SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Sinai, Brookings County
MBS-Lake-232-000
2017

Lake Information

Name: Sinai

County: Brookings

Legal Description: T109N- R52W-Sec 3-4, 8-10

Surface Area: 1,778 Acres

Maximum Depth: 33 Feet

Mean Depth: 17 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std frame net	July 05, 2017	10 net-nights
AFS std gill net	July 05, 2017	10 net-nights

Common Fish Species Present

Muskellunge

Walleye

Yellow Perch

White Bass

Smallmouth Bass

Black Crappie

Black Bullhead

Common Carp

Yellow Bullhead

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	1.7	0.9	100		53	20		
	Black Crappie	1.9	1.4	100		95		91	2
	Common Carp	0.7	0.5	100		86			
	Smallmouth Bass	1.9	1.4	95		37	18	89	2
	Walleye	0.9	1.1	56		56		84	9
	White Bass	2.0	1.2	100		85		92	1
	Yellow Bullhead	0.7	0.7	100		100			
AFS std gill net	Black Bullhead	0.7	0.3	100		71			
	Black Crappie	0.8	0.8	88		88		95	1
	Common Carp	0.3	0.3	100		100			
	Northern Pike	0.2	0.2	100		100		91	5
	Smallmouth Bass	0.7	0.6	71		71		91	3
	Walleye	4.7	1.7	70	10	28	10	84	1
	White Bass	1.0	1.4	90		50	28	95	1
	White Sucker	0.1	0.1	100		100			
	Yellow Perch	2.5	1.0	64	15	24	14	98	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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg
AFS std frame net	Black Bullhead										1.7	1.7
	Black Crappie										1.9	1.9
	Common Carp										0.7	0.7
	Smallmouth Bass										1.9	1.9
	Walleye										0.9	0.9
	White Bass										2.0	2.0
	Yellow Bullhead										0.7	0.7
AFS std gill net	Black Bullhead										0.7	0.7
	Black Crappie										0.8	0.8
	Common Carp										0.3	0.3
	Northern Pike										0.2	0.2
	Smallmouth Bass										0.7	0.7
	Walleye										4.7	4.7
	White Bass										1.0	1.0
	White Sucker										0.1	0.1
	Yellow Perch										2.5	2.5
fall night EF-WAE	Walleye	31.2	28.5	210.5	262.0	16.0	55.5	94.5	79.0			97.2
large frame net	Black Bullhead	0.3	0.6			0.4	2.5					1.0
	Black Crappie		0.4	0.4	0.0	11.1	2.5					2.9
	Bluegill	0.4		0.4	1.3	4.9	1.0					1.6
	Channel Catfish					0.1						0.1
	Common Carp	0.3	0.3	1.6	0.1	1.7	1.4					0.9
	Green Sunfish	0.2	0.1	0.1		0.1	0.1					0.1
	Northern Pike		0.1			0.6	0.2					0.3
	Smallmouth Bass	1.2	0.9	2.9	2.0	16.8	2.9					4.5
	Sunfish Hybrid			0.0								0.0
	Walleye	1.6	0.8	1.9	0.6	4.9	1.3					1.9
	Yellow Perch	1.7	2.2	1.0	1.5	2.7						1.8
std exp gill net	Black Bullhead					0.3	0.3	1.5	40.0	12.4		10.9
	Black Crappie					0.3		0.0	2.0	3.6		1.5
	Bluegill							0.3				0.3
	Common Carp	0.2	0.8		0.4	0.8		0.8		0.4		0.6
	Green Sunfish					0.3						0.3

		CPUE										
Gear	Species	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg
std exp gill net	Northern Pike	0.2		0.2		0.5	0.8		1.0	0.6		0.6
	Smallmouth Bass	0.8	1.0	0.4	0.8	2.5	0.3	1.3	1.7	2.0		1.2
	Walleye	8.4	10.6	15.0	4.4	36.8	23.0	18.3	18.0	7.8		15.8
	White Sucker		0.4				0.3					0.4
	Yellow Perch	10.4	41.8	23.4	45.0	33.8	4.5	2.5	24.3	12.8		22.1
std frame net (3/8 inch)	Black Bullhead							10.0	44.4	6.6		20.3
	Black Crappie							4.5	11.5	6.7		7.6
	Bluegill							0.3	2.6	0.4		1.1
	Common Carp								0.2	0.4		0.3
	Northern Pike								0.3	0.8		0.6
	Smallmouth Bass							0.9	2.7	6.1		3.2
	Sunfish Hybrid								0.0			0.0
	Walleye							2.8	1.6	1.2		1.9
	White Bass									1.1		1.1
	Yellow Bullhead							0.2	1.1	1.4		0.9
	Yellow Perch							0.3	1.8			1.1

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										100
		PSD-P										95
		Wr										91
	Walleye	PSD										56
		PSD-P										56
		Wr										84
AFS std gill net	Black Crappie	PSD										88
		PSD-P										88
		Wr										95
	Northern Pike	PSD										100
		PSD-P										100
		Wr										91
	Walleye	PSD										70
		PSD-P										28
		Wr										84
	Yellow Perch	PSD										64
		PSD-P										24
		Wr										98
fall night EF-WAE	Walleye	Wr	96	100	80	92	93	88	89	84		
large frame net	Black Crappie	PSD		50	25	0	98	92				
		PSD-P		0	0	0	5	84				
		Wr		102	115		103	102				
	Northern Pike	PSD		0			0	50				
		PSD-P		0			0	0				
		Wr		88			75	78				
	Walleye	PSD	25	29	32	100	14	54				
		PSD-P	6	14	5	17	8	46				
		Wr	83	83	88	82	78	91				
	Yellow Perch	PSD	24	90	70	60	100					
		PSD-P	0	0	10	7	33					

