SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Vermillion East, McCook County
VER-Lake-62-800
2016

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
std exp gill net	June 14, 2016	6 net-nights
std frame net (3/8 inch)	June 14, 2016	10 net-nights

Common Fish Species Present

Walleye

Black Bullhead

White Sucker

White Bass

Freshwater Drum

Bluegill

Northern Pike

Common Carp

Channel Catfish

Yellow Perch

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
std exp gill net	Channel Catfish	1.8	0.9	82		45		108	4
	Common Carp	1.3	0.9	100		75			
	Freshwater Drum	5.2	3.5	97		6			
	Northern Pike	2.7	0.9	81		13		90	4
	Walleye	3.7	1.9	36	16	5		81	2
	White Bass	9.0	4.9	65	10	41	10	93	1
	White Sucker	12.5	2.8	100		87	6		
	Yellow Perch	1.2	0.7	100		43		102	5
std frame net (3/8 inch)	Black Bullhead	12.8	3.4	99		70	6		
	Black Crappie	0.9	0.6	89		22		101	3
	Bluegill	3.3	1.6	85		42	13	116	3
	Channel Catfish	0.5	0.3	20		0		99	8
	Common Carp	2.1	0.8	76	15	52	17		
	Freshwater Drum	0.1	0.1	100		100			
	Largemouth Bass	0.1	0.1	100		0		108	
	Northern Pike	1.9	1.1	89		16		83	3
	Walleye	0.5	0.4	80		20		81	6
	White Bass	2.1	0.9	71	16	52	17	94	7
	White Crappie	1.1	0.6	64		9		102	4
	White Sucker	2.9	1.0	100		83			

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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
fall night EF-WAE	Walleye	16.5	35.4	163.8	102.0	51.5	59.0	149.5	1.2	82.5		73.5
large frame net	Black Bullhead	501.8	64.8	374.1	35.9	77.9	152.4	64.0				181.6
	Black Crappie	0.9	0.3	0.3	11.3	35.6	0.9	0.8				7.2
	Bluegill	2.5	3.6	0.8	2.1	4.1	2.1	3.7				2.7
	Channel Catfish	1.9	2.5	0.2	0.2	0.1	1.1	1.2				1.0
	Common Carp	7.6	7.4	0.3	1.7	0.9	3.1	7.6				4.1
	Freshwater Drum		0.1	0.1	0.6	0.5	0.4	0.2				0.3
	Green Sunfish	0.1	0.1		0.1							0.1
	Largemouth Bass					0.1	0.2					0.2
	Northern Pike	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	1.6	2.5	5.2	4.4	5.2	2.0	0.6				3.1
	Yellow Perch	0.7	0.1	0.1	1.5	1.9						0.9
std exp gill net	Bigmouth Buffalo									0.0		0.0
	Black Bullhead	98.8	86.8	129.3	59.0	51.0	164.7	20.3	8.2	1.8		68.9
	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	2.5	3.5	5.5	0.3	0.3	2.3	0.3	1.5	2.8	1.8	2.1
	Common Carp	3.8	2.0	0.8	0.3	1.0	3.3	1.8	1.0		1.3	1.7
	Freshwater Drum				0.5	0.5	1.7	4.3	1.2	5.3	5.2	2.7
	Northern Pike	0.5	0.8	0.3	1.0	3.5	3.7	4.0	3.7	1.8	2.7	2.2
	Orangespotted Sunfish			0.0	0.0							0.0
	Walleye	8.5	8.0	7.0	6.3	4.5	13.3	8.0	3.3	5.5	3.7	6.8
	White Bass							1.0	5.0	6.5	9.0	5.4
	White Crappie				2.0					0.5		1.3
	White Sucker	8.3	10.0	10.0	18.5	19.8	3.3	9.0	8.7	8.5	12.5	10.9
	Yellow Perch	7.3	11.5	2.8	4.3	12.0	1.7	3.0	1.3	1.3	1.2	4.6
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

		CPUE										
Gear	Species	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
std frame net (3/8 inch)	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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
fall night EF-WAE	Walleye	Wr	88	93	95	83	88	84	93	83	81	
large frame net	Black Crappie	PSD	44	0	33	47	41	89	100			
		PSD-P	0	0	0	3	5	11	29			
		Wr	111	127	126	111	109	101	110			
	Northern Pike	PSD	100	70	33	67	26	38	27			
		PSD-P	50	20	0	50	11	3	0			
		Wr	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	29	100	100	20	95					
		PSD-P	0	0	100	0	5					
		Wr	94	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	100	50	64	45	38	59	86	81
		PSD-P	50	33	0	25	0	9	6	5	0	13
		Wr	86	91	90	91	86	78	85	85	98	90
	Walleye	PSD	59	0	21	40	33	43	22	85	9	36
		PSD-P	15	0	4	0	11	8	3	20	5	5
		Wr	86	89	95	85	85	82	90	88	83	81
	Yellow Perch	PSD	24	89	45	47	40	80	42	100	100	100
		PSD-P	0	7	0	35	0	0	0	13	0	43
		Wr	113	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

