SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Vermillion East, McCook County
VER-Lake-62-800
2015

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
fall night EF-WAE	September 17, 2015	7200 seconds
std exp gill net	July 07, 2015	4 net-nights
std frame net (3/8 inch)	July 07, 2015	10 net-nights

Common Fish Species Present

Walleye

Black Bullhead

White Sucker

Common Carp

White Bass

Freshwater Drum

Channel Catfish

Northern Pike

Yellow Perch

Bigmouth Buffalo

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
fall night EF-WAE	Walleye	82.5	42.7					81	1
std exp gill net	Bigmouth Buffalo	0.0	0.0	0		0			
	Black Bullhead	1.8	1.4	86		29			
	Bluegill	0.8	0.4	67		0		119	1
	Channel Catfish	2.8	1.0	73		36		112	4
	Freshwater Drum	5.3	3.7	81		0			
	Northern Pike	1.8	1.0	86		0		98	16
	Walleye	5.5	4.5	9		5		83	2
	White Bass	6.5	5.2	42	15	27	14	92	2
	White Crappie	0.5	0.8	0		0		98	10
	White Sucker	8.5	2.2	100		65	13		
	Yellow Perch	1.3	1.2	100		0		97	3
std frame net (3/8 inch)	Bigmouth Buffalo	0.8	0.6	13		0			
	Black Bullhead	50.1	14.1	99	1	50	3		
	Black Crappie	0.2	0.3	100		0		119	1
	Bluegill	0.8	0.5	88		50		118	4
	Channel Catfish	1.5	1.4	80		40	21	103	3
	Common Carp	10.7	3.4	98		67	6		
	Freshwater Drum	1.2	0.8	83		25			
	Largemouth Bass	0.1	0.1	100		100		107	
	Northern Pike	1.9	0.7	89		16		83	3
	Walleye	0.7	0.4	71		29		83	4
	White Bass	3.8	3.2	82	10	58	12	93	1
	White Crappie	0.6	0.3	67		50		100	3
	White Sucker	11.7	5.1	98		96			

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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Avg
fall night EF-WAE	Largemouth Bass	1.9										1.9
	Walleye	150.0	16.5	35.4	163.8	102.0	51.5	59.0	149.5	1.2	82.5	81.1
large frame net	Black Bullhead	1,713.0	501.8	64.8	374.1	35.9	77.9	152.4	64.0			373.0
	Black Crappie	1.1	0.9	0.3	0.3	11.3	35.6	0.9	0.8			6.4
	Bluegill	4.9	2.5	3.6	0.8	2.1	4.1	2.1	3.7			3.0
	Channel Catfish	3.1	1.9	2.5	0.2	0.2	0.1	1.1	1.2			1.3
	Common Carp	1.9	7.6	7.4	0.3	1.7	0.9	3.1	7.6			3.8
	Freshwater Drum			0.1	0.1	0.6	0.5	0.4	0.2			0.3
	Green Sunfish	0.3	0.1	0.1		0.1						0.2
	Largemouth Bass	0.3					0.1	0.2				0.2
	Northern Pike	1.3	0.2	1.0	0.3	0.6	2.7	3.2	1.2			1.3
	Orangespotted Sunfish					0.0						0.0
	Walleye		1.1	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		0.2		0.1	0.1	4.1	1.1	0.3			1.0
	White Sucker	2.1	1.6	2.5	5.2	4.4	5.2	2.0	0.6			3.0
	Yellow Perch	1.5	0.7	0.1	0.1	1.5	1.9					1.0
std exp gill net	Bigmouth Buffalo										0.0	0.0
	Black Bullhead	167.5	98.8	86.8	129.3	59.0	51.0	164.7	20.3	8.2	1.8	78.7
	Black Crappie	0.3		0.3	0.3	2.0	2.0	2.3	0.3	0.3		1.0
	Bluegill								0.3		0.8	0.6
	Channel Catfish	10.8	2.5	3.5	5.5	0.3	0.3	2.3	0.3	1.5	2.8	3.0
	Common Carp	2.8	3.8	2.0	0.8	0.3	1.0	3.3	1.8	1.0		1.9
	Freshwater Drum	0.3				0.5	0.5	1.7	4.3	1.2	5.3	2.0
	Northern Pike		0.5	0.8	0.3	1.0	3.5	3.7	4.0	3.7	1.8	2.1
	Orangespotted Sunfish				0.0	0.0						0.0
	Walleye	13.8	8.5	8.0	7.0	6.3	4.5	13.3	8.0	3.3	5.5	7.8
	White Bass								1.0	5.0	6.5	4.2
	White Crappie	0.3				2.0					0.5	0.9
	White Sucker	3.0	8.3	10.0	10.0	18.5	19.8	3.3	9.0	8.7	8.5	9.9
	Yellow Perch	6.3	7.3	11.5	2.8	4.3	12.0	1.7	3.0	1.3	1.3	5.2
std frame net (3/8 inch)	Bigmouth Buffalo									0.5	0.8	0.7
	Black Bullhead									23.4	50.1	36.8

