SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Horseshoe, Day County
UBS-Lake-303-001
2022

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
spring day EF	May 18, 2022	3675 seconds

Common Fish Species Present

Yellow Perch

Walleye

Smallmouth Bass

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
spring day EF*	Smallmouth Bass	20	19.6	7.7	100		95		127	3

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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
AFS std gill net	Bluegill					0.0		0.0		0.1		0.03
	Northern Pike					0.1		0.1		0.2		0.13
	Smallmouth Bass					3.6		3.0		0.9		2.50
	Walleye					3.9		4.1		5.0		4.33
	Yellow Perch					19.2		4.7		3.2		9.03
boat shocker (day)	Smallmouth Bass							38.0				38.00
boat shocker (night, DC)	Smallmouth Bass	49.9		11.0								30.45
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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AFS std gill net	Smallmouth Bass	PSD					100		89		90	
		PSD-P					98		86		80	
		Wr					127		125		123	
	Walleye	PSD					98		51		89	
		PSD-P					72		51		11	
		Wr					92		87		97	
	Yellow Perch	PSD					6		29		9	
		PSD-P					0		4		9	
		Wr					112		111		112	
boat shocker (day)	Smallmouth Bass	PSD							100			
		PSD-P							97			
		Wr							124			
boat shocker (night, DC)	Smallmouth Bass	PSD	98		91							
		PSD-P	90		91							
		Wr	134		120							
frame net (std 3/4 in)	Smallmouth Bass	PSD		89	91							
		PSD-P		73	91							
		Wr			121							
	Walleye	PSD		77	100							
		PSD-P		69	100							
		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	Smallmouth Bass	PSD		100								

			Year									
Gear	Species	Index	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
std exp gill net	Smallmouth Bass	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: 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)
2013	58		253 (1)	337 (5)	376 (7)	386 (8)	435 (6)	441 (8)	454 (5)	467 (9)	473 (10)

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
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+
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

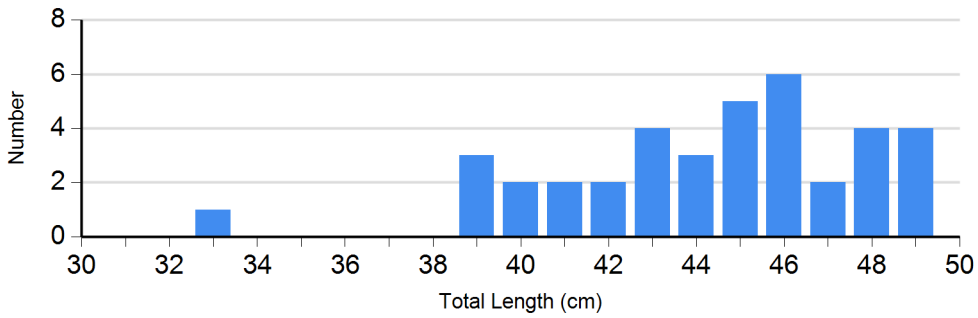
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Smallmouth Bass Electro Fishing	2018	0		1	101	8	126 (6.8)	10	121 (5.0)
	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)
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

Length Frequency Distribution

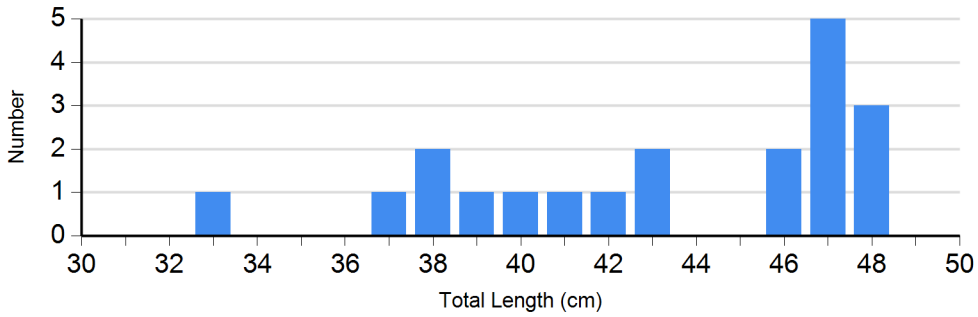
Length frequency histogram of species sampled by year.

Species: Smallmouth Bass
Gear: boat shocker (day)



