SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Vermillion East, McCook County
VER-Lake-62-800
2017

Lake Information

Name:	Vermillion East	**Maximum Depth:**	23 Feet
County:	McCook	**Mean Depth:**	12 Feet
Legal Description:	T102N-R53W-Sec. 14-15, 22-23, 26-27, 33-35		
Surface Area:	580 Acres		

Surveys and Investigations

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

Gear	Date	Effort
AFS std frame net	June 13, 2017	10 net-nights
AFS std gill net	June 13, 2017	10 net-nights

Common Fish Species Present

Walleye

White Sucker

Freshwater Drum

Channel Catfish

Black Bullhead

White Bass

Common Carp

Bluegill

Black Crappie

Northern Pike

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).

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

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)
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

	Stock		Quality		Preferred		Memorable		Trophy	
Species Name	(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).

		Abundance		Stock Density Indices				Condition	
Gear	Species	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std frame net	Black Bullhead	3.0	2.2	97		80	12		
	Black Crappie	1.0	0.5	60		20		105	4
	Bluegill	1.3	1.1	77		0		121	3
	Channel Catfish	0.1	0.1	100		0		101	
	Common Carp	1.6	0.8	88		75			
	Freshwater Drum	0.2	0.2	100		100			
	Green Sunfish	0.1	0.1	100		0			
	Northern Pike	0.5	0.4	60		40		87	3
	Sunfish Hybrid	0.0	0.0						
	Walleye	0.7	0.7	71		29		77	2
	White Bass	0.8	0.6	88		75		92	2
	White Crappie	0.0	0.0	0		0			
	White Sucker	6.9	4.3	100		100			
AFS std gill net	Black Bullhead	0.2	0.2	100		50			
	Black Crappie	0.2	0.2	50		0		113	11
	Bluegill	0.1	0.1	100		100		119	
	Channel Catfish	3.4	0.5	79	11	3		109	5
	Common Carp	1.6	1.2	50	21	31			
	Freshwater Drum	5.7	1.7	95		28	9		
	Northern Pike	0.6	0.2	100		17		90	6
	Walleye	1.1	0.8	64		27		95	12
	White Bass	2.6	1.1	69	14	62	15	95	1
	White Crappie	0.1	0.1	100		100		104	
	White Sucker	10.5	2.4	100		99			

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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg
AFS std frame net	Black Bullhead										3.0	3.0
	Black Crappie										1.0	1.0
	Bluegill										1.3	1.3
	Channel Catfish										0.1	0.1
	Common Carp										1.6	1.6
	Freshwater Drum										0.2	0.2
	Green Sunfish										0.1	0.1
	Northern Pike										0.5	0.5
	Sunfish Hybrid										0.0	0.0
	Walleye										0.7	0.7
	White Bass										0.8	0.8
	White Crappie										0.0	0.0
	White Sucker										6.9	6.9
AFS std gill net	Black Bullhead										0.2	0.2
	Black Crappie										0.2	0.2
	Bluegill										0.1	0.1
	Channel Catfish										3.4	3.4
	Common Carp										1.6	1.6
	Freshwater Drum										5.7	5.7
	Northern Pike										0.6	0.6
	Walleye										1.1	1.1
	White Bass										2.6	2.6
	White Crappie										0.1	0.1
	White Sucker										10.5	10.5
fall night EF-WAE	Walleye	35.4	163.8	102.0	51.5	59.0	149.5	1.2	82.5			80.6
large frame net	Black Bullhead	64.8	374.1	35.9	77.9	152.4	64.0					128.2
	Black Crappie	0.3	0.3	11.3	35.6	0.9	0.8					8.2
	Bluegill	3.6	0.8	2.1	4.1	2.1	3.7					2.7
	Channel Catfish	2.5	0.2	0.2	0.1	1.1	1.2					0.9
	Common Carp	7.4	0.3	1.7	0.9	3.1	7.6					3.5
	Freshwater Drum	0.1	0.1	0.6	0.5	0.4	0.2					0.3
	Green Sunfish	0.1		0.1								0.1
	Largemouth Bass				0.1	0.2						0.2

