

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Cottonwood, Marshall County
UMN-Lake-223-000
2017

Lake Information

Name:	Cottonwood	Maximum Depth:	12 Feet
County:	Marshall	Mean Depth:	9 Feet
Surface Area:	348 Acres		

Surveys and Investigations

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

Gear	Date	Effort
AFS std frame net	June 06, 2017	6 net-nights
AFS std frame net	June 07, 2017	6 net-nights
AFS std gill net	June 06, 2017	3 net-nights
AFS std gill net	June 07, 2017	3 net-nights

Common Fish Species Present

Walleye

Yellow Perch

Northern Pike

Largemouth Bass

Bluegill

Black Bullhead

White Sucker

Green Sunfish

Pumpkinseed

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).

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

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.

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

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)
Bigmouth Buffalo	11	28	18	46	24	61	30	76	37	94
Black Bullhead	6	15	9	23	12	30	15	38	18	46
Black Crappie	5	13	8	20	10	25	12	30	15	38

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)
Blue Catfish	12	30	20	51	30	76	35	89	45	114
Bluegill	3	8	6	15	8	20	10	25	12	30
Bluegill X Gr. Sunfish Hybrid	3	8	6	15	8	20	10	25	12	30
Brown Bullhead	5	13	8	20	11	28	14	36	17	43
Burbot	8	20	15	38	21	53	26	67	32	82
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Common Carp	11	28	16	41	21	53	26	66	33	84
Flathead Catfish	14	35	20	51	28	71	34	86	40	102
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Gizzard Shad	7	18	11	28						
Green Sunfish	3	8	6	15	8	20	10	25	12	30
Lake Herring	5	13	8	20	11	28	14	35	17	43
Largemouth Bass	8	20	12	30	15	38	20	51	25	63
Longnose Gar	16	41	27	69	36	91	45	114	55	140
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Paddlefish	16	41	26	66	33	84	41	104	51	130
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Redear Sunfish	4	10	7	18	9	23	11	28	13	33
River Carpsucker	7	18	11	28	14	36	18	46	22	56
Rock Bass	4	10	7	18	9	23	11	28	13	33
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
Saugeye	9	23	14	35	18	46	22	56	27	69
Shorthead Redhorse	6	15	10	25	13	33	16	41	20	51
Smallmouth Bass	7	18	11	28	14	35	17	43	20	51
Smallmouth Buffalo	11	28	18	46	24	61	30	76	37	94
Spotted Bass	7	18	11	28	14	35	17	43	20	51
Striped Bass	12	30	20	51	30	76	35	89	45	114
Striped Bass Hybrid (wiper)	8	20	12	30	15	38	20	51	25	63
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
White Perch	5	13	8	20	10	25	12	30	15	38
White Sucker	6	15	10	25	13	33	16	41	20	51
Yellow Bass	4	10	7	18	9	23	11	28	13	33
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).

Gear	Species	Abundance		Stock Density Indices			Condition		
		CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std frame net	Black Bullhead	10.9	4.2	90	4	51	6	99	1
	Bluegill	41.1	12.9	31	3	4	1	110	1
	Green Sunfish	1.3	1.0	0		0		106	3
	Largemouth Bass	0.0	0.0	0		0			
	Northern Pike	0.4	0.3	100		0		84	5
	Pumpkinseed	0.1	0.1	100		0		119	
	Yellow Perch	1.4	0.7	6		0		94	4
AFS std gill net	Black Bullhead	1.2	1.0	100		100		97	5
	Bluegill	2.2	1.9	38		0		115	2
	Largemouth Bass	0.2	0.2	0		0		132	
	Northern Pike	5.5	1.8	55	13	0		89	2
	Walleye	1.5	0.6	100		78		95	2
	White Sucker	1.5	1.4	100		100		104	3
	Yellow Perch	2.0	0.9	33		25		90	3

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.

