SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Waggoner, Haakon County

BAD-Lake-2426-000

2021

Lake Information

Name: Waggoner

County: Haakon

Surface Area: 95 Acres

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (day)	Oct 05, 2021	3230 seconds
frame net (std 3/4 in)	Jul 09, 2021	4 net-nights

Common Fish Species Present

Northern Pike

Largemouth Bass

Yellow Perch

Bluegill

Black Crappie

Black Bullhead

Green Sunfish

Channel Catfish

White Sucker

Golden Shiner

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.
- s**td 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.

$$CPUE = \frac{number\ of\ fish}{effort}$$

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.

$$PSD = \left(\frac{number\ of\ fish \geq quality\ length}{number\ of\ fish \geq stock\ length}\right) \text{x } 100$$

$$PSD - P = \left(\frac{number\ of\ fish \geq preferred\ length}{number\ of\ fish \geq stock\ length}\right) \text{x } 100$$

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.

$$Wr = \left(\frac{W}{Ws}\right) \text{x } 100$$

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).

	Stock		Quality		Preferred		Memorable		Trophy	
Species Name	(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**

			Abundance		Stock Density Indices				Condition	
Gear	Species	Sample Size (n)	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
boat shocker (day)	Largemouth Bass	33	35.2	14.1	63	13	25	12	110	3
frame net (std 3/4 in)	Black Bullhead	2361	444.8	160.0	35	1	3	1	92	1
	Black Crappie	145	36.3	22.8	97		13	4	94	1
	Bluegill	40	10.0	5.8	95		18	9	114	3
	Channel Catfish	3	0.8	1.2	100		0		114	4
	Golden Shiner	21	0.0	0.0						
	Green Sunfish	84	21.0	10.2	46	8	0		115	2
	Northern Pike	2	0.5	0.5	50		0		109	21
	White Sucker	2	0.5	0.5	100		100		101	9
	Yellow Perch	36	9.0	4.0	83	10	28	12	103	2

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**

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
AFS std frame net	Black Bullhead						1.5					1.50
	Black Crappie						8.3					8.30
	Bluegill						15.0					15.00
	Golden Shiner						0.0					0.00
	Green Sunfish						0.7					0.70
AFS std gill net	Black Bullhead						0.3	4.5	0.0			1.60
	Black Crappie						2.5	0.0	1.0			1.17
	Golden Shiner						0.0	0.0	0.0			0.00
	Largemouth Bass						0.0	0.5	0.0			0.17
	Northern Pike						0.8	0.0	0.0			0.27
	White Sucker						2.5	1.0	0.0			1.17
	Yellow Perch						0.0	1.0	0.0			0.33
boat shocker (day)	Largemouth Bass										35.2	35.20
boat shocker (night)	Largemouth Bass			73.0	45.0	29.0	20.0	44.0	24.4	16.0		35.91
	Walleye*			2.0	0.0	0.0	0.0	0.0	0.0	0.0		0.29
frame net (std 3/4 in)	Black Bullhead	0.6			1.1			2.8	10.4	34.0	444.8	82.28
	Black Crappie	74.3			42.1			2.5	19.9	50.7	36.3	37.63
	Bluegill	56.1			72.4			3.5	11.3	11.0	10.0	27.38
	Channel Catfish	0.0			0.0			0.0	0.0	0.0	0.8	0.13
	Golden Shiner	0.0			0.0			0.0	0.0	0.0	0.0	0.00
	Green Sunfish	0.0			0.0			0.3	13.0	62.3	21.0	16.10
	Largemouth Bass	0.9			0.0			0.3	0.0	0.0	0.0	0.20
	Northern Pike	5.0			2.4			0.0	0.0	0.2	0.5	1.35
	White Sucker	0.4			0.4			0.0	0.0	0.0	0.5	0.22
	Yellow Perch	1.5			0.6			0.0	0.1	1.2	9.0	2.07
std exp gill net	Black Bullhead	4.5			1.0							2.75
	Black Crappie	4.0			7.0							5.50
	Bluegill	1.5			3.0							2.25
	Golden Shiner	0.0			0.0							0.00
	Largemouth Bass	0.0			0.5							0.25
	Northern Pike	7.0			2.0							4.50
	White Sucker	1.0			0.5							0.75
	Yellow Perch	5.5			0.0							2.75

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.

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std frame net	Black Bullhead	PSD						89				
		PSD-P						56				
		Wr						100				
	Black Crappie	PSD						82				
		PSD-P						0				
		Wr						91				
	Bluegill	PSD						98				
		PSD-P						63				
		Wr						112				
	Green Sunfish	PSD						50				
		PSD-P						25				
		Wr						125				
AFS std gill net	Black Bullhead	PSD						100	100			
		PSD-P						100	33			
		Wr						104	113			
	Black Crappie	PSD						50		100		
		PSD-P						10		100		
		Wr						98		108		
	Largemouth Bass	PSD							0			
		PSD-P							0			
		Wr							121			
	Northern Pike	PSD						100				
		PSD-P						100				
		Wr						88				
	White Sucker	PSD						100	100			
		PSD-P						100	100			
		Wr						102	104			
	Yellow Perch	PSD							50			
		PSD-P							0			
		Wr							110			
boat shocker (day)	Largemouth Bass	PSD										63
		PSD-P										25

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
boat shocker (day)	Largemouth Bass	Wr										110
boat shocker (night)	Largemouth Bass	PSD			86	84	48	100	66	62	69	
		PSD-P			37	51	28	30	20	33	31	
		Wr			104	107	110	109	108	115	116	
frame net (std 3/4 in)	Black Bullhead	PSD	100			100			100	10	27	35
		PSD-P	60			100			73	5	0	3
		Wr	99			93			103	106	95	92
	Black Crappie	PSD	51			93			100	84	50	97
		PSD-P	0			0			0	72	19	13
		Wr	103			95			97	100	104	94
	Bluegill	PSD	92			98			100	90	80	95
		PSD-P	4			25			93	71	30	18
		Wr	110			102			118	125	127	114
	Channel Catfish	PSD										100
		PSD-P										0
		Wr										114
	Green Sunfish	PSD							0	18	11	46
		PSD-P							0	3	0	0
		Wr							146	127	123	115
	Largemouth Bass	PSD	71						0			
		PSD-P	57						0			
		Wr	104						112			
	Northern Pike	PSD	55			79					0	50
		PSD-P	30			16					0	0
		Wr	77			94					98	109
	White Sucker	PSD	100			100						100
		PSD-P	100			100						100
		Wr	90			86						101
	Yellow Perch	PSD	75			100				0	14	83
		PSD-P	25			100				0	14	28
		Wr	97			101				105	111	103
std exp gill net	Black Bullhead	PSD	89			100						
		PSD-P	89			0						
		Wr	106			112						
	Black Crappie	PSD	13			29						
		PSD-P	0			0						

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
std exp gill net	Black Crappie	Wr	104			109						
	Bluegill	PSD	67			17						
		PSD-P	0			0						
		Wr	102			116						
	Largemouth Bass	PSD				0						
		PSD-P				0						
		Wr				101						
	Northern Pike	PSD	79			50						
		PSD-P	7			0						
		Wr	87			92						
	White Sucker	PSD	100			100						
		PSD-P	100			100						
		Wr	93			103						
	Yellow Perch	PSD	64									
		PSD-P	27									
		Wr	95									

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Black Crappie

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2015	676	101 (2)	164 (36)	197 (12)	221 (160)	220 (107)	230 (294)	226 (66)			

Species: Largemouth Bass

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

Fish Condition

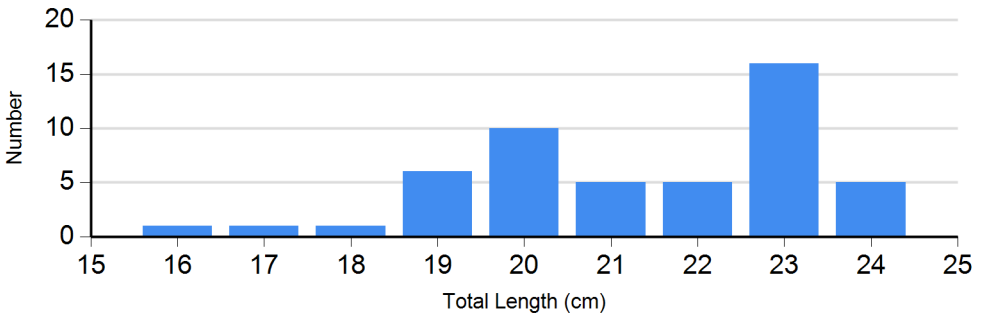
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2017	0		0		1	104	0	
	2018	0		6	114 (4.4)	3	111 (8.5)	0	
Black Crappie Frame Net	2017	9	96 (1.5)	41	90 (0.9)	0		0	
	2018	0		10	97 (1.6)	0		0	
	2019	25	109 (1.7)	20		114	96 (0.3)	0	
	2020	152	106 (0.5)	94	106 (0.8)	55	96 (0.7)	3	96 (1.2)
	2021	5	88 (4.5)	121	96 (0.4)	19	84 (0.7)	0	
Bluegill Frame Net	2017	2		31	115 (1.5)	57	111 (1.1)	0	
	2018	0		1	108	13	119 (2.3)	0	
	2019	9	129 (6.3)	17	131 (2.2)	62	121 (0.9)	2	143
	2020	13	130 (2.8)	33	131 (1.9)	19	117 (1.9)	1	116
	2021	2		31	116 (2.4)	7	103 (1.3)	0	
Largemouth Bass Electro Fishing	2017	0		14	110 (3.2)	6	105 (1.4)	0	
	2018	15	111 (2.6)	20	107 (2.5)	9	106 (1.6)	0	
	2019	8	114 (3.8)	6	118 (3.9)	7	115 (3.0)	0	
	2020	5	117 (3.0)	6	114 (5.2)	5	117 (5.3)	0	
	2021	12	98 (2.2)	12	118 (2.1)	8	118 (2.4)	0	
Northern Pike Gill Net	2017	0		0		3	88 (2.6)	0	
White Sucker Gill Net	2017	0		0		5	100 (1.8)	5	105 (5.3)
	2018	0		0		0		2	104 (6.4)
Yellow Perch Gill Net	2018	1	109	1	111	0		0	

