

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Stockade, Custer County
MCS-Lake-12-000
2017

Lake Information

Name: Stockade
County: Custer
Surface Area: 129 Acres

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (night)	May 30, 2017	4200 seconds
std frame net (3/8 inch)	May 30, 2017	600 net-nights

Common Fish Species Present

Smallmouth Bass

Northern Pike

Largemouth Bass

Bluegill

Yellow Perch

White Sucker

Black Crappie

Black Bullhead

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
boat shocker (night)	Largemouth Bass	66.9	23.0	78	7	19	7	111	5
	Smallmouth Bass	13.7	4.5	56	20	19		100	3
std frame net (3/8 inch)	Black Bullhead	0.0		100		0		97	
	Black Crappie	0.0		67		0		93	5
	White Sucker	0.0		100		100		100	12

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	
boat shocker (night)	Largemouth Bass			67.7	97.6	171.0	36.0	121.0	84.0	68.0	66.9	89.0
	Smallmouth Bass			6.1	6.0	20.0	4.0	12.0	0.0	9.0	13.7	8.9
boat shocker (night, AC)	Largemouth Bass		146.2									146.2
	Smallmouth Bass		12.2									12.2
frame net (std 3/4 in)	Black Bullhead	0.1	1.3	0.3		1.1	0.3	0.9	471.1			67.9
	Black Crappie	2.3	8.8	8.1	0.9	1.6	0.4	1.6	5.3			3.6
	Bluegill	4.5	15.8	58.4	2.8	3.1	4.6	3.5	12.8			13.2
	Bluegill X Gr. Sunfish Hybrid								0.1			0.1
	Golden Shiner						0.0					0.0
	Largemouth Bass	0.1							0.1			0.1
	Northern Pike	0.5	1.0	0.6	0.9	0.3	0.9	1.5	0.6			0.8
	Smallmouth Bass			0.1					0.4			0.3
	White Sucker	0.1	1.9	0.3	0.4			0.3	0.1			0.5
	Yellow Perch	2.8	20.4	20.4	35.6	67.9	48.0	197.5	3.0			49.5
std exp gill net (150 ft)	Black Bullhead		0.5	1.0			1.0	0.5	41.0	53.5		16.3
	Black Crappie	22.5	18.0	4.0	3.5	6.5	8.5	10.5	0.5			9.3
	Bluegill		1.0	0.5		2.5	6.5	2.0	1.5	1.0		2.1
	Golden Shiner								0.0			0.0
	Largemouth Bass					0.5			0.5	1.0		0.7
	Northern Pike	7.0	7.0	0.5	2.5	0.5	1.0	4.5	5.5	4.5		3.7
	Smallmouth Bass		0.5	0.5				0.5				0.5
	White Sucker	3.5	6.0	1.5	0.5	1.0		1.0	0.5	1.0		1.9
Yellow Perch	32.5	87.5	22.0	138.5	160.0	218.5	91.0	61.5	63.5		97.2	
std frame net (3/8 inch)	Black Bullhead										0.0	0.0
	Black Crappie										0.0	0.0
	White Sucker										0.0	0.0

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	
frame net (std 3/4 in)	Black Crappie	PSD	11	39	46	100	77	67	38	69			
		PSD-P	0	0	0	0	0	0	0	2			
		Wr	100	102	101	91	103	105	106	109			
	Northern Pike	PSD	75	88	60	100	50	71	67	40			
		PSD-P	0	13	40	43	50	57	50	0			
		Wr		91	103	95	96	98	92	81			
	Yellow Perch	PSD	14	42	50	52	76	99	97	92			
		PSD-P	9	3	1	1	3	26	42	42			
		Wr			91	95	93	96	89	78			
std exp gill net (150 ft)	Black Crappie	PSD	0	25	88	57	0	6	33	0			
		PSD-P	0	0	0	0	0	0	0	0			
		Wr	102	107	102	107	117	109	108	96			
	Northern Pike	PSD	100	93	100	100	0	100	89	64	78		
		PSD-P	7	0	100	20	0	0	44	9	0		
		Wr	98	96	104	96	98	88	98	90	95		
	Yellow Perch	PSD	5	13	48	65	74	76	85	62	60		
		PSD-P	0	0	0	2	9	30	21	15	5		
		Wr	87	90	98	99	100	95	98	89	90		
std frame net (3/8 inch)	Black Crappie	PSD										67	
		PSD-P											0
		Wr											93

