SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Brakke, Lyman County
MED-Lake-667-000
2016

Lake Information

Name:	Brakke	**Maximum Depth:**	17 Feet
County:	Lyman	**Mean Depth:**	5 Feet
Legal Description:	T105-R76-S21		
Surface Area:	115 Acres		

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (night)	September 21, 2016	3600 seconds
frame net (std 3/4 in)	June 28, 2016	5 net-nights
frame net (std 3/4 in)	June 29, 2016	5 net-nights
std exp gill net	June 28, 2016	1 net-nights
std exp gill net	June 29, 2016	1 net-nights

Common Fish Species Present

Largemouth Bass

Bluegill

Black Crappie

Walleye

Yellow Perch

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)	Largemouth Bass	20.0	8.5	40	18	15		110	3
	Walleye	18.0	8.2	20		7		92	3
frame net (std 3/4 in)	Black Crappie	43.4	14.4	35	3	1		98	1
	Bluegill	10.7	5.2	31	6	4		140	6
	Largemouth Bass	0.6	0.4	100		83		105	5
	Northern Pike	1.0	0.5	90		30		87	7
	Walleye	0.1	0.1	100		100		68	
	Yellow Perch	0.8	0.6	0		0		100	3
std exp gill net	Black Crappie	227.5	210.8	35	3	2	1		
	Bluegill	2.5	4.6	0		0		177	
	Northern Pike	1.5	1.5	100		33		100	13
	Yellow Perch	21.0	9.2	2		0		100	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.

		CPUE										
Gear	Species	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
boat shocker (night)	Largemouth Bass	46.8			79.0			9.0			20.0	38.7
	Walleye	6.0			26.0			13.0			18.0	15.8
frame net (std 3/4 in)	Black Bullhead							0.1				0.1
	Black Crappie	2.4			9.7			5.7			43.4	15.3
	Bluegill	9.4			10.0			10.0			10.7	10.0
	Channel Catfish	0.3										0.3
	Flathead Catfish	0.1										0.1
	Largemouth Bass	0.3			0.6			0.1			0.6	0.4
	Northern Pike	1.1			2.1			1.7			1.0	1.5
	Walleye	0.7			3.5			0.5			0.1	1.2
	Yellow Perch	0.0			0.3			0.3			0.8	0.4
std exp gill net	Black Crappie	2.5			4.0			0.0			227.5	58.5
	Bluegill	4.5			1.0						2.5	2.7
	Channel Catfish	0.5										0.5
	Largemouth Bass	2.5										2.5
	Northern Pike	1.5			2.0			1.5			1.5	1.6
	Walleye	6.5			9.0			1.0				5.5
	Yellow Perch	2.0			15.5			3.0			21.0	10.4

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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
boat shocker (night)	Walleye	PSD	50			92			100			20
		PSD-P	0			44			85			7
		Wr	92			91			95			92
frame net (std 3/4 in)	Black Crappie	PSD	25			57			65			35
		PSD-P	21			20			23			1
		Wr	102			106			99			98
	Northern Pike	PSD	64			81			94			90
		PSD-P	0			33			35			30
		Wr	86			94			86			87
	Walleye	PSD	71			100			100			100
		PSD-P	0			43			100			100
		Wr	85			87			85			68
	Yellow Perch	PSD	0			0			33			0
		PSD-P	0			0			0			0
		Wr				106			80			100
std exp gill net	Black Crappie	PSD	0			0			0			35
		PSD-P	0			0			0			2
		Wr	113			117						
	Northern Pike	PSD	67			100			100			100
		PSD-P	0			25			0			33
		Wr	74			87			87			100
	Walleye	PSD	38			67			100			
		PSD-P	0			17			100			
		Wr	89			90			85			
	Yellow Perch	PSD	50			3			17			2
		PSD-P	0			0			0			0
		Wr	68			93			90			100

