SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Waggoner, Haakon County

BAD-Lake-2426-000

2018

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
AFS std gill net	Jun 19, 2018	2 net-nights
boat shocker (night)	Aug 30, 2018	3600 seconds
frame net (std 3/4 in)	Jun 19, 2018	4 net-nights

Common Fish Species Present

Northern Pike

Largemouth Bass

Yellow Perch

Bluegill

Black Crappie

Black Bullhead

White Sucker

Green Sunfish

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
AFS std gill net	Black Bullhead	9	4.5	13.9	100		33		113	5
	Golden Shiner	89	0.0	0.0						
	Largemouth Bass	1	0.5	1.5	0		0		121	
	White Sucker	2	1.0	3.1	100		100		104	8
	Yellow Perch	2	1.0	0.0	50		0		110	2
boat shocker (night)	Largemouth Bass	127	44.0	16.8	66	11	20	9	108	2
frame net (std 3/4 in)	Black Bullhead	11	2.8	1.8	100		73		103	4
	Black Crappie	10	2.5	1.1	100		0		97	2
	Bluegill	14	3.5	3.0	100		93		118	3
	Golden Shiner	50	0.0	0.0						
	Green Sunfish	1	0.3	0.4	0		0		146	
	Largemouth Bass	1	0.3	0.4	0		0		112	

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.

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std frame net	Black Bullhead									1.5		1.5
	Black Crappie									8.3		8.3
	Bluegill									15.0		15.0
	Golden Shiner									0.0		0.0
	Green Sunfish									0.7		0.7
AFS std gill net	Black Bullhead									0.3	4.5	2.4
	Black Crappie									2.5		2.5
	Golden Shiner									0.0	0.0	0.0
	Largemouth Bass										0.5	0.5
	Northern Pike									0.8		0.8
	White Sucker									2.5	1.0	1.8
	Yellow Perch										1.0	1.0
boat shocker (night)	Largemouth Bass		71.4				73.0	45.0	29.0	20.0	44.0	47.1
	Walleye						2.0					2.0
boat shocker (night, AC)	Largemouth Bass			130.0								130.0
frame net (std 3/4 in)	Black Bullhead		0.9		0.6			1.1			2.8	1.4
	Black Crappie		21.0		74.3			42.1			2.5	35.0
	Bluegill		16.9		56.1			72.4			3.5	37.2
	Golden Shiner		0.0		0.0			0.0			0.0	0.0
	Green Sunfish										0.3	0.3
	Largemouth Bass				0.9						0.3	0.6
	Northern Pike		0.9		5.0			2.4				2.8
	White Sucker		0.4		0.4			0.4				0.4
	Yellow Perch		7.1		1.5			0.6				3.1
std exp gill net	Black Bullhead		9.0		4.5			1.0				4.8
	Black Crappie		28.0		4.0			7.0				13.0
	Bluegill		6.0		1.5			3.0				3.5
	Golden Shiner		0.0		0.0			0.0				0.0
	Largemouth Bass		1.0					0.5				0.8
	Northern Pike		2.0		7.0			2.0				3.7
	White Sucker				1.0			0.5				0.8
	Yellow Perch		22.0		5.5							13.8

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
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	
		PSD-P									10	
		Wr									98	
	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 (night)	Largemouth Bass	PSD		6				86	84	48	100	66
		PSD-P		6				37	51	28	30	20

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
boat shocker (night)	Largemouth Bass	Wr		105				104	107	110	109	108
boat shocker (night, AC)	Largemouth Bass	PSD			18							
		PSD-P			13							
		Wr			105							
frame net (std 3/4 in)	Black Bullhead	PSD		83		100			100			100
		PSD-P		50		60			100			73
		Wr		91		99			93			103
	Black Crappie	PSD		2		51			93			100
		PSD-P		0		0			0			0
		Wr		98		103			95			97
	Bluegill	PSD		64		92			98			100
		PSD-P		0		4			25			93
		Wr		106		110			102			118
	Green Sunfish	PSD										0
		PSD-P										0
		Wr										146
	Largemouth Bass	PSD				71						0
		PSD-P				57						0
		Wr				104						112
	Northern Pike	PSD		67		55			79			
		PSD-P		0		30			16			
		Wr		86		77			94			
	White Sucker	PSD		100		100			100			
		PSD-P		100		100			100			
		Wr		89		90			86			
	Yellow Perch	PSD		82		75			100			
		PSD-P		22		25			100			
		Wr		93		97			101			
std exp gill net	Black Bullhead	PSD		78		89			100			
		PSD-P		22		89			0			
		Wr		97		106			112			
	Black Crappie	PSD		0		13			29			
		PSD-P		0		0			0			
		Wr		106		104			109			
	Bluegill	PSD		17		67			17			
		PSD-P		0		0			0			

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
std exp gill net	Bluegill	Wr		109		102			116			
	Largemouth Bass	PSD		100					0			
		PSD-P		100					0			
		Wr		106					101			
	Northern Pike	PSD		100		79			50			
		PSD-P		0		7			0			
		Wr		85		87			92			
	White Sucker	PSD				100			100			
		PSD-P				100			100			
		Wr				93			103			
	Yellow Perch	PSD		73		64						
		PSD-P		0		27						
		Wr		92		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)			
2010	294		151 (190)	177 (102)		225 (2)					

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2010	220		133 (33)	154 (89)	168 (50)	181 (38)	188 (10)				

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)				
2010	140		220 (110)	238 (27)			421 (2)	466 (2)			

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2010	46	100 (2)	162 (6)	200 (10)	222 (10)	229 (14)	233 (4)				

Fish Condition

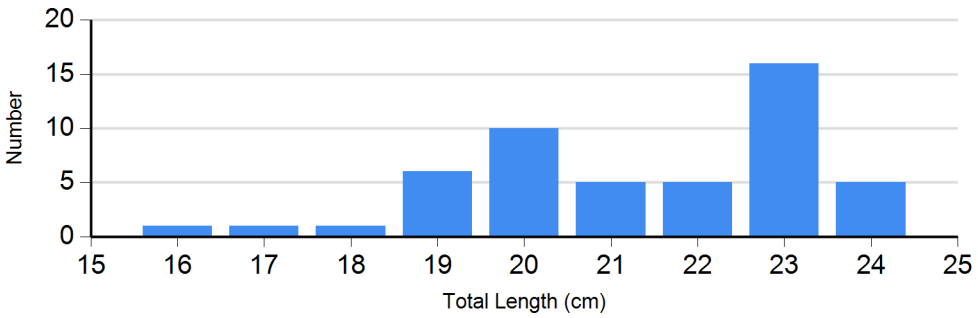
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2015	0		4	112 (5.4)	0		0	
	2017	0		0		1	104	0	
	2018	0		6	114 (4.4)	3	111 (8.5)	0	
Black Crappie Frame Net	2015	48	102 (0.8)	624	94 (0.3)	2	99 (0.0)	0	
	2017	9	96 (1.5)	41	90 (0.9)	0		0	
	2018	0		10	97 (1.6)	0		0	
Bluegill Frame Net	2015	28	108 (1.0)	842	103 (0.4)	288	99 (0.6)	0	
	2017	2		31	115 (1.5)	57	111 (1.1)	0	
	2018	0		1	108	13	119 (2.3)	0	
Largemouth Bass Electro Fishing	2014	20	107 (2.1)	72	106 (1.3)	50	100 (1.0)	4	99 (3.2)
	2015	14	107 (1.9)	30	104 (2.1)	46	109 (1.6)	0	
	2016	30	114 (1.8)	12	109 (2.2)	12	100 (1.9)	4	115 (2.3)
	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	
Northern Pike Gill Net	2015	4	96 (0.7)	4	89 (2.4)	0		0	
	2017	0		0		3	88 (2.6)	0	
White Sucker Gill Net	2015	0		0		0		2	103 (0.0)
	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

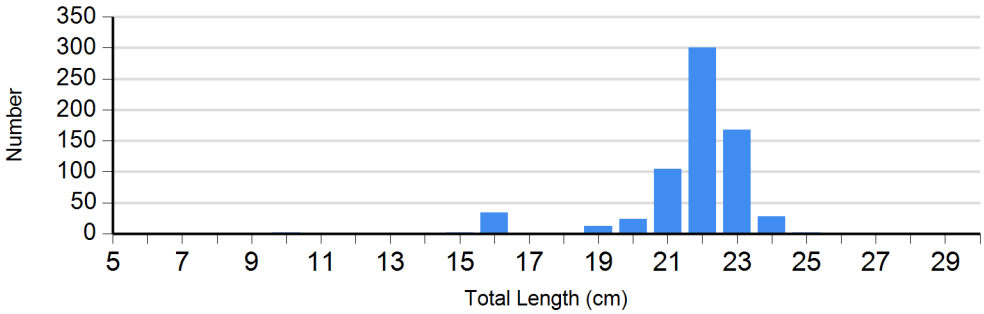
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net

