SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Cottonwood, Sully County
LLO-Lake-2428-000
2017

Lake Information

Name:	Cottonwood	**Maximum Depth:**	18 Feet
County:	Sully	**Mean Depth:**	9 Feet
Legal Description:	T116-R75-S20	**OHWM Elevation:**	1,804
Surface Area:	574 Acres	**Outlet Elevation:**	1,804

Surveys and Investigations

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

Gear	Date	Effort
AFS std frame net	June 20, 2017	6 net-nights
AFS std frame net	June 21, 2017	6 net-nights
AFS std gill net	June 20, 2017	4 net-nights
AFS std gill net	June 21, 2017	4 net-nights

Common Fish Species Present

Walleye

Black Crappie

Common Carp

Black Bullhead

Yellow Perch

Smallmouth Bass

White Crappie

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
AFS std frame net	Black Bullhead	8.0	5.6	100		2		84	2
	Black Crappie	59.8	12.0	91	1	10	2	102	1
	Common Carp	0.3	0.2	100		75		91	3
	Northern Pike	0.1	0.1	100		100		80	
	Smallmouth Bass	0.9	0.8	0		0		84	4
	Walleye	1.6	0.6	89		11		64	2
	White Crappie	0.2	0.2	50		50		86	0
AFS std gill net	Black Bullhead	5.6	1.9	100		16	9	84	3
	Black Crappie	2.5	1.3	75	16	0		95	3
	Common Carp	16.4	2.2	96	3	19	5	91	1
	Walleye	1.1	0.5	100		11		78	0
	Yellow Perch	1.9	0.8	93		47	21	91	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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg
AFS std frame net	Black Bullhead										8.0	8.0
	Black Crappie										59.8	59.8
	Common Carp										0.3	0.3
	Northern Pike										0.1	0.1
	Smallmouth Bass										0.9	0.9
	Walleye										1.6	1.6
	White Crappie										0.2	0.2
AFS std gill net	Black Bullhead										5.6	5.6
	Black Crappie										2.5	2.5
	Common Carp										16.4	16.4
	Walleye										1.1	1.1
	Yellow Perch										1.9	1.9
frame net (std 3/4 in)	Black Bullhead			3.7	4.8		8.7					5.7
	Black Crappie			0.1	0.3		5.5					2.0
	Common Carp			0.0	0.8		4.1					1.6
	Northern Pike						1.5					1.5
	Smallmouth Bass						0.9					0.9
	Walleye			0.2	7.9		8.5					5.5
	White Sucker						0.2					0.2
	Yellow Perch			2.0	8.2		2.5					4.2
std exp gill net	Black Bullhead				8.0		11.3					9.7
	Common Carp			0.5	0.3		16.5					5.8
	Northern Pike						2.0					2.0
	Walleye			0.0	29.0		7.8					12.3
	Yellow Perch			8.5	6.0		7.8					7.4

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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AFS std frame net	Black Crappie	PSD										91
		PSD-P										10
		Wr										102
	Northern Pike	PSD										100
		PSD-P										100
		Wr										80
	Walleye	PSD										89
		PSD-P										11
		Wr										64
AFS std gill net	Black Crappie	PSD										75
		PSD-P										0
		Wr										95
	Walleye	PSD										100
		PSD-P										11
		Wr										78
	Yellow Perch	PSD										93
		PSD-P										47
		Wr										91
frame net (std 3/4 in)	Black Crappie	PSD			100	33		45				
		PSD-P			100	0		14				
		Wr			93	114		109				
	Northern Pike	PSD						83				
		PSD-P						6				
		Wr						84				
	Walleye	PSD			100	35		28				
		PSD-P			0	0		0				
		Wr			87	91		71				
	Yellow Perch	PSD			8	23		100				
		PSD-P			0	11		20				
		Wr			105	94		93				
std exp gill net	Northern Pike	PSD						88				

			Year									
Gear	Species	Index	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
std exp gill net	Northern Pike	PSD-P						0				
		Wr						84				
	Walleye	PSD			0	26		45				
		PSD-P			0	0		0				
		Wr				90		75				
	Yellow Perch	PSD			9	6		94				
		PSD-P			0	0		6				
		Wr			110	101		93				

