

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Angostura Reservoir, Fall River County
ANR-Lake-4-000
2015

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 13, 2015	16 net-nights
std exp gill net (150 ft)	August 04, 2015	8 net-nights

Common Fish Species Present

Largemouth Bass

Gizzard Shad

Channel Catfish

Black Crappie

Walleye

Common Carp

Smallmouth Bass

Shorthead Redhorse

Yellow Perch

Freshwater Drum

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).

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

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.

$$PSD = \left(\frac{\text{number of fish} \geq \text{quality length}}{\text{number of fish} \geq \text{stock length}} \right) \times 100$$

$$PSD - P = \left(\frac{\text{number of fish} \geq \text{preferred length}}{\text{number of fish} \geq \text{stock length}} \right) \times 100$$

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.

$$Wr = \left(\frac{W}{W_s} \right) \times 100$$

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).

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(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

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(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).

Gear	Species	Abundance		Stock Density Indices			Condition		
		CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
frame net (std 3/4 in)	Black Crappie	5.9	2.3	100		94	4	99	1
	Bluegill	1.4	0.8	91		0		95	2
	Channel Catfish	0.3	0.2	0		0		79	5
	Common Carp	0.3	0.2	100		0		73	4
	Rock Bass	0.1	0.1	100		0		101	0
	Shorthead Redhorse	0.3	0.1	100		100		78	0
	Walleye	1.3	0.5	100		80		80	2
	White Sucker	0.1	0.1	100		100		71	0
	Yellow Perch	0.0	0.0	0		0			
std exp gill net (150 ft)	Black Crappie	2.3	0.8	56	19	56	19	118	4
	Channel Catfish	8.8	2.6	11	6	0		87	1
	Common Carp	6.5	1.9	58	10	0		87	1
	Freshwater Drum	2.0	0.8	13		0		93	1
	Gizzard Shad	5.8	1.0	100				97	2
	Northern Pike	1.8	0.4	29		0		95	2
	River Carpsucker	2.0	1.3	100		100		93	3
	Shorthead Redhorse	4.8	2.5	100		26	11	90	1
	Smallmouth Bass	5.0	3.0	80	10	15	9	97	1
	Spottail Shiner	0.0	0.0						
	Walleye	28.0	1.9	58	5	14	3	92	1
	White Sucker	0.8	0.4	100		67		93	2
	Yellow Perch	3.0	1.6	8		0		95	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.

Gear	Species	CPUE										Avg	
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		
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	4.0	2.3				26.4	3.9	11.3	7.0	5.9		8.7
	Bluegill	0.1	2.1				0.8	4.5	8.1	2.0	1.4		2.7
	Bluegill X Gr. Sunfish Hybrid								0.3				0.3
	Channel Catfish	0.0	0.0				3.4		0.1	1.3	0.3		0.9
	Common Carp	0.0	0.0				0.6		0.4	2.6	0.3		0.7
	Freshwater Drum	0.0	0.0						0.0				0.0
	Gizzard Shad		0.0										0.0
	Green Sunfish							0.1	0.9				0.5
	Northern Pike								0.1		0.1		0.1
	River Carpsucker	0.1	0.3				0.6	0.1	0.3	0.5			0.3
	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			0.8
	Walleye	1.0	0.8				0.9	0.8	0.8	1.3	1.3		1.0
	White Sucker		0.1							0.4	0.1		0.2
Yellow Perch						0.3					0.0	0.2	

		CPUE										
Gear	Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Avg
std exp gill net	Black Crappie	2.0	1.3	1.0	0.3	1.0			1.3			1.2
	Channel Catfish	14.3	10.0	19.0	26.5	13.8			13.5			16.2
	Common Carp	2.5	5.5	2.3	3.5	10.0			6.0			5.0
	Freshwater Drum	5.0	8.5	10.0	4.0	1.3			2.3			5.2
	Gizzard Shad	0.0	0.0	0.0	0.5	0.0			2.8			0.6
	Largemouth Bass			0.0	0.3	1.5						0.6
	Northern Pike				0.8				0.3			0.6
	River Carpsucker	8.3	8.5	1.0	1.3	2.5			2.5			4.0
	Shorthead Redhorse	0.8		2.0	3.3	2.8			5.0			2.8
	Smallmouth Bass	0.3		0.7	4.3	6.8			5.3			3.5
	Spottail Shiner	0.0		0.0	0.0	0.0			0.0			0.0
	Walleye	23.3	20.5	39.0	21.8	21.5			25.3			25.2
	White Sucker				0.5							0.5
	Yellow Perch	1.3	0.5	2.3	17.0	12.0			3.0			6.0
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.