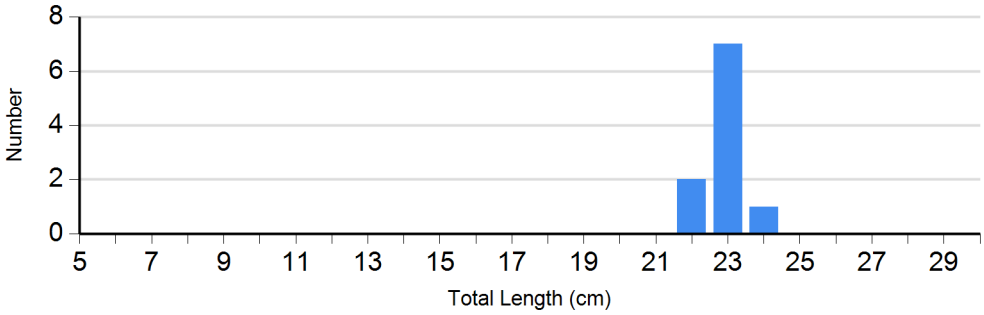


2017

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

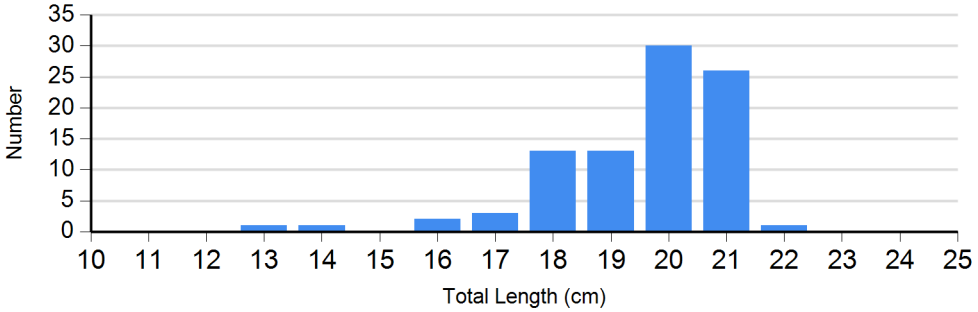


2015



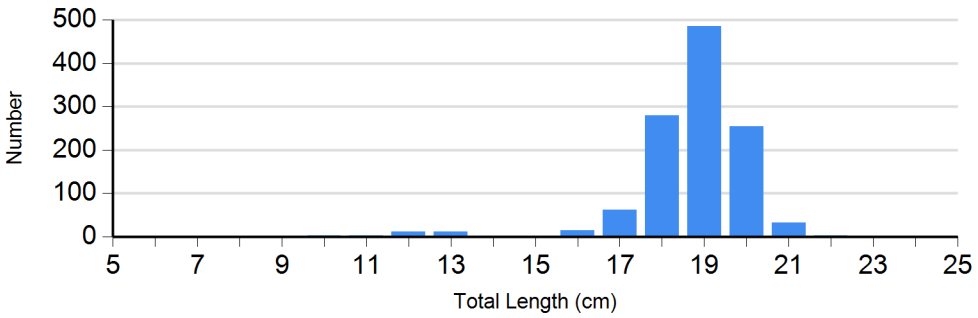
2018

Species: Bluegill
Gear: AFS std frame net

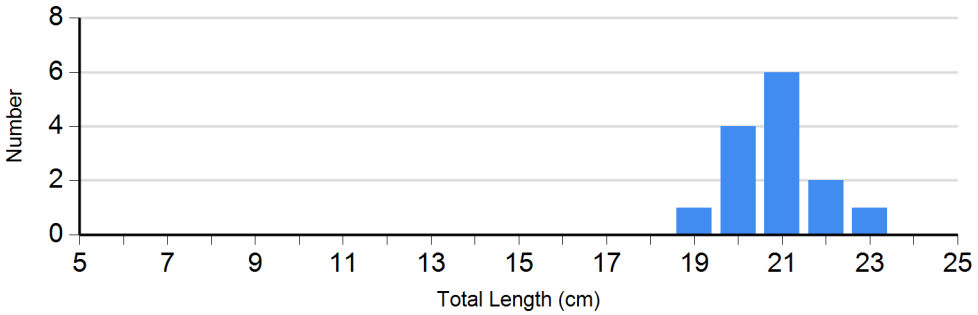


2017

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

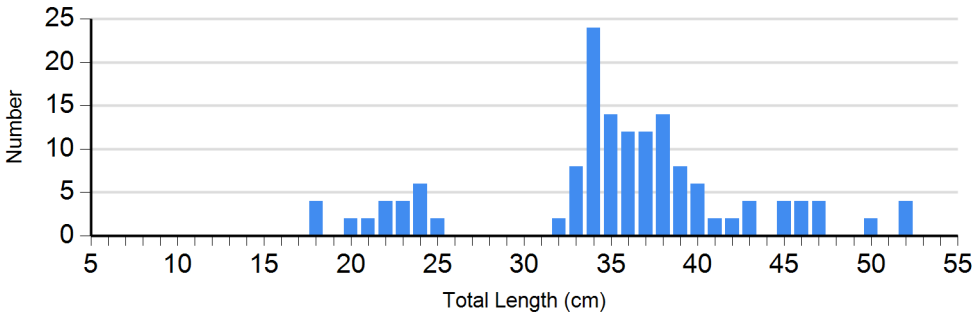


2015

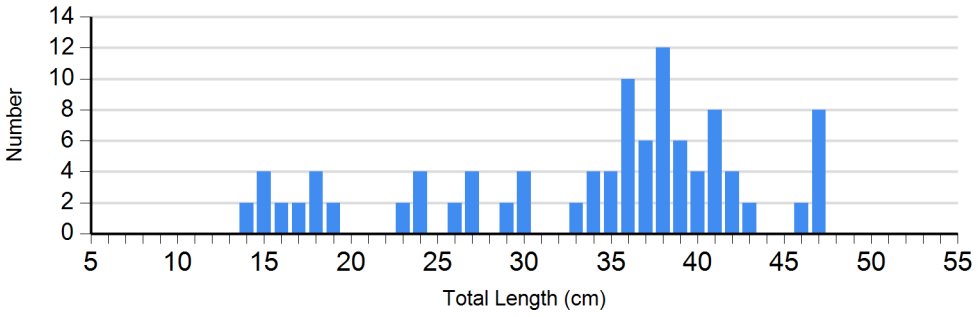


2018

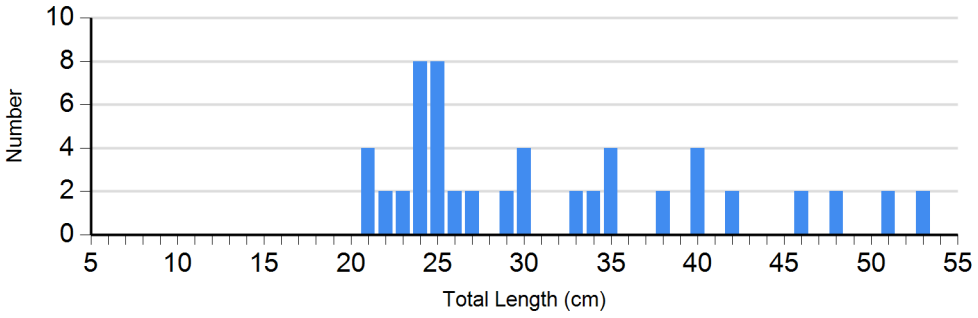
Species: Largemouth Bass
Gear: boat shocker (night)



