SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Shadehill Reservoir, Perkins County
SFG-Lake-1017-000
2016

Lake Information

Name: Shadehill Reservoir

County: Perkins

Surface Area: 5,072 Acres

Surveys and Investigations

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

Gear	Date	Effort
frame net (std 3/4 in)	May 24, 2016	20 net-nights
std exp gill net	August 09, 2016	12 net-nights

Common Fish Species Present

Black Crappie

Channel Catfish

Smallmouth Bass

Gizzard Shad

Walleye

Yellow Perch

White Crappie

Common Carp

Freshwater Drum

Shorthead Redhorse

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	34.7	9.8	98	1	97	1	103	0
	Bluegill	0.4	0.3	100		25		124	2
	Channel Catfish	0.5	0.4	100		0		91	1
	Common Carp	0.1	0.1	0		0		96	0
	Gizzard Shad	0.1	0.1	100				85	0
	Smallmouth Bass	0.3	0.1	33		33		92	3
	Walleye	0.1	0.1	100		0		99	0
	White Bass	0.8	0.7	100		63	20	91	2
	White Crappie	45.3	16.3	100		99	0	102	0
std exp gill net	Black Bullhead	0.2	0.2	100		0		92	0
	Black Crappie	1.7	0.7	100		90		100	2
	Channel Catfish	22.7	2.1	35	4	1		86	0
	Common Carp	8.2	3.2	76	6	10	5	85	3
	Freshwater Drum	3.0	0.9	67	12	6		105	1
	Gizzard Shad	1.0	0.6	83					
	Northern Pike	0.3	0.2	50		50		79	2
	River Carpsucker	0.8	0.3	100		100			
	Shorthead Redhorse	2.3	1.1	100		36	14	82	0
	Walleye	8.0	2.1	52	7	8	4	86	1
	White Bass	1.3	0.6	100		63	20	94	2
	White Crappie	1.5	0.6	100		100		99	3
	Yellow Perch	3.3	1.3	90		20	10	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	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
boat shocker (night)	Walleye									168.3		168.3
frame net (1/2 inch)	Black Crappie		0.6	2.0	6.1							2.9
	Bluegill		0.4	1.1	0.8							0.8
	Channel Catfish		1.5	0.7	1.6							1.3
	Common Carp			1.1	0.6							0.9
	Freshwater Drum		0.4		0.1							0.3
	Northern Pike		0.8									0.8
	River Carpsucker		0.9	0.6	0.9							0.8
	Shorthead Redhorse		0.8	0.1	0.1							0.3
	Smallmouth Bass		0.1	0.0	1.3							0.5
	Walleye		0.1	0.3	1.4							0.6
	White Bass		0.8	0.1	0.8							0.6
	White Crappie		1.5	0.1	0.1							0.6
	White Sucker		0.1									0.1
	Yellow Perch		0.1	0.4	0.5							0.3
frame net (std 3/4 in)	Black Bullhead							3.0	0.2			1.6
	Black Crappie	1.4				6.9	44.6	75.3	1.7	2.9	34.7	23.9
	Bluegill	0.9				0.3	1.8		2.4	0.3	0.4	1.0
	Channel Catfish	0.4				3.6		0.0	3.5	0.2	0.5	1.4
	Common Carp					1.5	0.1	6.3	0.6	0.5	0.1	1.5
	Freshwater Drum	0.5				0.2		0.2	0.1	0.1		0.2
	Gizzard Shad							0.9			0.1	0.5
	Green Sunfish						0.1					0.1
	Northern Pike	0.4				0.0		1.7		0.1		0.6
	River Carpsucker	0.9				0.6		0.4	4.1			1.5
	Shorthead Redhorse	0.4						0.1	0.7			0.4
	Smallmouth Bass	1.1				0.1	0.9	0.2	0.2	0.3	0.3	0.4
	Walleye	0.9				0.1		3.8	0.5		0.1	1.1
	White Bass	1.5						0.6	0.1		0.8	0.8
	White Crappie	1.0				13.9	4.1	49.6	1.7	22.6	45.3	19.7
	White Sucker						0.1	0.1	0.1			0.1
	Yellow Perch					0.1	0.4	0.2	0.3			0.3
std exp gill net	Black Bullhead										0.2	0.2

		CPUE										
Gear	Species	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
std exp gill net	Black Crappie	0.2			0.7			2.8			1.7	1.4
	Channel Catfish	18.7	31.7	4.8	13.2			14.8			22.7	17.7
	Common Carp	3.0	2.3	1.0	0.3			0.4			8.2	2.5
	Freshwater Drum	2.3	2.5	0.8	1.5			0.4			3.0	1.8
	Gizzard Shad	0.3	0.3					3.6			1.0	1.3
	Goldeye	0.0	0.0	0.0	0.0							0.0
	Northern Pike	0.5	0.5	0.3	2.2			0.8			0.3	0.8
	River Carpsucker	1.7	1.0	0.5	1.3			1.4			0.8	1.1
	Shorthead Redhorse	0.8	2.7	1.5	1.3			1.8			2.3	1.7
	Smallmouth Bass		0.2									0.2
	Walleye	8.2	7.5	13.0	5.8			25.2			8.0	11.3
	White Bass	12.2	8.8	5.3	11.5			1.0			1.3	6.7
	White Crappie	1.5	1.0	2.2	0.8			0.6			1.5	1.3
	White Sucker		0.2	0.2	0.2			0.2				0.2
	Yellow Perch	1.0	0.2	2.2	3.3			4.4			3.3	2.4
std exp gill net (150 ft)	Black Crappie					3.3	1.3		1.8	1.5		2.0
	Bluegill								0.2			0.2
	Channel Catfish					20.5	19.0		21.3	12.5		18.3
	Common Carp					2.0	1.3		2.2	1.7		1.8
	Freshwater Drum					3.0	1.0		0.8	2.3		1.8
	Gizzard Shad						2.3		0.0	2.3		1.5
	Goldeye						0.0		0.0	0.0		0.0
	Northern Pike					1.5	0.8		0.7	1.5		1.1
	River Carpsucker					1.2	0.7		0.8	0.3		0.8
	Shorthead Redhorse					2.5	0.3		6.5	5.8		3.8
	Smallmouth Bass								0.2			0.2
	Spottail Shiner					0.0						0.0
	Walleye					11.5	14.2		7.7	6.7		10.0
	White Bass					8.0	0.7		9.8	20.3		9.7
	White Crappie					3.7	3.3		0.2	0.7		2.0
	White Sucker					0.7				0.2		0.5
	Yellow Perch					3.0	2.0		5.7	4.2		3.7

