

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Gardner, Harding County

SFG-Lake-581-000

2019

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 gill net (1/2 inch)	Aug 16, 2019	2 net-nights
AFS std gill net	Aug 16, 2019	4 net-nights
frame net (std 3/4 in)	May 31, 2019	6 net-nights

Common Fish Species Present

Walleye

Channel Catfish

Black Crappie

Largemouth Bass

Gizzard Shad

Yellow Perch

Northern Pike

Common Carp

Spottail Shiner

White Sucker

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 gill net (1/2 inch)*	Black Crappie	8	4.0	0.0	0		0			
	Channel Catfish	1	0.5	0.0						
	Common Carp	2	1.0	0.0						
	Gizzard Shad	36	18.0	10.2						
	Spottail Shiner	1	0.5	0.0						
	Walleye	4	2.0	3.1	0		0			
	Yellow Perch	3	1.5	0.0						
AFS std gill net	Black Crappie	17	3.5	1.1	57	22	57	22	96	4
	Channel Catfish	7	1.8	0.4	100		29		88	5
	Common Carp	7	1.8	1.9	71		0		84	3
	Gizzard Shad	112	28.0	4.2	7	4			104	1
	Northern Pike	7	1.8	1.4	43		0		100	14
	Walleye	20	3.3	1.7	85		46	23	88	2
	Yellow Perch	12	3.0	1.8	25		8		90	2
frame net (std 3/4 in)	Black Crappie	64	10.0	7.1	100		35	9	92	1
	Channel Catfish	1	0.2	0.2	100		100		89	
	Common Carp	4	0.7	0.5	75		0		91	2
	Northern Pike	1	0.2	0.2	100		0		91	
	Walleye	3	0.2	0.2	100		100		92	
	White Sucker	1	0.2	0.2	100		100		89	

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 gill net (1/2 inch)	Black Crappie										4.0	4.00
	Channel Catfish										0.5	0.50
	Common Carp										1.0	1.00
	Gizzard Shad										18.0	18.00
	Spottail Shiner										0.5	0.50
	Walleye										2.0	2.00
	Yellow Perch										1.5	1.50
AFS std frame net	Black Crappie								33.0			33.00
	Northern Pike								0.2			0.20
	Yellow Perch								0.2			0.20
AFS std gill net	Black Crappie								32.5	3.3	3.5	13.10
	Channel Catfish								5.5	1.3	1.8	2.87
	Common Carp								11.0	6.5	1.8	6.43
	Gizzard Shad								0.0	0.0	28.0	9.33
	Northern Pike								2.0	0.8	1.8	1.53
	Walleye								5.0	2.8	3.3	3.70
	Yellow Perch								1.0	1.8	3.0	1.93
boat shocker (day)	Largemouth Bass		4.0				61.2			9.6		24.93
	Walleye		8.9				0.0			16.9		8.60
frame net (std 3/4 in)	Black Bullhead		0.0		0.0		0.0	0.0		0.0	0.0	0.00
	Black Crappie		86.8		165.5		24.4	138.8		17.0	10.0	73.75
	Channel Catfish		2.0		0.0		0.0	0.0		0.2	0.2	0.40
	Common Carp		0.3		0.0		0.1	0.0		0.3	0.7	0.23
	Northern Pike		0.2		0.7		0.3	0.2		1.3	0.2	0.48
	Walleye		2.5		1.8		1.1	0.0		1.5	0.2	1.18
	White Sucker		0.0		0.0		0.0	0.0		0.0	0.2	0.03
	Yellow Perch		0.8		0.0		0.3	0.2		0.0	0.0	0.22
std exp gill net	Black Crappie		4.0		3.0		7.0	11.0				6.25
	Channel Catfish		2.5		1.5		0.0	1.0				1.25
	Common Carp		2.0		10.0		4.0	10.5				6.63
	Gizzard Shad		0.0		0.0		0.0	0.0				0.00
	Largemouth Bass		0.0		0.0		0.0	2.0				0.50
	Northern Pike		0.0		3.0		4.0	20.0				6.75
	Spottail Shiner		0.0		0.0		0.0	0.0				0.00

		CPUE										
Gear	Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg
std exp gill net	Walleye		5.0		4.0		2.0	7.0				4.50
	Yellow Perch		6.0		0.0		9.5	15.0				7.63

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 gill net (1/2 inch)	Black Crappie	PSD												0	
		PSD-P												0	
	Walleye	PSD												0	
		PSD-P												0	
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	57	
		PSD-P										63	85	57	
		Wr										93	84	96	
	Channel Catfish	PSD										27	40	100	
		PSD-P										0	20	29	
		Wr										89	87	88	
	Common Carp	PSD										64	96	71	
		PSD-P										0	0	0	
		Wr										87	82	84	
	Gizzard Shad	PSD												0	7
		Wr													104
	Northern Pike	PSD											75	67	43
		PSD-P											25	33	0
		Wr											84	86	100
	Walleye	PSD											90	100	85
		PSD-P											20	82	46
		Wr											83	81	88
	Yellow Perch	PSD											0	0	25
PSD-P												0	0	8	

Gear	Species	Index	Year											
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
AFS std gill net	Yellow Perch	Wr									82	98	90	
boat shocker (day)	Largemouth Bass	PSD		25					12				82	
		PSD-P		0					6				0	
		Wr		123					121				110	
	Walleye	PSD		100										22
		PSD-P		67										22
		Wr		86										95
frame net (std 3/4 in)	Black Crappie	PSD		0		88			66	99			94	100
		PSD-P		0		0			7	61			18	35
		Wr		104		98			101	106			88	92
	Channel Catfish	PSD		0									0	100
		PSD-P		0									0	100
		Wr		86									89	89
	Common Carp	PSD		0						100			50	75
		PSD-P		0						0			0	0
		Wr		85						89			89	91
	Northern Pike	PSD		100		75			0	100			25	100
		PSD-P		0		25			0	100			0	0
		Wr		73		86			119	107			85	91
	Walleye	PSD		13		82			64				100	100
		PSD-P		0		45			9				78	100
		Wr		84		78			79				80	92
	White Sucker	PSD												100
		PSD-P												100
		Wr												89
	Yellow Perch	PSD		0						0	100			
		PSD-P		0						0	0			
		Wr		95						98				
	std exp gill net	Black Crappie	PSD		0		67			21	77			
			PSD-P		0		0			0	64			
			Wr		103		107			108	102			
Channel Catfish		PSD		0		100					0			
		PSD-P		0		67					0			
		Wr		87		78					92			
Common Carp		PSD		75		80			88	38				
		PSD-P		0		0			0	0				

Gear	Species	Index	Year											
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
std exp gill net	Common Carp	Wr		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				
	Walleye	PSD		60		63			50	86				
		PSD-P		20		13			25	7				
		Wr		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+
2019	16	218 (3)	359 (2)	423 (5)	514 (1)		543 (2)		557 (1)		683 (2)
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)					

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).

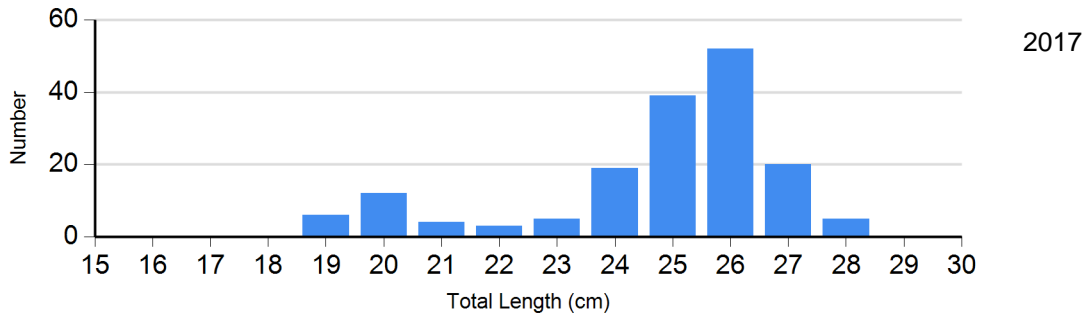
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2015	164	111 (2.0)	292	96 (0.5)	32	91 (0.7)	0	
	2016	18	104 (1.5)	522	108 (0.4)	848	106 (0.3)	0	
	2017	6	97 (6.3)	43	98 (1.0)	116	92 (0.5)	0	
	2018	6	92 (0.8)	78	88 (0.4)	18	86 (1.1)	0	
	2019	0		39	92 (1.0)	21	91 (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	
	2019	0		5	85 (3.1)	2	94 (10.1)	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	
	2019	2	82	5	84 (3.4)	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	
	2019	4	108 (18.3)	3	89 (0.9)	0		0	
Walleye Gill Net	2015	4	79 (2.2)	2	74 (0.0)	2	74 (0.0)	0	

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Walleye Gill Net	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
	2019	2	84 (0.1)	5	88 (2.0)	4	92 (0.3)	2	84 (3.7)
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	
	2017	2	82 (8.8)	0		0		0	
	2018	7	98 (2.1)	0		0		0	
	2019	9	90 (2.2)	2	89 (1.7)	1	95	0	