Back-Calculated Lengths

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

Species: Black Crappie

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2015	1	3	83 (4.7)									
2014	2	20	85 (1.8)	144 (2.9)								
2013	3	20	91 (1.3)	148 (2.1)	191 (2.5)							
2011	5	15	83 (1.8)	126 (2.6)	177 (3.8)	212 (3.5)	228 (2.4)					
2010	6	3	85 (3.8)	134 (7.9)	179 (6.7)	213 (7.6)	234 (6.4)	249 (4.3)				
Weighted Mean		61	86	140	185	212	229	249				

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2015	1	3										
2014	2	20										
2013	3	20										
2011	5	15										
2010	6	3										
Weighted Mean		61										

Species: Walleye

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2015	1	15	201 (10.9)									
2014	2	1	201	369								
2013	3	1	181	277	384							
2010	6	1	206	337	392	439	495	533				
Weighted Mean		18	200	328	388	439	495	533				

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2015	1	15										
2014	2	1										
2013	3	1										
2010	6	1										
Weighted Mean		18										

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Black Crappie

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2016	437	110 (3)	162 (234)	202 (169)		236 (27)	254 (4)				
2013	101		123 (55)	192 (11)	237 (22)	271 (12)	265 (1)				
2010	98	116 (1)	154 (39)	212 (39)	254 (6)	274 (10)	294 (3)				
2007	30	101 (3)	138 (21)		222 (1)	282 (2)	268 (2)	286 (1)			

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2013	2							562 (1)			562 (1)
2007	19	225 (10)	323 (4)		436 (4)	413 (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+
2013	6		154 (5)				242 (1)				
2010	55	106 (4)	130 (47)	166 (2)	190 (1)			237 (1)			
2007	62	103 (59)		199 (3)							

Fish Condition

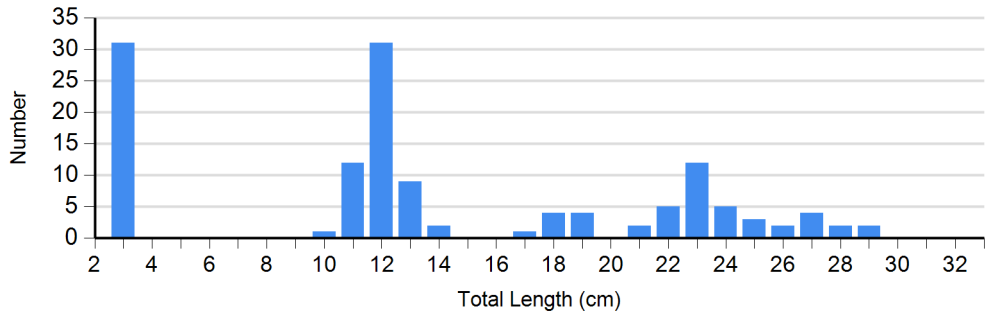
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2013	20	112 (2.1)	24	94 (0.9)	13	87 (1.3)	0	
	2016	283	100 (0.8)	145	94 (0.8)	6	87 (7.7)	0	
Northern Pike Gill Net	2013	0		3	87 (1.6)	0		0	
	2016	0		2	104 (16.4)	1	94	0	
Walleye Gill Net	2013	0		0		2	85 (1.8)	0	
Yellow Perch Gill Net	2013	5	92 (5.6)	1	84	0		0	
	2016	41	101 (2.1)	1	84	0		0	

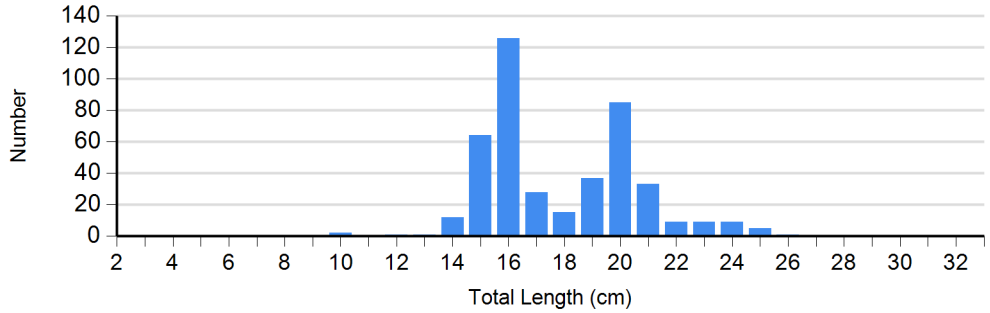
Length Frequency Distribution

Length frequency histogram of species sampled by year.