Length Frequency Distribution

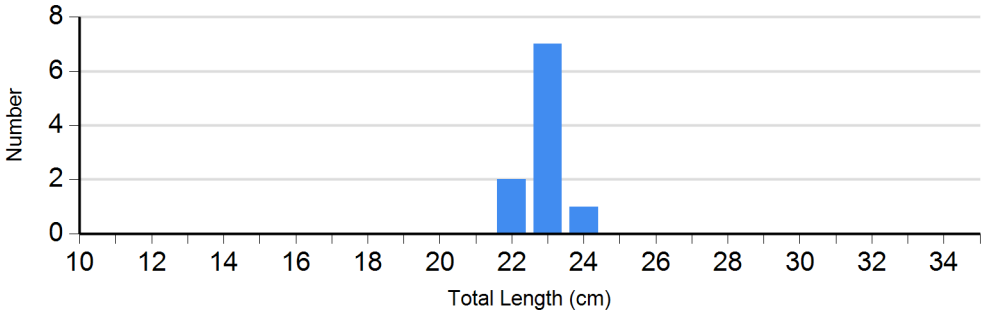
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net

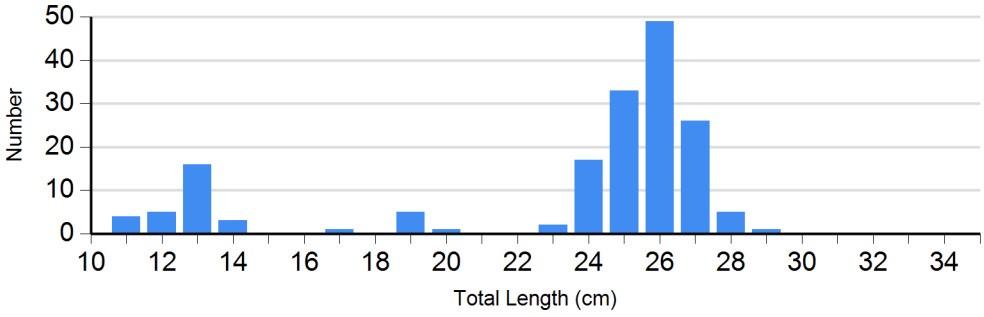


2017

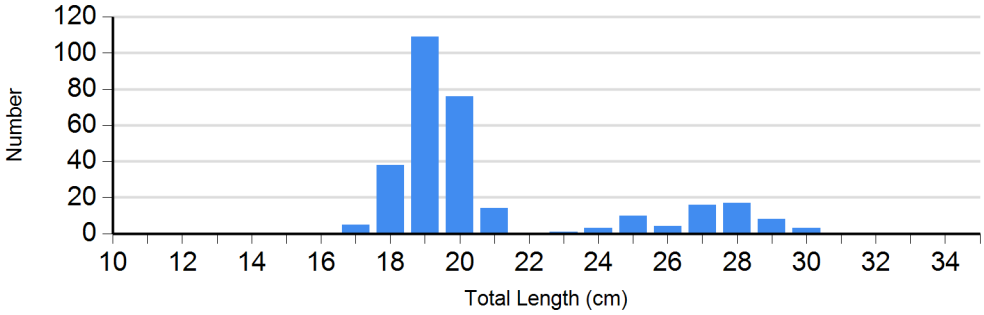
Species: Black Crappie
Gear: frame net (std 3/4 in)



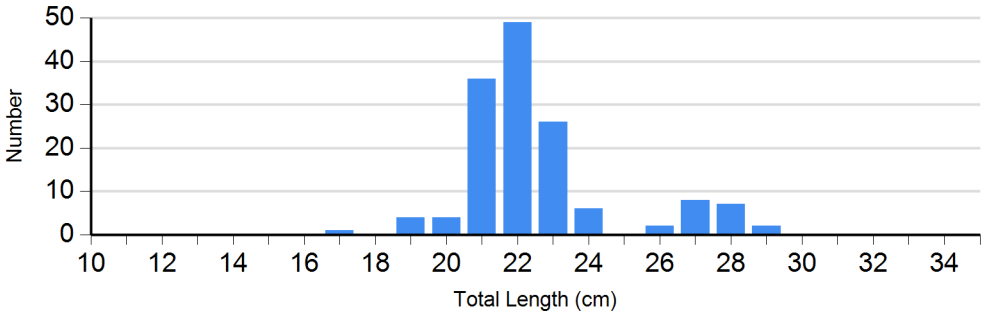
2018



2019

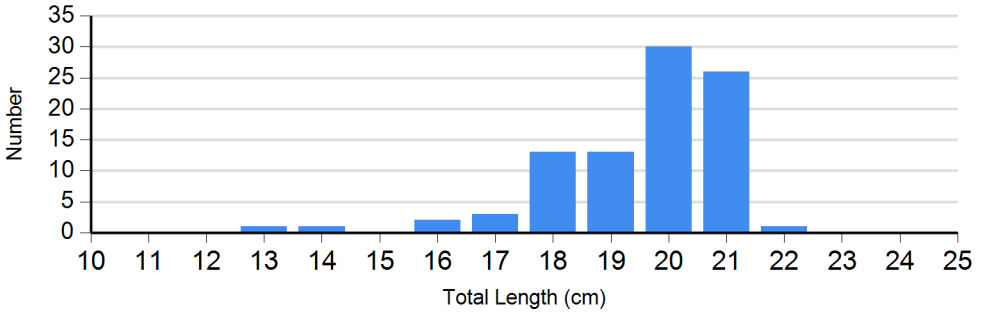


2020



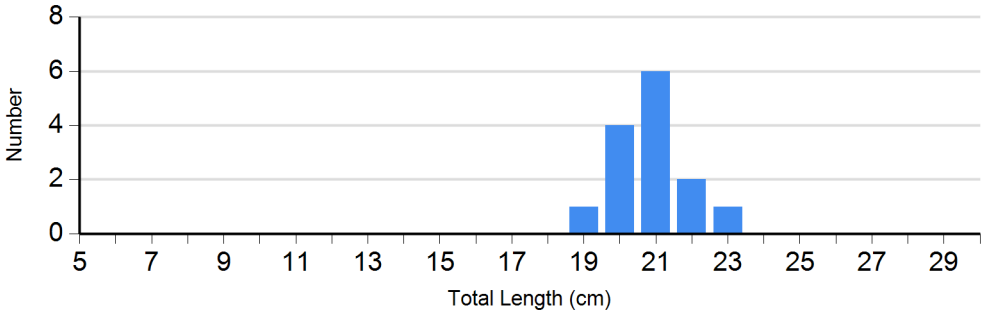
2021

Species: Bluegill
Gear: AFS std frame net

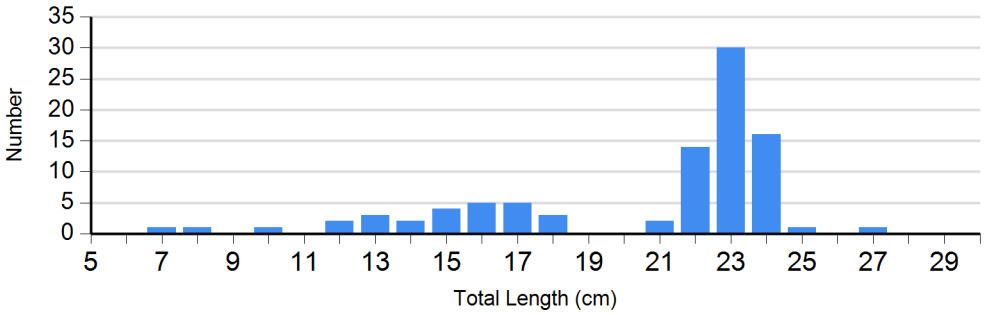


2017

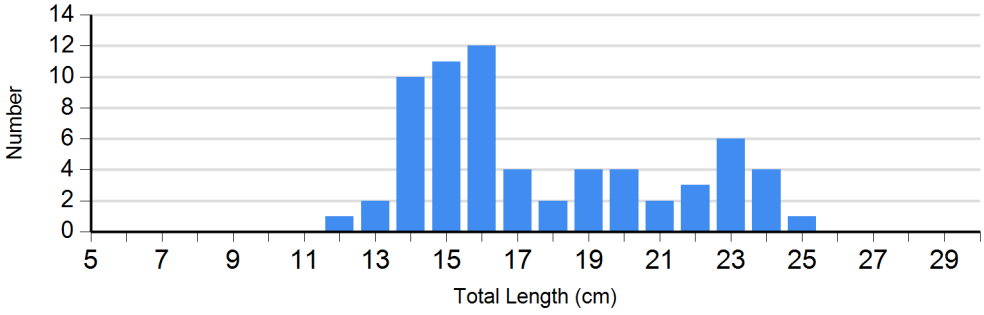
Species: Bluegill
Gear: frame net (std 3/4 in)



