Enemy Swim Survey Summary

Enemy Swim, located 1.5 miles east and 6.5 miles north of Waubay, is managed as a multiple species fishery including panfish (i.e., black crappie, bluegill, and yellow perch), black bass (largemouth and smallmouth) and walleye.

- **Black crappie.** Black crappie numbers were higher in 2018 than 2017, but most were small (i.e., 3.0 to 4.5 inches); those ≥5.0 inches were not abundant (3.7/frame net).

- **Bluegill.** Relative abundance was high with a mean frame net CPUE of 118.0, the highest recorded from 2009 - 2018. Sampled bluegills ranged in length from 2.8 to 9.8 inches; 25% were ≥6.0 inches and 8% were ≥8.0 inches. Eight year classes (2007 and 2010 – 2016) were present; cohorts produced from 2013 – 2015 were the most represented. Bluegills from the strong 2015 (age 3) year class accounted for 75% of the catch. Since 2009, mean length at capture values for age-5 bluegills have ranged from 5.2 to 8.0 inches. In 2018, age-5 bluegills had a mean length of 7.4 inches.

- **Largemouth bass.** Fewer largemouth bass were sampled in 2018 than in surveys conducted from 2009-2017. The lower catch rates observed in 2018 (21.2/hour) may have been related to spring sampling conditions (e.g., water clarity or temperature) more so than changes in the at-large population; future surveys will provide more insight (next survey scheduled for 2020). Sampled largemouth bass ranged in length from 8.0 to 16.5 inches; seven year classes (1998 and 2010 -2015) were represented.

- **Smallmouth bass.** Spring daytime electrofishing was attempted on two different occasions but water clarity was high and sampling ineffective.

- **Walleye.** Similar to 2017, walleye numbers were low (3.8/gill net). Sampled walleyes ranged in length from 8.3 to 26.4 inches; most (>80%) were 12.6 to 18.5 inches. Nine year classes (2002, 2009 – 2011, and 2013 – 2017), each represented by 11 or fewer individuals, were present. The 2009 cohort, which coincided with a large fingerling stocking, was the last strong year class to recruit to the adult population. Currently, walleyes appear to be growing well with a mean length at capture of 14.4 inches at age 3 in 2018.

- **Yellow perch**. Yellow perch numbers remain low (1.0/gill net) in Enemy Swim Lake. Sampled yellow perch ranged in length from 5.1 to 7.1 inches.

For more detailed results see the computer generated South Dakota Statewide Fisheries Survey for Enemy Swim Lake (below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Enemy Swim, Day County
UBS-Lake-196-000
2018

Lake Information

Name:	Enemy Swim	**Maximum Depth:**	26 Feet
County:	Day	**Mean Depth:**	16 Feet
		OHWM Elevation:	1,854
Surface Area:	2,186 Acres	**Outlet Elevation:**	1,854

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 09, 2018	4 net-nights
AFS std gill net	Jul 10, 2018	4 net-nights
AFS std gill net	Jul 12, 2018	4 net-nights
fall night EF-WAE	Oct 01, 2018	3600 seconds
frame net (std 3/4 in)	Jul 09, 2018	9 net-nights
frame net (std 3/4 in)	Jul 10, 2018	6 net-nights
frame net (std 3/4 in)	Jul 11, 2018	6 net-nights
spring night EF-LMB	Jun 20, 2018	3600 seconds

Common Fish Species Present

Largemouth Bass

Bluegill

Black Crappie

Walleye

Smallmouth Bass

Yellow Perch

Rock Bass

White Bass

White Sucker

Pumpkinseed

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).

A statewide effort to help make netting efforts comparable to all waters sampled across the state, occurred in 2017, with a switch to American Fisheries Society gill nets. Past gill netting efforts were completed with different style/types of nets and are not comparable side by side.

- **AFS std gill net** – 80 ft experimental gill net containing eight panels (10 ft each) of varying monofilament meshes of 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25 and 2.50 inches.
- **std experimental gill net for non-Missouri River waters** - 150 ft experimental gill net containing six panels (25 ft each) of varying monofilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.
- s**td experimental gill net for Missouri River reservoirs** – 300 ft experimental gill net containing six panels (50 ft each) of varying multifilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.

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

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
Bluegill	3	8	6	15	8	20	10	25	12	30
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Common Carp	11	28	16	41	21	53	26	66	33	84
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
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Rock Bass	4	10	7	18	9	23	11	28	13	33
Rudd	6	15	10	25	12	30	15	38	19	48
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
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 Sucker	6	15	10	25	13	33	16	41	20	51
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).

*** Methods/Species that ignore stock length**

		Abundance		Stock Density Indices				Condition	
Gear	Species	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	0.1	0.1	100		100		70	
	Black Crappie	0.1	0.1	100		100		93	
	Bluegill	6.5	2.7	72	7	15	6	119	1
	Common Carp	0.1	0.1	100		100		79	
	Northern Pike	0.3	0.2	100		0		77	7
	Rock Bass	0.6	0.3	71		14		105	2
	Smallmouth Bass	2.8	0.8	74	12	65	13	97	2
	Walleye	3.8	1.0	70	10	4		90	1
	White Bass	2.1	0.9	100		100		88	1
	White Sucker	1.6	0.4	100		100		103	3
	Yellow Perch	1.0	0.4	0		0		94	3
fall night EF-WAE*	Walleye	11.0	3.6					89	2
frame net (std 3/4 in)	Black Bullhead	0.3	0.1	86		43		82	5
	Black Crappie	3.7	2.5	9	5	0		104	3
	Bluegill	118.0	40.8	25	1	8	1	104	1
	Channel Catfish	0.1	0.1	50		0		126	10
	Common Carp	0.1	0.1	50		50		98	
	Northern Pike	0.3	0.2	83		0		76	5
	Pumpkinseed	0.5	0.4	0		0		101	3
	Rock Bass	4.5	1.9	41	7	13	5	101	1
	Smallmouth Bass	0.8	0.4	41	20	24		100	3
	Walleye	0.1	0.1	100		100		83	4
	White Bass	0.5	0.4	100		100		89	2
	Yellow Perch	3.8	1.7	3		0		84	1
spring night EF-LMB	Largemouth Bass	21.2	8.9	82		23	15	105	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.