		CPUE										
Gear	Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Avg
std frame net (3/8 inch)	Black Crappie									0.6	0.2	0.4
	Bluegill									5.9	0.8	3.4
	Channel Catfish									1.4	1.5	1.5
	Common Carp									3.2	10.7	7.0
	Freshwater Drum									0.2	1.2	0.7
	Largemouth Bass										0.1	0.1
	Northern Pike									2.2	1.9	2.1
	Walleye									1.9	0.7	1.3
	White Bass									0.9	3.8	2.4
	White Crappie									0.1	0.6	0.4
	White Sucker									1.9	11.7	6.8
	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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
fall night EF-WAE	Walleye	Wr	93	88	93	95	83	88	84	93	83	81
large frame net	Black Crappie	PSD	44	44	0	33	47	41	89	100		
		PSD-P	0	0	0	0	3	5	11	29		
		Wr	115	111	127	126	111	109	101	110		
	Northern Pike	PSD	10	100	70	33	67	26	38	27		
		PSD-P	10	50	20	0	50	11	3	0		
		Wr	90	81	87	94	93	89	75	78		
	Walleye	PSD		45	7	35	73	27	33	50		
		PSD-P		18	0	6	13	0	33	50		
		Wr		79	90	88	83	82	73	92		
	Yellow Perch	PSD	8	29	100	100	20	95				
		PSD-P	8	0	0	100	0	5				
		Wr	99	94	108	108	99	87				
std exp gill net	Black Crappie	PSD	0		0	0	38	0	100	100	50	
		PSD-P	0		0	0	0	0	43	100	50	
		Wr	113		105	121	121	122	107	125	101	
	Northern Pike	PSD		100	100	100	50	64	45	38	59	86
		PSD-P		50	33	0	25	0	9	6	5	0
		Wr		86	91	90	91	86	78	85	85	98
	Walleye	PSD	60	59	0	21	40	33	43	22	85	9
		PSD-P	4	15	0	4	0	11	8	3	20	5
		Wr	100	86	89	95	85	85	82	90	88	83
	Yellow Perch	PSD	60	24	89	45	47	40	80	42	100	100
		PSD-P	16	0	7	0	35	0	0	0	13	0
		Wr	105	113	108	120	107	90	88	105	101	97
std frame net (3/8 inch)	Black Crappie	PSD									33	100
		PSD-P									33	0
		Wr									106	119
	Northern Pike	PSD									77	89
		PSD-P									5	16

			Year									
Gear	Species	Index	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
std frame net (3/8 inch)	Northern Pike	Wr									88	83
	Walleye	PSD									100	71
		PSD-P									37	29
		Wr									87	83
	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)					
2006	9	169 (6)	220 (3)								

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
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)							
2007	35	270 (6)	323 (5)	387 (5)	392 (5)	462 (2)	446 (2)	467 (3)	518 (3)	552 (1)	578 (3)
2006	70	229 (18)	325 (19)	418 (20)		449 (5)	459 (5)	509 (3)		531 (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)							
2006	24	158 (8)	212 (7)	231 (3)	235 (1)	256 (5)					

Fish Condition

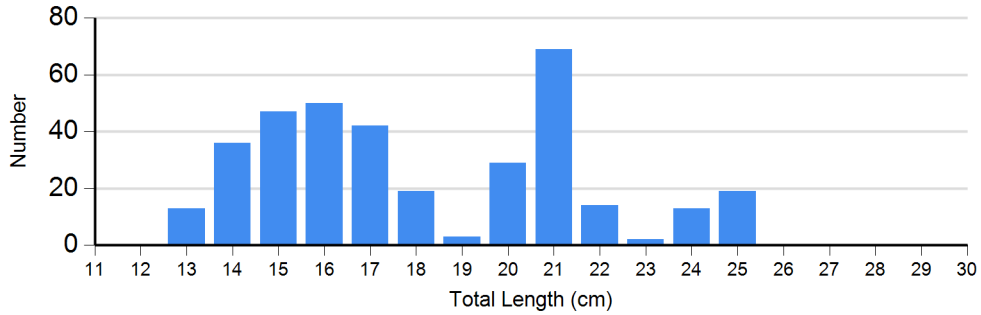
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2011	210	114 (0.7)	127	102 (0.9)	19	98 (1.5)	0	
	2012	1	124	7	100 (5.6)	1	84	0	
	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	
Northern Pike Gill Net	2011	5	86 (3.3)	9	86 (3.3)	0		0	
	2012	6	78 (3.2)	4	82 (3.7)	1	65	0	
	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	
Walleye Gill Net	2011	12	85 (4.1)	4	82 (4.4)	2	91 (3.7)	0	
	2012	23	83 (0.9)	14	81 (1.3)	3	81 (0.5)	0	
	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
Yellow Perch Gill Net	2011	29	91 (1.5)	19	89 (1.6)	0		0	
	2012	1	96	4	86 (4.3)	0		0	
	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	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: large frame net