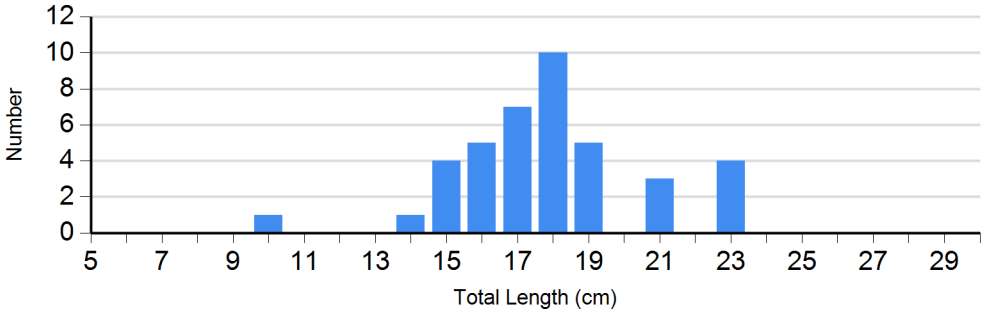
2018



2019

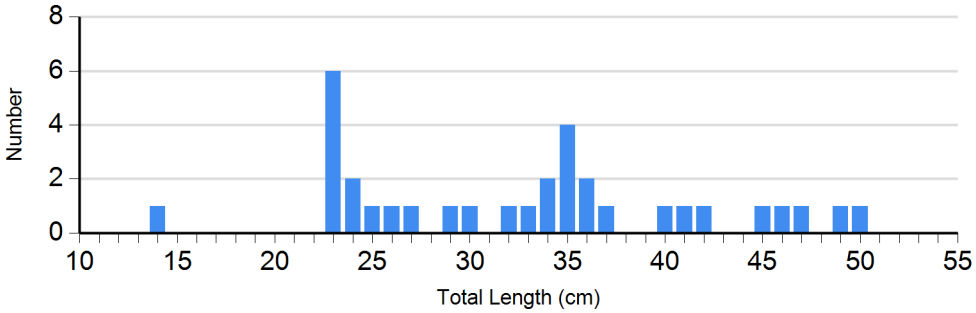


2020



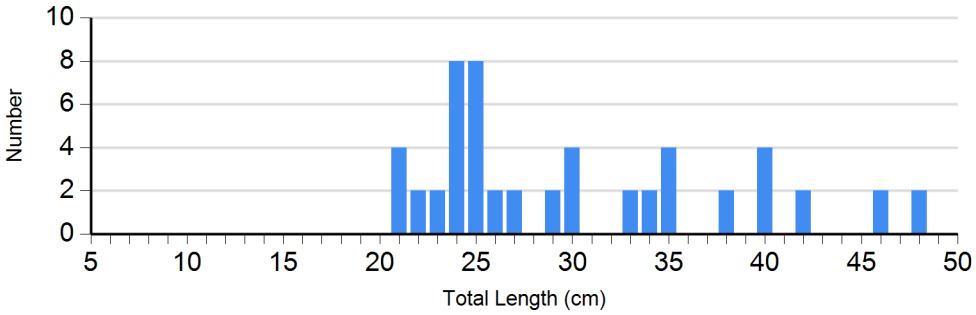
2021

Species: Largemouth Bass
Gear: boat shocker (day)

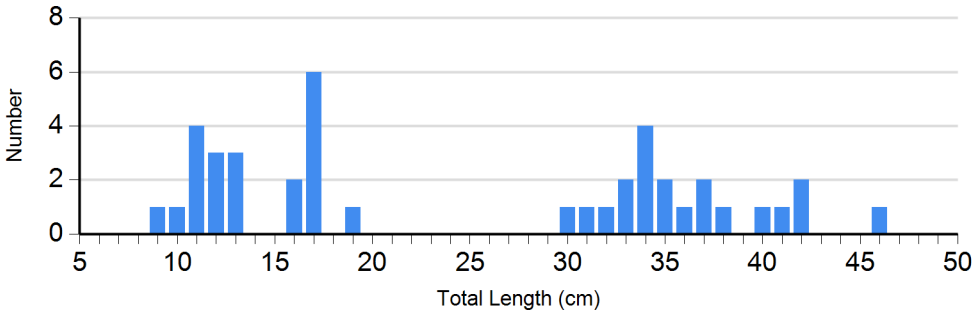


2021

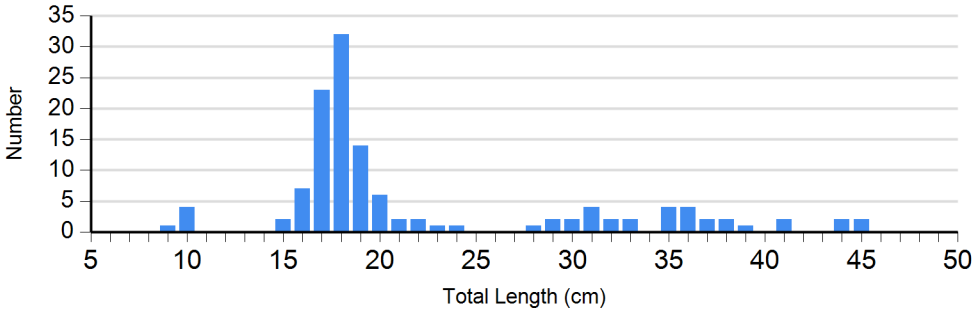
Species: Largemouth Bass
Gear: boat shocker (night)



