SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Gardner, Harding County
SFG-Lake-581-000
2015

Lake Information

Name: Gardner

County: Harding

Surface Area: 196 Acres

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (day)	September 30, 2015	6000 seconds
frame net (std 3/4 in)	June 24, 2015	20 net-nights
std exp gill net (150 ft)	June 24, 2015	4 net-nights

Common Fish Species Present

Channel Catfish

Black Crappie

Largemouth Bass

Walleye

Yellow Perch

Common Carp

Northern Pike

Spottail 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).

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

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 (day)	Largemouth Bass	61.2	14.9	12	5	6	4	121	1
frame net (std 3/4 in)	Black Crappie	24.4	5.5	66	3	7	2	101	1
	Common Carp	0.1	0.1	100		0		89	0
	Northern Pike	0.3	0.1	0		0		119	22
	Walleye	1.1	0.3	64	16	9		79	1
	Yellow Perch	0.3	0.2	0		0		98	5
std exp gill net (150 ft)	Black Crappie	7.0	1.9	21	12	0		108	3
	Common Carp	4.0	2.8	88		0		91	4
	Northern Pike	4.0	0.9	13		0		86	3
	Spottail Shiner	0.0	0.0						
	Walleye	2.0	0.0	50		25		76	2
	Yellow Perch	9.5	2.4	32	12	0		106	2

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 (day)	Largemouth Bass						4.0				61.2	32.6
	Walleye						8.9					8.9
frame net (std 3/4 in)	Black Bullhead						0.0					0.0
	Black Crappie	0.3					86.8		165.5		24.4	69.3
	Channel Catfish	4.0	1.3				2.0					2.4
	Common Carp	2.0	0.1				0.3				0.1	0.6
	Northern Pike	1.3	0.4				0.2		0.7		0.3	0.6
	Walleye	2.7	0.4				2.5		1.8		1.1	1.7
	White Sucker	5.8	0.5									3.2
	Yellow Perch		0.5				0.8				0.3	0.5
std exp gill net	Black Crappie				0.0							0.0
	Channel Catfish	1.0	1.5		2.5							1.7
	Common Carp	0.5			1.0							0.8
	Walleye	0.5	10.0		8.0							6.2
	Yellow Perch		1.0									1.0
std exp gill net (150 ft)	Black Crappie						4.0		3.0		7.0	4.7
	Channel Catfish						2.5		1.5			2.0
	Common Carp						2.0		10.0		4.0	5.3
	Northern Pike								3.0		4.0	3.5
	Spottail Shiner						0.0		0.0		0.0	0.0
	Walleye						5.0		4.0		2.0	3.7
	Yellow Perch						6.0				9.5	7.8
std frame net (3/8 inch)	Black Crappie				4.3							4.3
	Channel Catfish				0.9							0.9
	Common Carp				0.3							0.3
	Northern Pike				0.3							0.3
	Walleye				2.1							2.1
	White Sucker				0.4							0.4
	Yellow Perch				0.6							0.6

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
boat shocker (day)	Walleye	PSD						100				
		PSD-P						67				
		Wr						86				
frame net (std 3/4 in)	Black Crappie	PSD	100					0		88		66
		PSD-P	50					0		0		7
		Wr						104		98		101
	Northern Pike	PSD	63	100				100		75		0
		PSD-P	0	0				0		25		0
		Wr		108				73		86		119
	Walleye	PSD	69	100				13		82		64
		PSD-P	0	0				0		45		9
		Wr		100				84		78		79
	Yellow Perch	PSD		50				0				0
		PSD-P		50				0				0
		Wr		96				95				98
std exp gill net	Black Crappie	PSD				0						
		PSD-P				0						
	Walleye	PSD	0	75		13						
		PSD-P	0	0		0						
		Wr		106		85						
	Yellow Perch	PSD		50								
		PSD-P		0								
		Wr		100								
std exp gill net (150 ft)	Black Crappie	PSD						0		67		21
		PSD-P						0		0		0
		Wr						103		107		108
	Northern Pike	PSD								100		13
		PSD-P								83		0
		Wr								92		86
	Walleye	PSD						60		63		50
		PSD-P						20		13		25

