

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Spring, Walworth County
LLO-Lake-239-000
2020

Lake Information

Name:	Spring	Maximum Depth:	9 Feet
County:	Walworth	Mean Depth:	6 Feet
Legal Description:	T122-R74-S6		
Surface Area:	852 Acres		

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 09, 2020	3 net-nights
frame net (std 3/4 in)	Jun 09, 2020	6 net-nights
frame net (std 3/4 in)	Jun 10, 2020	6 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Black Bullhead

Northern Pike

Black Crappie

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.
- **std 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.

$$CPUE = \frac{\text{number of fish}}{\text{effort}}$$

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.

$$PSD = \left(\frac{\text{number of fish} \geq \text{quality length}}{\text{number of fish} \geq \text{stock length}} \right) \times 100$$

$$PSD - P = \left(\frac{\text{number of fish} \geq \text{preferred length}}{\text{number of fish} \geq \text{stock length}} \right) \times 100$$

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.

$$Wr = \left(\frac{W}{Ws} \right) \times 100$$

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).

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(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**

Gear	Species	Sample Size (n)	Abundance		Stock Density Indices			Condition		
			CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Walleye	95	31.7	1.8						
	Yellow Perch	42	12.3	1.7	70	12	19	10	112	2
frame net (std 3/4 in)	Black Bullhead	34	2.2	1.0	69	14	8		125	4
	Black Crappie	1	0.1	0.1	100		100		110	
	Northern Pike	7	0.6	0.3	14		0		98	4
	Walleye	253	21.1	4.2	49	4	30	4	104	1
	Yellow Perch	31	2.0	0.6	83		63	16	106	2

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**

Gear	Species	CPUE										Avg
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
AFS std gill net	Northern Pike								0.3		0.0	0.15
	Walleye								29.7		31.7	30.68
	Yellow Perch								4.7		12.3	8.50
frame net (std 3/4 in)	Black Bullhead	0.0		1.0		0.3			1.3		2.2	0.96
	Black Crappie	0.0		0.0		0.0			0.0		0.1	0.02
	Northern Pike	0.7		0.0		0.0			0.2		0.6	0.30
	Walleye	0.0		10.0		9.8			45.8		21.1	17.34
	Yellow Perch	0.0		0.1		0.5			0.6		2.0	0.64
std exp gill net	Walleye			50.0		29.5						39.75

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.

Gear	Species	Index	Year											
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
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		70
		PSD-P										100		19
		Wr										115		112
frame net (std 3/4 in)	Black Bullhead	PSD			70		67				94		69	
		PSD-P			0		0				88		8	
		Wr			123		104				98		125	
	Black Crappie	PSD												100
		PSD-P												100
		Wr												110
	Northern Pike	PSD	100									100		14
		PSD-P	14									0		0
		Wr	90									101		98
	Walleye	PSD			60		100					100		49
		PSD-P			0		0					4		30
		Wr			95		81					92		104
	Yellow Perch	PSD			100		100					100		83
		PSD-P			0		80					100		63
		Wr			96		87					113		106
	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								
2019	1	2	240 (8.2)																	
2018	2	19	222 (4.8)	331 (2.9)																
2017	3	16	201 (4.1)	291 (5.2)	363 (2.7)															
2016	4	1	244	335	382	428														
2014	6	18	221 (6.2)	312 (9.7)	374 (8.1)	419 (5.9)	451 (5.4)	479 (5.6)												
2013	7	3	221 (15.3)	312 (6)	379 (19.5)	430 (13.8)	462 (10.3)	488 (9.1)	508 (4.2)											
2012	8	1	226	332	399	427	444	472	497	510										
2011	9	19	237 (5.1)	344 (10.1)	394 (10.2)	432 (7.9)	457 (7.3)	480 (7)	507 (6.9)	527 (6.8)	547 (6.5)									
2010	10	1	245	322	388	412	456	476	505	521	545	564								
Weighted Mean		80	222	321	379	426	454	480	507	526	547	564								
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20								
2019	1	2																		
2018	2	19																		
2017	3	16																		
2016	4	1																		
2014	6	18																		
2013	7	3																		
2012	8	1																		
2011	9	19																		
2010	10	1																		
Weighted Mean		80																		

