

Fish Lake Survey Summary

Fish Lake, located 4.0 miles east and 3.0 miles north of Astoria, is managed as a northern pike, walleye, and yellow perch fishery, but other fish species (e.g., channel catfish, white bass) are present and may contribute to the fishery.

- **Northern pike.** The relative abundance of northern pike was low to moderate (1.1 per gill net) in 2021. Thirteen northern pike from 18.5 to 32.7 inches were netted.
- **Walleye.** Although fewer walleyes were sampled in 2021 than in 2017, relative abundance of fish ≥ 10.0 inches remained moderate to high (8.3 per gill net). Sampled walleyes ranged in length from 6.7 to 26.0 inches, of those that were at least 10.0 inches, 97% were ≥ 15.0 inches and 34% were ≥ 20.0 inches. Five year classes (2015 and 2017 – 2020) contributed to the catch. Individuals from cohorts produced in 2015, 2017, and 2019, all of which coincided with stocking events, were the most abundant. Walleyes from the 2017 (age 4) year class accounted for 57% of fish in the sample, while those from the 2015 (age 6) and 2019 (age 2) cohorts made up an additional 33%. The 2021 sample suggests good walleye growth with mean length at capture for age-3 and age-4 fish of 17.6 and 19.8 inches.
- **Yellow perch.** Yellow perch numbers were lower in 2021 than in 2017. At 17.1 per gill net, relative abundance was considered moderate to high for Fish Lake. Those sampled ranged in length from 5.5 to 12.6 inches, 81% were 8.0 inches and 46% were ≥ 10.0 inches. Seven consecutive year classes (2014 – 2020) contributed to the gill net catch. The 2017 (age 4) and 2019 (age 2) cohorts were represented by a similar number of individuals and accounted for more than 70% of yellow perch in the sample. The 2021 sample suggests moderate to fast growth with a mean length at capture at age 3 of 10.3 inches.

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

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Fish, Deuel County

LQP-Lake-14-000

2021

Lake Information

Name:	Fish	Maximum Depth:	8 Feet
County:	Deuel	Mean Depth:	4 Feet
		OHWM Elevation:	1,751
Surface Area:	754 Acres	Outlet Elevation:	1,751

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Sep 14, 2021	6 net-nights
AFS std gill net	Sep 15, 2021	6 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Northern Pike

Freshwater Drum

Black Bullhead

Bigmouth Buffalo

Common Carp

Channel Catfish

White Bass

White Sucker

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	Bigmouth Buffalo	160	6.4	2.1	3		0		109	1
	Black Bullhead	126	10.4	1.6	46	6	34	6	84	1
	Channel Catfish	26	2.2	1.1	100		15		98	3
	Common Carp	30	2.3	1.0	4		4		106	2
	Freshwater Drum	193	15.6	3.3	0		0		90	1
	Northern Pike	13	1.1	0.3	77		23		90	4
	River Carpsucker	2	0.2	0.2	100		100		98	6
	Walleye	101	8.3	1.4	97		34	7	94	1
	White Bass	17	1.4	0.5	100		6		92	2
	White Sucker	13	1.1	0.4	92		92		106	3
	Yellow Perch	205	17.1	3.5	81	4	46	5	85	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

Gear	Species	CPUE										Avg
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
AFS std gill net	Bigmouth Buffalo						5.3				6.4	5.85
	Black Bullhead						9.0				10.4	9.70
	Channel Catfish						0.0				2.2	1.10
	Common Carp						0.6				2.3	1.45
	Freshwater Drum						0.0				15.6	7.80
	Northern Pike						2.7				1.1	1.90
	River Carpsucker						0.0				0.2	0.10
	Walleye						18.0				8.3	13.15
	White Bass						0.2				1.4	0.80
	White Sucker						1.4				1.1	1.25
	Yellow Perch						25.5				17.1	21.30
std exp gill net	Black Bullhead		70.7									70.70
	Channel Catfish		0.5									0.50
	Common Carp		0.5									0.50
	Common Shiner*		0.3									0.30
	Freshwater Drum		0.0									0.00
	Northern Pike		2.0									2.00
	Walleye		10.3									10.30
	White Sucker		1.8									1.80
Yellow Perch		3.7									3.70	

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.

