

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Horseshoe, Day County
UBS-Lake-303-001
2017

Lake Information

Name:	Horseshoe	Maximum Depth:	24 Feet
County:	Day	Mean Depth:	15 Feet
Surface Area:	614 Acres		

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	July 18, 2017	4 net-nights
AFS std gill net	July 19, 2017	4 net-nights
AFS std gill net	July 20, 2017	4 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Smallmouth Bass

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).

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

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 gill net	Northern Pike	0.1	0.1	100		100		75	
	Smallmouth Bass	3.6	1.1	100		98		127	2
	Walleye	3.9	1.2	98		72	10	92	2
	Yellow Perch	19.2	4.2	6	2	0		112	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.

Gear	Species	CPUE										Avg	
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
AFS std gill net	Northern Pike										0.1	0.1	
	Smallmouth Bass										3.6	3.6	
	Walleye										3.9	3.9	
	Yellow Perch										19.2	19.2	
boat shocker (night)	Smallmouth Bass		45.3		23.9		49.9		11.0			32.5	
frame net (std 3/4 in)	Black Bullhead							0.1				0.1	
	Black Crappie	0.1			0.0			0.0				0.0	
	Bluegill	2.4			1.4			17.9	3.6			6.3	
	Green Sunfish	0.6						0.4				0.5	
	Northern Pike	0.2			0.6			1.6	0.4			0.7	
	Smallmouth Bass	4.4			0.8			2.5	1.8			2.4	
	Sunfish Hybrid							0.0				0.0	
	Walleye	1.1			0.8			1.4	0.3				0.9
	Western Painted Turtle	0.0											0.0
	Yellow Perch	0.0			0.4			5.2	0.2				1.5
std exp gill net	Bluegill								0.3			0.3	
	Green Sunfish	0.0										0.0	
	Northern Pike	0.5			0.7			1.3	1.2			0.9	
	Smallmouth Bass							0.3				0.3	
	Walleye	3.2			2.8			3.5	4.0			3.4	
	Yellow Perch	10.8			6.1			8.2	29.7			13.7	

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 gill net	Northern Pike	PSD											100	
		PSD-P											100	
		Wr											75	
	Walleye	PSD												98
		PSD-P												72
		Wr												92
	Yellow Perch	PSD												6
		PSD-P												0
		Wr												112
frame net (std 3/4 in)	Black Crappie	PSD	0			0				0				
		PSD-P	0			0				0				
		Wr	117											
	Northern Pike	PSD	50			100				76	100			
		PSD-P	25			40				31	25			
		Wr	93			86					90			
	Walleye	PSD	85			57				77	100			
		PSD-P	80			57				69	100			
		Wr	86			90					75			
	Yellow Perch	PSD	0			0				2	0			
		PSD-P	0			0				1	0			
		Wr				81					104			
	std exp gill net	Northern Pike	PSD	100			100				88	100		
			PSD-P	33			58				13	14		
			Wr	89			91				90	89		
		Walleye	PSD	42			16				52	63		
			PSD-P	0			6				24	21		
			Wr	94			93				89	99		
Yellow Perch		PSD	43			69				45	33			
		PSD-P	5			43				22	3			
		Wr	110			110				104	110			

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	53	206 (6)	355 (1)	456 (8)		523 (3)	536 (9)	570 (13)	617 (7)	712 (1)	683 (5)
2015	35	185 (11)	276 (3)	375 (7)		483 (11)	568 (3)				
2014	23		274 (6)	366 (7)	397 (5)	567 (3)					611 (2)
2011	82	189 (32)	346 (45)	438 (2)		556 (1)					673 (2)
2008	19		337 (3)	377 (15)	374 (1)						

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	230	147 (206)	201 (24)								
2015	178		190 (172)	264 (2)	285 (3)	307 (1)					
2014	74	128 (48)	166 (5)	231 (12)	260 (11)						
2011	125	132 (50)	224 (24)			286 (51)					

