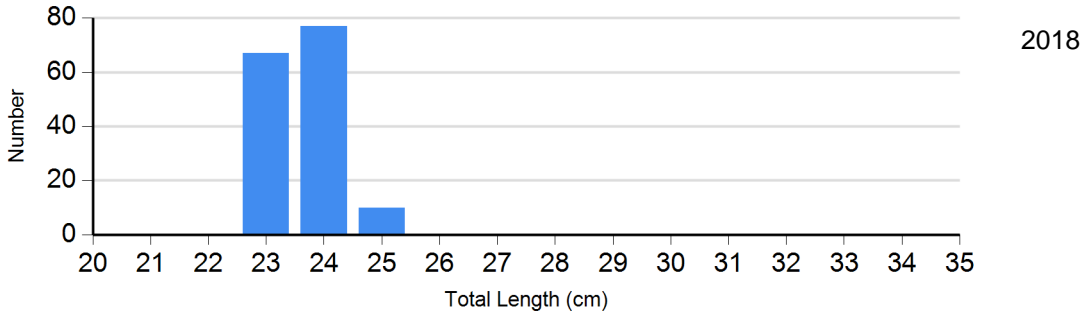
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2018	0		154	88 (1.4)	0		0	
	2020	1	89	44	95 (1.4)	0		0	
	2021	0		65	94 (1.2)	1	98	0	
Black Crappie Frame Net	2018	17	103 (1.0)	2	105 (2.9)	1	92	0	
	2020	28	99 (1.2)	18	94 (1.3)	1	77	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	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	
	2021	11	103 (2.7)	41	102 (0.9)	12	96 (2.2)	0	
	2022	35	110 (1.2)	44	109 (0.9)	7	99 (3.6)	0	
Northern Pike Gill Net	2018	1	95	4	93 (1.4)	2	99 (9.0)	0	
	2020	0		8	91 (1.3)	1	92	0	
	2021	2	88 (10.3)	6	103 (8.6)	4	90 (4.6)	1	
Smallmouth Bass Electro Fishing	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	
	2021	1	80	3	90 (5.1)	0		0	
	2022	2	99 (4.4)	0		0		0	
Walleye Gill Net	2021	1	75	2	94 (8.3)	0		0	
White Sucker Gill Net	2018	0		0		0		1	97
	2020	0		0		0		3	97 (6.6)

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	2021	0		0		0		7	102 (2.2)
Yellow Perch Gill Net	2018	4	94 (1.4)	5	79 (2.7)	1	76	0	
	2020	1	93	0		0		0	
	2021	28	108 (2.2)	0		0		0	

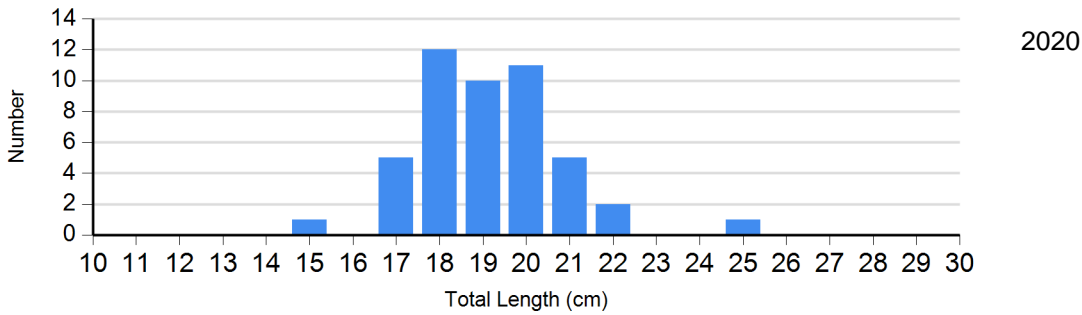
Length Frequency Distribution

Length frequency histogram of species sampled by year.

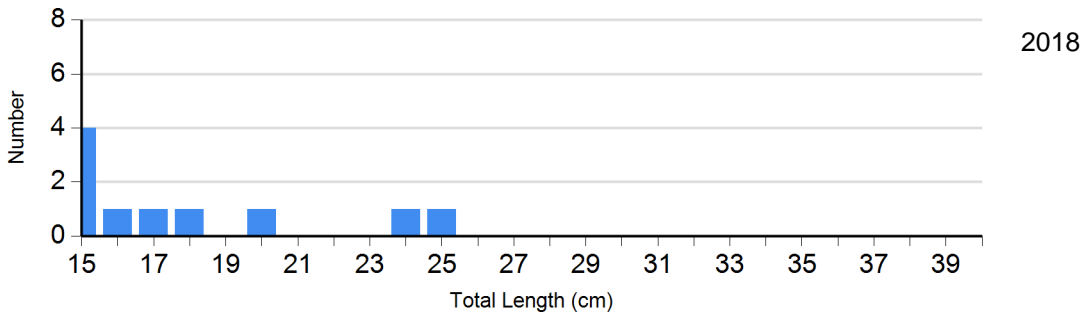
Species: Black Bullhead
Gear: AFS std gill net



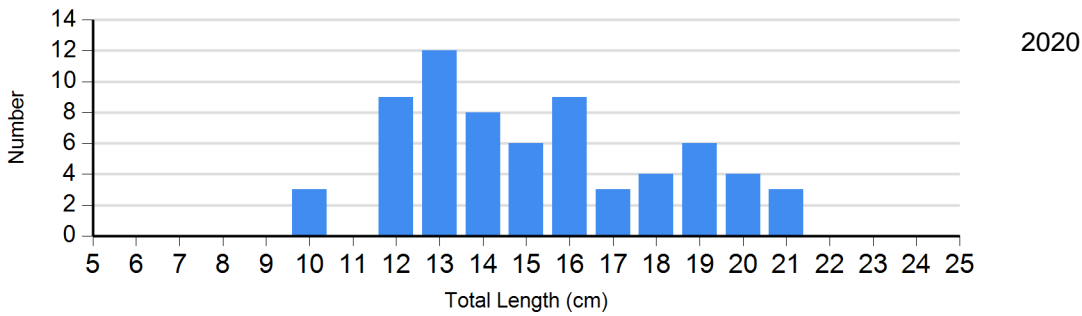
Species: Black Crappie
Gear: AFS std frame net



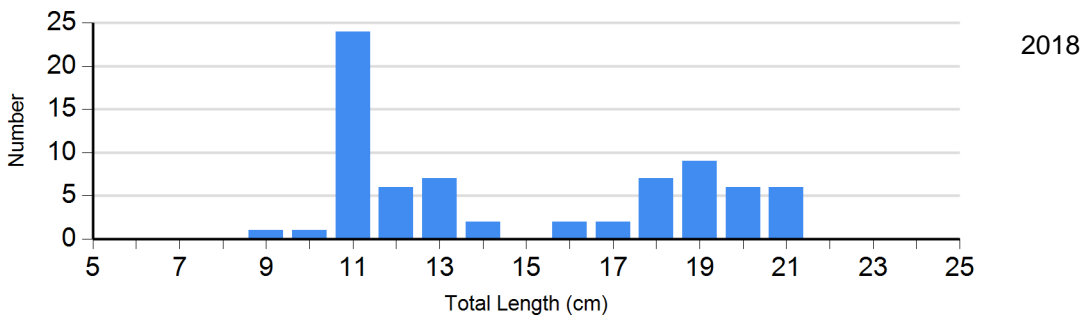
Species: Black Crappie
Gear: frame net (std 3/4 in)



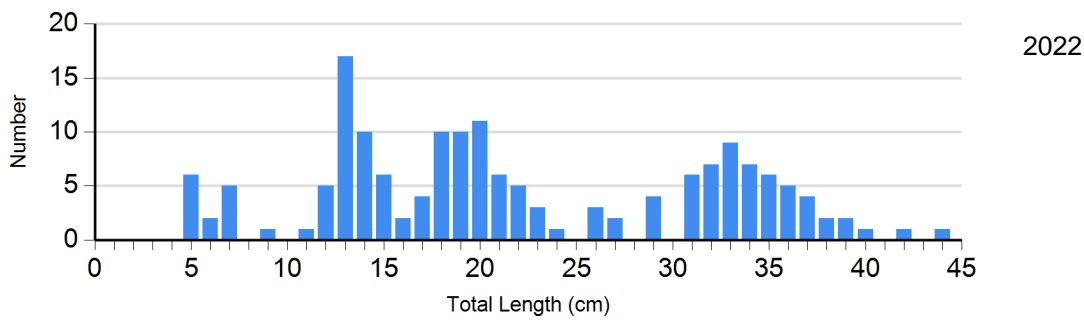
Species: Bluegill
Gear: AFS std frame net