			Year									
Gear	Species	Index	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
large frame net	Yellow Perch	Wr	106	101	100	100	99					
std exp gill net	Black Crappie	PSD					100		0	17	78	
		PSD-P					0		0	0	0	
		Wr					99			113	96	
	Northern Pike	PSD	100		100		50	33		100	100	
		PSD-P	100		100		0	0		33	33	
		Wr	62		76		84	76		85	83	
	Walleye	PSD	12	2	28	59	7	5	92	83	46	
		PSD-P	7	0	4	0	1	0	1	13	26	
		Wr	82	85	84	83	77	87	91	85	81	
	Yellow Perch	PSD	52	76	81	56	99	94	40	11	77	
		PSD-P	19	6	26	9	39	72	20	0	8	
		Wr	103	110	102	103	96	110	106	99	98	
std frame net (3/8 inch)	Black Crappie	PSD							91	20	92	
		PSD-P							84	14	47	
		Wr							99	104	94	
	Northern Pike	PSD								100	100	
		PSD-P								67	14	
		Wr								83	83	
	Walleye	PSD							61	100	73	
		PSD-P							11	31	27	
		Wr							89	84	74	
	Yellow Perch	PSD							67	39		
		PSD-P							33	0		
		Wr							91	92		

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2017	52	231 (5)	346 (14)	420 (11)	444 (2)		491 (3)	518 (12)		689 (2)	623 (3)
2016	61	204 (22)	298 (18)	367 (4)		506 (6)	520 (10)			637 (1)	
2015	55	209 (1)	340 (10)		469 (10)	470 (29)			541 (4)		593 (1)
2014	73	260 (5)		408 (22)	429 (43)			471 (2)	547 (1)		
2013	92		294 (14)	343 (75)	455 (1)	416 (1)		424 (1)			
2012	150	195 (4)	307 (133)	419 (5)	404 (3)	450 (5)					602 (2)
2011	64	208 (45)	352 (5)	376 (1)	429 (12)	426 (1)					
2010	75	280 (1)	329 (10)	365 (45)	383 (15)		507 (2)			530 (1)	645 (1)
2009	51		283 (36)	339 (14)	365 (1)						
2008	57	208 (14)	299 (36)		404 (4)			573 (2)			655 (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+
2015	75	103 (2)	179 (73)								
2014	29	119 (25)		248 (3)	265 (1)						
2013	18		231 (5)	260 (4)	274 (8)		322 (1)				
2012	135		221 (37)	247 (88)	278 (11)						
2011	227	134 (9)	199 (186)	248 (23)	268 (9)						
2010	159	107 (42)	206 (76)	259 (41)							
2009	209		208 (188)	252 (18)	273 (4)						
2008	67	132 (40)	221 (13)	254 (14)							

Fish Condition

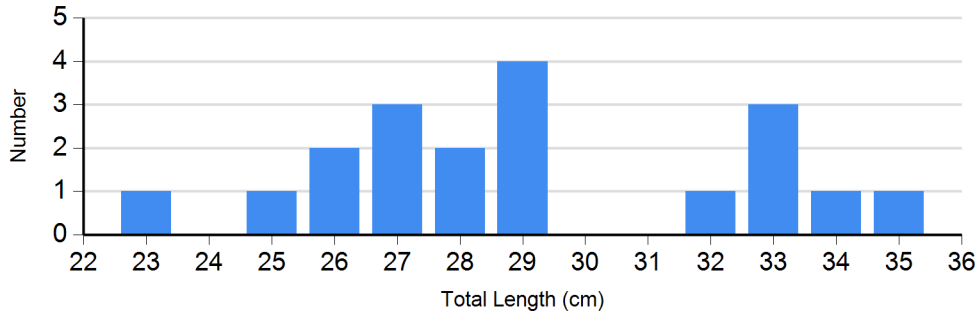
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2	112 (2.0)	2	98 (1.4)	21	102 (2.2)	0	
	2014	4	137 (5.8)	3	111 (0.4)	12	95 (1.5)	26	93 (1.1)
	2015	92	108 (0.9)	7	108 (0.8)	5	97	11	89 (1.4)
	2016	5	102 (2.2)	27	99 (1.6)	11	89 (2.9)	17	87 (1.1)
	2017	0		1	102	12	92 (1.2)	6	87 (1.1)
Northern Pike Gill Net	2013	2	73 (3.8)	1	81	0		0	
	2015	0		2	82 (3.3)	1	91	0	
	2016	0		2	87 (0.1)	1	74	0	
	2017	0		0		2	91 (3.6)	0	
Walleye Gill Net	2013	87	88 (0.8)	5	81 (3.1)	0		0	
	2014	6	89 (3.6)	66	91 (0.7)	1	97	0	
	2015	9	84 (1.8)	38	85 (1.6)	6	85 (3.1)	1	82
	2016	21	84 (1.9)	8	78 (1.1)	9	77 (1.2)	1	78
	2017	14	81 (1.2)	20	85 (1.3)	9	87 (2.2)	4	88 (3.1)
Yellow Perch Gill Net	2013	1	116	4	110 (4.0)	12	110 (2.1)	1	106
	2014	6	108 (6.8)	2	99 (0.3)	2	107 (1.1)	0	
	2015	65	99 (1.0)	8	99 (6.4)	0		0	
	2016	15	97 (1.9)	44	99 (3.2)	5	92 (3.1)	0	
	2017	9	104 (3.6)	10	94 (2.1)	6	94 (2.2)	0	