Fish Condition

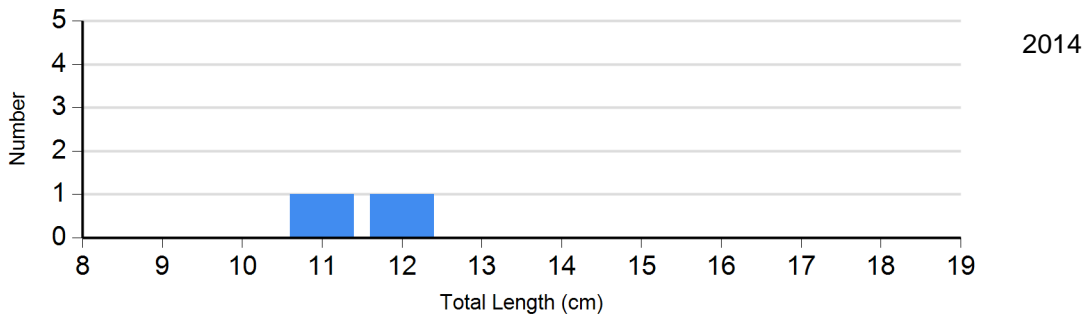
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	2014	1		6	91 (3.8)	1	86	0	
	2015	0		6	89 (3.3)	1	93	0	
	2017	0		0		1	75	0	
Walleye Gill Net	2014	10	89 (2.9)	6	92 (3.0)	4	86 (3.1)	1	78
	2015	9	95 (2.6)	10	99 (1.5)	5	106 (4.4)	0	
	2017	1	94	12	96 (2.2)	25	94 (1.3)	9	83 (2.8)
Yellow Perch Gill Net	2014	27	107 (1.0)	11	102 (2.6)	11	103 (2.6)	0	
	2015	119	110 (0.6)	53	111 (1.0)	4	105 (4.6)	2	115 (6.6)
	2017	217	113 (0.6)	13	109 (2.2)	0		0	

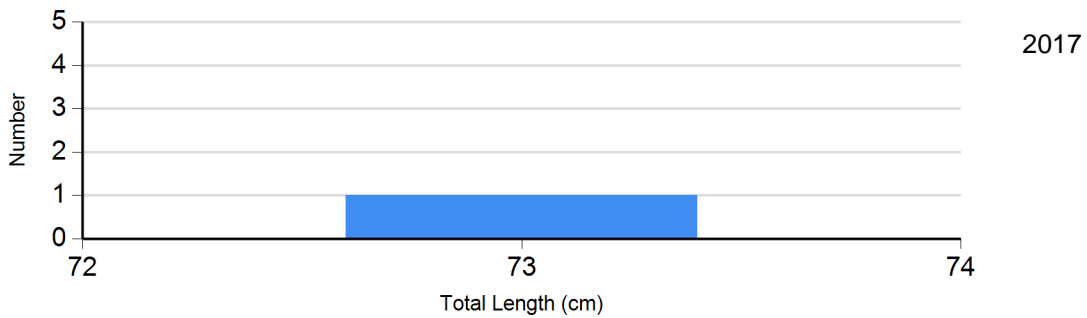
Length Frequency Distribution

Length frequency histogram of species sampled by year.

