

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Alvin, Lincoln County

LBS-Lake-180-000

2017

## Lake Information

**Name:** Alvin **Maximum Depth:** 26 Feet  
**County:** Lincoln **Mean Depth:** 9 Feet  
**Legal Description:** T100N-R49W-Sec. 33,34  
**Surface Area:** 105 Acres

## Surveys and Investigations

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

Gear	Date	Effort
AFS std frame net	May 30, 2017	10 net-nights
AFS std gill net	May 30, 2017	6 net-nights

## **Common Fish Species Present**

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Channel Catfish

Bluegill

Black Crappie

Largemouth Bass

Walleye

Gizzard Shad

Black Bullhead

River Carpsucker

White Crappie

White Sucker

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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
AFS std frame net	Black Bullhead	5.7	2.7	0		0			
	Black Crappie	23.2	10.5	84	3	8	3	92	1
	Bluegill	2.0	1.3	60	18	0		94	3
	Channel Catfish	0.0	0.0	0		0			
	Common Carp	0.1	0.1	100		0			
	Gizzard Shad	2.7	2.2	19	12				
	Green Sunfish	0.2	0.2	0		0			
	Orangespotted Sunfish	0.0	0.0						
	Pumpkinseed	0.1	0.1	100		0		92	
	River Carpsucker	0.2	0.2	100		100			
	Sunfish Hybrid	0.0	0.0						
	Walleye	0.2	0.2	0		0		85	0
	White Crappie	3.6	1.6	100		25	11	90	1
	White Sucker	1.3	0.7	100		85			
AFS std gill net	Black Bullhead	9.5	5.7	0		0			
	Black Crappie	2.2	1.4	69		15		87	6
	Channel Catfish	3.2	1.9	47	18	5		95	7
	Freshwater Drum	1.2	1.2	14		0			
	Gizzard Shad	16.7	2.6	43	7				
	Northern Pike	0.2	0.2	0		0		89	
	River Carpsucker	4.3	4.0	100		100			
	Walleye	0.3	0.5	50		50		92	8
	White Crappie	0.5	0.5	100		0		92	7
	White Sucker	1.0	0.9	83		83			
Yellow Perch	0.2	0.2	100		0		75		

## 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	
AFS std frame net	Black Bullhead										5.7	5.7
	Black Crappie										23.2	23.2
	Bluegill										2.0	2.0
	Channel Catfish										0.0	0.0
	Common Carp										0.1	0.1
	Gizzard Shad										2.7	2.7
	Green Sunfish										0.2	0.2
	Orangespotted Sunfish										0.0	0.0
	Pumpkinseed										0.1	0.1
	River Carpsucker										0.2	0.2
	Sunfish Hybrid										0.0	0.0
	Walleye										0.2	0.2
	White Crappie										3.6	3.6
	White Sucker										1.3	1.3
AFS std gill net	Black Bullhead										9.5	9.5
	Black Crappie										2.2	2.2
	Channel Catfish										3.2	3.2
	Freshwater Drum										1.2	1.2
	Gizzard Shad										16.7	16.7
	Northern Pike										0.2	0.2
	River Carpsucker										4.3	4.3
	Walleye										0.3	0.3
	White Crappie										0.5	0.5
	White Sucker										1.0	1.0
	Yellow Perch										0.2	0.2
boat shocker (night)	Largemouth Bass		17.5		17.2	50.5						28.4
hoop net	Black Bullhead										28.0	28.0
	Black Crappie										0.7	0.7
	Bluegill										0.3	0.3
	Common Carp										1.7	1.7
large frame net	Bigmouth Buffalo				0.6		0.2					0.4
	Black Bullhead	39.2	62.2	58.8	31.3	16.5	26.2					39.0
	Black Crappie	15.9	2.1	183.8	40.1	13.0	44.5					49.9

