SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Horseshoe, Day County
UBS-Lake-303-001
2023

Lake Information

Name: Horseshoe

County: Day

Surface Area: 614 Acres

Maximum Depth: 24 Feet

Mean Depth: 15 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 18, 2023	4 net-nights
AFS std gill net	Jul 19, 2023	4 net-nights
AFS std gill net	Jul 20, 2023	4 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Smallmouth Bass

Northern Pike

Bluegill

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	Bluegill	3	0.3	0.3	0		0		127	6
	Northern Pike	26	2.2	0.7	96		12		83	1
	Smallmouth Bass	11	0.6	0.8	71		71		118	3
	Walleye	57	3.7	0.9	98		66	11	84	2
	Yellow Perch	135	11.3	2.9	17	5	0		108	1

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	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
AFS std gill net	Bluegill				0.0		0.0		0.1		0.3	0.10
	Northern Pike				0.1		0.1		0.2		2.2	0.65
	Smallmouth Bass				3.6		3.0		0.9		0.6	2.03
	Walleye				3.9		4.1		5.0		3.7	4.18
	Yellow Perch				19.2		4.7		3.2		11.3	9.60
boat shocker (day)	Smallmouth Bass						38.0					38.00
boat shocker (night, DC)	Smallmouth Bass		11.0									11.00
frame net (std 3/4 in)	Black Bullhead	0.1	0.0									0.05
	Black Crappie	0.0	0.0									0.00
	Bluegill	17.9	3.6									10.75
	Green Sunfish	0.4	0.0									0.20
	Northern Pike	1.6	0.4									1.00
	Smallmouth Bass	2.5	1.8									2.15
	Sunfish Hybrid	0.1	0.0									0.05
	Walleye	1.4	0.3									0.85
	Yellow Perch	5.2	0.2									2.70
spring day EF*	Smallmouth Bass									19.6		19.60
spring night EF-SMB*	Smallmouth Bass					19.0						19.00
std exp gill net	Bluegill	0.0	0.3									0.15
	Northern Pike	1.3	1.2									1.25
	Smallmouth Bass	0.3	0.0									0.15
	Walleye	3.5	4.0									3.75
	Yellow Perch	8.2	29.7									18.95

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	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AFS std gill net	Bluegill	PSD								0		0
		PSD-P								0		0
		Wr								145		127
	Northern Pike	PSD				100		100		100		96
		PSD-P				100		100		0		12
		Wr				75		73		105		83
	Smallmouth Bass	PSD				100		89		90		71
		PSD-P				98		86		80		71
		Wr				127		125		123		118
	Walleye	PSD				98		51		89		98
		PSD-P				72		51		11		66
		Wr				92		87		97		84
	Yellow Perch	PSD				6		29		9		17
		PSD-P				0		4		9		0
		Wr				112		111		112		108
boat shocker (day)	Smallmouth Bass	PSD						100				
		PSD-P						97				
		Wr						124				
boat shocker (night, DC)	Smallmouth Bass	PSD		91								
		PSD-P		91								
		Wr		120								
frame net (std 3/4 in)	Bluegill	PSD	17	25								
		PSD-P	2	3								
		Wr		119								
	Northern Pike	PSD	76	100								
		PSD-P	31	25								
		Wr		90								
	Smallmouth Bass	PSD	89	91								
		PSD-P	73	91								
		Wr		121								
	Walleye	PSD	77	100								
		PSD-P	69	100								

			Year									
Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
frame net (std 3/4 in)	Walleye	Wr		75								
	Yellow Perch	PSD	2	0								
		PSD-P	1	0								
		Wr		104								
spring day EF	Smallmouth Bass	PSD									100	
		PSD-P									95	
		Wr									127	
spring night EF-SMB	Smallmouth Bass	PSD					100					
		PSD-P					95					
		Wr					122					
std exp gill net	Bluegill	PSD		100								
		PSD-P		0								
		Wr		130								
	Northern Pike	PSD	88	100								
		PSD-P	13	14								
		Wr	90	89								
	Smallmouth Bass	PSD	100									
		PSD-P	100									
		Wr	116									
	Walleye	PSD	52	63								
		PSD-P	24	21								
		Wr	89	99								
	Yellow Perch	PSD	45	33								
		PSD-P	22	3								
		Wr	104	110								

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	64	95 (9)	133 (52)	196 (1)	246 (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+
2019	1					338 (1)					
2015	10		233 (1)		368 (3)		445 (1)	444 (3)	455 (1)		485 (1)

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2023	57	195 (13)	345 (1)			487 (18)	543 (2)	543 (3)		563 (1)	636 (19)
2021	55	270 (3)	360 (3)	422 (32)	472 (11)						641 (6)
2019	60	179 (10)	276 (24)	353 (1)		551 (4)		553 (1)	563 (4)	590 (8)	621 (8)
2017	53	206 (6)	355 (1)	456 (8)		523 (3)	536 (9)	570 (13)	617 (7)	712 (1)	683 (5)
2015	35	185 (11)	276 (3)	375 (7)		483 (11)	568 (3)				
2014	23		274 (6)	366 (7)	397 (5)	567 (3)					611 (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+
2023	135	148 (109)	212 (26)								
2021	35	150 (32)		275 (2)	311 (1)						
2019	56	147 (38)	223 (16)	260 (2)							
2017	230	147 (206)	201 (24)								
2015	178		190 (172)	264 (2)	285 (3)	307 (1)					
2014	74	128 (48)	166 (5)	231 (12)	260 (11)						

Fish Condition

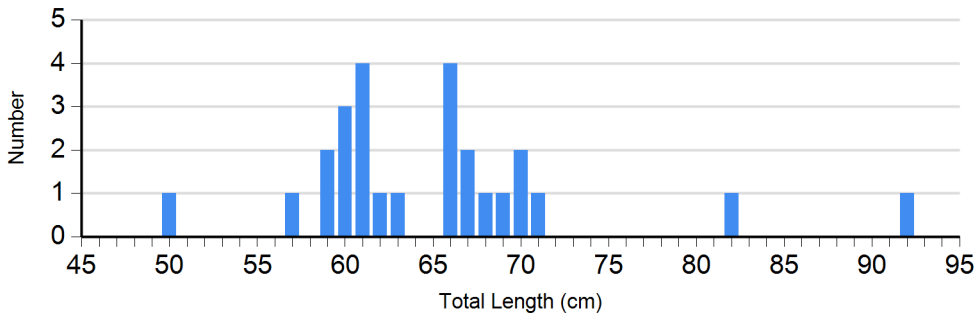
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Northern Pike Gill Net	2019	0		0		1	73	0	
	2021	0		2	105 (8.3)	0		0	
	2023	1	86	22	84 (1.0)	2	78 (3.9)	1	73
Smallmouth Bass Electro Fishing	2019	0		1	122	9	130 (3.0)	28	122 (2.1)
	2022	0		1	118	7	125 (2.7)	12	129 (3.0)
Walleye Gill Net	2019	24	90 (1.4)	0		21	86 (1.5)	4	77 (3.5)
	2021	6	98 (2.7)	43	99 (0.9)	2	88 (1.2)	4	85 (2.7)
	2023	1	75	14	89 (1.5)	17	87 (1.8)	12	75 (1.5)
Yellow Perch Gill Net	2019	40	111 (1.7)	14	111 (1.7)	2	112 (1.2)	0	
	2021	32	113 (1.7)	0		2	100 (4.7)	1	99
	2023	112	109 (0.6)	23	105 (1.4)	0		0	