Length Frequency Distribution

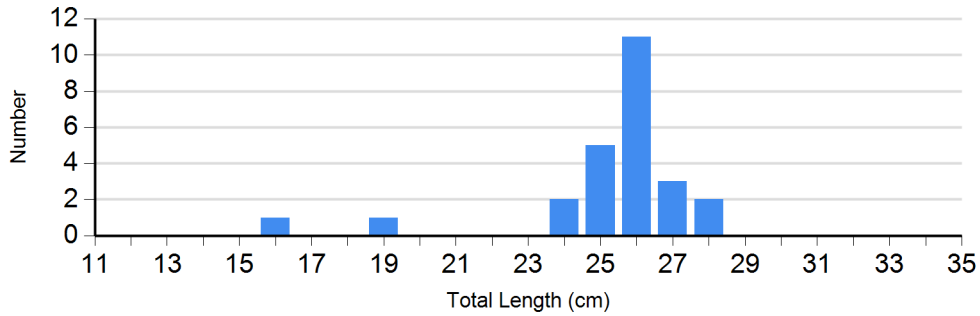
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net



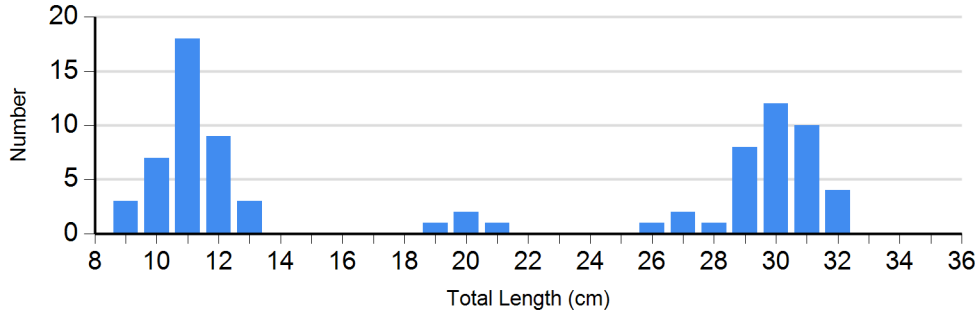
2017

Species: Black Crappie
Gear: large frame net



2013

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



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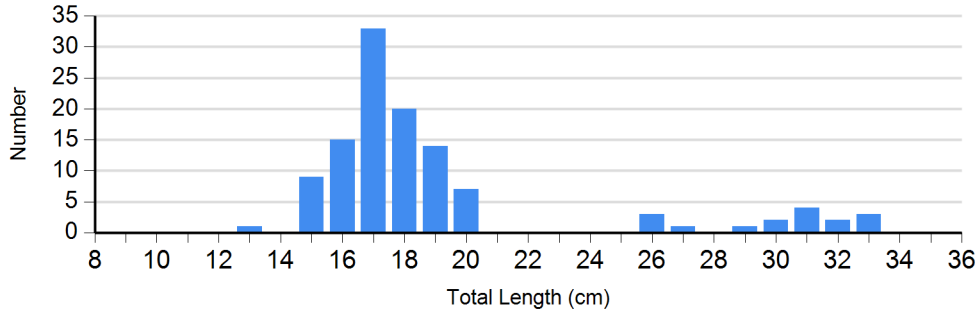

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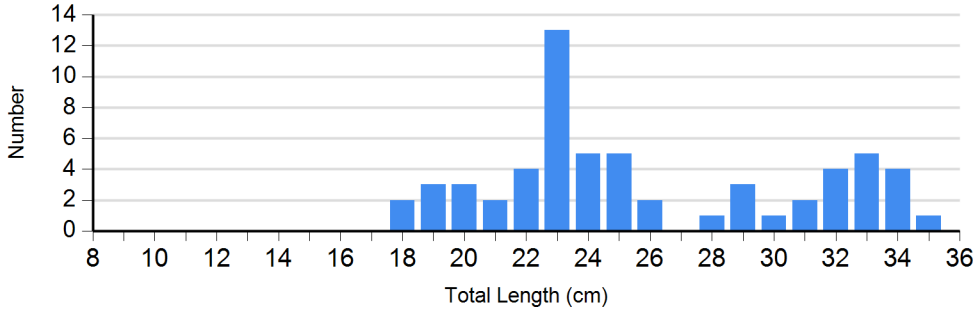
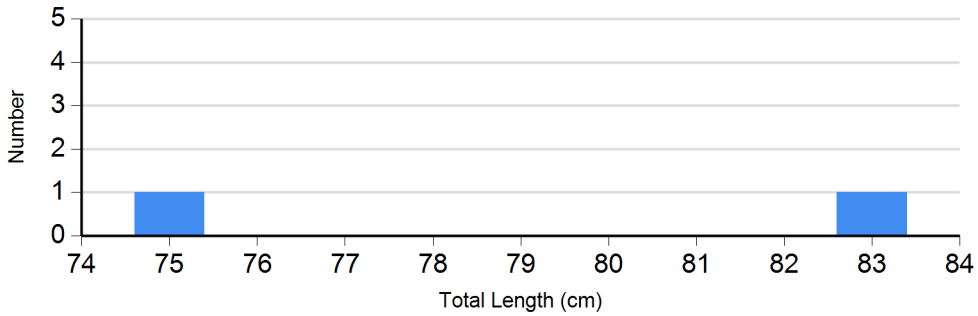