Gear	Species	Index	Year										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
AFS std gill net	Northern Pike	PSD							72				77
		PSD-P							13				23
		Wr							85				90
	Walleye	PSD							100				97
		PSD-P							0				34
		Wr							105				94
	Yellow Perch	PSD							41				81
		PSD-P							28				46
		Wr							92				85
std exp gill net	Northern Pike	PSD		83									
		PSD-P		8									
		Wr		85									
	Walleye	PSD		87									
		PSD-P		6									
		Wr		92									
	Yellow Perch	PSD		23									
		PSD-P		5									
		Wr		91									

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	99	361 (3)	422 (23)	446 (6)	504 (58)		626 (10)				
2017	216		458 (216)								
2013	62	273 (8)		476 (54)							

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	205	159 (31)	222 (73)	262 (14)	267 (72)	287 (15)	311 (1)	326 (1)			
2017	306	178 (208)	263 (91)	300 (3)	326 (4)						
2013	24	148 (11)	188 (10)	257 (3)							

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).

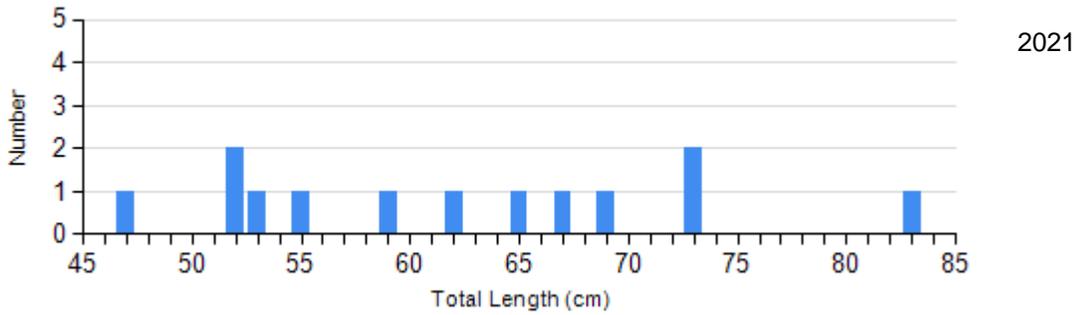
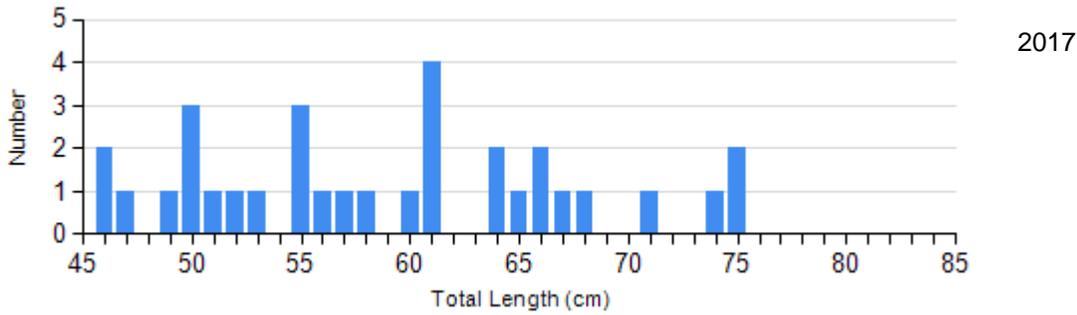
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Northern Pike Gill Net	2017	9	93 (2.5)	19	83 (1.7)	4	81 (3.2)	0	
	2021	3	88 (10.1)	7	93 (3.8)	3	86 (3.6)	0	
Walleye Gill Net	2017	0		216	105 (0.4)	0		0	
	2021	3	85 (0.5)	62	92 (0.8)	28	98 (1.1)	6	96 (2.7)
Yellow Perch Gill Net	2017	180	91 (0.4)	41	91 (0.7)	78	96 (0.8)	7	92 (2.4)
	2021	39	90 (1.2)	72	86 (0.6)	86	81 (0.5)	8	78 (2.3)

Length Frequency Distribution

Length frequency histogram of species sampled by year.