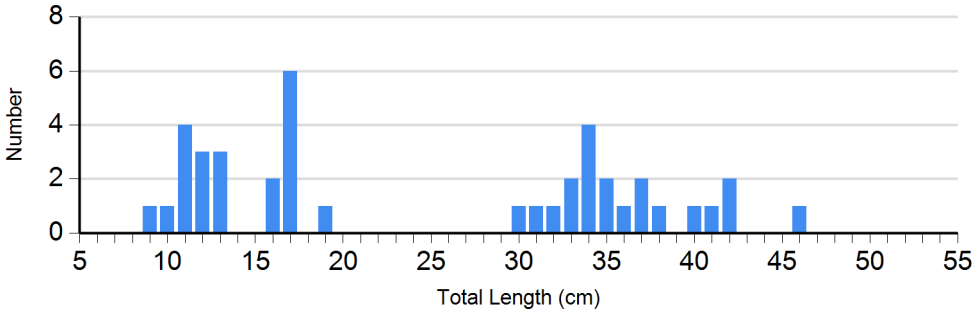
2014



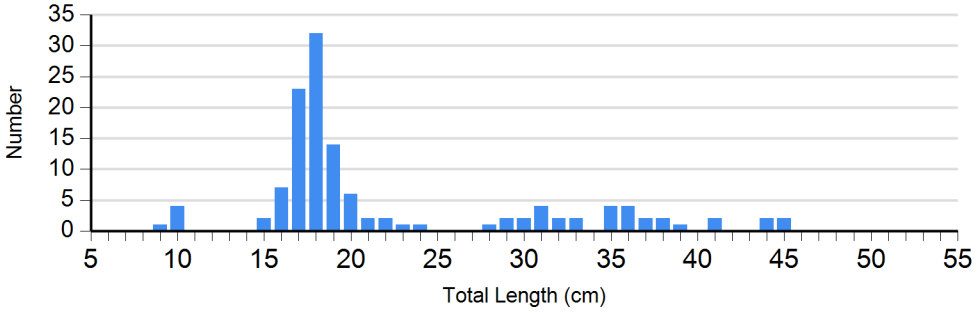
2015



2016

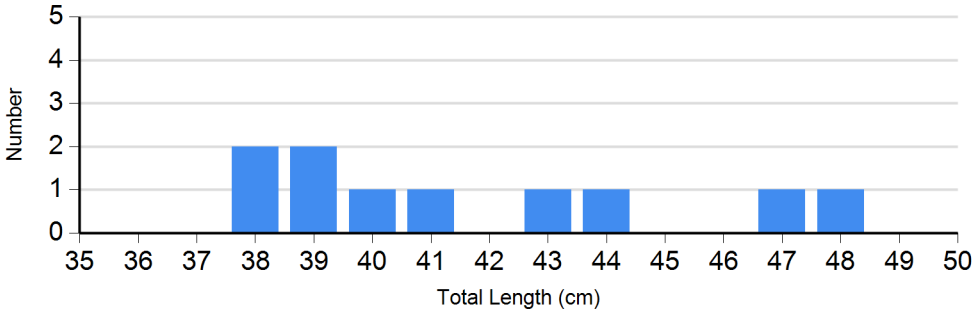


2017



2018

Species: White Sucker
Gear: AFS std gill net

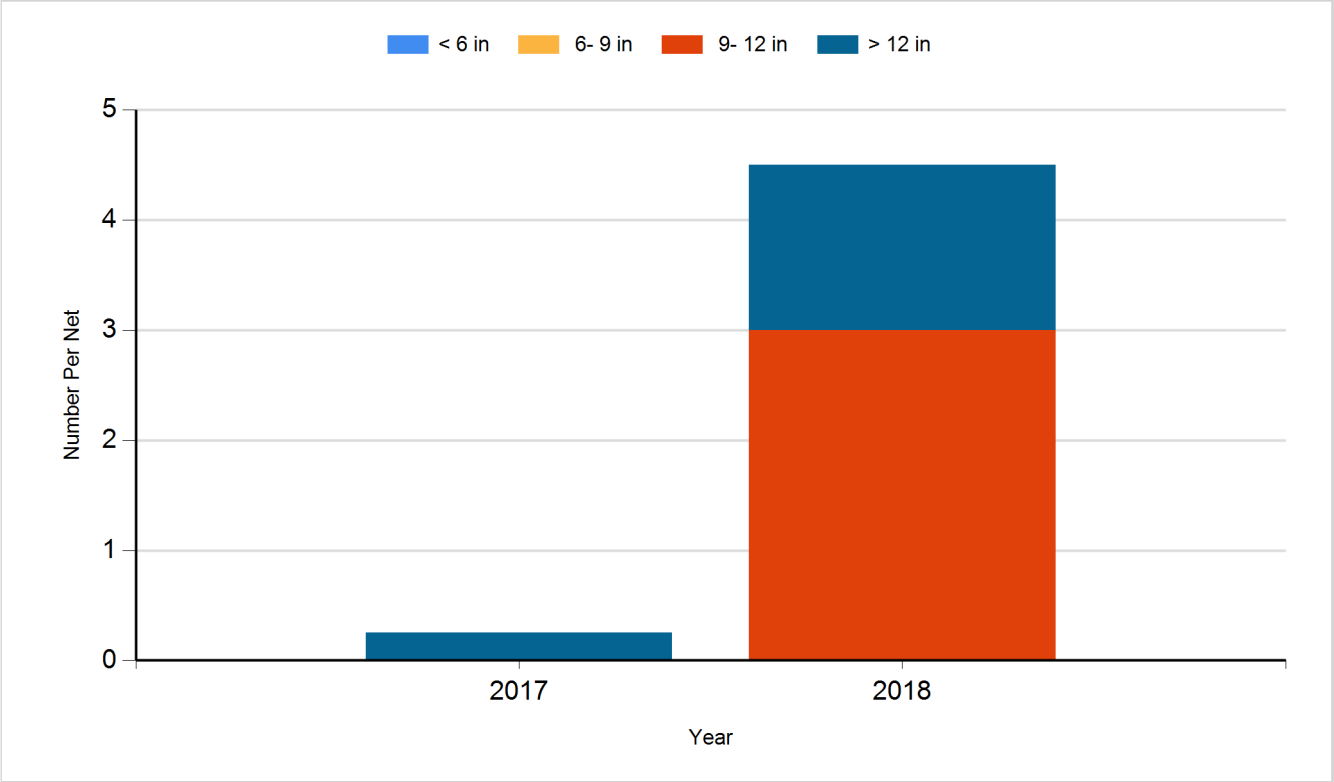


2017

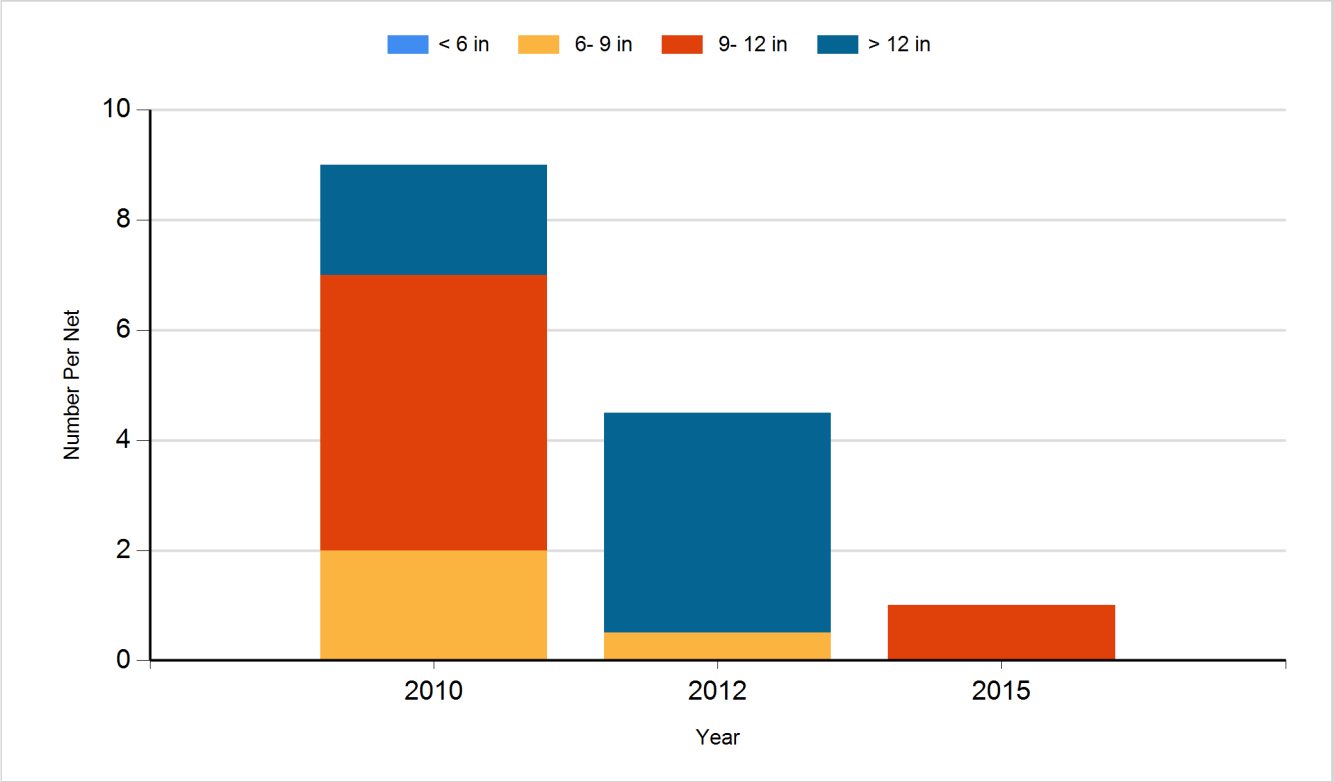
Historic Fish Sizes and Relative Abundance

