

Cottonwood Lake Survey Summary

Cottonwood Lake, located 0.5 miles west of Lake City, is managed as a northern pike and yellow perch fishery, but other fish species (e.g., bluegill, walleye) also contribute to the fishery.

- **Bluegill.** Considerably fewer bluegills were sampled in 2021 (5.2 per frame net) than in 2017 (41.1 per frame net). Despite the decrease in relative abundance, bluegills were the second most abundant species in the 2021 frame net catch. Sampled bluegills ranged in length from 2.8 to 9.1 inches, of those that were at least 3.0 inches 18% were ≥ 6.0 inches and 7% were ≥ 8.0 inches. Five year classes (2015, 2016, 2017, 2019, and 2020) contributed to the catch. Individuals from the 2019 (age-2) cohort, which had a mean length at capture of 4.8 inches, were the most abundant accounting for 83% of bluegills in the sample.
- **Northern pike.** Northern pike numbers were similar to those observed in 2017. At 5.8 per gill net, relative abundance was considered high. Sampled northern pike ranged in length from 16.1 to 29.9 inches, 71% were ≥ 21.0 inches and 6% were ≥ 28.0 inches.
- **Walleye.** Although the lake is managed as a northern pike and yellow perch fishery, walleyes are occasionally stocked into Cottonwood Lake. Unfortunately, the number of walleyes sampled by gill nets in recent surveys (i.e., 2013 – 2021) has been low. In 2021, gill nets caught four individuals from 9.9 to 19.7 inches, each represented a different cohort produced between 2014 and 2020.
- **Yellow perch.** At 12.2 per net, yellow perch were the most abundant species in the 2021 gill net catch. Sampled yellow perch ranged in length from 4.7 to 10.6 inches, of those that were at least 5.0 inches 32% were ≥ 8.0 inches and 8% were ≥ 10.0 inches. Three year classes (2016, 2018, and 2019) comprised the entire sample. Individuals from the 2018 (age-3) cohort were the most abundant accounting for 54% of yellow perch in the sample, while fish from the 2019 (age-2) year class made up an additional 31%. Growth tends to be slow to moderate with mean length at capture values at age 3 from 5.6 to 7.5 inches in surveys conducted since 2013. In 2021, the mean length of age-3 fish was 7.5 inches.

For more detailed results see the computer-generated South Dakota Statewide Fisheries Survey for Cottonwood Lake (Marshall; below)

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Cottonwood, Marshall County
UMN-Lake-223-000
2021

Lake Information

Name:	Cottonwood	Maximum Depth:	12 Feet
County:	Marshall	Mean Depth:	9 Feet
Surface Area:	348 Acres		

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 02, 2021	3 net-nights
AFS std gill net	Jun 03, 2021	3 net-nights
frame net (std 3/4 in)	Jun 02, 2021	6 net-nights
frame net (std 3/4 in)	Jun 03, 2021	5 net-nights

Common Fish Species Present

Walleye

Northern Pike

Largemouth Bass

Bluegill

Yellow Perch

White Sucker

Black Bullhead

Common Carp

Green Sunfish

Black Crappie

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.
- **std 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.

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

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.

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

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

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.

$$Wr = \left(\frac{W}{W_s} \right) \times 100$$

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).

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(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).

Gear	Species	Sample Size (n)	Abundance		Stock Density Indices			Condition		
			CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Common Carp	4	0.7	0.7	75		0		130	7
	Northern Pike	35	5.8	0.9	71	12	6		91	2
	Walleye	4	0.7	0.5	25		0		95	1
	White Sucker	17	2.8	0.9	100		94		119	4
	Yellow Perch	74	12.2	2.4	32	8	8	5	98	1
frame net (std 3/4 in)	Black Bullhead	27	1.9	1.1	24	15	10		99	4
	Black Crappie	1	0.1	0.1	100		0		86	
	Bluegill	58	5.2	1.4	18	8	7		122	2
	Common Carp	1	0.1	0.1	0		0		146	
	Green Sunfish	2	0.2	0.2	0		0		118	11
	Northern Pike	8	0.7	0.4	50		13		88	4
	Yellow Perch	68	6.0	3.0	15	7	0		92	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.

* AFS standard frame nets used 2017

Gear	Species	CPUE										Avg
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
AFS std gill net	Black Bullhead						1.2				0.0	0.60
	Bluegill						2.2				0.0	1.10
	Common Carp						0.0				0.7	0.35
	Largemouth Bass						0.2				0.0	0.10
	Northern Pike						5.5				5.8	5.65
	Walleye						1.5				0.7	1.10
	White Sucker						1.5				2.8	2.15
	Yellow Perch						2.0				12.2	7.10
frame net (std 3/4 in)*	Black Bullhead		13.3				10.9				1.9	8.70
	Black Crappie		0.0				0.0				0.1	0.00
	Bluegill		3.0				41.1				5.2	16.43
	Common Carp		0.0				0.0				0.1	0.00
	Green Sunfish		0.0				1.3				0.2	0.50
	Northern Pike		1.2				0.4				0.7	0.77
	Pumpkinseed		0.0				0.1				0.0	0.00
	White Sucker		0.1				0.0				0.0	0.00
Yellow Perch		8.0				1.4				6.0	5.13	
std exp gill net	Northern Pike		5.3									5.30
	Walleye		2.7									2.70
	White Sucker		8.3									8.30
	Yellow Perch		61.0									61.00

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.

