South Rush Survey Summary

South Rush Lake, located 1.0 miles west of Waubay, is managed as a northern pike, walleye, and yellow perch fishery; other fish species (e.g., white bass) are present and contribute to the fishery.

- **Northern pike.** At 1.8/gill net, relative abundance was considered moderate in 2019. Sampled northern pike ranged in length from 20.5 to 31.1 inches; 95% were ≥21.0 inches and 27% were 28.0 inches or longer. 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 8.8/gill net, relative abundance was moderate to high. Sampled walleyes ranged in length from 6.7 to 28.3 inches; of those that were at least 10.0 inches, 75% were ≥15.0 inches and 12% ≥20.0 inches. Eleven year classes (2002, 2005, 2008, 2010 – 2012, and 2014 – 2018) were represented. Cohorts produced in 2015 and 2016 were the most abundant accounting for 56% of walleyes sampled. Walleye growth appears to be good with mean length at capture values of 15.1 inches at age 3 and 17.1 inches at age 4.

- **Yellow Perch**. Although yellow perch were the most abundant species in the 2019 gill net catch, relative abundance was considered low to moderate (12.2/gill net). Sampled yellow perch ranged in length from 4.7 to 14.6 inches, 49% were ≥8.0 inches and 36% 10.0 inches or longer. Nine consecutive year classes (2010 – 2018) were represented. Individuals from the 2017 (age 2) cohort were the most abundant and comprised 53% of the yellow perch catch. Yellow perch growth appears to be good with mean length at capture at age 3 exceeding 9.0 inches from 2010 – 2019. In 2019, the mean length at capture of age-3 fish was 9.4 inches.

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

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Rush South, Day County
UBS-Lake-411-002
2019

Lake Information

Name: Rush South

County: Day

Surface Area: 1,800 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 05, 2019	6 net-nights
AFS std gill net	Jun 06, 2019	6 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Northern Pike

Common Carp

White Bass

White Sucker

Black Crappie

Black Bullhead

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	1	0.1	0.1	100		100		98	
	Black Crappie	2	0.2	0.2	100		100		95	6
	Common Carp	7	0.6	0.3	100		100		91	6
	Northern Pike	22	1.8	0.6	95		27	15	85	2
	Walleye	113	8.8	2.0	75	6	12	5	91	1
	White Bass	5	0.4	0.3	100		100		95	1
	White Sucker	4	0.3	0.3	100		100		103	2
	Yellow Perch	148	12.2	2.9	50	6	36	6	107	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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg
AFS std gill net	Black Bullhead							0.2			0.1	0.2
	Black Crappie							0.2			0.2	0.2
	Common Carp							0.3			0.6	0.5
	Northern Pike							0.5			1.8	1.2
	Walleye							5.3			8.8	7.1
	White Bass							2.7			0.4	1.6
	White Sucker							1.3			0.3	0.8
	Yellow Perch							9.3			12.2	10.8
frame net (std 3/4 in)	Black Bullhead	1.0			9.2							5.1
	Black Crappie	1.6			4.3							3.0
	Common Carp	1.3			0.2							0.8
	Northern Pike	0.3			0.5							0.4
	Orangespotted Sunfish*	0.3			0.0							0.2
	Rock Bass	0.2			0.4							0.3
	Walleye	2.6			6.8							4.7
	White Bass	1.7			5.9							3.8
	White Sucker	0.6			0.2							0.4
	Yellow Perch	0.1			0.1							0.1
std exp gill net	Black Bullhead	0.0			0.8							0.4
	Black Crappie	0.0			0.5							0.3
	Common Carp	0.1			0.0							0.1
	Northern Pike	0.4			6.5							3.5
	Orangespotted Sunfish*	0.3			0.0							0.2
	Spottail Shiner*	0.0			0.3							0.2
	Walleye	1.4			14.7							8.1
	White Bass	0.1			0.5							0.3
	White Sucker	0.4			1.0							0.7
	Yellow Perch	4.1			12.3							8.2