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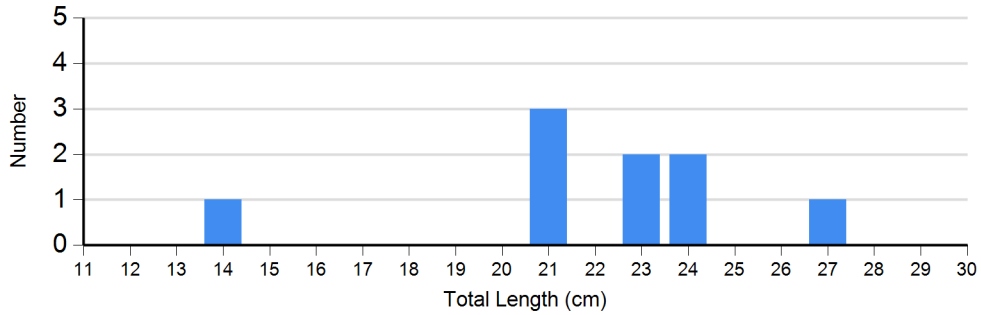

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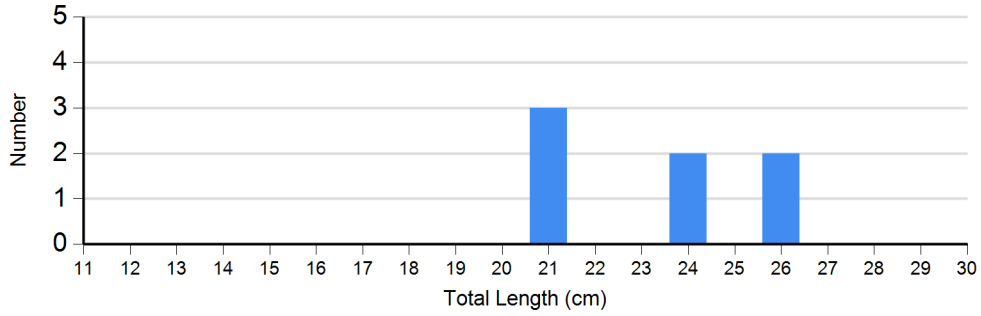

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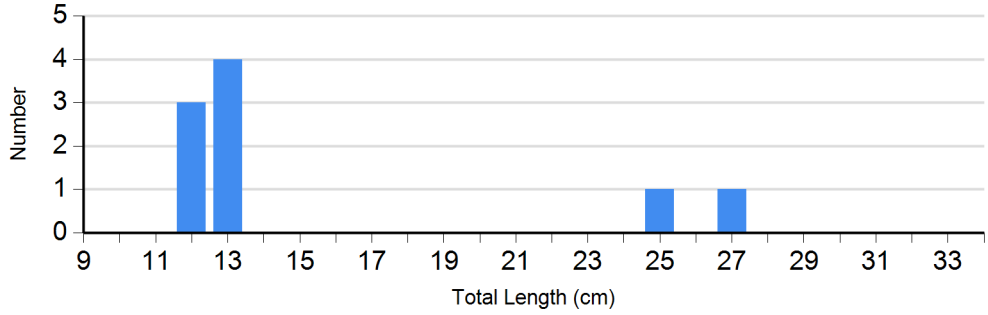
Species: Black Crappie
Gear: std frame net (3/8 inch)



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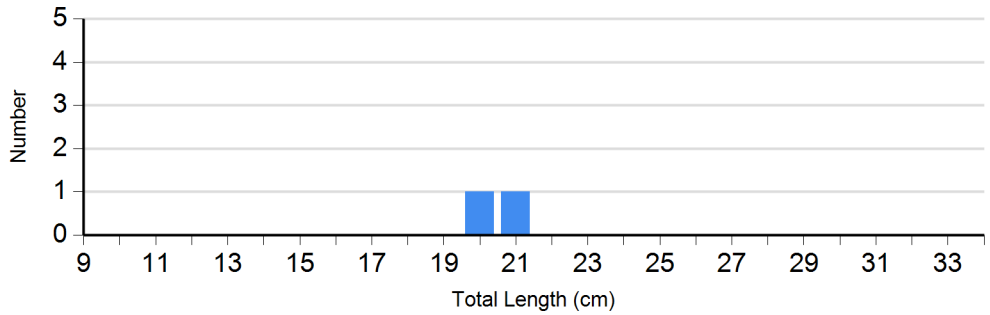

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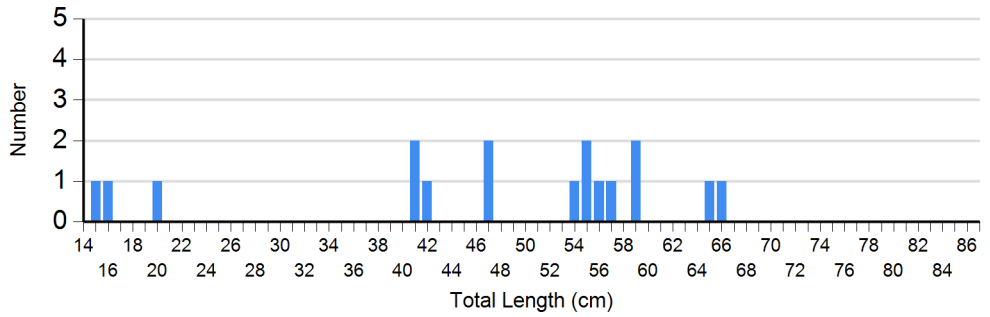
Species: Northern Pike
Gear: std exp gill net



