North Rush Survey Summary

North Rush Lake, located 3.0 miles west of Waubay, is managed as a northern pike, walleye, and yellow perch fishery; other fish species (e.g., rock bass, white bass) are present and contribute to the fishery.

- **Northern pike.** Relative abundance of northern pike has been low (i.e., <1.0/gill net) in three of four surveys conducted since 2010. In 2019, six northern pike that ranged in length from 23.0 to 38.4 inches were sampled. Northern pike respond to rising water levels and population increases are expected following high-water conditions experienced across northeast South Dakota in 2019.

- **Walleye.** Walleye numbers were higher in 2019 than 2016. At 6.0/gill net, relative abundance was considered moderate. Sampled walleyes ranged in length from 7.1 to 25.2 inches, most (69%) were ≥15.0 inches and 7% were ≥20 inches. Ten year classes (2008 and 2010 – 2018) were represented. The 2014 – 2016 cohorts, two of which coincided with fry stockings, accounted for 77% of walleyes sampled and the high proportion of walleyes >15.0 inches. Walleye growth appears to be good with mean length at capture values of 14.9 inches at age 3 and 16.5 inches at age 4.

- **Yellow perch**. Although yellow perch numbers have increased in each of the last two surveys, relative abundance remains low (7.4/gill net). Sampled yellow perch ranged in length from 5.1 to 14.2 inches; most (72%) were ≥8.0 inches and 54% were ≥10.0 inches. Ten consecutive year classes (2009 – 2018) were represented; those from the 2013 and 2017 cohorts were the most abundant and accounted for 51% of fish sampled. Yellow perch growth appears to be good with age-3 yellow perch approaching or exceeding 10.0 inches in surveys conducted since 2010. In 2019, the mean length at capture of age-3 fish was 9.8 inches.

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

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Rush North, Day County
UBS-Lake-411-001
2019

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	Jun 03, 2019	6 net-nights
AFS std gill net	Jun 04, 2019	6 net-nights

Common Fish Species Present

Yellow Perch

Walleye

White Bass

Northern Pike

White Sucker

Common Carp

Rock 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	Common Carp	2	0.2	0.2	100		100		86	6
	Northern Pike	6	0.5	0.2	100		83		89	5
	Rock Bass	1	0.1	0.1	100		100		126	
	Walleye	73	6.0	0.7	69	8	7	5	91	1
	White Bass	17	1.4	0.8	100		100		94	2
	White Sucker	2	0.2	0.2	100		100		106	8
	Yellow Perch	89	7.4	2.0	72	7	54	8	110	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.

		CPUE										
Gear	Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg
AFS std gill net	Black Bullhead							0.3			0.0	0.2
	Black Crappie							0.1			0.0	0.1
	Common Carp							0.2			0.2	0.2
	Northern Pike							0.8			0.5	0.7
	Rock Bass							0.0			0.1	0.1
	Walleye							3.6			6.0	4.8
	White Bass							0.7			1.4	1.1
	White Sucker							1.5			0.2	0.9
	Yellow Perch							5.8			7.4	6.6
frame net (std 3/4 in)	Black Bullhead	2.1			25.1							13.6
	Black Crappie	0.1			1.2							0.7
	Common Carp	1.2			0.1							0.7
	Northern Pike	0.5			1.0							0.8
	Rock Bass	0.0			0.1							0.1
	Smallmouth Bass	0.0			0.1							0.1
	Walleye	4.2			9.0							6.6
	White Bass	1.7			1.3							1.5
	White Sucker	0.6			0.2							0.4
	Yellow Perch	0.0			0.1							0.1
std exp gill net	Black Bullhead	0.0			1.5							0.8
	Black Crappie	0.1			0.0							0.1
	Common Carp	0.1			0.0							0.1
	Northern Pike	0.3			1.7							1.0
	Walleye	4.7			3.5							4.1
	White Bass	0.0			0.2							0.1
	White Sucker	0.6			0.3							0.5
	Yellow Perch	2.6			2.0							2.3

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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
AFS std gill net	Northern Pike	PSD							100			100
		PSD-P							0			83
		Wr							79			89
	Walleye	PSD							47			69
		PSD-P							5			7
		Wr							88			91
	Yellow Perch	PSD							94			72
		PSD-P							75			54
		Wr							110			110
std exp gill net	Northern Pike	PSD	60			80						
		PSD-P	40			10						
		Wr	91			73						
	Walleye	PSD	43			62						
		PSD-P	11			19						
		Wr	104			82						
	Yellow Perch	PSD	87			67						
		PSD-P	41			58						
		Wr	104			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+
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)		
2010	87	236 (4)	346 (48)	431 (16)	458 (5)	498 (10)	537 (4)				

