SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Rush North, Day County
UBS-Lake-411-001
2022

Lake Information

Name: Rush North

County: Day

Surface Area: 3,572 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 06, 2022	4 net-nights
AFS std gill net	Jul 07, 2022	4 net-nights
AFS std gill net	Jul 08, 2022	4 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Northern Pike

Smallmouth Bass

Common Carp

Black Bullhead

White Sucker

White 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
AFS std gill net	Black Bullhead	3	0.3	0.2	100		100		100	7
	Common Carp	4	0.3	0.2	100		100		92	
	Northern Pike	14	1.2	0.4	71		14		77	2
	Smallmouth Bass	3	0.3	0.2	33		0		113	2
	Walleye	62	4.6	1.1	73	9	18	8	88	1
	White Bass	1	0.1	0.1	100		100		101	
	White Sucker	2	0.2	0.2	100		100		107	1
	Yellow Perch	163	13.2	2.6	81	4	46	6	115	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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
AFS std gill net	Black Bullhead				0.3			0.0			0.3	0.20
	Black Crappie				0.1			0.0			0.0	0.03
	Common Carp				0.2			0.2			0.3	0.23
	Northern Pike				0.8			0.5			1.2	0.83
	Rock Bass				0.0			0.1			0.0	0.03
	Smallmouth Bass				0.0			0.0			0.3	0.10
	Walleye				3.6			6.0			4.6	4.73
	White Bass				0.7			1.4			0.1	0.73
	White Sucker				1.5			0.2			0.2	0.63
	Yellow Perch				5.8			7.4			13.2	8.80
frame net (std 3/4 in)	Black Bullhead	25.1										25.10
	Black Crappie	1.2										1.20
	Common Carp	0.1										0.10
	Northern Pike	1.0										1.00
	Rock Bass	0.1										0.10
	Smallmouth Bass	0.1										0.10
	Walleye	9.0										9.00
	White Bass	1.3										1.30
	White Sucker	0.2										0.20
	Yellow Perch	0.1										0.10
std exp gill net	Black Bullhead	1.5										1.50
	Northern Pike	1.7										1.70
	Walleye	3.5										3.50
	White Bass	0.2										0.20
	White Sucker	0.3										0.30
	Yellow Perch	2.0										2.00

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.

			Year									
Gear	Species	Index	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AFS std gill net	Black Bullhead	PSD				25						100
		PSD-P				0						100
		Wr				104						100
	Common Carp	PSD				50			100			100
		PSD-P				50			100			100
		Wr				96			86			92
	Northern Pike	PSD				100			100			71
		PSD-P				0			83			14
		Wr				79			89			77
	Smallmouth Bass	PSD										33
		PSD-P										0
		Wr										113
	Walleye	PSD				47			69			73
		PSD-P				5			7			18
		Wr				88			91			88
	White Bass	PSD				88			100			100
		PSD-P				88			100			100
		Wr				98			94			101
	White Sucker	PSD				100			100			100
		PSD-P				100			100			100
		Wr				103			106			107
	Yellow Perch	PSD				94			72			81
		PSD-P				75			54			46
		Wr				110			110			115
frame net (std 3/4 in)	Black Bullhead	PSD	98									
		PSD-P	47									
		Wr	98									
	Common Carp	PSD	100									
		PSD-P	100									
	Northern Pike	PSD	75									
		PSD-P	19									
		Wr	73									
	Smallmouth Bass	PSD	50									

			Year									
Gear	Species	Index	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
frame net (std 3/4 in)	Smallmouth Bass	PSD-P	0									
		Wr	104									
	Walleye	PSD	53									
		PSD-P	8									
		Wr	82									
	White Bass	PSD	100									
		PSD-P	100									
		Wr	96									
	White Sucker	PSD	100									
		PSD-P	100									
		Wr	92									
	Yellow Perch	PSD	100									
		PSD-P	100									
		Wr	87									
std exp gill net	Black Bullhead	PSD	100									
		PSD-P	78									
		Wr	107									
	Northern Pike	PSD	80									
		PSD-P	10									
		Wr	73									
	Walleye	PSD	62									
		PSD-P	19									
		Wr	82									
	White Bass	PSD	100									
		PSD-P	100									
		Wr	95									
	White Sucker	PSD	100									
		PSD-P	50									
		Wr	98									
	Yellow Perch	PSD	67									
		PSD-P	58									
		Wr	100									

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+
2022	62	200 (7)	320 (4)	365 (12)	407 (21)	438 (3)	456 (3)		571 (5)	620 (1)	614 (6)
2019	73	178 (1)	321 (6)	379 (32)	418 (10)	447 (14)	504 (1)	510 (1)	525 (6)	482 (1)	643 (1)
2016	48	208 (5)	308 (18)	376 (2)	386 (10)	438 (7)	441 (4)	584 (1)			663 (1)
2013	21		291 (2)	382 (14)	484 (1)		560 (2)		647 (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+
2022	163	137 (27)	214 (49)	252 (37)	279 (46)	303 (1)	314 (1)	314 (1)			352 (1)
2019	88	133 (3)	187 (29)	250 (8)	262 (10)	303 (2)	299 (16)	300 (3)	317 (10)	350 (3)	322 (4)
2016	68	151 (1)	204 (5)	246 (10)	256 (8)	280 (31)	297 (8)		348 (2)	353 (1)	
2013	12		183 (5)	268 (3)	299 (3)		347 (1)				

Fish Condition

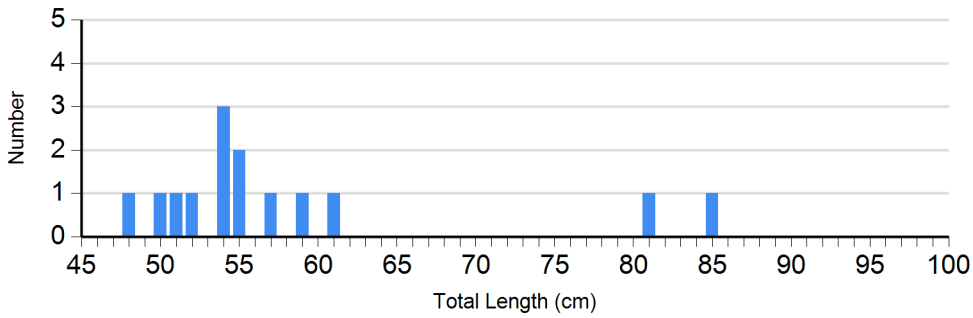
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2022	0		0		3	100 (5.4)	0	
Common Carp Gill Net	2019	0		0		0		2	86 (4.7)
	2022	0		0		0		4	92
Northern Pike Gill Net	2019	0		1	83	3	91 (6.4)	2	89 (7.7)
	2022	4	75 (2.3)	8	76 (2.8)	2	82 (4.9)	0	
Walleye Gill Net	2019	22	93 (1.2)	45	91 (0.8)	4	89 (2.6)	1	89
	2022	15	91 (1.4)	30	86 (0.8)	6	94 (1.7)	4	87 (6.7)
White Bass Gill Net	2019	0		0		13	93 (1.5)	4	95 (4.4)
	2022	0		0		1	101	0	
White Sucker Gill Net	2019	0		0		0		2	106 (6.6)
	2022	0		0		1	108	1	106
Yellow Perch Gill Net	2019	25	118 (1.3)	16	113 (2.3)	21	108 (1.7)	27	102 (1.5)
	2022	30	124 (1.7)	56	114 (1.1)	64	112 (1.0)	8	106 (2.8)