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							83			95
		PSD-P							0			27
		Wr							79			85
	Walleye	PSD							50			75
		PSD-P							11			12
		Wr							88			91
	Yellow Perch	PSD							85			50
		PSD-P							52			36
		Wr							109			107
std exp gill net	Northern Pike	PSD	86			97						
		PSD-P	0			5						
		Wr	86			83						
	Walleye	PSD	56			86						
		PSD-P	16			15						
		Wr	96			89						
	Yellow Perch	PSD	73			32						
		PSD-P	32			23						
		Wr	111			98						

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	113	188 (8)	339 (15)	383 (43)	435 (20)	467 (15)		622 (1)	546 (4)	612 (4)	702 (3)
2016	66	208 (2)	304 (27)	386 (5)	414 (14)	479 (4)	506 (10)	530 (1)	527 (1)	571 (1)	705 (1)
2013	93	130 (5)	302 (3)	419 (55)	492 (14)	517 (12)	633 (1)		600 (1)		580 (1)
2010	28	219 (3)	349 (10)	429 (10)	475 (1)	549 (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	148	136 (5)	179 (78)	238 (14)	278 (18)	305 (10)	318 (11)	335 (1)	339 (6)	356 (2)	
2016	114	135 (8)	208 (33)	253 (37)	287 (7)	293 (24)	333 (2)	339 (2)	340 (1)		
2013	76	102 (2)	178 (55)	263 (10)	300 (6)		323 (3)				
2010	81	127 (18)	207 (35)	255 (28)							

Fish Condition

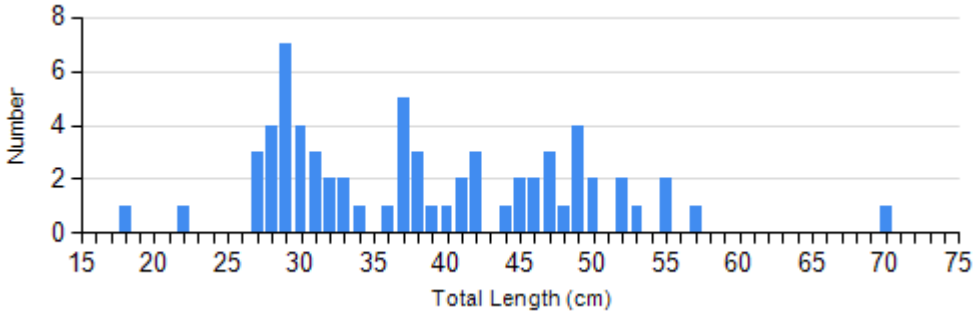
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	1	89	5	77 (2.8)	0		0	
	2019	1	84	15	86 (1.5)	6	82 (2.2)	0	
Walleye Gill Net	2016	32	88 (0.8)	25	89 (0.9)	6	87 (1.3)	1	74
	2019	26	93 (1.4)	66	91 (0.7)	8	91 (1.8)	5	89 (4.6)
Yellow Perch Gill Net	2016	17	114 (1.9)	37	111 (0.9)	46	108 (1.1)	12	100 (1.9)
	2019	73	113 (0.8)	20	108 (1.9)	24	103 (1.3)	29	94 (1.2)

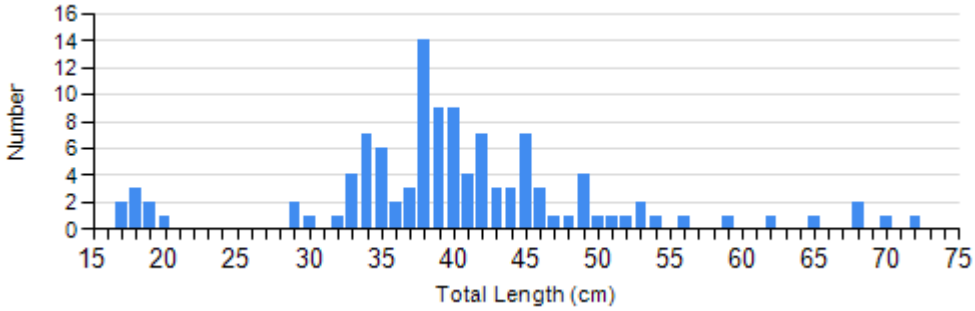
Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net