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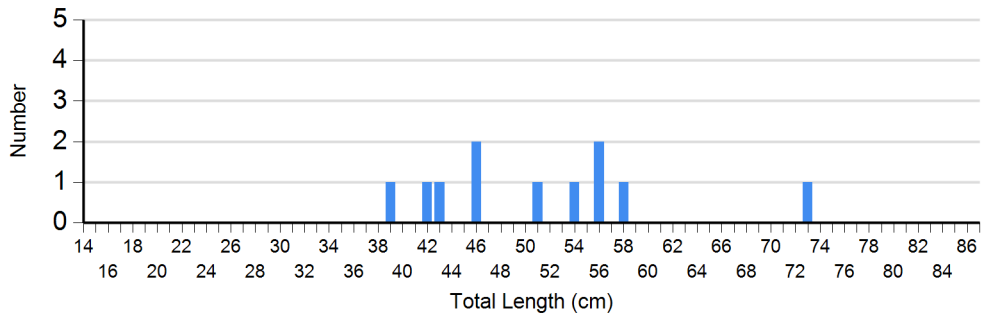

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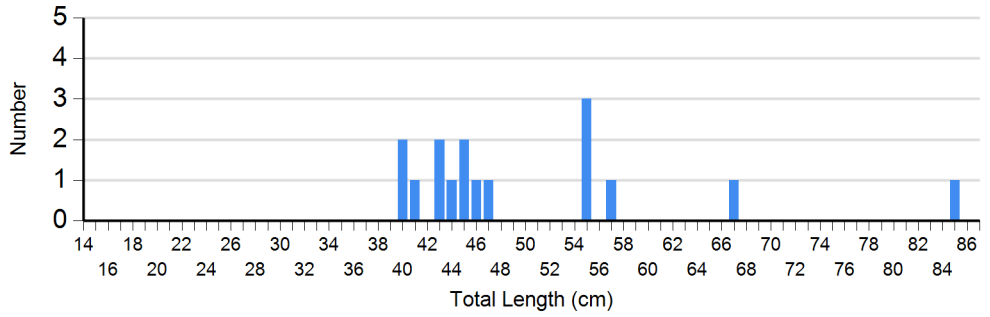

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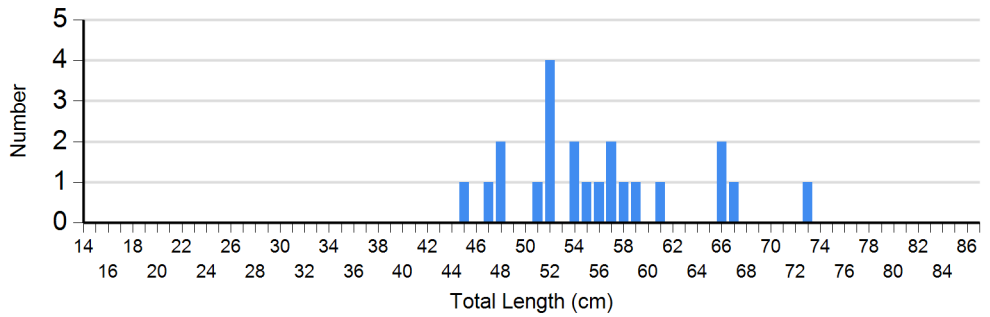

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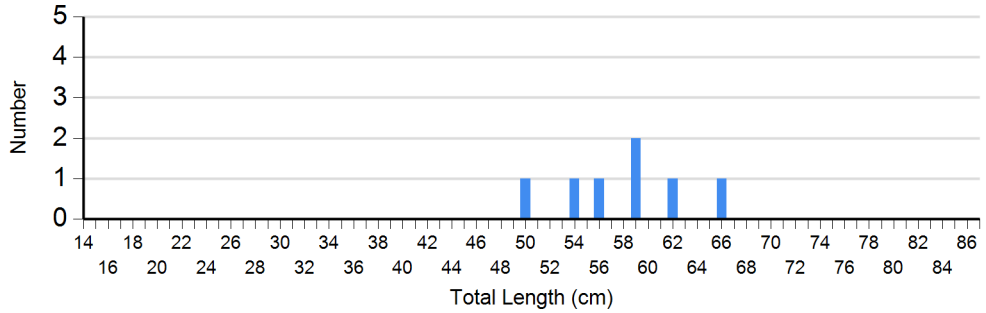
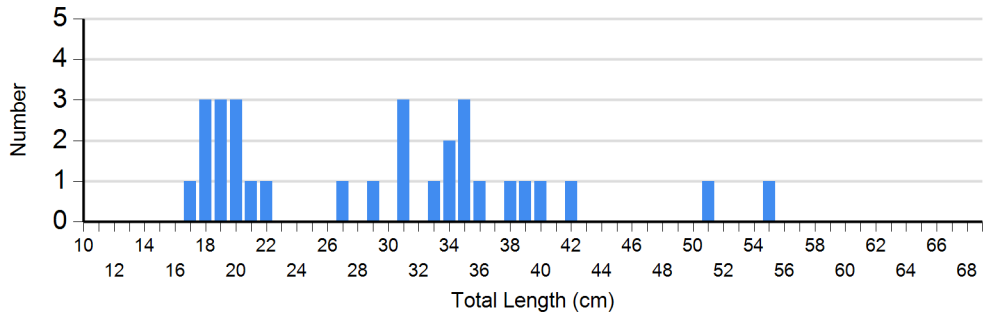
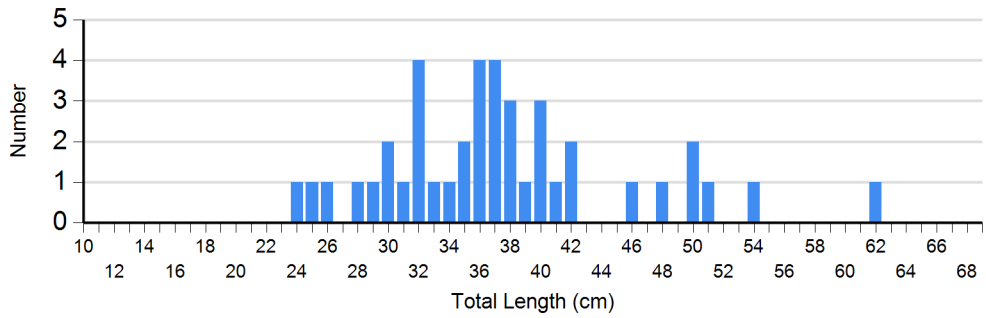


