

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Shadehill Reservoir, Perkins County
SFG-Lake-1017-000
2017

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 (1/2 inch)	May 31, 2017	12 net-nights
std exp gill net	August 08, 2017	12 net-nights

Common Fish Species Present

Black Crappie

Smallmouth Bass

Channel Catfish

Gizzard Shad

Walleye

Yellow Perch

White Bass

White Crappie

Freshwater Drum

Common Carp

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 (1/2 inch)	Black Crappie	14.2	4.5	100		82	4	95	1
	Common Carp	0.1	0.1	0		0			
	Freshwater Drum	0.2	0.2	50		0		104	14
	Northern Pike	0.2	0.2	100		100		87	
	River Carpsucker	0.9	0.6	100		91		108	7
	Shorthead Redhorse	0.1	0.1	100		0		81	
	Smallmouth Bass	0.2	0.2	50		0		91	5
	Spottail Shiner	0.0	0.0						
	Walleye	0.0	0.0	0		0			
	White Bass	0.9	0.4	100		100		91	2
	White Crappie	4.2	3.0	100		100		98	1
std exp gill net	Black Crappie	0.4	0.3	100		100		94	2
	Bluegill	0.1	0.1	0		0		78	
	Channel Catfish	8.5	1.5	41	7	5	3	86	1
	Common Carp	2.2	1.0	73	14	12		93	2
	Freshwater Drum	2.2	0.8	81		8		104	1
	Goldeye	0.0	0.0						
	Northern Pike	0.3	0.2	100		0		83	4
	River Carpsucker	1.8	0.7	100		95		101	2
	Shorthead Redhorse	0.7	0.5	100		75		92	3
	Smallmouth Bass	0.2	0.2	100		50		71	22
	Walleye	3.6	1.1	33	11	9		81	1
	White Bass	6.0	3.0	90	5	90	5	92	1
	White Crappie	0.8	0.6	90		90		99	6
	Yellow Perch	1.2	0.4	86		14		92	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
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
boat shocker (night)	Walleye								168.3			168.3
frame net (1/2 inch)	Black Crappie	0.6	2.0	6.1							14.2	5.7
	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							0.1	0.6
	Freshwater Drum	0.4		0.1							0.2	0.2
	Northern Pike	0.8									0.2	0.5
	River Carpsucker	0.9	0.6	0.9							0.9	0.8
	Shorthead Redhorse	0.8	0.1	0.1							0.1	0.3
	Smallmouth Bass	0.1	0.0	1.3							0.2	0.4
	Spottail Shiner										0.0	0.0
	Walleye	0.1	0.3	1.4							0.0	0.5
	White Bass	0.8	0.1	0.8							0.9	0.7
	White Crappie	1.5	0.1	0.1							4.2	1.5
	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				6.9	44.6	75.3	1.7	2.9	34.7		27.7
	Bluegill				0.3	1.8		2.4	0.3	0.4		1.0
	Channel Catfish				3.6		0.0	3.5	0.2	0.5		1.6
	Common Carp				1.5	0.1	6.3	0.6	0.5	0.1		1.5
	Freshwater Drum				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				0.0		1.7		0.1			0.6
	River Carpsucker				0.6		0.4	4.1				1.7
	Shorthead Redhorse						0.1	0.7				0.4
	Smallmouth Bass				0.1	0.9	0.2	0.2	0.3	0.3		0.3
	Walleye				0.1		3.8	0.5		0.1		1.1
	White Bass						0.6	0.1		0.8		0.5
	White Crappie				13.9	4.1	49.6	1.7	22.6	45.3		22.9
White Sucker					0.1	0.1	0.1				0.1	
Yellow Perch				0.1	0.4	0.2	0.3				0.3	

Gear	Species	CPUE										
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Avg
std exp gill net	Black Bullhead									0.2		0.2
	Black Crappie			0.7			2.8			1.7	0.4	1.4
	Bluegill										0.1	0.1
	Channel Catfish	31.7	4.8	13.2			14.8			22.7	8.5	16.0
	Common Carp	2.3	1.0	0.3			0.4			8.2	2.2	2.4
	Freshwater Drum	2.5	0.8	1.5			0.4			3.0	2.2	1.7
	Gizzard Shad	0.3					3.6			1.0		1.6
	Goldeye	0.0	0.0	0.0							0.0	0.0
	Northern Pike	0.5	0.3	2.2			0.8			0.3	0.3	0.7
	River Carpsucker	1.0	0.5	1.3			1.4			0.8	1.8	1.1
	Shorthead Redhorse	2.7	1.5	1.3			1.8			2.3	0.7	1.7
	Smallmouth Bass	0.2									0.2	0.2
	Walleye	7.5	13.0	5.8			25.2			8.0	3.6	10.5
	White Bass	8.8	5.3	11.5			1.0			1.3	6.0	5.7
	White Crappie	1.0	2.2	0.8			0.6			1.5	0.8	1.2
White Sucker	0.2	0.2	0.2			0.2					0.2	
Yellow Perch	0.2	2.2	3.3			4.4			3.3	1.2	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.