Length Frequency Distribution

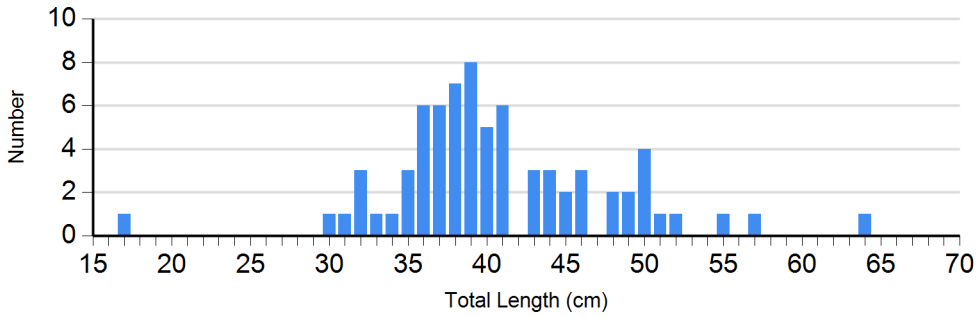
Length frequency histogram of species sampled by year.

Species: Northern Pike
Gear: AFS std gill net

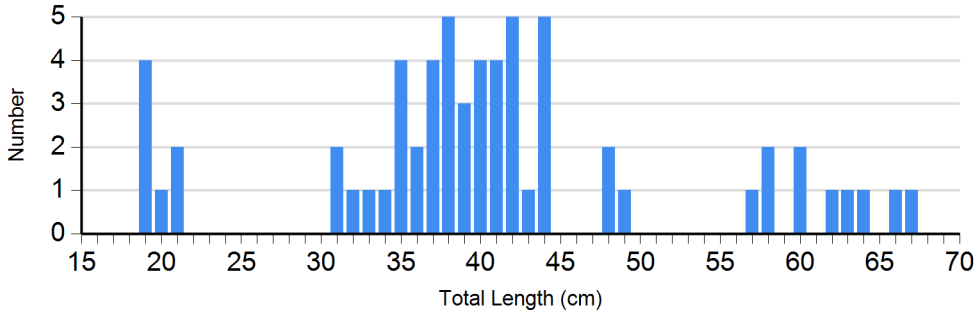


2022

Species: Walleye
Gear: AFS std gill net

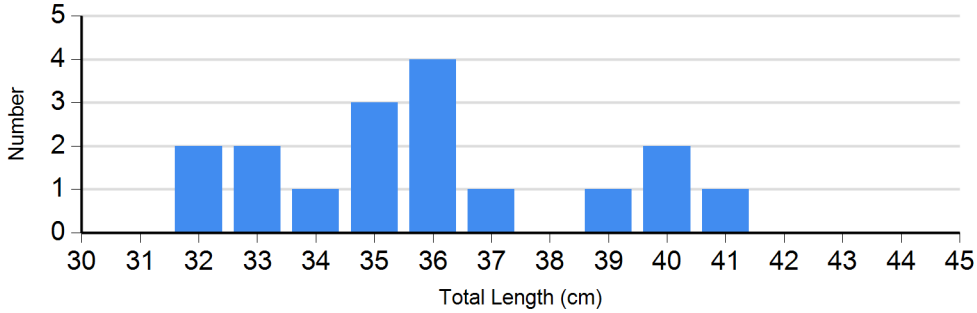


2019



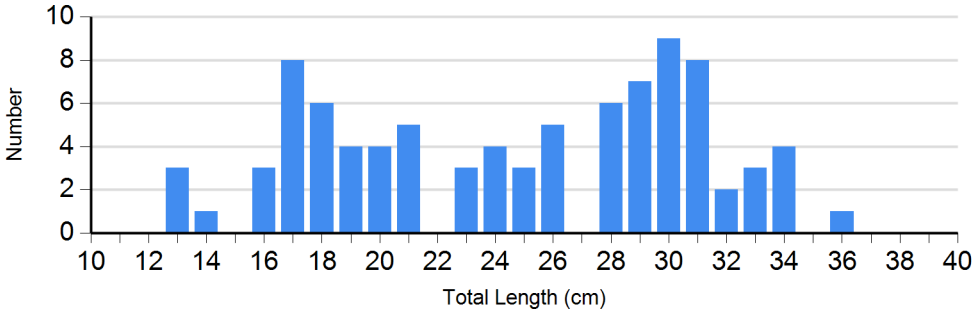
2022

Species: White Bass
