

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Beaver, Minnehaha County

LBS-Lake-70-000

2019

## Lake Information

<b>Name:</b>	Beaver	<b>Maximum Depth:</b>	11 Feet
<b>County:</b>	Minnehaha	<b>Mean Depth:</b>	9 Feet
<b>Legal Description:</b>	T102N-R52W-Sec. 14,15	<b>OHWM Elevation:</b>	1,652
<b>Surface Area:</b>	372 Acres	<b>Outlet Elevation:</b>	1,652

## Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	May 30, 2019	6 net-nights
frame net (std 3/4 in)	May 30, 2019	5 net-nights

## **Common Fish Species Present**

Yellow Perch

Walleye

Black Bullhead

Black Crappie

Common Carp

Northern Pike

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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).

A statewide effort to help make netting efforts comparable to all waters sampled across the state, occurred in 2017, with a switch to American Fisheries Society gill nets. Past gill netting efforts were completed with different style/types of nets and are not comparable side by side.

- **AFS std gill net** – 80 ft experimental gill net containing eight panels (10 ft each) of varying monofilament meshes of 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25 and 2.50 inches.
- **std experimental gill net for non-Missouri River waters** - 150 ft experimental gill net containing six panels (25 ft each) of varying monofilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.
- **std experimental gill net for Missouri River reservoirs** – 300 ft experimental gill net containing six panels (50 ft each) of varying multifilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.

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

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)
Black Bullhead	6	15	9	23	12	30	15	38	18	46
Black Crappie	5	13	8	20	10	25	12	30	15	38
Bluegill	3	8	6	15	8	20	10	25	12	30
Brown Trout	8	20	12	30	16	40	20	50	18	46
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Lake Trout	12	30	20	50	26	65	31	80	39	100
Largemouth Bass	8	20	12	30	15	38	20	51	25	63
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Rainbow Trout	10	25	16	40	20	50	26	65	31	80
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
Smallmouth Bass	7	18	11	28	14	35	17	43	20	51
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
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).

\* **Methods/Species that ignore stock length**

Gear	Species	Sample Size (n)	Abundance		Stock Density Indices			Condition		
			CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	41	6.8	3.1	15	9	0			
	Black Crappie	5	0.2	0.2	100		100		110	
	Common Carp	53	8.8	1.6	66	10	2			
	Northern Pike	9	1.5	0.3	89		22		89	2
	Walleye	64	10.3	4.1	74	8	10	6	99	1
	Yellow Perch	1	0.2	0.2	100		100		87	
frame net (std 3/4 in)	Black Bullhead	462	88.6	25.8	6	2	1			
	Black Crappie	258	49.4	23.3	72	4	62	4	119	1
	Common Carp	111	22.2	11.3	82	5	16	5		
	Northern Pike	4	0.8	0.3	50		0		83	2
	Walleye	3	0.6	0.6	67		0		98	9
	Yellow Perch	2	0.4	0.4	100		50		90	0

## 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
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
AFS std frame net	Black Bullhead								24.3			24.30
	Black Crappie								25.0			25.00
	Common Carp								0.0			0.00
	Green Sunfish								0.3			0.30
	Northern Pike								0.3			0.30
	Orangespotted Sunfish								0.0			0.00
	Walleye								1.0			1.00
	Yellow Perch								0.8			0.80
AFS std gill net	Black Bullhead								4.8	5.2	6.8	5.60
	Black Crappie								0.0	0.5	0.2	0.23
	Common Carp								7.5	8.3	8.8	8.20
	Green Sunfish								0.0	0.2	0.0	0.07
	Northern Pike								3.3	2.2	1.5	2.33
	Walleye								9.3	6.0	10.3	8.53
	Yellow Perch								3.8	1.2	0.2	1.73
	frame net (std 3/4 in)	Black Bullhead				689.3	740.0	72.0	6.2		248.2	88.6
Black Crappie					0.3	0.0	0.0	0.2		58.8	49.4	18.12
Bluegill					0.0	0.0	0.0	0.0		0.0	0.0	0.00
Common Carp					0.0	0.2	1.0	10.2		3.4	22.2	6.17
Green Sunfish					0.0	0.0	0.0	0.0		0.4	0.0	0.07
Northern Pike					0.3	1.0	0.0	0.4		1.4	0.8	0.65
Walleye					0.3	1.0	0.0	1.2		3.4	0.6	1.08
Yellow Perch					0.0	0.0	0.2	0.6		0.8	0.4	0.33
std exp gill net	Black Bullhead				129.7	74.0	19.0	7.7				57.60
	Black Crappie				0.0	0.0	0.0	0.0				0.00
	Common Carp				0.0	0.0	4.0	14.7				4.68
	Northern Pike				2.0	1.0	0.3	0.7				1.00
	Orangespotted Sunfish				0.0	0.0	0.0	0.0				0.00
	Walleye				2.0	6.3	1.7	13.7				5.93
	Yellow Perch				0.3	7.7	14.3	24.0				11.58

## 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												
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019			
AFS std frame net	Black Bullhead	PSD									19				
		PSD-P									13				
		Wr									112				
	Black Crappie	PSD										29			
		PSD-P										11			
		Wr										112			
	Common Carp	PSD										0			
		PSD-P										0			
		Wr										90			
	Northern Pike	PSD										0			
		PSD-P										0			
		Wr										90			
	Walleye	PSD										100			
		PSD-P										0			
		Wr										88			
Yellow Perch	PSD										67				
	PSD-P										0				
	Wr										83				
AFS std gill net	Black Bullhead	PSD									63	23	15		
		PSD-P									32	3	0		
		Wr										98	110		
	Black Crappie	PSD										0	33	100	
		PSD-P										0	0	100	
		Wr											98	110	
	Common Carp	PSD										63	36	66	
		PSD-P										10	4	2	
		Wr										96	82	89	
	Northern Pike	PSD										38	85	89	
		PSD-P										15	8	22	
		Wr										96	82	89	
	Walleye	PSD										68	86	74	
		PSD-P										8	6	10	
		Wr										96	93	99	
Yellow Perch	PSD										100	29	100		
	PSD-P										13	0	100		
	Wr										86	90	87		

Gear	Species	Index	Year									
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
frame net (std 3/4 in)	Black Bullhead	PSD				97	100	85	87		7	6
		PSD-P				4	4	65	65		2	1
		Wr				93						
	Black Crappie	PSD				100		0	0		47	72
		PSD-P				67		0	0		31	62
		Wr				105			115		108	119
	Common Carp	PSD					100	0	75		71	82
		PSD-P					0	0	2		53	16
		Wr					117					
	Northern Pike	PSD				100	100		100		57	50
		PSD-P				33	80		100		0	0
		Wr				77	81		131		91	83
	Walleye	PSD				100	100	0	33		94	67
		PSD-P				0	0	0	17		24	0
		Wr				97	92		89		93	98
	Yellow Perch	PSD							100	33	75	100
		PSD-P							0	33	0	50
		Wr							110	114	92	90
std exp gill net	Black Bullhead	PSD				96	100	88	91			
		PSD-P				1	7	65	52			
		Wr				97						
	Common Carp	PSD							0	52		
		PSD-P							0	0		
	Northern Pike	PSD				83	100	100	50			
		PSD-P				50	67	0	50			
		Wr				84	90	85	117			
	Walleye	PSD				33	79	100	2			
		PSD-P				33	11	40	2			
		Wr				89	97	93	91			
	Yellow Perch	PSD				100	0	93	6			
		PSD-P				0	0	2	6			
		Wr				115	99	111	124			



## 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+
2014	29	135 (29)									

## Fish Condition

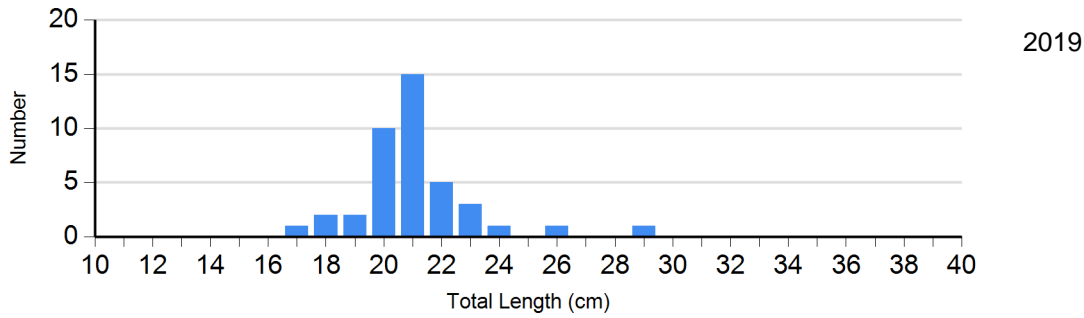
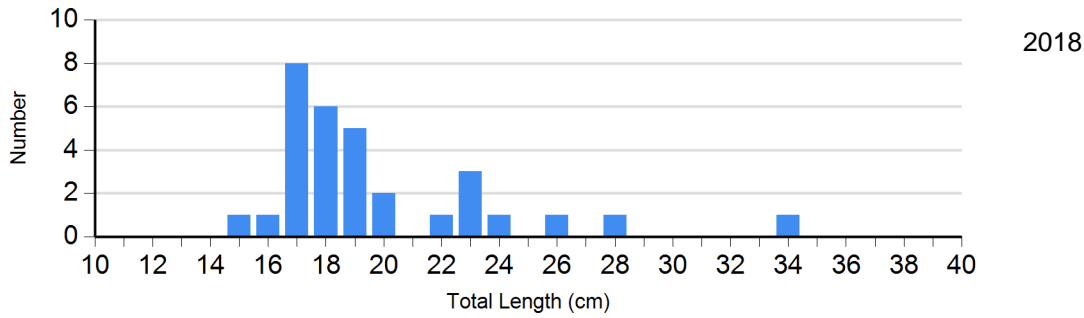
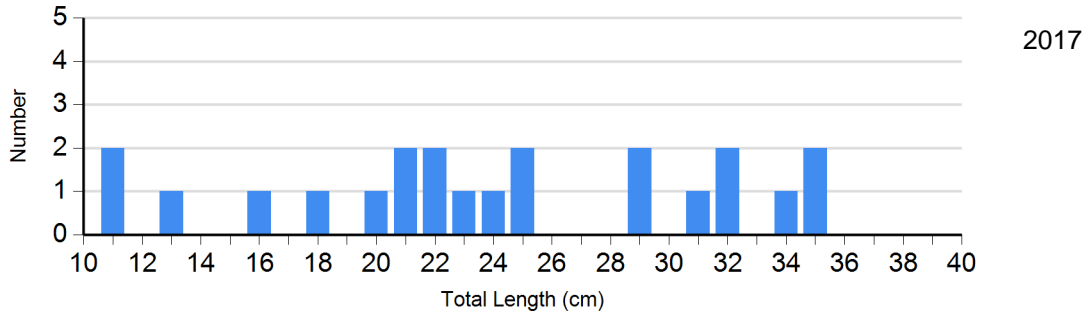
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	2015	0		0		0		0	
	2016	1	115	0		0		0	
	2017	71	109 (2.5)	18	122 (2.9)	8	112 (3.1)	3	97 (3.8)
	2018	155	110 (2.4)	47	106 (1.3)	92	93 (0.4)	0	
	2019	69	128 (4.0)	24	124	153	117 (1.1)	1	
Northern Pike Gill Net	2015	0		1	85	0		0	
	2016	1	109	0		1	124	0	
	2017	8	95 (2.2)	3	104 (2.1)	1	88	1	83
	2018	2	75 (2.7)	10	84 (3.0)	1	78	0	
	2019	1	92	6	88 (2.6)	2	91 (0.6)	0	
Walleye Gill Net	2015	0		3	92 (2.9)	2	95 (3.4)	0	
	2016	40	91 (1.5)	0		0		1	98
	2017	12	99 (1.9)	22	94 (1.1)	3	96 (7.2)	0	
	2018	5	98 (2.6)	29	92 (1.1)	2	93 (0.5)	0	
	2019	16	105 (0.9)	40	97 (1.1)	6	95 (3.3)	0	
Yellow Perch Gill Net	2015	3	117 (7.3)	39	110 (1.5)	1	110	0	
	2016	68	126 (2.9)	0		4	104 (2.7)	0	
	2017	0		13	86 (1.5)	1	86	1	92
	2018	5	90 (2.9)	2	89 (6.7)	0		0	
	2019	0		0		1	87	0	