Gear	Species	Index	Year										
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
boat shocker (night)	Walleye	PSD									80		
		PSD-P									20		
		Wr									90		
frame net (1/2 inch)	Black Crappie	PSD	40	93	31								100
		PSD-P	0	57	16								82
		Wr	96	102	108								95
	Northern Pike	PSD	100										100
		PSD-P	50										100
		Wr	82										87
	Walleye	PSD	100	50	82								0
		PSD-P	100	50	9								0
		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				97	97	99	100	100	98		
		PSD-P				41	12	2	100	100	97		
		Wr				108	108	98	96	104	103		
	Northern Pike	PSD				0		100		100			
		PSD-P				0		73		100			
		Wr						99		93			
	Walleye	PSD				100		62	80		100		
		PSD-P				0		9	0		0		
		Wr				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			0			100			100	100	
		PSD-P			0			43			90	100	
		Wr			114			110			100	94	
	Northern Pike	PSD	100	100	38			100			50	100	

Gear	Species	Index	Year									
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
std exp gill net	Northern Pike	PSD-P	33	50	0			50			50	0
		Wr	82	81	84			93			79	83
	Walleye	PSD	27	19	34			21			52	33
		PSD-P	2	1	0			1			8	9
		Wr	82	86	81			86			86	81
	Yellow Perch	PSD	0	38	30			77			90	86
		PSD-P	0	0	0			0			20	14
		Wr	85	106	101			99			98	92
	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+
2017	35		333 (9)	366 (13)	430 (4)	423 (2)		471 (2)	528 (4)	630 (1)	
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)						

Fish Condition

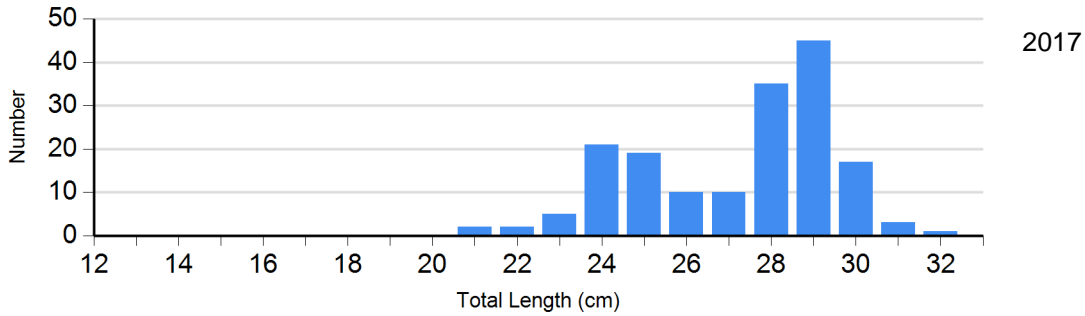
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	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)
	2017	0		30	103 (1.4)	119	93 (0.8)	21	90 (1.1)
Northern Pike Gill Net	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	
	2017	0		3	83 (3.5)	0		0	
Walleye Gill Net	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	
	2017	29	81 (0.8)	10	80 (0.9)	3	84 (2.5)	1	88
Yellow Perch Gill Net	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	
	2017	2	96 (0.8)	10	93 (1.7)	2	87 (0.9)	0	

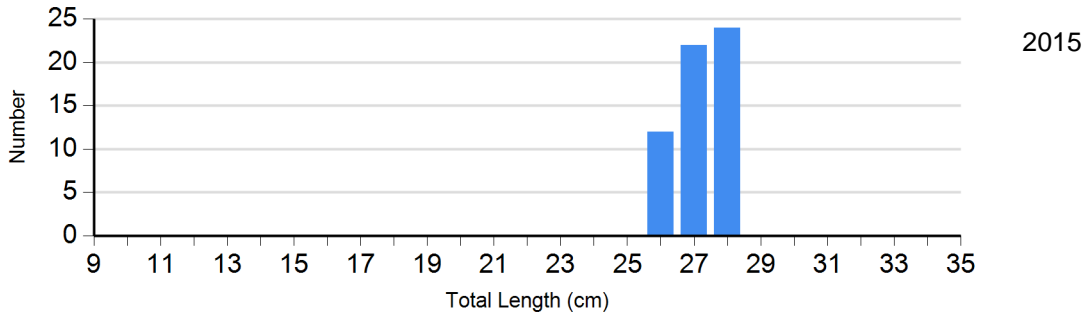
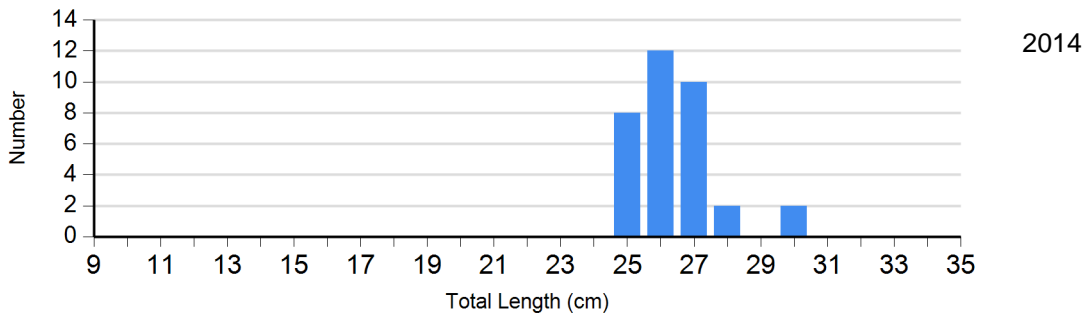
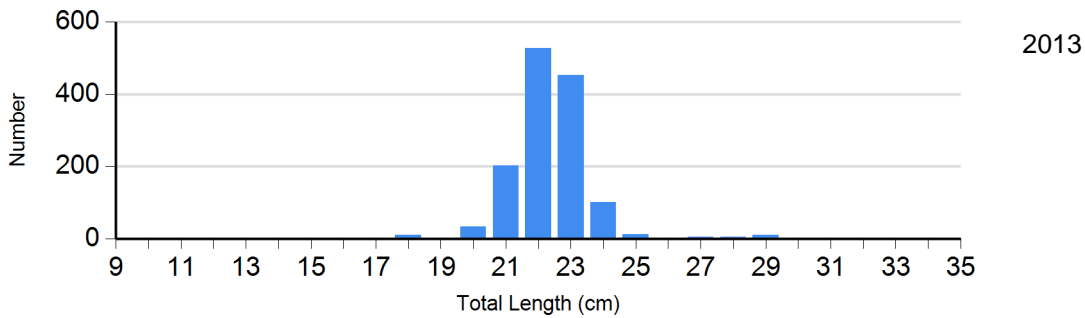
Length Frequency Distribution