*** Methods/Species that ignore stock length; ** Day/night samples combined; *** AFS std frame nets used in 2016 and 2017**

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std gill net	Black Bullhead								0.1	0.2	0.1	0.1
	Black Crappie								0.8	0.3	0.1	0.4
	Bluegill								3.8	0.9	6.5	3.7
	Common Carp								0.8	0.3	0.1	0.4
	Largemouth Bass								0.1	0.3	0.0	0.1
	Northern Pike								1.2	1.3	0.3	0.9
	Pumpkinseed								0.3	0.1	0.0	0.1
	Rock Bass								0.2	0.1	0.6	0.3
	Smallmouth Bass								2.4	0.9	2.8	2.0
	Walleye								7.2	1.3	3.8	4.1
	White Bass								7.6	3.0	2.1	4.2
	White Sucker								2.2	3.5	1.6	2.4
	Yellow Perch								4.9	0.9	1.0	2.3
fall night EF-WAE*	Walleye	10.2	34.7	31.0	3.0	116.0	8.0	20.0	38.5	9.0	11.0	28.1
boat shocker	Largemouth Bass	81.7	112.1		67.2		224.3				21.2	101.3
boat shocker	Smallmouth Bass	123.7	107.0		299.0		82.0**		86.0**			139.5
frame net (std 3/4 in)***	Black Bullhead	0.1	0.1	0.5	0.3	0.2	0.7	0.2	0.1	0.3	0.3	0.3
	Black Crappie	0.2	1.3	8.3	2.1	5.7	1.2	0.3	2.6	0.2	3.7	2.6
	Bluegill	56.8	57.3	90.2	53.8	54.2	31.5	26.1	62.7	39.2	118.0	59.0
	Channel Catfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
	Common Carp	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1
	Northern Pike	0.1	0.3	0.3	0.3	0.4	0.3	0.6	0.5	0.2	0.3	0.3
	Pumpkinseed	0.3	1.7	2.3	0.6	2.1	0.4	1.5	1.1	0.3	0.5	1.1
	Rock Bass	8.3	5.3	12.7	8.2	3.8	5.3	6.4	0.8	2.3	4.5	5.8
	Smallmouth Bass	1.8	1.9	14.9	4.6	3.4	3.3	2.0	0.6	0.5	0.8	3.4
	Walleye	0.1	0.0	0.6	1.2	0.7	0.8	0.8	1.0	0.6	0.1	0.6
	White Bass	0.0	0.0	0.1	0.2	0.1	0.2	0.3	0.3	0.0	0.5	0.2
	White Sucker	0.1	0.2	0.1	0.1	0.2	0.0	0.2	0.1	0.1	0.0	0.1
	Yellow Perch	1.6	5.1	7.4	0.9	1.1	0.5	0.3	1.4	0.1	3.8	2.2
std exp gill net	Black Crappie	0.0	2.0	2.0	4.0	8.5	3.5	1.3				3.0
	Bluegill	2.8	3.8	2.5	54.8	41.8	10.3	15.5				18.8
	Common Carp	0.5	0.2	0.3	1.2	0.0	0.2	0.2				0.4
	Northern Pike	2.0	1.3	2.8	3.7	1.0	1.7	0.2				1.8
	Pumpkinseed	0.0	0.0	0.0	0.2	0.3	0.2	0.3				0.1
	Rock Bass	3.3	1.2	0.2	0.7	2.7	2.0	0.7				1.5
	Smallmouth Bass	4.2	0.7	1.5	2.7	2.3	5.3	1.5				2.6
	Walleye	4.7	5.7	10.8	7.5	8.7	8.5	8.7				7.8
	White Bass	2.7	0.3	1.8	8.0	5.8	1.3	2.0				3.1
	White Sucker	4.5	7.7	3.3	1.5	2.2	4.7	1.8				3.7
	Yellow Perch	40.5	112.3	152.2	34.0	9.7	1.7	0.0				50.1

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.

*** Day/night samples combined in 2014 and 2016; ** AFS std frame nets used in 2016 and 2017**

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Walleye	PSD								52	81	70
		PSD-P								1	6	4
		Wr								86	83	90
boat shocker	Largemouth Bass	PSD	91	99		86		71				82
		PSD-P	45	55		79		32				23
		Wr	105	109		107		107				105
boat shocker*	Smallmouth Bass	PSD	7	72		8		71		50		
		PSD-P	6	41		3		12		10		
		Wr	88	95		83		86		92		
frame net (std 3/4 in)**	Black Crappie	PSD	20	23	84	84	99	100	100	37	40	9
		PSD-P	20	16	5	57	46	93	100	34	20	0
		Wr	107	102	104	96	100	95	98	94	101	104
	Bluegill	PSD	15	41	61	78	68	46	42	43	3	25
		PSD-P	4	7	0	7	32	27	21	18	1	8
		Wr	104	101	103	110	104	103	105	104	107	104
std exp gill net	Walleye	PSD	96	56	14	18	21	16	10			
		PSD-P	18	9	5	9	17	4	2			
		Wr	91	92	85	81	80	82	83			