Gear: AFS std gill net

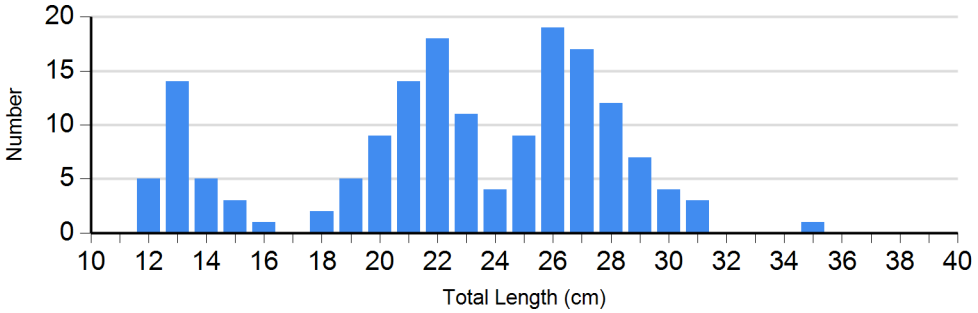


2019

Species: Yellow Perch
Gear: AFS std gill net



2019

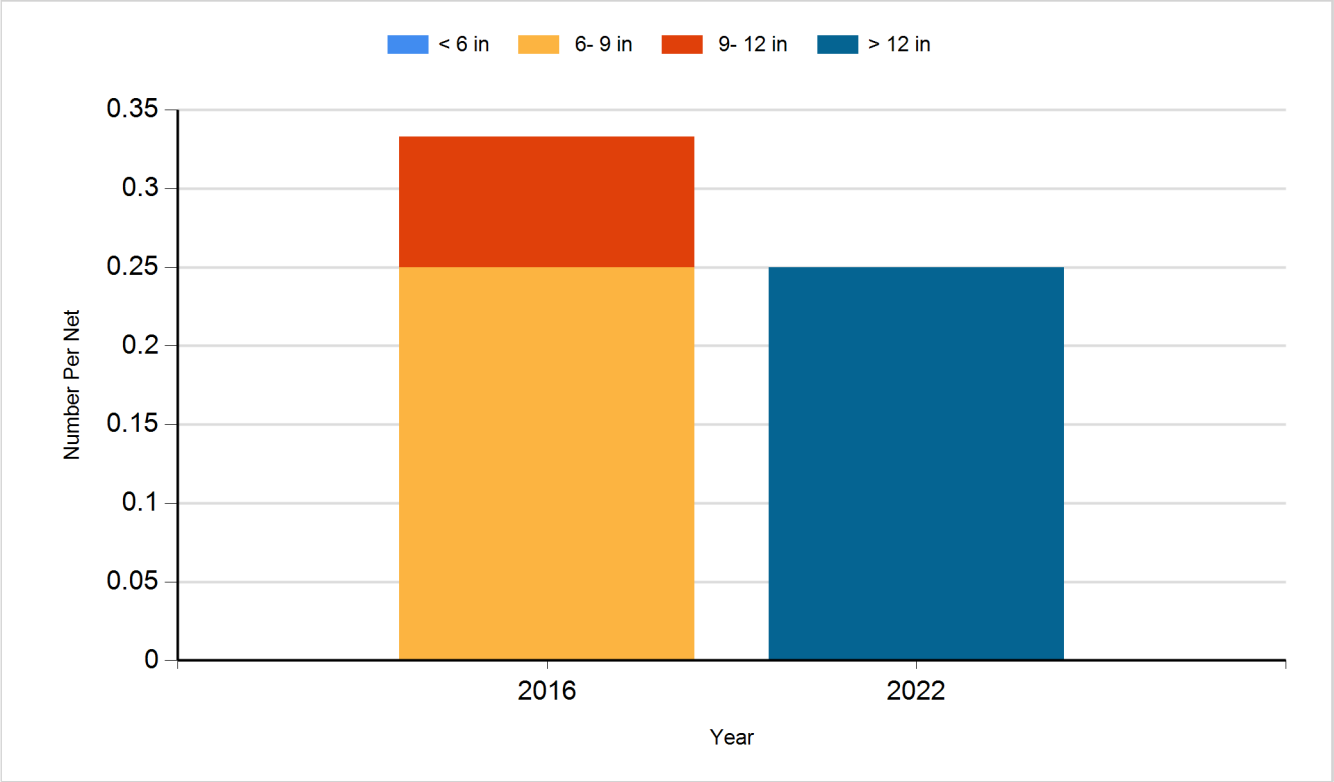


2022

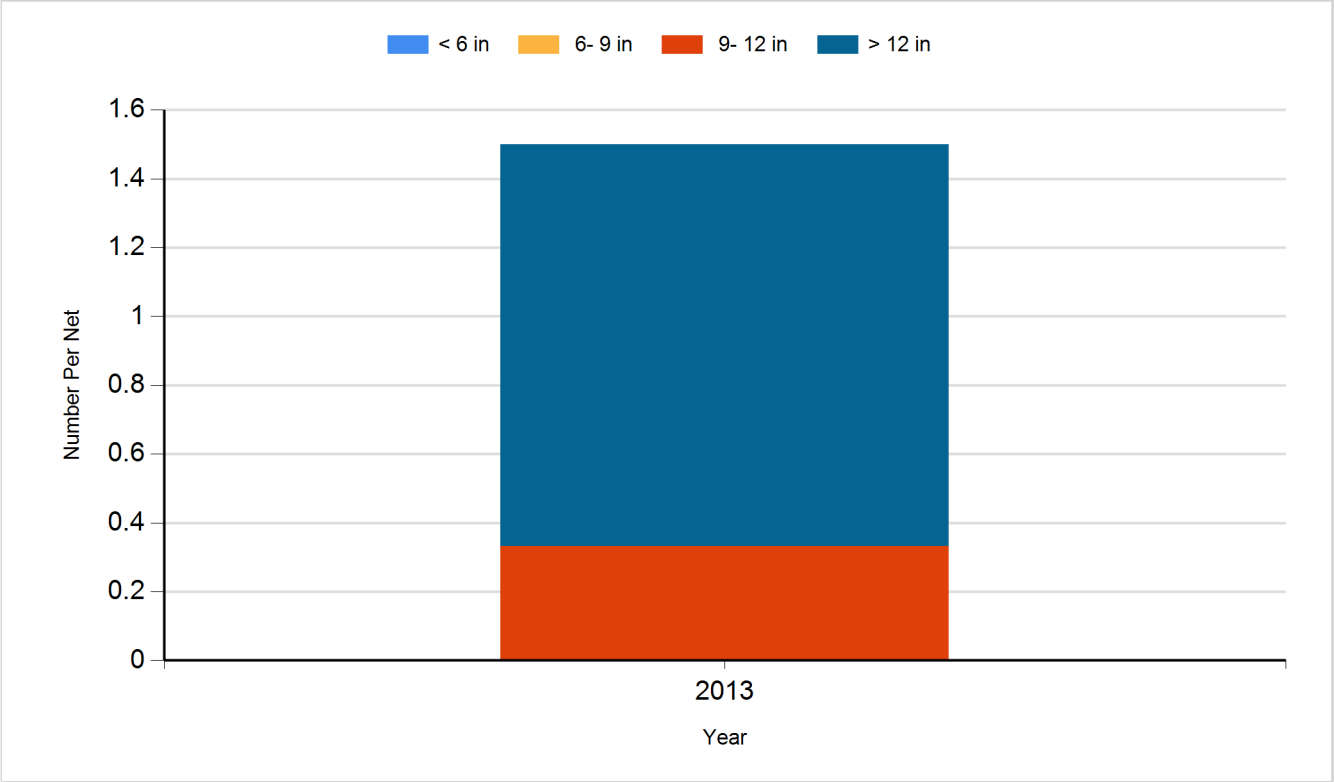
Historic Fish Sizes and Relative Abundance

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

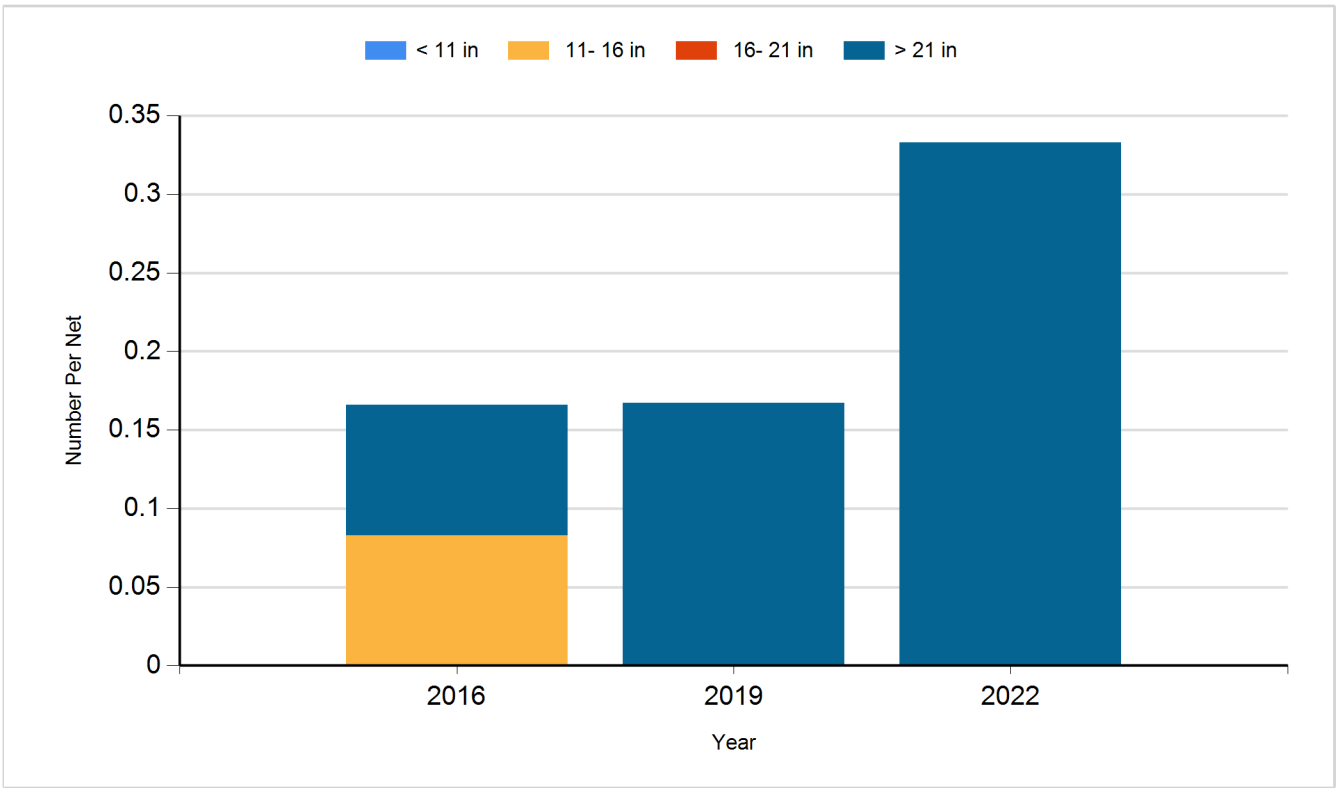
Species: Black Bullhead
Gear: AFS std gill net