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									80	
		PSD-P									20	
		Wr									90	
frame net (1/2 inch)	Black Crappie	PSD		40	93	31						
		PSD-P		0	57	16						
		Wr		96	102	108						
	Northern Pike	PSD		100								
		PSD-P		50								
		Wr		82								
	Walleye	PSD		100	50	82						
		PSD-P		100	50	9						
		Wr		72	84	78						
	Yellow Perch	PSD		0	33	50						
		PSD-P		0	0	0						
		Wr		112	98	95						
frame net (std 3/4 in)	Black Crappie	PSD	73				97	97	99	100	100	98
		PSD-P	18				41	12	2	100	100	97
		Wr	93				108	108	98	96	104	103
	Northern Pike	PSD	100				0		100		100	
		PSD-P	67				0		73		100	
		Wr	84						99		93	
	Walleye	PSD	71				100		62	80		100
		PSD-P	43				0		9	0		0
		Wr	78				99		81	88		99
	Yellow Perch	PSD					0	100	100	100		
		PSD-P					0	33	0	0		
		Wr					89	99	86	93		
std exp gill net	Black Crappie	PSD	100			0			100			100
		PSD-P	0			0			43			90
		Wr	91			114			110			100
	Northern Pike	PSD	100	100	100	38			100			50

			Year									
Gear	Species	Index	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
std exp gill net	Northern Pike	PSD-P	0	33	50	0			50			50
		Wr	76	82	81	84			93			79
	Walleye	PSD	33	27	19	34			21			52
		PSD-P	2	2	1	0			1			8
		Wr	80	82	86	81			86			86
	Yellow Perch	PSD	33	0	38	30			77			90
		PSD-P	17	0	0	0			0			20
		Wr	86	85	106	101			99			98
std exp gill net (150 ft)	Black Crappie	PSD					85	100		91	100	
		PSD-P					5	13		91	100	
		Wr					112	102		116	103	
	Northern Pike	PSD					67	60		100	67	
		PSD-P					0	20		50	33	
		Wr					78	90		79	87	
	Walleye	PSD					20	6		74	58	
		PSD-P					0	1		4	0	
		Wr					84	77		80	84	
	Yellow Perch	PSD					67	58		65	36	
		PSD-P					11	0		6	12	
		Wr					96	91		96	101	

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	1304				227 (1271)	242 (33)					
2011	118		176 (2)	218 (68)	263 (6)	280 (22)	287 (20)				
2009	28		178 (2)	214 (6)	247 (8)	260 (2)	295 (10)				

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2016	96		294 (38)	384 (16)	394 (2)	411 (10)	468 (8)	480 (20)	505 (2)		
2015	104	215 (26)	305 (18)	353 (12)	398 (8)	396 (12)	443 (26)	441 (2)			
2014	92	275 (10)	330 (4)	367 (8)	407 (6)	430 (58)	545 (2)		483 (2)		748 (2)
2013	252	221 (4)	297 (8)	302 (22)	348 (207)	432 (7)				525 (4)	
2012	168		285 (17)	326 (149)		556 (2)					
2011	156	205 (6)	272 (106)	375 (34)	426 (6)	471 (4)					
2010	106	219 (40)	341 (34)	378 (18)	403 (12)					462 (2)	
2009	168	242 (26)	307 (52)	349 (56)	386 (18)	390 (6)	419 (6)	460 (2)			530 (2)
2008	98	216 (28)	288 (22)	348 (34)	396 (14)						
2007	106	216 (12)	318 (28)	348 (34)	395 (20)	431 (12)					

Fish Condition

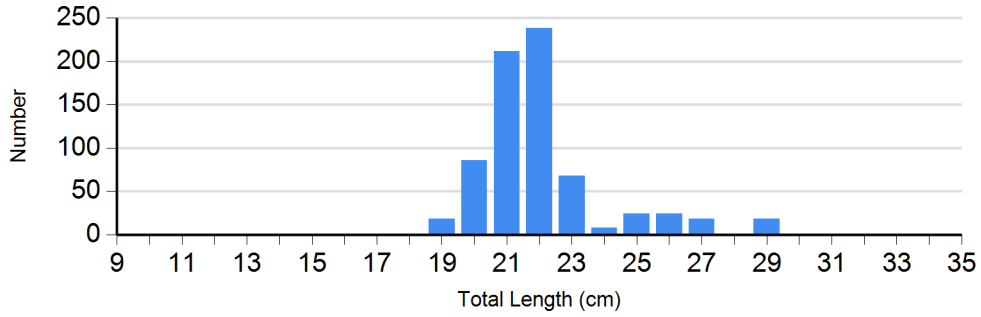
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	18	109 (0.3)	612	110 (0.4)	84	99 (0.6)	0	
	2013	10	105 (0.0)	1316	98 (0.3)	30	89 (0.2)	0	
	2014	0		0		32	97 (1.0)	2	82 (0.0)
	2015	0		0		58	104 (0.8)	0	
	2016	12	114 (1.3)	12	108 (2.2)	648	102 (0.3)	22	100 (0.7)
Northern Pike Gill Net	2012	4	86 (3.5)	4	95 (0.5)	2		0	
	2013	0		4	90 (0.8)	2	100 (0.0)	2	92 (0.0)
	2014	0		4	75 (6.2)	4	83 (4.7)	0	
	2015	6	88 (1.4)	6	90 (2.5)	4	80 (4.6)	2	
	2016	2	81 (0.0)	0		2	76 (0.0)	0	
Walleye Gill Net	2012	160	77 (0.3)	8	73 (0.9)	2	90 (0.0)	0	
	2013	198	87 (0.5)	52	83 (0.7)	2	69 (0.0)	0	
	2014	24	82 (1.2)	64	80 (0.6)	2	89 (0.0)	2	66 (0.0)
	2015	34	84 (1.4)	46	83 (0.6)	0		0	
	2016	46	89 (0.7)	42	86 (0.7)	8	81 (2.0)	0	
Yellow Perch Gill Net	2012	10	95 (1.6)	14	88 (2.3)	0		0	
	2013	10	99 (2.6)	34	98 (1.8)	0		0	
	2014	24	97 (1.5)	40	96 (1.1)	4	87 (2.8)	0	
	2015	32	100 (1.4)	12	106 (2.2)	6	99 (4.4)	0	
	2016	4	97 (0.7)	28	100 (1.5)	8	90 (2.2)	0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

