SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Angostura Reservoir, Fall River County
ANR-Lake-4-000
2016

Lake Information

Name: Angostura Reservoir

County: Fall River

Surface Area: 4,835 Acres

Surveys and Investigations

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

Gear	Date	Effort
frame net (std 3/4 in)	May 12, 2016	14 net-nights
std exp gill net	August 16, 2016	8 net-nights

Common Fish Species Present

Black Crappie

Channel Catfish

Largemouth Bass

Gizzard Shad

Walleye

Smallmouth Bass

Freshwater Drum

Common Carp

Shorthead Redhorse

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
frame net (std 3/4 in)	Black Crappie	8.3	3.1	79	5	60	6	111	1
	Bluegill	0.6	0.3	100		25		115	6
	Channel Catfish	6.3	2.5	32	7	0		96	1
	Common Carp	0.9	0.5	50	25	0		99	5
	Largemouth Bass	0.6	0.4	100		75		109	2
	River Carpsucker	0.3	0.2	100		100		108	0
	Smallmouth Bass	0.4	0.4	67		0		93	5
	Walleye	1.9	0.4	69	14	38	15	86	2
std exp gill net	Black Crappie	4.3	3.0	76	11	18	10	105	1
	Bluegill	0.3	0.2	100		0		122	0
	Channel Catfish	10.8	3.4	28	7	0		83	1
	Common Carp	4.5	0.9	33	12	0		82	1
	Freshwater Drum	5.0	2.8	35	11	0		90	1
	Gizzard Shad	2.8	1.1	100				93	1
	Largemouth Bass	0.3	0.2	100		0		120	0
	Northern Pike	1.0	0.7	75		0		85	4
	River Carpsucker	1.5	0.5	100		83		105	0
	Shorthead Redhorse	4.5	2.5	100		67	12		
	Smallmouth Bass	5.0	4.0	70	11	25	10	101	1
	Spottail Shiner	0.0	0.0						
	Walleye	25.8	3.7	36	5	5	2	85	1
	White Sucker	0.5	0.3	100		100		88	0
	Yellow Perch	2.0	1.3	25		13		85	1

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
boat shocker (night)	Walleye		60.0									60.0
frame net (1/2 inch)	Black Crappie		10.8	5.5	2.9							6.4
	Bluegill		19.0	16.3	5.9							13.7
	Channel Catfish		0.0	3.3	8.1							3.8
	Common Carp			0.3	1.1							0.7
	Freshwater Drum		0.1	0.1	0.9							0.4
	Gizzard Shad				0.0							0.0
	Green Sunfish		0.3									0.3
	River Carpsucker		3.1	0.6	0.8							1.5
	Rock Bass		0.1	0.1								0.1
	Shorthead Redhorse		0.6		0.5							0.6
	Smallmouth Bass		1.1	0.4	0.3							0.6
	Walleye		0.5	0.6	1.1							0.7
	White Sucker				0.1							0.1
	Yellow Perch		0.3	0.1								0.2
frame net (std 3/4 in)	Black Bullhead					0.3			1.1			0.7
	Black Crappie	2.3				26.4	3.9	11.3	7.0	5.9	8.3	9.3
	Bluegill	2.1				0.8	4.5	8.1	2.0	1.4	0.6	2.8
	Bluegill X Gr. Sunfish Hybrid							0.3				0.3
	Channel Catfish	0.0				3.4		0.1	1.3	0.3	6.3	1.9
	Common Carp	0.0				0.6		0.4	2.6	0.3	0.9	0.8
	Freshwater Drum	0.0						0.0				0.0
	Gizzard Shad	0.0										0.0
	Green Sunfish						0.1	0.9				0.5
	Largemouth Bass										0.6	0.6
	Northern Pike						0.1		0.1			0.1
	River Carpsucker	0.3				0.6	0.1	0.3	0.5		0.3	0.4
	Rock Bass							0.8	0.1	0.1		0.3
	Shorthead Redhorse	0.4					0.1		0.1	0.3		0.2
	Smallmouth Bass	0.8				0.3	0.5		1.4		0.4	0.7
	Walleye	0.8				0.9	0.8	0.8	1.3	1.3	1.9	1.1
	White Sucker	0.1							0.4	0.1		0.2

		CPUE										
Gear	Species	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
frame net (std	Yellow Perch					0.3				0.0		0.2
std exp gill net	Black Crappie	1.3	1.0	0.3	1.0			1.3			4.3	1.5
	Bluegill										0.3	0.3
	Channel Catfish	10.0	19.0	26.5	13.8			13.5			10.8	15.6
	Common Carp	5.5	2.3	3.5	10.0			6.0			4.5	5.3
	Freshwater Drum	8.5	10.0	4.0	1.3			2.3			5.0	5.2
	Gizzard Shad	0.0	0.0	0.5	0.0			2.8			2.8	1.0
	Largemouth Bass		0.0	0.3	1.5						0.3	0.5
	Northern Pike			0.8				0.3			1.0	0.7
	River Carpsucker	8.5	1.0	1.3	2.5			2.5			1.5	2.9
	Shorthead Redhorse		2.0	3.3	2.8			5.0			4.5	3.5
	Smallmouth Bass		0.7	4.3	6.8			5.3			5.0	4.4
	Spottail Shiner		0.0	0.0	0.0			0.0			0.0	0.0
	Walleye	20.5	39.0	21.8	21.5			25.3			25.8	25.7
	White Sucker			0.5							0.5	0.5
	Yellow Perch	0.5	2.3	17.0	12.0			3.0			2.0	6.1
std exp gill net (150 ft)	Black Crappie					2.5	0.8		3.3	2.3		2.2
	Bluegill						0.3					0.3
	Channel Catfish					24.0	9.8		16.8	8.8		14.9
	Common Carp					8.8	6.0		3.0	6.5		6.1
	Freshwater Drum					1.5	1.8		4.3	2.0		2.4
	Gizzard Shad					0.3	0.3		2.5	5.8		2.2
	Largemouth Bass					0.5			0.3			0.4
	Northern Pike					0.3	0.5			1.8		0.9
	River Carpsucker					1.0	3.5		2.0	2.0		2.1
	Shorthead Redhorse					0.3	1.5		8.5	4.8		3.8
	Smallmouth Bass					4.0	12.8		4.3	5.0		6.5
	Spottail Shiner					0.0	0.0			0.0		0.0
	Walleye					16.5	21.5		29.5	28.0		23.9
	White Sucker								0.3	0.8		0.6
	Yellow Perch					9.0	2.8		3.8	3.0		4.7