Gear	Species	CPUE										Avg
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
AFS std frame net	Black Bullhead										10.9	10.9
	Bluegill										41.1	41.1
	Green Sunfish										1.3	1.3
	Largemouth Bass										0.0	0.0
	Northern Pike										0.4	0.4
	Pumpkinseed										0.1	0.1
	Yellow Perch										1.4	1.4
AFS std gill net	Black Bullhead										1.2	1.2
	Bluegill										2.2	2.2
	Largemouth Bass										0.2	0.2
	Northern Pike										5.5	5.5
	Walleye										1.5	1.5
	White Sucker										1.5	1.5
	Yellow Perch										2.0	2.0
frame net (std 3/4 in)	Black Bullhead		1.1				13.3					7.2
	Bluegill		0.8				3.0					1.9
	Northern Pike		0.4				1.2					0.8
	Walleye		0.2									0.2
	White Sucker						0.1					0.1
	Yellow Perch						8.0					8.0
	std exp gill net	Northern Pike		1.4				5.3				
Walleye			0.0				2.7					1.4
White Sucker			0.7				8.3					4.5
Yellow Perch			1.1				61.0					31.1

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										
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
AFS std frame net	Northern Pike	PSD											100
		PSD-P											0
		Wr											84
	Yellow Perch	PSD											6
		PSD-P											0
		Wr											94
AFS std gill net	Northern Pike	PSD											55
		PSD-P											0
		Wr											89
	Walleye	PSD											100
		PSD-P											78
		Wr											95
	Yellow Perch	PSD											33
		PSD-P											25
		Wr											90
frame net (std 3/4 in)	Northern Pike	PSD		60					43				
		PSD-P		0					7				
		Wr		77					86				
	Walleye	PSD		100									
		PSD-P		100									
		Wr		87									
	Yellow Perch	PSD								27			
		PSD-P								0			
		Wr								92			
std exp gill net	Northern Pike	PSD		85					56				
		PSD-P		8					13				
		Wr		91					87				
	Walleye	PSD		0					88				
		PSD-P		0					38				
		Wr							93				
	Yellow Perch	PSD		0					15				

Gear	Species	Index	Year									
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
std exp gill net	Yellow Perch	PSD-P		0					0			
		Wr		97					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+
2017	9					505 (1)	510 (2)			609 (5)	621 (1)
2013	8		329 (1)		484 (1)	506 (4)	570 (1)				592 (1)
2009	3	193 (3)									

Species: Yellow Perch

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2017	15			143 (9)	165 (3)			287 (3)			
2013	245	96 (60)	147 (22)	185 (147)	195 (16)						
2009	23	88 (2)	120 (20)	188 (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).

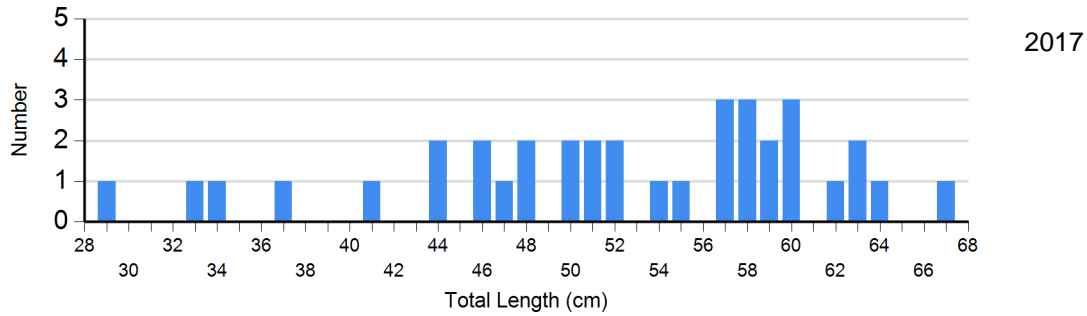
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Northern Pike Gill Net	2013	7	86 (3.5)	7	89 (1.7)	2	82 (3.3)	0	
	2017	15	90 (1.9)	18	88 (1.6)	0		0	
Walleye Gill Net	2013	1	103	4	95 (0.5)	3	87 (3.4)	0	
	2017	0		2	98 (0.4)	5	94 (2.9)	2	95 (4.7)
Yellow Perch Gill Net	2013	156	99 (0.6)	27	94 (0.9)	0		0	
	2017	8	91 (1.8)	1	74	3	91 (3.5)	0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

