SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Beaver, Minnehaha County
LBS-Lake-70-000
2018

Lake Information

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

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	May 22, 2018	6 net-nights
frame net (std 3/4 in)	May 22, 2018	5 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Black Bullhead

Black Crappie

Common Carp

Northern Pike

Green Sunfish

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.
- s**td 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.

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

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)
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**

			Abundance		Stock Density Indices				Condition	
Gear	Species	Sample Size (n)	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	31	5.2	1.9	23	12	3			
	Black Crappie	3	0.5	0.3	33		0		98	4
	Common Carp	50	8.3	2.8	36	10	4			
	Green Sunfish	1	0.2	0.2	0		0			
	Northern Pike	13	2.2	1.0	85		8		82	3
	Walleye	36	6.0	1.5	86	9	6		93	1
	Yellow Perch	7	1.2	0.7	29		0		90	3
frame net (std 3/4 in)	Black Bullhead	1322	238.0	192.1	9	1	4	1		
	Black Crappie	307	61.4	20.1	25	3	2	1	108	2
	Common Carp	17	3.4	1.4	71		53	20		
	Green Sunfish	2	0.4	0.4	100		0			
	Northern Pike	7	1.4	0.9	57		0		91	13
	Walleye	17	3.4	1.5	94		24		93	2
	Yellow Perch	4	0.8	0.9	75		0		92	10

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std frame net	Black Bullhead									24.3		24.3
	Black Crappie									25.0		25.0
	Common Carp									0.0		0.0
	Green Sunfish									0.3		0.3
	Northern Pike									0.3		0.3
	Orangespotted Sunfish									0.0		0.0
	Walleye									1.0		1.0
	Yellow Perch									0.8		0.8
AFS std gill net	Black Bullhead									4.8	5.2	5.0
	Black Crappie									0.0	0.5	0.3
	Common Carp									7.5	8.3	7.9
	Green Sunfish										0.2	0.2
	Northern Pike									3.3	2.2	2.8
	Walleye									9.3	6.0	7.7
	Yellow Perch									3.8	1.2	2.5
frame net (std 3/4 in)	Black Bullhead	35.2				689.3	740.0	72.0	6.2		238.0	296.8
	Black Crappie	7.4				0.3		0.0	0.2		61.4	13.9
	Bluegill	0.1										0.1
	Common Carp						0.2	1.0	10.2		3.4	3.7
	Green Sunfish	0.2									0.4	0.3
	Northern Pike	1.9				0.3	1.0		0.4		1.4	1.0
	Walleye	0.4				0.3	1.0	0.0	1.2		3.4	1.1
	Yellow Perch	0.1						0.2	0.6		0.8	0.4
std exp gill net	Black Bullhead	1.0				129.7	74.0	19.0	7.7			46.3
	Black Crappie	0.3										0.3
	Common Carp							4.0	14.7			9.4
	Northern Pike	11.0				2.0	1.0	0.3	0.7			3.0
	Orangespotted Sunfish							0.0				0.0
	Walleye	6.3				2.0	6.3	1.7	13.7			6.0
	Yellow Perch	3.3				0.3	7.7	14.3	24.0			9.9

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std frame net	Black Bullhead	PSD									19	
		PSD-P									13	
	Black Crappie	PSD									29	
		PSD-P									11	
		Wr									112	
	Common Carp	PSD									0	
		PSD-P									0	
	Green Sunfish	PSD									100	
		PSD-P									0	
	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
		PSD-P									32	3
	Black Crappie	PSD									0	33
		PSD-P									0	0
		Wr										98
	Common Carp	PSD									63	36
		PSD-P									10	4
	Green Sunfish	PSD										0
		PSD-P										0
	Northern Pike	PSD									38	85
		PSD-P									15	8
		Wr									96	82
	Walleye	PSD									68	86
		PSD-P									8	6
		Wr									96	93

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Yellow Perch	PSD									100	29
		PSD-P									13	0
		Wr									86	90
frame net (std 3/4 in)	Black Bullhead	PSD	5				97	100	85	87		9
		PSD-P	2				4	4	65	65		4
		Wr	95				93					
	Black Crappie	PSD	95				100		0	0		25
		PSD-P	53				67		0	0		2
		Wr	106				105			115		108
	Common Carp	PSD						100	0	75		71
		PSD-P						0	0	2		53
		Wr						117				
	Green Sunfish	PSD	100									100
		PSD-P	0									0
		Wr	129									
	Northern Pike	PSD	74				100	100		100		57
		PSD-P	0				33	80		100		0
		Wr	97				77	81		131		91
	Walleye	PSD	25				100	100	0	33		94
		PSD-P	0				0	0	0	17		24
		Wr	97				97	92		89		93
	Yellow Perch	PSD	100						100	33		75
		PSD-P	0						0	33		0
		Wr	110						110	114		92
std exp gill net	Black Bullhead	PSD	67				96	100	88	91		
		PSD-P	0				1	7	65	52		
		Wr	123				97					
	Black Crappie	PSD	100									
		PSD-P	100									
		Wr	104									
	Common Carp	PSD							0	52		
		PSD-P							0	0		
	Northern Pike	PSD	58				83	100	100	50		
		PSD-P	0				50	67	0	50		
		Wr	102				84	90	85	117		
	Walleye	PSD	5				33	79	100	2		

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
std exp gill net	Walleye	PSD-P	0				33	11	40	2		
		Wr	99				89	97	93	91		
	Yellow Perch	PSD	70				100	0	93	6		
		PSD-P	0				0	0	2	6		
		Wr	108				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

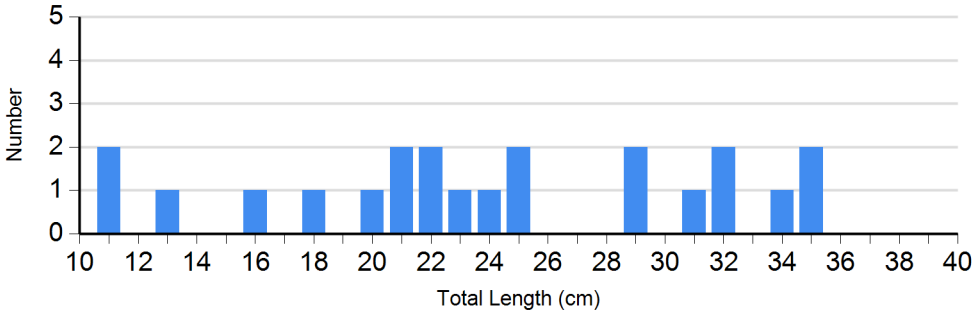
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	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	230	110 (2.5)	71	106 (1.2)	6	93 (0.6)	0	
Northern Pike Gill Net	2014	0		1	94	2	88 (1.1)	0	
	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	
Walleye Gill Net	2014	4	99 (4.1)	13	97 (1.4)	2	95 (1.4)	0	
	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	
Yellow Perch Gill Net	2014	23	99 (2.1)	0		0		0	
	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	

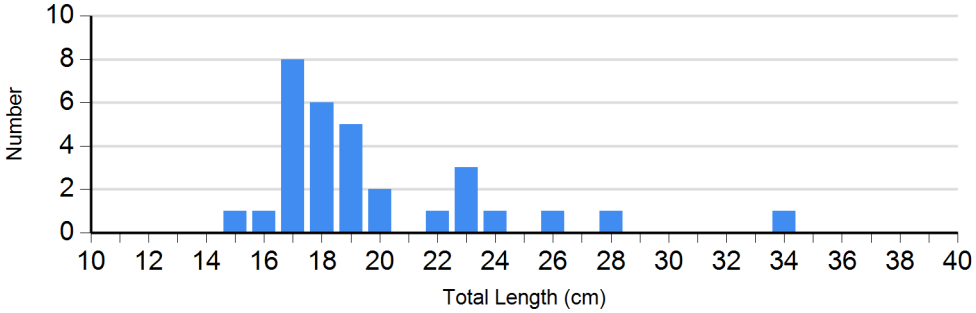
Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Bullhead
Gear: AFS std gill net