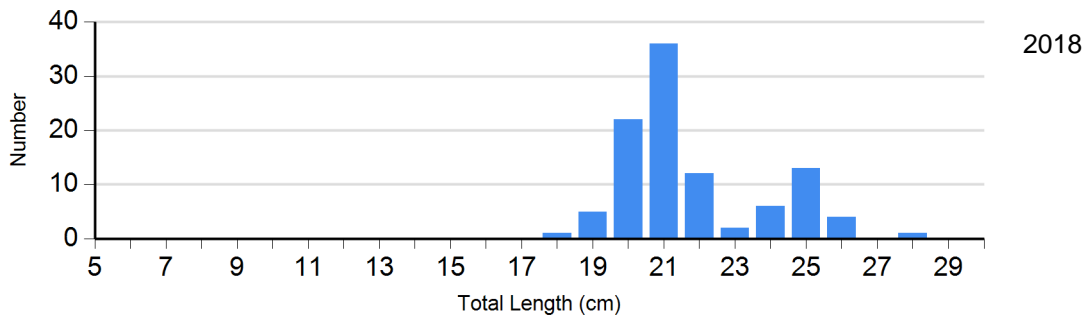
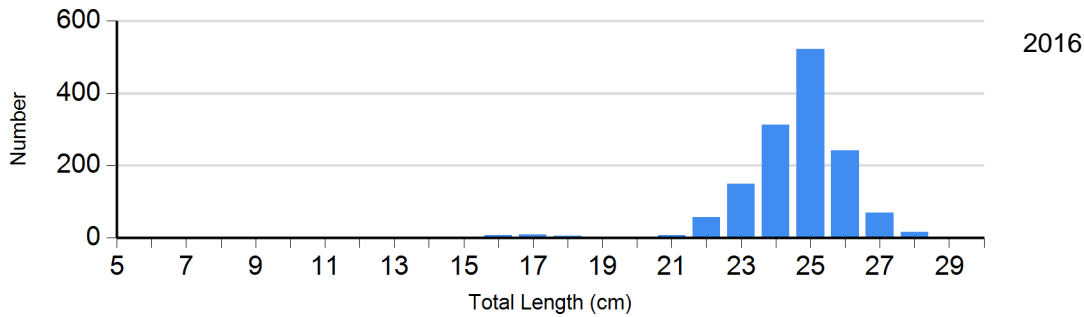
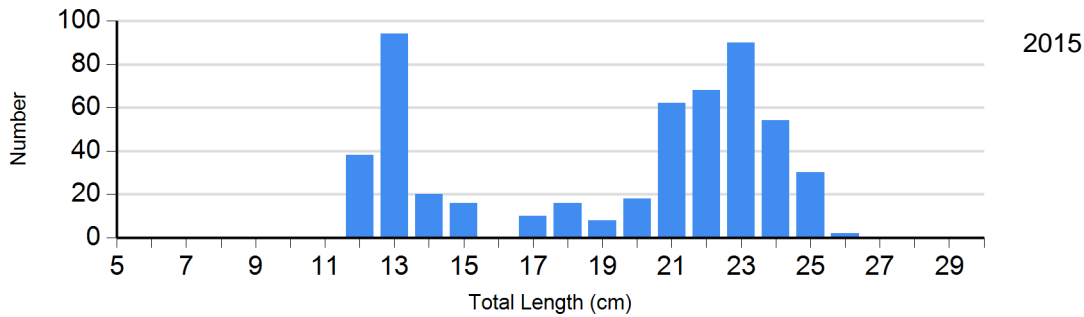
Length Frequency Distribution

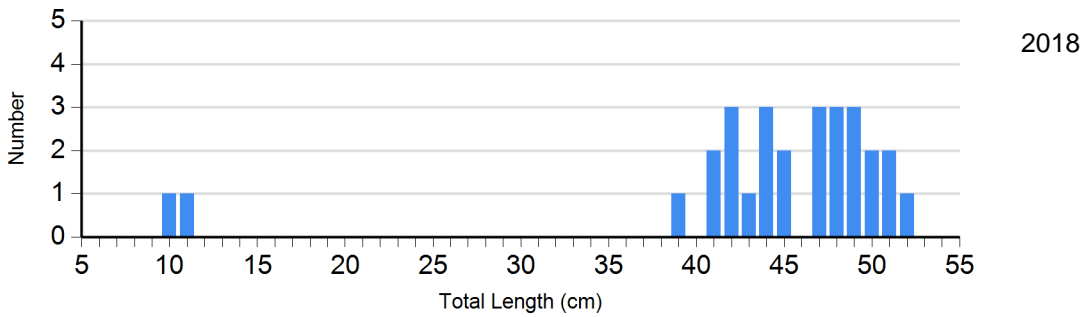
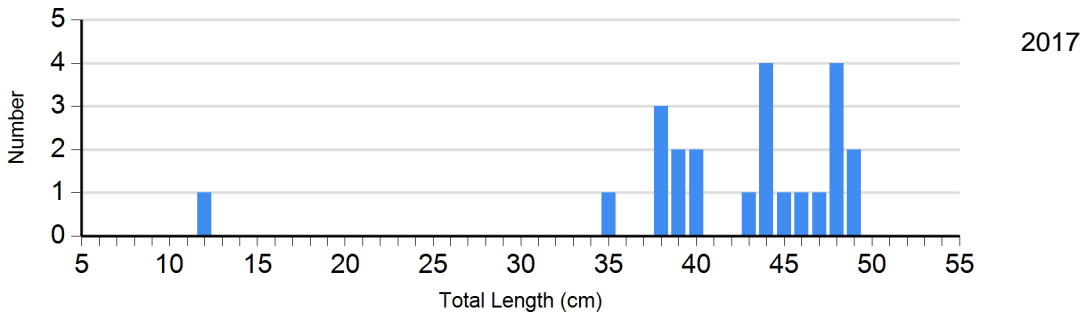
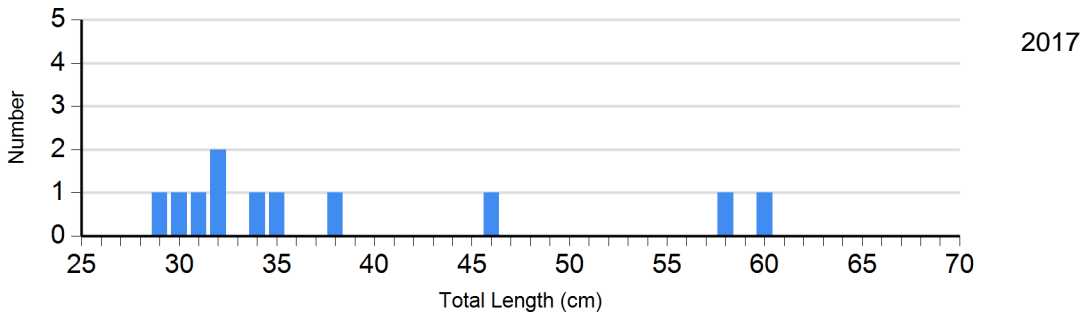
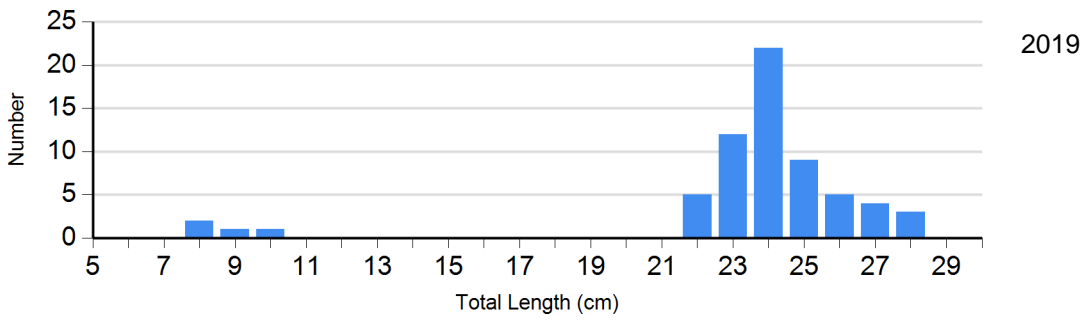
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net

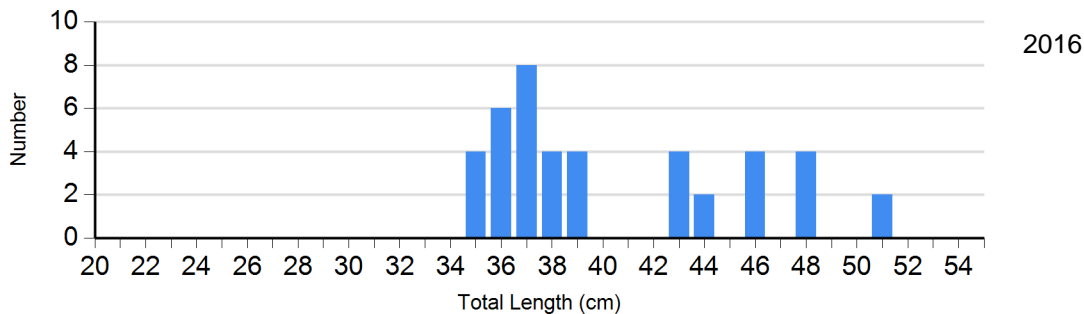
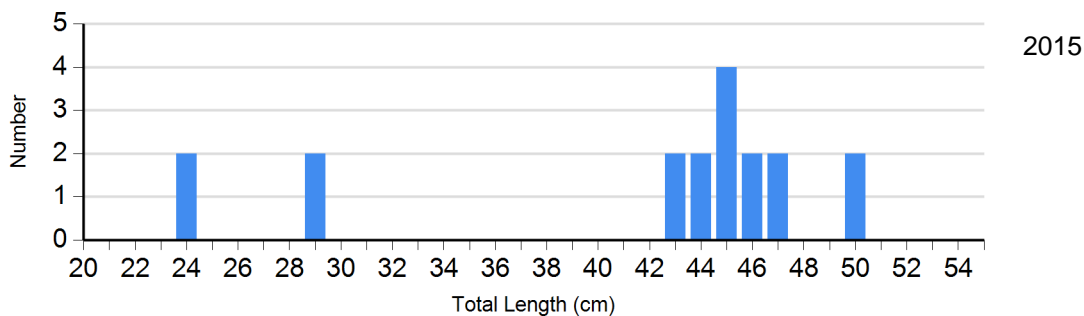