Length Frequency Distribution

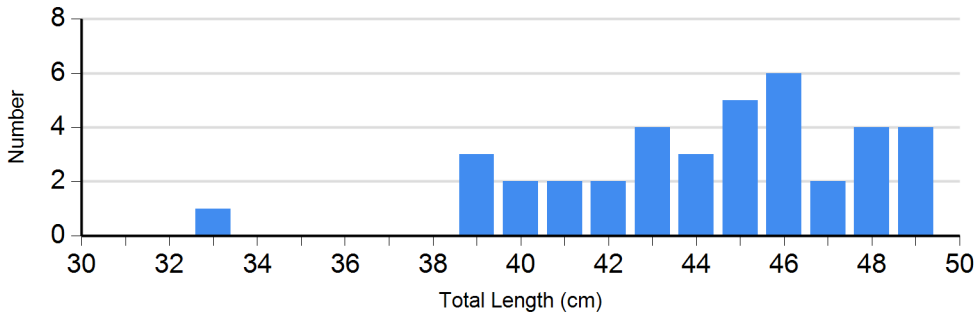
Length frequency histogram of species sampled by year.

Species: Northern Pike
Gear: AFS std gill net



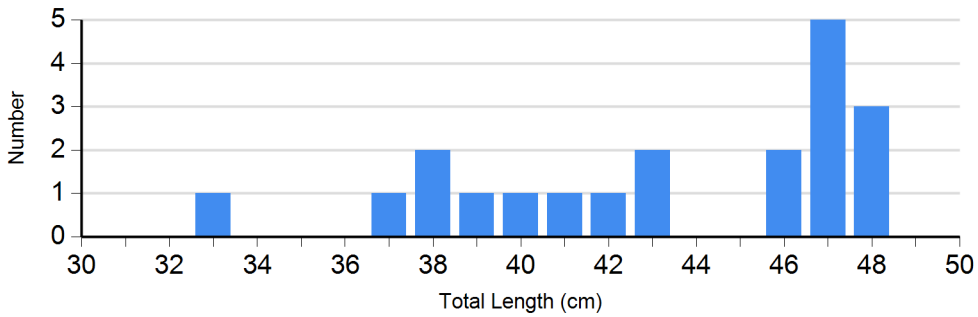
2023

Species: Smallmouth Bass
Gear: boat shocker (day)