		CPUE										
Gear	Species	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg
large frame net	Northern Pike	1.0	0.3	0.6	2.7	3.2	1.2					1.5
	Orangespotted Sunfish			0.0								0.0
	Walleye	1.5	1.7	1.5	1.1	0.3	0.4					1.1
	White Bass				0.3	0.1	0.3					0.2
	White Crappie		0.1	0.1	4.1	1.1	0.3					1.1
	White Sucker	2.5	5.2	4.4	5.2	2.0	0.6					3.3
	Yellow Perch	0.1	0.1	1.5	1.9							0.9
std exp gill net	Bigmouth Buffalo								0.0			0.0
	Black Bullhead	86.8	129.3	59.0	51.0	164.7	20.3	8.2	1.8			65.1
	Black Crappie	0.3	0.3	2.0	2.0	2.3	0.3	0.3				1.1
	Bluegill						0.3		0.8			0.6
	Channel Catfish	3.5	5.5	0.3	0.3	2.3	0.3	1.5	2.8	1.8		2.0
	Common Carp	2.0	0.8	0.3	1.0	3.3	1.8	1.0		1.3		1.4
	Freshwater Drum			0.5	0.5	1.7	4.3	1.2	5.3	5.2		2.7
	Northern Pike	0.8	0.3	1.0	3.5	3.7	4.0	3.7	1.8	2.7		2.4
	Orangespotted Sunfish		0.0	0.0								0.0
	Walleye	8.0	7.0	6.3	4.5	13.3	8.0	3.3	5.5	3.7		6.6
	White Bass						1.0	5.0	6.5	9.0		5.4
	White Crappie			2.0					0.5			1.3
	White Sucker	10.0	10.0	18.5	19.8	3.3	9.0	8.7	8.5	12.5		11.1
	Yellow Perch	11.5	2.8	4.3	12.0	1.7	3.0	1.3	1.3	1.2		4.3
std frame net (3/8 inch)	Bigmouth Buffalo							0.5	0.8			0.7
	Black Bullhead							23.4	50.1	12.8		28.8
	Black Crappie							0.6	0.2	0.9		0.6
	Bluegill							5.9	0.8	3.3		3.3
	Channel Catfish							1.4	1.5	0.5		1.1
	Common Carp							3.2	10.7	2.1		5.3
	Freshwater Drum							0.2	1.2	0.1		0.5
	Largemouth Bass								0.1	0.1		0.1
	Northern Pike							2.2	1.9	1.9		2.0
	Walleye							1.9	0.7	0.5		1.0
	White Bass							0.9	3.8	2.1		2.3
	White Crappie							0.1	0.6	1.1		0.6
	White Sucker							1.9	11.7	2.9		5.5
	Yellow Perch							0.1				0.1

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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
AFS std frame net	Black Crappie	PSD										60
		PSD-P										20
		Wr										105
	Northern Pike	PSD										60
		PSD-P										40
		Wr										87
	Walleye	PSD										71
		PSD-P										29
		Wr										77
AFS std gill net	Black Crappie	PSD										50
		PSD-P										0
		Wr										113
	Northern Pike	PSD										100
		PSD-P										17
		Wr										90
	Walleye	PSD										64
		PSD-P										27
		Wr										95
fall night EF-WAE	Walleye	Wr	93	95	83	88	84	93	83	81		
large frame net	Black Crappie	PSD	0	33	47	41	89	100				
		PSD-P	0	0	3	5	11	29				
		Wr	127	126	111	109	101	110				
	Northern Pike	PSD	70	33	67	26	38	27				
		PSD-P	20	0	50	11	3	0				
		Wr	87	94	93	89	75	78				
	Walleye	PSD	7	35	73	27	33	50				
		PSD-P	0	6	13	0	33	50				
		Wr	90	88	83	82	73	92				
	Yellow Perch	PSD	100	100	20	95						
		PSD-P	0	100	0	5						

			Year									
Gear	Species	Index	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
large frame net	Yellow Perch	Wr	108	108	99	87						
std exp gill net	Black Crappie	PSD	0	0	38	0	100	100	50			
		PSD-P	0	0	0	0	43	100	50			
		Wr	105	121	121	122	107	125	101			
	Northern Pike	PSD	100	100	50	64	45	38	59	86	81	
		PSD-P	33	0	25	0	9	6	5	0	13	
		Wr	91	90	91	86	78	85	85	98	90	
	Walleye	PSD	0	21	40	33	43	22	85	9	36	
		PSD-P	0	4	0	11	8	3	20	5	5	
		Wr	89	95	85	85	82	90	88	83	81	
	Yellow Perch	PSD	89	45	47	40	80	42	100	100	100	
		PSD-P	7	0	35	0	0	0	13	0	43	
		Wr	108	120	107	90	88	105	101	97	102	
std frame net (3/8 inch)	Black Crappie	PSD							33	100	89	
		PSD-P							33	0	22	
		Wr							106	119	101	
	Northern Pike	PSD							77	89	89	
		PSD-P							5	16	16	
		Wr							88	83	83	
	Walleye	PSD							100	71	80	
		PSD-P							37	29	20	
		Wr							87	83	81	
	Yellow Perch	PSD							0			
		PSD-P							0			
		Wr							98			

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+
2013	7		214 (3)	254 (4)							
2012	9	142 (1)	226 (4)	236 (3)	272 (1)						
2011	354	160 (173)	201 (143)	238 (13)	254 (11)	248 (14)					

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2016	28	214 (8)	316 (13)	419 (2)			466 (4)	434 (1)			
2015	30	227 (14)	310 (14)		394 (1)					646 (1)	
2014	22	248 (3)		373 (2)	404 (10)	461 (4)			594 (1)	485 (1)	576 (1)
2013	32		304 (6)	347 (22)	466 (4)						
2012	41	269 (1)	320 (17)	391 (15)	449 (3)	497 (3)	587 (2)				
2011	29	195 (11)	334 (13)	397 (2)		466 (2)					550 (1)
2010	39	254 (28)		409 (3)	437 (8)						
2009	28		292 (4)	350 (23)	555 (1)						
2008	40	216 (2)	290 (37)	372 (1)							

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2013	12		165 (7)	226 (5)							
2012	5		188 (2)	221 (3)							
2011	48	145 (4)	198 (43)	245 (1)							