* AFS standard frame nets used 2017

Gear	Species	Index	Year									
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std gill net	Northern Pike	PSD						55				71
		PSD-P						0				6
		Wr						89				91
	Walleye	PSD						100				25
		PSD-P						78				0
		Wr						95				95
	Yellow Perch	PSD						33				32
		PSD-P						25				8
		Wr						90				98
frame net (std 3/4 in)*	Bluegill	PSD		42				31				18
		PSD-P		14				4				7
		Wr		129				110				122
std exp gill net	Northern Pike	PSD		56								
		PSD-P		13								
		Wr		87								
	Walleye	PSD		88								
		PSD-P		38								
		Wr		93								
	Yellow Perch	PSD		15								
		PSD-P		0								
		Wr		98								

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+
2021	58	90 (4)	122 (48)		197 (3)	224 (2)	215 (1)				

Species: Walleye

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2021	4	251 (1)	372 (1)	350 (1)				500 (1)			
2017	9					505 (1)	510 (2)			609 (5)	621 (1)
2013	8		329 (1)		484 (1)	506 (4)	570 (1)				592 (1)

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	74		141 (23)	190 (40)		239 (11)					
2017	15			143 (9)	165 (3)			287 (3)			
2013	245	96 (60)	147 (22)	185 (147)	195 (16)						

Fish Condition

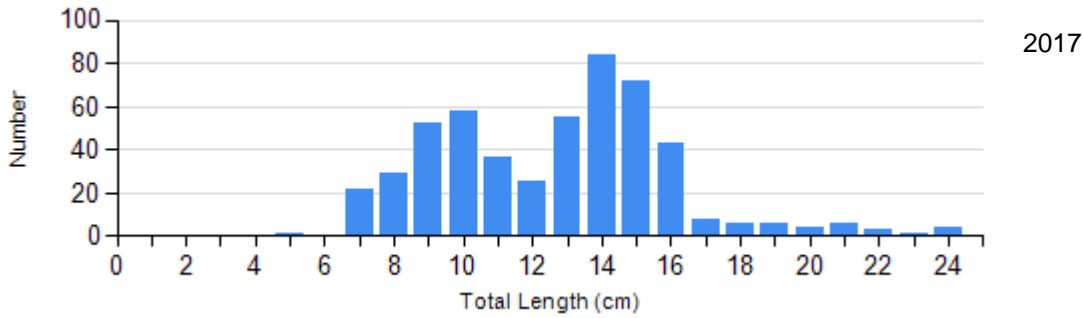
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Bluegill Frame Net	2017	340	107 (0.9)	135	114 (0.9)	18	121 (2.0)	0	
	2021	47	121 (1.1)	6	119 (4.9)	4	135 (5.7)	0	
Northern Pike Gill Net	2017	15	90 (1.9)	18	88 (1.6)	0		0	
	2021	10	88 (2.3)	23	93 (1.6)	2	87 (1.1)	0	
Walleye Gill Net	2017	0		2	98 (0.4)	5	94 (2.9)	2	95 (4.7)
	2021	3	95 (1.4)	1	95	0		0	
Yellow Perch Gill Net	2017	8	91 (1.8)	1	74	3	91 (3.5)	0	
	2021	50	102 (1.0)	17	91 (1.3)	6	91 (3.1)	0	

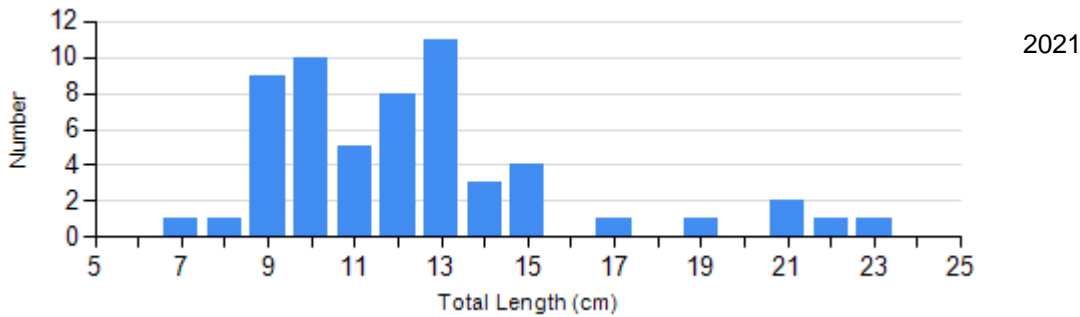
Length Frequency Distribution

Length frequency histogram of species sampled by year.

