SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Spring, Walworth County
LLO-Lake-239-000
2018

Lake Information

Name: Spring

County: Walworth

Legal Description: T122-R74-S6

Surface Area: 852 Acres

Maximum Depth: 9 Feet

Mean Depth: 6 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 10, 2018	3 net-nights
frame net (std 3/4 in)	Jul 10, 2018	6 net-nights
frame net (std 3/4 in)	Jul 11, 2018	6 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Black Bullhead

Northern Pike

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	Northern Pike	1	0.3	0.6	100		0		102	
	Walleye	89	29.7	11.5	100		6	4	91	1
	Yellow Perch	14	4.7	3.1	100		100		115	2
frame net (std 3/4 in)	Black Bullhead	16	1.3	0.7	94		88		98	4
	Northern Pike	2	0.2	0.2	100		0		101	3
	Walleye	550	45.8	12.4	100		4	1	92	1
	Yellow Perch	7	0.6	0.3	100		100		113	5

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std gill net	Northern Pike										0.3	0.3
	Walleye										29.7	29.7
	Yellow Perch										4.7	4.7
frame net (std 3/4 in)	Black Bullhead					1.0		0.3			1.3	0.9
	Northern Pike			0.7							0.2	0.5
	Walleye					10.0		9.8			45.8	21.9
	Yellow Perch					0.1		0.5			0.6	0.4
std exp gill net	Walleye					50.0		29.5				39.8

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Northern Pike	PSD										100
		PSD-P										0
		Wr										102
	Walleye	PSD										100
		PSD-P										6
		Wr										91
	Yellow Perch	PSD										100
		PSD-P										100
		Wr										115
frame net (std 3/4 in)	Black Bullhead	PSD					70		67			94
		PSD-P					0		0			88
		Wr					123		104			98
	Northern Pike	PSD			100							100
		PSD-P			14							0
		Wr			90							101
	Walleye	PSD					60		100			100
		PSD-P					0		0			4
		Wr					95		81			92
	Yellow Perch	PSD					100		100			100
		PSD-P					0		80			100
		Wr					96		87			113
std exp gill net	Walleye	PSD					58		100			
		PSD-P					0		0			
		Wr					97		86			

Back-Calculated Lengths

Mean species back-calculated total length (mm) at age, standard error (SE), and sample size (N).

Species: Walleye

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2014	4	8	219 (10.9)	300 (14.9)	365 (14.7)	403 (13.2)						
2014	4	37	219 (4.3)	309 (5.1)	366 (5.4)	406 (3.9)						
2011	7	10	239 (7.3)	313 (9.2)	374 (12.7)	414 (9.4)	442 (9)	467 (9.1)	489 (8)			
2011	7	15	250 (5.2)	330 (9.1)	383 (10.3)	415 (10.6)	440 (10.4)	461 (9.8)	481 (10.2)			
Weighted Mean		70	229	313	371	409	441	463	484			

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2014	4	8										
2014	4	37										
2011	7	10										
2011	7	15										
Weighted Mean		70										

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2012	6	2	121 (3.8)	165 (5.3)	189 (1.1)	223 (4.2)	249 (10.1)	274 (13.9)				
2012	6	4	119 (4.4)	171 (8.1)	198 (9.8)	221 (12.2)	245 (11.1)	261 (8.3)				
2011	7	1	92	141	170	205	234	273	302			
2011	7	6	109 (3.3)	167 (9.4)	205 (5.5)	233 (4.5)	257 (3.1)	280 (3.3)	294 (4.6)			
2010	8	1	106	128	172	198	217	246	256	273		
2010	8	4	108 (8)	141 (6.5)	172 (5.2)	192 (6)	215 (7.4)	237 (5.6)	259 (5.7)	277 (8.1)		
2009	9	1	98	135	179	193	207	224	241	262	274	
Weighted Mean		19	111	157	190	215	239	261	277	274	274	

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2012	6	2										
2012	6	4										
2011	7	1										
2011	7	6										
2010	8	1										
2010	8	4										
2009	9	1										
Weighted Mean		19										

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+
2018	89				435 (72)			491 (18)			
2015	100	191 (41)			431 (59)						

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	14						282 (4)	307 (6)	294 (4)		