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

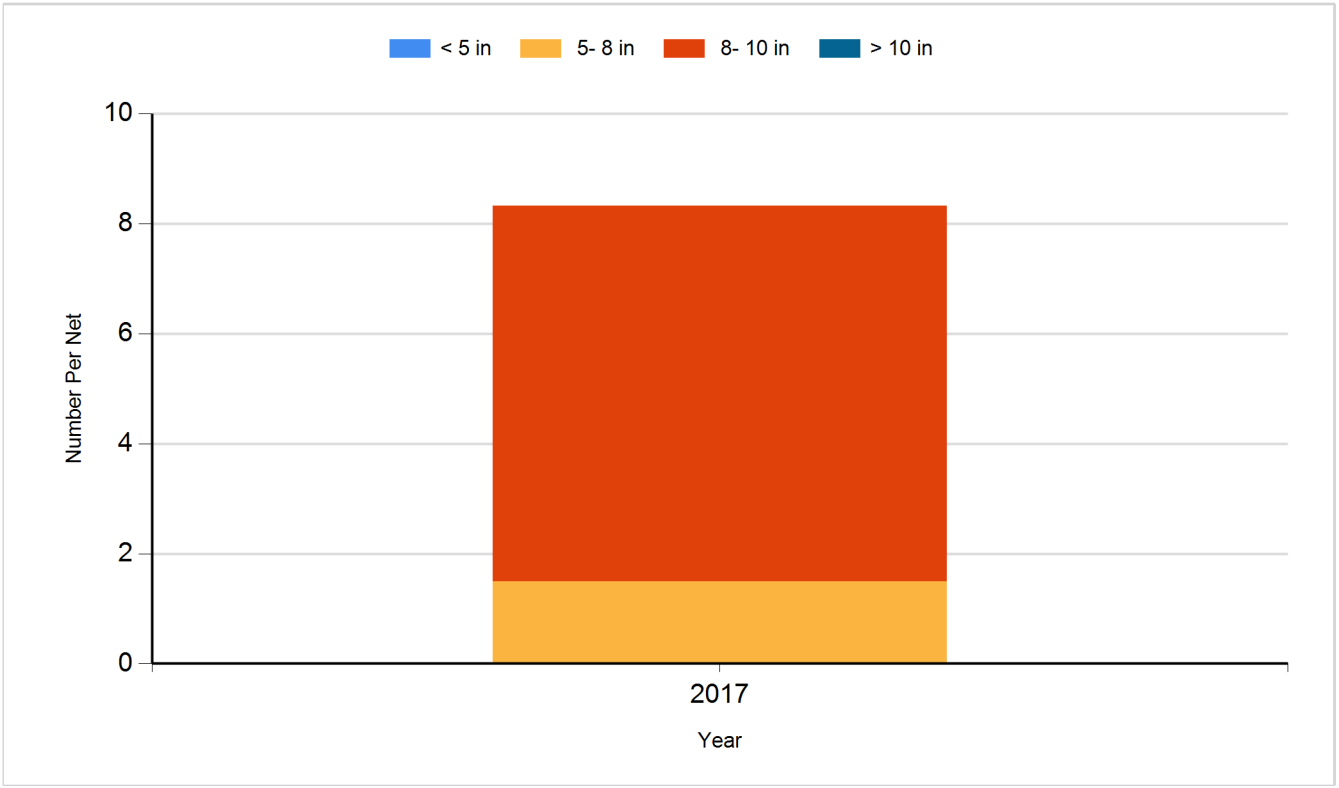
Species: Black Bullhead
Gear: AFS std gill net



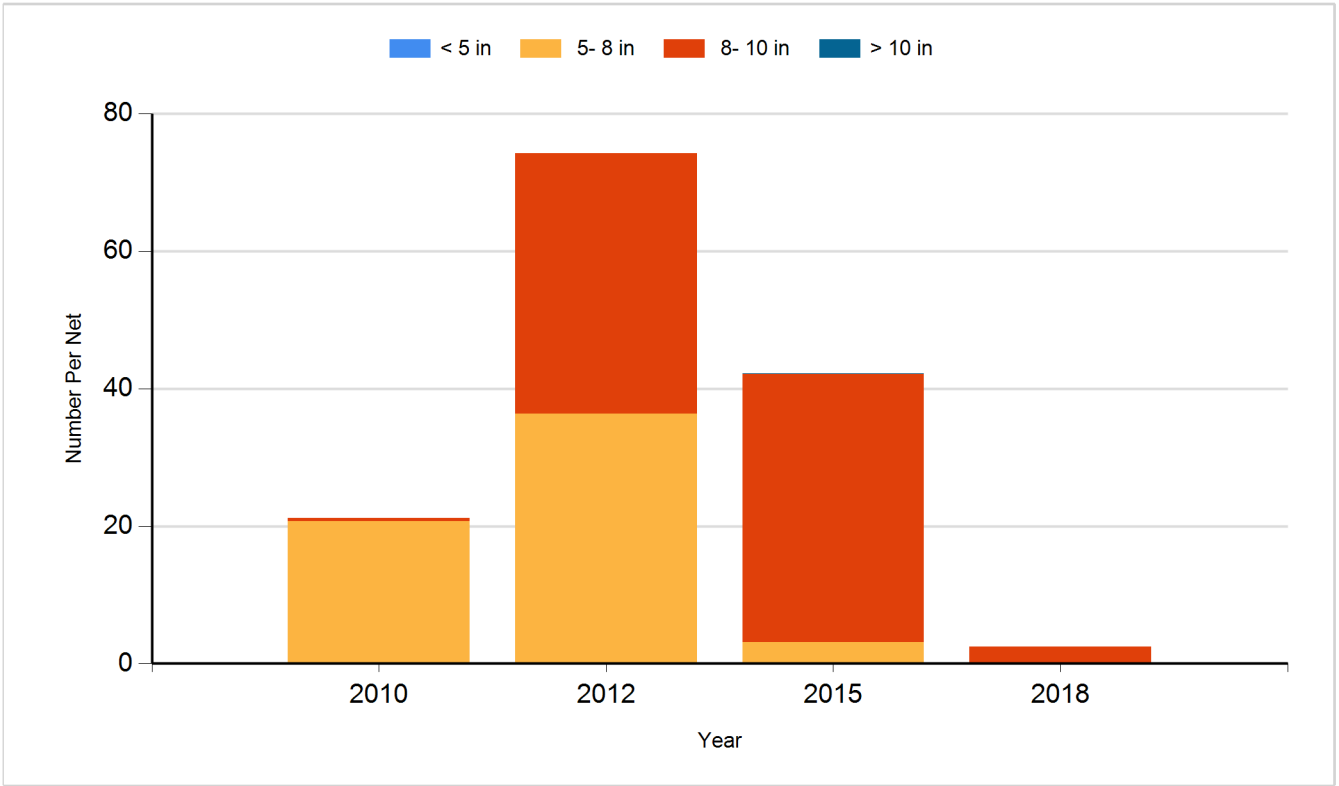
Species: Black Bullhead
Gear: std exp gill net