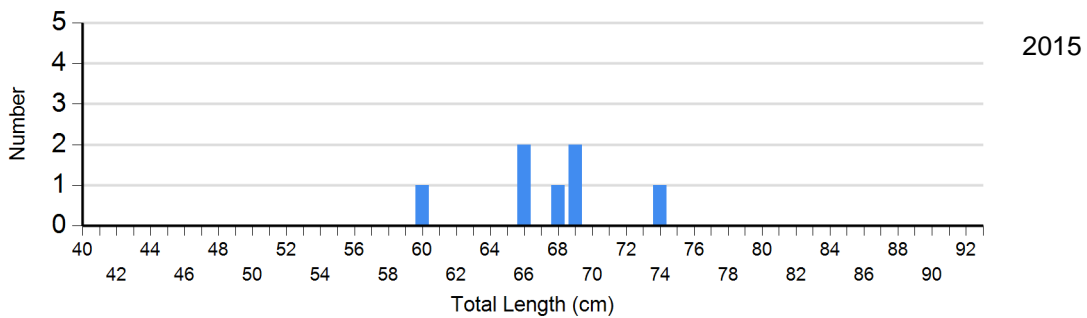
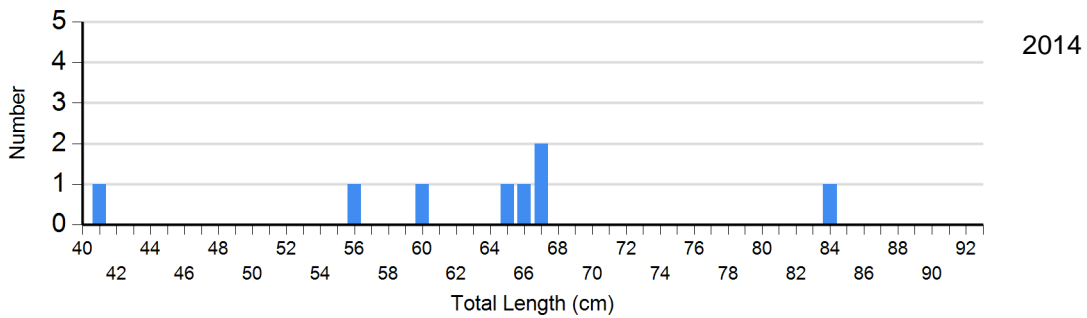
Species: Black Crappie
Gear: frame net (std 3/4 in)



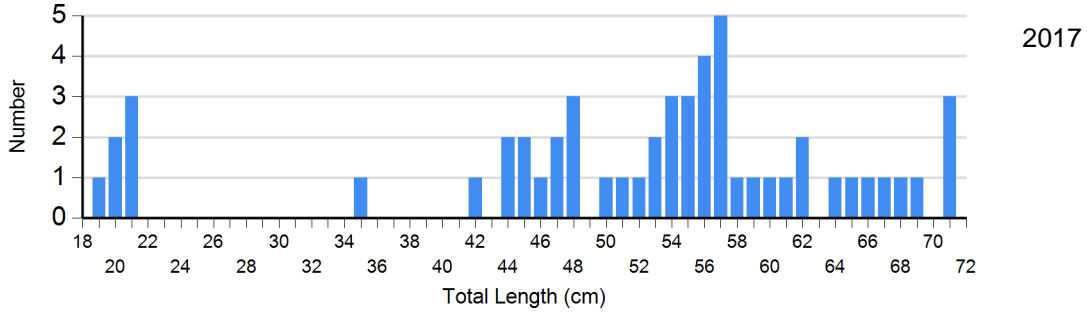
Species: Northern Pike
Gear: AFS std gill net