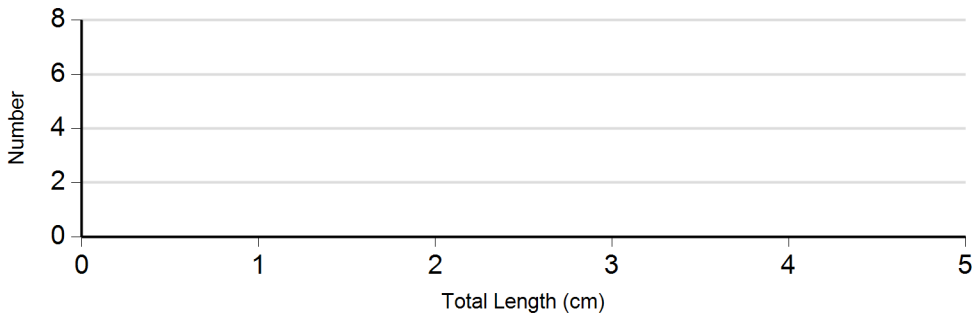
2019

Species: Smallmouth Bass
Gear: spring day EF



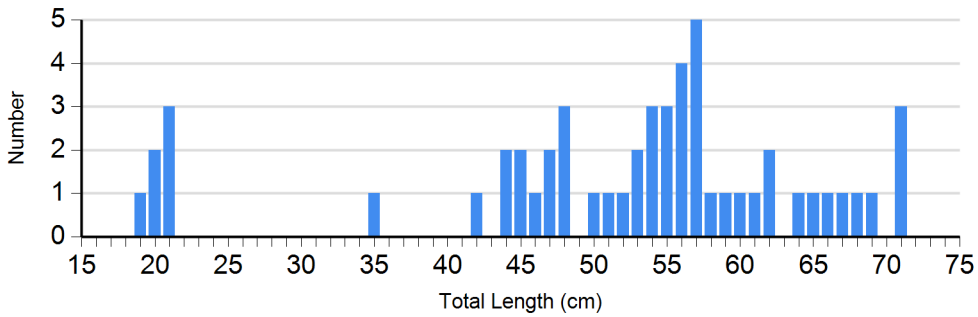
2022

Species: Smallmouth Bass
Gear: spring night EF-SMB

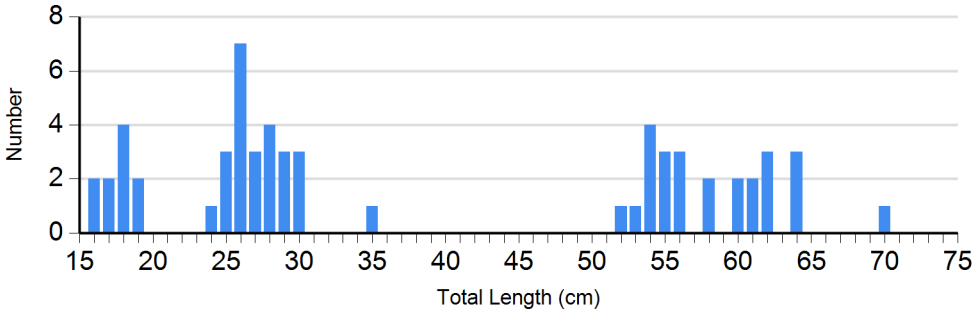


2018