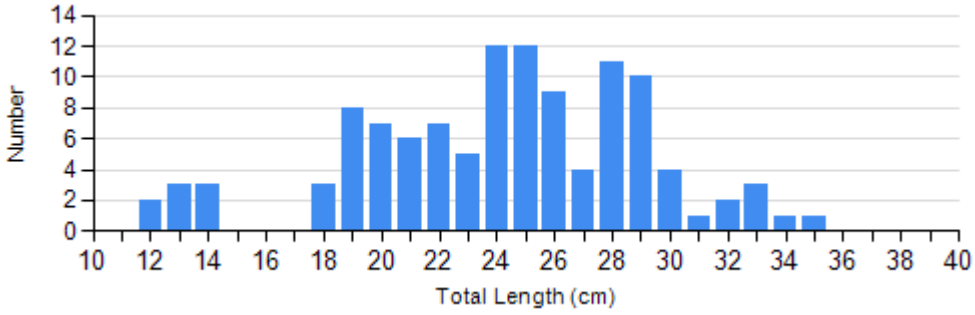


2016



2019

Species: Yellow Perch
Gear: AFS std gill net



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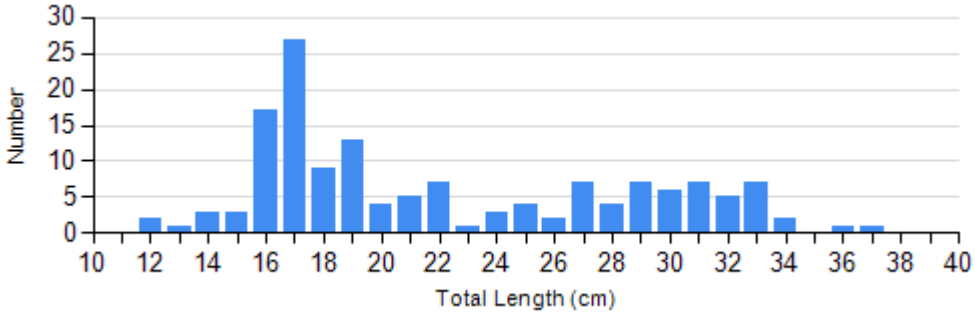
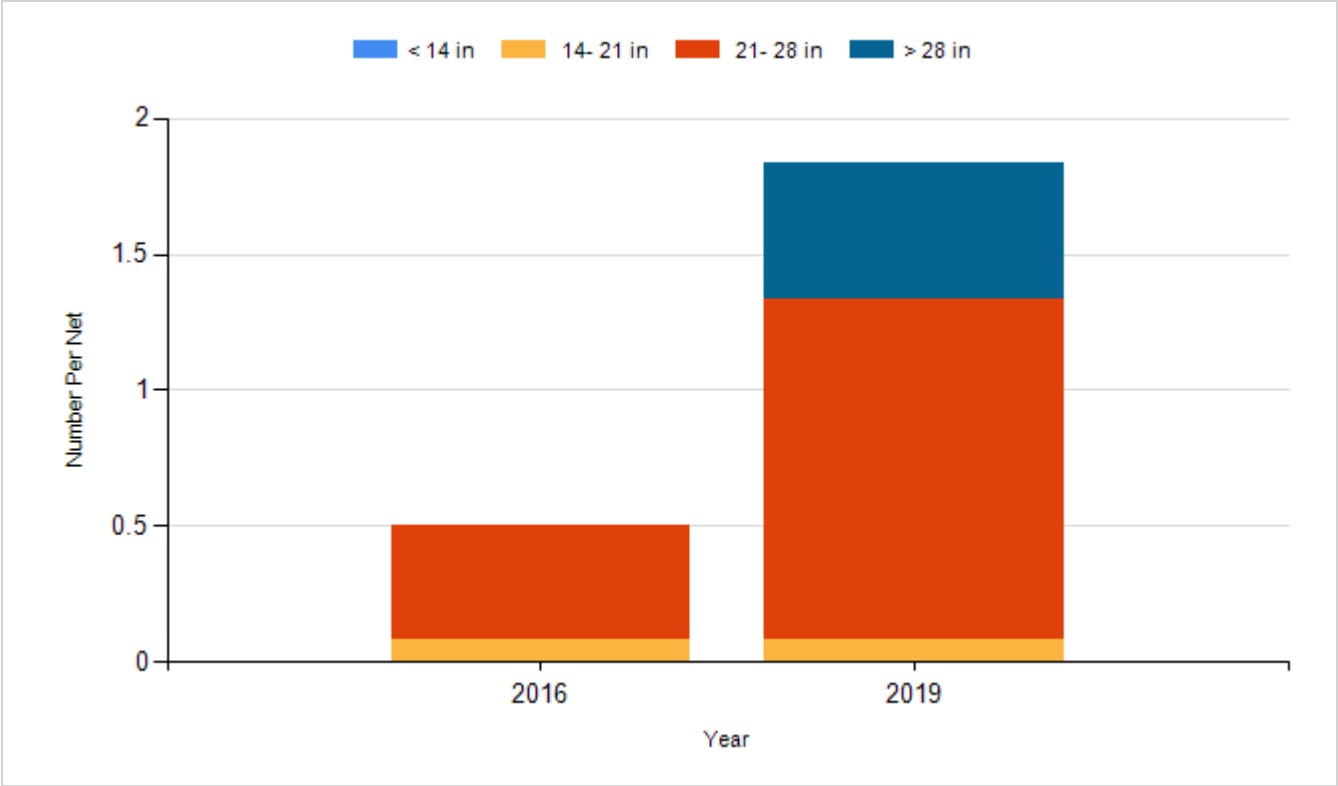