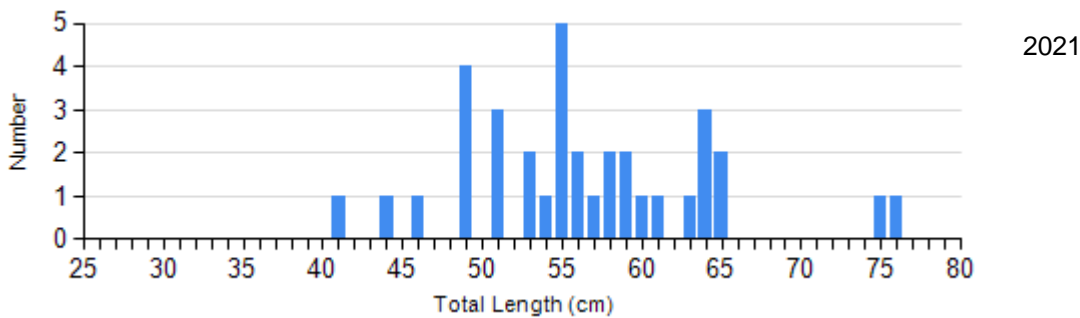
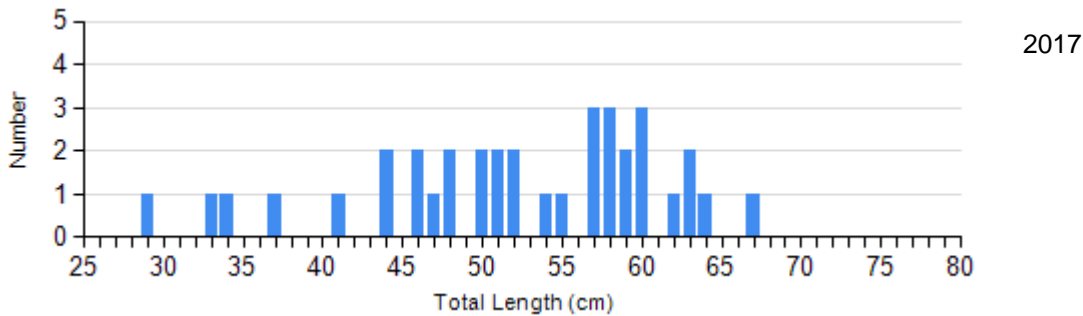
Species: Bluegill
Gear: AFS std frame net



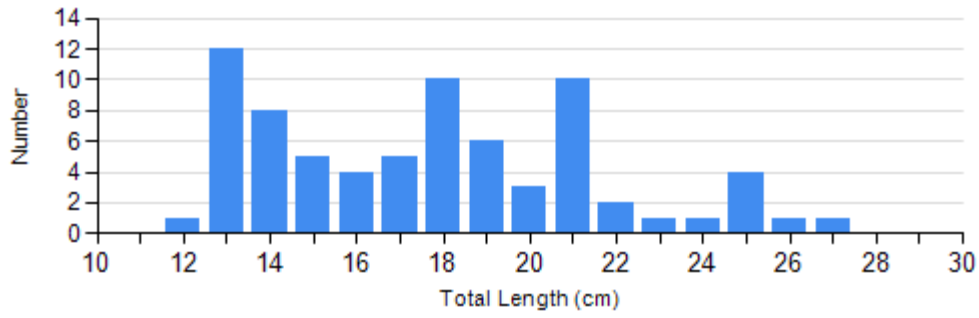
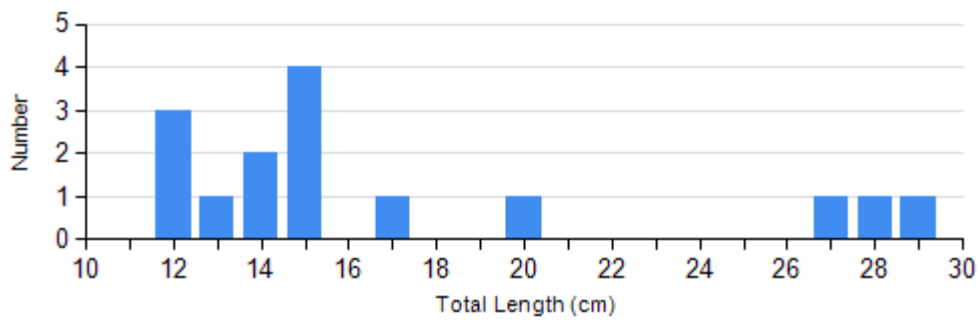
Species: Bluegill
Gear: frame net (std 3/4 in)