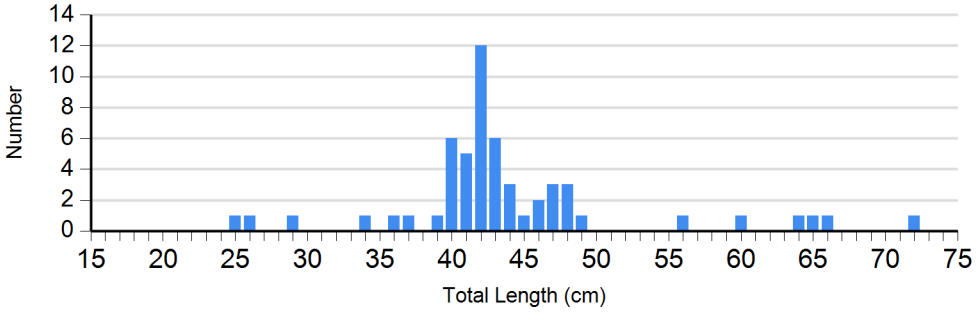
Species: Walleye
Gear: AFS std gill net



2017

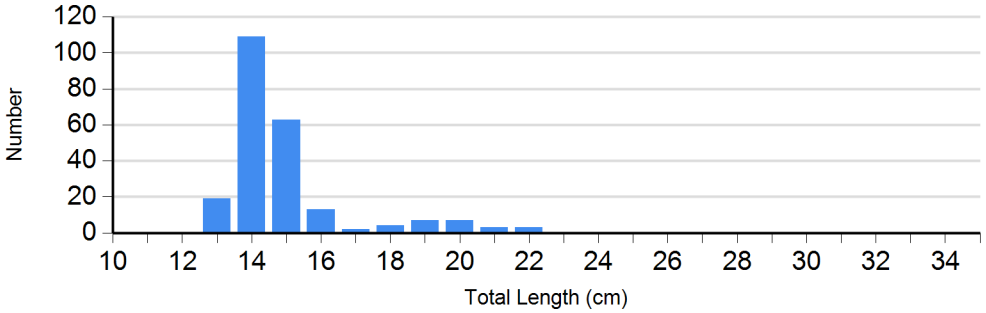


2019

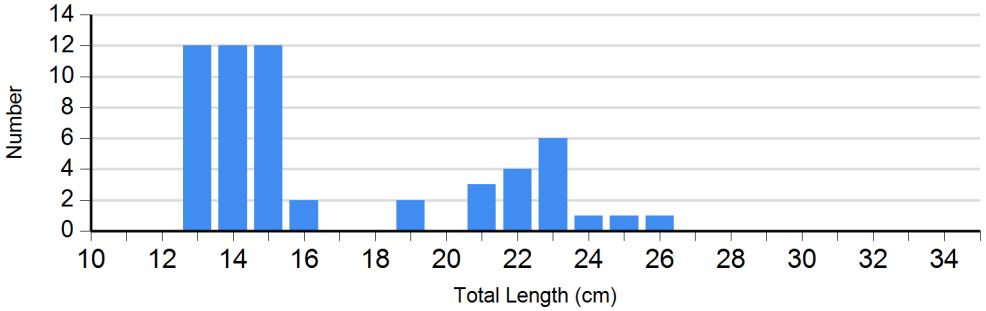


2021

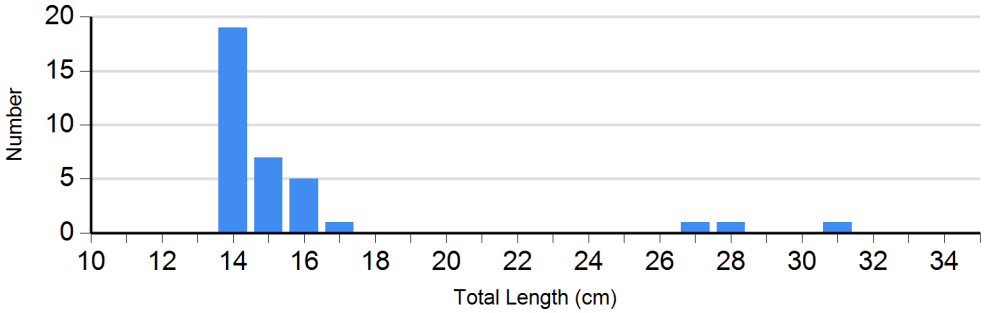
Species: Yellow Perch
Gear: AFS std gill net



