

**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**Gardner, Harding County**  
**SFG-Lake-581-000**  
**2016**

**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
frame net (std 3/4 in)	May 17, 2016	10 net-nights
std exp gill net	August 02, 2016	4 net-nights

## **Common Fish Species Present**

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Channel Catfish

Black Crappie

Largemouth Bass

Walleye

Northern Pike

Yellow Perch

Common Carp

Spottail Shiner

Gizzard Shad

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## 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
frame net (std 3/4 in)	Black Crappie	138.8	22.4	99	0	61	2	106	0
	Northern Pike	0.2	0.2	100		100		107	0
	Yellow Perch	0.2	0.2	100		0			
std exp gill net	Black Crappie	11.0	5.7	77	10	64	11	102	2
	Channel Catfish	1.0	0.9	0		0		92	1
	Common Carp	10.5	0.5	38	11	0		91	1
	Gizzard Shad	0.0	0.0	0					
	Largemouth Bass	2.0	0.0	0		0		112	2
	Northern Pike	20.0	2.8	18	6	5		85	1
	Spottail Shiner	0.0	0.0						
	Walleye	7.0	0.0	86		7		88	1
	Yellow Perch	15.0	9.5	30	9	0		95	6

## 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	
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					86.8		165.5		24.4	138.8	103.9
	Channel Catfish	1.3				2.0						1.7
	Common Carp	0.1				0.3				0.1		0.2
	Northern Pike	0.4				0.2		0.7		0.3	0.2	0.4
	Walleye	0.4				2.5		1.8		1.1		1.5
	White Sucker	0.5										0.5
	Yellow Perch	0.5				0.8				0.3	0.2	0.5
	std exp gill net	Black Crappie			0.0							11.0
Channel Catfish		1.5		2.5							1.0	1.7
Common Carp				1.0							10.5	5.8
Gizzard Shad											0.0	0.0
Largemouth Bass											2.0	2.0
Northern Pike											20.0	20.0
Spottail Shiner											0.0	0.0
Walleye		10.0		8.0							7.0	8.3
Yellow Perch		1.0									15.0	8.0
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.

Gear	Species	Index	Year									
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
boat shocker (day)	Walleye	PSD					100					
		PSD-P					67					
		Wr					86					
frame net (std 3/4 in)	Black Crappie	PSD					0		88		66	99
		PSD-P					0		0		7	61
		Wr					104		98		101	106
	Northern Pike	PSD	100				100		75		0	100
		PSD-P	0				0		25		0	100
		Wr	108				73		86		119	107
	Walleye	PSD	100				13		82		64	
		PSD-P	0				0		45		9	
		Wr	100				84		78		79	
	Yellow Perch	PSD	50				0				0	100
		PSD-P	50				0				0	0
		Wr	96				95				98	
std exp gill net	Black Crappie	PSD				0						77
		PSD-P				0						64
		Wr										102
	Northern Pike	PSD										18
		PSD-P										5
		Wr										85
	Walleye	PSD	75			13						86
		PSD-P	0			0						7
		Wr	106			85						88
	Yellow Perch	PSD	50									30
		PSD-P	0									0
		Wr	100									95
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



Gear	Species	Index	Year									
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
std exp gill net (150 ft)	Northern Pike	PSD-P								83		0
		Wr							92		86	
		PSD					60		63		50	
	Walleye	PSD-P					20		13		25	
		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							

## 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+
2016	20		346 (4)	412 (4)	455 (2)	413 (4)	446 (2)			536 (4)	
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