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



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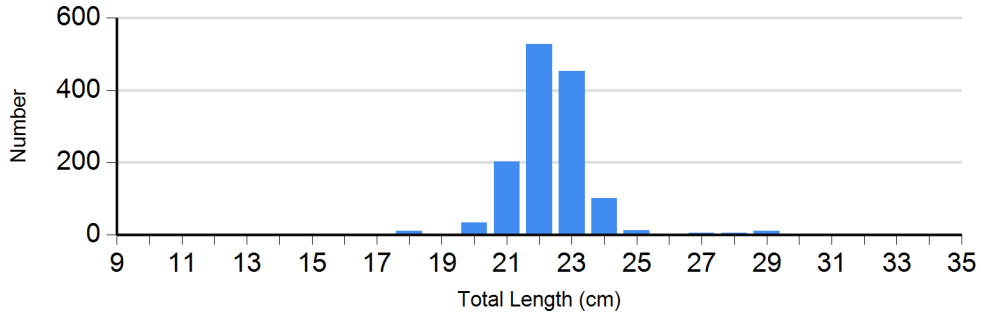

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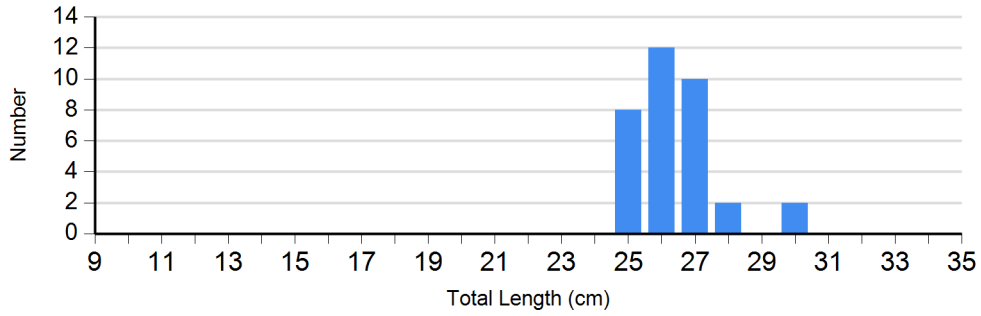

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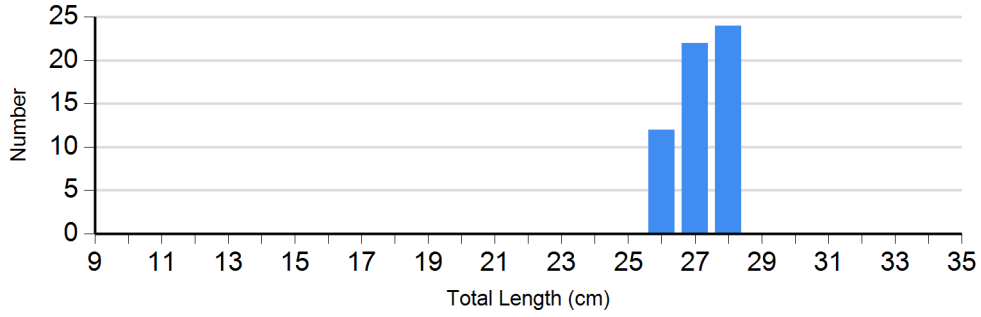

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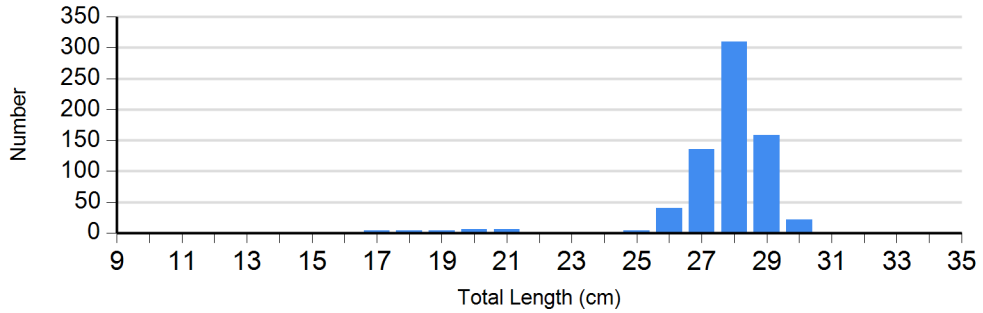