Species: Black Crappie
Gear: frame net (std 3/4 in)

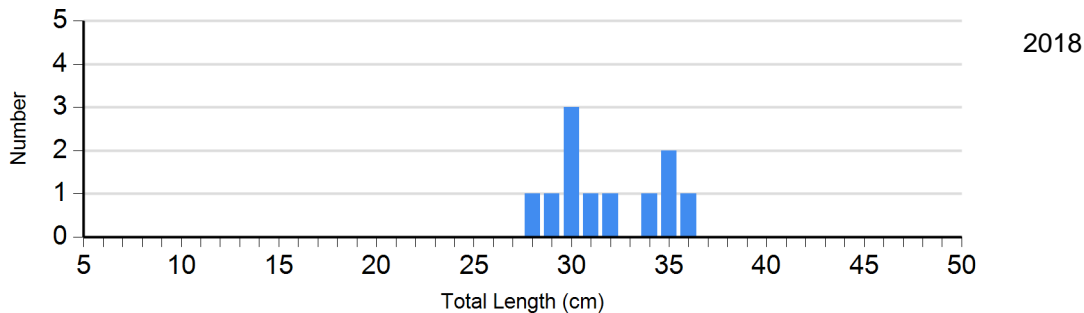
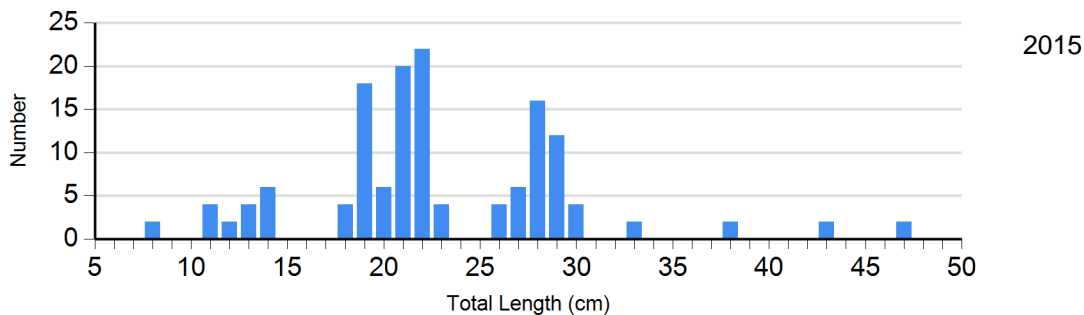




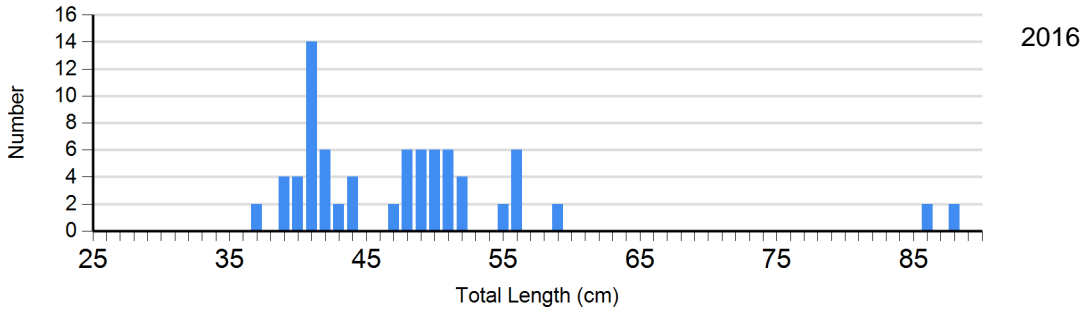
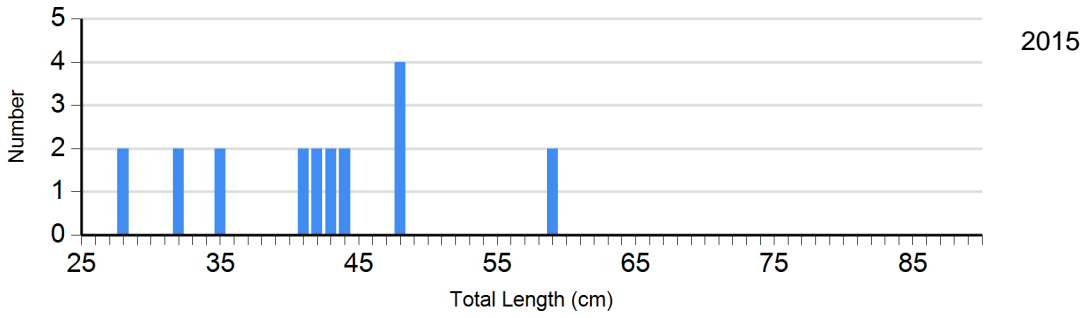
Species: Common Carp
 Gear: std exp gill net



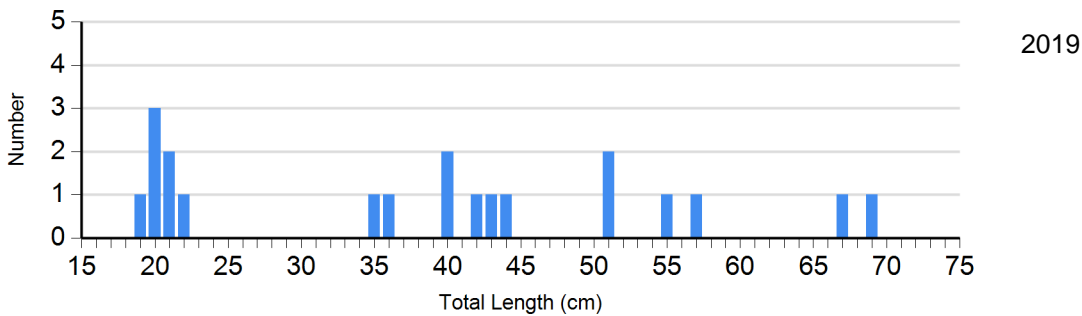
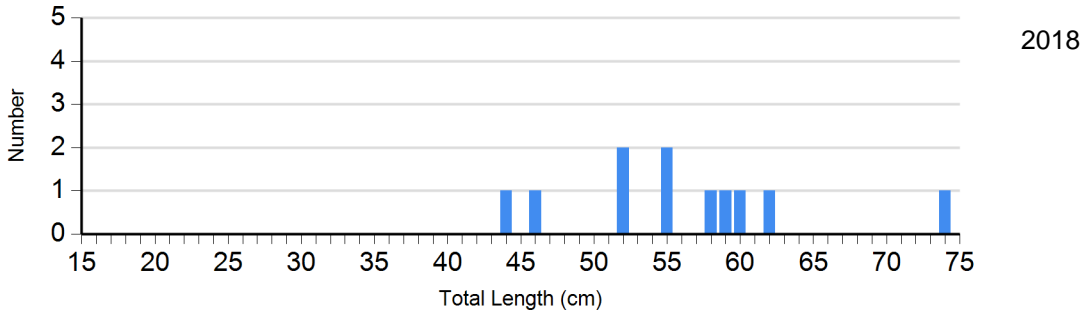
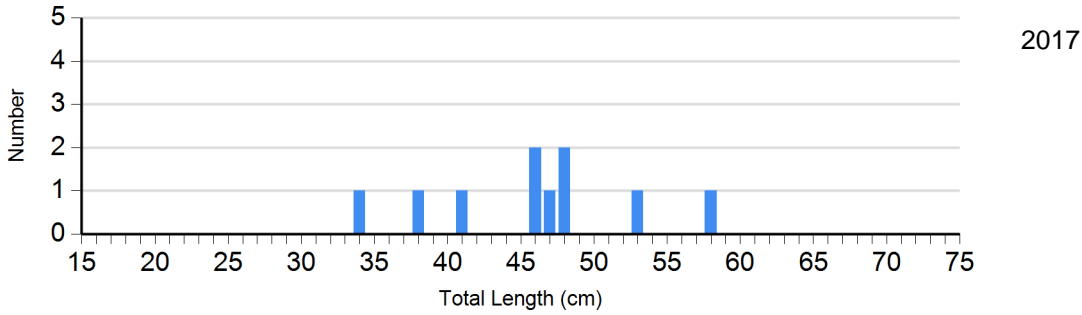
Species: Largemouth Bass
 Gear: boat shocker (day)



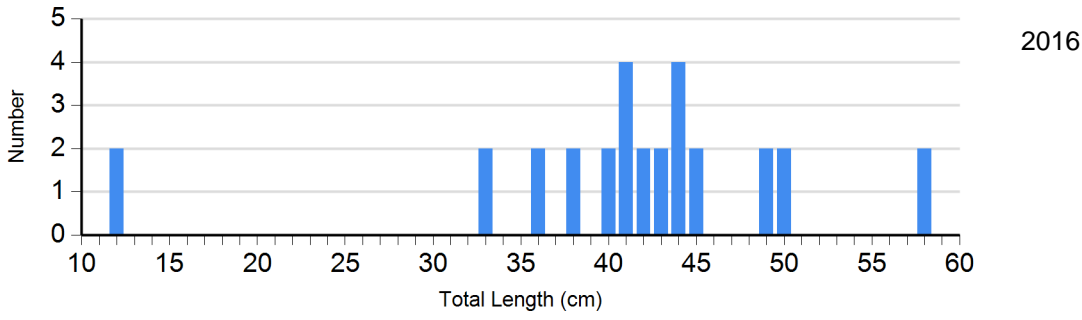
Species: Northern Pike
 Gear: std exp gill net