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age											
			1	2	3	4	5	6	7	8	9	10		
2019	1	7	117 (1.7)											
2019	1	9	108 (2.1)											
2018	2	1	104	127										
2018	2	2	110 (6.1)	132 (2.1)										
2017	3	2	116 (1.7)	157 (8.1)	206 (.7)									
2017	3	6	99 (3.5)	154 (6.8)	196 (4.8)									
2016	4	3	118 (2.1)	158 (3)	196 (3)	222 (1.7)								
2016	4	8	114 (3.6)	153 (4.6)	189 (5.4)	224 (3.9)								
2013	7	3	107 (7.3)	160 (5.7)	188 (5.3)	222 (13.2)	252 (14.5)	276 (12)	292 (10.8)					
2012	8	4	109 (8.2)	157 (7.3)	183 (7.3)	221 (9.8)	250 (11.4)	276 (9)	293 (9.6)	304 (8.6)				
2011	9	2	97 (2.6)	147 (1.6)	182 (12.3)	215 (23.4)	236 (21.1)	253 (18.9)	270 (18.8)	283 (16.3)	294 (12.1)			
2011	9	2	111 (8.8)	144 (8.6)	192 (6.7)	221 (7.4)	246 (11)	266 (8.4)	284 (3)	301 (2.6)	311 (.9)			
2010	10	8	110 (4.2)	158 (2.9)	199 (4.3)	227 (6.2)	253 (5.7)	276 (4.5)	292 (3.3)	308 (3.6)	320 (3.8)	330 (4)		
2009	11	1	109	136	176	217	257	278	297	316	326	332		
2008	12	1	90	140	176	208	251	277	292	304	312	317		
Weighted Mean		59	109	152	192	223	250	273	290	304	315	329		
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20		
2019	1	7												
2019	1	9												
2018	2	1												
2018	2	2												
2017	3	2												
2017	3	6												
2016	4	3												

2016	4	8		
2013	7	3		
2012	8	4		
2011	9	2		
2011	9	2		
2010	10	8		
2009	11	1	337	
2008	12	1	327	337
Weighted Mean		59	332	337

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+
2020	42	135 (13)	144 (2)	217 (9)	237 (12)			300 (3)		299 (2)	340 (1)
2018	14						282 (4)	307 (6)	294 (4)		

Fish Condition

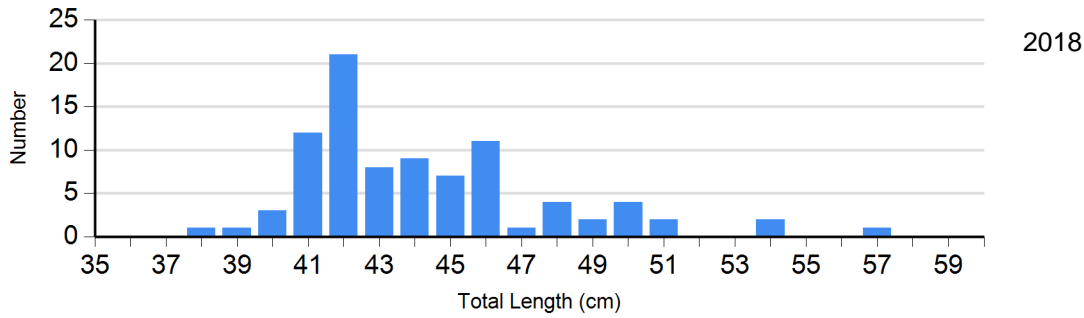
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2020	0		0		1	110	0	
Northern Pike Gill Net	2018	0		1	102	0		0	
Walleye Gill Net	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)
	2020	11	111 (1.9)	19	112 (2.1)	4	120 (3.7)	3	109 (4.9)

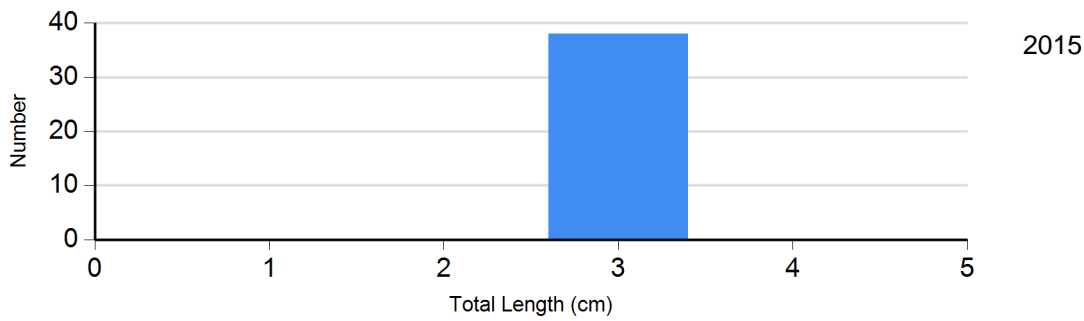
Length Frequency Distribution

Length frequency histogram of species sampled by year.