2017



2019

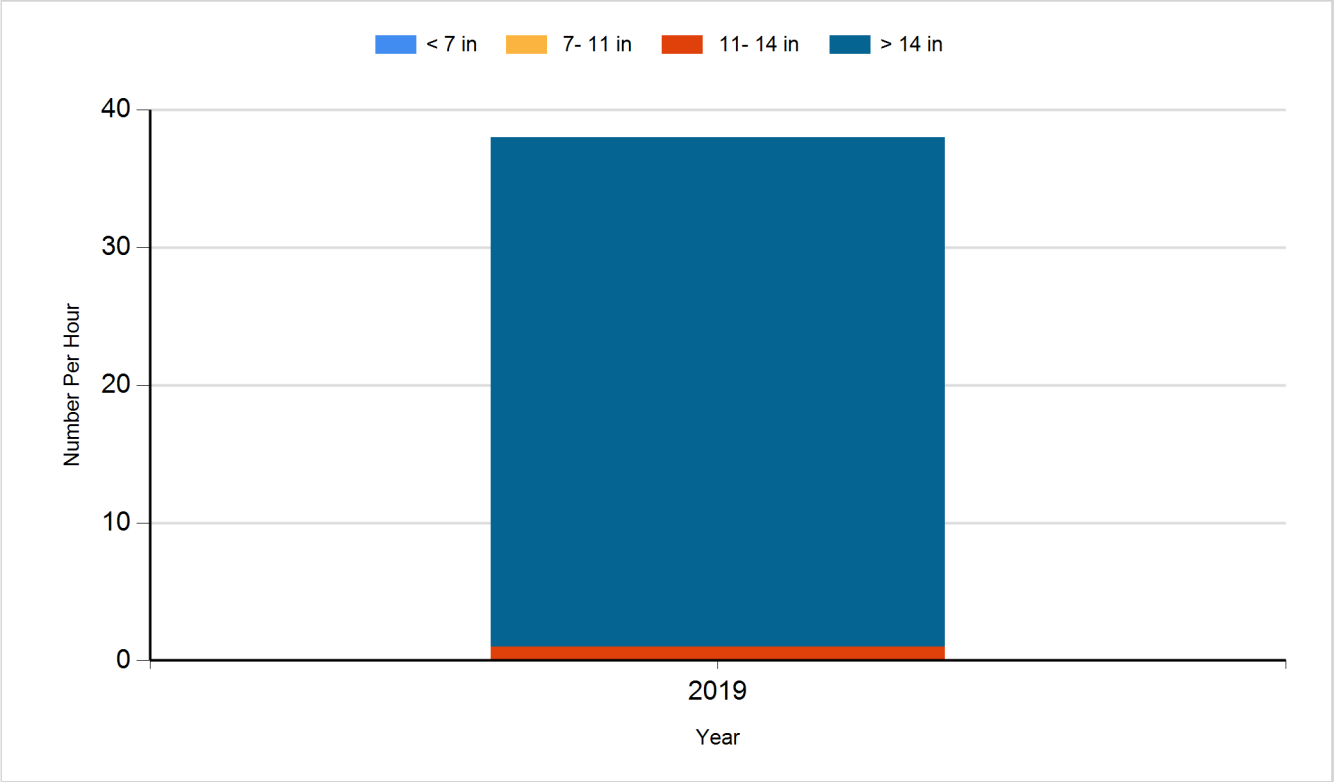


2021

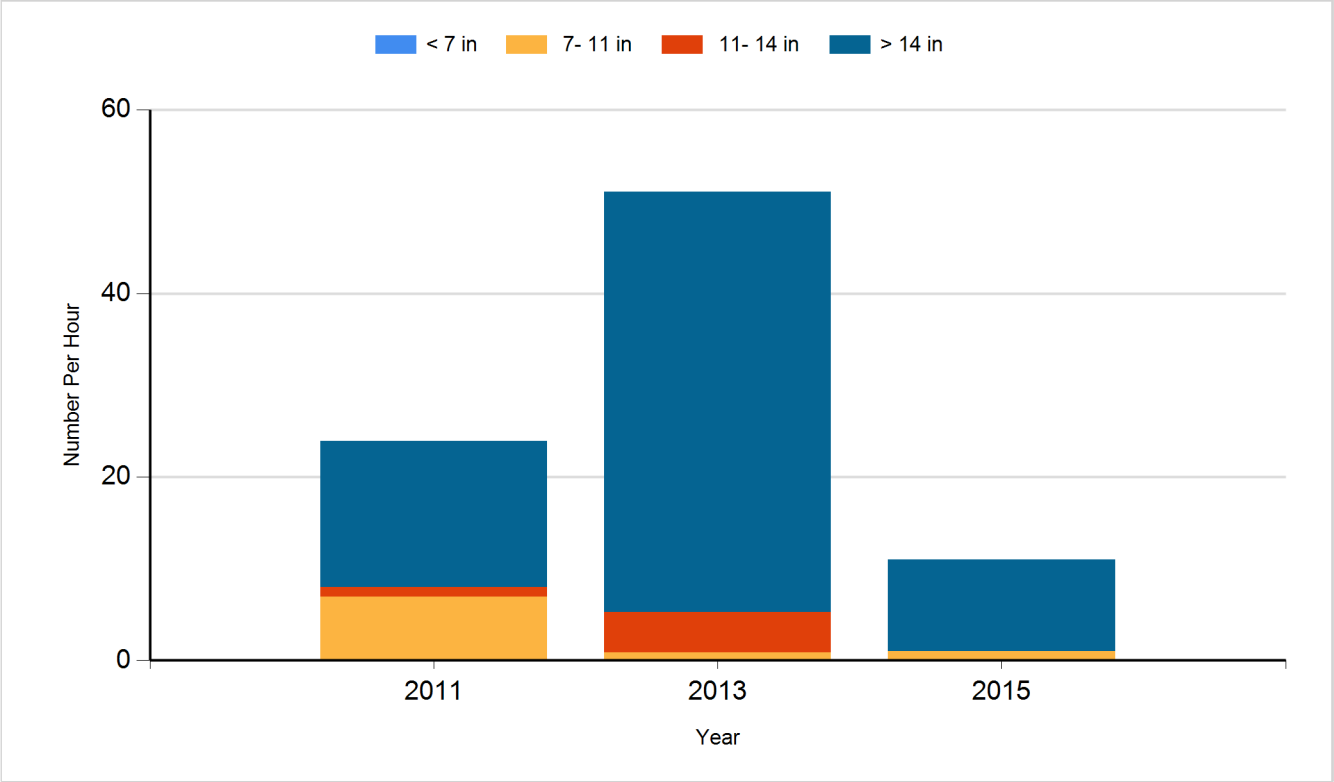
Historic Fish Sizes and Relative Abundance