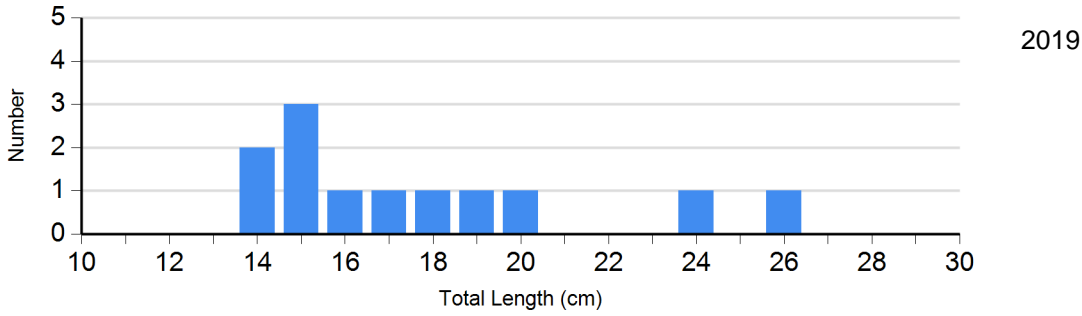
Species: Walleye
 Gear: AFS std gill net



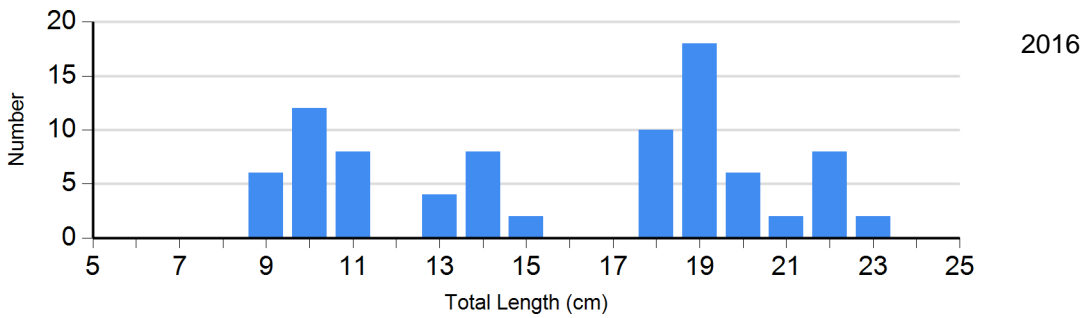
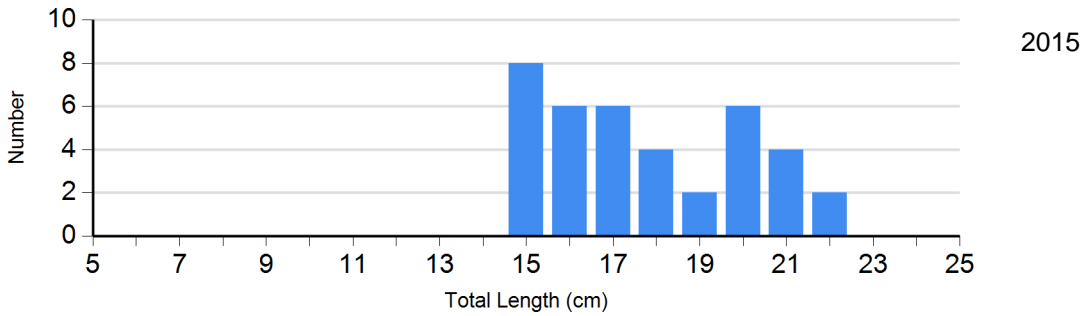
Species: Walleye
Gear: std exp gill net



Species: Yellow Perch
Gear: AFS std gill net



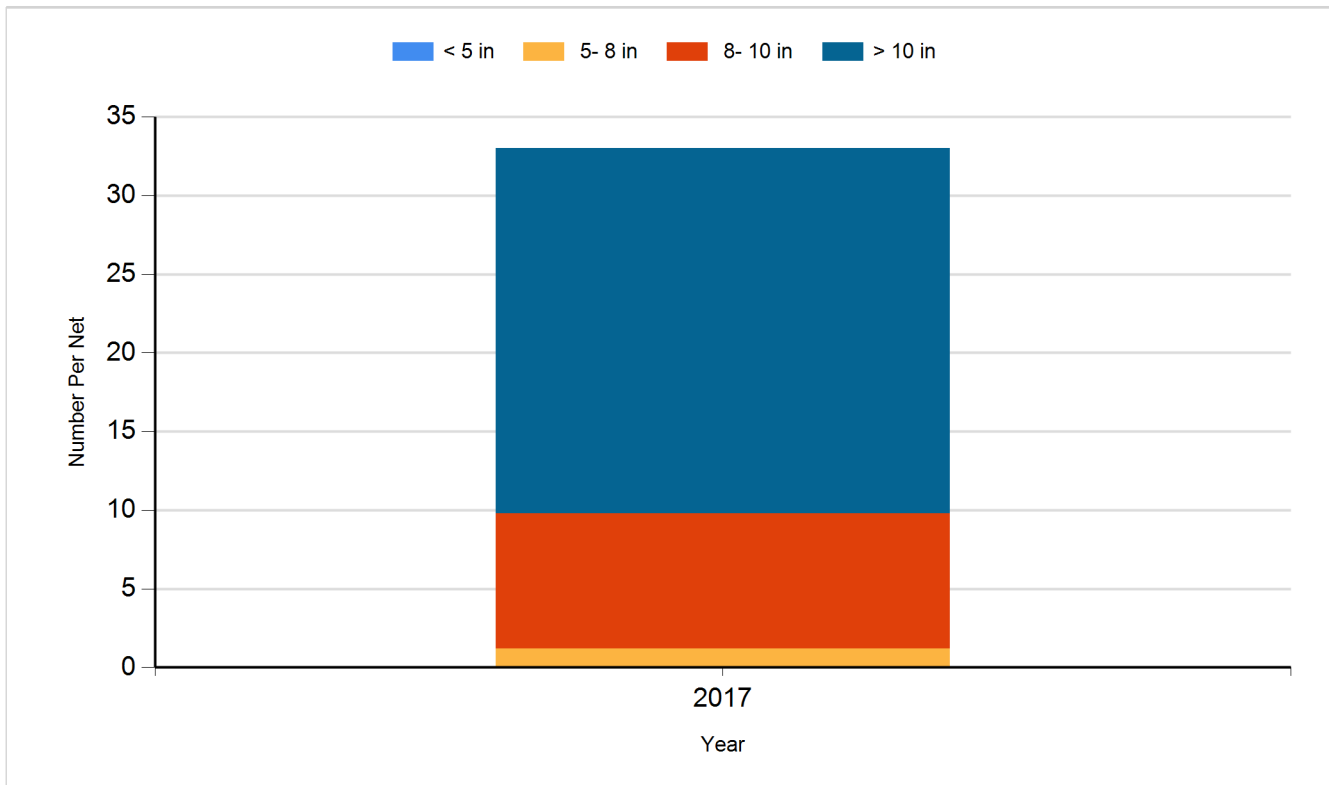
Species: Yellow Perch
Gear: std exp gill net



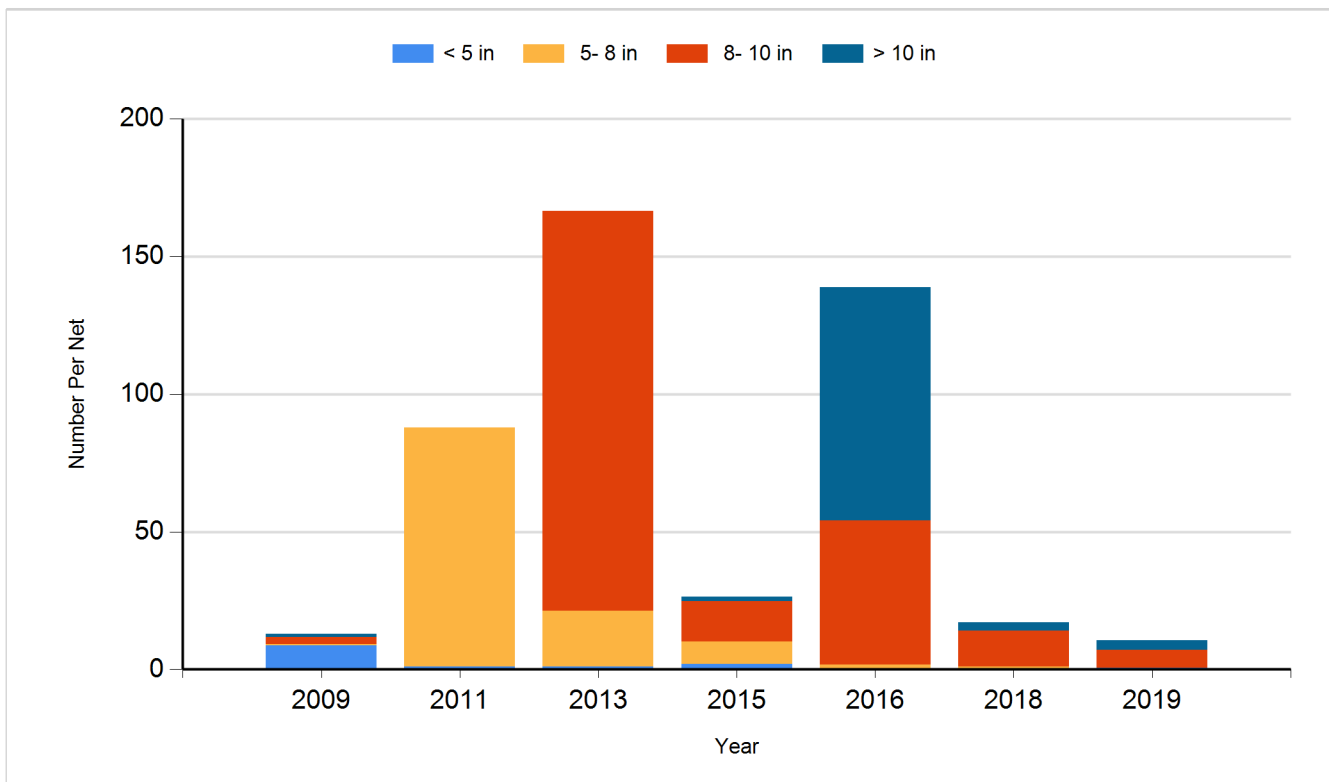
Historic Fish Sizes and Relative Abundance