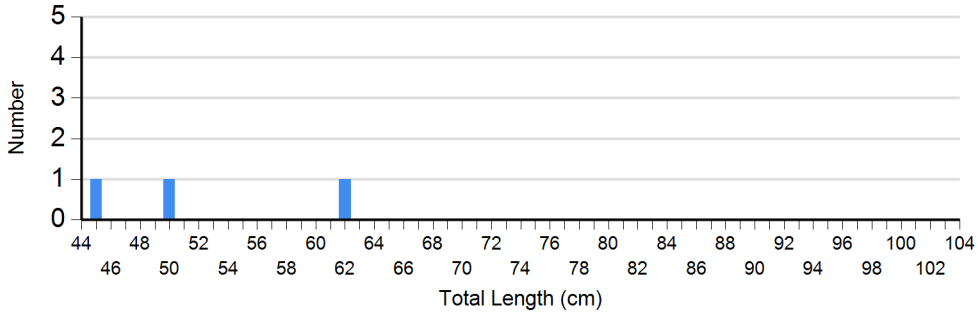
2016

Species: Northern Pike
Gear: AFS std gill net



2017

Species: Northern Pike
Gear: std exp gill net



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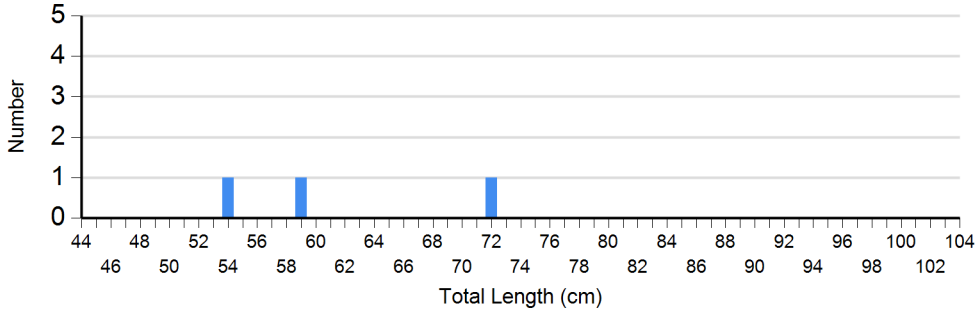

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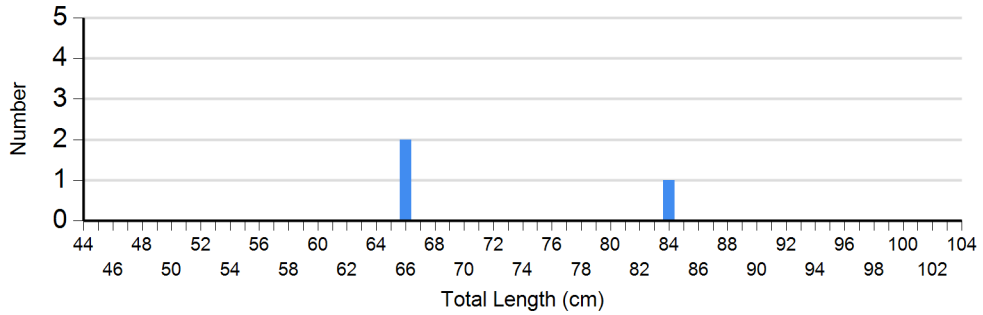
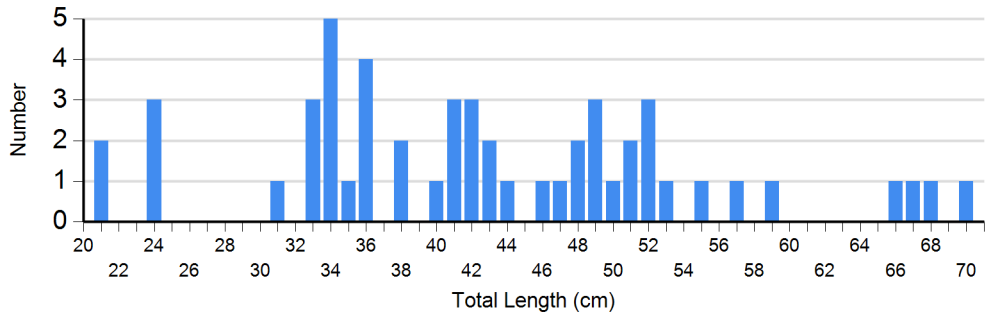