Length at Capture

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

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	127			187 (39)	206 (52)	220 (20)	237 (3)		245 (4)	234 (2)	250 (5)
2014	181		177 (18)	210 (73)	243 (3)	236 (5)	243 (27)	245 (24)	241 (35)		
2013	437		193 (134)	228 (25)	230 (29)	242 (68)	247 (102)	243 (17)	254 (55)	265 (8)	
2012	292	142 (29)	185 (24)	204 (23)	234 (11)	227 (103)	239 (55)	233 (49)			
2011	277		158 (9)	186 (25)	205 (111)	217 (49)	217 (84)				
2010	43			155 (6)	180 (10)	207 (21)	211 (8)				

Fish Condition

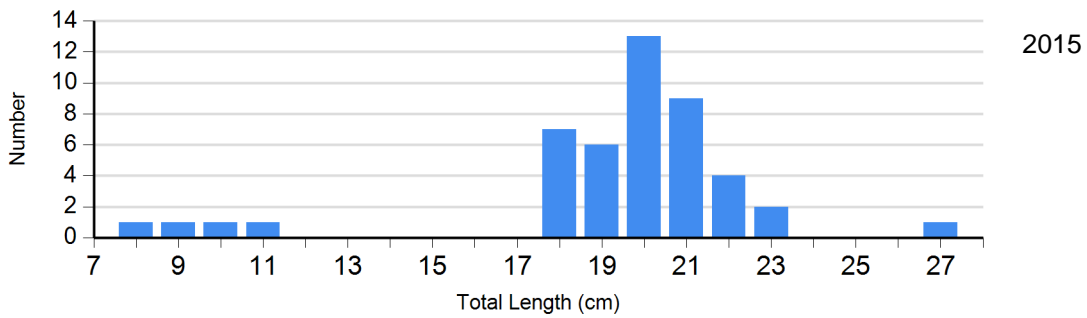
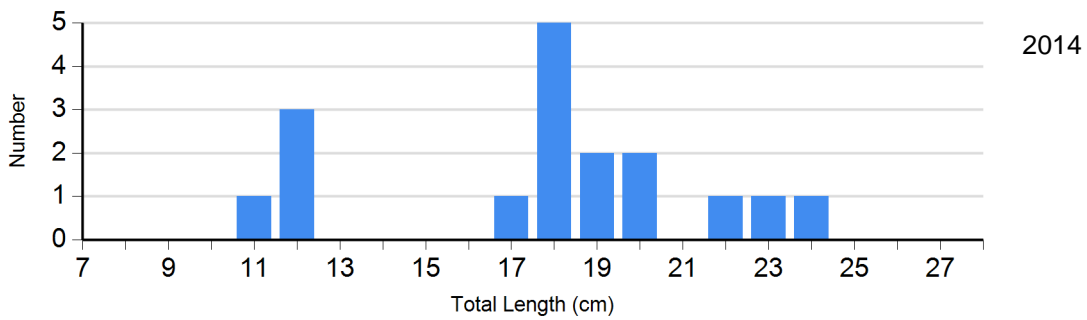
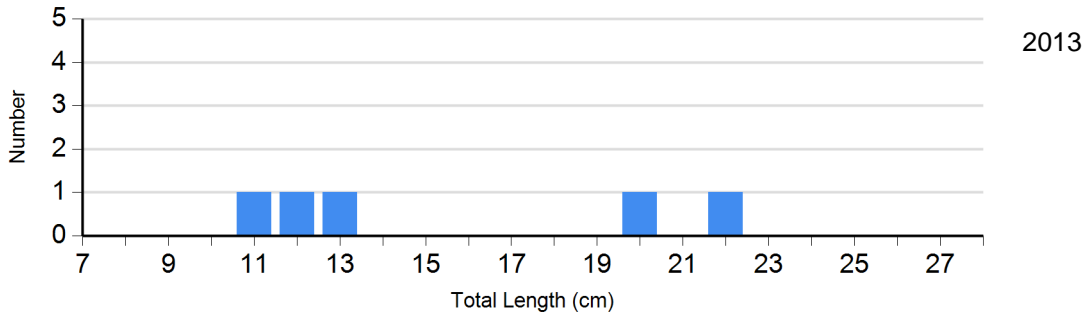
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	1	115	2	100 (10.7)	0		0	
	2014	8	112 (3.4)	5	97 (5.1)	0		0	
	2015	13	119 (3.5)	28	106 (1.4)	1	63	0	
	2017	1	95	2	92 (6.0)	0		0	
Northern Pike Gill Net	2013	0		2	88 (0.3)	0		0	
	2014	1	95	4	101 (1.3)	4	97 (5.4)	0	
	2015	4	88 (2.5)	6	90 (3.6)	1	94	0	
	2016	2	95 (0.0)	7	94 (3.6)	0		0	
Yellow Perch Gill Net	2013	104	92 (0.6)	204	96 (0.6)	129	94 (0.6)	0	
	2014	27	98 (1.3)	116	99 (0.8)	39	93 (0.9)	0	
	2015	47	91 (0.8)	57	88 (0.9)	19	86 (1.4)	0	
	2016	51	96 (0.8)	70	86 (0.9)	6	77 (3.6)	0	