Gear	Species	Index	Year										
			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
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	19	39				100	94	73	95	100	
		PSD-P	6	11				50	32	26	68	94	
		Wr	102	101				99	95	94	98	99	
	Northern Pike	PSD								100		100	
		PSD-P								100		0	
		Wr										83	
	Walleye	PSD	75	33					100	83	100	100	100
		PSD-P	75	17					57	50	67	20	80
		Wr	77	82					86	90	89	85	80
	Yellow Perch	PSD								0			0
		PSD-P								0			0
		Wr								164			
	std exp gill net	Black Crappie	PSD	0	0	100	100	50				100	
			PSD-P	0	0	33	100	0				60	
			Wr	106	121	99	103	105				108	
Northern Pike		PSD				100					100		
		PSD-P				0					100		
		Wr				94					91		
Walleye		PSD	27	23	65	53	53				55		
		PSD-P	3	5	2	8	6				9		

Gear	Species	Index	Year										
			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
std exp gill net	Walleye	Wr	83	83	85	86	83				85		
	Yellow Perch	PSD	60	0	14	22	19				25		
		PSD-P	0	0	0	0	0				0		
		Wr	79	90	87	90	89				89		
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

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+
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)						
2006	58	138 (44)	214 (10)	261 (4)							

Species: Walleye

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
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)					
2006	190	273 (122)	372 (28)	412 (14)	436 (7)	473 (18)					

Fish Condition

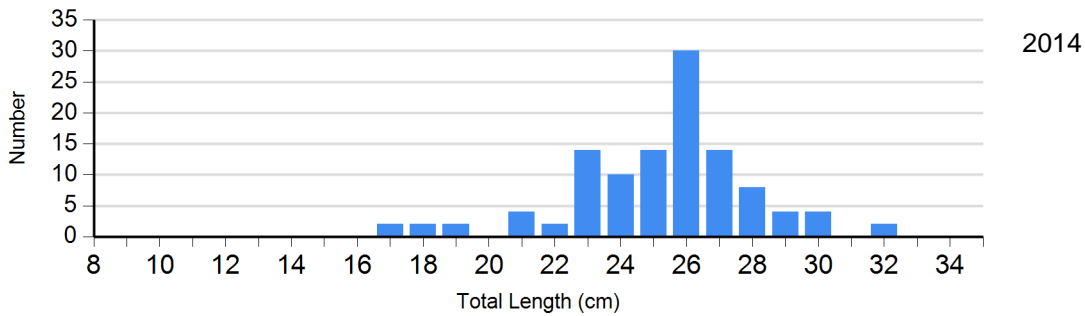
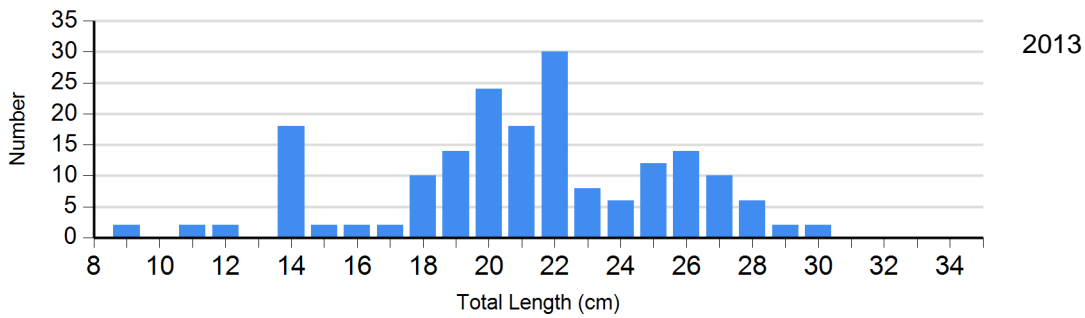
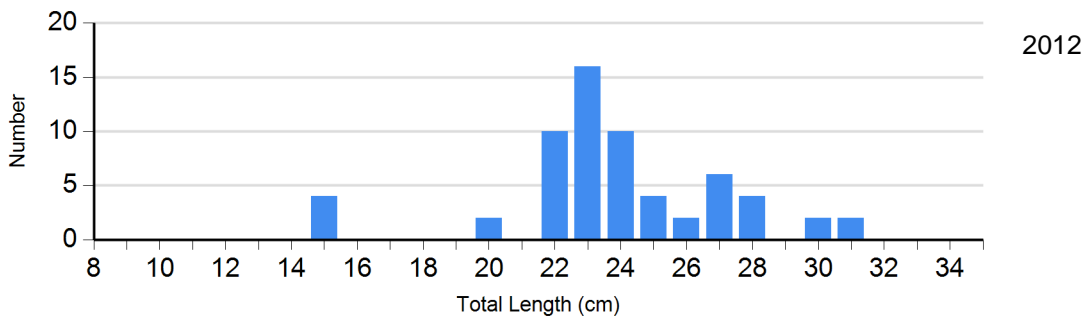
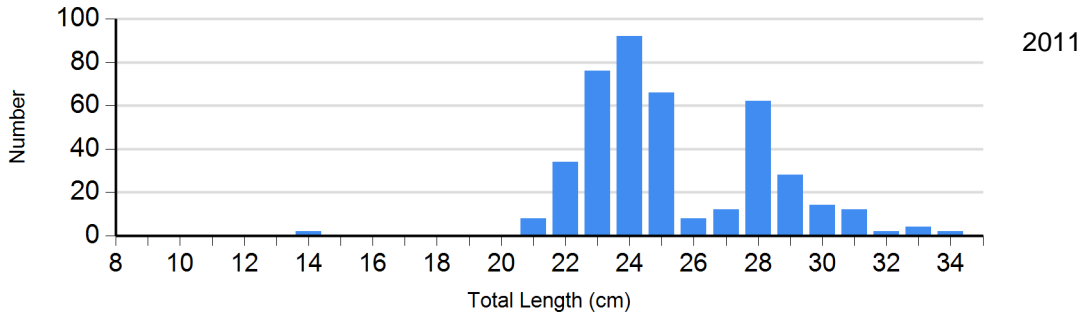
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