			Year									
Gear	Species	Index	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
std exp gill net (150 ft)	Walleye	Wr						79		82		76
	Yellow Perch	PSD						0				32
		PSD-P						0				0
		Wr						93				106
std frame net (3/8 inch)	Black Crappie	PSD				90						
		PSD-P				30						
		Wr				97						
	Northern Pike	PSD				0						
		PSD-P				0						
		Wr				92						
	Walleye	PSD				53						
		PSD-P				13						
		Wr				89						
	Yellow Perch	PSD				50						
		PSD-P				25						
		Wr				85						

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
2013	2	18	59 (1.8)	117 (1.7)								
2012	3	22	69 (3.3)	122 (4.3)	171 (4.9)							
2011	4	18	73 (2.1)	131 (3.1)	186 (2.6)	210 (2.4)						
2010	5	14	68 (2)	130 (4.4)	185 (1.8)	214 (1.8)	232 (1.7)					
2009	6	14	74 (2.4)	131 (2.5)	189 (2.3)	216 (3.2)	232 (3.2)	243 (2.5)				
Weighted Mean		86	68	126	182	213	232	243				

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2013	2	18										
2012	3	22										
2011	4	18										
2010	5	14										
2009	6	14										
Weighted Mean		86										

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+
2015	518		135 (149)	192 (107)	224 (94)	238 (102)	244 (67)				
2011	1042		158 (94)	182 (948)							

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2013	16		232 (2)	363 (4)	383 (6)		495 (2)	522 (2)			
2011	20				382 (16)	531 (4)					
2009	32		315 (32)								
2007	48	248 (16)	342 (2)	414 (22)		461 (6)	462 (2)				

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2011	42	106 (18)	147 (6)	162 (18)							

Fish Condition

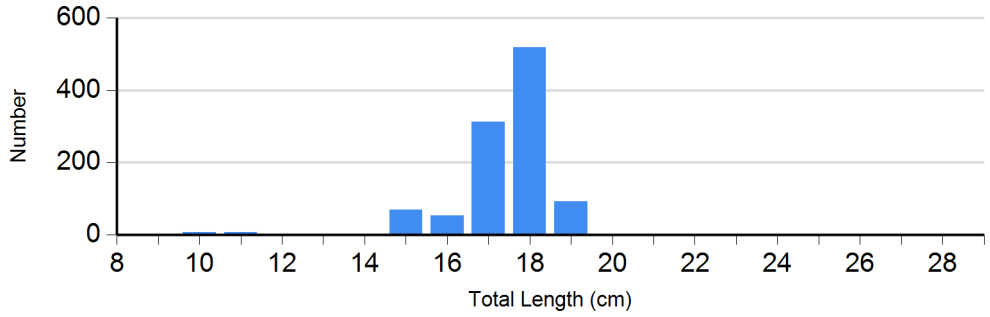
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	1042	104 (0.4)	0		0		0	
	2013	242	103 (0.7)	1744	97 (0.3)	0		0	
	2015	164	111 (2.0)	292	96 (0.5)	32	91 (0.7)	0	
Northern Pike Gill Net	2013	0		2	86 (0.0)	10	93 (1.2)	0	
	2015	14	86 (2.9)	2	91 (0.0)	0		0	
Walleye Gill Net	2011	8	80 (1.2)	8	79 (0.9)	4	75 (0.0)	0	
	2013	6	81 (0.8)	8	80 (1.3)	2	91 (0.0)	0	
	2015	4	79 (2.2)	2	74 (0.0)	2	74 (0.0)	0	
Yellow Perch Gill Net	2011	24	93 (1.5)	0		0		0	
	2015	26	110 (1.5)	12	99 (1.6)	0		0	