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
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)				
2010	46	142 (2)	208 (19)	261 (25)							

Fish Condition

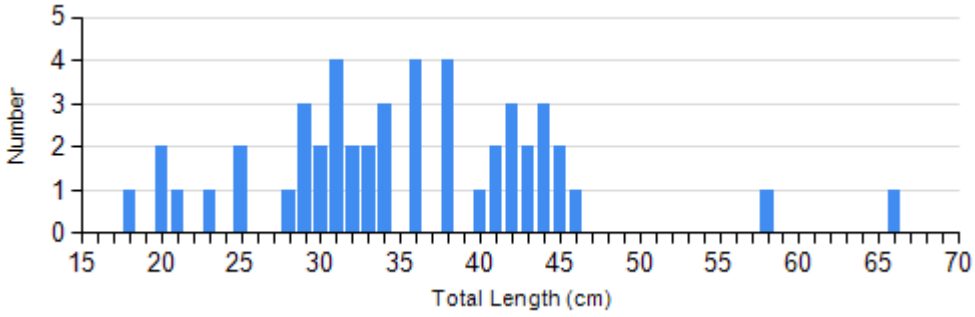
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2016	0		10	79 (1.7)	0		0	
	2019	0		1	83	3	91 (6.4)	2	89 (7.7)
Walleye Gill Net	2016	23	90 (1.1)	18	87 (0.9)	1	85	1	88
	2019	22	93 (1.2)	45	91 (0.8)	4	89 (2.6)	1	89
Yellow Perch Gill Net	2016	4	114 (2.9)	13	113 (2.5)	44	110 (1.1)	8	99 (4.5)
	2019	25	118 (1.3)	16	113 (2.3)	21	108 (1.7)	27	102 (1.5)

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net



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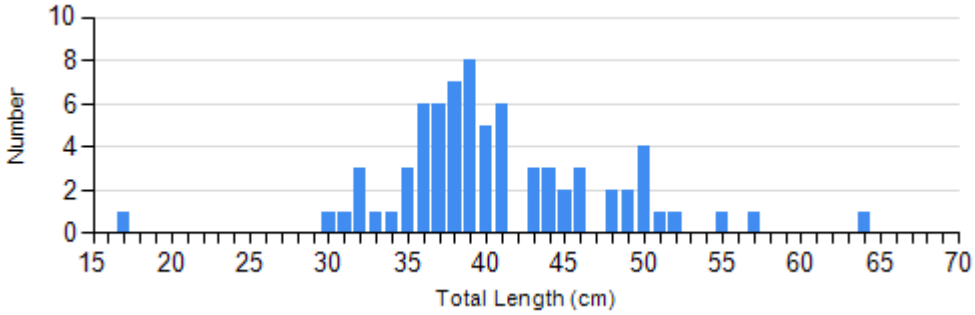
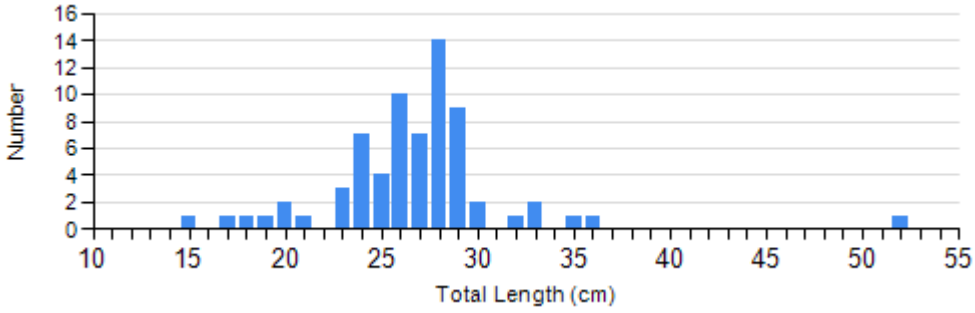