Fish Condition

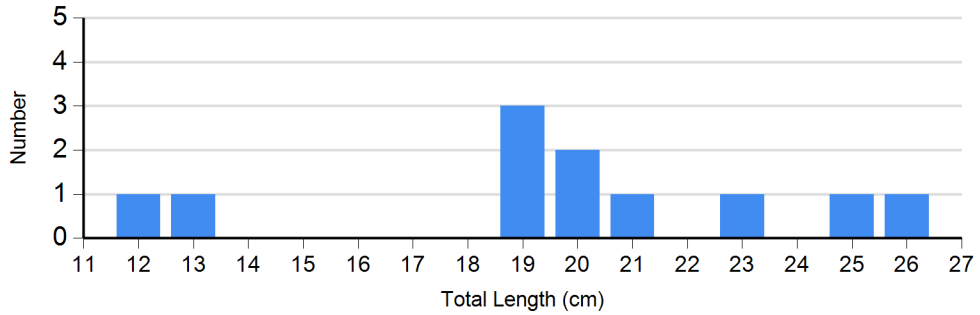
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2013	0		5	112 (3.1)	2	107 (3.9)	0	
	2014	4	119 (2.8)	0		2	87 (3.9)	0	
	2015	0		2	119 (0.9)	0		0	
	2016	1	100	6	103 (2.8)	2	96 (4.1)	0	
	2017	4	114 (4.6)	4	100 (1.8)	2	98 (0.4)	0	
Northern Pike Gill Net	2013	10	80 (1.6)	5	89 (5.2)	1	120	0	
	2014	9	84 (1.9)	12	86 (1.4)	1	87	0	
	2015	1	78	6	102 (14.0)	0		0	
	2016	3	106 (15.5)	11	87 (1.4)	2	82 (2.5)	0	
	2017	0		5	88 (4.5)	1	102	0	
Walleye Gill Net	2013	25	89 (1.1)	6	91 (3.0)	1	88	0	
	2014	3	82 (2.2)	13	87 (2.1)	4	96 (4.9)	0	
	2015	20	84 (1.2)	1	80	0		1	69
	2016	14	82 (1.7)	7	81 (1.5)	1	79	0	
	2017	4	112 (24.5)	4	84 (4.6)	1	85	2	89 (4.1)
Yellow Perch Gill Net	2013	7	112 (2.0)	5	99 (7.2)	0		0	
	2014	0		7	104 (3.7)	1	87	0	
	2015	0		5	97 (2.5)	0		0	
	2016	0		4	107 (5.1)	3	94 (1.9)	0	

Length Frequency Distribution

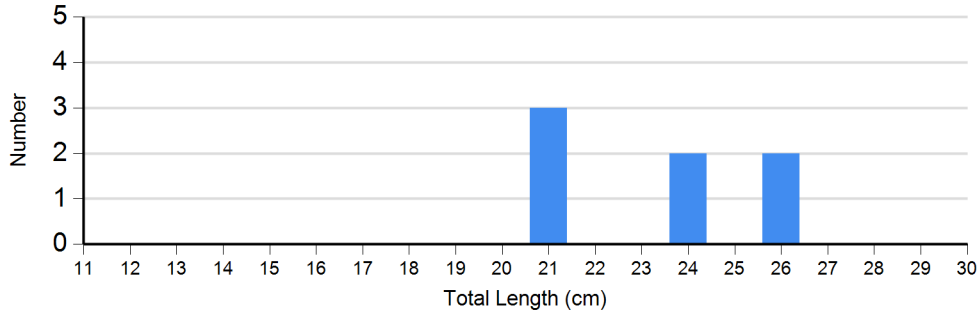
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net



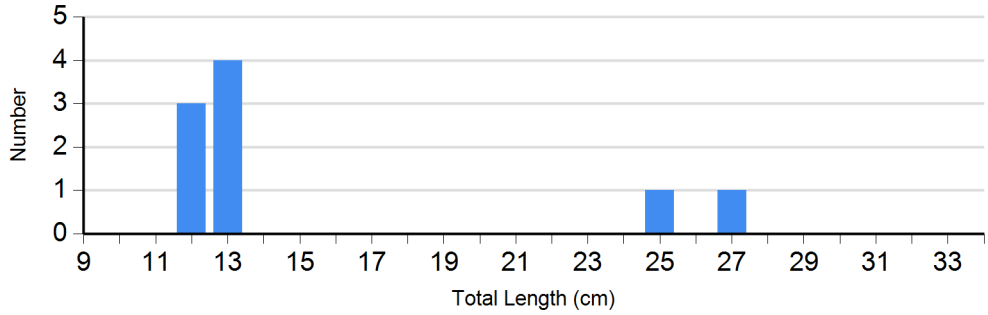
2017

Species: Black Crappie
Gear: large frame net



2013

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



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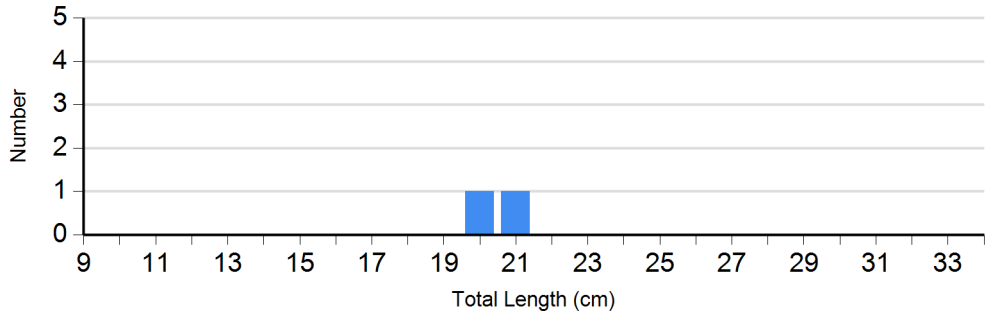