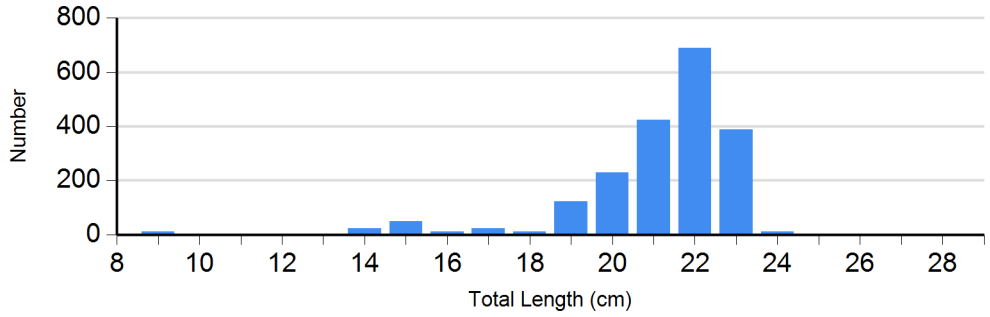
Length Frequency Distribution

Length frequency histogram of species sampled by year.

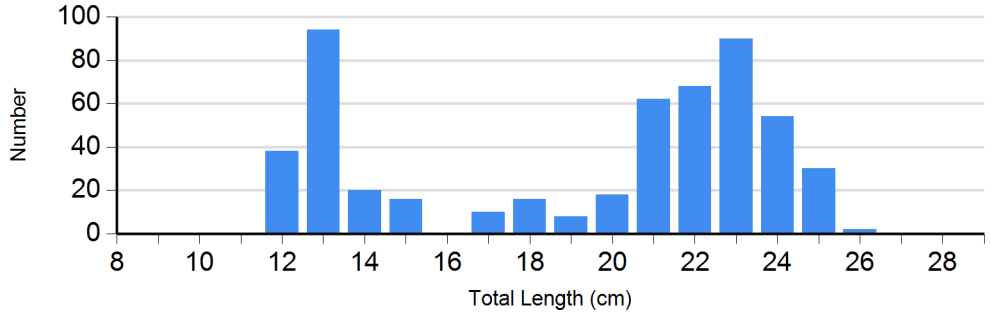
Species: Black Crappie
Gear: frame net (std 3/4 in)