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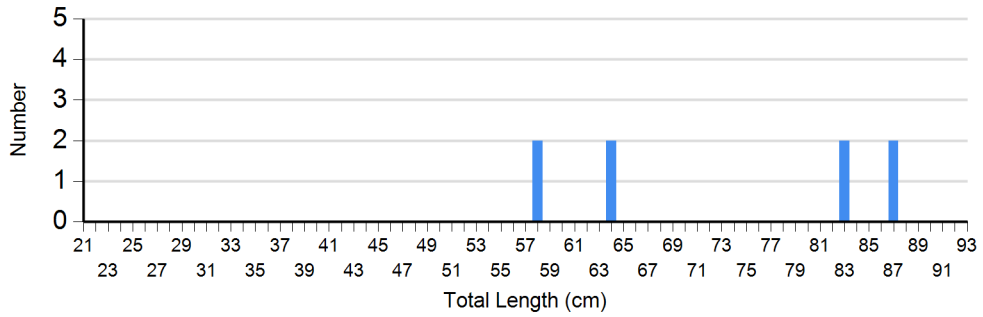
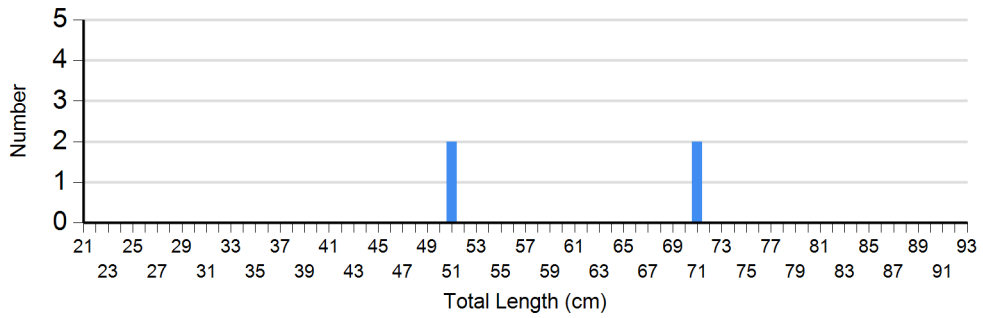
Species: Northern Pike
Gear: std exp gill net



2013



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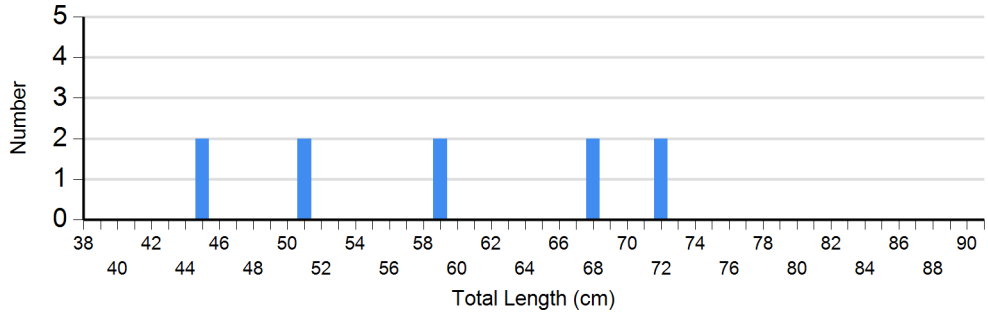
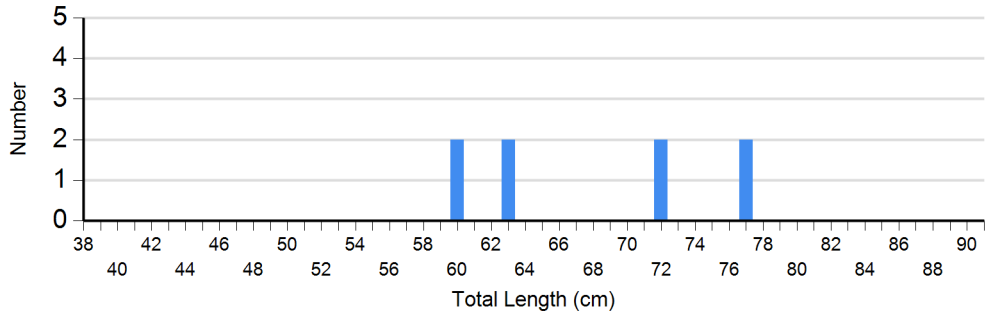
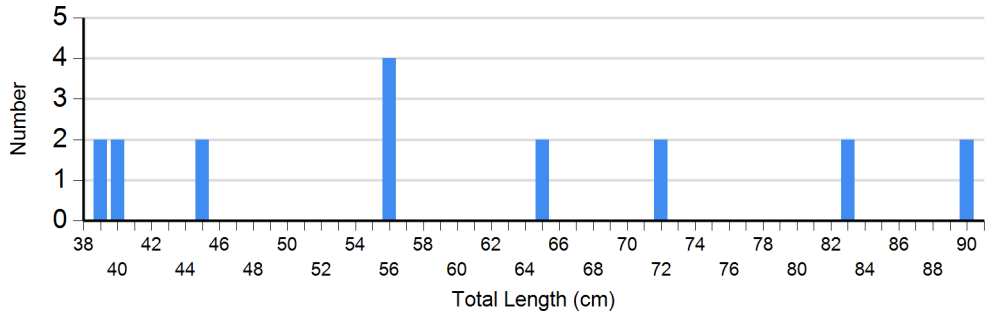
Species: Northern Pike
Gear: std exp gill net (150 ft)



