

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Buffalo North, Marshall County
UJA-Lake-917-700
2016

Lake Information

Name: Buffalo North

County: Marshall

Surface Area: 414 Acres

OHWM Elevation: 1,835

Outlet Elevation: 1,835

Surveys and Investigations

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

Gear	Date	Effort
AFS std frame net	June 07, 2016	6 net-nights
AFS std frame net	June 08, 2016	6 net-nights
AFS std gill net	June 07, 2016	3 net-nights
AFS std gill net	June 08, 2016	3 net-nights

Common Fish Species Present

Bluegill

Black Bullhead

Yellow Perch

Northern Pike

White Sucker

Walleye

Black Crappie

Largemouth Bass

Common Carp

Golden Shiner

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	31.8	11.3	99		17	3	84	1
	Black Crappie	0.3	0.2	75		75		88	4
	Bluegill	33.8	10.1	88	2	32	3	113	1
	Golden Shiner	0.0	0.0						
	Northern Pike	0.2	0.2	100		50		43	11
	Walleye	0.4	0.3	80		40		87	3
	White Sucker	0.2	0.2	100		100		93	2
	Yellow Perch	1.1	0.8	23		0		86	2
AFS std gill net	Black Bullhead	22.2	11.0	99		1		80	1
	Black Crappie	0.8	0.7	100		100		97	3
	Bluegill	1.0	0.9	67		17		115	4
	Common Carp	0.2	0.2	100		100		76	
	Golden Shiner	0.0	0.0						
	Largemouth Bass	0.3	0.3	0		0		118	3
	Northern Pike	3.2	1.2	84		21		86	2
	Walleye	3.0	1.1	89		33	18	90	2
	White Sucker	3.0	1.1	100		100		107	3
Yellow Perch	14.7	5.2	3		0		90	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
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
AFS std frame net	Black Bullhead										31.8	31.8
	Black Crappie										0.3	0.3
	Bluegill										33.8	33.8
	Golden Shiner										0.0	0.0
	Northern Pike										0.2	0.2
	Walleye										0.4	0.4
	White Sucker										0.2	0.2
	Yellow Perch										1.1	1.1
AFS std gill net	Black Bullhead										22.2	22.2
	Black Crappie										0.8	0.8
	Bluegill										1.0	1.0
	Common Carp										0.2	0.2
	Golden Shiner										0.0	0.0
	Largemouth Bass										0.3	0.3
	Northern Pike										3.2	3.2
	Walleye										3.0	3.0
	White Sucker										3.0	3.0
	Yellow Perch										14.7	14.7
frame net (std 3/4 in)	Black Bullhead	17.0			14.4			128.4				53.3
	Black Crappie	5.3			5.4			4.8				5.2
	Bluegill	50.8			65.5			47.1				54.5
	Common Carp	0.1										0.1
	Golden Shiner				0.0							0.0
	Green Sunfish	0.3			2.6							1.5
	Northern Pike	0.4			0.5			0.3				0.4
	Orangespotted Sunfish	0.0			0.0							0.0
	Sunfish Hybrid	0.0										0.0
	Walleye				0.3			0.2				0.3
	Western Painted Turtle	0.0										0.0
	White Sucker	0.2			0.3							0.3
	Yellow Perch	28.7			32.7			25.4				28.9
	std exp gill net	Black Bullhead	3.3			0.1			62.3			
Black Crappie		0.3			0.1			1.3				0.6

		CPUE										
Gear	Species	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
std exp gill net	Bluegill				0.1			0.3				0.2
	Common Carp	0.5			0.2			0.3				0.3
	Northern Pike	4.8			3.9			11.7				6.8
	Walleye	1.3			1.2			4.0				2.2
	White Sucker	1.8			0.8			0.7				1.1
	Yellow Perch	77.8			4.7			68.0				50.2

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											
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
AFS std frame net	Black Crappie	PSD											75	
		PSD-P											75	
		Wr											88	
	Northern Pike	PSD												100
		PSD-P												50
		Wr												43
	Walleye	PSD												80
		PSD-P												40
		Wr												87
	Yellow Perch	PSD												23
		PSD-P												0
		Wr												86
AFS std gill net	Black Crappie	PSD											100	
		PSD-P											100	
		Wr											97	
	Northern Pike	PSD												84
		PSD-P												21
		Wr												86
	Walleye	PSD												89
		PSD-P												33
		Wr												90
	Yellow Perch	PSD												3
		PSD-P												0
		Wr												90
frame net (std 3/4 in)	Black Crappie	PSD	79			11				96				
		PSD-P	72			3				7				
		Wr	105			106				101				
	Northern Pike	PSD	100			33				100				
		PSD-P	25			0				33				
		Wr	82			92				87				
	Walleye	PSD				67				100				