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

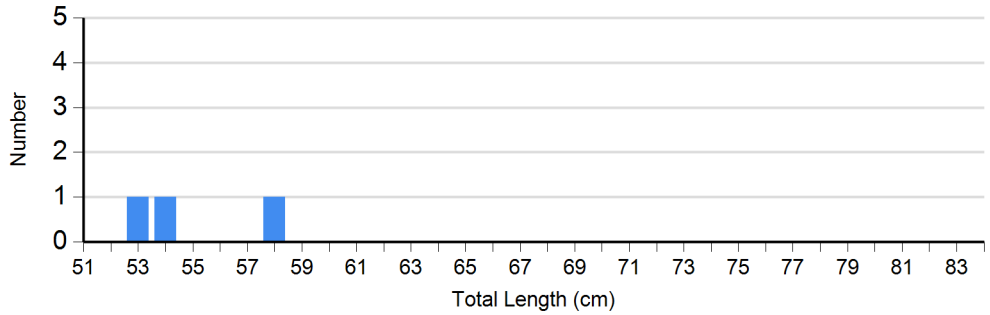


2013

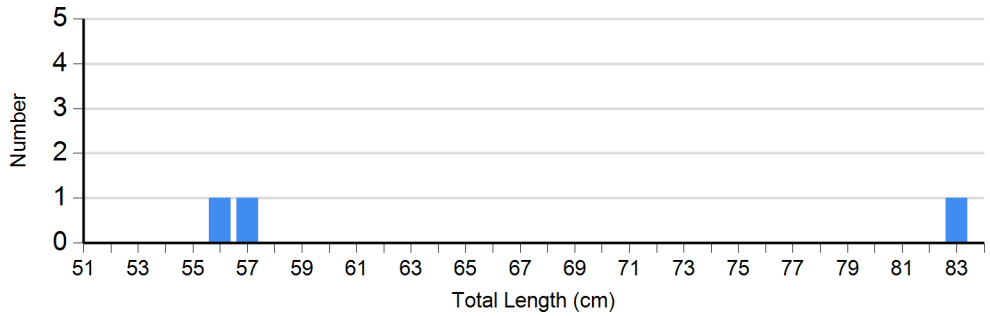


2016

Species: Northern Pike
Gear: std exp gill net