2011

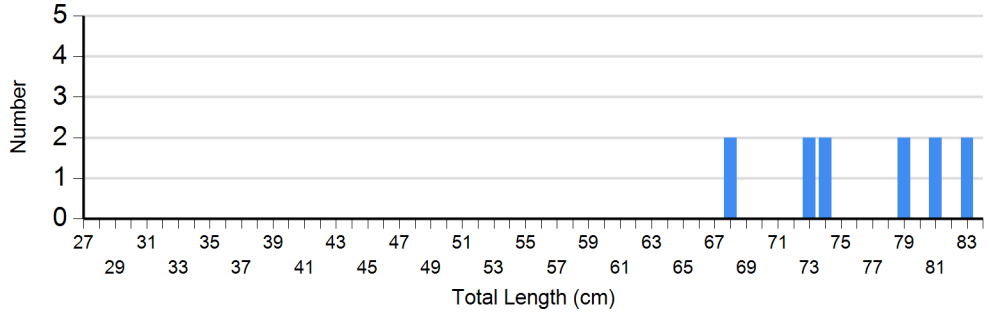


2013

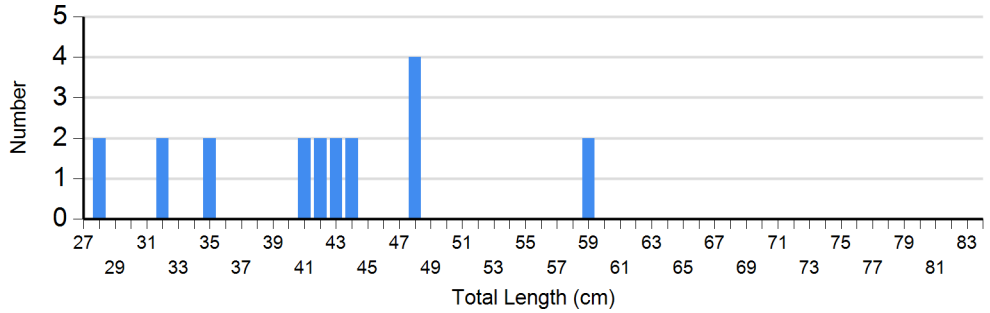


2015

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

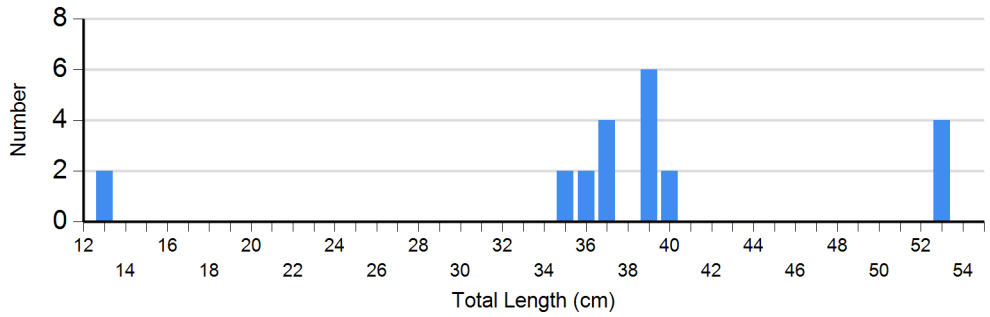


2013

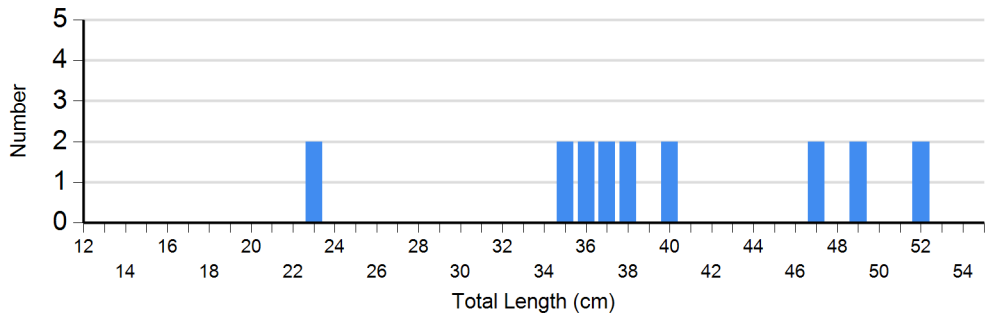


2015

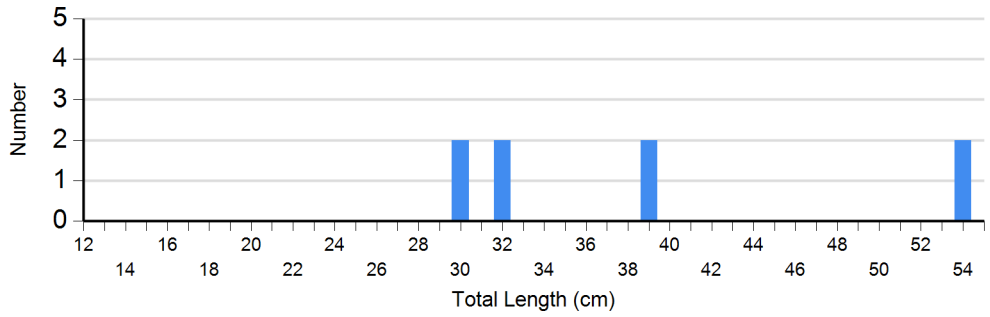
Species: Walleye
Gear: std exp gill net (150 ft)



