Horseshoe Lake Survey Summary

Horseshoe Lake, located 9.0 miles south and 4.5 miles west of Webster, is managed as a smallmouth bass, walleye and yellow perch fishery; other fish species (e.g., northern pike) are present and contribute to the fishery.

- **Smallmouth bass.** Spring electrofishing was not completed in 2021.

- **Walleye.** A 28-inch minimum length limit and one fish daily limit is in effect for walleyes at Horseshoe Lake. The objective of the regulation is to provide a unique fishery with high catch rates for large fish. In 2021, the mean gill net CPUE was 5.0. Sampled walleyes ranged in length from 9.8 to 28.5 inches, most (89%) were ≥15.0 inches and 11% were ≥20.0 inches. Seven year classes contributed to the catch. Individuals from the 2018 (age-3) cohort, which coincided with a fry stocking, were the most abundant accounting for more than half (58%) of walleyes in the sample, while those from the naturally produced 2017 (age-4) year class made up an additional 20%. The 2021 sample suggests good walleye growth with mean length at capture at ages 3 and 4 of 16.6 and 18.6 inches, respectively.

- **Yellow perch**. Yellow perch were not abundant (3.2/gill net) in 2021. Those sampled ranged in length from 5.5 to 12.2 inches, most (32 of 35 individuals) were from the 2020 (age-1) cohort, which had a mean length at capture of 5.9 inches.

For more detailed results see the computer-generated South Dakota Statewide Fisheries Survey for Horseshoe (Day; below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Horseshoe, Day County
UBS-Lake-303-001
2021

Lake Information

Name:	Horseshoe	**Maximum Depth:**	24 Feet
County:	Day	**Mean Depth:**	15 Feet
Surface Area:	614 Acres		

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 07, 2021	4 net-nights
AFS std gill net	Jul 08, 2021	3 net-nights
AFS std gill net	Jul 09, 2021	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).

			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	1	0.1	0.1	0		0		145	
	Northern Pike	2	0.2	0.2	100		0		105	11
	Smallmouth Bass	11	0.9	0.9	90		80		123	3
	Walleye	55	5.0	1.8	89	7	11	7	97	1
	Yellow Perch	35	3.2	1.6	9		9		112	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.

*** Includes both day and night samples**

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	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*	Smallmouth Bass		49.9		11.0			19.0	38.0			29.48
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
	Walleye			1.4	0.3							0.85
	Yellow Perch			5.2	0.2							2.70
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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std gill net	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
std exp gill net	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: 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

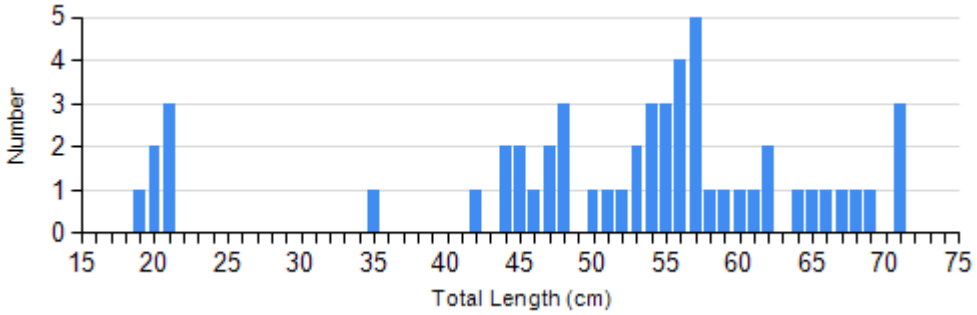
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Walleye Gill Net	2017	1	94	12	96 (2.2)	25	94 (1.3)	9	83 (2.8)
	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	2017	217	113 (0.6)	13	109 (2.2)	0		0	
	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: Walleye
Gear: AFS std gill net