Gear	Species	Index	Year									
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
frame net (std 3/4 in)	Walleye	PSD-P				67			50			
		Wr				98			82			
	Yellow Perch	PSD	18			2			3			
		PSD-P	1			1			1			
		Wr	89			90			88			
std exp gill net	Black Crappie	PSD	0			0			100			
		PSD-P	0			0			0			
		Wr	120			128			107			
	Northern Pike	PSD	84			57			60			
		PSD-P	5			0			6			
		Wr	89			96			91			
	Walleye	PSD	80			55			67			
		PSD-P	20			45			8			
		Wr	97			101			90			
	Yellow Perch	PSD	12			0			1			
		PSD-P	0			0			0			
		Wr	98			105			91			

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+
2016	18					393 (10)	478 (2)	517 (2)	656 (1)		595 (3)
2013	16		212 (4)	358 (7)	471 (4)						585 (1)
2010	19	178 (8)	348 (5)			515 (1)	596 (1)				545 (4)
2007	5		377 (1)	450 (3)							685 (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+
2016	88			149 (16)		176 (13)	183 (53)	184 (5)			
2013	211		106 (1)	141 (64)	157 (109)	171 (36)					
2010	816	89 (2)	109 (809)	153 (4)	164 (2)						

Fish Condition

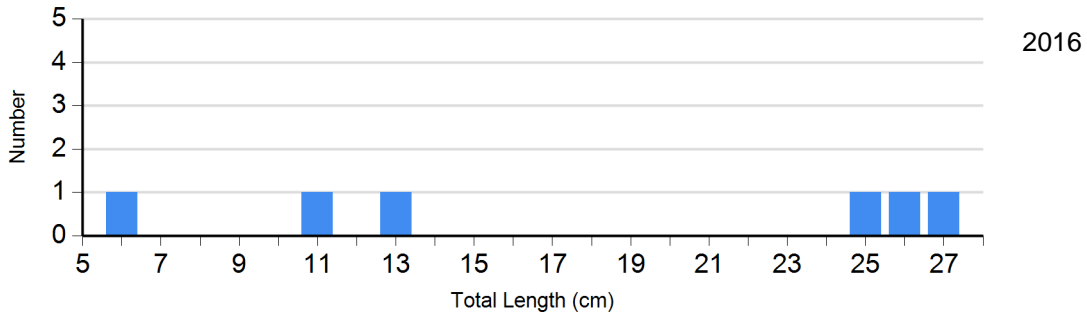
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2013	2	102 (2.1)	51	102 (1.2)	4	94 (1.2)	0	
	2016	1	94	0		3	85 (3.1)	0	
Northern Pike Gill Net	2013	14	92 (1.0)	19	90 (1.4)	2	91 (2.8)	0	
	2016	3	89 (3.7)	12	85 (1.4)	3	85 (3.6)	1	89
Walleye Gill Net	2013	4	89 (3.9)	7	89 (2.1)	1	104	0	
	2016	2	95 (7.3)	10	88 (2.1)	5	93 (3.2)	1	83
Yellow Perch Gill Net	2013	202	91 (0.5)	2	79 (7.3)	0		0	
	2016	85	90 (0.9)	3	88 (4.1)	0		0	

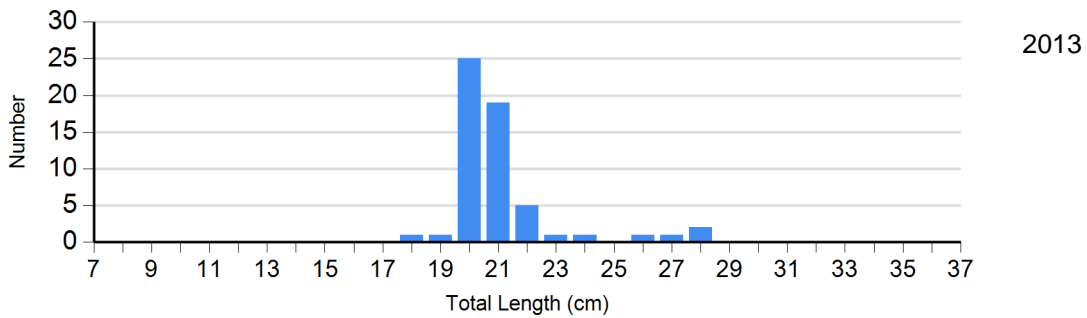
Length Frequency Distribution

Length frequency histogram of species sampled by year.