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
boat shocker (night)	Walleye	PSD		0								
		PSD-P		0								
frame net (1/2 inch)	Black Crappie	PSD		43	66	61						
		PSD-P		9	14	22						
		Wr		100	104	102						
	Walleye	PSD		75	60	89						
		PSD-P		0	40	44						
		Wr		82	82	75						
	Yellow Perch	PSD		50	0							
		PSD-P		0	0							
		Wr		81	93							
frame net (std 3/4 in)	Black Crappie	PSD	39				100	94	73	95	100	79
		PSD-P	11				50	32	26	68	94	60
		Wr	101				99	95	94	98	99	111
	Northern Pike	PSD						100		100		
		PSD-P						100		0		
		Wr								83		
	Walleye	PSD	33				100	83	100	100	100	69
		PSD-P	17				57	50	67	20	80	38
		Wr	82				86	90	89	85	80	86
	Yellow Perch	PSD					0				0	
		PSD-P					0				0	
		Wr					164					
std exp gill net	Black Crappie	PSD	0	100	100	50			100			76
		PSD-P	0	33	100	0			60			18
		Wr	121	99	103	105			108			105
	Northern Pike	PSD			100				100			75
		PSD-P			0				100			0
		Wr			94				91			85
	Walleye	PSD	23	65	53	53			55			36
		PSD-P	5	2	8	6			9			5

			Year									
Gear	Species	Index	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
std exp gill net	Walleye	Wr	83	85	86	83			85			85
	Yellow Perch	PSD	0	14	22	19			25			25
		PSD-P	0	0	0	0			0			13
		Wr	90	87	90	89			89			85
std exp gill net (150 ft)	Black Crappie	PSD					60	33		54	56	
		PSD-P					10	33		54	56	
		Wr					116	82		108	118	
	Northern Pike	PSD					100	100			29	
		PSD-P					0	0			0	
		Wr					94	89			95	
	Walleye	PSD					70	48		59	58	
		PSD-P					9	6		6	14	
		Wr					85	88		85	92	
	Yellow Perch	PSD					22	18		60	8	
		PSD-P					3	9		13	0	
		Wr					89	92		92	95	

Back-Calculated Lengths

Mean species back-calculated total length (mm) at age, standard error (SE), and sample size (N).

Species: Black Crappie

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2014	2	20	65 (3.6)	187 (2.4)								
2013	3	36	66 (1.9)	149 (4.2)	248 (2.3)							
2012	4	6	61 (2.3)	163 (4)	242 (1.4)	268 (5.2)						
2011	5	4	69 (.2)	137 (4.7)	231 (1.6)	270 (2.3)	295 (2.9)					
2010	6	20	69 (1.4)	145 (3.8)	209 (3.7)	265 (2.4)	289 (2.1)	308 (2)				
Weighted Mean		86	66	157	235	266	290	308				

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2014	2	20										
2013	3	36										
2012	4	6										
2011	5	4										
2010	6	20										
Weighted Mean		86										

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+
2016	116		189 (26)	251 (56)	264 (10)	298 (4)	308 (20)				
2014	108		207 (14)	241 (20)	264 (60)	309 (4)	269 (11)	320 (2)			
2012	58			236 (44)	279 (10)	304 (2)	316 (2)				
2011	412		145 (2)	242 (273)	285 (86)	299 (46)	334 (6)				
2009	112	127 (52)	221 (48)	272 (12)							
2007	46	136 (32)	225 (10)	255 (2)	272 (2)						

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2016	204	308 (126)	397 (62)		445 (8)	524 (6)			606 (2)		
2015	228	279 (92)	390 (21)	447 (25)	460 (46)	515 (16)	523 (10)	610 (6)	584 (4)	515 (6)	623 (2)
2014	236	290 (60)	381 (63)	426 (82)	464 (17)	525 (4)	599 (4)	617 (2)		576 (2)	485 (2)
2013	192	264 (2)	359 (110)	442 (53)	525 (2)	517 (23)					662 (2)
2012	182	276 (78)	384 (70)	471 (9)	497 (14)	525 (2)	514 (5)	519 (2)			723 (2)
2011	142	251 (22)	381 (54)	456 (29)	475 (15)	483 (5)	523 (15)		544 (2)		499 (2)
2010	170	267 (24)	379 (110)	445 (14)	496 (12)	502 (6)				519 (4)	
2009	156	291 (66)	401 (10)	435 (33)	452 (33)	435 (3)	555 (4)	525 (2)	514 (2)		584 (4)
2008	230	307 (54)	383 (76)	430 (93)	444 (5)	491 (2)					
2007	158	280 (18)	364 (126)	411 (4)	479 (6)	542 (4)					