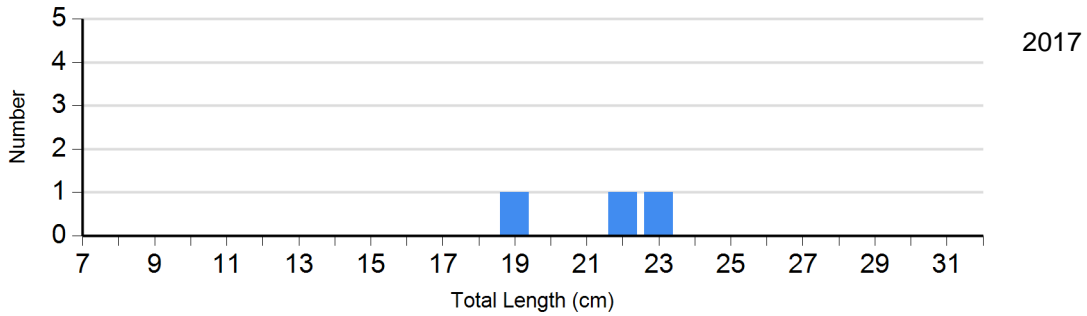
Length Frequency Distribution

Length frequency histogram of species sampled by year.

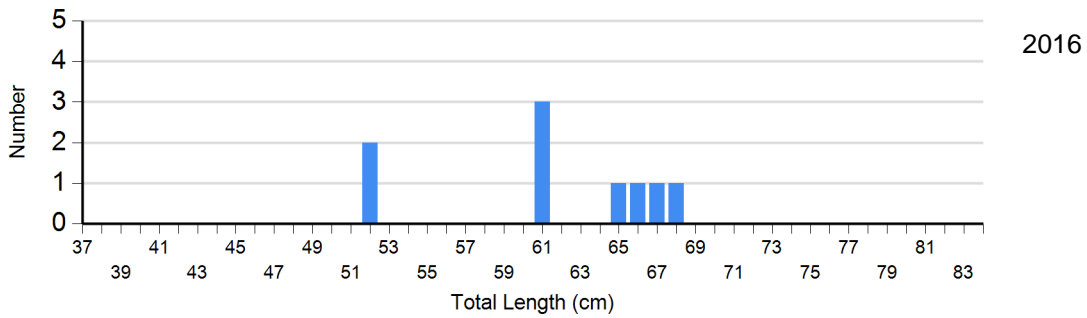
