

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Stockade, Custer County

MCS-Lake-12-000

2021

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, 2021	4 net-nights
boat shocker (night)	Sep 22, 2021	3600 seconds

Common Fish Species Present

Smallmouth Bass

Northern Pike

Largemouth Bass

Yellow Perch

Bluegill

Black Bullhead

Black Crappie

White Sucker

Walleye

Channel Catfish

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	66	16.5	6.4	100		2		95	2
	Black Crappie	31	7.3	5.3	93		0		110	6
	Bluegill	82	20.5	9.4	94		10	5	106	1
	Channel Catfish	1	0.3	0.4	100		0		113	
	Largemouth Bass	1	0.3	0.4	100		100		116	
	Northern Pike	13	3.3	1.4	85		38		96	6
	Smallmouth Bass	6	1.5	1.9	100		67		102	4
	Walleye	3	0.8	0.8	67		0		88	10
	White Sucker	7	1.8	1.8	100		100		102	3
	Yellow Perch	28	7.0	6.1	0		0		108	3
boat shocker (night)	Largemouth Bass	74	64.0	16.1	83	7	19	7	101	1
	Smallmouth Bass	4	4.0	3.0	75		0		88	6
	Walleye*	1	1.0	1.5	0		0		102	

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
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
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	22.10
	Black Crappie							0.0		2.3	7.3	3.20
	Bluegill							1.5		5.0	20.5	9.00
	Channel Catfish							0.3		0.0	0.3	0.20
	Golden Shiner							0.0		0.0	0.0	0.00
	Largemouth Bass							0.0		0.0	0.3	0.10
	Northern Pike							1.8		2.3	3.3	2.47
	Smallmouth Bass							0.3		0.3	1.5	0.70
	Walleye							0.0		0.0	0.8	0.27
	White Sucker							0.3		0.8	1.8	0.97
	Yellow Perch							2.5		0.3	7.0	3.27
boat shocker (night)	Largemouth Bass	171.0	36.0	121.0	84.0	68.0	66.9	105.0	134.0	59.0	64.0	90.89
	Smallmouth Bass	20.0	4.0	12.0	0.0	9.0	13.7	7.0	26.0	1.0	4.0	9.67
	Walleye*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	1.0	0.50
frame net (std 3/4 in)	Black Bullhead	1.1	0.3	0.9	471.1			91.4				112.96
	Black Crappie	1.6	0.4	1.6	5.3			2.5				2.28
	Bluegill	3.1	4.6	3.5	12.8			9.1				6.62
	Bluegill X Gr. Sunfish Hybrid	0.0	0.0	0.0	0.1			0.0				0.02
	Golden Shiner	0.0	0.0	0.0	0.0			0.0				0.00
	Largemouth Bass	0.0	0.0	0.0	0.1			0.0				0.02
	Northern Pike	0.3	0.9	1.5	0.6			0.8				0.82
	Smallmouth Bass	0.0	0.0	0.0	0.4			0.6				0.20
	White Sucker	0.0	0.0	0.3	0.1			0.1				0.10
	Yellow Perch	67.9	48.0	197.5	3.0			21.0				67.48
std exp gill net	Black Bullhead	0.0	1.0	0.5	41.0	53.5						19.20
	Black Crappie	6.5	8.5	10.5	0.5	0.0						5.20

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
std exp gill net	Bluegill	2.5	6.5	2.0	1.5	1.0						2.70
	Golden Shiner	0.0	0.0	0.0	0.0	0.0						0.00
	Largemouth Bass	0.5	0.0	0.0	0.5	1.0						0.40
	Northern Pike	0.5	1.0	4.5	5.5	4.5						3.20
	Smallmouth Bass	0.0	0.0	0.5	0.0	0.0						0.10
	White Sucker	1.0	0.0	1.0	0.5	1.0						0.70
	Yellow Perch	160.0	218.5	91.0	61.5	63.5						118.9 0

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												
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021			
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	
		PSD-P										0		0	2
		Wr										88		95	95
	Black Crappie	PSD												11	93
		PSD-P												0	0
		Wr												107	110
	Bluegill	PSD										100		75	94
		PSD-P										33		10	10
		Wr										109		108	106
	Channel Catfish	PSD										100			100
		PSD-P										0			0
		Wr										126			113
	Largemouth Bass	PSD													100
		PSD-P													100
		Wr													116

Gear	Species	Index	Year										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
AFS std gill net	Northern Pike	PSD								86	100	85	
		PSD-P								29	11	38	
		Wr								95	91	96	
	Smallmouth Bass	PSD									100	100	100
		PSD-P									100	100	67
		Wr									77	89	102
	Walleye	PSD											67
		PSD-P											0
		Wr											88
	White Sucker	PSD									100	100	100
		PSD-P									100	100	100
		Wr									97	97	102
	Yellow Perch	PSD									60	0	0
		PSD-P									10	0	0
		Wr									84	93	108
boat shocker (night)	Largemouth Bass	PSD	76	72	46	46	72	78	65	66	53	83	
		PSD-P	12	22	10	18	47	19	11	16	14	19	
		Wr	115	111	105	125	75	111	103	105	104	101	
	Smallmouth Bass	PSD	70	100	42	0	33	56	71	73	100	75	
		PSD-P	30	50	8	0	22	19	14	35	100	0	
		Wr	99	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	100	29	0				79			
		PSD-P	11	100	29	0					0		
		Wr	104	102	81	84					88		
	Black Crappie	PSD	77	67	38	69					15		
		PSD-P	0	0	0	2					5		
		Wr	103	105	106	109					102		
	Bluegill	PSD	80	86	79	93					44		
		PSD-P	16	19	21	23					16		
		Wr	129	122	121	111					103		
	Largemouth Bass	PSD					100						
		PSD-P					0						
		Wr					110						

Gear	Species	Index	Year									
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
frame net (std 3/4 in)	Northern Pike	PSD	50	71	67	40				50		
		PSD-P	50	57	50	0				17		
		Wr	96	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	76	99	97	92				89		
		PSD-P	3	26	42	42				4		
		Wr	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	0	6	33	0						
		PSD-P	0	0	0	0						
		Wr	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	0	100	89	64	78					
		PSD-P	0	0	44	9	0					
		Wr	98	88	98	90	95					
	Smallmouth Bass	PSD			100							
		PSD-P			100							
		Wr			90							
	White Sucker	PSD	100		100	100	100					
		PSD-P	100		100	100	100					
		Wr	101		105	109	104					
	Yellow Perch	PSD	74	76	85	62	60					
		PSD-P	9	30	21	15	5					
		Wr	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)		

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)			

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).

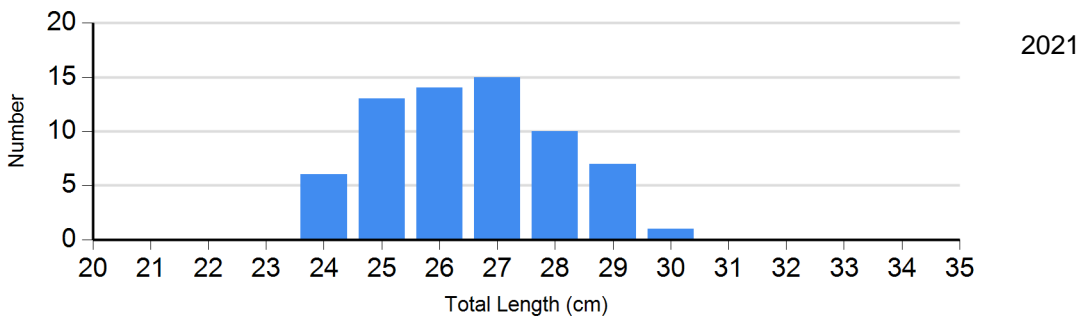
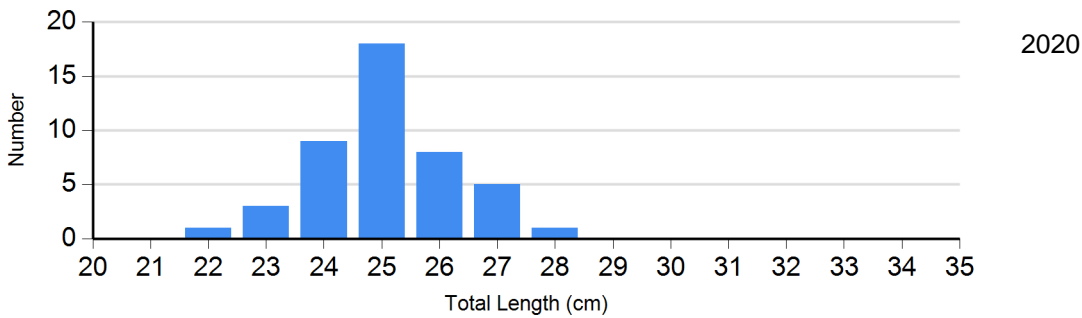
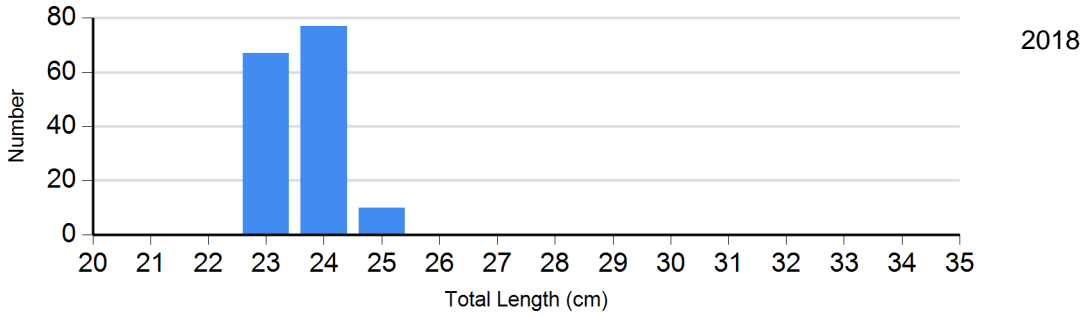
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2018	0		154	88 (1.4)	0		0	
	2020	1	89	44	95 (1.4)	0		0	
	2021	0		65	94 (1.2)	1	98	0	
Black Crappie Frame Net	2017	1	95	2	92 (6.0)	0		0	
	2018	17	103 (1.0)	2	105 (2.9)	1	92	0	
	2020	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	
Channel Catfish Gill Net	2018	0		1	126	0		0	
	2021	0		1	113	0		0	
Largemouth Bass Electro Fishing	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	
	2021	11	103 (2.7)	41	102 (0.9)	12	96 (2.2)	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	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	
	2021	1	80	3	90 (5.1)	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)
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)
	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	

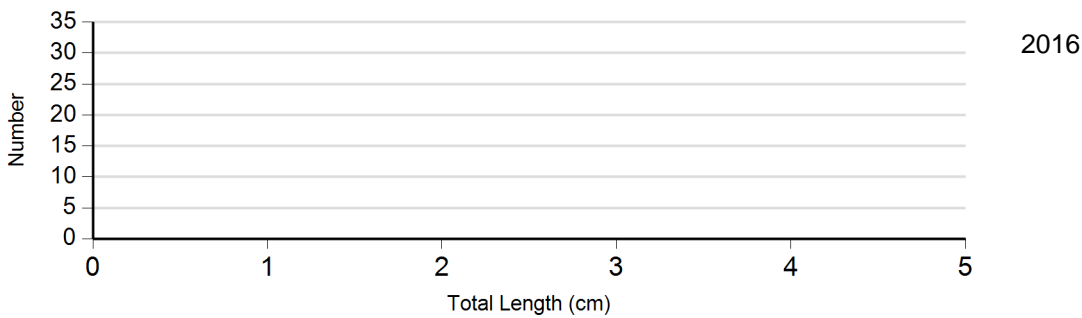
Length Frequency Distribution

Length frequency histogram of species sampled by year.