		CPUE										
Gear	Species	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg
large frame net	Bluegill	26.1	27.5	21.3	6.1	47.5	4.1					22.1
	Channel Catfish	3.1	7.2	5.4	2.2	5.9	1.4					4.2
	Common Carp		0.1	0.4	1.1		0.2					0.5
	Freshwater Drum		0.6		0.1	0.3						0.3
	Golden Shiner					0.0	0.0					0.0
	Green Sunfish		0.9				0.2					0.6
	Largemouth Bass		0.0			0.2						0.1
	Northern Pike	0.1	0.7		0.3	0.1	0.1					0.3
	Orangespotted Sunfish	0.0										0.0
	Pumpkinseed					0.1	0.1					0.1
	River Carpsucker				0.2	0.1						0.2
	Sunfish Hybrid		0.0									0.0
	White Crappie	0.2	0.1	0.8		0.2	0.1					0.3
	White Sucker	7.1	2.6	4.3	6.7	3.3	1.0					4.2
	Yellow Bullhead					0.4						0.4
Yellow Perch		0.2									0.2	
std exp gill net	Black Bullhead							2.0	142.3	83.0		75.8
	Black Crappie								1.0	2.0		1.5
	Channel Catfish							5.3	12.7	4.3		7.4
	Common Carp							1.0	6.3			3.7
	Freshwater Drum							1.7	0.7	3.0		1.8
	Gizzard Shad								0.3	11.3		5.8
	Largemouth Bass									0.3		0.3
	Northern Pike							0.7				0.7
	River Carpsucker							1.3	1.3	10.3		4.3
	Walleye								0.3			0.3
	White Crappie									0.7		0.7
	White Sucker							2.0	4.0	6.0		4.0
std frame net (3/8 inch)	Bigmouth Buffalo							0.5	0.1	0.1		0.2
	Black Bullhead							70.1	133.1	321.9		175.0
	Black Crappie							6.2	35.9	17.2		19.8
	Bluegill							3.2	60.5	49.0		37.6
	Channel Catfish							1.9	1.0	1.6		1.5
	Common Carp							0.9	0.1	0.2		0.4
	Freshwater Drum								0.0	0.2		0.1
	Gizzard Shad									2.1		2.1

CPUE

Gear	Species	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg	
std frame net (3/8 inch)	Golden Shiner								0.0			0.0	
	Green Sunfish								1.5	0.8		1.2	
	Largemouth Bass							0.0				0.0	
	Northern Pike							0.3	0.1			0.2	
	Orangespotted Sunfish							0.0	0.0	0.0		0.0	
	Pumpkinseed									0.1		0.1	
	River Carpsucker							0.3	0.2	0.9		0.5	
	Sunfish Hybrid								0.0	0.0		0.0	
	Walleye										0.0		0.0
	White Crappie								0.8	3.6	3.3		2.6
	White Sucker								3.3	3.1	12.9		6.4
	Yellow Bullhead								0.6				0.6
	Yellow Perch								0.2		0.1		0.2



## 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										
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
AFS std frame net	Black Crappie	PSD											84
		PSD-P											8
		Wr											92
	Walleye	PSD											0
		PSD-P											0
		Wr											85
AFS std gill net	Black Crappie	PSD											69
		PSD-P											15
		Wr											87
	Northern Pike	PSD											0
		PSD-P											0
		Wr											89
	Walleye	PSD											50
		PSD-P											50
		Wr											92
	Yellow Perch	PSD											100
		PSD-P											0
		Wr											75
hoop net	Black Crappie	PSD											0
		PSD-P											0
		Wr											95
large frame net	Black Crappie	PSD	13	38	1	68	53	6					
		PSD-P	0	0	0	0	1	0					
		Wr	104	110	110	101	105	109					
	Northern Pike	PSD	100	0		67	100	100					
		PSD-P	0	0		0	0	0					
		Wr	74	89		80	95	96					
	Yellow Perch	PSD		100									
		PSD-P		0									
		Wr		89									
std exp gill net	Black Crappie	PSD										0	
												17	

Gear	Species	Index	Year											
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
std exp gill net	Black Crappie	PSD-P									0	0		
		Wr											99	
	Northern Pike	PSD									100			
		PSD-P									0			
		Wr									97			
	Walleye	PSD										100		
		PSD-P									0			
		Wr										93		
	std frame net (3/8 inch)	Black Crappie	PSD									77	8	12
PSD-P											2	0	2	
Wr											93	100	95	
Northern Pike		PSD									100	100		
		PSD-P									0	0		
		Wr									84	113		
Walleye		PSD												0
		PSD-P												0
Yellow Perch		PSD									0			0
		PSD-P									0			0
		Wr									94			75

## 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		
2016	1	1	86											
2015	2	11	88 (1.8)	172 (4)										
2014	3	15	73 (2)	145 (1.7)	204 (3.4)									
2013	4	8	77 (3.9)	141 (10.3)	192 (5.8)	227 (2.1)								
2012	5	10	99 (3.5)	165 (5.1)	200 (3.6)	227 (2.5)	248 (2.3)							
2011	6	1	69	160	195	215	232	240						
Weighted Mean		46	83	156	200	226	247	240						
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20		
2016	1	1												
2015	2	11												
2014	3	15												
2013	4	8												
2012	5	10												
2011	6	1												
Weighted Mean		46												