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

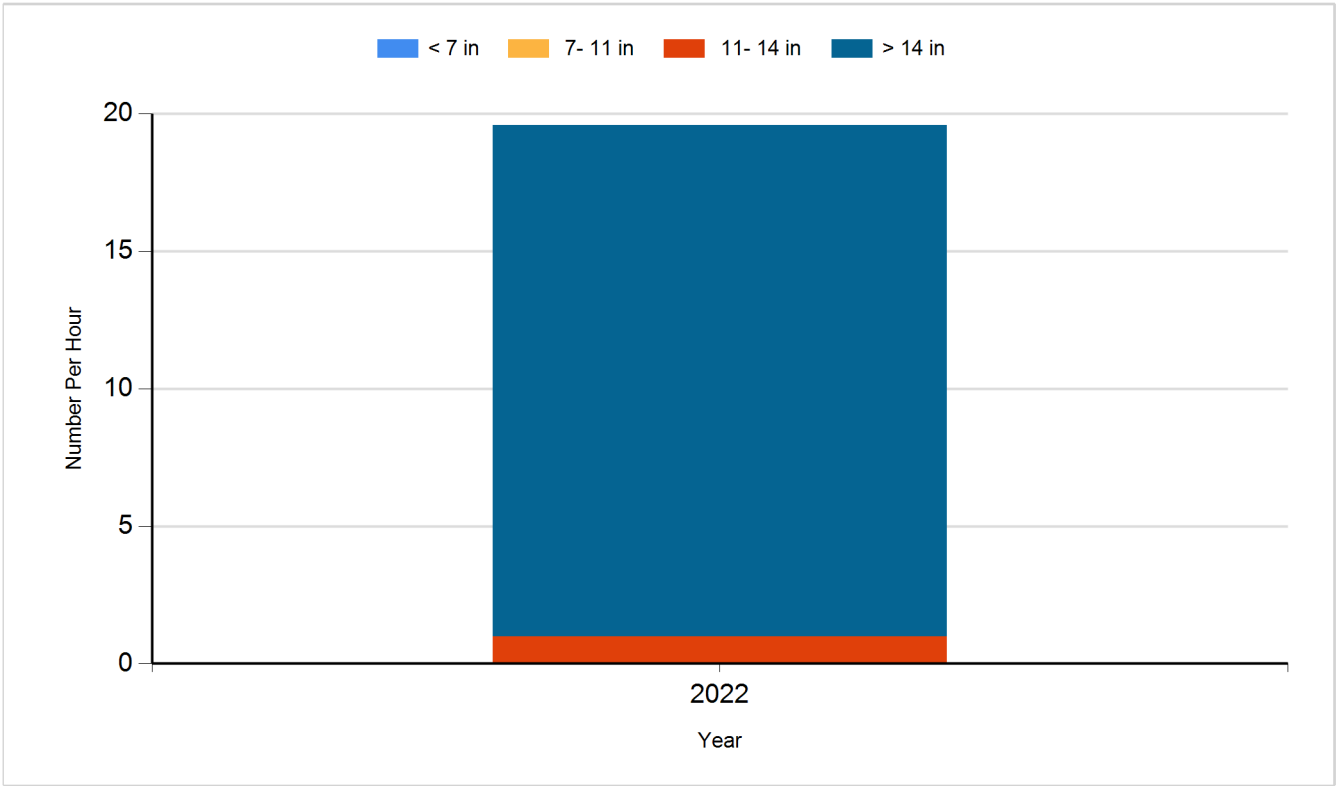
Species: Smallmouth Bass
Gear: boat shocker (day)



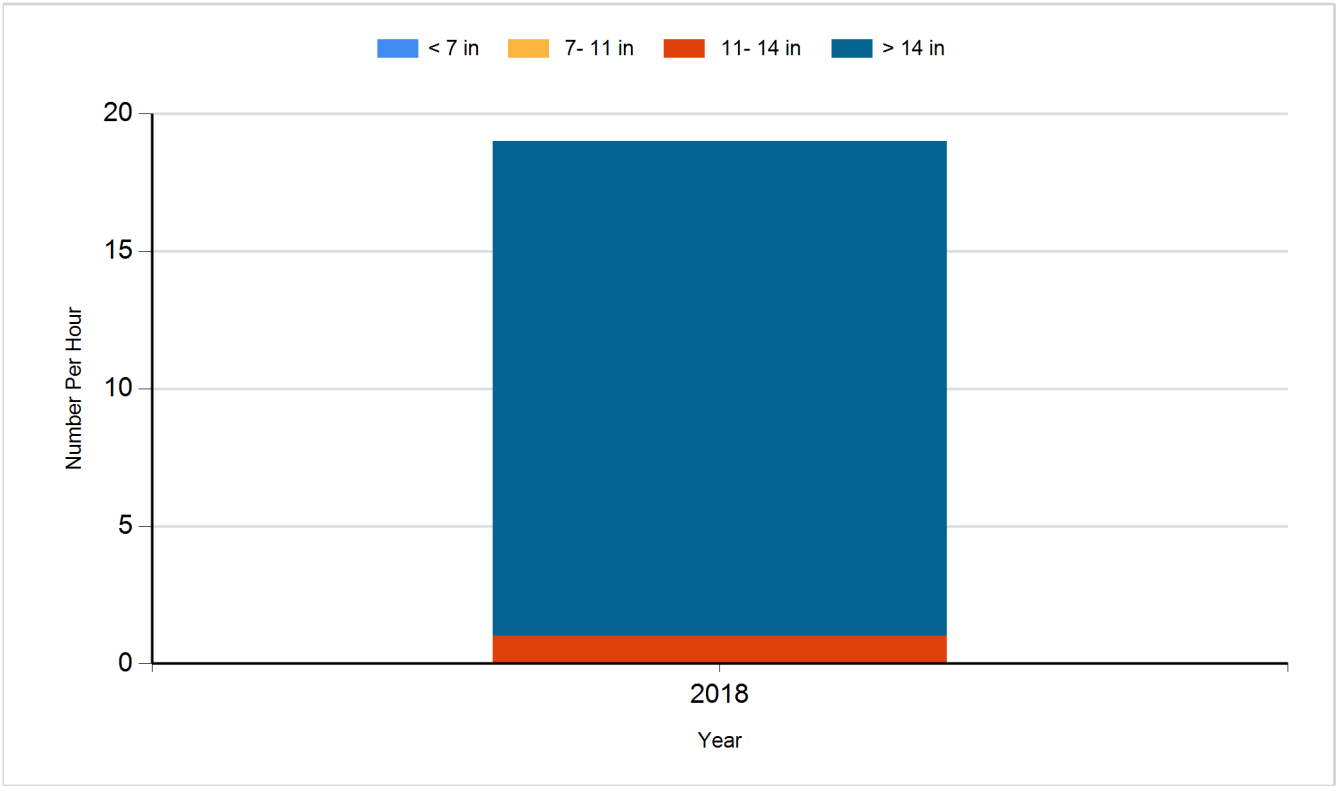
Species: Smallmouth Bass
Gear: boat shocker (night, DC)