Fish Condition

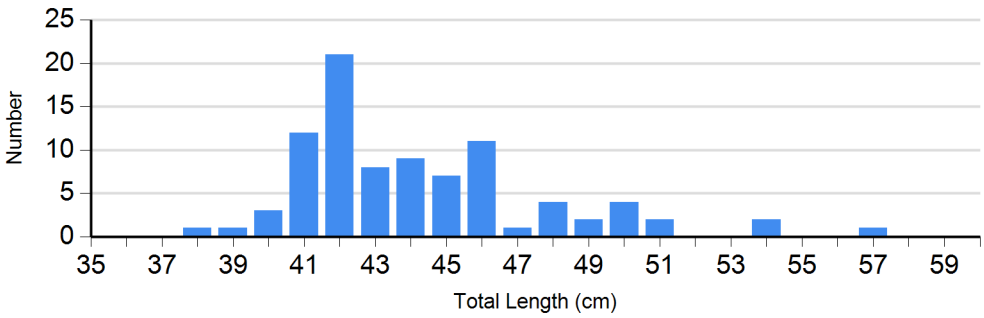
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2018	0		1	102	0		0	
Walleye Gill Net	2015	0		59	86 (0.8)	0		0	
	2018	0		84	91 (0.7)	5	85 (3.1)	0	
Yellow Perch Gill Net	2018	0		0		6	116 (3.1)	8	114 (2.2)

Length Frequency Distribution

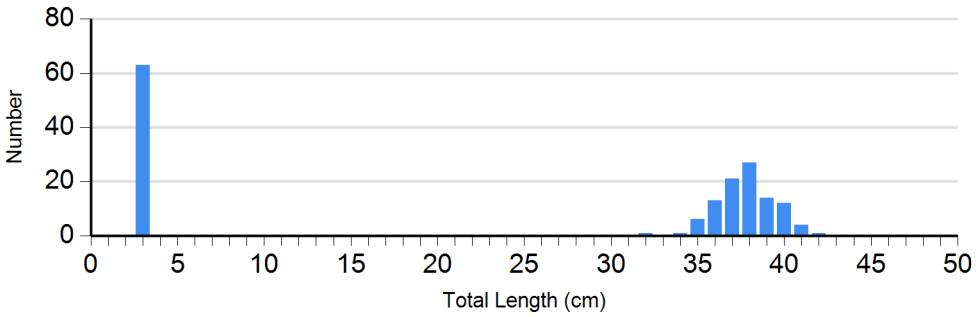
Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net