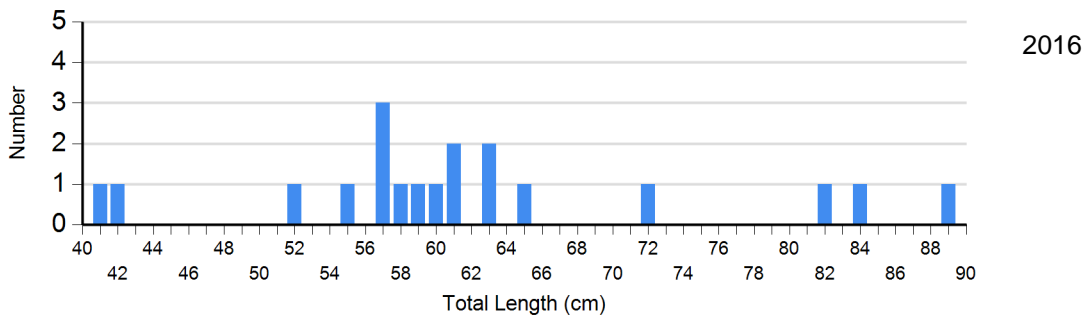
Species: Black Crappie
Gear: AFS std frame net



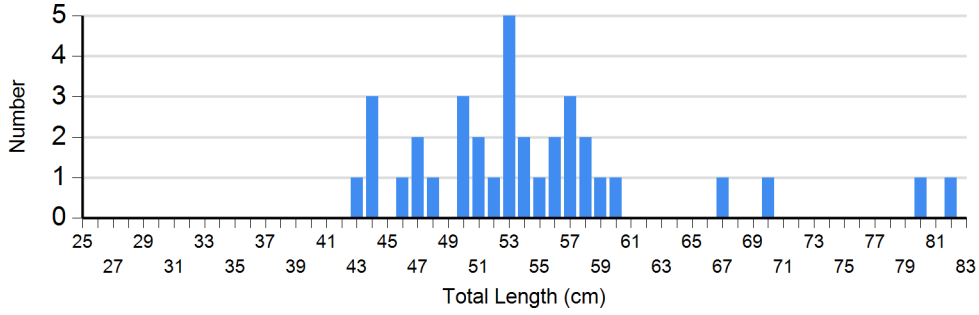
Species: Black Crappie
Gear: frame net (std 3/4 in)