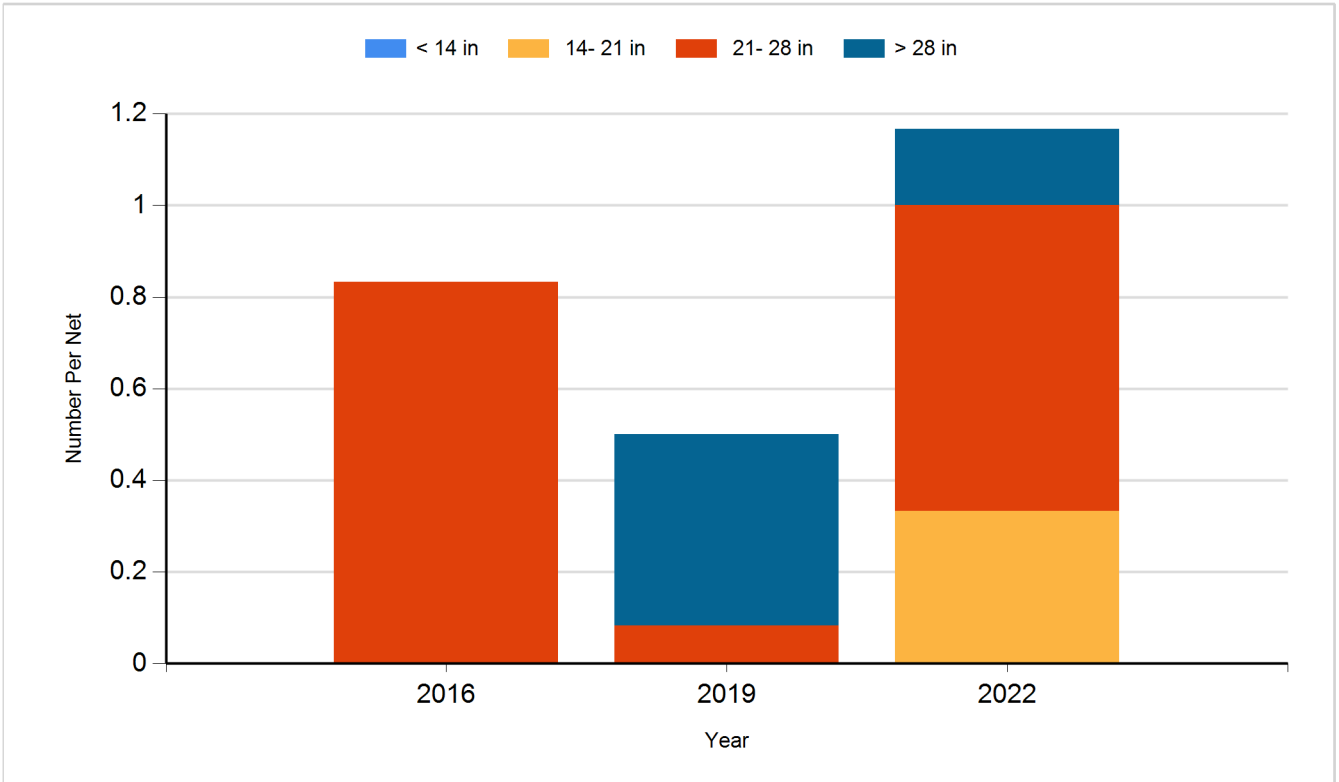
Species: Black Bullhead
Gear: std exp gill net



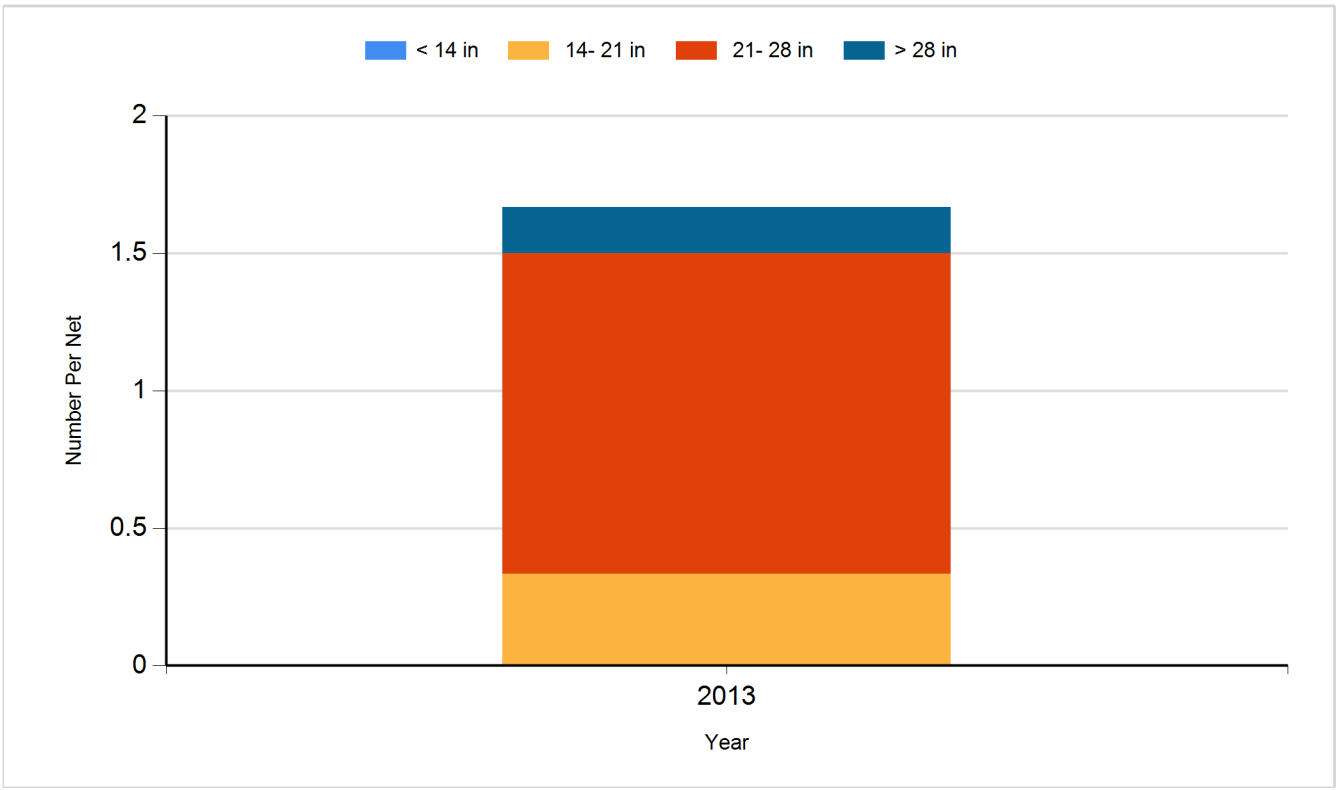
Species: Common Carp
Gear: AFS std gill net



