SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Gardner, Harding County
SFG-Lake-581-000
2018

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
AFS std gill net	Jul 31, 2018	4 net-nights
boat shocker (day)	Aug 22, 2018	4080 seconds
frame net (std 3/4 in)	May 16, 2018	6 net-nights

Common Fish Species Present

Channel Catfish

Black Crappie

Largemouth Bass

Walleye

Common Carp

Yellow Perch

Northern Pike

Gizzard Shad

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 Crappie	13	3.3	1.8	100		85		84	2
	Channel Catfish	5	1.3	1.2	40		20		87	4
	Common Carp	28	6.5	3.0	96		0		82	2
	Gizzard Shad	1	0.0	0.0	0					
	Northern Pike	3	0.8	0.8	67		33		86	4
	Walleye	11	2.8	0.8	100		82		81	2
	Yellow Perch	7	1.8	1.4	0		0		98	3
boat shocker (day)	Largemouth Bass	11	9.6	3.6	82		0		110	5
	Walleye*	19	16.9	13.9	22		22		95	2
frame net (std 3/4 in)	Black Crappie	102	17.0	5.2	94	4	18	6	88	1
	Channel Catfish	1	0.2	0.2	0		0		89	
	Common Carp	2	0.3	0.3	50		0		89	1
	Northern Pike	8	1.3	0.7	25		0		85	5
	Walleye	9	1.5	1.1	100		78		80	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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std frame net	Black Crappie									33.0		33.0
	Northern Pike									0.2		0.2
	Yellow Perch									0.2		0.2
AFS std gill net	Black Crappie									32.5	3.3	17.9
	Channel Catfish									5.5	1.3	3.4
	Common Carp									11.0	6.5	8.8
	Gizzard Shad										0.0	0.0
	Northern Pike									2.0	0.8	1.4
	Walleye									5.0	2.8	3.9
	Yellow Perch									1.0	1.8	1.4
boat shocker (day)	Largemouth Bass			4.0				61.2			9.6	24.9
	Walleye			8.9							16.9	12.9
frame net (std 3/4 in)	Black Bullhead			0.0								0.0
	Black Crappie	4.3		86.8		165.5		24.4	138.8		17.0	72.8
	Channel Catfish	0.9		2.0							0.2	1.0
	Common Carp	0.3		0.3				0.1			0.3	0.3
	Northern Pike	0.3		0.2		0.7		0.3	0.2		1.3	0.5
	Walleye	2.1		2.5		1.8		1.1			1.5	1.8
	White Sucker	0.4										0.4
	Yellow Perch	0.6		0.8				0.3	0.2			0.5
std exp gill net	Black Crappie	0.0		4.0		3.0		7.0	11.0			5.0
	Channel Catfish	2.5		2.5		1.5			1.0			1.9
	Common Carp	1.0		2.0		10.0		4.0	10.5			5.5
	Gizzard Shad								0.0			0.0
	Largemouth Bass								2.0			2.0
	Northern Pike					3.0		4.0	20.0			9.0
	Spottail Shiner			0.0		0.0		0.0	0.0			0.0
	Walleye	8.0		5.0		4.0		2.0	7.0			5.2
	Yellow Perch			6.0				9.5	15.0			10.2

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.

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std frame net	Black Crappie	PSD									96	
		PSD-P									70	
		Wr									94	
	Northern Pike	PSD									0	
		PSD-P									0	
		Wr									87	
	Yellow Perch	PSD									100	
		PSD-P									0	
		Wr									88	
AFS std gill net	Black Crappie	PSD									97	100
		PSD-P									63	85
		Wr									93	84
	Channel Catfish	PSD									27	40
		PSD-P									0	20
		Wr									89	87
	Common Carp	PSD									64	96
		PSD-P									0	0
		Wr									87	82
	Gizzard Shad	PSD										0
	Northern Pike	PSD									75	67
		PSD-P									25	33
		Wr									84	86
	Walleye	PSD									90	100
		PSD-P									20	82
		Wr									83	81
	Yellow Perch	PSD									0	0
		PSD-P									0	0
		Wr									82	98
boat shocker (day)	Largemouth Bass	PSD			25				12			82
		PSD-P			0				6			0
		Wr			123				121			110
	Walleye	PSD			100							22

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
boat shocker (day)	Walleye	PSD-P			67							22
		Wr			86							95
frame net (std 3/4 in)	Black Crappie	PSD	90		0		88		66	99		94
		PSD-P	30		0		0		7	61		18
		Wr	97		104		98		101	106		88
	Channel Catfish	PSD	100		0							0
		PSD-P	0		0							0
		Wr	88		86							89
	Common Carp	PSD	50		0				100			50
		PSD-P	0		0				0			0
		Wr	69		85				89			89
	Northern Pike	PSD	0		100		75		0	100		25
		PSD-P	0		0		25		0	100		0
		Wr	92		73		86		119	107		85
	Walleye	PSD	53		13		82		64			100
		PSD-P	13		0		45		9			78
		Wr	89		84		78		79			80
	Yellow Perch	PSD	50		0				0	100		
		PSD-P	25		0				0	0		
		Wr	85		95				98			
std exp gill net	Black Crappie	PSD	0		0		67		21	77		
		PSD-P	0		0		0		0	64		
		Wr			103		107		108	102		
	Channel Catfish	PSD	100		0		100			0		
		PSD-P	20		0		67			0		
		Wr	92		87		78			92		
	Common Carp	PSD	100		75		80		88	38		
		PSD-P	0		0		0		0	0		
		Wr	67		71		86		91	91		
	Gizzard Shad	PSD								0		
	Largemouth Bass	PSD								0		
		PSD-P								0		
		Wr								112		
	Northern Pike	PSD					100		13	18		
		PSD-P					83		0	5		
		Wr					92		86	85		

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
std exp gill net	Walleye	PSD	13		60		63		50	86		
		PSD-P	0		20		13		25	7		
		Wr	85		79		82		76	88		
	Yellow Perch	PSD			0				32	30		
		PSD-P			0				0	0		
		Wr			93				106	95		

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: Largemouth Bass

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2015	122	211 (71)	276 (37)	305 (10)			409 (4)				

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	8				454 (2)			526 (2)	551 (2)		667 (2)
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)								

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).

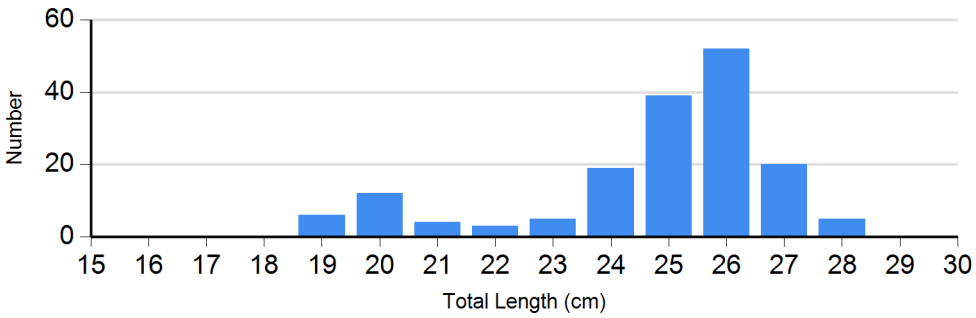
		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2015	164	111 (2.0)	292	96 (0.5)	32	91 (0.7)	0	
	2016	18	104 (1.5)	522	108 (0.4)	848	106 (0.3)	0	
	2017	6	97 (6.3)	43	98 (1.0)	116	92 (0.5)	0	
	2018	6	92 (0.8)	78	88 (0.4)	18	86 (1.1)	0	
Channel Catfish Gill Net	2016	4	92 (0.7)	0		0		0	
	2017	8	86 (2.1)	3	98 (4.7)	0		0	
	2018	3	90 (3.7)	1	79	1	87	0	
Common Carp Gill Net	2015	2	113 (0.0)	14	88 (2.3)	0		0	
	2016	26	91 (1.3)	16		0		0	
	2017	8	92 (2.5)	14	84 (1.6)	0		0	
	2018	1	79	25	83 (1.4)	0		0	
Largemouth Bass Electro Fishing	2015	90	121 (0.6)	6	124 (3.6)	6	122 (2.9)	0	
	2018	2	110 (0.6)	9	110 (4.5)	0		0	
Northern Pike Gill Net	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)
	2017	1	94	2	82 (0.3)	1	77	0	
	2018	1	88	1	81	1	90	0	
Walleye Gill Net	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	
	2017	1	80	7	85 (2.1)	2	79 (2.1)	0	
	2018	0		2	81 (0.4)	8	81 (1.7)	1	85
Yellow Perch Gill Net	2015	26	110 (1.5)	12	99 (1.6)	0		0	

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Yellow Perch Gill Net	2016	42	101 (6.2)	18	83 (2.4)	0		0	
	2017	2	82 (8.8)	0		0		0	
	2018	7	98 (2.1)	0		0		0	

Length Frequency Distribution

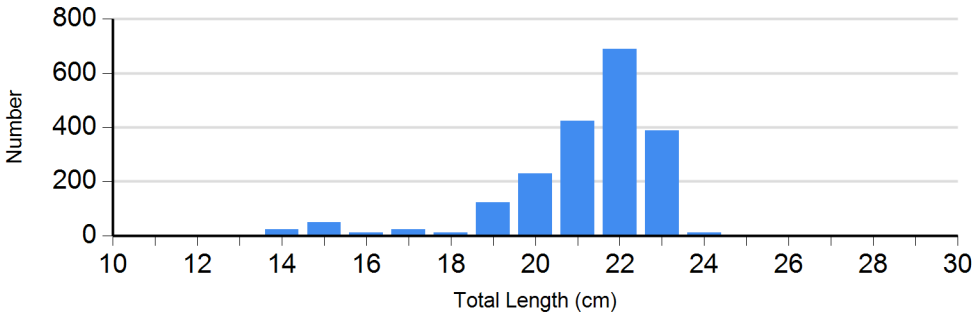
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net