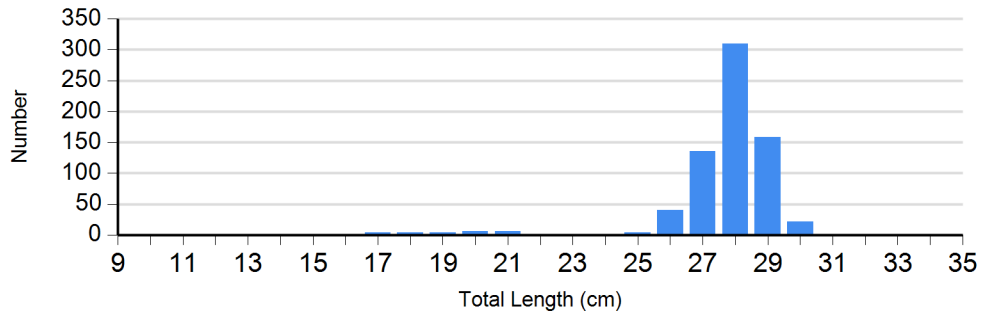
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: frame net (1/2 inch)



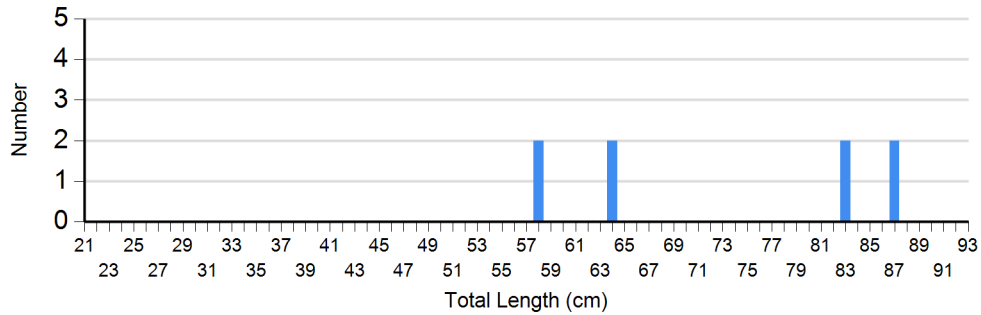
Species: Black Crappie
Gear: frame net (std 3/4 in)



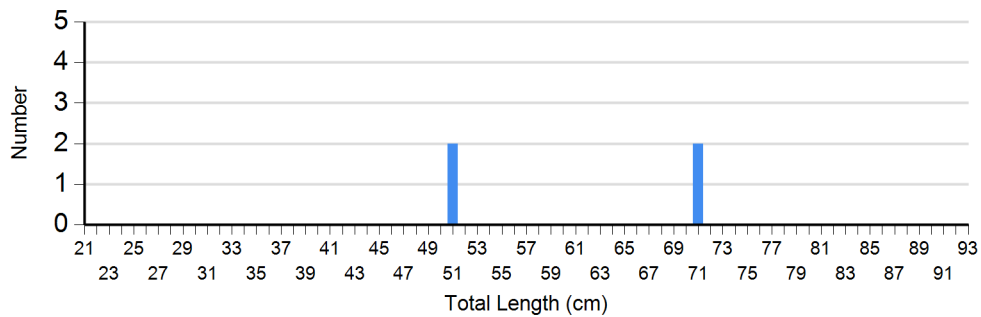


2016

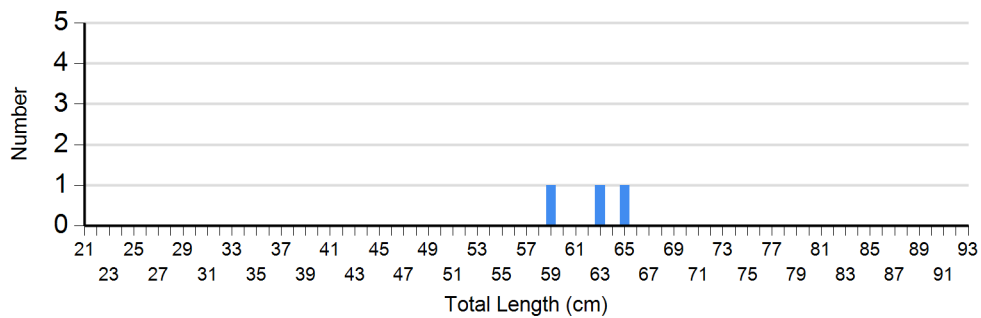
Species: Northern Pike
Gear: std exp gill net