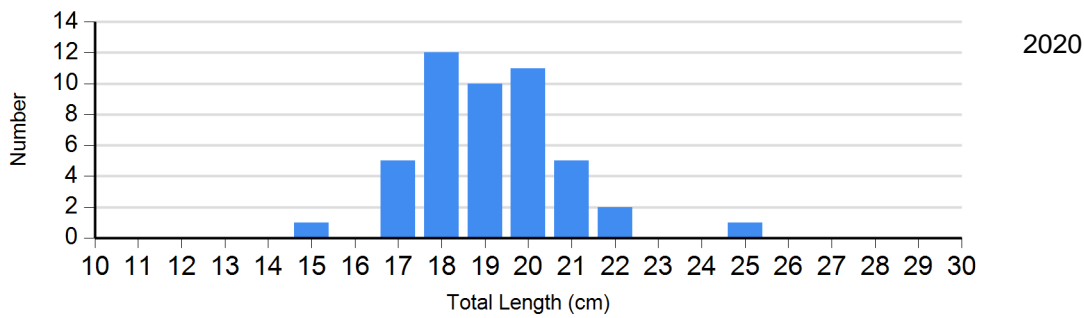
Species: Black Bullhead
Gear: AFS std gill net



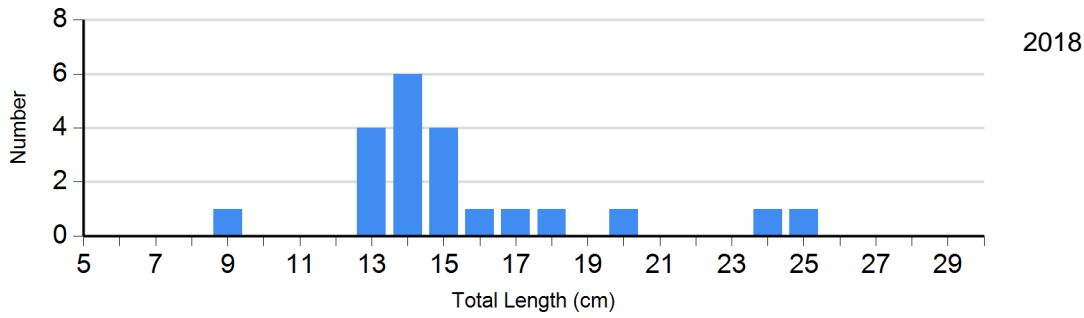
Species: Black Bullhead
Gear: std exp gill net



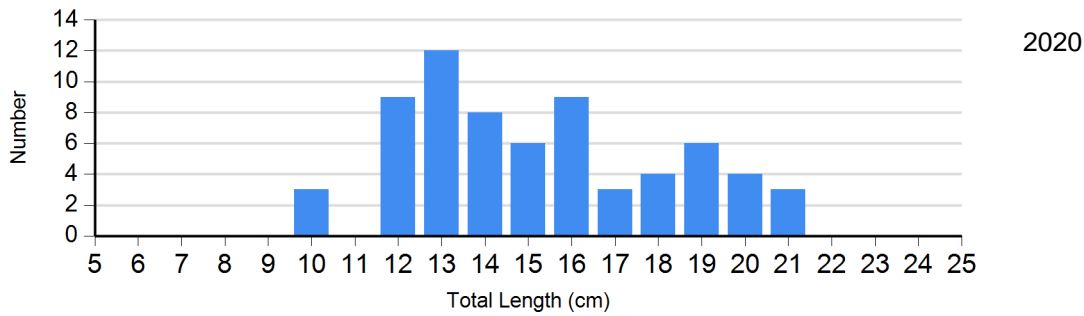
Species: Black Crappie
Gear: AFS std frame net



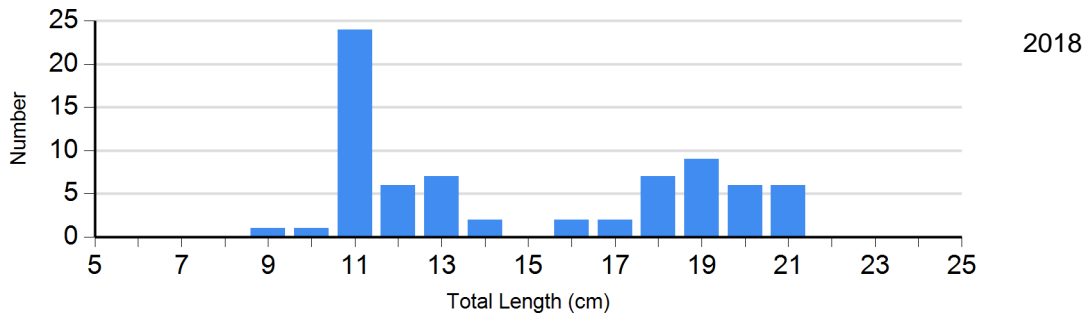
Species: Black Crappie
Gear: frame net (std 3/4 in)



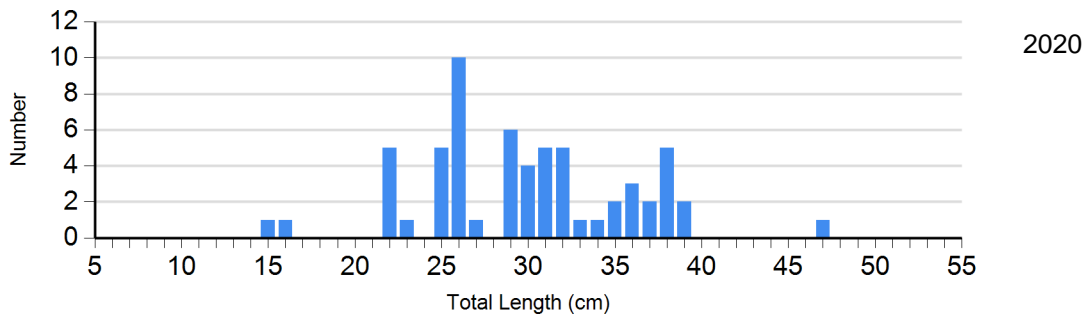
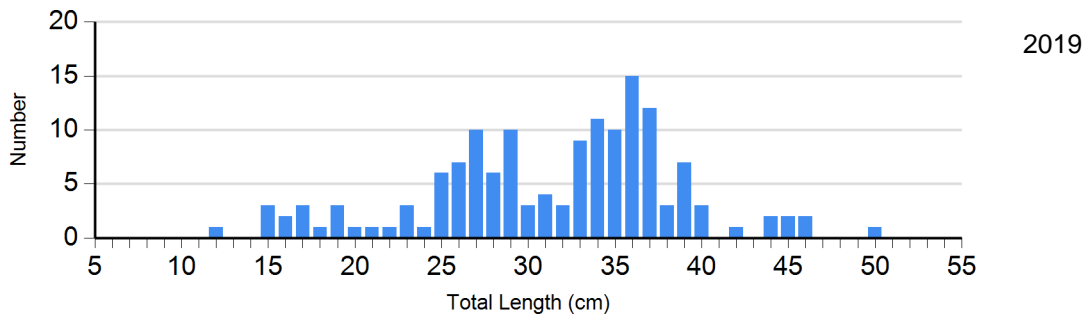
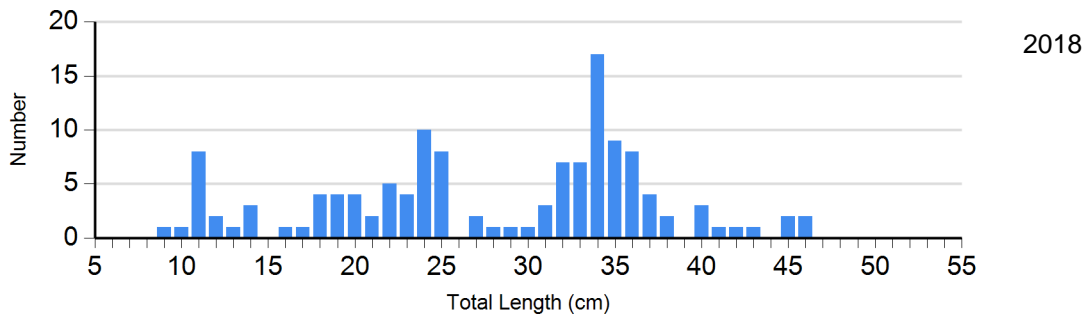
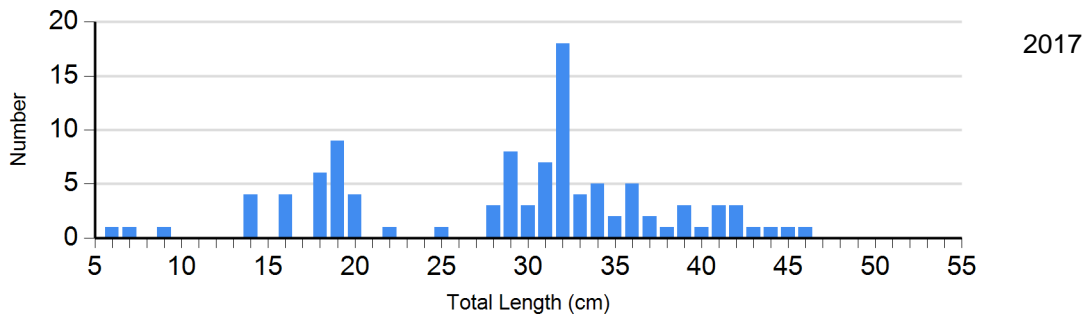
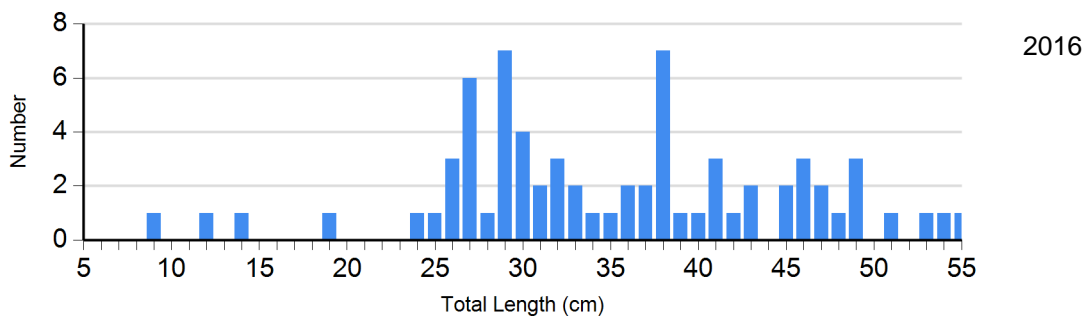
Species: Bluegill
Gear: AFS std frame net