Length at Capture

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

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	2500		84 (41)	110 (1854)	151 (193)	187 (299)	223 (28)	237 (29)	242 (36)		251 (22)
2017	2228		75 (1923)	123 (74)	125 (158)	136 (66)	204 (1)	249 (1)		245 (4)	242 (2)
2016	2140	68 (636)	100 (206)	95 (582)	161 (338)	198 (248)	215 (85)	243 (8)	233 (17)	256 (8)	246 (14)
2015	636	77 (6)	77 (3)	93 (327)	163 (122)	187 (61)	205 (22)	224 (81)	226 (10)	224 (5)	242 (1)
2014	757		96 (125)	109 (209)	144 (101)	196 (92)	200 (155)	198 (76)	234 (1)	234 (1)	
2013	1323	94 (12)	84 (91)	116 (328)	173 (124)	190 (249)	199 (431)	201 (77)	214 (14)		
2012	1291		94 (54)	126 (63)	158 (358)	176 (530)	190 (129)	193 (114)	198 (45)		
2011	2164			108 (266)	130 (505)	173 (669)	183 (727)				
2010	1374		93 (57)	106 (196)	130 (307)	153 (728)	212 (77)	216 (6)			261 (3)
2009	1351			98 (148)	112 (1066)	132 (123)	164 (14)				

Species: Largemouth Bass

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	22			208 (2)	249 (2)	327 (7)	363 (1)	366 (4)	380 (5)		420 (1)
2014	223			246 (26)	304 (97)	315 (8)	337 (22)	381 (3)	405 (10)	426 (32)	427 (25)
2012	56		209 (3)	251 (5)	317 (2)	369 (1)	376 (2)	393 (7)	415 (10)	421 (14)	433 (12)
2010	94				290 (1)	330 (4)	350 (2)	369 (17)	382 (44)	391 (22)	429 (4)

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	47	218 (1)	316 (5)	366 (10)	380 (2)	434 (7)		443 (8)	420 (2)	462 (11)	672 (1)
2017	17		281 (2)	151 (1)	410 (4)		392 (3)		438 (7)		
2016	88	248 (2)	281 (4)	331 (11)	366 (1)	381 (28)	398 (7)	386 (36)			625 (1)
2015	54		256 (6)		329 (7)	360 (3)	354 (37)				681 (1)
2014	55	187 (4)		278 (4)		356 (45)					584 (2)
2013	56		224 (6)	288 (10)	334 (30)			559 (1)	565 (1)	559 (1)	581 (7)
2012	48	167 (3)	264 (1)	320 (40)				552 (1)		636 (1)	544 (2)
2011	73	209 (3)	298 (61)	399 (1)	481 (2)		478 (2)			536 (2)	580 (2)
2010	85	210 (52)	311 (13)	402 (1)	446 (3)	445 (4)			478 (3)	494 (3)	525 (6)
2009	29	198 (1)	311 (1)	411 (1)	426 (4)		471 (6)	484 (8)	468 (3)	483 (2)	615 (3)

Fish Condition

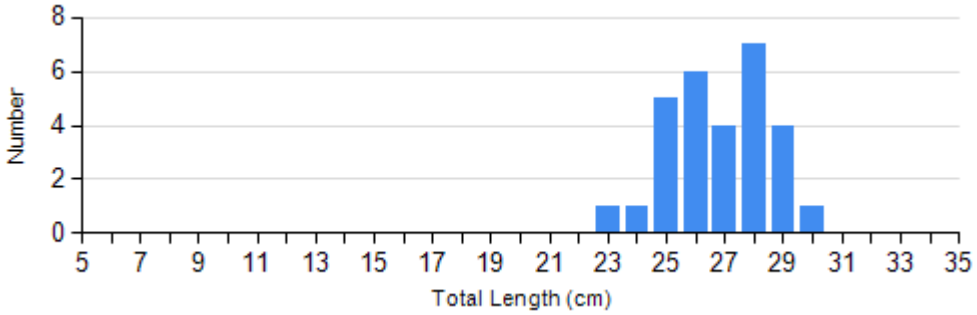
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2014	0		2	106	26	95 (1.0)	1	83
	2015	0		0		6	98 (2.3)	0	
	2016	39	97 (0.9)	2	104 (4.7)	5	90 (2.2)	16	86 (2.3)
	2017	3	108 (4.4)	1	95	0		1	85
	2018	70	104 (2.2)	7	102 (2.0)	0		0	
Bluegill Frame Net	2014	406	102 (0.6)	144	106 (0.7)	207	102 (0.6)	0	
	2015	366	104 (0.9)	127	110 (0.6)	134	106 (0.9)	0	
	2016	864	101 (1.1)	368	111 (0.6)	257	103 (1.1)	15	100 (3.8)
	2017	908	106 (0.6)	23	111 (1.7)	7	106 (2.5)	2	95 (4.6)
	2018	1851	102 (0.5)	434	110 (0.6)	165	107 (0.9)	29	104 (3.4)
Largemouth Bass Electro Fishing	2014	66	109 (1.1)	88	109 (0.8)	71	101 (1.0)	0	
	2018	4	117 (3.0)	13	101 (2.2)	5	104 (0.5)	0	
Smallmouth Bass Electro Fishing	2014	24	87 (1.0)	48	85 (0.8)	7	90 (3.5)	3	91 (8.5)
	2016	43	93 (0.9)	34	91 (0.8)	9	85 (2.3)	0	
Walleye Gill Net	2014	43	82 (0.8)	6	78 (1.1)	2	78 (8.5)	0	
	2015	47	83 (1.5)	4	79 (0.6)	0		1	74
	2016	41	87 (0.8)	44	85 (0.9)	1	80	0	
	2017	3	86 (3.7)	12	83 (1.6)	1	78	0	
	2018	14	94 (1.5)	30	88 (0.8)	1	87	1	79

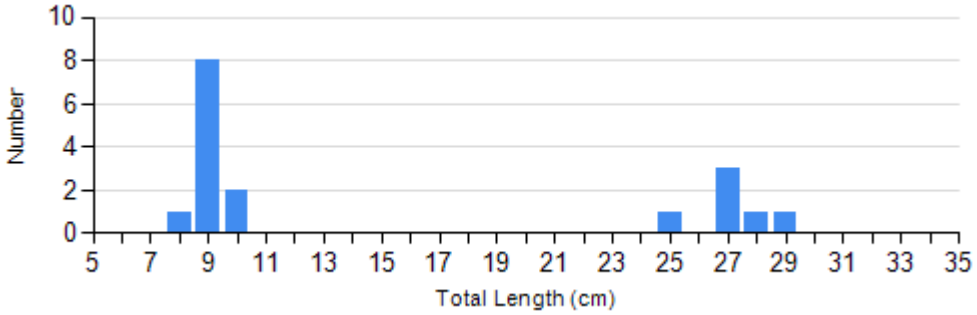
Length Frequency Distribution

Length frequency histogram of species sampled by year.
*** AFS std frame nets used**