2011

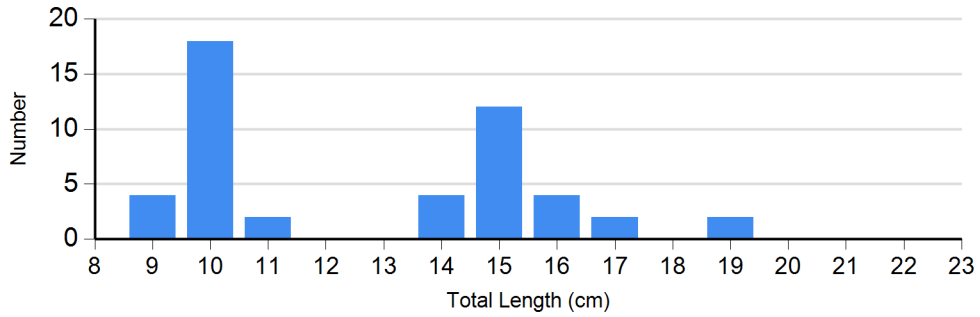


2013

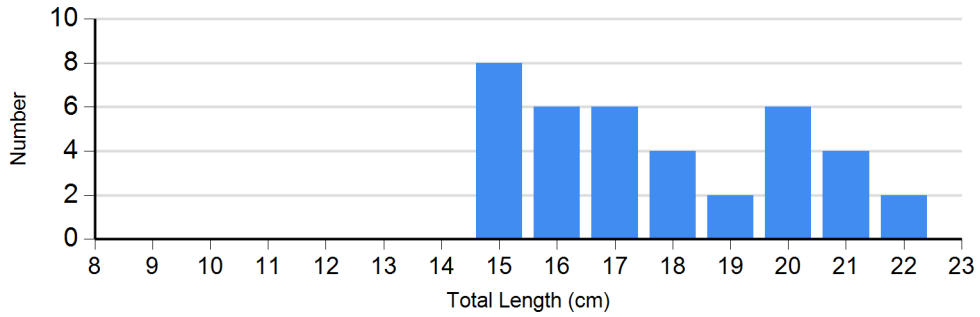


2015

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



