Brush Lake Survey Summary

Brush Lake, located 2 miles south, and ½ mile east of Arlington, SD is managed as a walleye and yellow perch fishery; other fish species (e.g., black bullhead, common carp, and northern pike) are also present.

- **Walleye**. Gill netting efforts produced 5.8 walleye per net in 2023 which is one of the highest catch rates in the southeast region. Catches were slightly below the previous sample year (7.0 fish per net in 2021) and the long-term average (9.9 fish per net), however. Sampled fish ranged in length from 10.2 to 25.2 inches with approximately 86% measuring >15 inches long. A large proportion of the sample also measured >20 inches in length (47%). Nine year classes of fish were represented in the sample, but a few of these cohorts stood out. The 2018 and 2019 cohorts (age 5 and age 4 fish) in particular, accounted for a large proportion of the sample (43%). These two naturally reproduced year classes likely benefitted from the high water conditions present in those years.

- **Yellow Perch**. Yellow perch abundance increased to 10.7 fish per gill net in 2023, which is the third highest catch rate in the southeast region. Relative abundance was much higher than the previous sample year (1.3 fish per net in 2021) and close the long term mean (10.9 fish per net). Most of these fish were quite young, though, with age 1 fish comprising a majority of the sample (91%). Measured fish ranged in length from 4.7 to 7.1 inches long but most were <6 inches. Brush lake might be worth a look in future years for anglers targeting yellow perch.

For more detailed results see the computer-generated South Dakota Statewide Fisheries Survey for Brush Lake (below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Brush, Brookings County
MBS-Lake-253-800
2023

Lake Information

Name: Brush

County: Brookings

Surface Area: 553 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 06, 2023	6 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Black Bullhead

Common Carp

Northern Pike

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.
- 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	Black Bullhead	24	4.0	2.0	13		13			
	Common Carp	19	3.2	0.9	100		95			
	Northern Pike	8	1.3	0.6	88		0		88	4
	Walleye	35	5.8	2.4	86		40	13	95	2
	White Sucker	4	0.7	0.5	100		100			
	Yellow Perch	66	10.7	4.8	0		0		104	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	Black Bullhead				8.5	11.7	1.8	20.7	26.3		4.0	12.17
	Common Carp				0.0	0.0	0.3	11.2	13.7		3.2	4.73
	Green Sunfish				0.0	0.0	0.0	0.2	0.0		0.0	0.03
	Northern Pike				1.2	0.2	0.0	2.2	1.7		1.3	1.10
	Walleye				23.7	13.7	2.7	6.7	7.0		5.8	9.93
	White Sucker				0.2	0.0	0.0	0.3	0.5		0.7	0.28
	Yellow Perch				2.2	15.8	19.5	16.0	1.3		10.7	10.92

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	Black Bullhead	PSD				49	59	36	53	36		13
		PSD-P				4	13	9	7	12		13
	Common Carp	PSD						0	0	91		100
		PSD-P						0	0	0		95
	Northern Pike	PSD				100	0		38	60		88
		PSD-P				29	0		15	0		0
		Wr				91	106		97	91		88
	Walleye	PSD				78	54	56	65	95		86
		PSD-P				3	12	31	23	14		40
		Wr				94	97	93	103	96		95
	White Sucker	PSD				100			0	100		100
		PSD-P				100			0	100		100
	Yellow Perch	PSD				62	51	4	92	13		0
		PSD-P				8	34	3	8	13		0
		Wr				96	105	105	99	91		104

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+
2023	35	271 (3)	397 (9)	479 (2)	500 (8)	522 (7)	577 (3)	642 (1)		577 (1)	596 (1)
2021	42		412 (27)	446 (8)	491 (4)		527 (3)				
2020	40	286 (7)	379 (16)	466 (8)	524 (1)		544 (2)				619 (6)
2019	22	233 (7)	361 (6)	458 (3)	500 (1)					615 (3)	627 (2)
2018	82	287 (37)	410 (12)	447 (12)	502 (13)			533 (1)	562 (2)	540 (1)	652 (3)

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	66	143 (60)	166 (6)								
2021	9	144 (8)		275 (1)							
2019	112	156 (107)	187 (5)								

Fish Condition

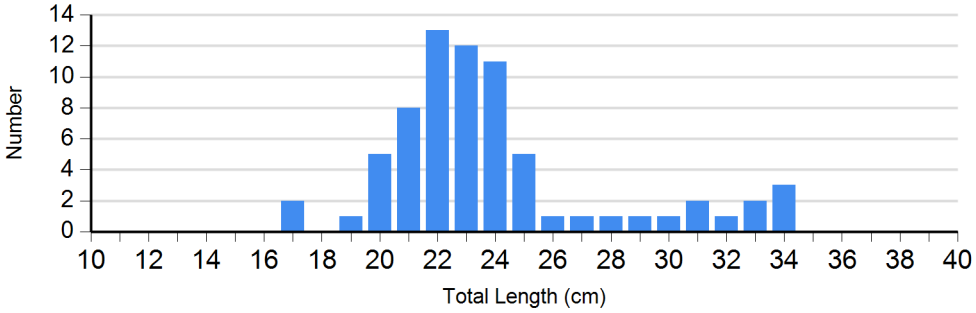
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2020	8	100 (1.7)	3	90 (3.4)	2	97 (7.6)	0	
	2021	4	97 (3.0)	6	87 (1.3)	0		0	
	2023	1	85	7	88 (3.4)	0		0	
Walleye Gill Net	2019	7	95 (2.0)	4	97 (4.6)	3	87 (4.1)	2	86 (0.7)
	2020	14	103 (2.5)	17	105 (1.0)	6	100 (3.0)	3	98 (6.5)
	2021	2	94 (6.0)	34	96 (0.8)	6	96 (1.8)	0	
	2023	5	97 (1.4)	16	96 (1.9)	13	94 (3.1)	1	83
Yellow Perch Gill Net	2019	112	105 (0.8)	2		2		1	94
	2020	8	100 (2.6)	80	100 (0.6)	8	90	0	
	2021	7	92 (3.5)	0		1	89	0	
	2023	64	104 (1.1)	0		0		0	