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

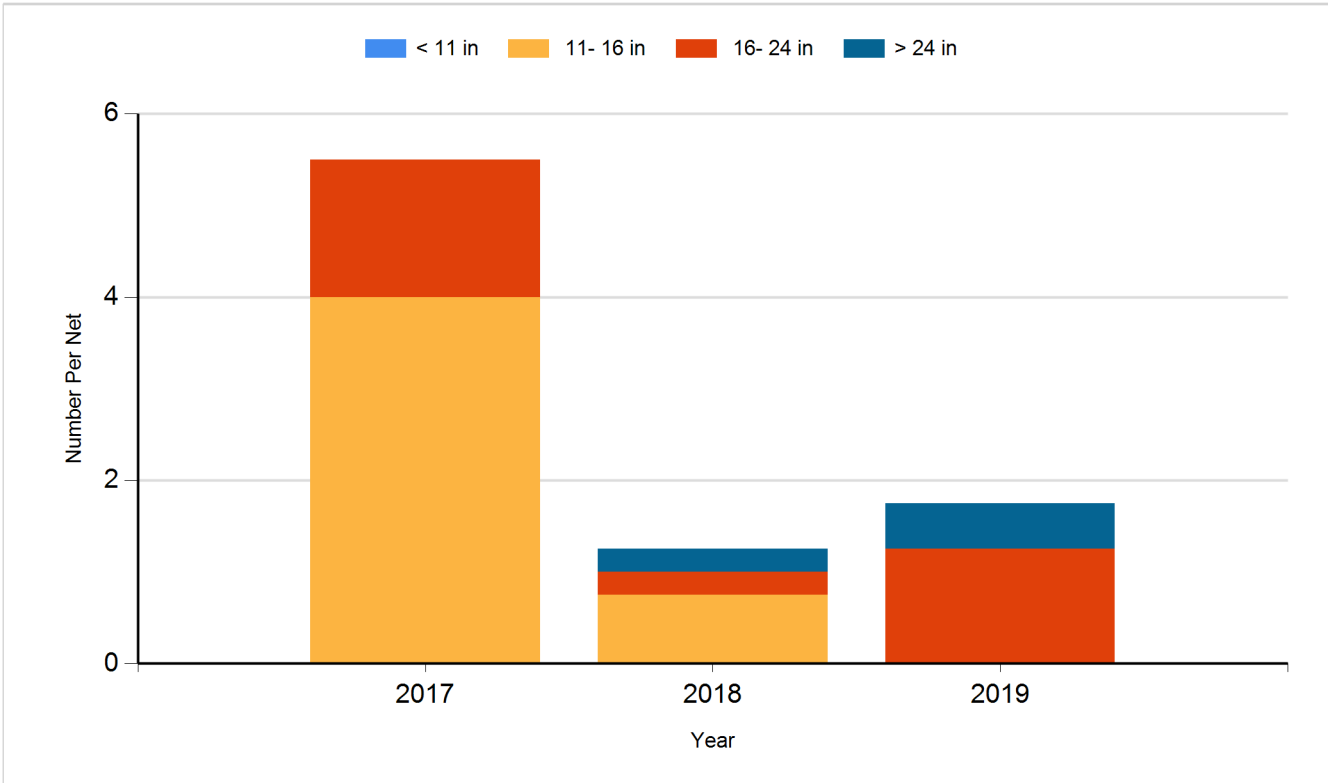
Species: Black Crappie
Gear: AFS std frame net



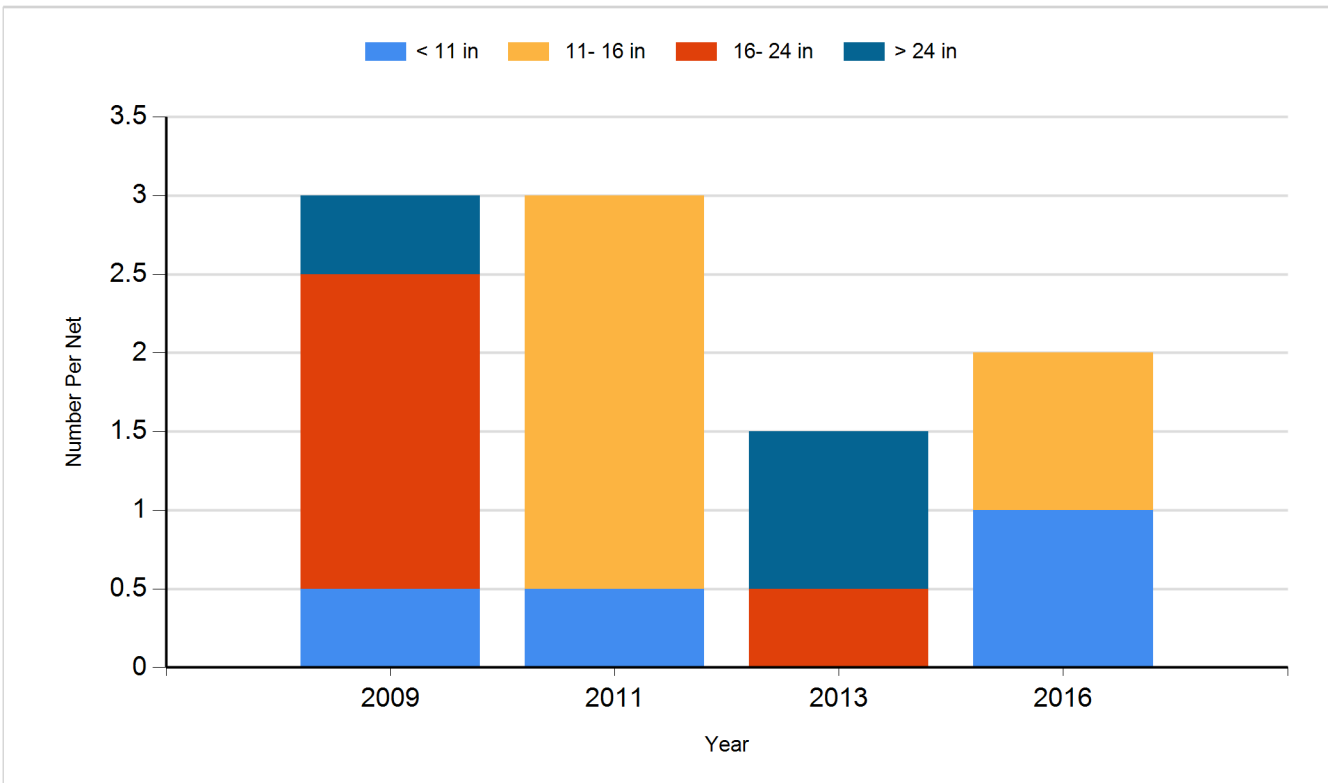
Species: Black Crappie
Gear: frame net (std 3/4 in)



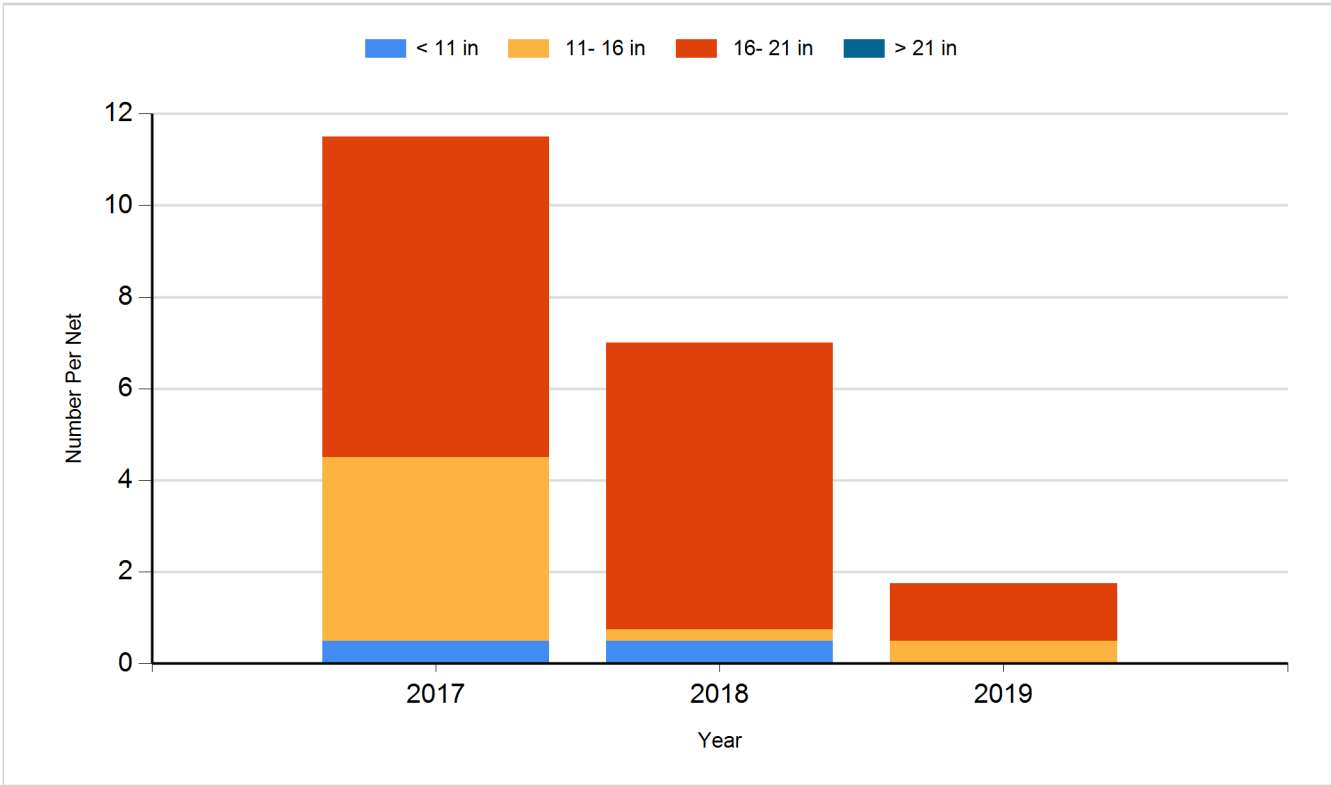
Species: Channel Catfish
Gear: AFS std gill net