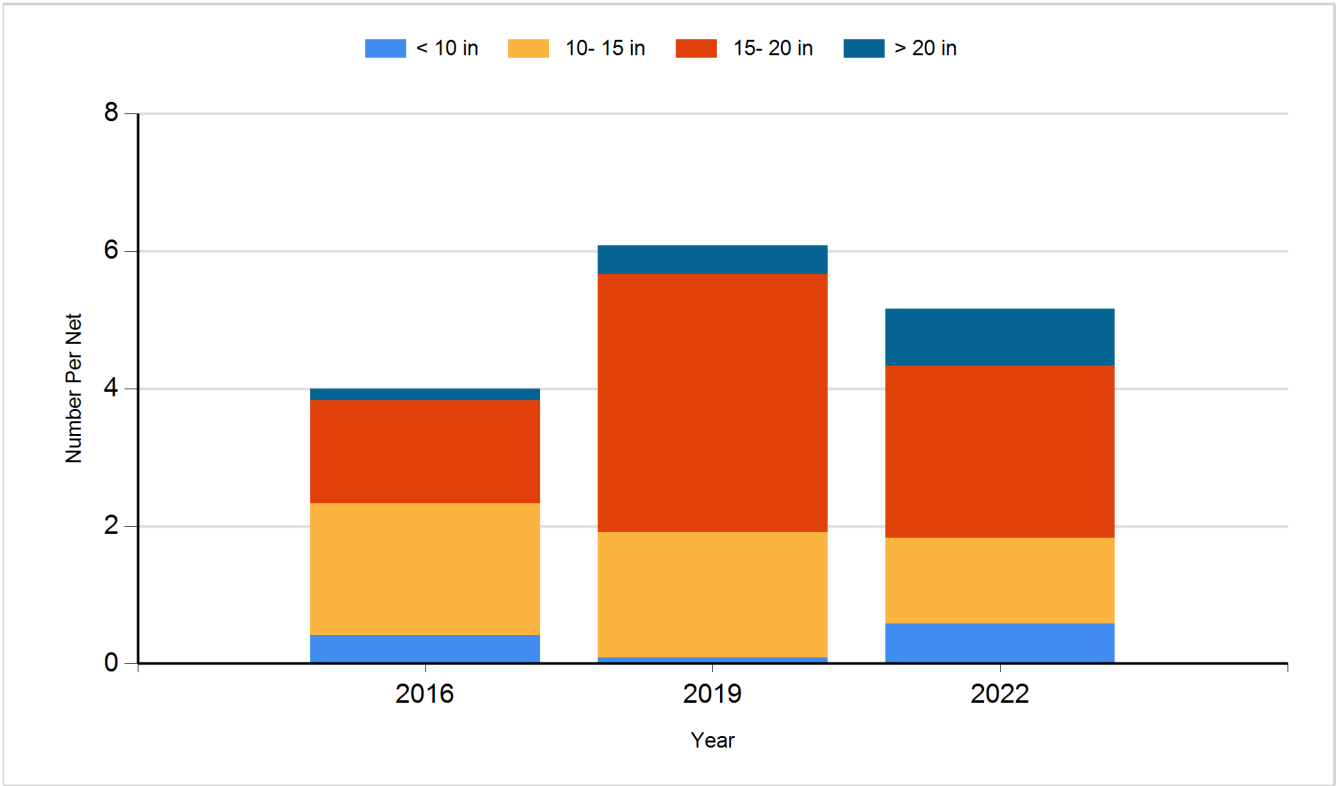
Species: Northern Pike
Gear: AFS std gill net



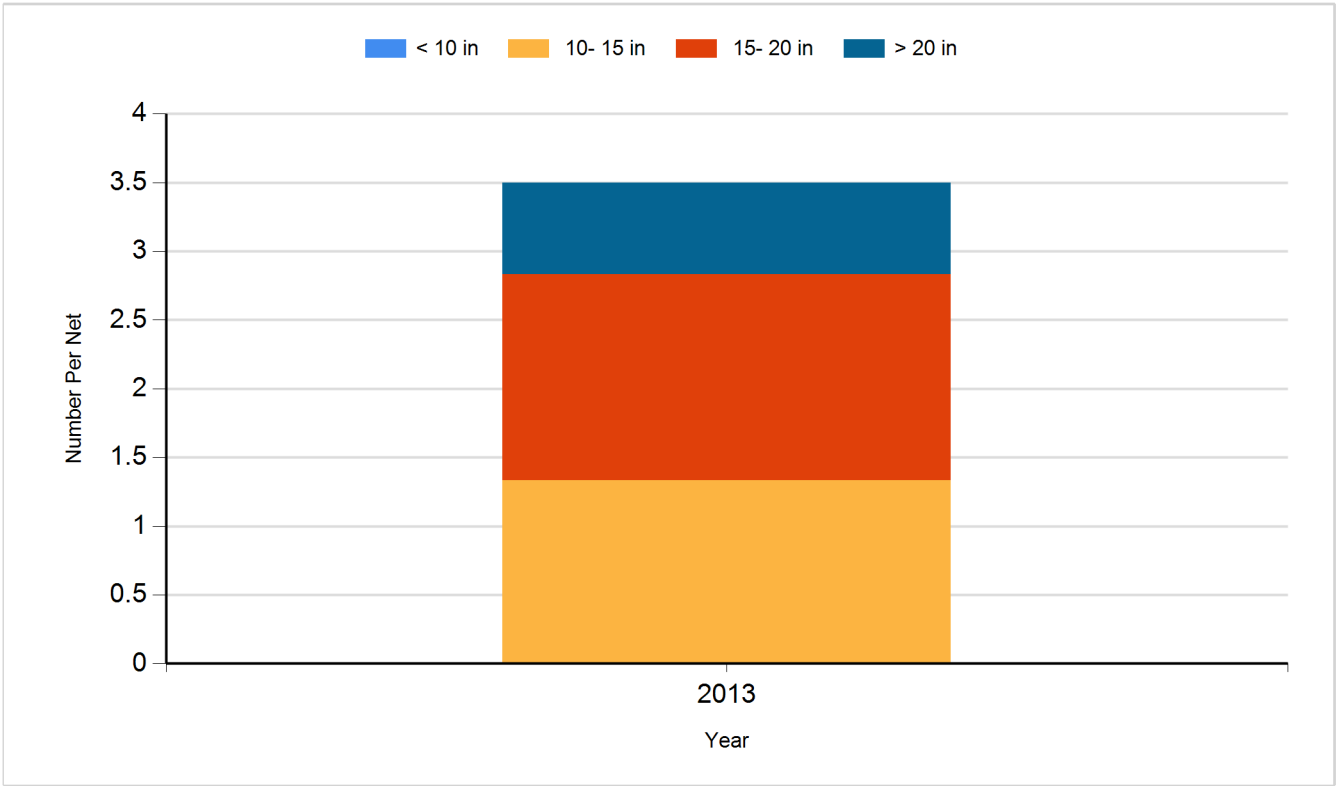
Species: Northern Pike
Gear: std exp gill net