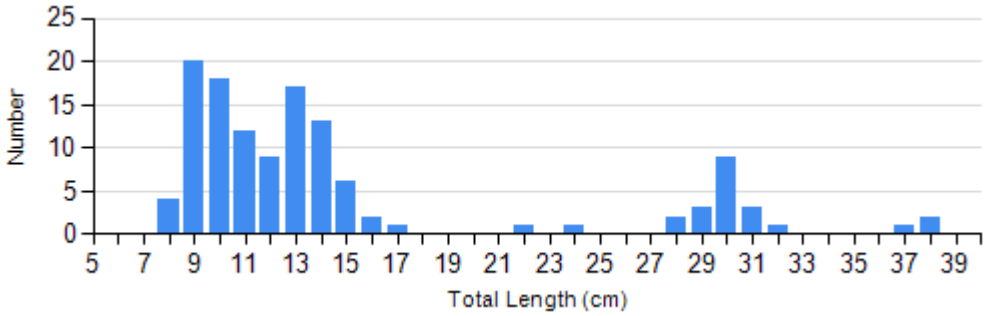
Species: Black Crappie
Gear: frame net (std 3/4 in)



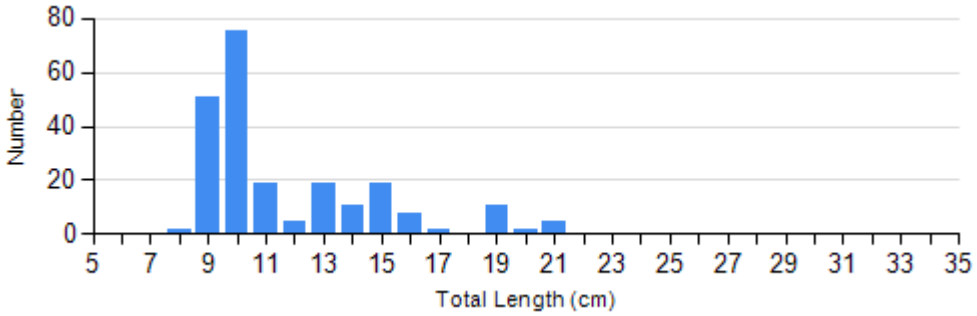
2014



2015

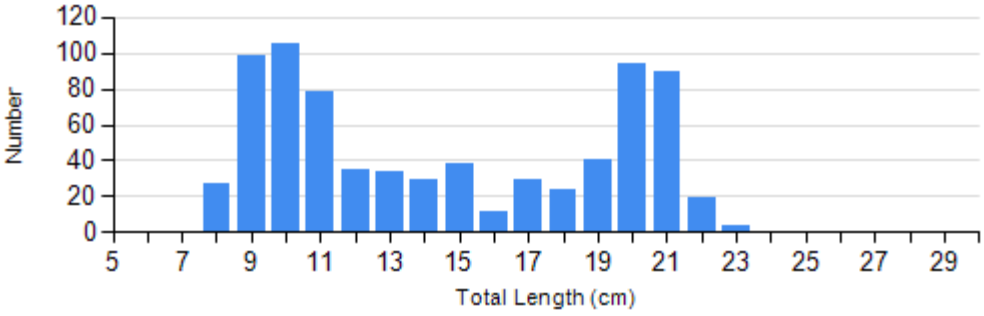


2016*

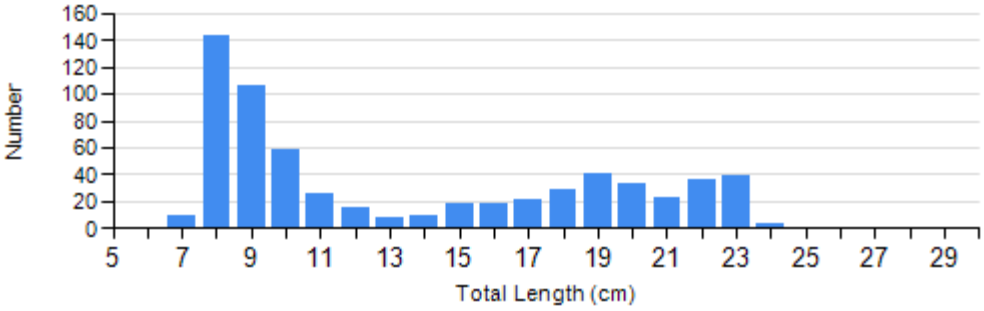


2018

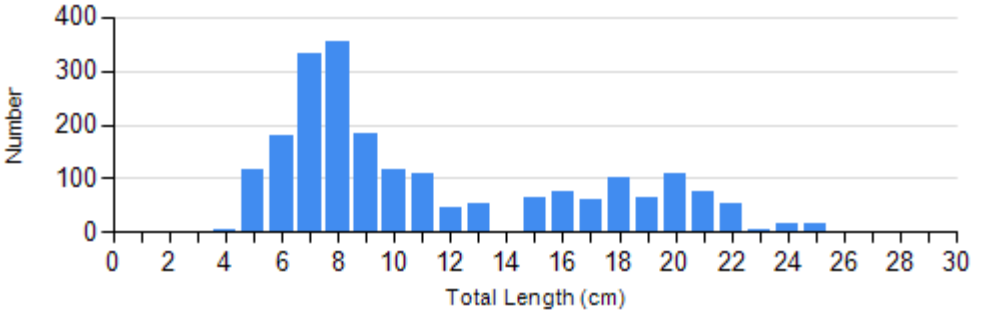
Species: Bluegill
Gear: frame net (std 3/4 in)