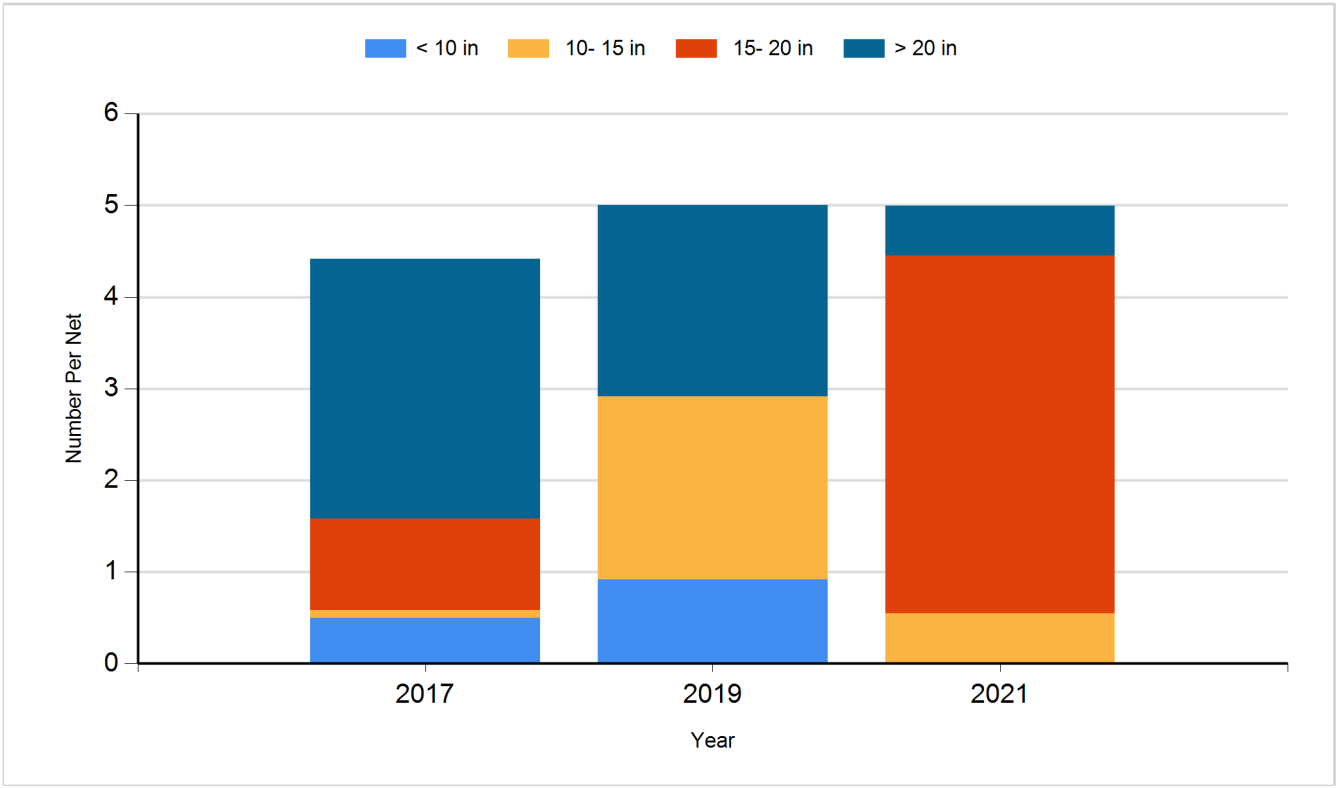
Species: Smallmouth Bass
Gear: spring day EF