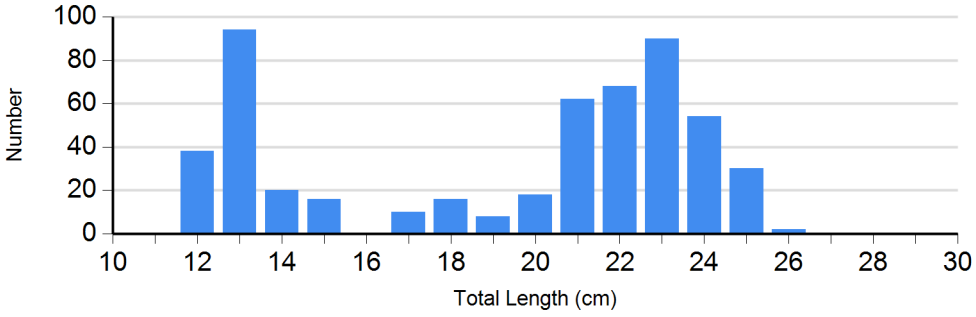


2017

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



2013



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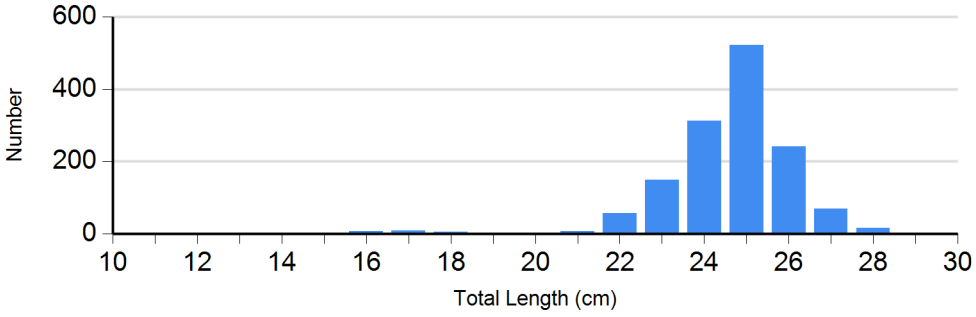

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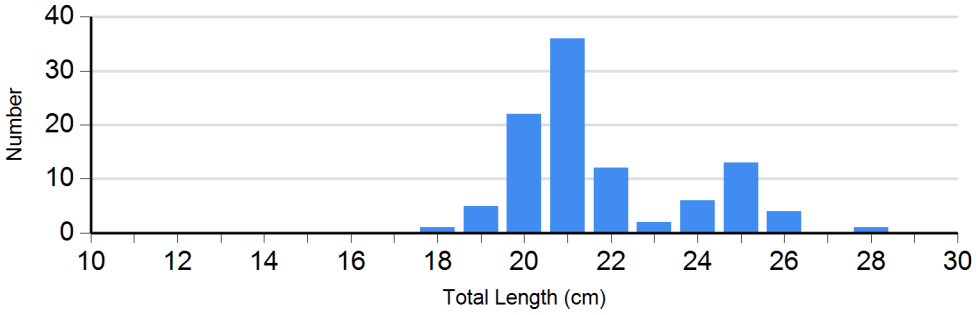
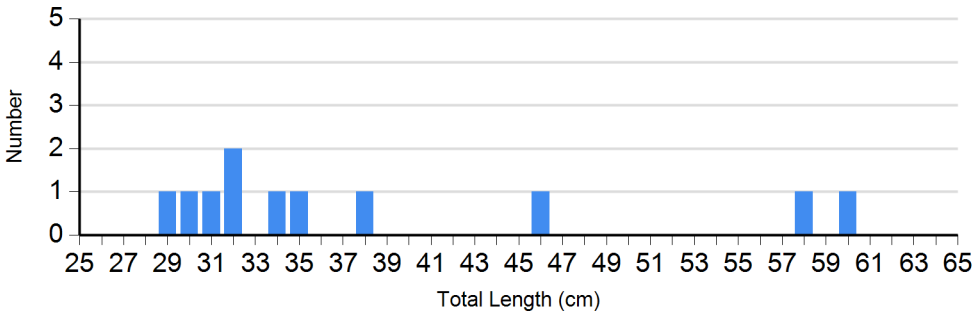


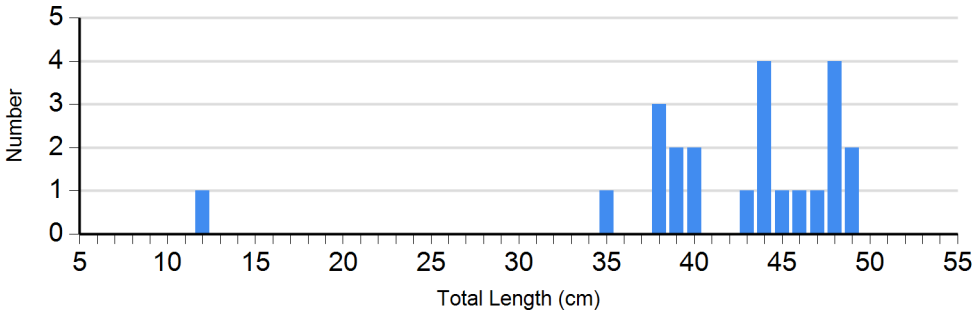
2018

Species: Channel Catfish
Gear: AFS std gill net

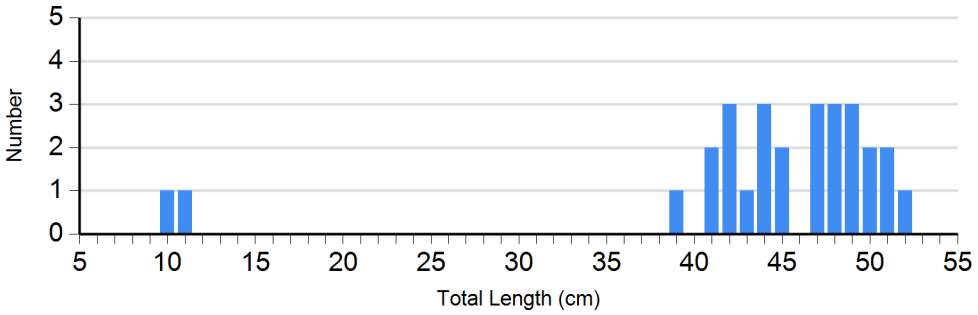


2017

Species: Common Carp
Gear: AFS std gill net

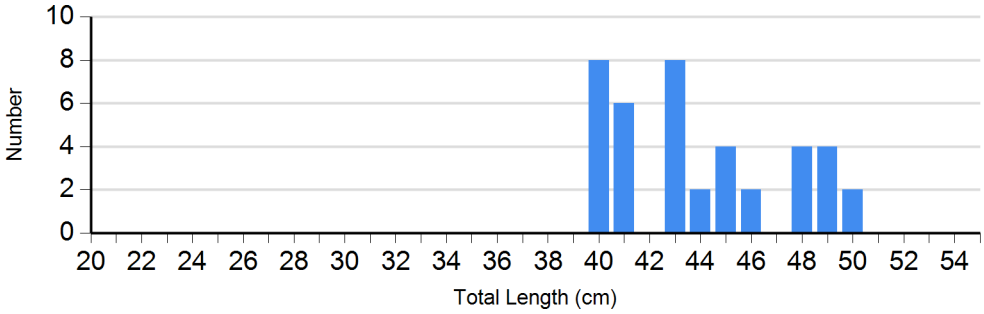


2017

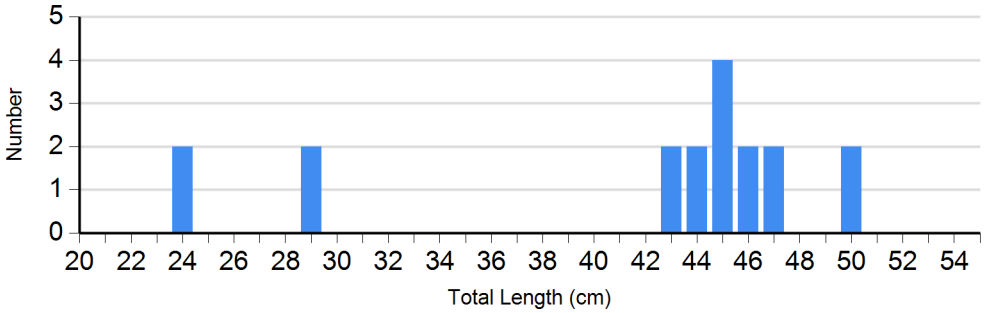


2018

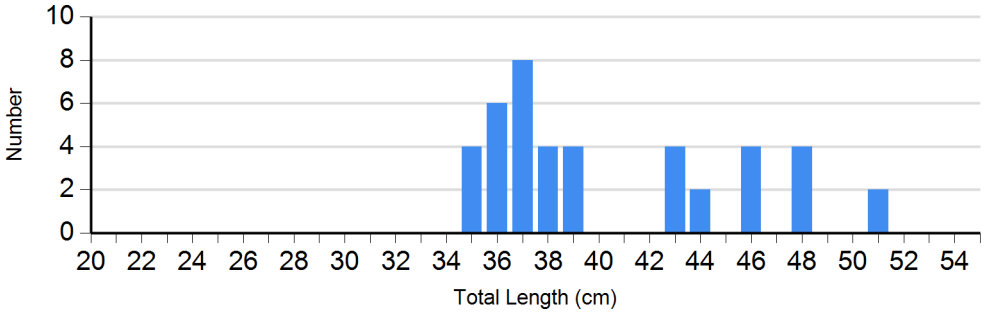
Species: Common Carp
Gear: std exp gill net