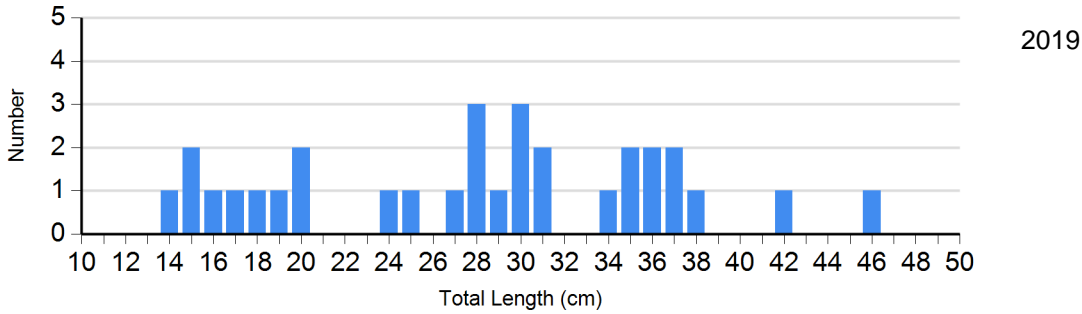
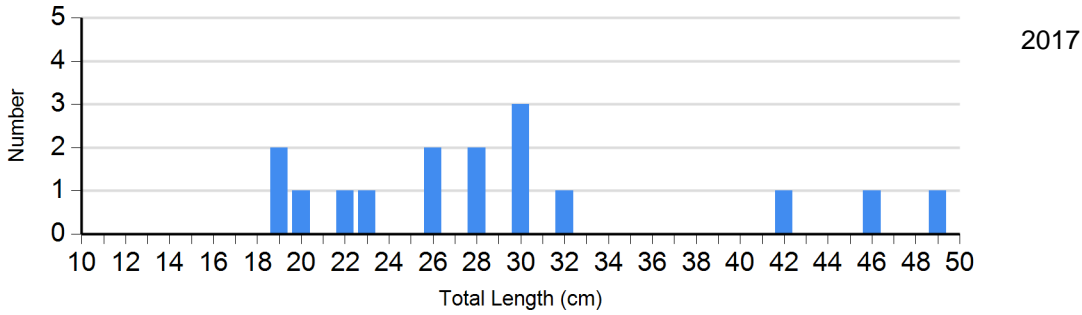
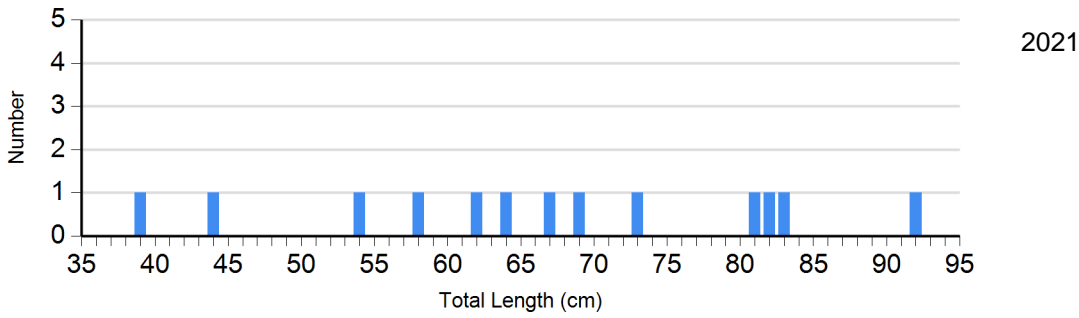
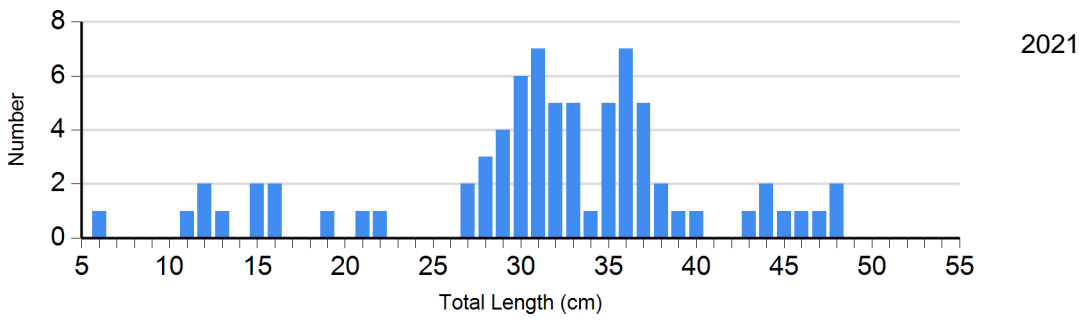


Species: Bluegill
Gear: frame net (std 3/4 in)

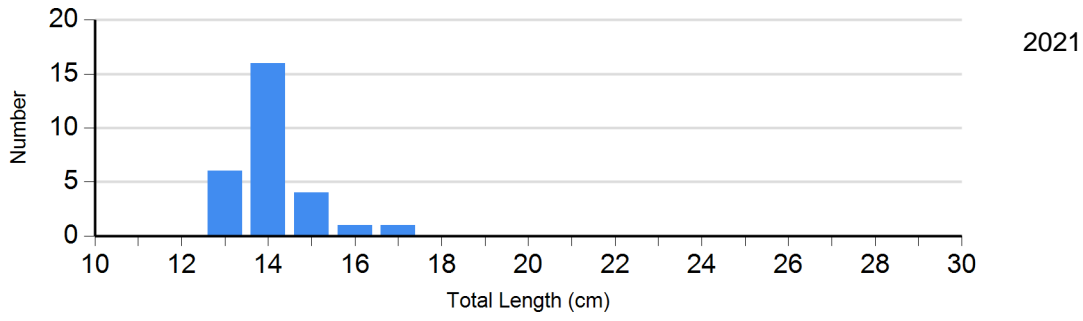
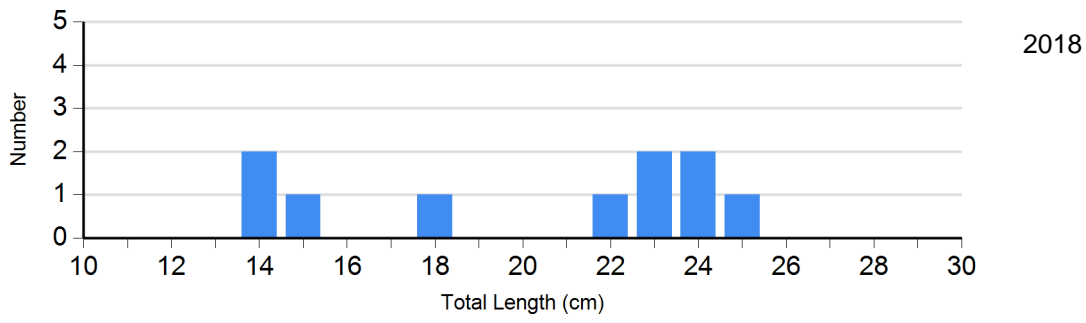


Species: Largemouth Bass
Gear: boat shocker (night)