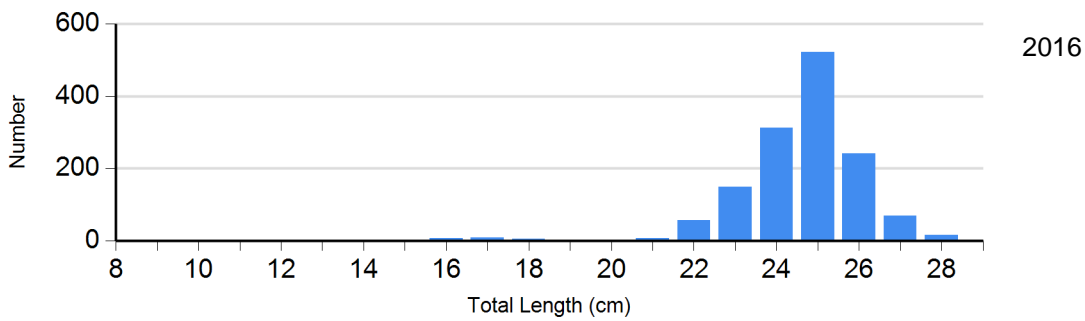
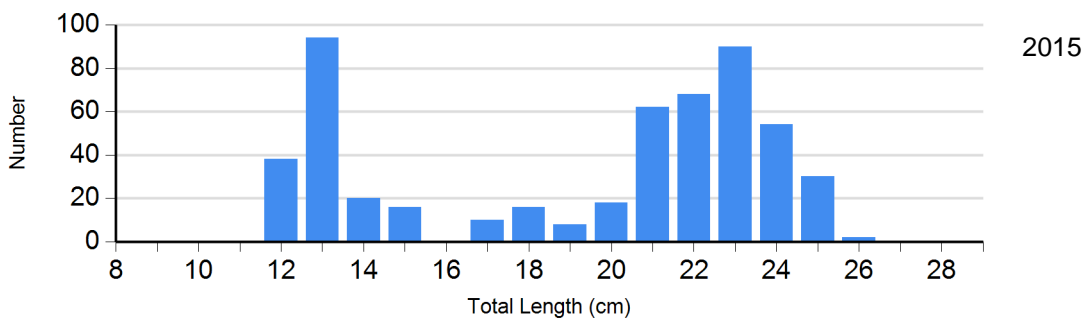
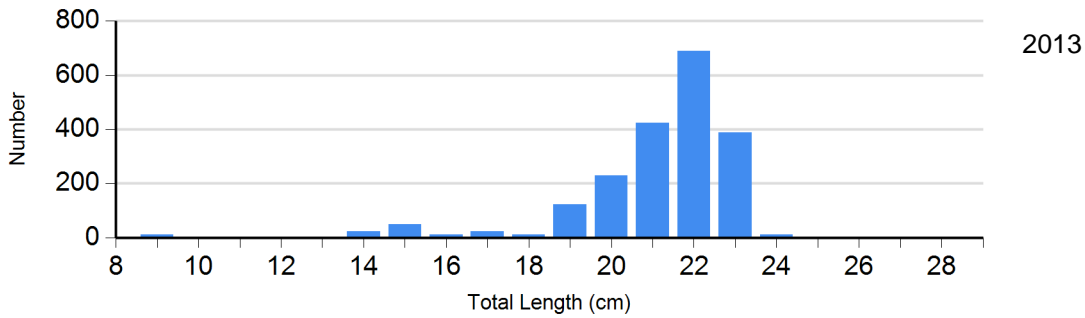
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	242	103 (0.7)	1744	97 (0.3)	0		0	
	2015	164	111 (2.0)	292	96 (0.5)	32	91 (0.7)	0	
	2016	18	104 (1.5)	522	108 (0.4)	848	106 (0.3)	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	
	2016	66	86 (0.5)	10	77 (4.6)	0		4	88 (2.6)
Walleye Gill Net	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	
	2016	4	95 (2.7)	22	87 (0.8)	2	86 (0.0)	0	
Yellow Perch Gill Net	2015	26	110 (1.5)	12	99 (1.6)	0		0	
	2016	42	101 (6.2)	18	83 (2.4)	0		0	