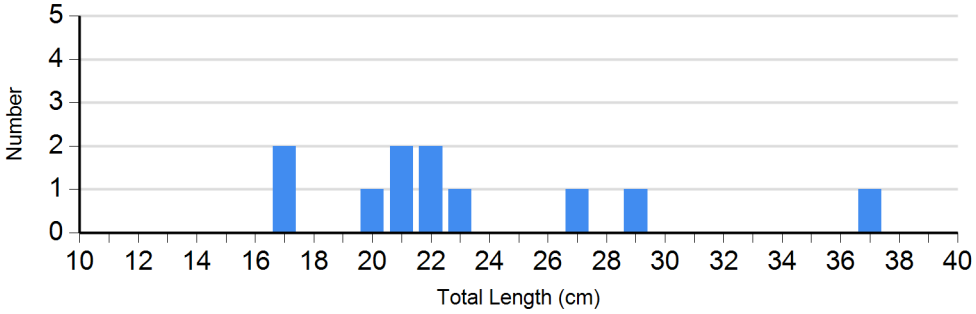
Length Frequency Distribution

Length frequency histogram of species sampled by year.

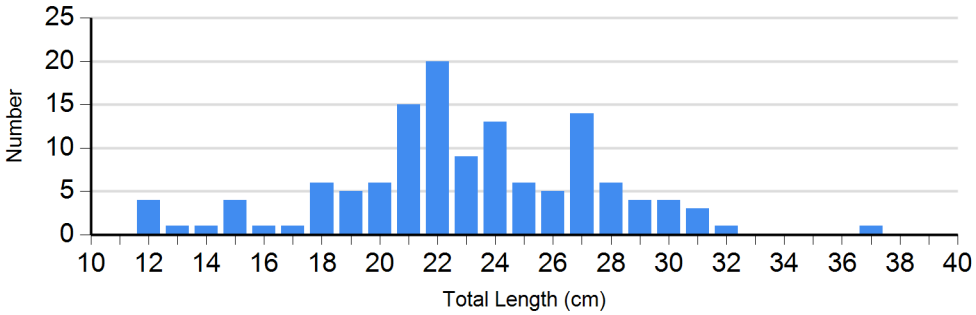
Species: Black Bullhead
Gear: AFS std gill net