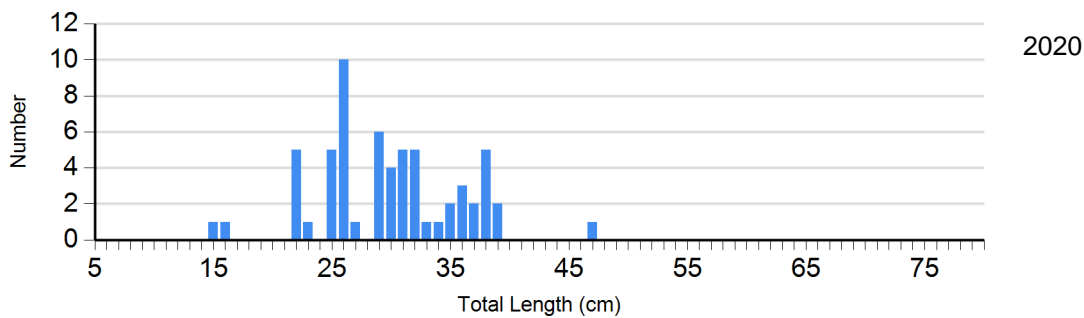
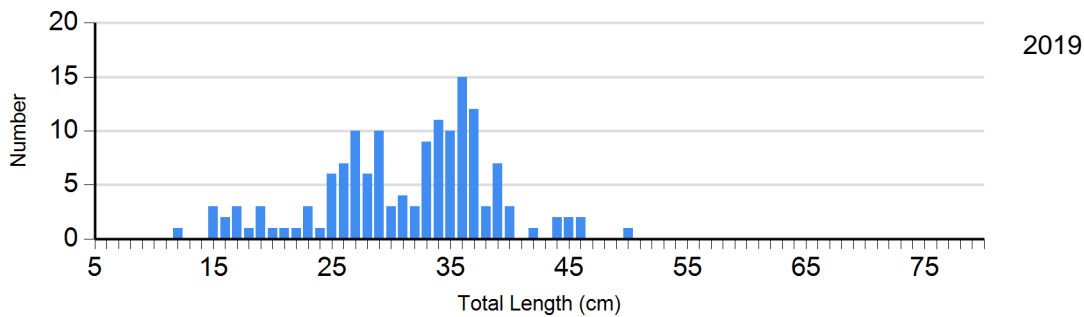
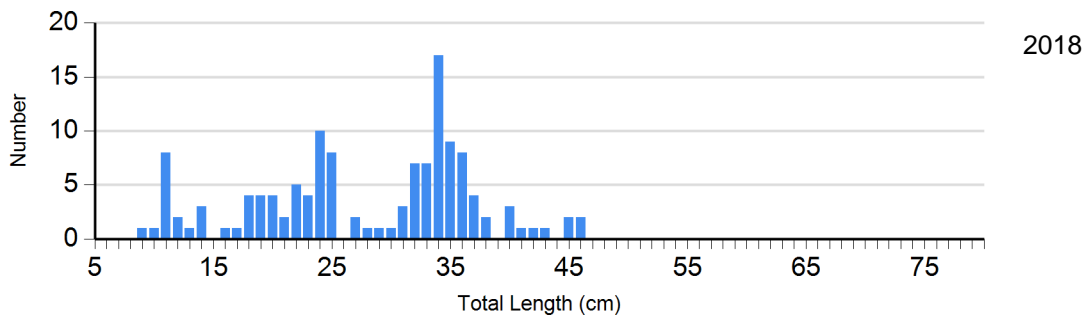
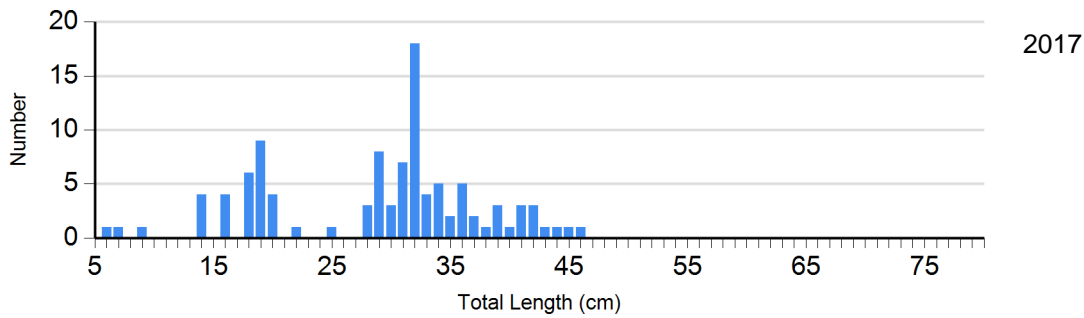
Species: Bluegill
Gear: frame net (std 3/4 in)

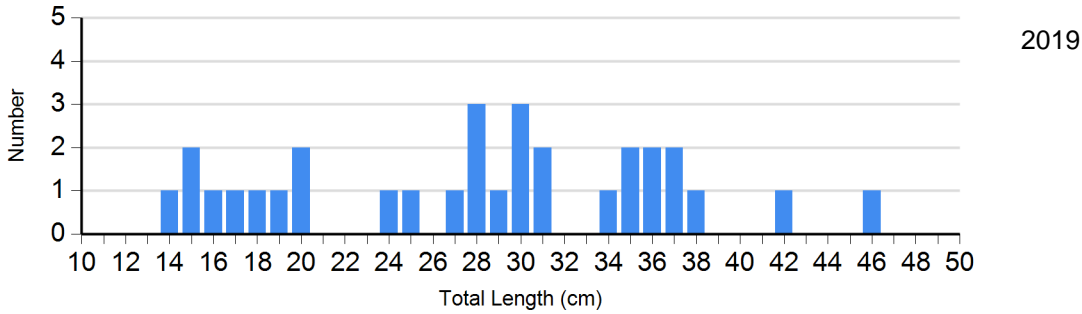
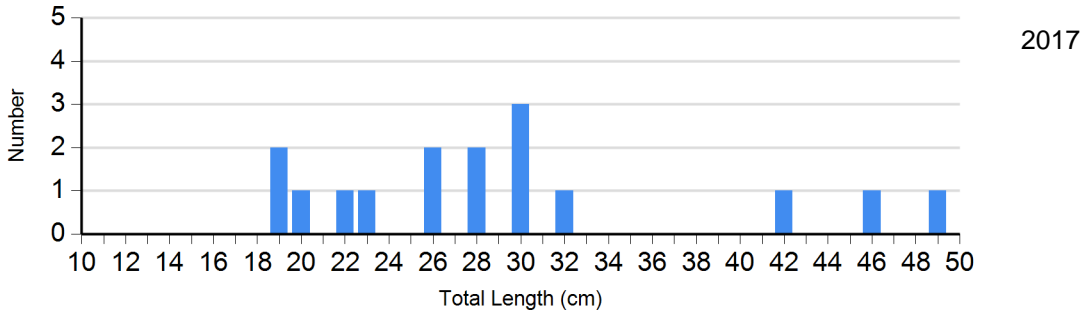
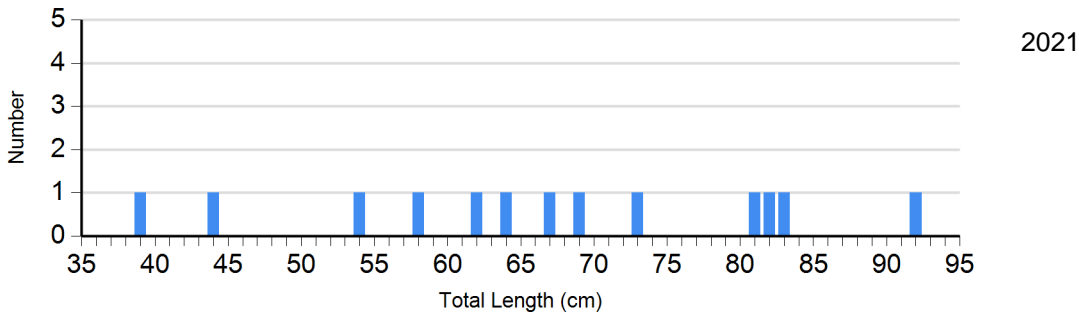
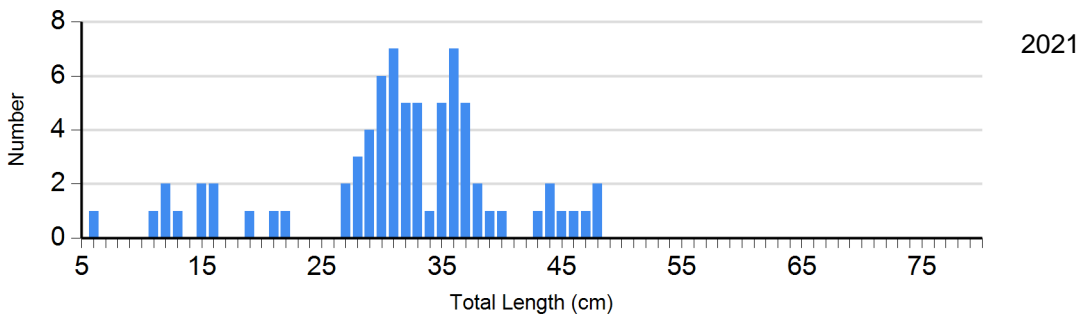


Species: Largemouth Bass
Gear: boat shocker (day)

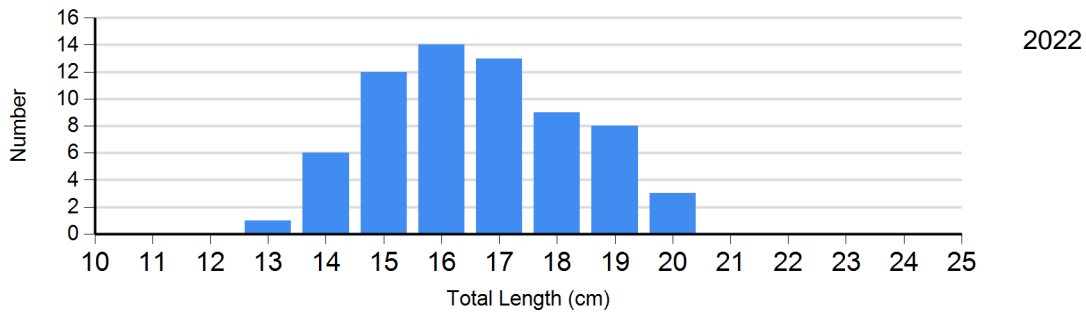
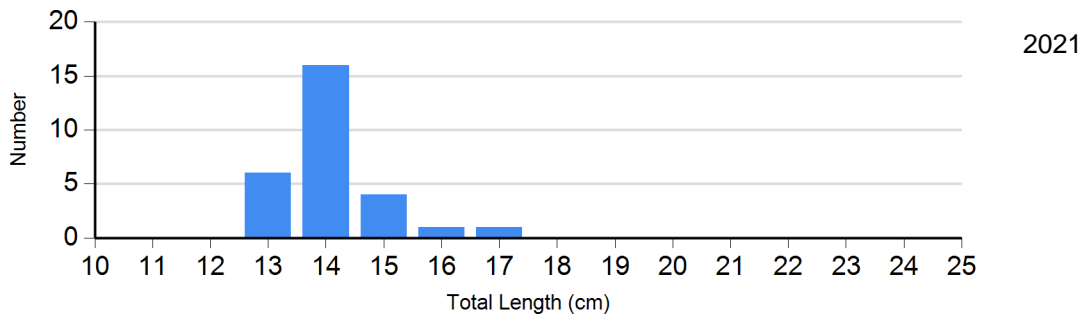
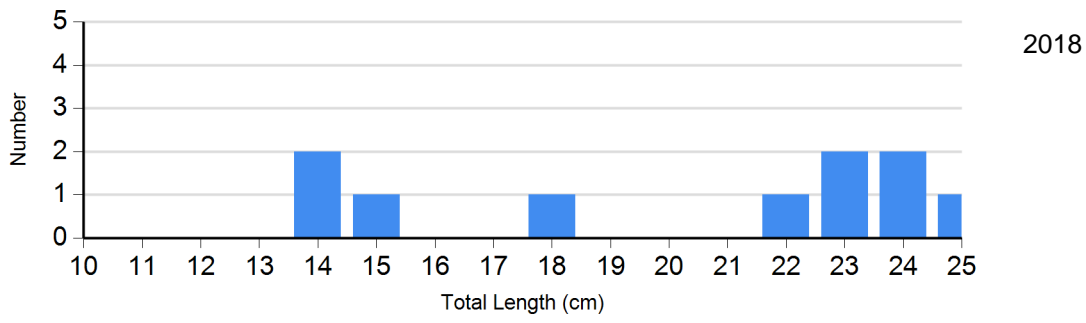