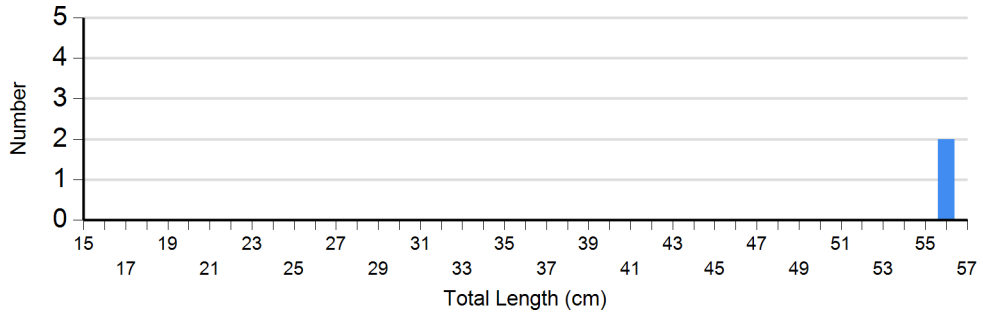


2013



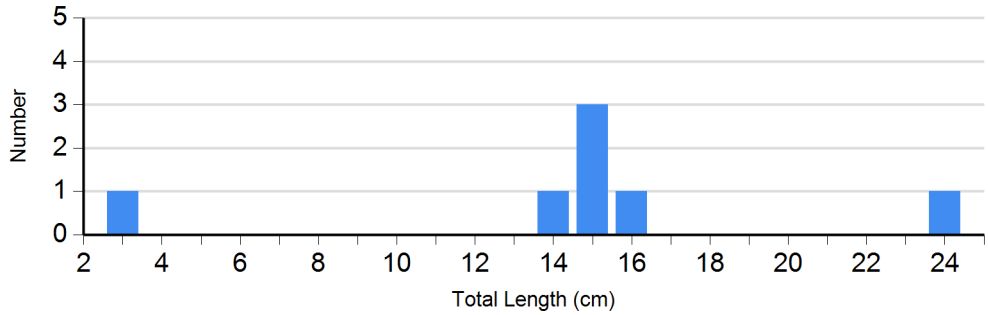
2016

Species: Walleye
Gear: std exp gill net

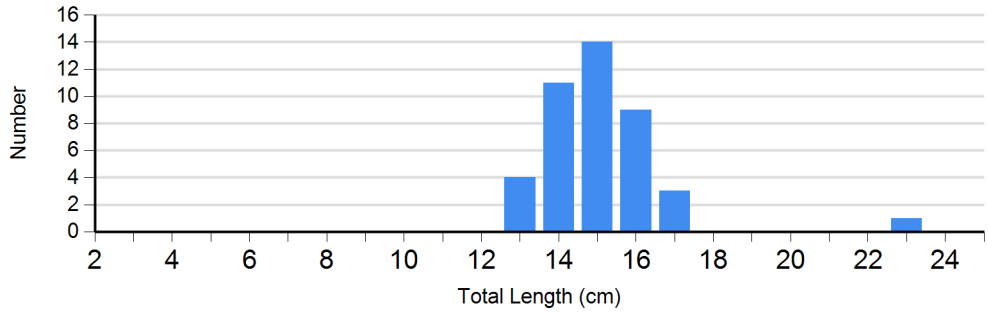