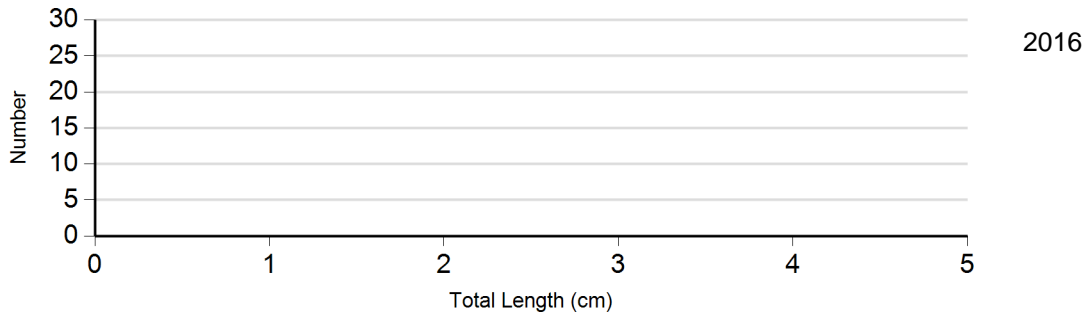




Species: Yellow Perch
Gear: AFS std gill net



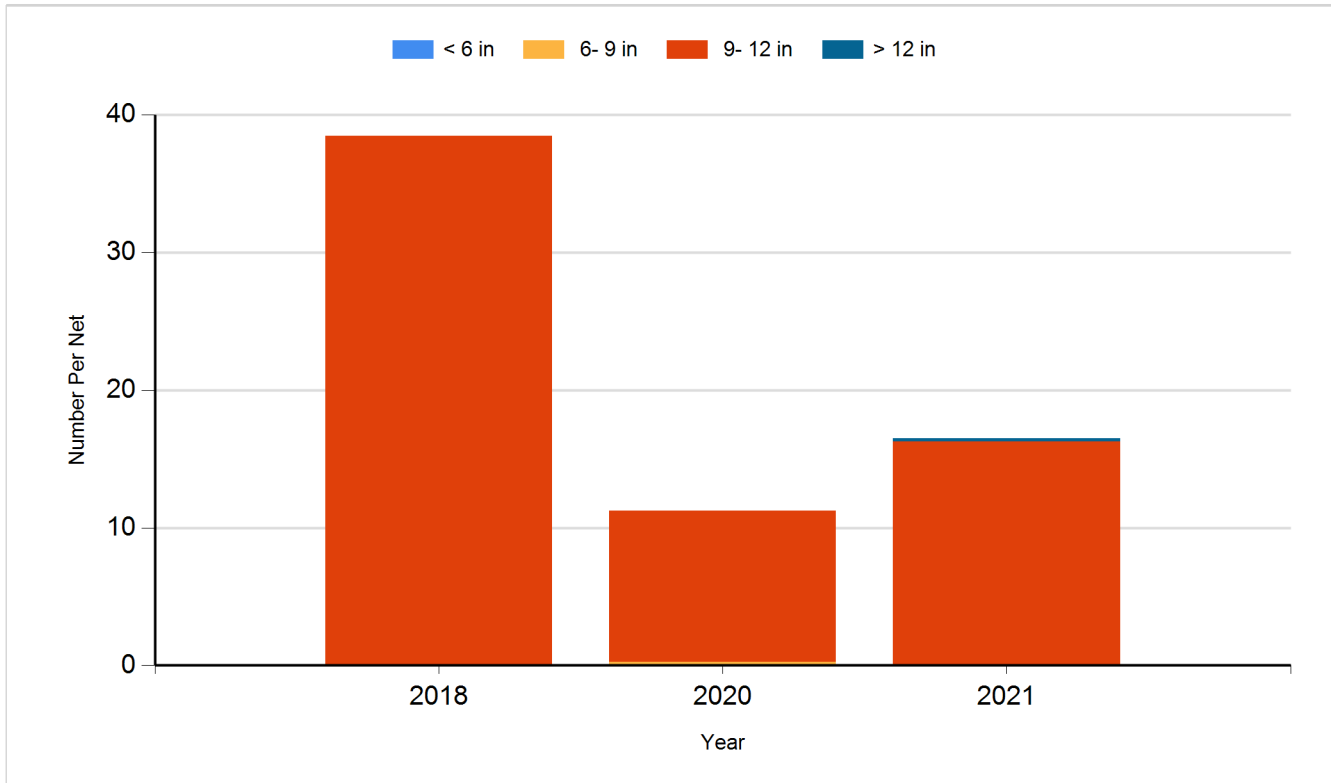
Species: Yellow Perch
Gear: std exp gill net



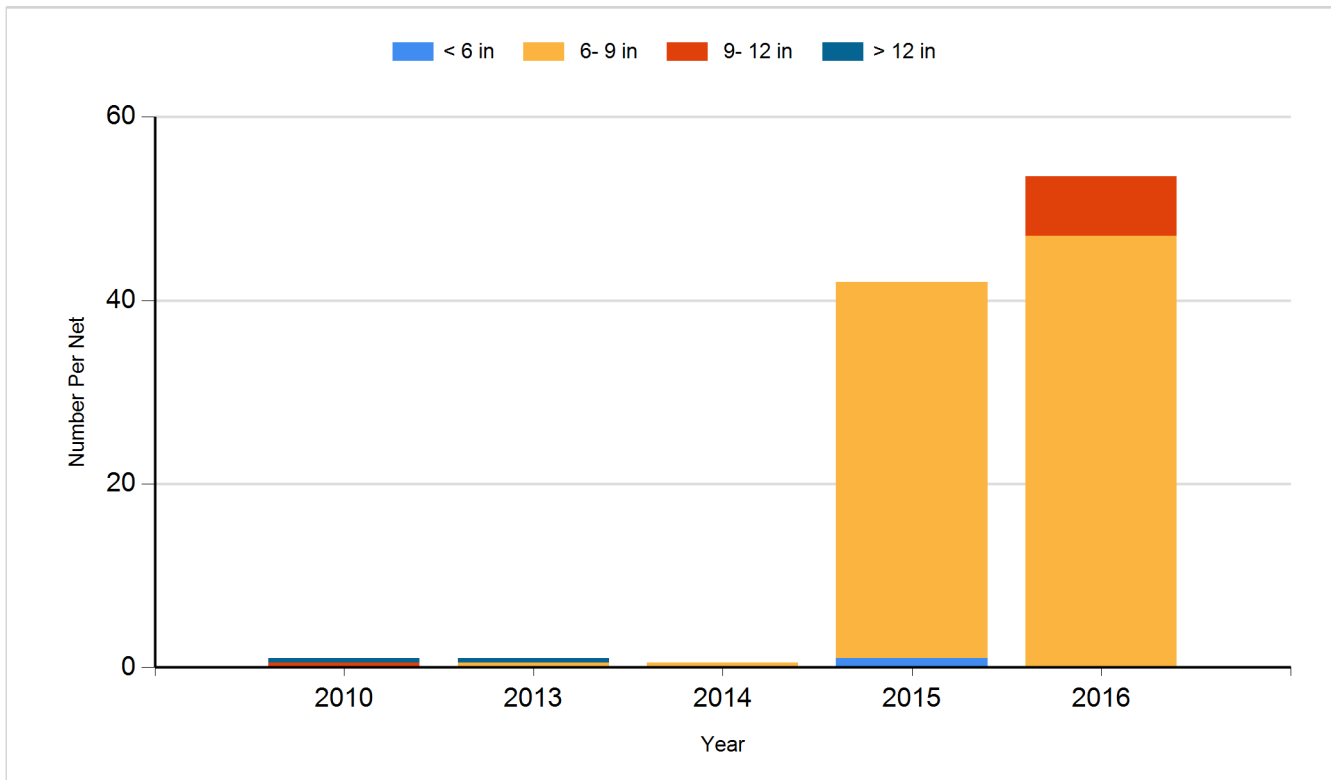
Historic Fish Sizes and Relative Abundance

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

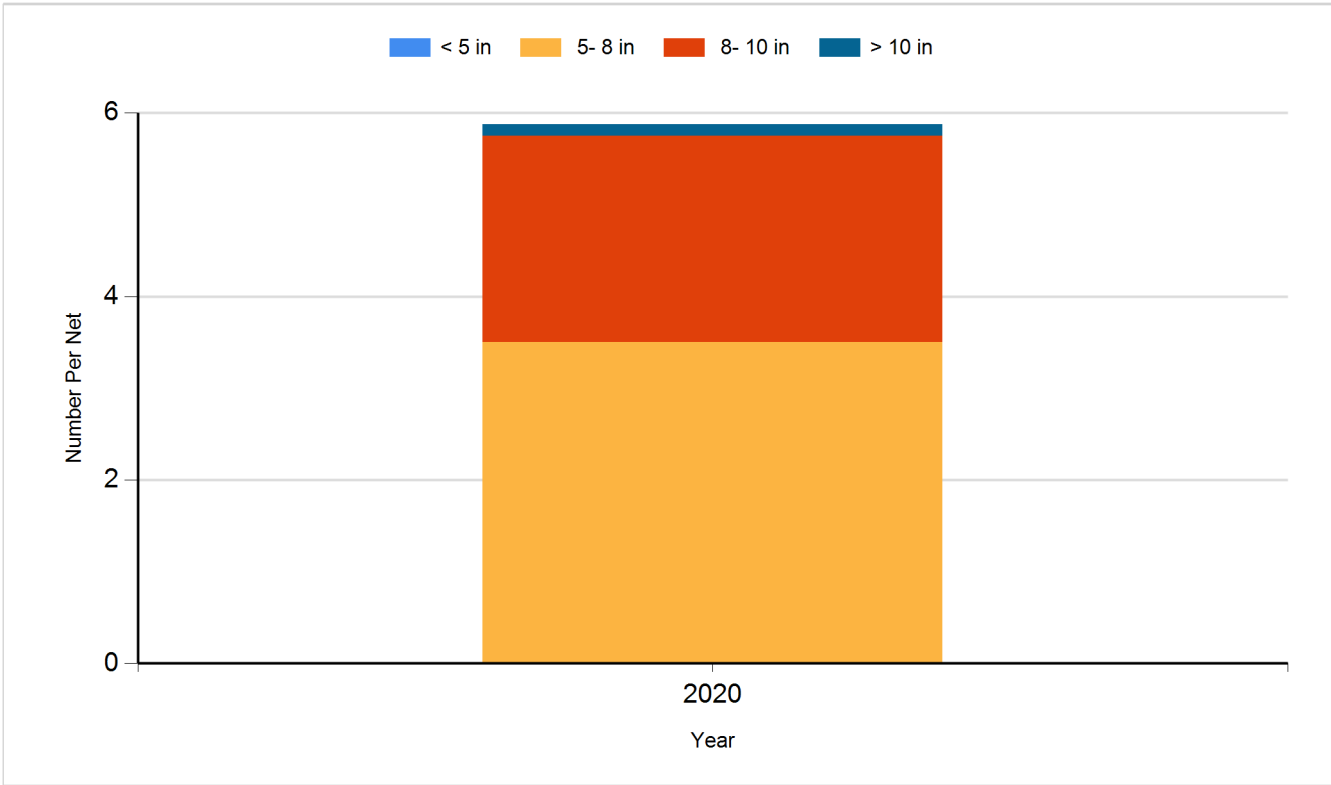
Species: Black Bullhead
Gear: AFS std gill net



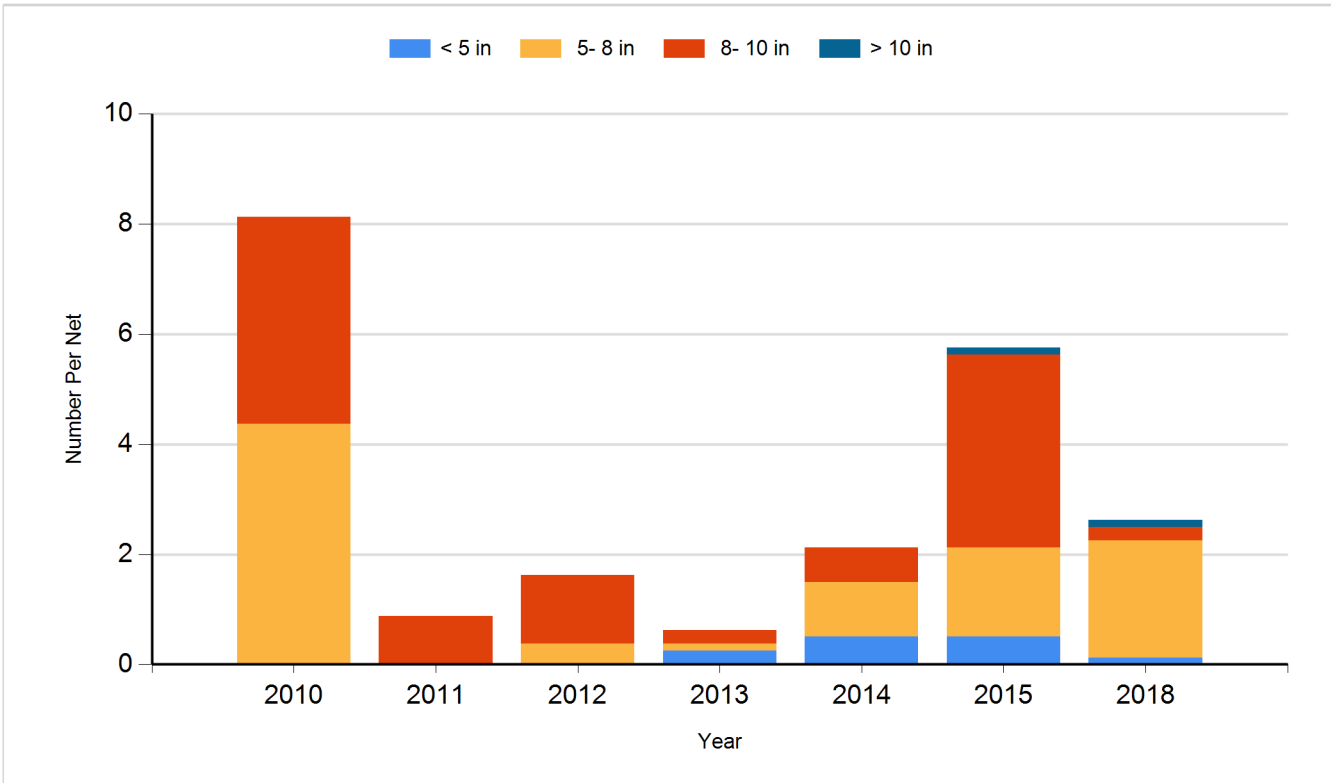
Species: Black Bullhead
Gear: std exp gill net