Species: Largemouth Bass
Gear: boat shocker (night)





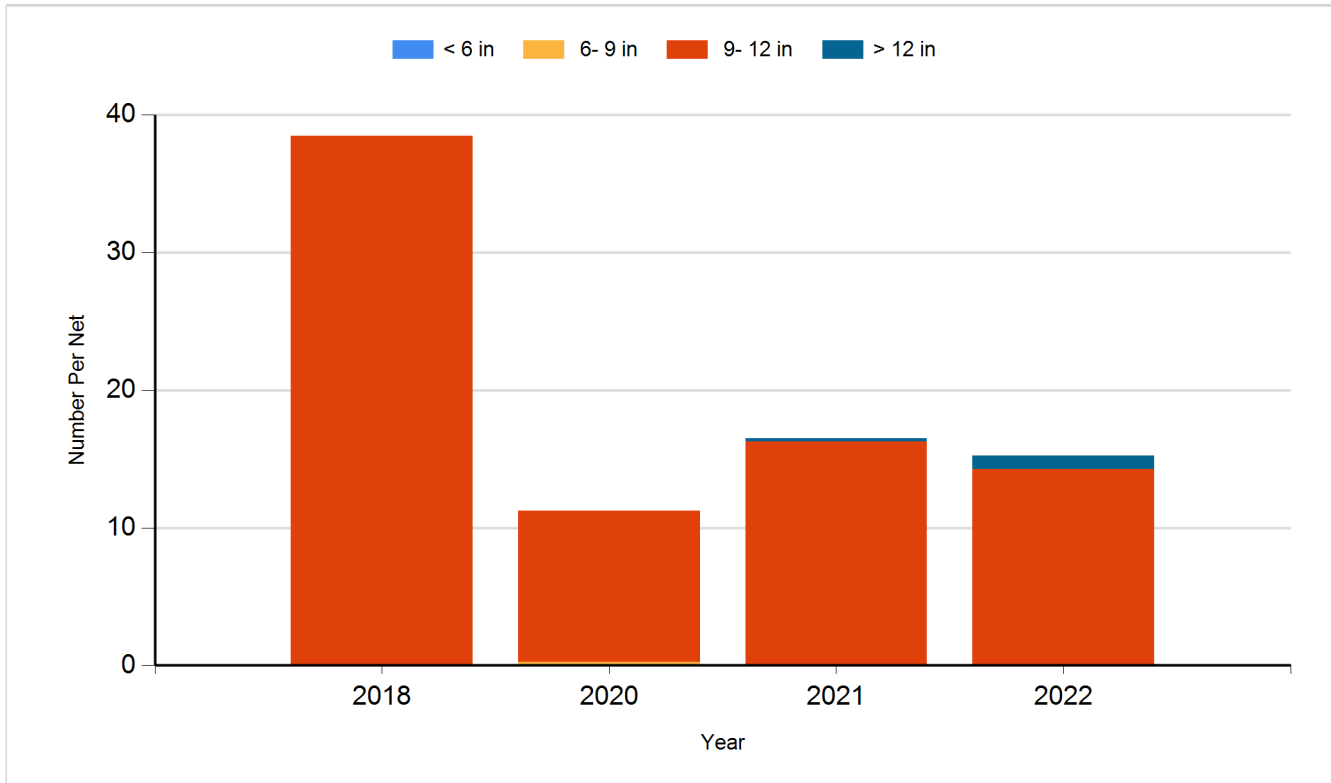
Species: Yellow Perch
Gear: AFS std gill net



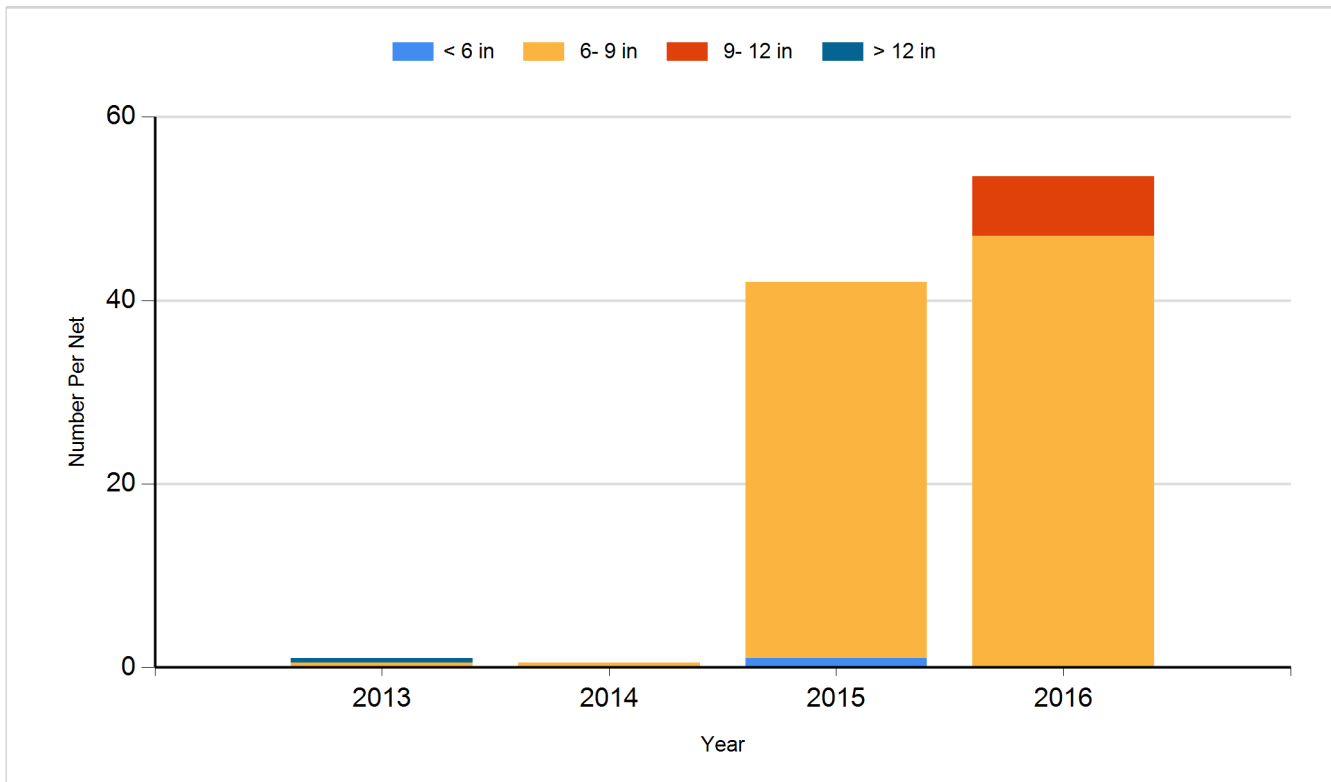
Historic Fish Sizes and Relative Abundance