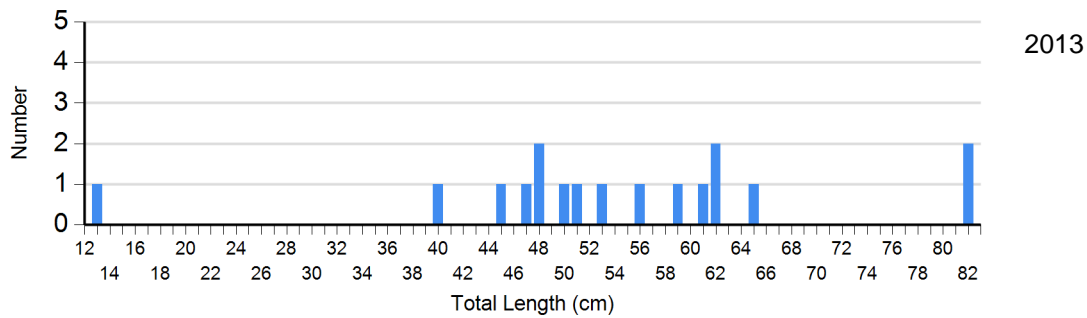
Species: Northern Pike

Gear: AFS std gill net



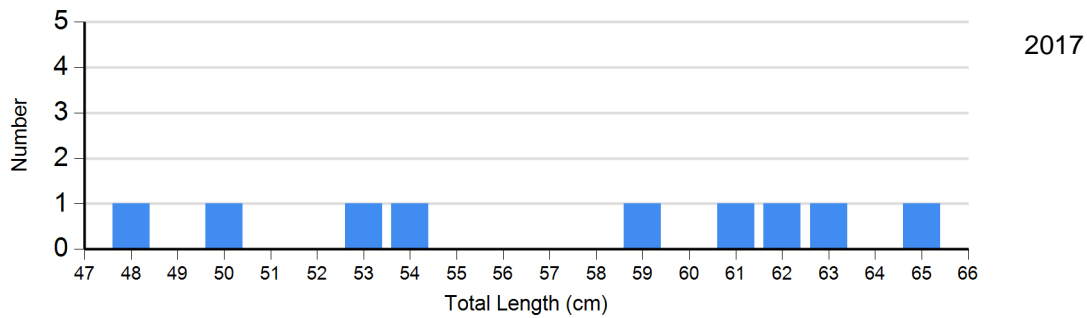
Species: Northern Pike

Gear: std exp gill net

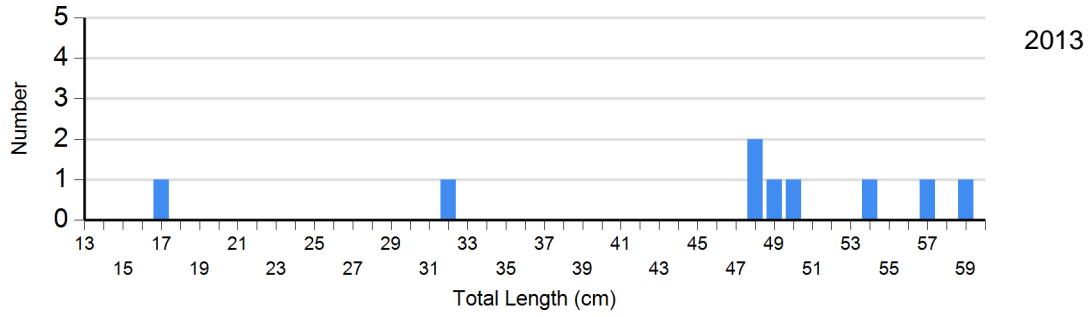


Species: Walleye

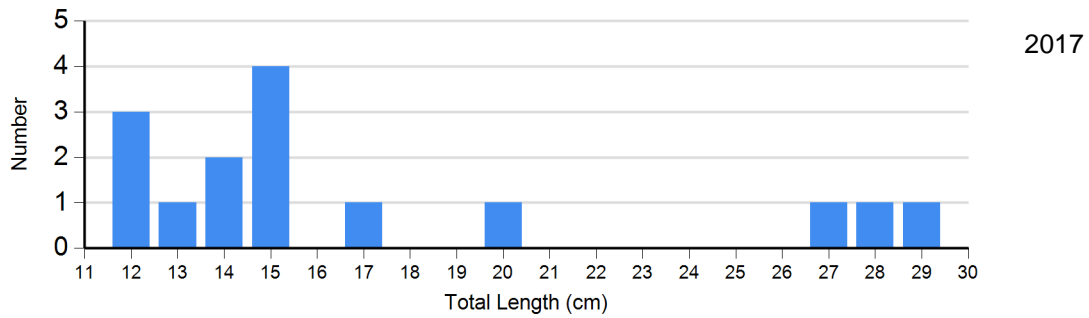