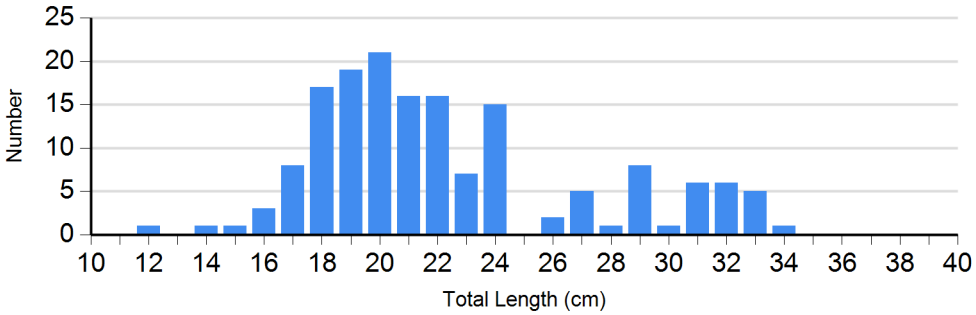
2018



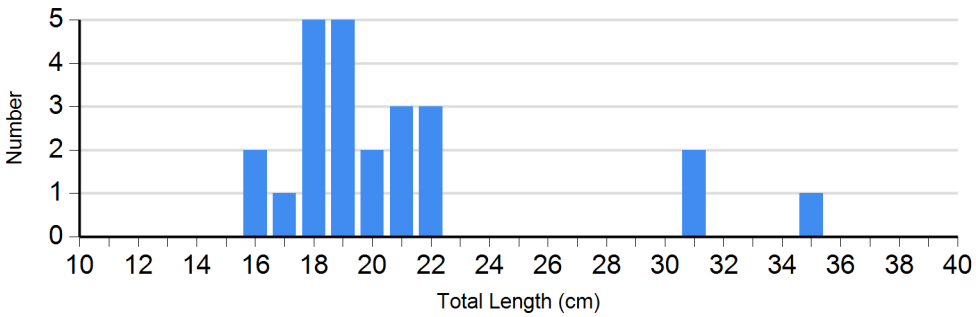
2019



2020

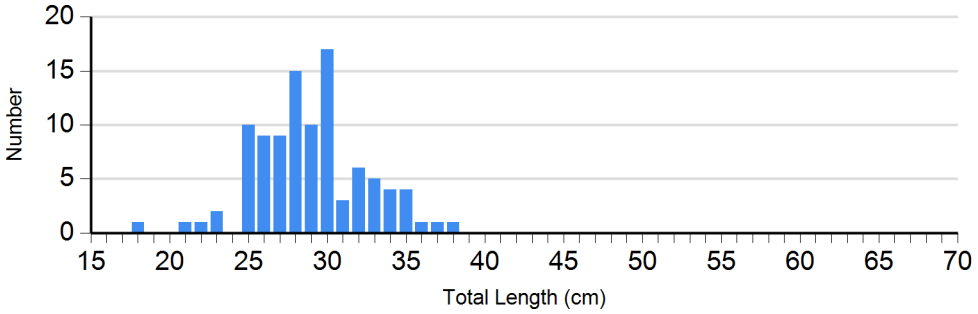


2021

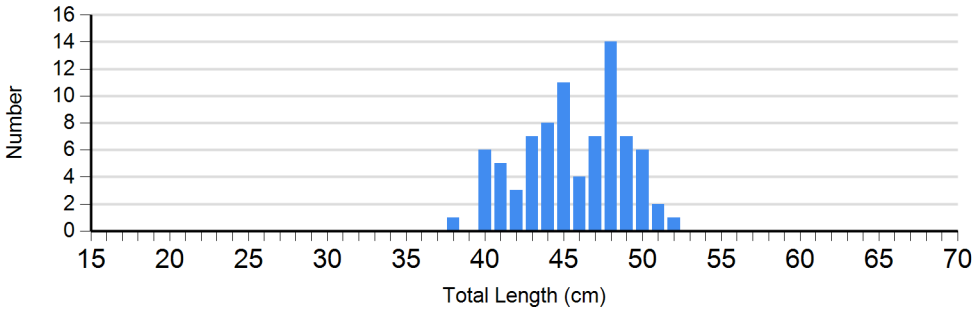


2023

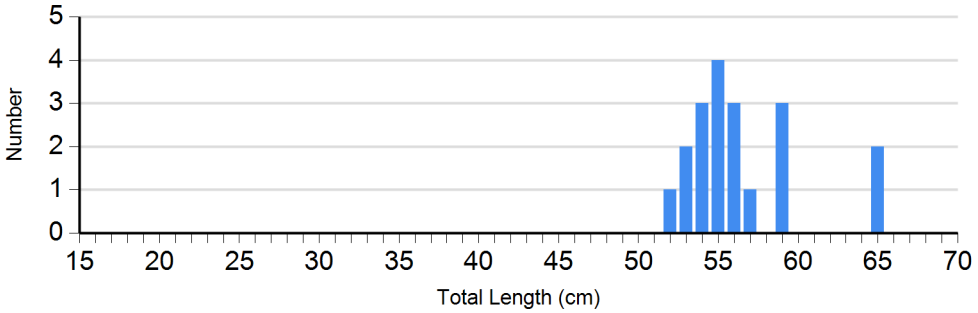
Species: Common Carp
Gear: AFS std gill net