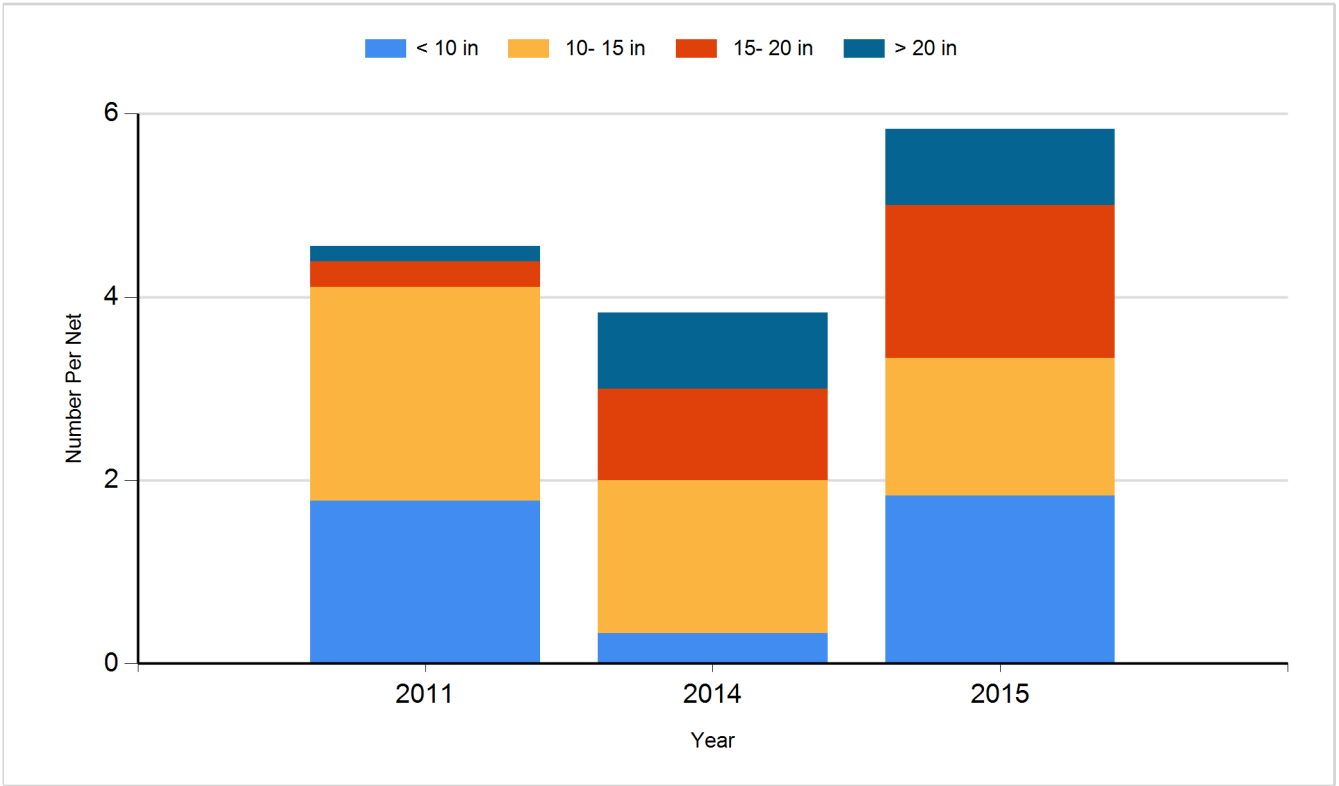
Species: Smallmouth Bass
Gear: spring night EF-SMB