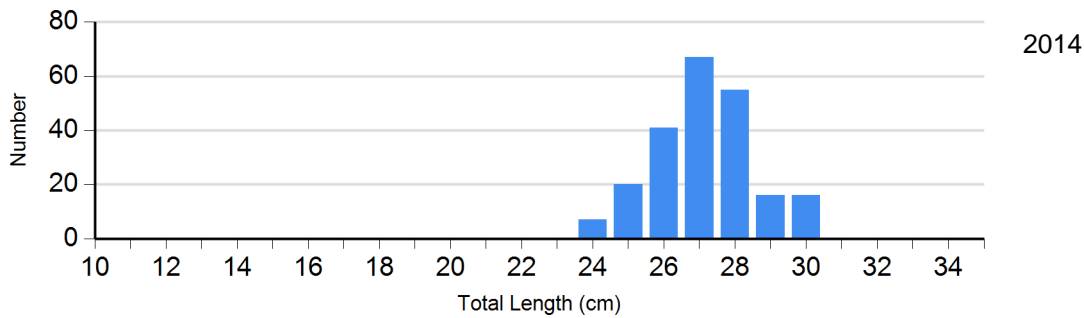
## Length Frequency Distribution

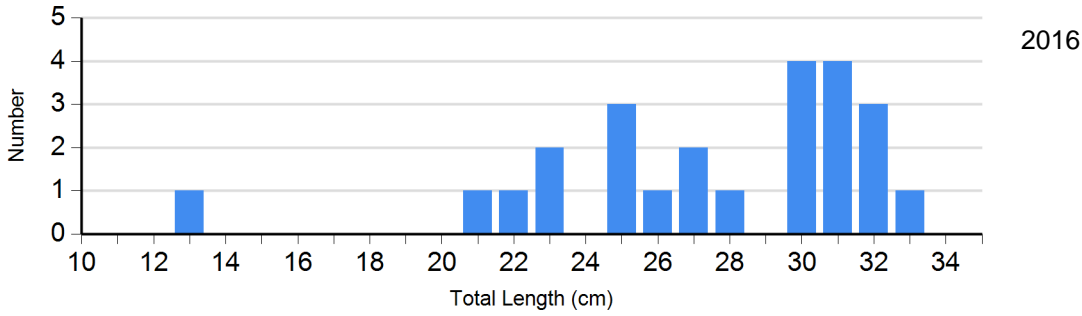
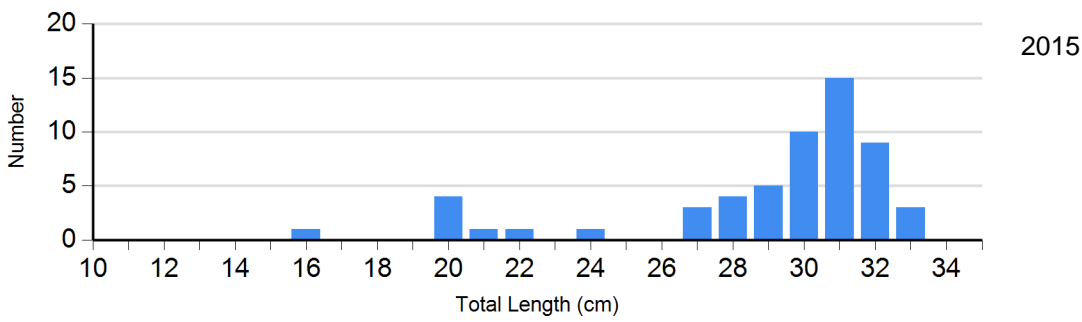
Length frequency histogram of species sampled by year.

Species: Black Bullhead  
Gear: AFS std gill net

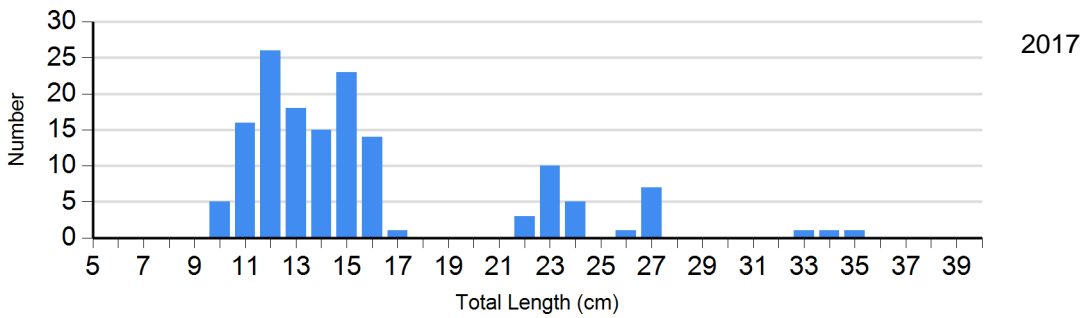


Species: Black Bullhead  
Gear: std exp gill net

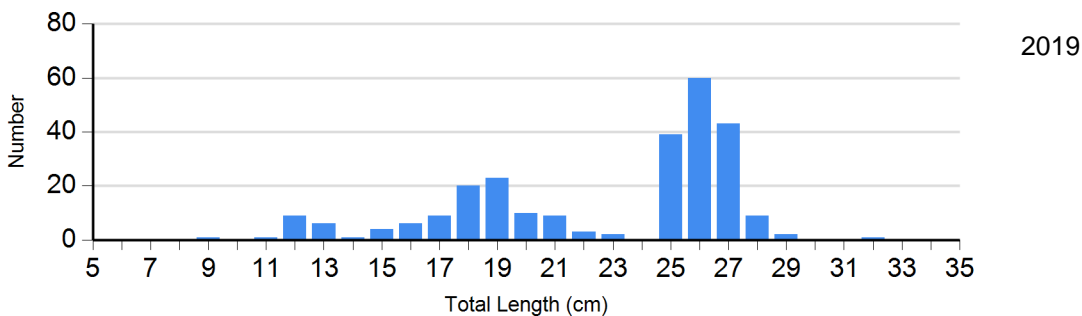
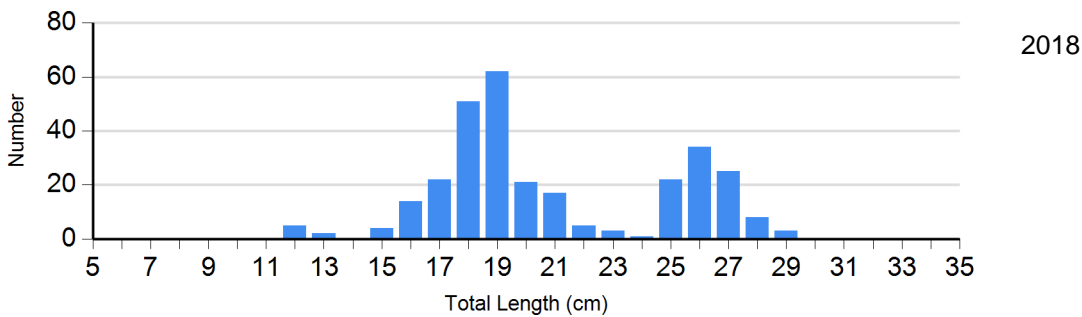