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

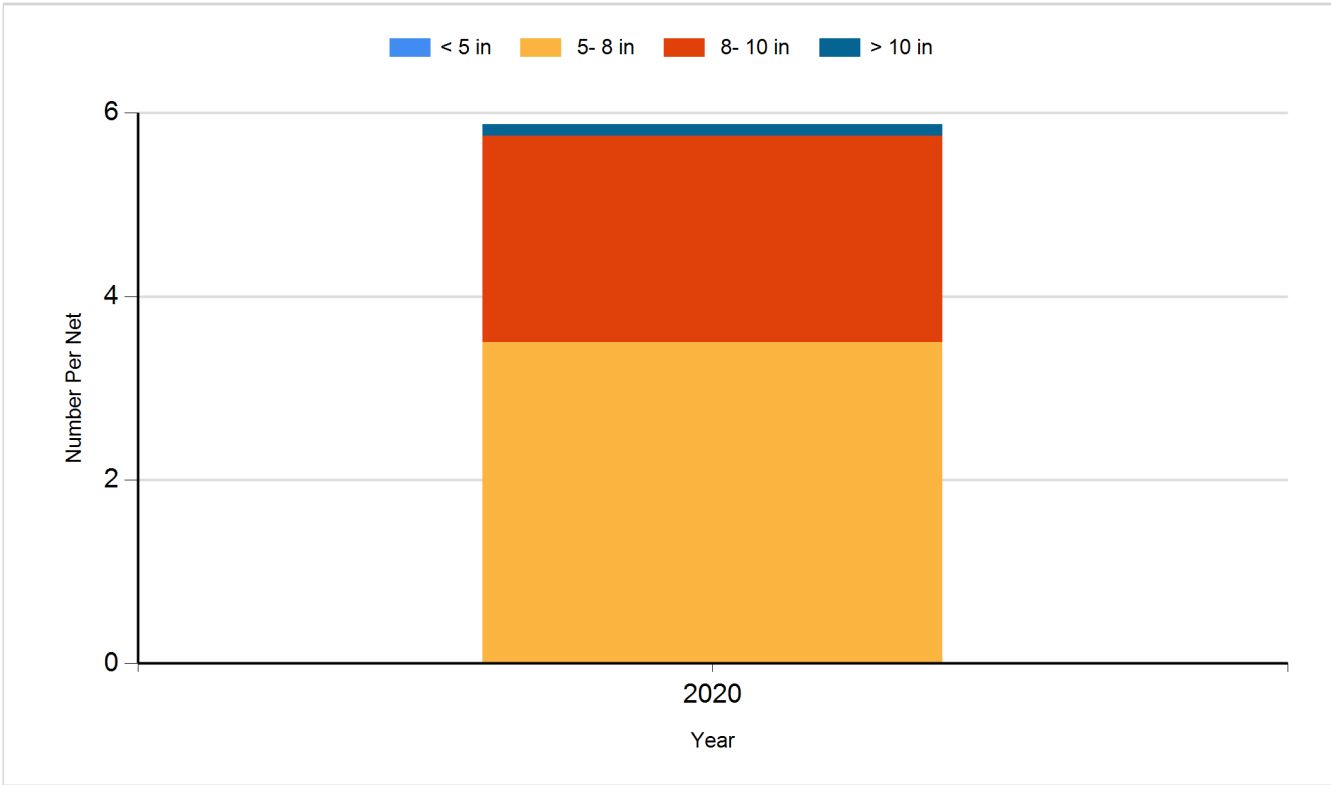
Species: Black Bullhead
Gear: AFS std gill net



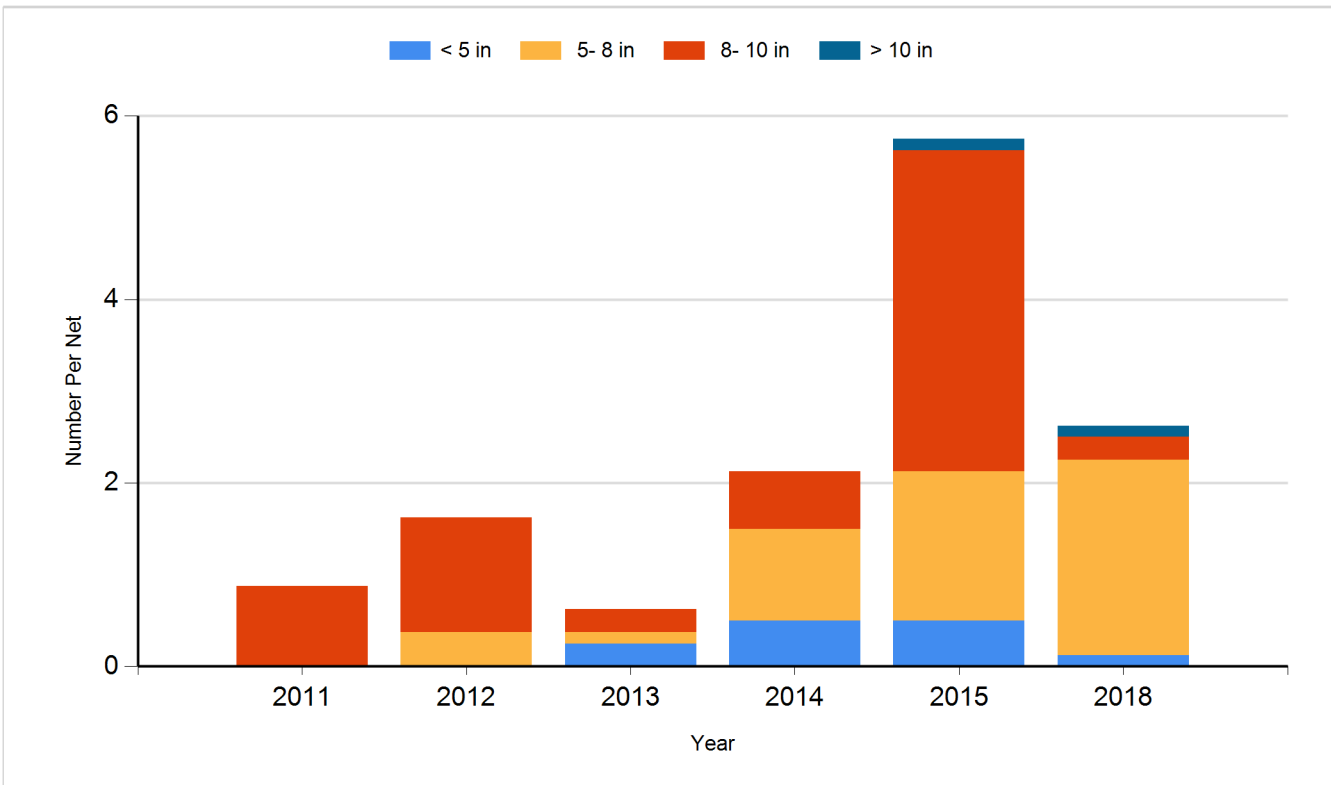
Species: Black Bullhead
Gear: std exp gill net



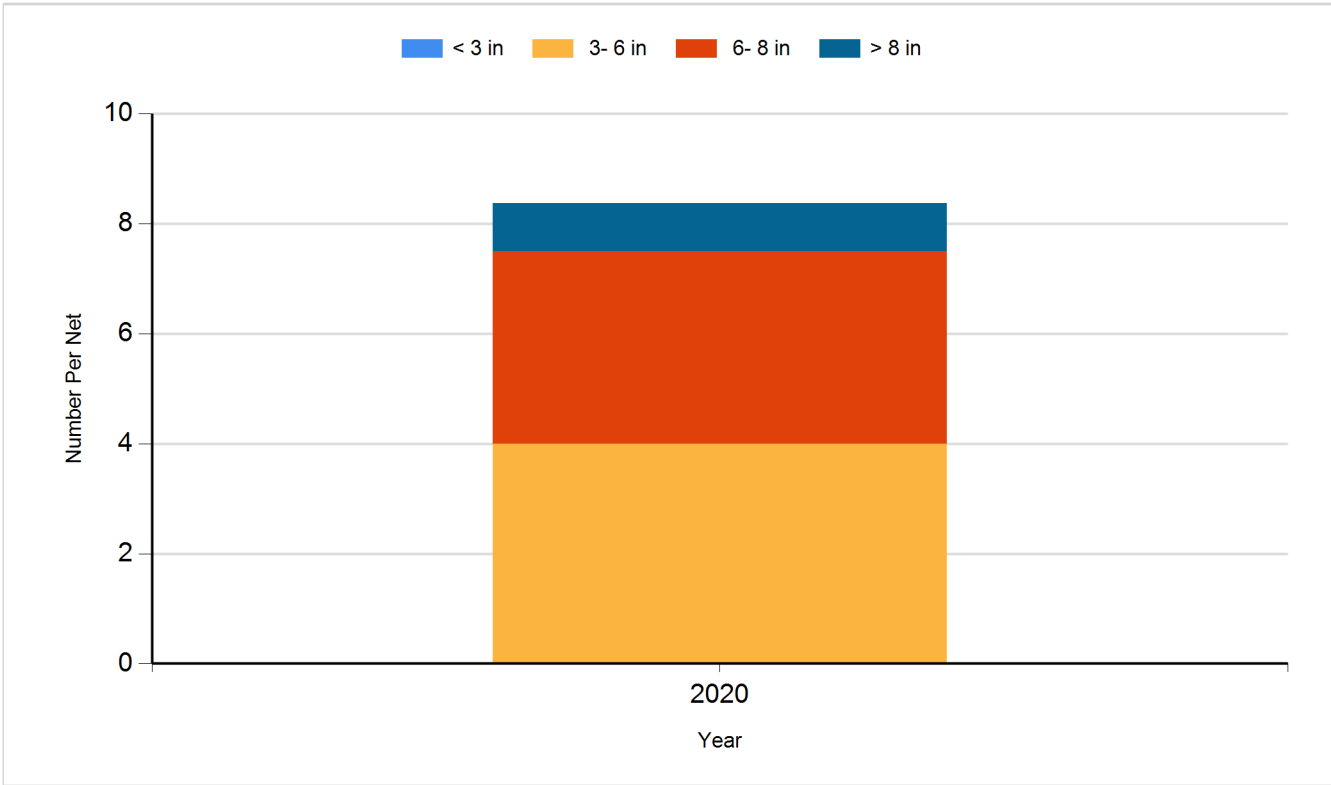
Species: Black Crappie
Gear: AFS std frame net