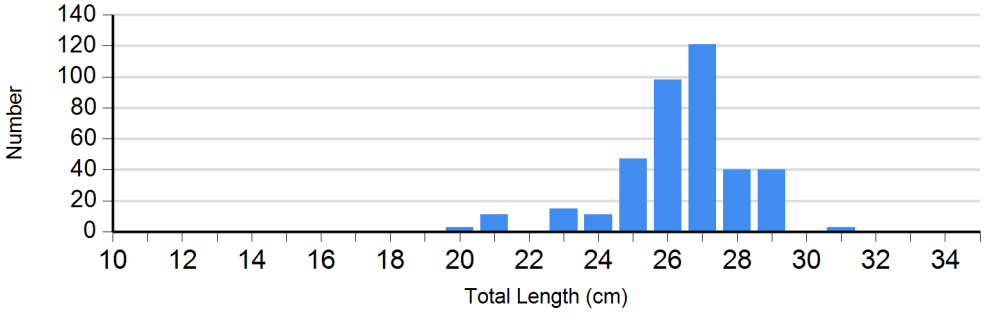


2017

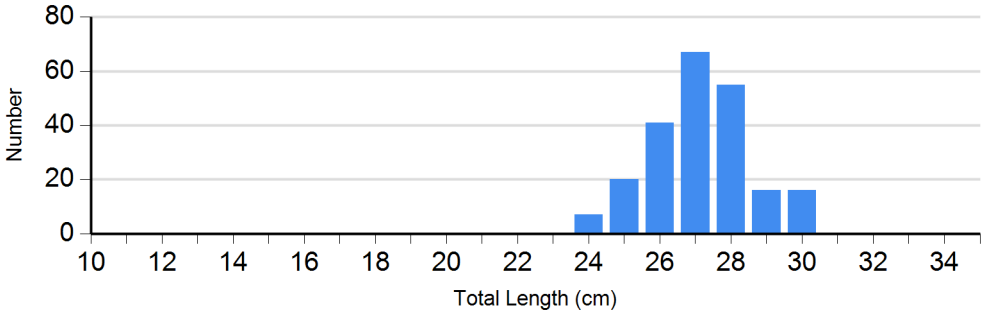


2018

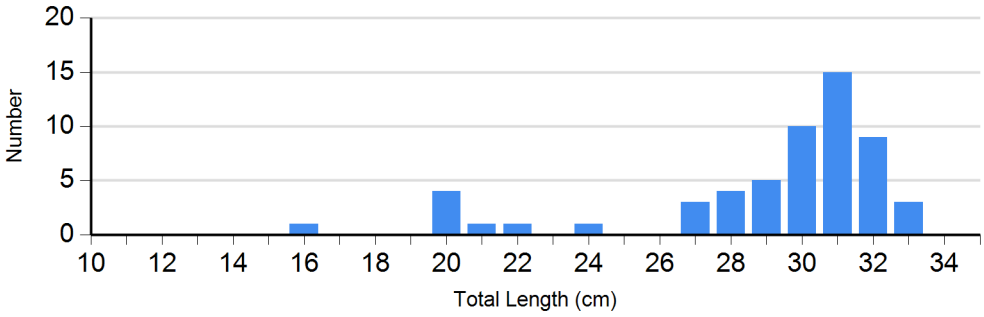
Species: Black Bullhead
Gear: std exp gill net



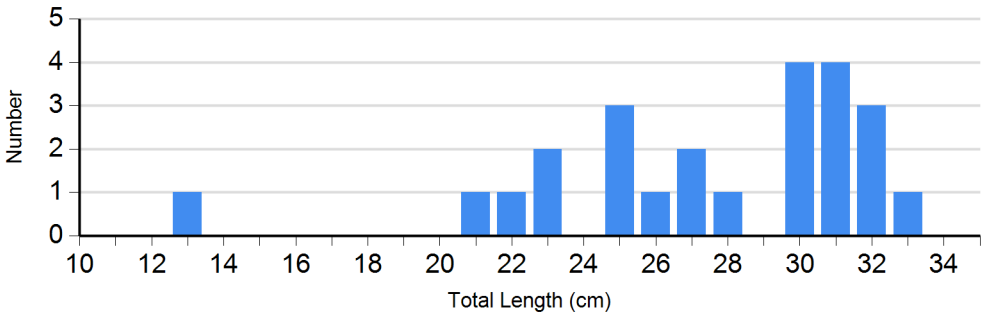
2013



2014

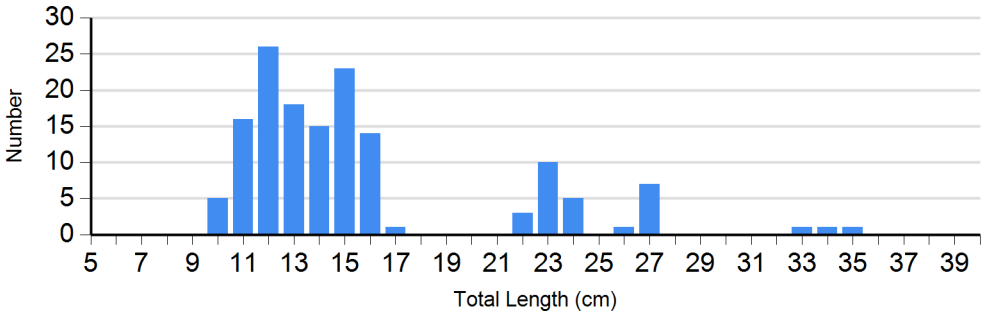


2015



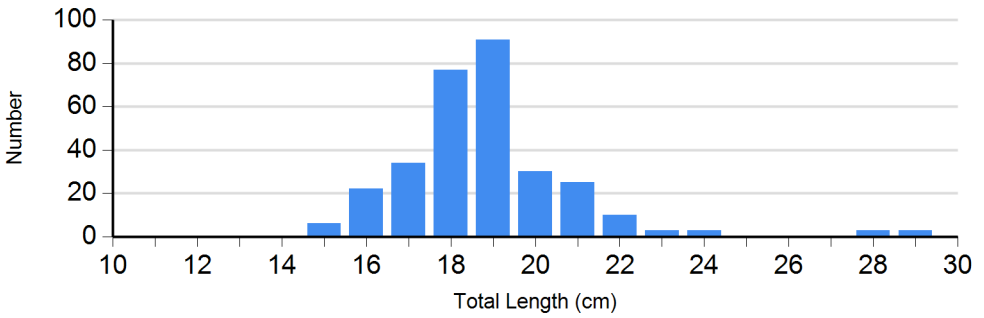
2016

Species: Black Crappie
Gear: AFS std frame net



2017

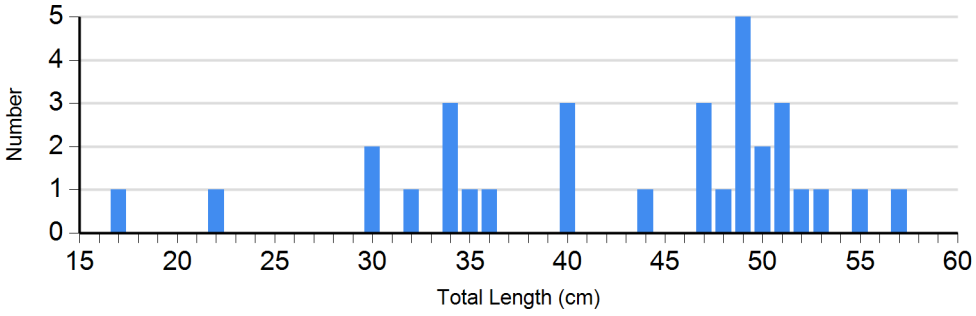
Species: Black Crappie
Gear: frame net (std 3/4 in)