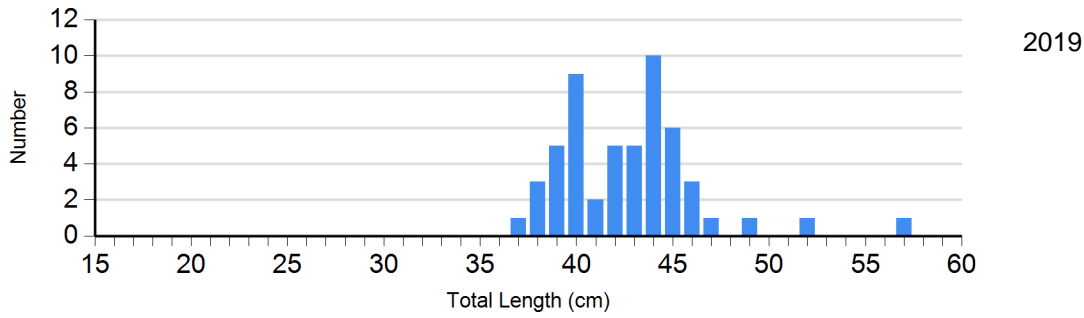
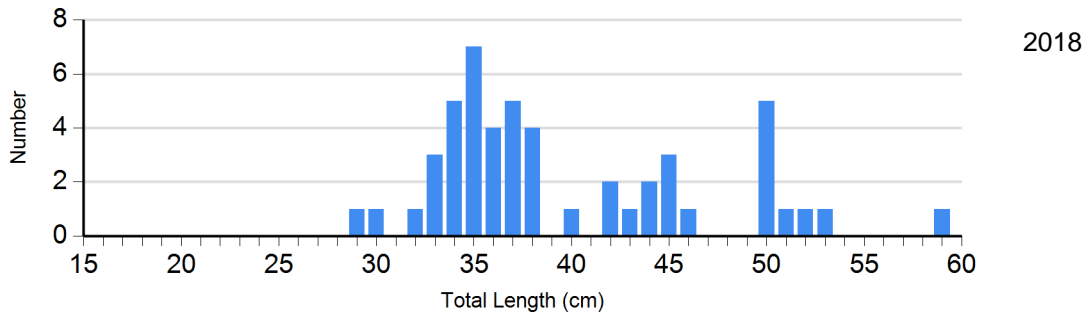
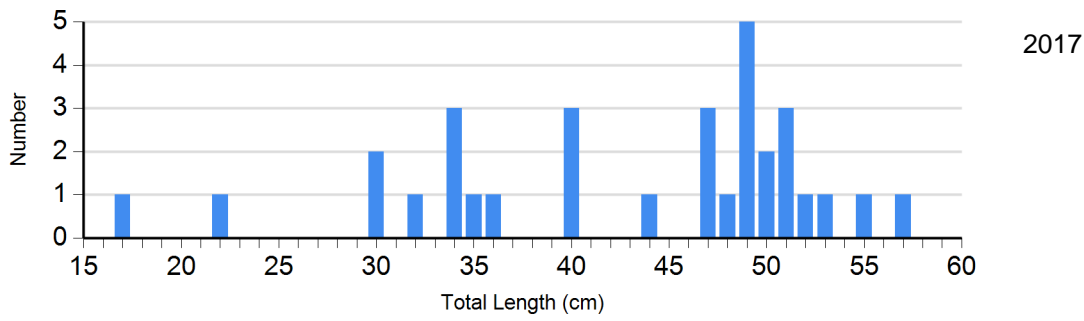
Species: Black Crappie  
Gear: AFS std frame net



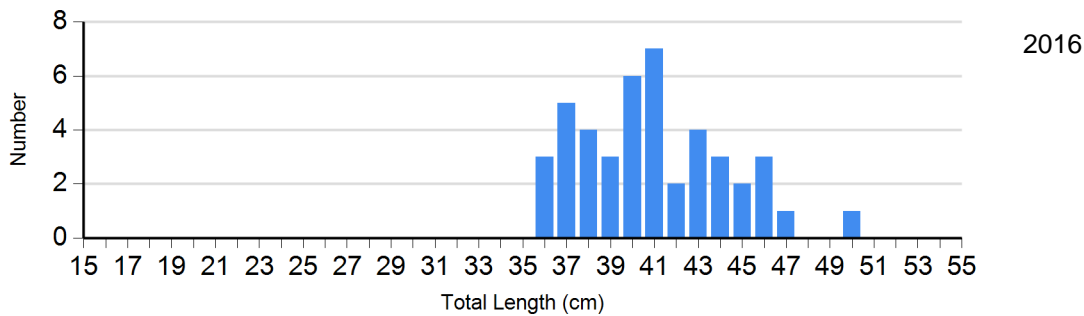
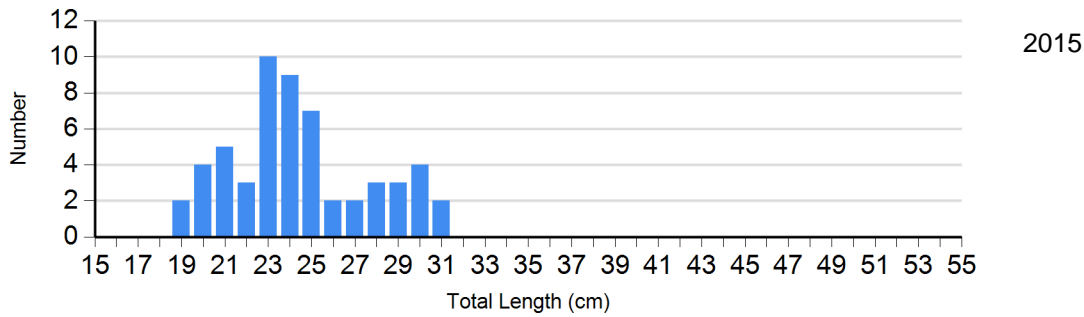
Species: Black Crappie  
Gear: frame net (std 3/4 in)



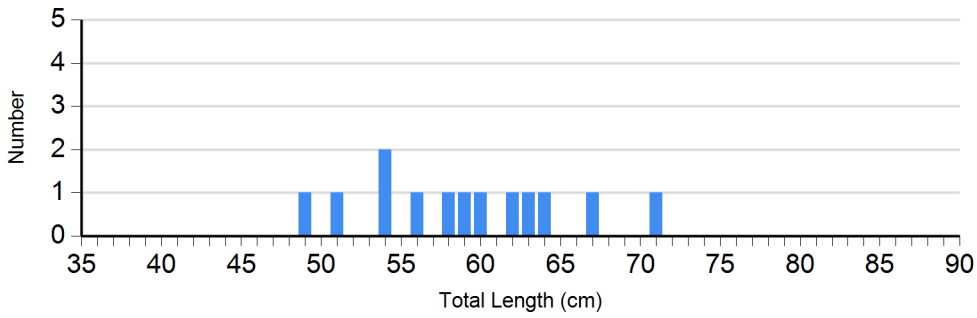
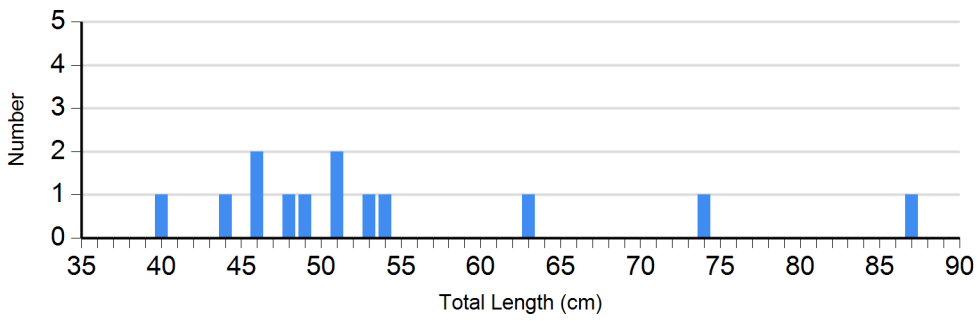
Species: Common Carp  
 Gear: AFS std gill net



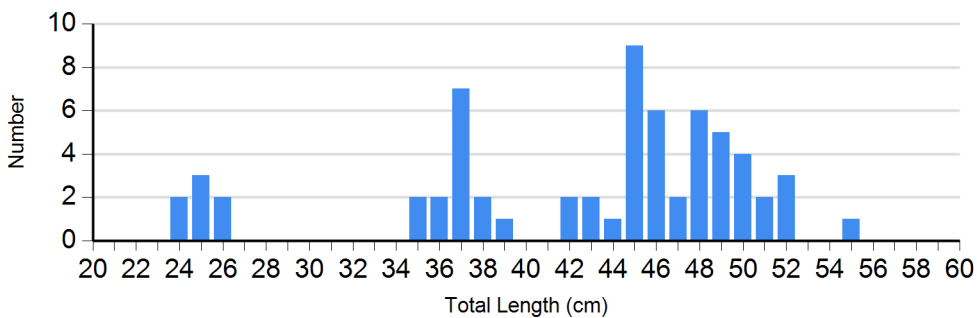
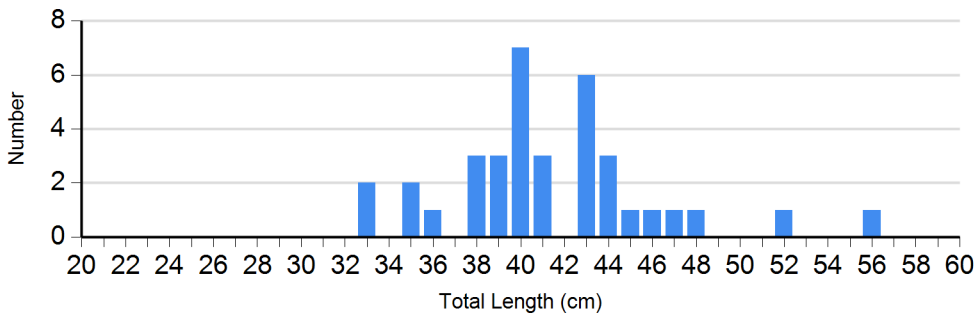
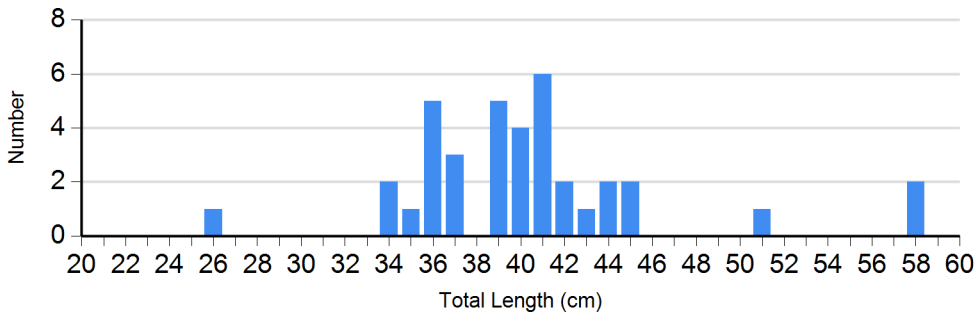
Species: Common Carp  
 Gear: std exp gill net