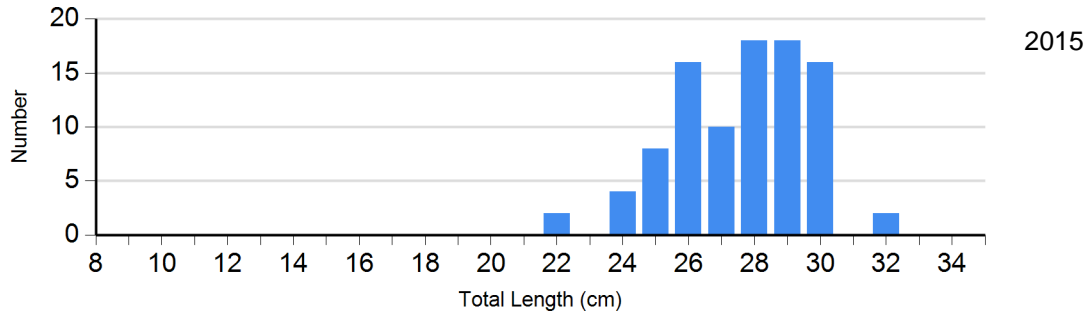
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2011	2		210	103 (0.5)	176	98 (0.4)	34	93 (0.7)
	2012	4	97 (0.7)	38	96 (1.1)	16	94 (1.3)	4	87 (2.9)
	2013	48	95 (1.3)	86	91 (0.7)	44	100 (0.8)	2	97 (0.0)
	2014	6	99 (0.3)	30	102 (1.1)	70	97 (0.7)	6	96 (1.1)
	2015	0		6	106 (1.6)	70	99 (0.6)	18	98 (1.2)
Northern Pike Gill Net	2011	0		2	94 (0.0)	0		0	
	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	
Walleye Gill Net	2011	40	85 (1.0)	80	85 (0.5)	12	81 (1.3)	0	
	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)
Yellow Perch Gill Net	2011	56	90 (1.2)	14	88 (2.8)	2	76 (0.0)	0	
	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	

Length Frequency Distribution

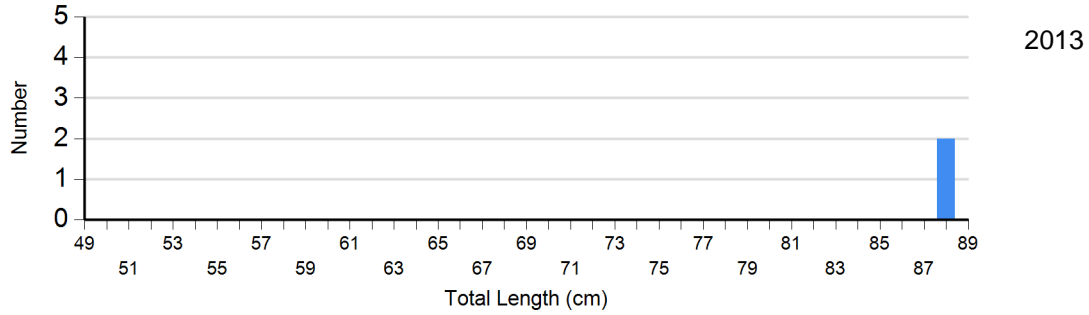
Length frequency histogram of species sampled by year.

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

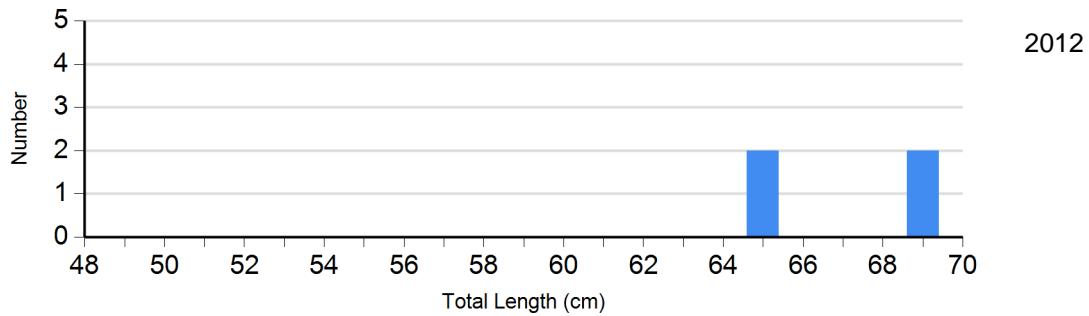
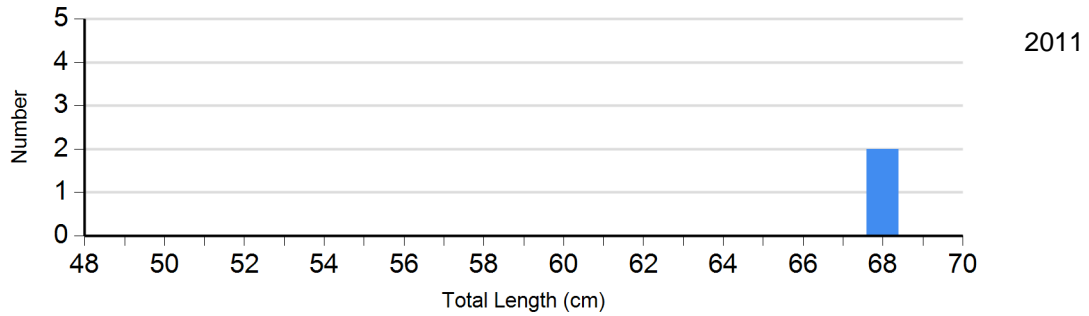