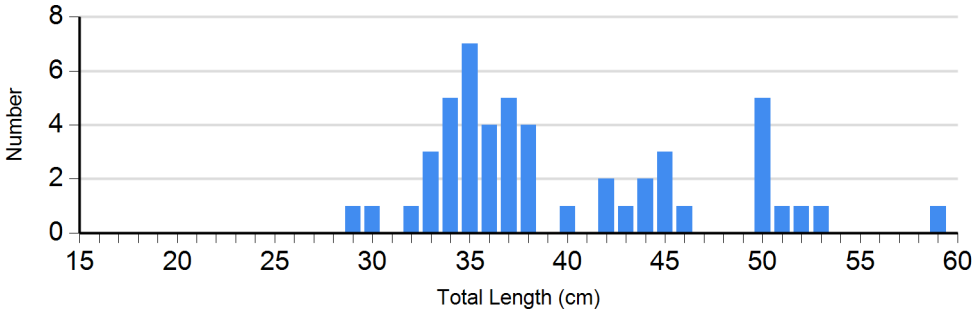
2018

Species: Common Carp
Gear: AFS std gill net

2017

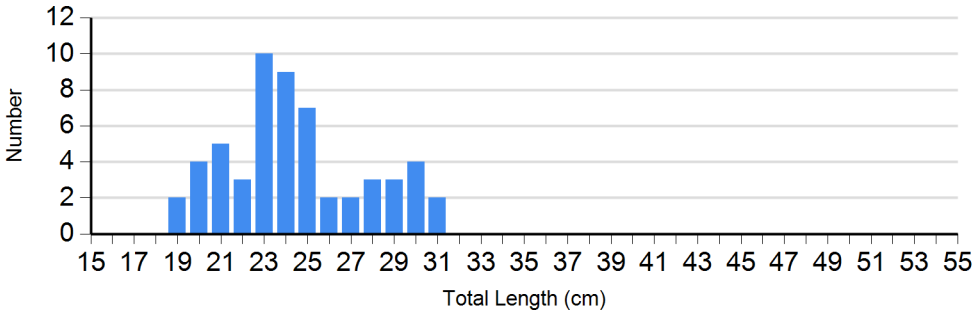


2018



Species: Common Carp
Gear: std exp gill net

2015



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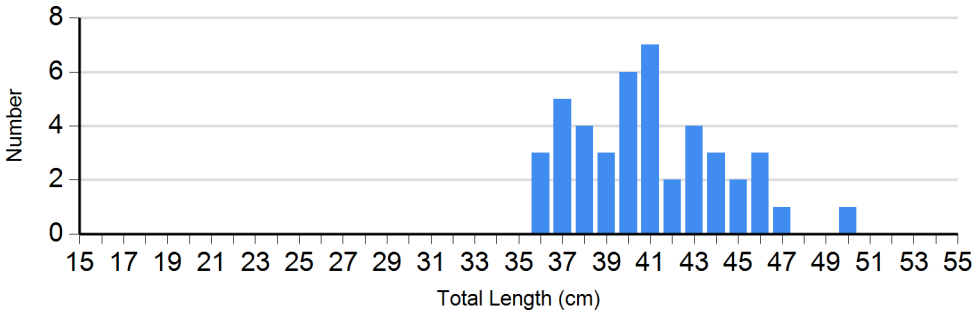
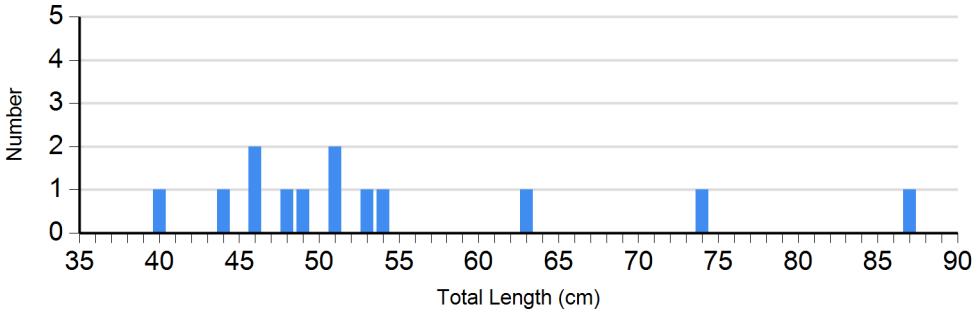
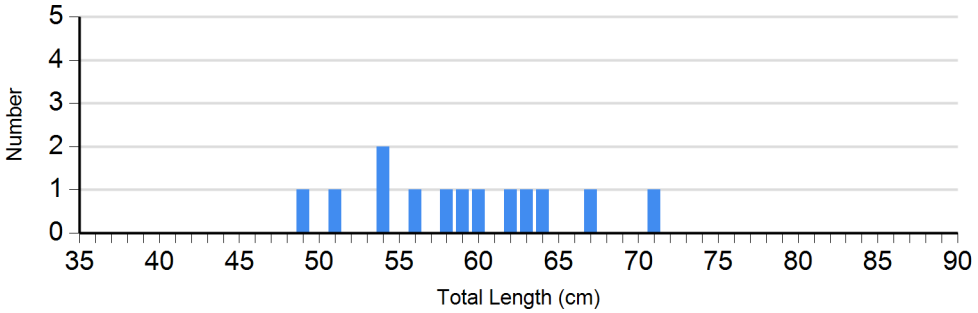


Species: Northern Pike
Gear: AFS std gill net

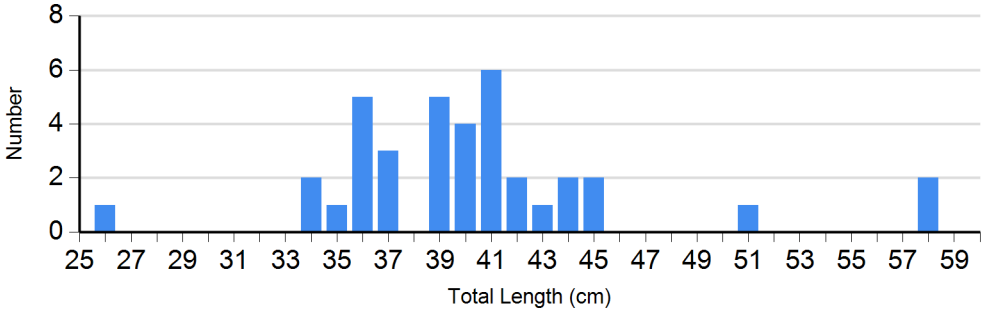


2017



2018

Species: Walleye
Gear: AFS std gill net



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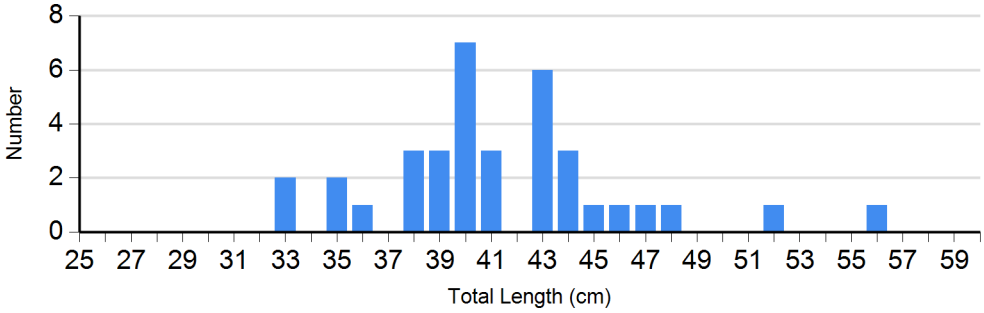
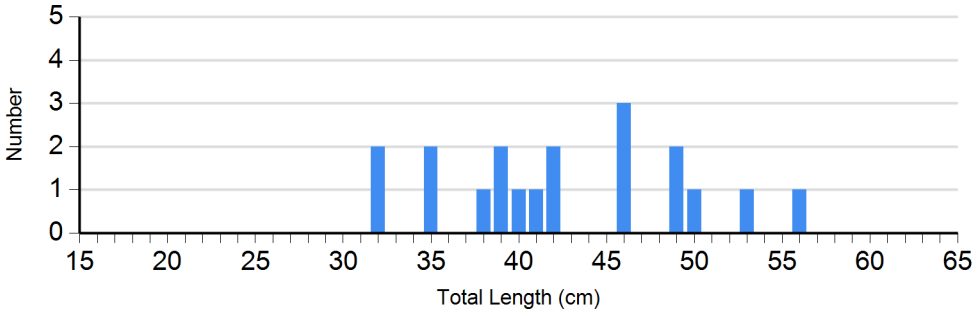


2018

Species: Walleye
Gear: std exp gill net



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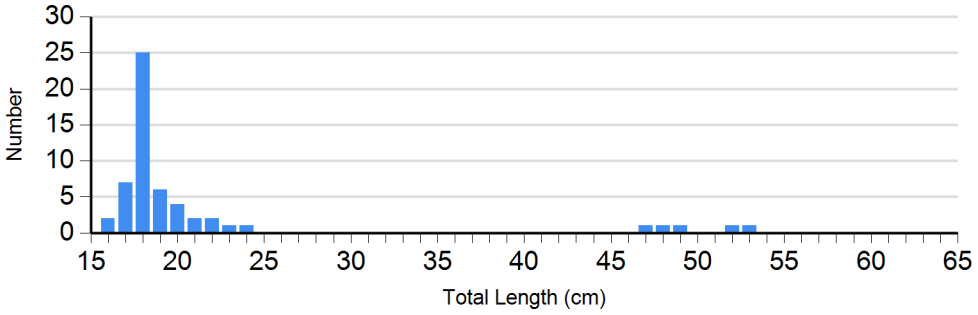

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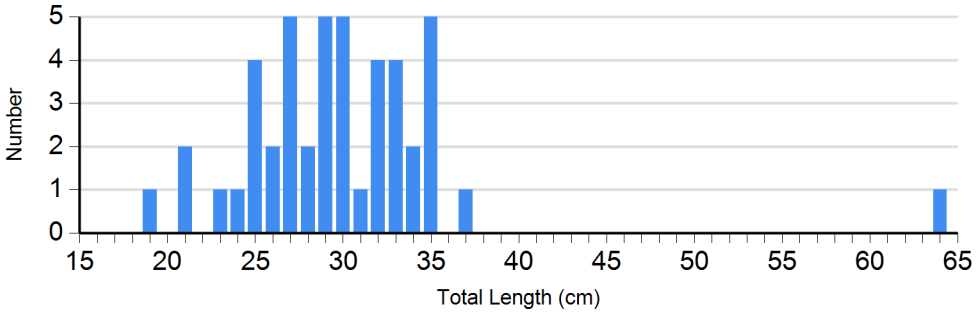
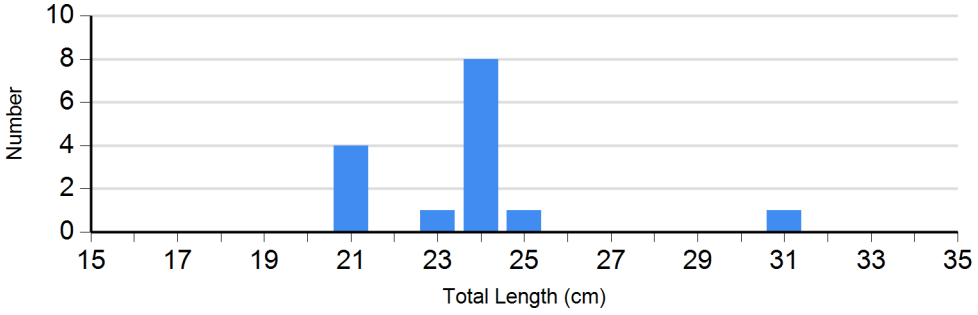