## Length at Capture

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

Species: Black Crappie

Year	N	Mean Length (expanded sample number) at capture by age									
		1	2	3	4	5	6	7	8	9	10+
2017	235	90 (3)	184 (33)	215 (86)	234 (80)	252 (31)	251 (2)				
2016	172		162 (85)	193 (81)	258 (5)	254 (2)					
2015	409	124 (70)	176 (316)	224 (23)							
2014	70	125 (11)	207 (56)		248 (2)	239 (1)					
2013	445		173 (420)	212 (4)	228 (17)	226 (4)					
2012	135	139 (44)	189 (24)	215 (3)	225 (42)	228 (21)		320 (1)			
2011	409	120 (13)	197 (159)	207 (237)							
2010	1838	130 (19)	177 (1819)								
2009	167	117 (154)	190 (4)	218 (3)	222 (6)	191 (1)					
2008	163	119 (22)	157 (61)	188 (58)	204 (4)	192 (18)					

## **Fish Condition**

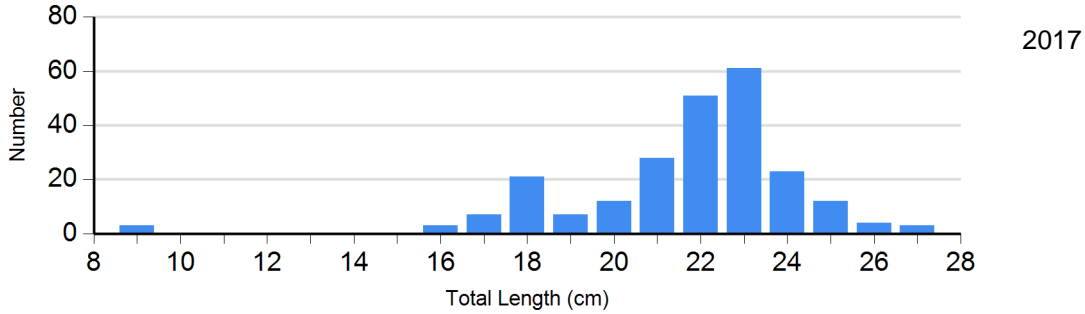
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	420	111 (0.7)	25	91 (1.4)	0		0	
	2014	14	106 (4.6)	47	89 (1.1)	1	83	0	
	2015	329	102 (0.8)	30	85 (0.6)	0		0	
	2016	151	97 (1.4)	17	84 (2.3)	3	96 (0.6)	1	83
	2017	38	88 (1.6)	175	93 (0.9)	19	88 (1.8)	0	
Northern Pike Gill Net	2014	0		2	97 (6.5)	0		0	
	2017	1	89	0		0		0	
Walleye Gill Net	2015	0		1	93	0		0	
	2017	1	85	0		1	98	0	
Yellow Perch Gill Net	2017	0		1	75	0		0	

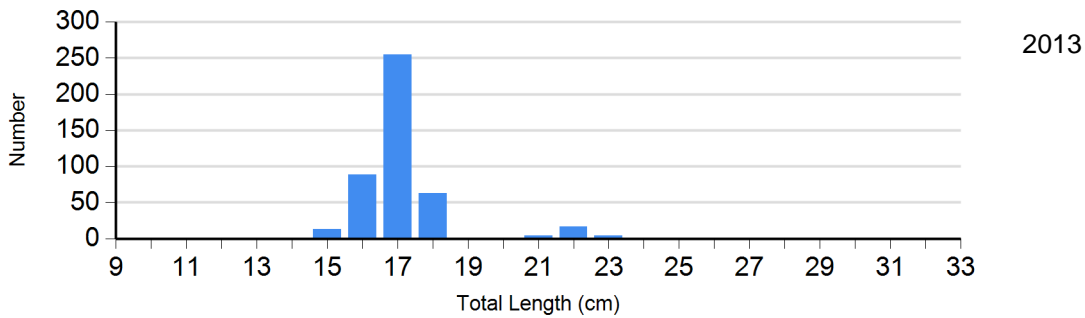
# Length Frequency Distribution

Length frequency histogram of species sampled by year.