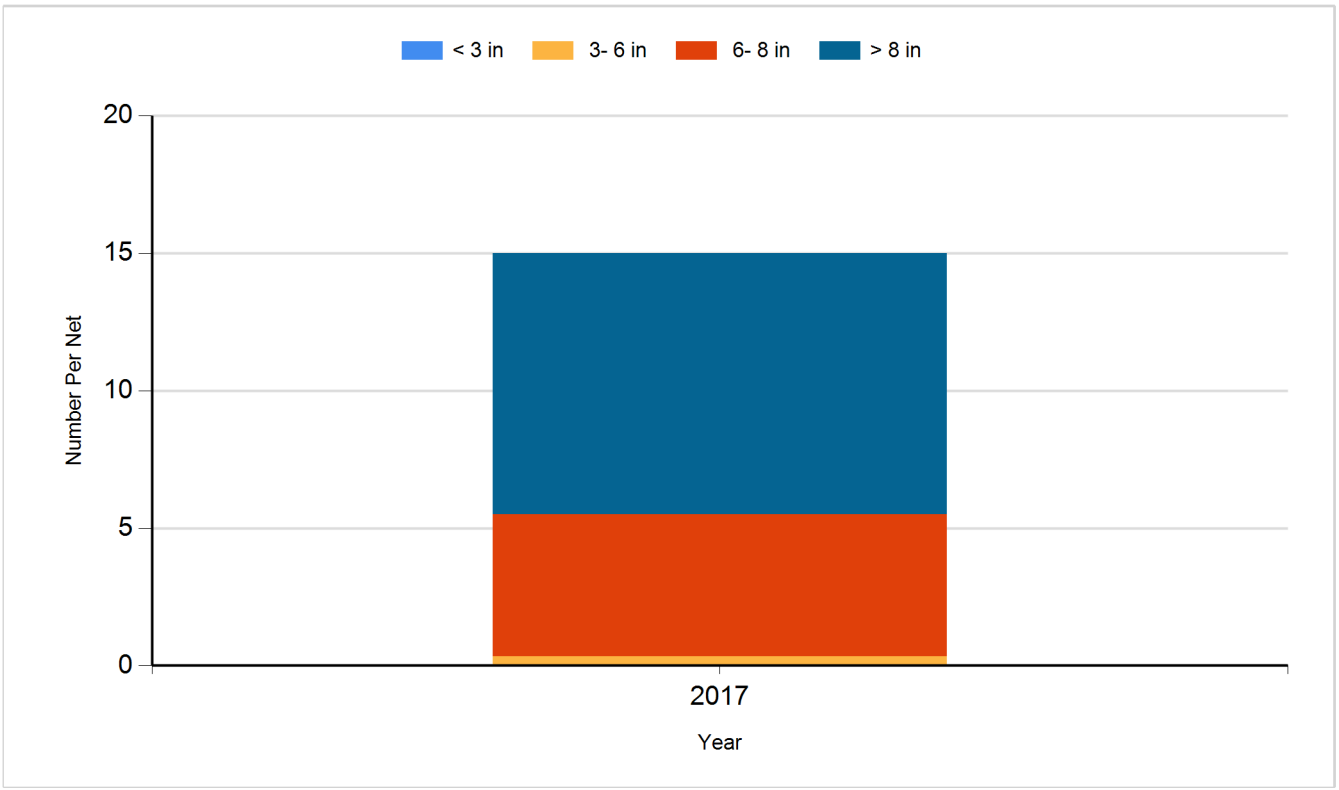
Species: Black Crappie
Gear: AFS std frame net



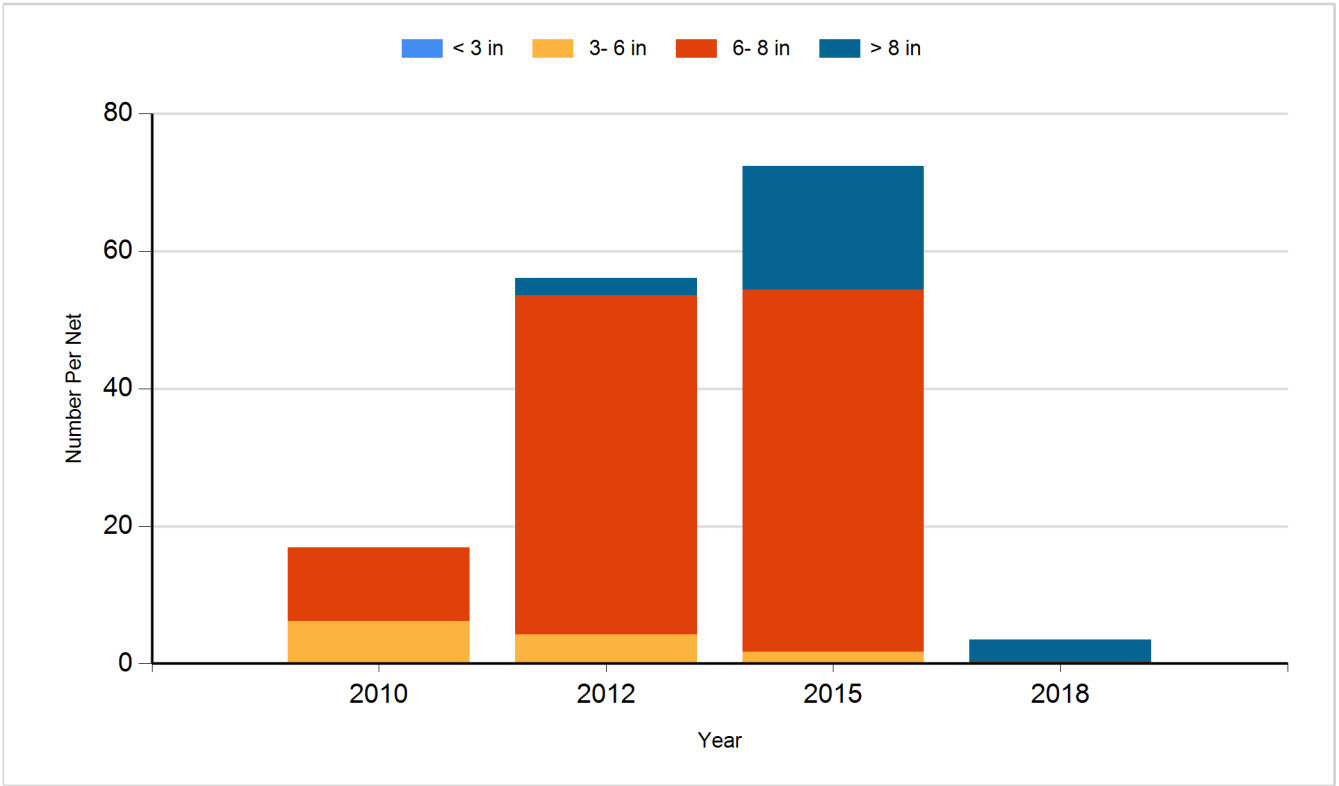
Species: Black Crappie
Gear: frame net (std 3/4 in)



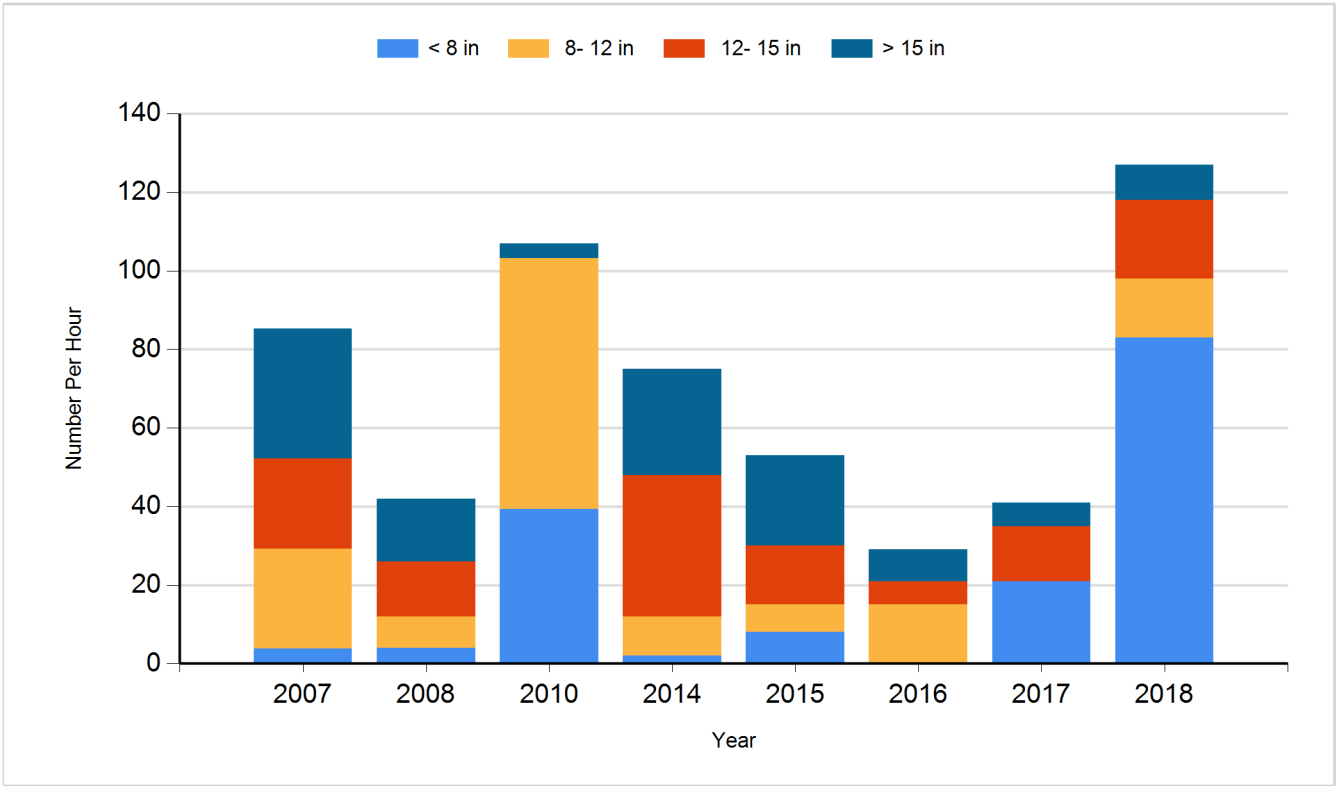
Species: Bluegill
Gear: AFS std frame net