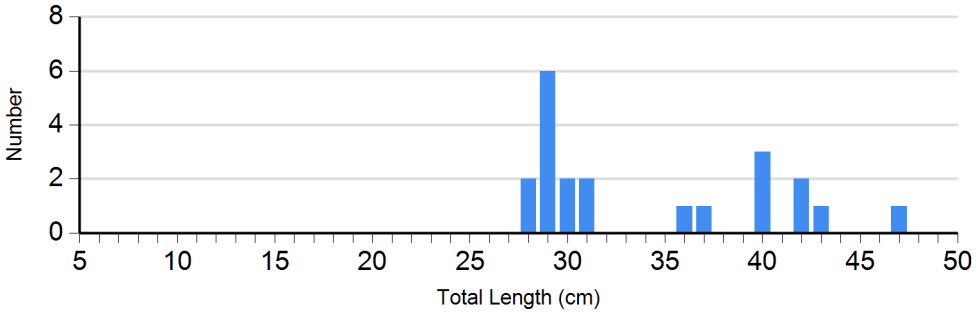
2016

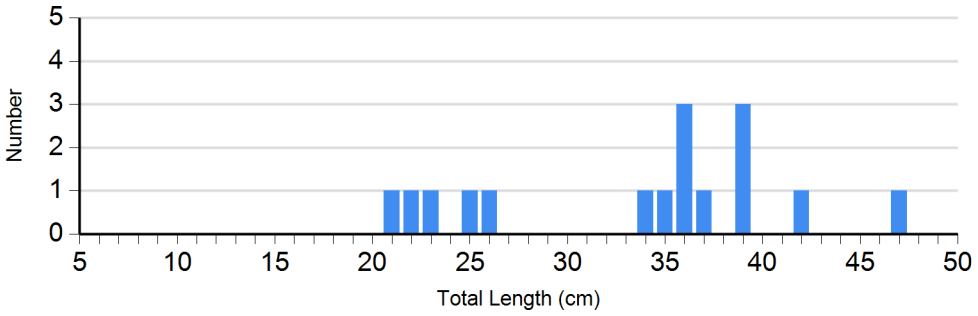


2017

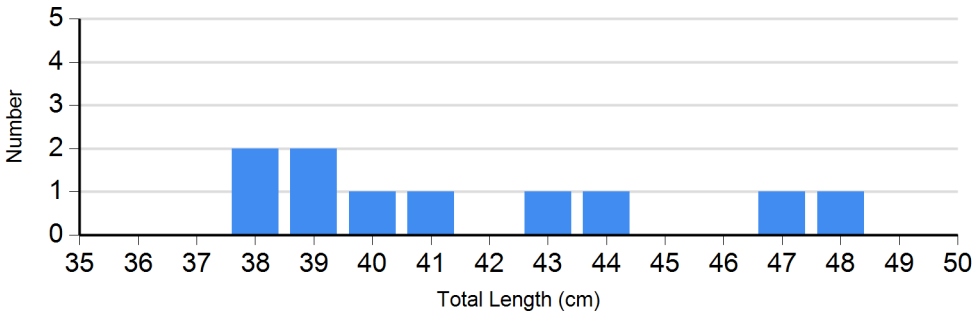


2018





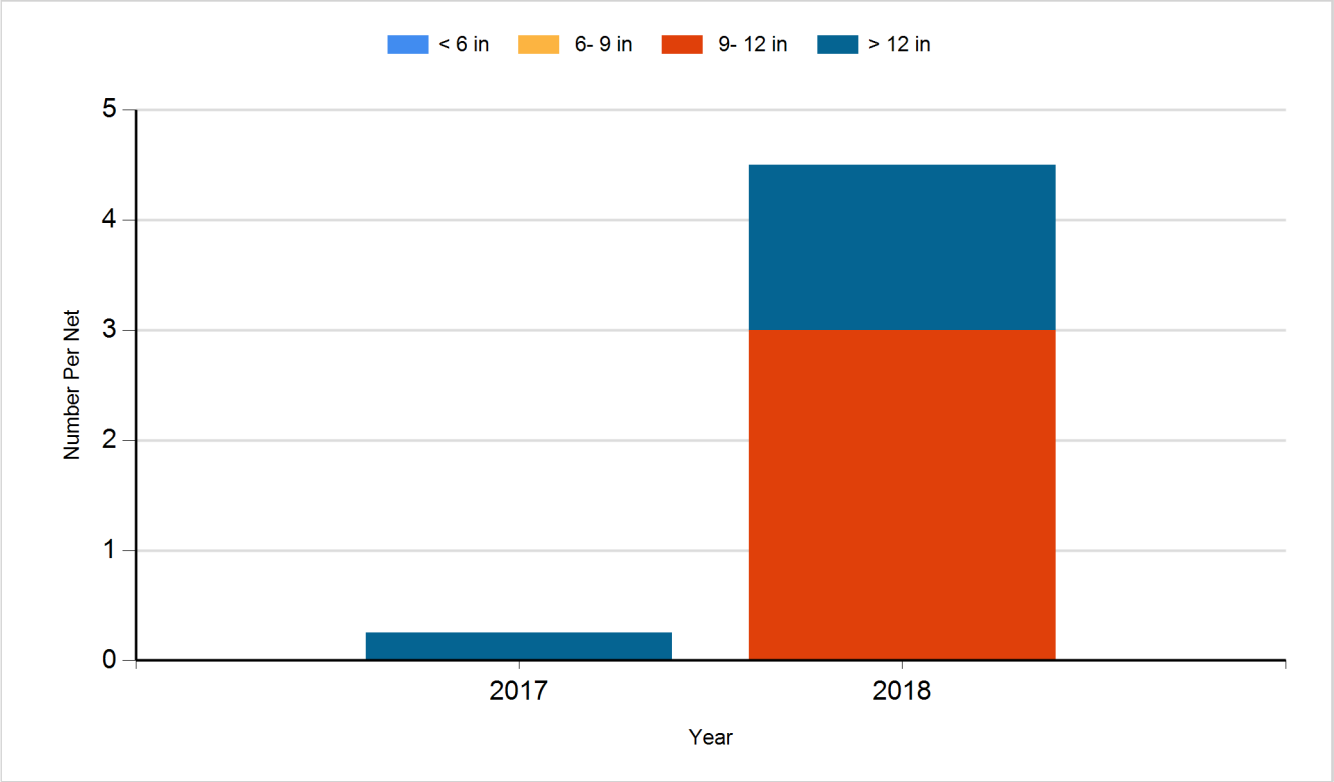
Species: White Sucker
Gear: AFS std gill net



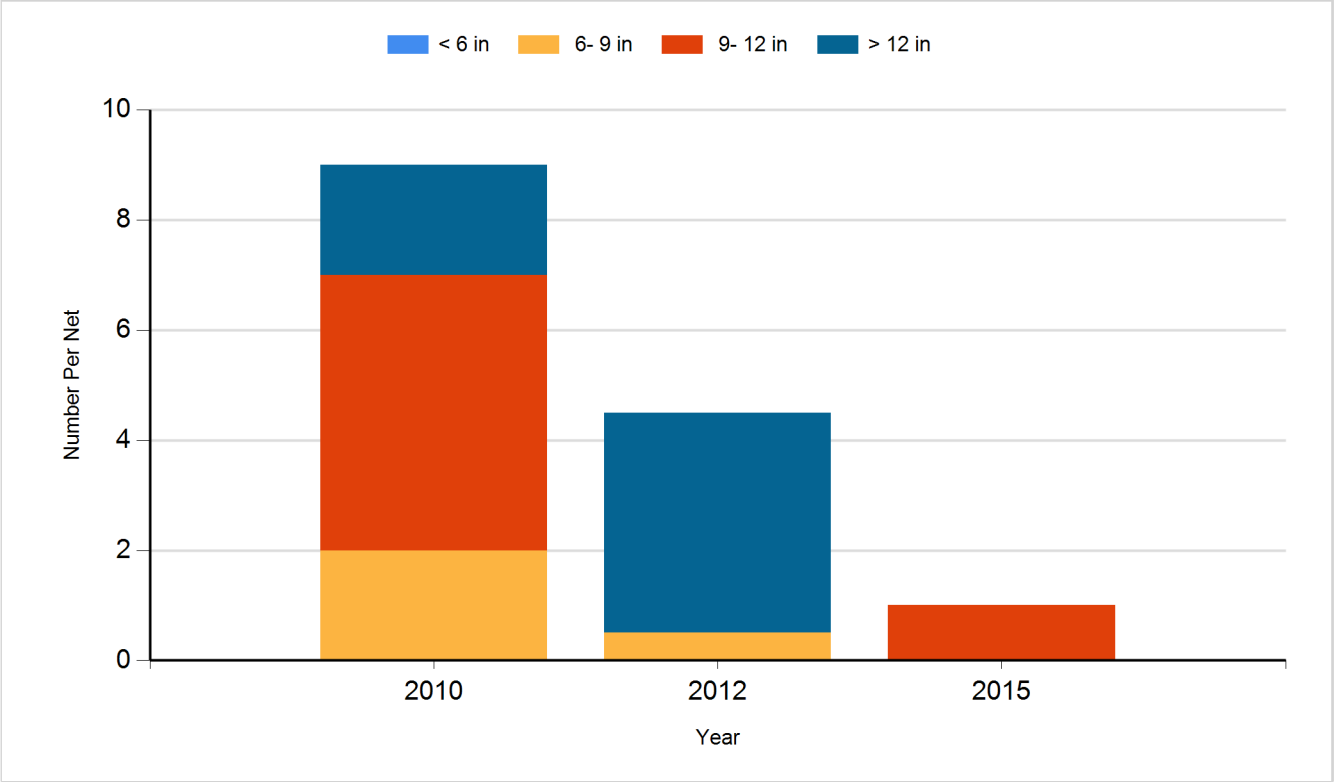
Historic Fish Sizes and Relative Abundance

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

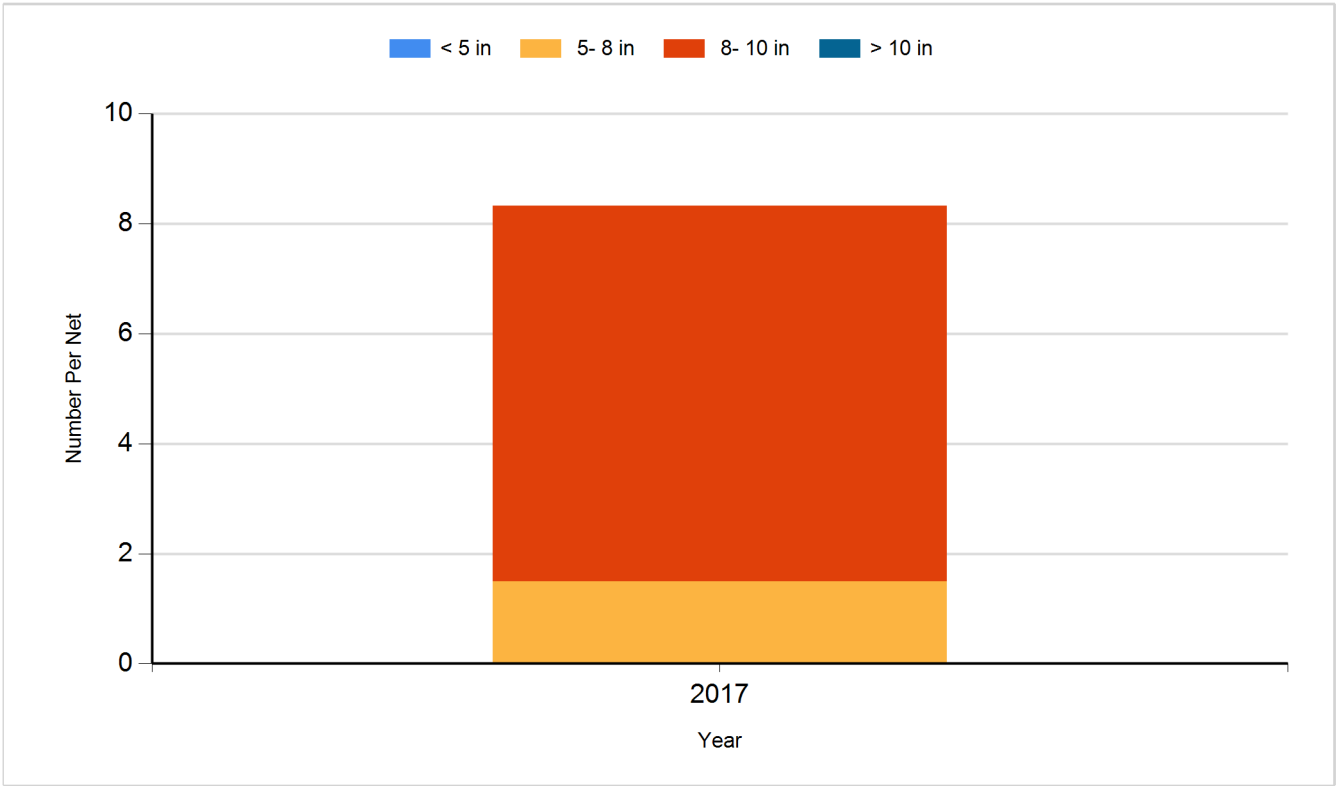
Species: Black Bullhead
Gear: AFS std gill net