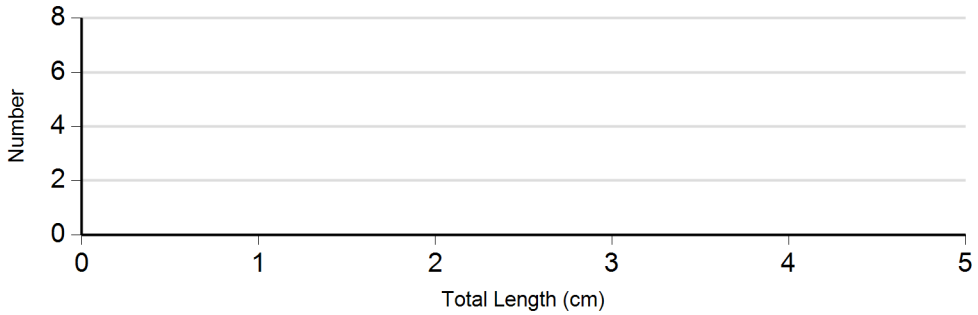
2019

Species: Smallmouth Bass
Gear: spring day EF



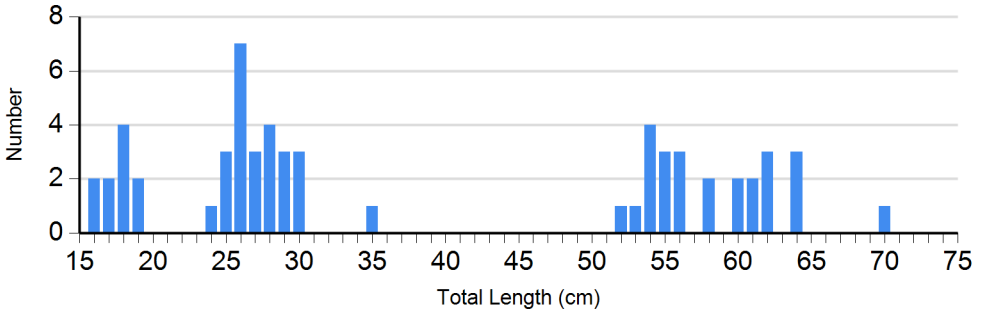
2022

Species: Smallmouth Bass
Gear: spring night EF-SMB

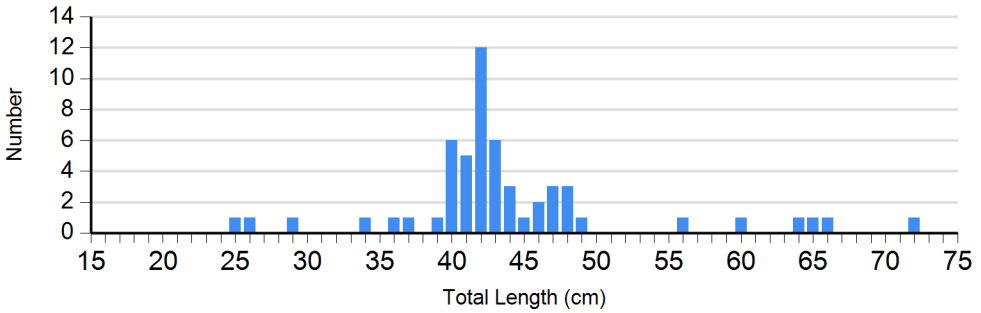


2018

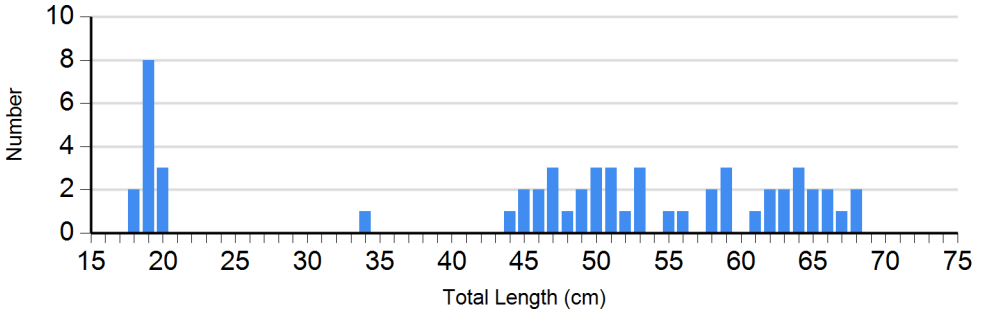
Species: Walleye
Gear: AFS std gill net



2019

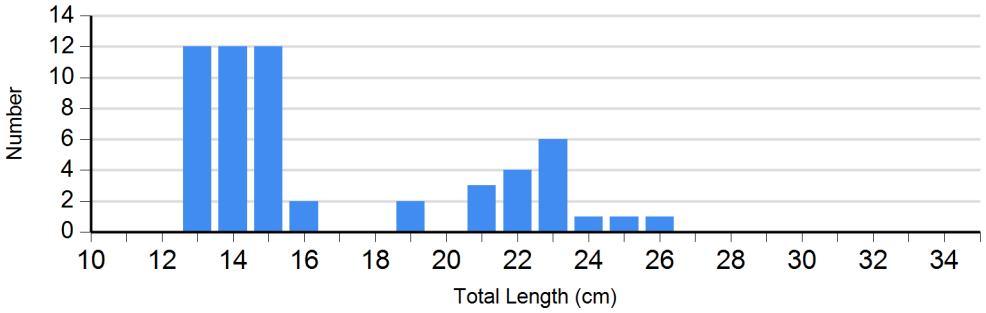


2021

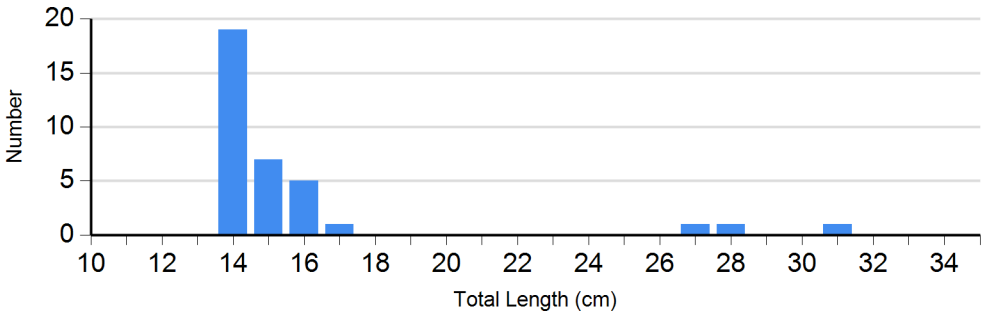


2023

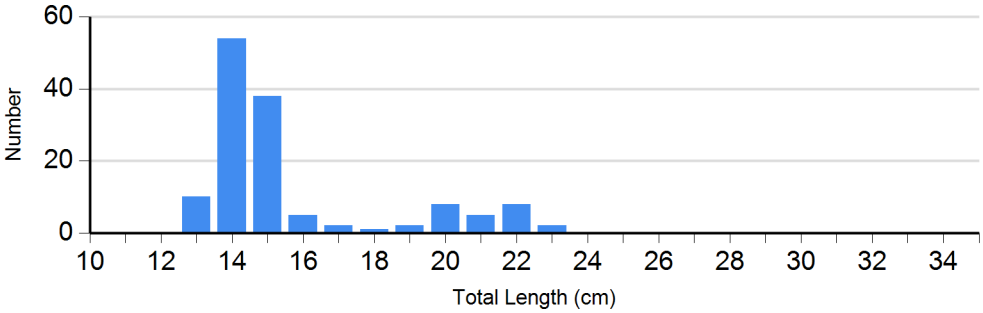
Species: Yellow Perch
Gear: AFS std gill net



2019



2021

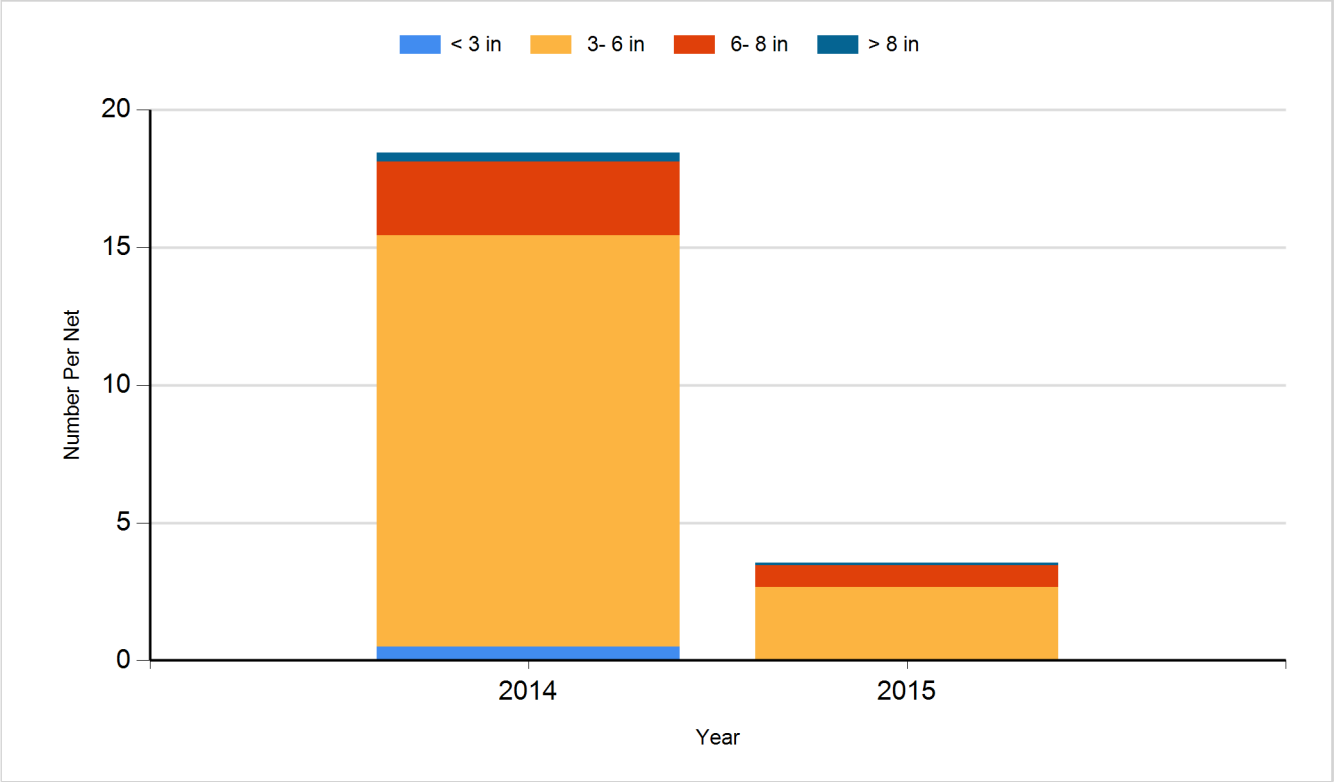

60
40
20
0
Number
10
12
14
16
18
20
22
24
26
28
30
32
34
Total Length (cm)