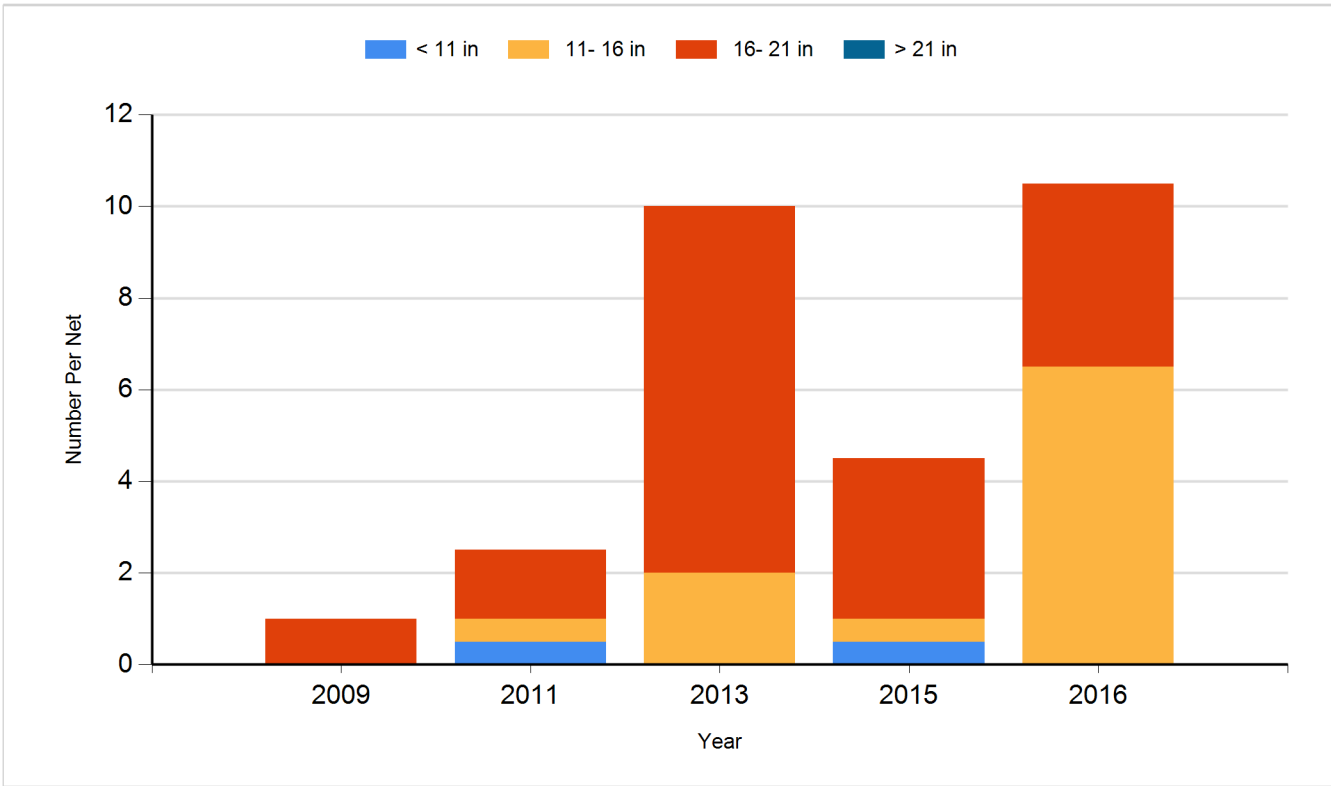
Species: Channel Catfish
Gear: std exp gill net



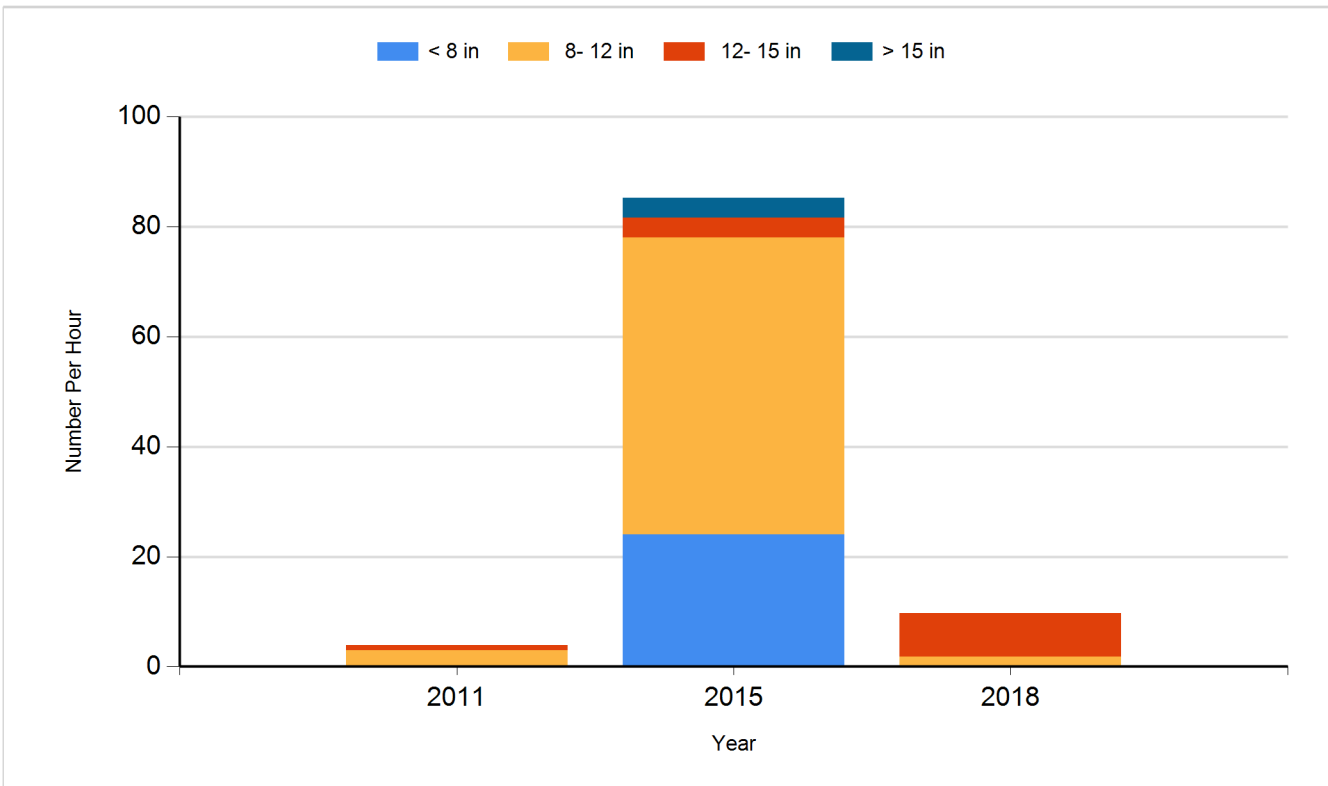
Species: Common Carp
Gear: AFS std gill net