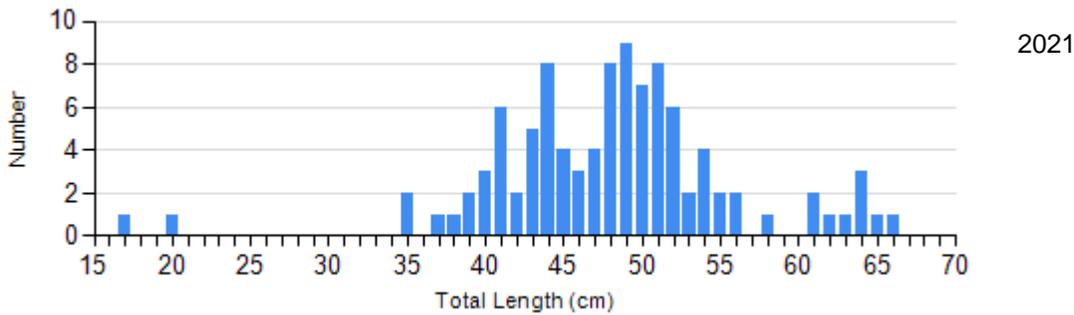
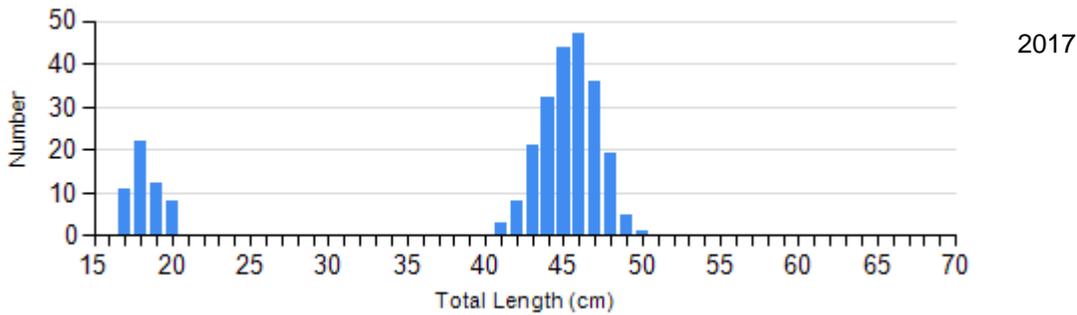
Species: Northern Pike

Gear: AFS std gill net

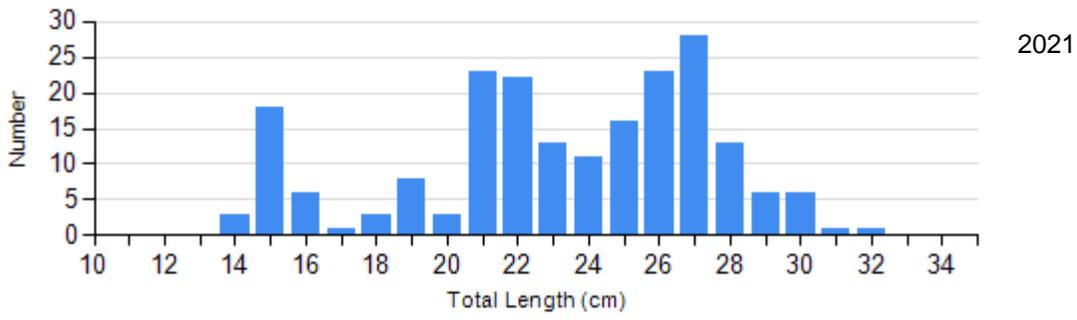
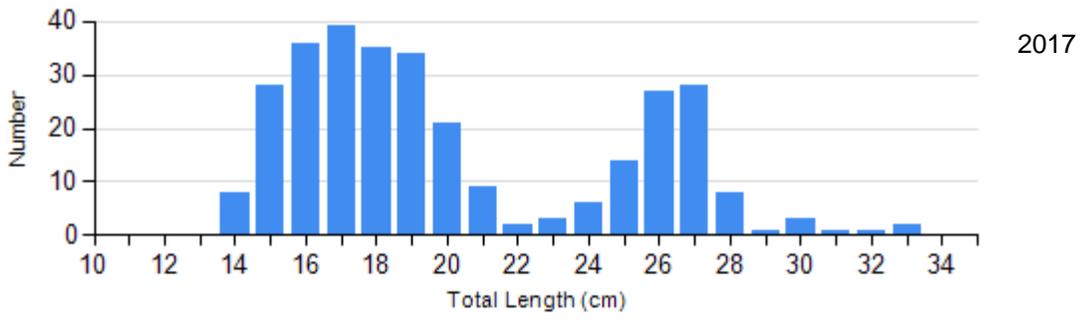