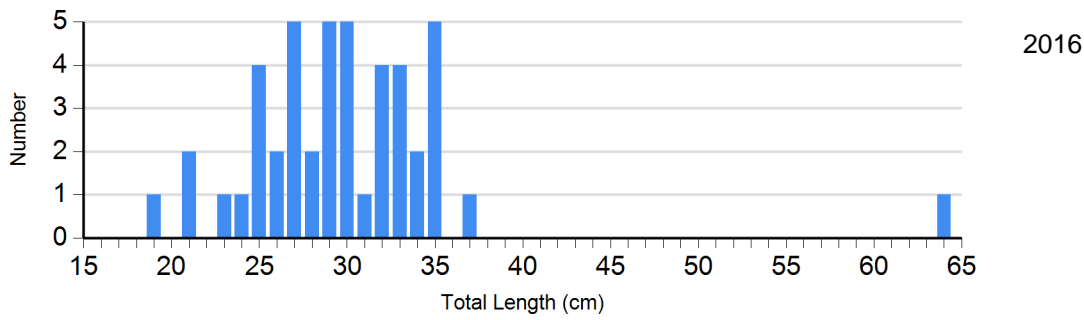
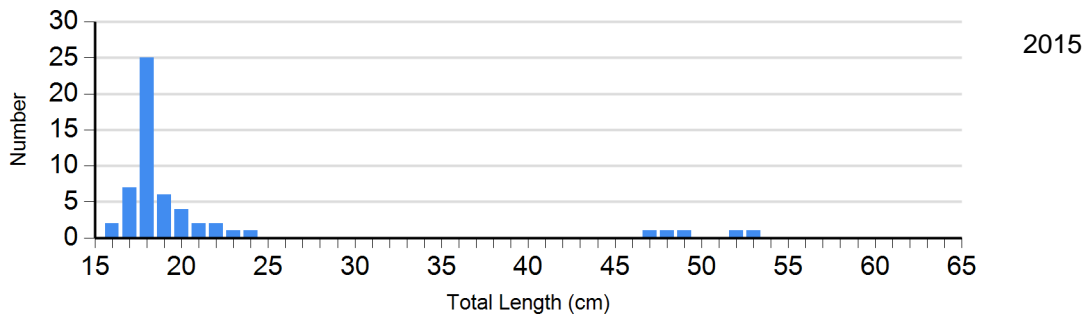
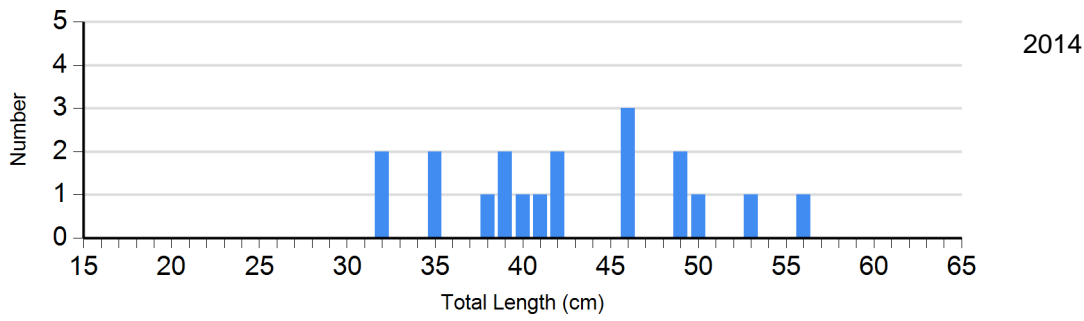
Species: Northern Pike  
 Gear: AFS std gill net



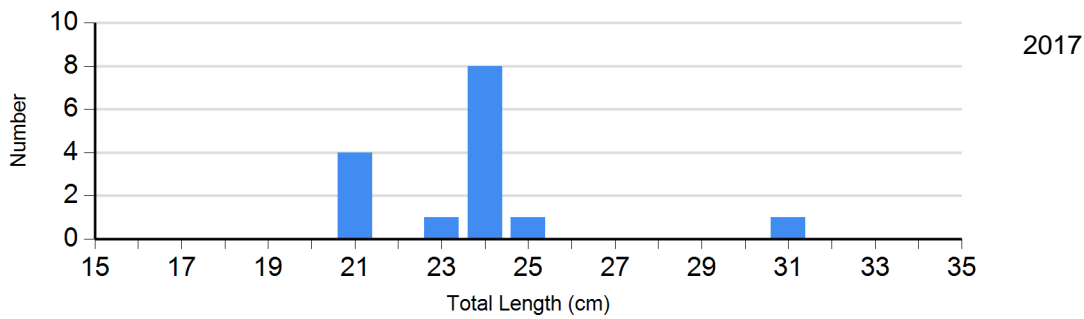
Species: Walleye  
 Gear: AFS std gill net



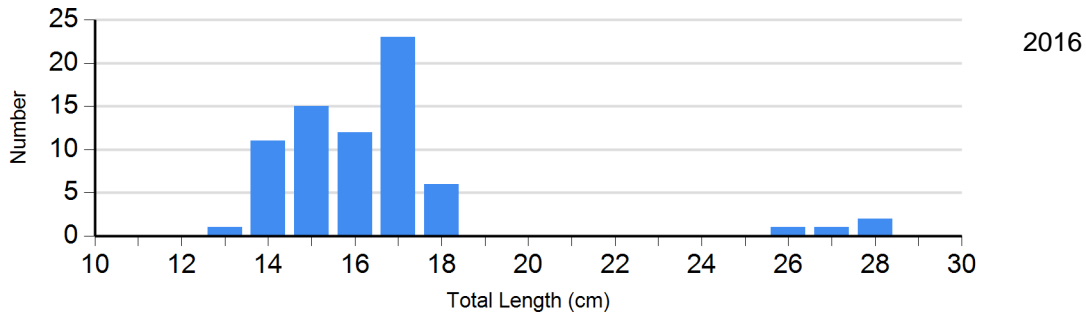
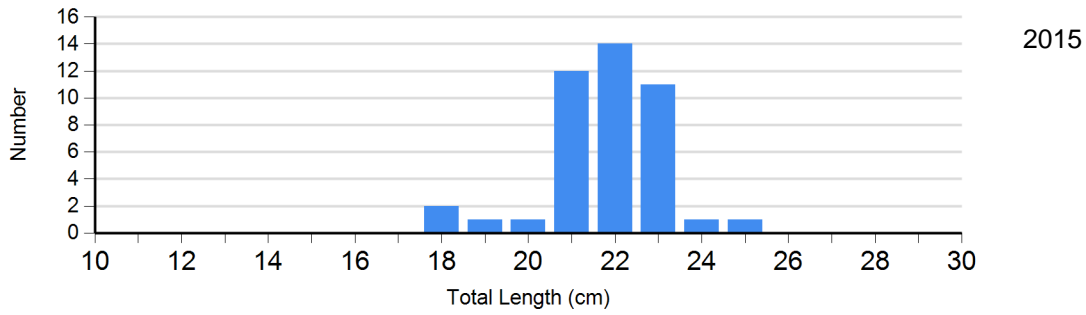
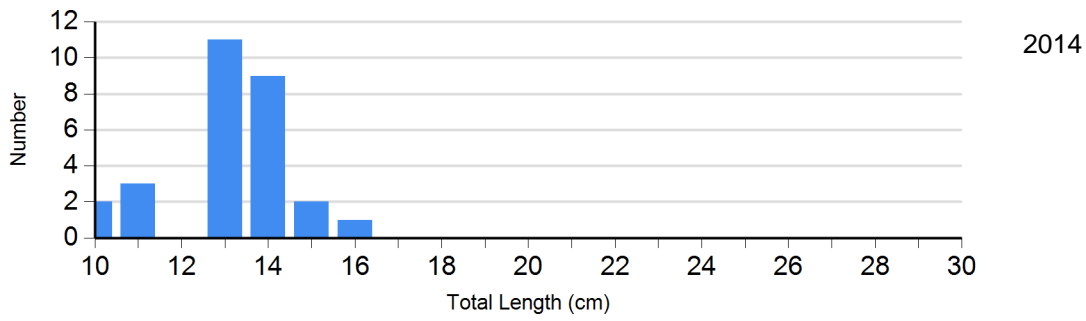
Species: Walleye  
Gear: std exp gill net