2013

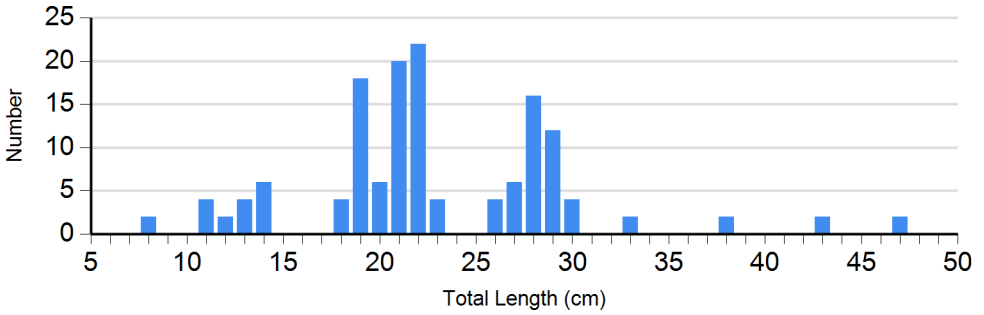


2015

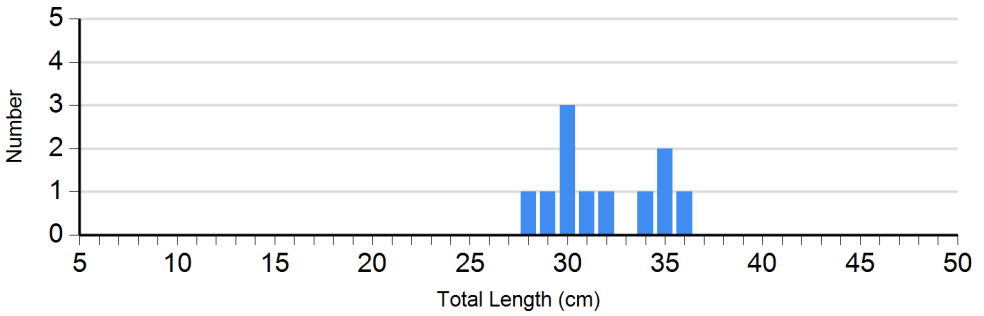


2016

Species: Largemouth Bass
Gear: boat shocker (day)



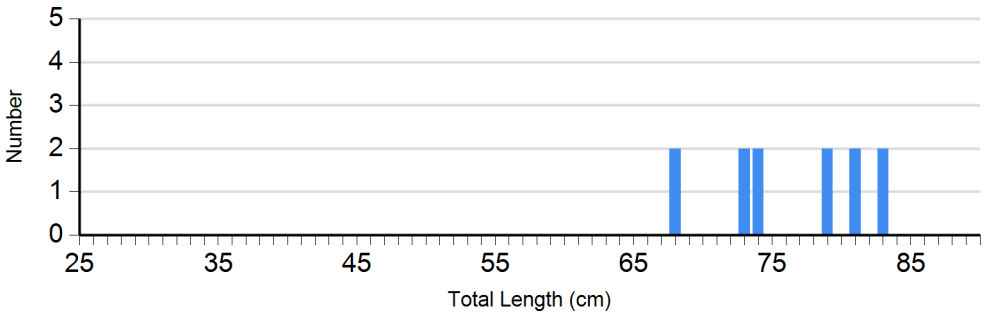
2015



2018

Species: Northern Pike
Gear: std exp gill net

2013



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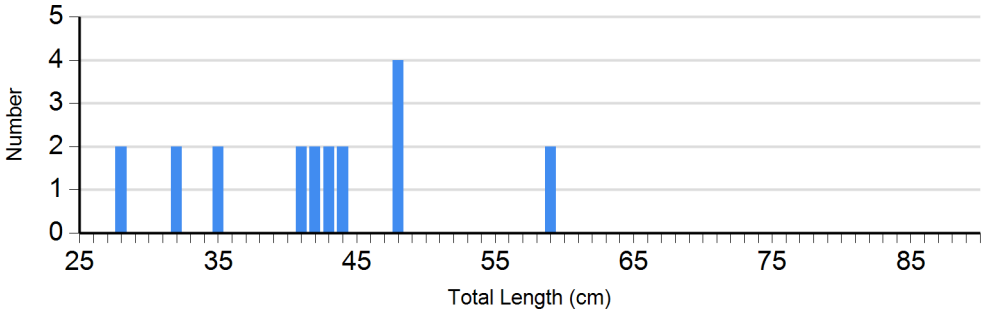
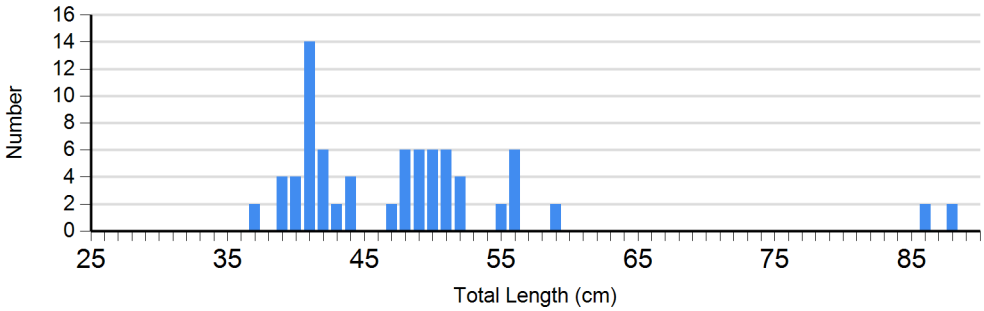
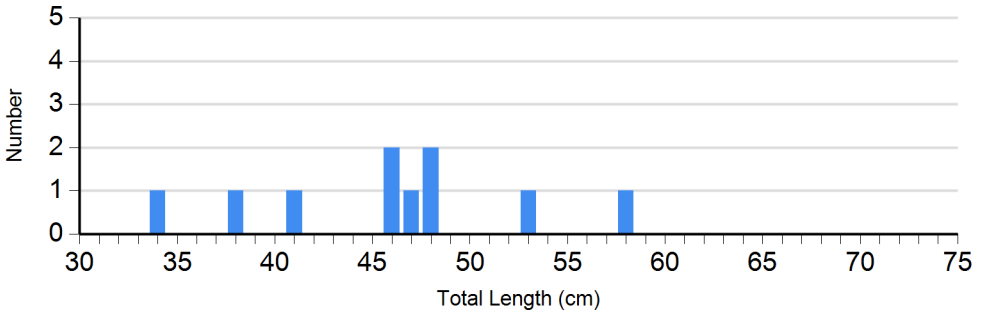