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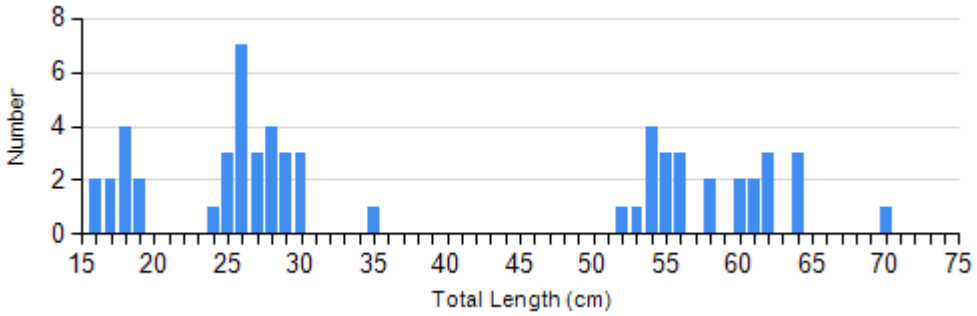

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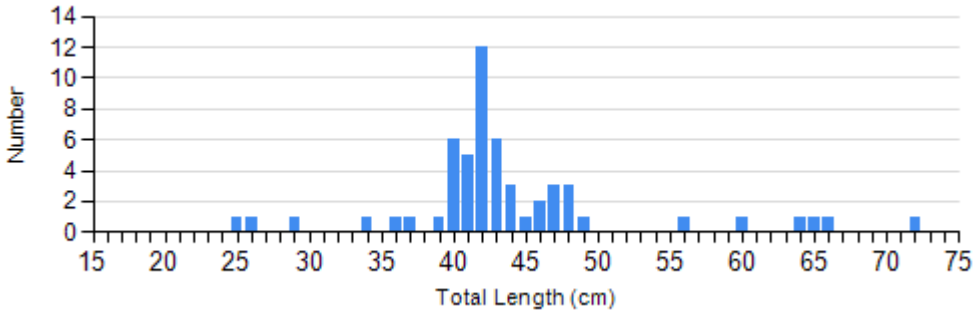
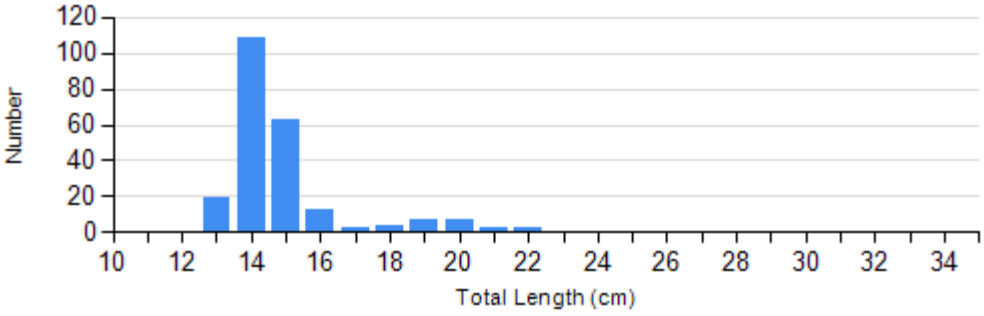


2021

Species: Yellow Perch
Gear: AFS std gill net



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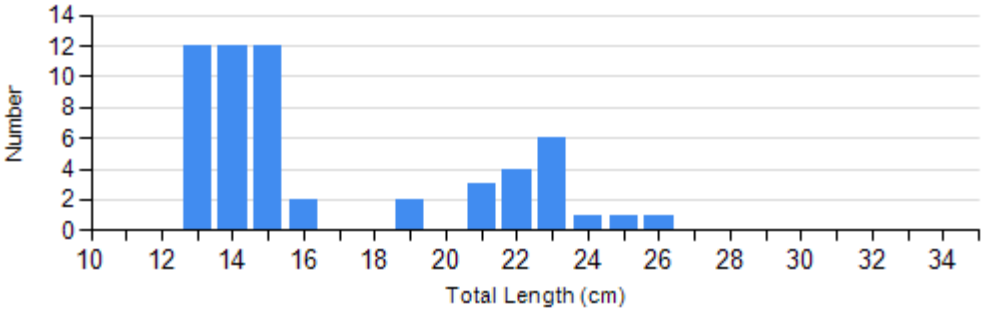