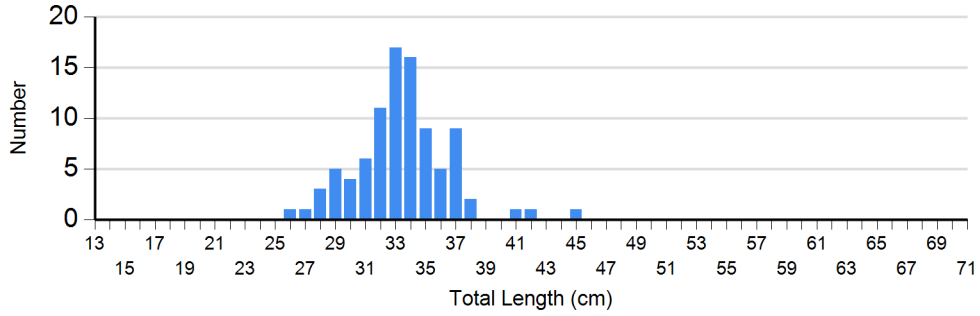
2016

Species: Walleye
Gear: AFS std gill net

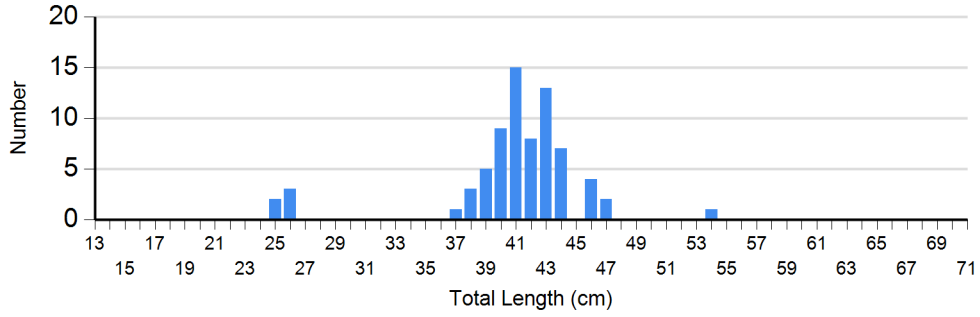


2017

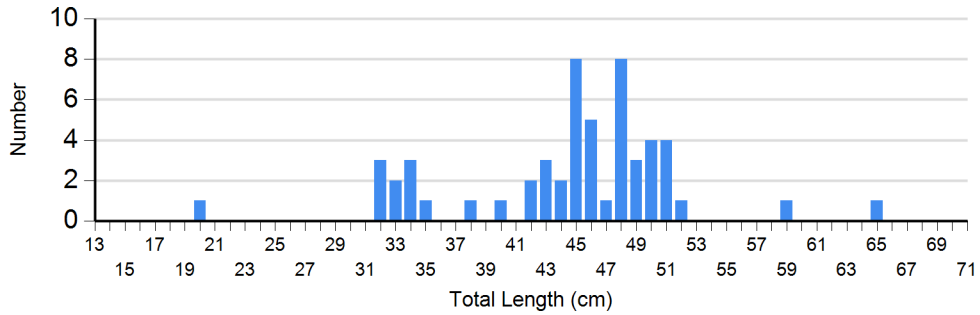
Species: Walleye
Gear: std exp gill net



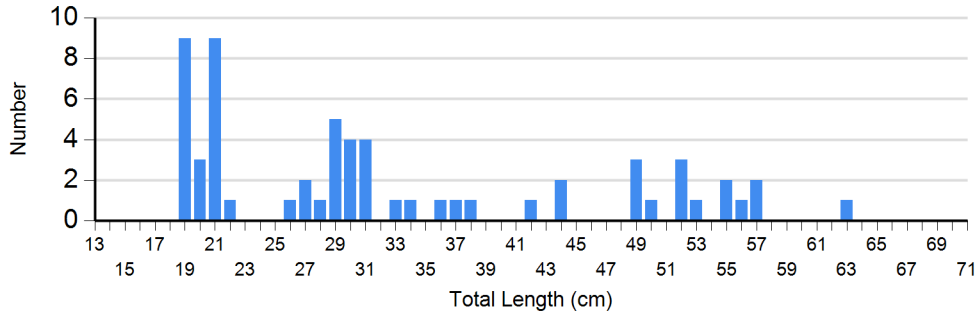
2013



2014