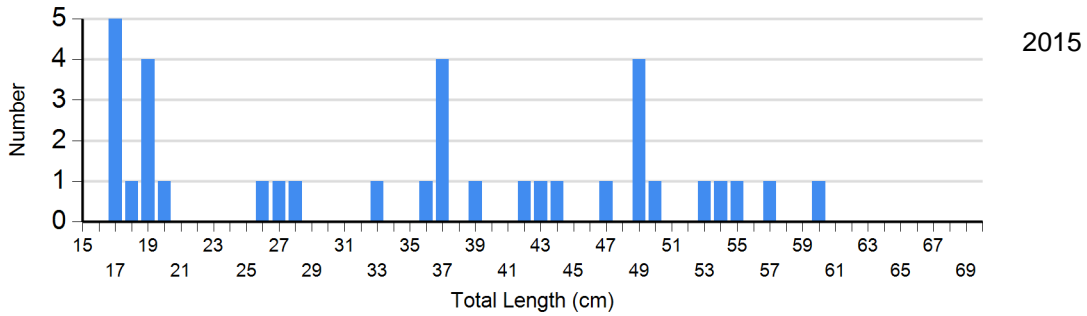
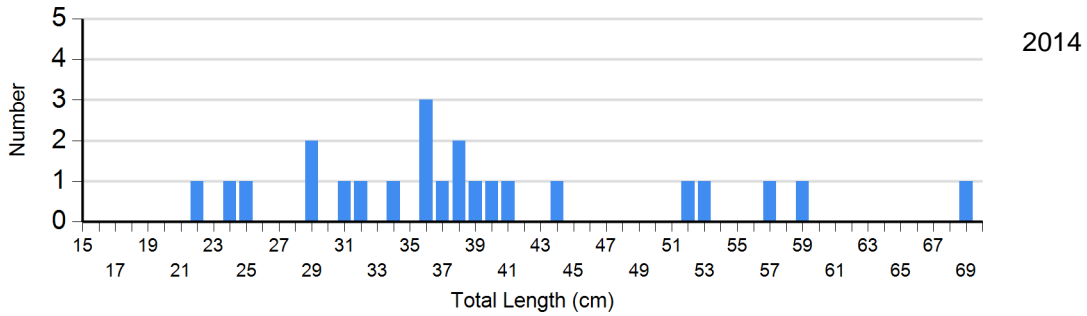
Species: Northern Pike
Gear: std exp gill net



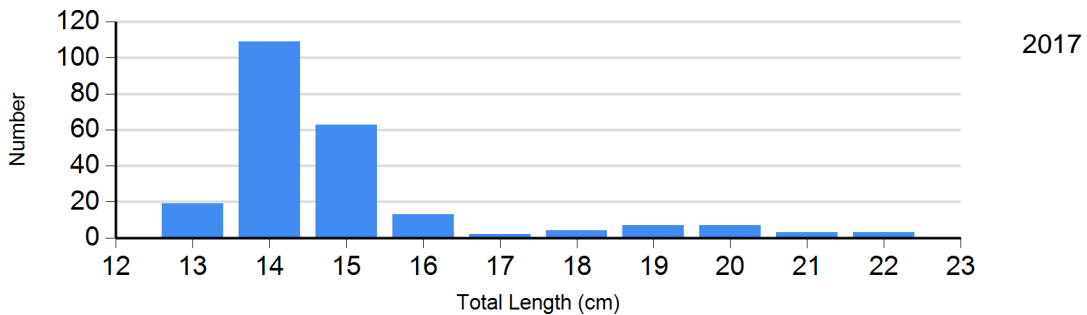
Species: Walleye
 Gear: AFS std gill net