Species: Northern Pike
Gear: AFS std gill net

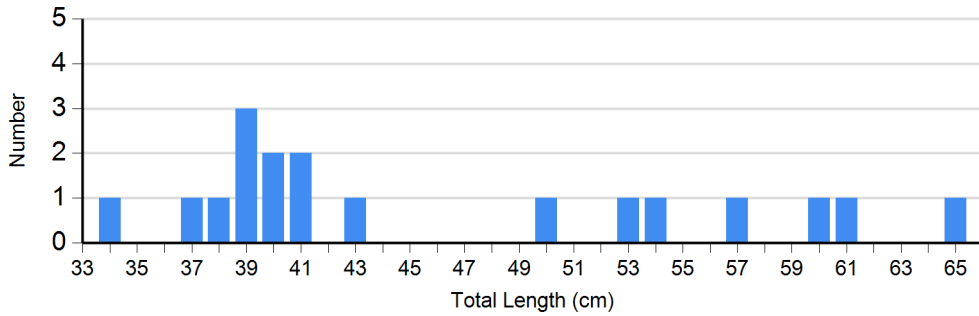


Species: Northern Pike
Gear: std exp gill net



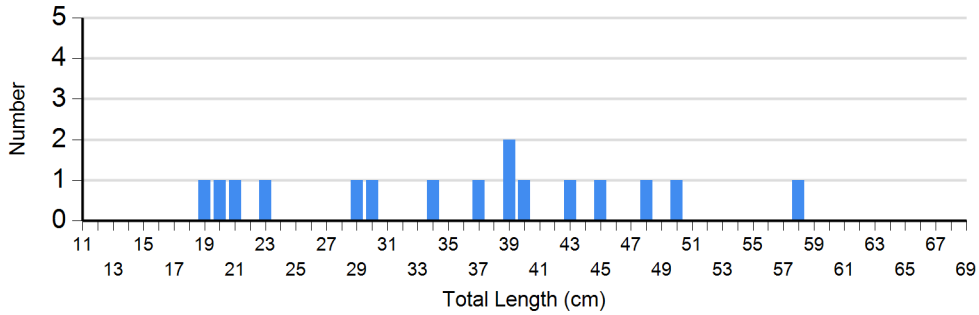
2013

Species: Walleye
Gear: AFS std gill net



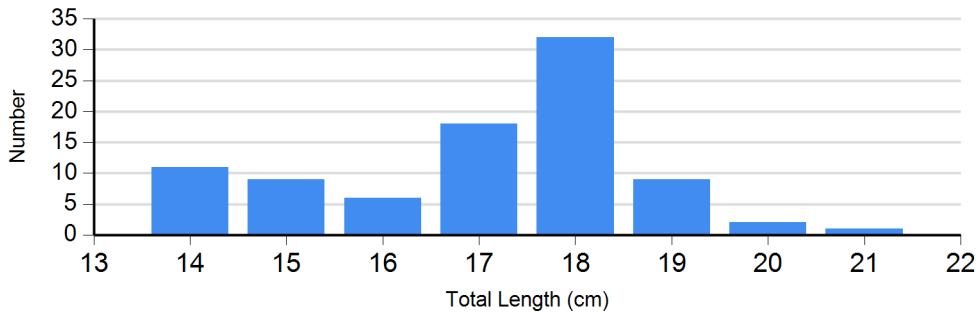
2016

Species: Walleye