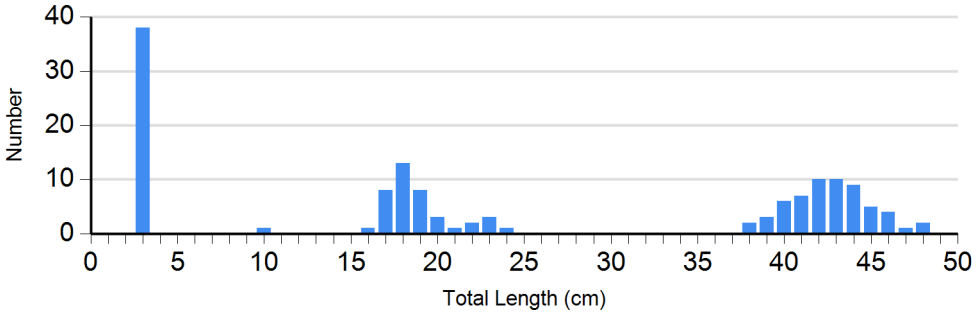


2018

Species: Walleye
Gear: std exp gill net

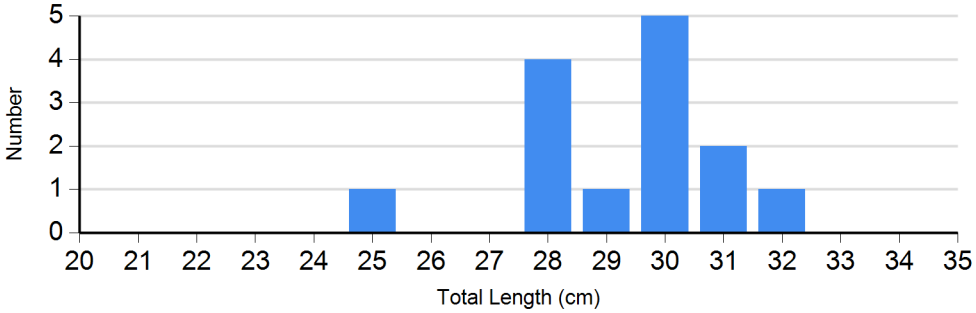


2013



2015

Species: Yellow Perch
Gear: AFS std gill net

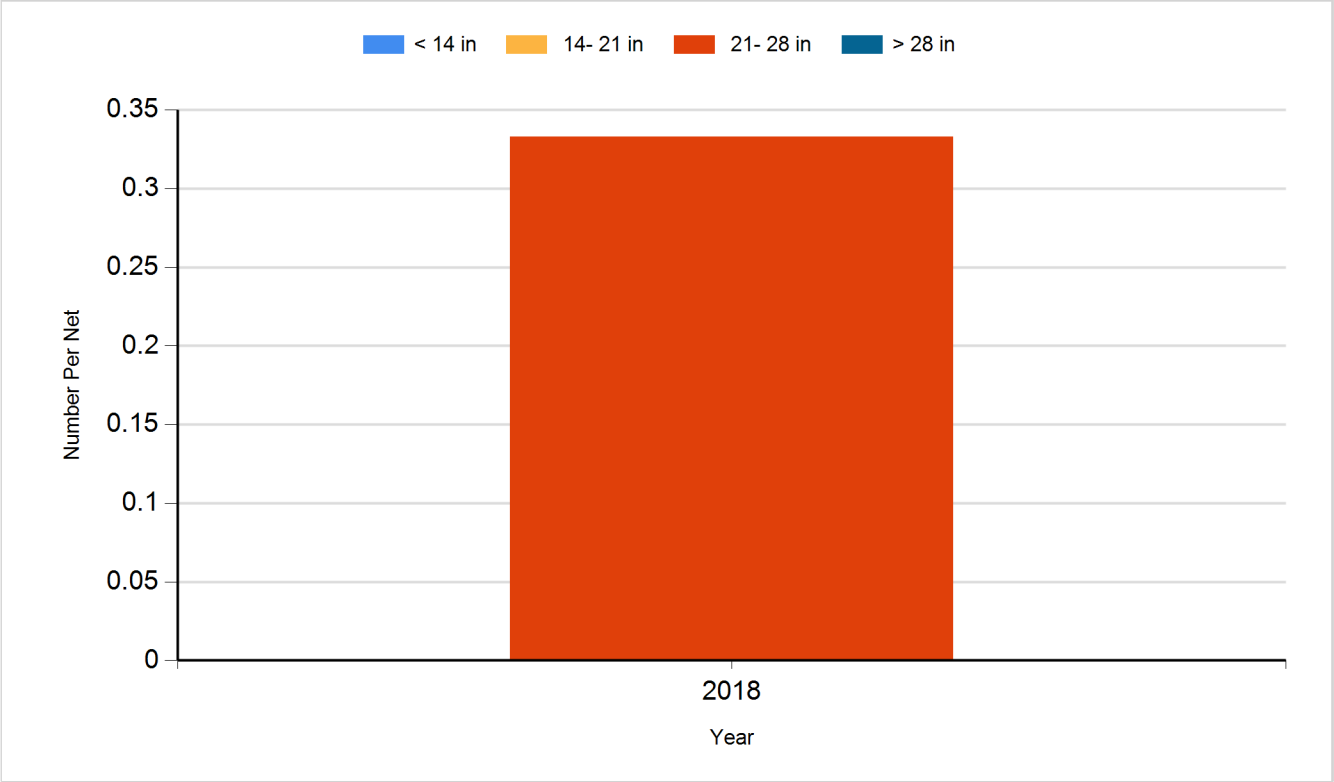


