SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Horseshoe, Day County
UBS-Lake-303-001
2015

Lake Information

Name: Horseshoe

County: Day

Surface Area: 614 Acres

Maximum Depth: 24 Feet

Mean Depth: 15 Feet

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (night)	May 21, 2015	3600 seconds
frame net (std 3/4 in)	July 07, 2015	6 net-nights
frame net (std 3/4 in)	July 08, 2015	6 net-nights
frame net (std 3/4 in)	July 09, 2015	6 net-nights
std exp gill net	July 07, 2015	2 net-nights
std exp gill net	July 08, 2015	2 net-nights
std exp gill net	July 09, 2015	2 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Smallmouth Bass

Bluegill

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).

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

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)
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

	Stock		Quality		Preferred		Memorable		Trophy	
Species Name	(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).

		Abundance		Stock Density Indices				Condition	
Gear	Species	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
boat shocker (night)	Smallmouth Bass	11.0	5.1	91		91		120	4
frame net (std 3/4 in)	Bluegill	3.6	1.3	25	8	3		119	2
	Northern Pike	0.4	0.2	100		25		90	4
	Smallmouth Bass	1.8	0.7	91		91		121	3
	Walleye	0.3	0.2	100		100		75	3
	Yellow Perch	0.2	0.2	0		0		104	5
std exp gill net	Bluegill	0.3	0.3	100		0		130	12
	Northern Pike	1.2	0.7	100		14		89	4
	Walleye	4.0	1.6	63	16	21	14	99	2
	Yellow Perch	29.7	21.2	33	5	3	2	110	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.

		CPUE										
Gear	Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Avg
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.

			Year									
Gear	Species	Index	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
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+
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+
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

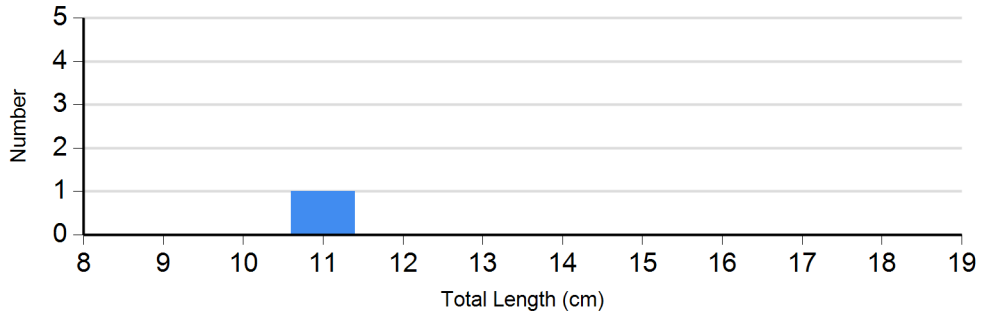
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2011	0		0		0		0	
Northern Pike Gill Net	2011	0		5	93 (2.8)	6	90 (2.7)	1	91
	2014	1		6	91 (3.8)	1	86	0	
	2015	0		6	89 (3.3)	1	93	0	
Walleye Gill Net	2011	42	93 (1.0)	5	90 (3.6)	1	87	2	86 (2.9)
	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	
Yellow Perch Gill Net	2011	34	111 (1.3)	28	110 (1.1)	31	110 (1.1)	16	103 (1.7)
	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)

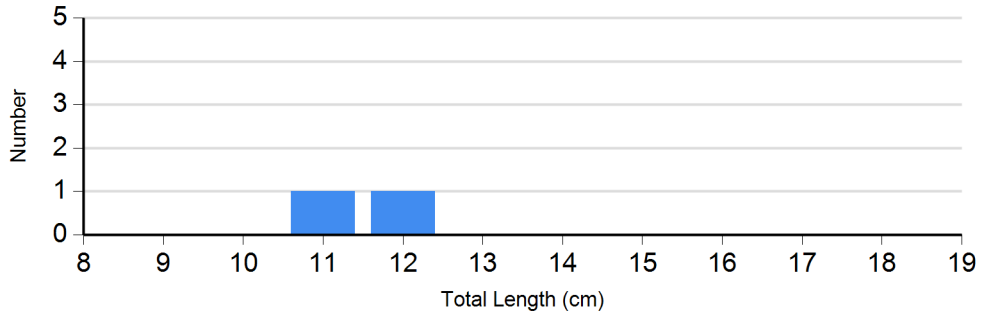
Length Frequency Distribution

Length frequency histogram of species sampled by year.