2012

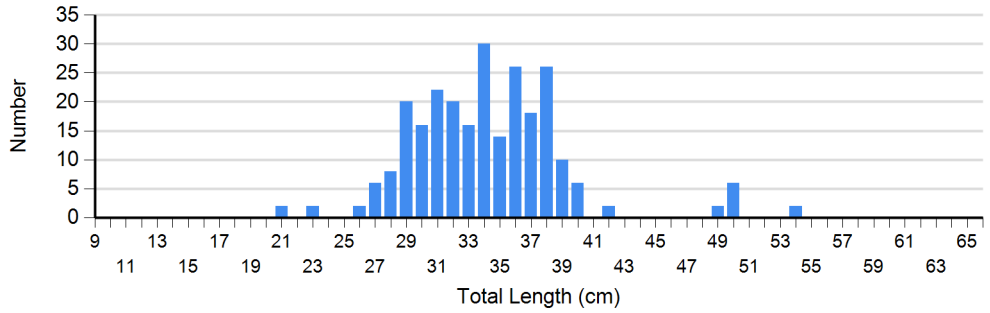


2014

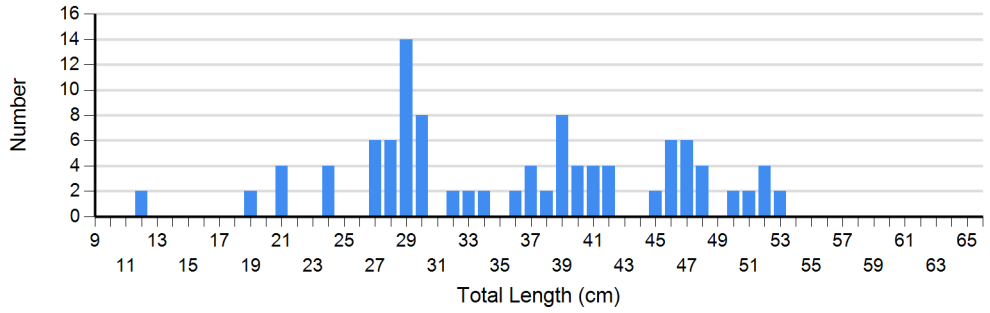


2015

Species: Walleye
Gear: std exp gill net

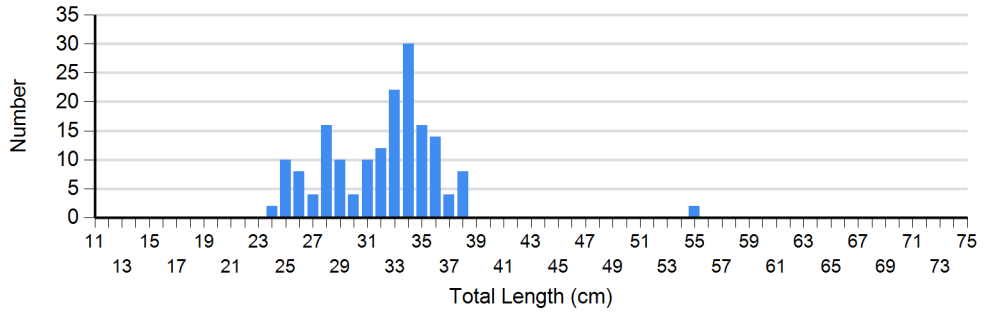


2013

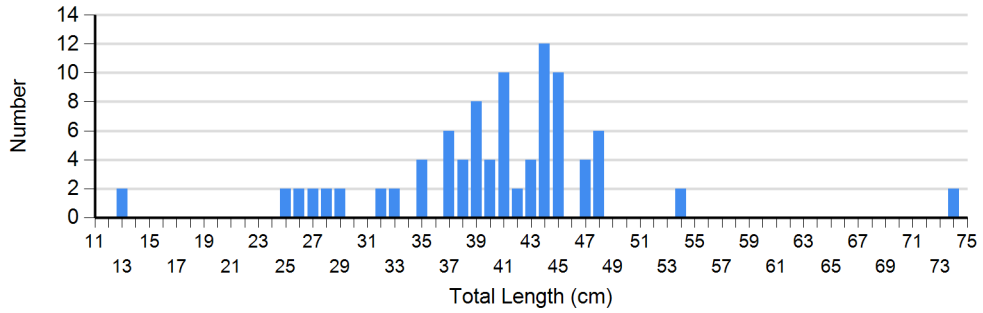


2016

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



2012



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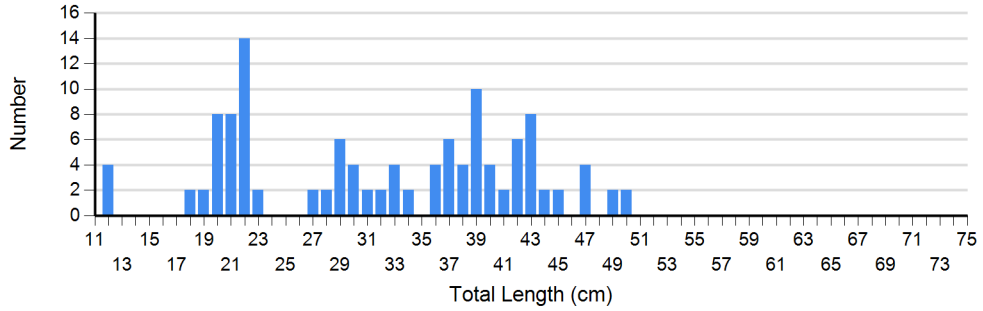
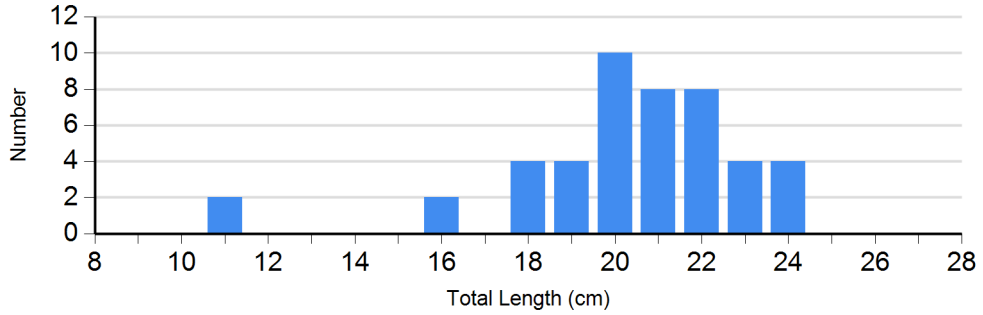