Gear: std exp gill net



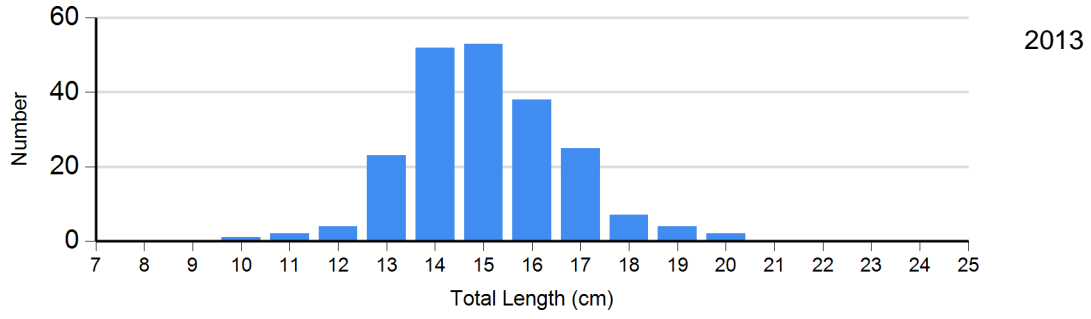
2013

Species: Yellow Perch
Gear: AFS std gill net



2016

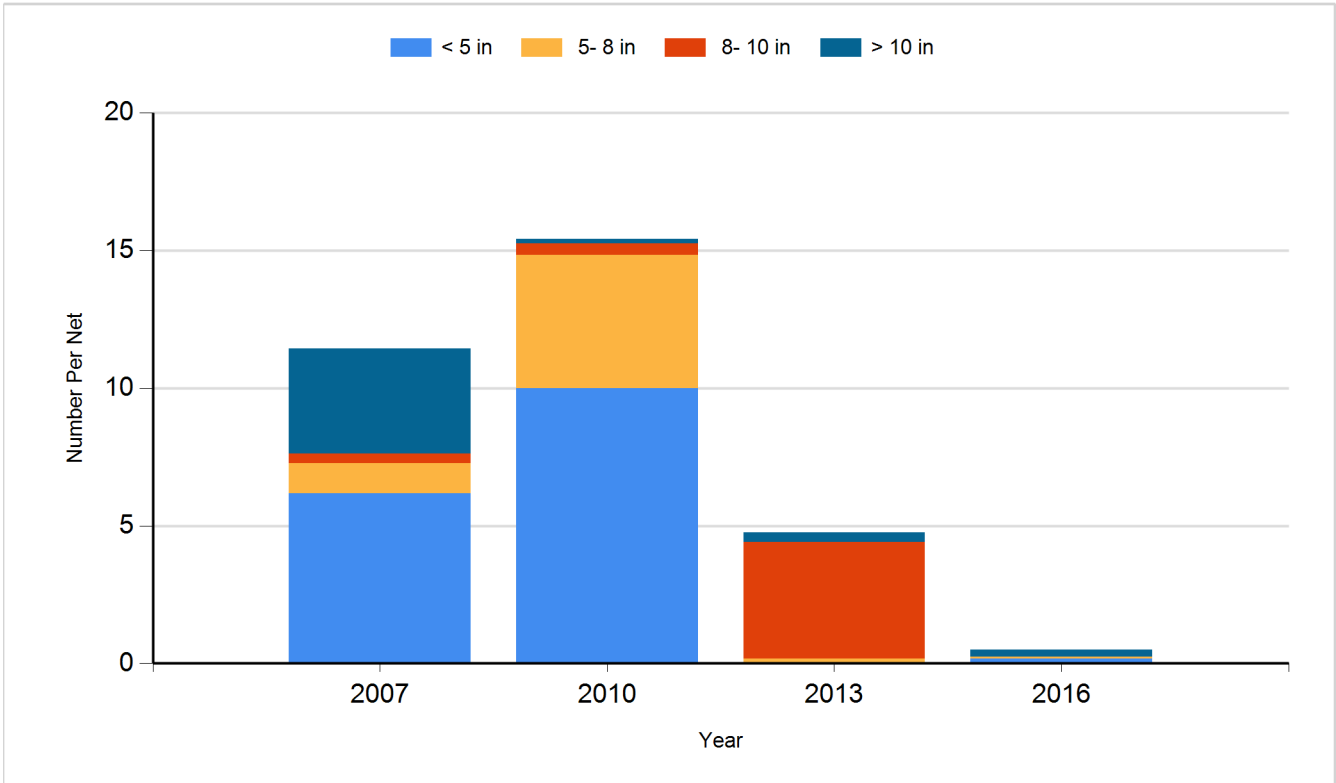
Species: Yellow Perch
Gear: std exp gill net



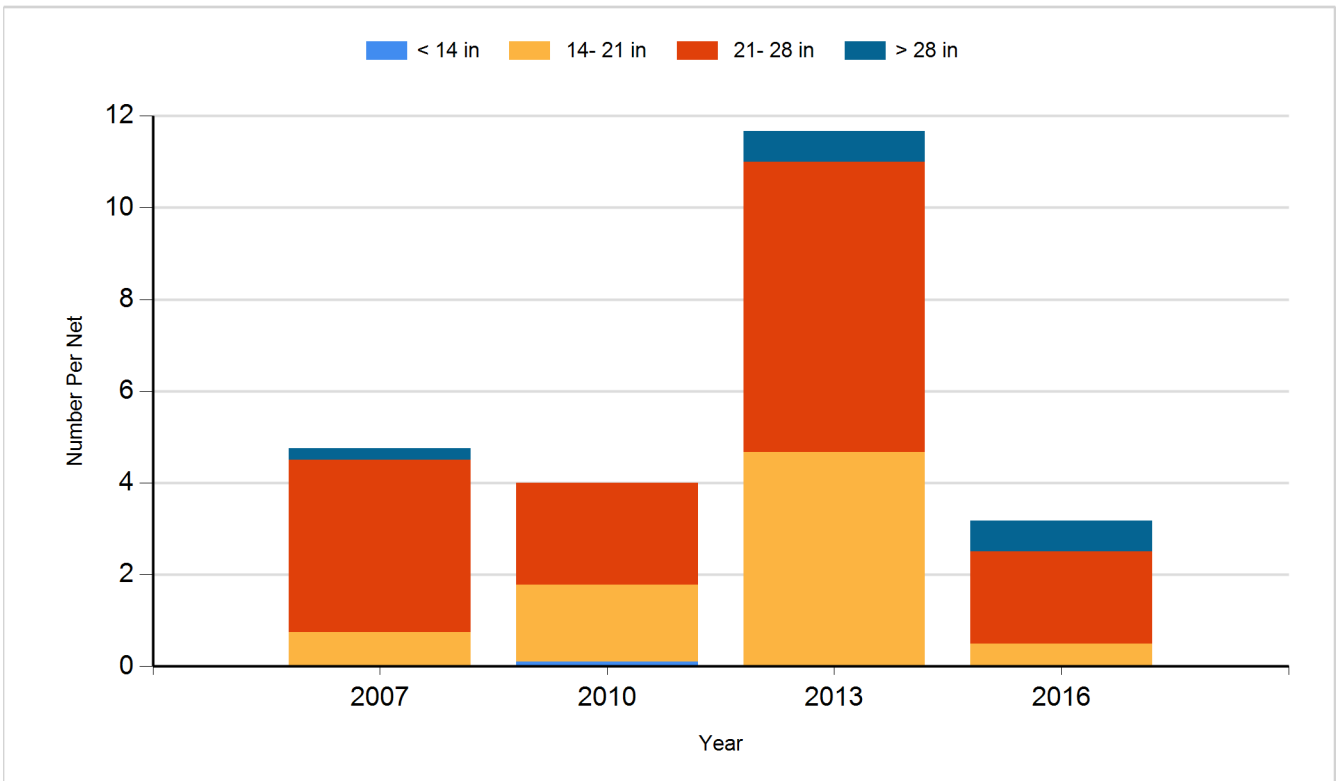
Historic Fish Sizes and Relative Abundance