2015

Species: Walleye
Gear: std exp gill net



2011



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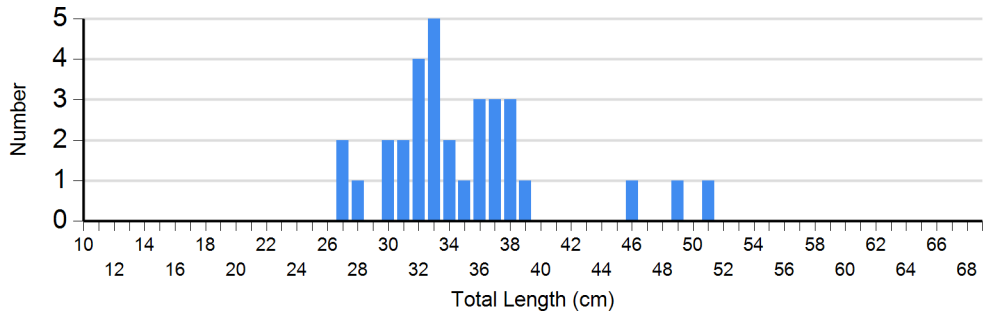
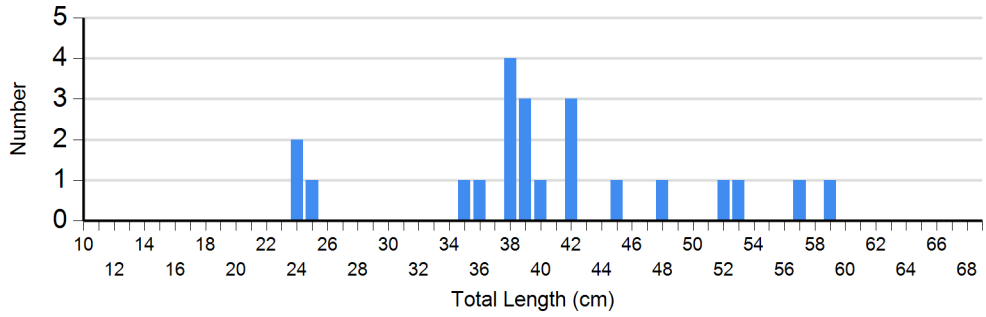


2013



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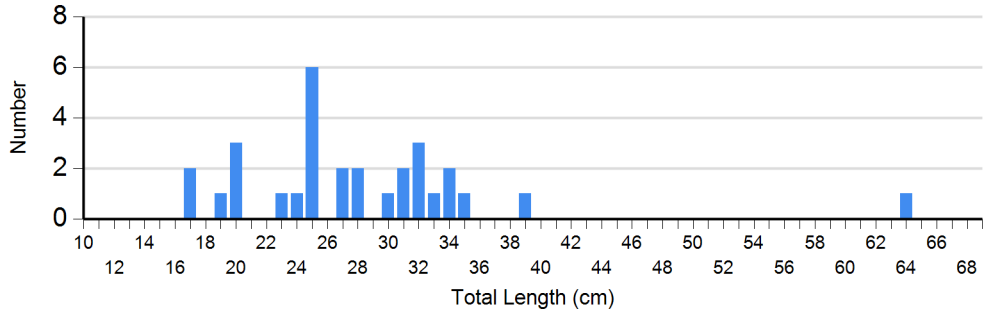
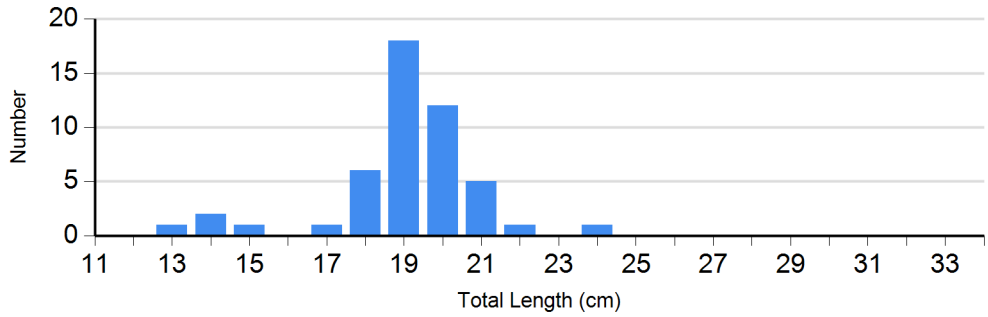