2013

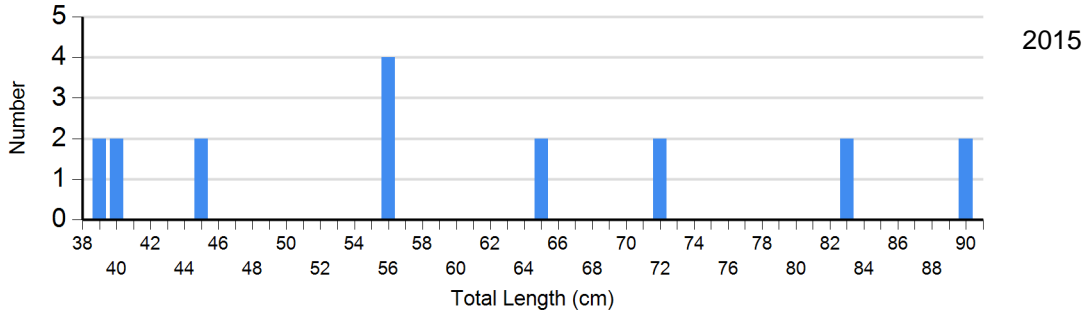
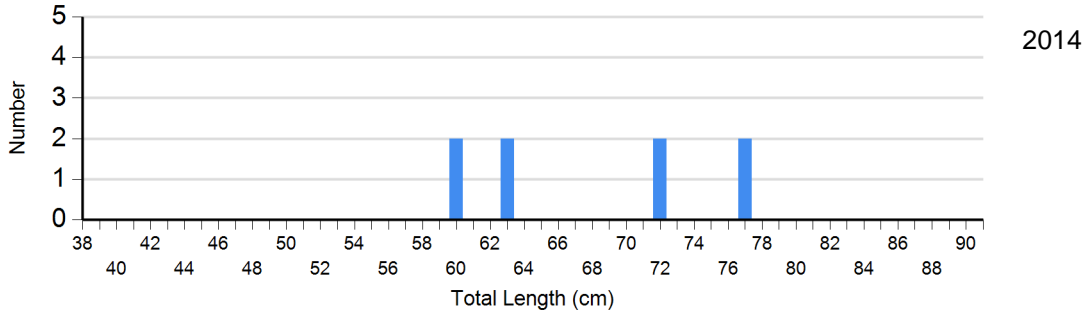


2016

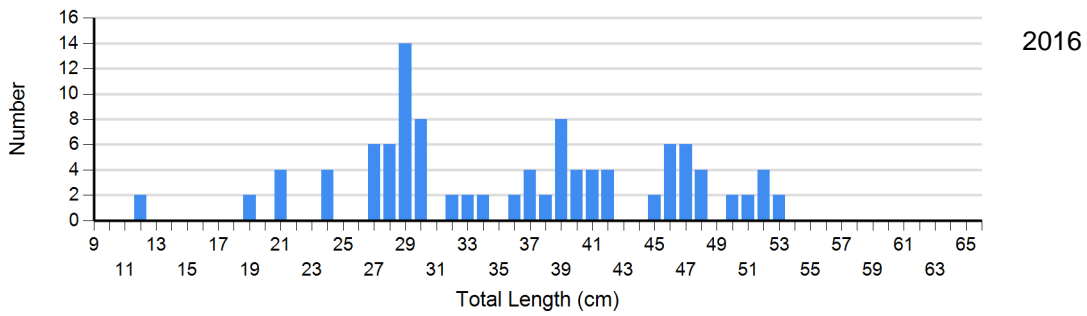
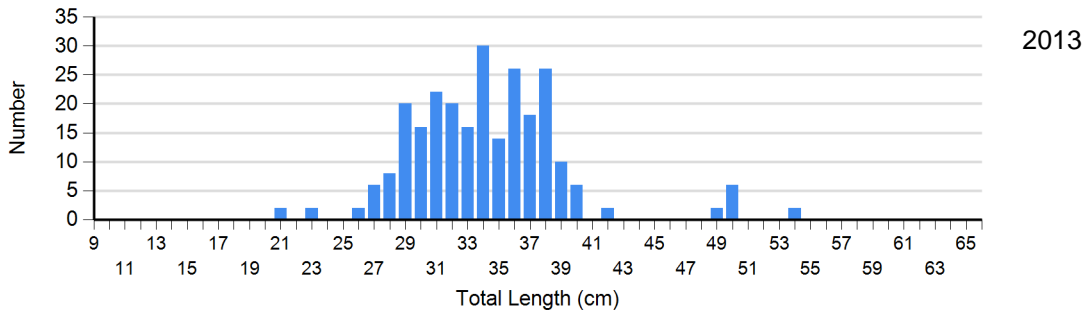