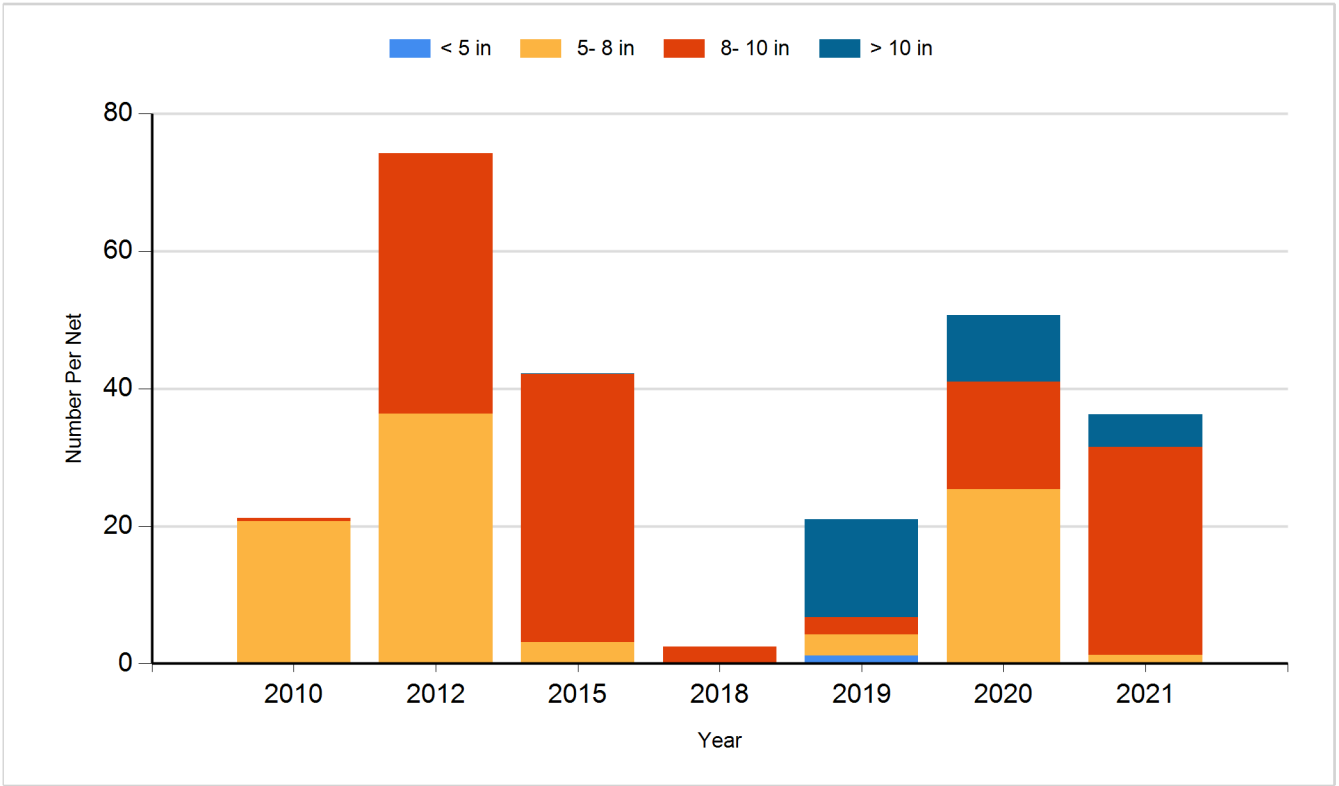
Species: Black Bullhead
Gear: std exp gill net



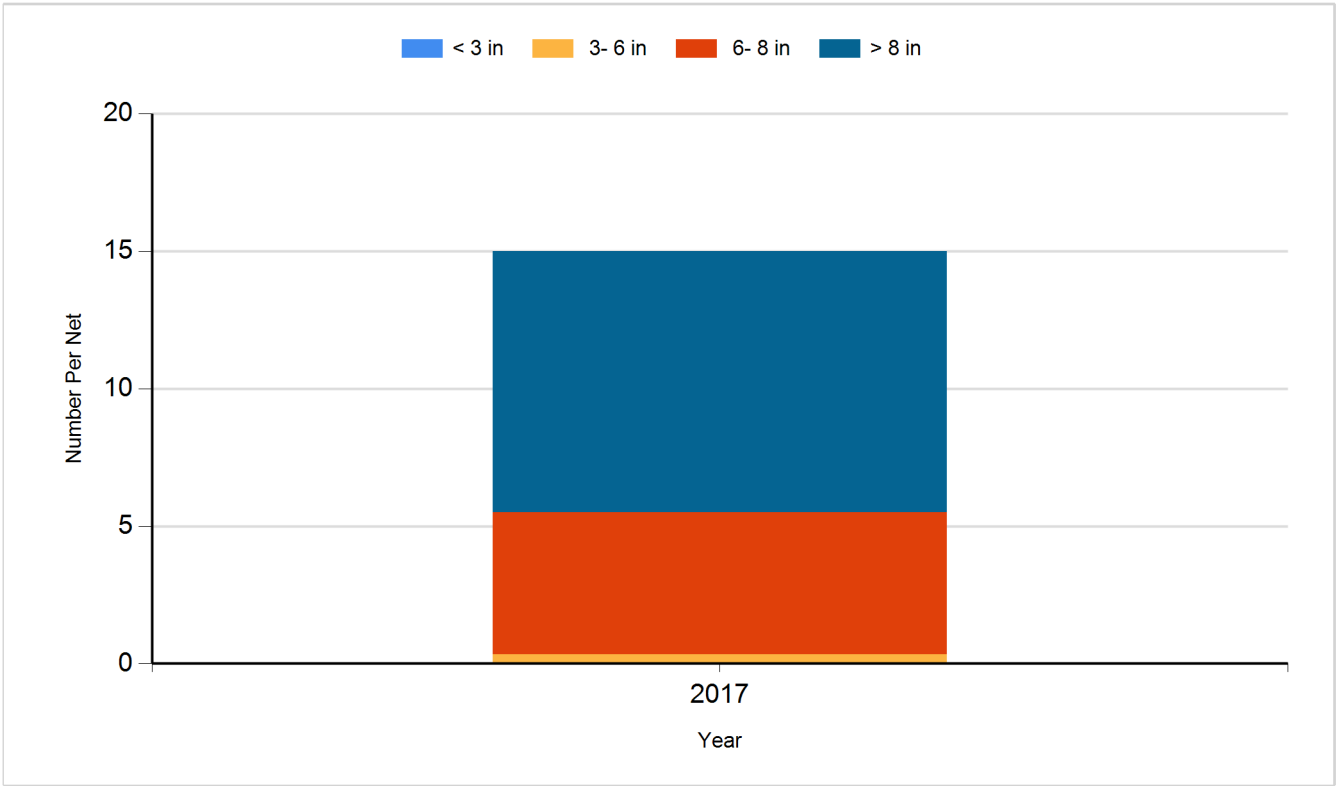
Species: Black Crappie
Gear: AFS std frame net



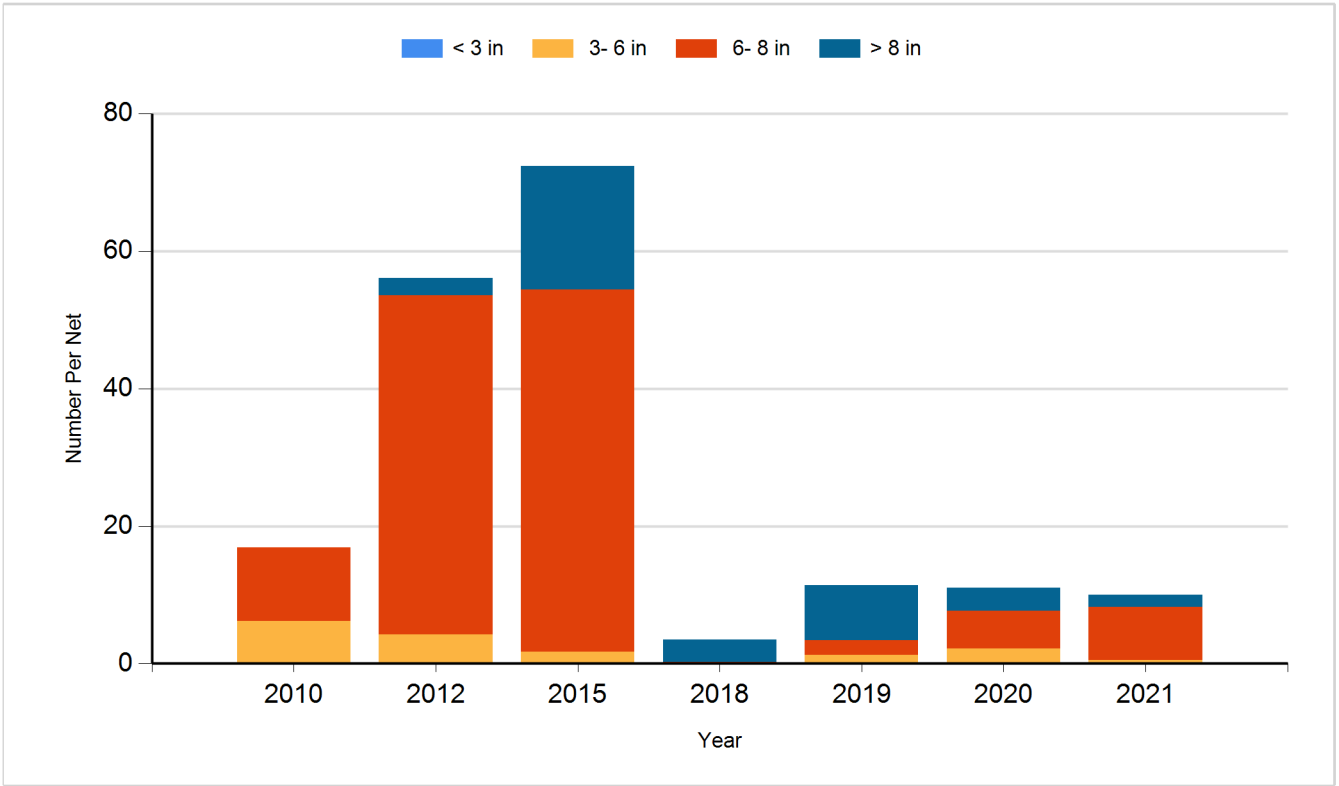
Species: Black Crappie
Gear: frame net (std 3/4 in)