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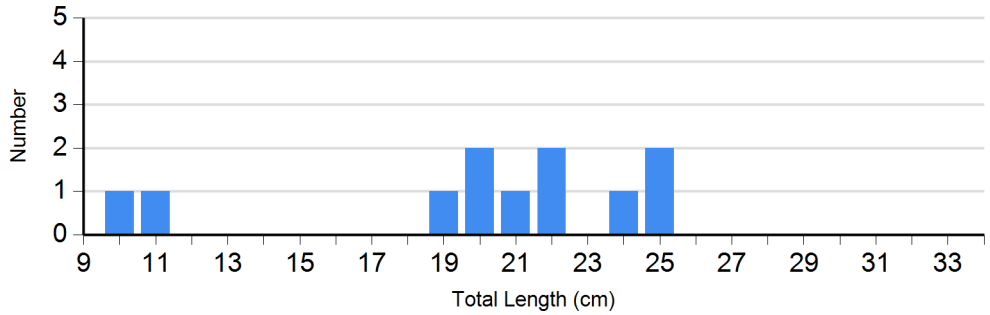
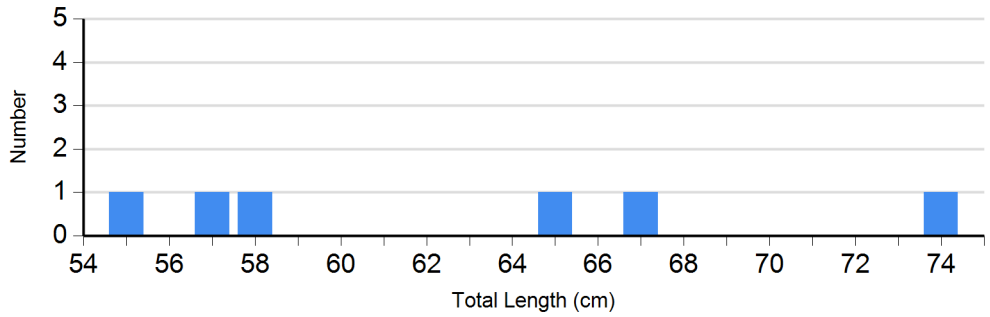