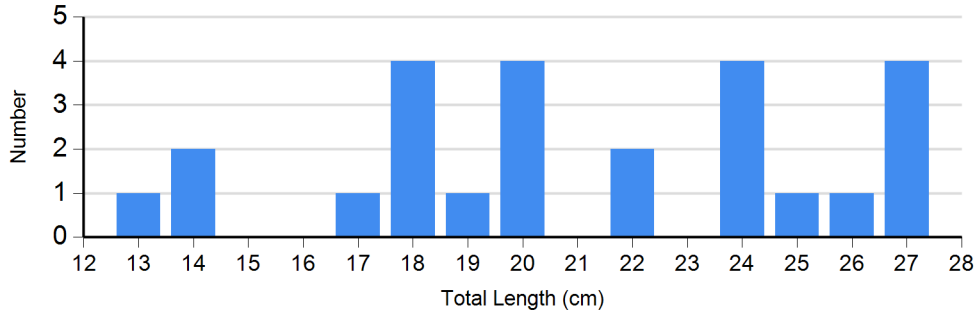


2015



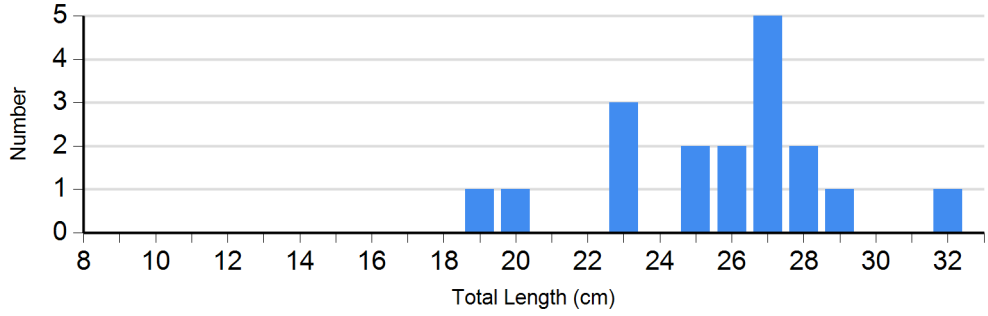
2016

Species: Yellow Perch
Gear: AFS std gill net

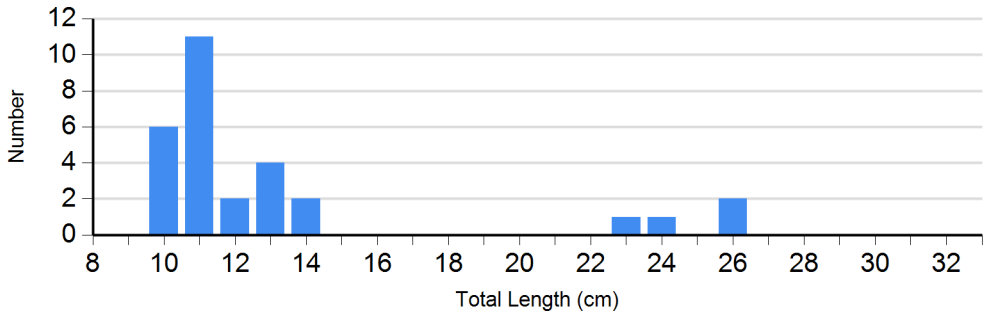


2017

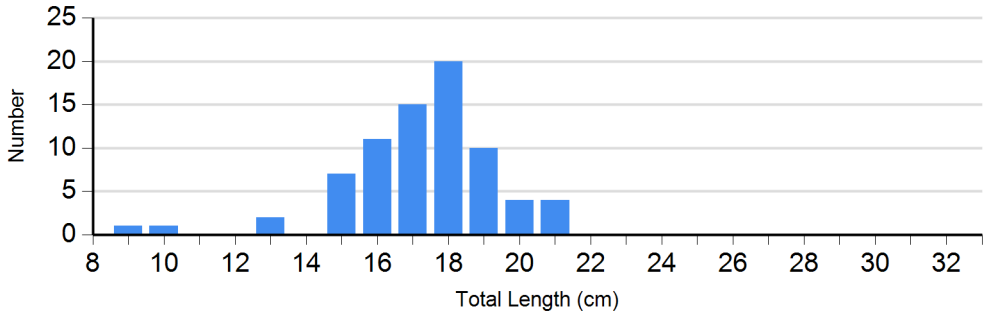
Species: Yellow Perch
Gear: std exp gill net