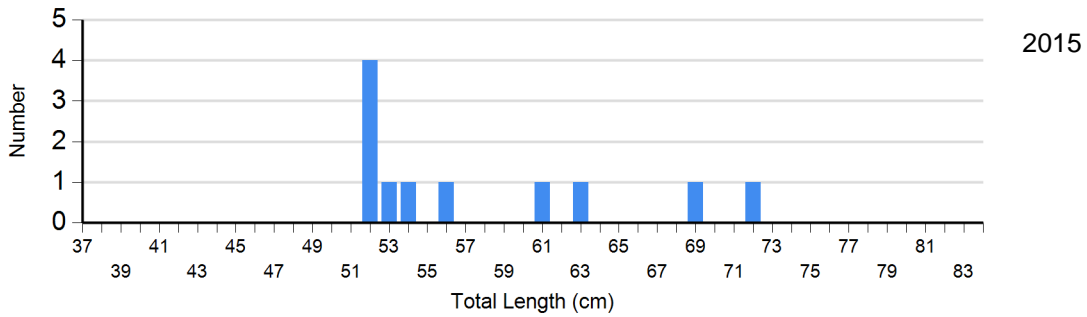
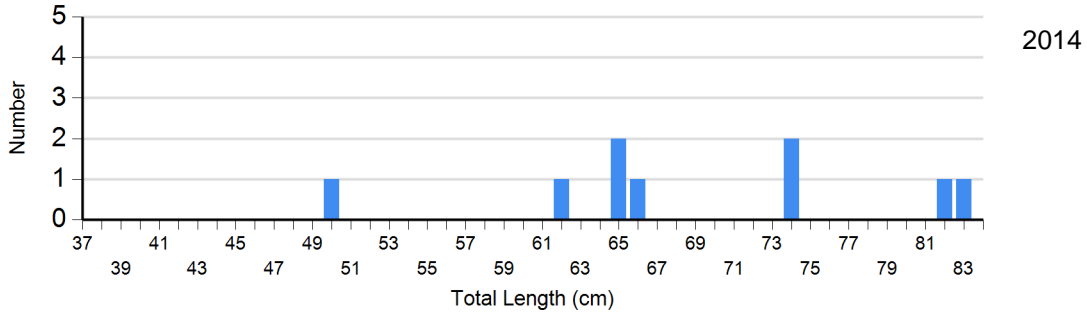
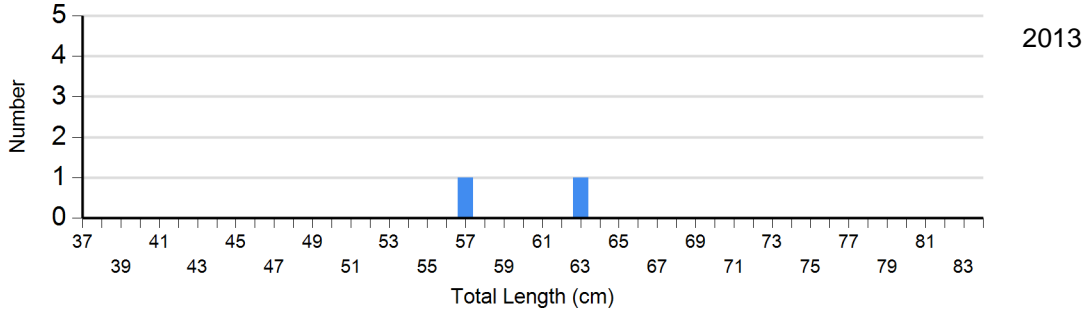
Species: Black Crappie
Gear: frame net (std 3/4 in)