Fish Condition

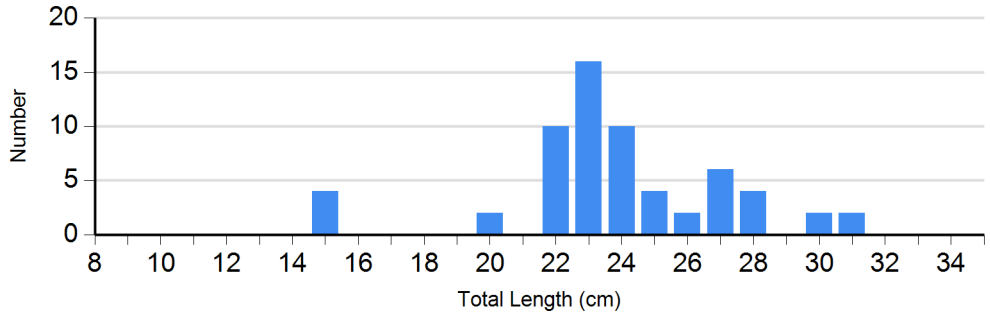
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	4	97 (0.7)	38	96 (1.1)	16	94 (1.3)	4	87 (2.9)
	2013	48	95 (1.3)	86	91 (0.7)	44	100 (0.8)	2	97 (0.0)
	2014	6	99 (0.3)	30	102 (1.1)	70	97 (0.7)	6	96 (1.1)
	2015	0		6	106 (1.6)	70	99 (0.6)	18	98 (1.2)
	2016	24	113 (2.9)	22	116 (1.2)	50	112 (1.1)	20	104 (1.1)
Northern Pike Gill Net	2012	0		4	89 (2.9)	0		0	
	2013	0		0		0		2	91 (0.0)
	2015	10	97 (1.4)	4	93 (1.1)	0		0	
	2016	2	85 (0.0)	6	85 (4.0)	0		0	
Walleye Gill Net	2012	90	87 (0.7)	72	89 (0.6)	8	91 (1.6)	2	74 (0.0)
	2013	90	84 (0.5)	94	85 (0.6)	16	81 (1.3)	2	85 (0.0)
	2014	96	88 (0.8)	126	83 (0.4)	12	77 (1.3)	2	79 (0.0)
	2015	94	95 (0.5)	98	91 (0.5)	30	87 (0.8)	2	81 (0.0)
	2016	132	85 (0.4)	64	86 (0.6)	8	76 (1.4)	2	65 (0.0)
Yellow Perch Gill Net	2012	18	92 (2.2)	2	93 (0.0)	2	90 (0.0)	0	
	2013	18	89 (1.4)	6	89 (2.8)	0		0	
	2014	12	94 (2.2)	14	92 (1.9)	4	90 (3.4)	0	
	2015	22	95 (1.9)	2	93 (0.0)	0		0	
	2016	12	86 (1.3)	2	87 (0.0)	2	82 (0.0)	0	

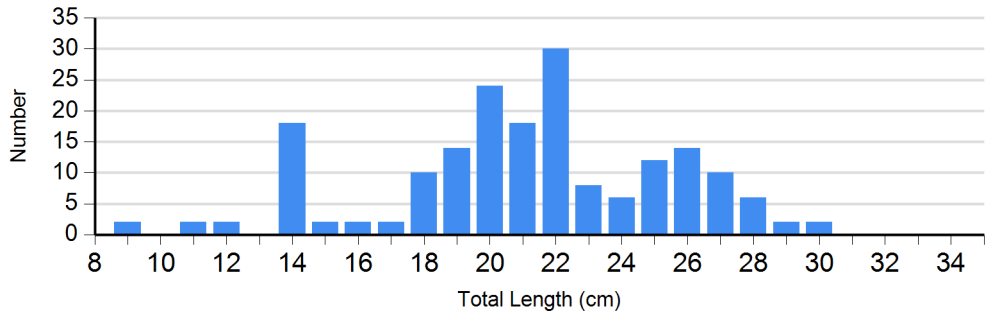
Length Frequency Distribution

Length frequency histogram of species sampled by year.

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



2012



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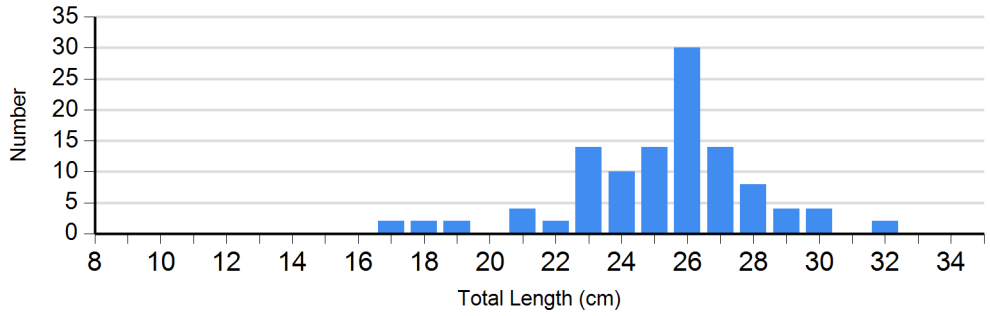