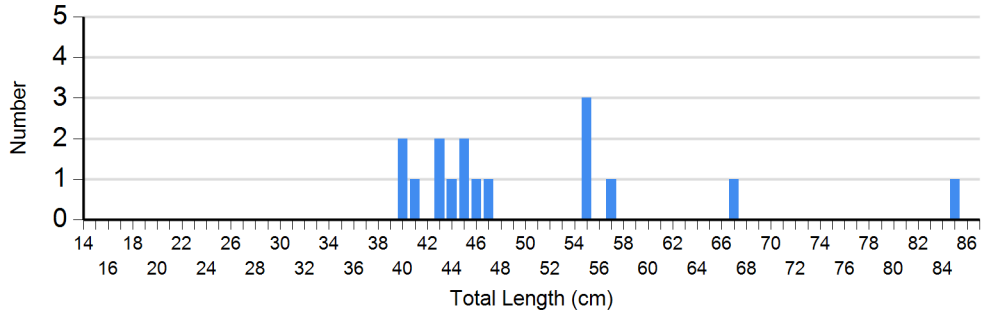
2016

Species: Northern Pike
Gear: AFS std gill net

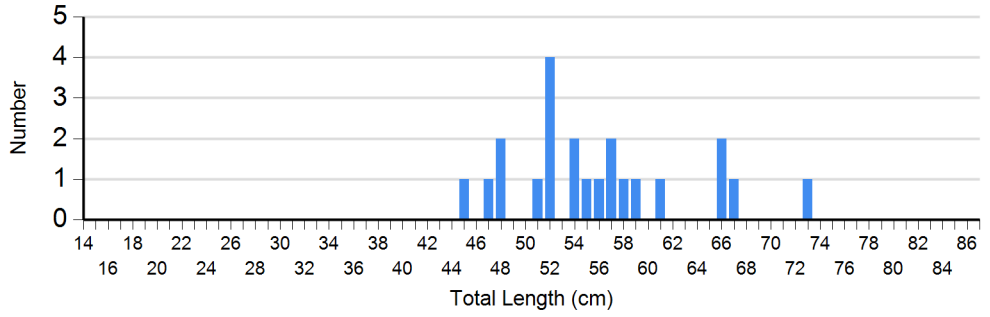


2017

Species: Northern Pike
Gear: std exp gill net



2013



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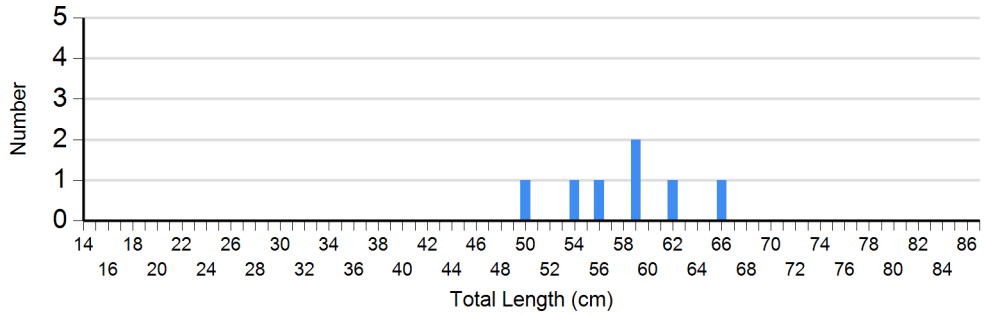
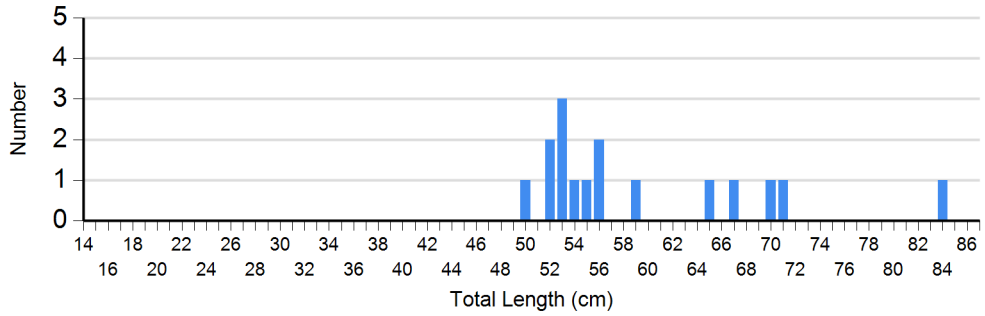
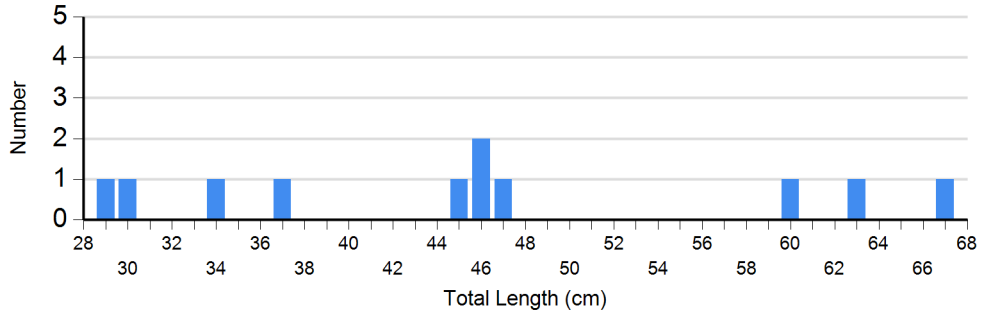