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	2	4	87 (5.9)	165 (4.4)								
2014	3	26	93 (3.7)	176 (3.9)	212 (3.2)							
2013	4	5	91 (10.4)	170 (14.3)	218 (8.2)	238 (11.3)						
2012	5	3	77 (6.1)	177 (10.1)	235 (10.8)	261 (10.2)	282 (12)					
2011	6	1	101	186	243	273	291	305				
2010	7	2	97 (1.4)	188 (4.6)	250 (4.5)	286 (8.5)	303 (3.6)	311 (.4)	318 (.4)			
Weighted Mean		41	91	175	218	256	291	309	318			

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2015	2	4										
2014	3	26										
2013	4	5										
2012	5	3										
2011	6	1										
2010	7	2										
Weighted Mean		41										

Species: Walleye

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2015	2	5	170 (1.6)	233 (12)								
2012	5	10	185 (7)	272 (8)	321 (9.1)	378 (6.9)	414 (5.2)					
2011	6	2	209 (15.4)	279 (12.2)	340 (9.8)	408 (9.7)	449 (7.6)	473 (11.6)				
2010	7	1	200	260	308	382	446	478	493			
2010	7	4	168 (20.2)	295 (11.5)	340 (12.7)	399 (22)	433 (18.8)	454 (16.8)	474 (14.6)			
Weighted Mean		22	181	267	327	387	424	463	478			

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2015	2	5										
2012	5	10										
2011	6	2										
2010	7	1										
2010	7	4										
Weighted Mean		22										

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+
2017	707		199 (56)	216 (513)	230 (88)	275 (34)	314 (6)	321 (11)			
2013	132		178 (53)	195 (35)	244 (24)	252 (16)	256 (5)				

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2017	2							496 (2)			
2013	66		312 (38)	399 (10)	448 (18)						
2011	204	249 (62)	373 (142)								
2010	144	201 (144)									

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	62		185 (4)	238 (56)		291 (2)					
2011	36	152 (32)		194 (2)	226 (2)						
2010	78	129 (24)	151 (4)	179 (50)							

Fish Condition

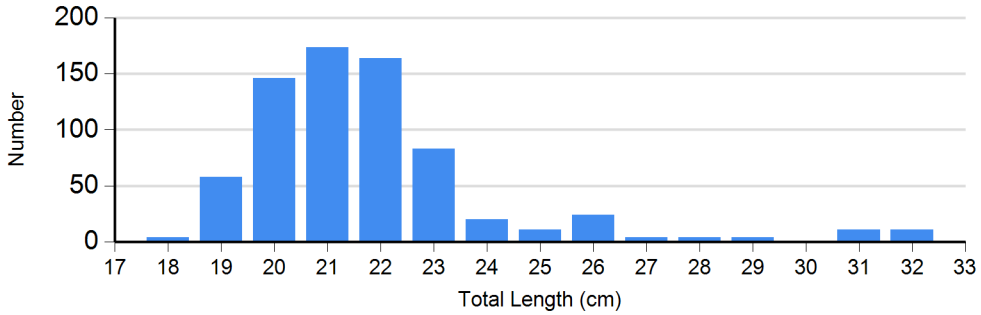
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	72	116 (1.4)	42	101 (1.1)	18	98 (1.4)	0	
	2017	62	106 (4.3)	587	104 (1.0)	47	90 (1.9)	22	95 (6.8)
Northern Pike Gill Net	2013	2	76 (0.0)	14	85 (1.5)	0		0	
Walleye Gill Net	2013	34	74 (1.0)	28	77 (1.3)	0		0	
	2017	0		8	78 (0.2)	1		0	
Yellow Perch Gill Net	2013	4	109 (5.1)	54	93 (0.8)	4	79 (6.0)	0	
	2017	1	94	7	92 (0.8)	7	89 (1.6)	0	