Species: Walleye

Gear: AFS std gill net



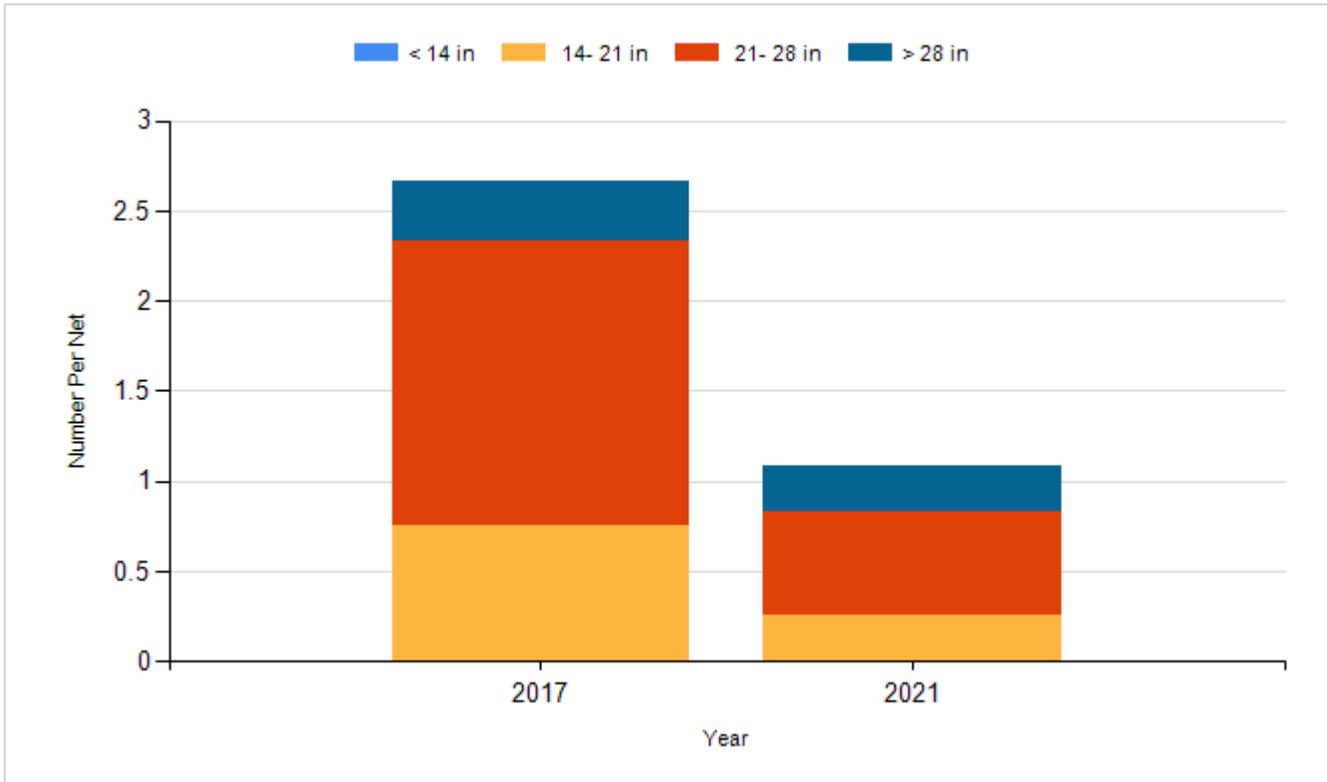
Species: Yellow Perch
Gear: AFS std gill net