2016

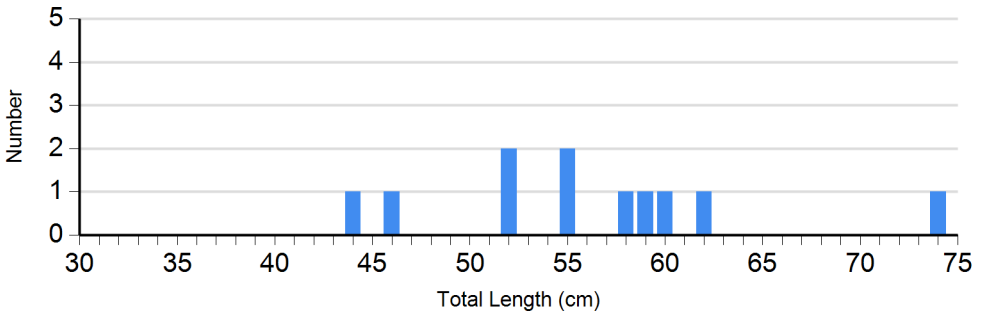


Species: Walleye
Gear: AFS std gill net

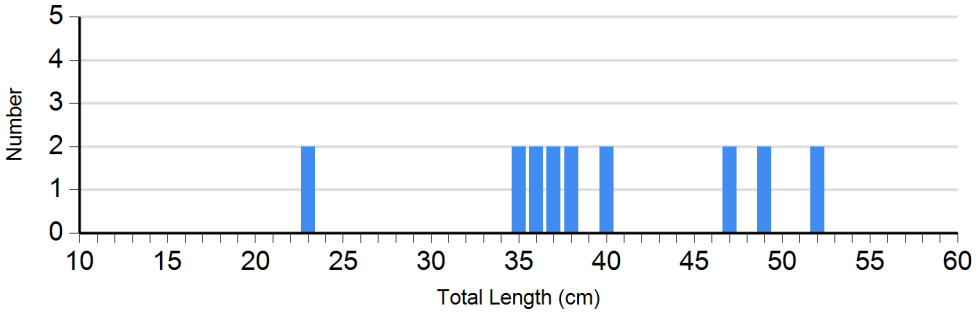
2017



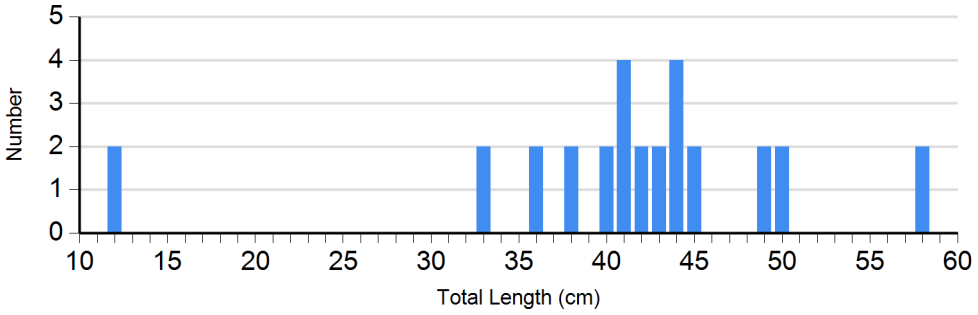
2018



Species: Walleye
Gear: std exp gill net

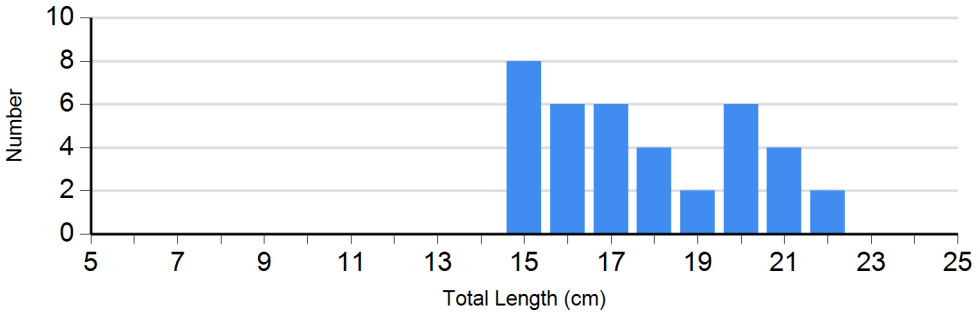


2013

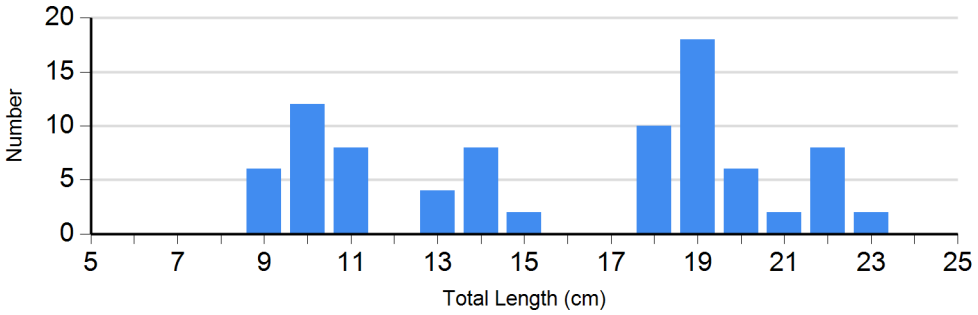


2016

Species: Yellow Perch
Gear: std exp gill net



2015

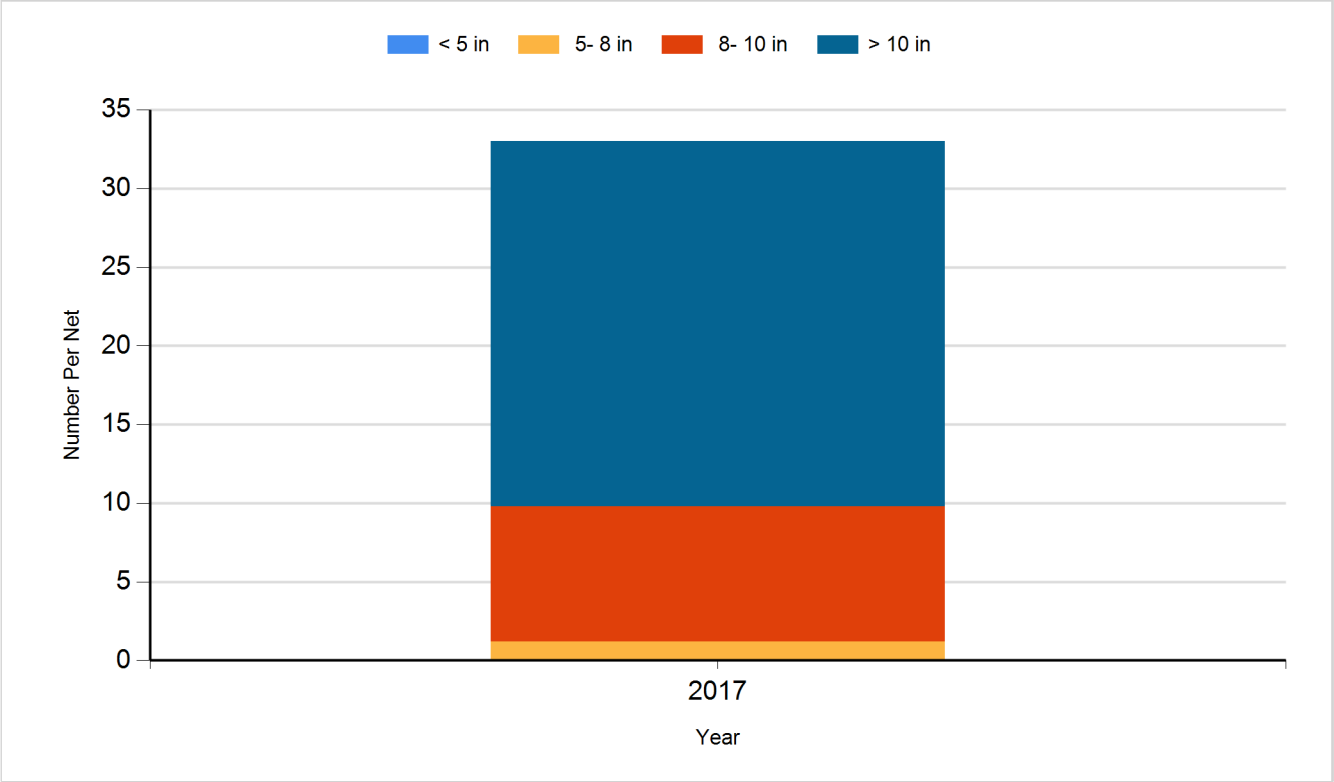


2016

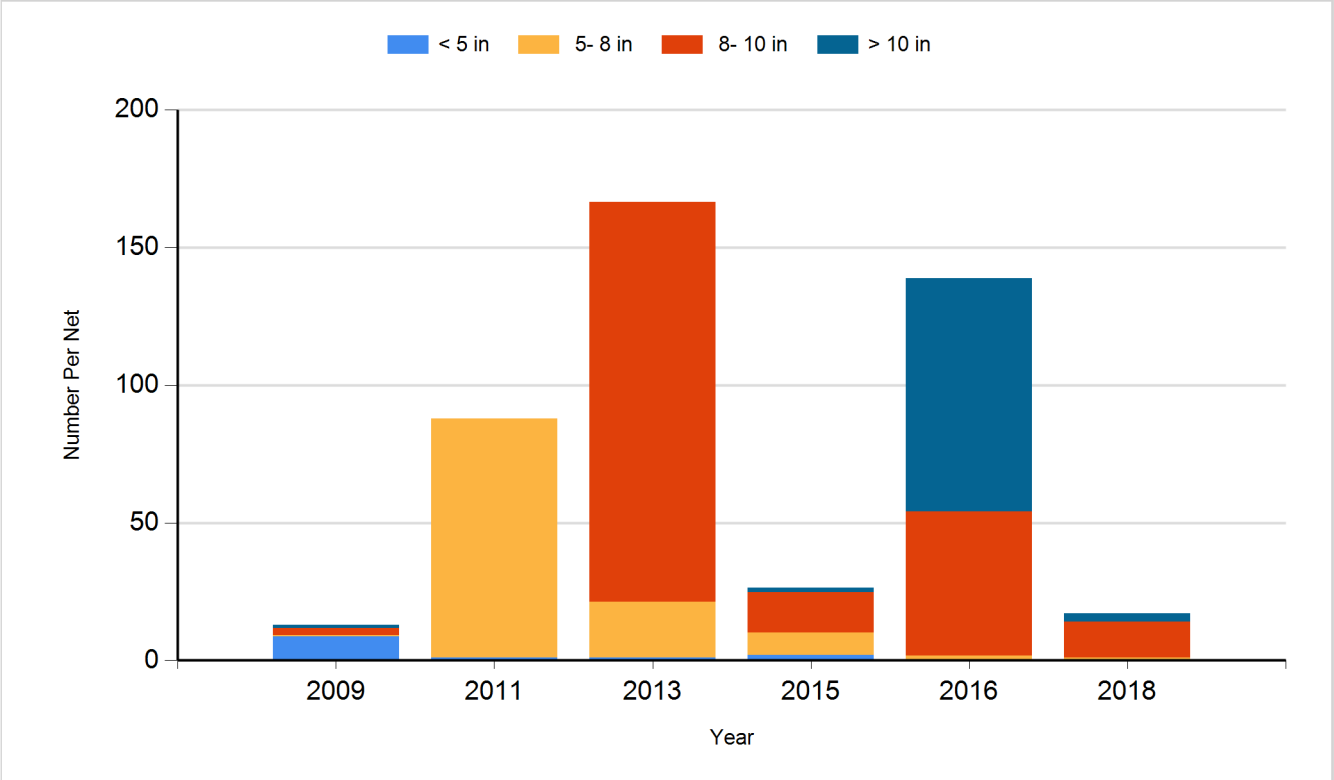
Historic Fish Sizes and Relative Abundance