			Year									
Gear	Species	Index	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
std frame net (3/8 inch)	Northern Pike	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)							
2007	35	270 (6)	323 (5)	387 (5)	392 (5)	462 (2)	446 (2)	467 (3)	518 (3)	552 (1)	578 (3)

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

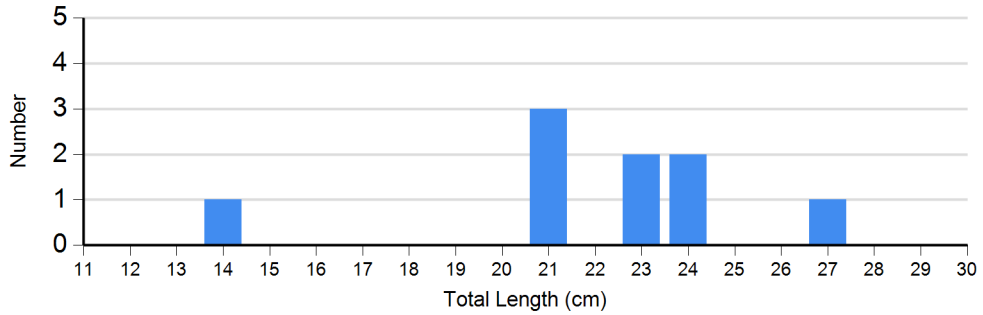
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	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	
	2016	1	100	6	103 (2.8)	2	96 (4.1)	0	
Northern Pike Gill Net	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	
	2016	3	106 (15.5)	11	87 (1.4)	2	82 (2.5)	0	
Walleye Gill Net	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
	2016	14	82 (1.7)	7	81 (1.5)	1	79	0	
Yellow Perch Gill Net	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	
	2016	0		4	107 (5.1)	3	94 (1.9)	0	

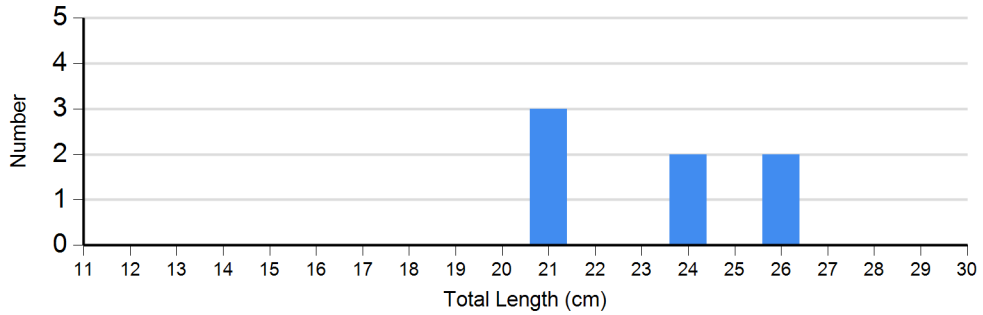
Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: large frame net

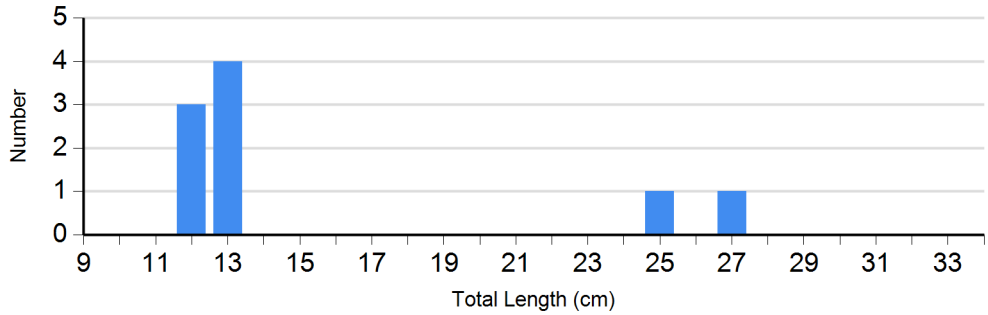


2012



2013

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



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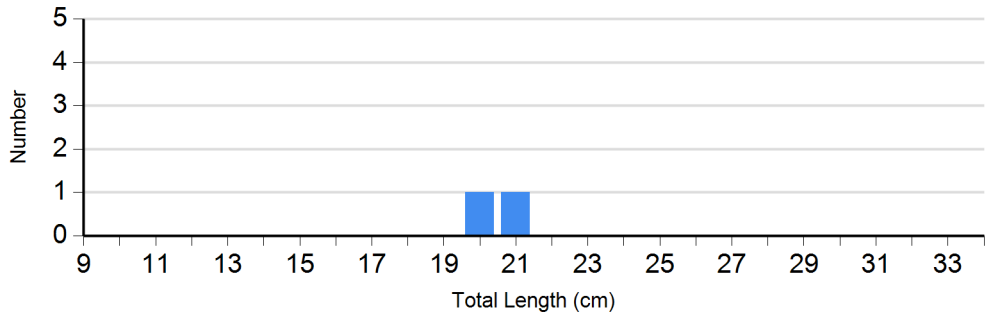