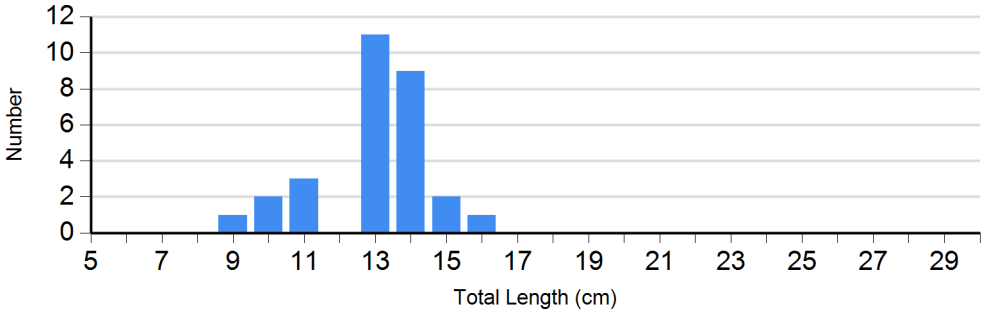
2016

Species: Yellow Perch
Gear: AFS std gill net



2017

Species: Yellow Perch
Gear: std exp gill net



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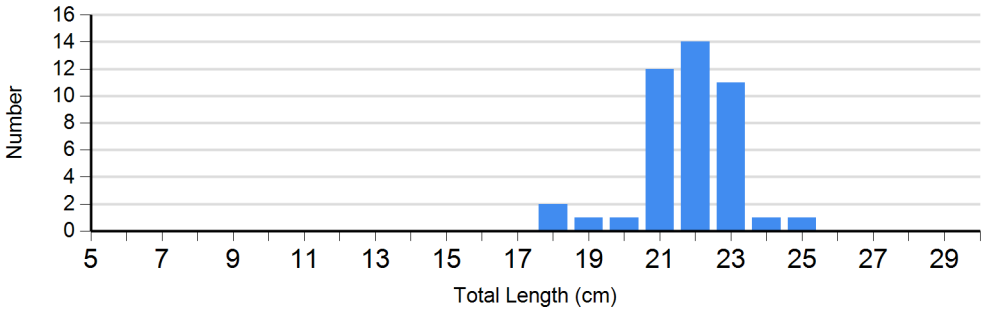

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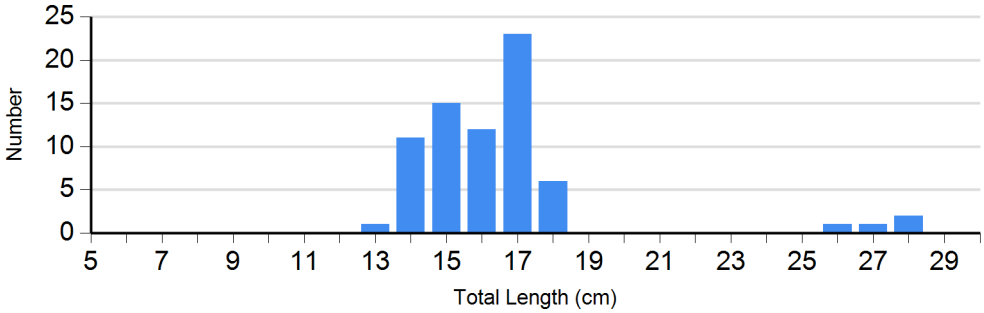
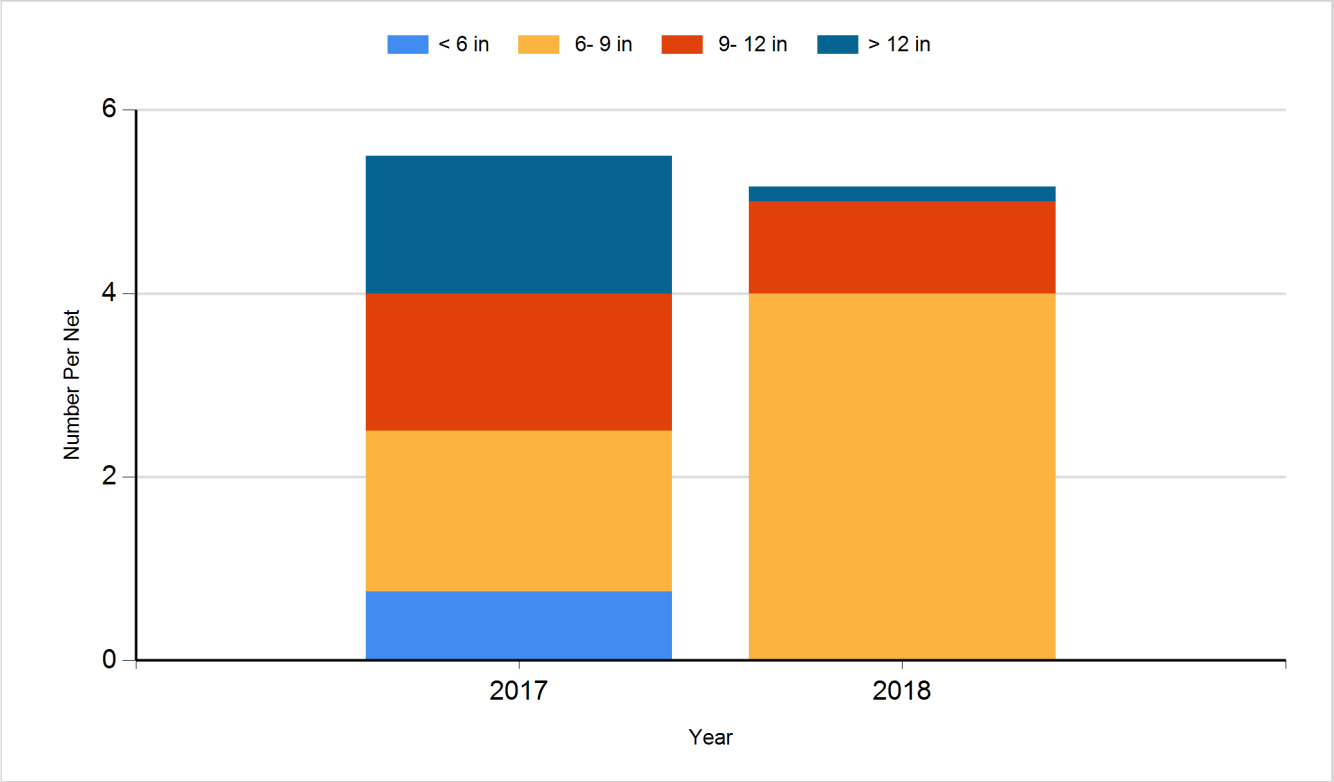


2016

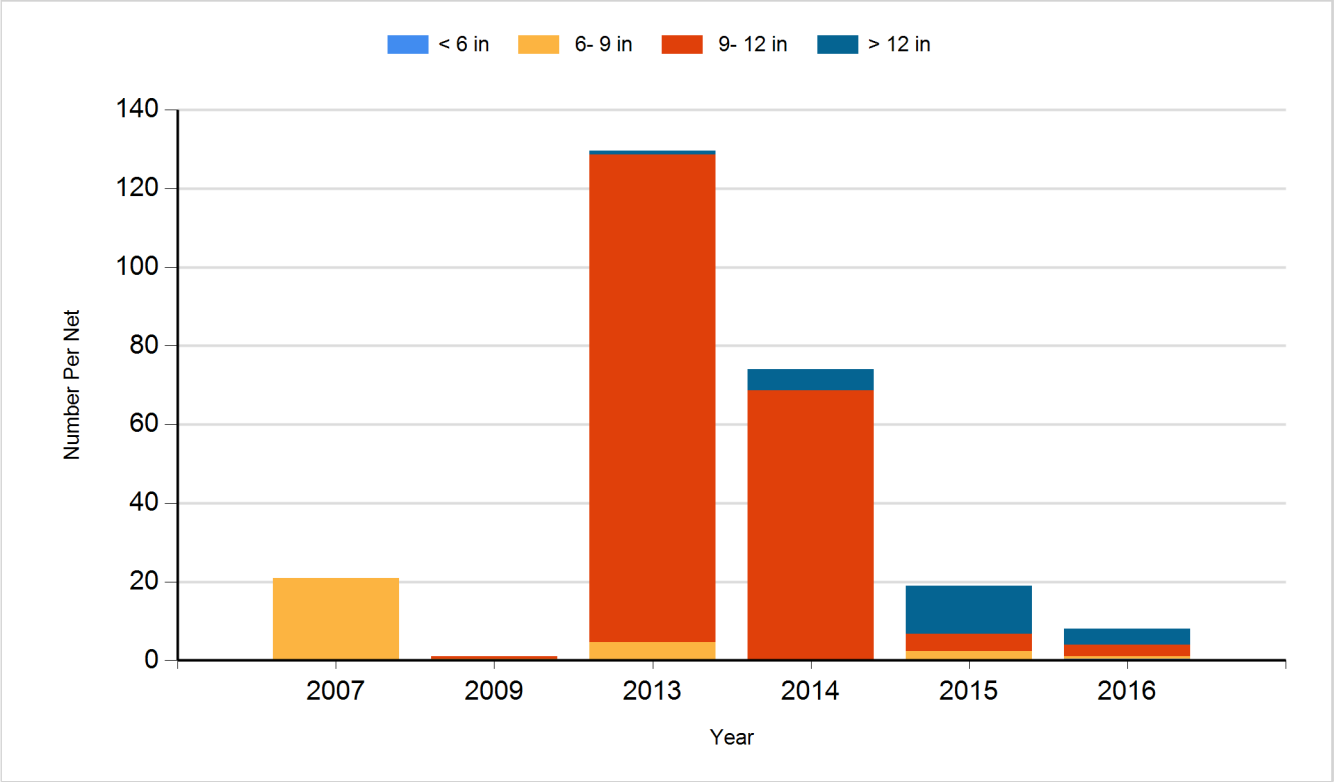
Historic Fish Sizes and Relative Abundance