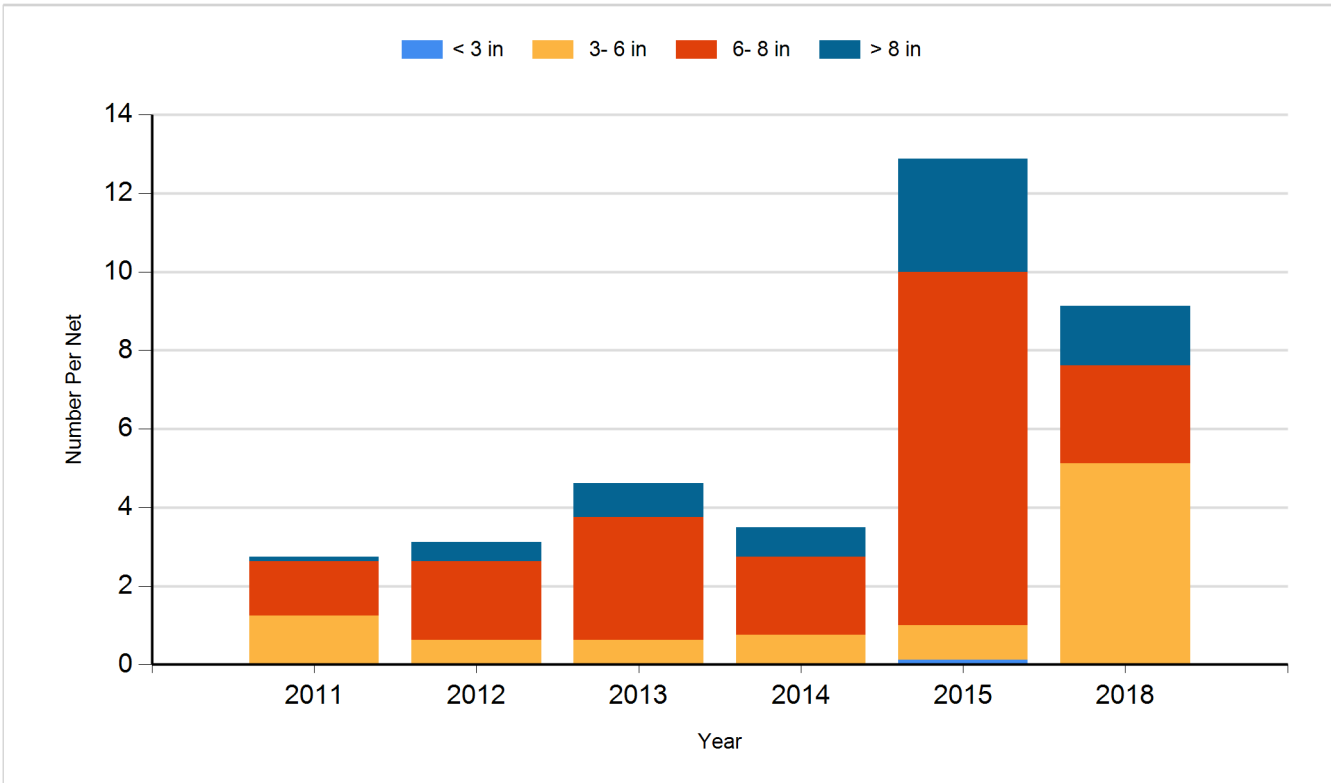
Species: Black Crappie
Gear: frame net (std 3/4 in)



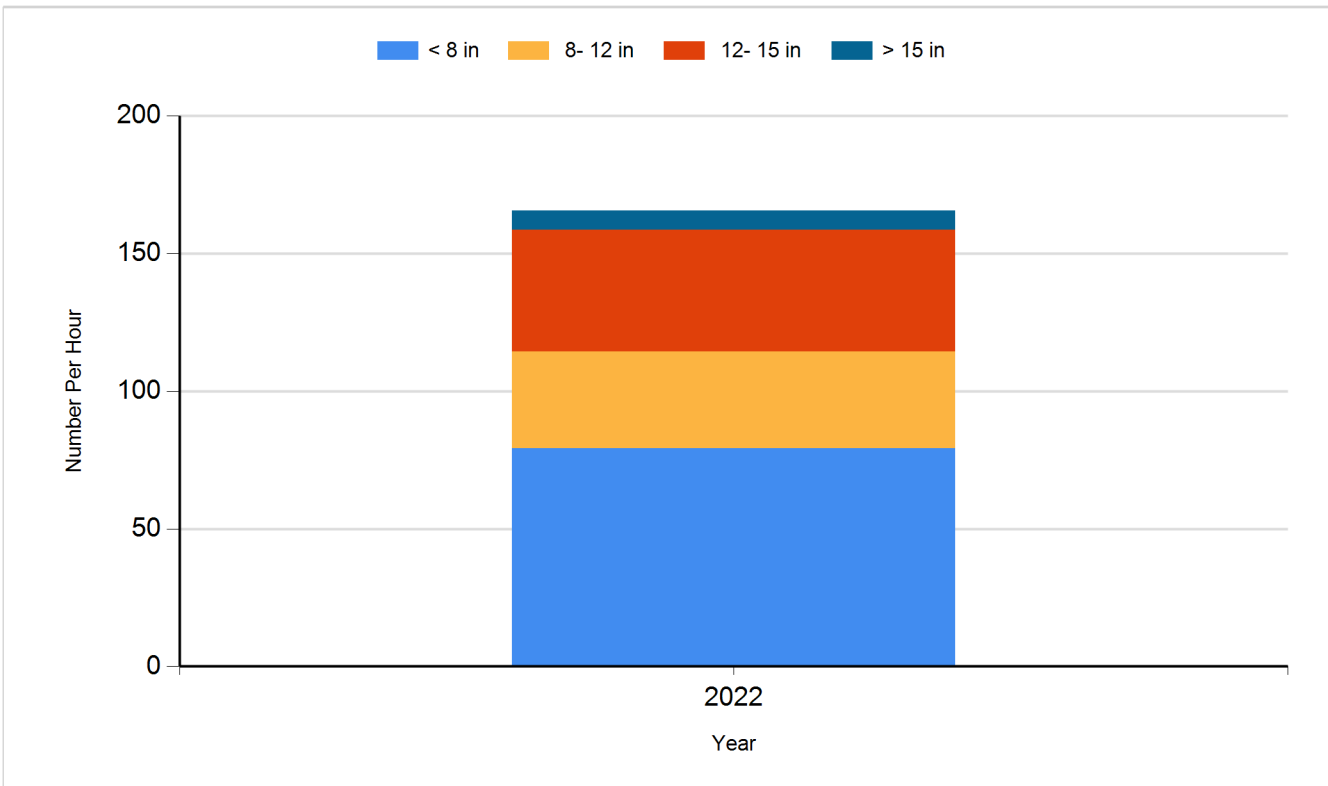
Species: Bluegill
Gear: AFS std frame net



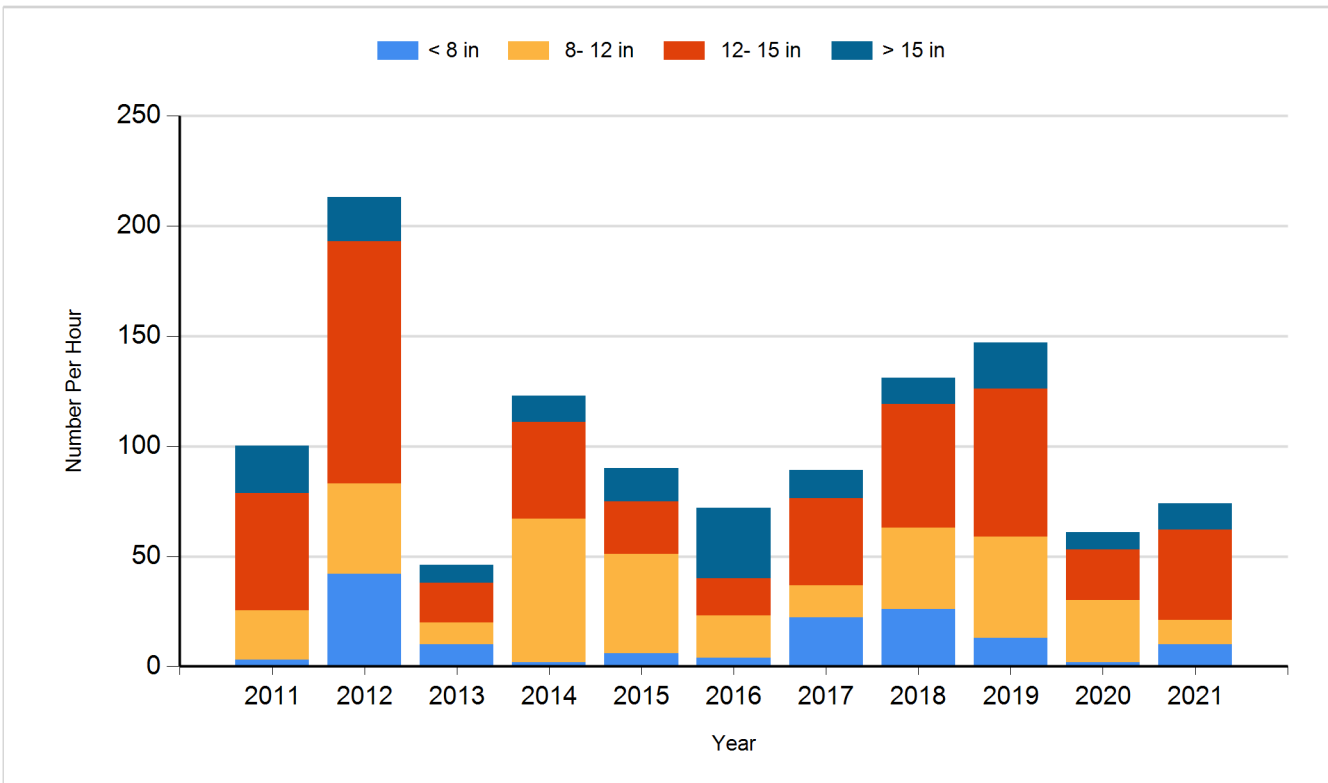
Species: Bluegill
Gear: frame net (std 3/4 in)