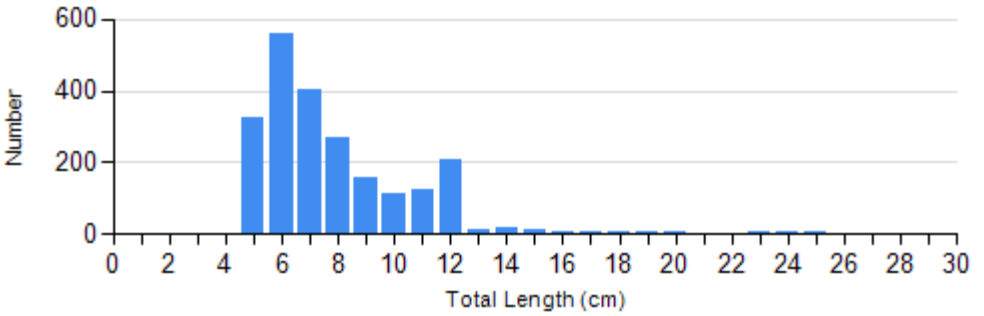
2014



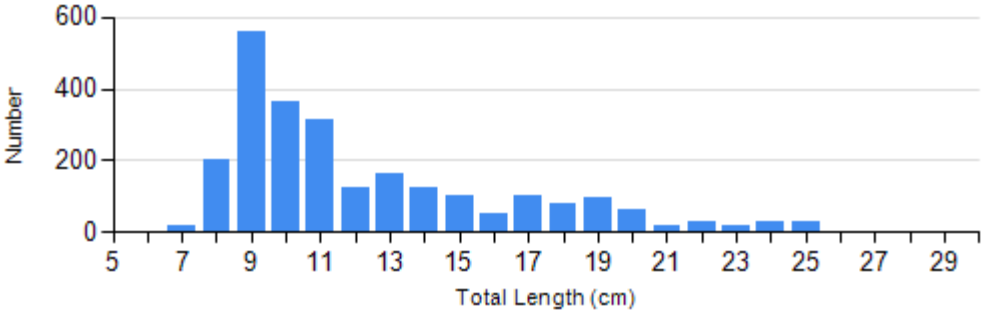
2015



2016*



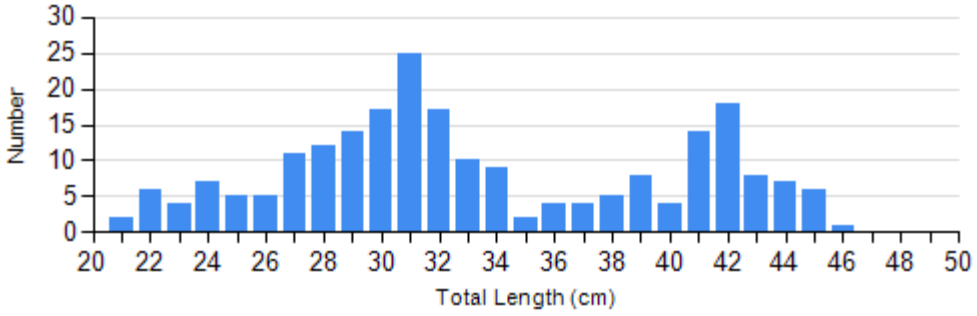
2017*



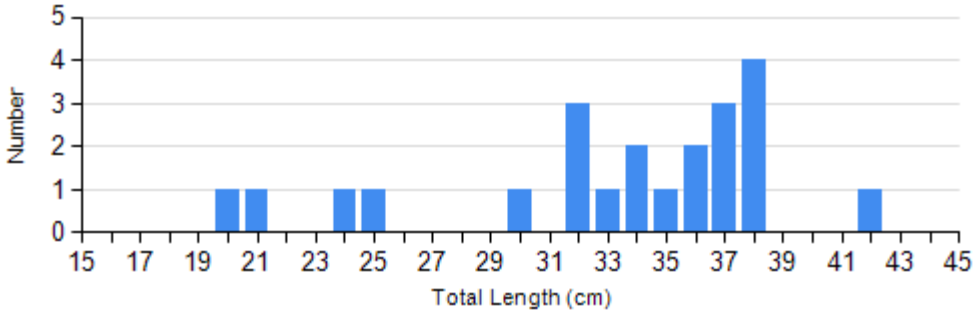
2018

Species: Largemouth Bass
Gear: boat shocker