2023

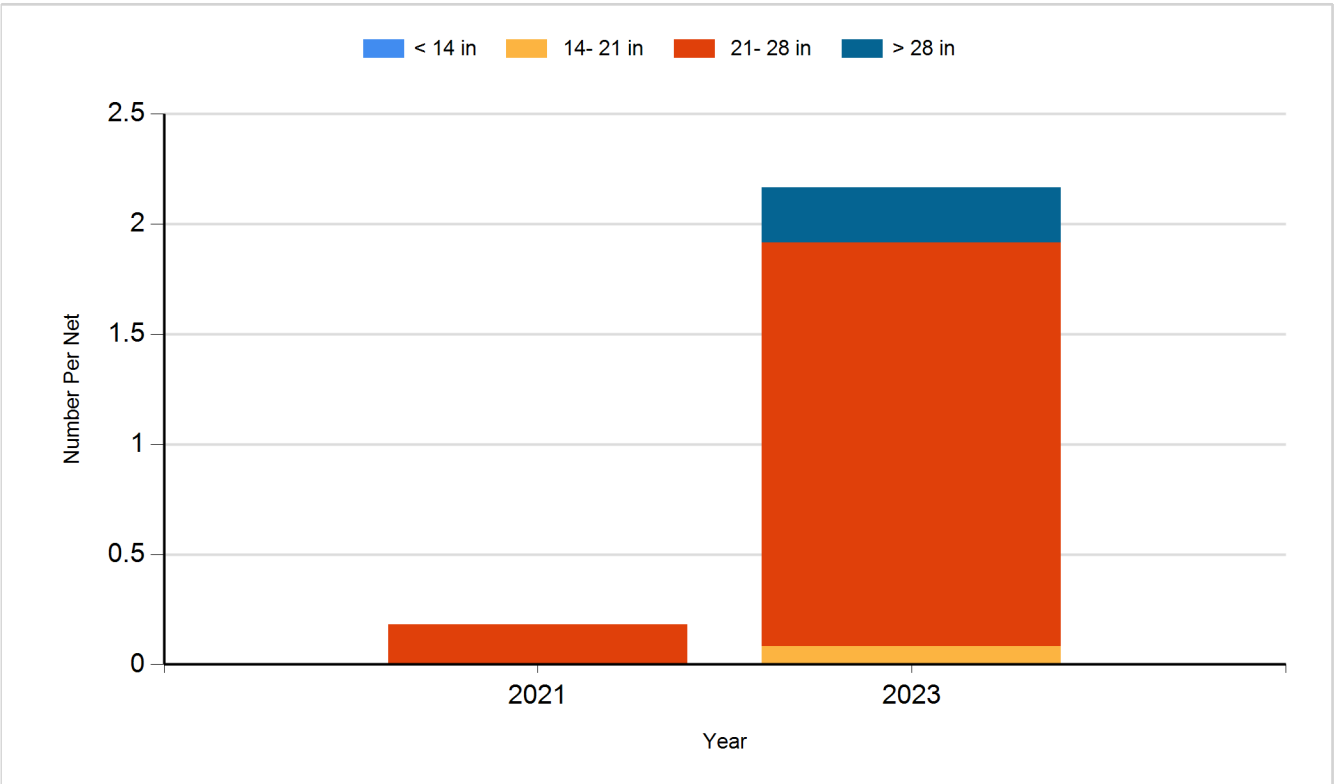
Historic Fish Sizes and Relative Abundance

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

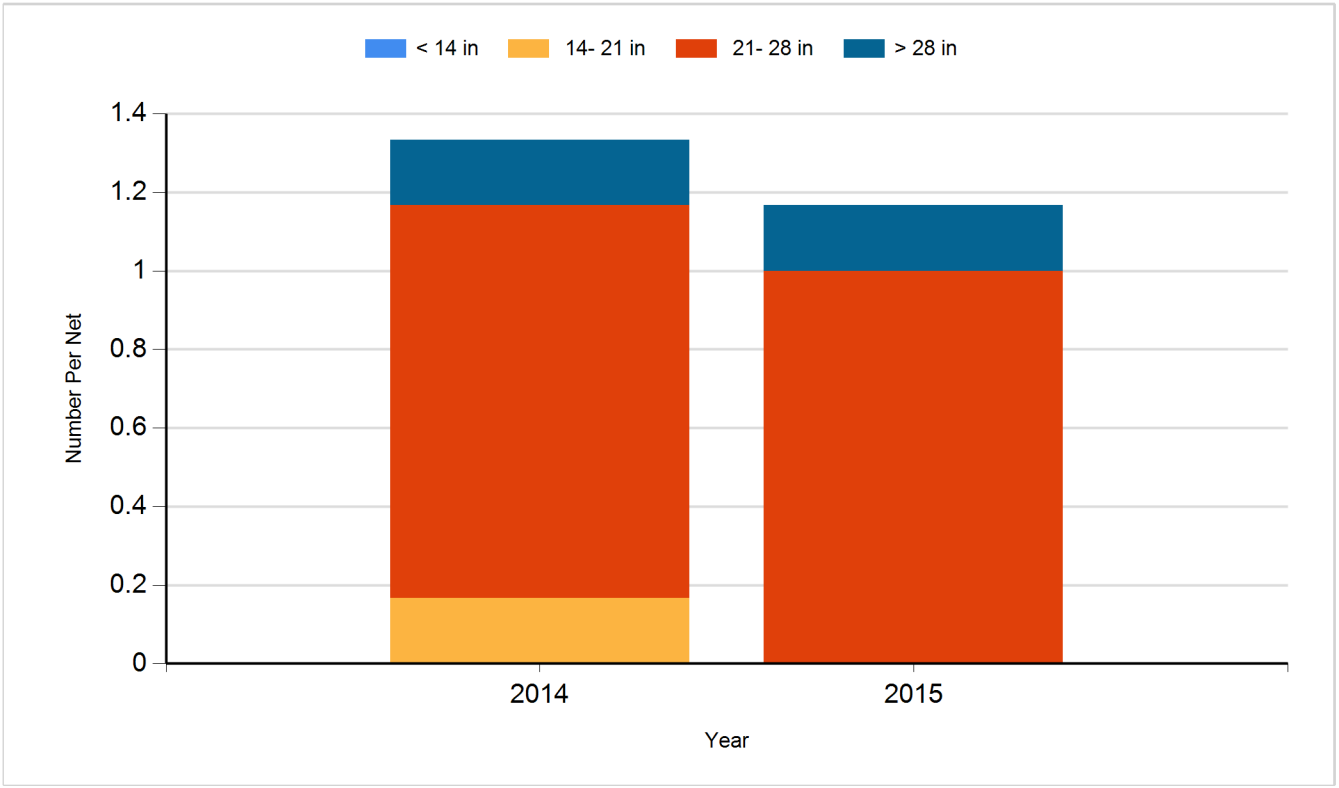
Species: Bluegill
Gear: frame net (std 3/4 in)