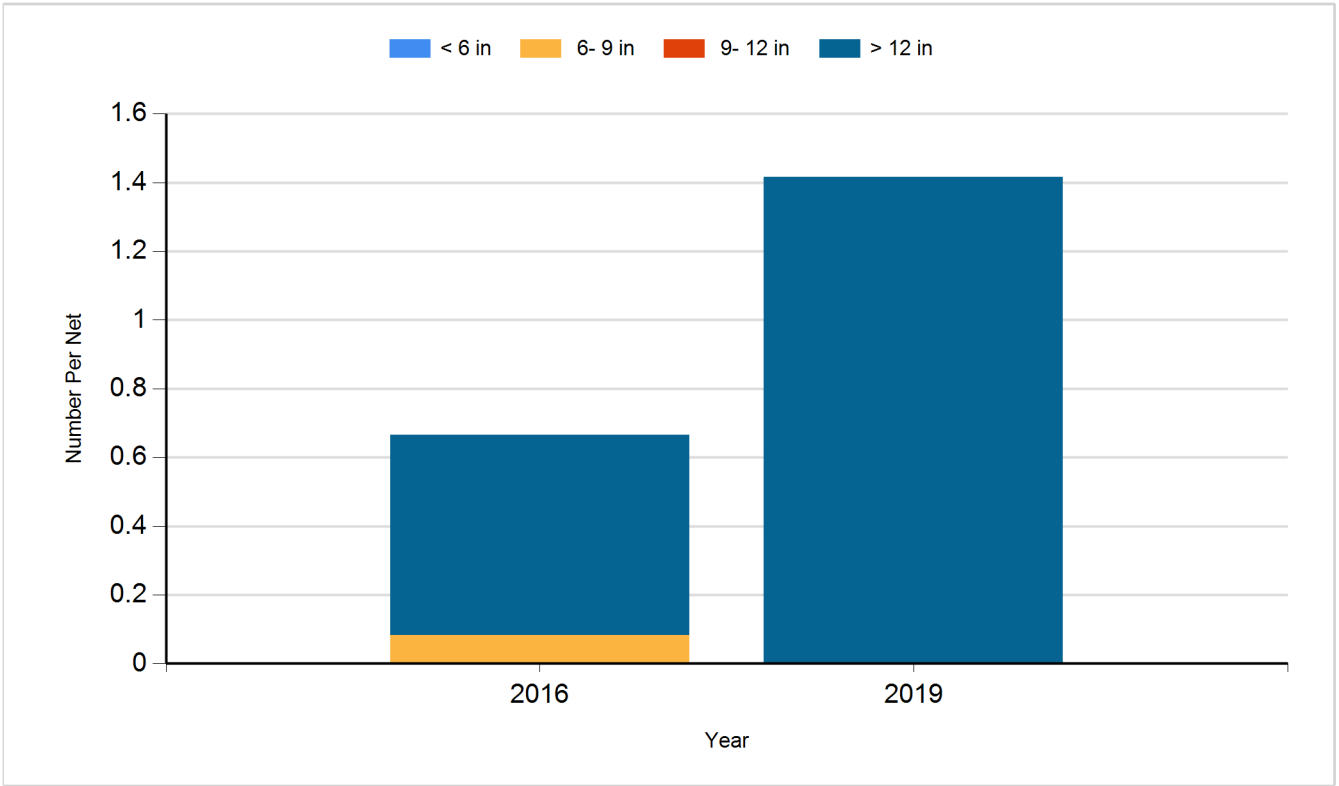
Species: Walleye
Gear: AFS std gill net



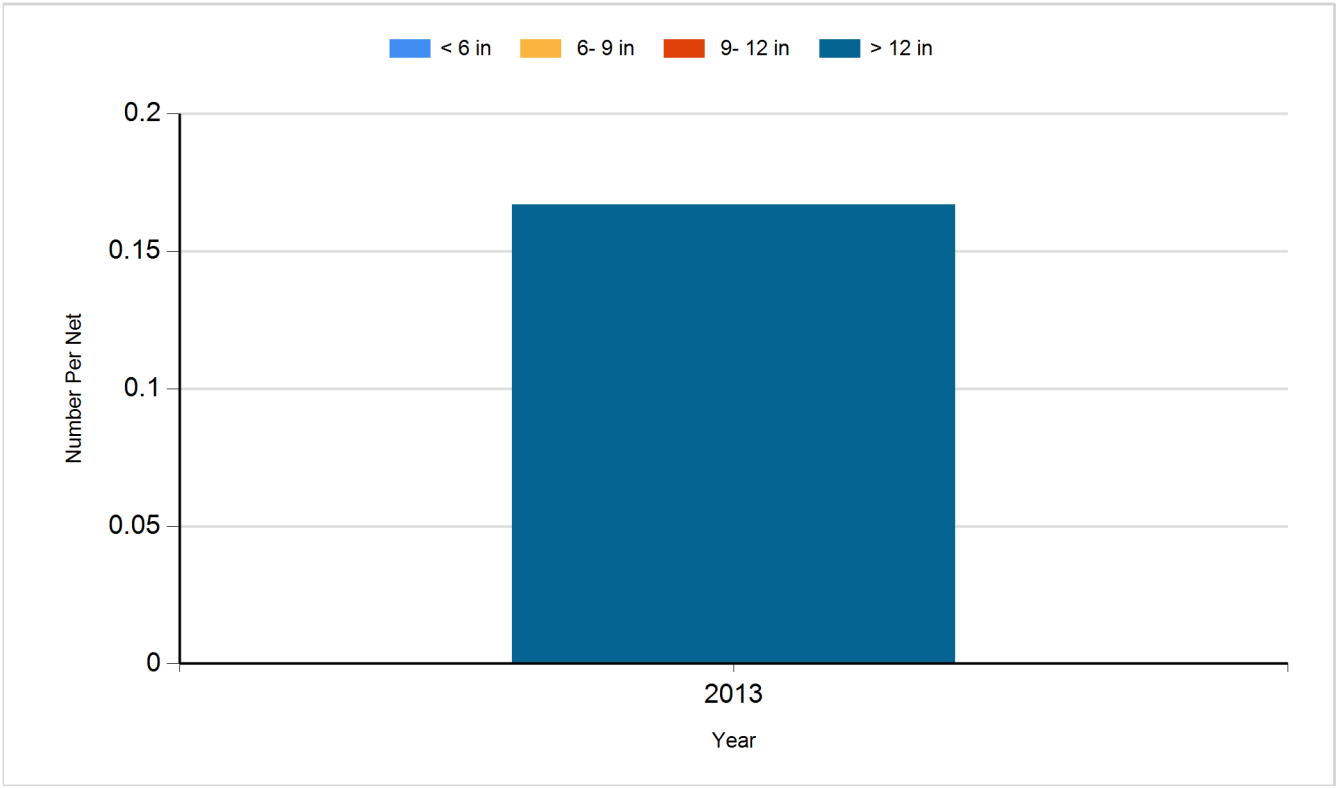
Species: Walleye
Gear: std exp gill net