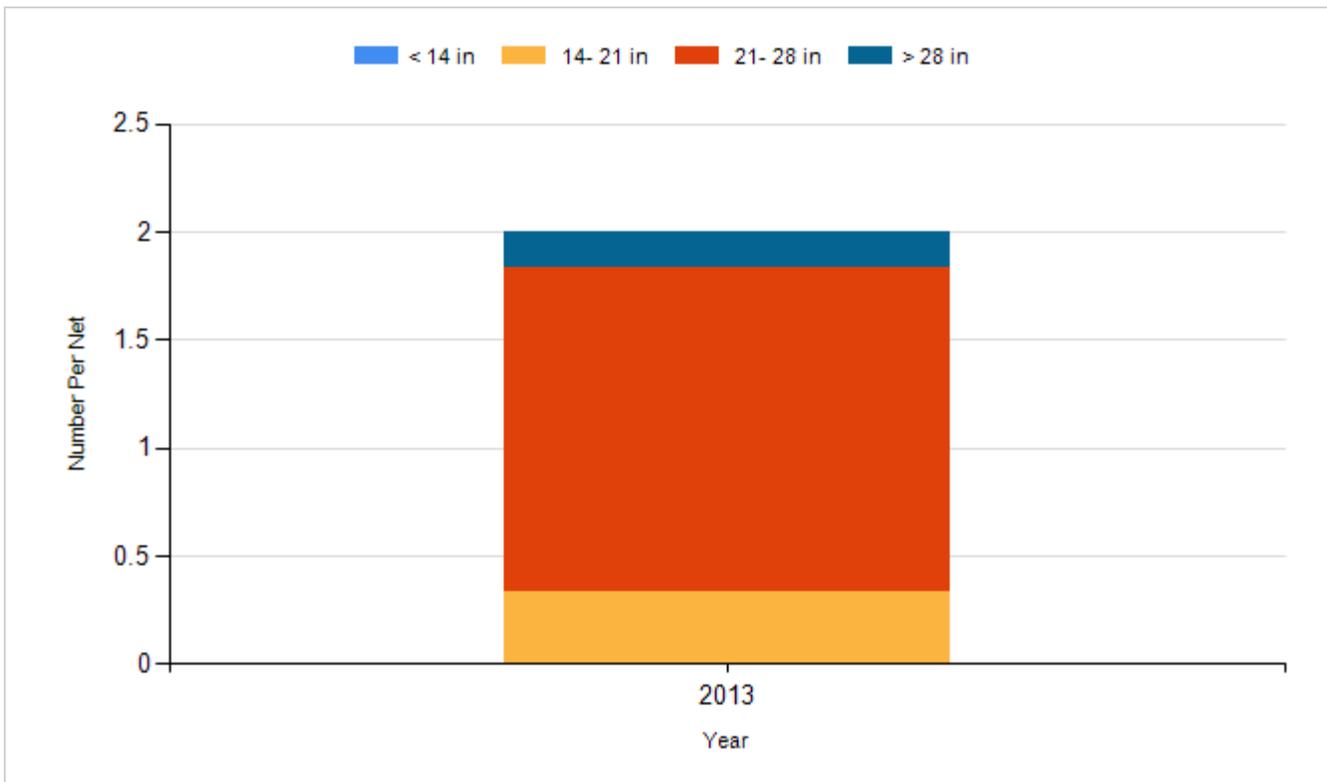
Historic Fish Sizes and Relative Abundance