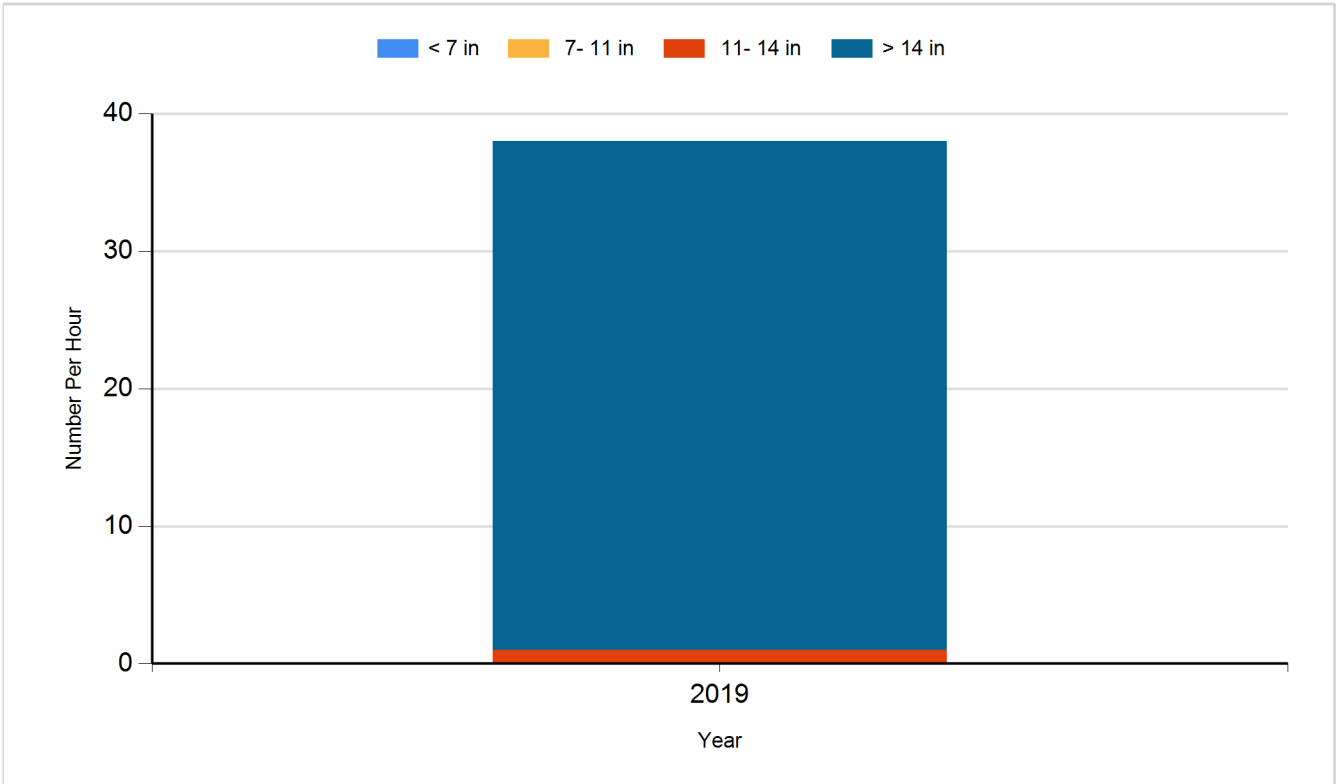
Species: Northern Pike
Gear: AFS std gill net



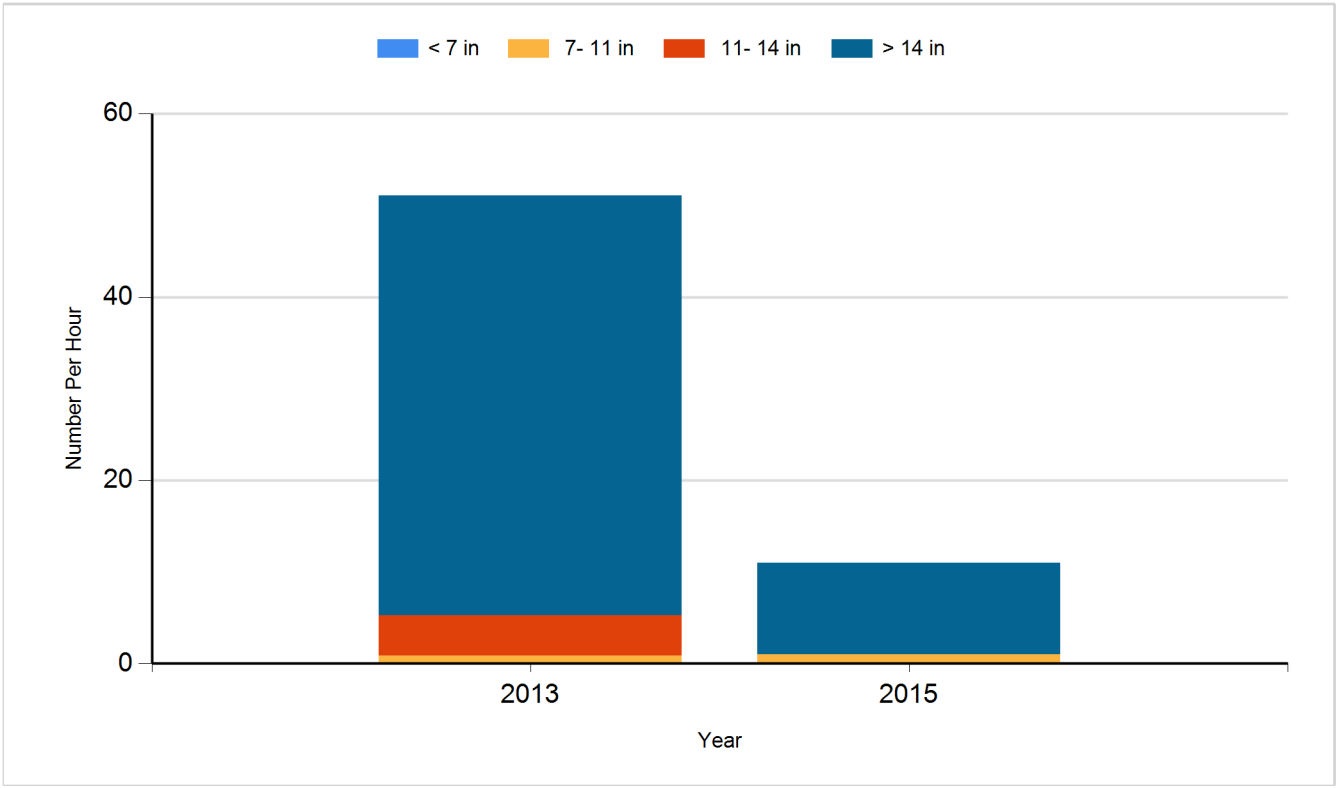
Species: Northern Pike
Gear: std exp gill net