2015



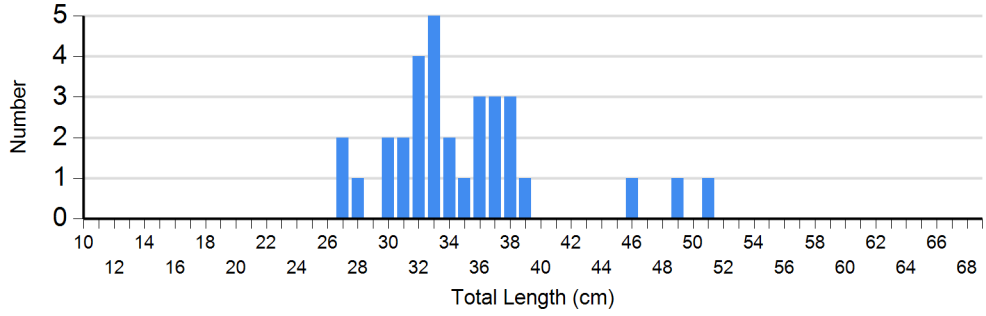
2016

Species: Walleye
Gear: AFS std gill net

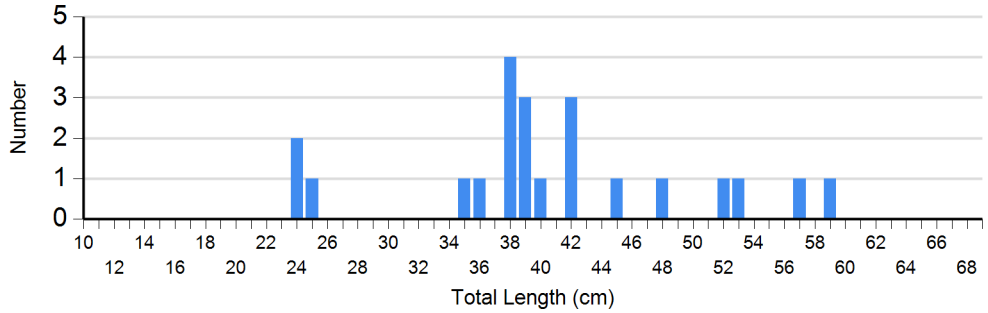


2017

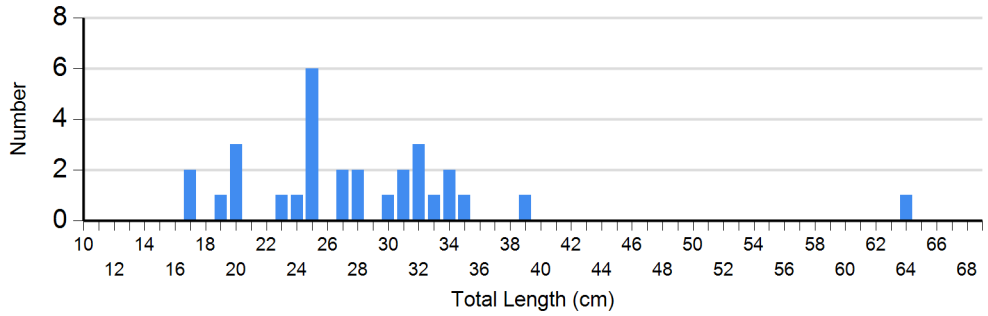
Species: Walleye
Gear: std exp gill net



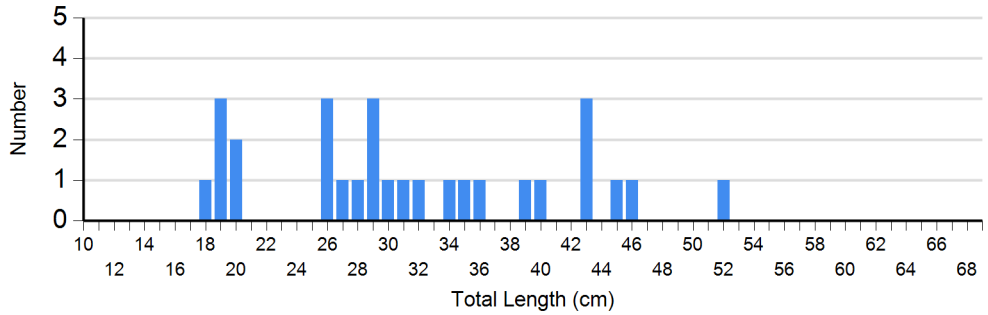
2013



2014

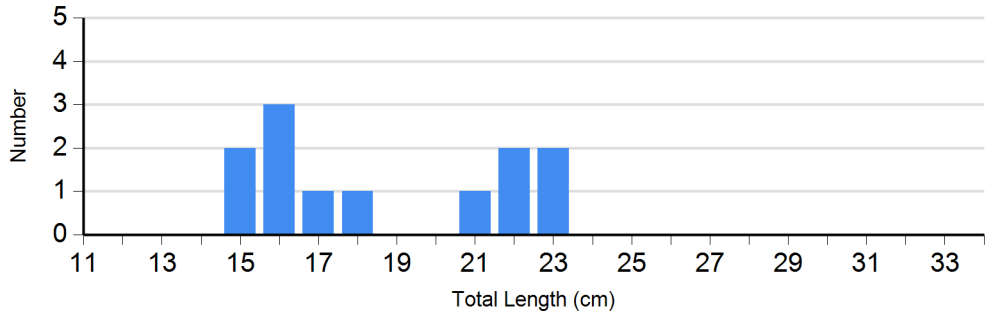


2015

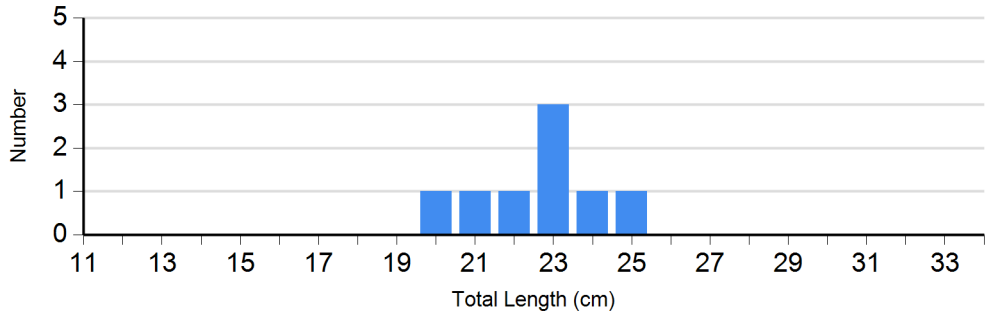


2016

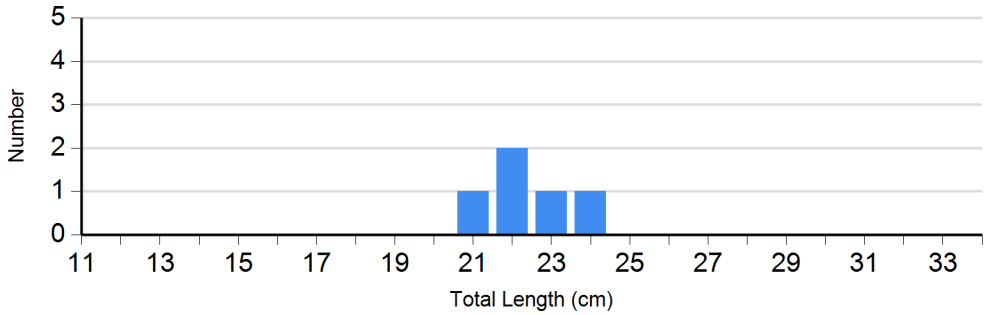
Species: Yellow Perch
Gear: std exp gill net



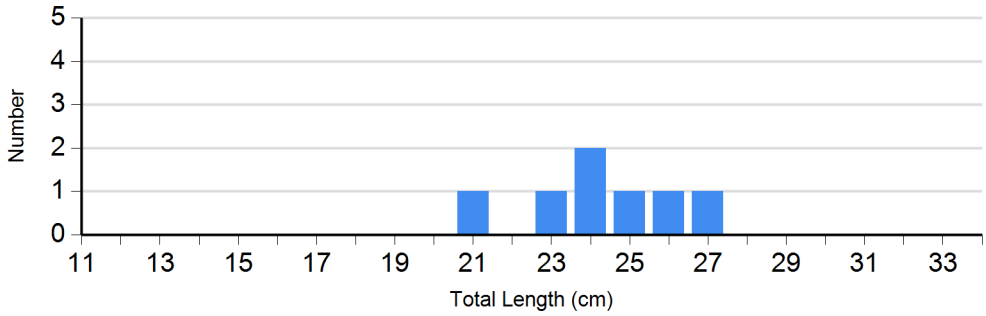
2013



2014


Number
5
4
3
2
1
0
11
13
15
17
19
21
23
25
27
29
31
33
Total Length (cm)