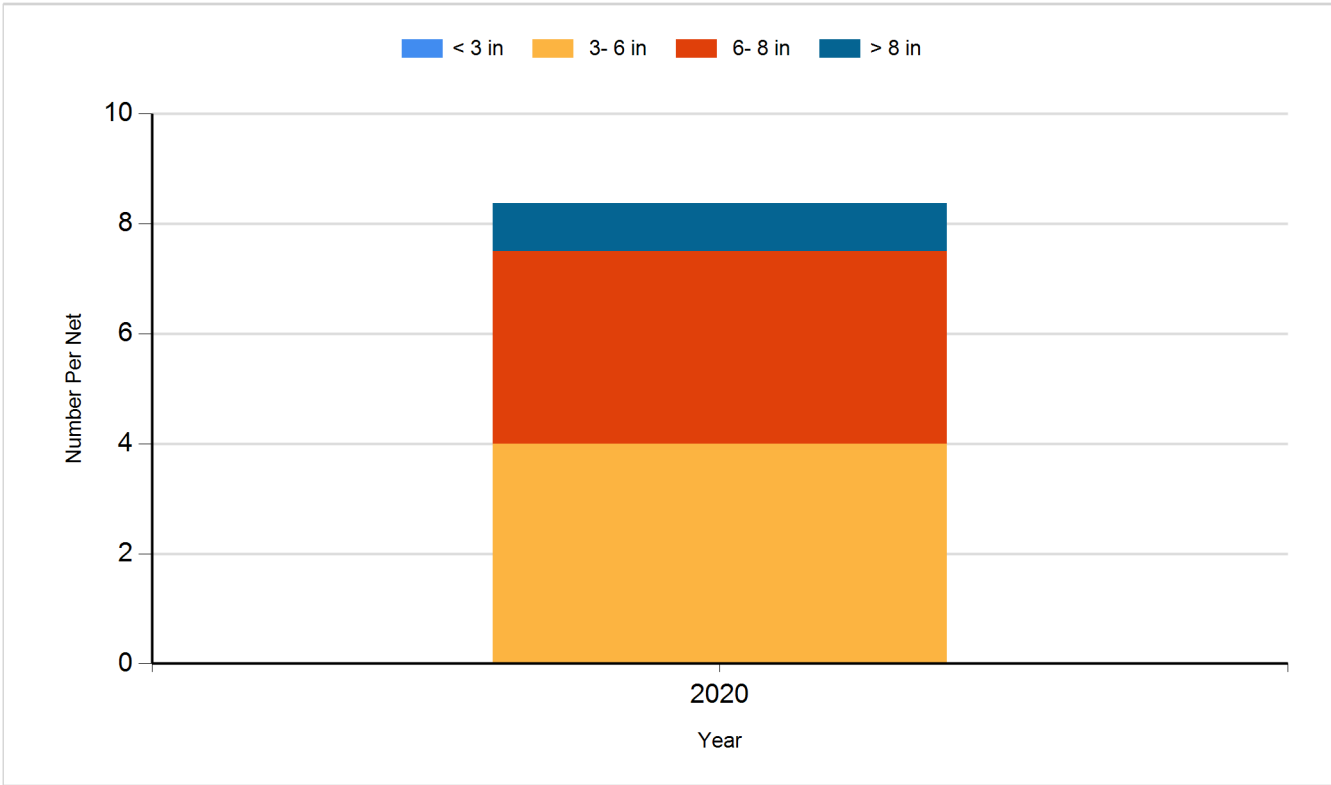
Species: Black Crappie
Gear: AFS std frame net



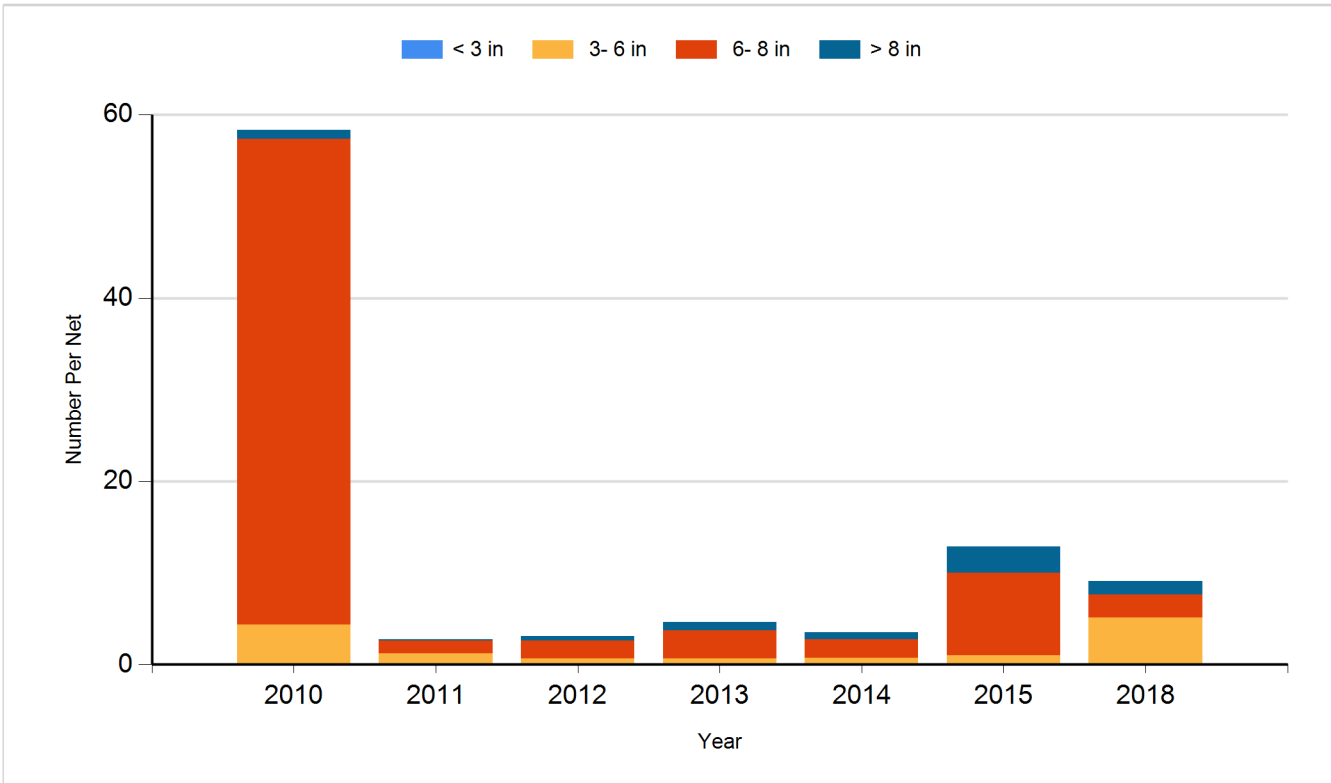
Species: Black Crappie
Gear: frame net (std 3/4 in)



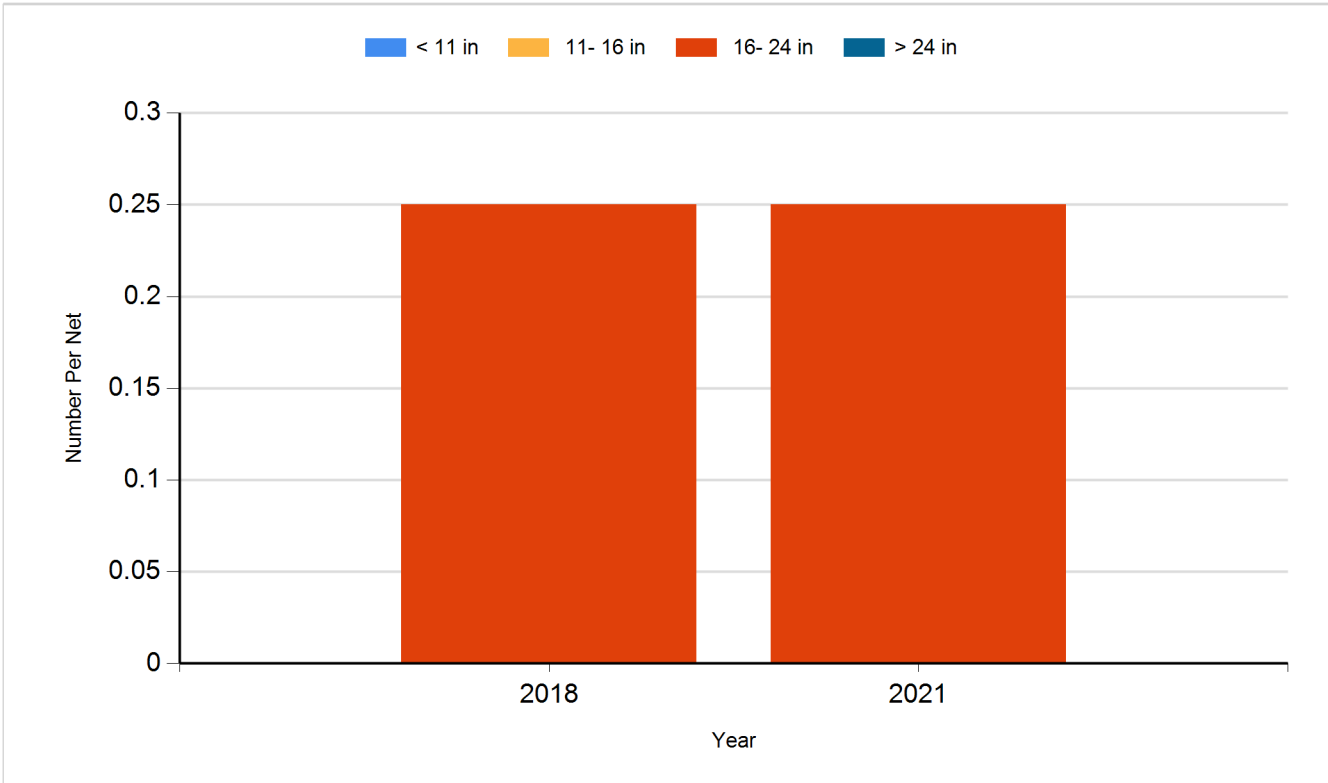
Species: Bluegill
Gear: AFS std frame net