2020

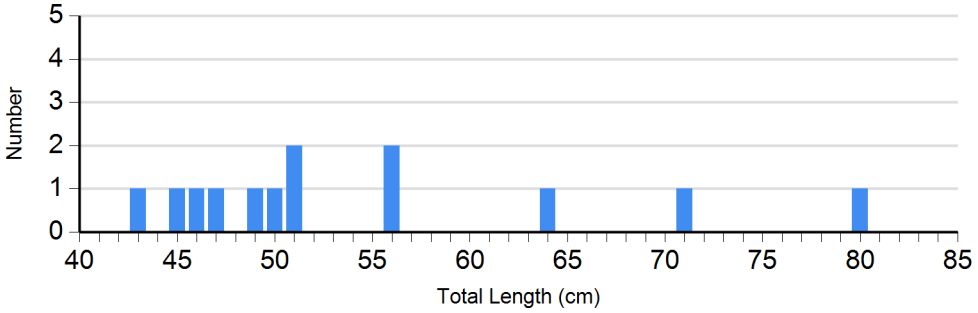


2021

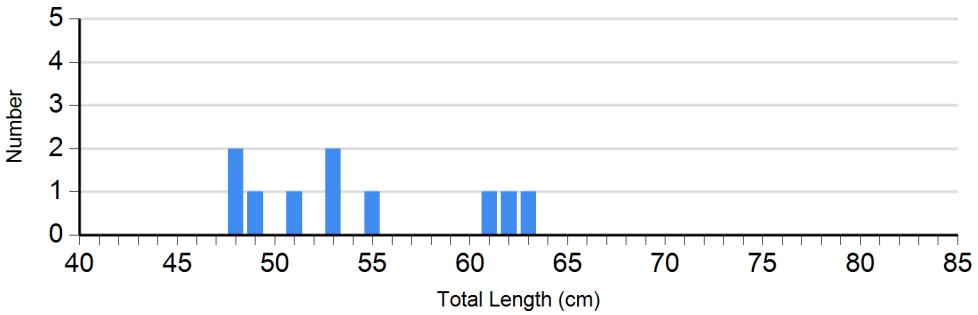


2023

Species: Northern Pike
Gear: AFS std gill net



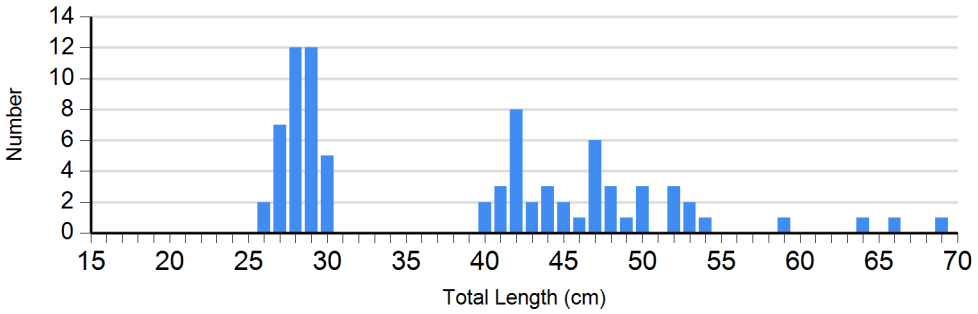
2020



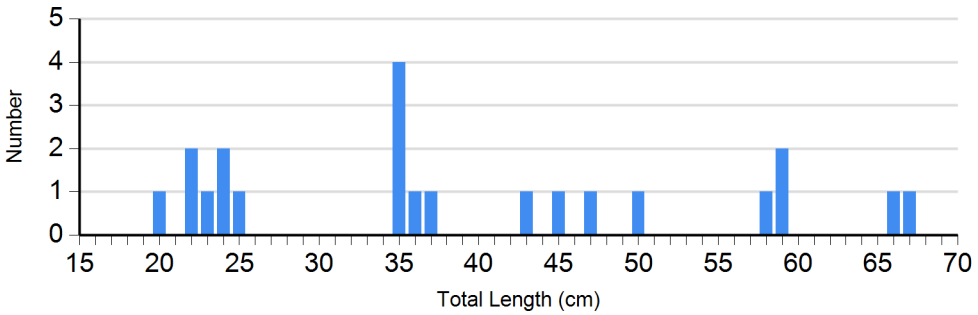
2021

Species: Walleye
Gear: AFS std gill net

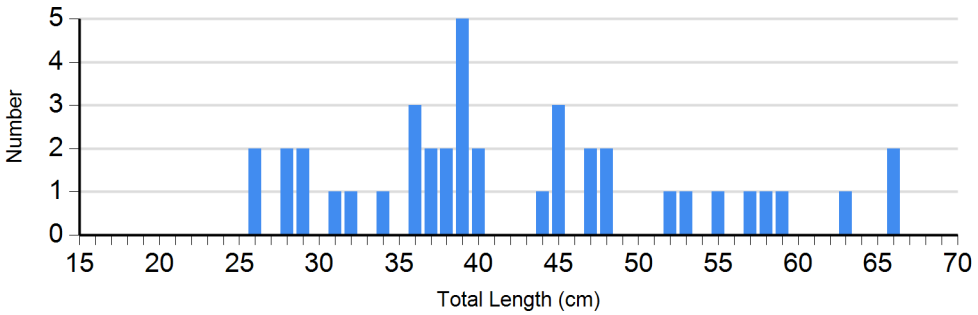