2018

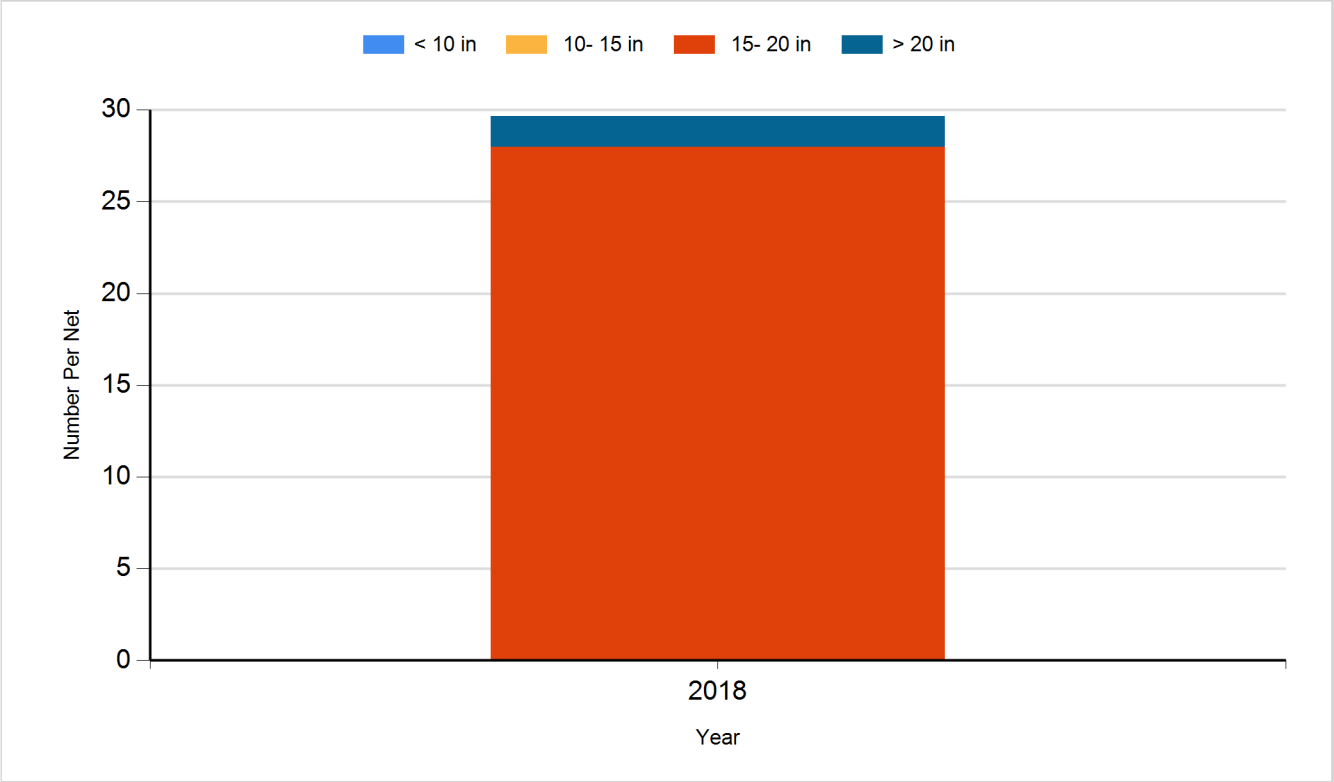
Historic Fish Sizes and Relative Abundance

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

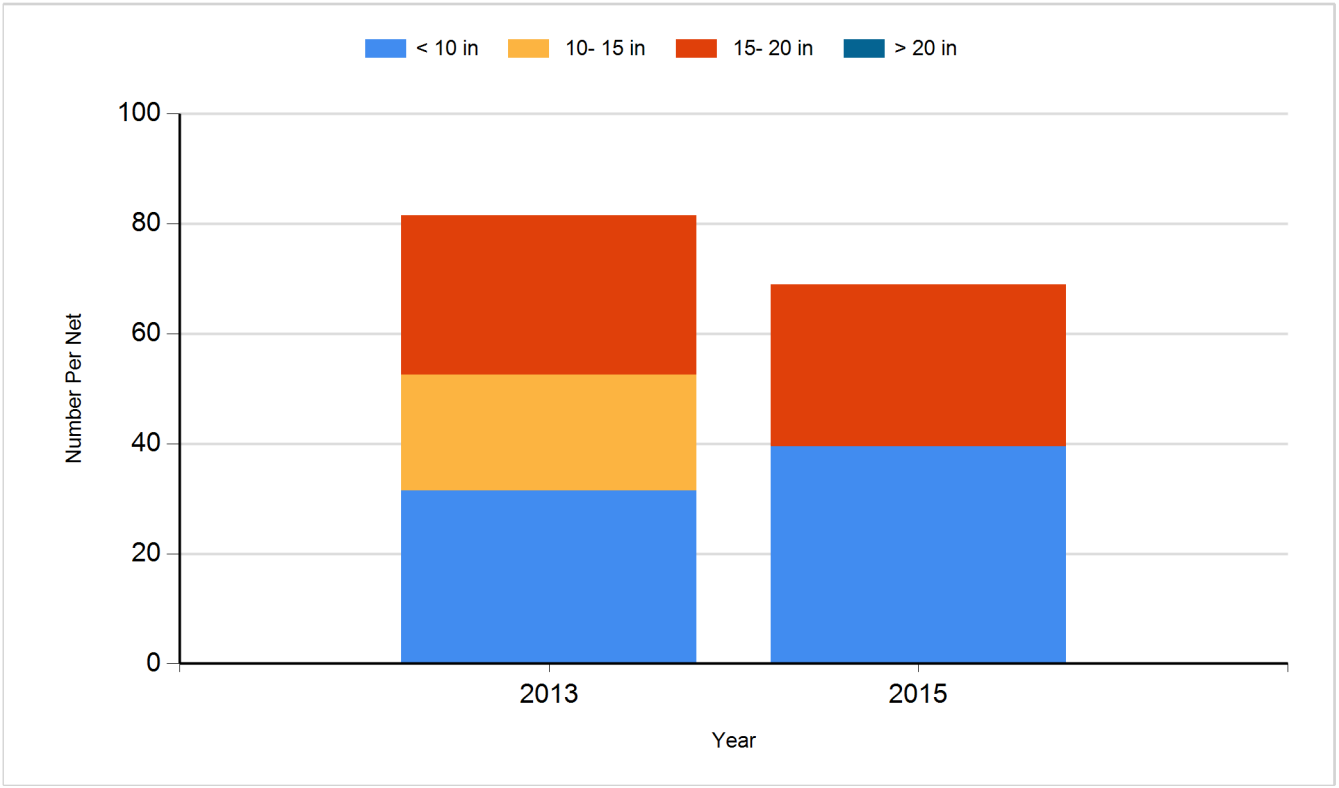
Species: Northern Pike
Gear: AFS std gill net