2015

Species: Yellow Perch
Gear: std exp gill net



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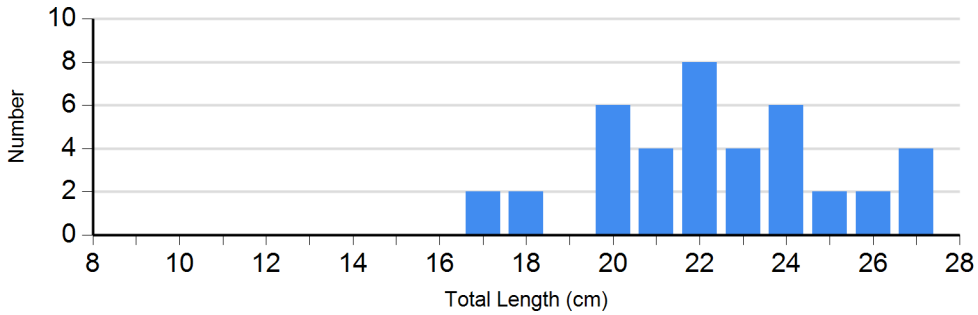
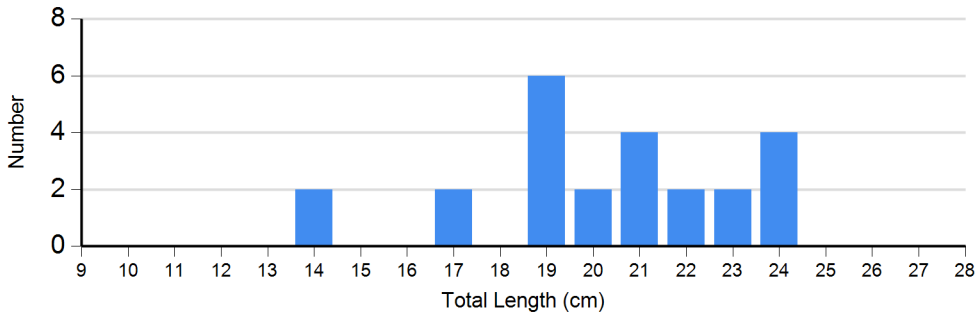


2016

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



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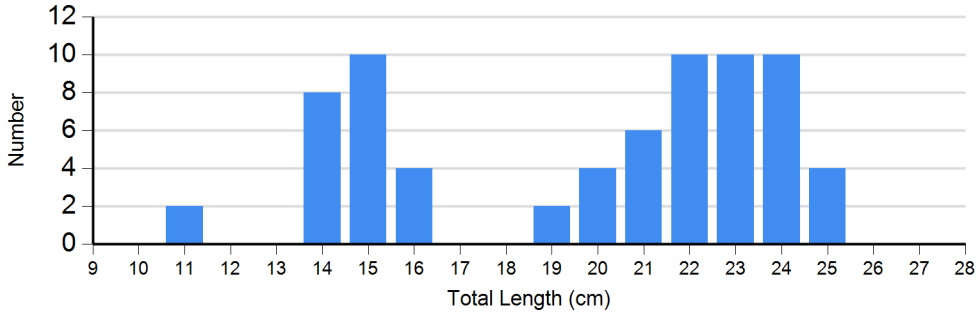

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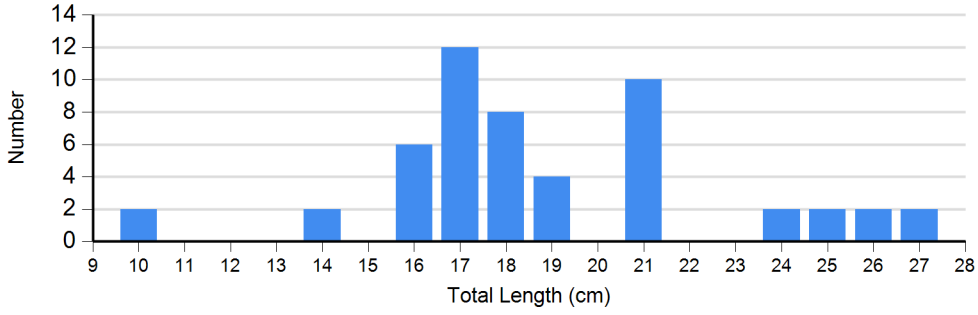
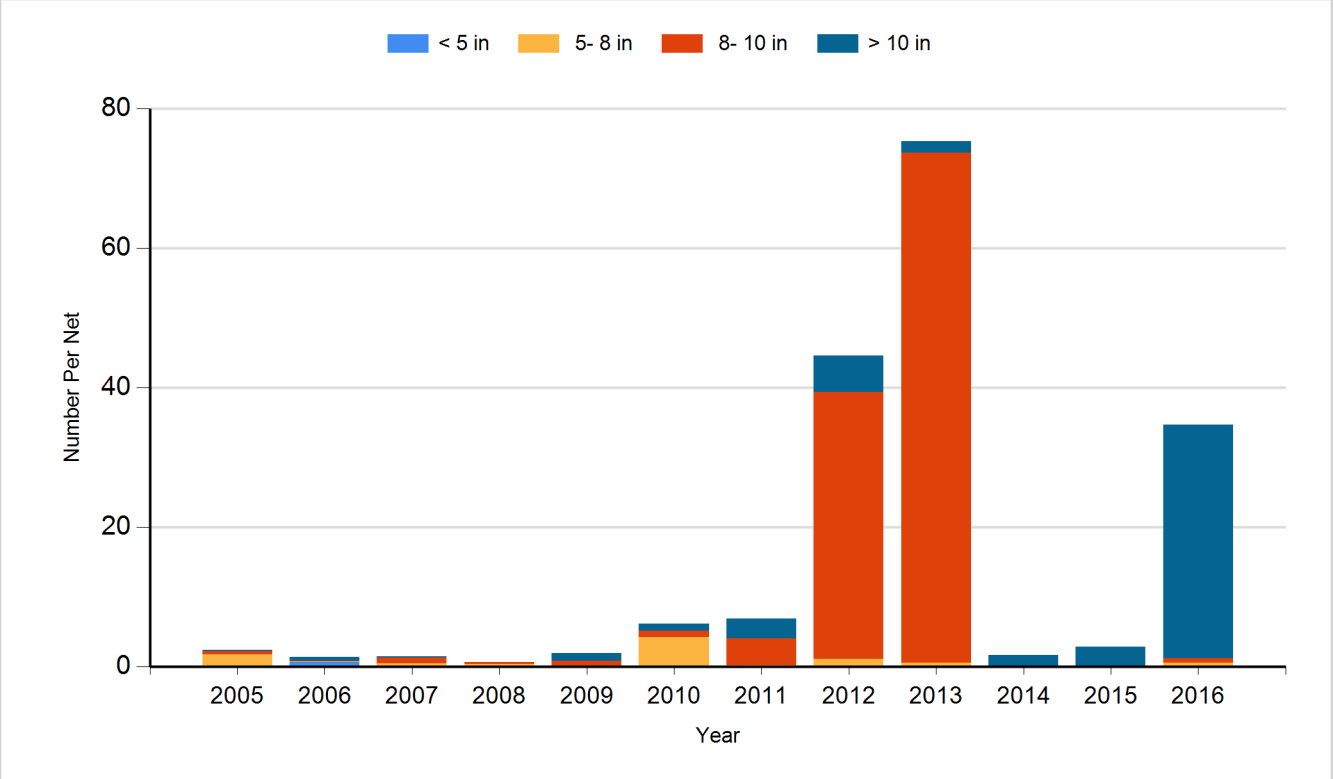