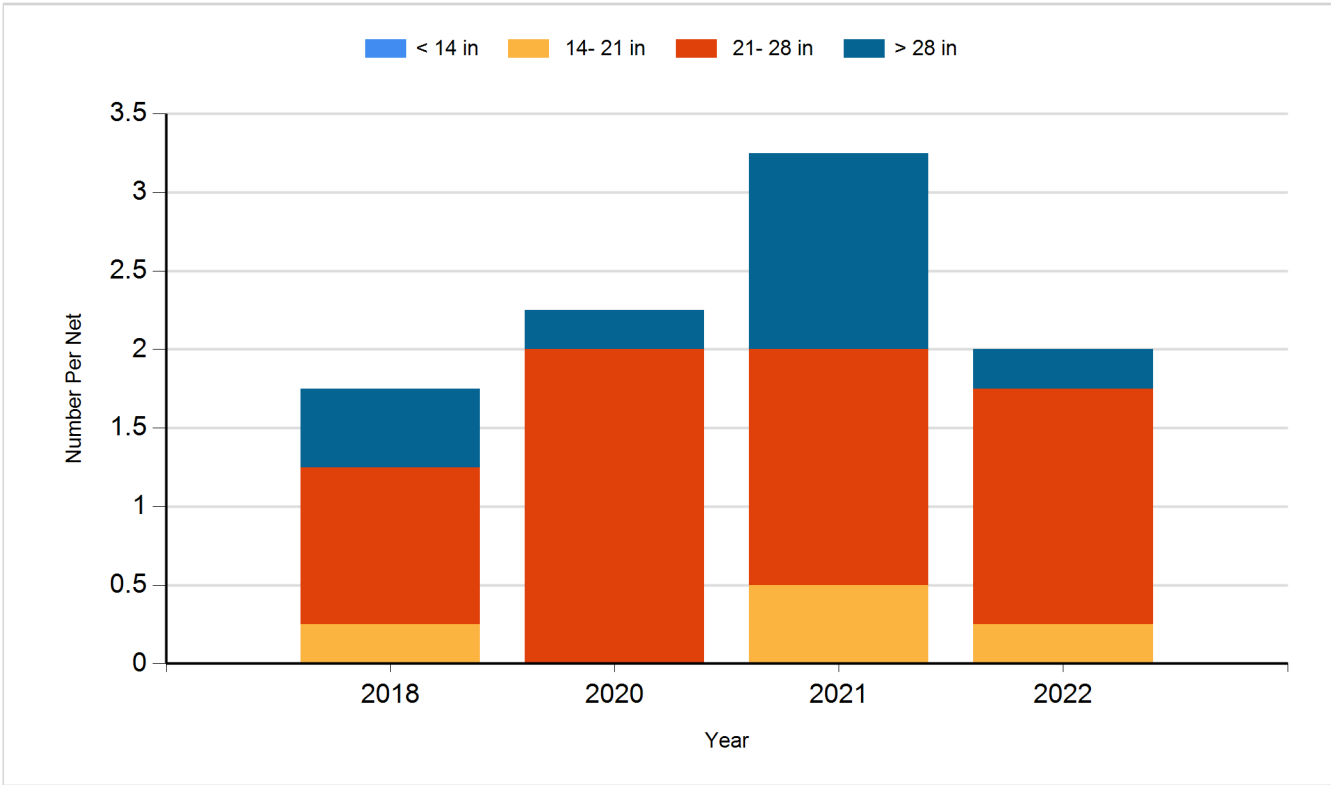
Species: Largemouth Bass
Gear: boat shocker (day)



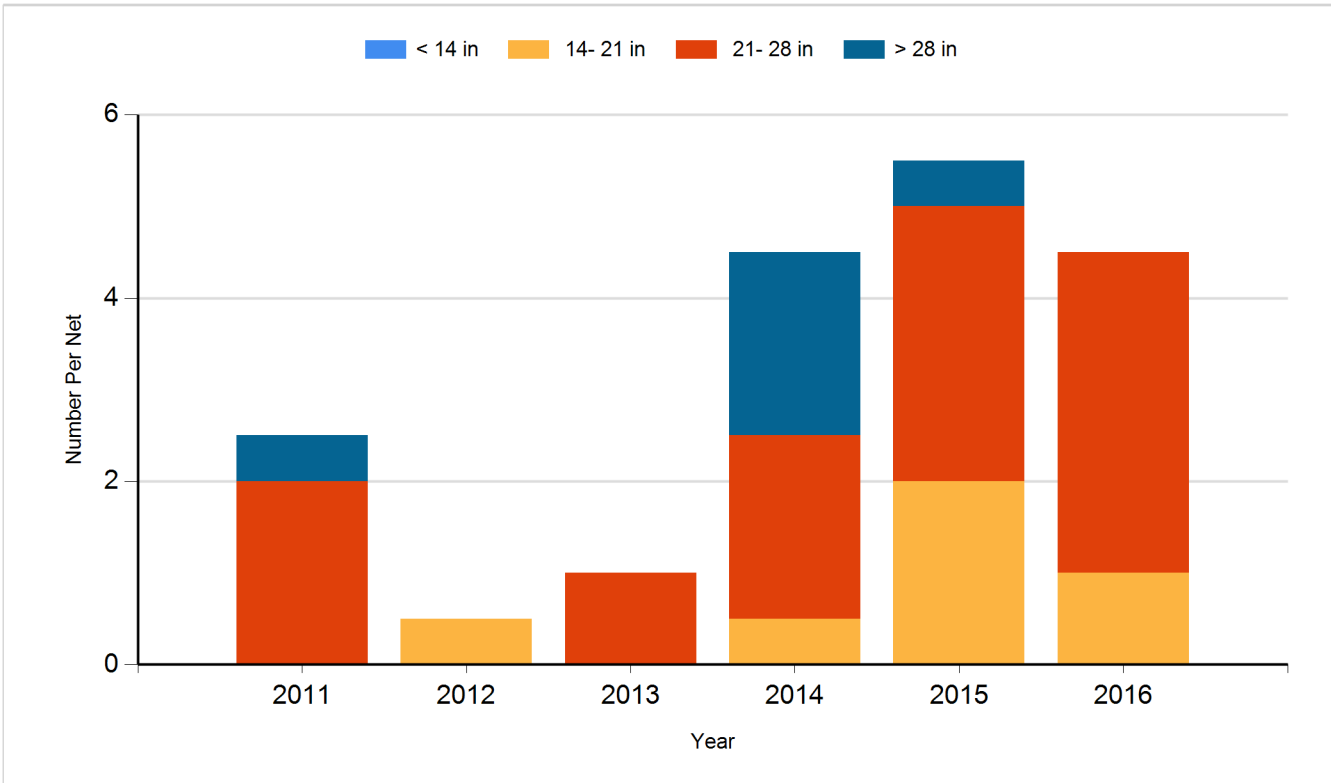
Species: Largemouth Bass
Gear: boat shocker (night)



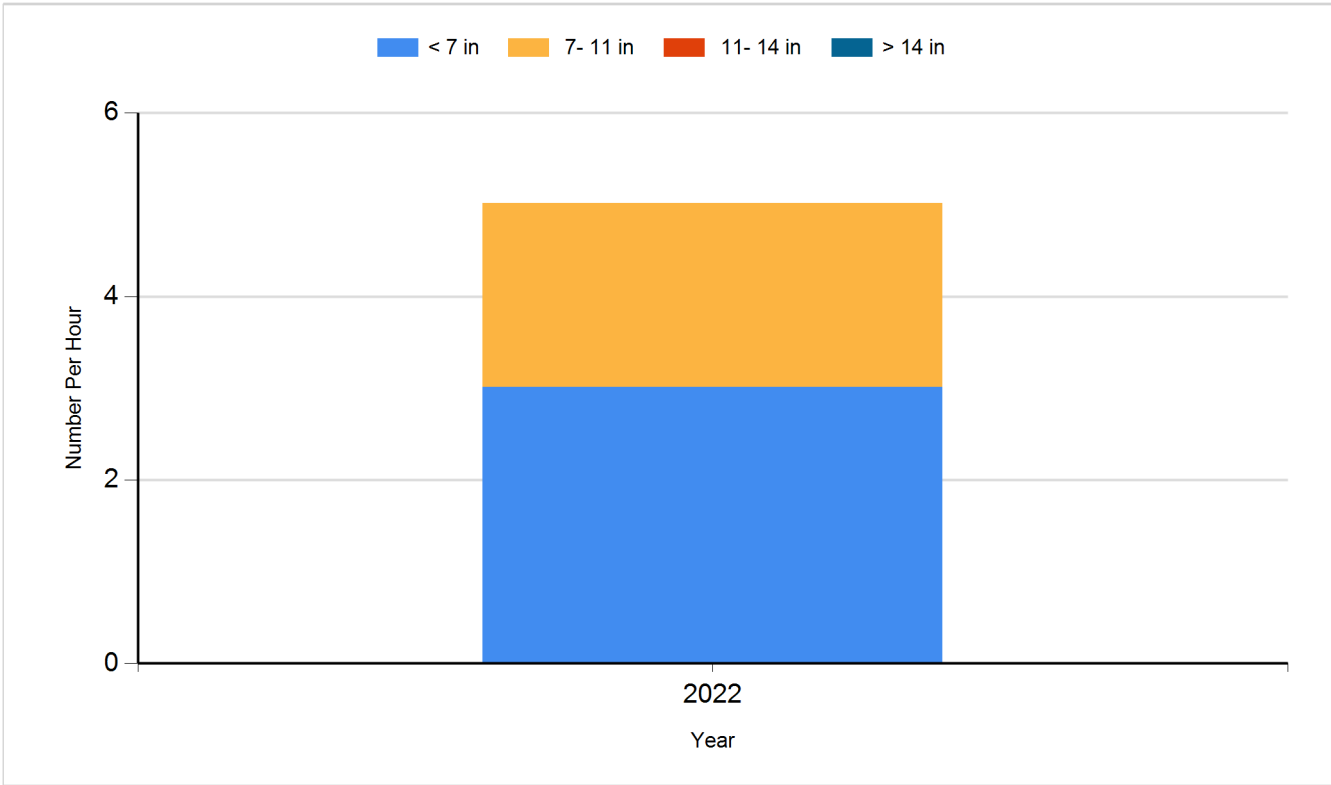
Species: Northern Pike
Gear: AFS std gill net