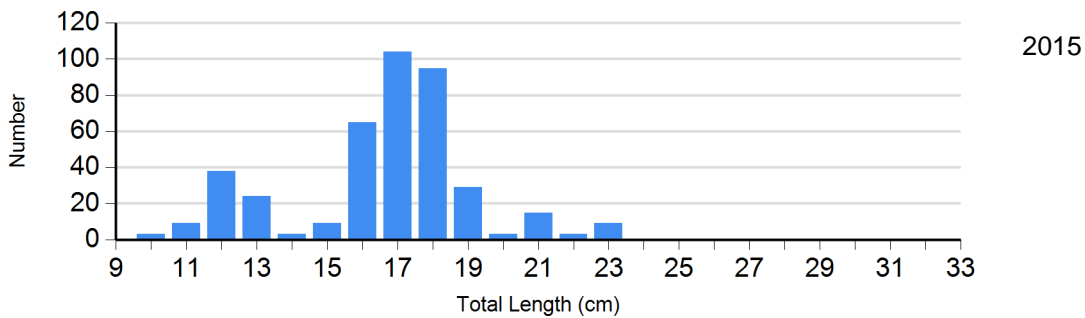
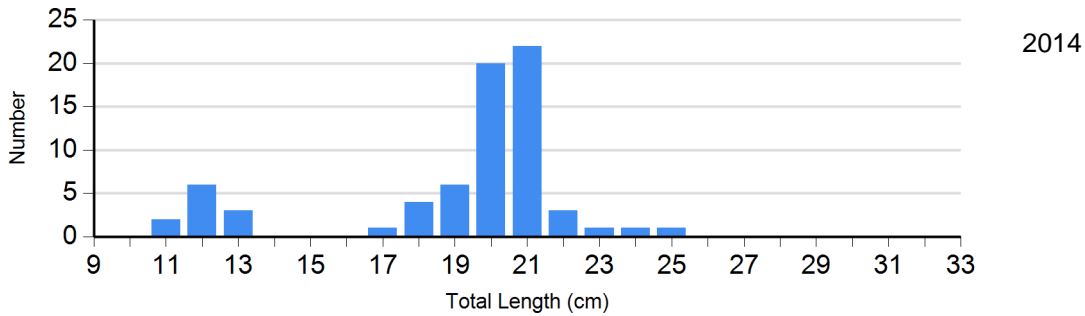
Species: Black Crappie  
Gear: AFS std frame net

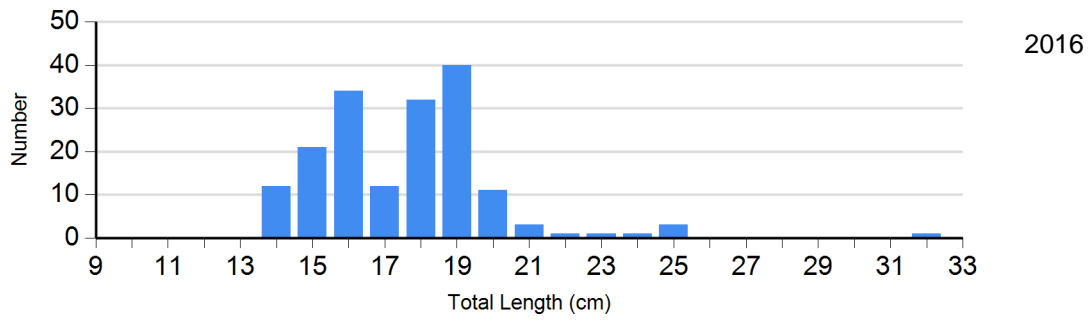


Species: Black Crappie  
Gear: large frame net

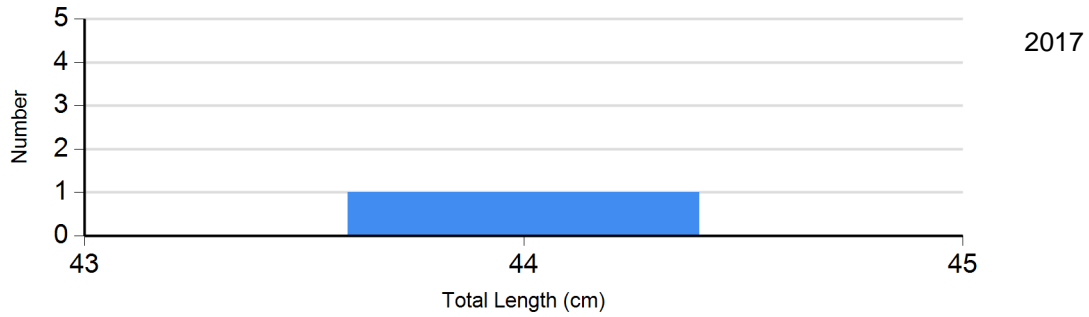


Species: Black Crappie  
Gear: std frame net (3/8 inch)