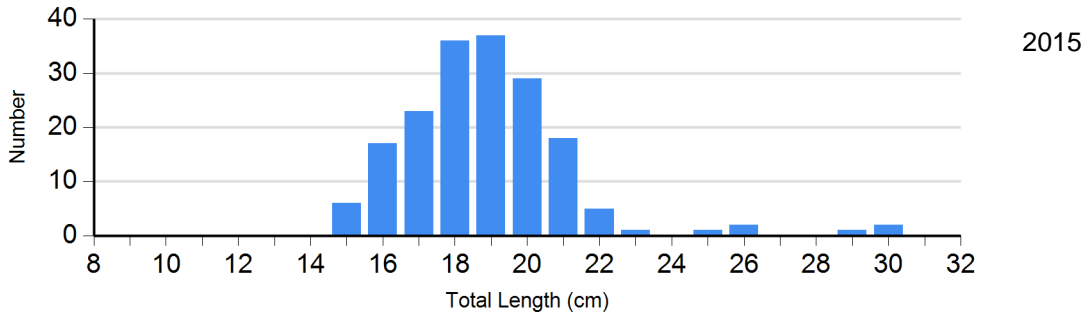
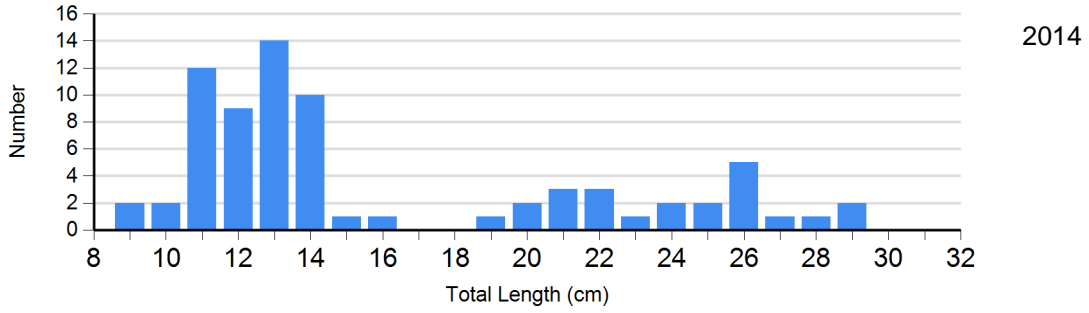
Species: Walleye
 Gear: std exp gill net



Species: Yellow Perch
 Gear: AFS std gill net



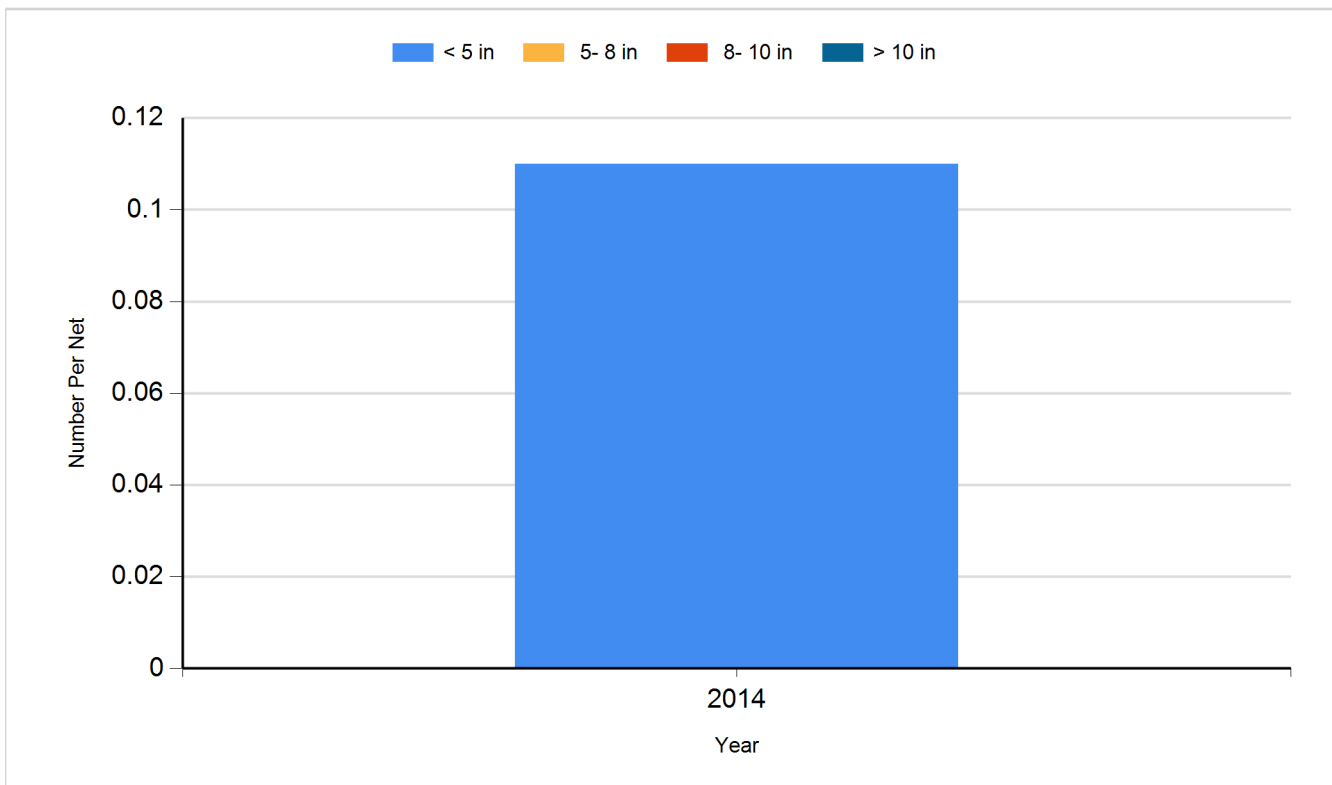
Species: Yellow Perch
Gear: std exp gill net