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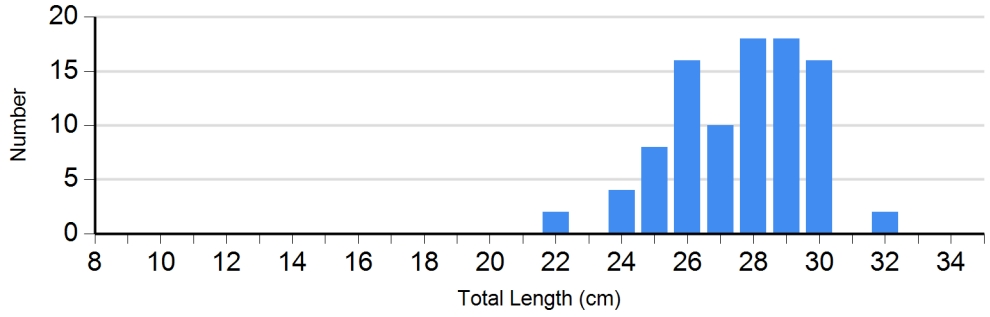
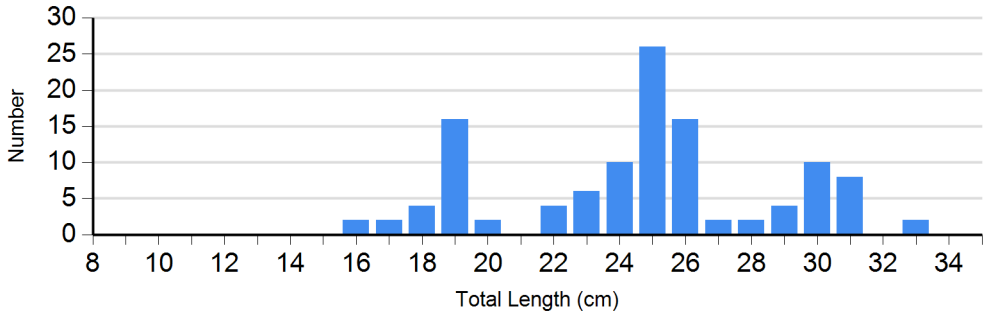
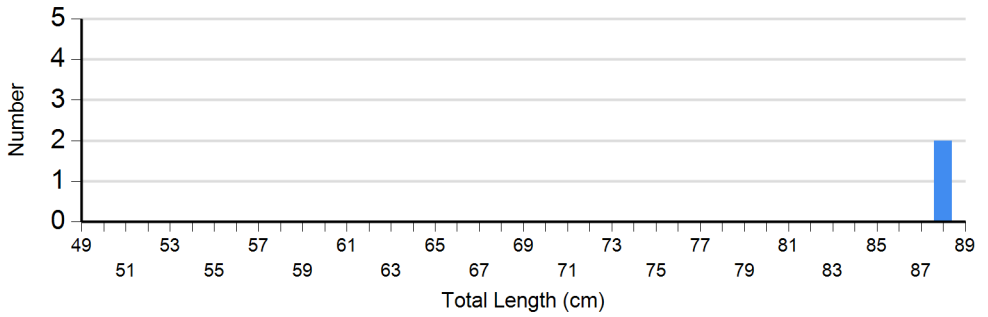


2015

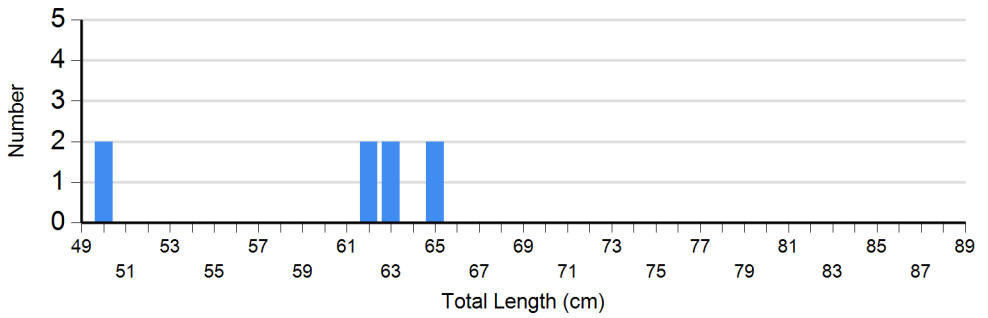


2016

Species: Northern Pike
Gear: std exp gill net

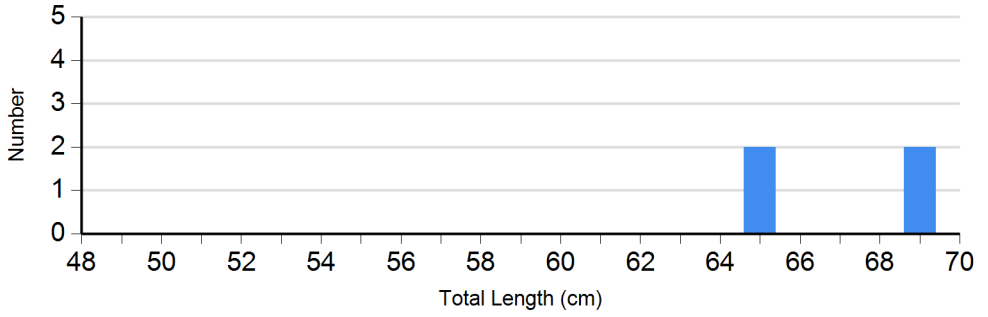


2013

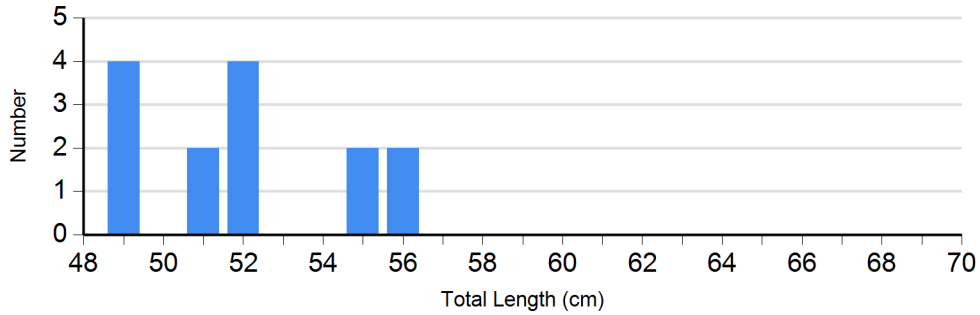


2016

Species: Northern Pike
Gear: std exp gill net (150 ft)