Species: Northern Pike
Gear: AFS std gill net



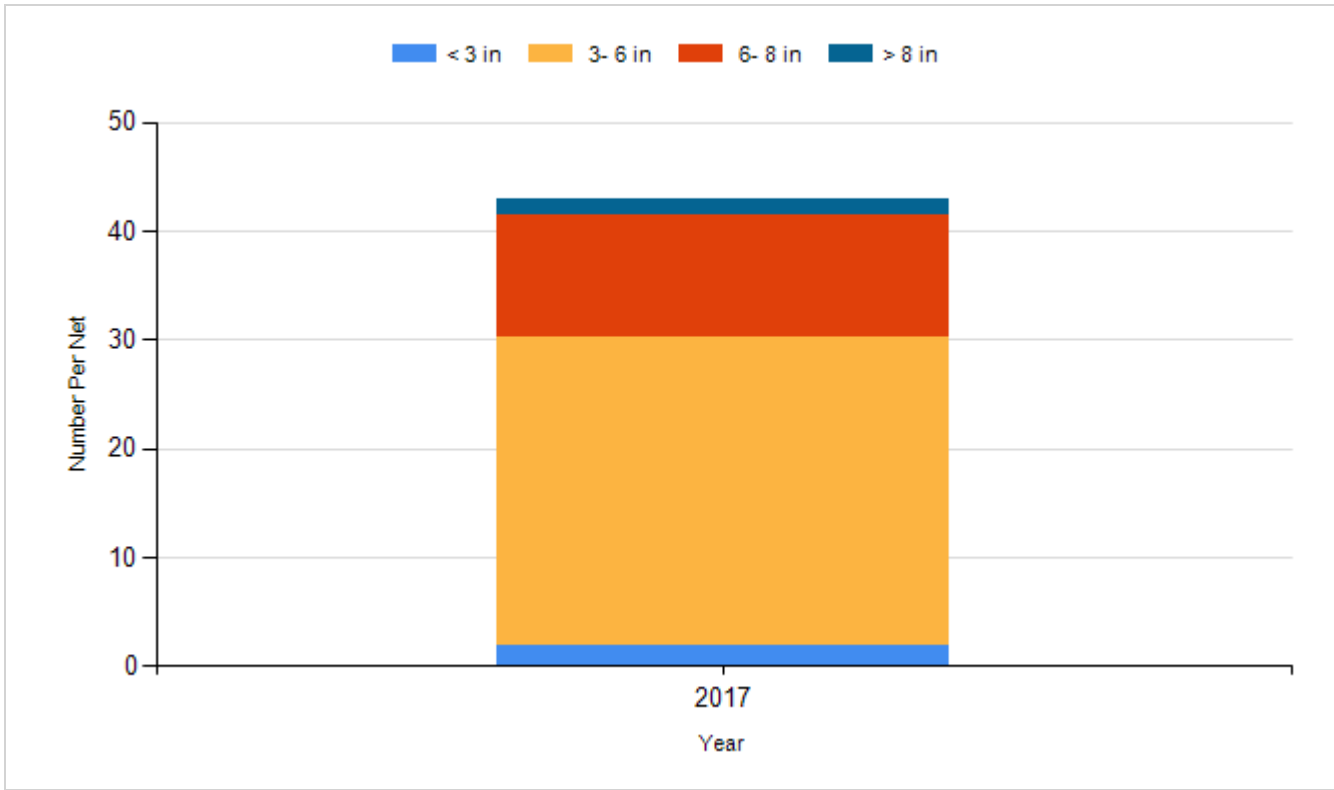
Species: Yellow Perch
Gear: AFS std gill net



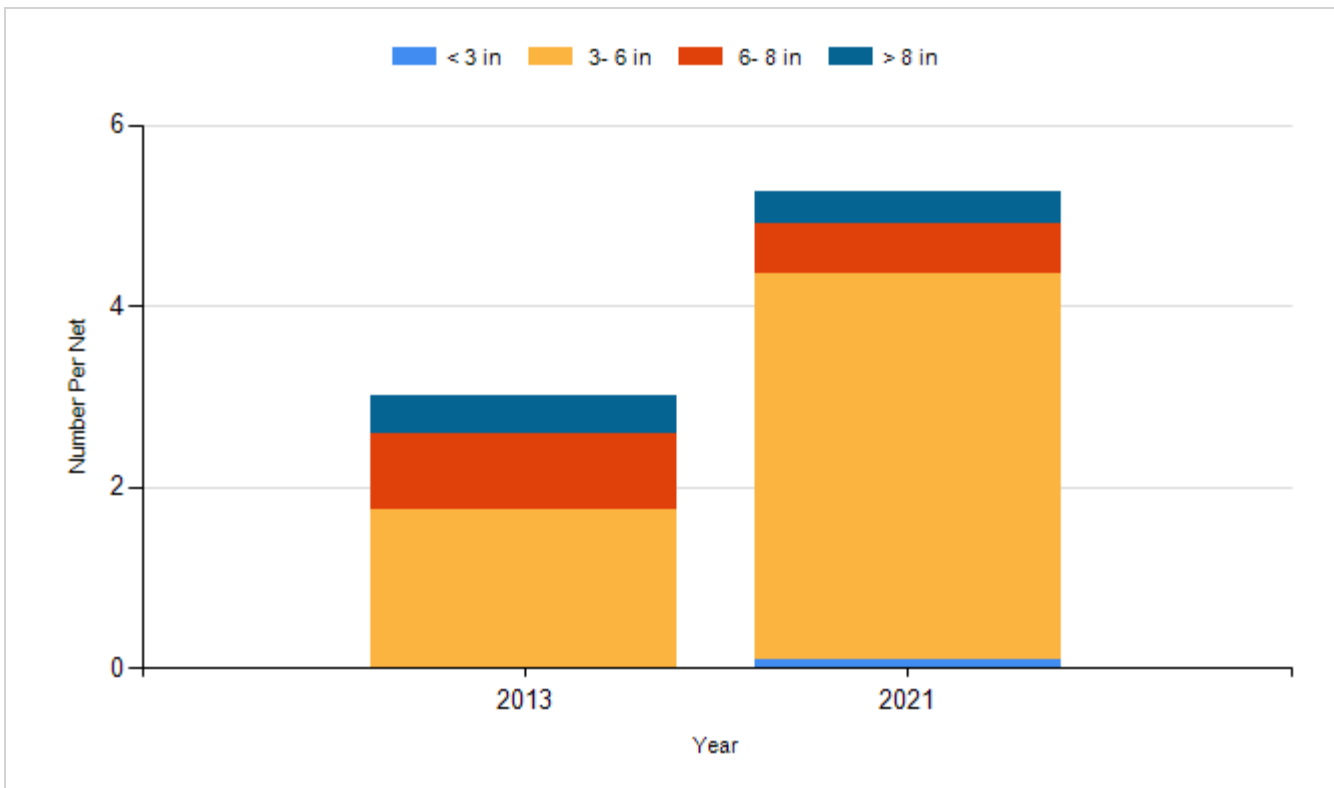
Historic Fish Sizes and Relative Abundance