Species: Yellow Perch  
Gear: AFS std gill net



Species: Yellow Perch  
Gear: std exp gill net

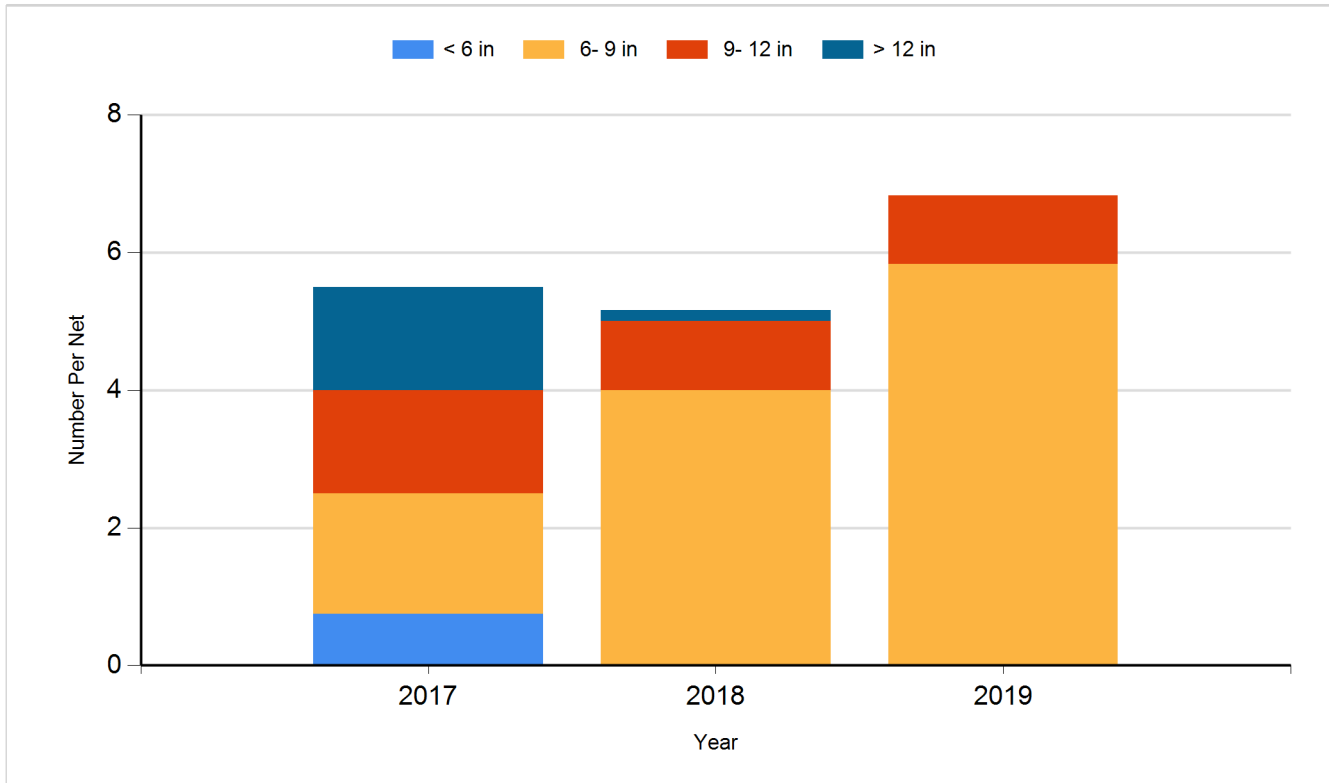




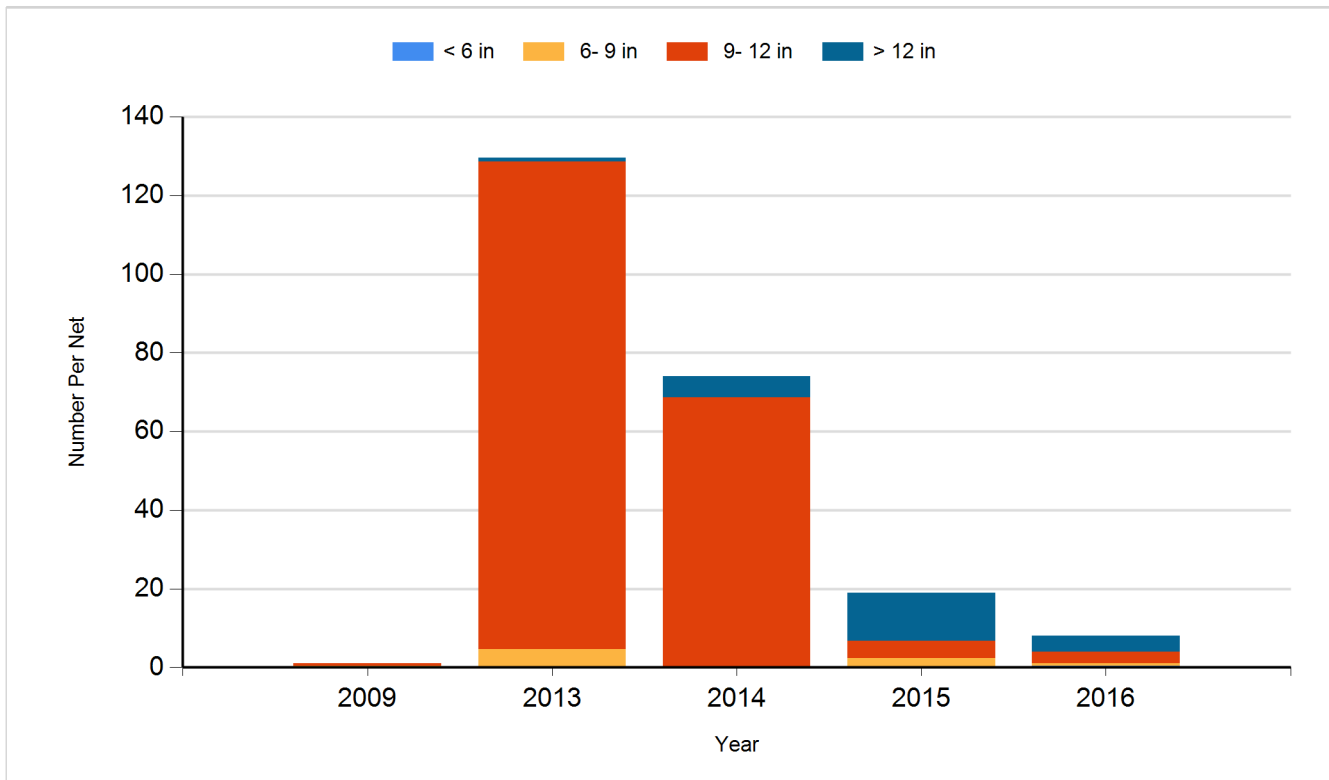
## Historic Fish Sizes and Relative Abundance

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

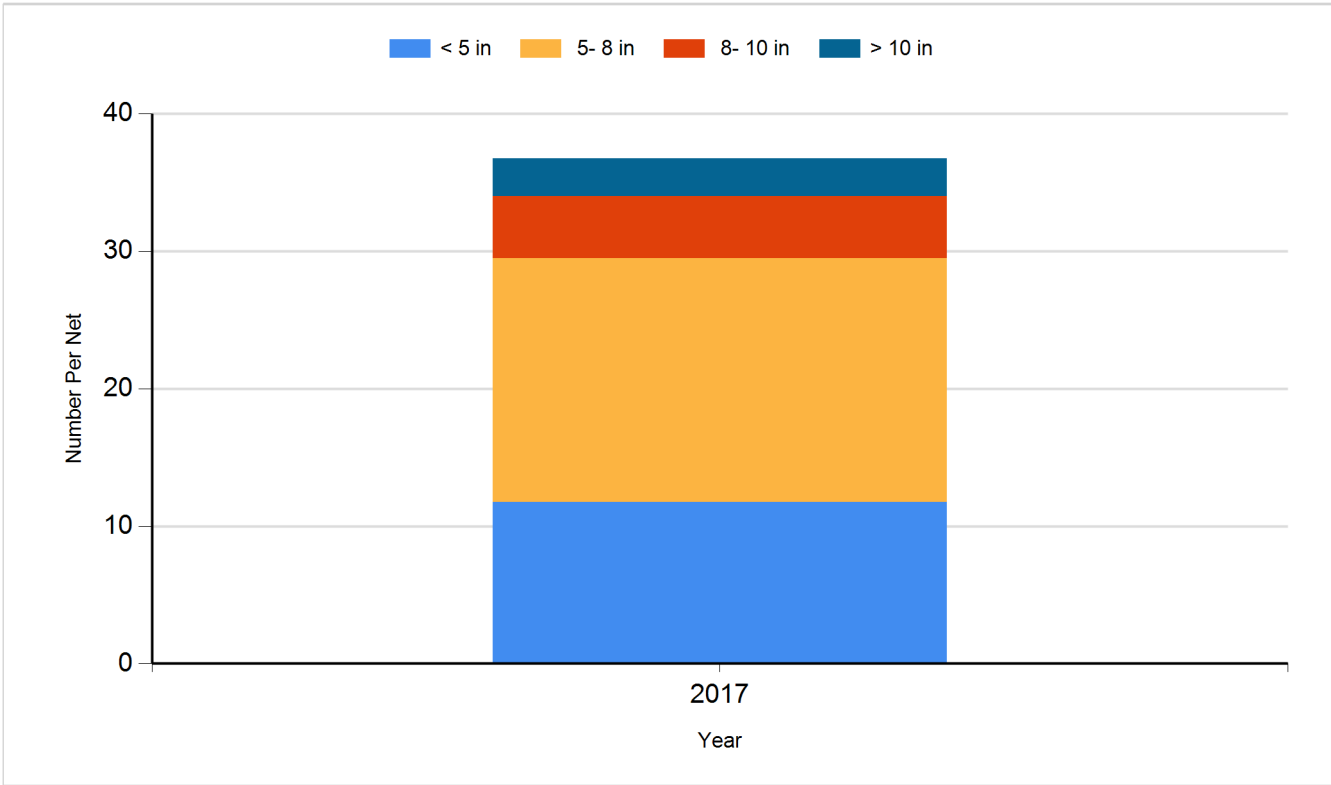
Species: Black Bullhead  
Gear: AFS std gill net