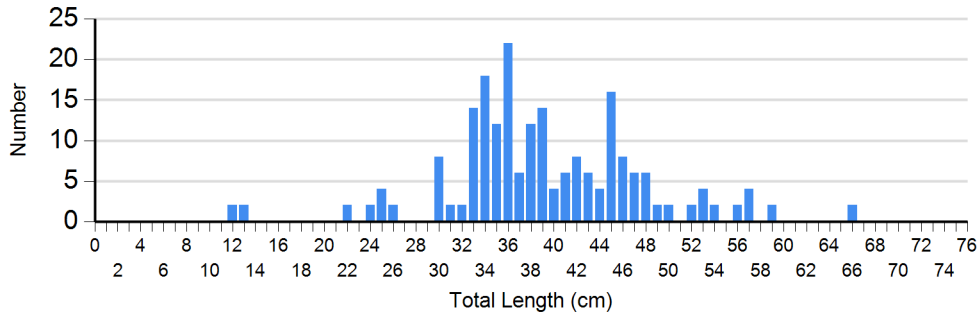


2012

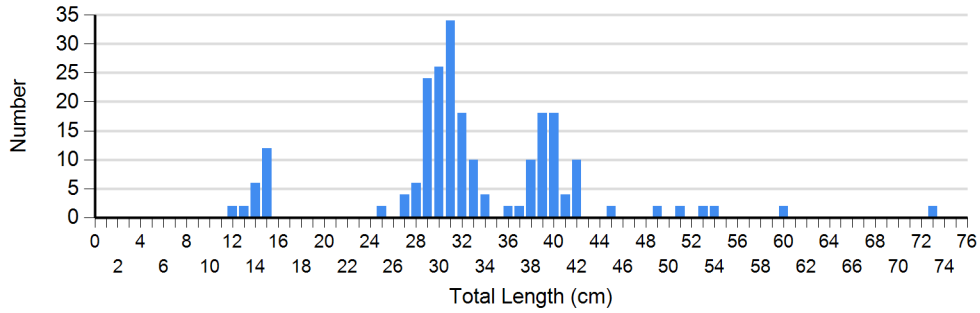


2015

Species: Walleye
Gear: std exp gill net

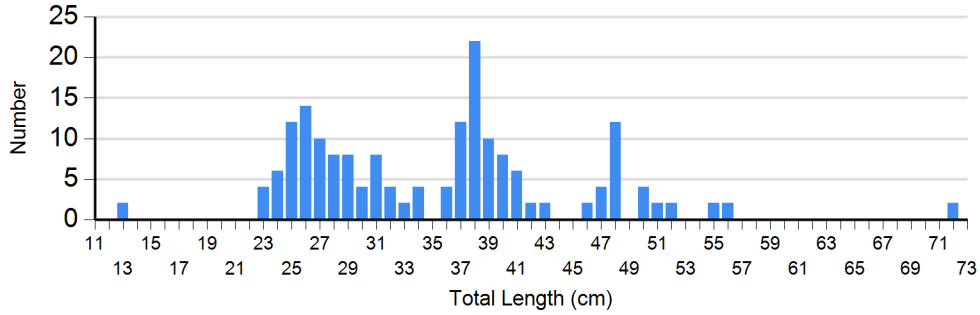


2013

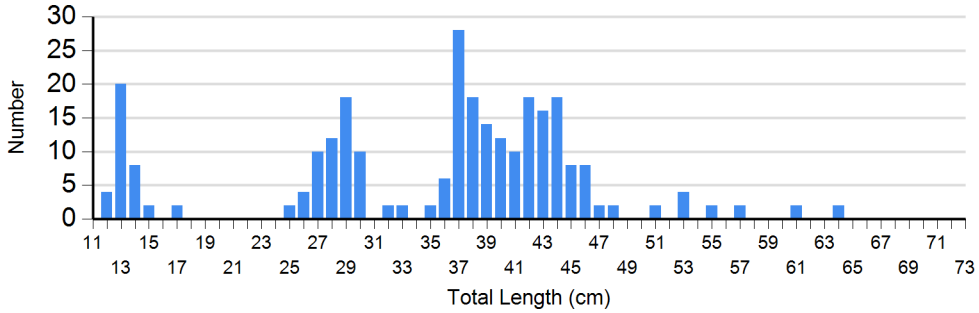


2016

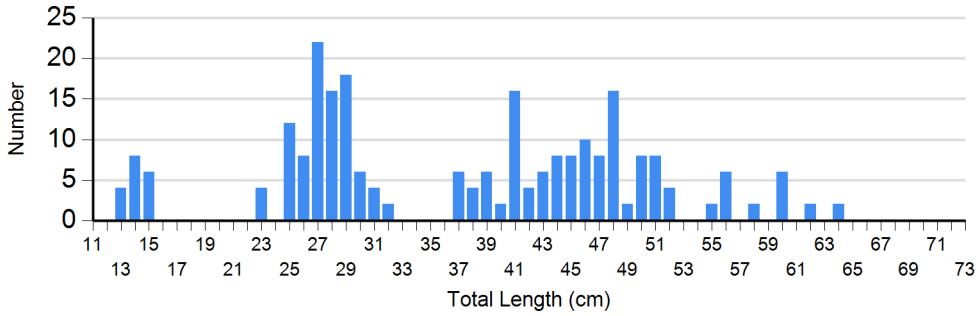
Species: Walleye
Gear: std exp gill net (150 ft)