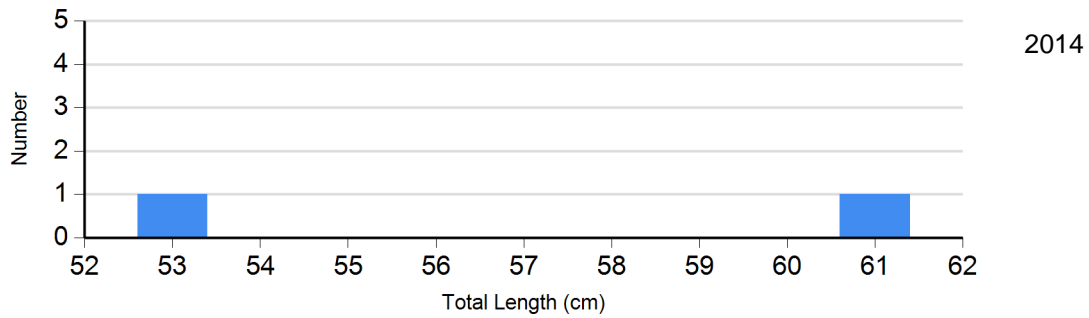




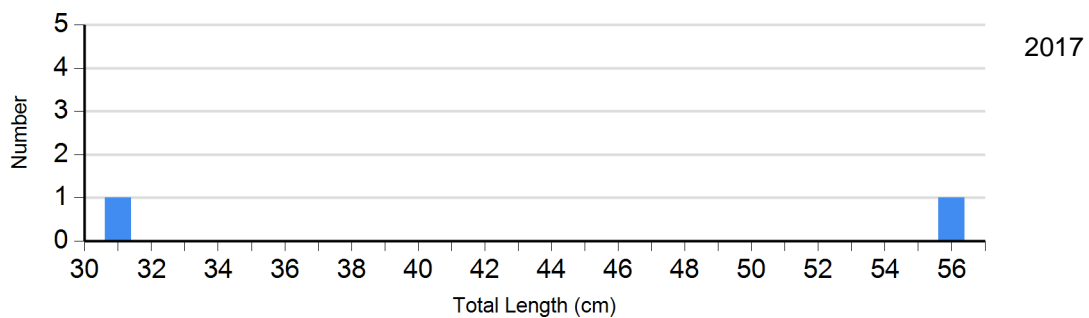
Species: Northern Pike  
Gear: AFS std gill net



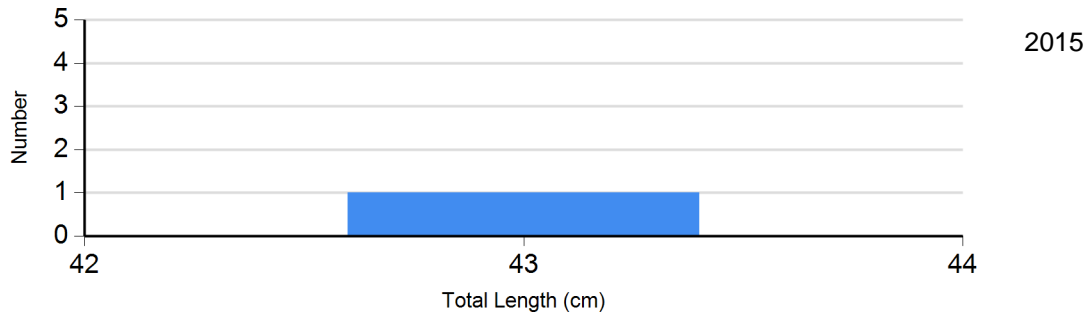
Species: Northern Pike  
Gear: std exp gill net



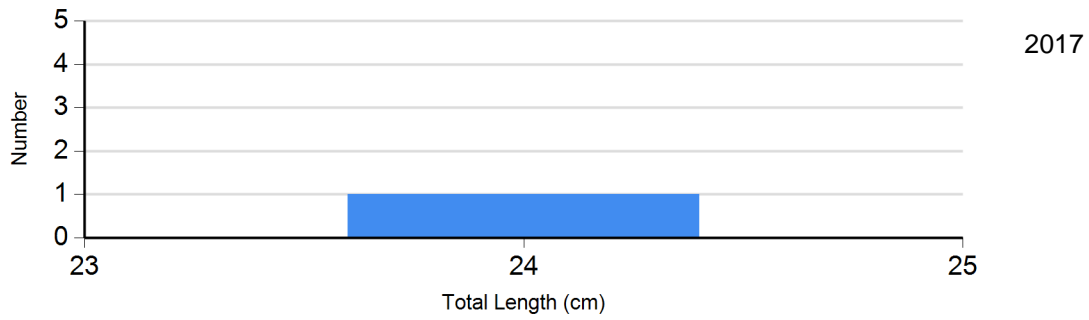
Species: Walleye  
Gear: AFS std gill net