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

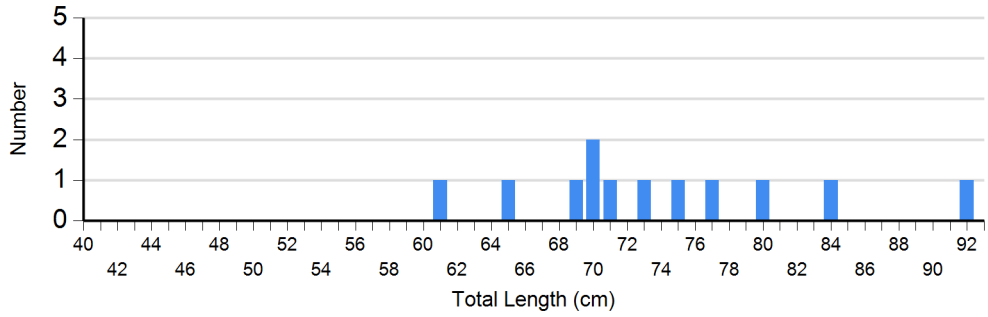


2011

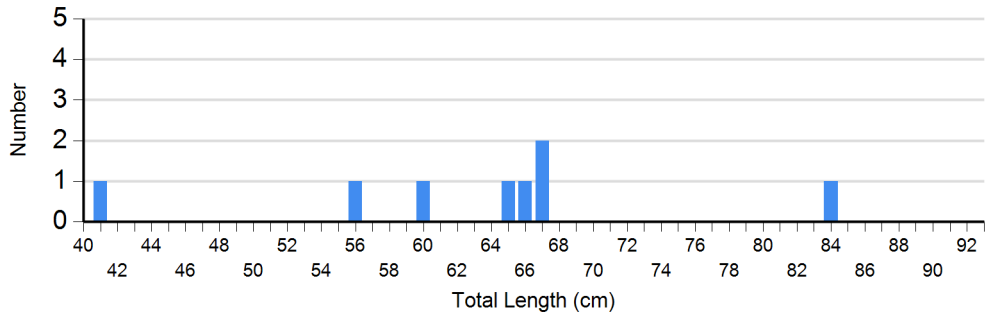


2014

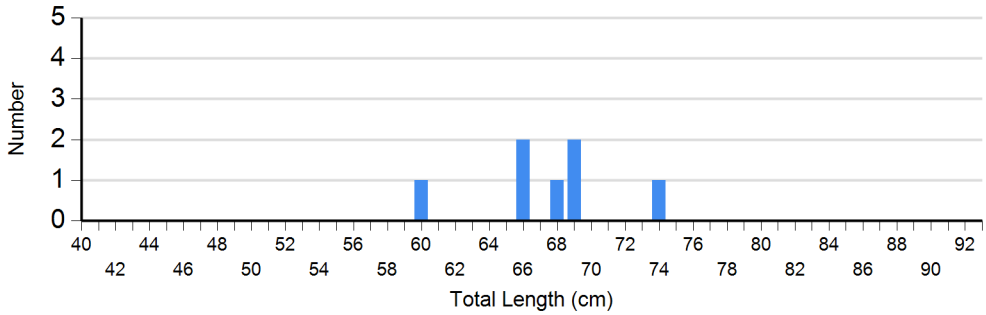
Species: Northern Pike
Gear: std exp gill net