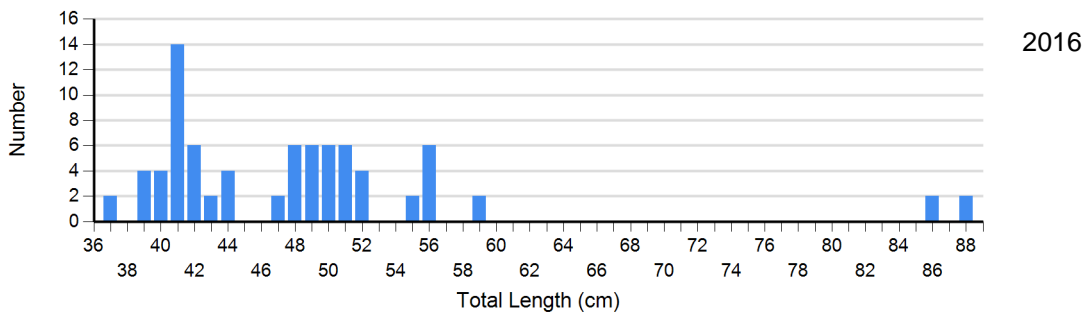
## Length Frequency Distribution

Length frequency histogram of species sampled by year.

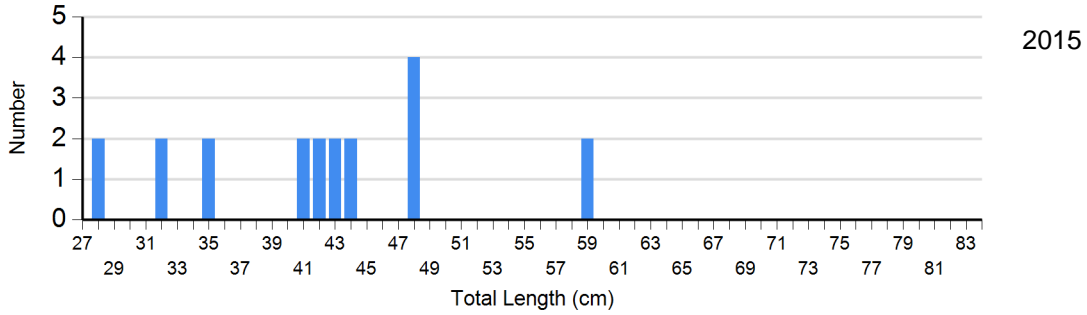
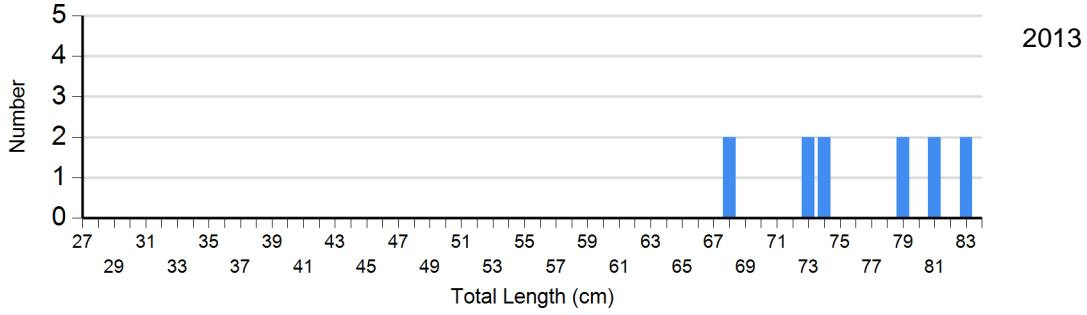
Species: Black Crappie  
Gear: frame net (std 3/4 in)