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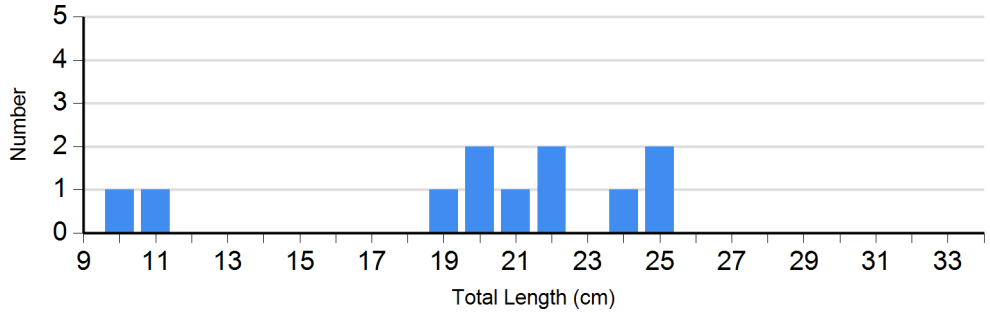

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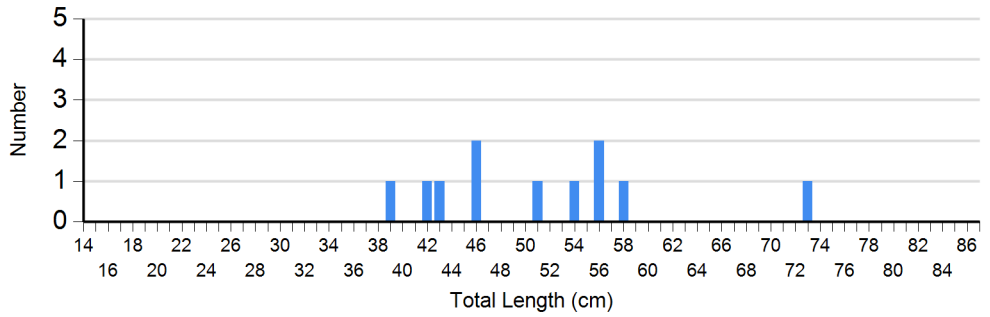
Species: Northern Pike
Gear: std exp gill net



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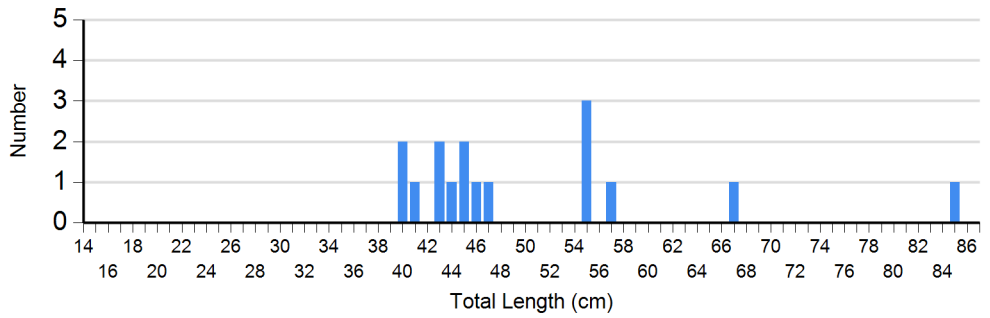