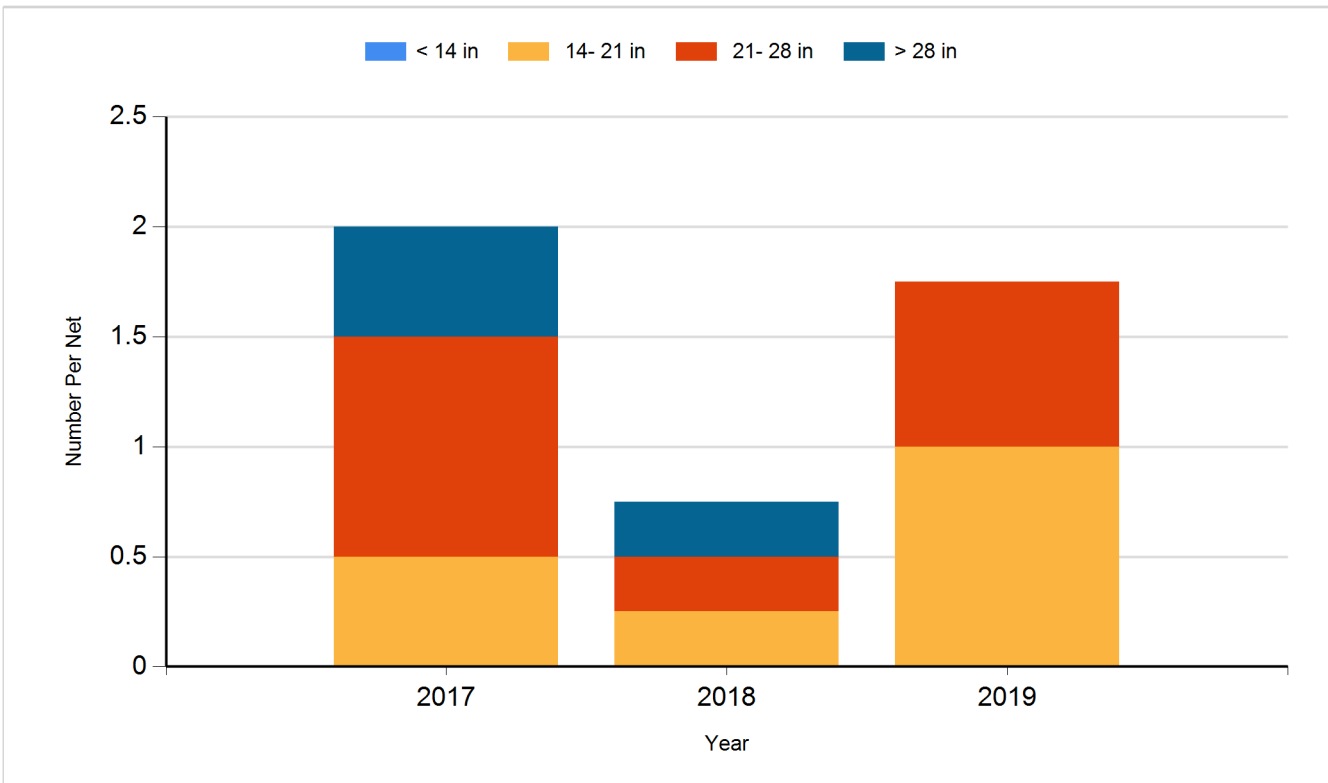
Species: Common Carp
Gear: std exp gill net



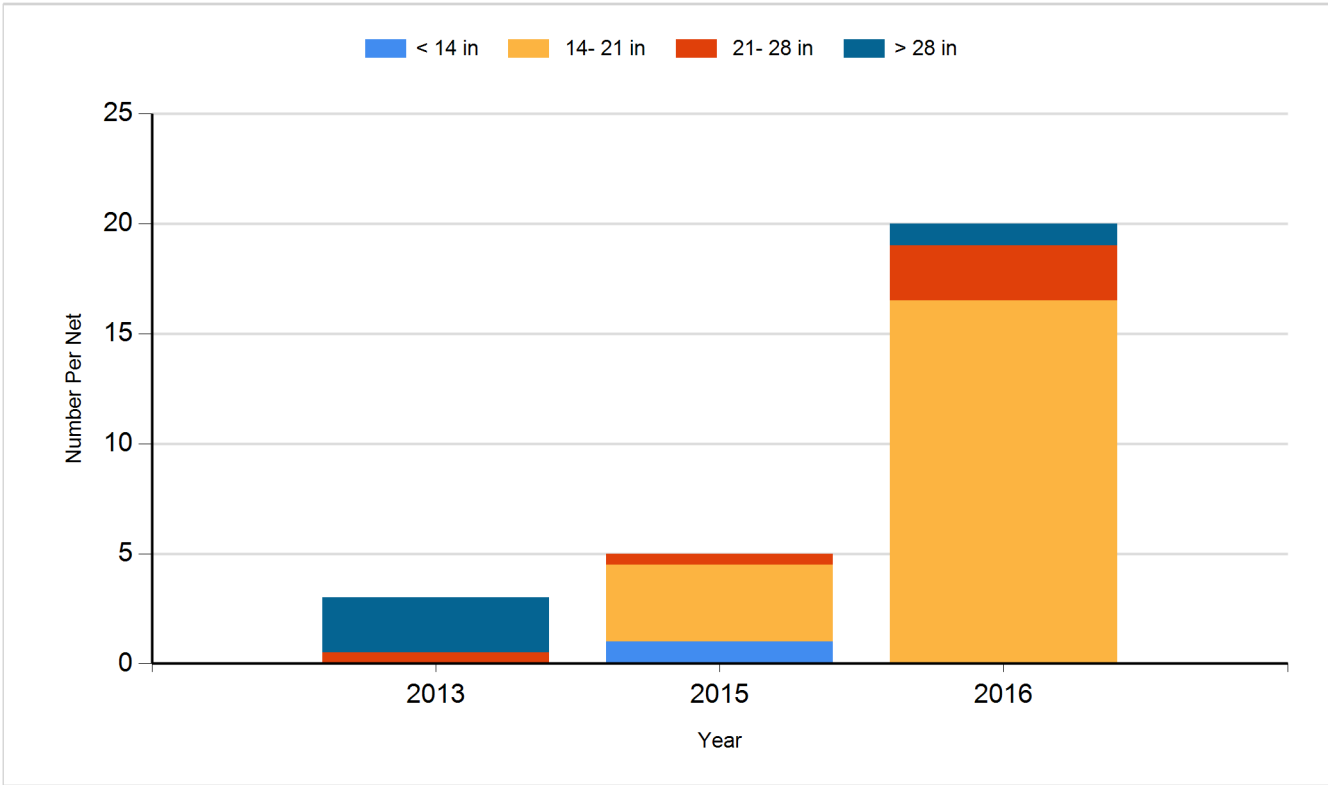
Species: Largemouth Bass
Gear: boat shocker (day)



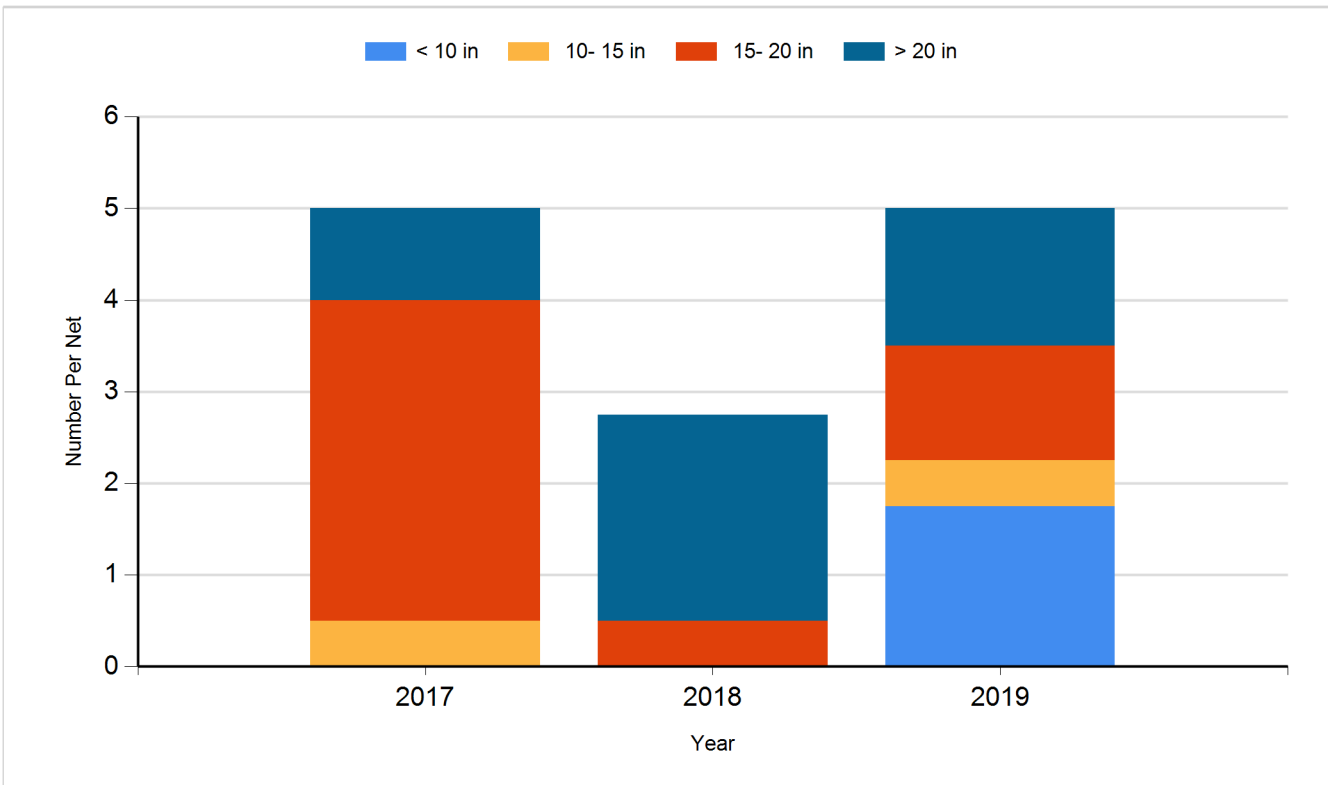
Species: Northern Pike
Gear: AFS std gill net