2013

Species: Yellow Perch
Gear: std exp gill net



2013

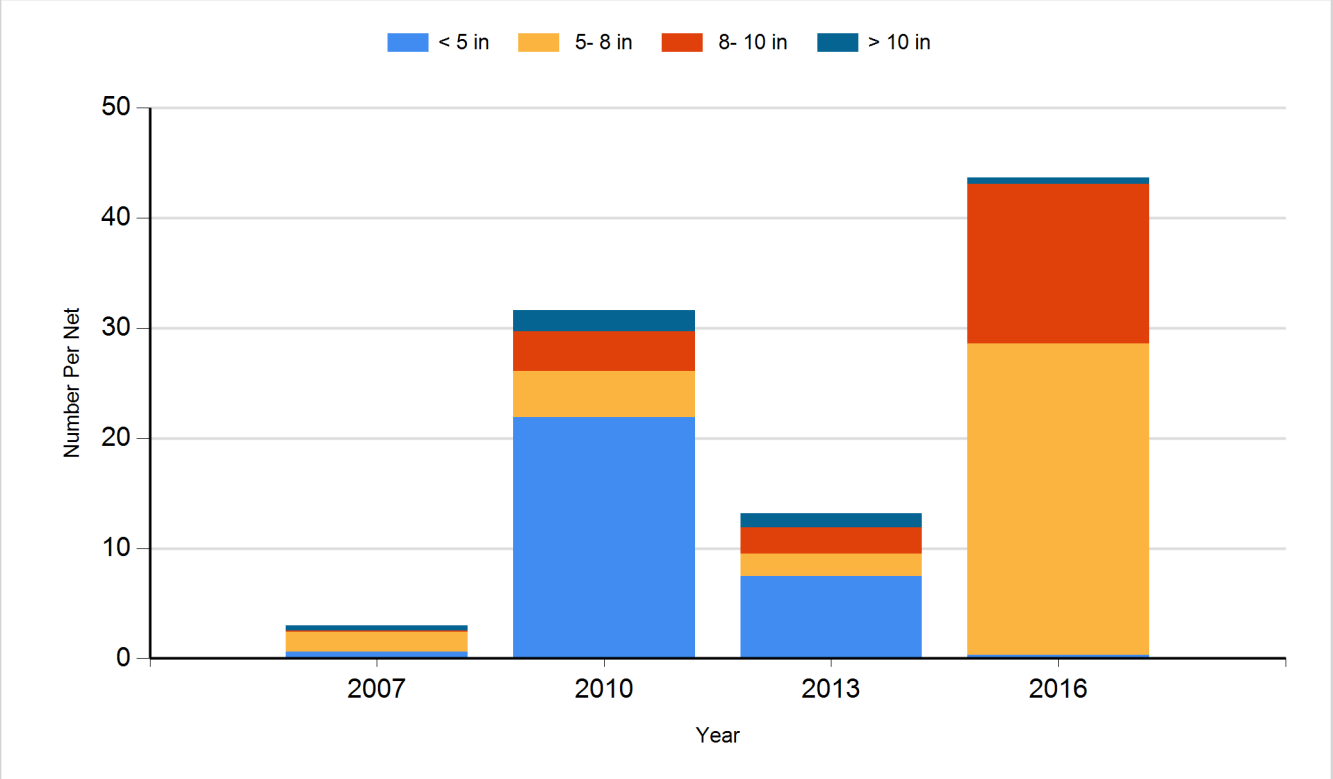


2016

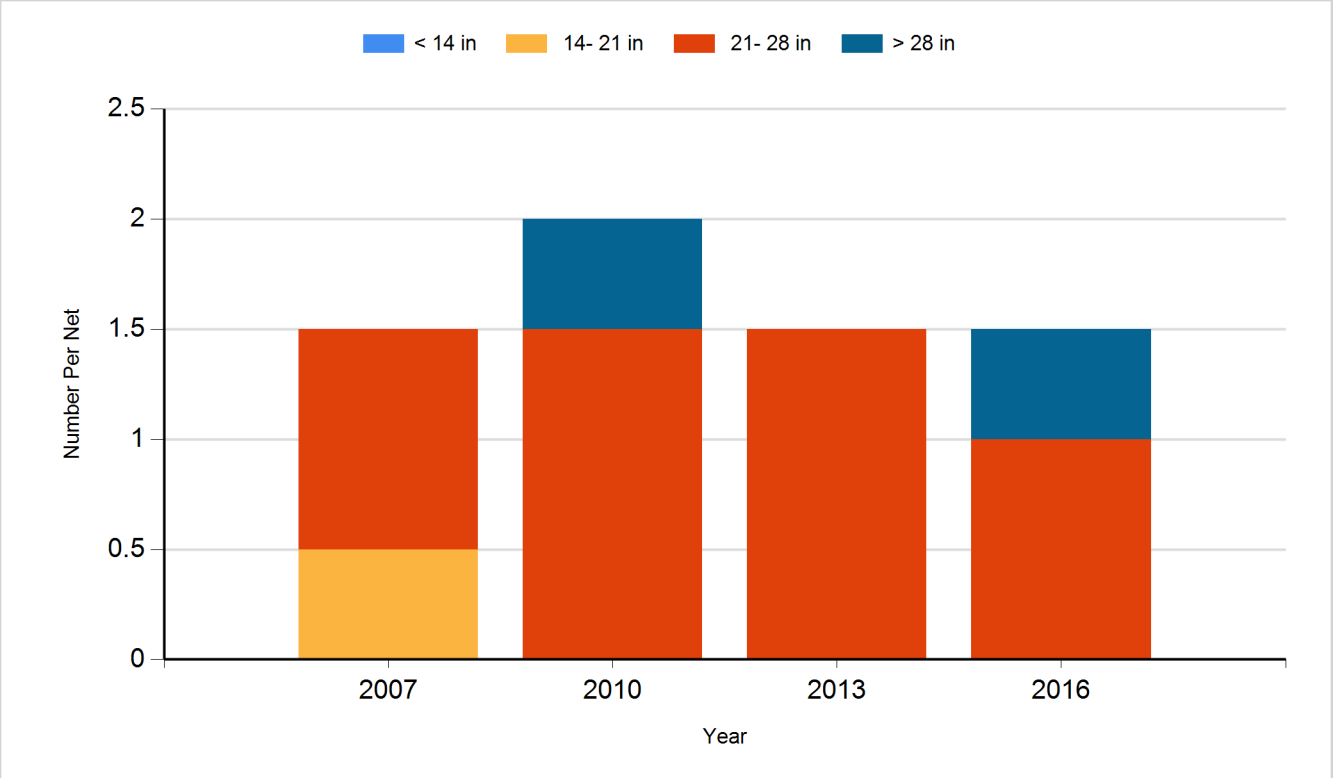
Historic Fish Sizes and Relative Abundance