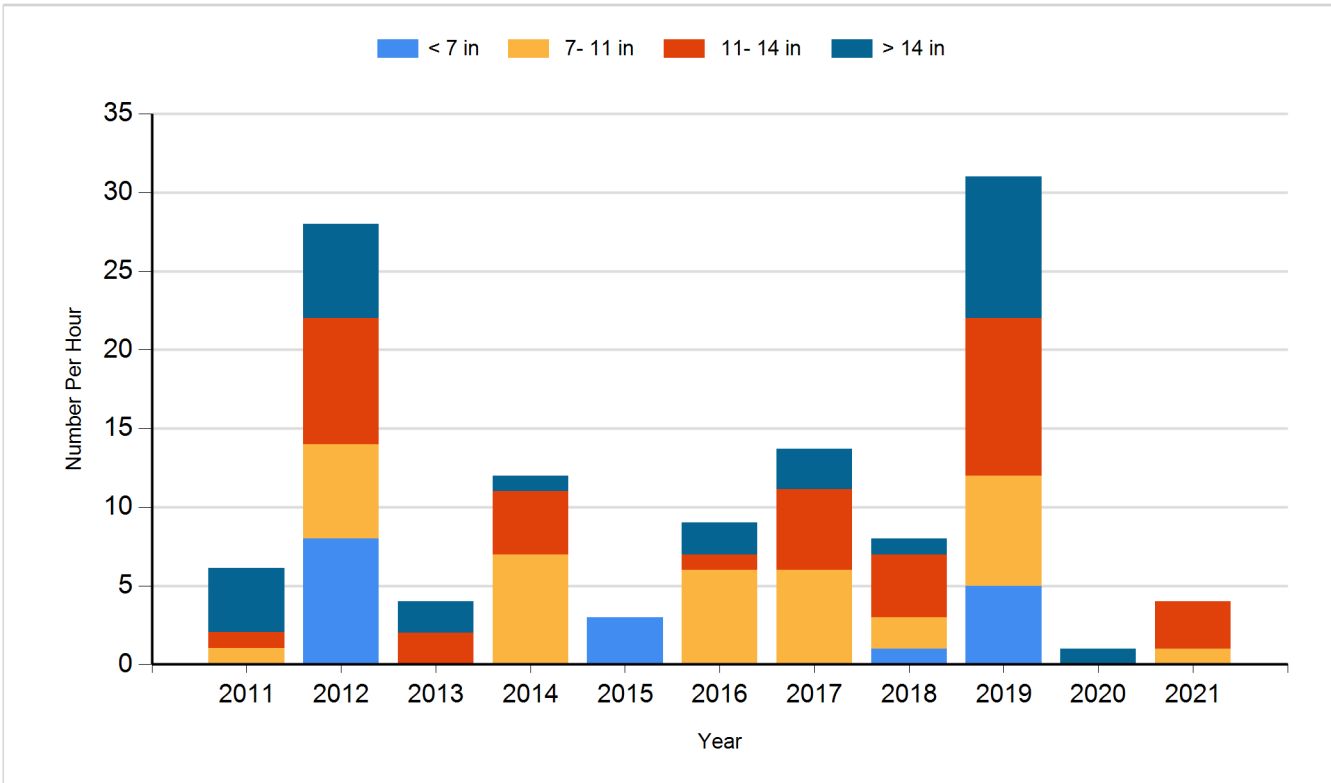
Species: Northern Pike
Gear: std exp gill net



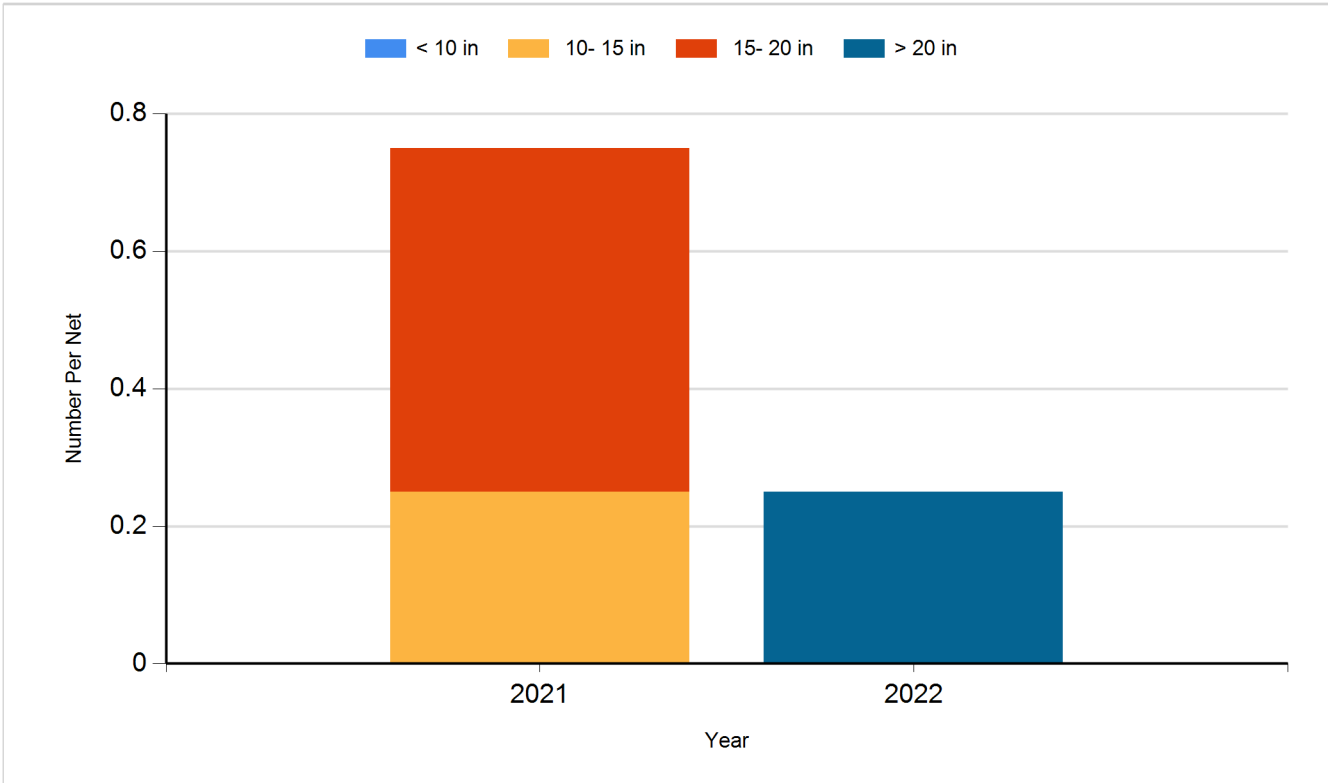
Species: Smallmouth Bass
Gear: boat shocker (day)



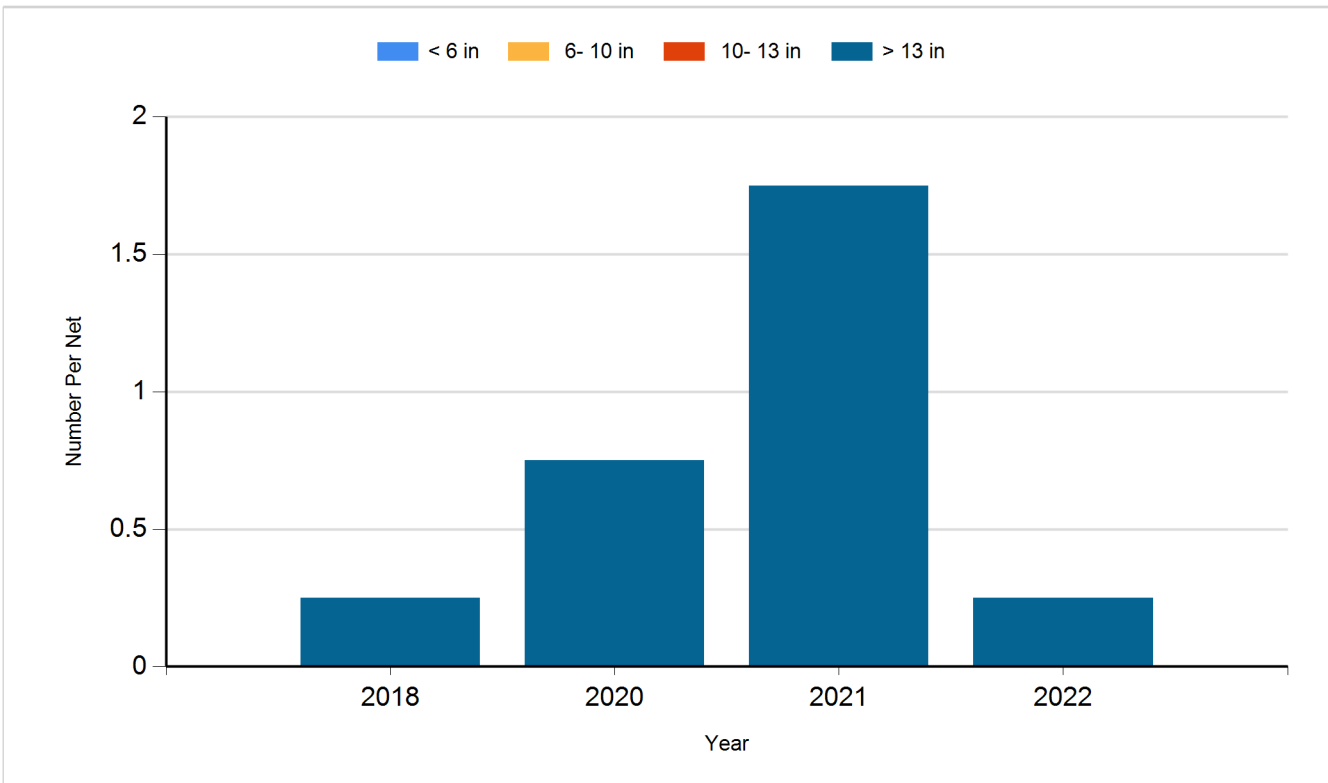
Species: Smallmouth Bass
Gear: boat shocker (night)