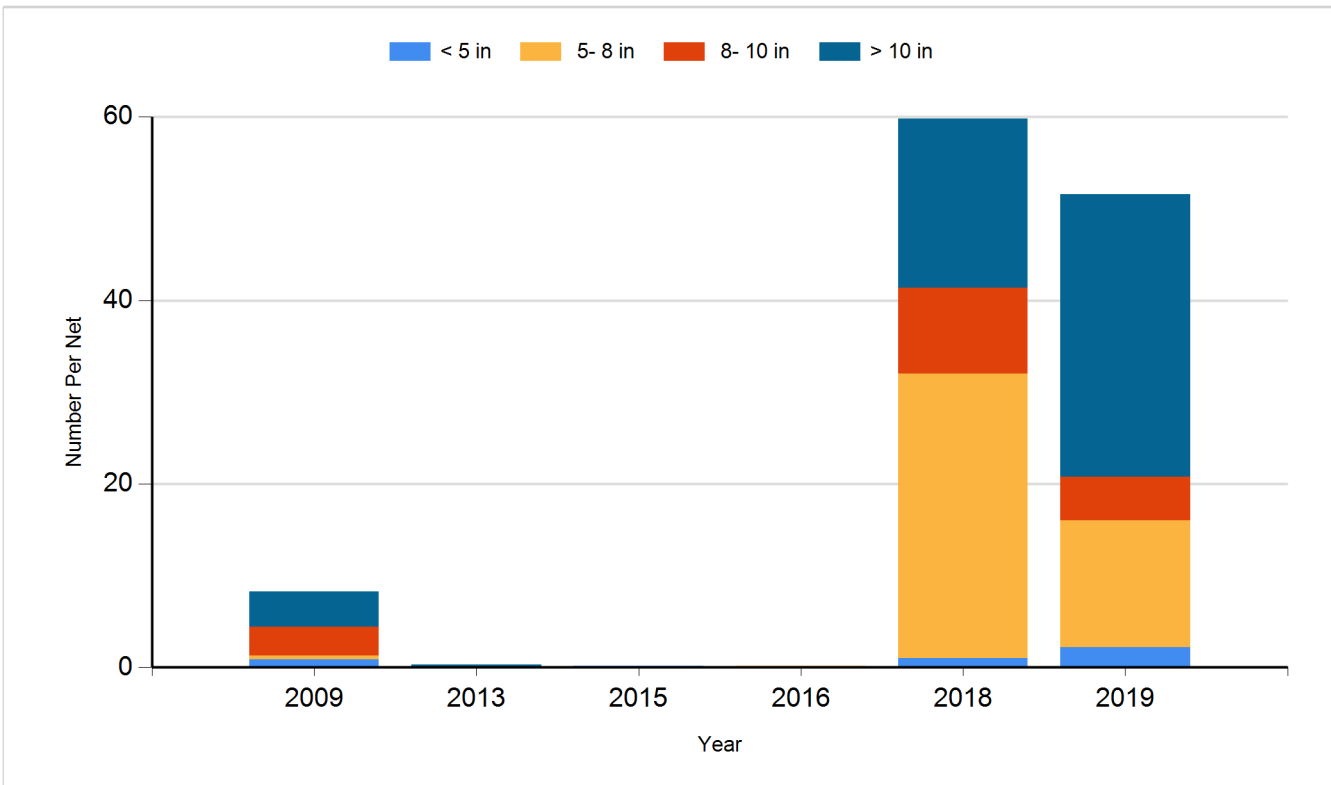
Species: Black Bullhead  
Gear: std exp gill net



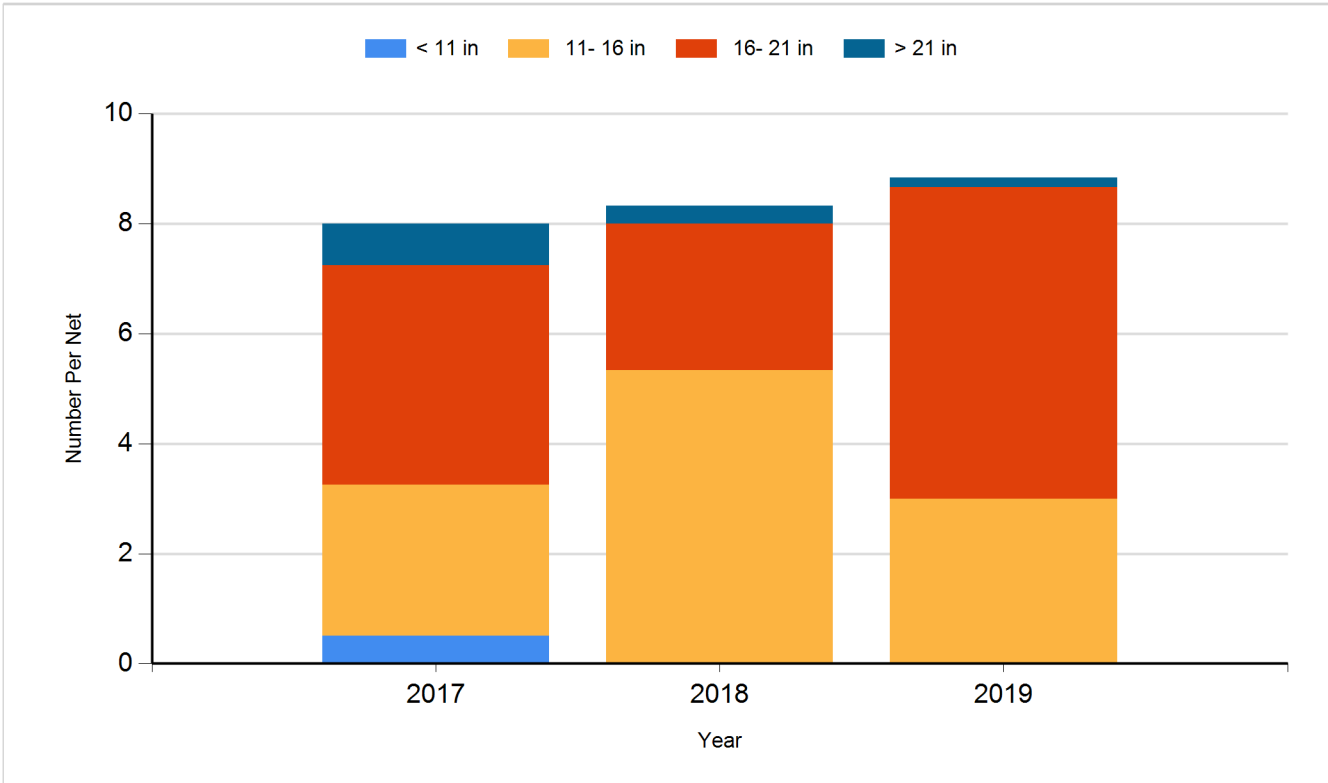
Species: Black Crappie  
Gear: AFS std frame net



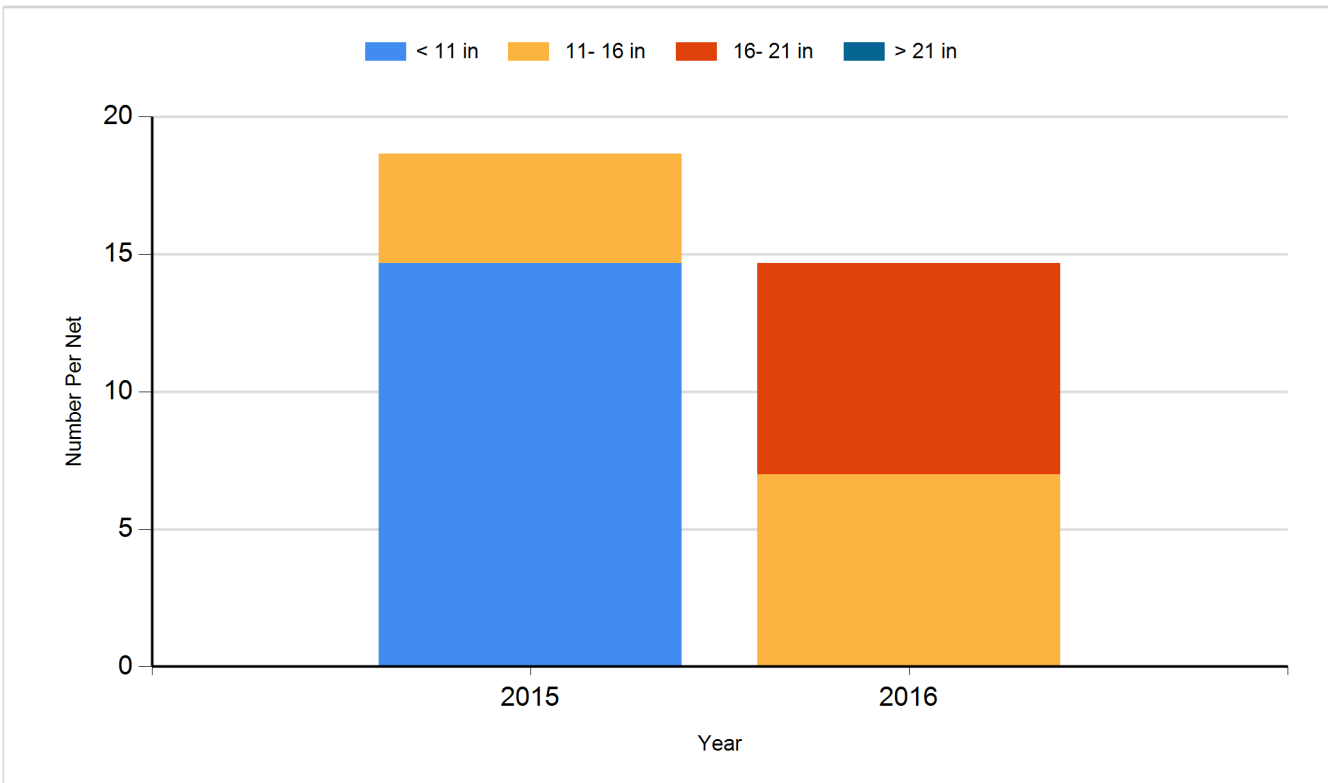
Species: Black Crappie  
Gear: frame net (std 3/4 in)