2019

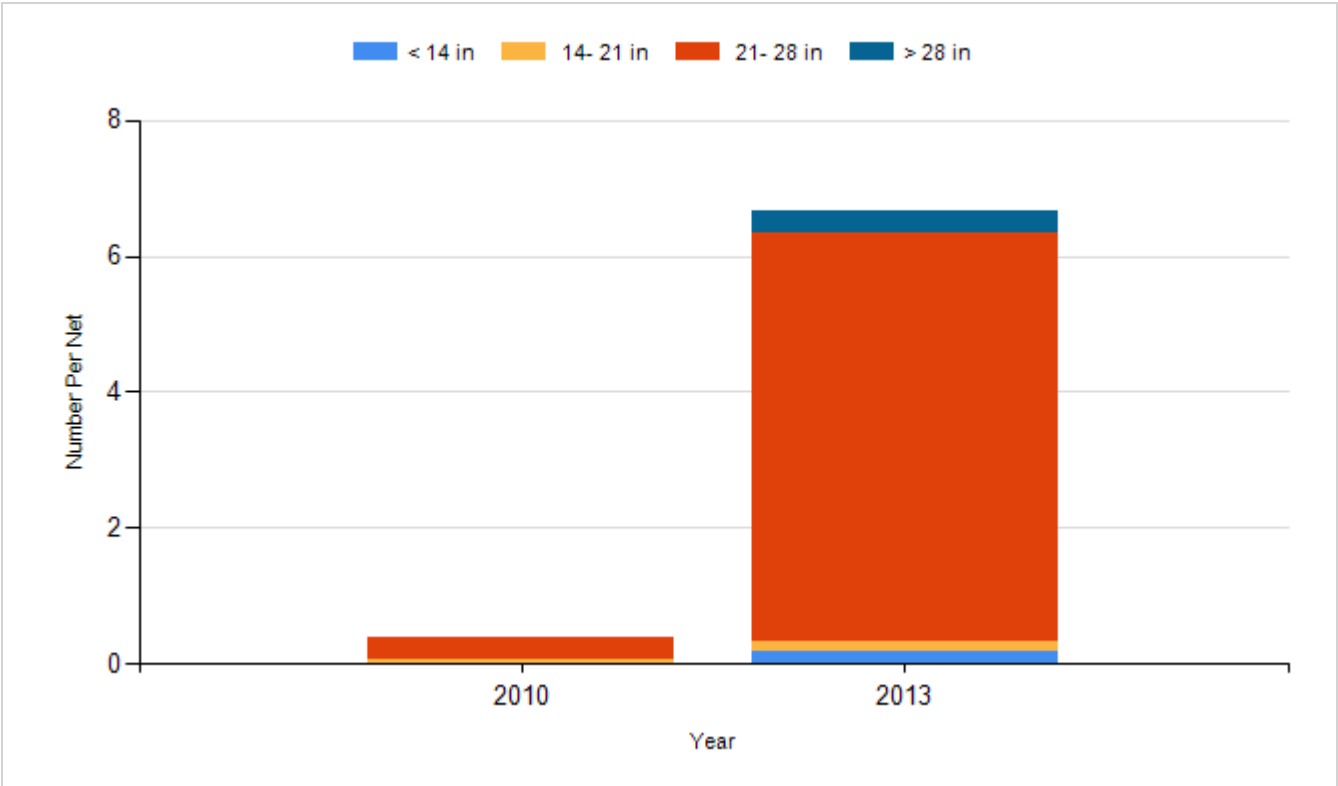
Historic Fish Sizes and Relative Abundance