2011

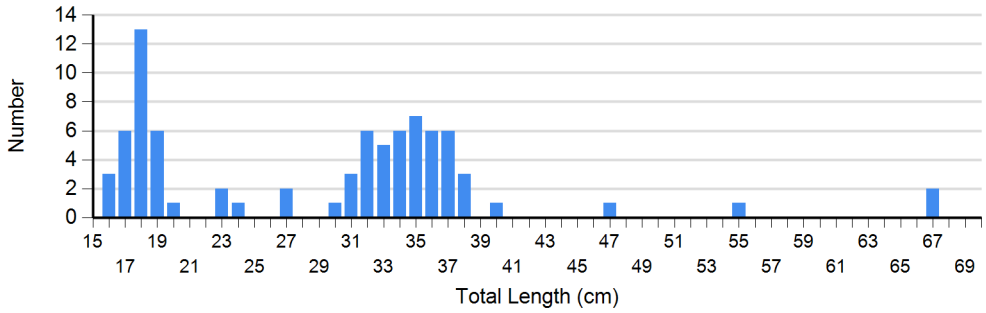


2014

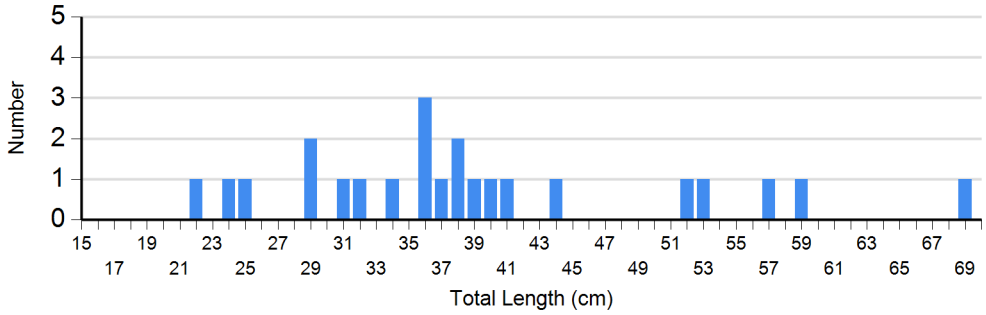


2015

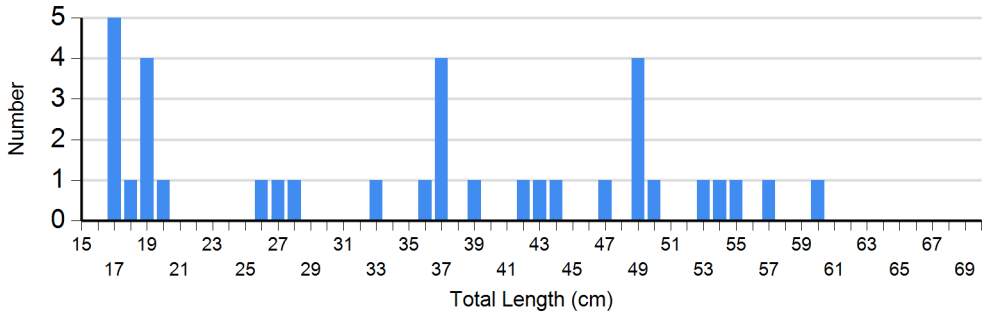
Species: Walleye
Gear: std exp gill net



2011

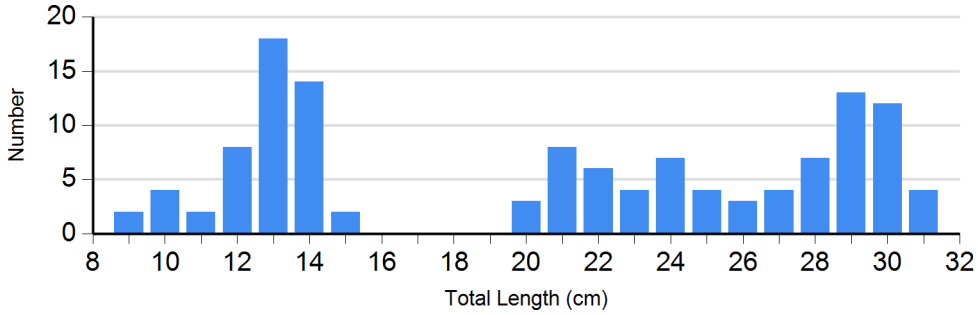


2014

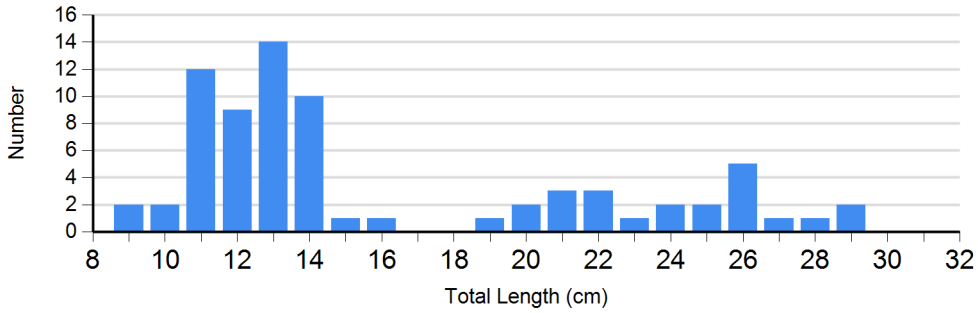


2015

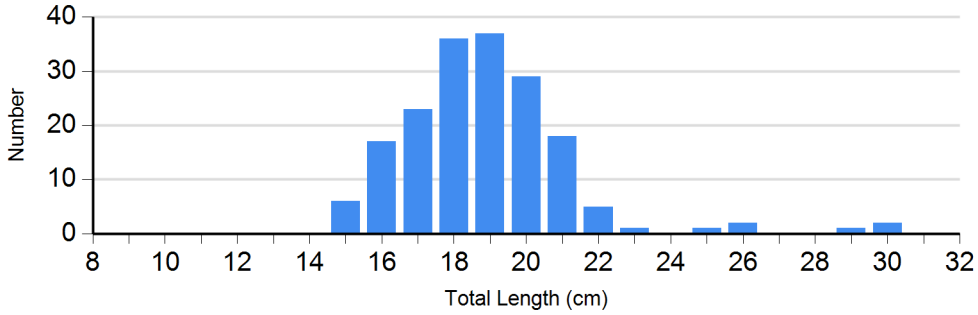
Species: Yellow Perch
Gear: std exp gill net