2014

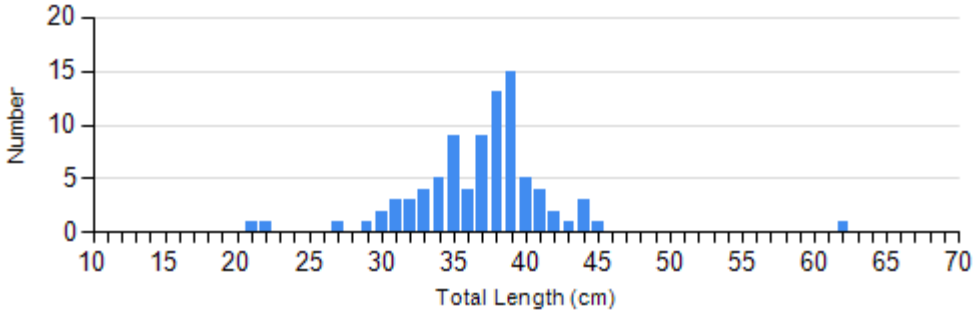


2018

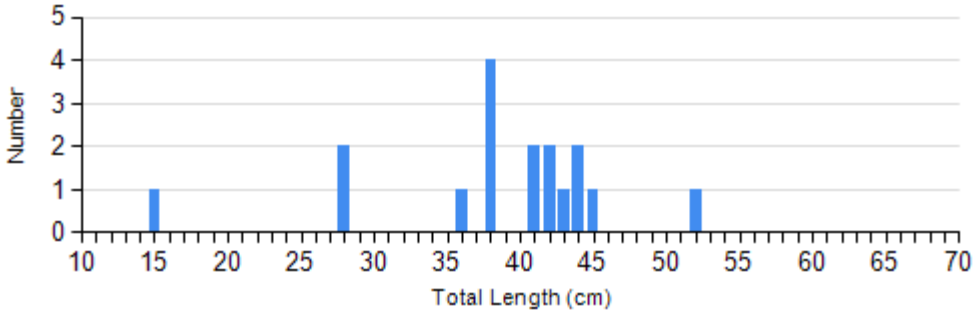


Species: Walleye
Gear: AFS std gill net

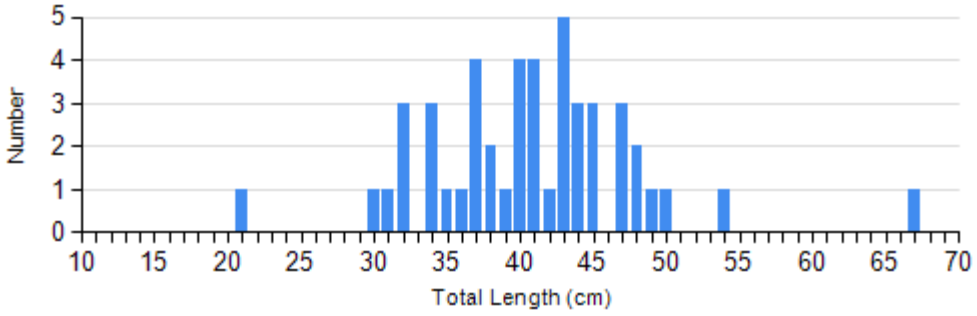
2016



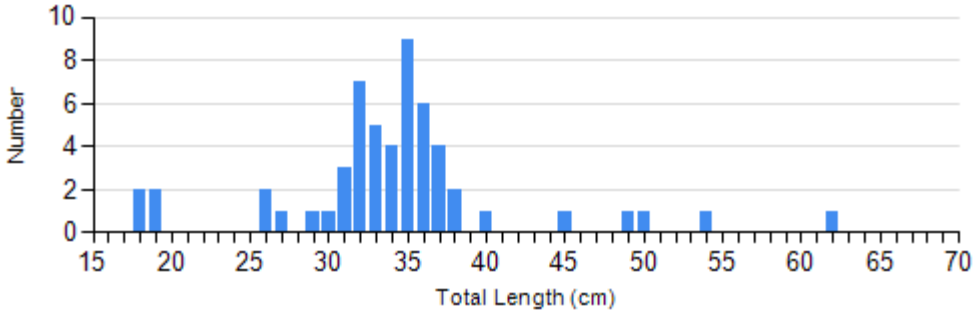