2012

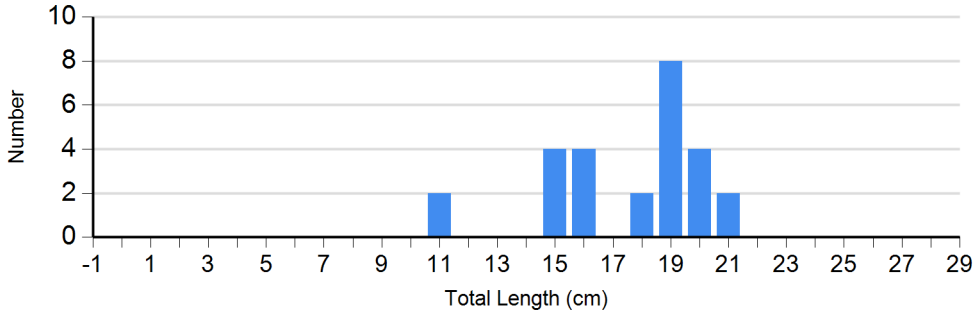


2014

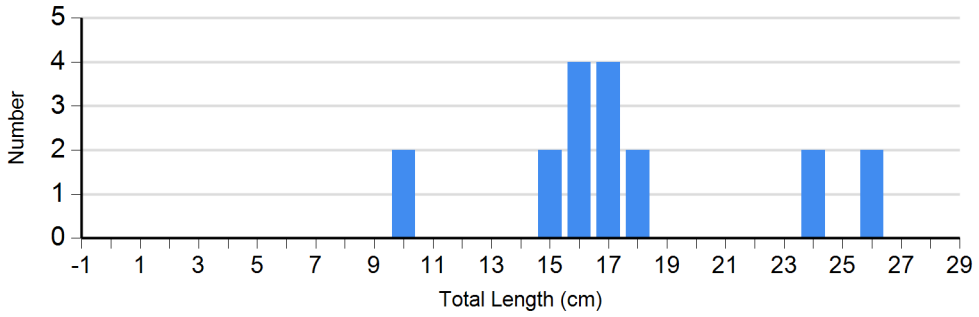


2015

Species: Yellow Perch
Gear: std exp gill net

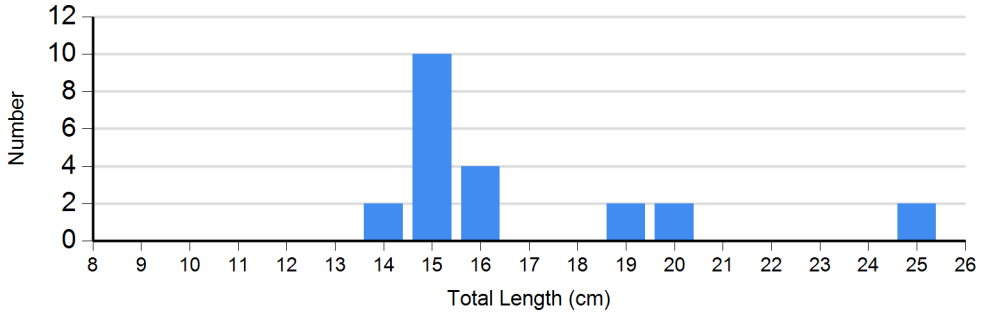


2013

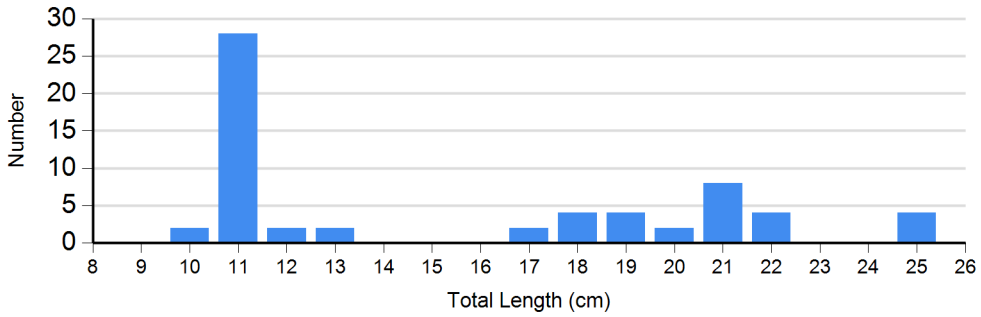


2016

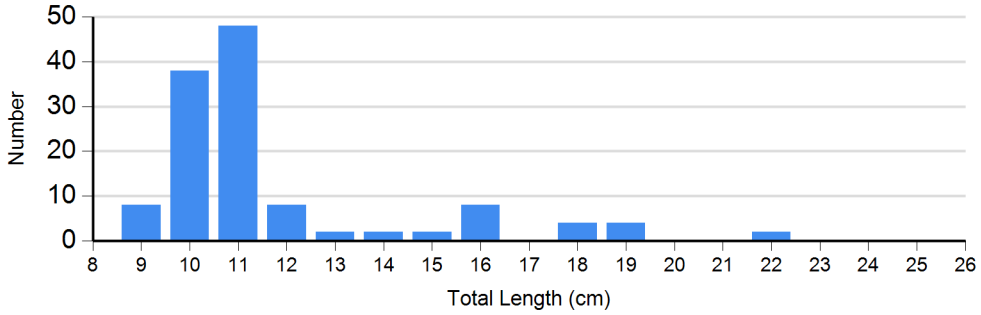
Species: Yellow Perch
Gear: std exp gill net (150 ft)