2019

Species: Yellow Perch
Gear: AFS std gill net



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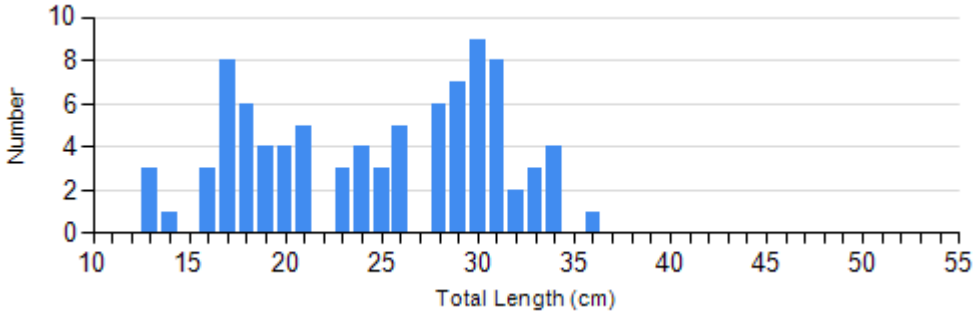
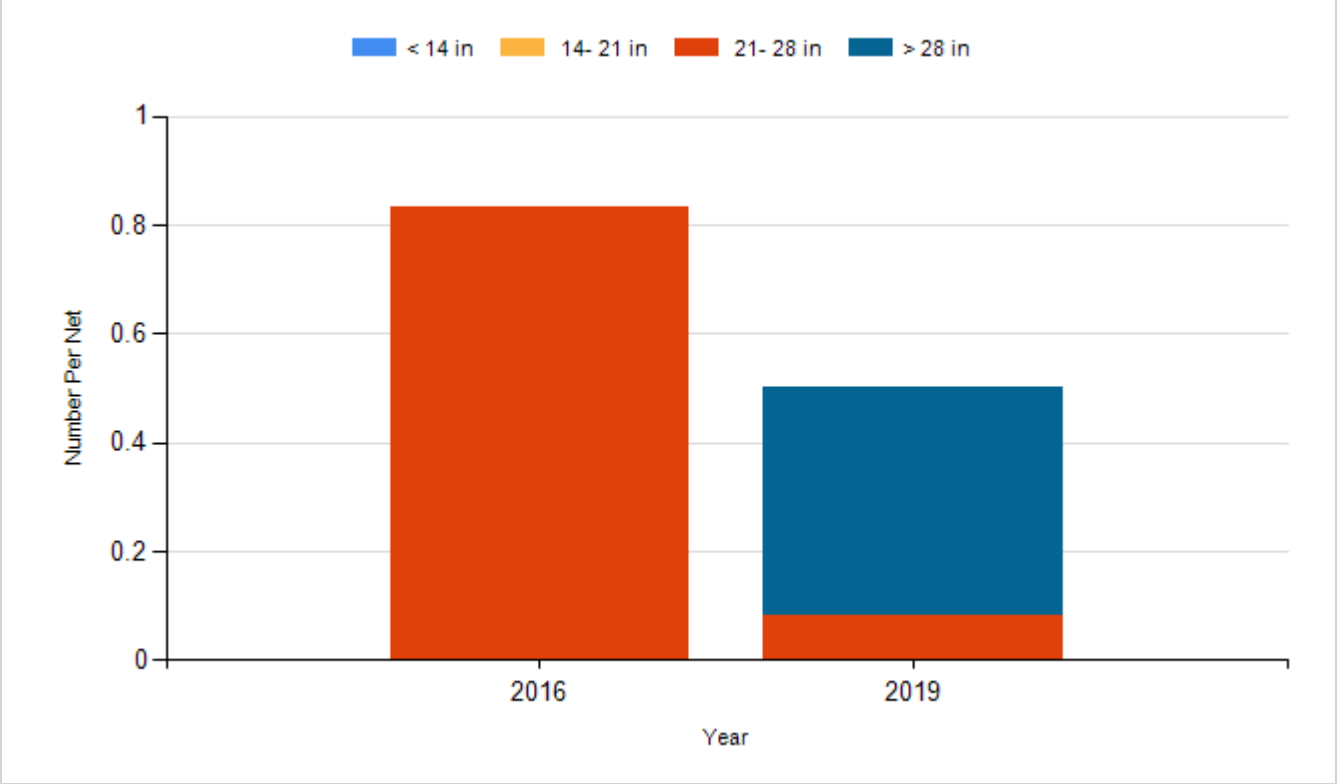