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

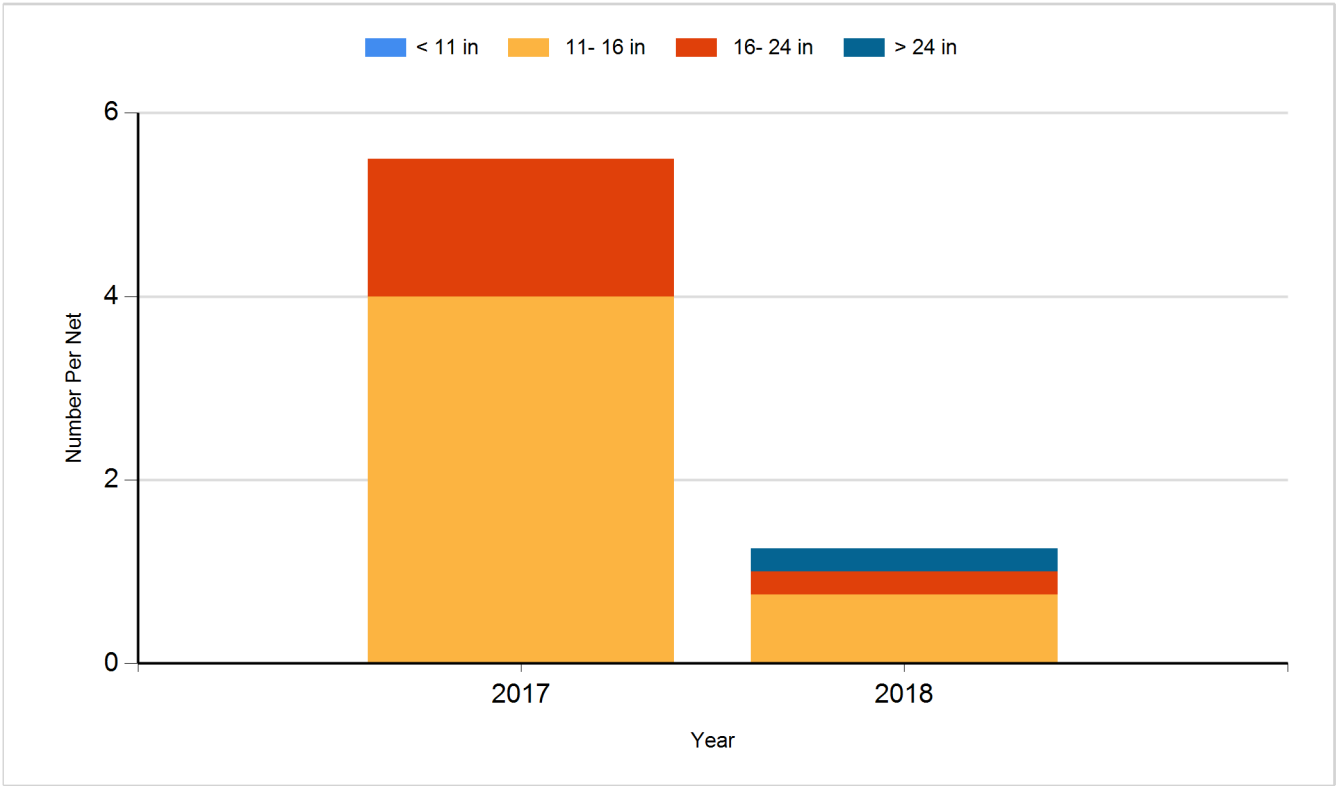
Species: Black Crappie
Gear: AFS std frame net



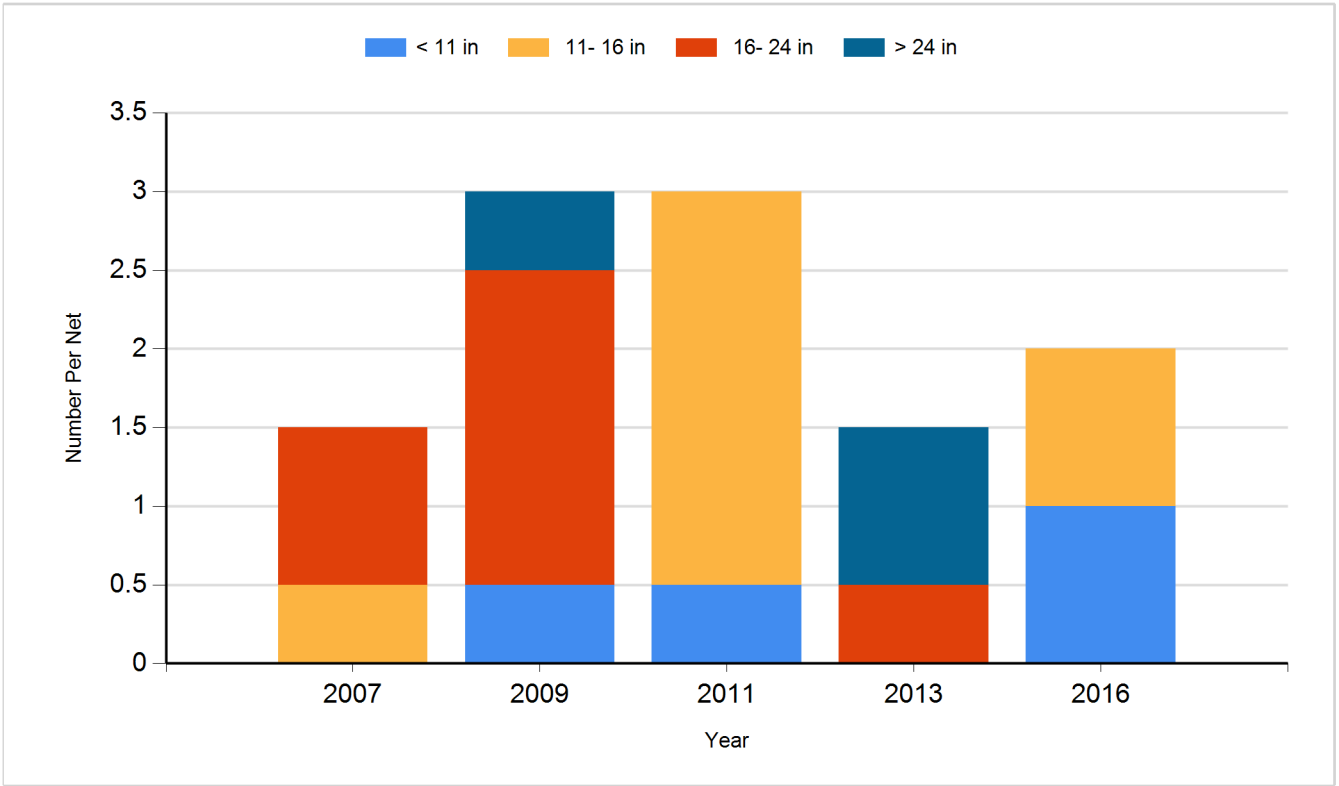
Species: Black Crappie
Gear: frame net (std 3/4 in)



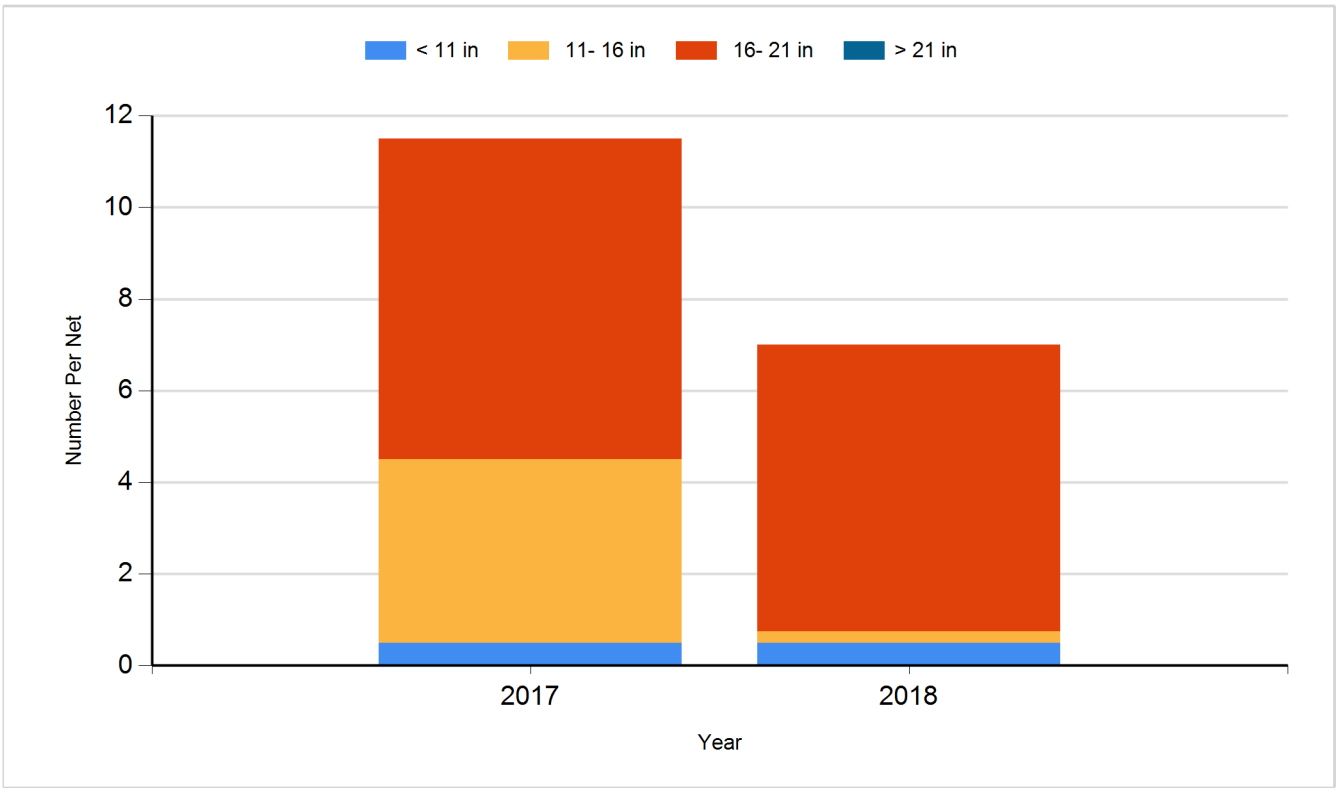
Species: Channel Catfish
Gear: AFS std gill net