2011

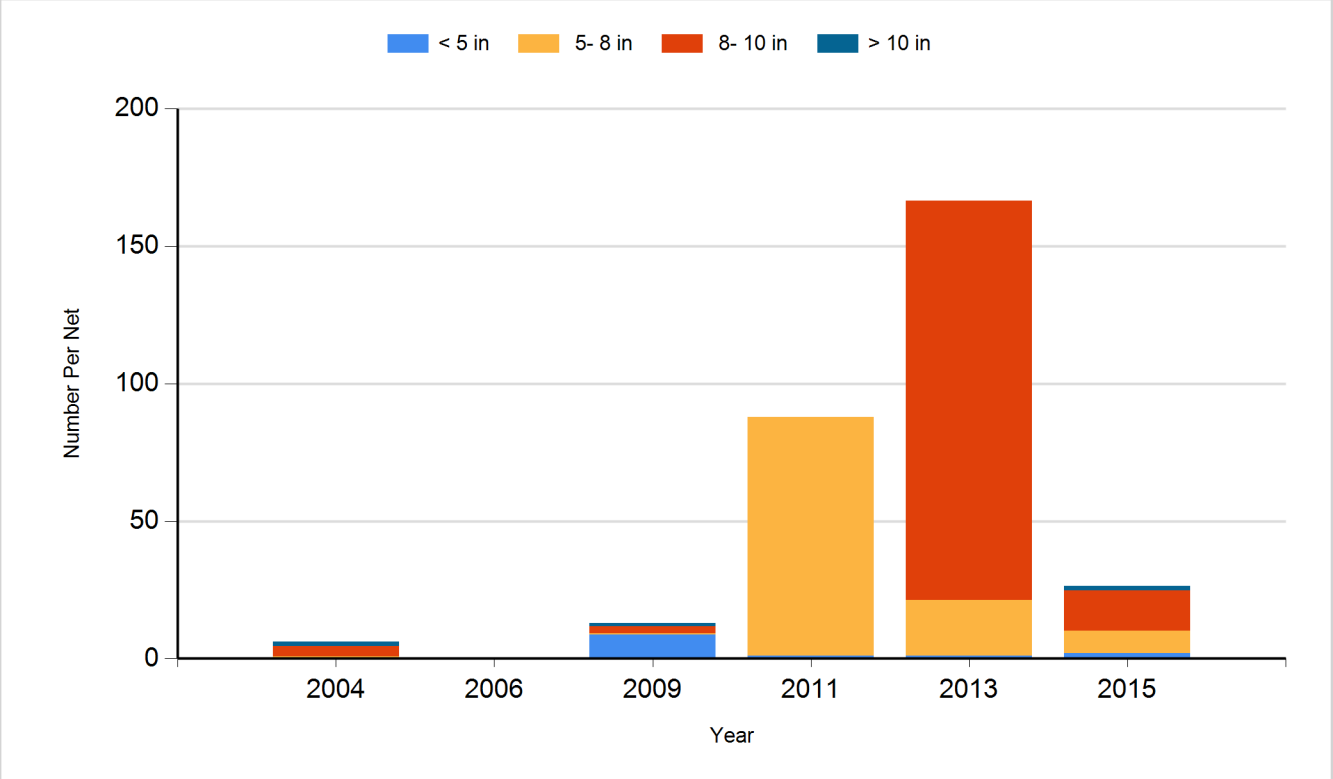


2015

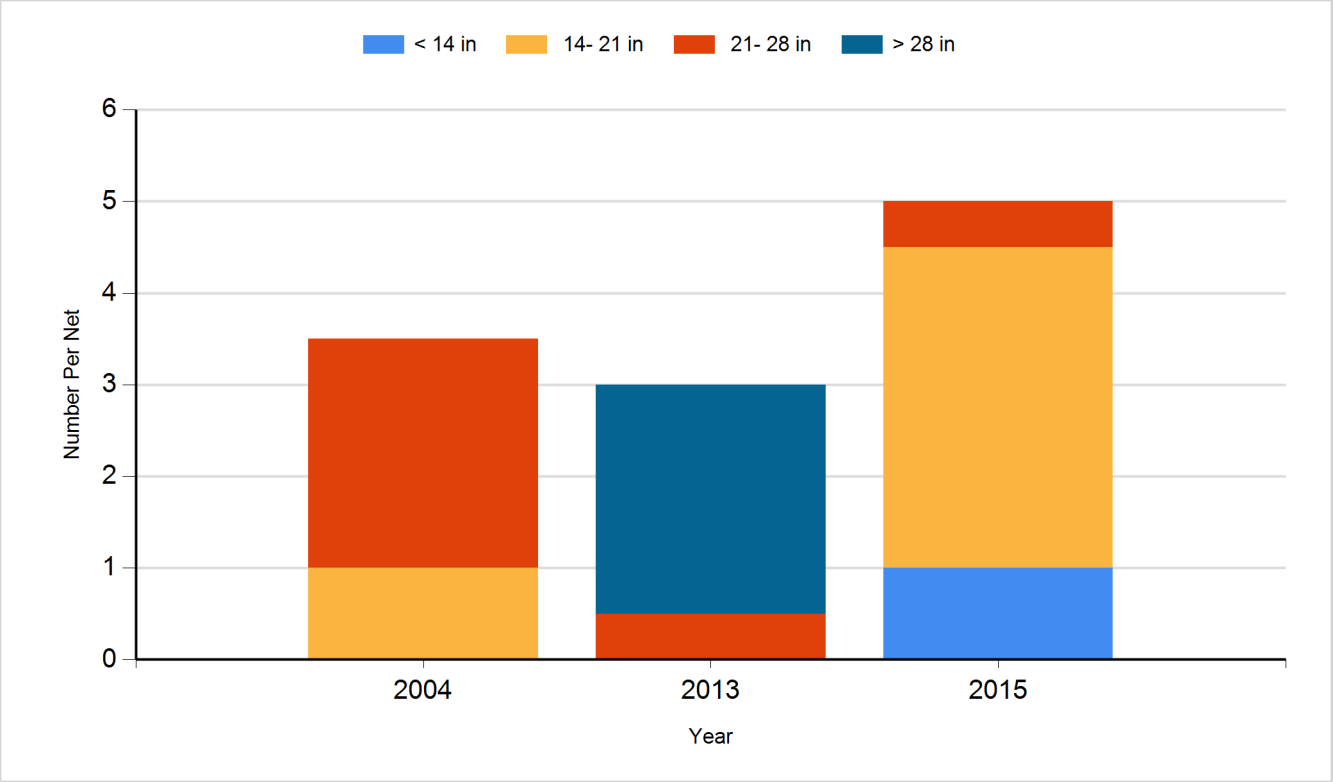
Historic Fish Sizes and Relative Abundance