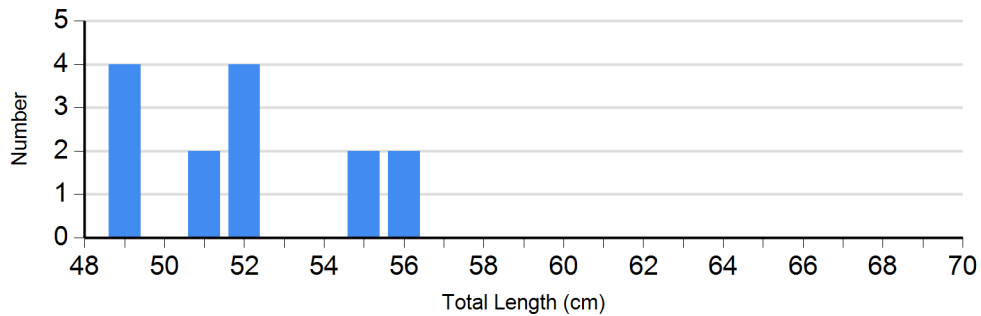


Species: Northern Pike
 Gear: std exp gill net



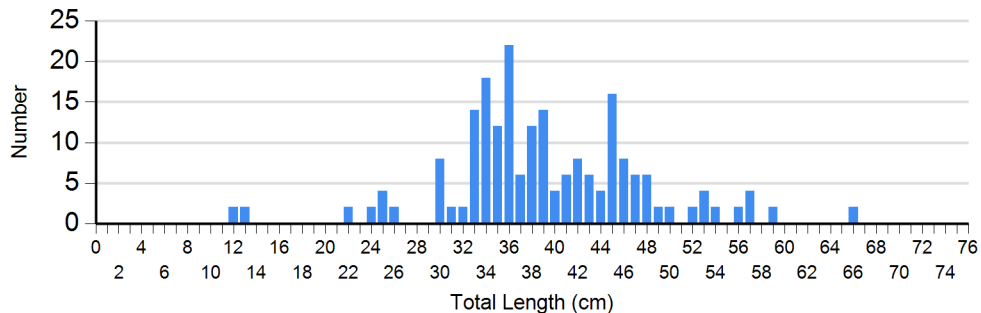
Species: Northern Pike
 Gear: std exp gill net (150 ft)