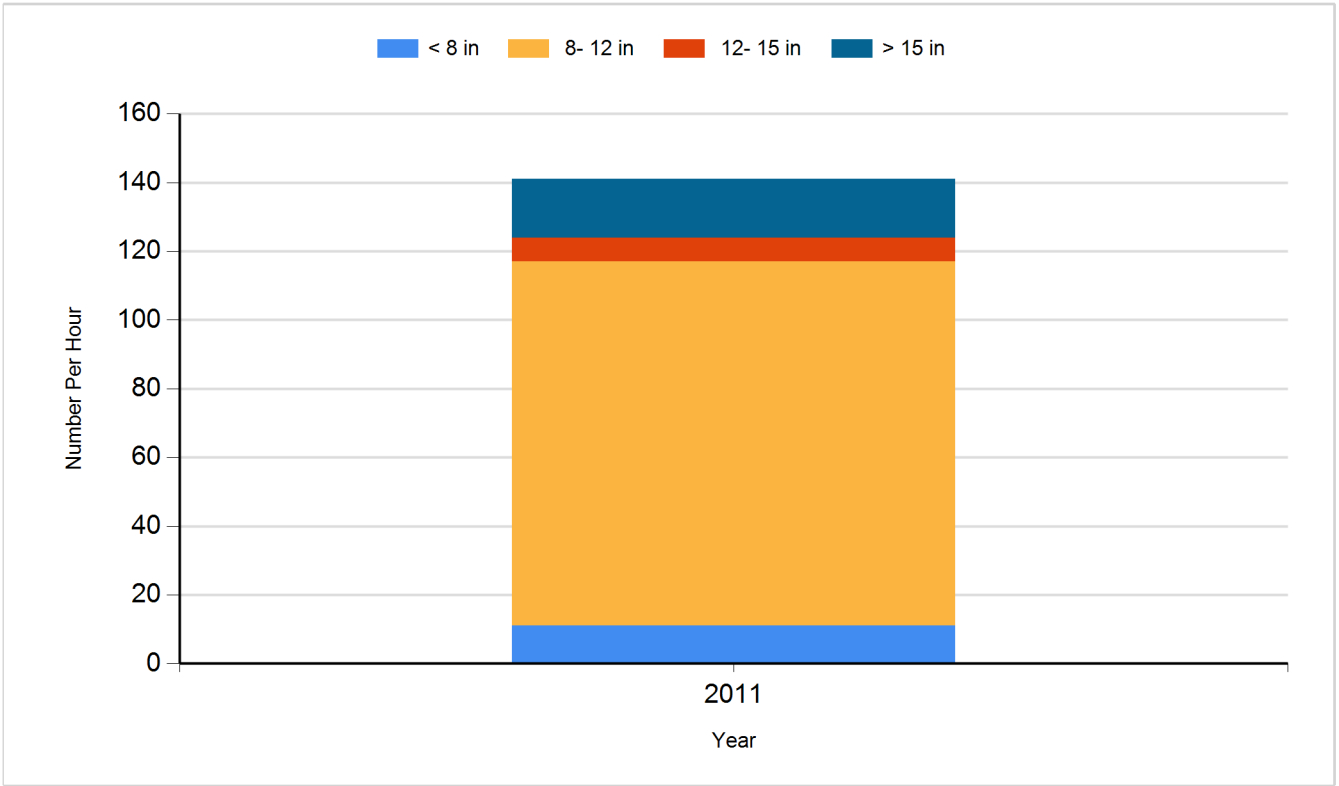
Species: Bluegill
Gear: frame net (std 3/4 in)



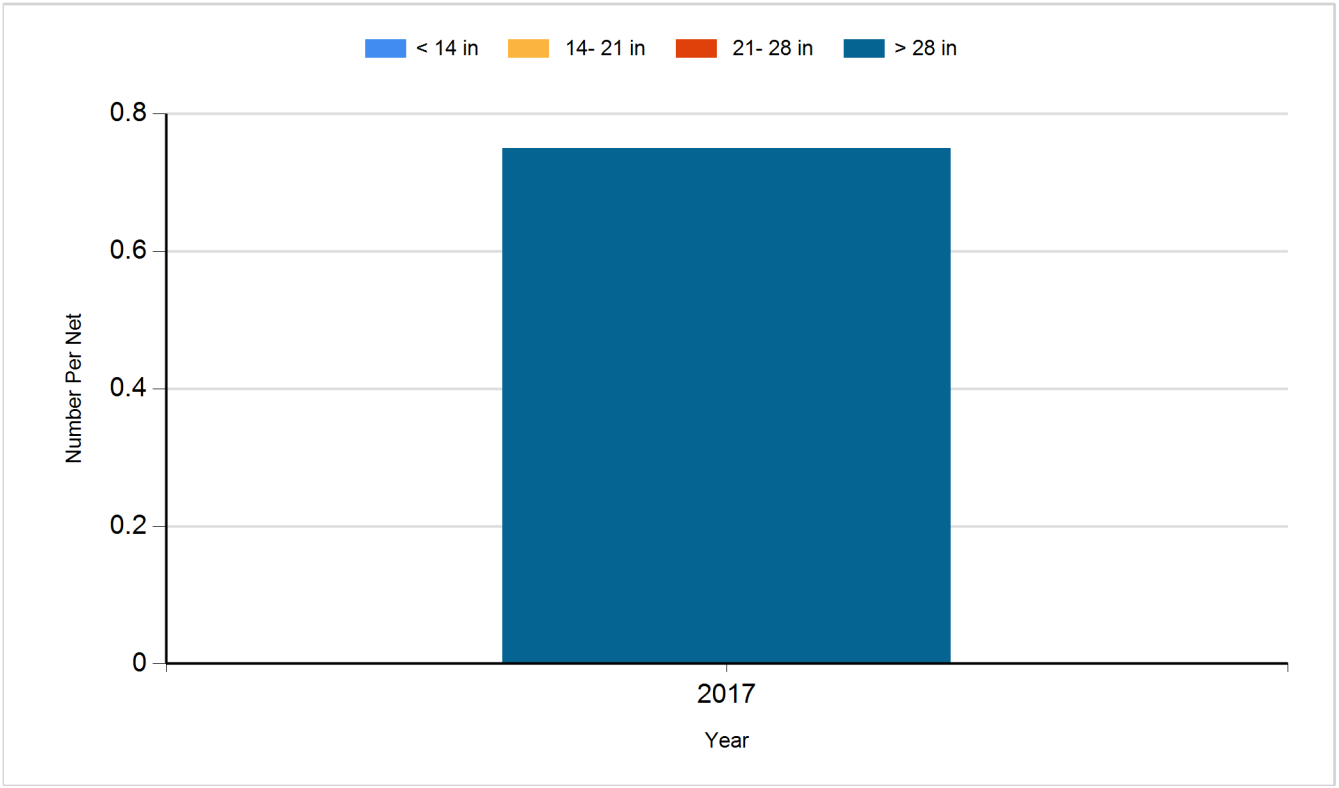
Species: Largemouth Bass
Gear: boat shocker (night)