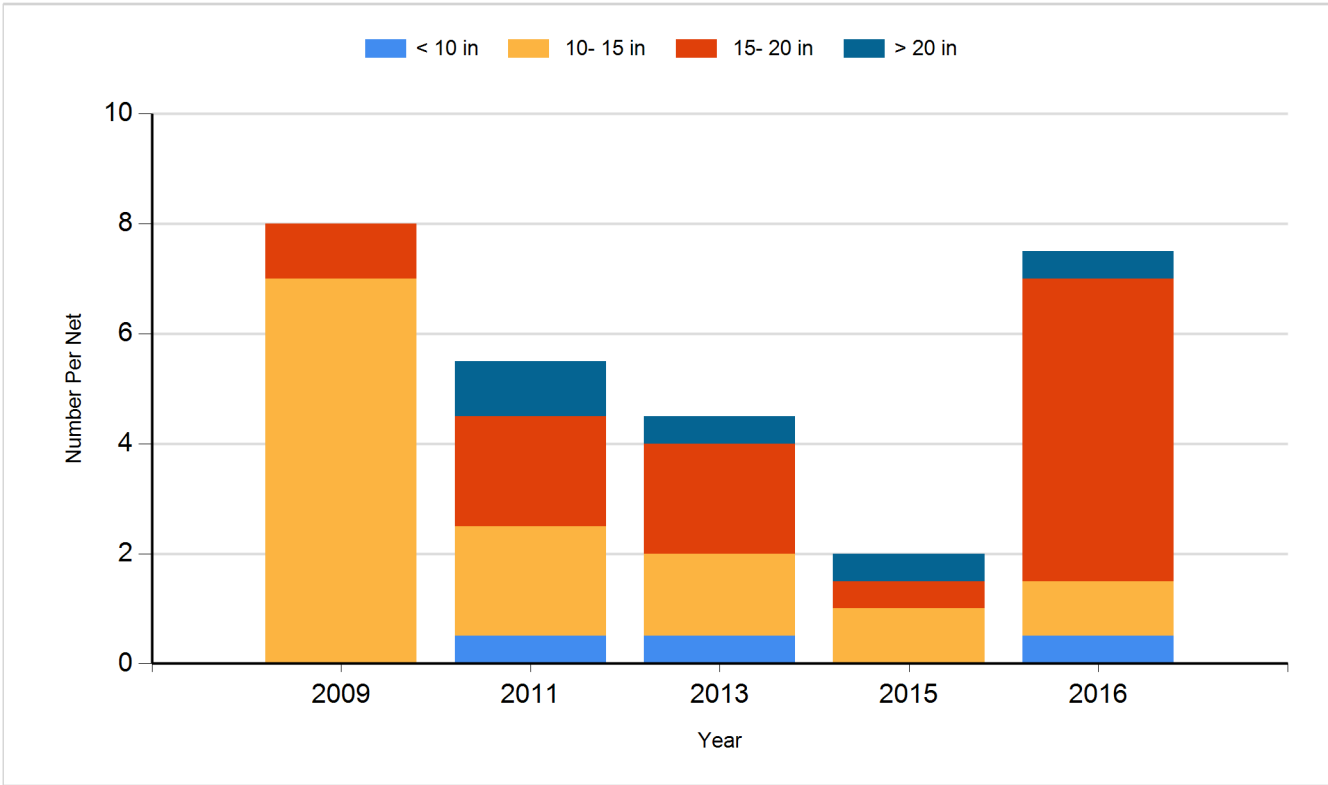
Species: Northern Pike
Gear: std exp gill net



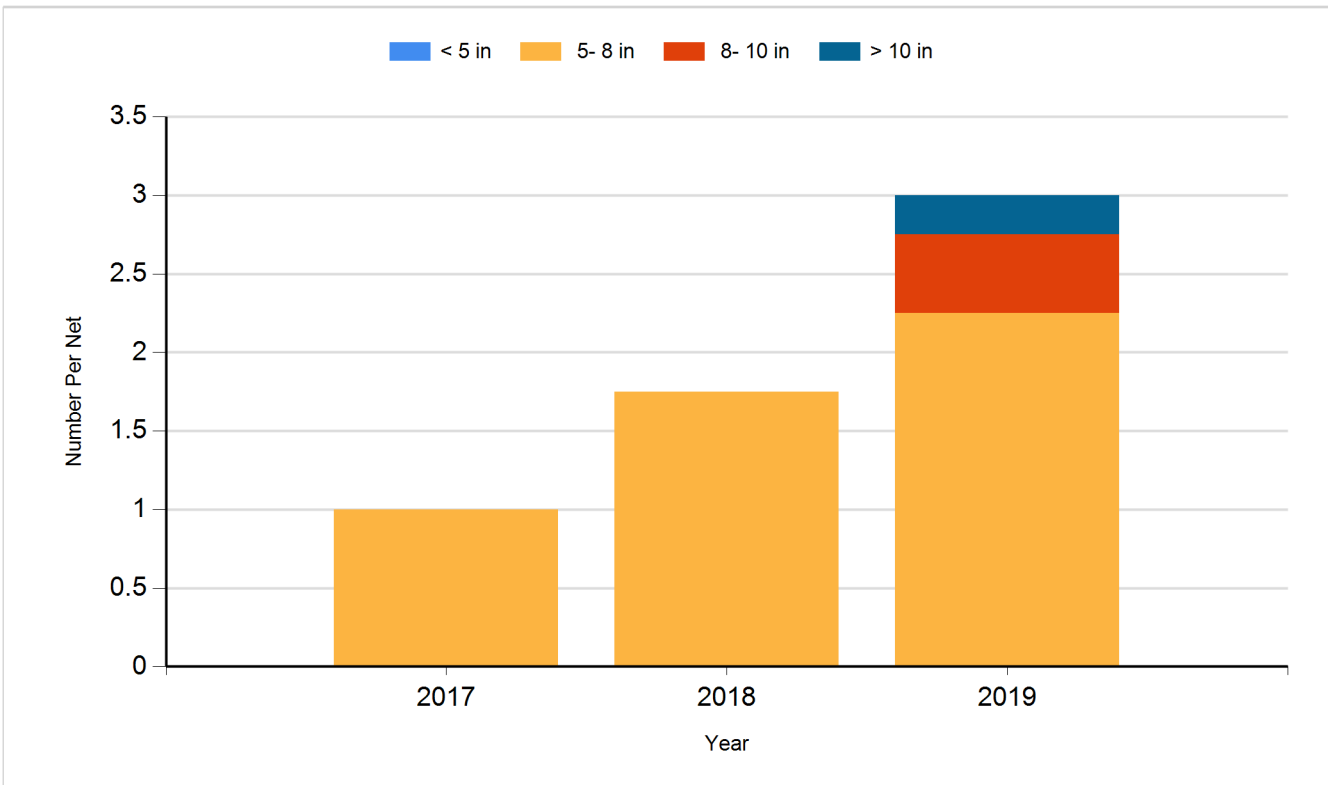
Species: Walleye
Gear: AFS std gill net



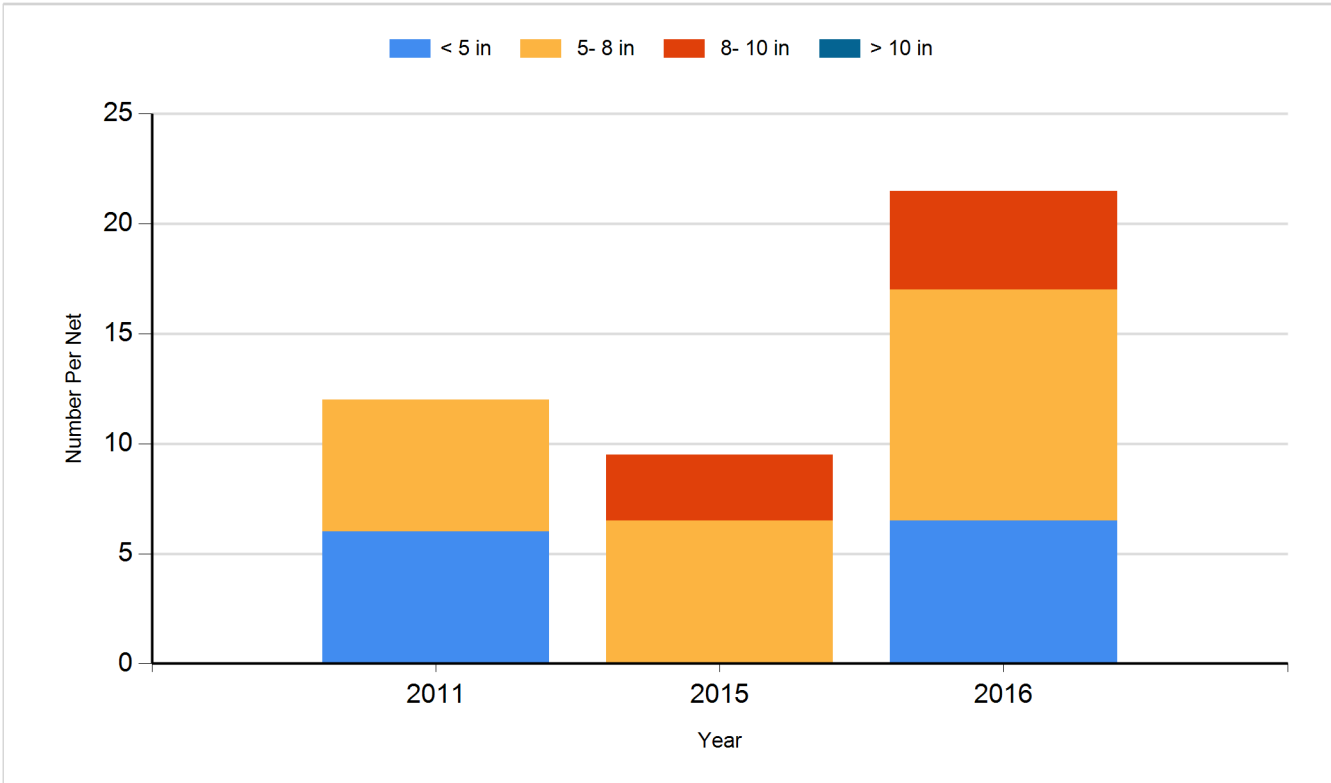
Species: Walleye
Gear: std exp gill net



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
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
2019	Gizzard Shad	Adult	65
2019	Walleye	Small Fingerling	30,600