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

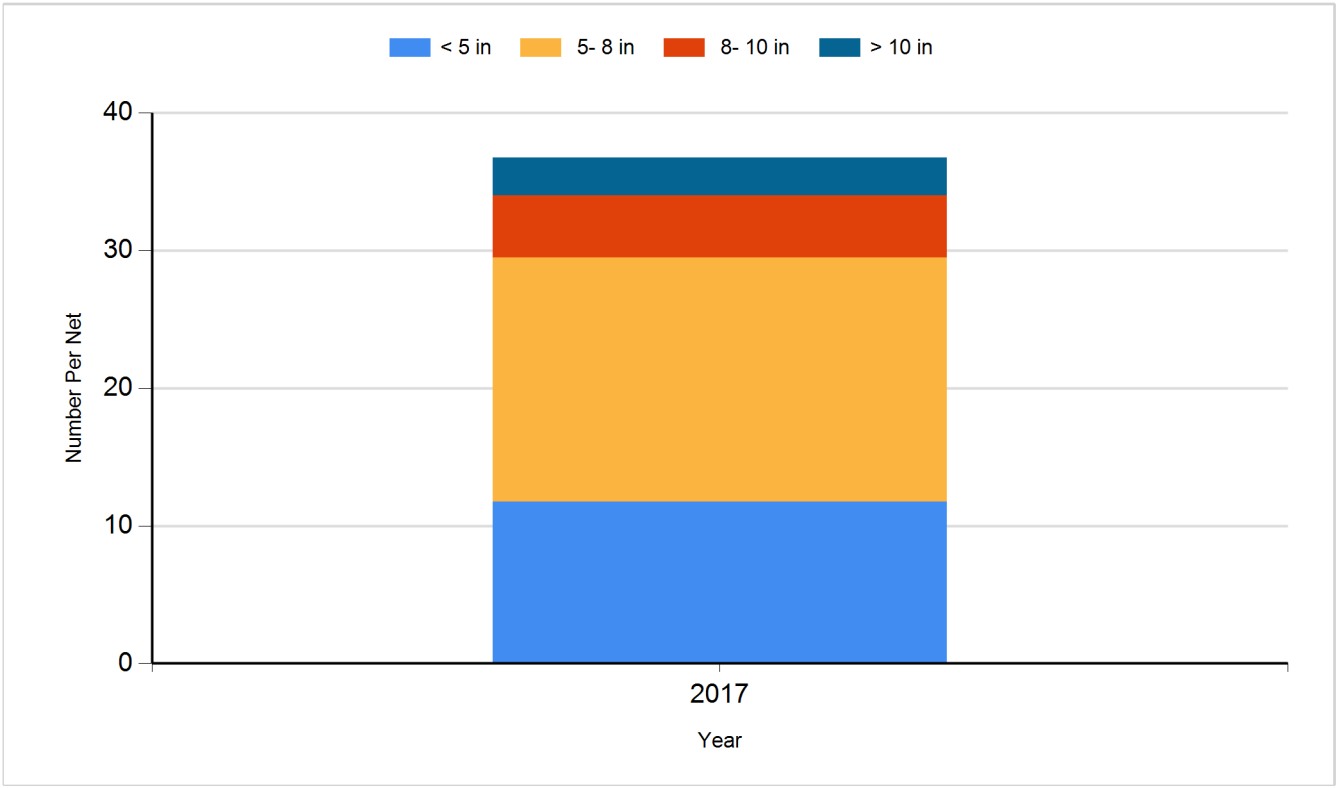
Species: Black Bullhead
Gear: AFS std gill net



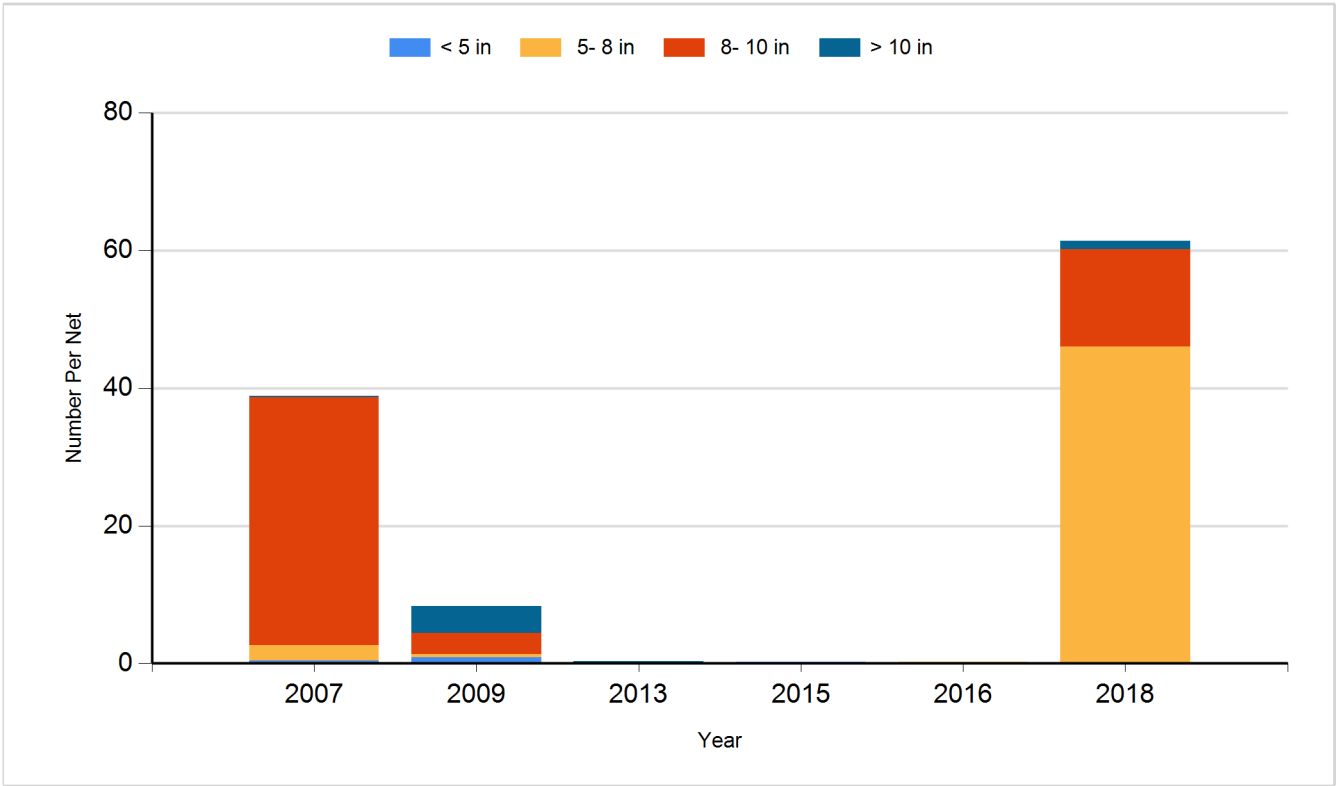
Species: Black Bullhead
Gear: std exp gill net