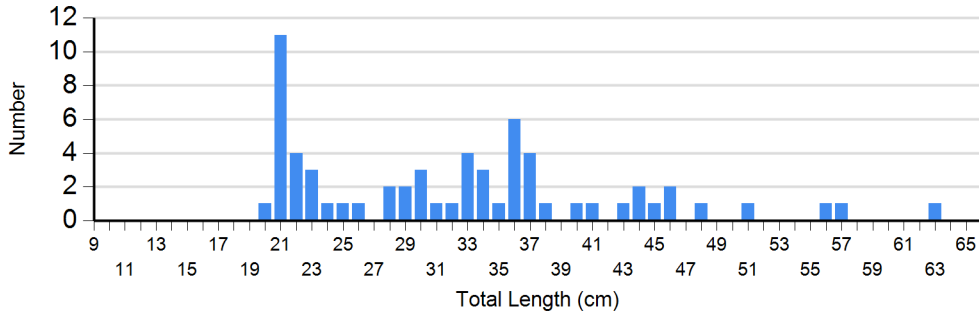
2017

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



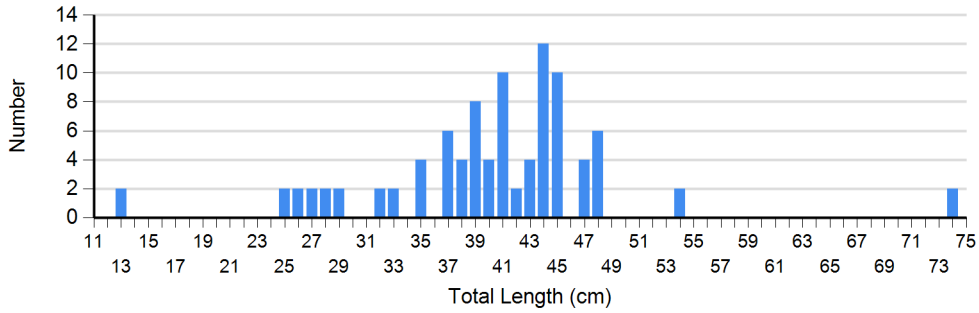
Species: Walleye
 Gear: std exp gill net



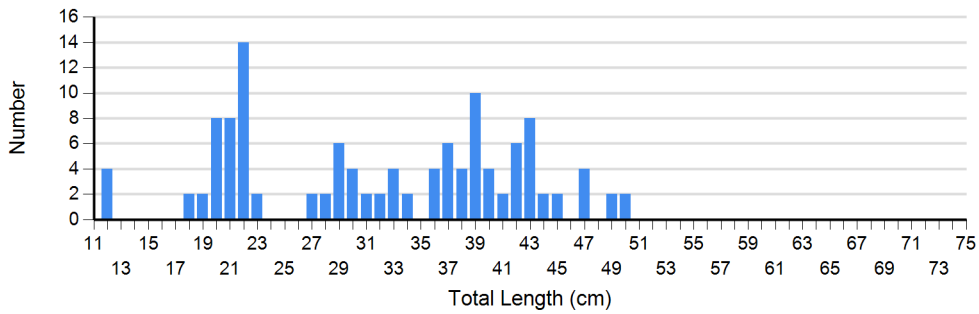


2017

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

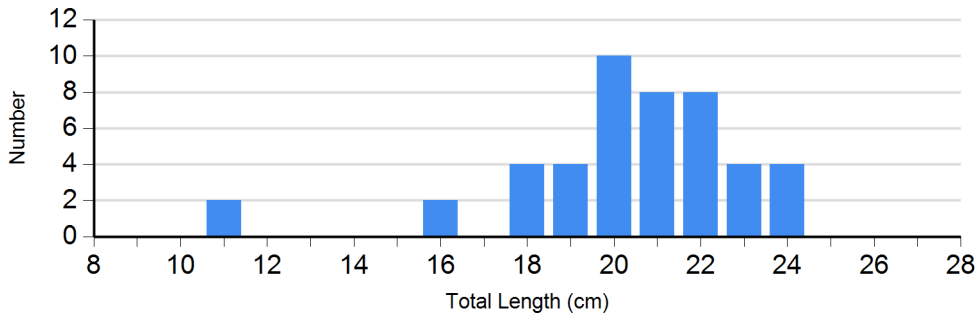


2014

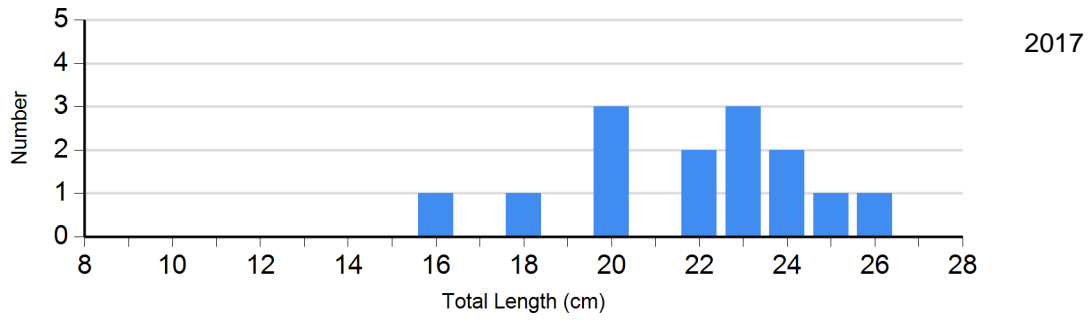
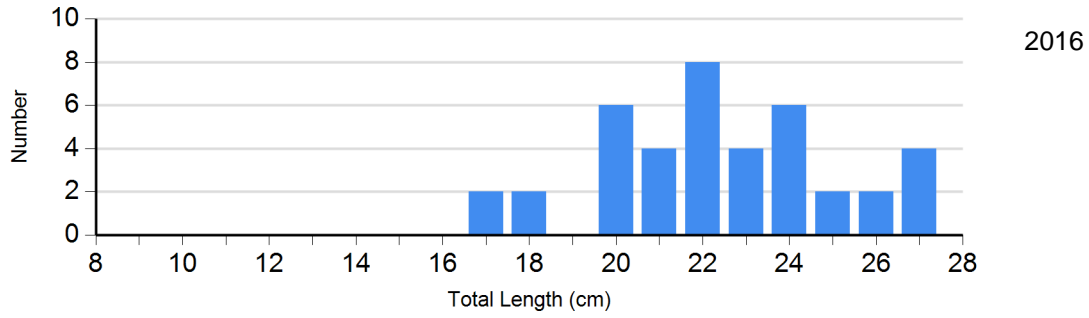