2018



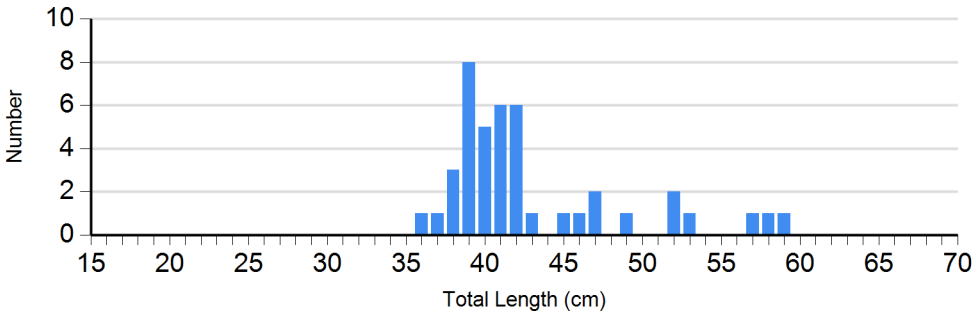
2019



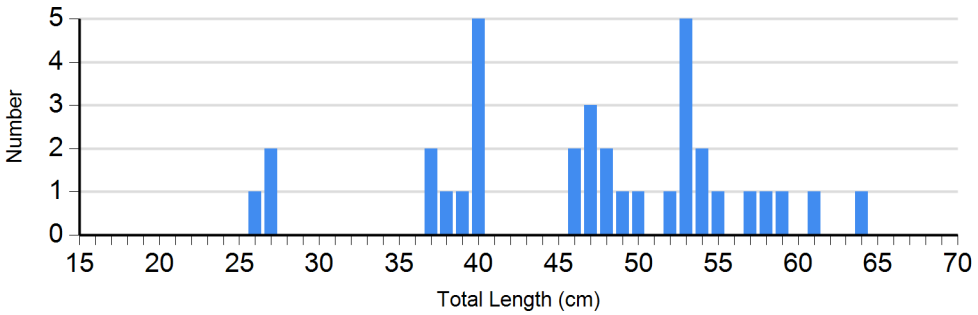
2020



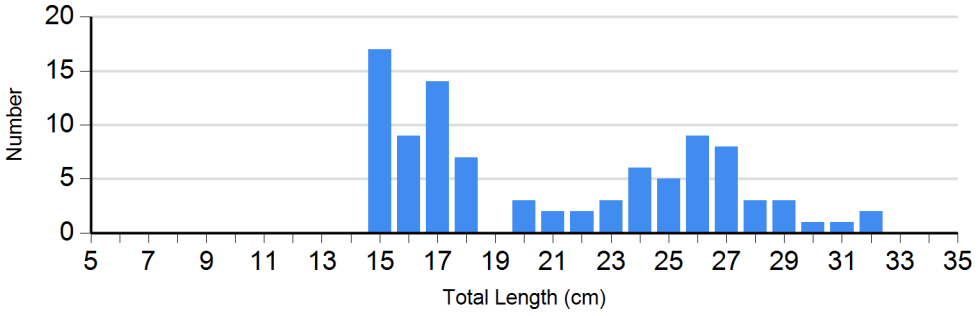
2021

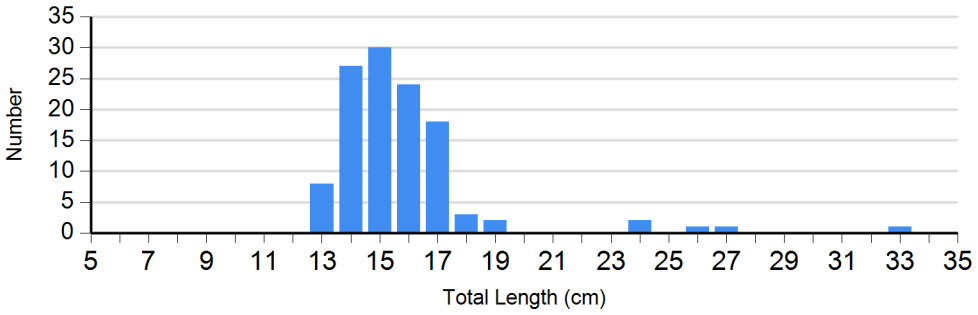


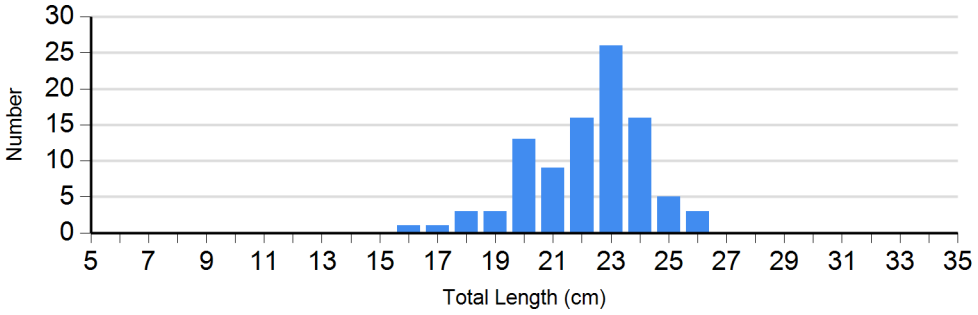
2023

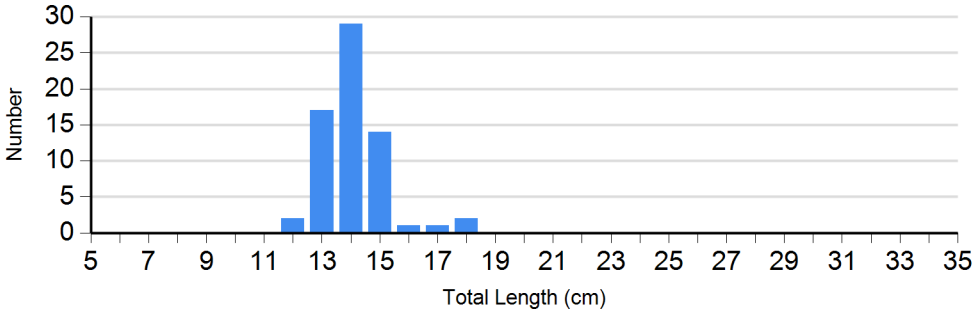


Species: Yellow Perch