2015

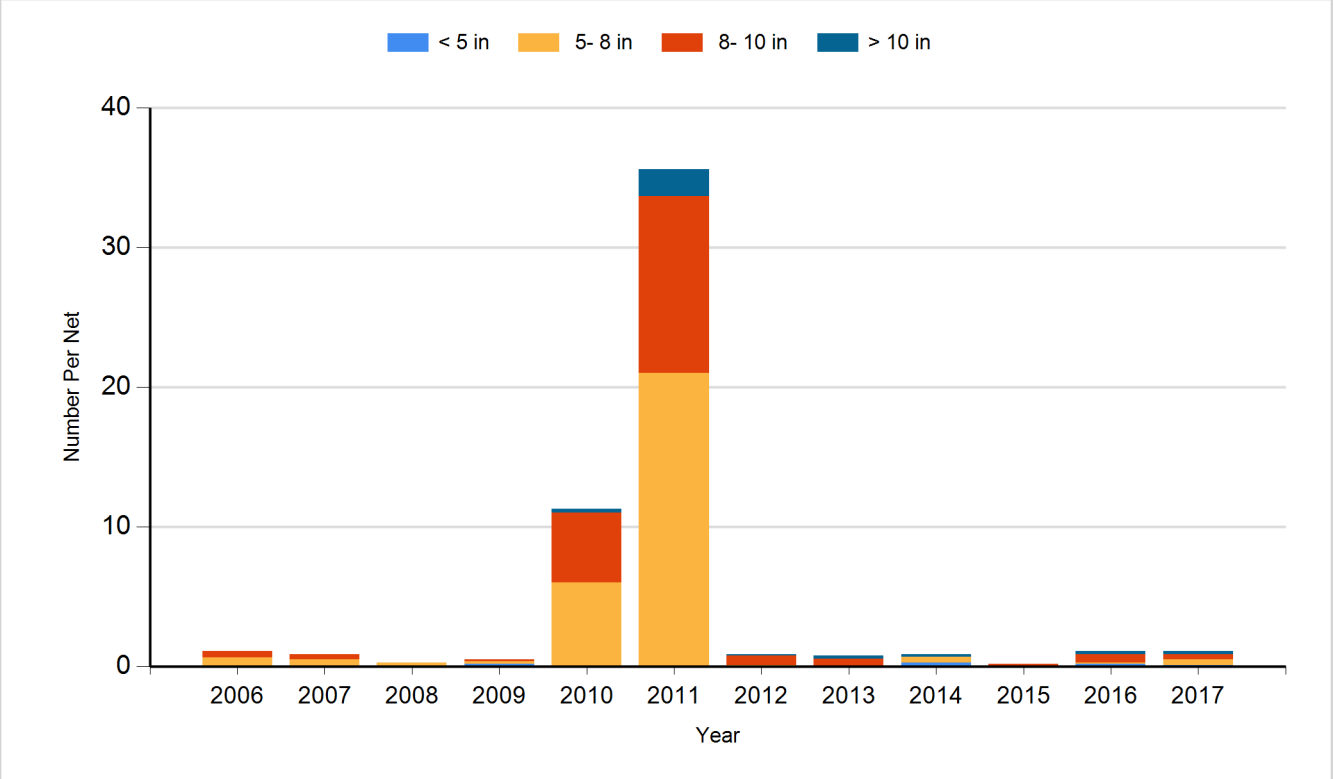

Number
5
4
3
2
1
0
11
13
15
17
19
21
23
25
27
29
31
33
Total Length (cm)