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

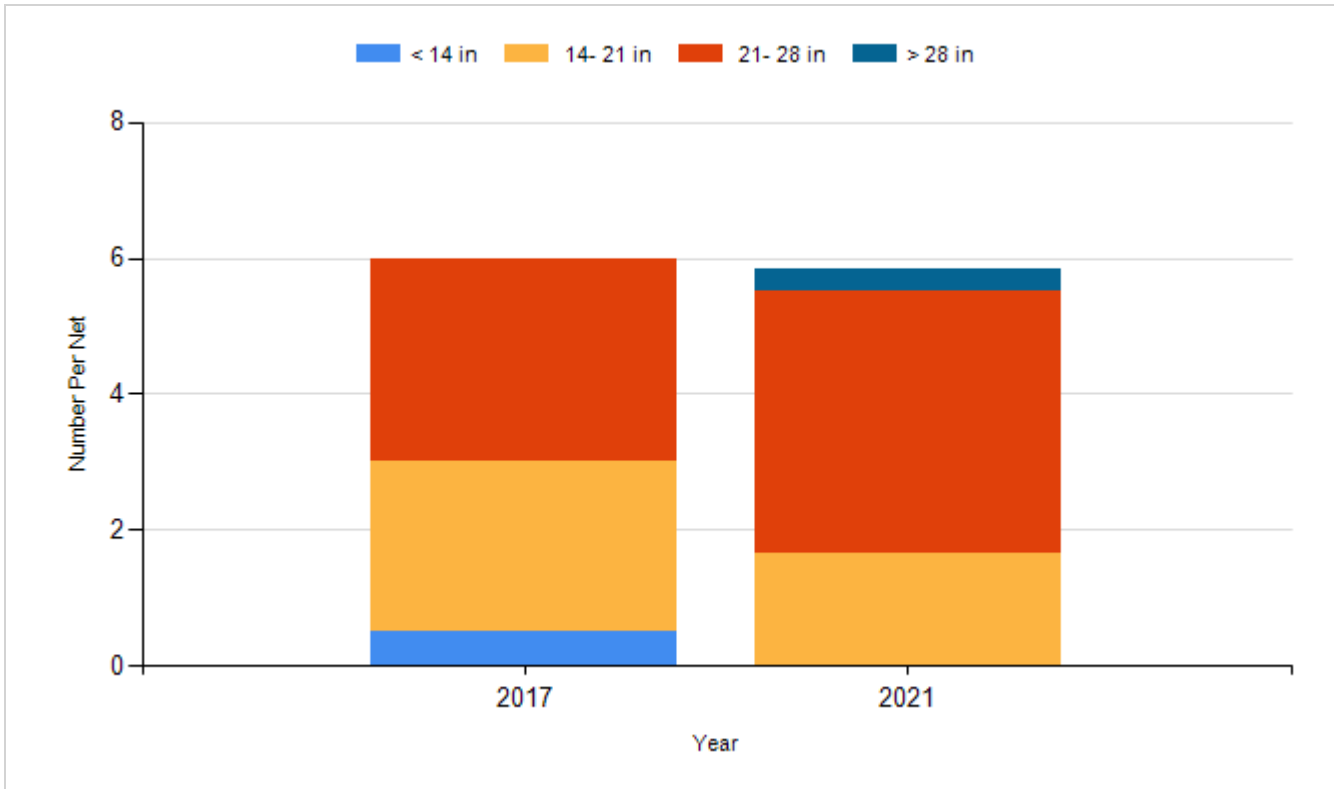
Species: Bluegill
Gear: AFS std frame net