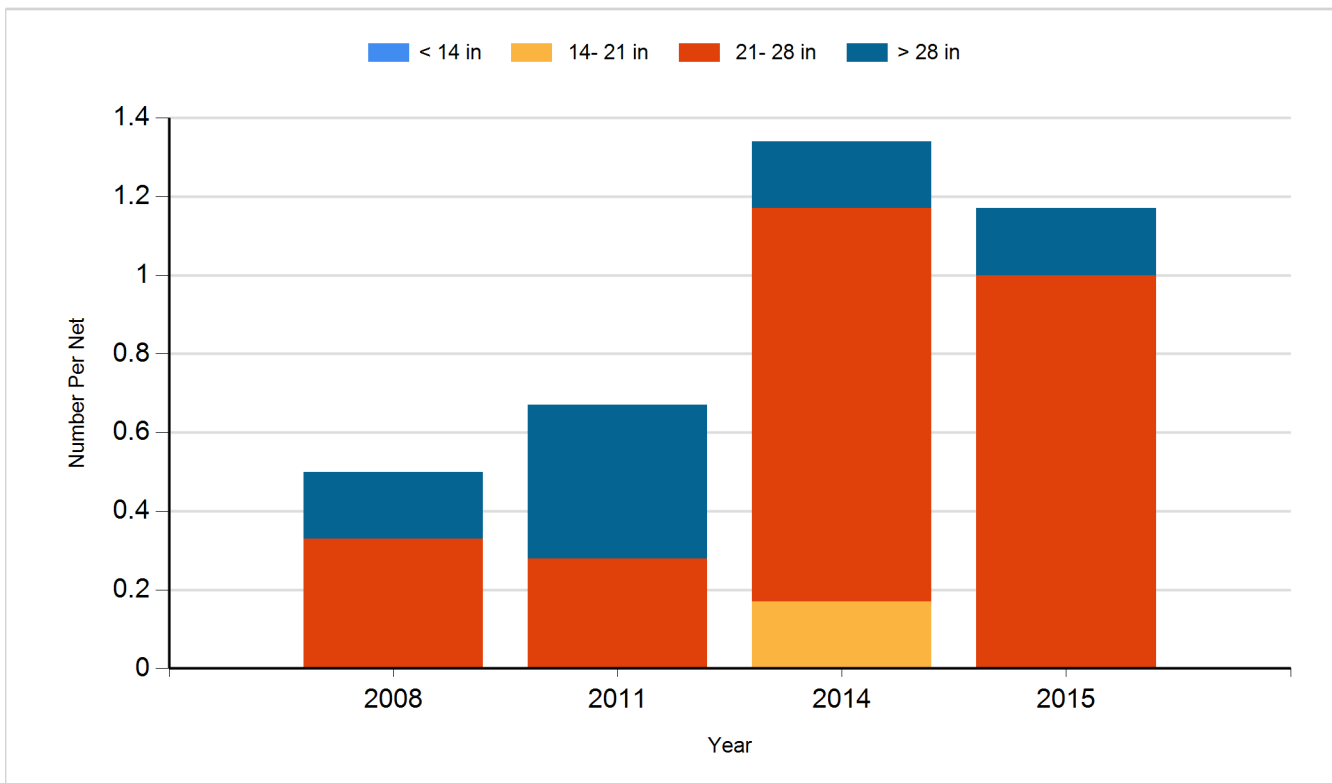
Historic Fish Sizes and Relative Abundance