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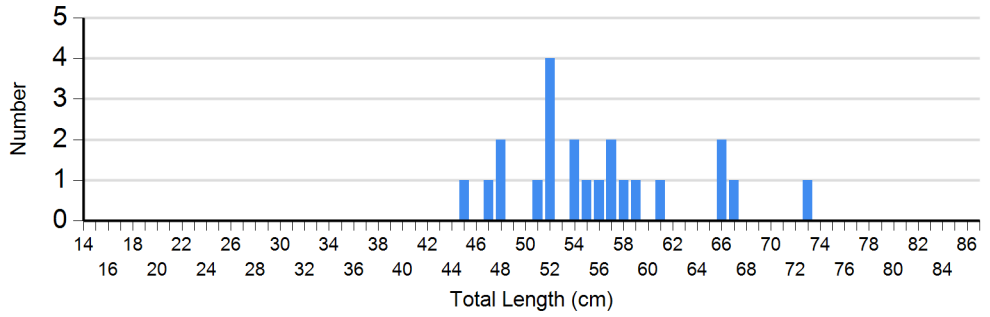
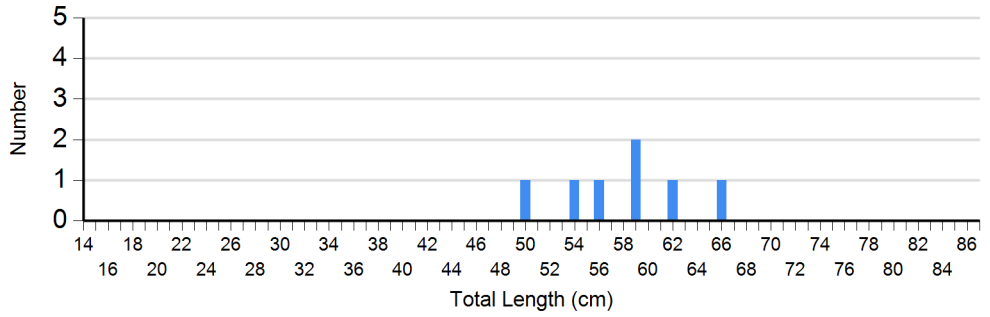


2014



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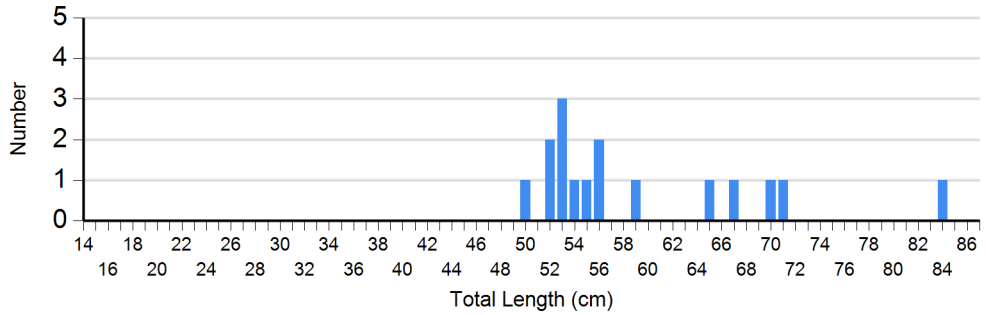

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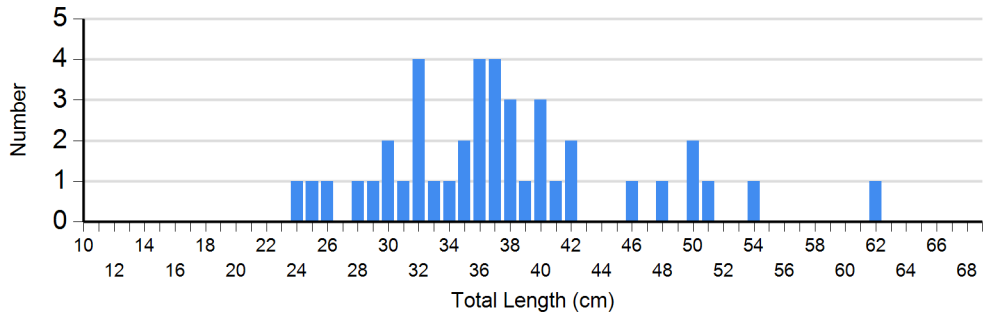
Species: Walleye
Gear: std exp gill net