2012



2014

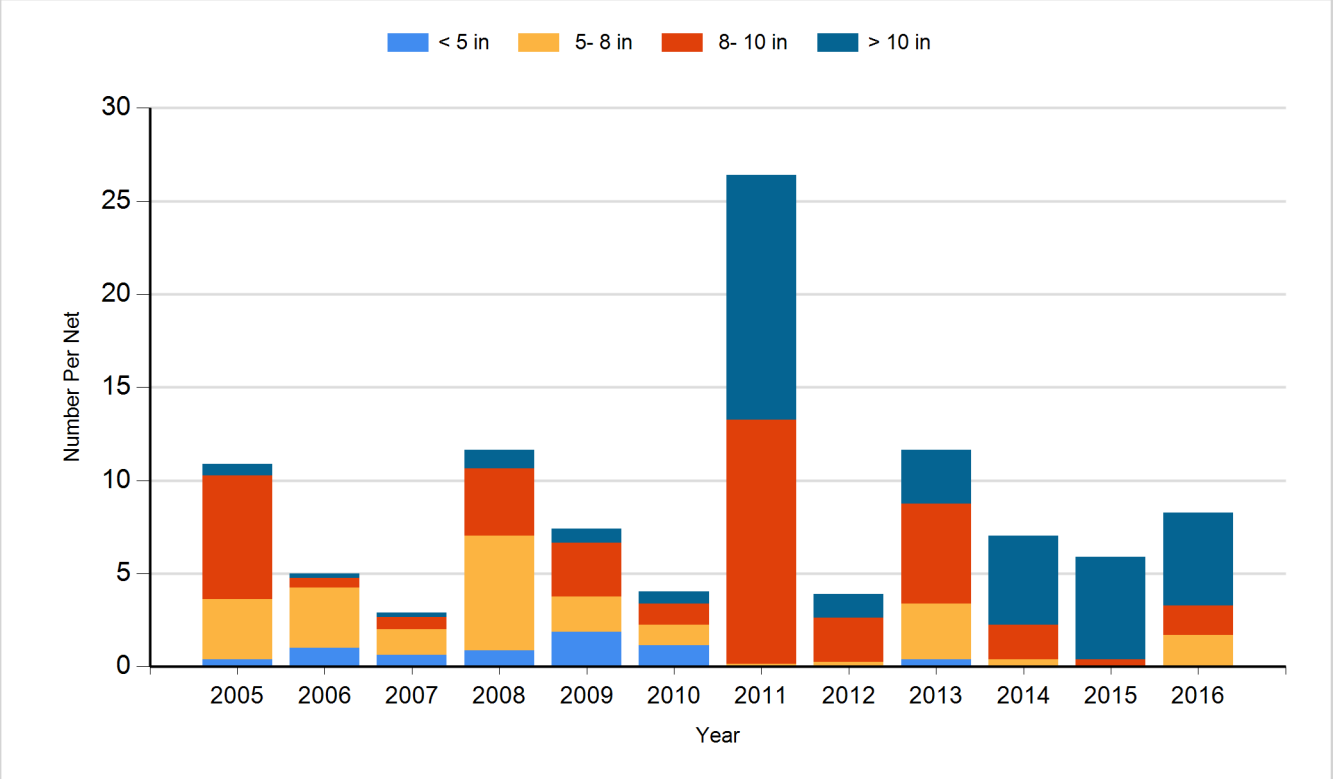


2015

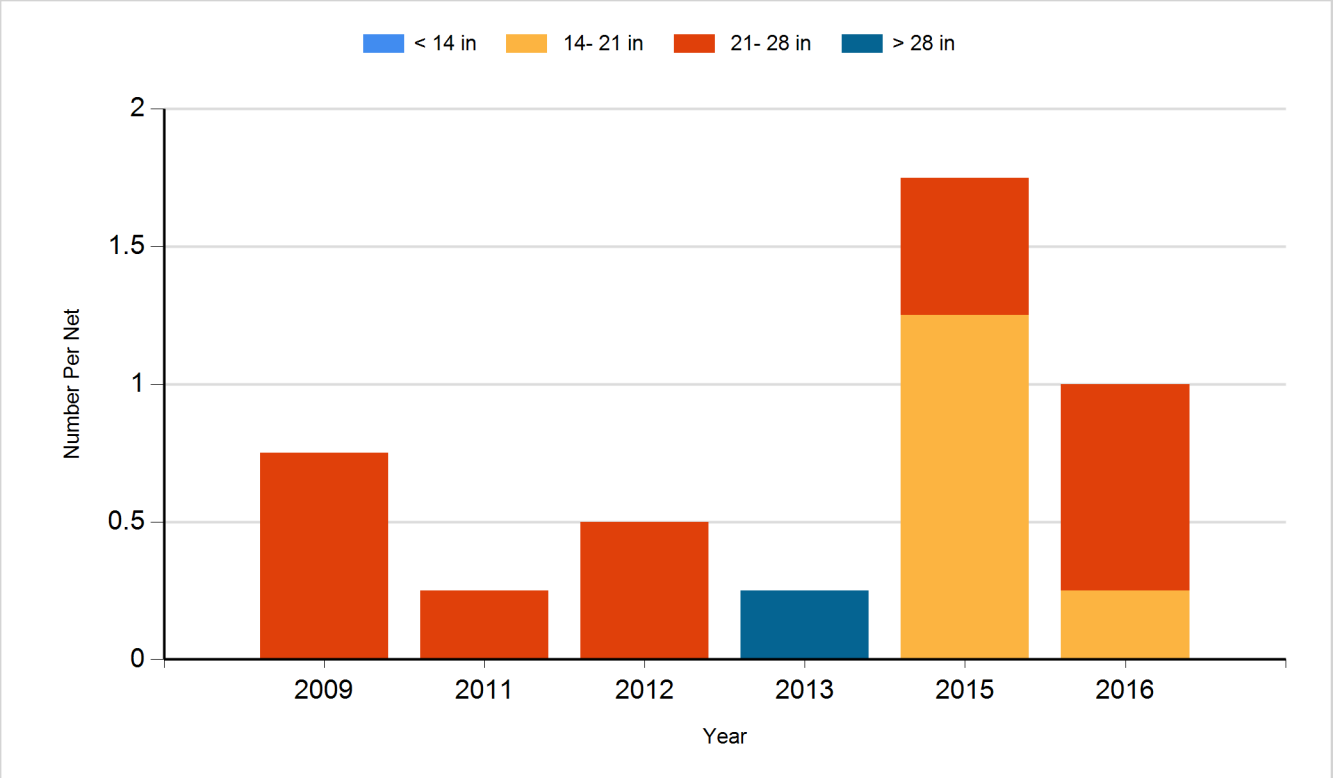
Historic Fish Sizes and Relative Abundance