2015

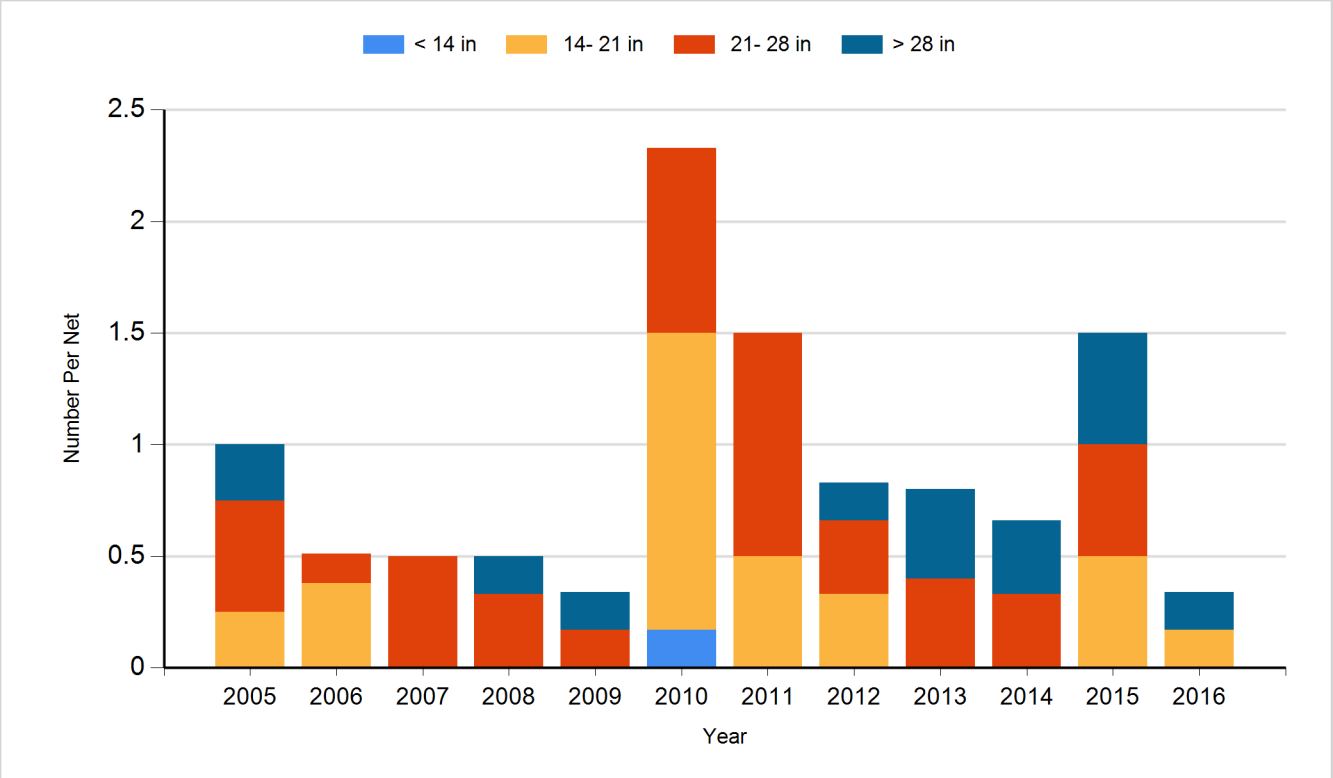
Historic Fish Sizes and Relative Abundance