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

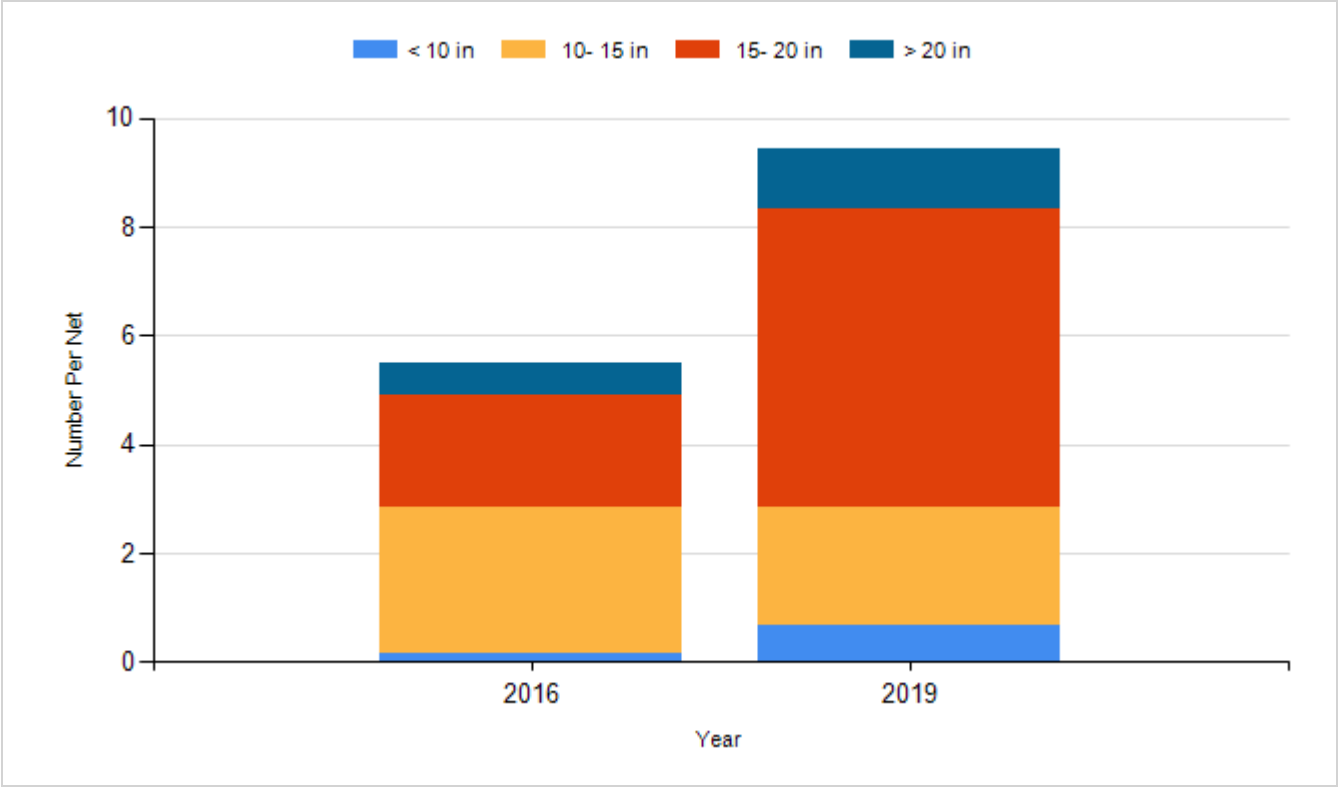
Species: Northern Pike
Gear: AFS std gill net