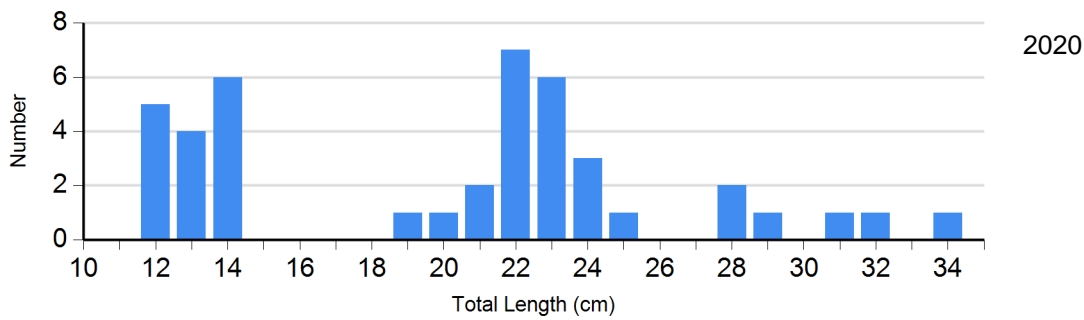
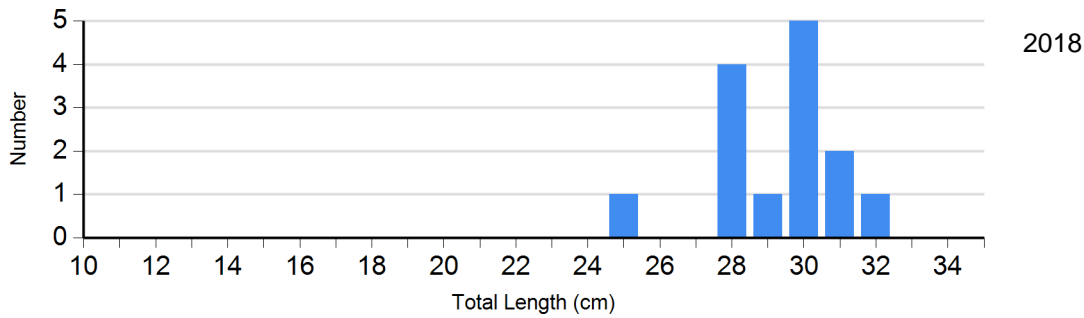
Species: Walleye
Gear: AFS std gill net