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

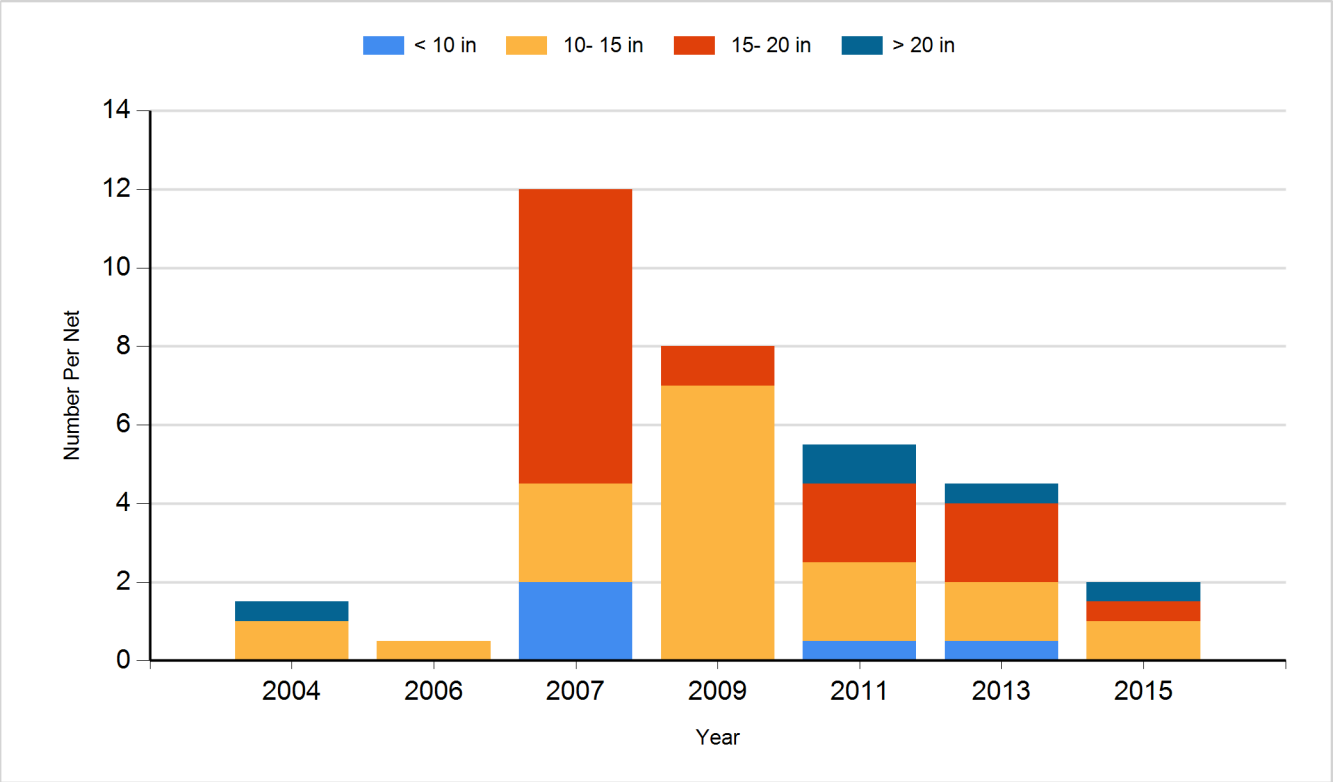
Species: Black Crappie
Gear: Frame Net



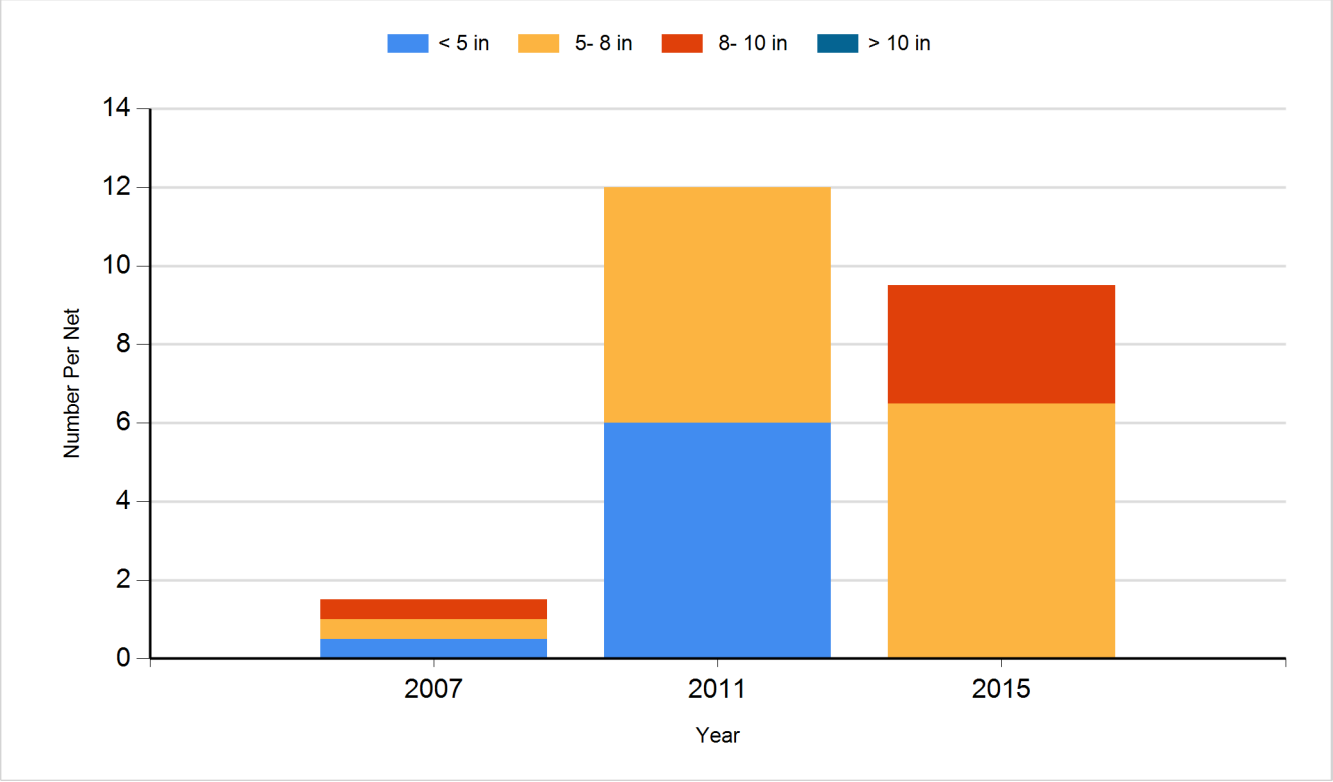
Species: Northern Pike
Gear: Gill Net



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
2004	Channel Catfish	Adult	912
2004	Walleye	Fingerling	5,759
2005	Yellow Perch	Adult	718
2006	Largemouth Bass	Fingerling	1,000
2006	Walleye	Large Fingerling	800
2007	Black Crappie	Adult	660
2007	Walleye	Fingerling	50,000
2009	Walleye	Fingerling	59,680
2010	Walleye	Small Fingerling	20,700
2011	Walleye	Small Fingerling	19,900
2014	Channel Catfish	Adult	150
2014	Walleye	Fingerling	30,000
2014	Yellow Perch	Adult	800