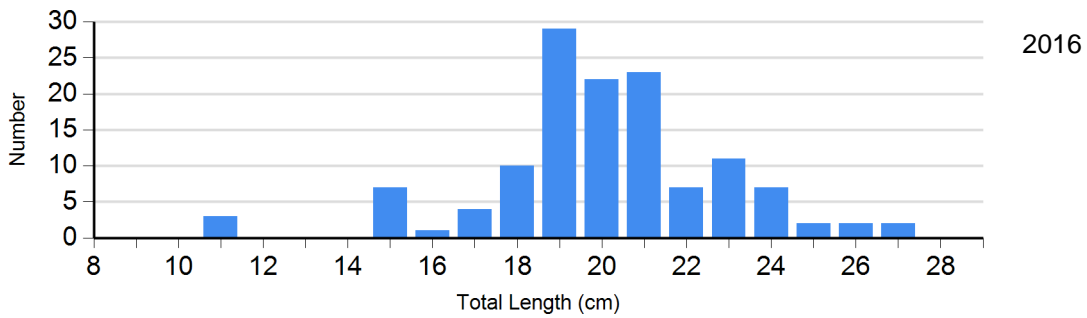
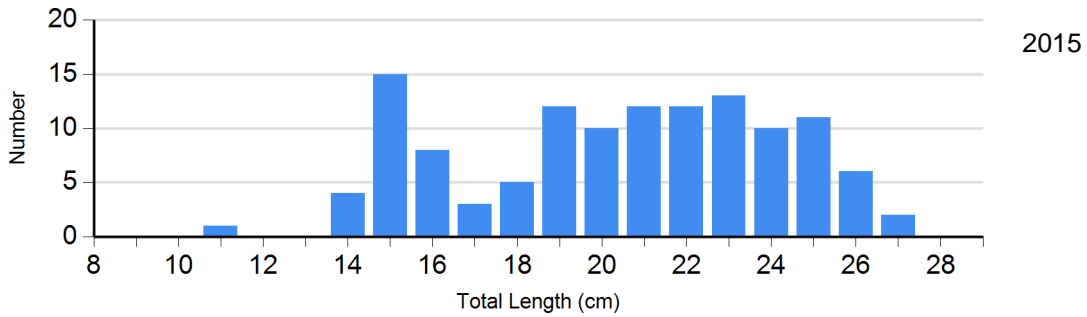
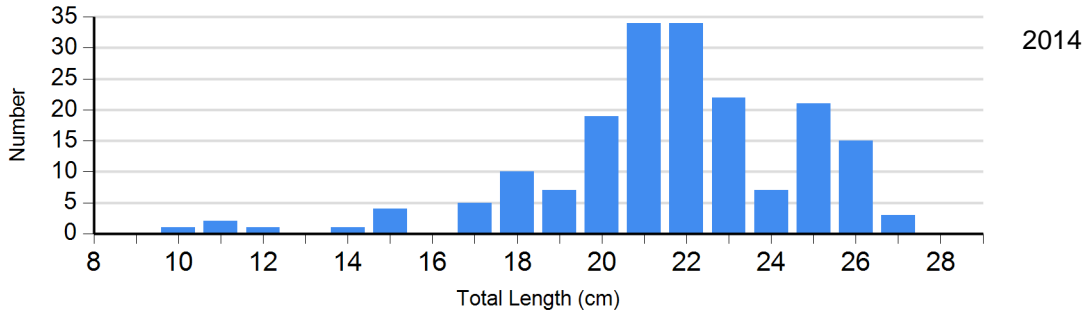
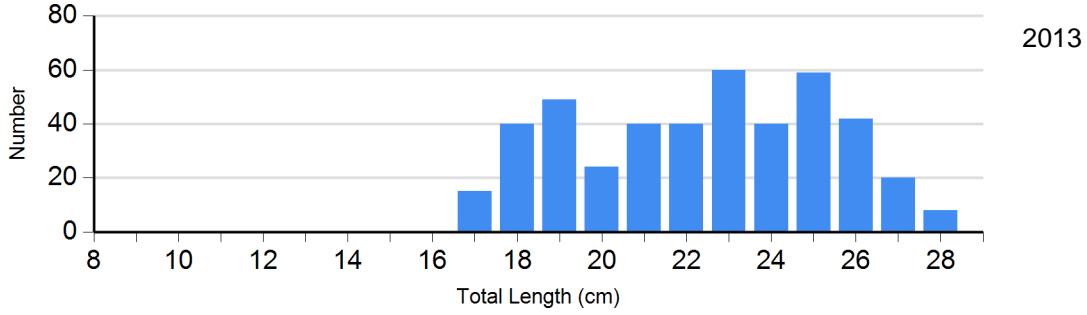
Species: Black Crappie
Gear: std frame net (3/8 inch)