2019

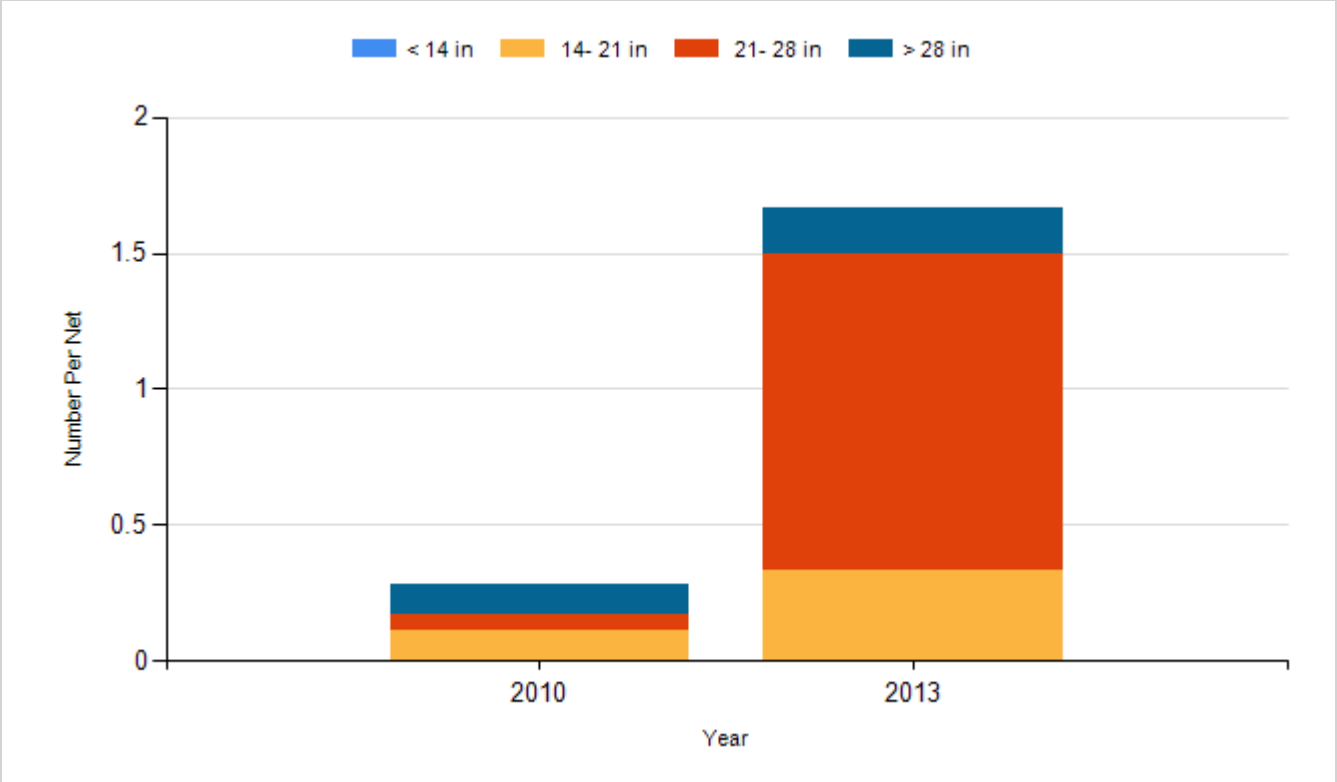
Historic Fish Sizes and Relative Abundance