2016

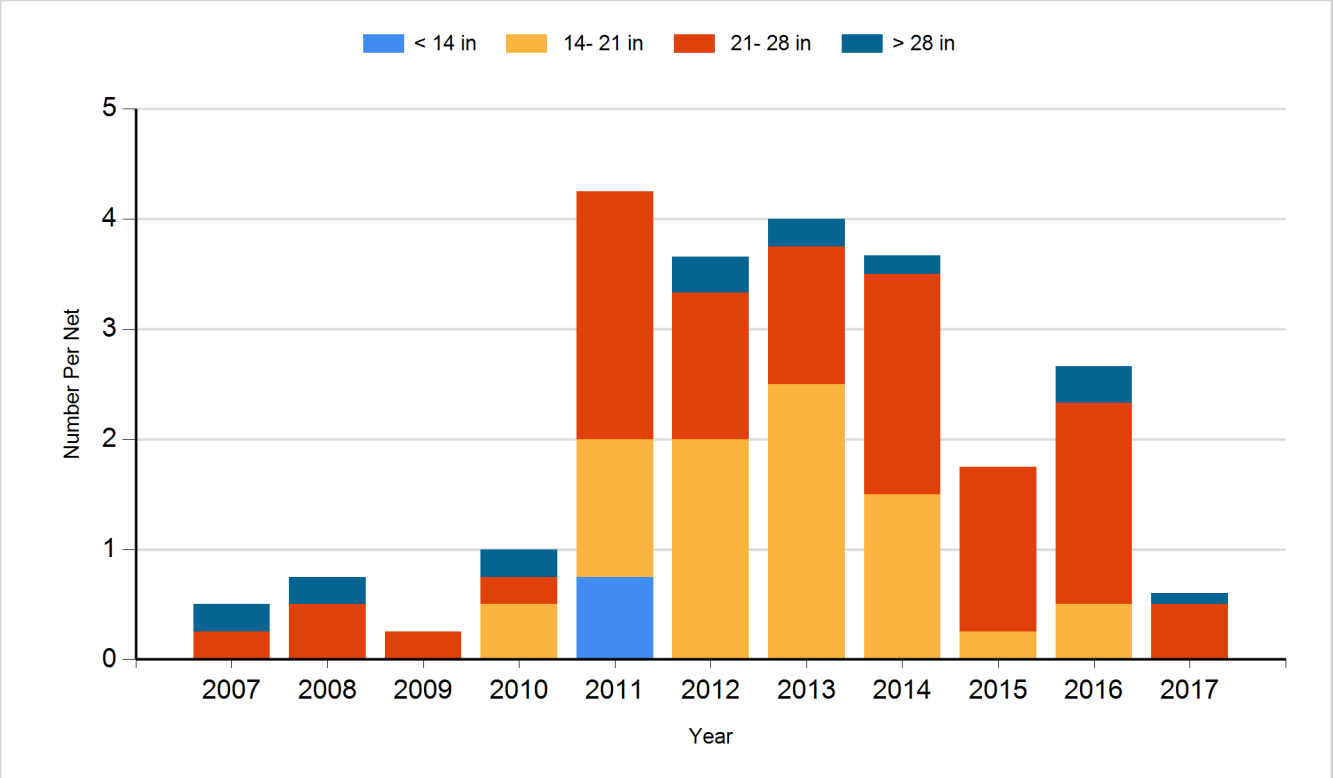
Historic Fish Sizes and Relative Abundance

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

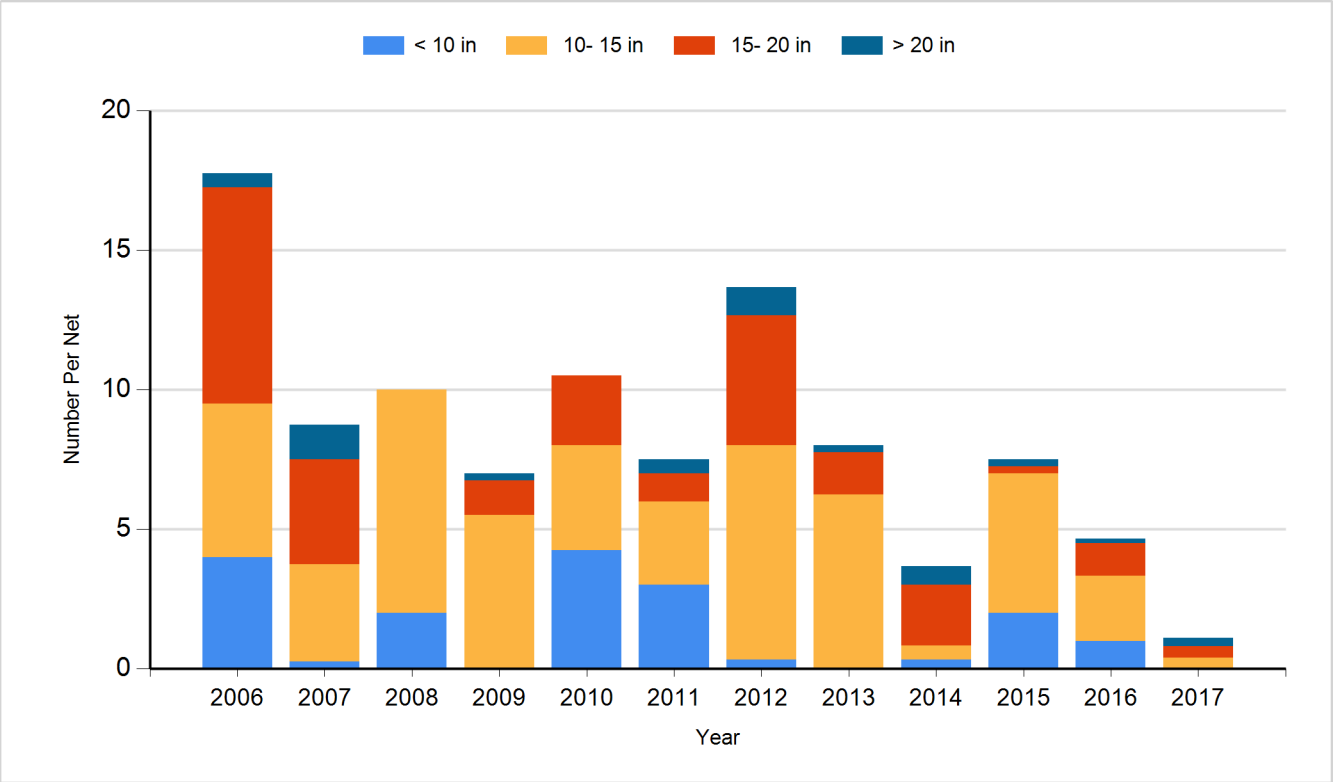
Species: Black Crappie
Gear: Frame Net



Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net