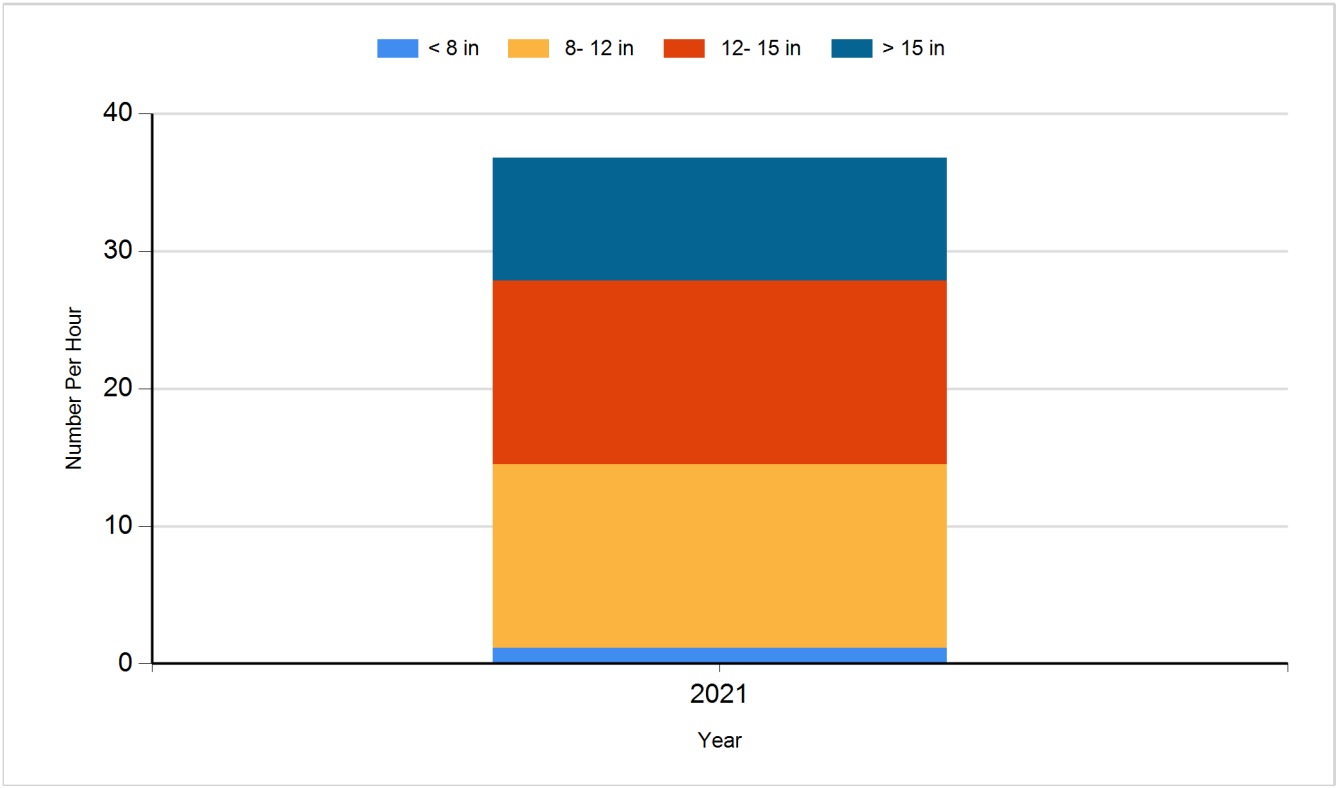
Species: Bluegill
Gear: AFS std frame net



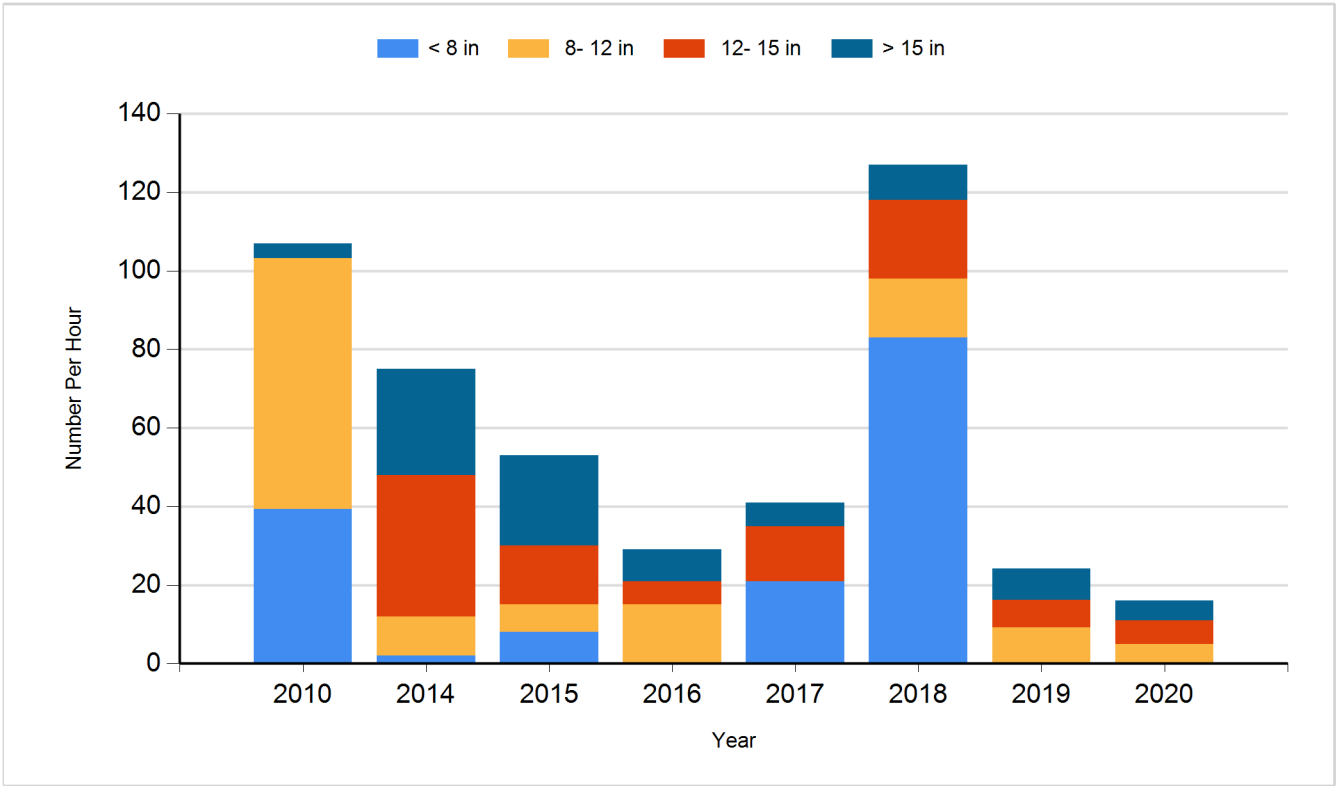
Species: Bluegill
Gear: frame net (std 3/4 in)



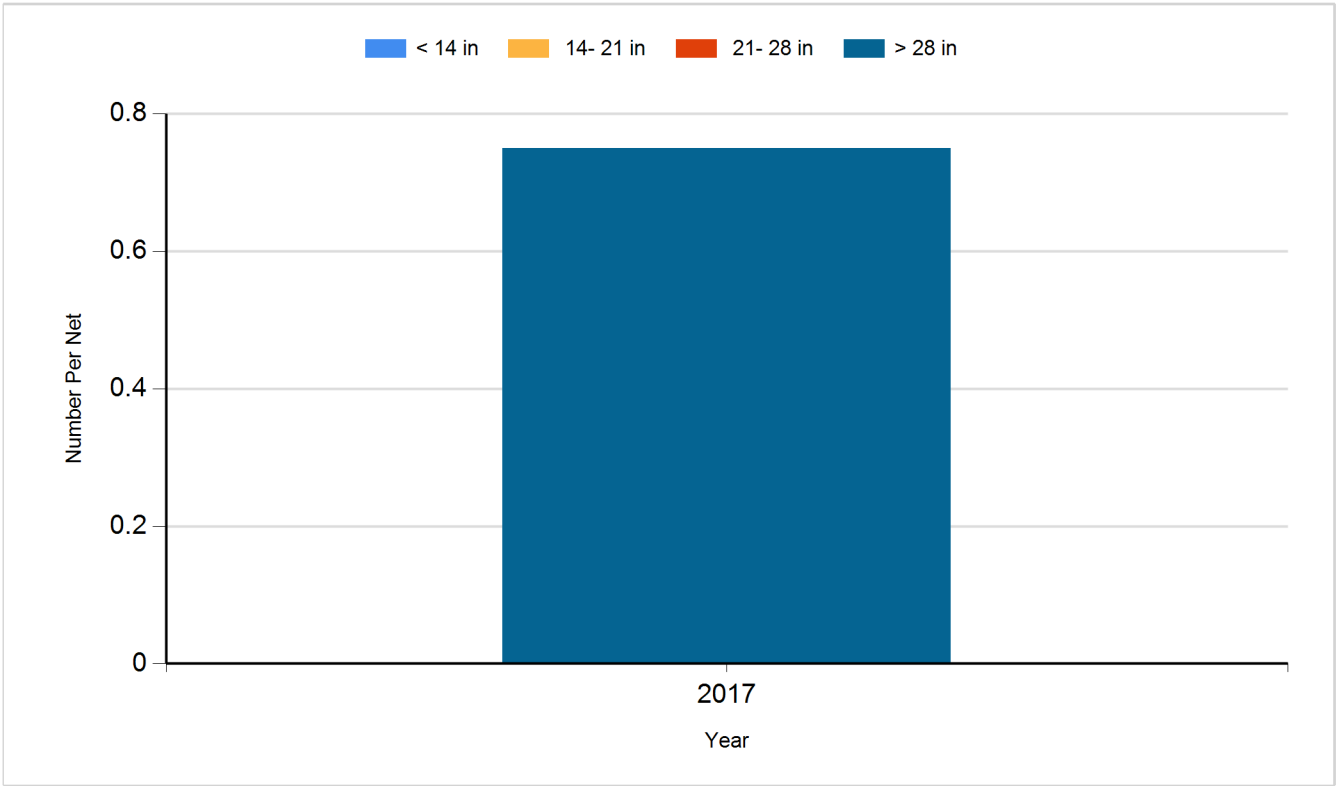
Species: Largemouth Bass
Gear: boat shocker (day)