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

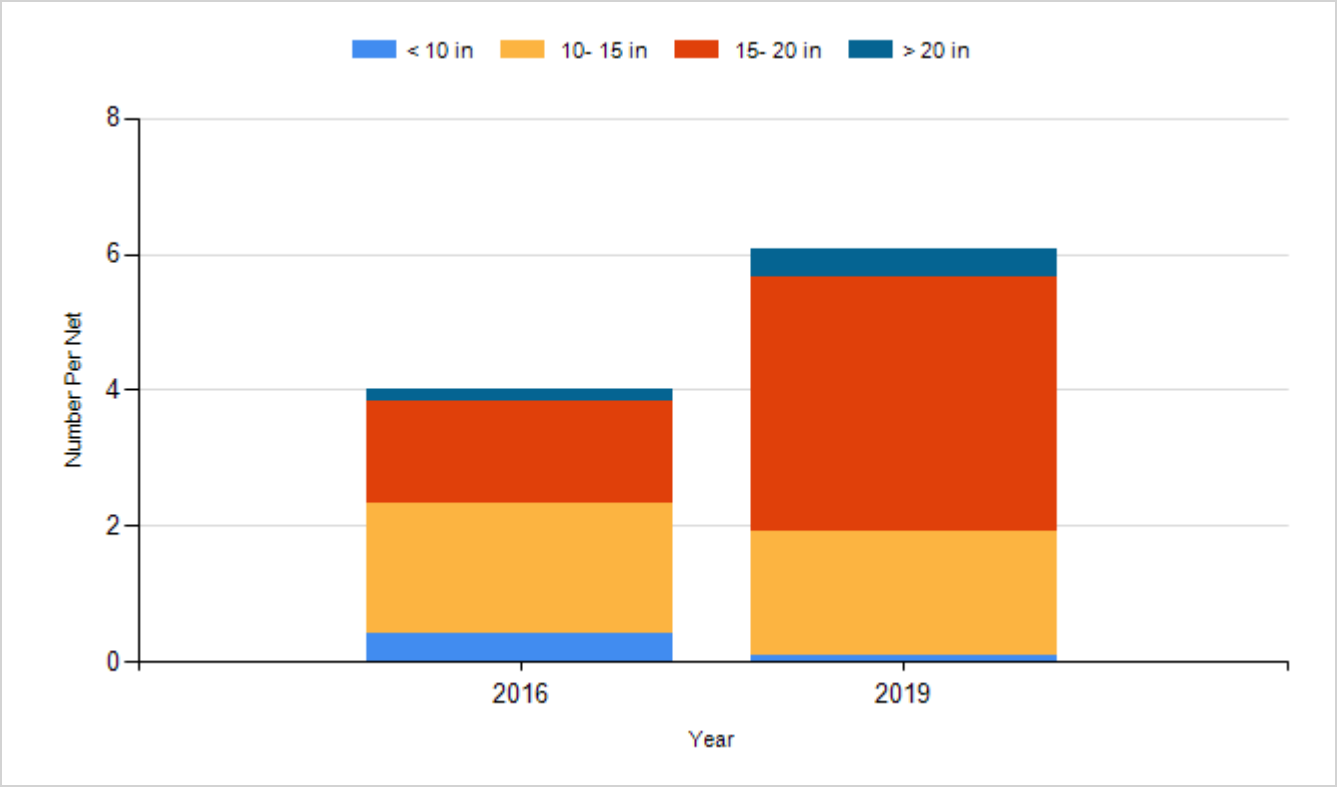
Species: Northern Pike
Gear: AFS std gill net



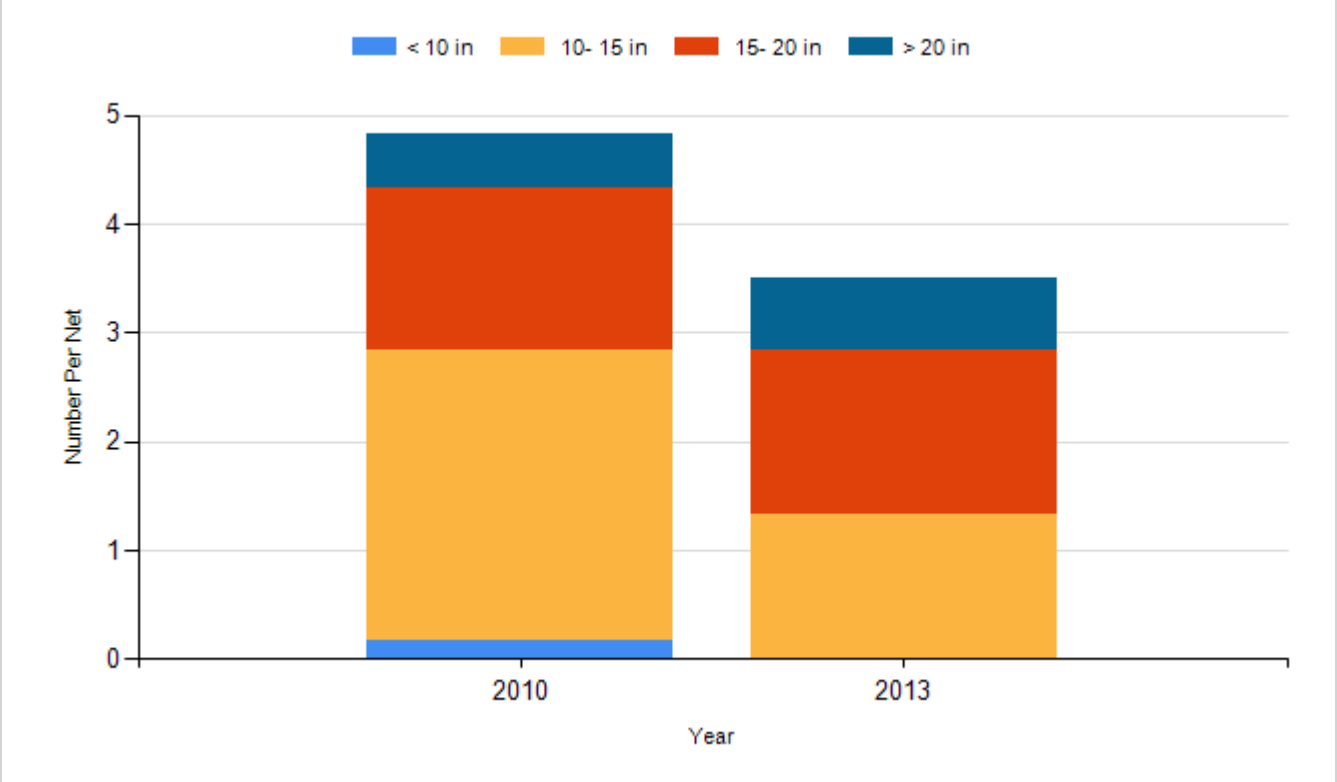
Species: Northern Pike
Gear: std exp gill net