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

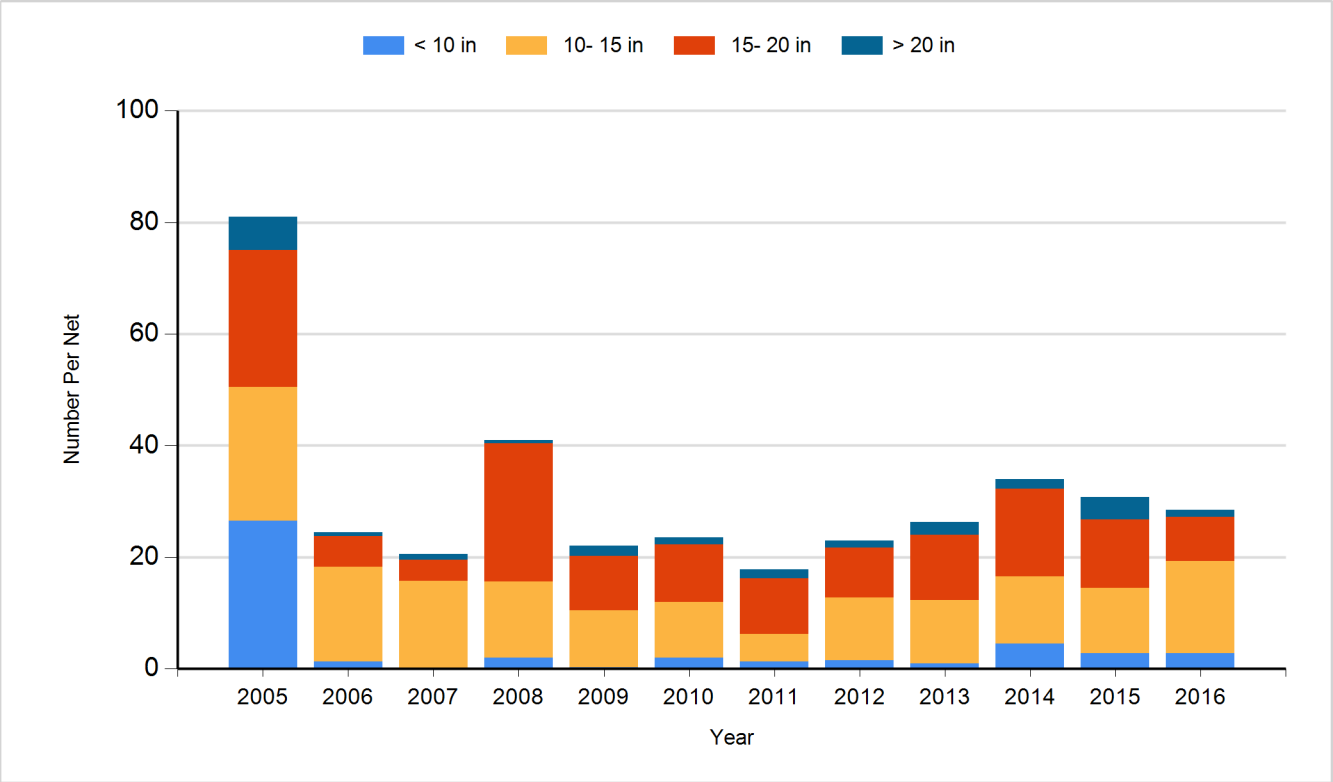
Species: Black Crappie
Gear: Frame Net



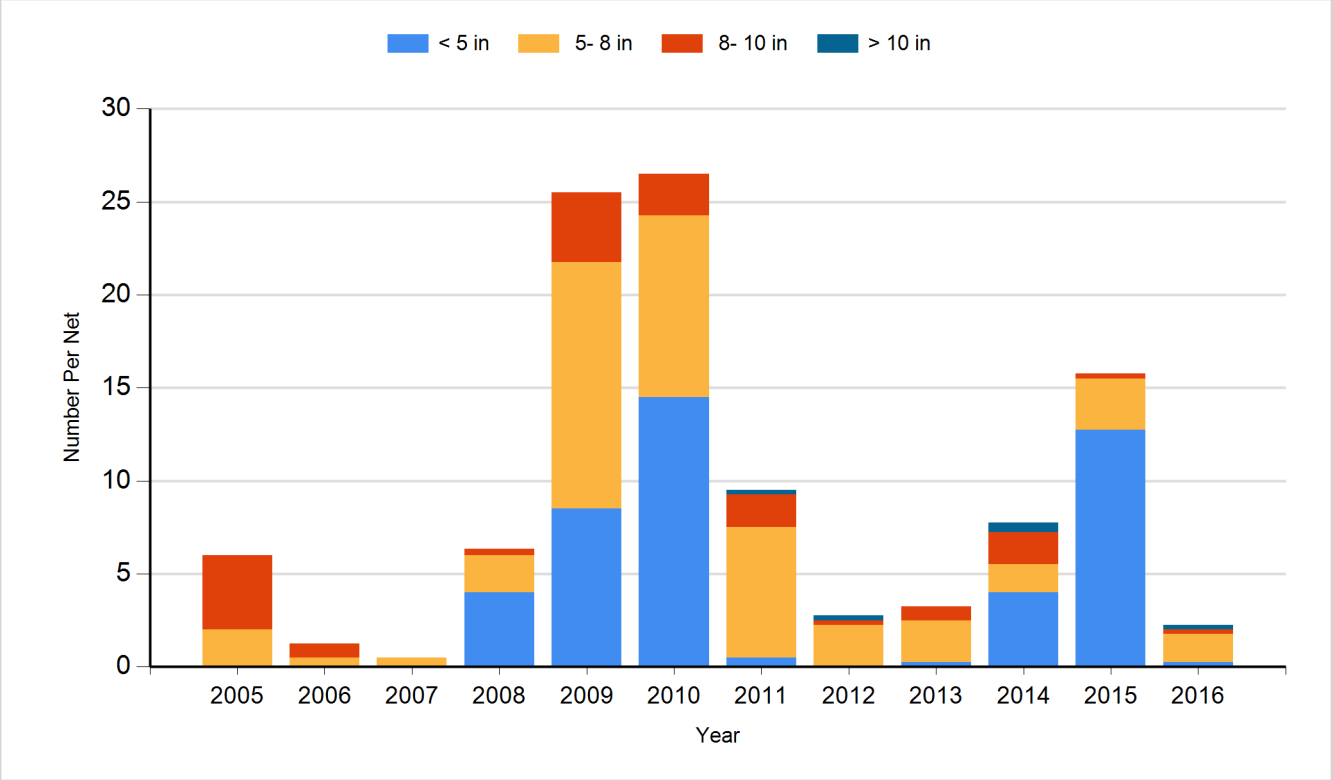
Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net



Fish Stocking

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

Year	Species	Size	Number
2005	Walleye	Fingerling	381,045
2008	Walleye	Fingerling	479,900
2010	Walleye	Fingerling	289,340
2011	Walleye	Fingerling	310,199
2012	Walleye	Fingerling	476,423
2014	Walleye	Fingerling	549,725
2015	Walleye	Fry	4,702,776
2016	Walleye	Fry	4,809,475