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

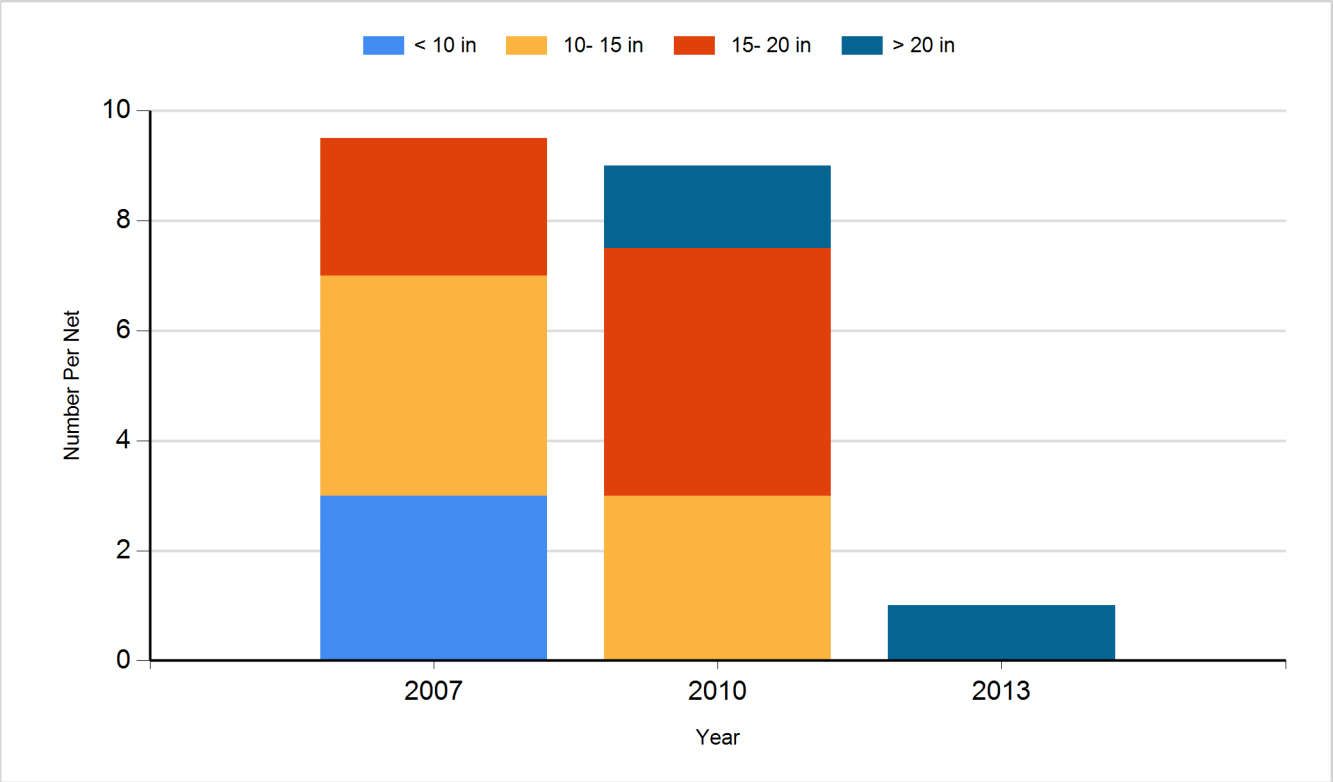
Species: Black Crappie
Gear: Frame Net



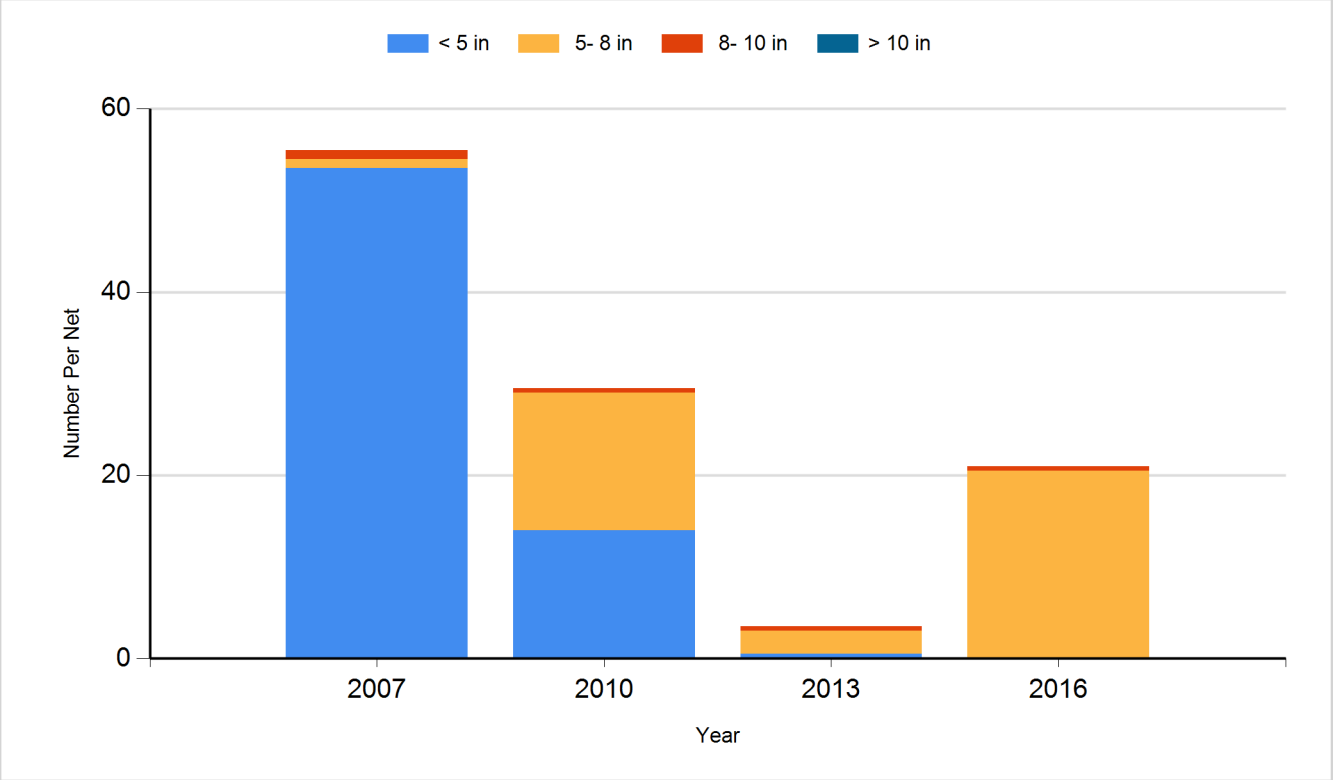
Species: Northern Pike
Gear: Gill Net



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	2,335
2008	Walleye	Large Fingerling	1,170
2010	Walleye	Small Fingerling	13,000
2013	Walleye	Large Fingerling	3,089
2015	Walleye	Large Fingerling	864