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

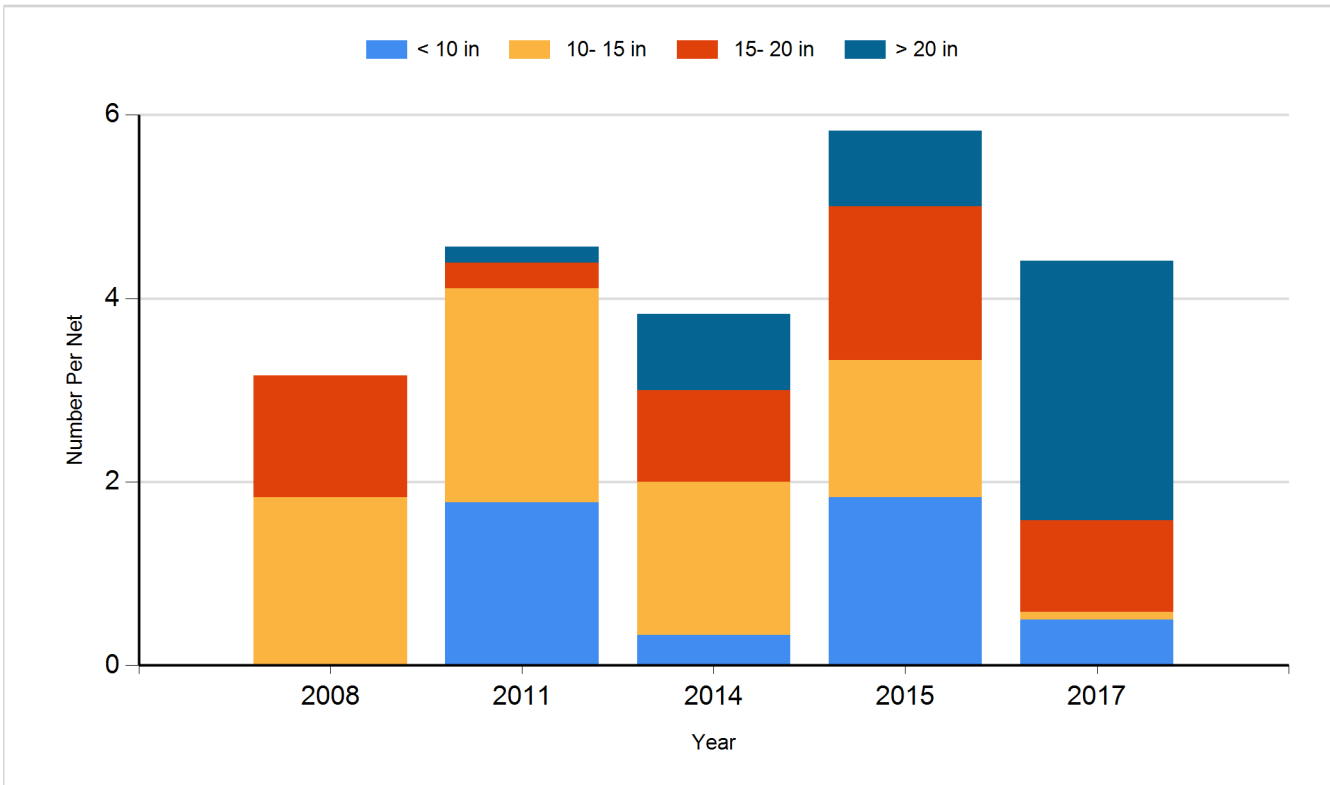
Species: Black Crappie
Gear: Frame Net



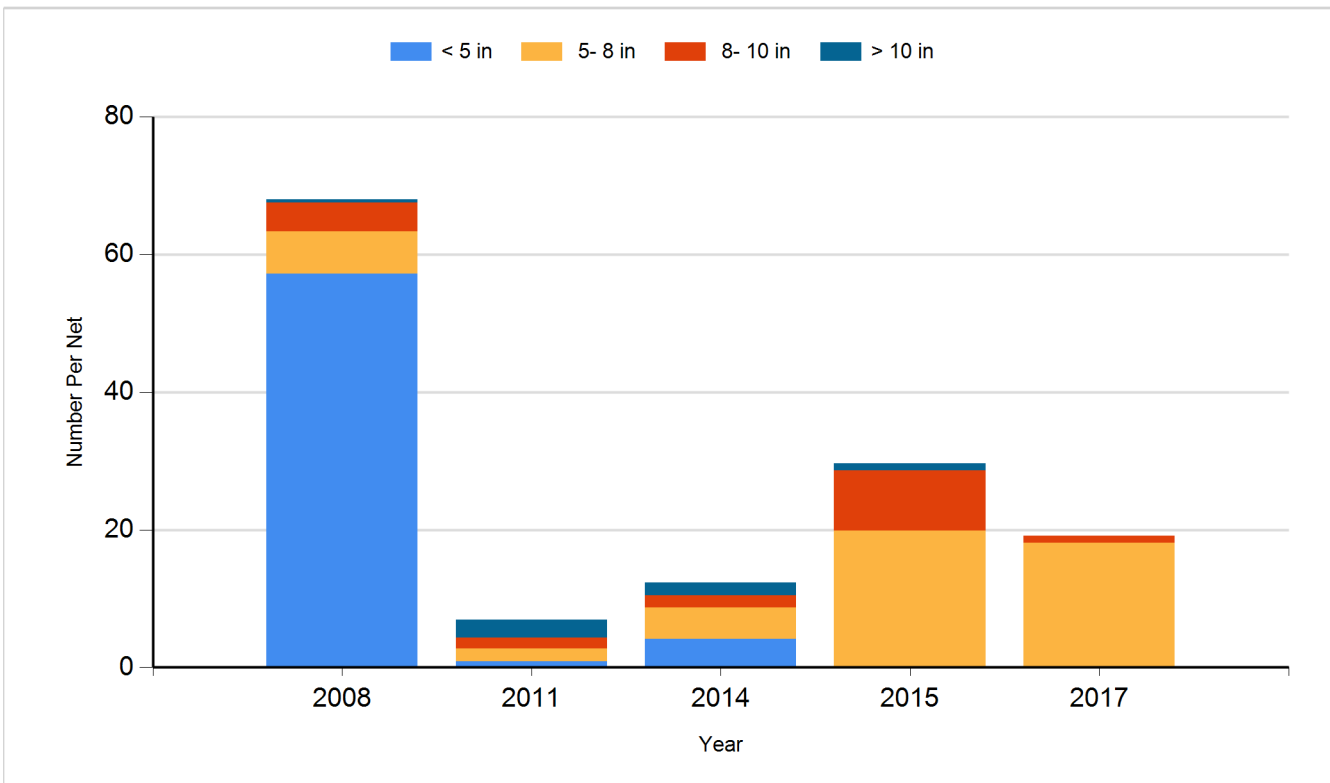
Species: Northern Pike
Gear: Gill Net



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
2006	Walleye	Small Fingerling	60,800
2008	Walleye	Small Fingerling	55,480
2010	Walleye	Fry	600,000
2012	Walleye	Small Fingerling	60,510
2014	Walleye	Fry	300,000
2016	Walleye	Fry	300,000