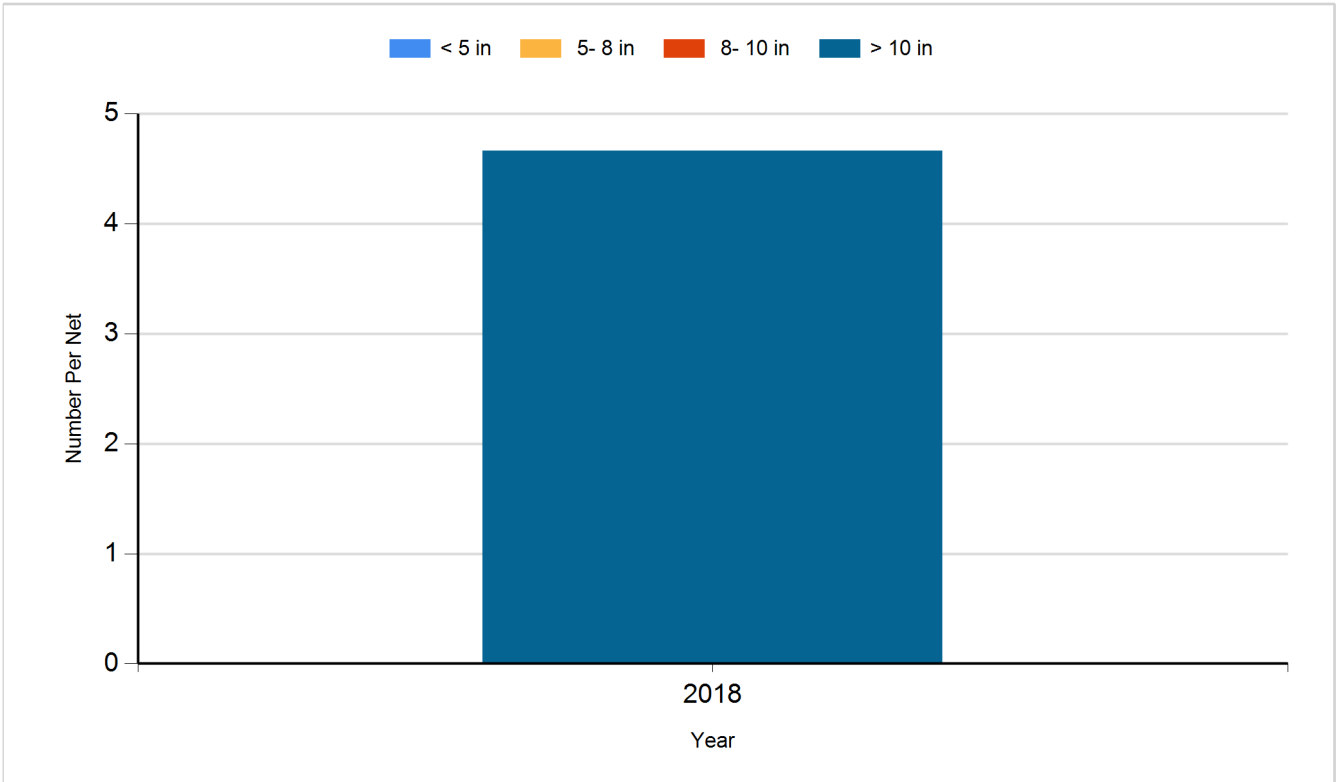
Species: Walleye
Gear: AFS std gill net



Species: Walleye
Gear: std exp 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
2011	Walleye	Small Fingerling	78,000
2012	Yellow Perch	Adult	300
2014	Walleye	Fry	750,000
2015	Yellow Perch	Fingerling	6,600
2018	Walleye	Fry	720,000