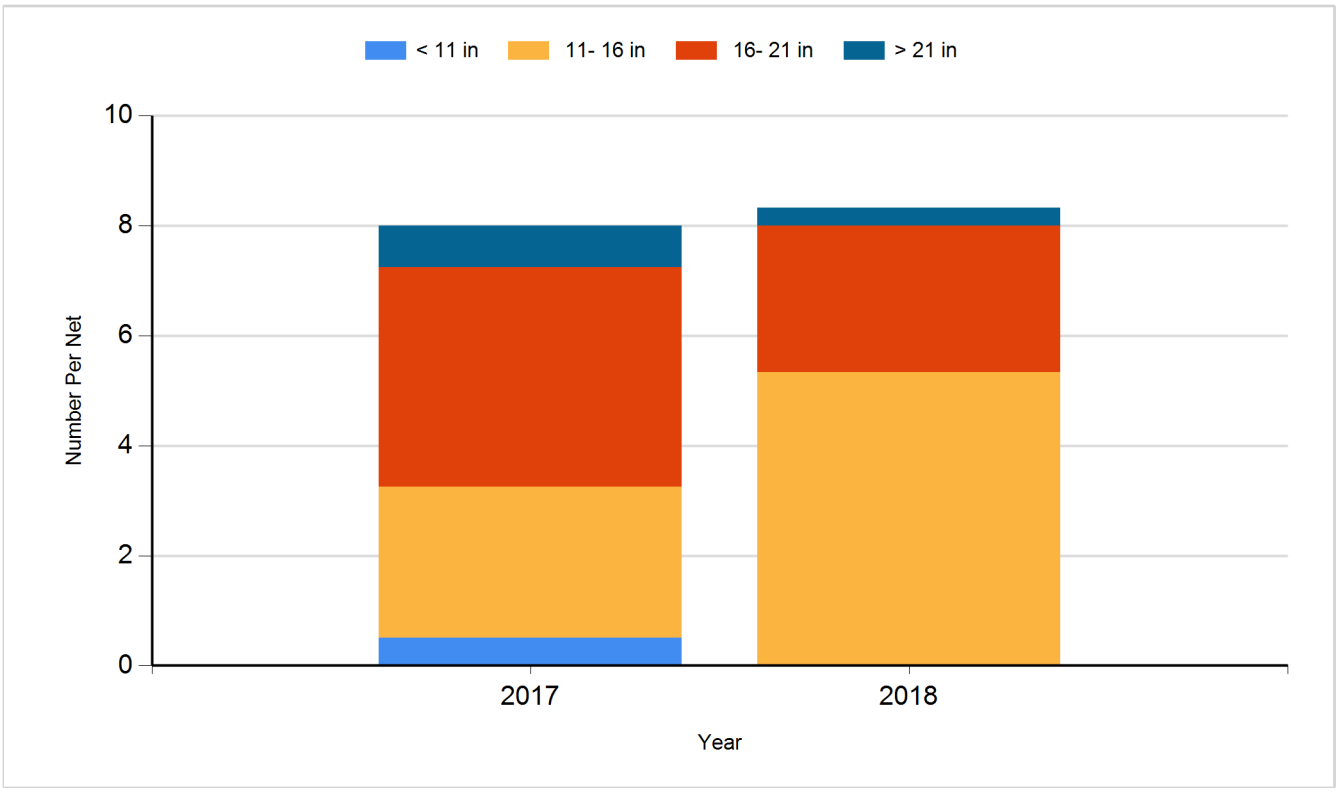
Species: Black Crappie
Gear: AFS std frame net



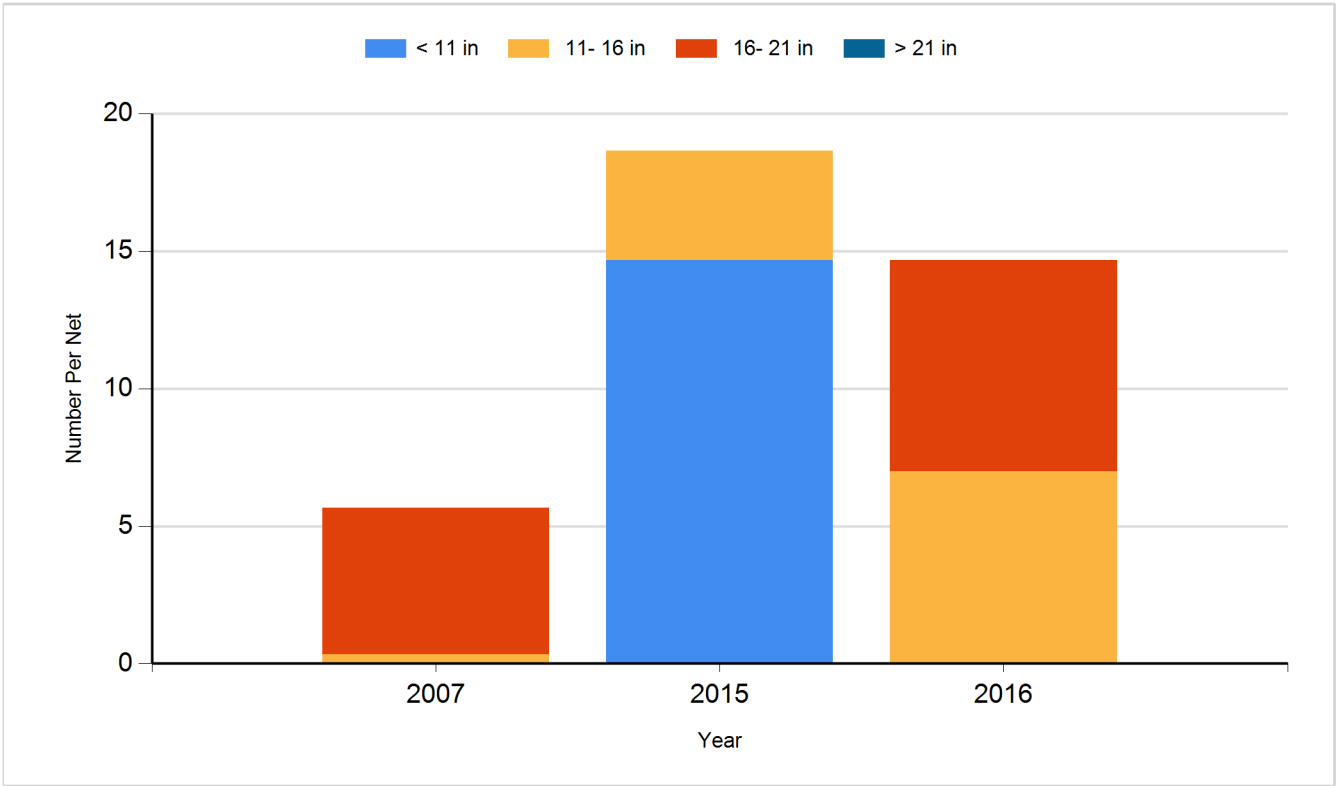
Species: Black Crappie
Gear: frame net (std 3/4 in)



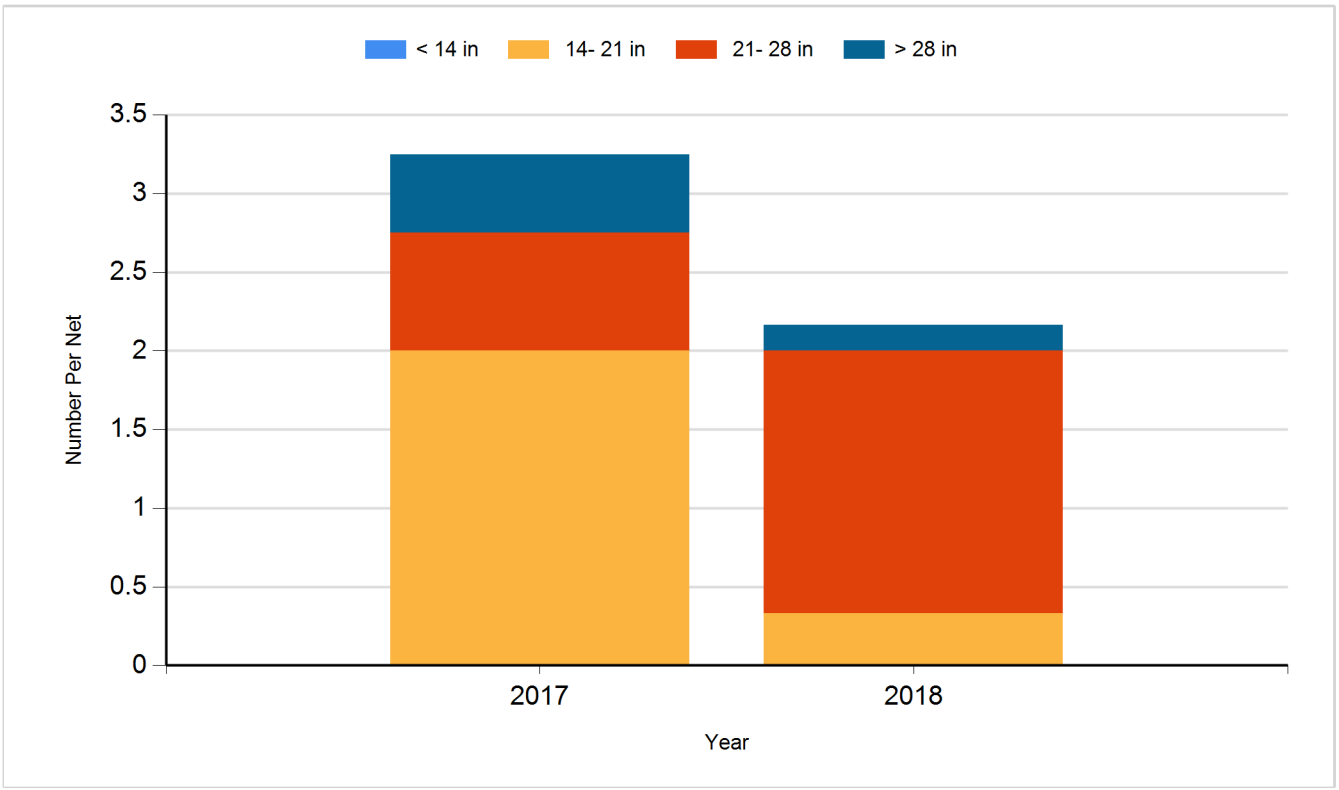
Species: Common Carp
Gear: AFS std gill net