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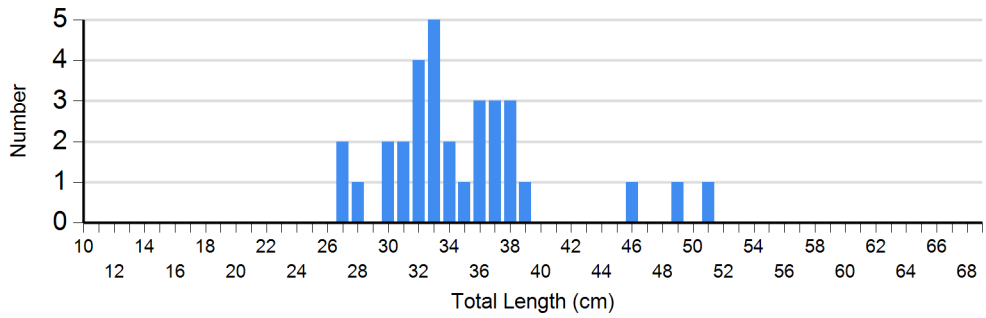
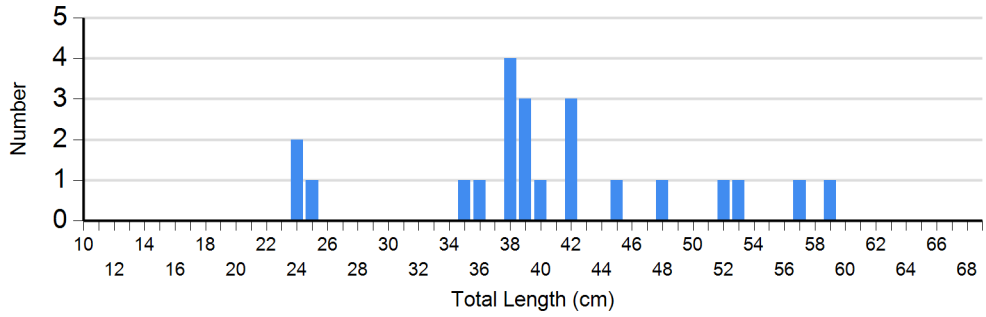
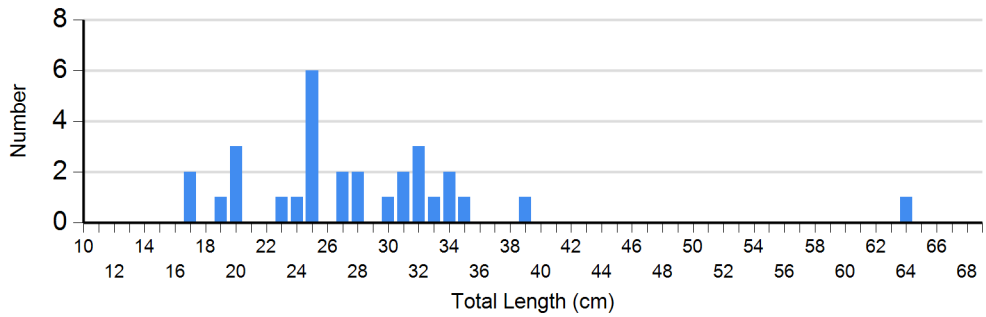