2015

Species: Yellow Perch
Gear: std exp gill net



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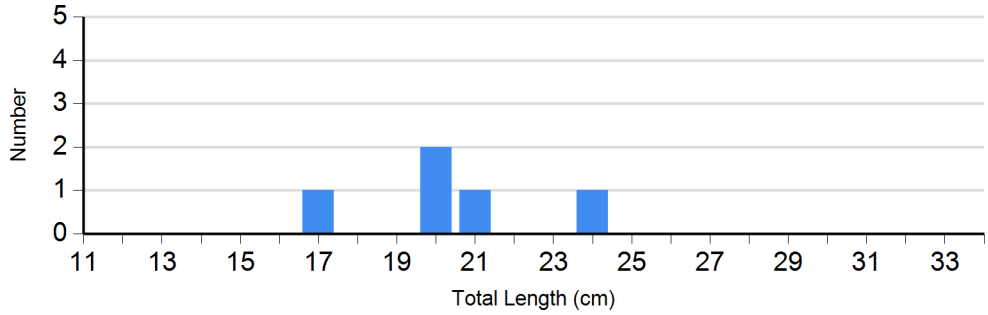

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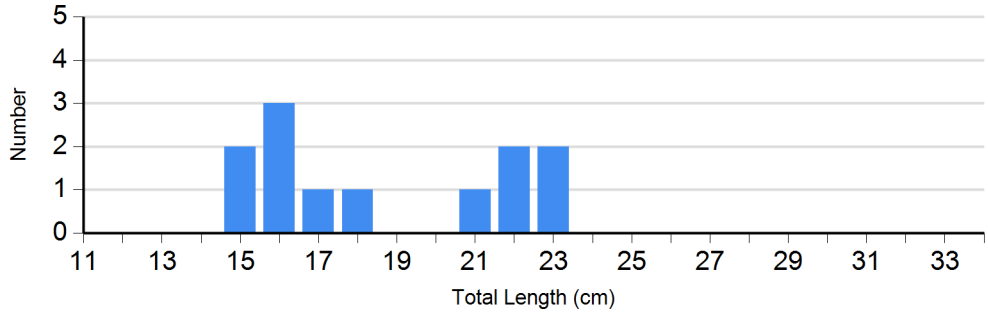

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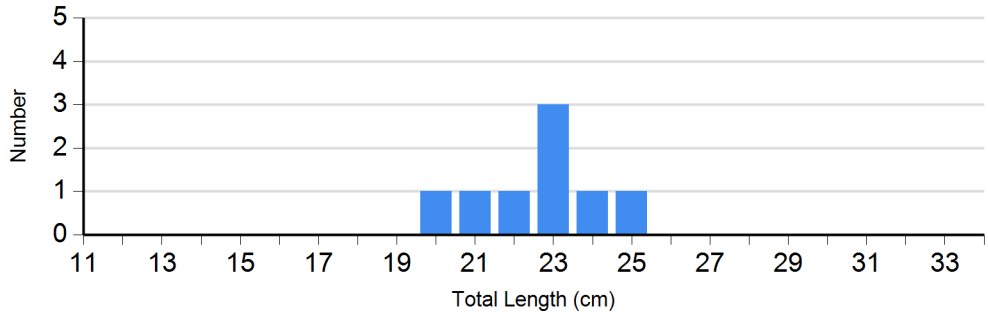