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

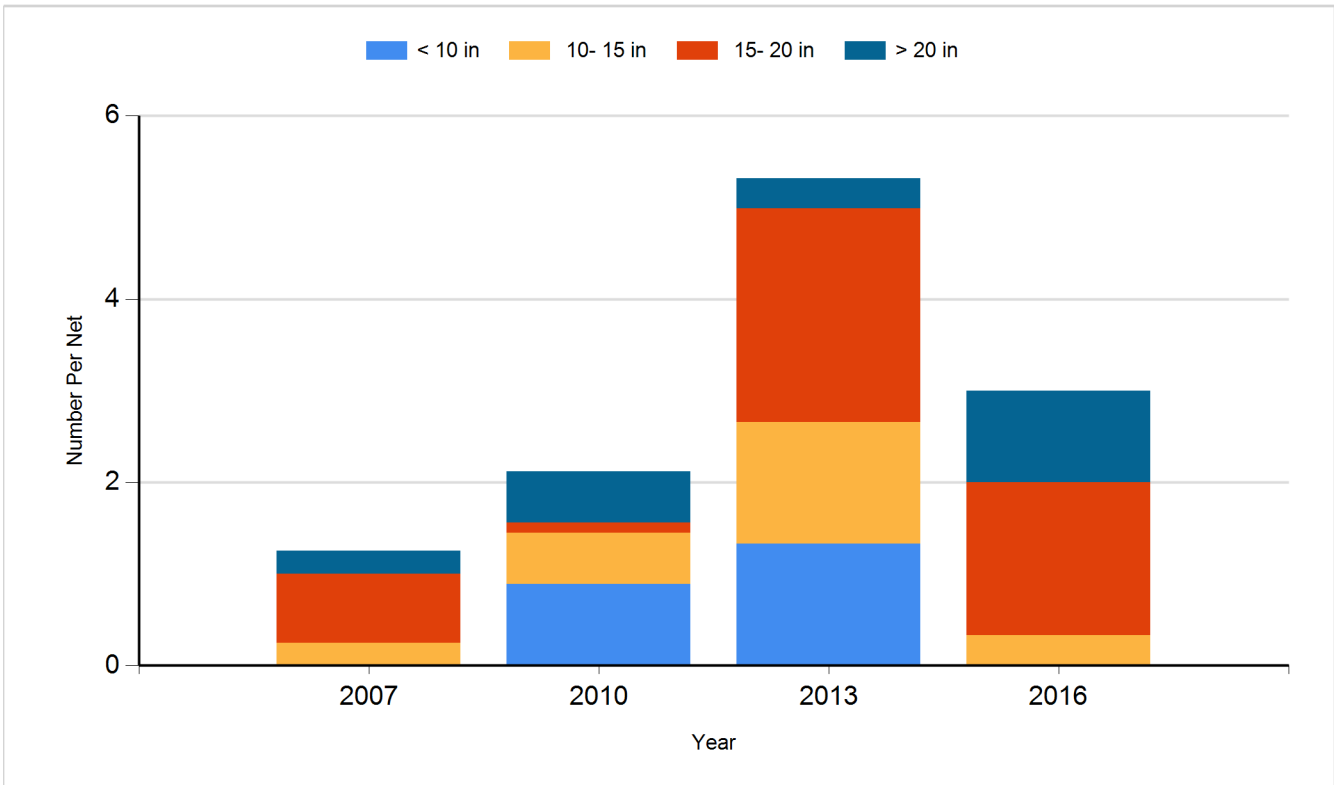
Species: Black Crappie
Gear: Frame Net



Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net