Gear: AFS std gill net





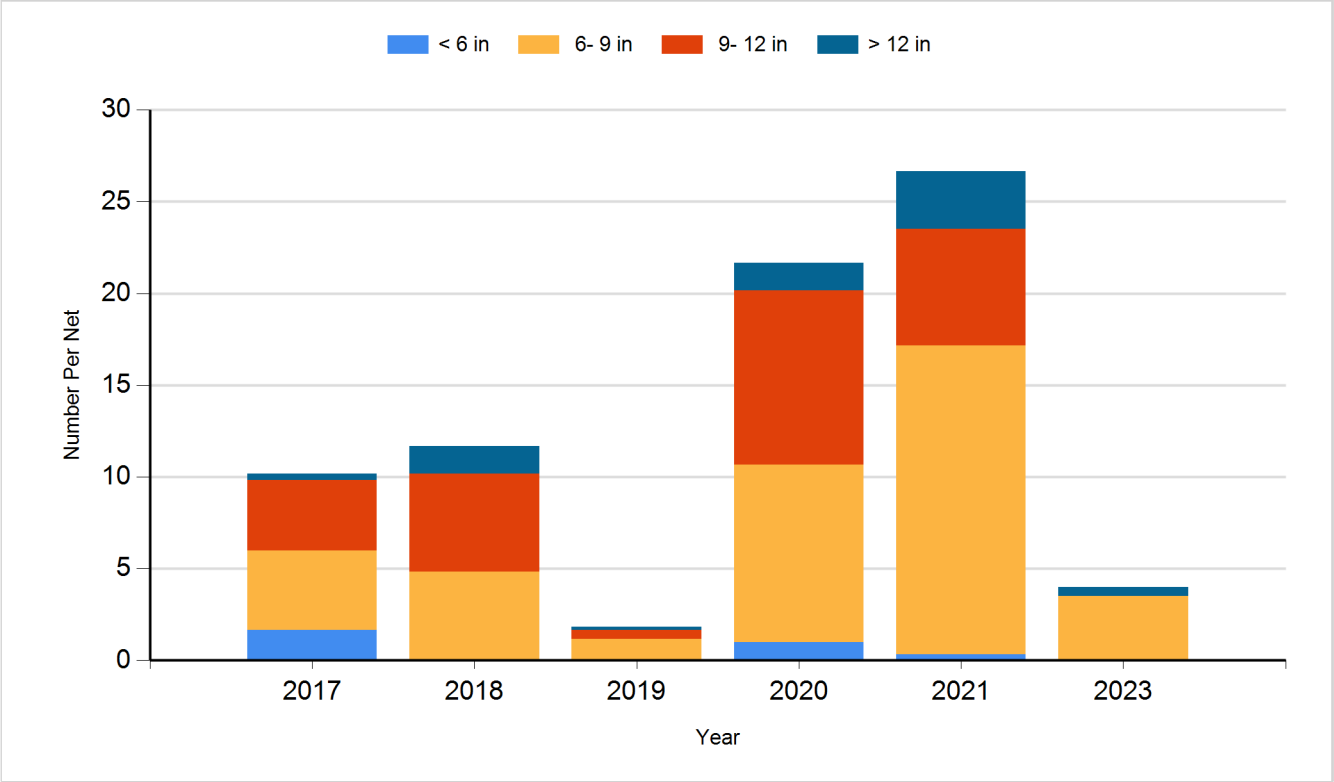




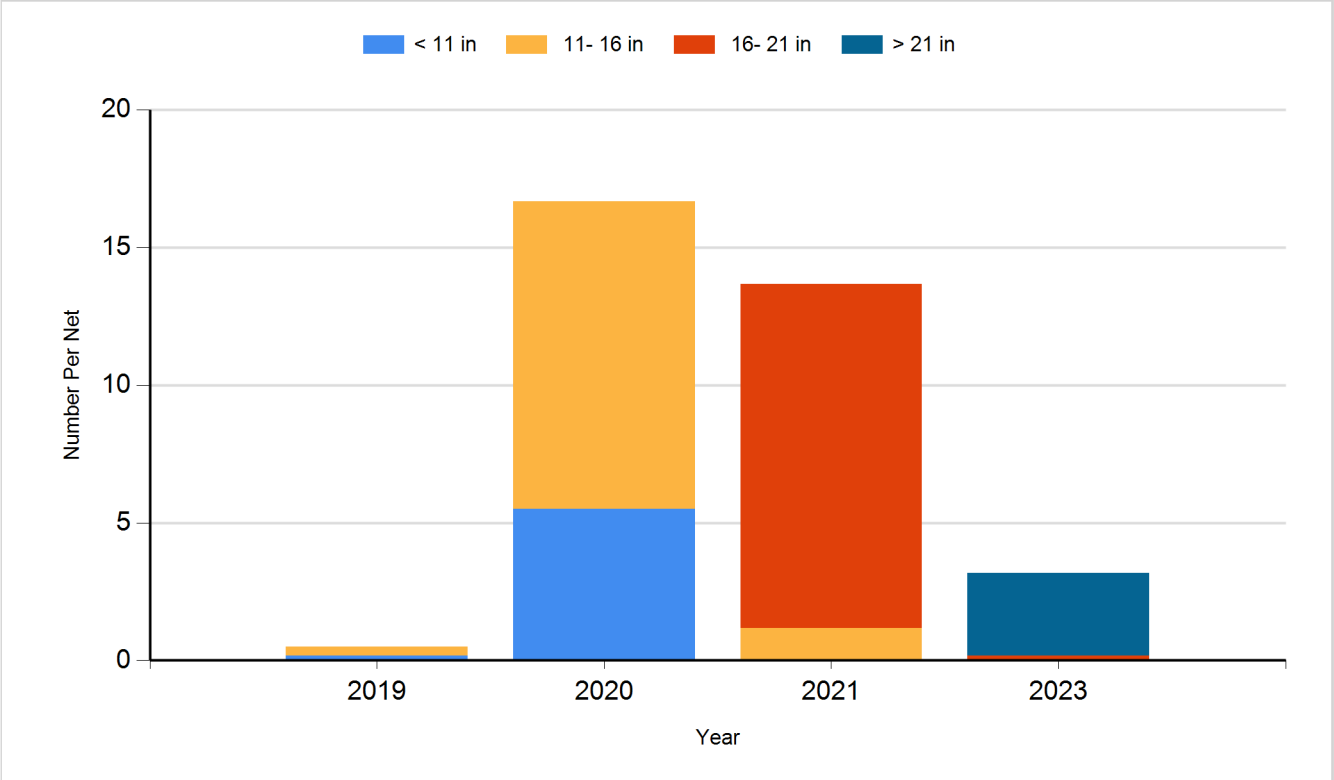
Historic Fish Sizes and Relative Abundance

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

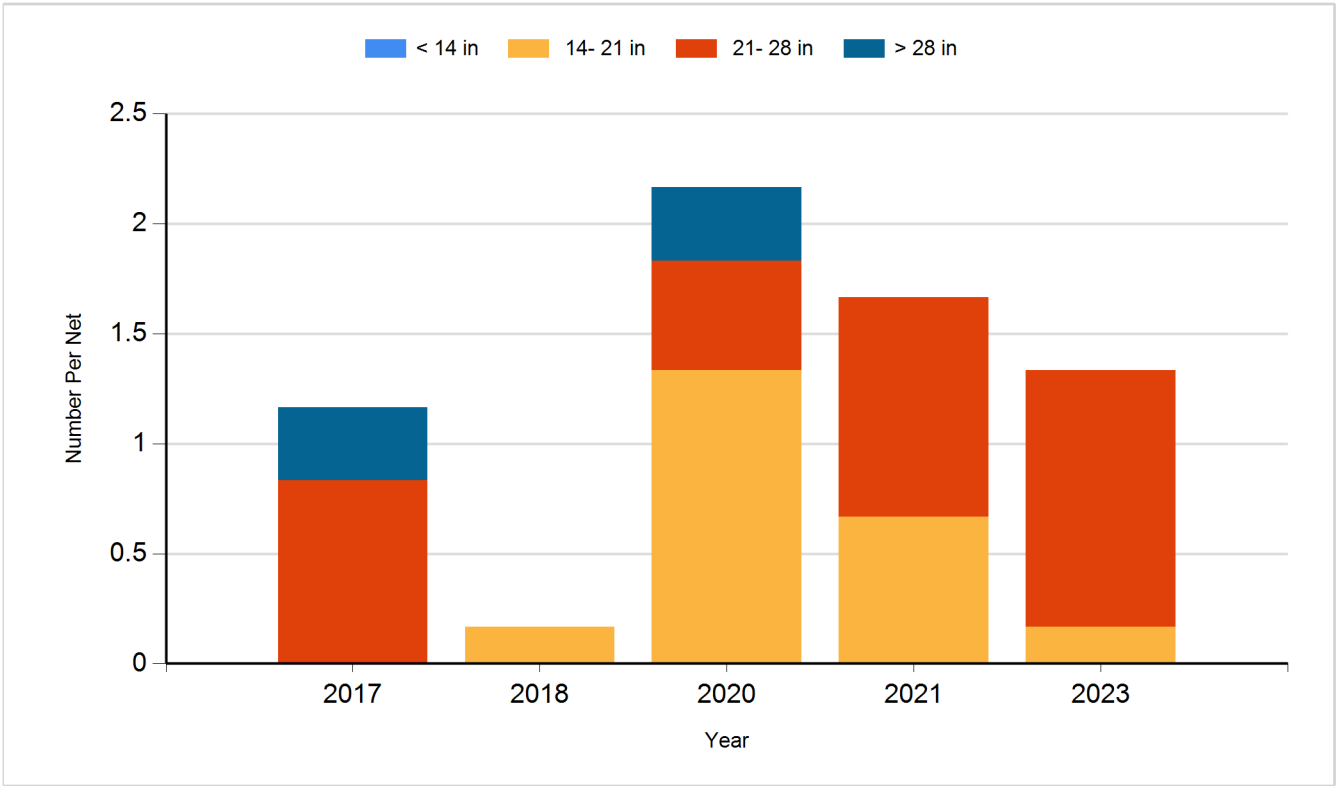
Species: Black Bullhead
Gear: AFS std gill net