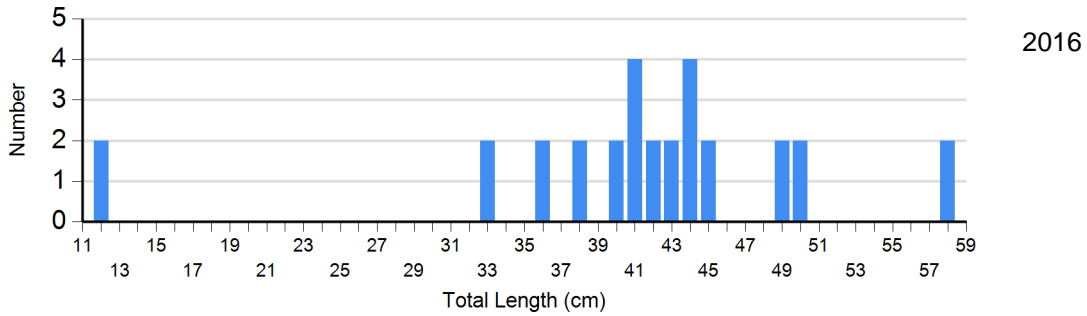
Species: Northern Pike  
Gear: std exp gill net



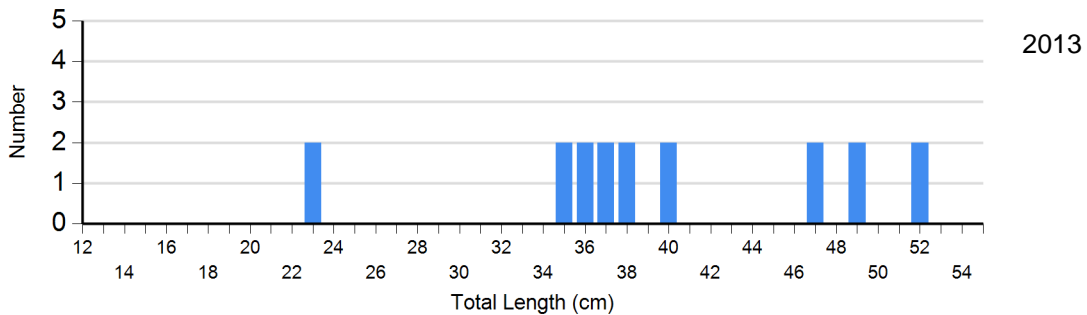
Species: Northern Pike  
 Gear: std exp gill net (150 ft)

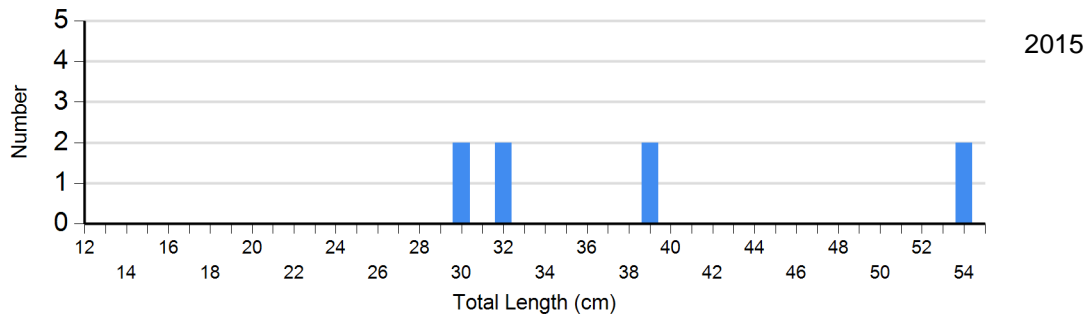


Species: Walleye  
 Gear: std exp gill net

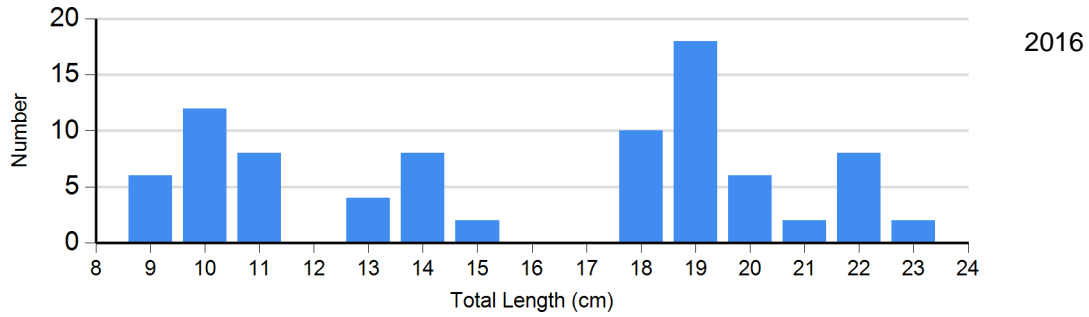


Species: Walleye  
 Gear: std exp gill net (150 ft)