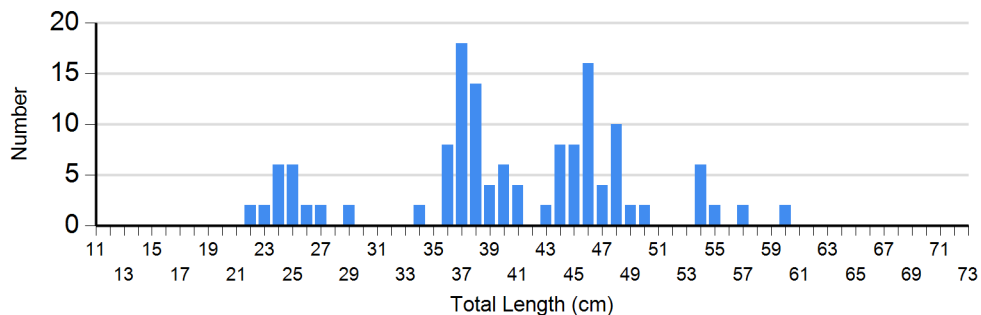
2015

Species: Walleye
Gear: std exp gill net

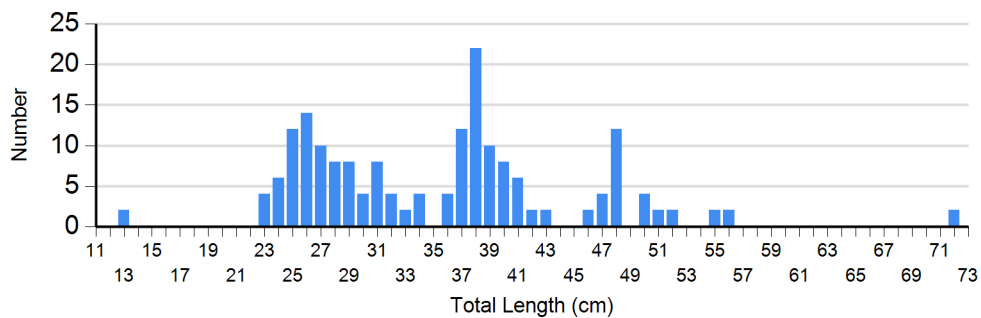


2013

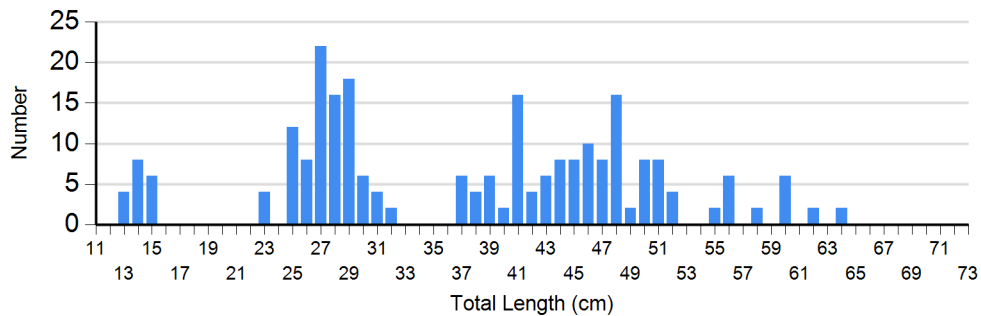
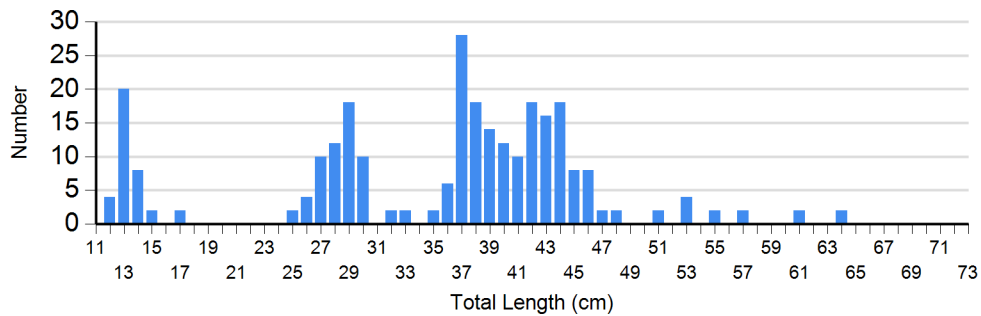
Species: Walleye
Gear: std exp gill net (150 ft)