Length Frequency Distribution

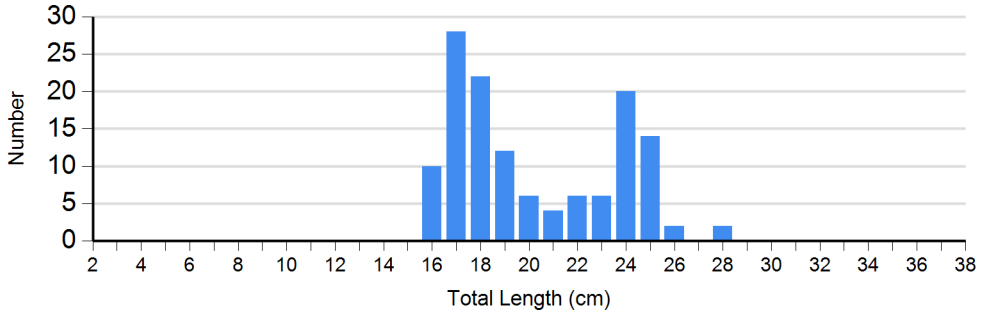
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net



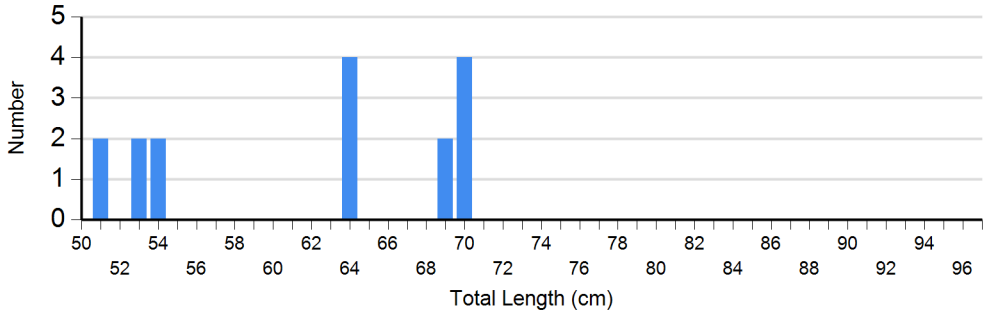
2017

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



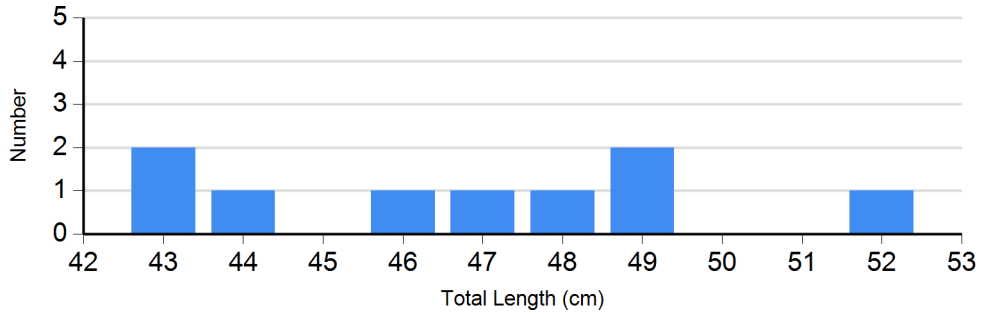