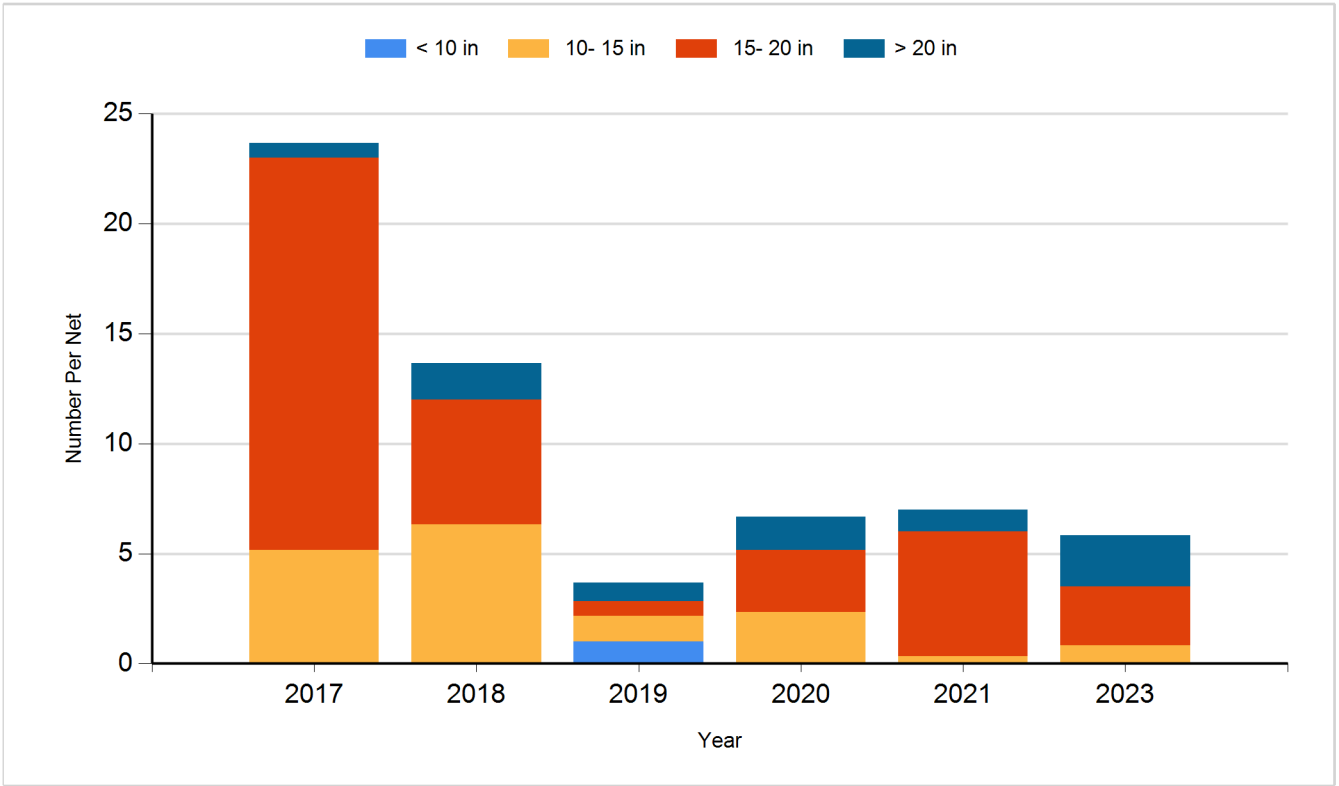
Species: Common Carp
Gear: AFS std gill net