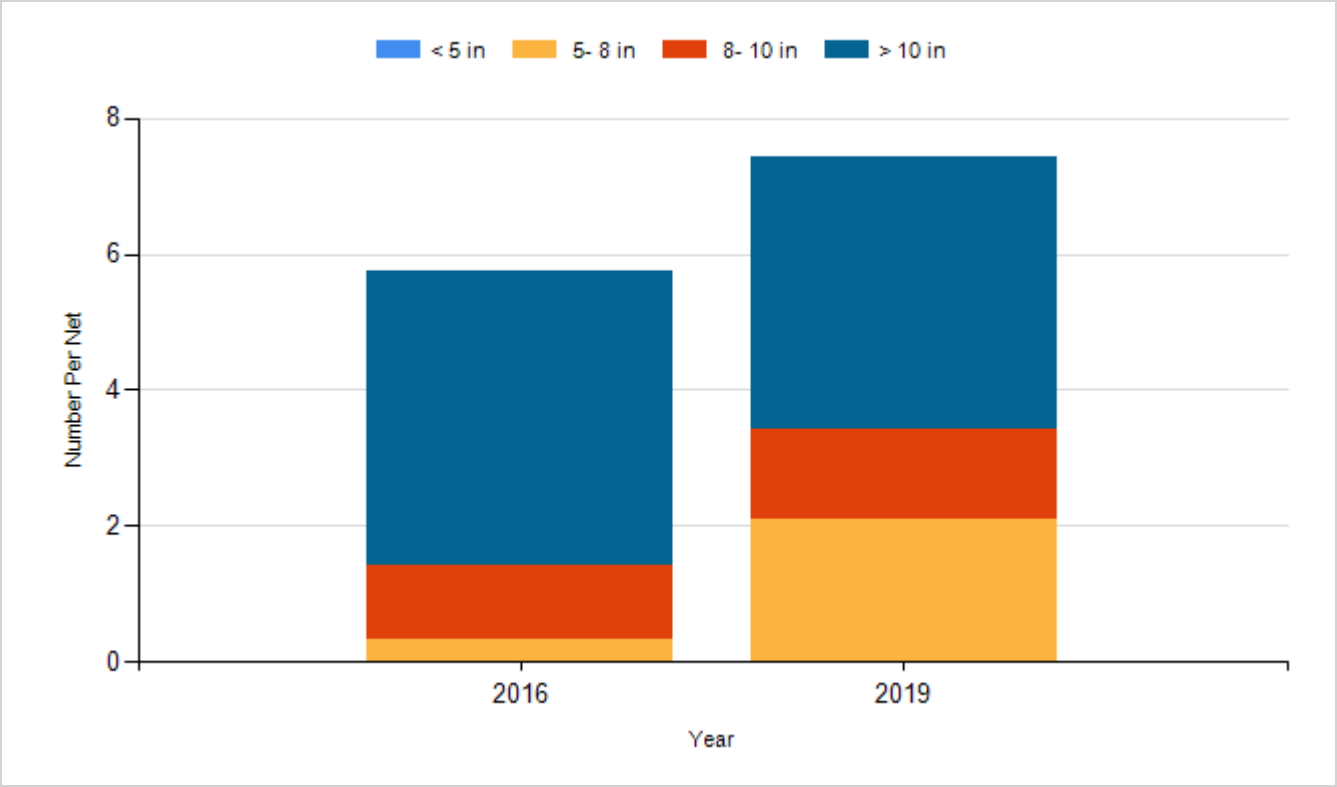
Species: Walleye
Gear: AFS std gill net



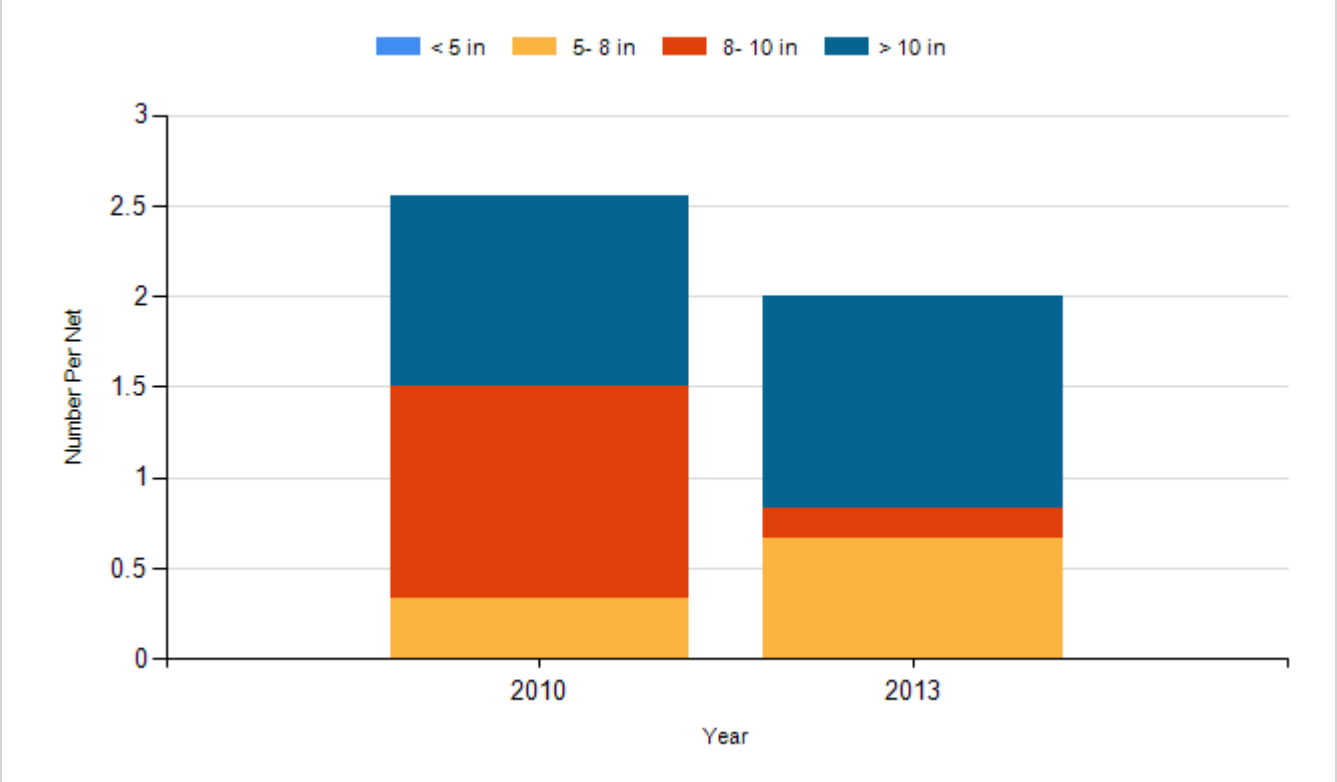
Species: Walleye
Gear: std exp gill net



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
2011	Walleye	Fry	300,000
2012	Walleye	Fry	1,400,000
2014	Walleye	Fry	3,400,000
2016	Walleye	Fry	1,400,000
2018	Walleye	Fry	1,400,000