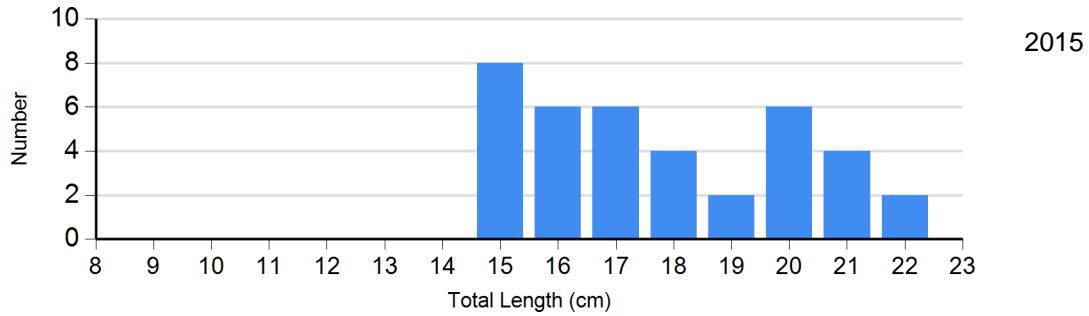




Species: Yellow Perch  
 Gear: std exp gill net



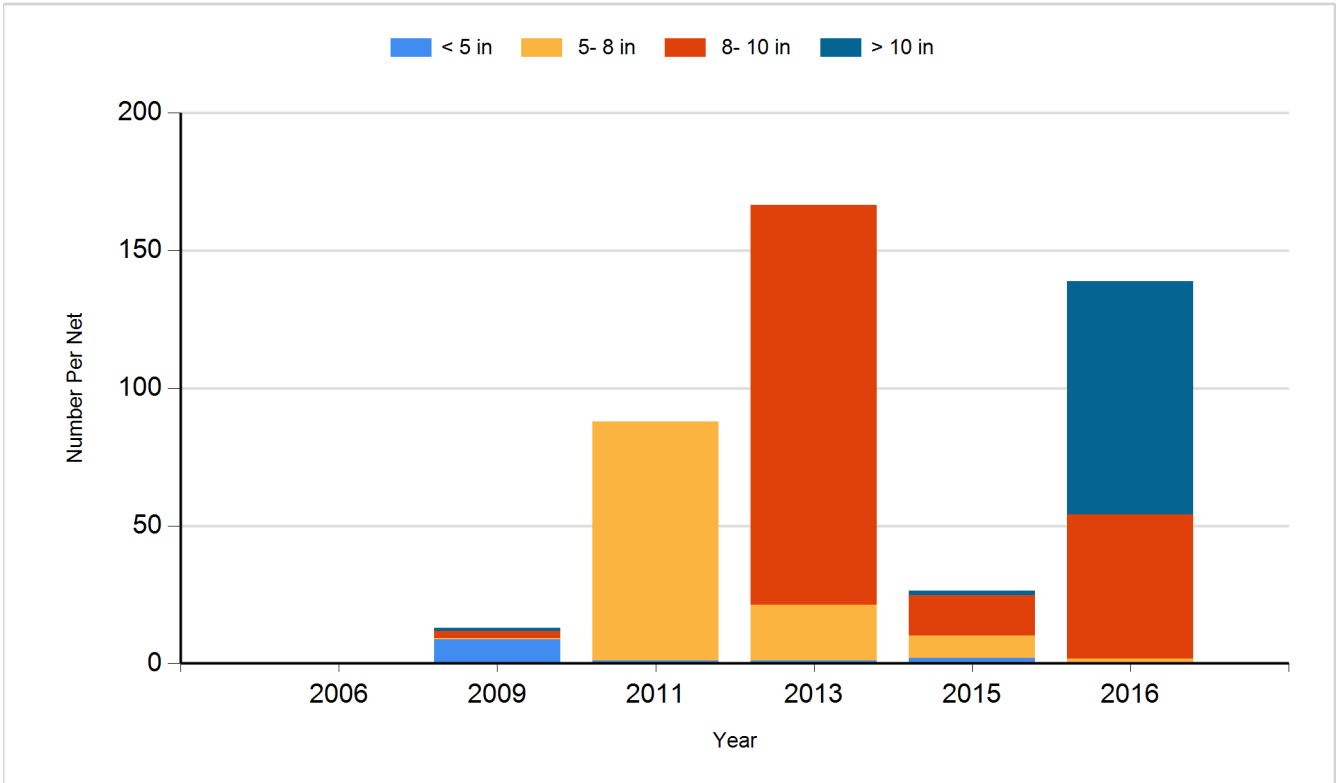
Species: Yellow Perch  
 Gear: std exp gill net (150 ft)