2015

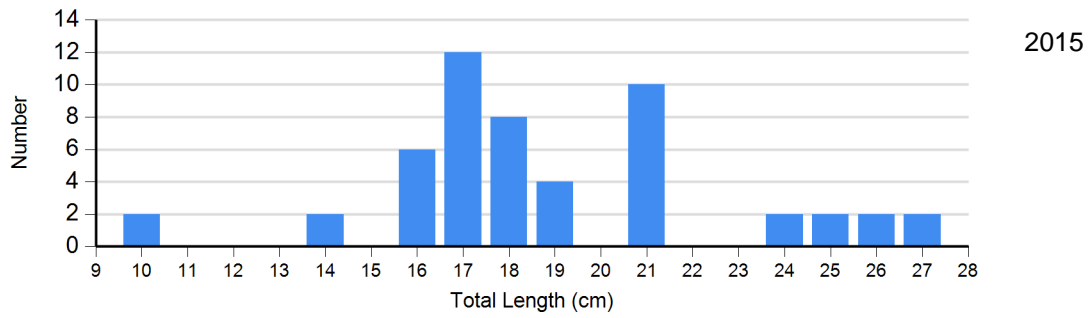
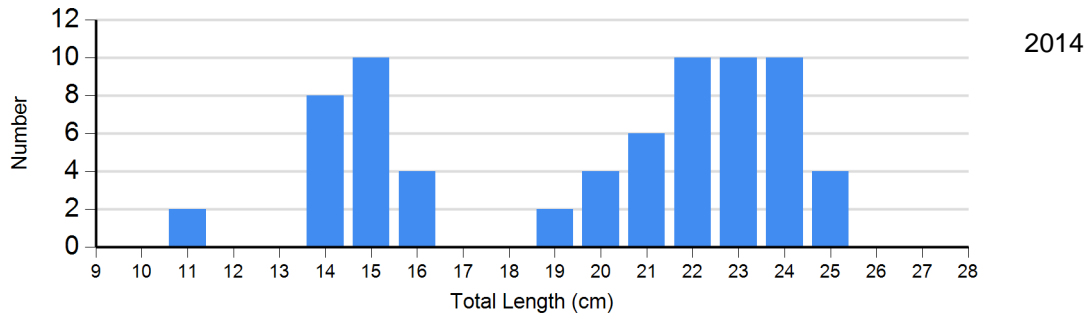
Species: Yellow Perch
Gear: std exp gill net



2013



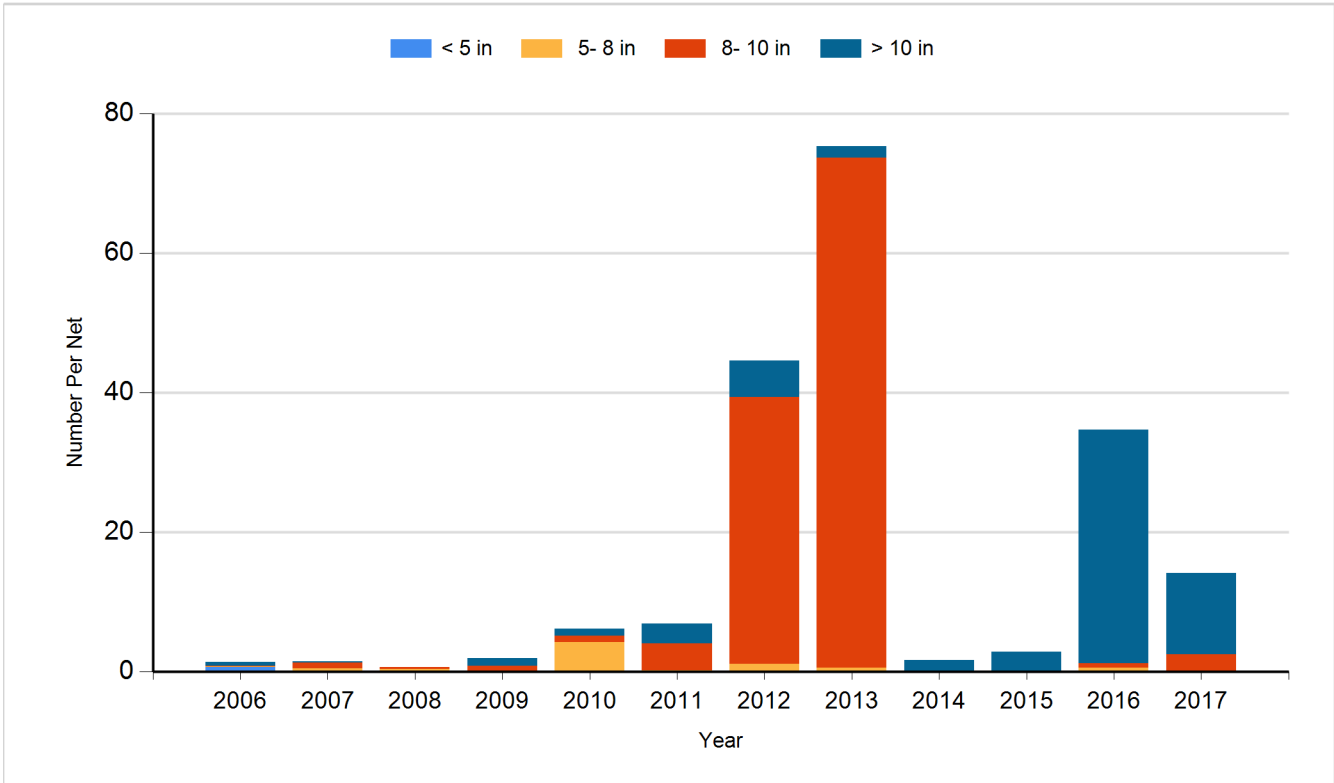
Species: Yellow Perch
 Gear: std exp gill net (150 ft)