Gear: AFS std gill net



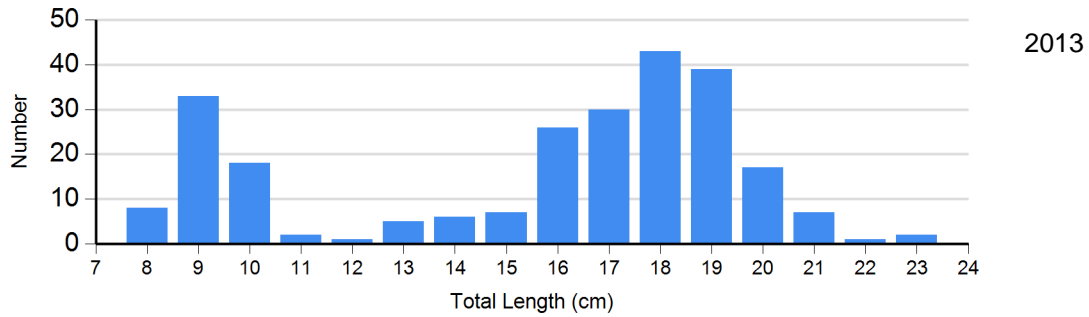
Species: Walleye
Gear: std exp gill net



Species: Yellow Perch
Gear: AFS std gill net



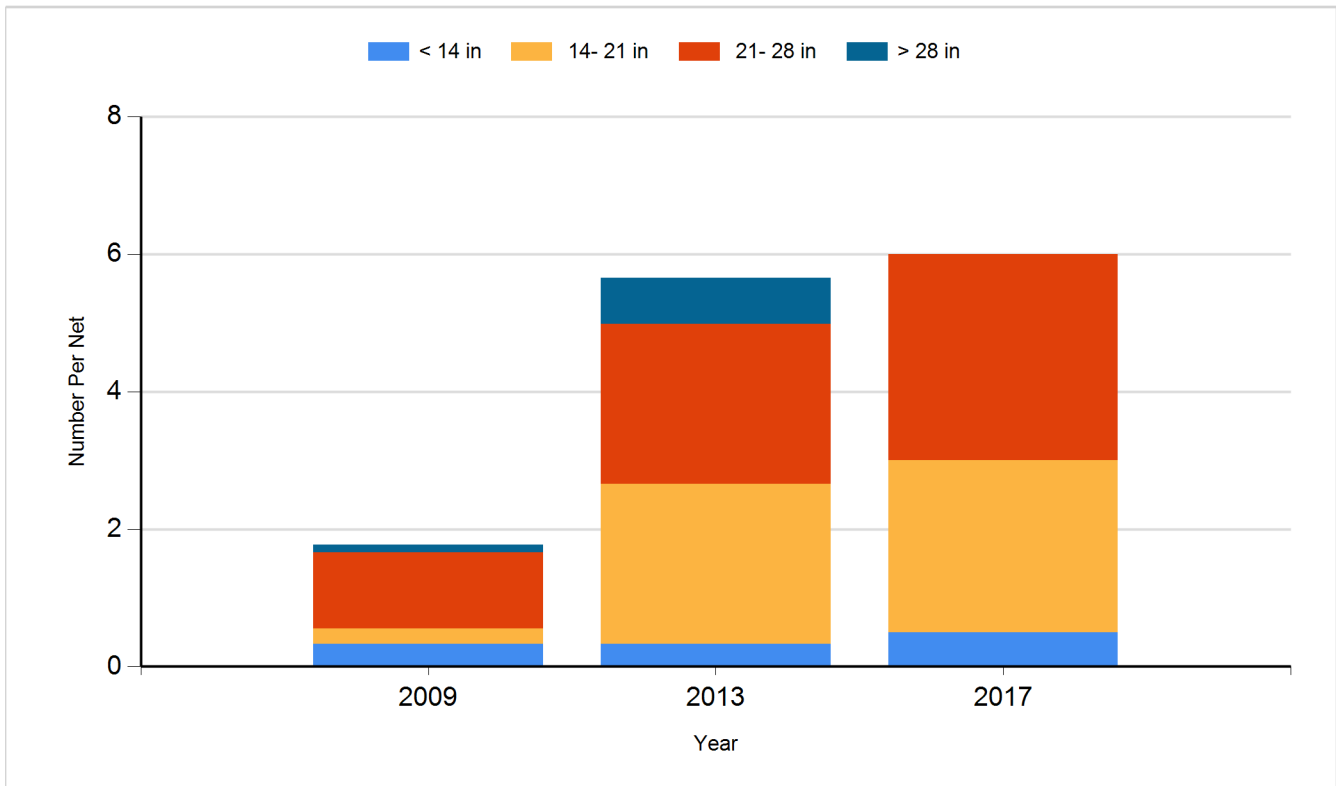
Species: Yellow Perch
Gear: std exp gill net