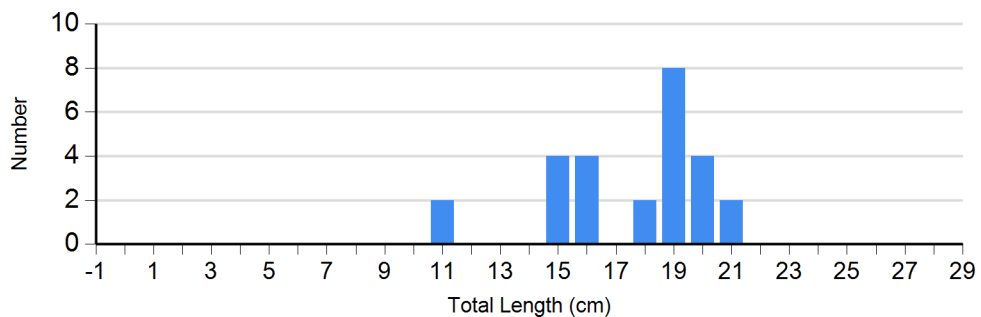
2011



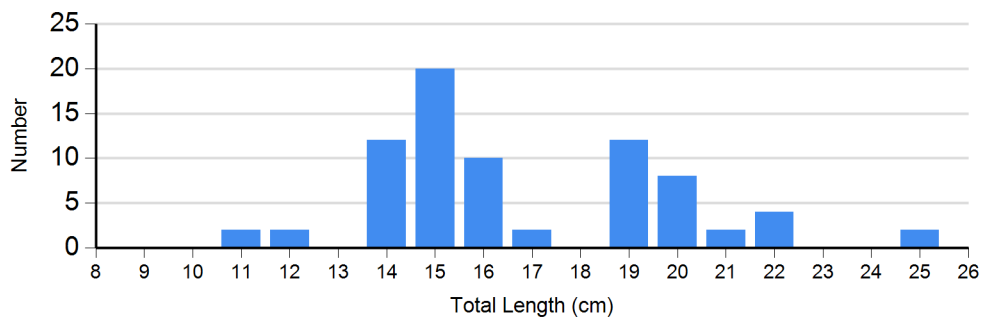
2012

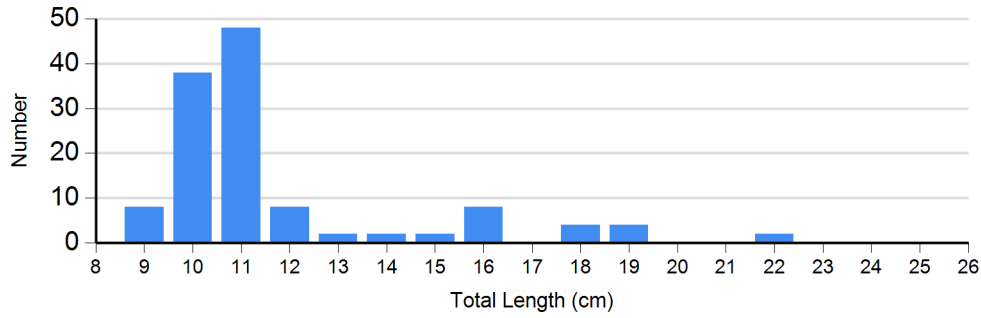
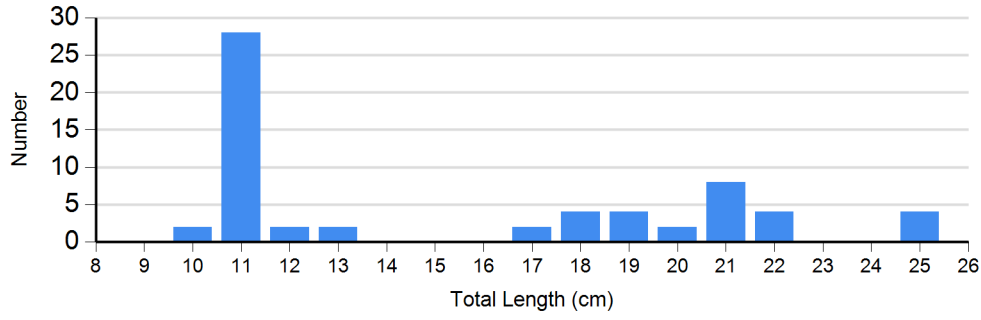
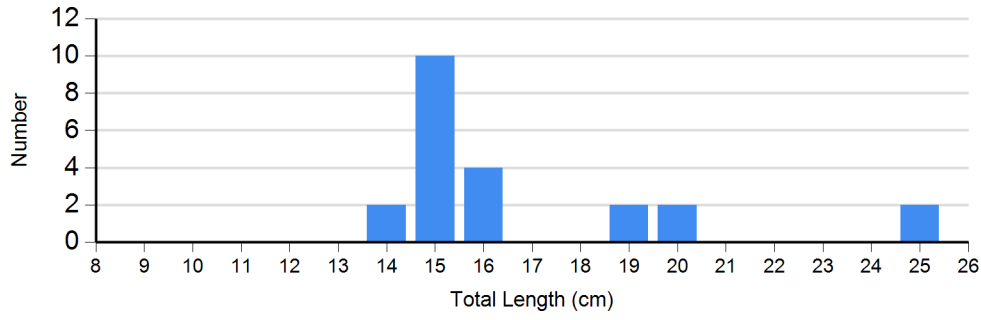