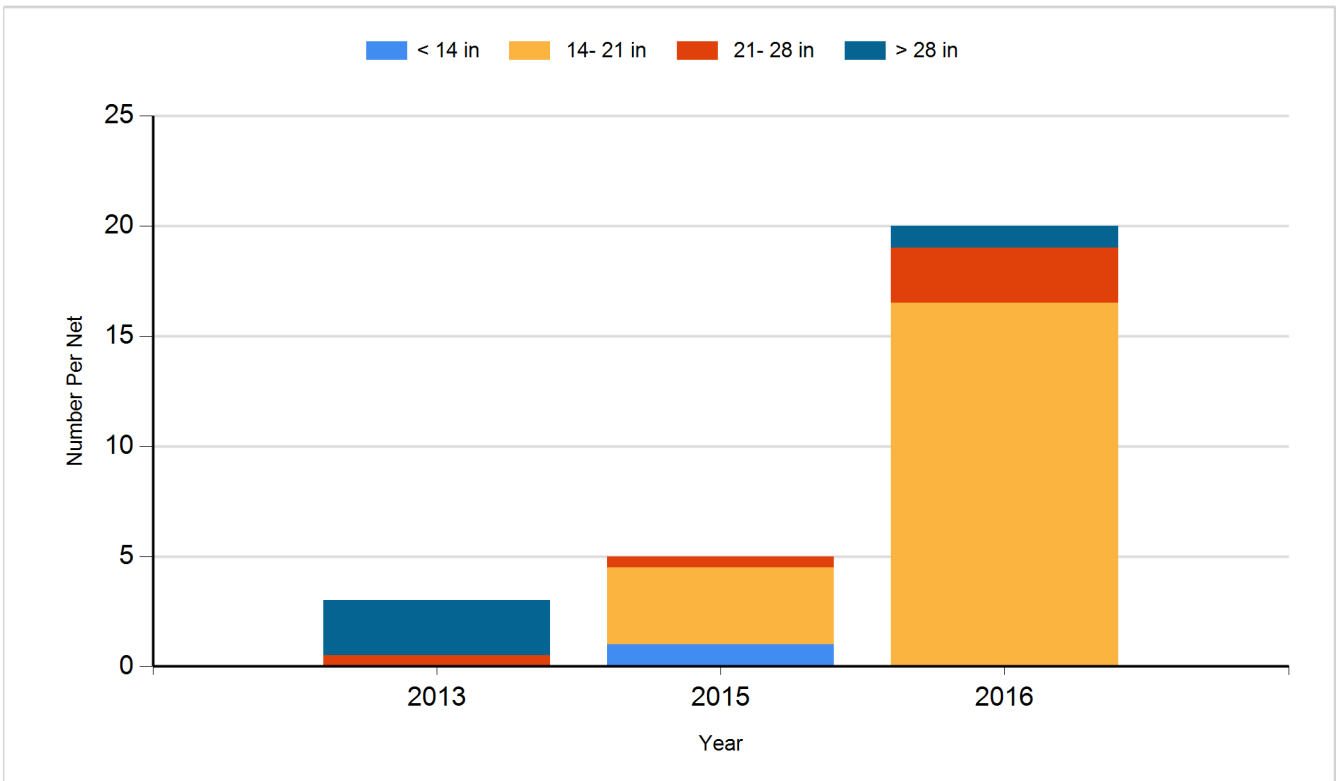
## Historic Fish Sizes and Relative Abundance