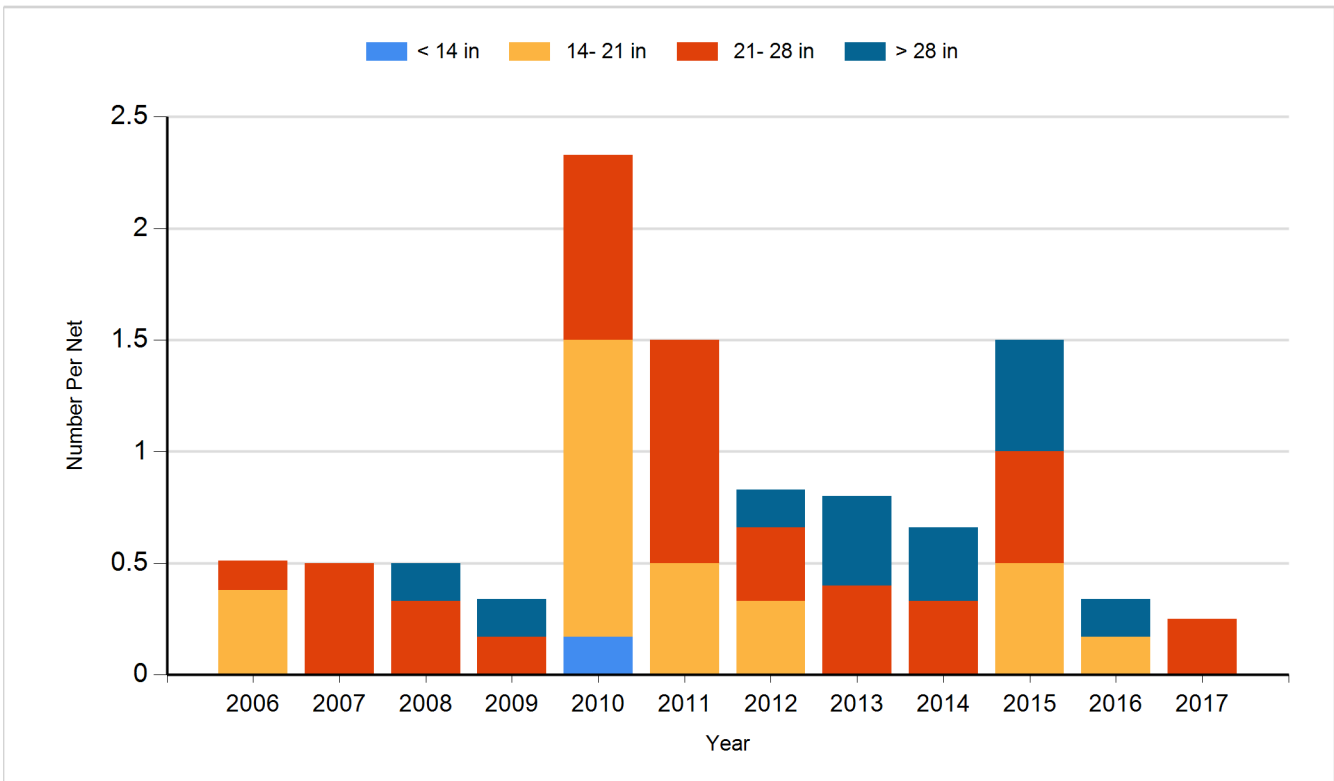
Historic Fish Sizes and Relative Abundance