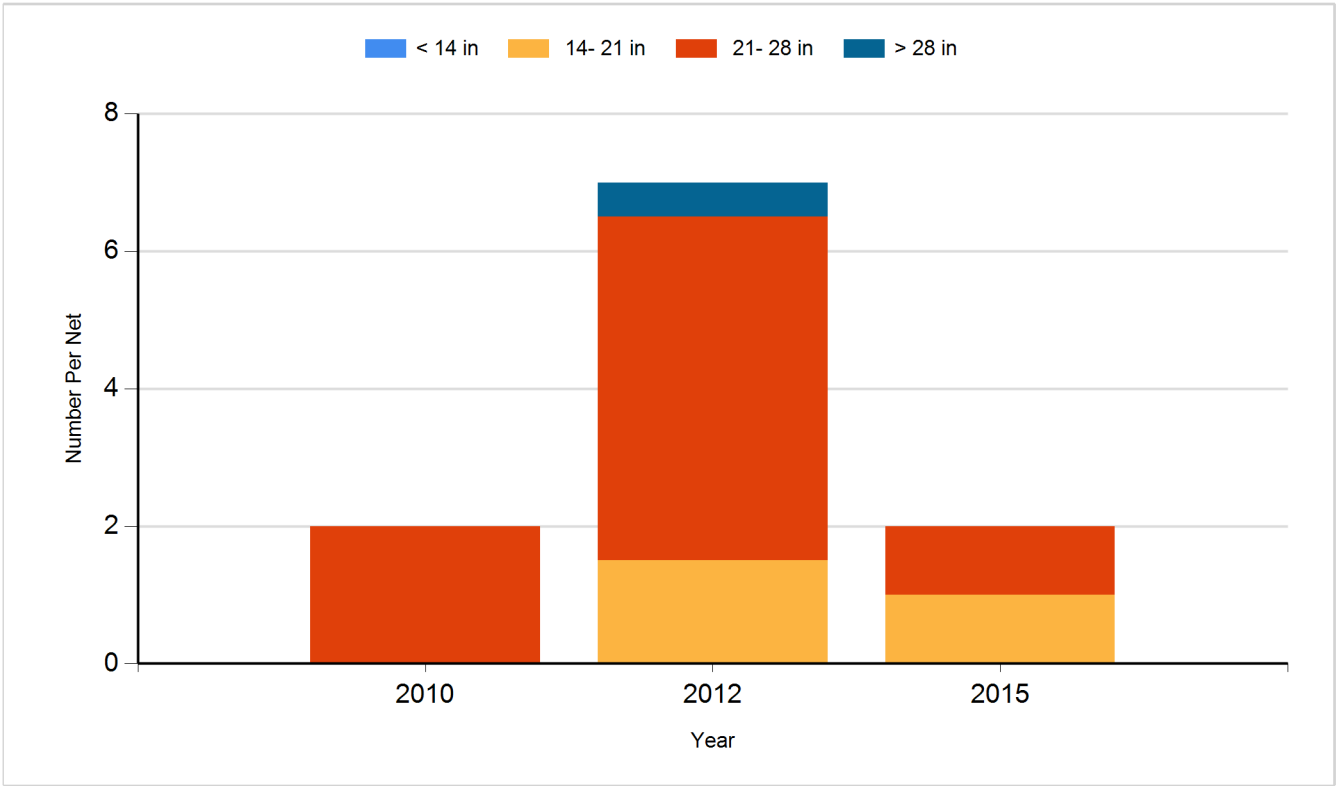
Species: Largemouth Bass
Gear: boat shocker (night)



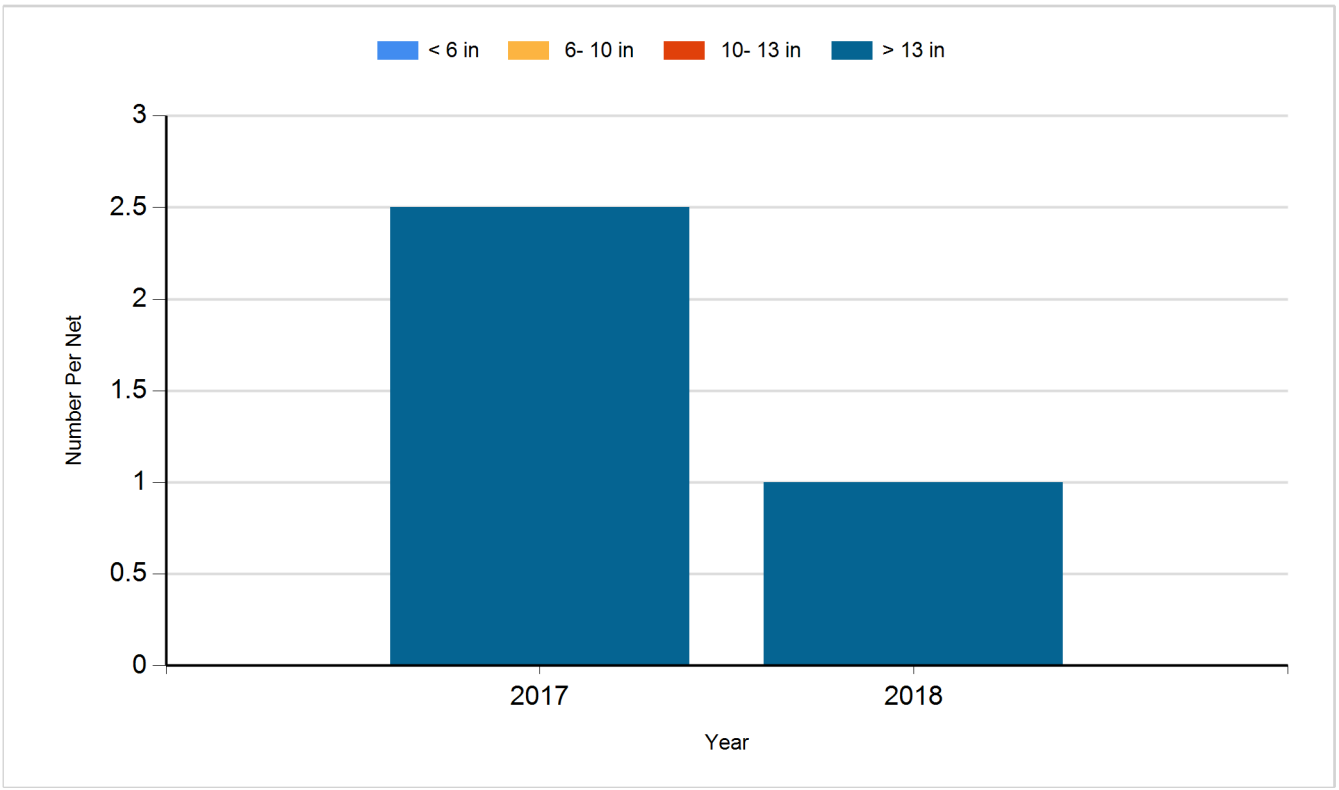
Species: Northern Pike
Gear: AFS std gill net