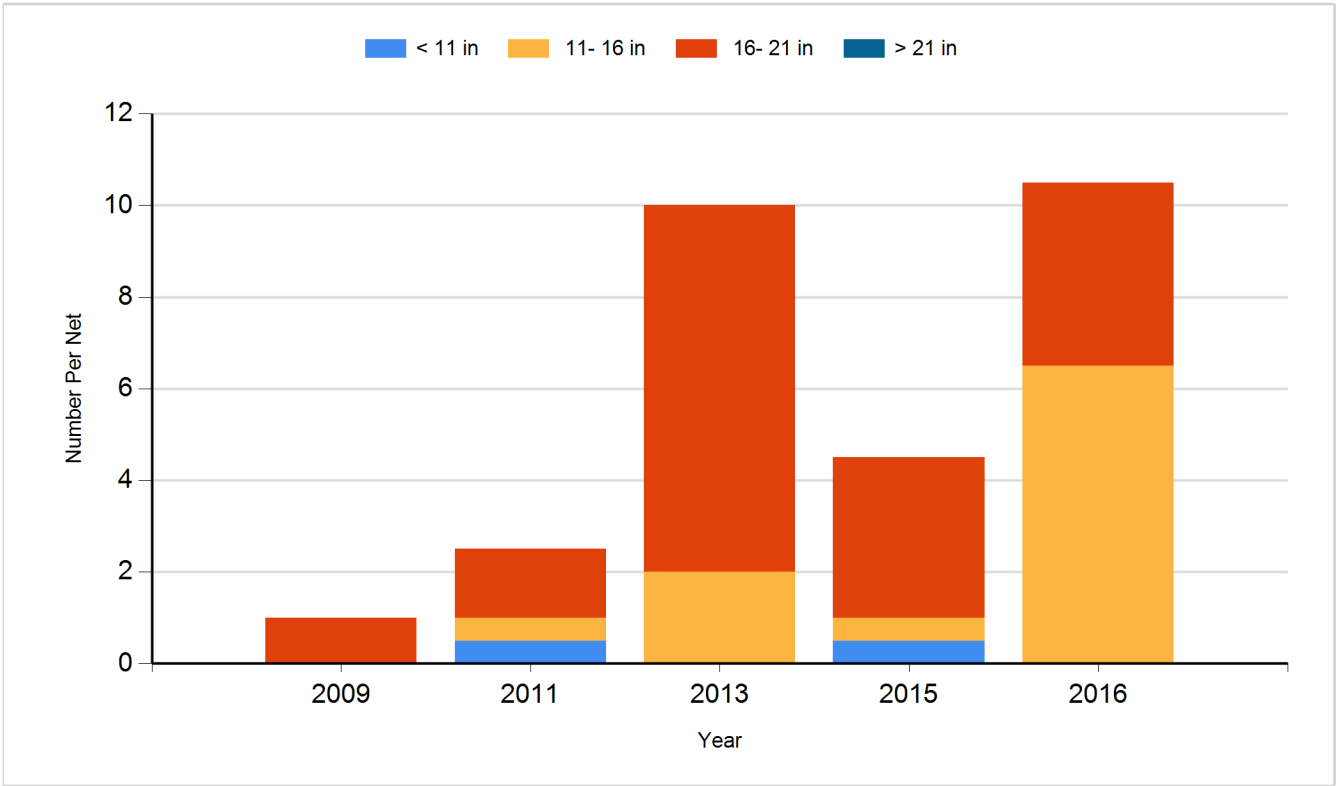
Species: Channel Catfish
Gear: std exp gill net



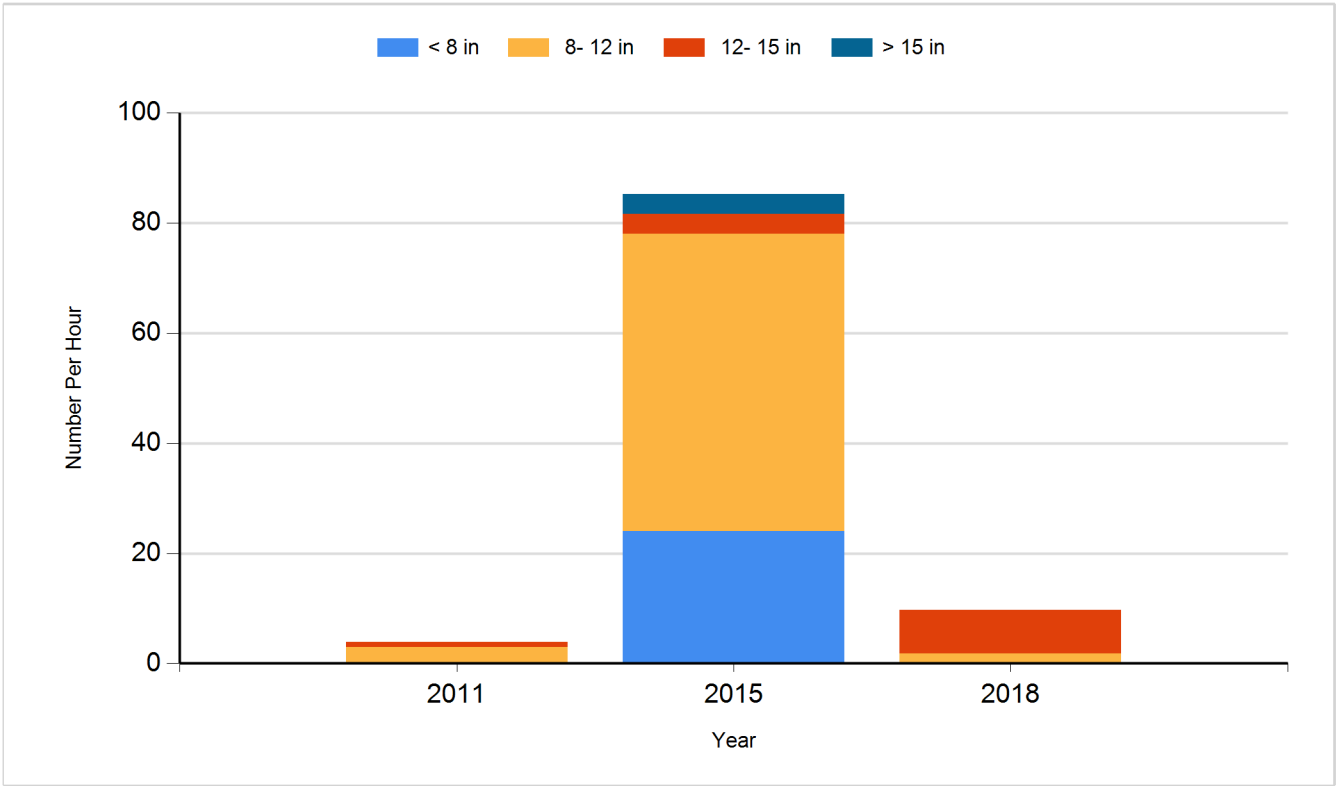
Species: Common Carp
Gear: AFS std gill net



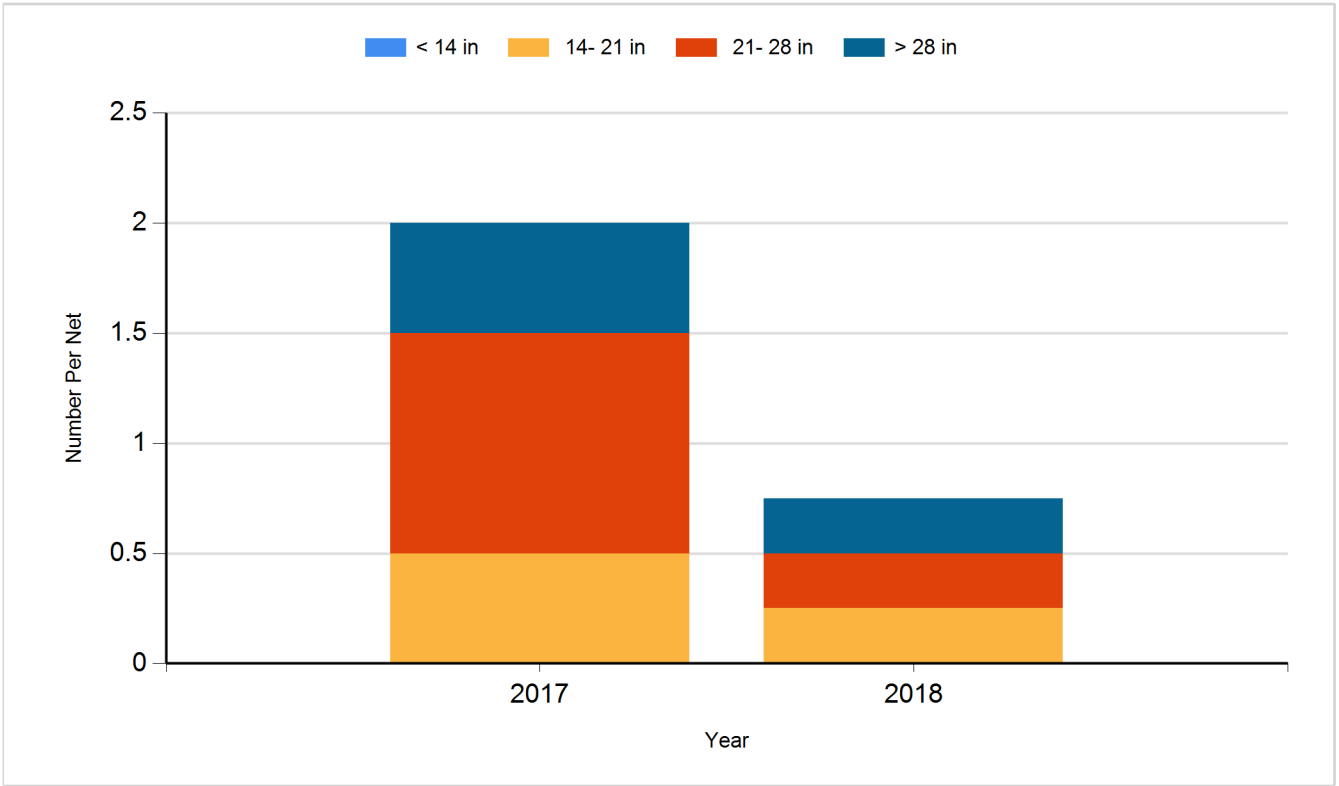
Species: Common Carp
Gear: std exp gill net