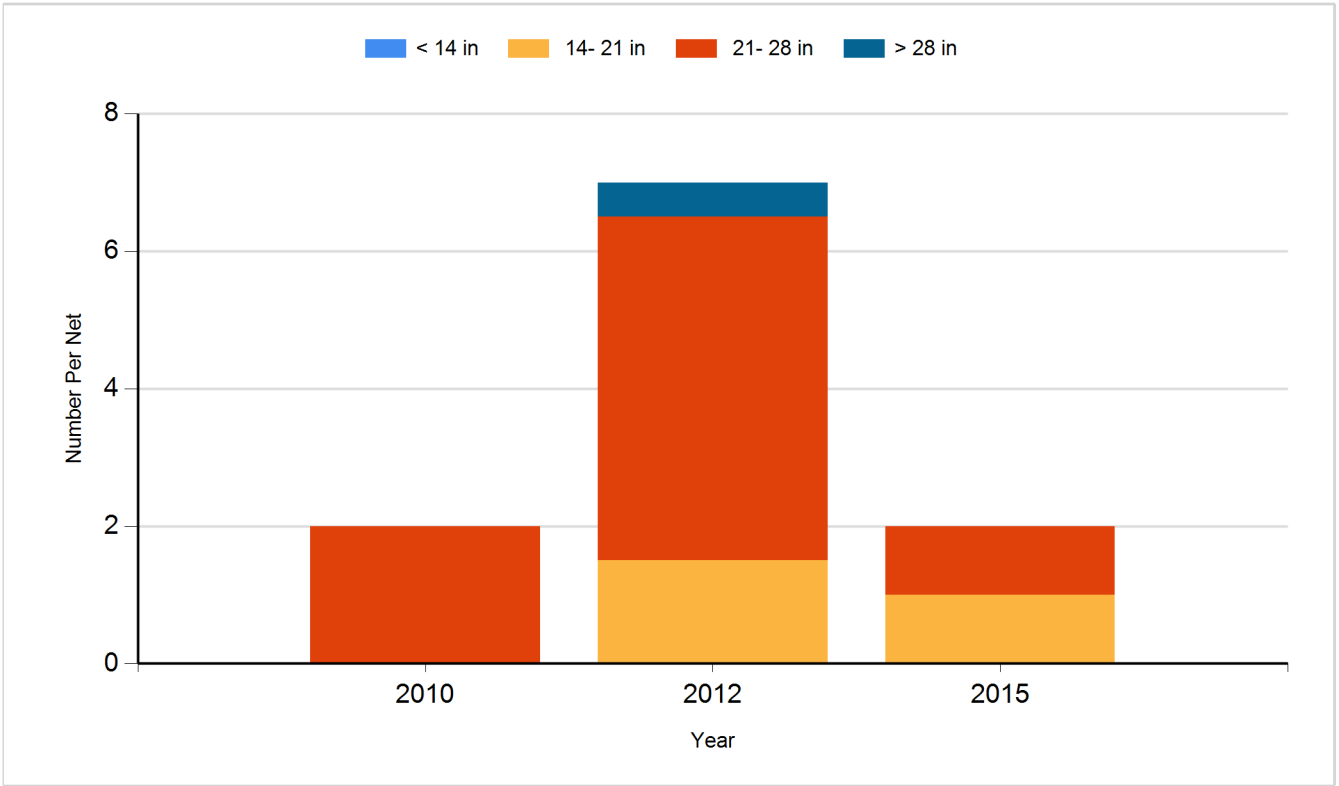
Species: Largemouth Bass
Gear: boat shocker (night, AC)



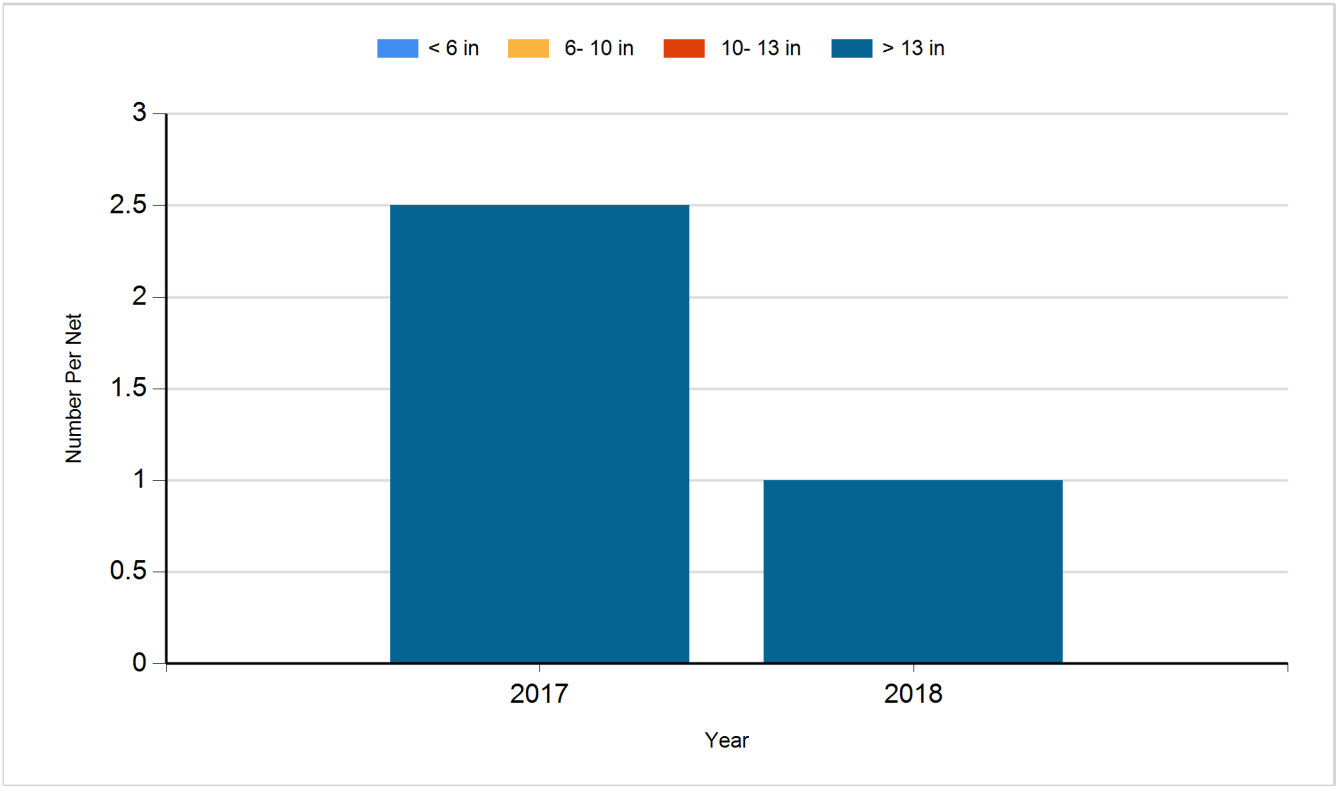
Species: Northern Pike
Gear: AFS std gill net



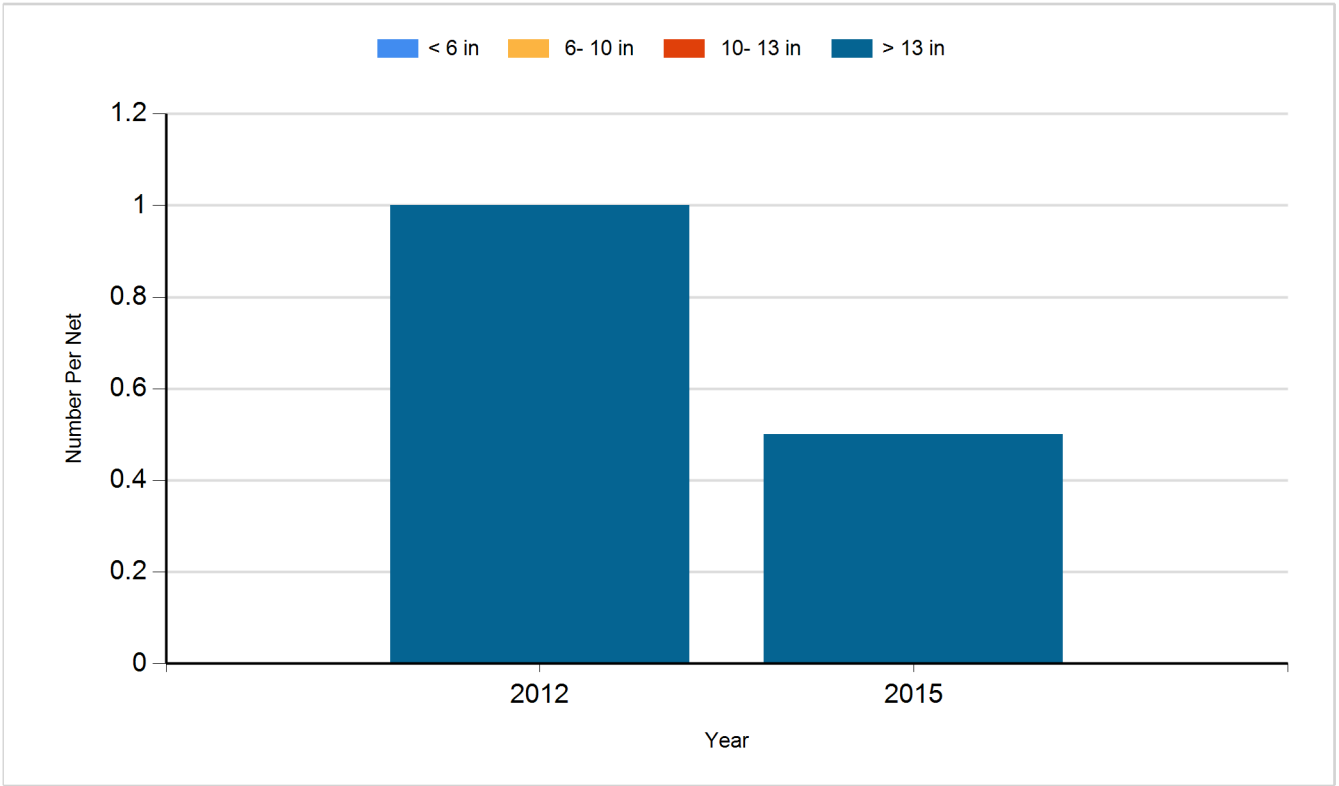
Species: Northern Pike
Gear: std exp gill net