Species: Yellow Perch
 Gear: std exp gill net



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

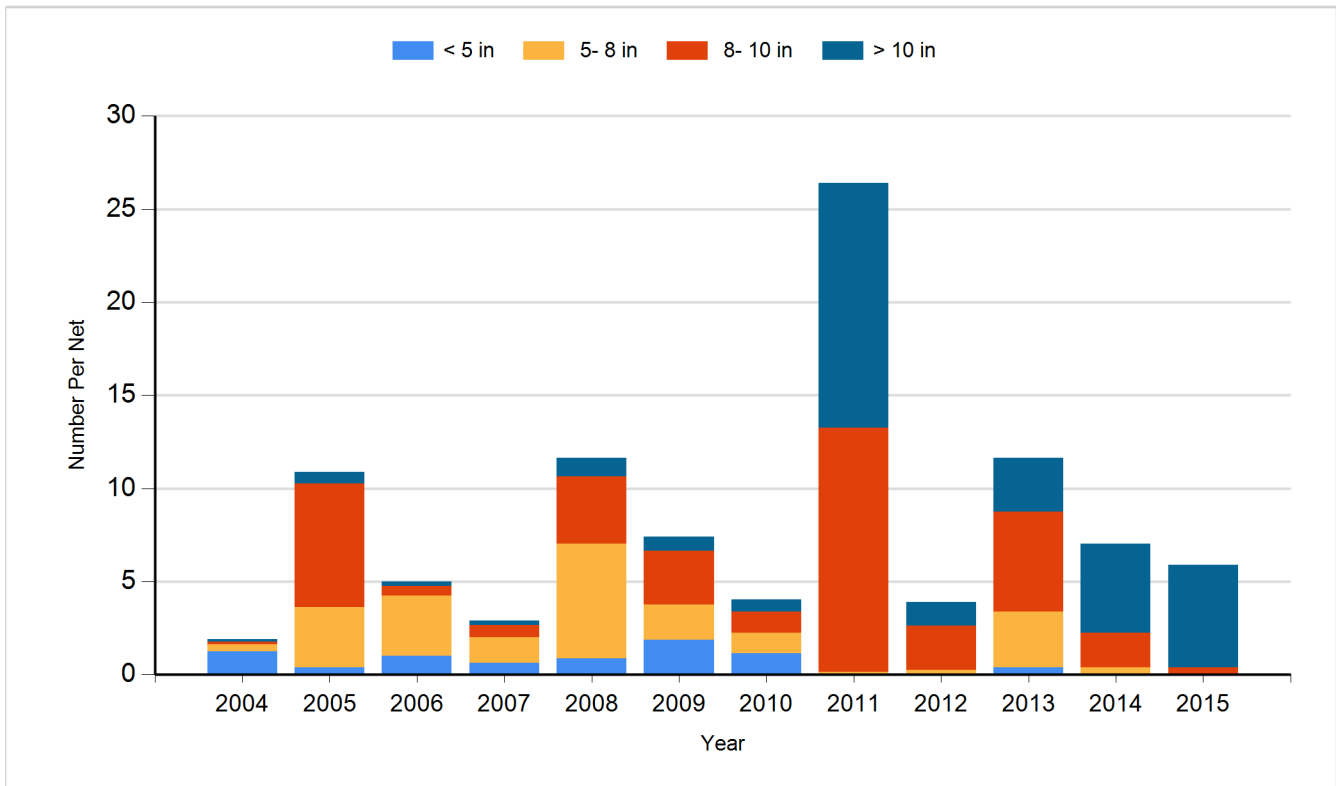




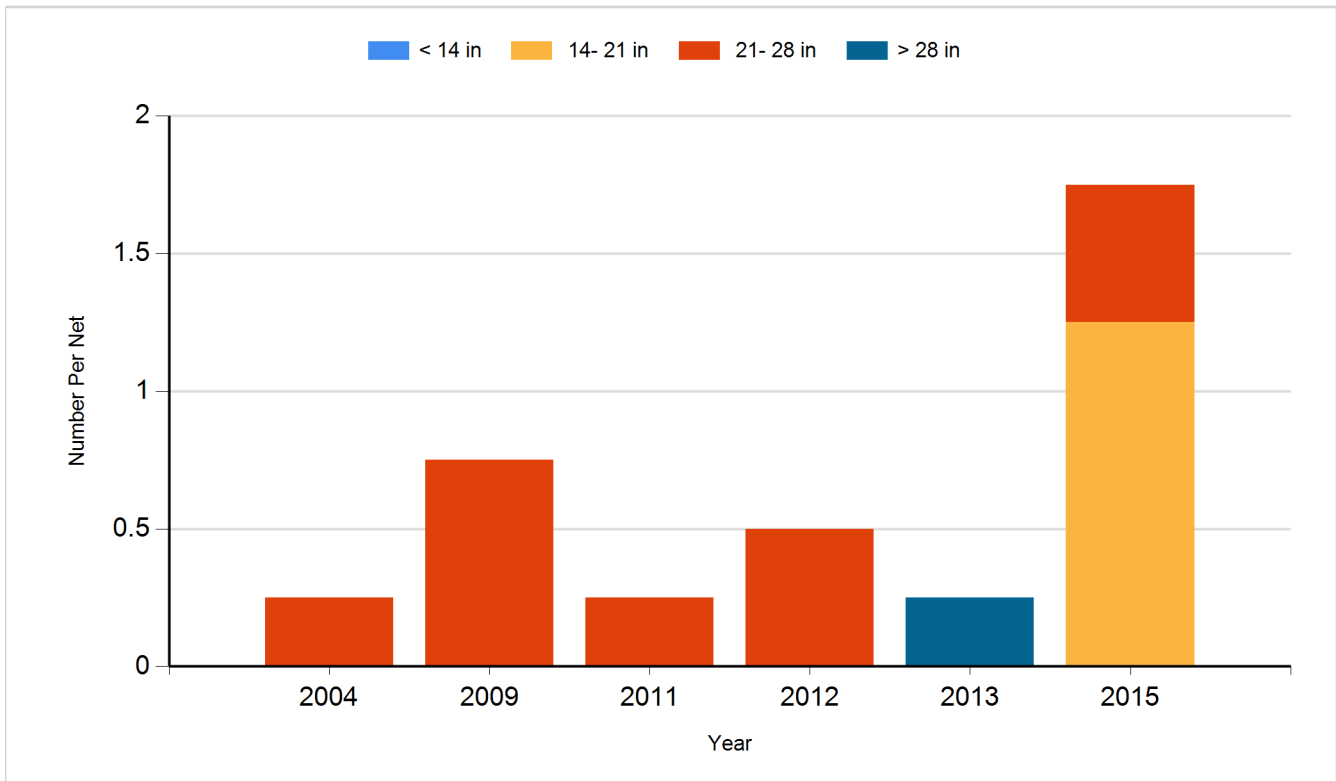
Historic Fish Sizes and Relative Abundance