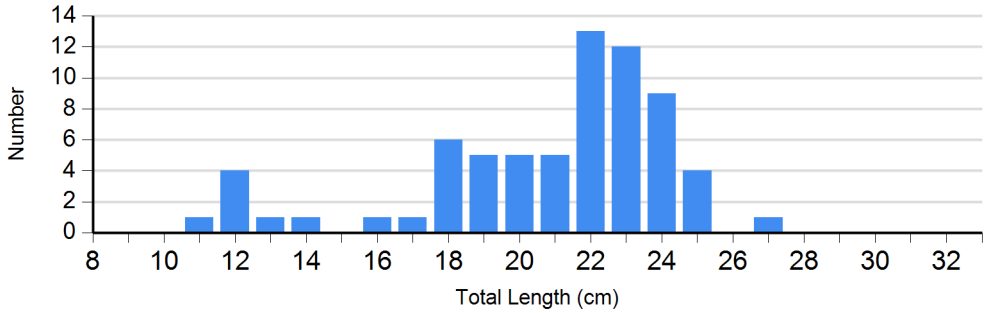
2013



2014



2015

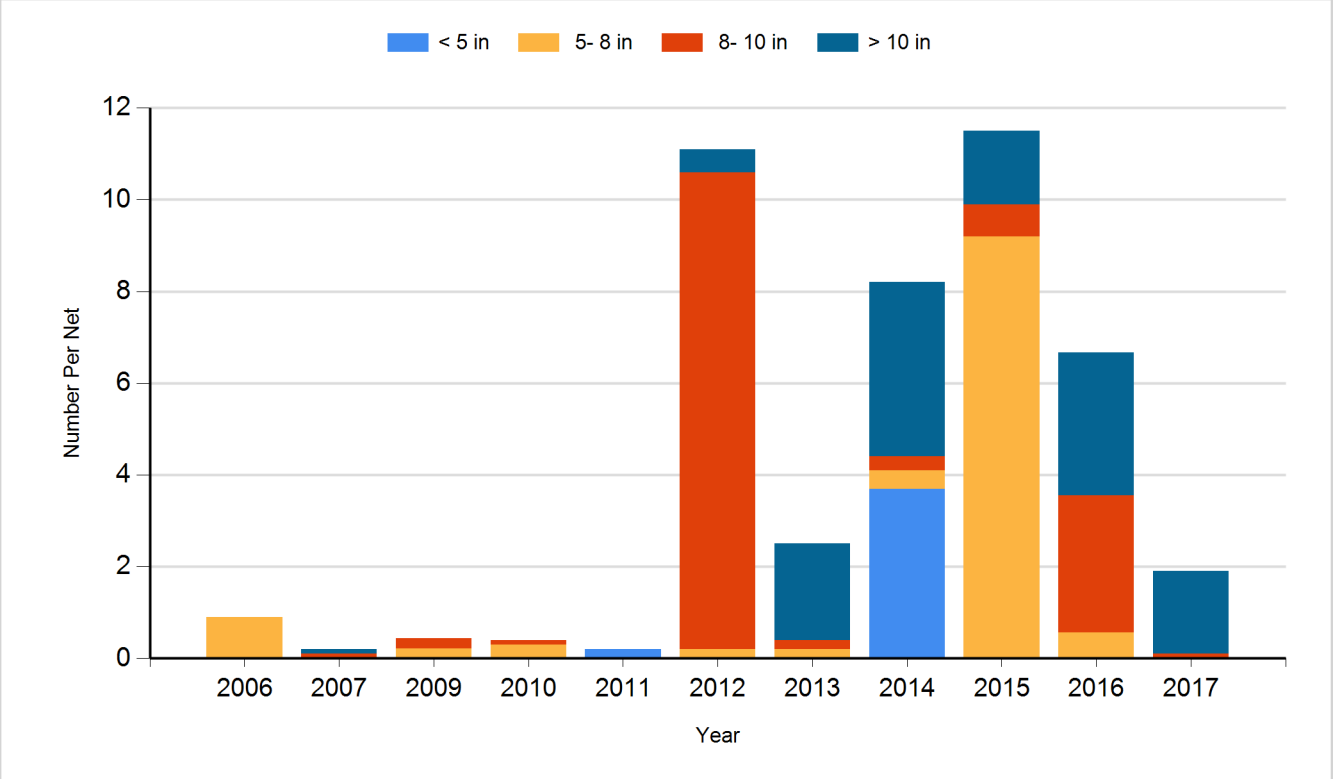


2016

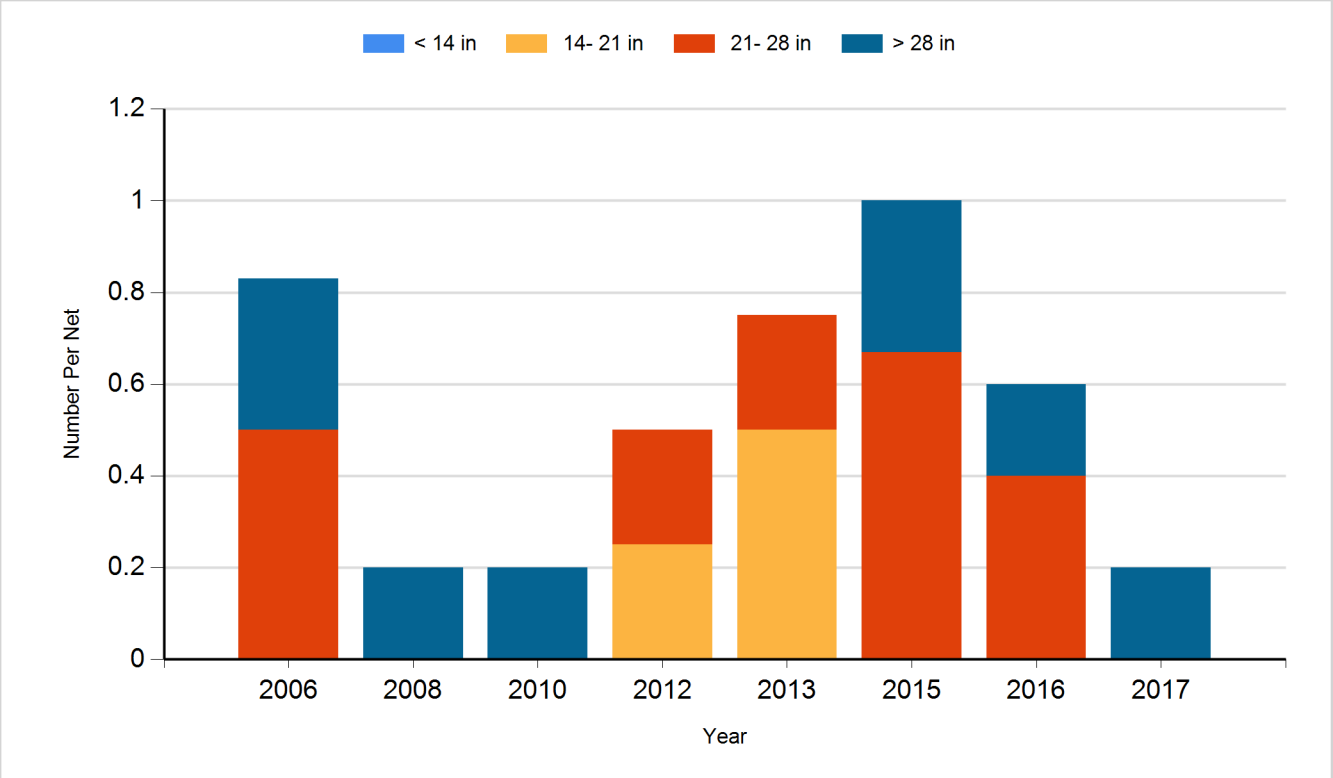
Historic Fish Sizes and Relative Abundance