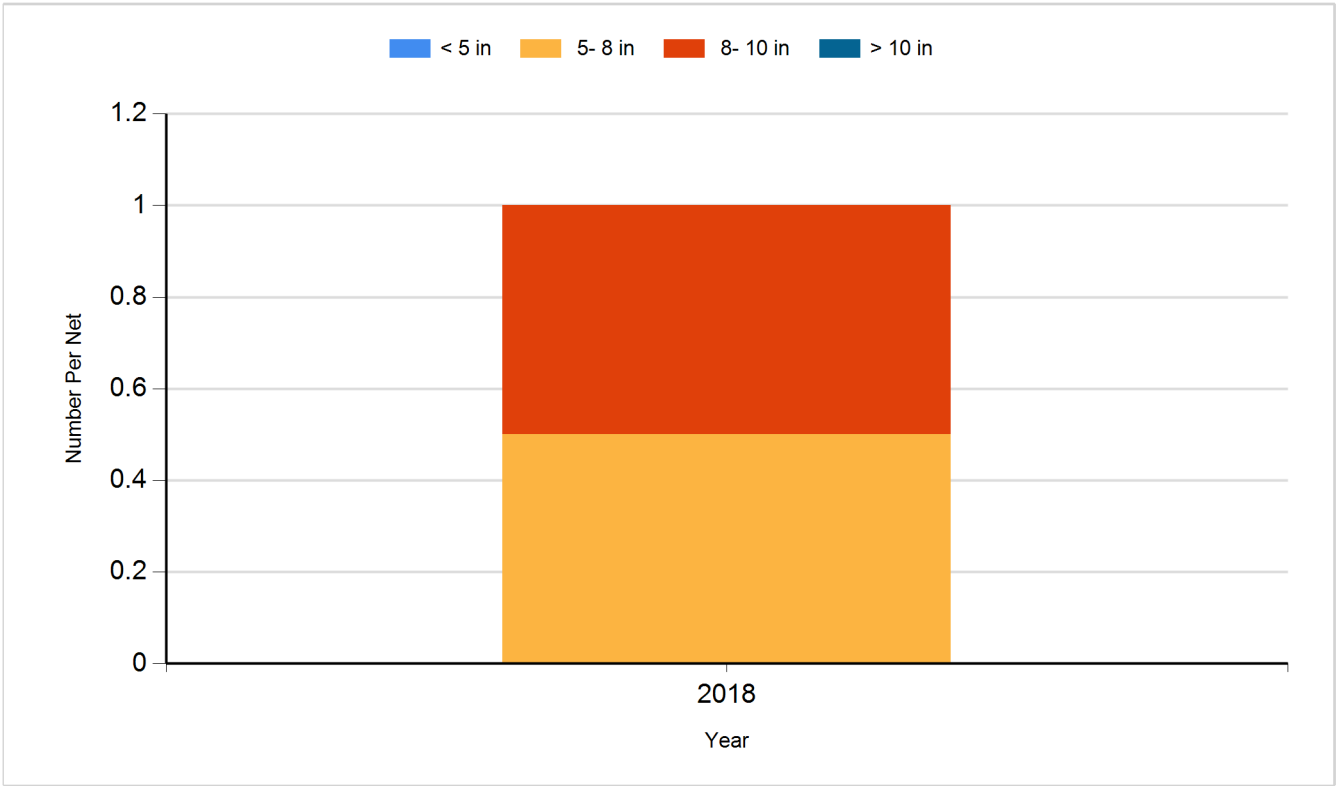
Species: White Sucker
Gear: AFS std gill net



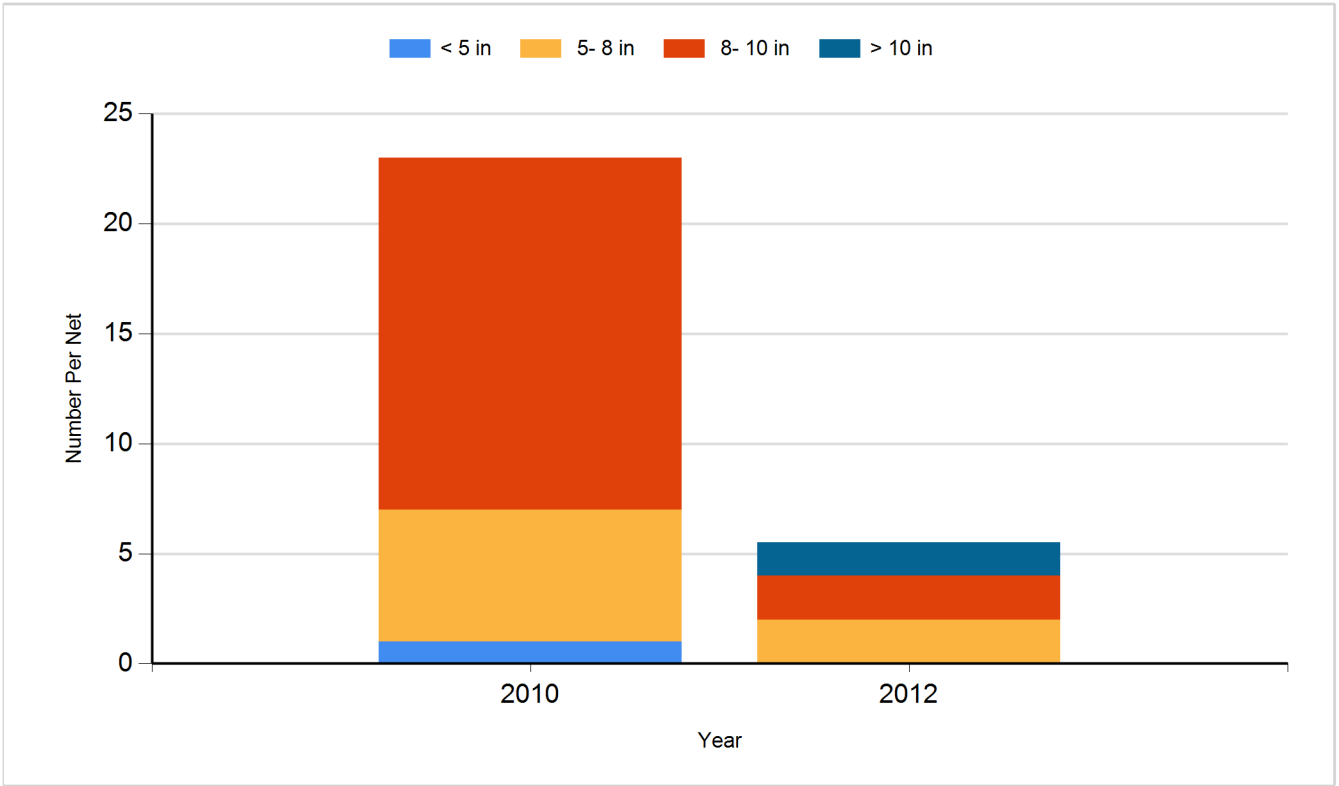
Species: White Sucker
Gear: std exp gill net



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