Species: Northern Pike
Gear: std exp gill net (150 ft)



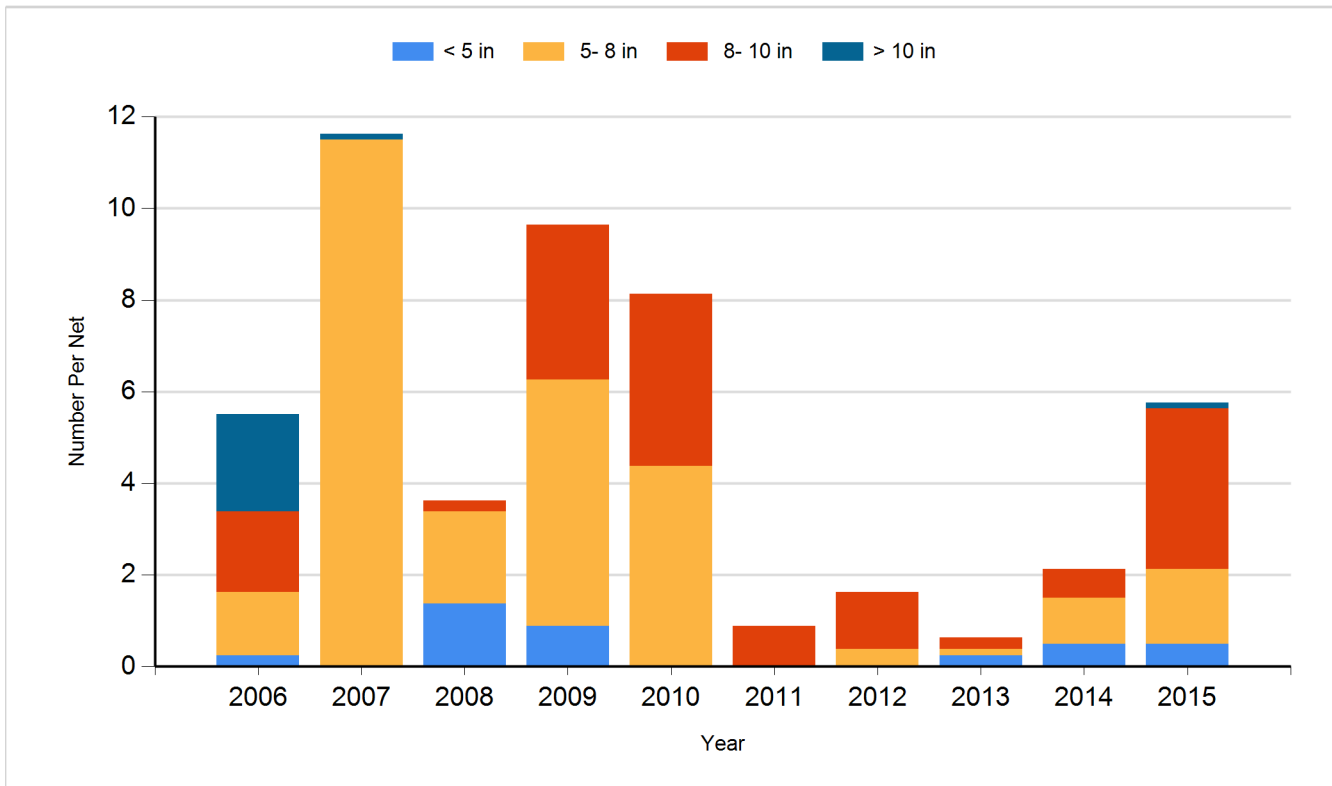
Species: Yellow Perch
Gear: std exp gill net (150 ft)