Species: Walleye
Gear: std exp gill net



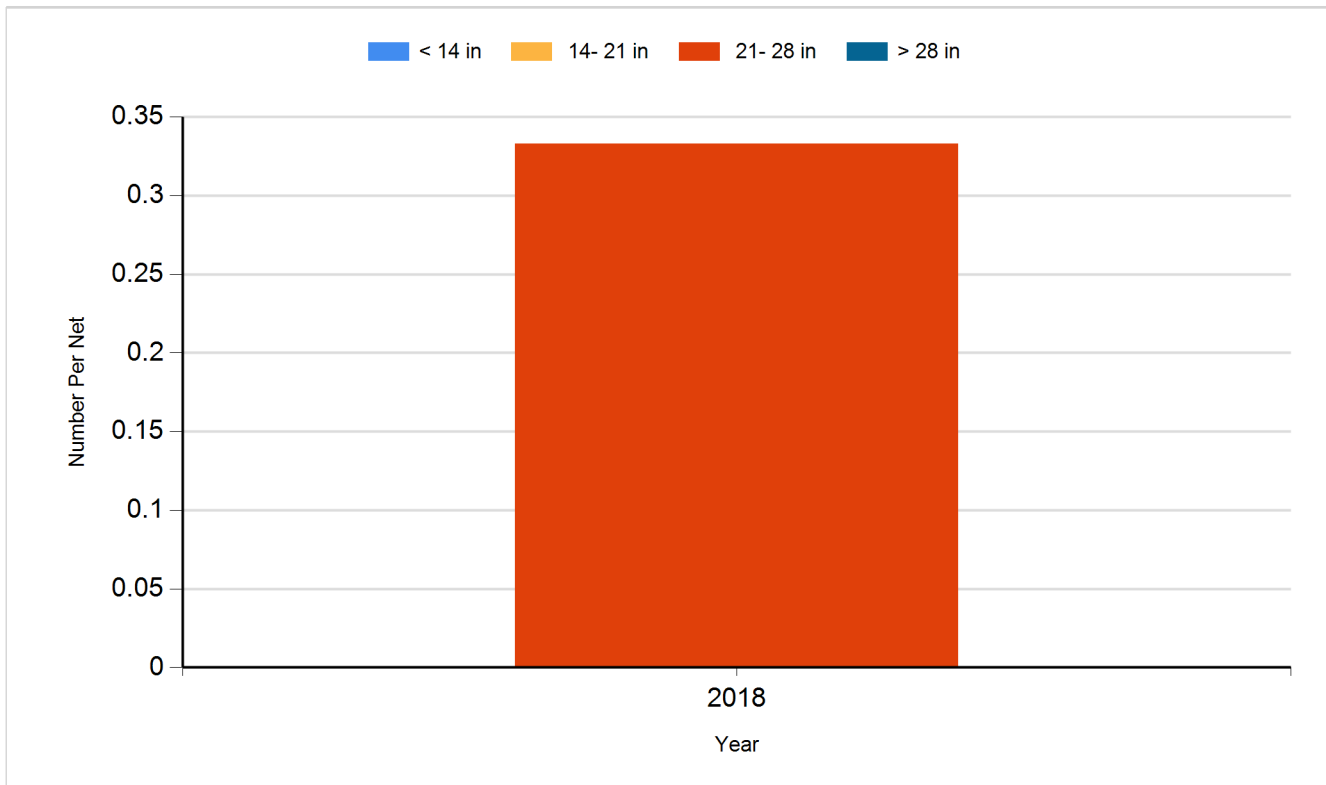
Species: Yellow Perch
Gear: AFS std gill net



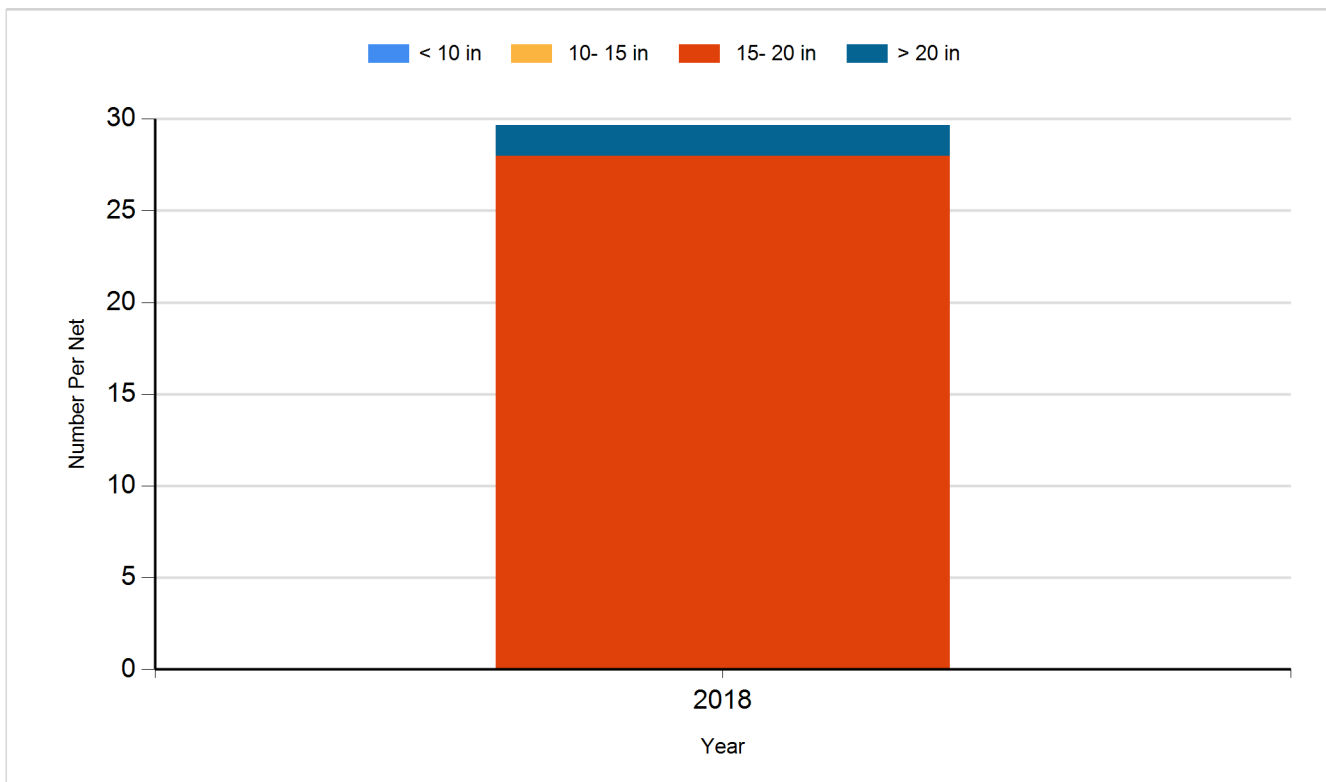
Historic Fish Sizes and Relative Abundance