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

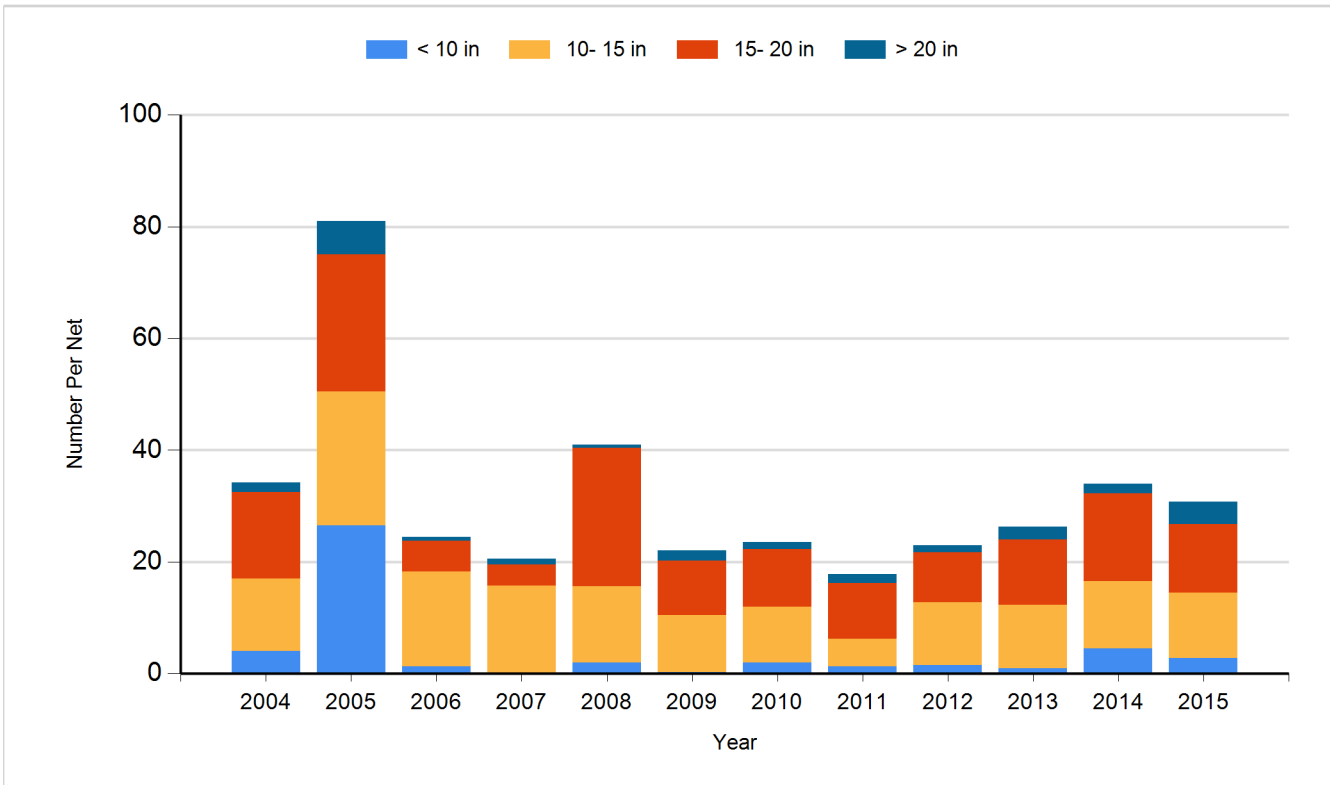
Species: Black Crappie
Gear: Frame Net



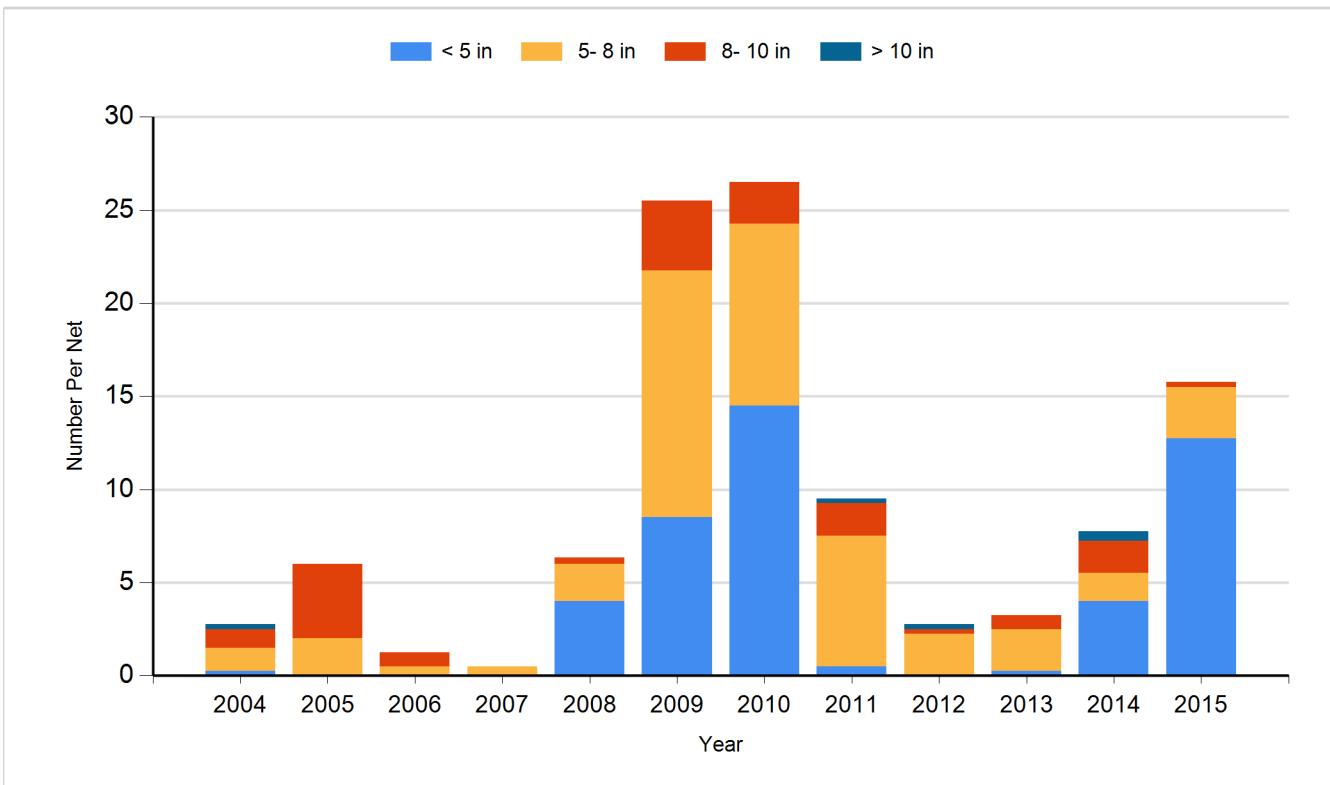
Species: Northern Pike
Gear: Gill Net



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