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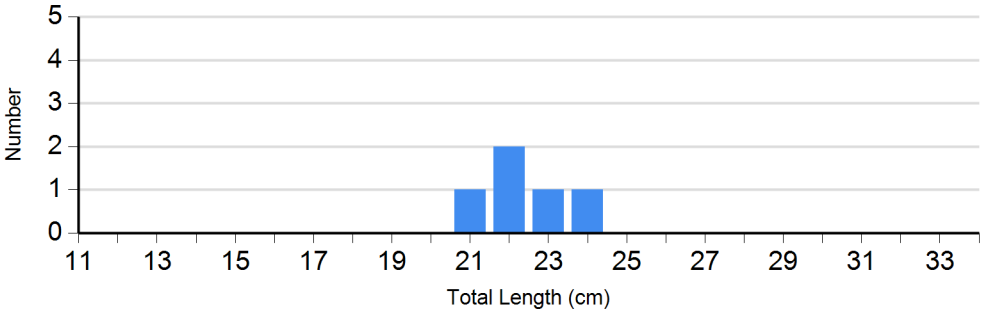
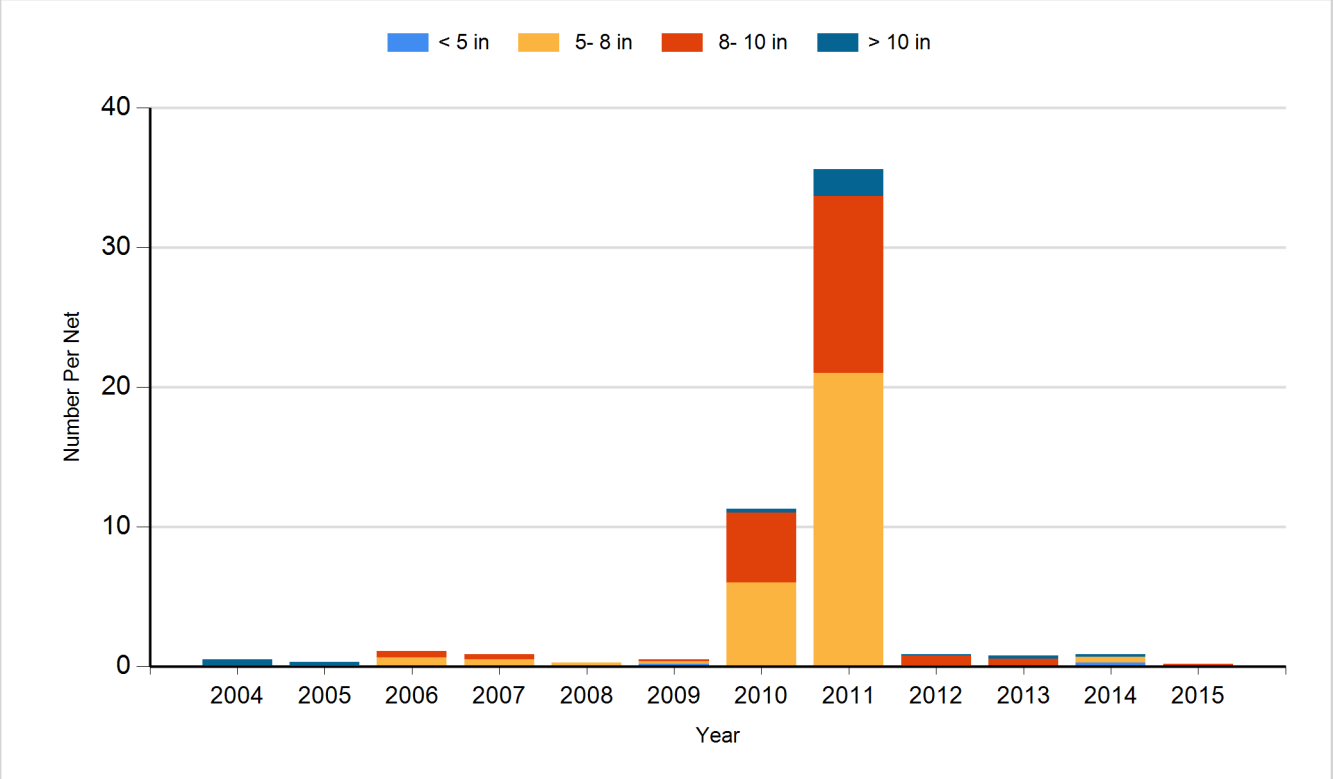