Species: Walleye  
Gear: std exp gill net



Species: Yellow Perch  
Gear: AFS std gill net

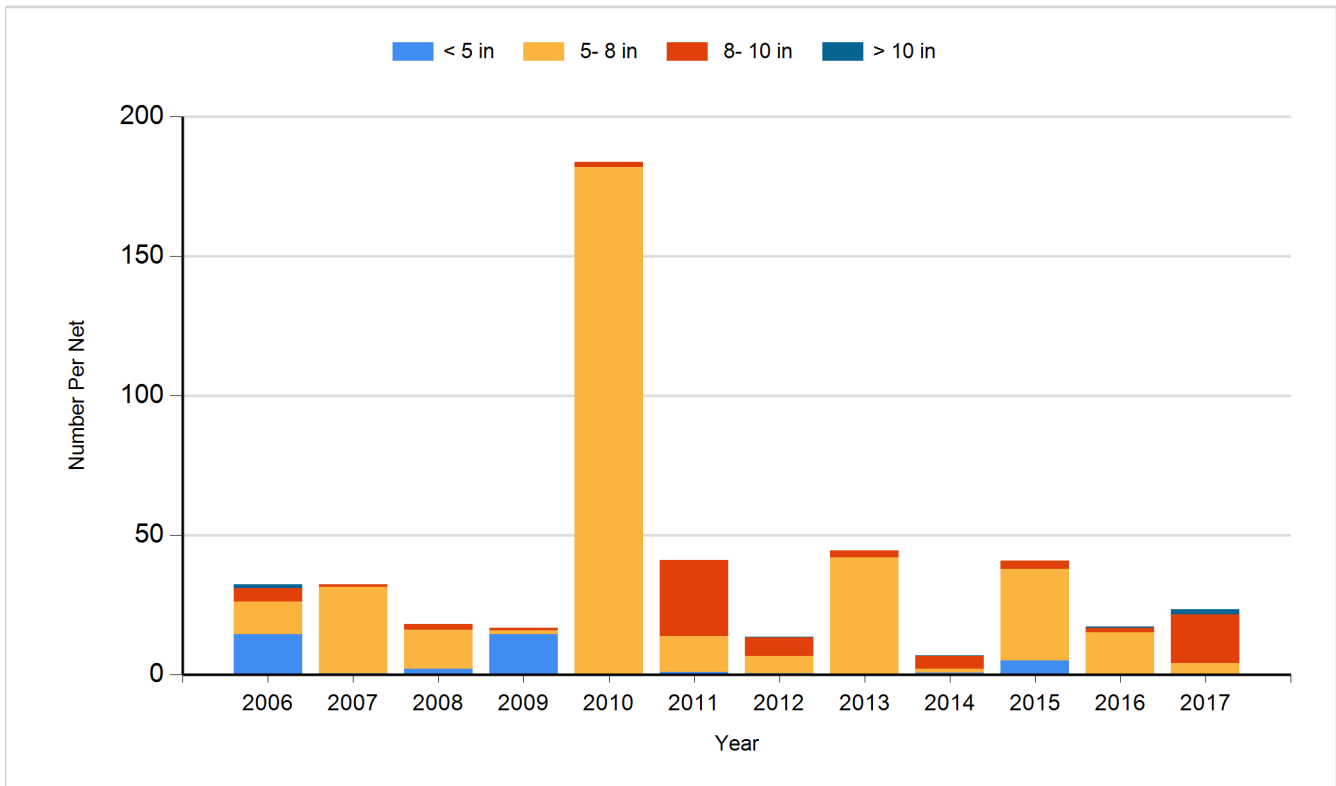




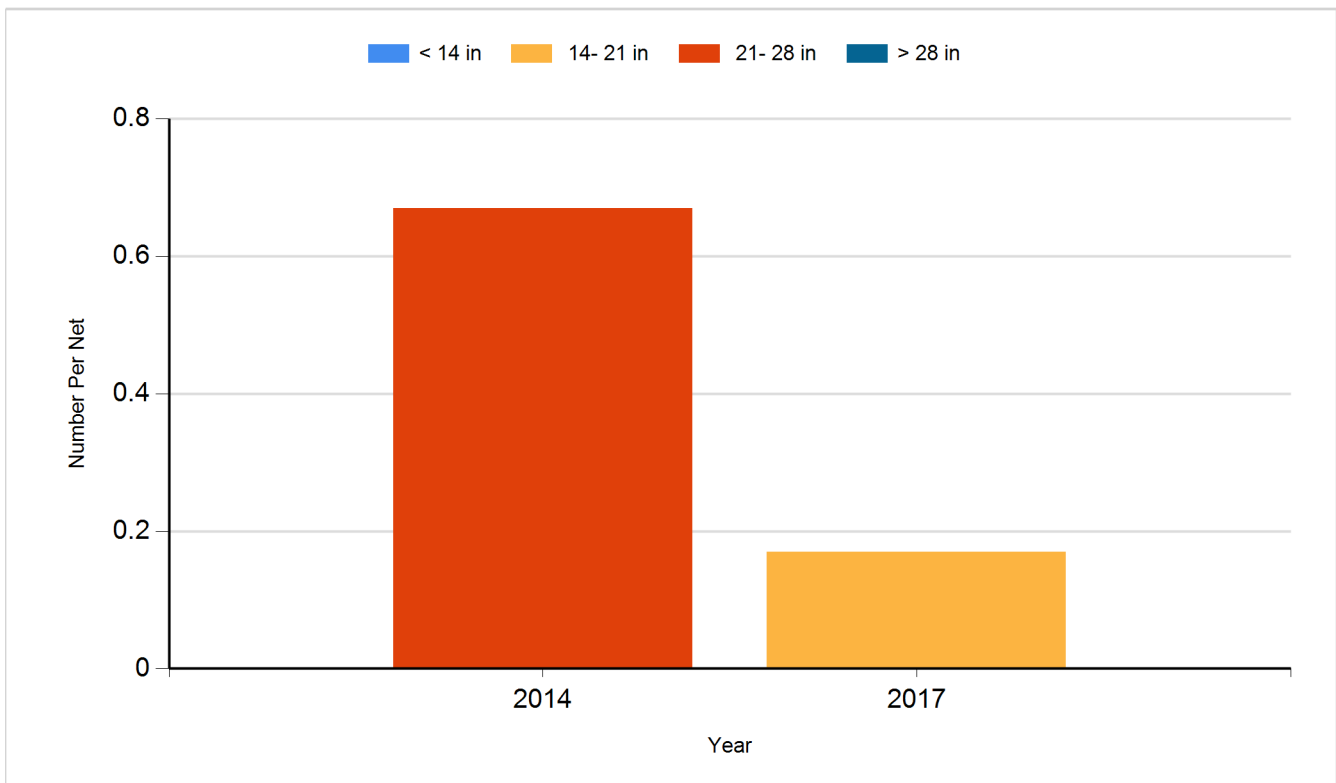
## Historic Fish Sizes and Relative Abundance