2011



2014

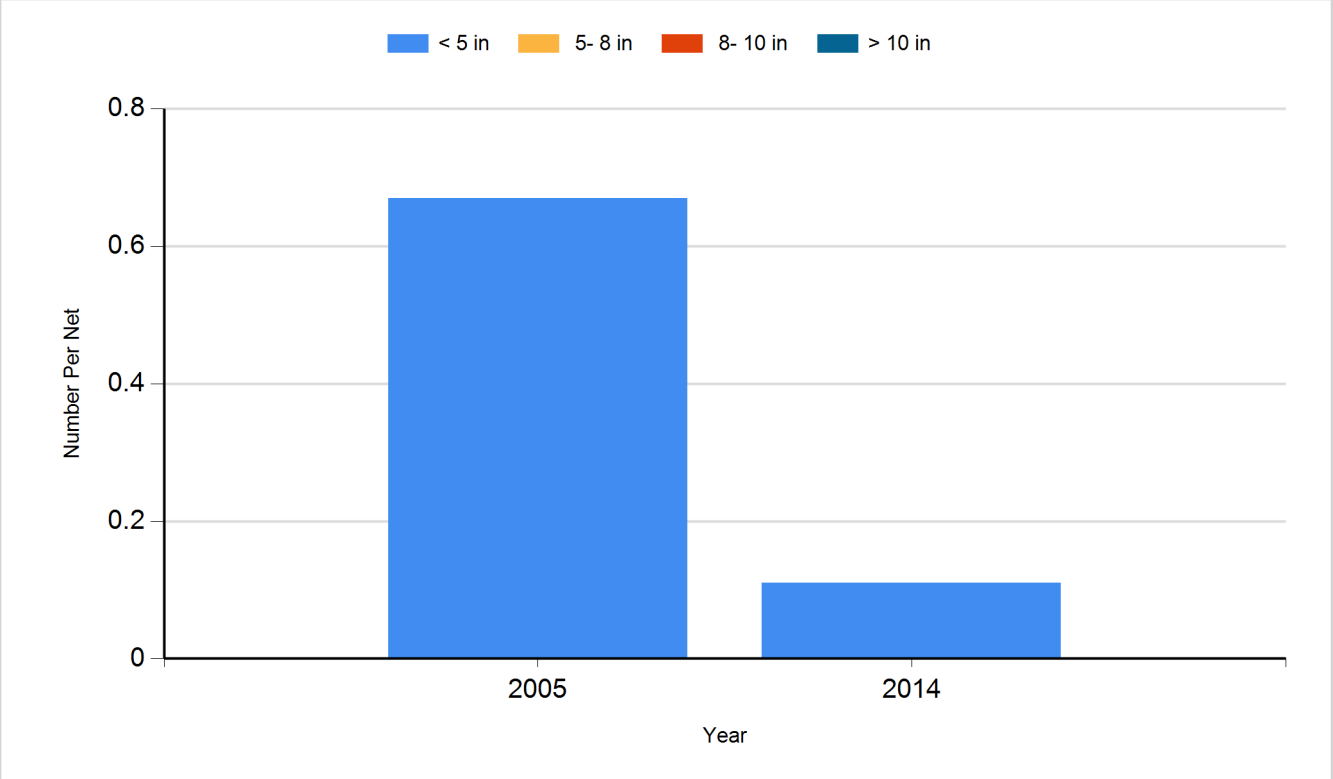


2015