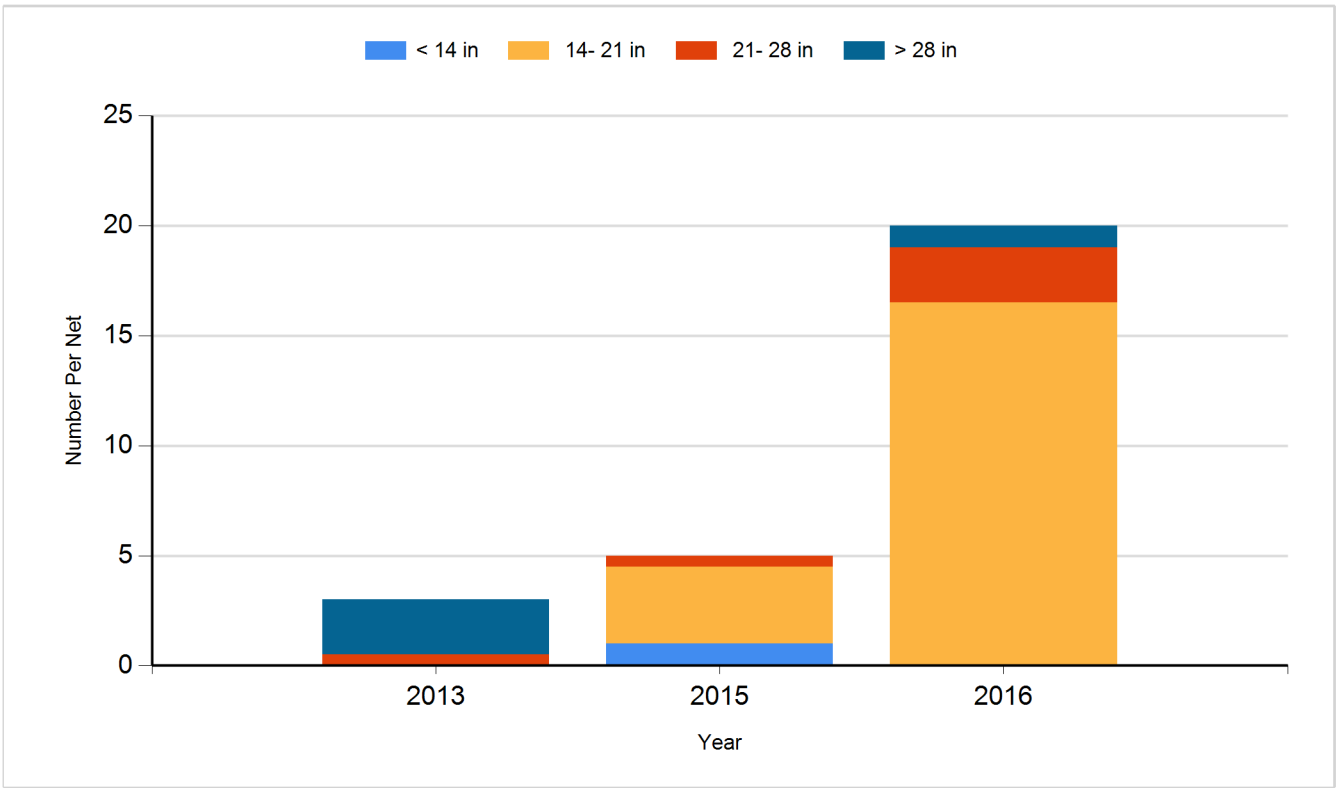
Species: Largemouth Bass
Gear: boat shocker (day)



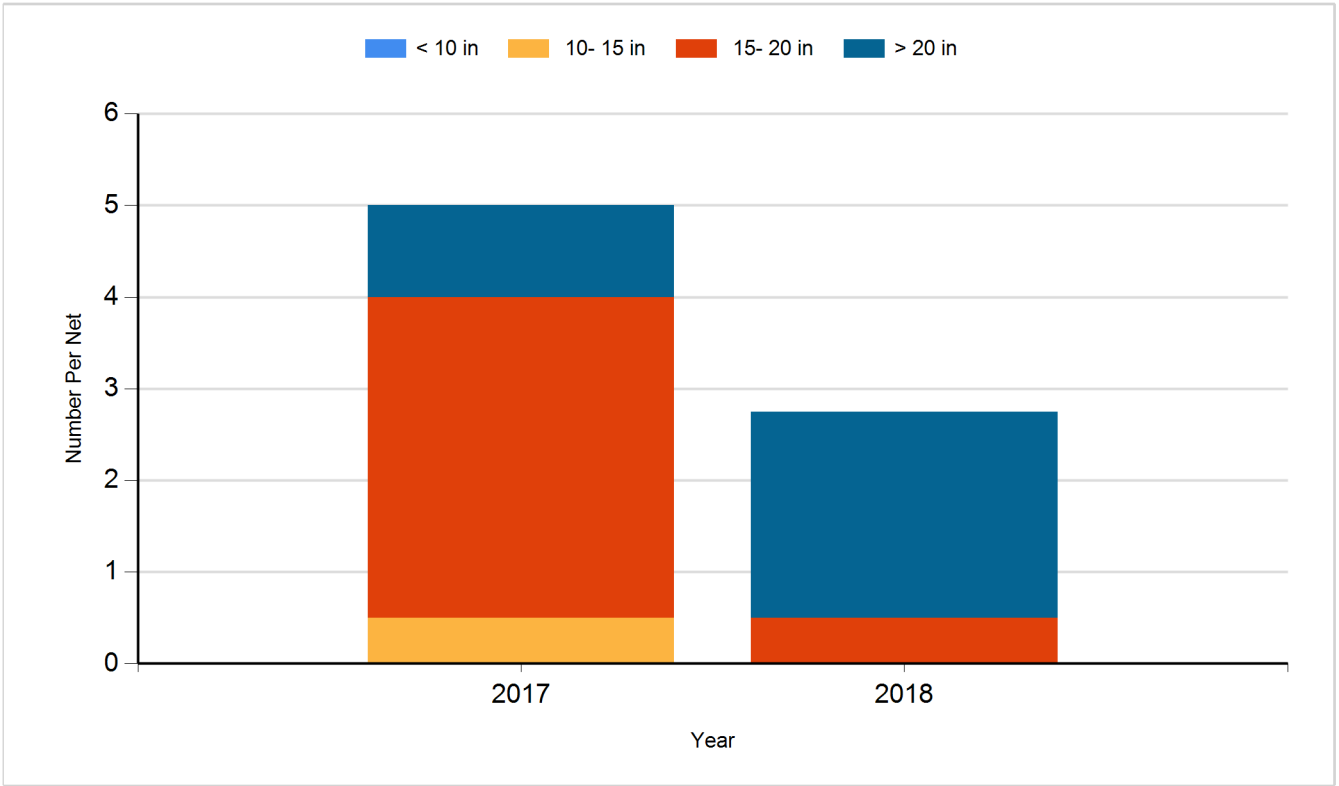
Species: Northern Pike
Gear: AFS std gill net