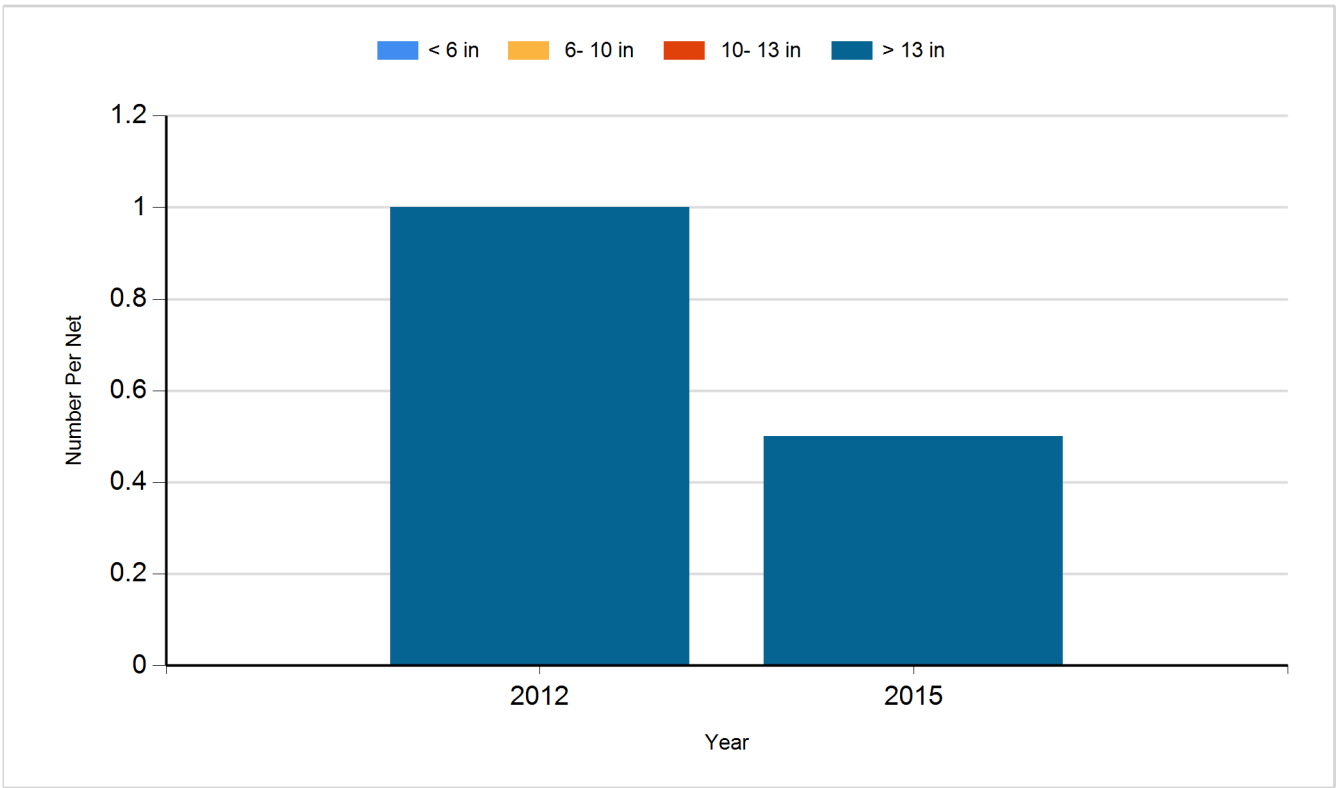
Species: Northern Pike
Gear: std exp gill net



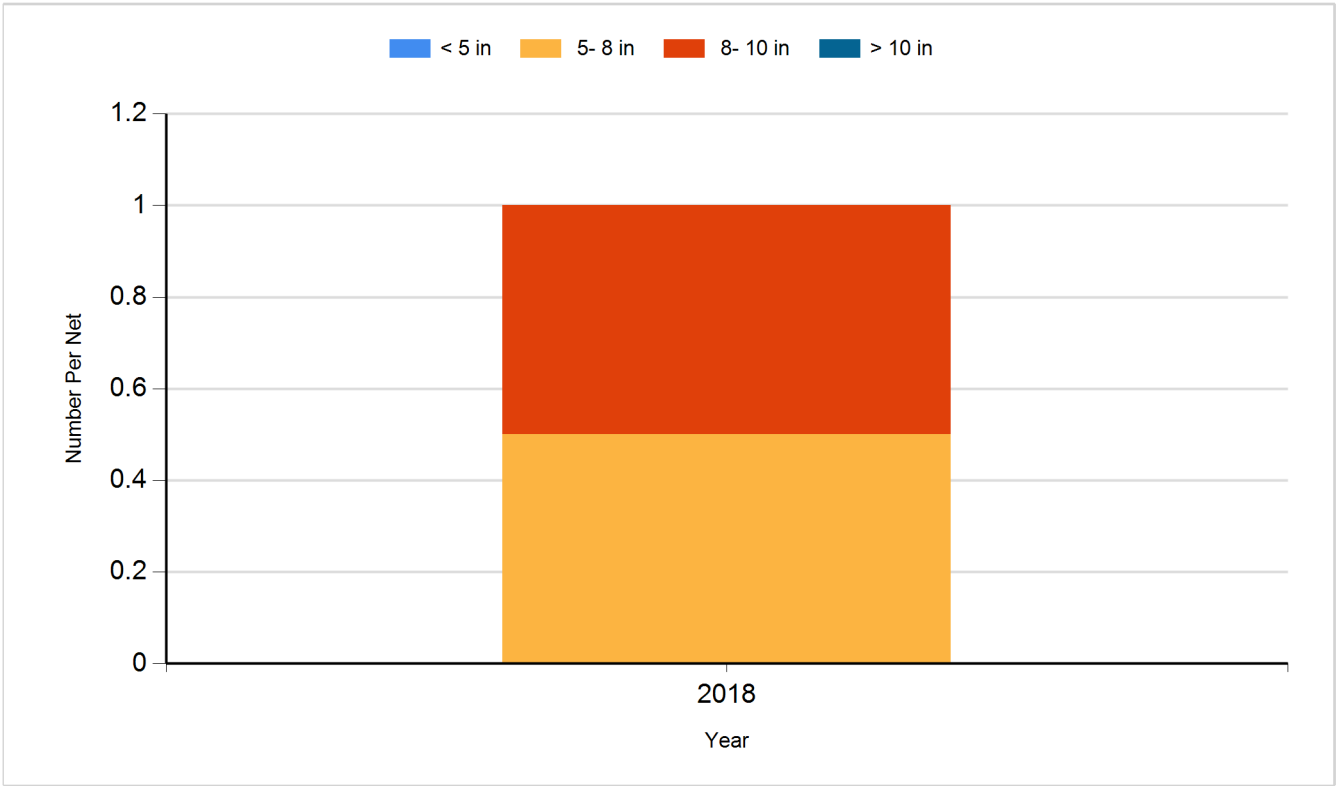
Species: White Sucker
Gear: AFS std gill net



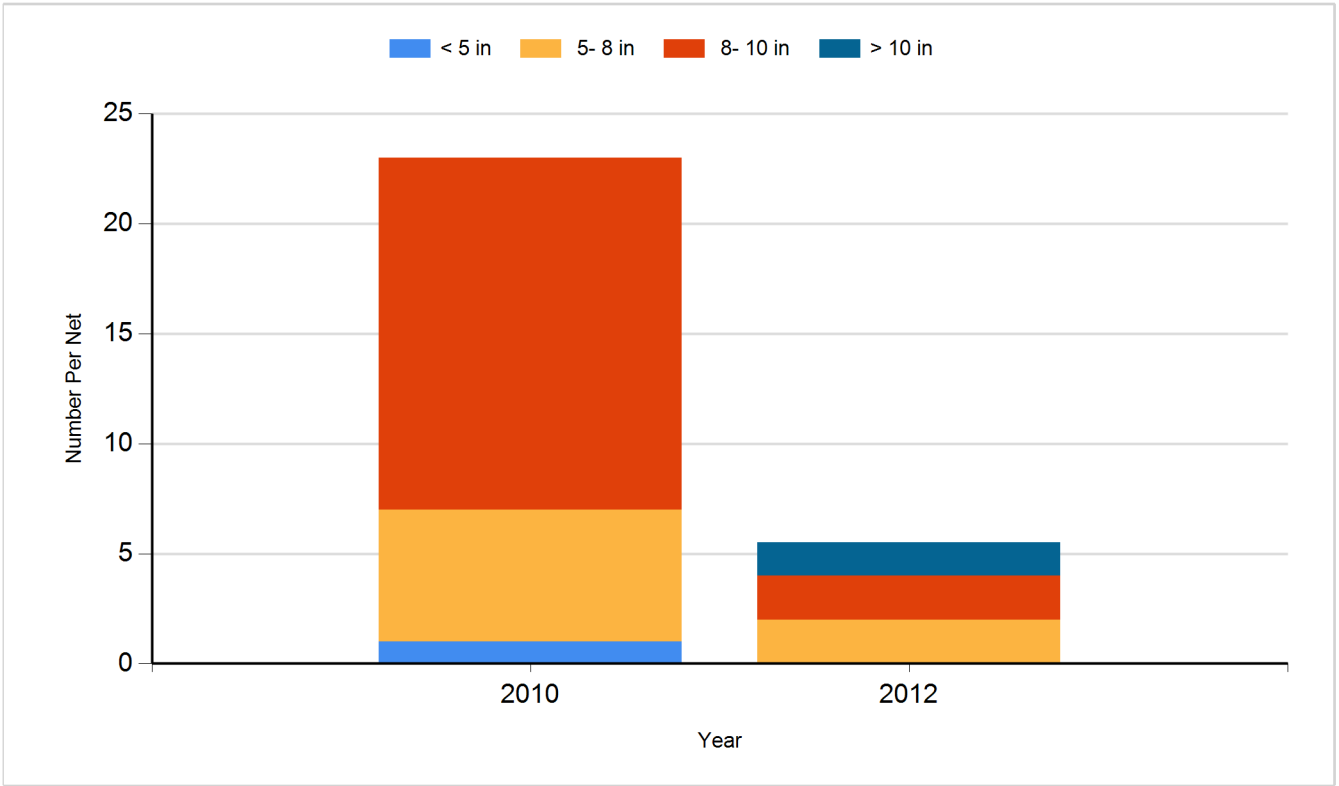
Species: White Sucker
Gear: std exp gill net



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
2017	Largemouth Bass	Fingerling	18,000
2017	Largemouth Bass	Fry	44,500
2018	Largemouth Bass	Juvenile	300
2021	Largemouth Bass	Adult	140
2021	Largemouth Bass	Fingerling	2,500