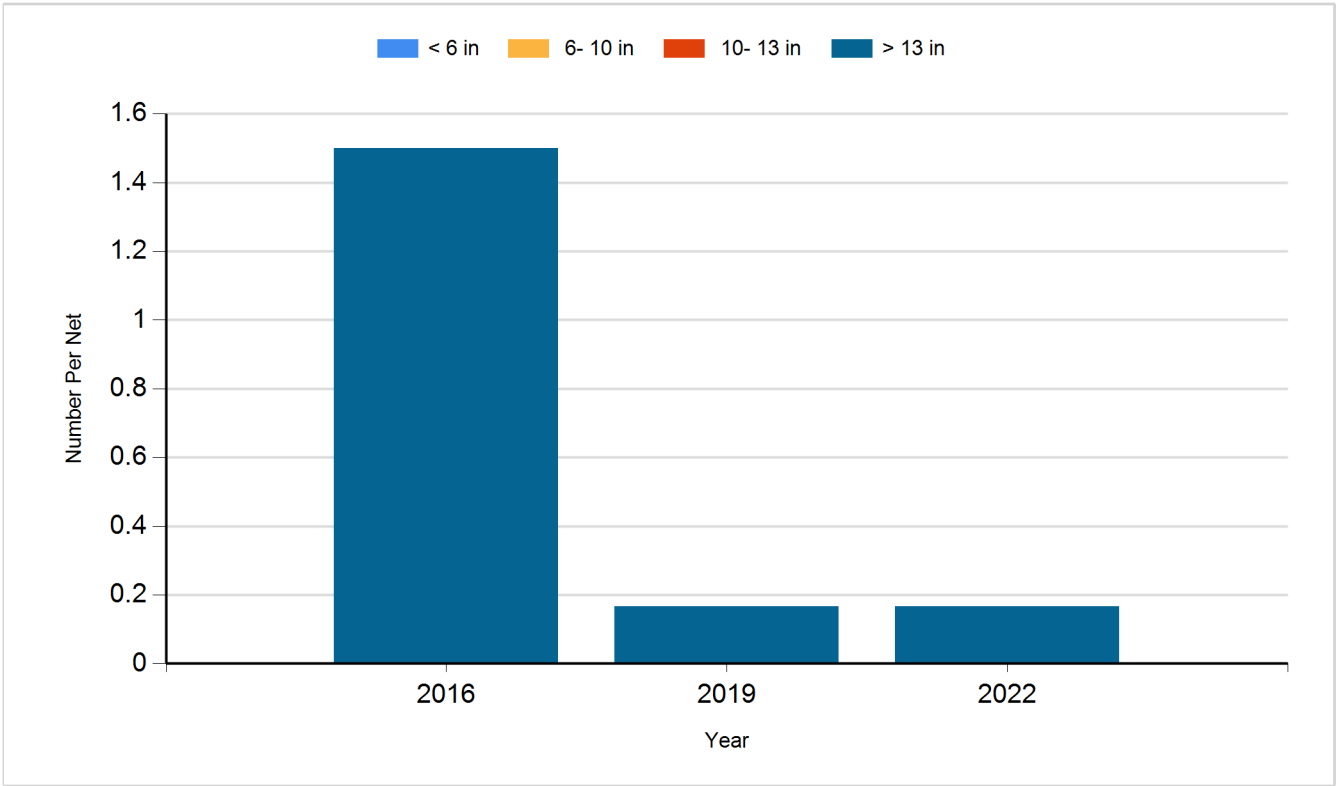
Species: White Bass
Gear: AFS std gill net



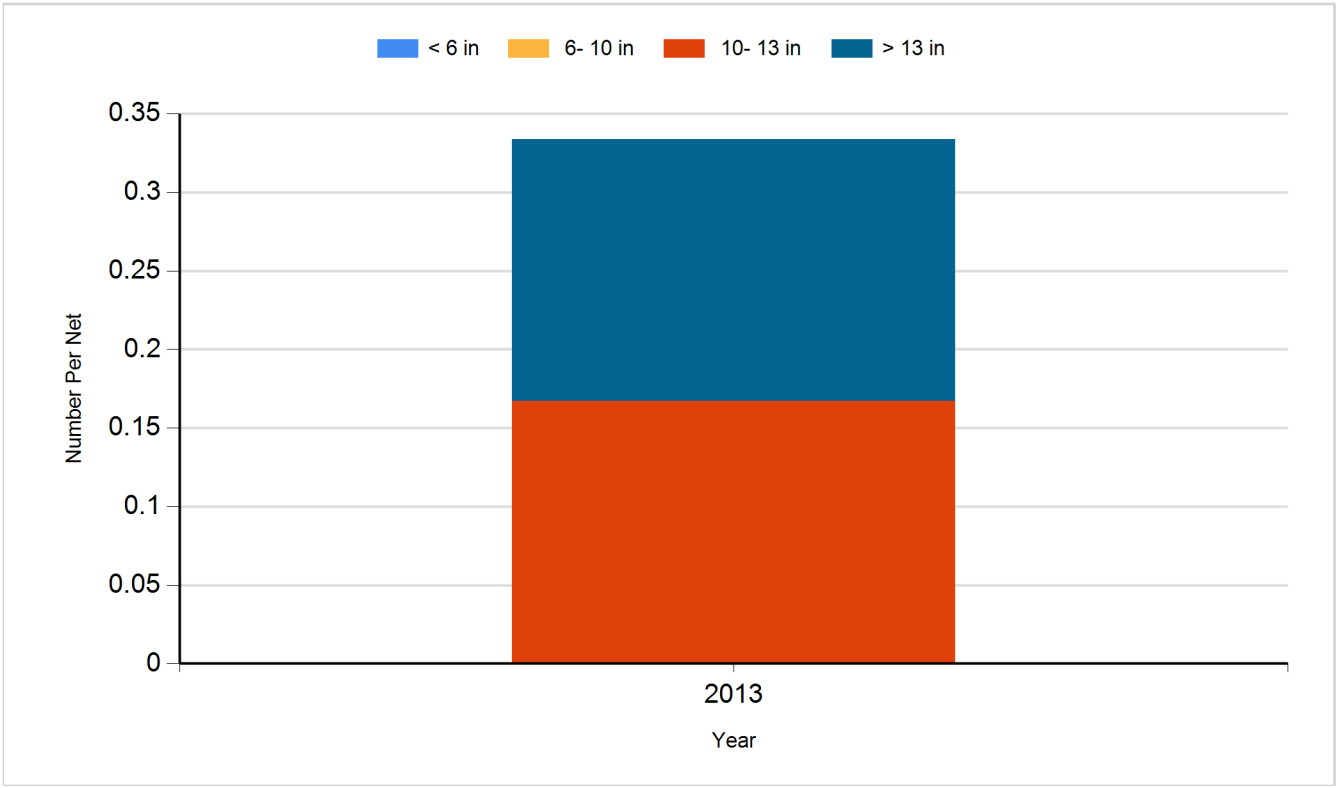
Species: White Bass
Gear: std exp gill net