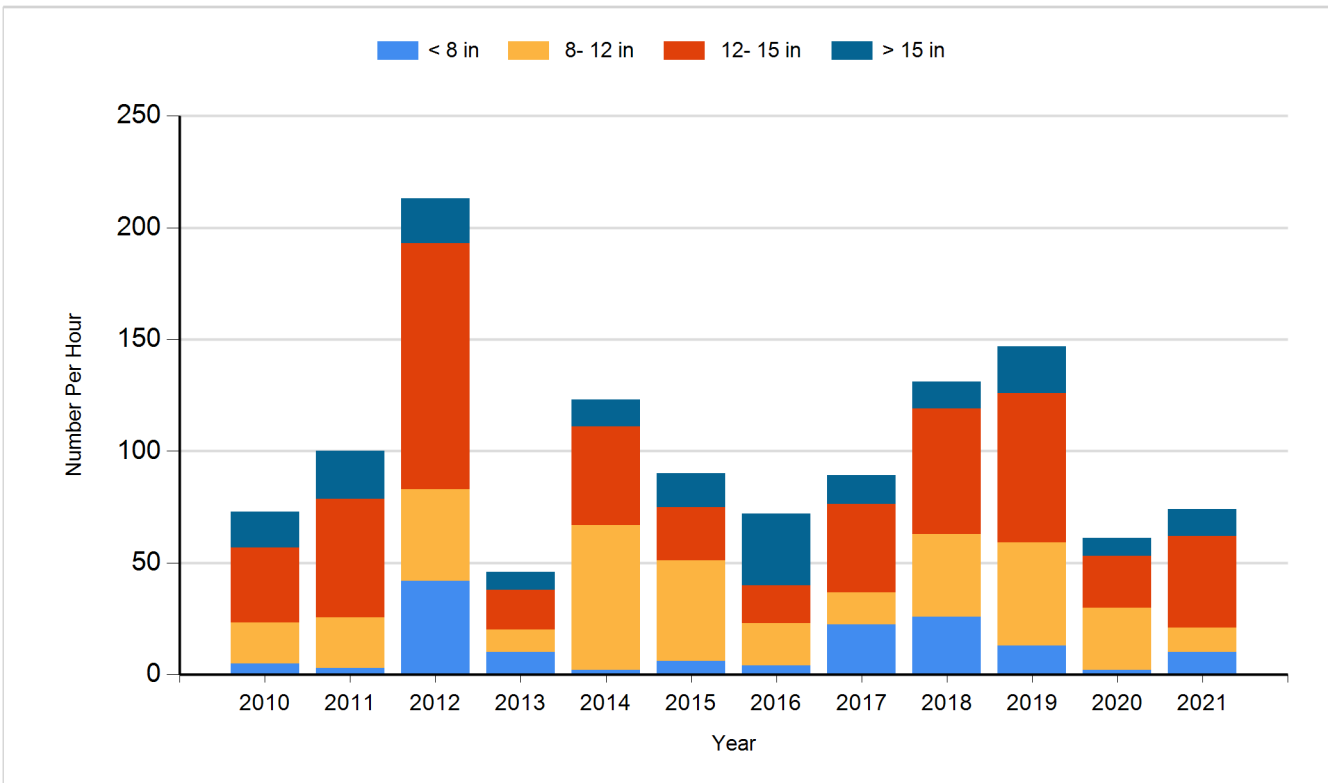
Species: Bluegill
Gear: frame net (std 3/4 in)



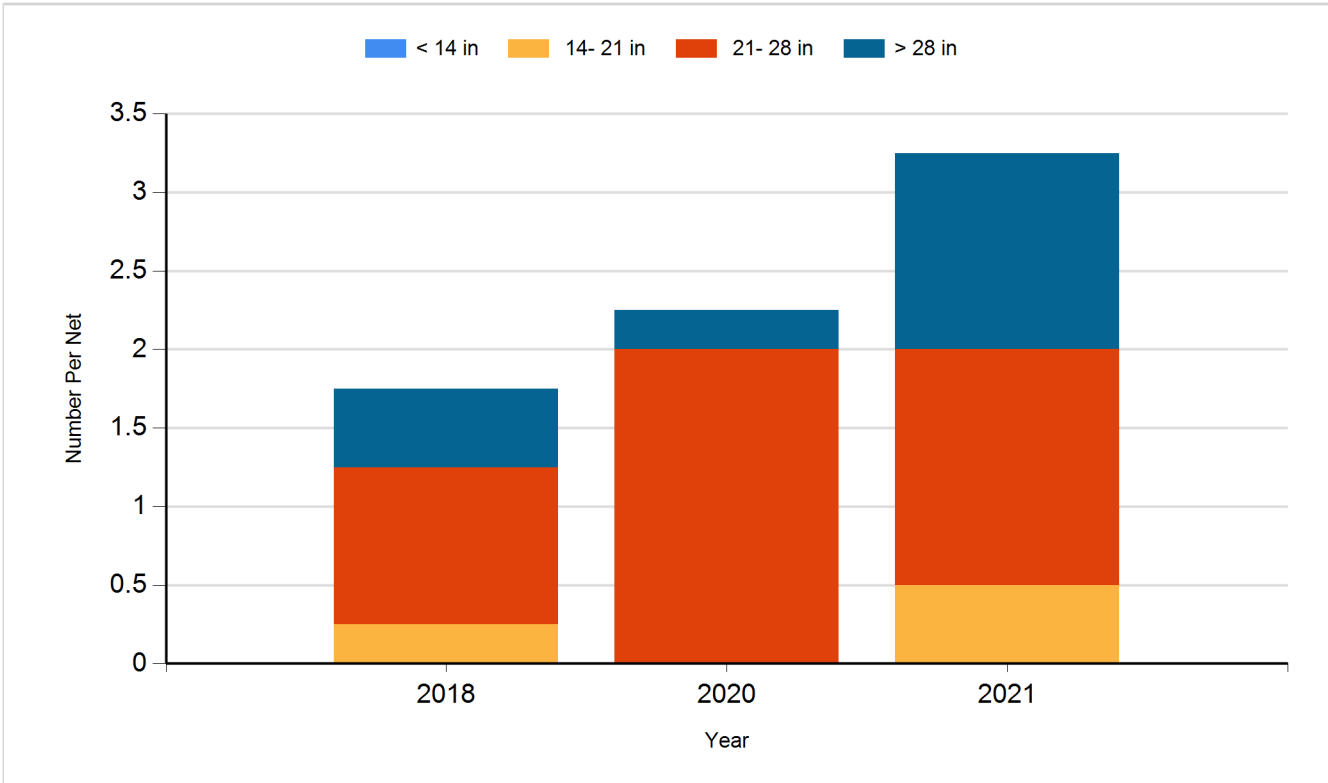
Species: Channel Catfish
Gear: AFS std gill net



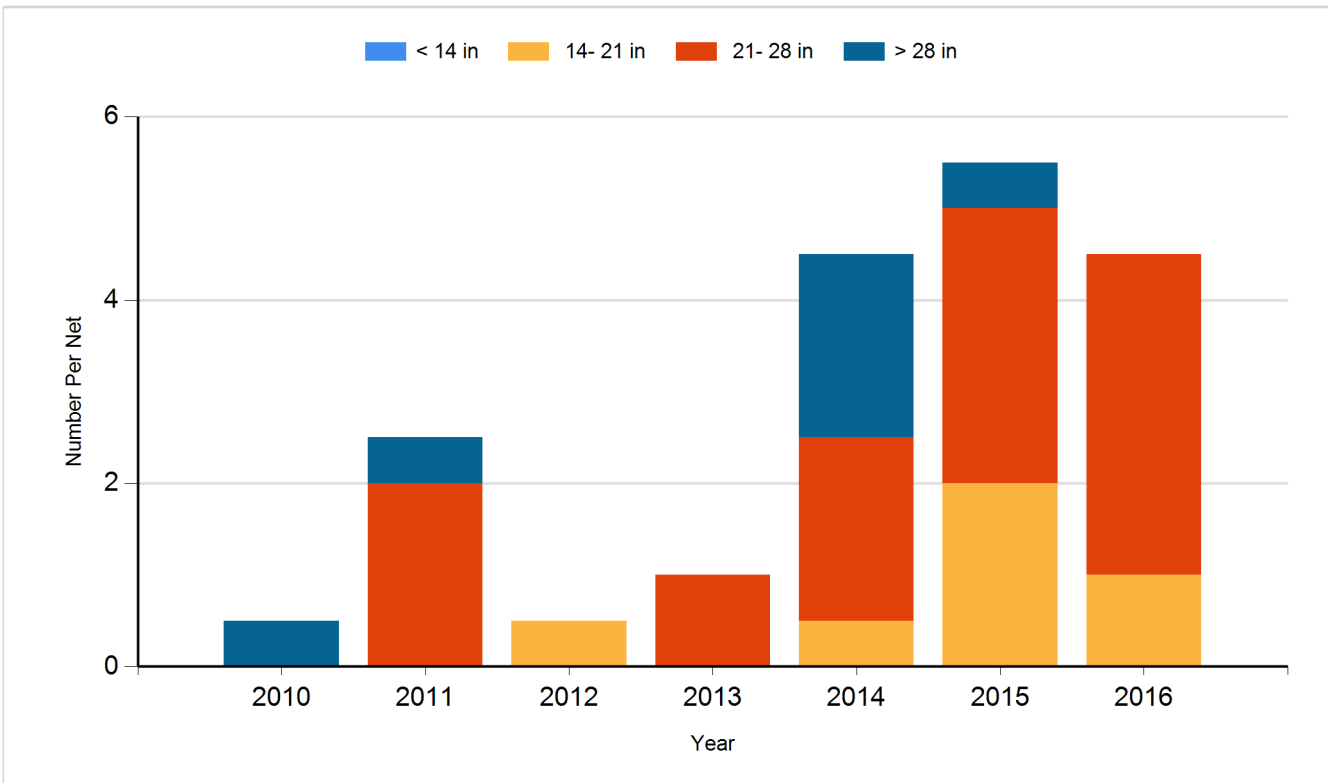
Species: Largemouth Bass
Gear: boat shocker (night)