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

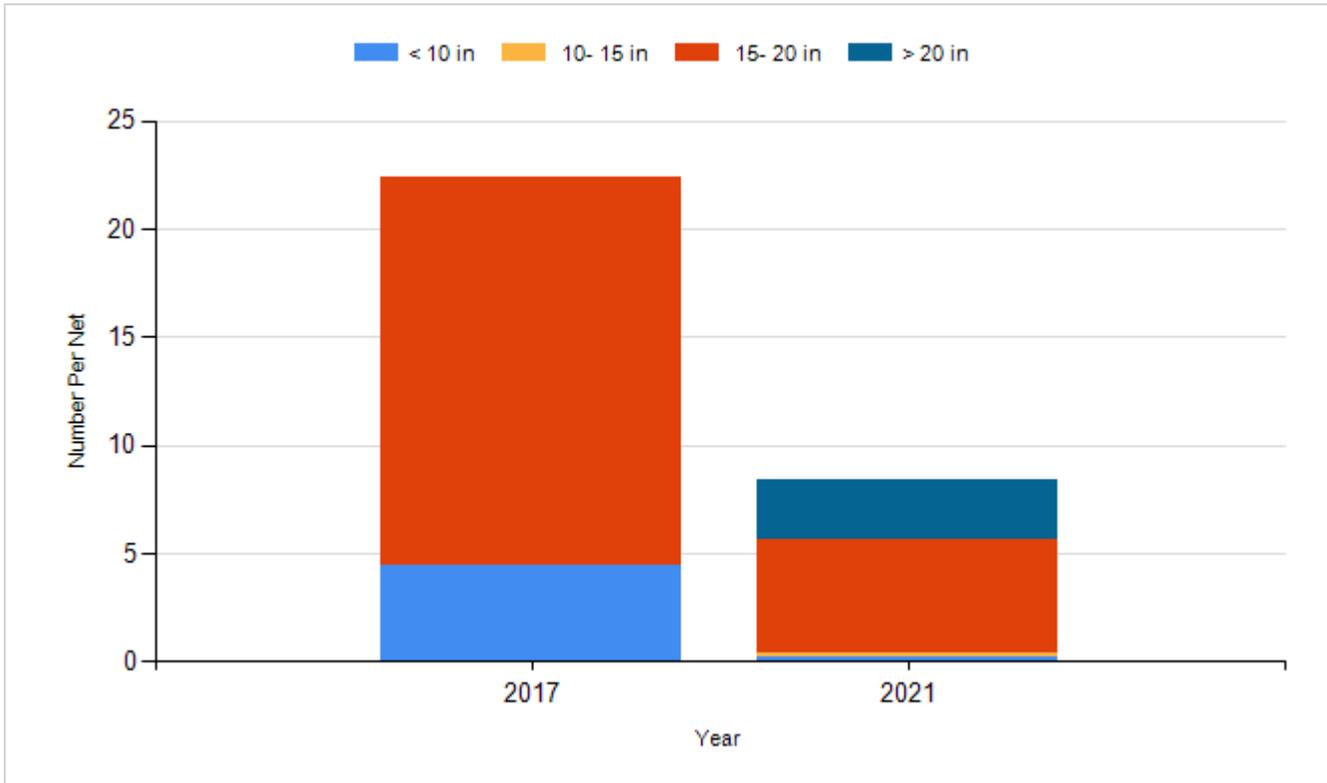
Species: Northern Pike
Gear: AFS std gill net



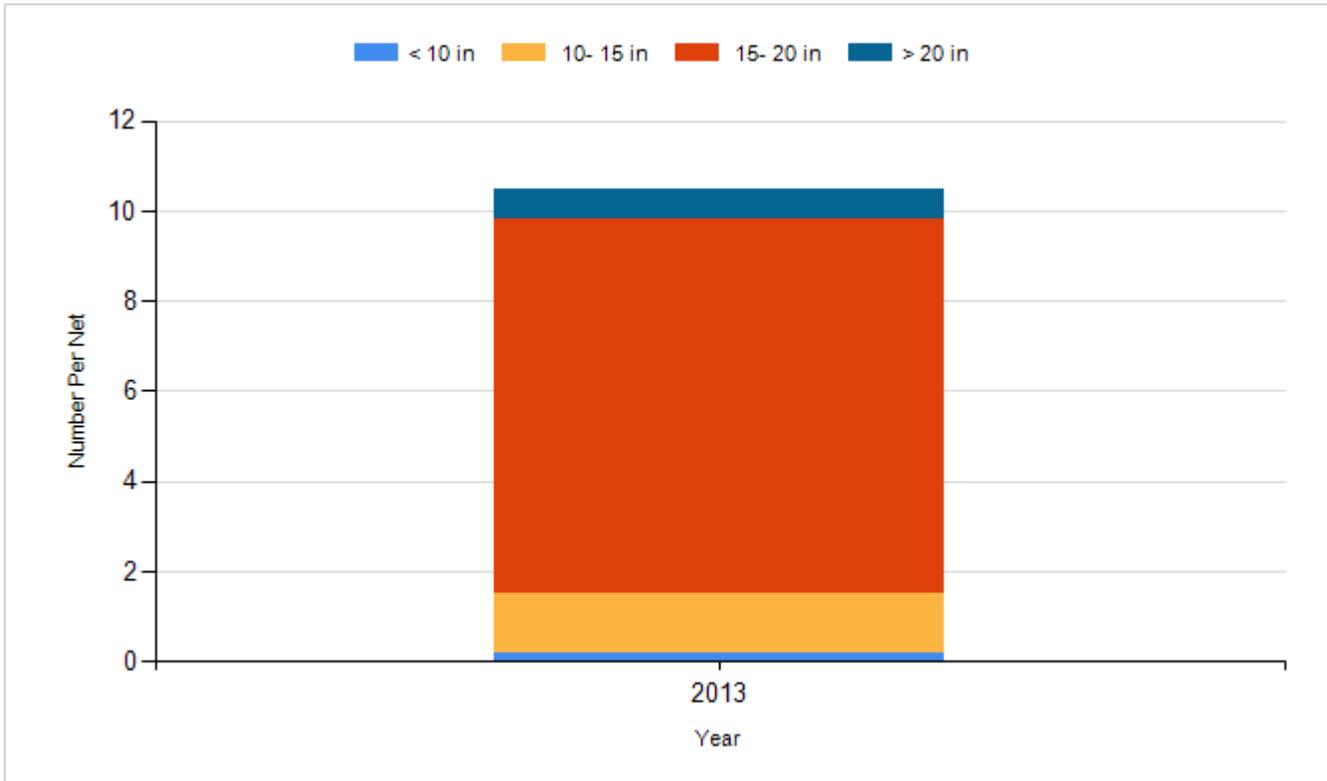
Species: Northern Pike
Gear: std exp gill net