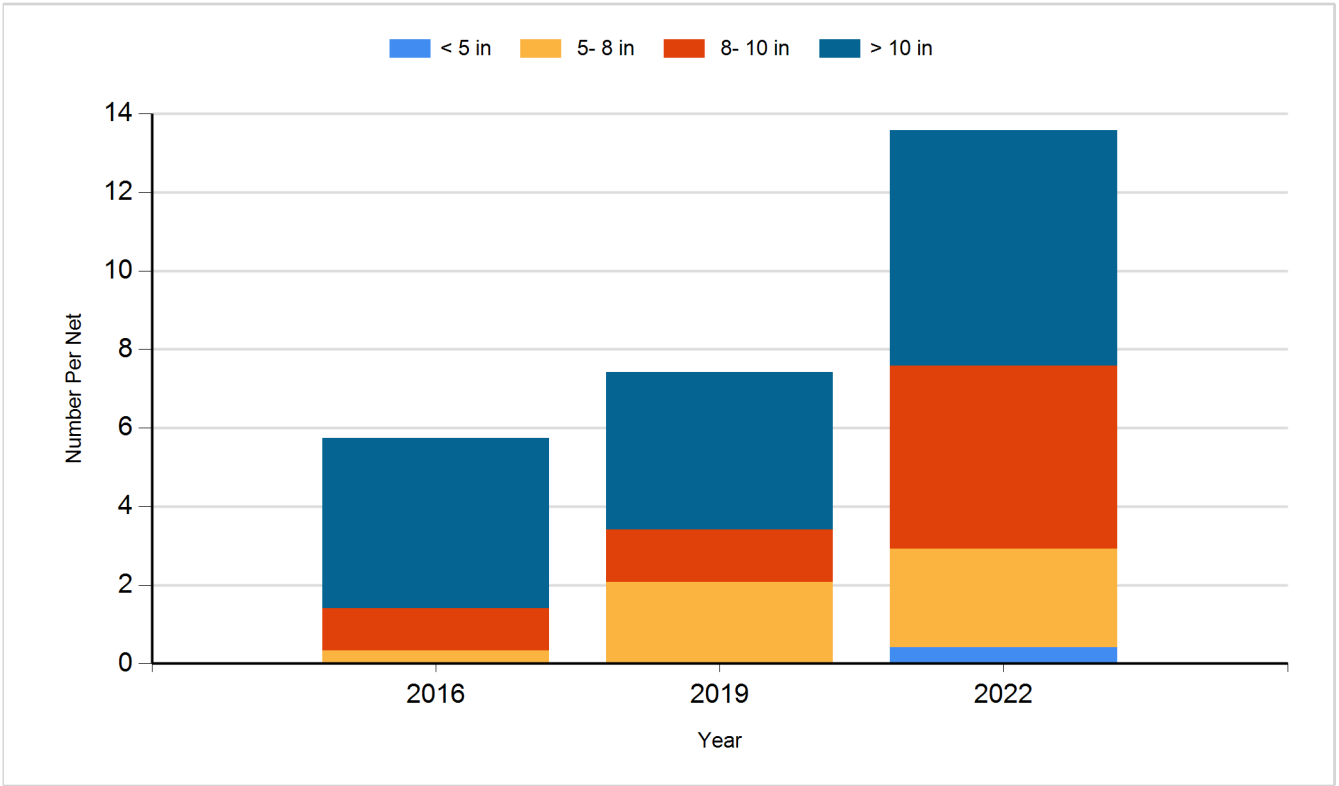
Species: White Sucker
Gear: AFS std gill net



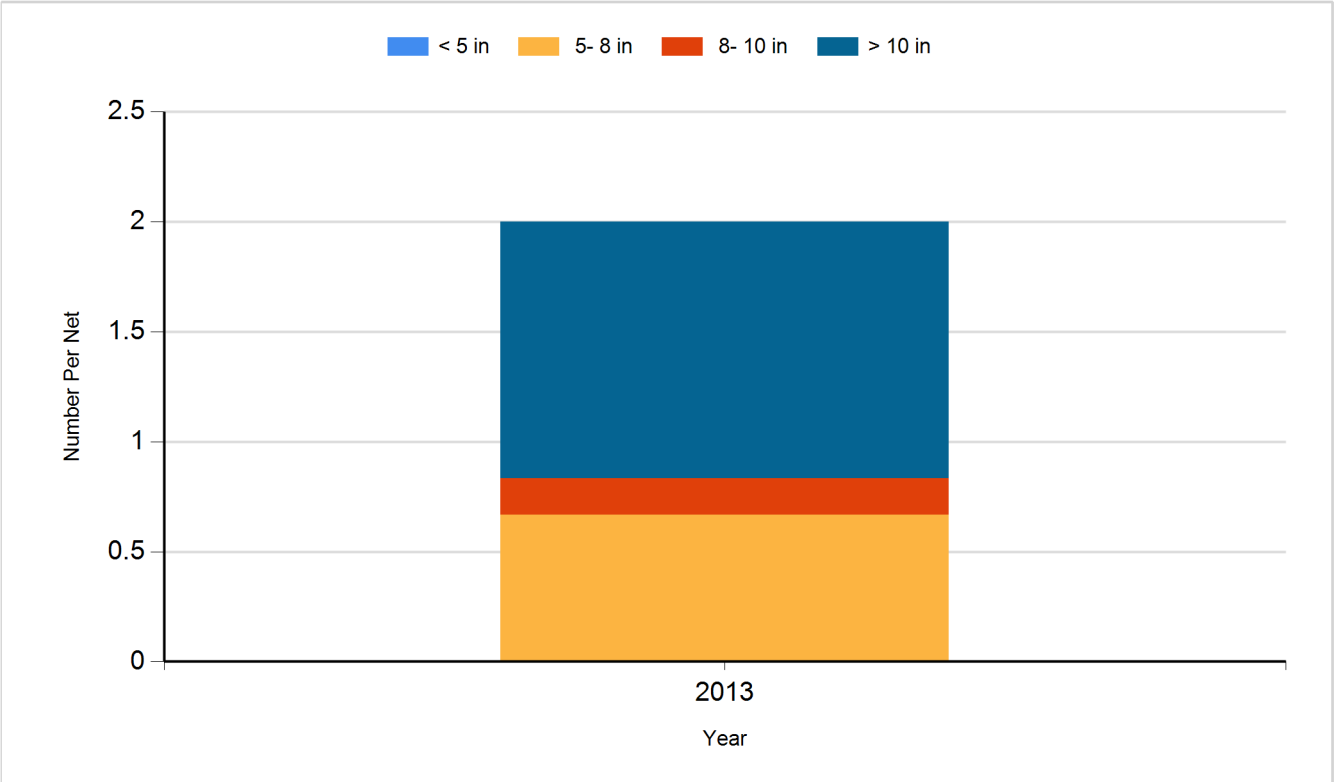
Species: White Sucker
Gear: std exp gill net



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
2011	Walleye	Fry	300,000
2014	Walleye	Fry	3,400,000
2016	Walleye	Fry	1,400,000
2018	Walleye	Fry	1,400,000
2021	Walleye	Fry	1,400,000
2022	Walleye	Fry	1,400,000