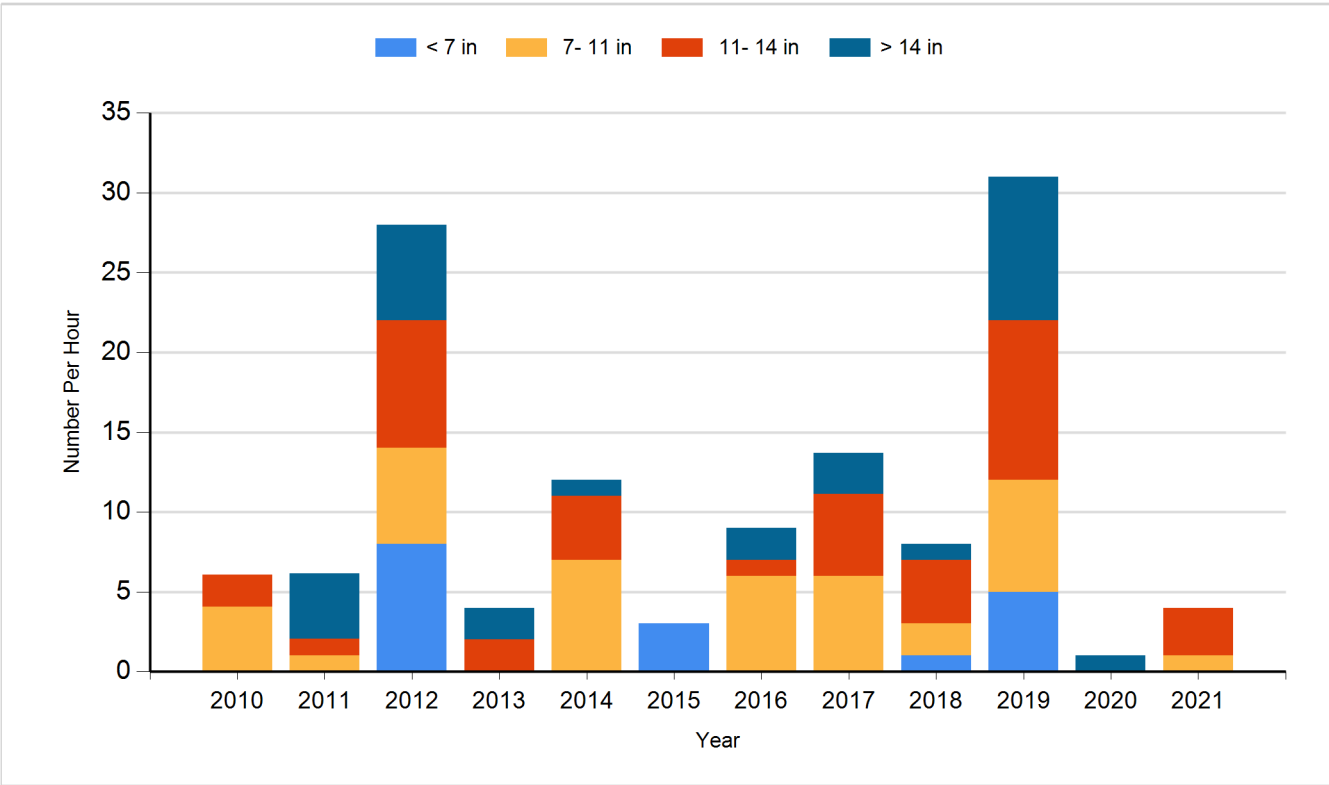
Species: Northern Pike
Gear: AFS std gill net



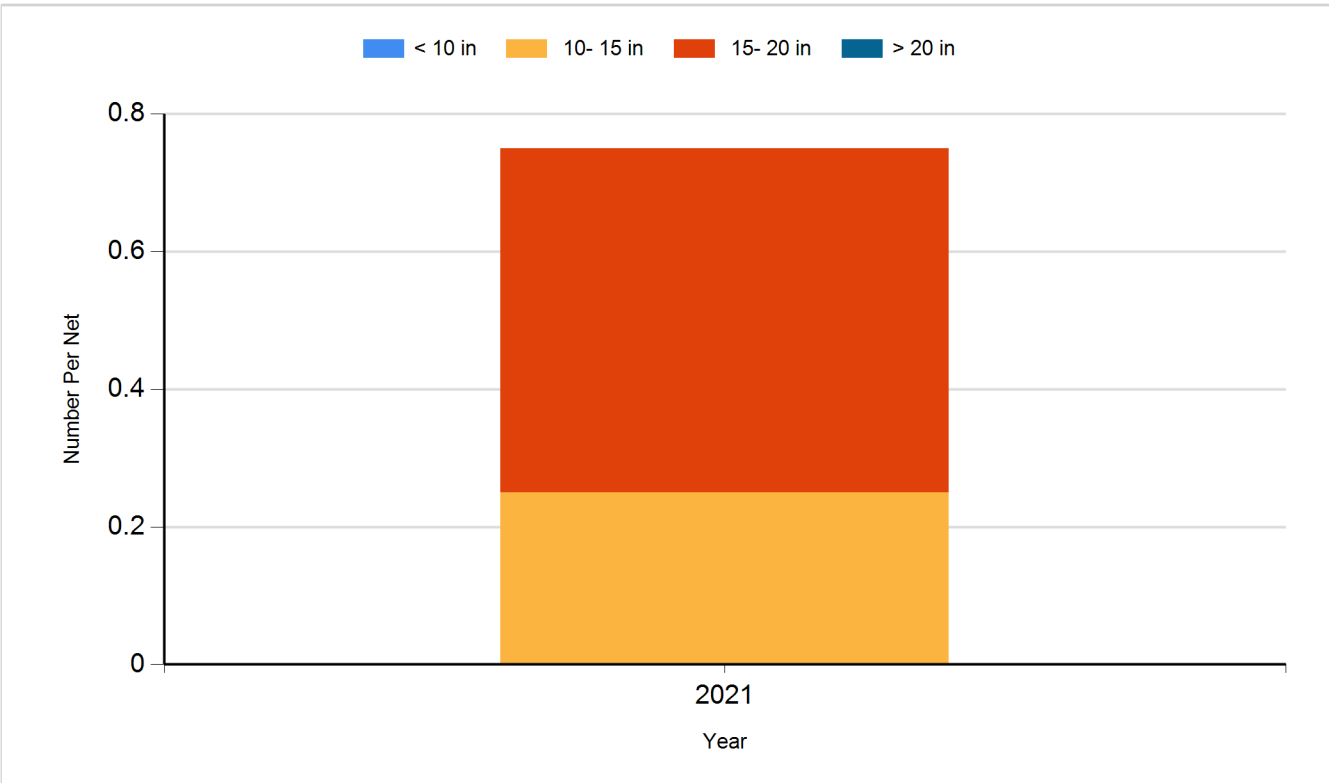
Species: Northern Pike
Gear: std exp gill net



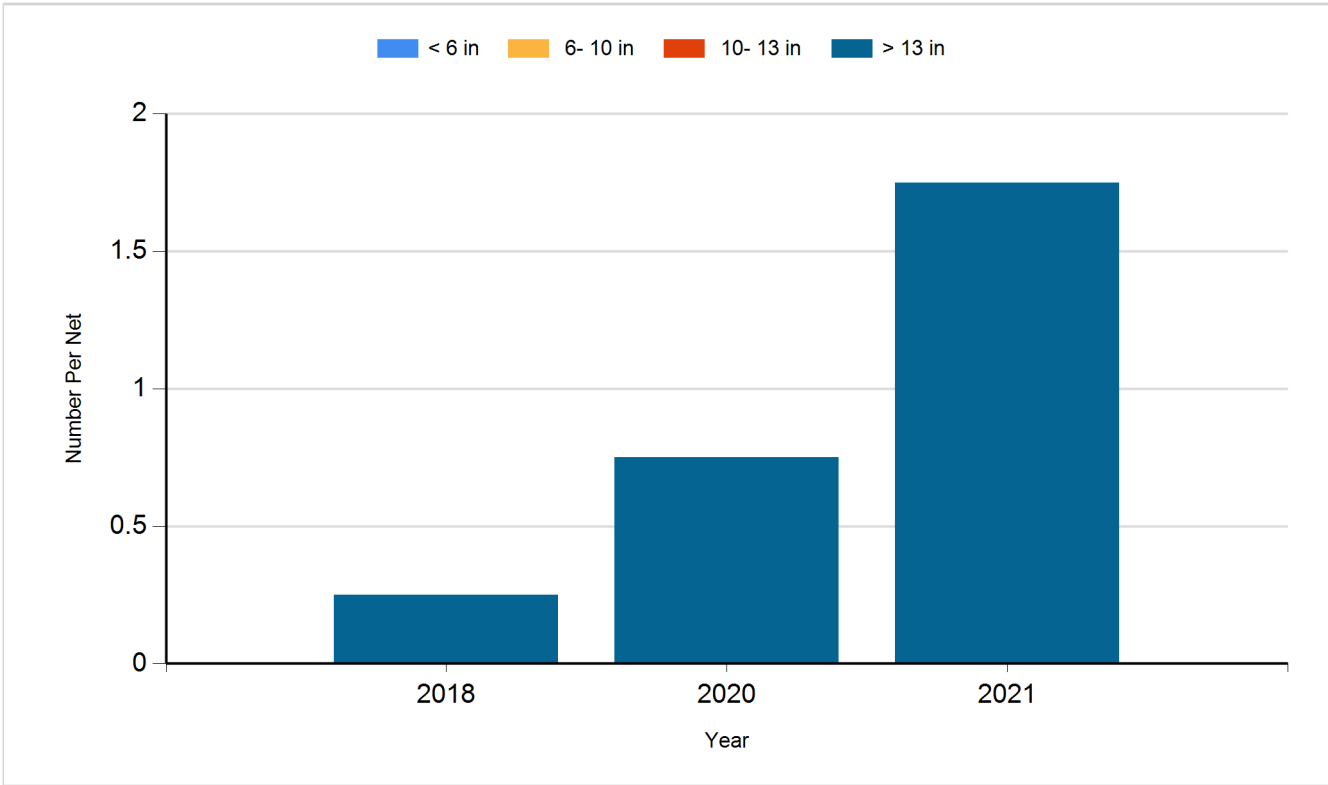
Species: Smallmouth Bass
Gear: boat shocker (night)