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

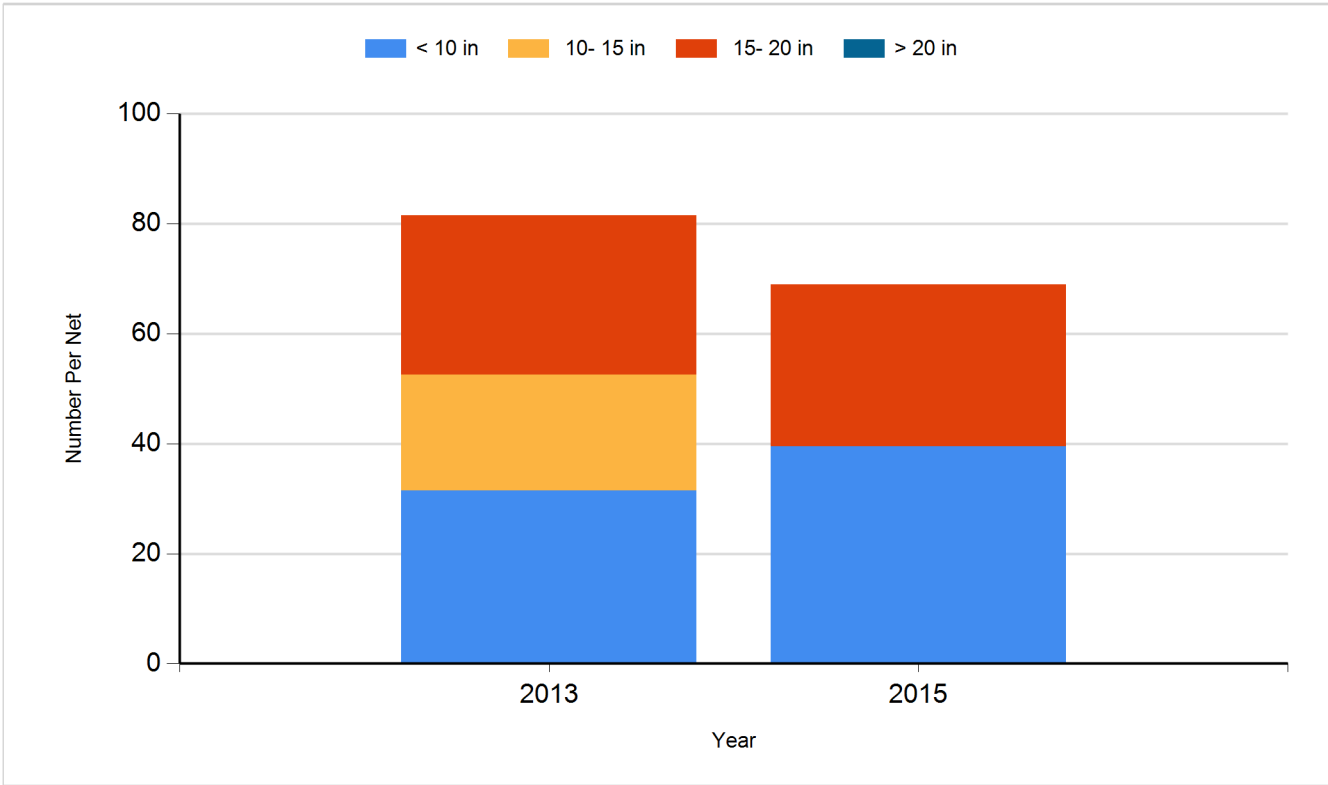
Species: Northern Pike
Gear: AFS std gill net