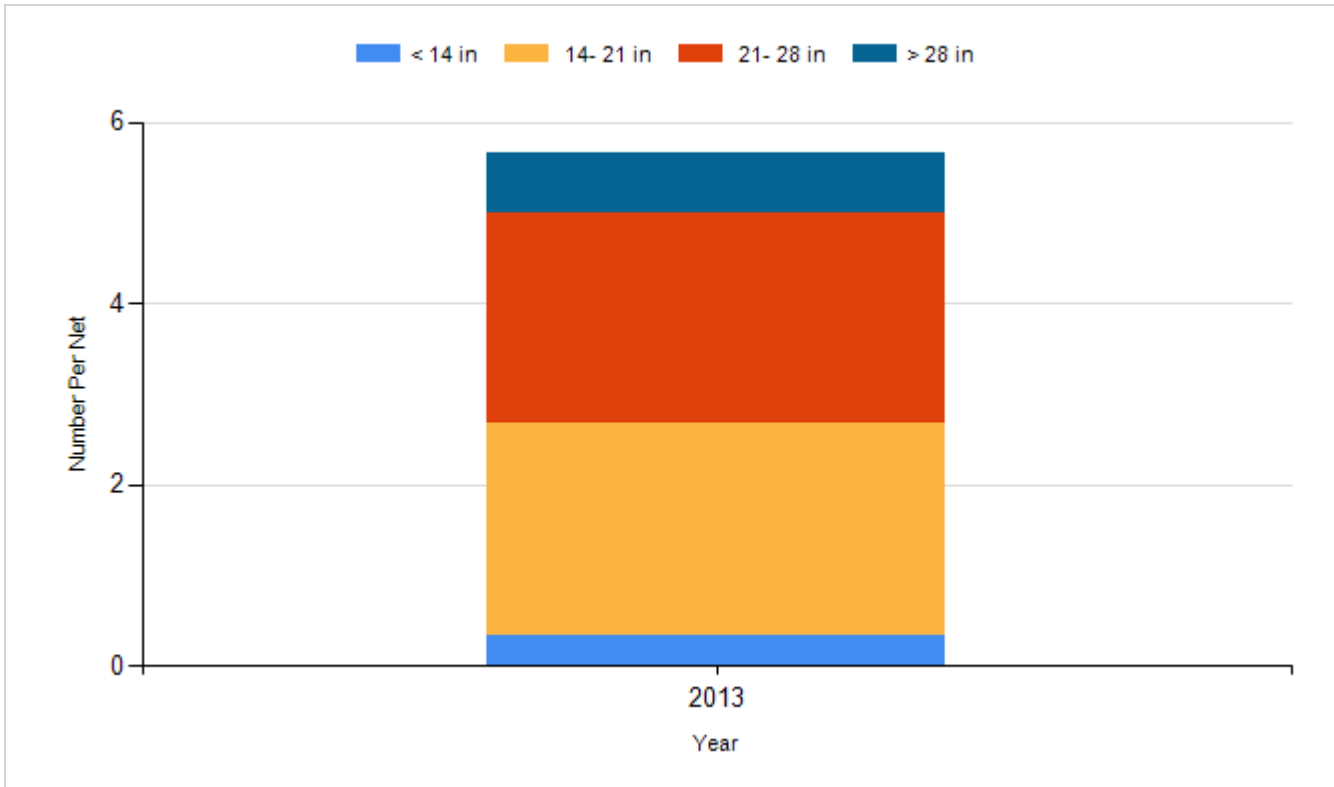
Species: Bluegill
Gear: frame net (std 3/4 in)



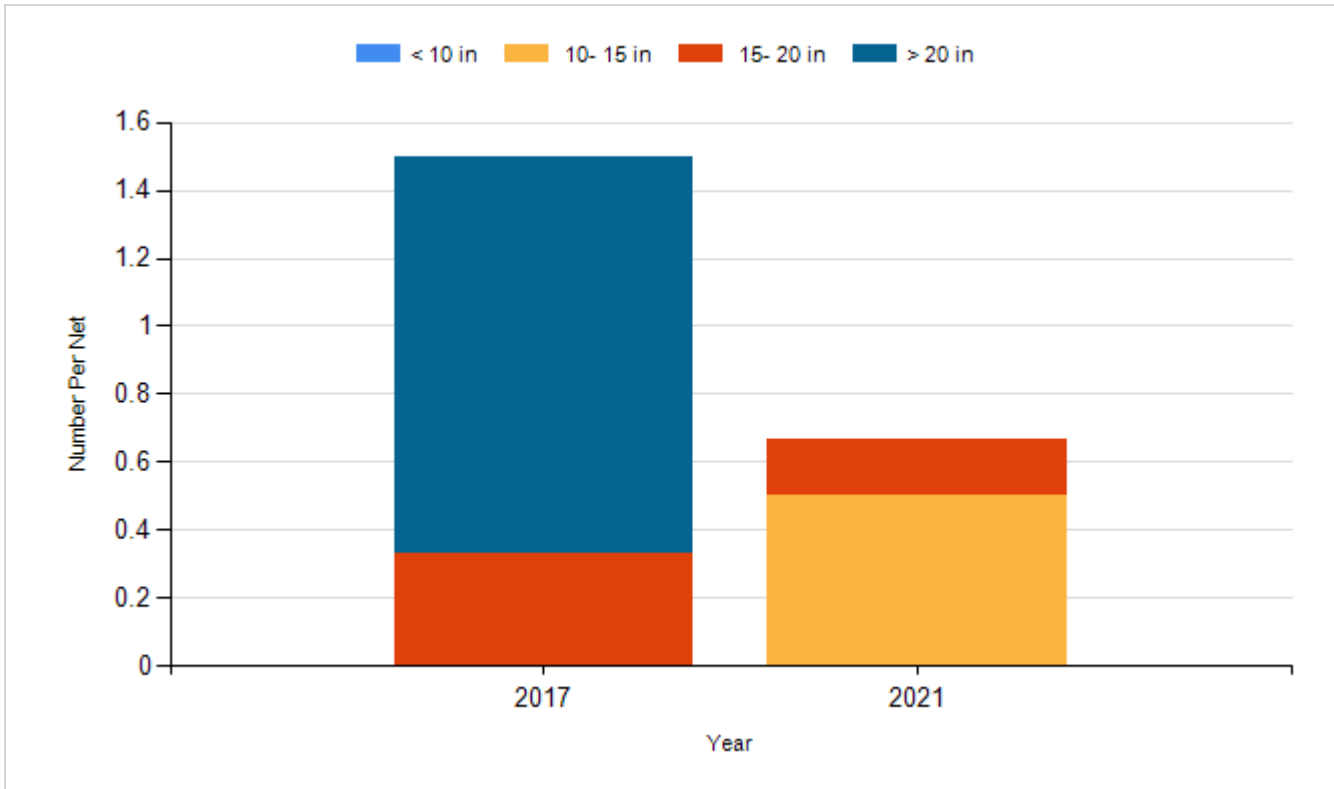
Species: Northern Pike
Gear: AFS std gill net