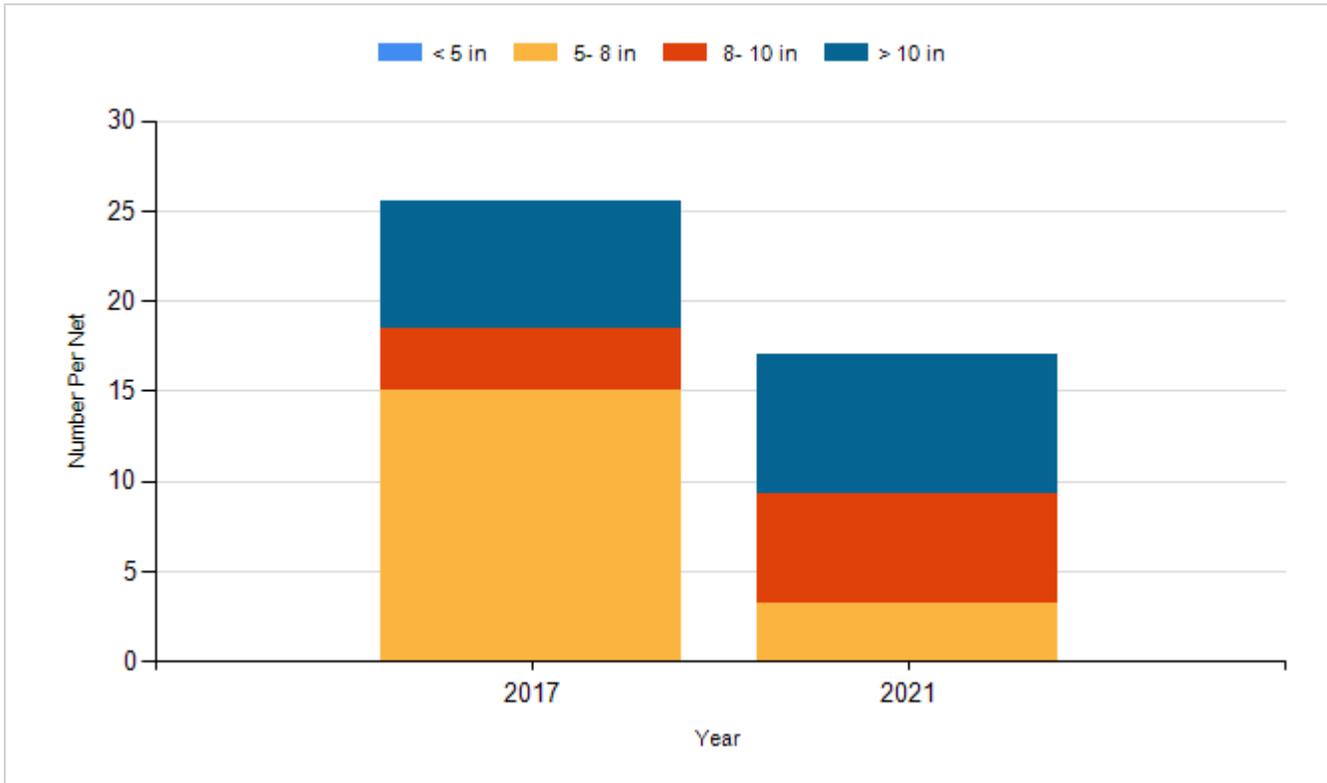
Species: Walleye
Gear: AFS std gill net



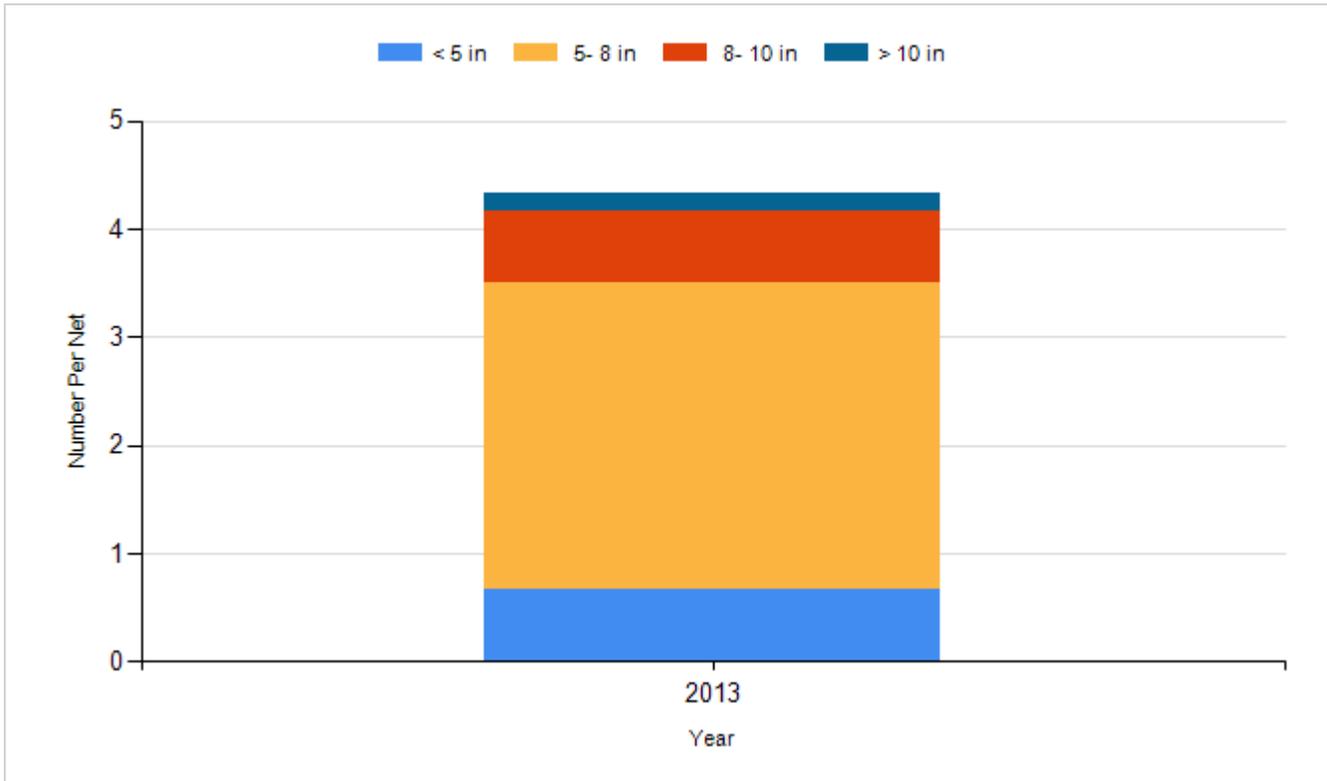
Species: Walleye
Gear: std exp gill net



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	800,000
2012	Walleye	Fry	400,000
2015	Walleye	Fry	500,000
2017	Walleye	Fry	400,000
2019	Walleye	Small Fingerling	70,750
2021	Walleye	Fry	400,000