2013

Species: Northern Pike
Gear: std exp gill net



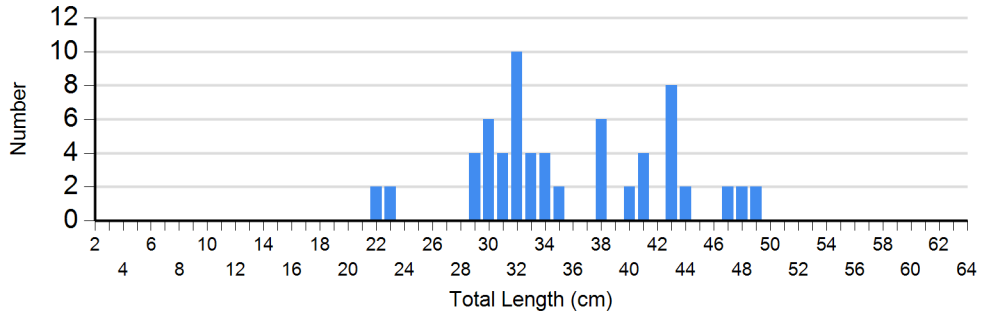
2013

Species: Walleye
Gear: AFS std gill net



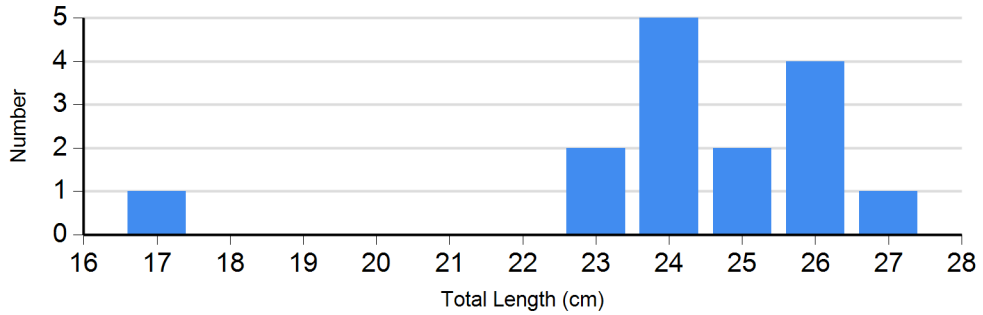
2017

Species: Walleye
Gear: std exp gill net