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

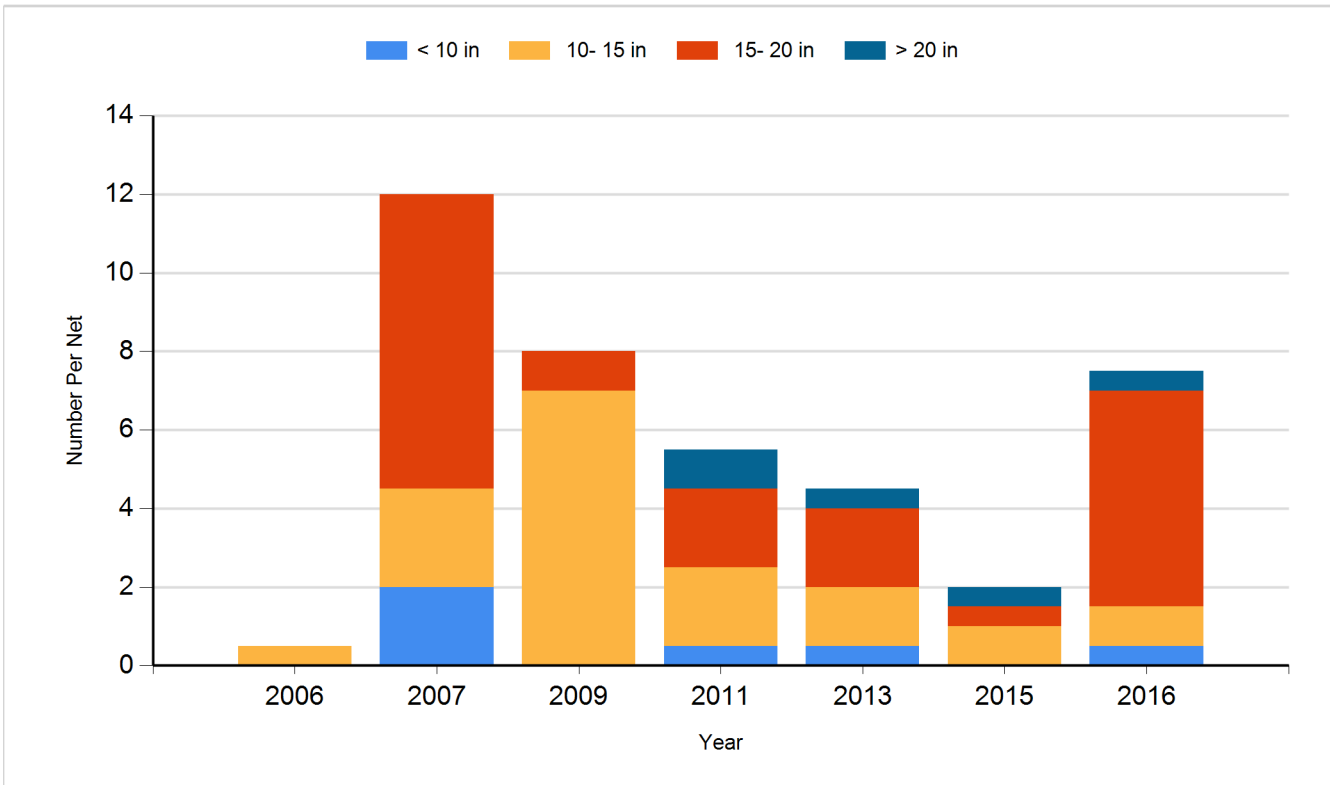
Species: Black Crappie  
Gear: Frame Net