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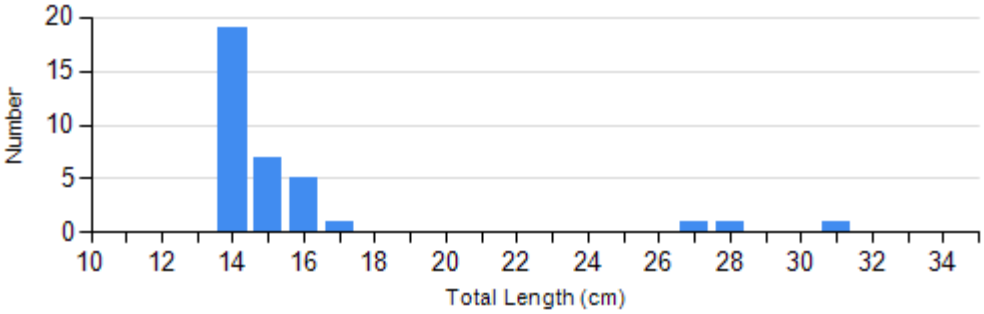
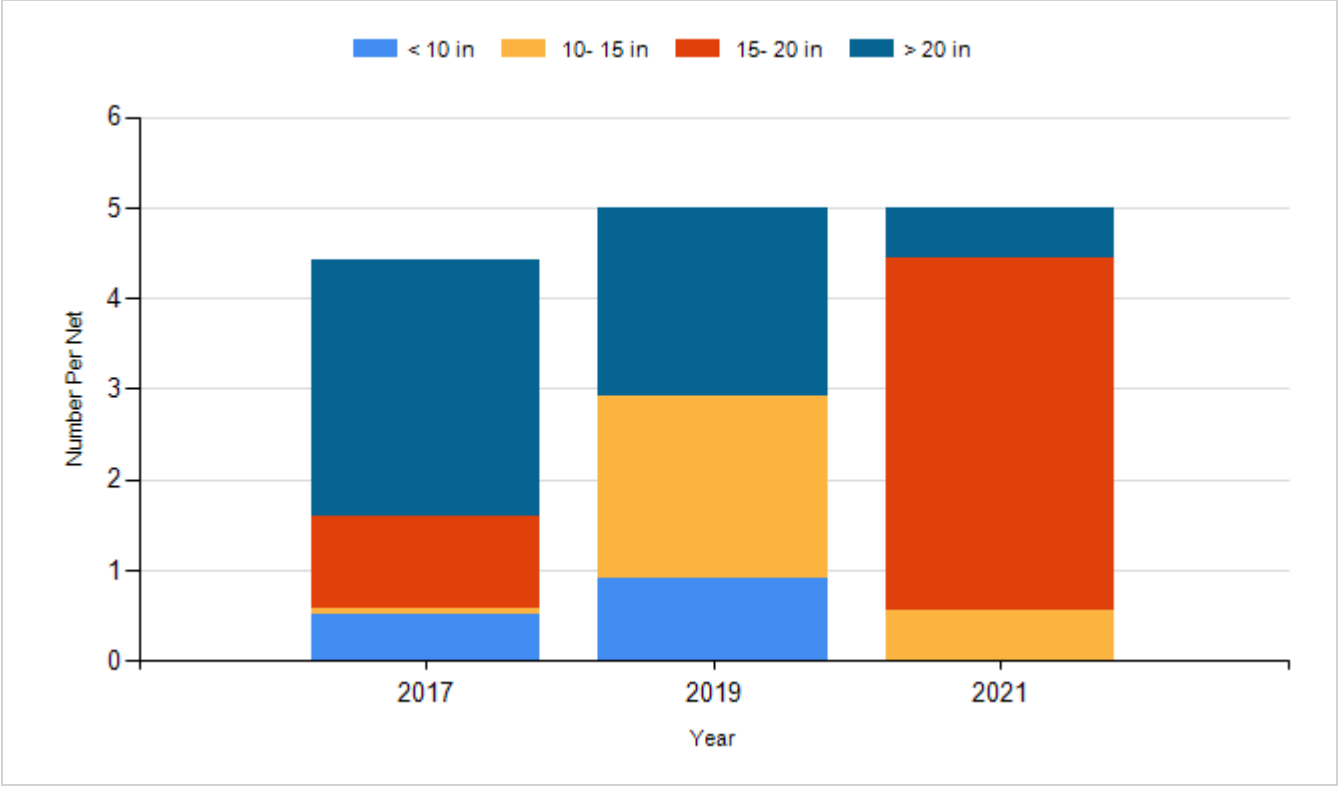