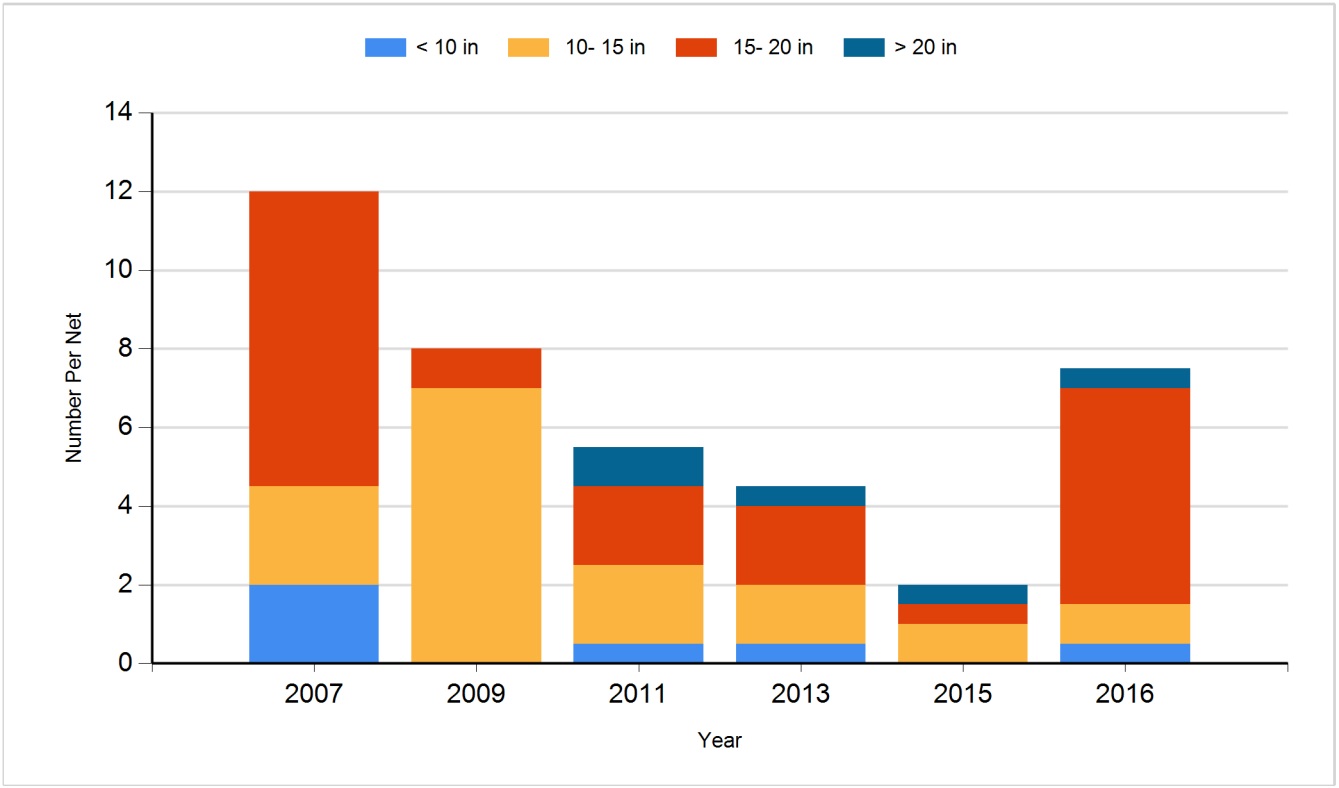
Species: Northern Pike
Gear: std exp gill net



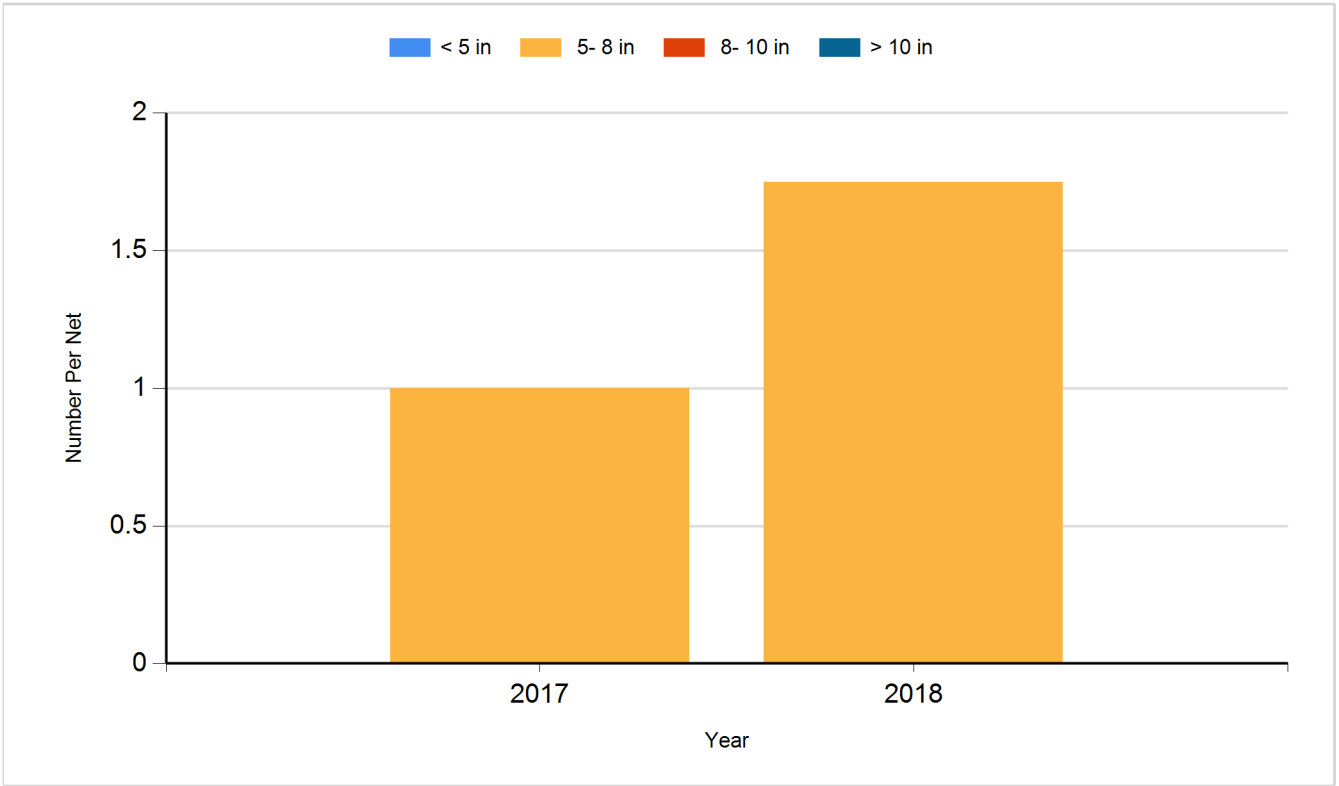
Species: Walleye
Gear: AFS std gill net



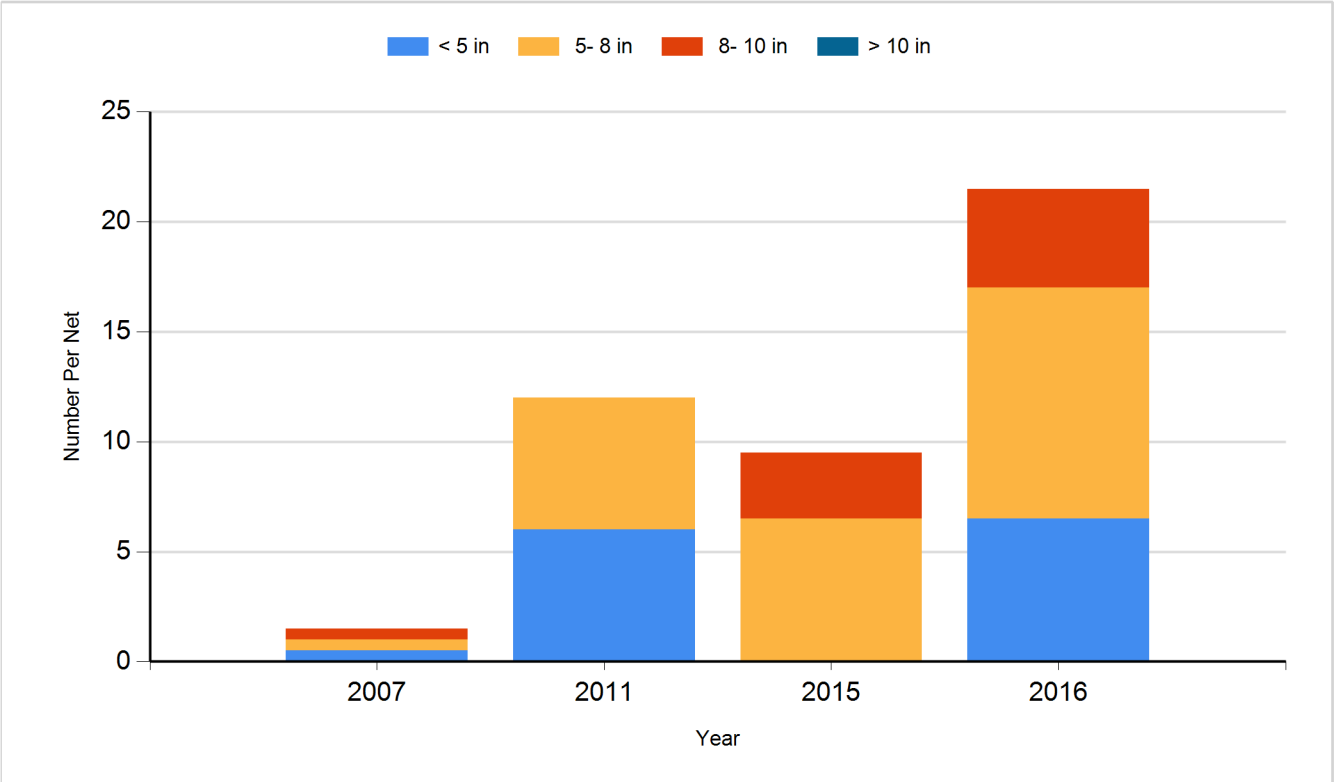
Species: Walleye
Gear: std exp gill net



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	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
2017	Gizzard Shad	Adult	125
2017	Walleye	Small Fingerling	30,800
2018	Gizzard Shad	Adult	44
2018	Walleye	Small Fingerling	29,600