2017



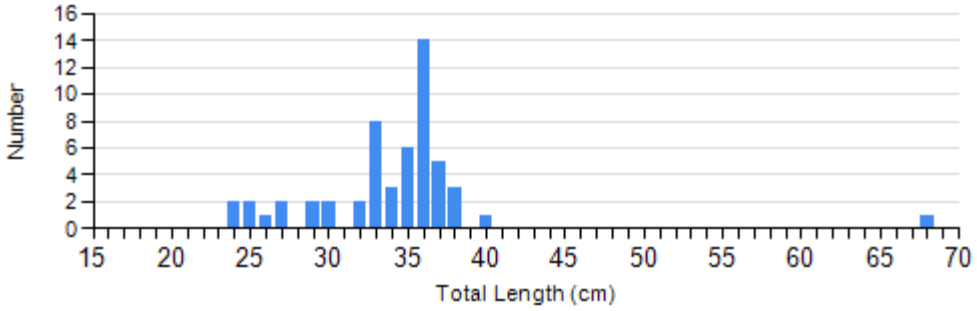
2018



Species: Walleye
Gear: std exp gill net



2014

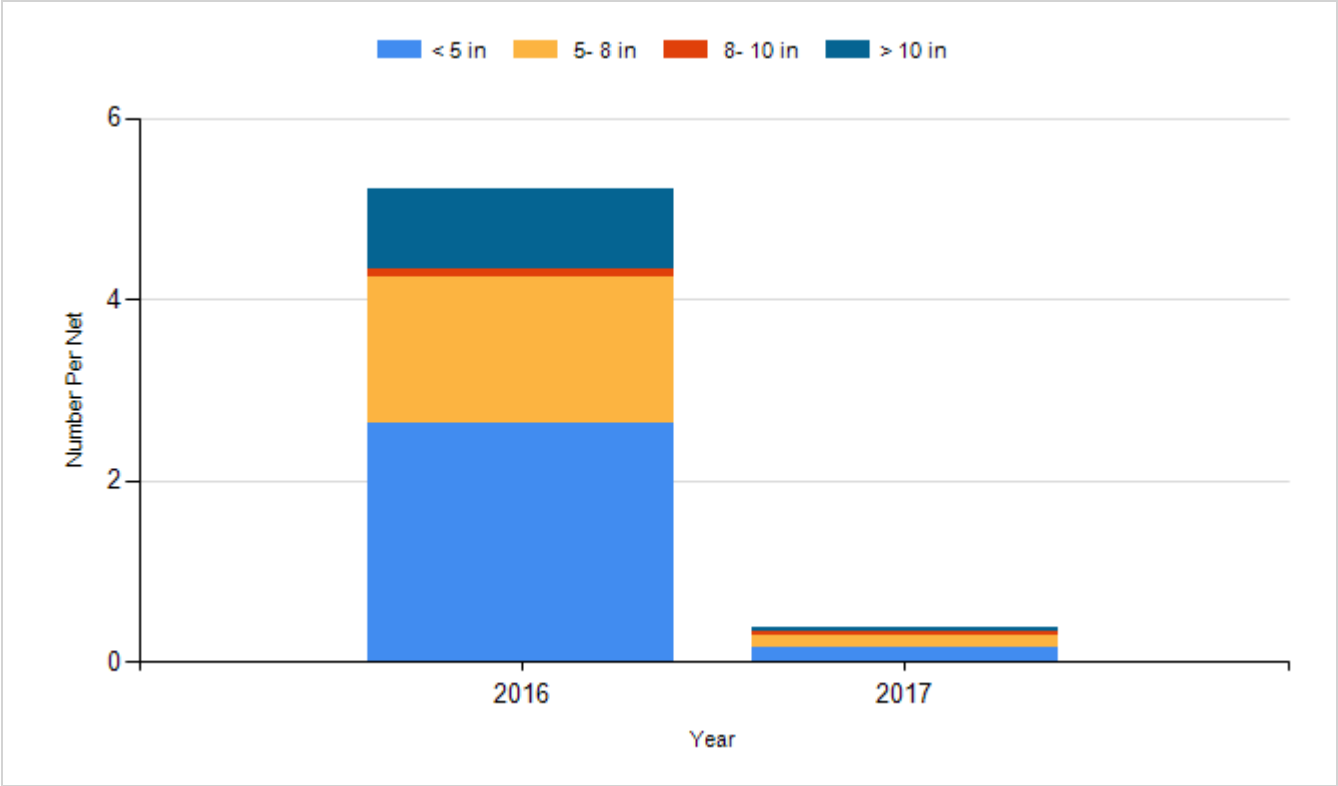


2015

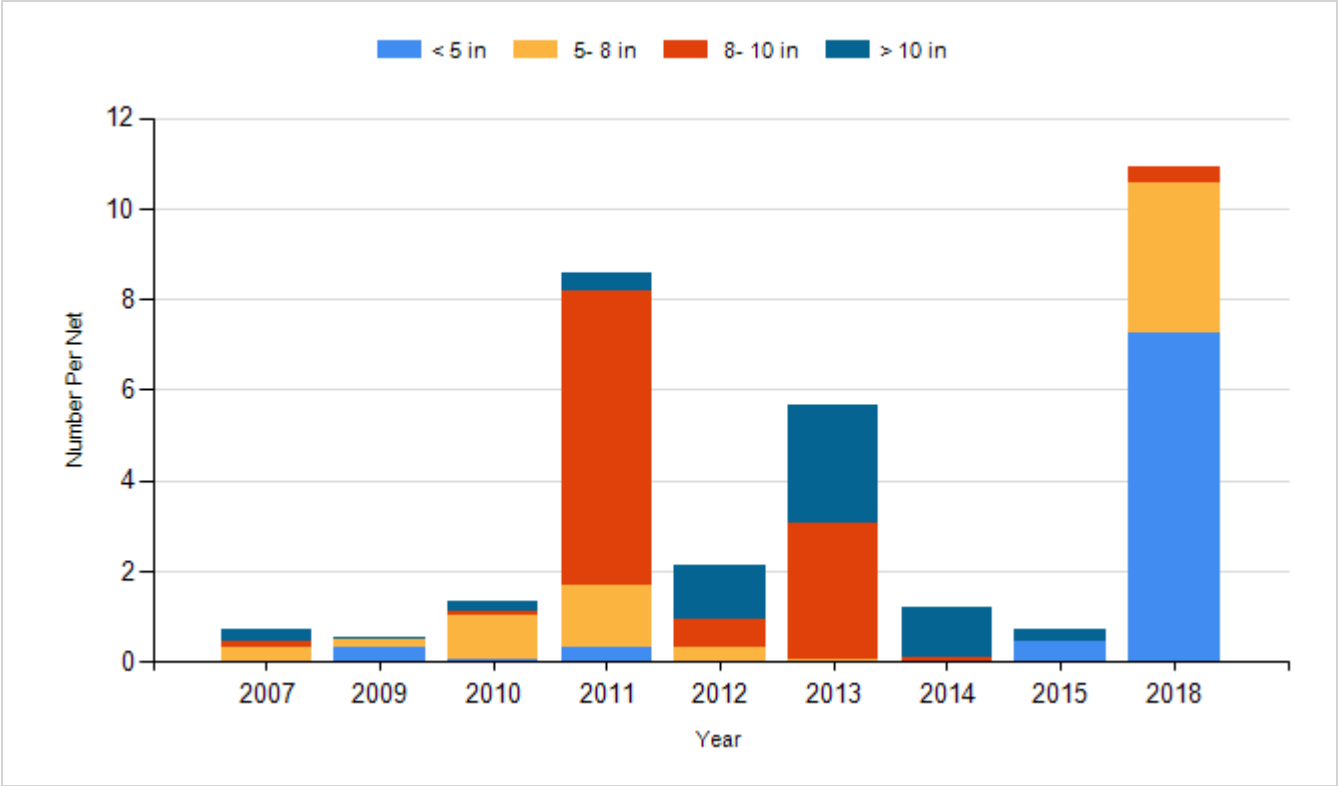
Historic Fish Sizes and Relative Abundance