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

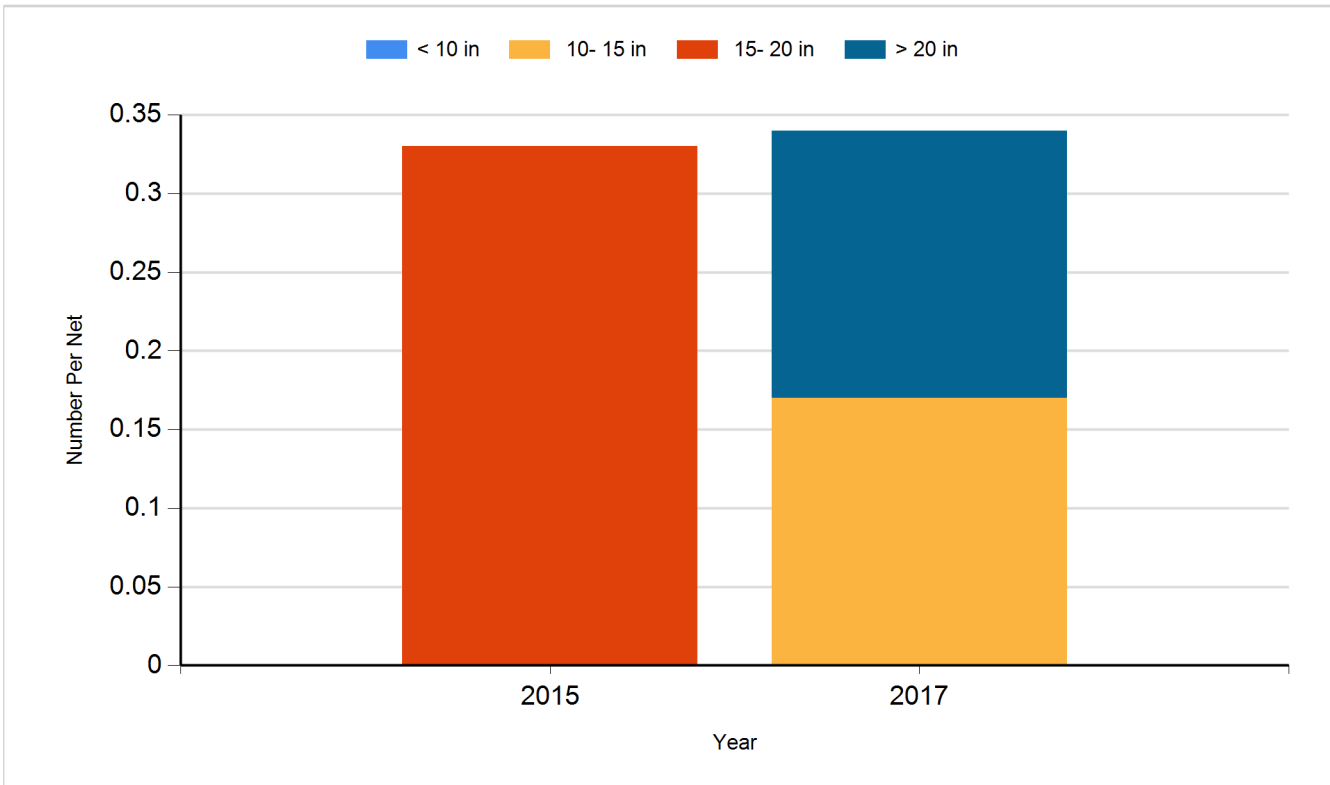
Species: Black Crappie  
Gear: Frame Net