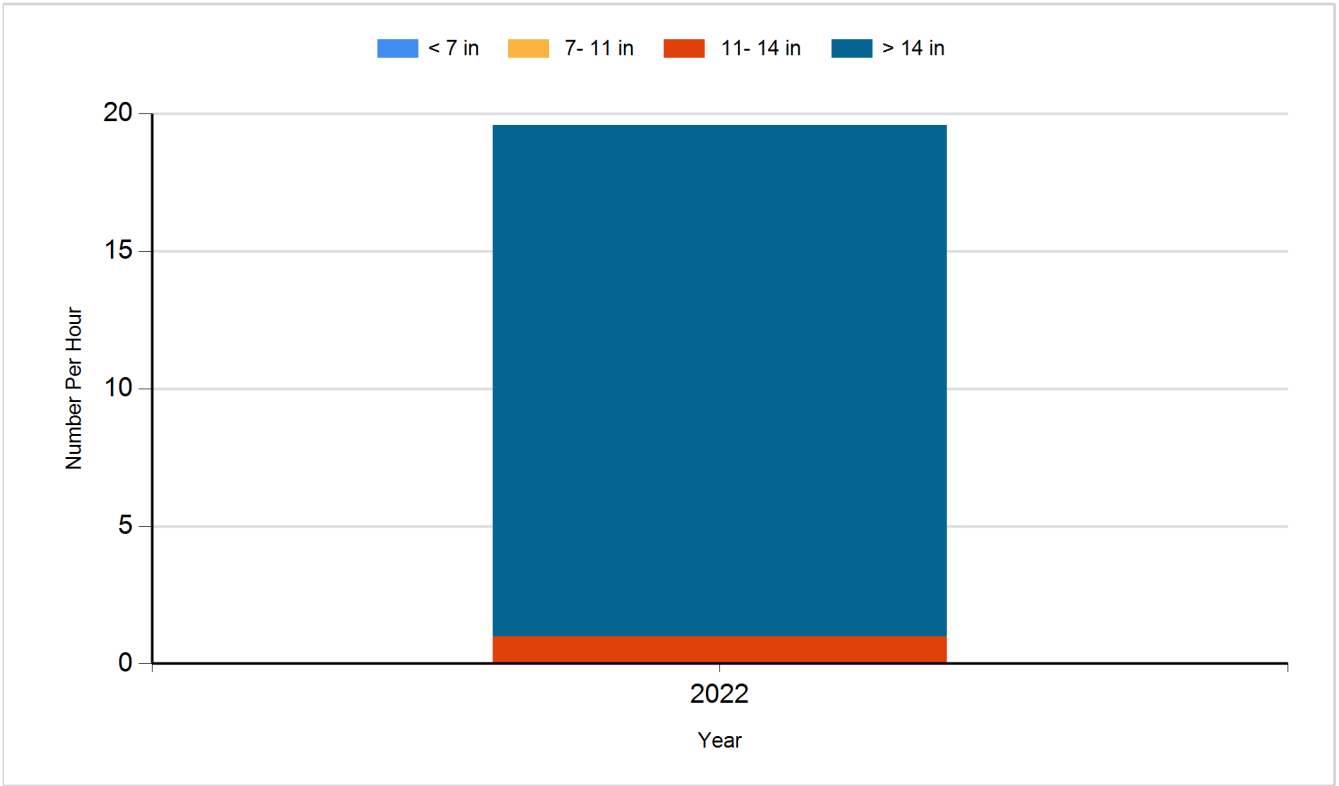
Species: Smallmouth Bass
Gear: boat shocker (day)



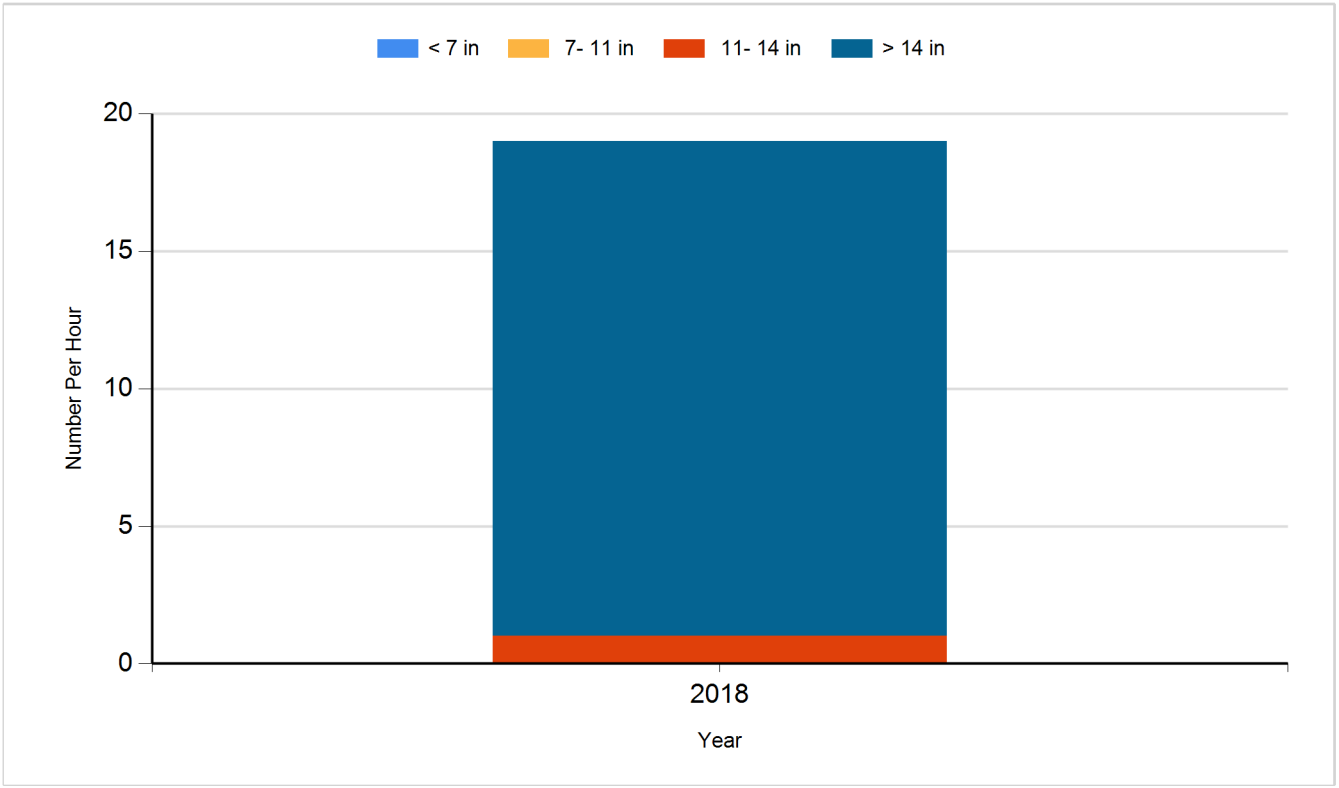
Species: Smallmouth Bass
Gear: boat shocker (night, DC)