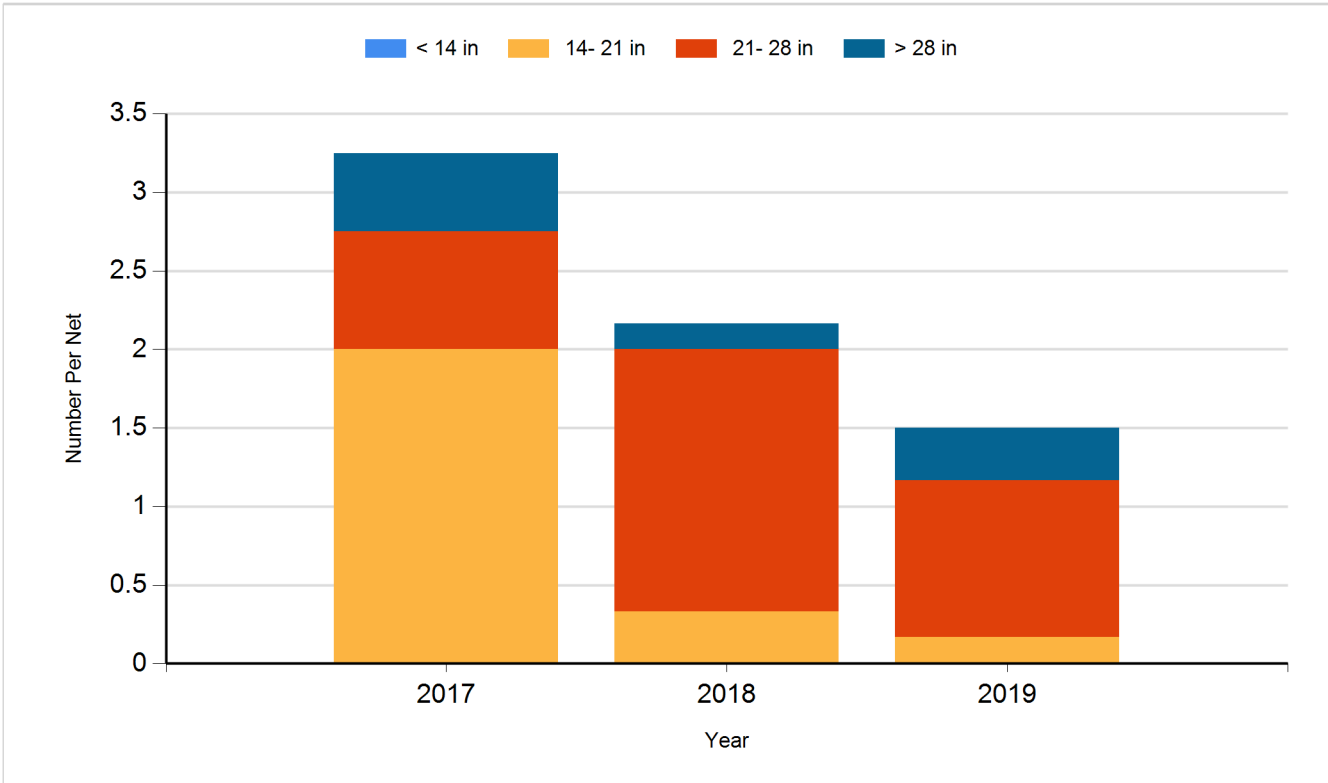
Species: Common Carp  
Gear: AFS std gill net



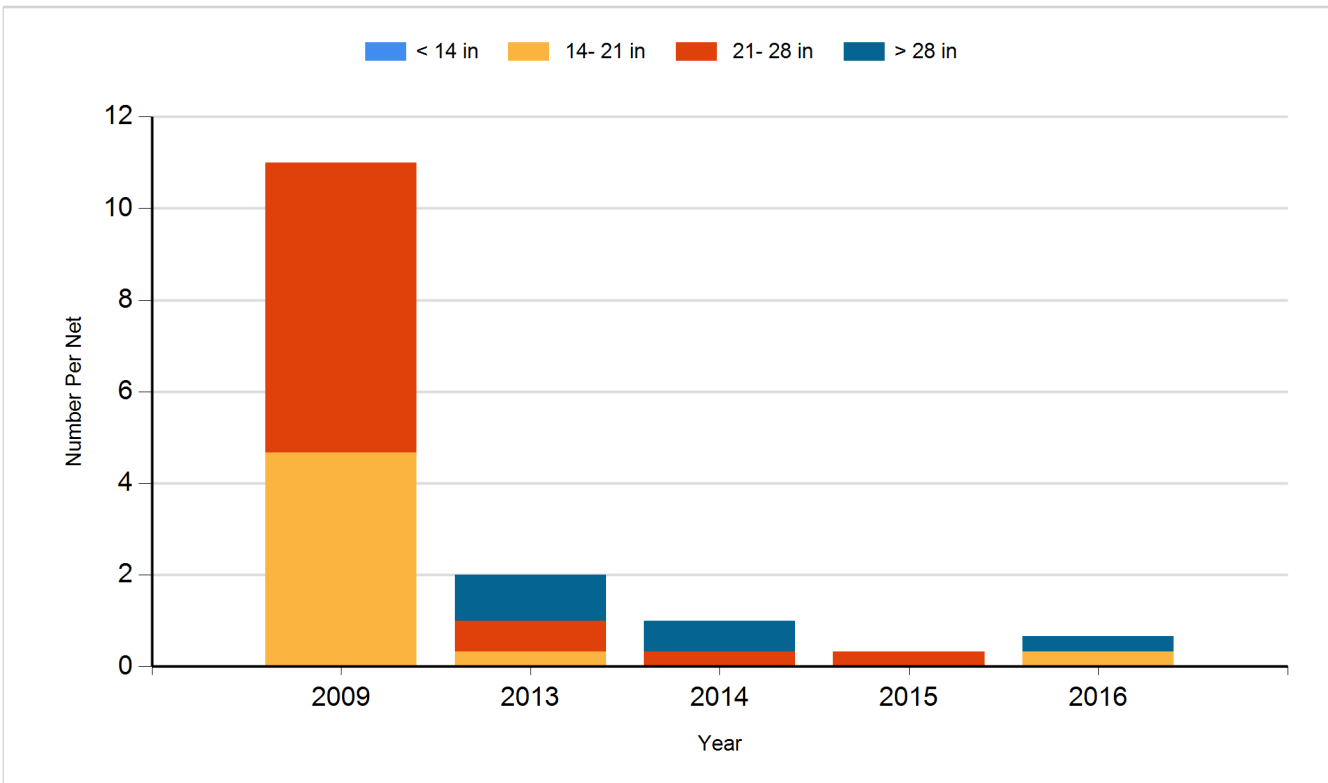
Species: Common Carp  
Gear: std exp gill net



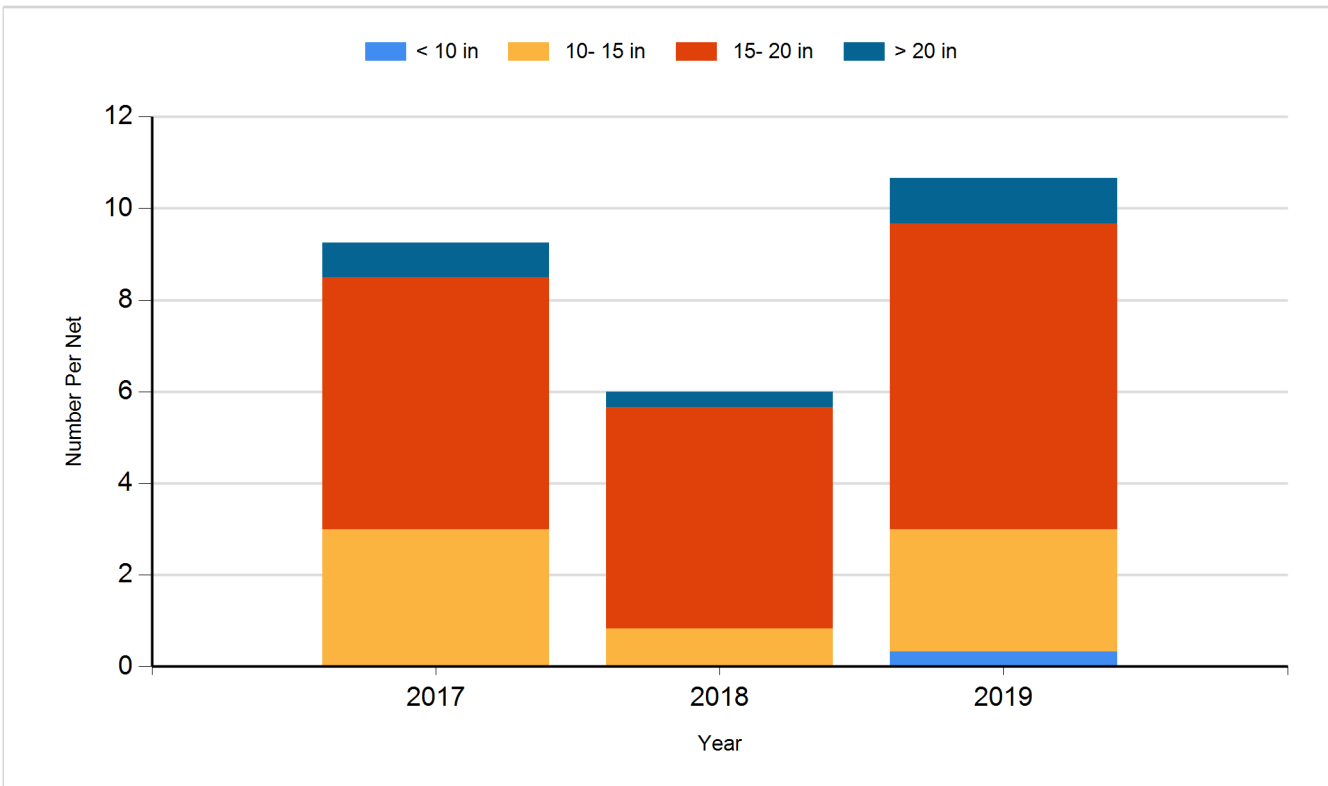
Species: Northern Pike  
Gear: AFS std gill net