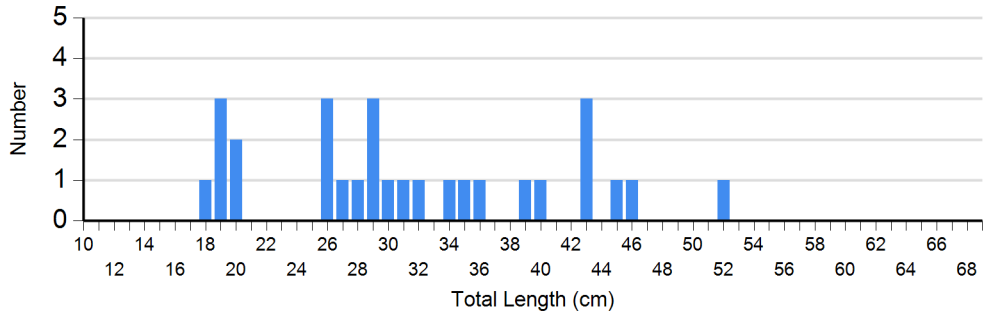
2013



2014

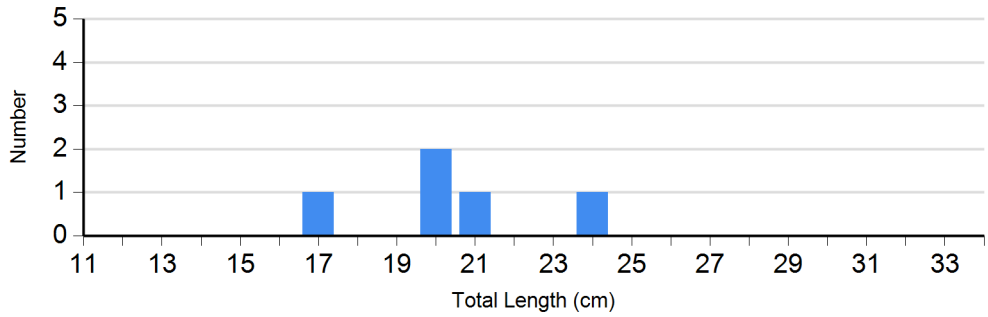


2015

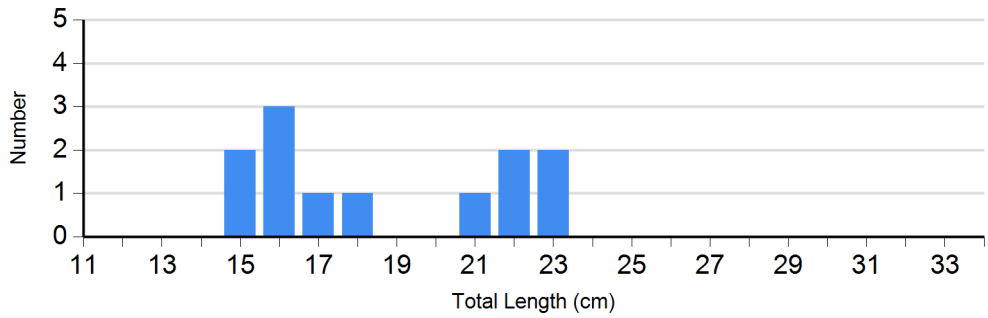


2016

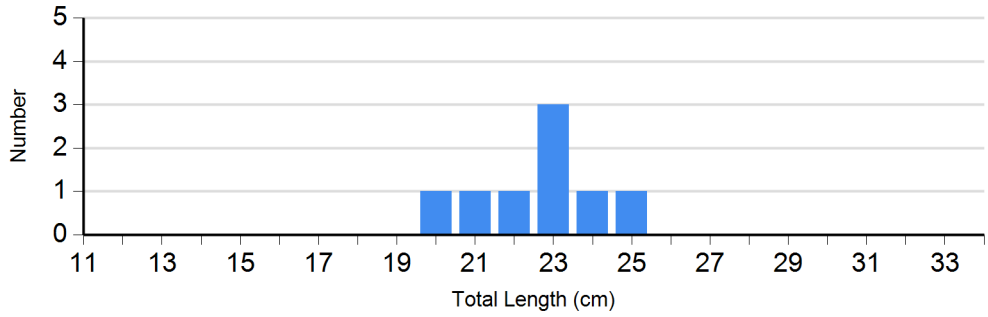
Species: Yellow Perch
Gear: std exp gill net