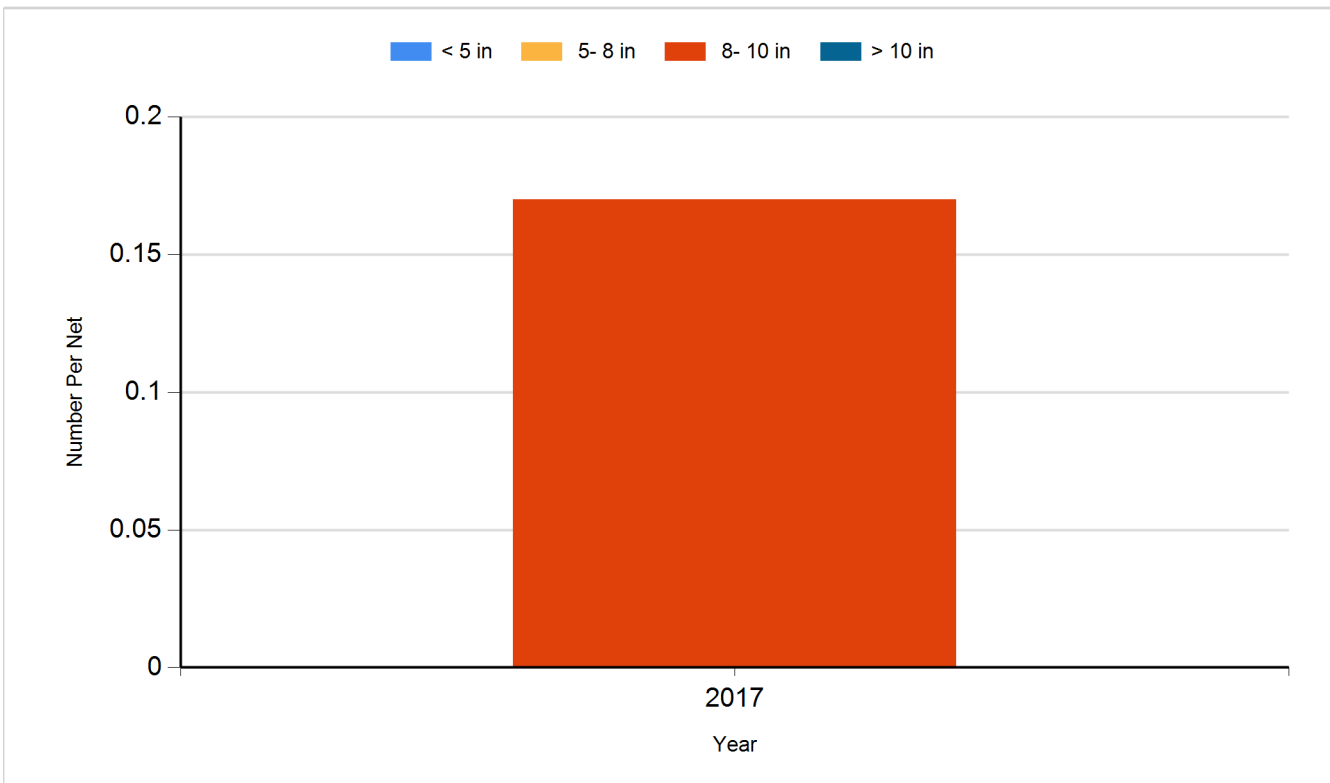
Species: Northern Pike  
Gear: Gill Net



Species: Walleye  
Gear: Gill Net



Species: Yellow Perch  
Gear: Gill Net



## **Fish Stocking**

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

Year	Species	Size	Number
2007	Walleye	Adult	430
2008	Fathead Minnow	Adult	684,610
2010	Largemouth Bass	Juvenile	1,585
2011	Largemouth Bass	Fingerling	2,240
2012	Largemouth Bass	Adult	259
2013	Largemouth Bass	Large Fingerling	1,056
2013	Walleye	Adult	300
2014	Walleye	Fry	90,000
2015	Gizzard Shad	Adult	50
2015	Walleye	Small Fingerling	7,560
2016	Walleye	Juvenile	889
2017	Walleye	Juvenile	1,152
2017	Yellow Perch	Adult	5,525
2017	Yellow Perch	Small Fingerling	54,860