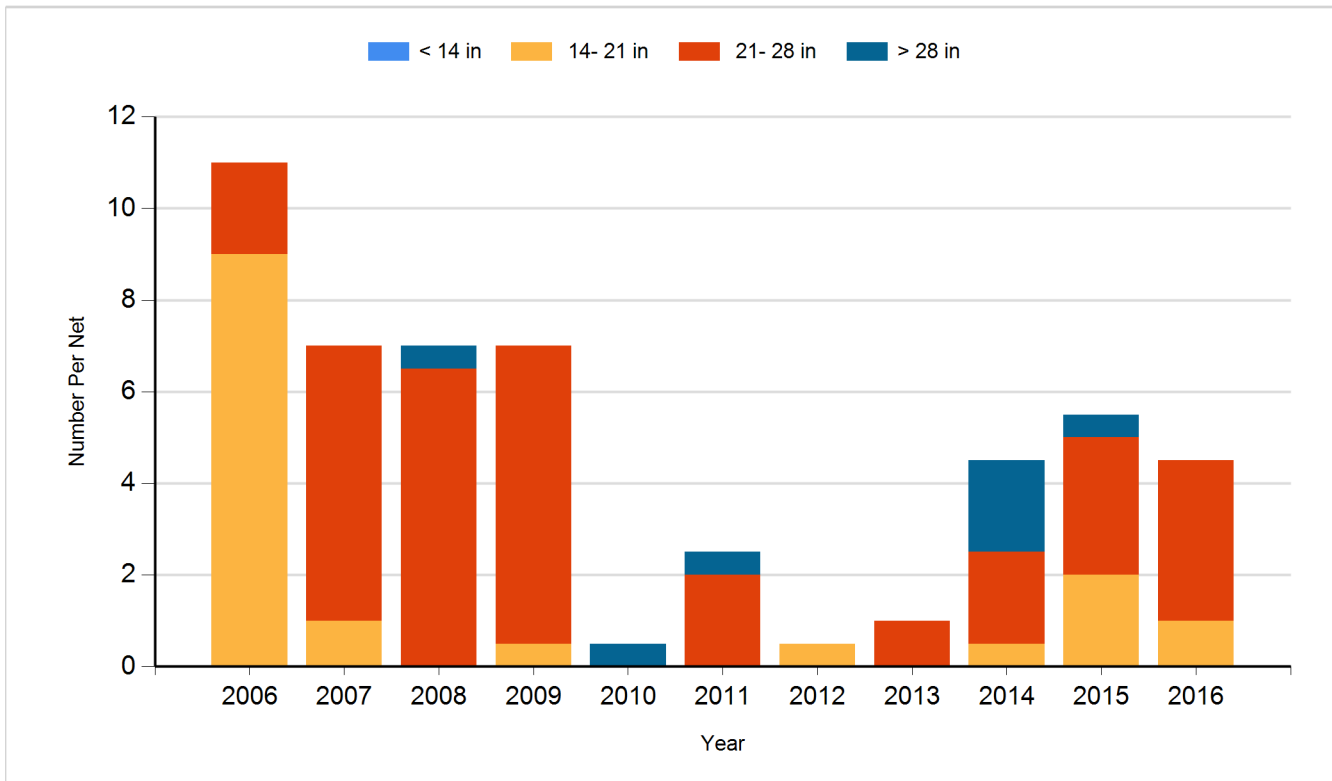
Historic Fish Sizes and Relative Abundance