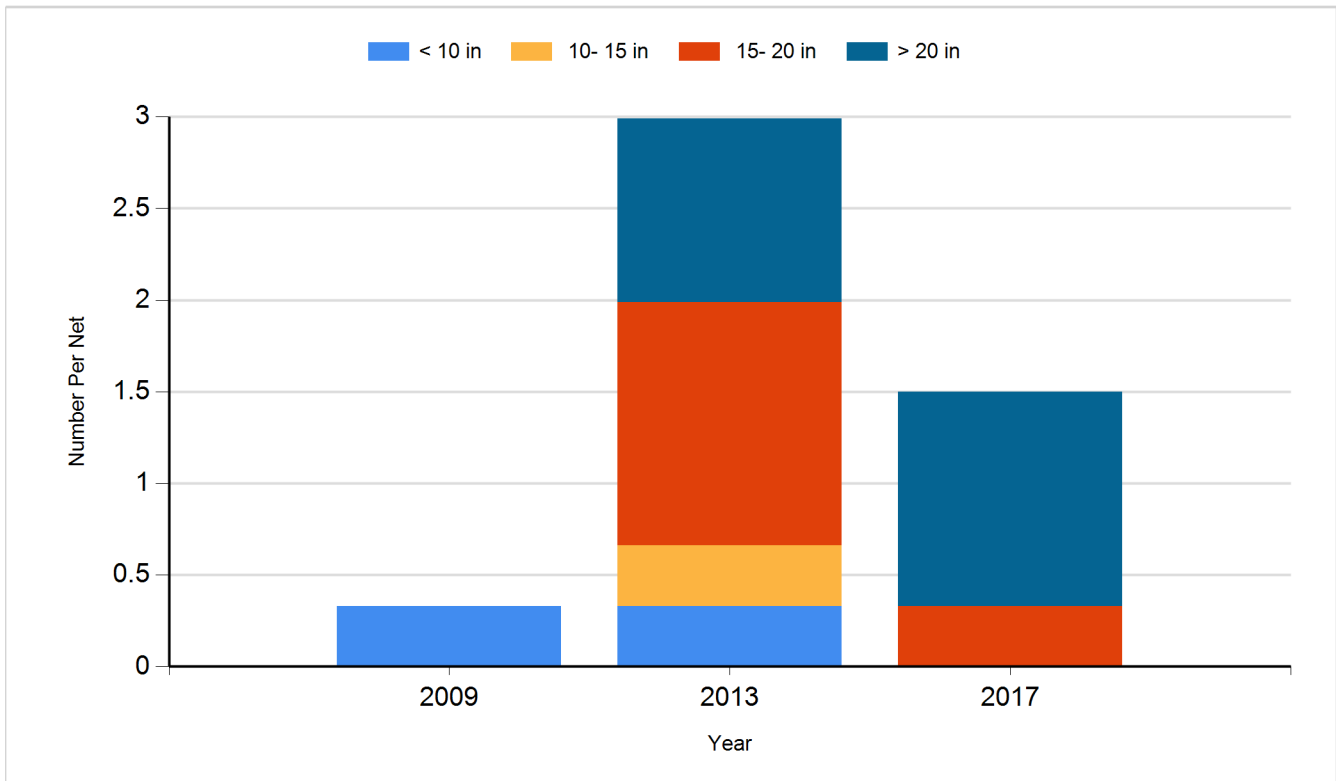
Historic Fish Sizes and Relative Abundance