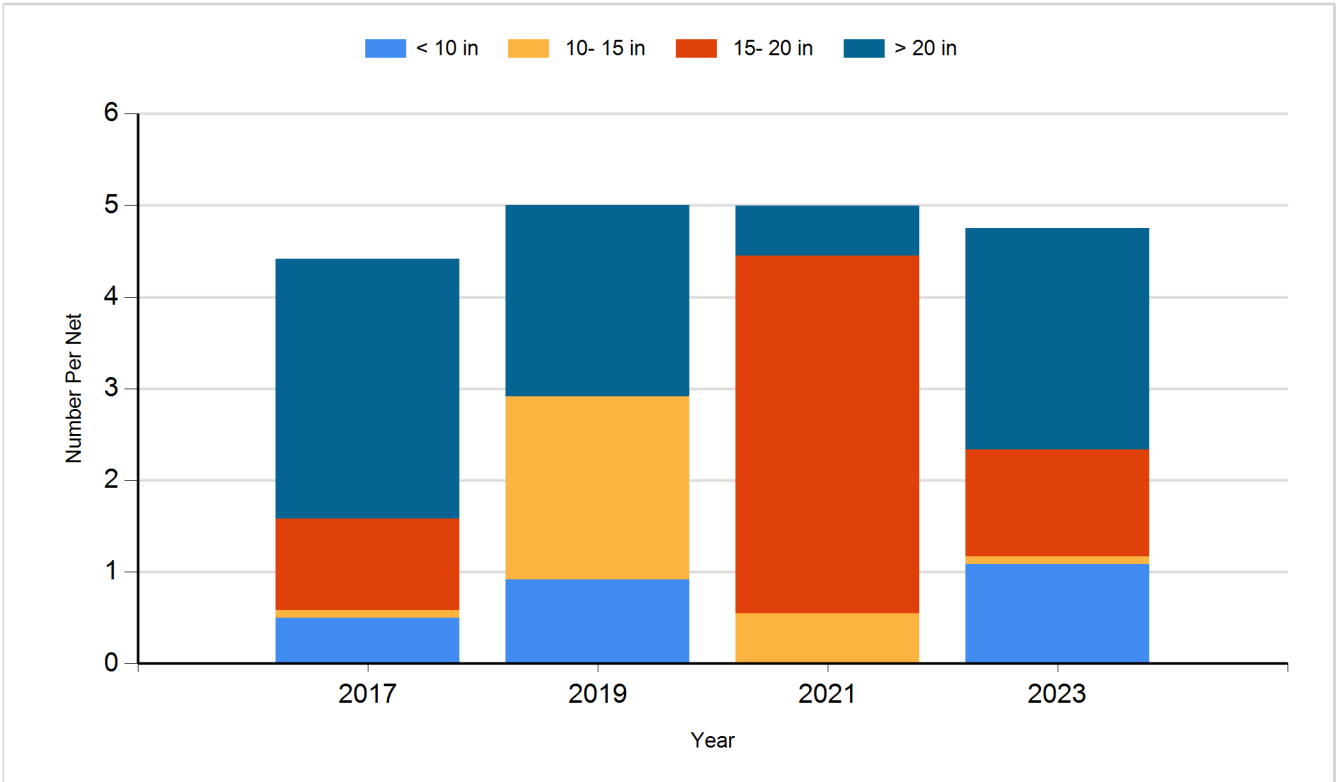
Species: Smallmouth Bass
Gear: spring day EF



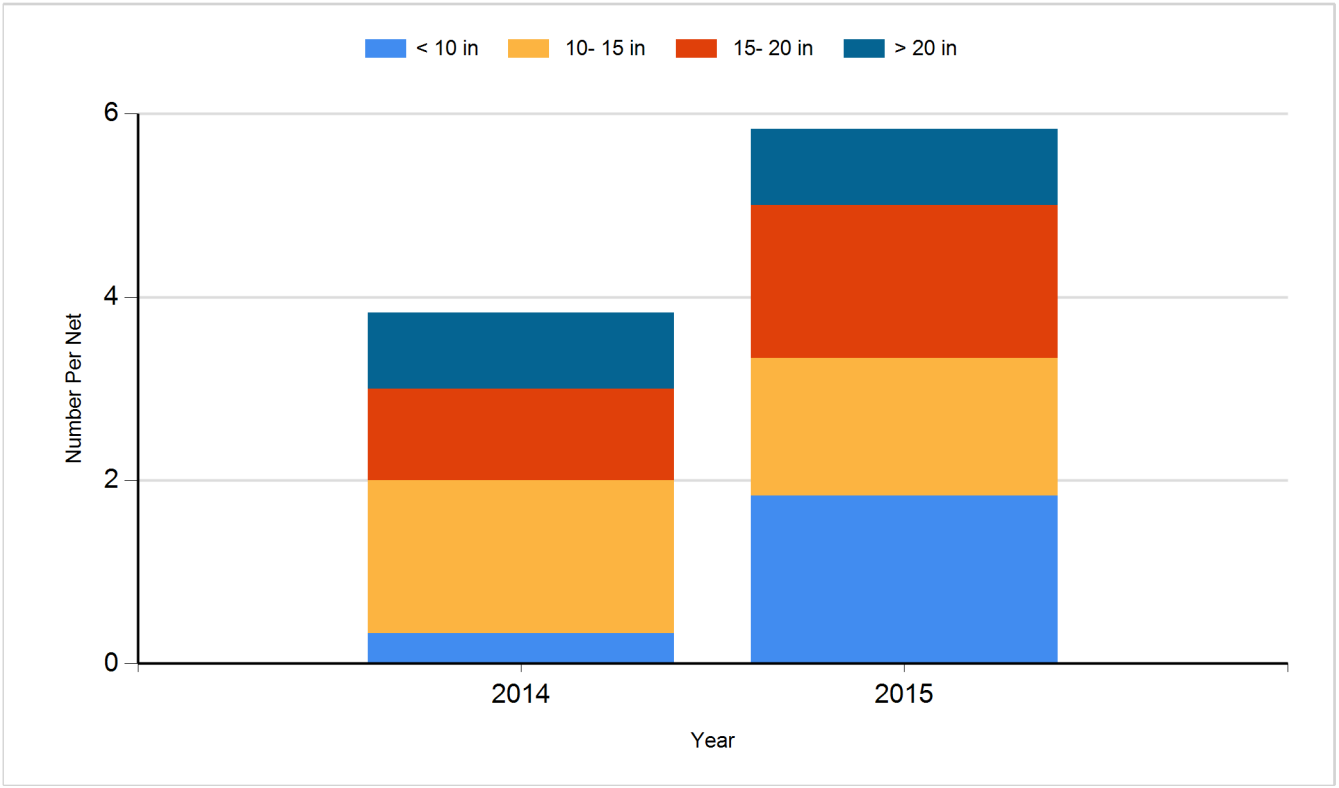
Species: Smallmouth Bass
Gear: spring night EF-SMB