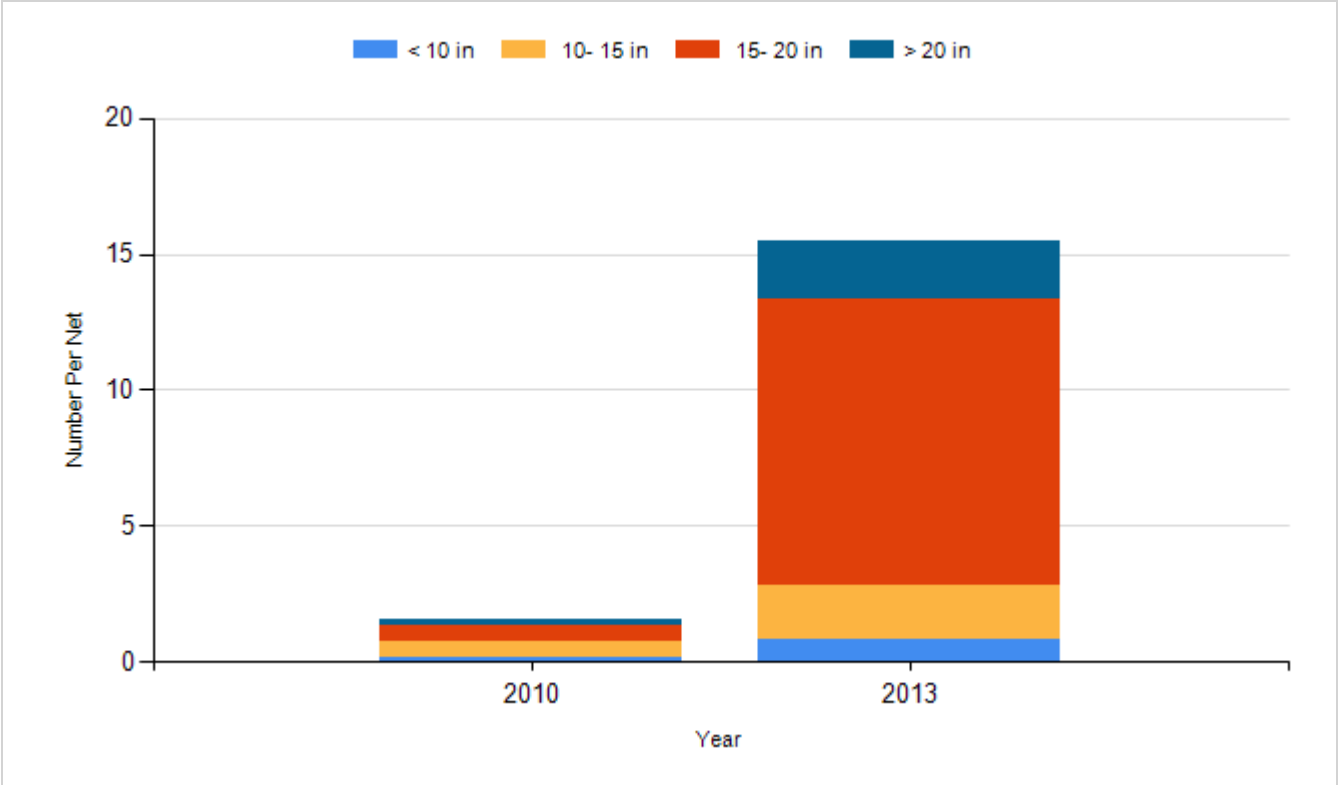
Species: Northern Pike
Gear: std exp gill net