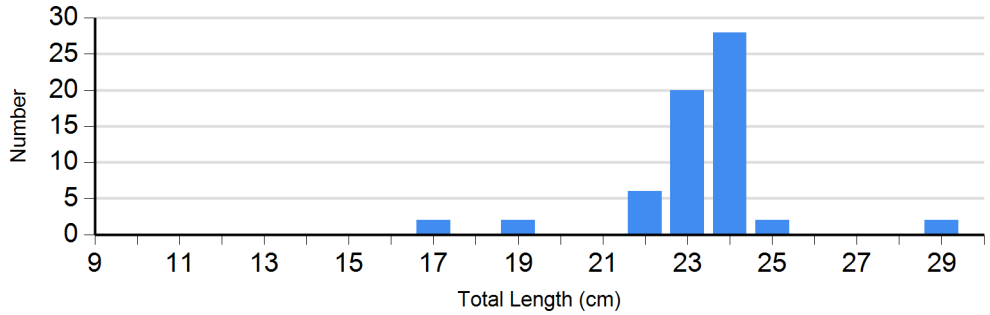
2013

Species: Yellow Perch
Gear: AFS std gill net



2017

Species: Yellow Perch
Gear: std exp gill net

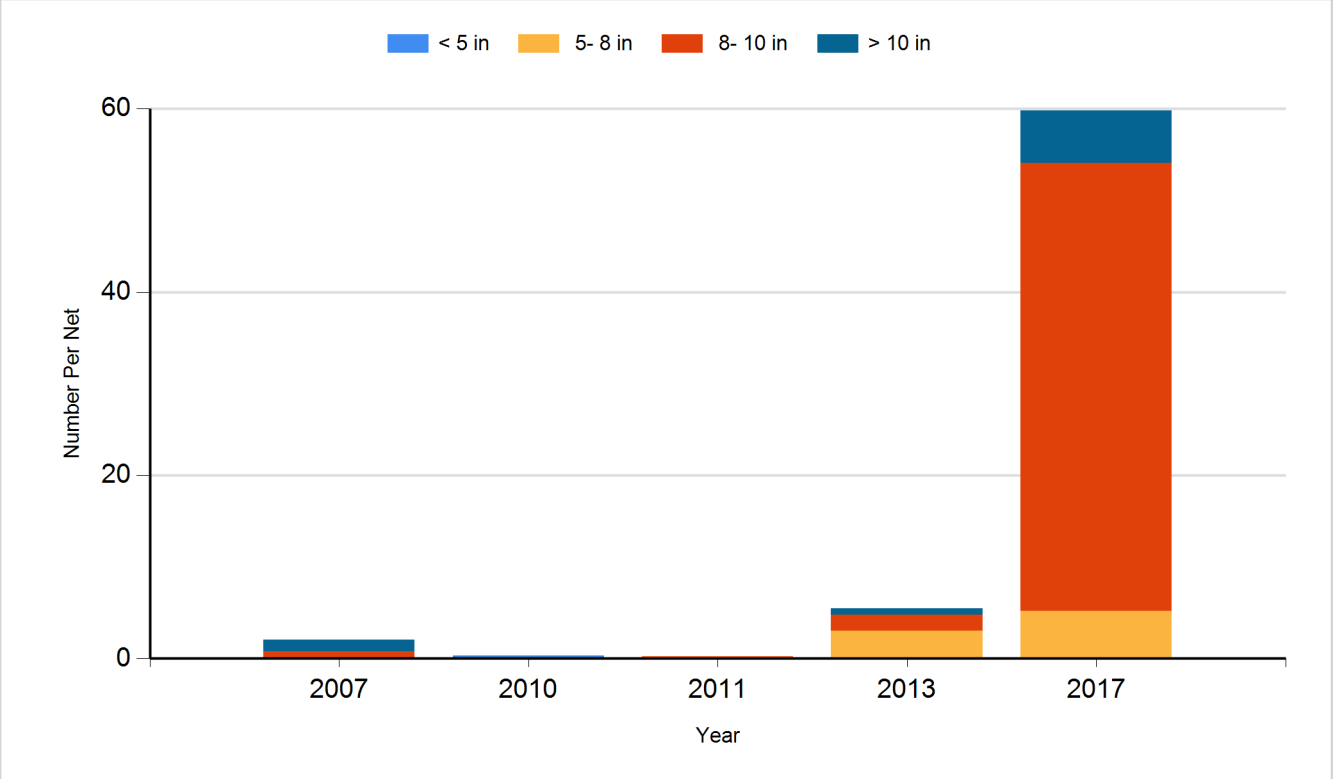


2013

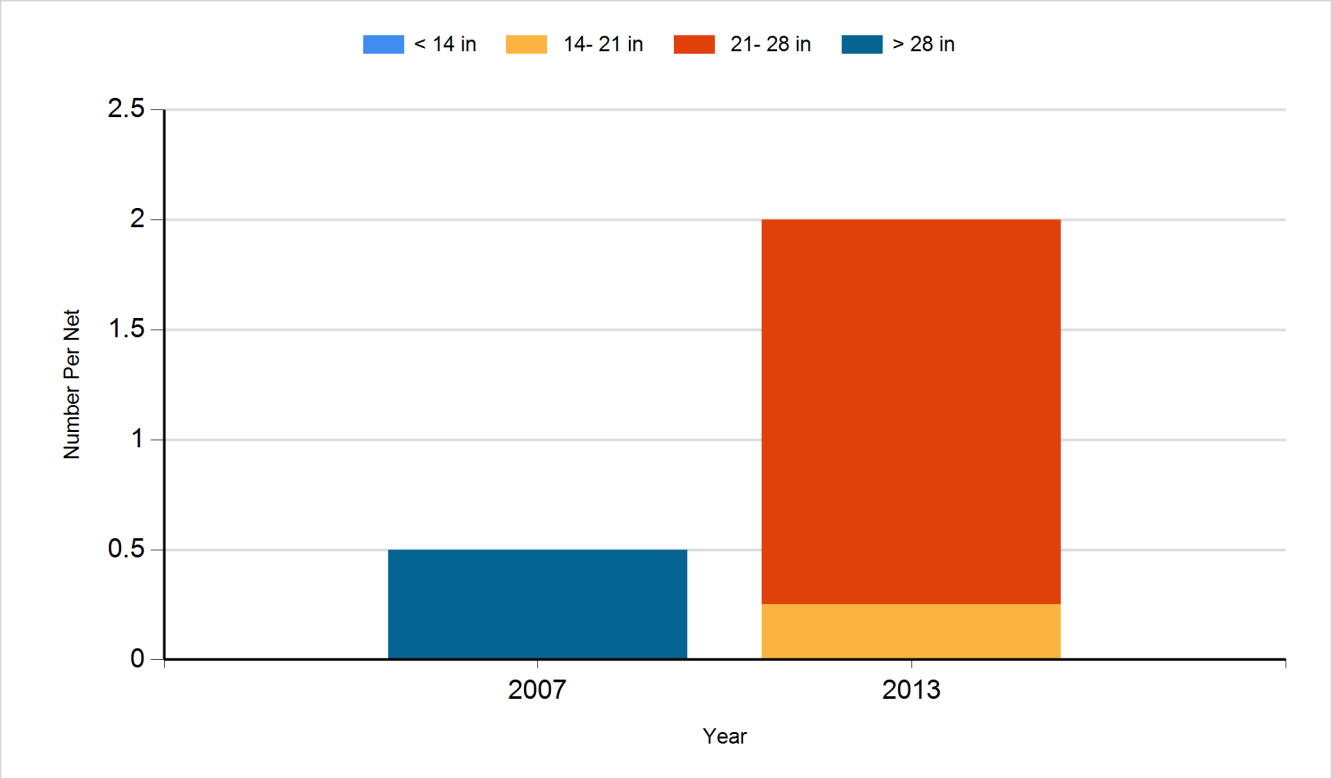
Historic Fish Sizes and Relative Abundance