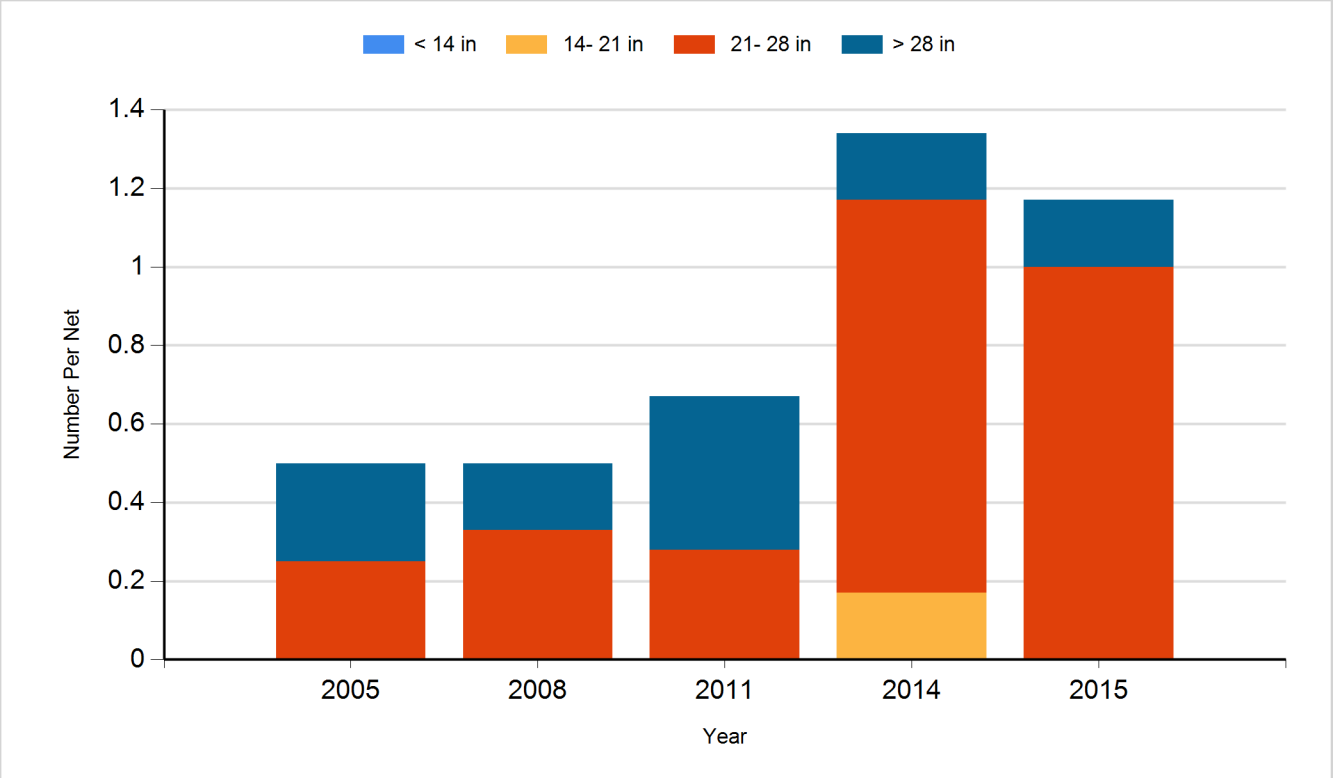
Historic Fish Sizes and Relative Abundance