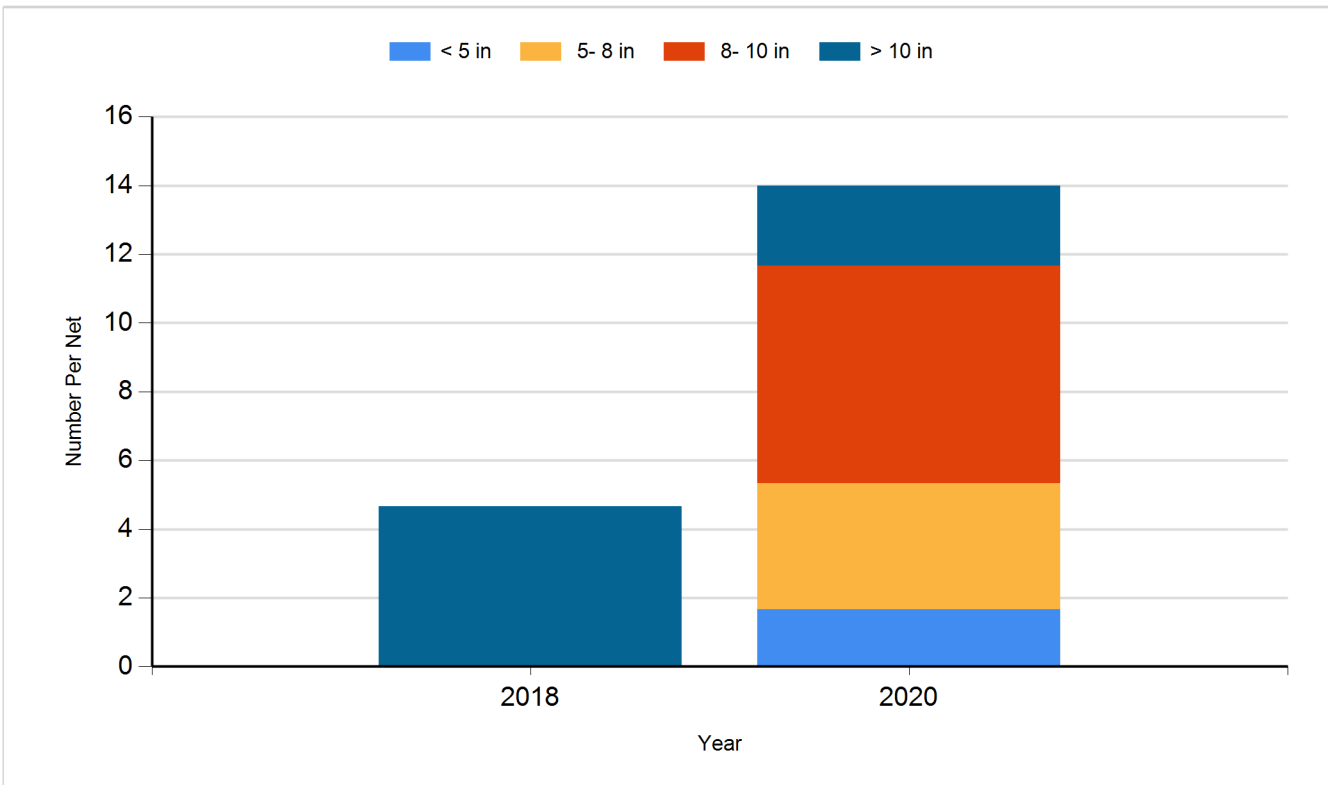
Species: Walleye
Gear: AFS std gill net



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