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

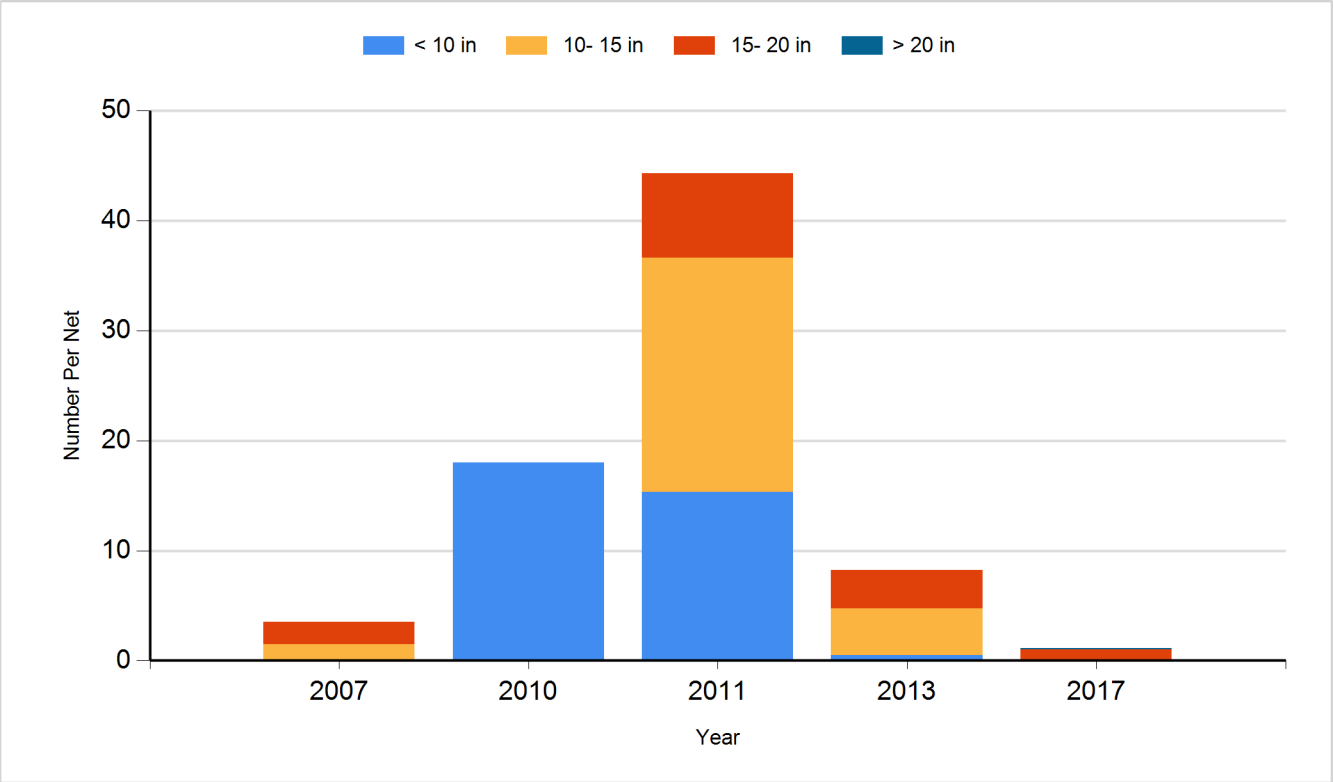
Species: Black Crappie
Gear: Frame Net



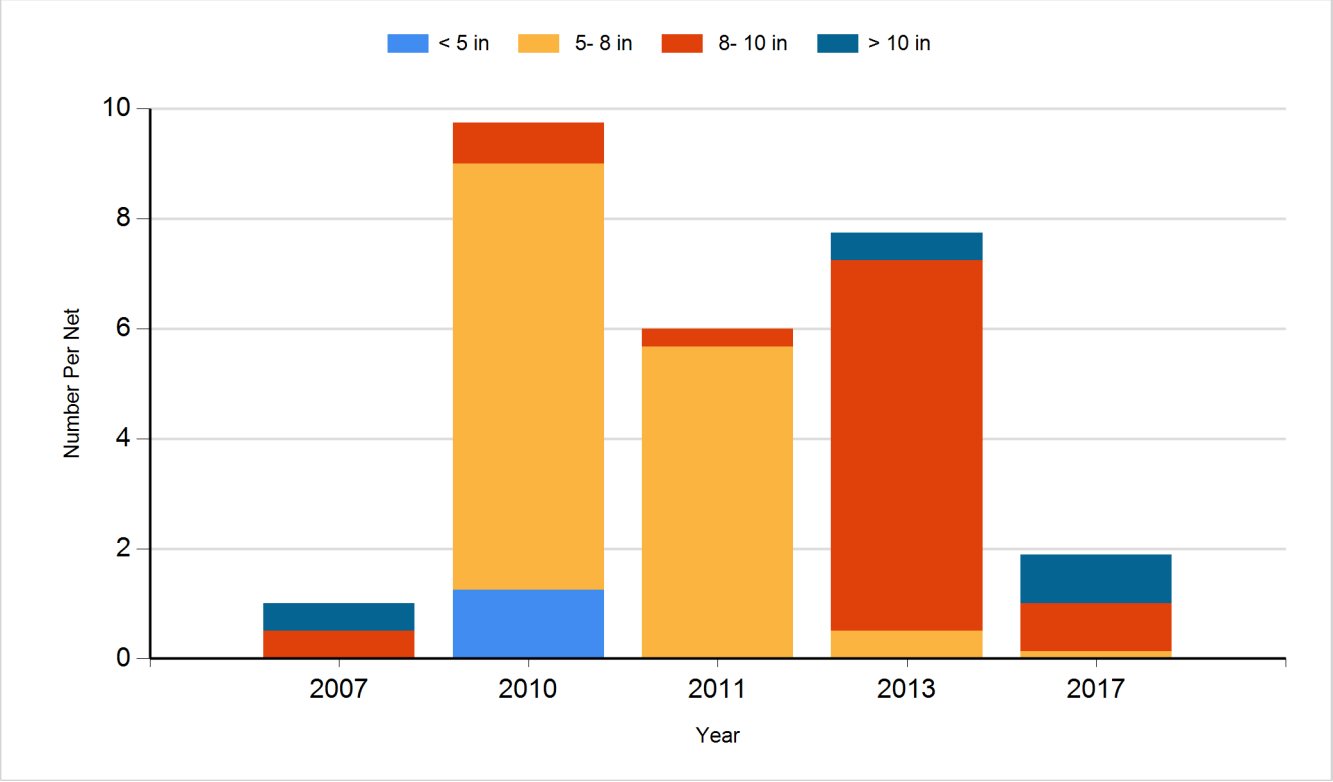
Species: Northern Pike
Gear: Gill Net



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	Yellow Perch	Juvenile	10,349
2007	Smallmouth Bass	Juvenile	20
2007	Walleye	Small Fingerling	61,600
2008	Yellow Perch	Juvenile	75
2009	Walleye	Small Fingerling	45,750
2010	Walleye	Small Fingerling	45,260
2011	Walleye	Small Fingerling	44,660
2011	Yellow Perch	Adult	736
2012	Smallmouth Bass	Juvenile	250
2015	Walleye	Small Fingerling	45,500
2015	White Crappie	Adult	167
2016	Black Crappie	Adult	105
2016	White Crappie	Adult	106
2017	Walleye	Large Fingerling	4,800
2017	Yellow Perch	Adult	2,100