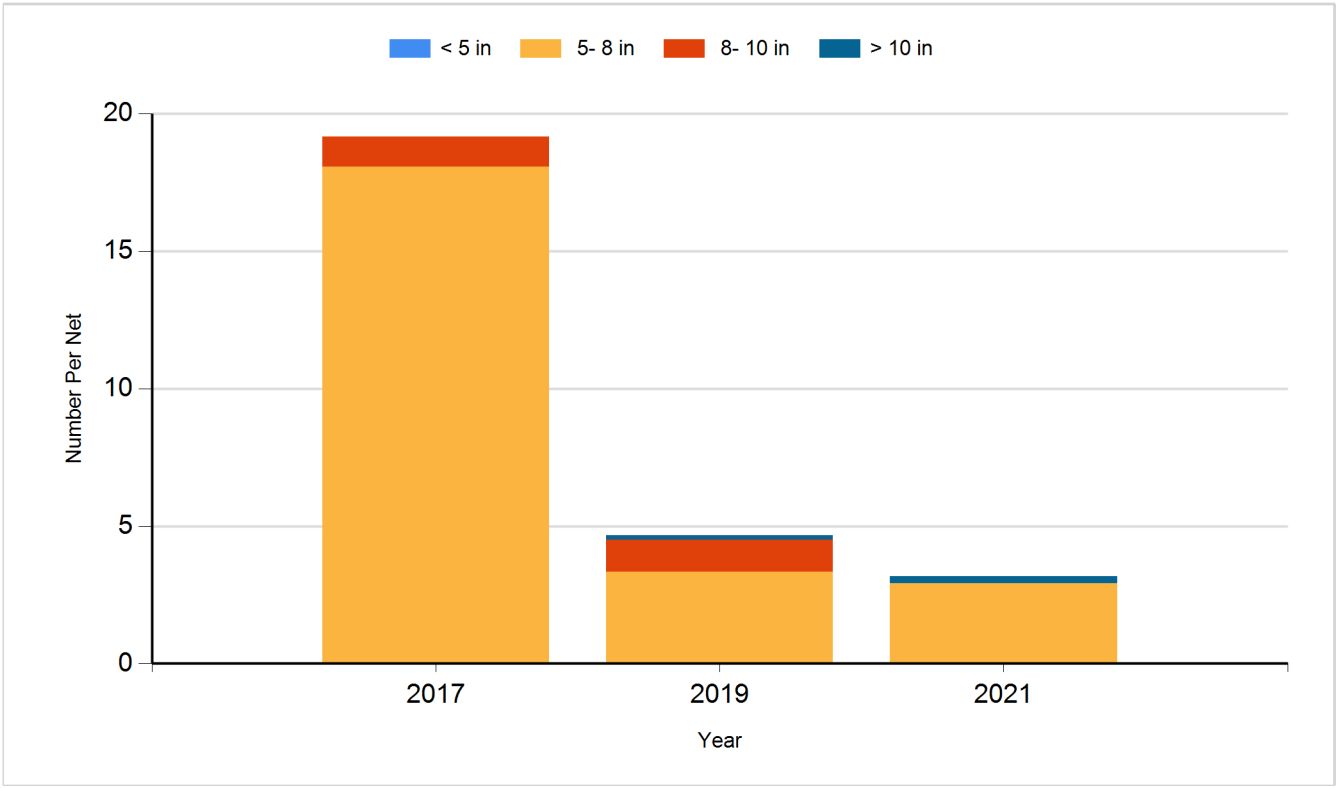
Species: Walleye
Gear: AFS std gill net



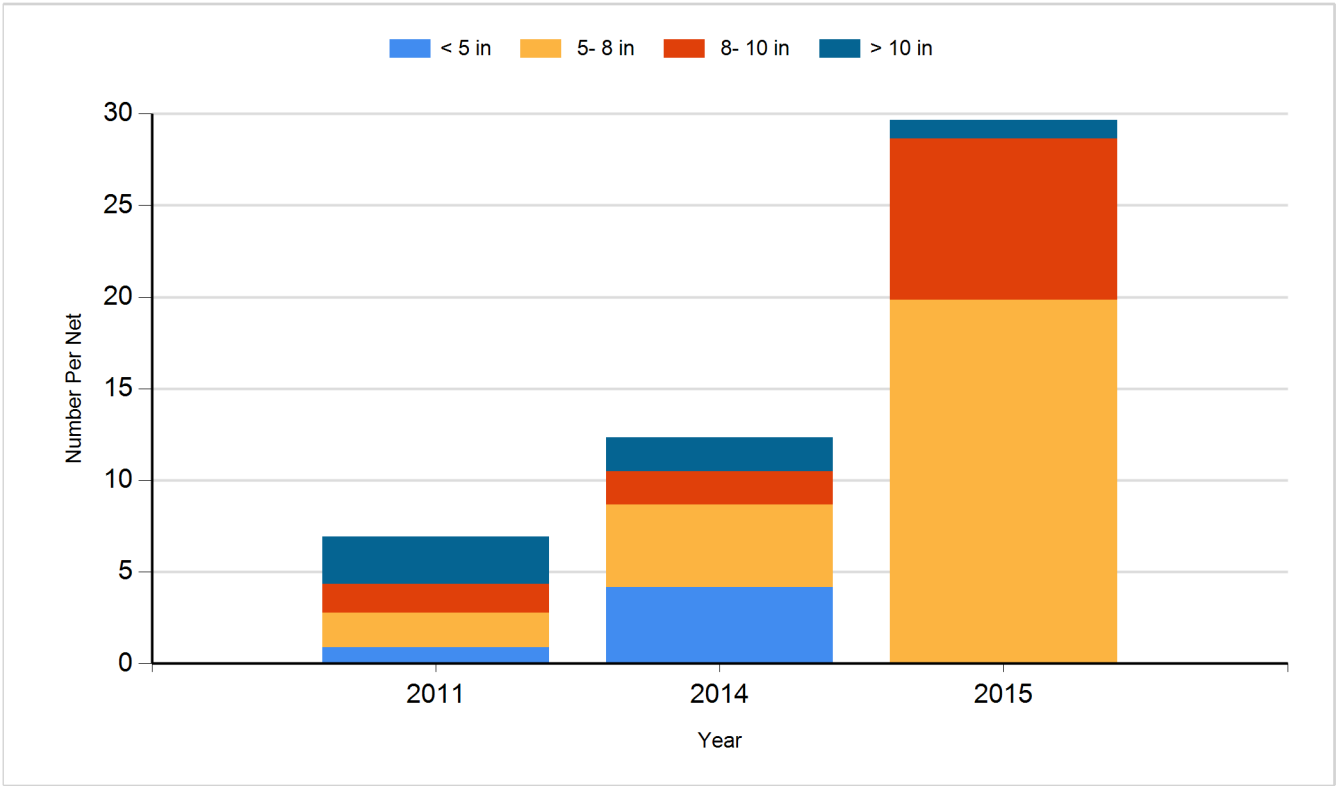
Species: Walleye
Gear: std exp gill net



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