2021

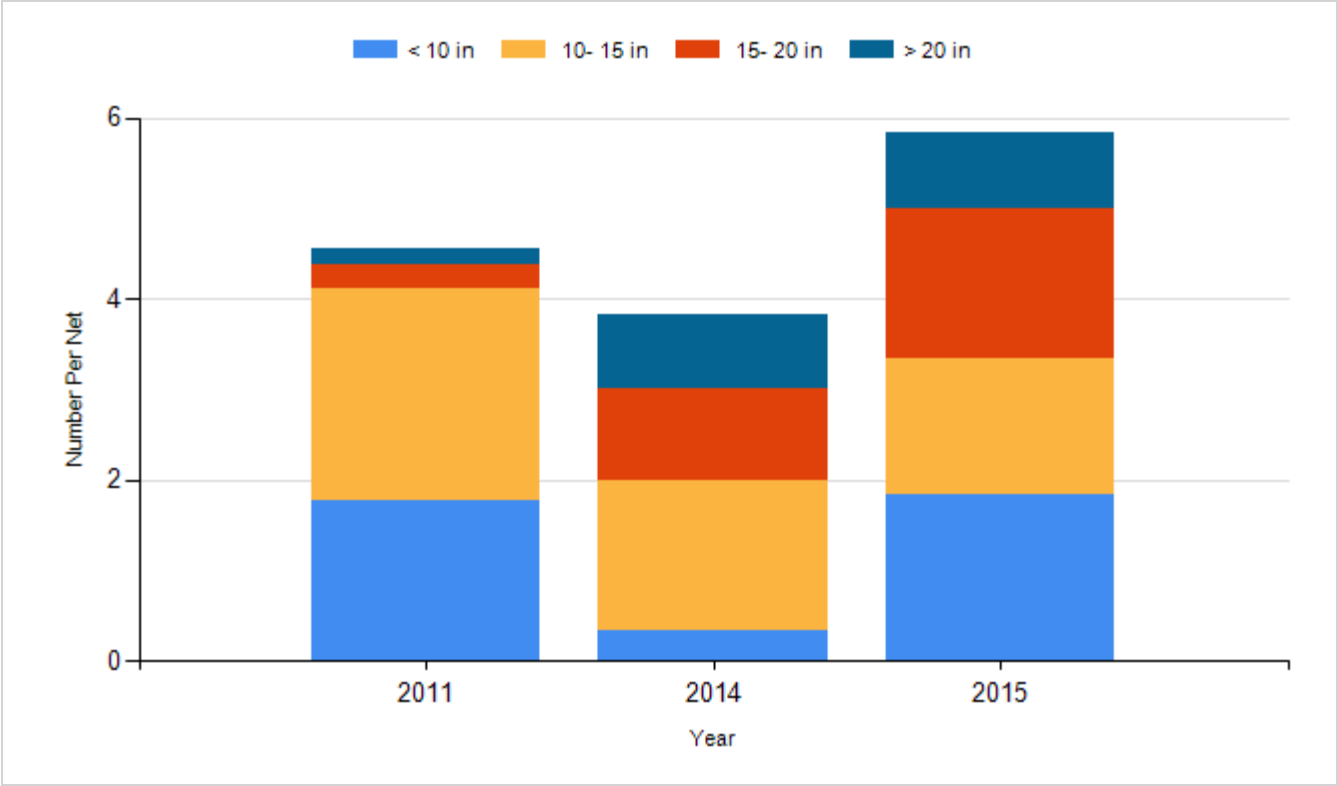
Historic Fish Sizes and Relative Abundance