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

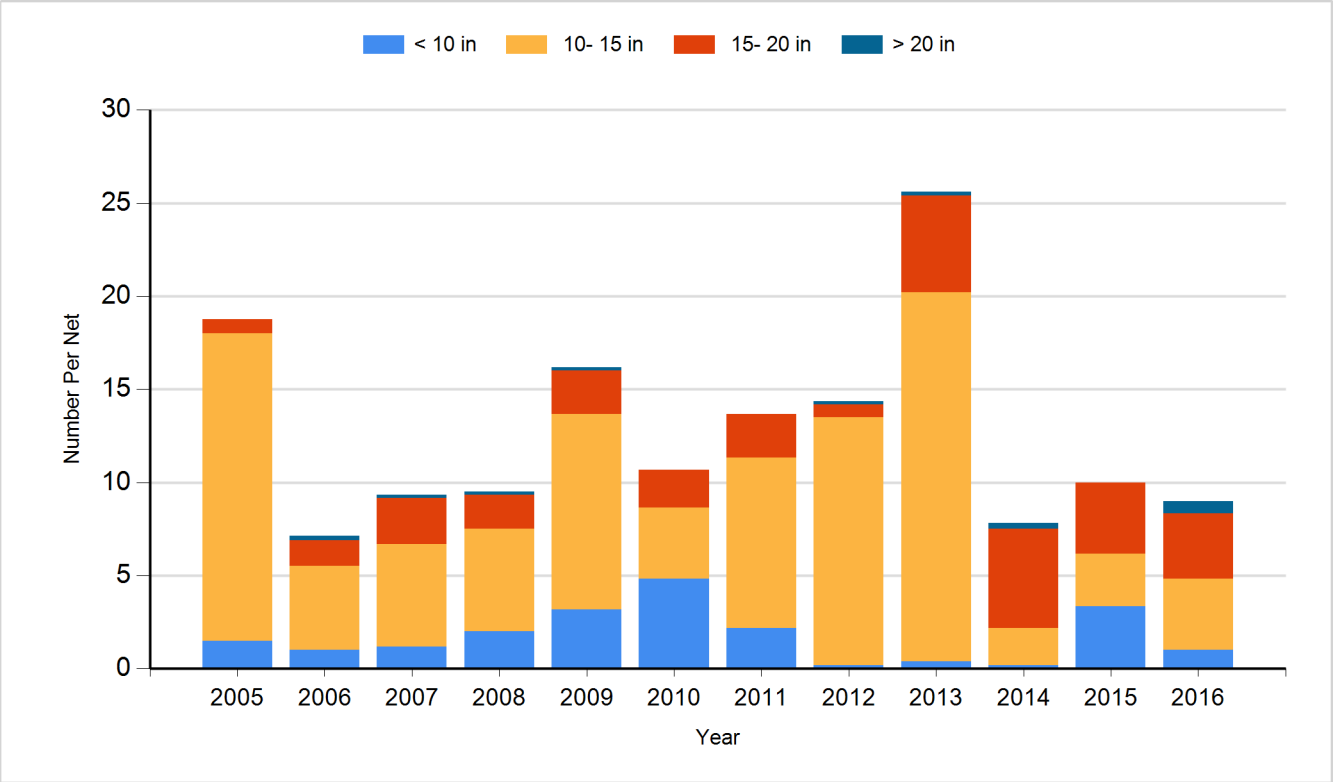
Species: Black Crappie
Gear: Frame Net



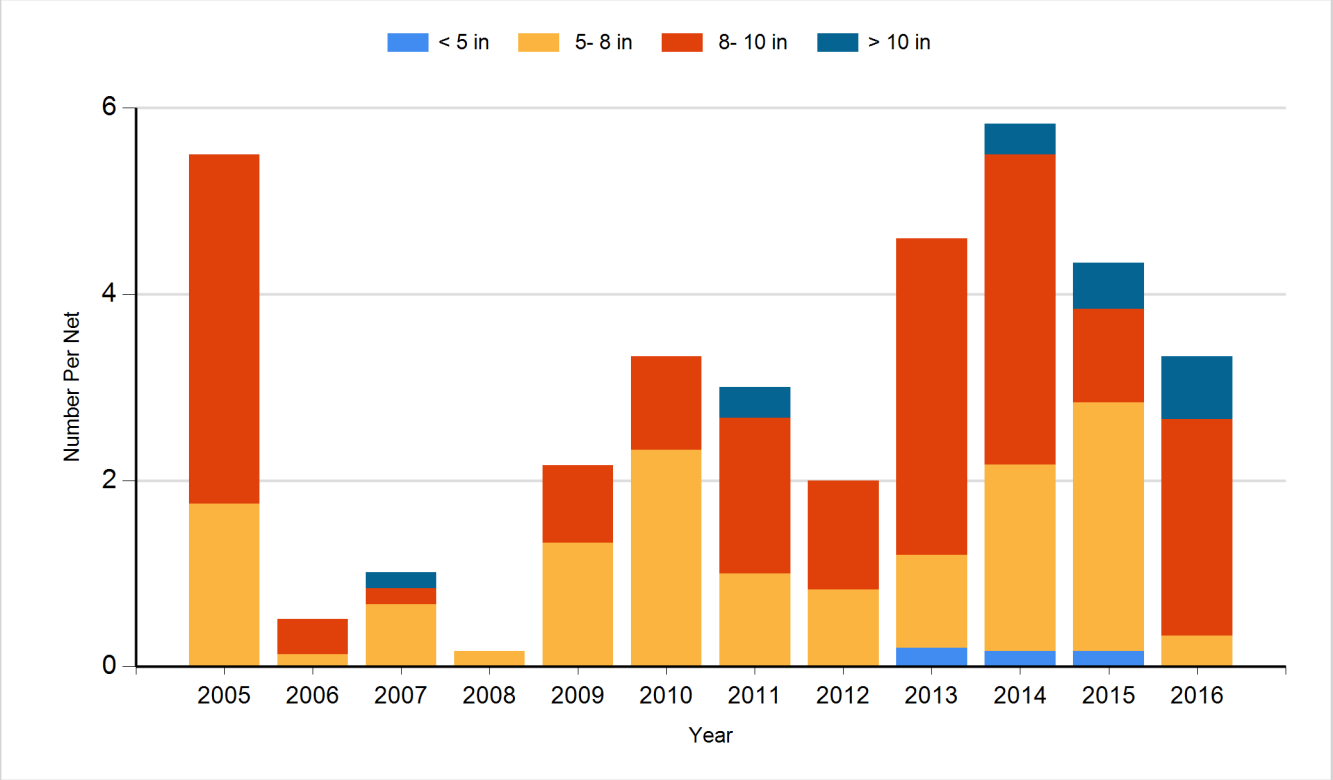
Species: Northern Pike
Gear: Gill Net



Species: Walleye
Gear: Gill Net



Species: Yellow Perch
Gear: Gill Net



Fish Stocking

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

Year	Species	Size	Number
2005	Gizzard Shad	Adult	250
2005	Walleye	Fingerling	400,300
2006	Gizzard Shad	Adult	65
2006	Walleye	Fingerling	166,698
2007	Walleye	Fingerling	192,953
2008	Walleye	Fingerling	409,235
2009	Gizzard Shad	Adult	85
2009	Walleye	Fingerling	420,652
2009	Walleye	Fry	420,652
2010	Gizzard Shad	Adult	90
2010	Walleye	Fingerling	385,829
2011	Gizzard Shad	Adult	225
2011	Walleye	Fingerling	278,922
2012	Rainbow Trout (Shasta)	Fingerling	28,832
2012	Smallmouth Bass	Fingerling	30,173
2012	Walleye	Fry	6,000,000
2013	Gizzard Shad	Adult	100
2013	Walleye	Fingerling	112,275
2014	Gizzard Shad	Adult	373
2014	Walleye	Fry	5,000,000
2015	Walleye	Fry	4,700,000
2016	Walleye	Fry	5,000,000