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

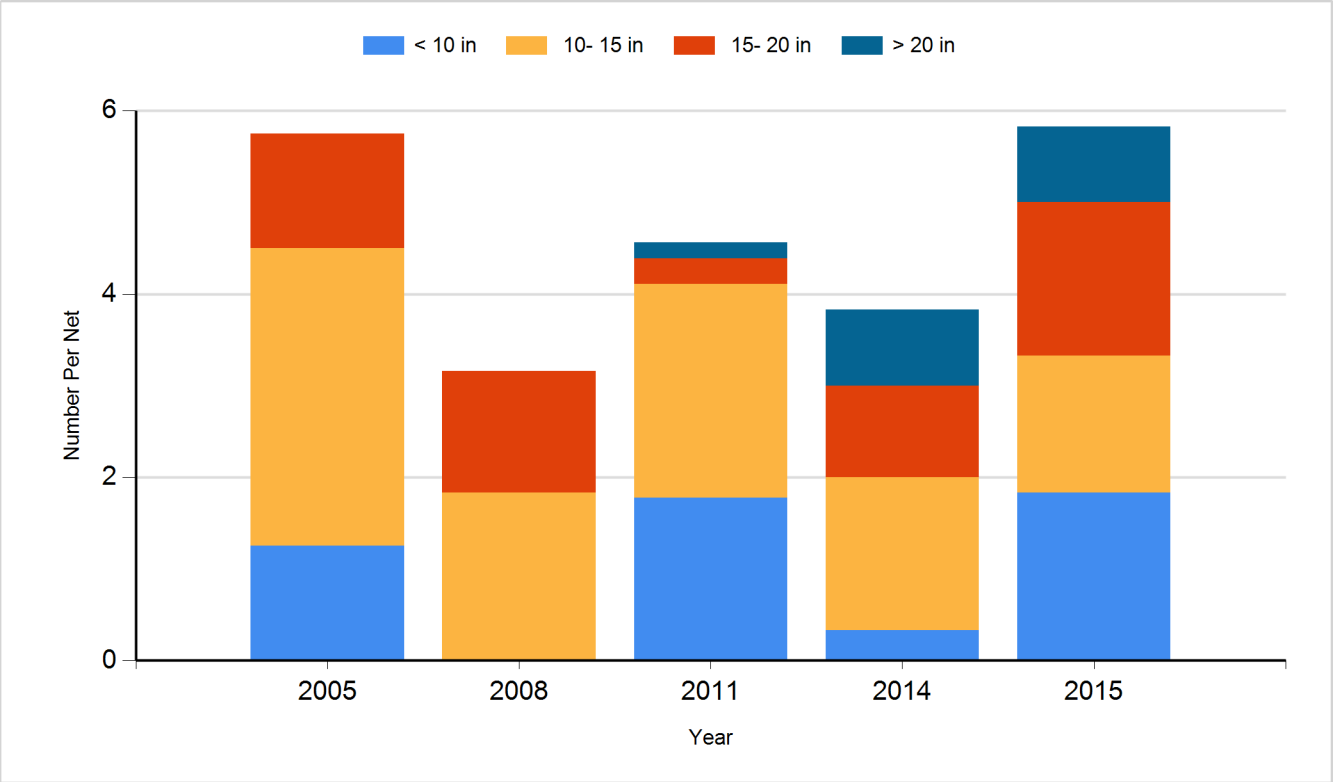
Species: Black Crappie
Gear: Frame Net



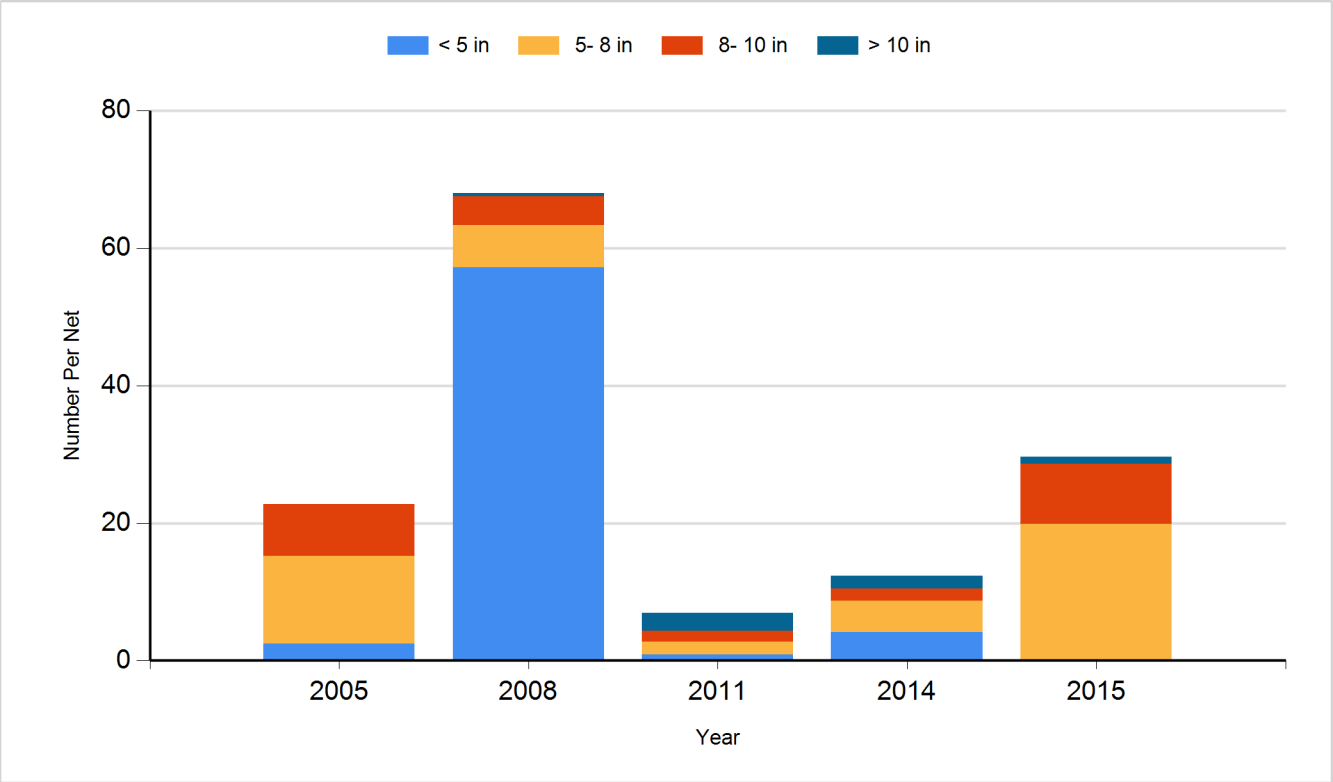
Species: Northern Pike
Gear: Gill Net



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
2005	Walleye	Fingerling	101,200
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