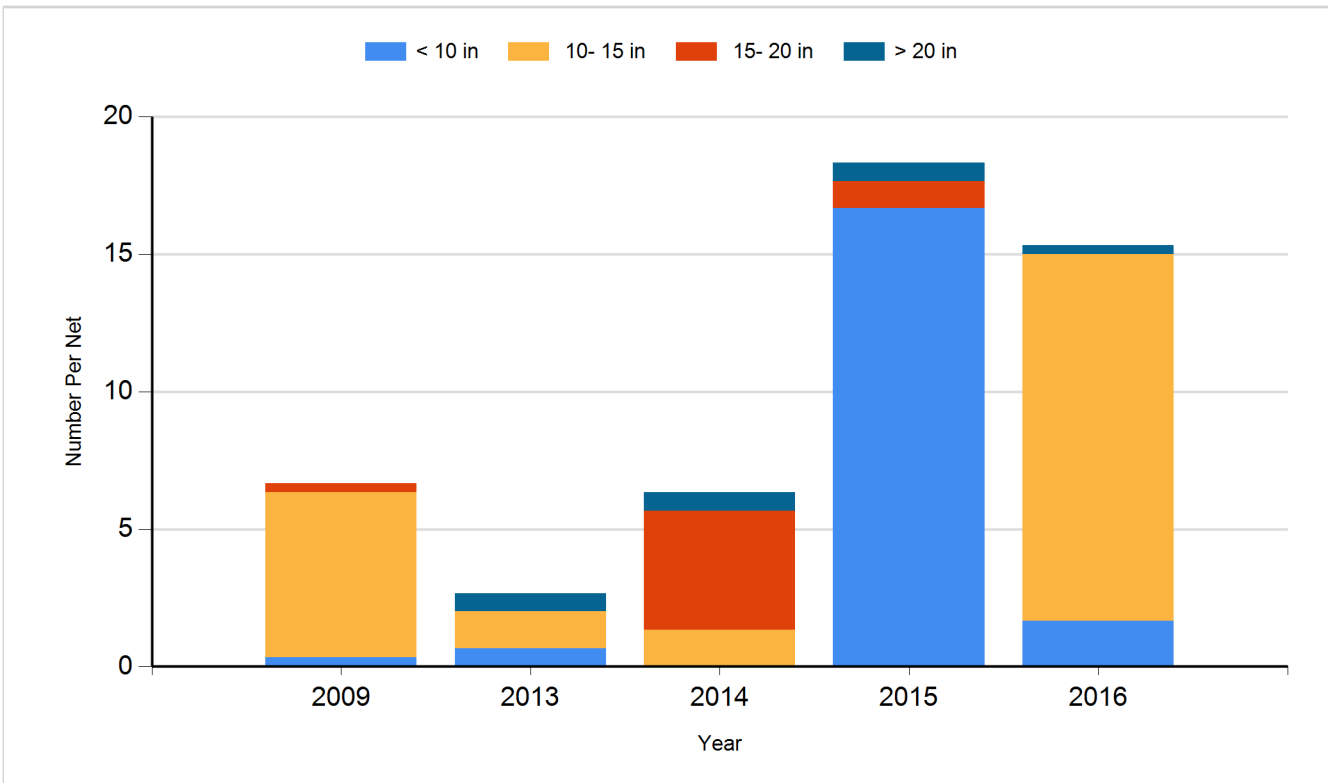
Species: Northern Pike  
Gear: std exp gill net



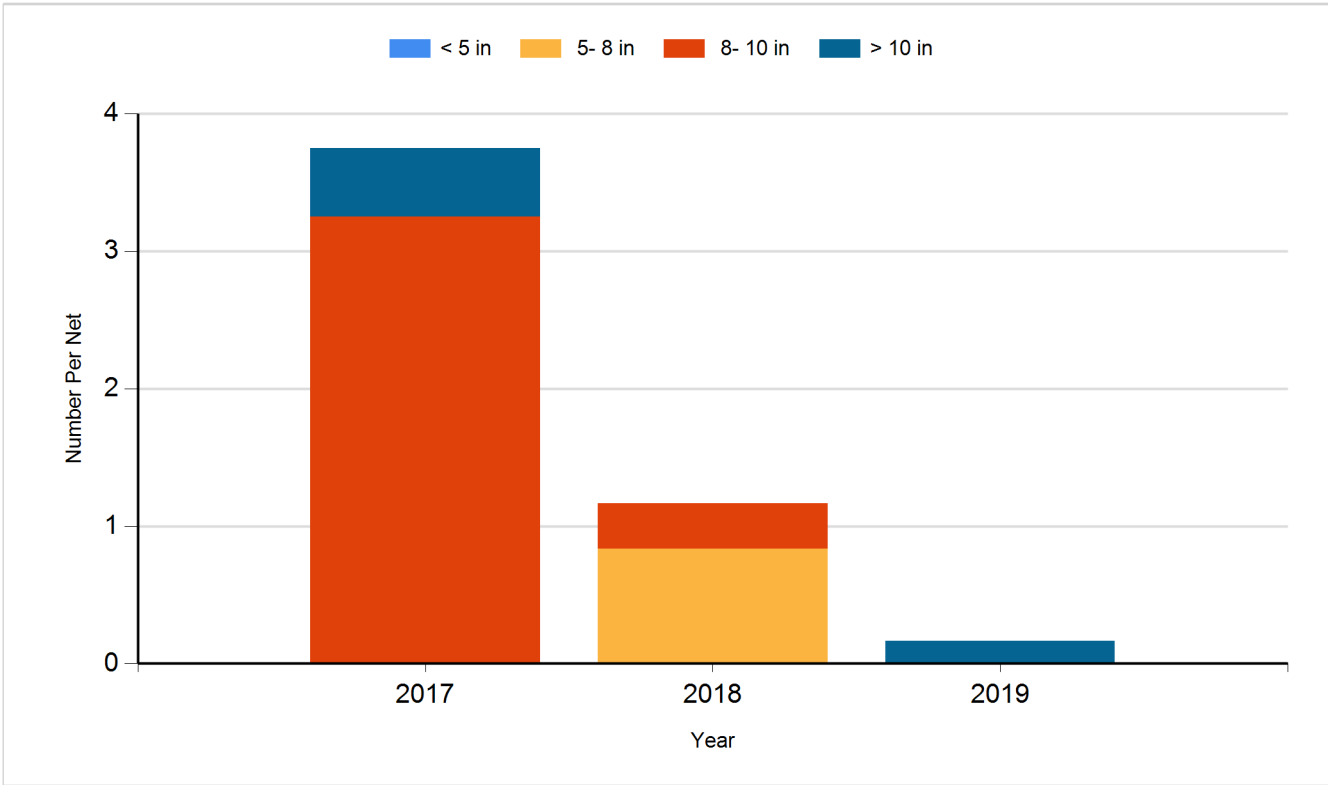
Species: Walleye  
Gear: AFS std gill net



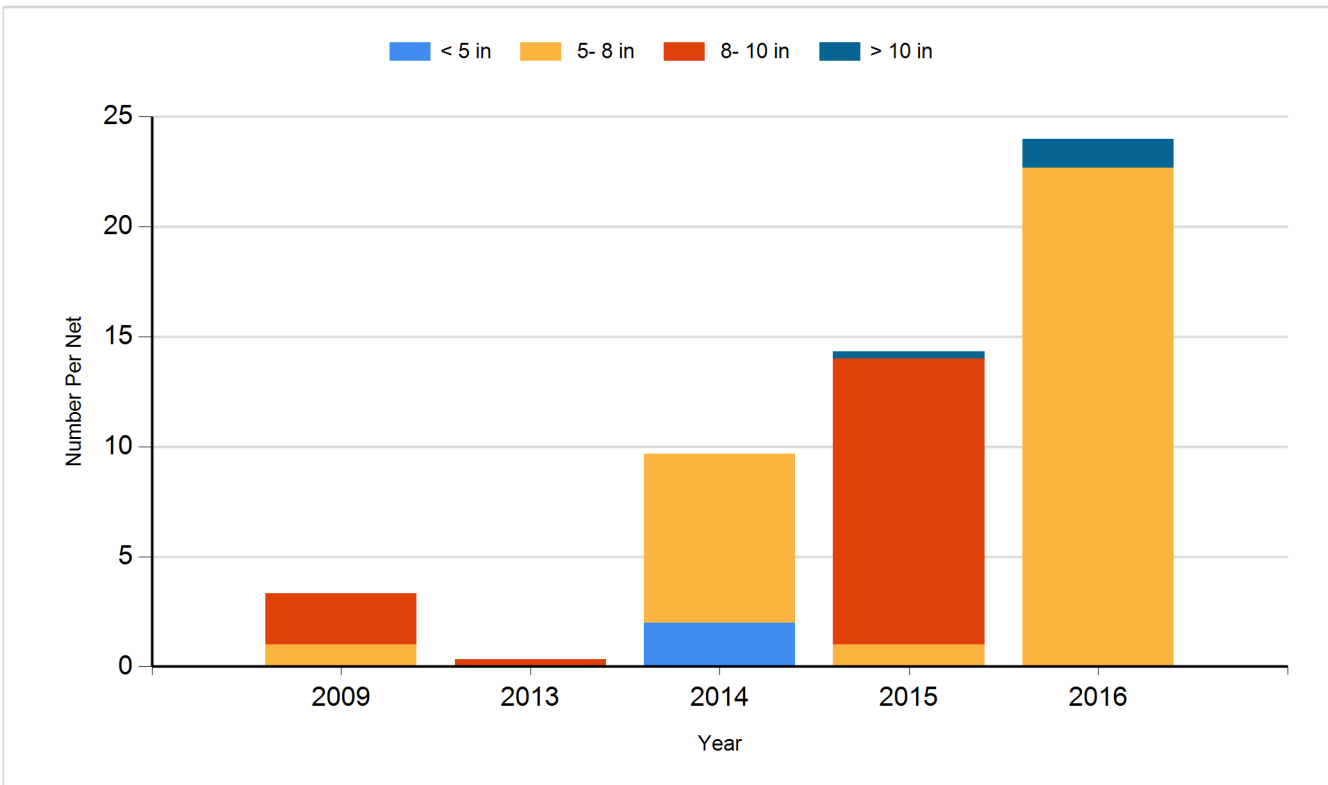
Species: Walleye  
Gear: std exp gill net



Species: Yellow Perch  
Gear: AFS std gill net



Species: Yellow Perch  
Gear: std exp gill net



## **Fish Stocking**

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

Year	Species	Size	Number
2008	Black Crappie	Adult	3,283
2008	Northern Pike	Juvenile	820
2008	Walleye	Fry	300,000
2008	Walleye	Small Fingerling	30,340
2008	Yellow Perch	Fingerling	37,185
2010	Walleye	Juvenile	500
2010	Walleye	Small Fingerling	27,000
2011	Walleye	Small Fingerling	29,900
2012	Walleye	Small Fingerling	60,500
2012	Yellow Perch	Fingerling	54,670
2013	Yellow Perch	Small Fingerling	161,182
2014	Walleye	Fry	300,000
2015	Walleye	Small Fingerling	21,054
2017	Walleye	Fingerling	21,600
2019	Walleye	Small Fingerling	24,025
2019	Yellow Perch	Fry	160,000