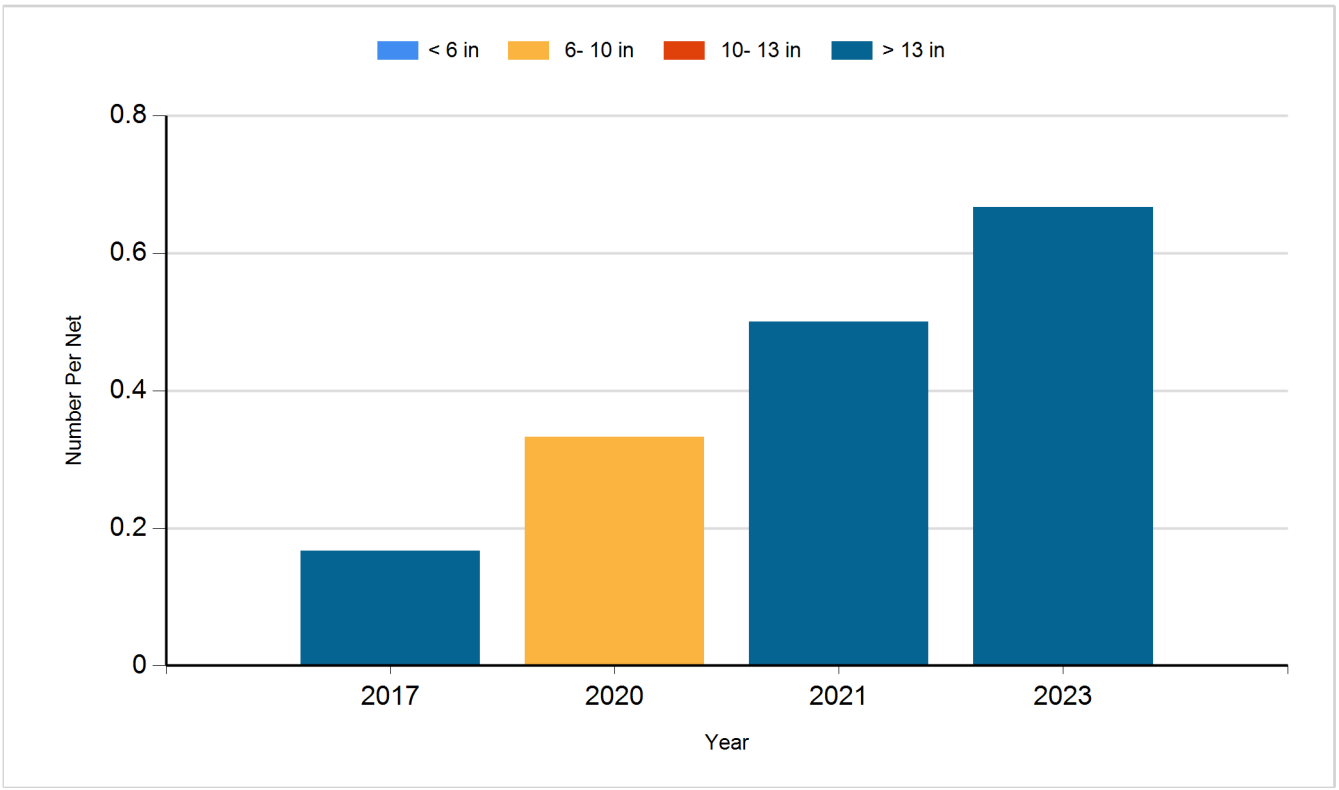
Species: Northern Pike
Gear: AFS std gill net



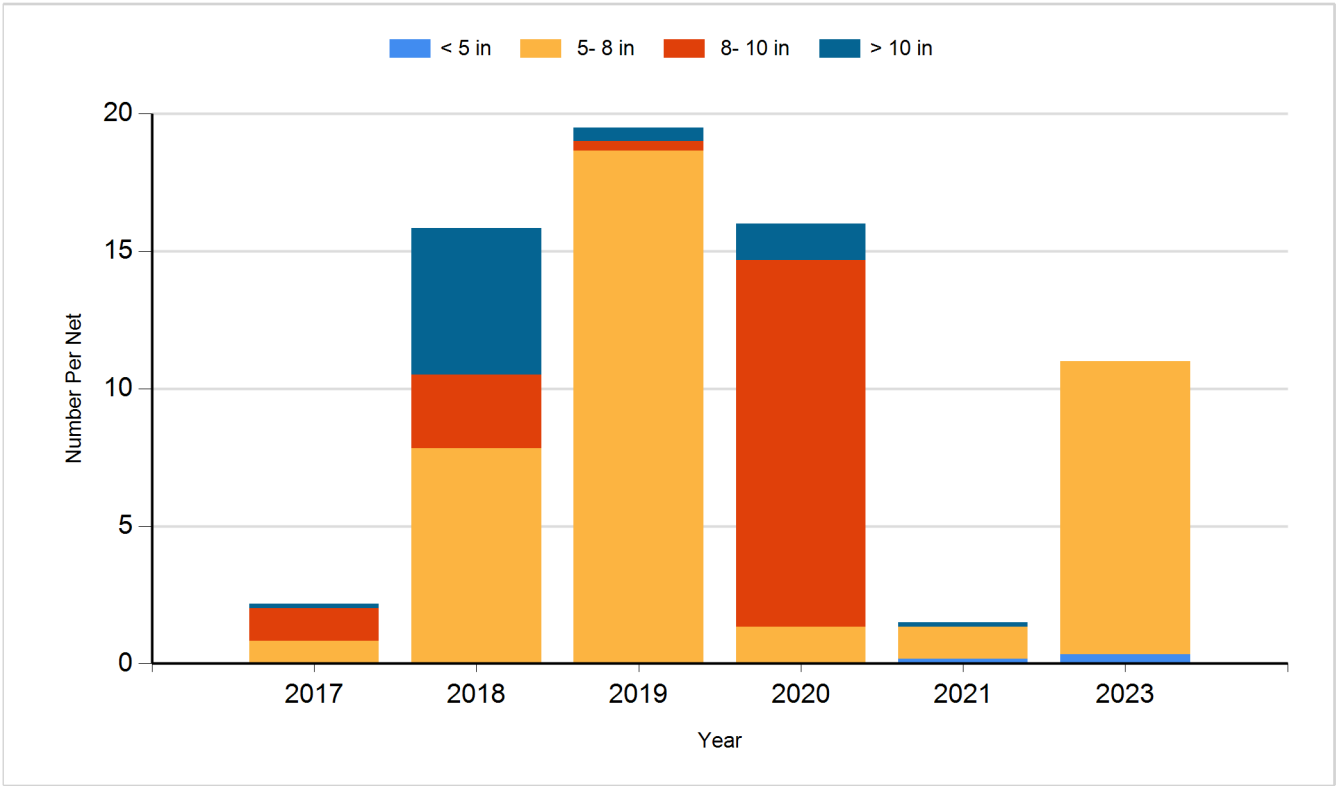
Species: Walleye
Gear: AFS std gill net



Species: White Sucker
Gear: AFS std gill net



Species: Yellow Perch
Gear: AFS std gill net



Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2012	Black Crappie	Juvenile	770
2012	Yellow Perch	Fingerling	165,360
2014	Walleye	Fingerling	48,603
2015	Walleye	Small Fingerling	28,160
2017	Walleye	Small Fingerling	27,550
2018	Yellow Perch	Small Fingerling	199,710
2021	Walleye	Juvenile	33,000