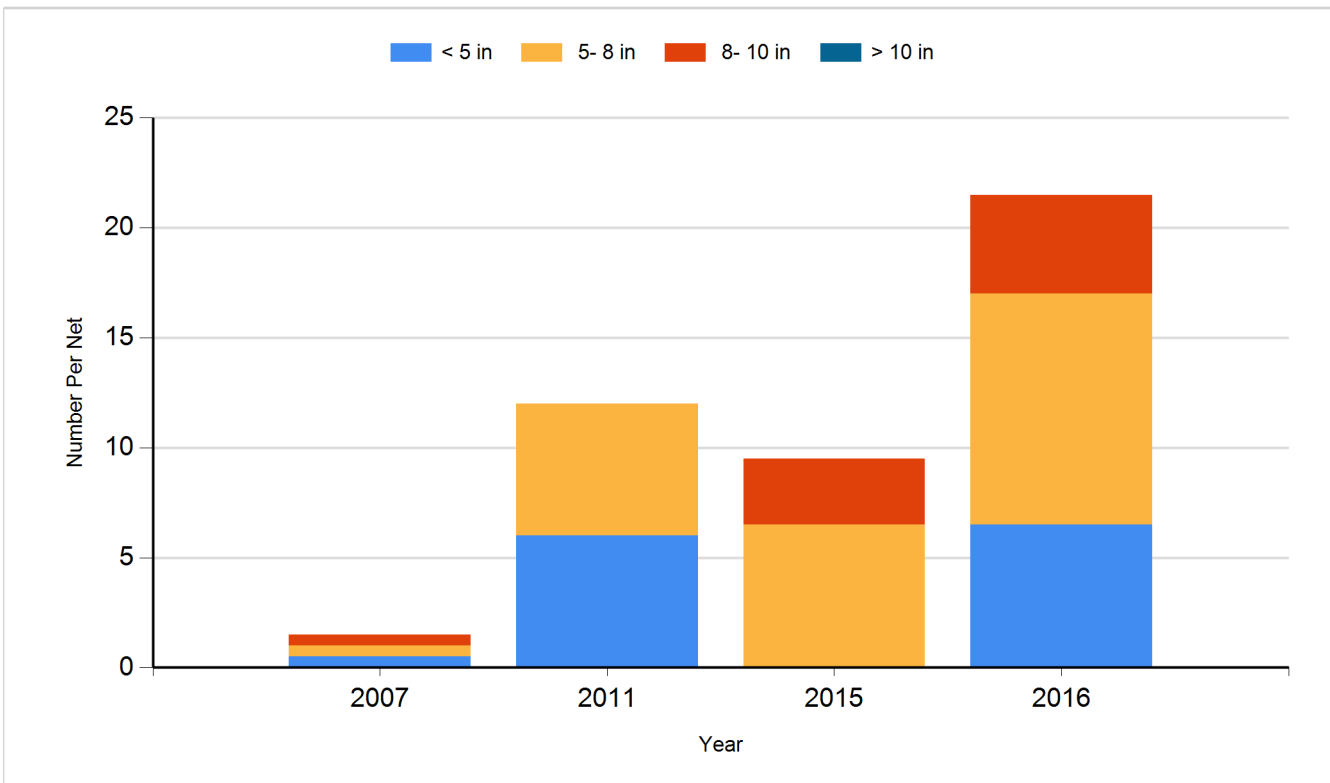
Species: Northern Pike  
Gear: Gill Net



Species: 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	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
2016	Gizzard Shad	Adult	33
2016	Walleye	Fingerling	25,500