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

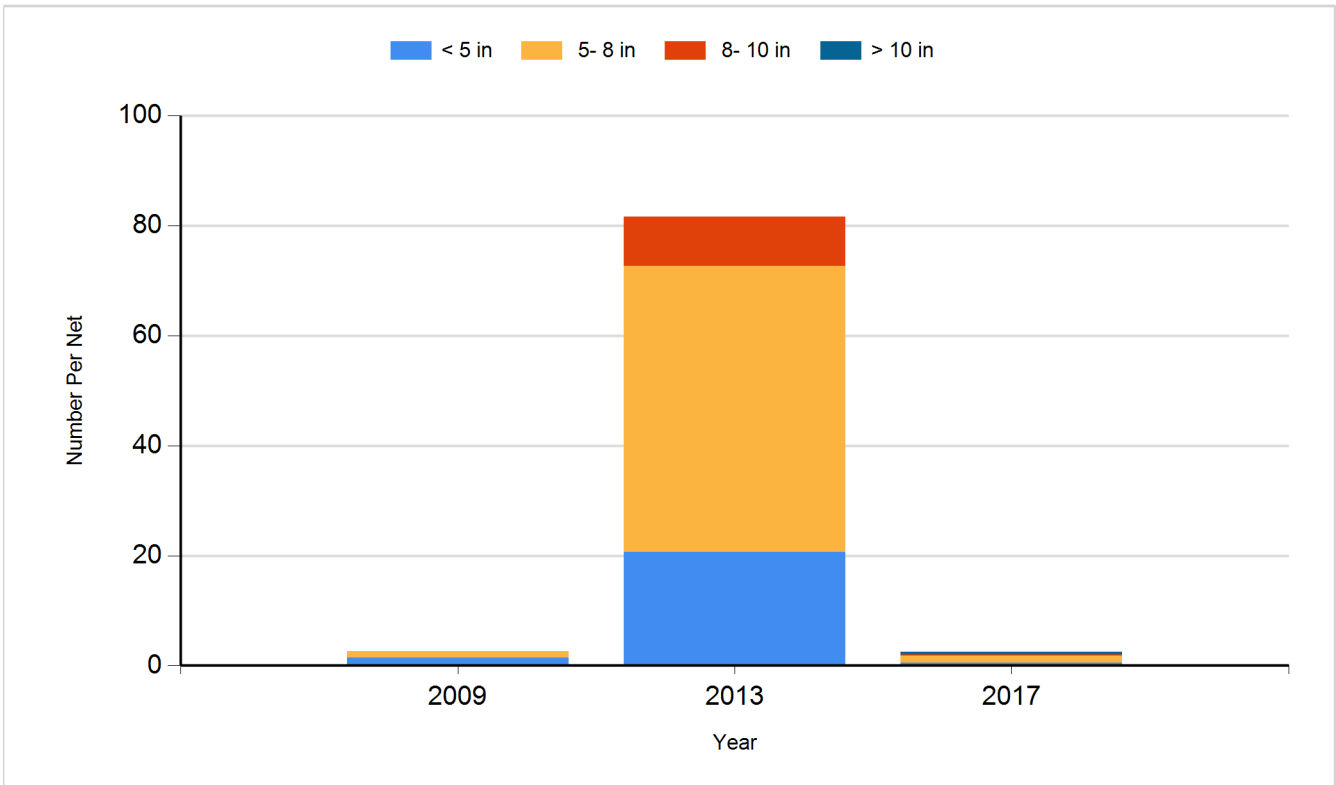
Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net



Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2008	Walleye	Large Fingerling	5,015
2010	Walleye	Fry	350,000
2012	Walleye	Fry	175,000
2014	Walleye	Fry	200,000