2015

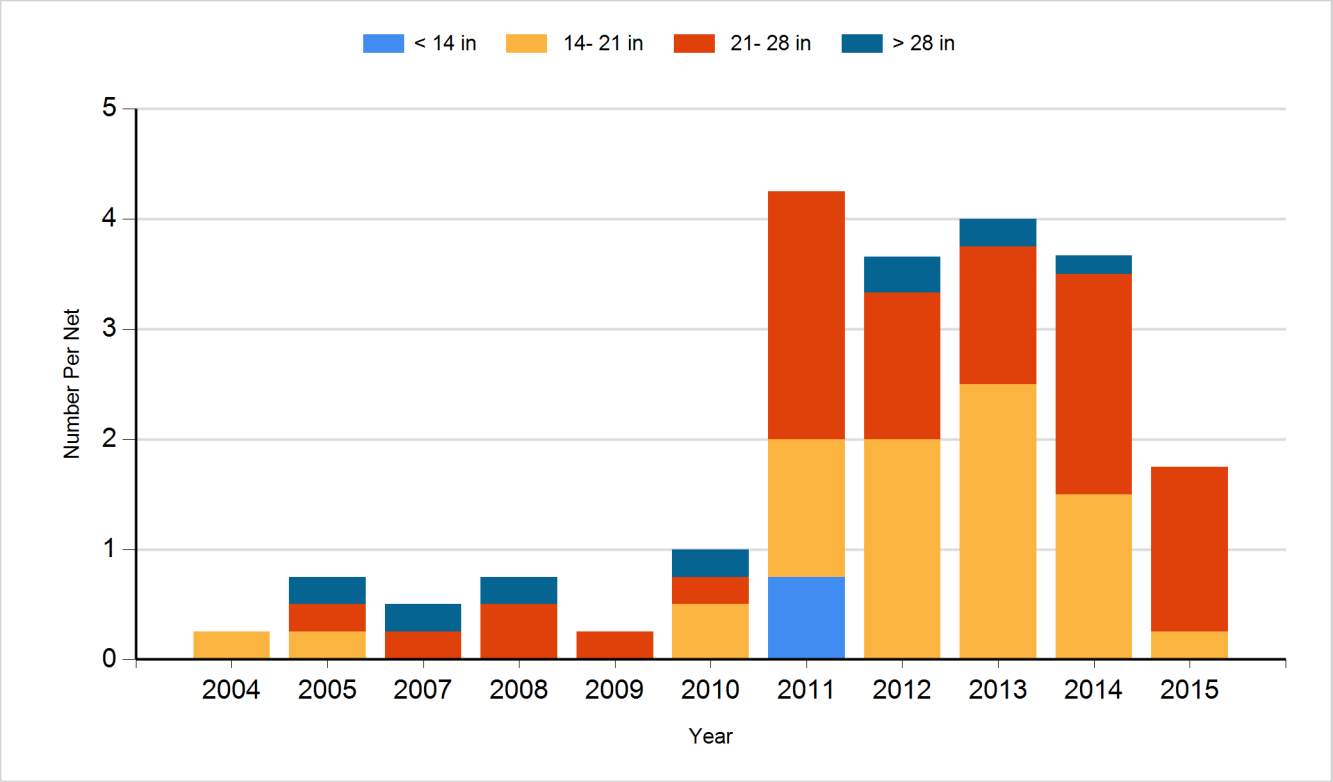
Historic Fish Sizes and Relative Abundance

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

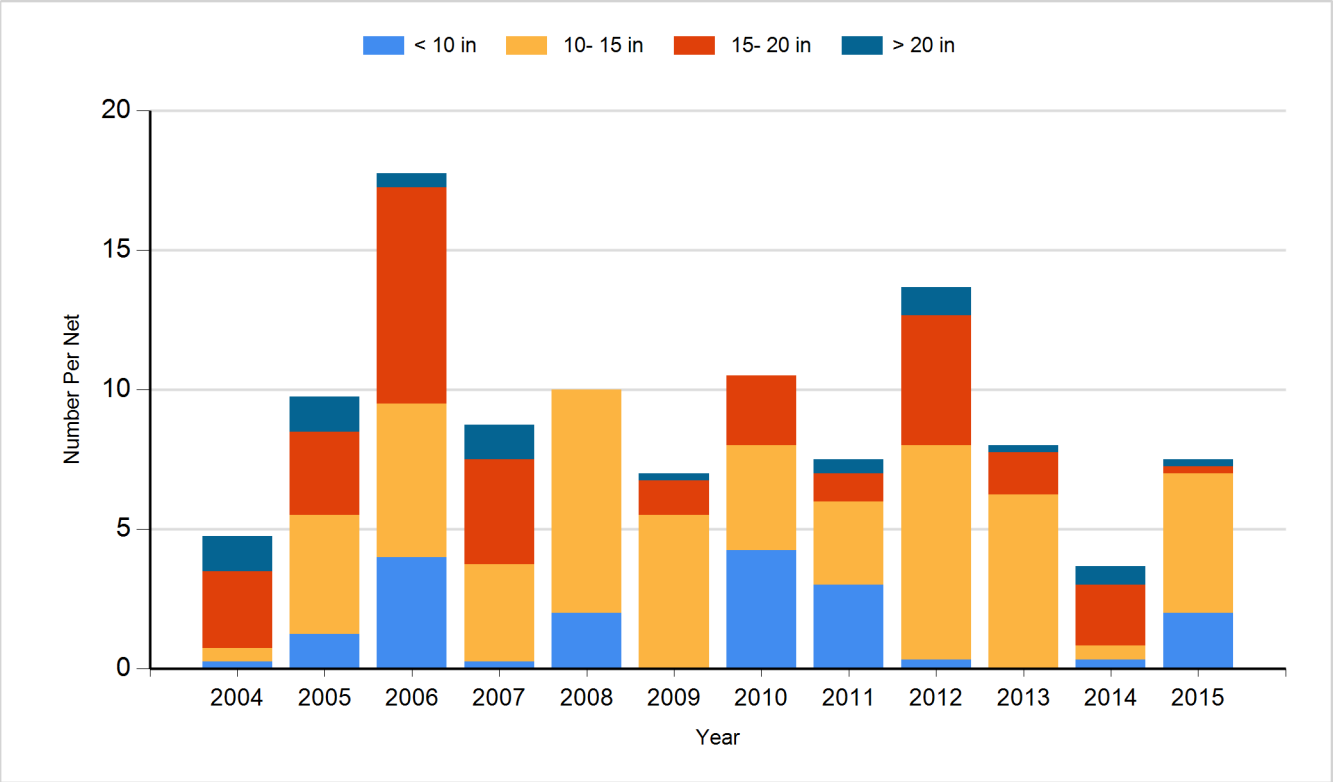
Species: Black Crappie
Gear: Frame Net



Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net