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

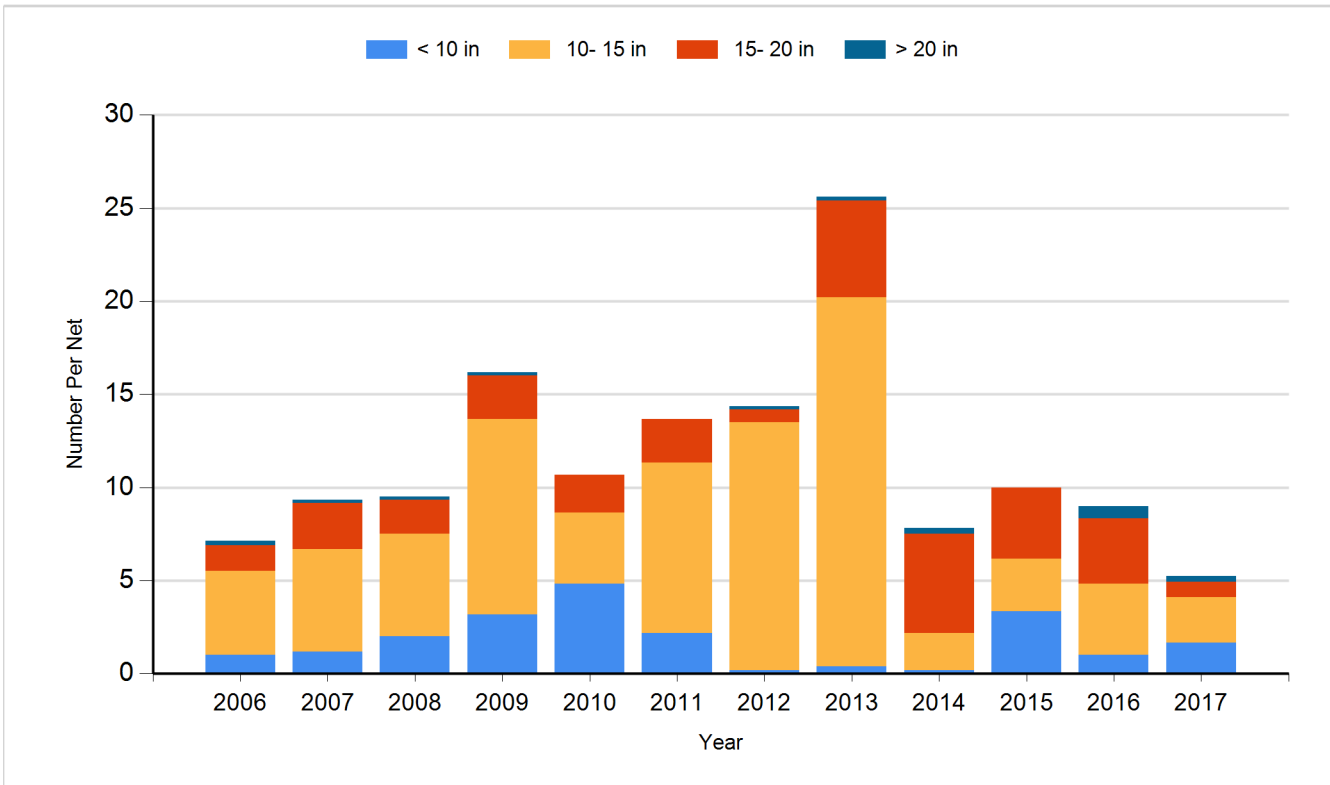
Species: Black Crappie
Gear: Frame Net



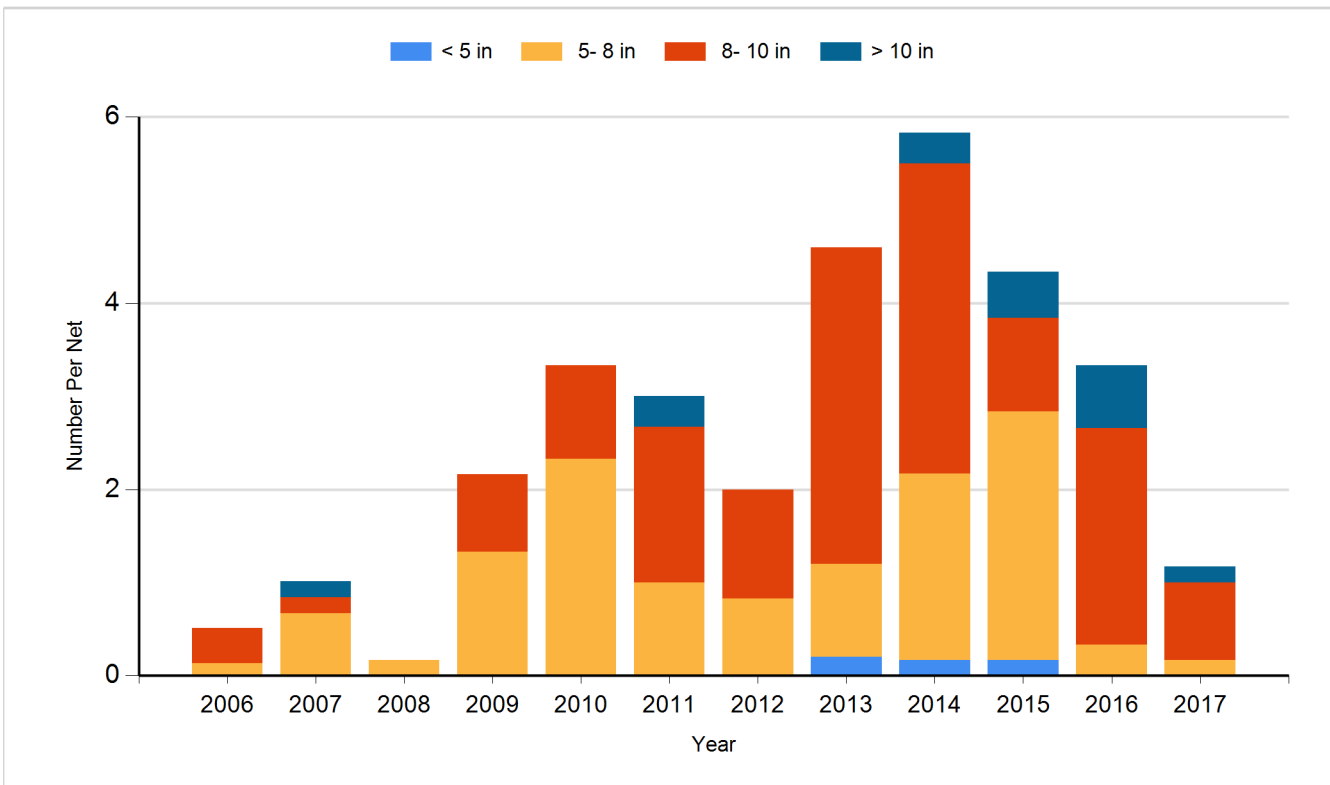
Species: Northern Pike
Gear: Gill Net



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
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
2017	Walleye	Fry	5,000,000