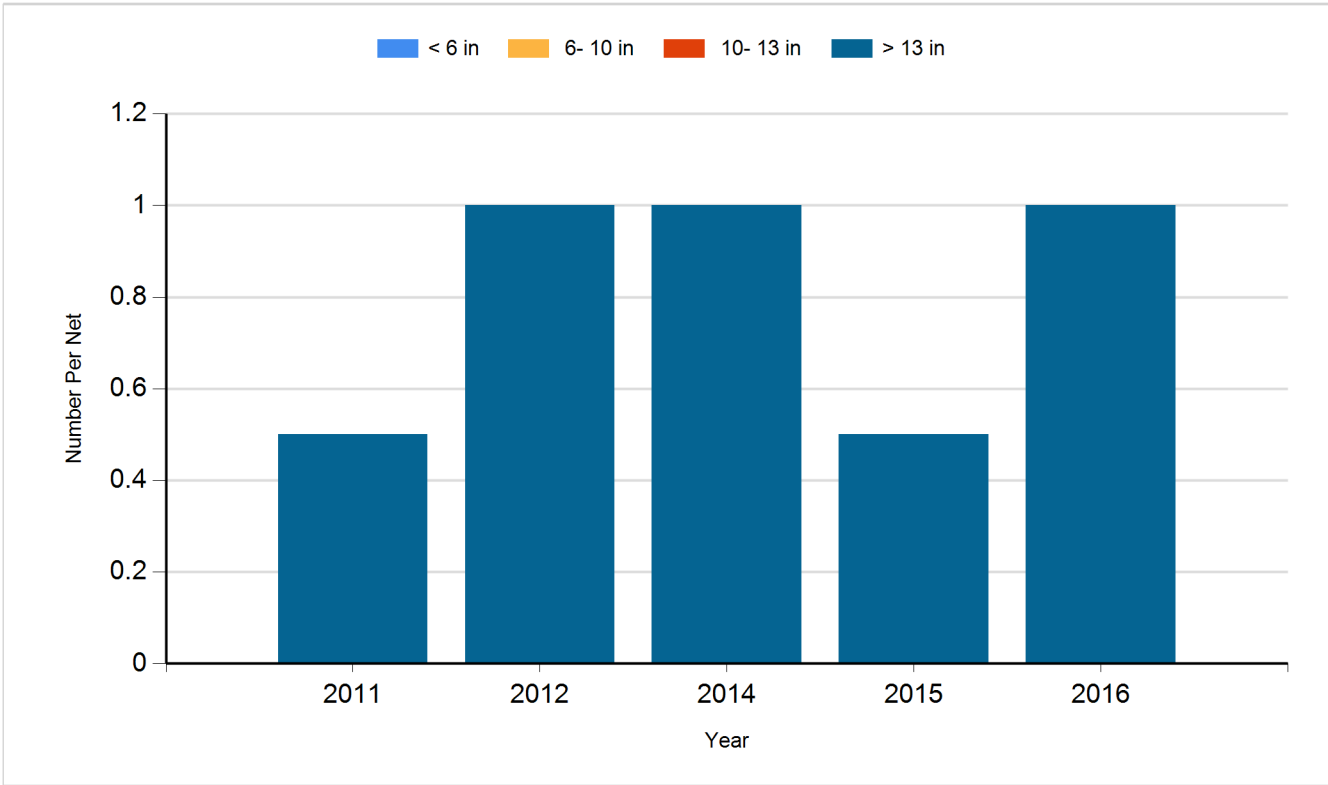
Species: Walleye
Gear: AFS std gill net



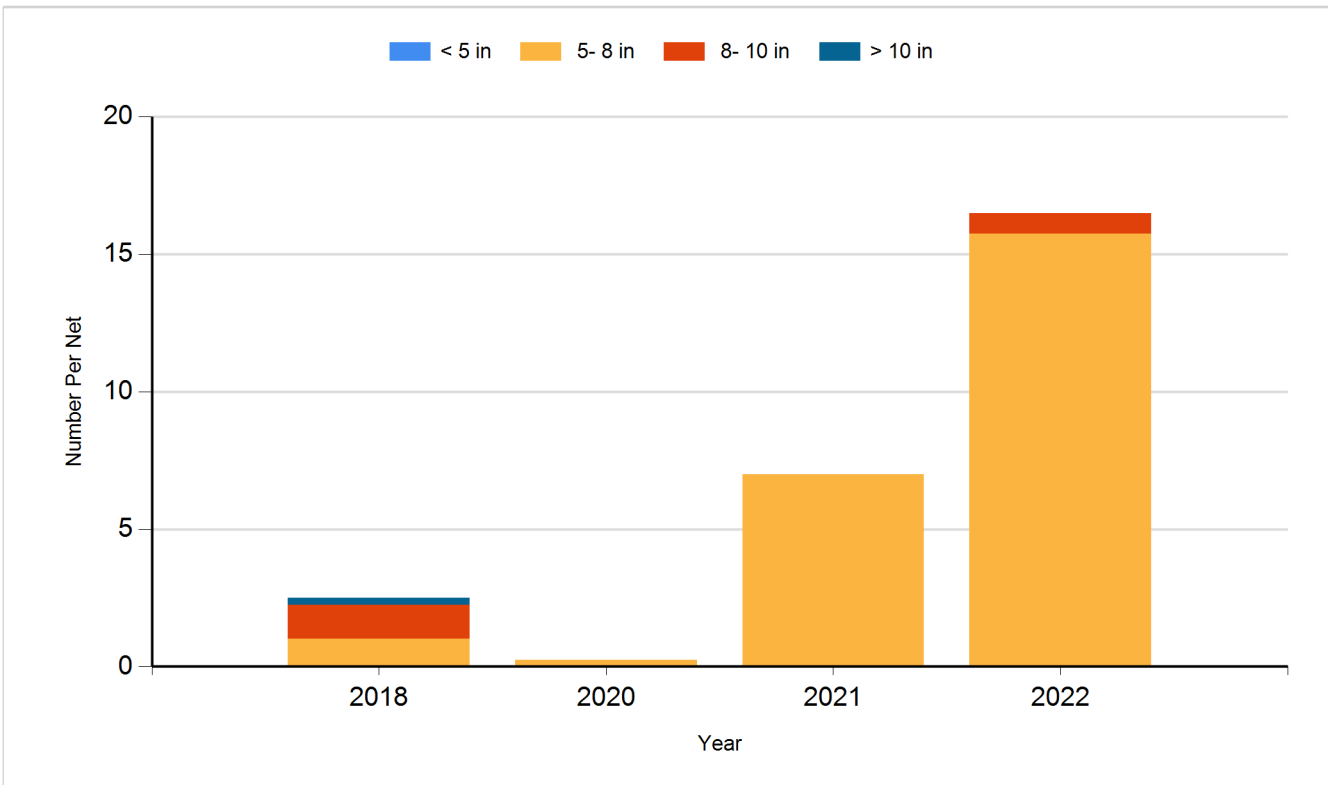
Species: White Sucker
Gear: AFS std gill net



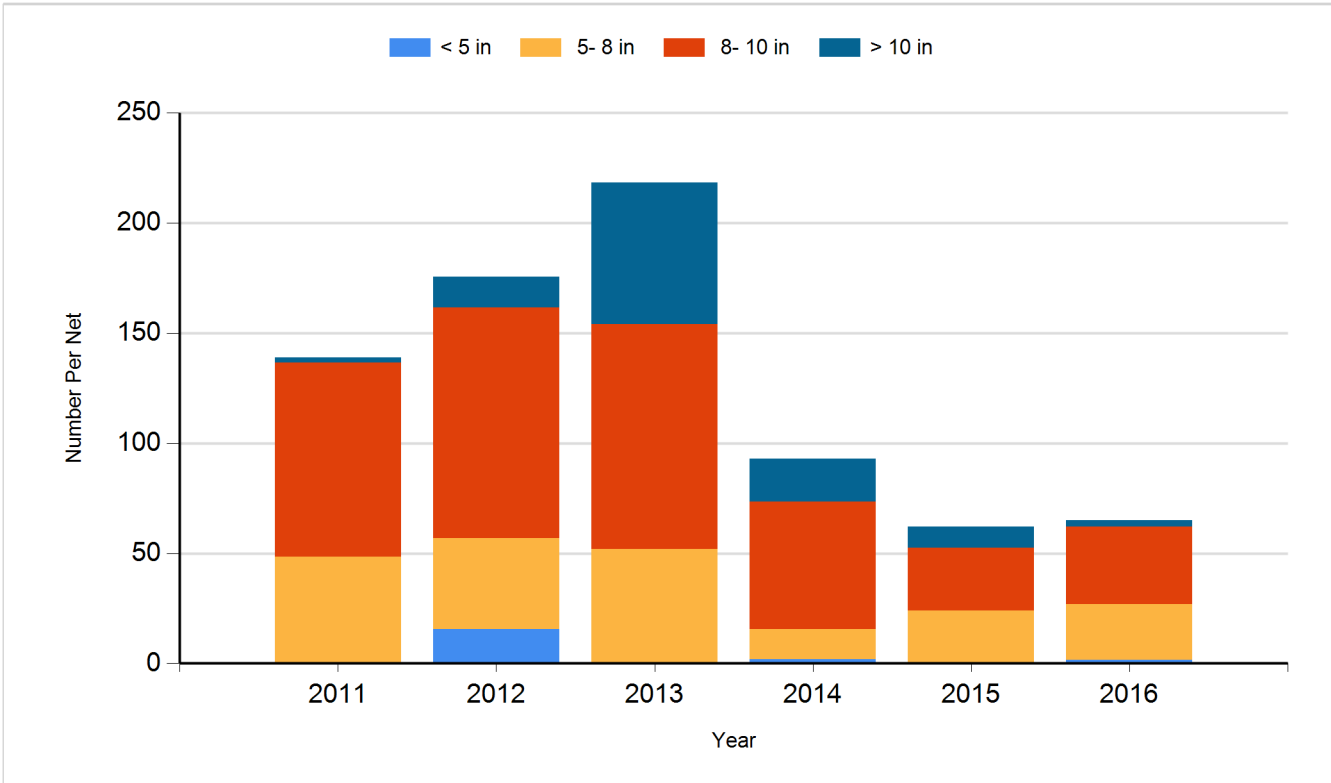
Species: White Sucker
Gear: std exp gill net



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
2013	Smallmouth Bass	Fingerling	4,770
2016	Smallmouth Bass	Juvenile	300
2017	Walleye	Large Fingerling	9,500
2019	Walleye	Small Fingerling	12,240