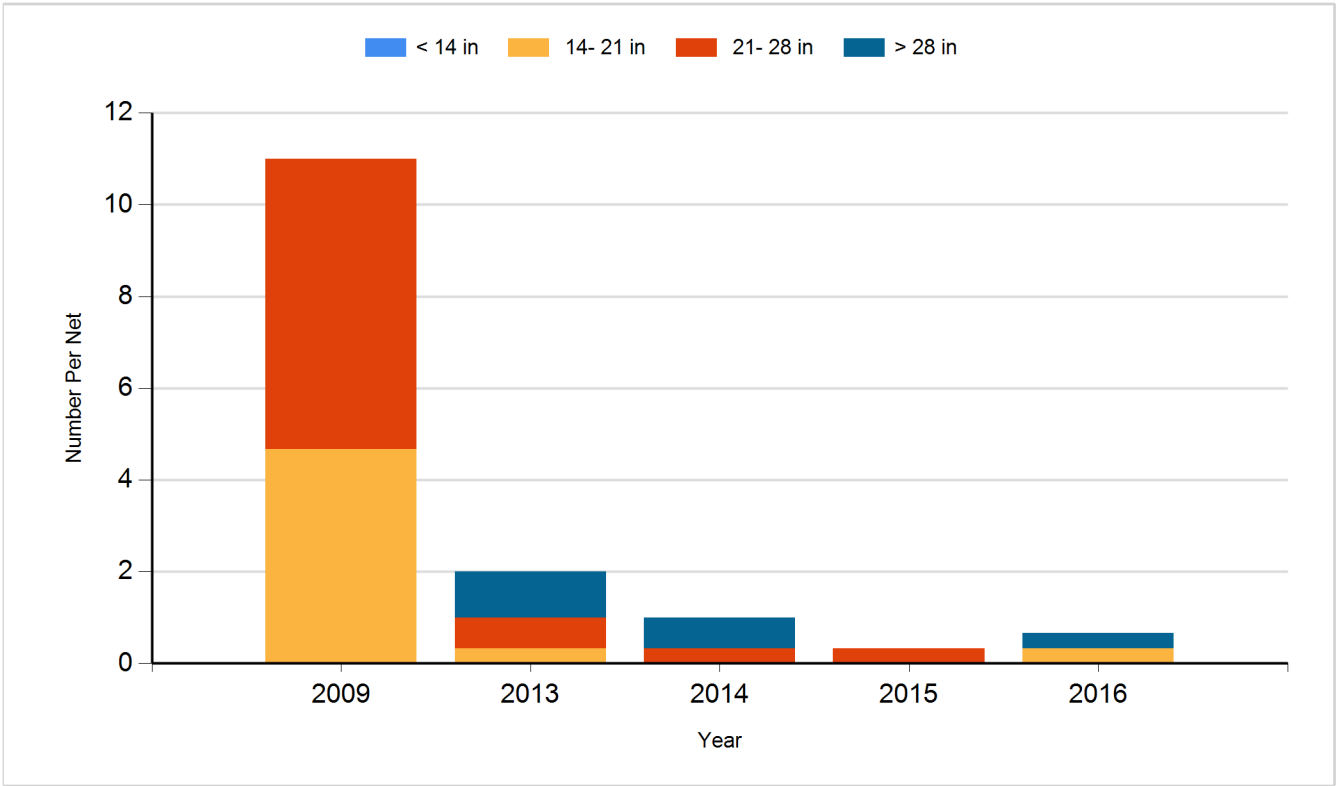
Species: Common Carp
Gear: std exp gill net



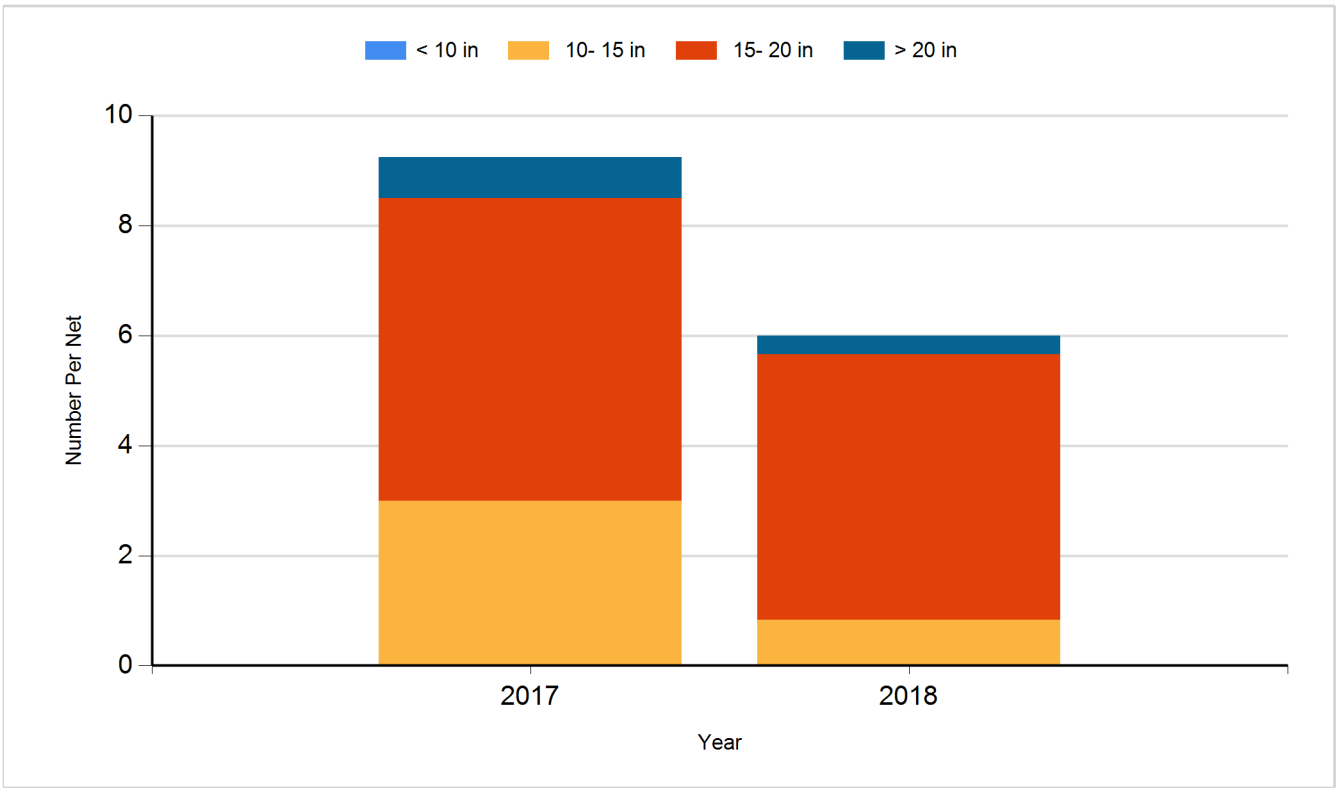
Species: Northern Pike
Gear: AFS std gill net