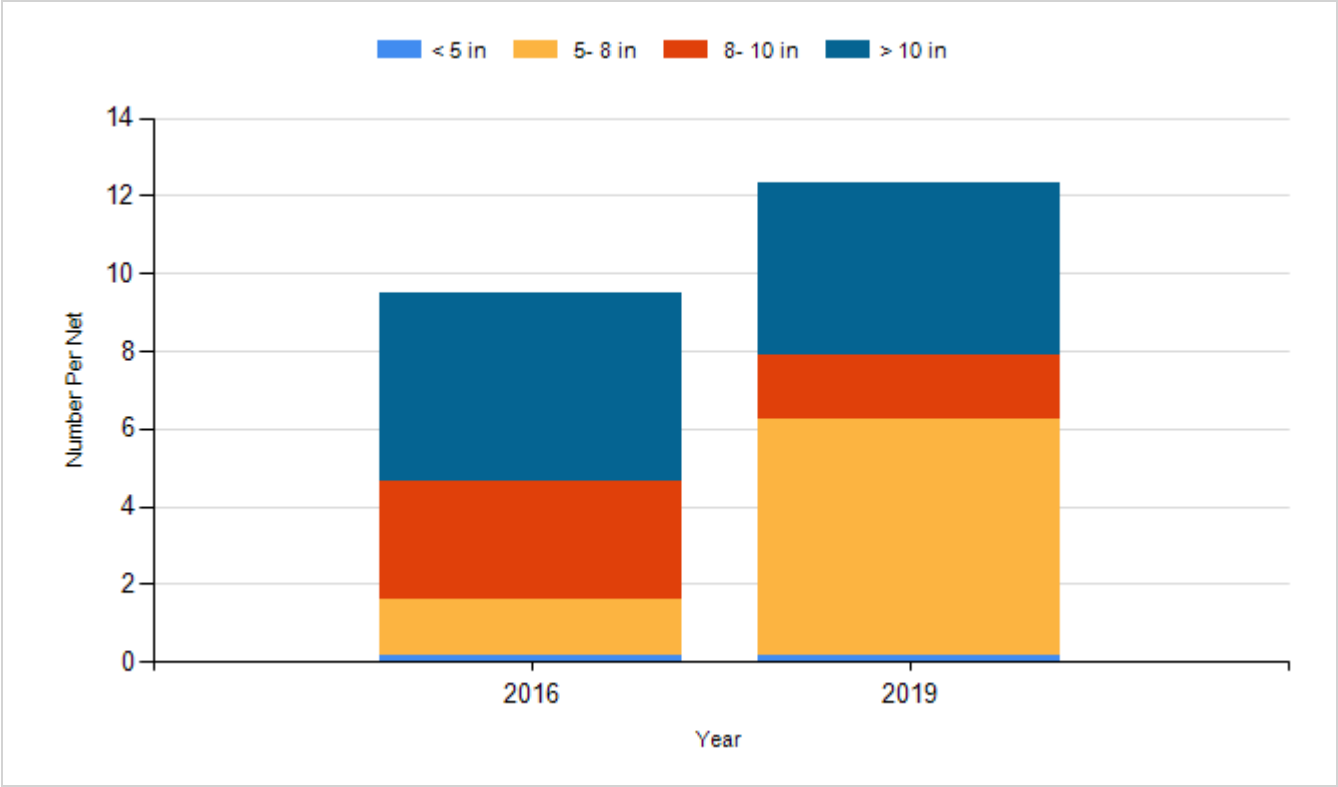
Species: Walleye
Gear: AFS std gill net



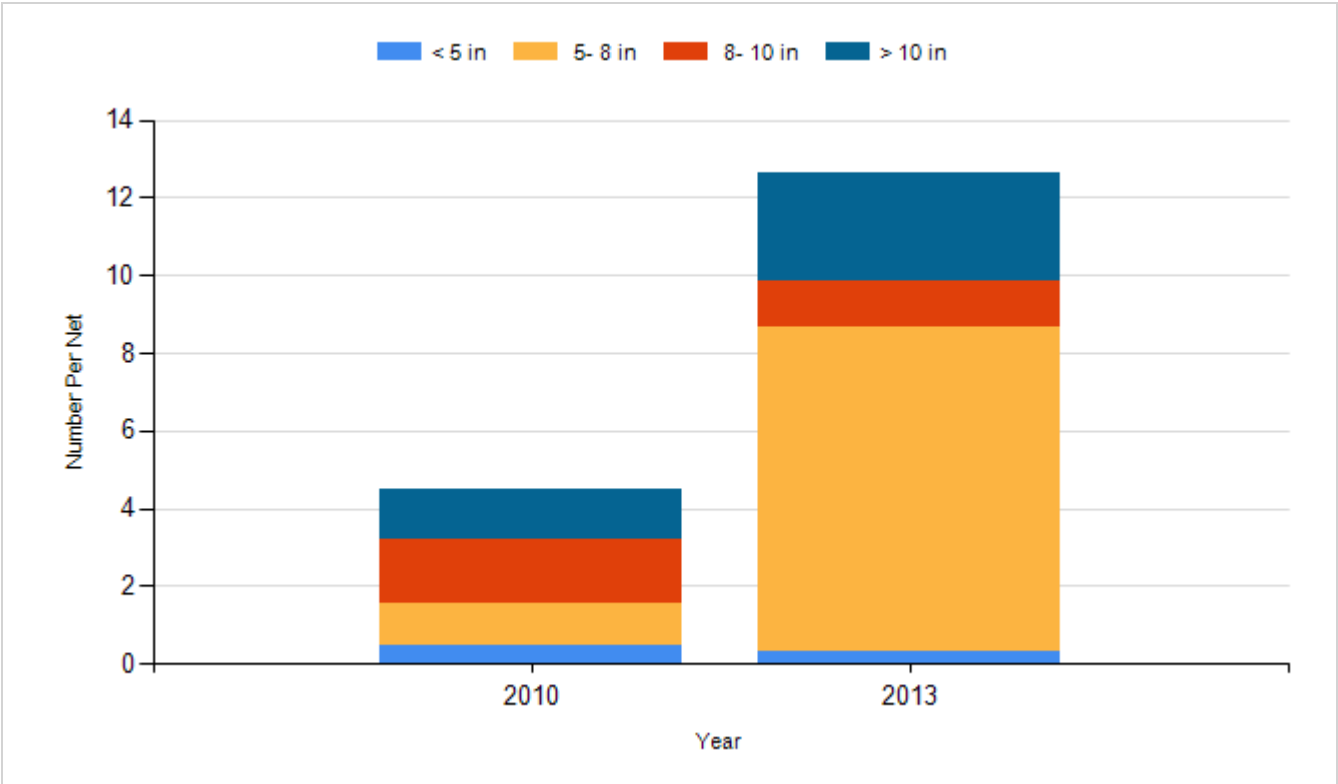
Species: Walleye
Gear: std exp gill net



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
2012	Walleye	Fry	850,000
2014	Walleye	Fry	850,000
2016	Walleye	Fry	850,000
2018	Walleye	Fry	850,000