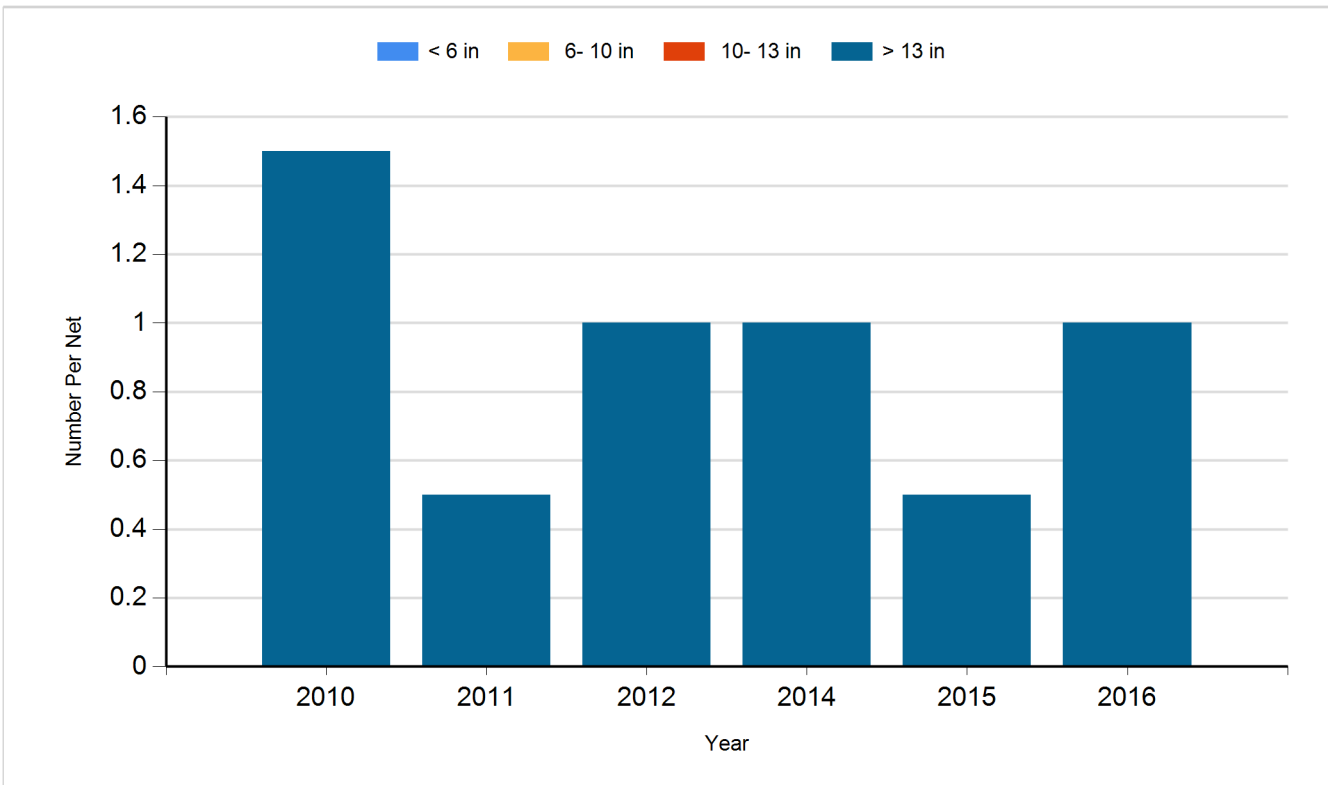
Species: Walleye
Gear: AFS std gill net



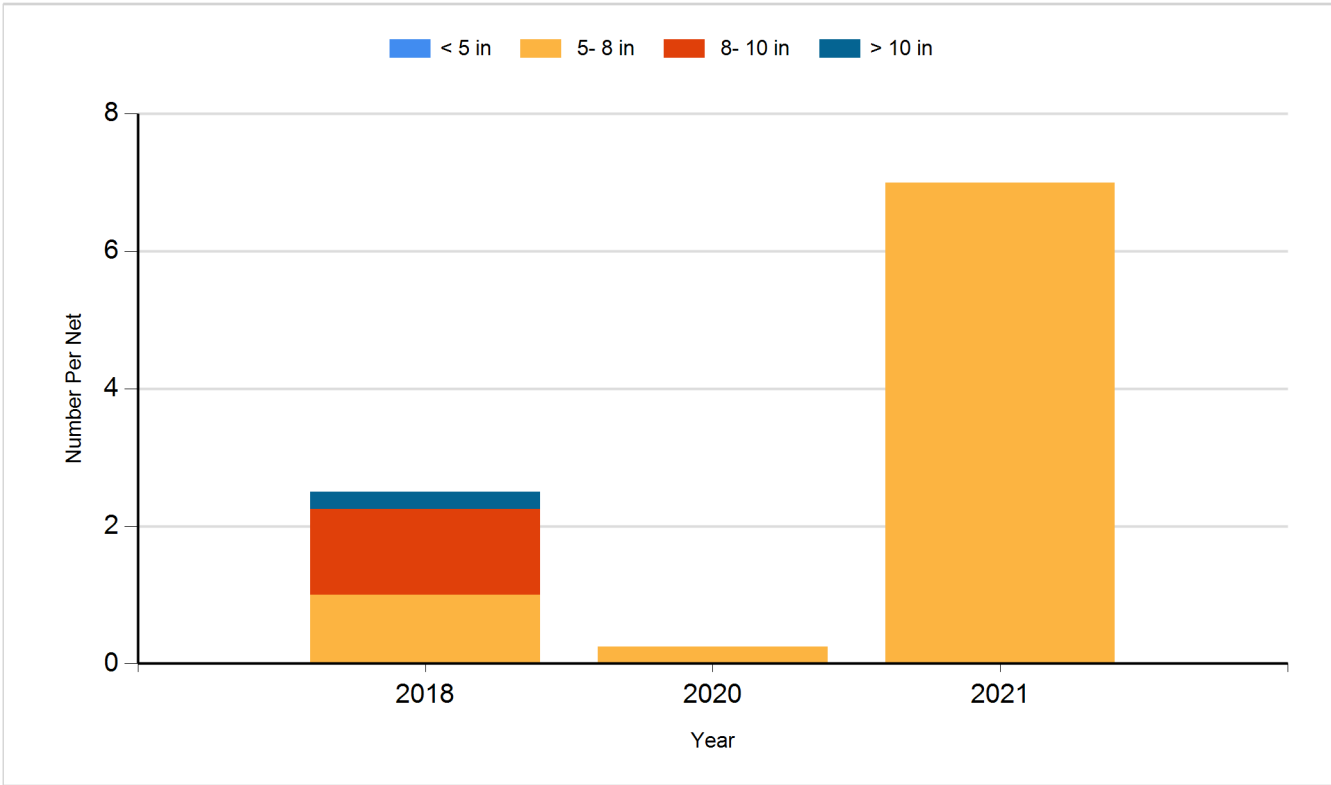
Species: White Sucker
Gear: AFS std gill net



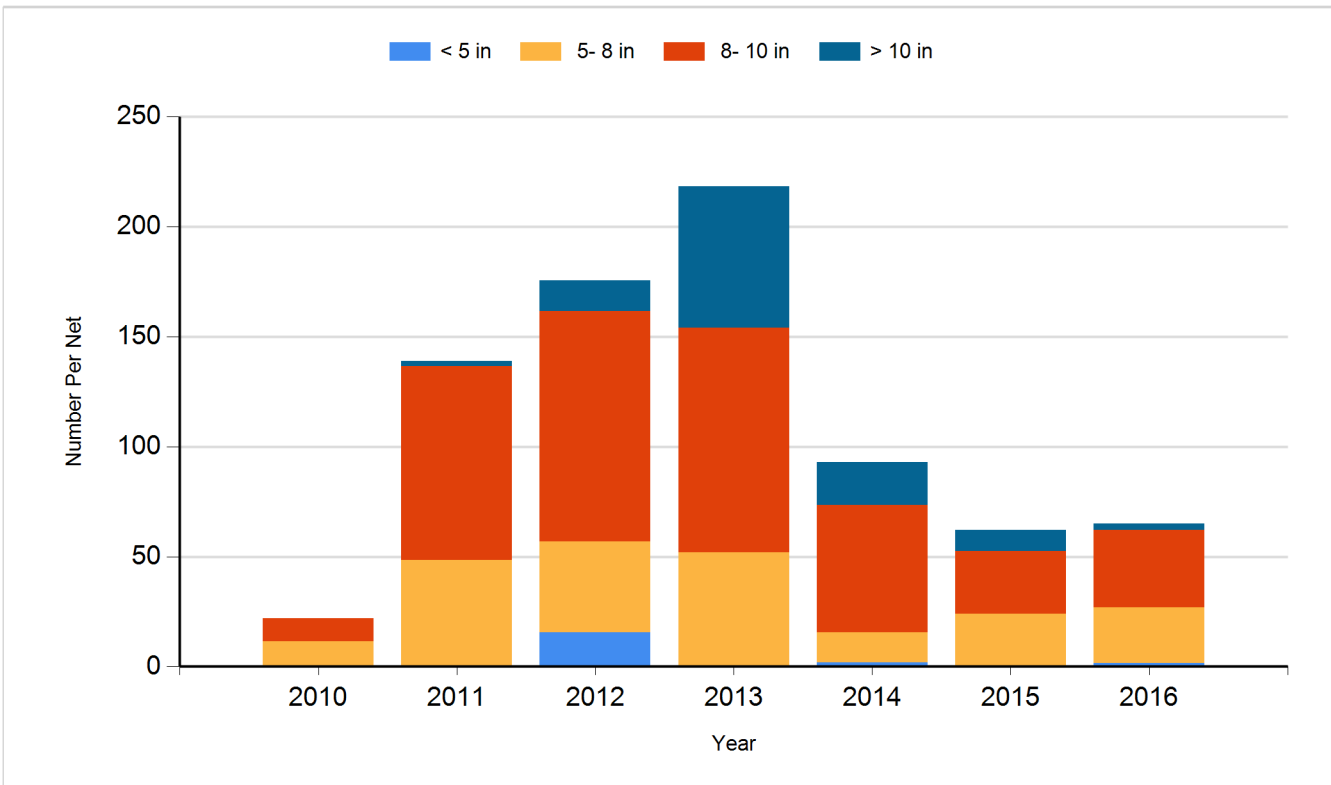
Species: White Sucker
Gear: std exp gill net



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