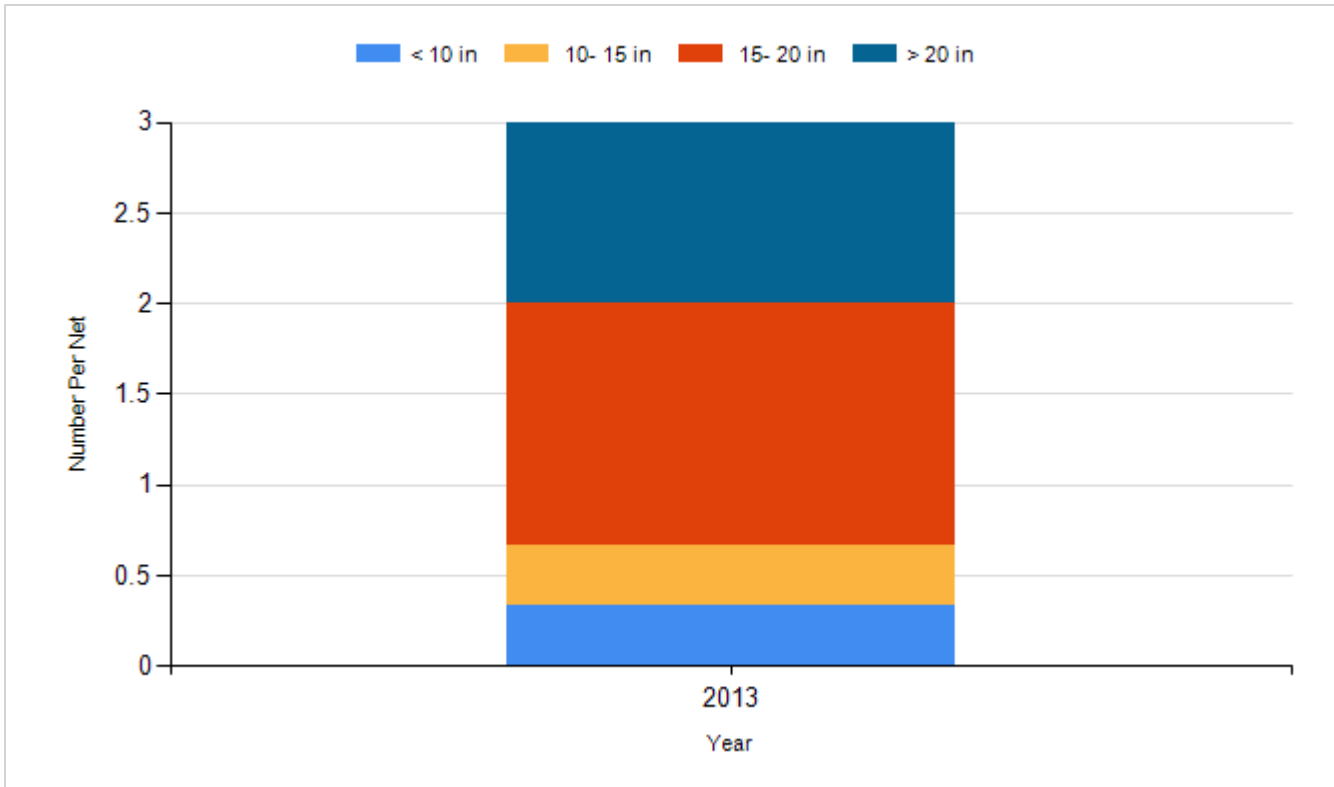
Species: Northern Pike
Gear: std exp gill net