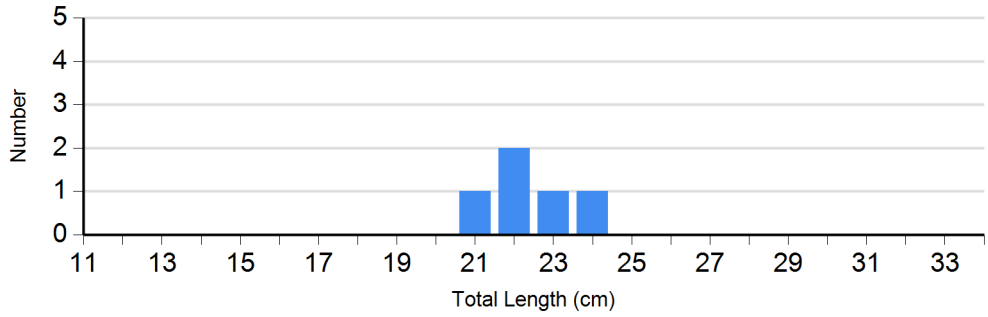
2012



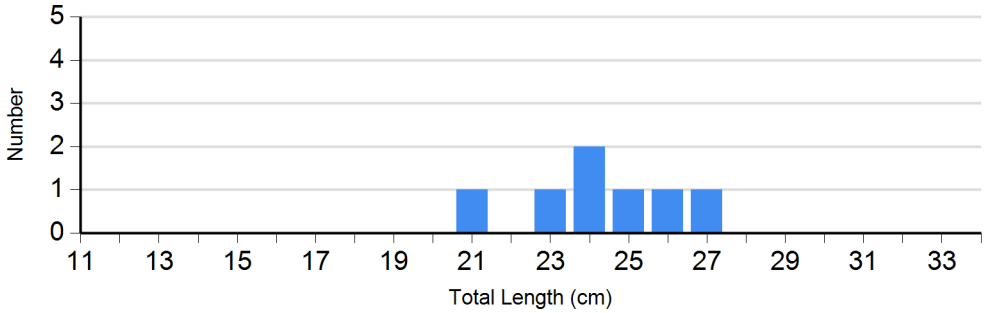
2013



2014



2015

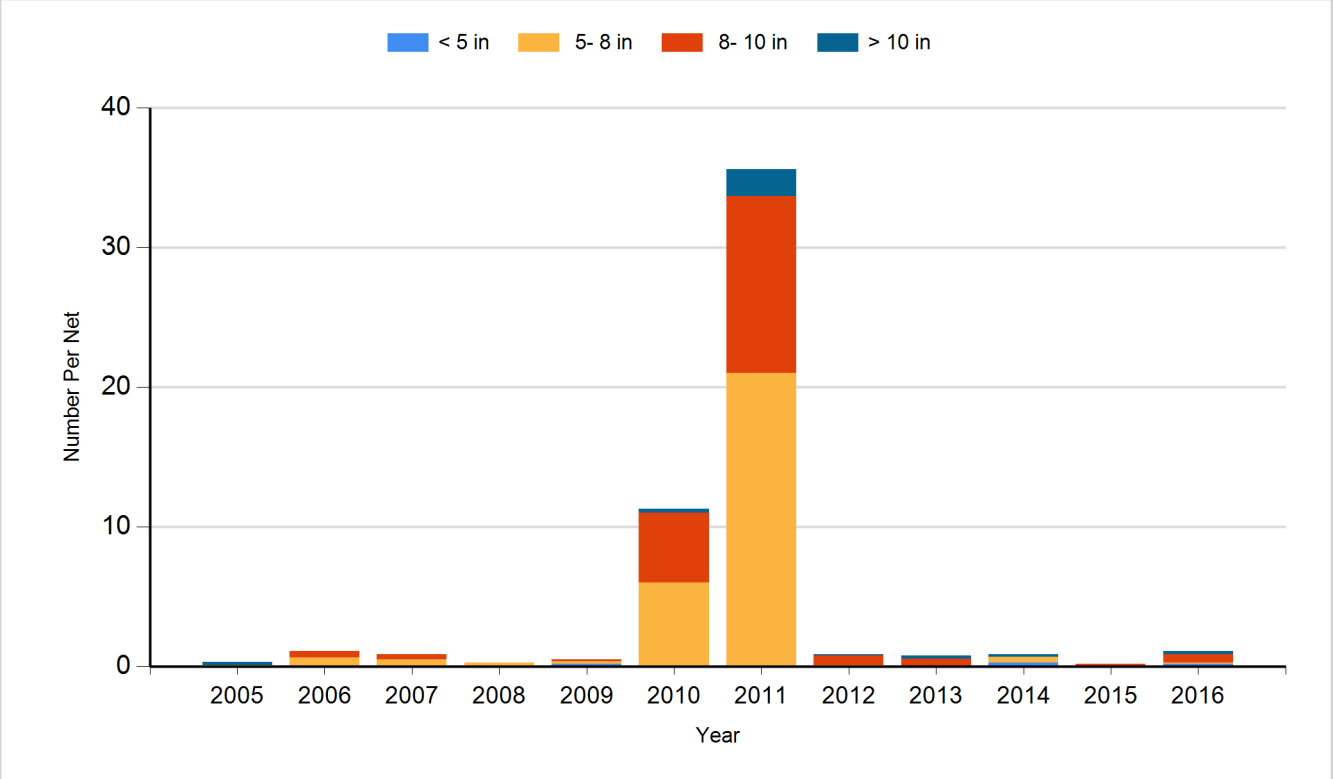


2016

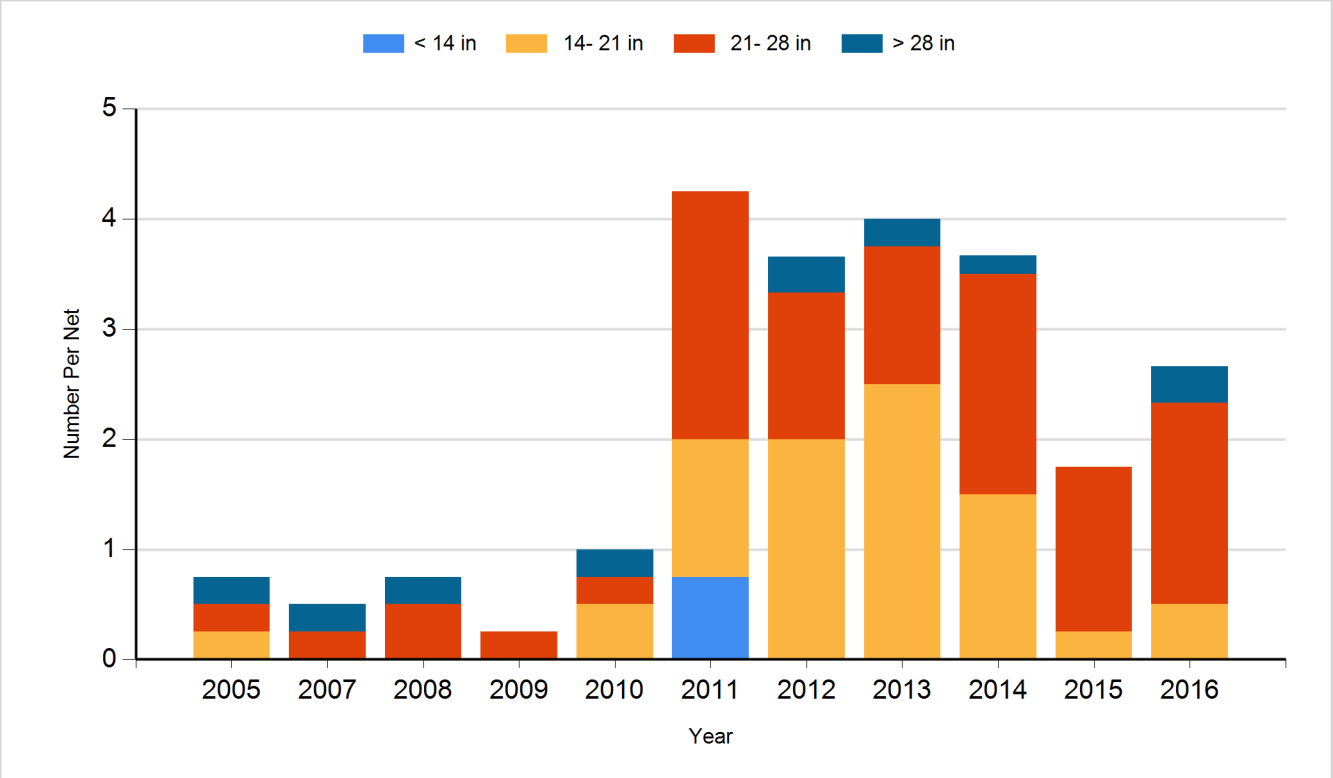
Historic Fish Sizes and Relative Abundance