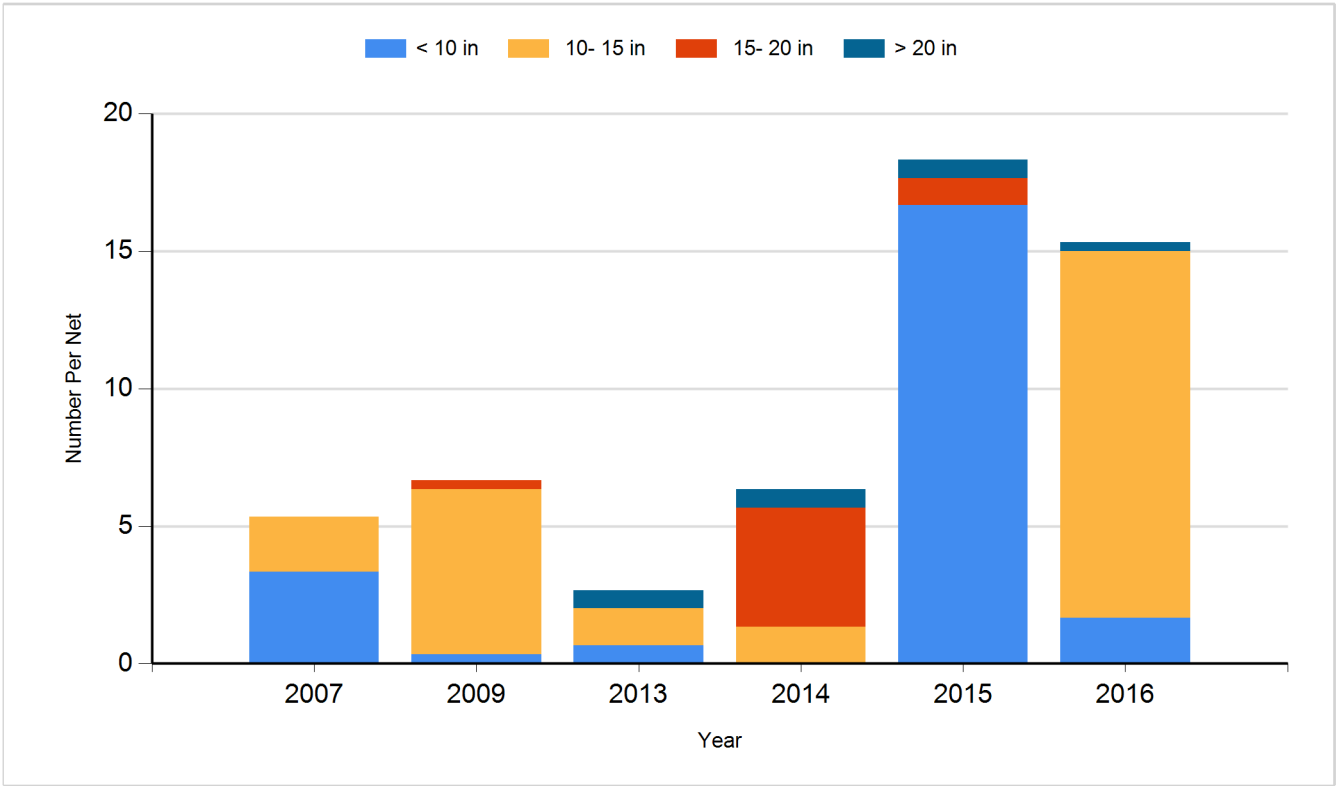
Species: Northern Pike
Gear: std exp gill net



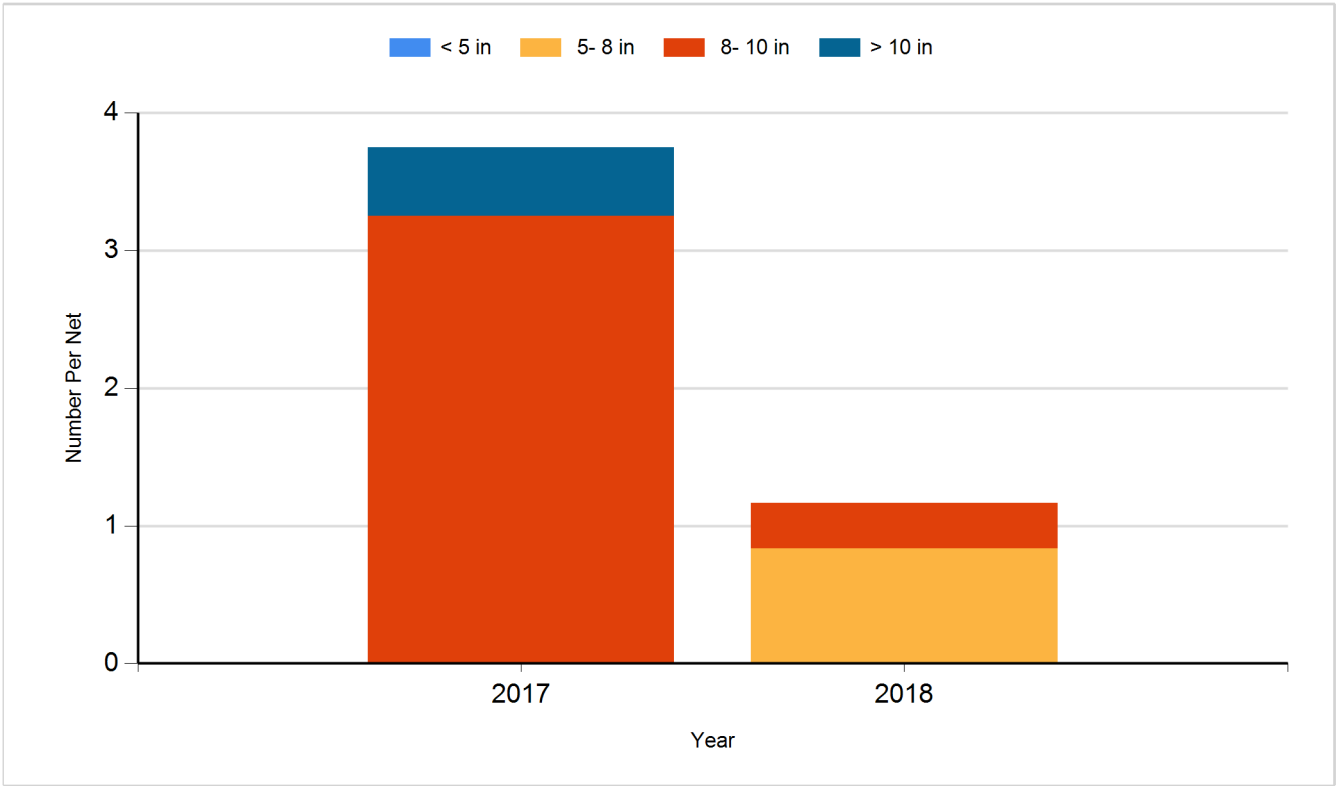
Species: Walleye
Gear: AFS std gill net



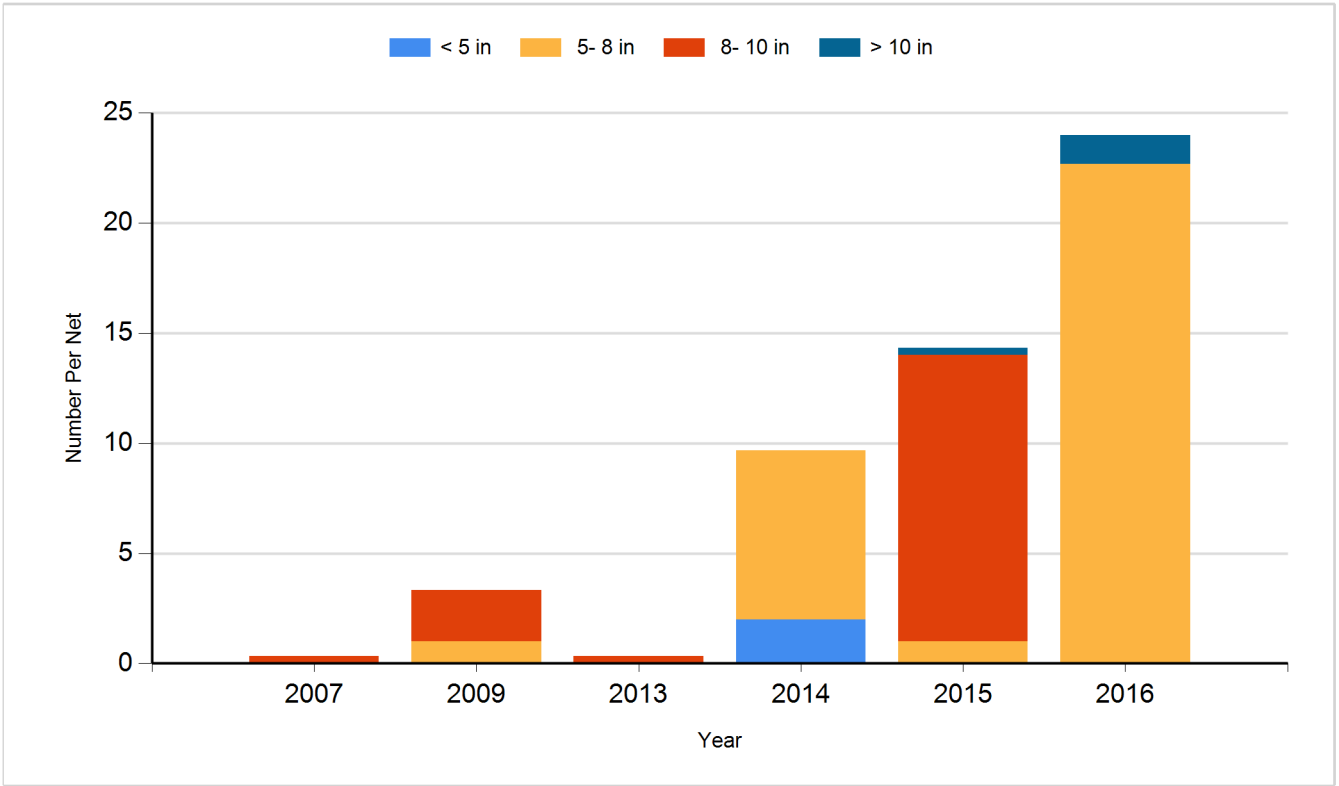
Species: Walleye
Gear: std exp gill net



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
2007	Walleye	Large Fingerling	825
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