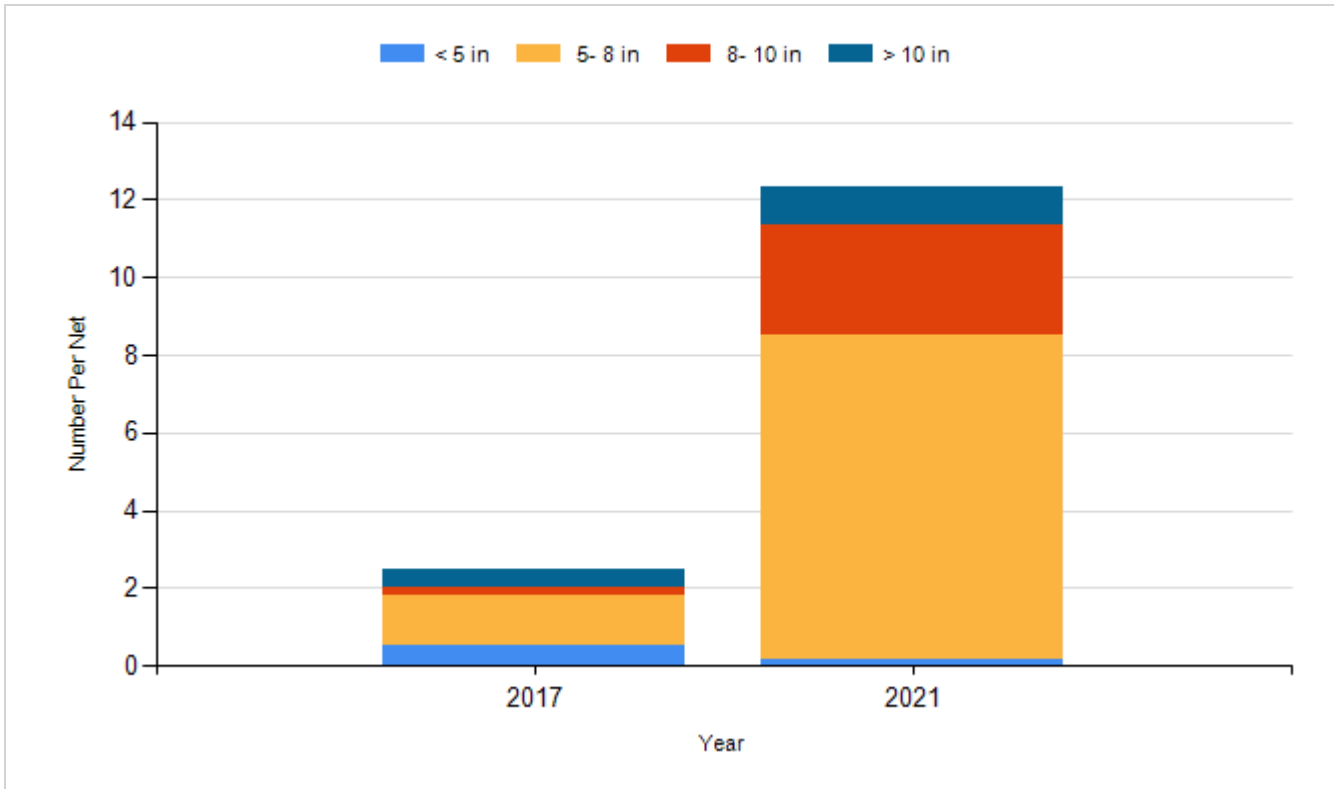
Species: Walleye
Gear: AFS std gill net



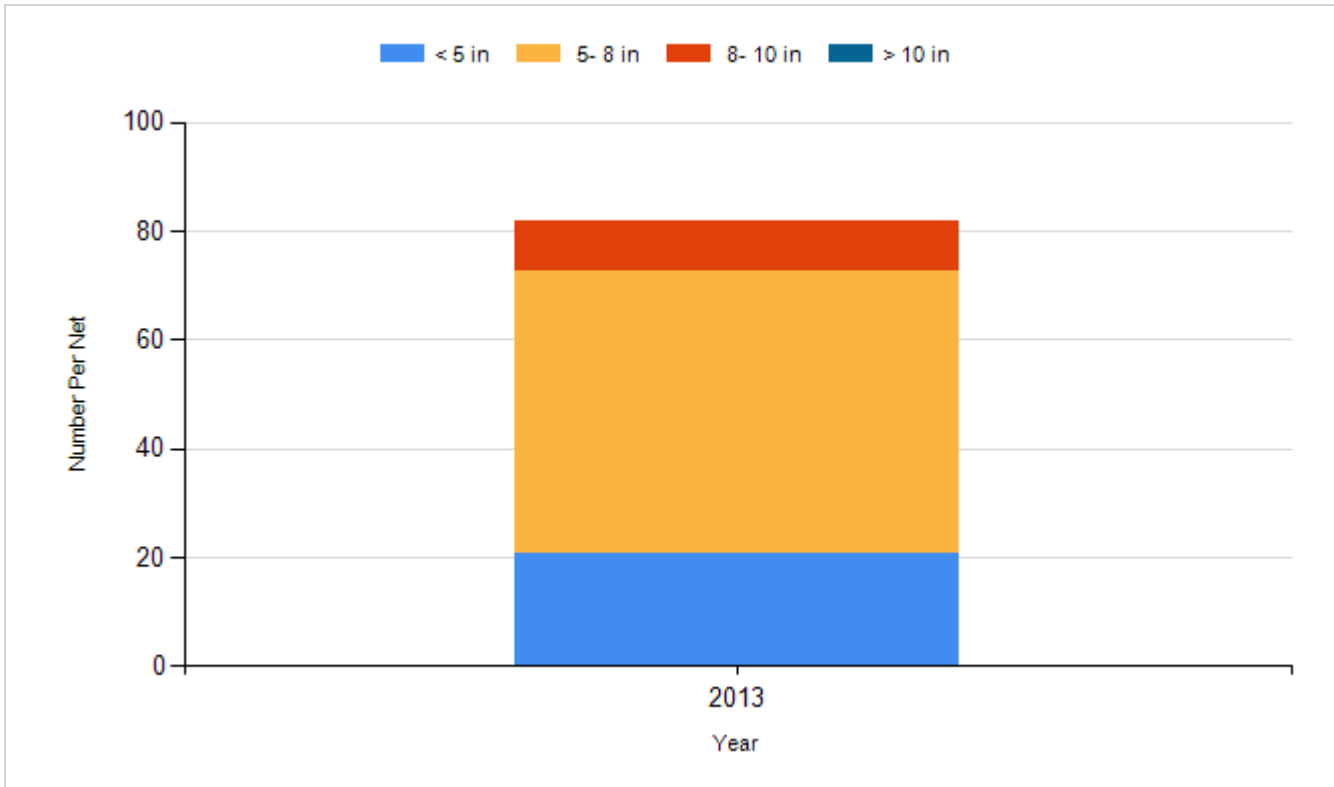
Species: Walleye
Gear: std exp gill net



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	350,000
2012	Walleye	Fry	175,000
2014	Walleye	Fry	200,000
2018	Walleye	Fry	175,000
2021	Walleye	Fry	200,000