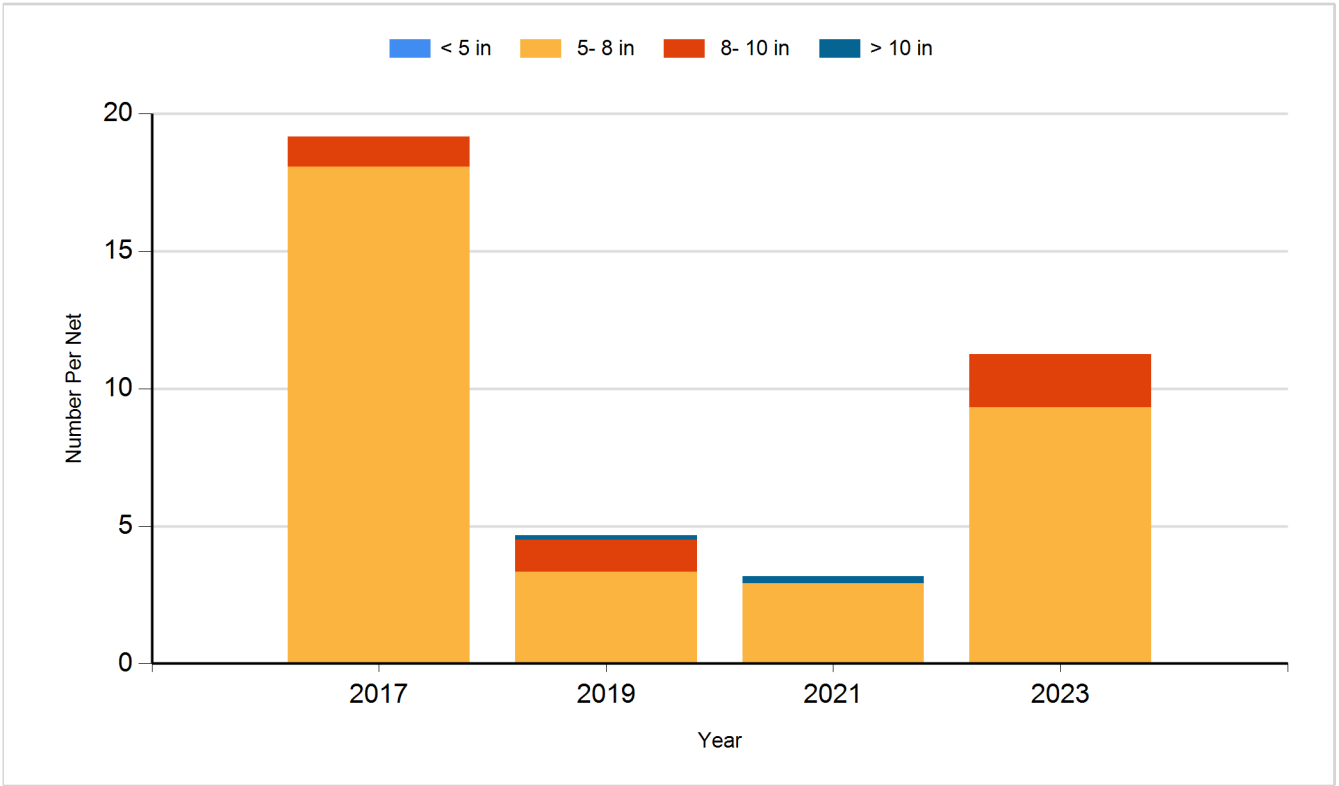
Species: Walleye
Gear: AFS std gill net



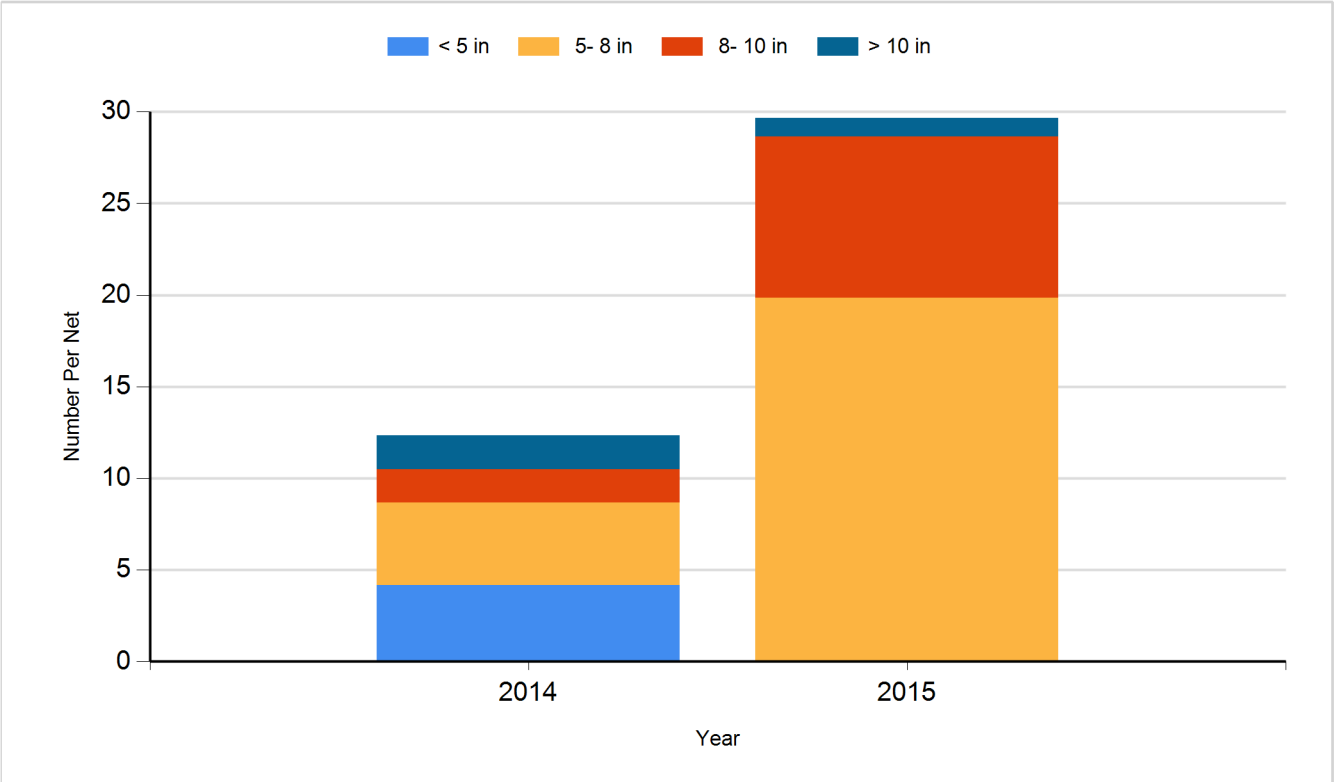
Species: Walleye
Gear: std exp gill net



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
2012	Walleye	Small Fingerling	60,510
2014	Walleye	Fry	300,000
2016	Walleye	Fry	300,000
2018	Walleye	Fry	300,000
2021	Walleye	Fry	300,000
2022	Walleye	Fry	300,000