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

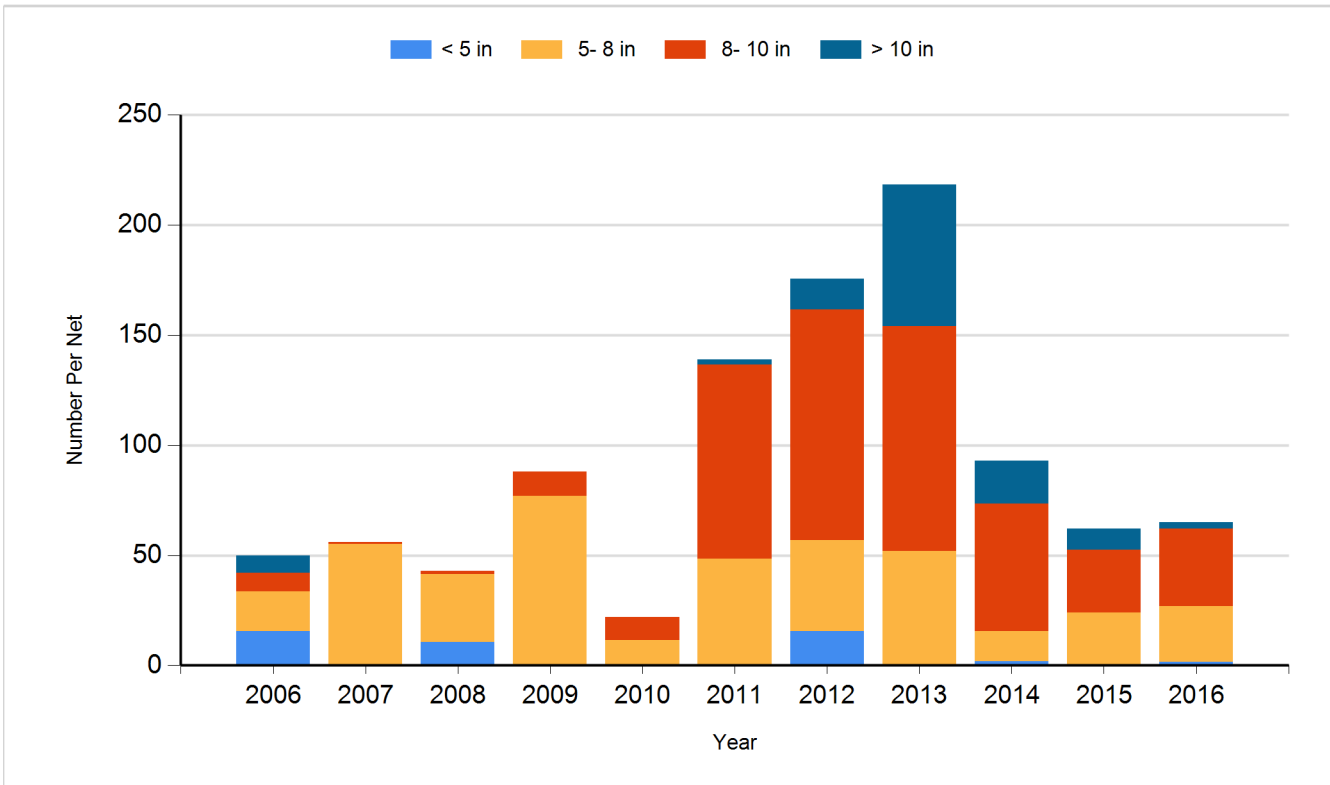
Species: Black Crappie
Gear: Frame Net



Species: Northern Pike
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net



Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2009	Rainbow Trout (McConaugRainbow Trout	Fingerling	1,500
2013	Smallmouth Bass	Fingerling	4,770
2016	Smallmouth Bass	Juvenile	300
2017	Walleye	Large Fingerling	9,500