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

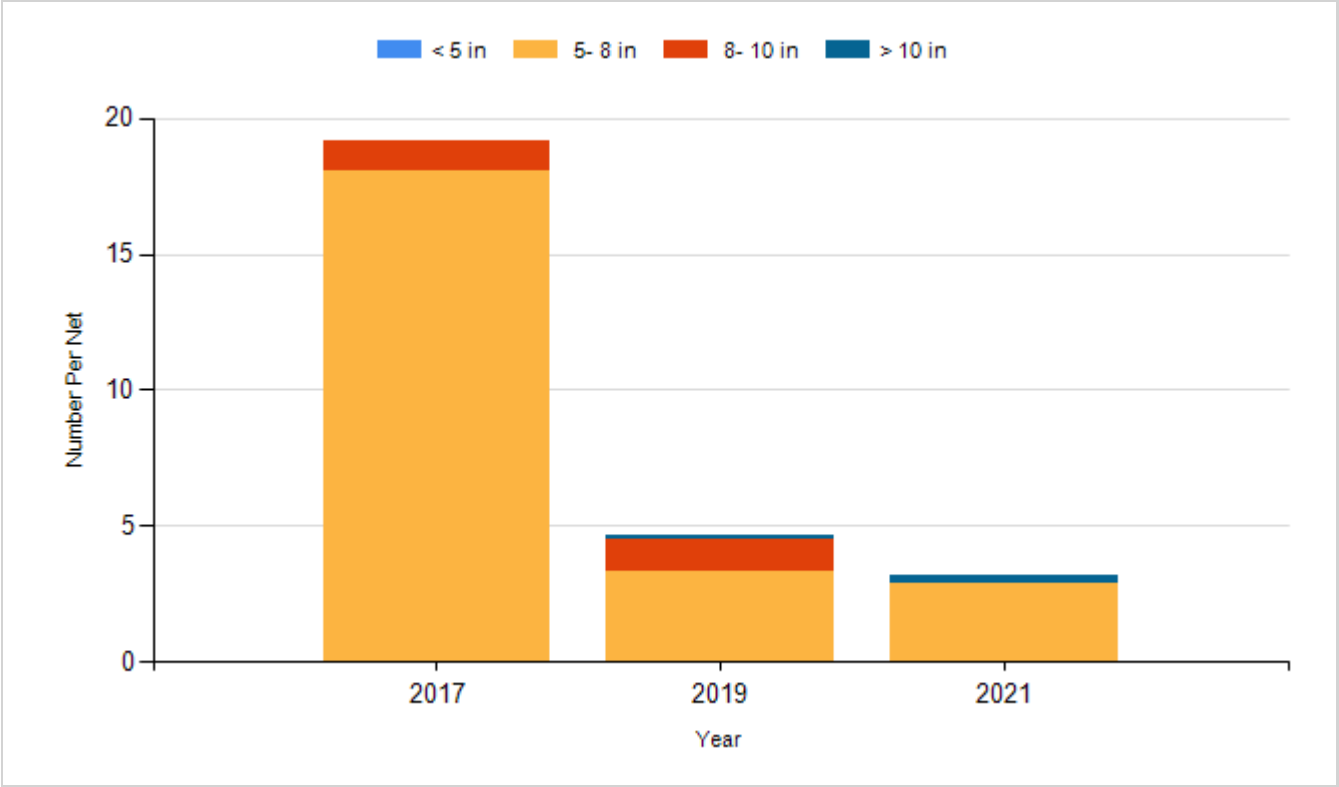
Species: Walleye
Gear: AFS std gill net



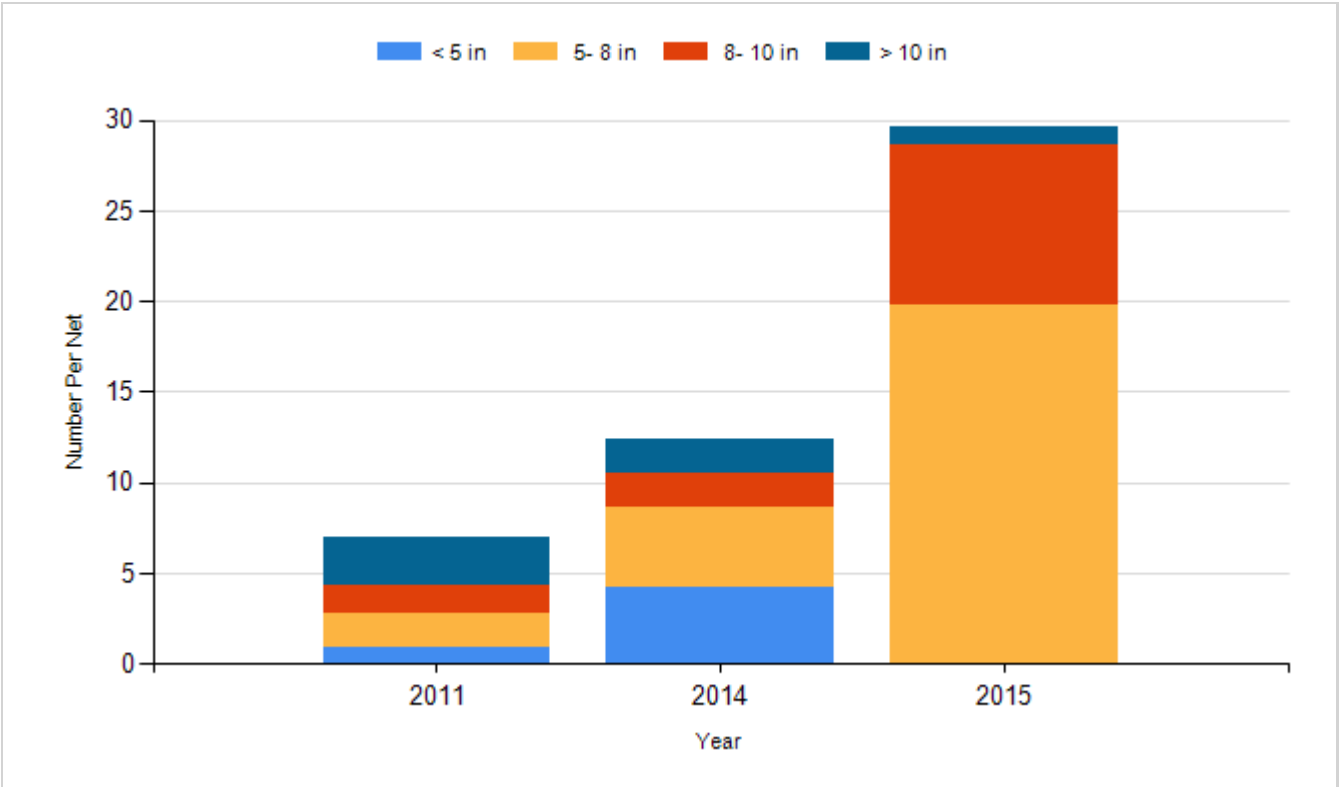
Species: Walleye
Gear: std exp gill net



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
2010	Walleye	Fry	600,000
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