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

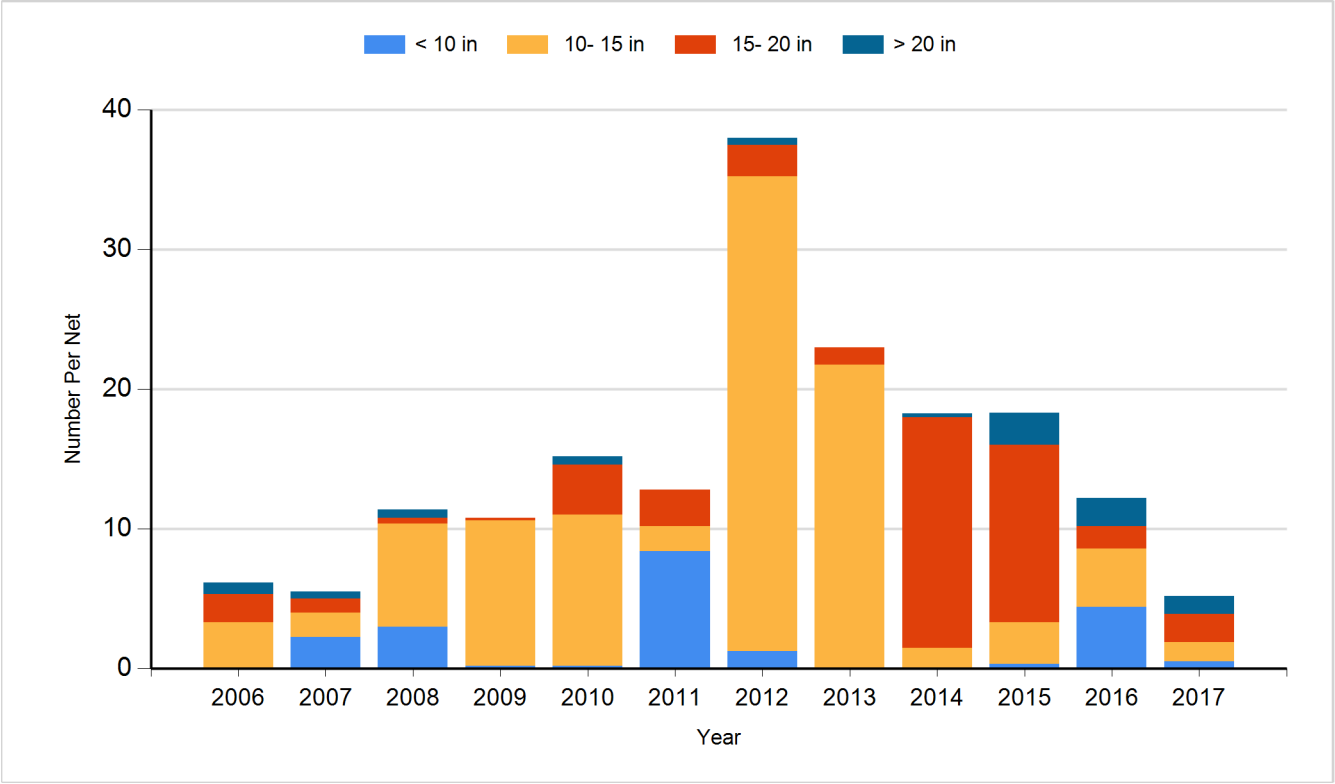
Species: Black Crappie
Gear: Frame Net



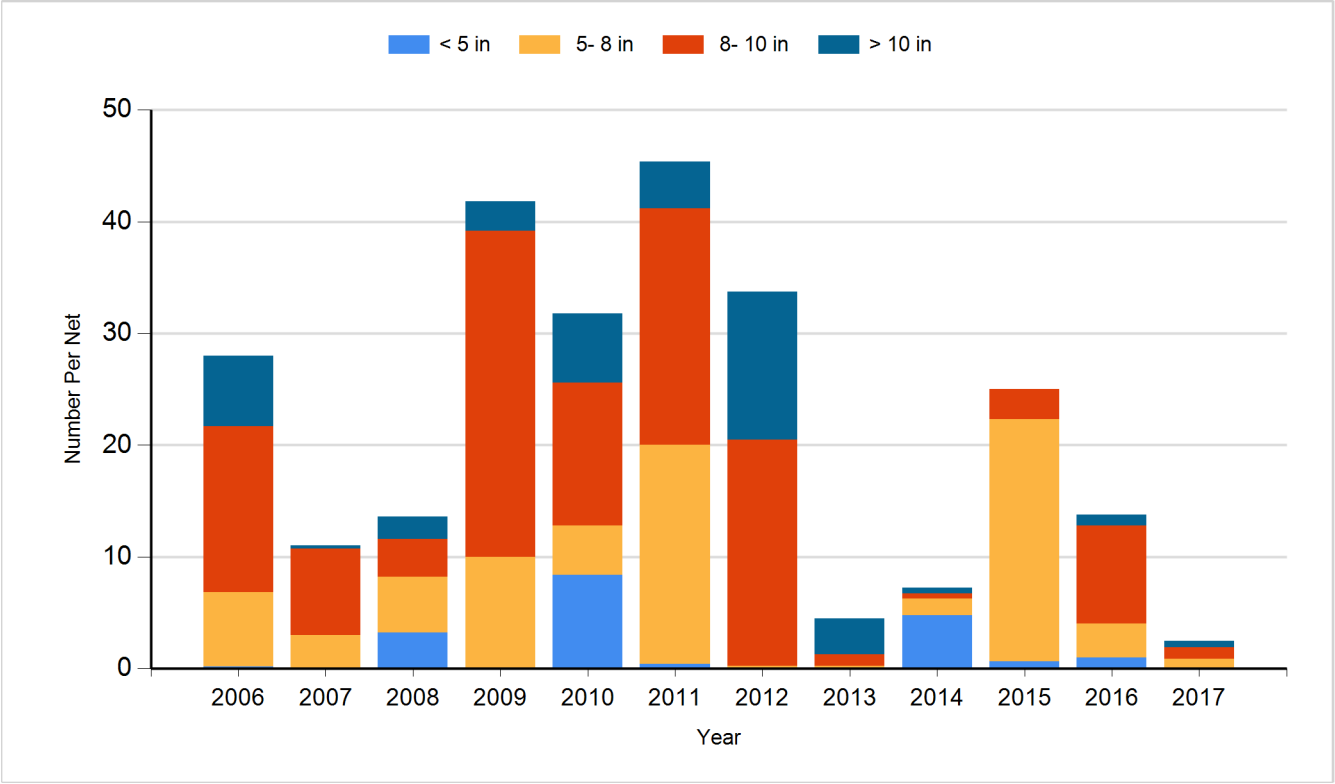
Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net



Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2006	Fathead Minnow	Adult	76,806
2006	Walleye	Small Fingerling	173,060
2010	Walleye	Small Fingerling	172,480
2011	Muskellunge	Large Fingerling	1,223
2012	Muskellunge	Adult	2
2013	Muskellunge	Fingerling	780
2014	Muskellunge	Large Fingerling	1,719
2015	Muskellunge	Large Fingerling	1,720
2015	Walleye	Small Fingerling	118,400
2017	Muskellunge	Large Fingerling	3,206
2017	Walleye	Small Fingerling	121,030