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

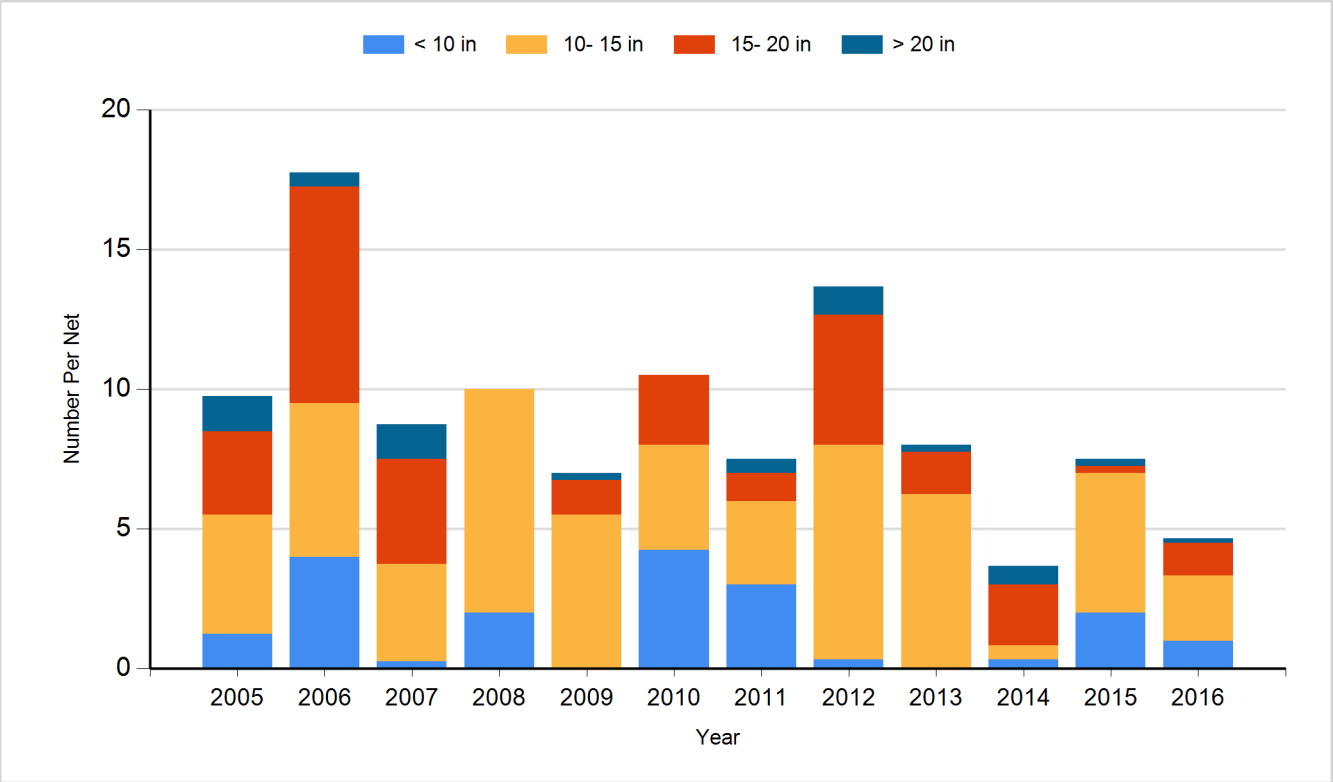
Species: Black Crappie
Gear: Frame Net



Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net