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

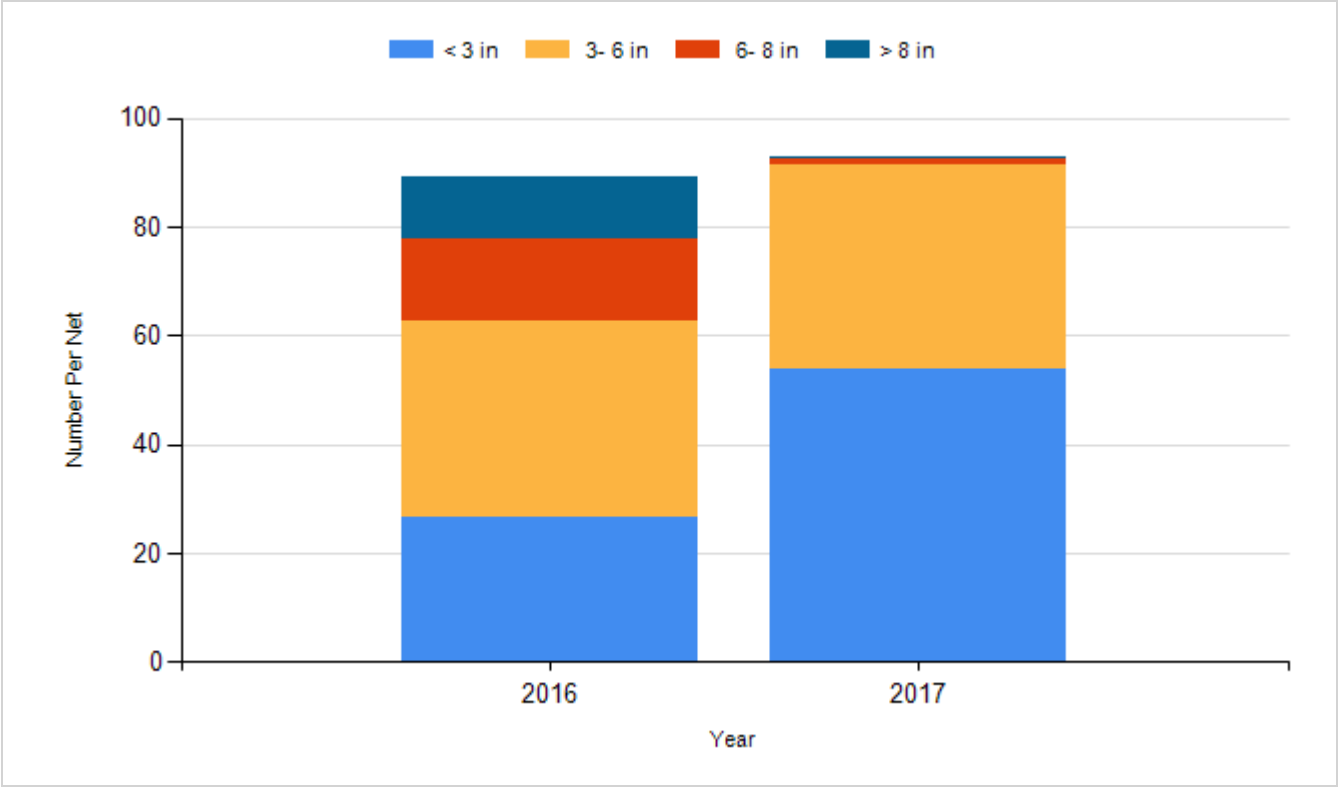
Species: Black Crappie
Gear: AFS std frame net



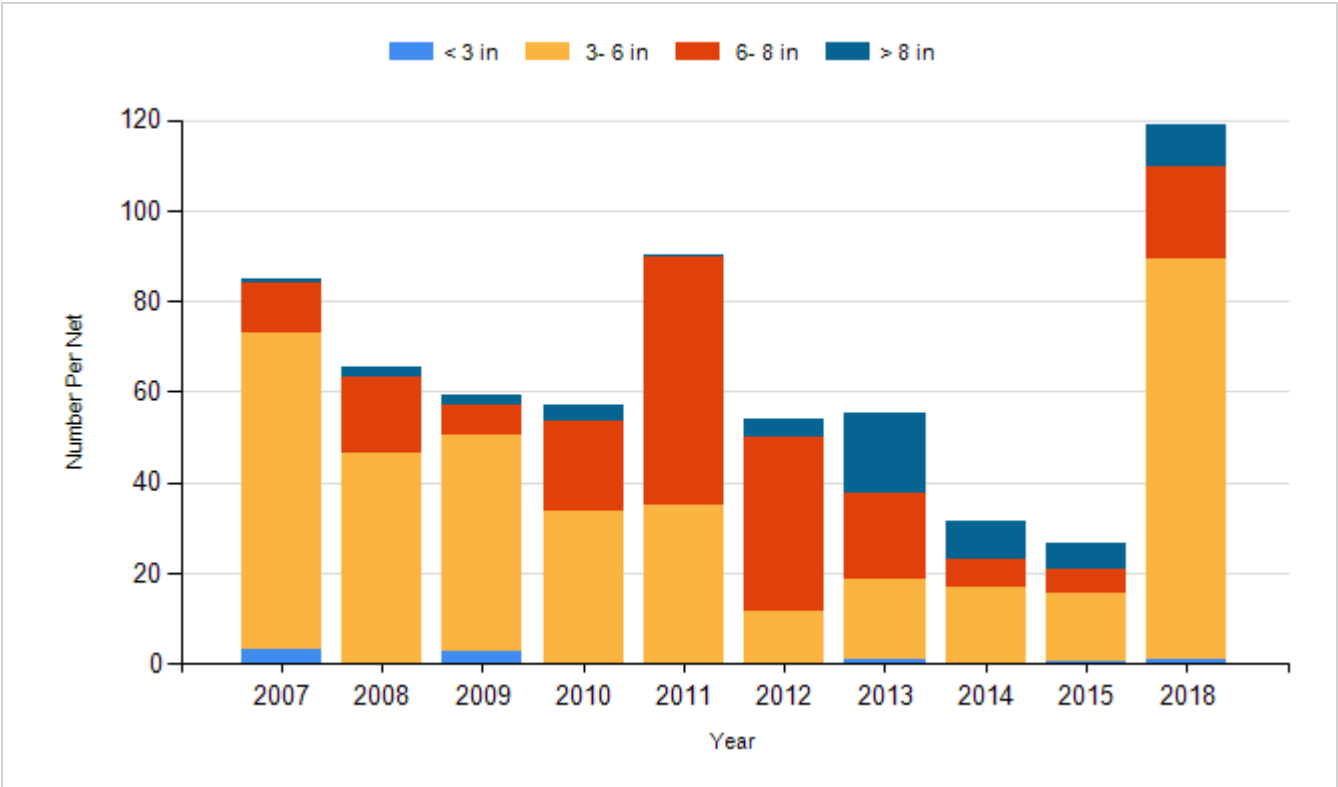
Species: Black Crappie
Gear: frame net (std 3/4 in)



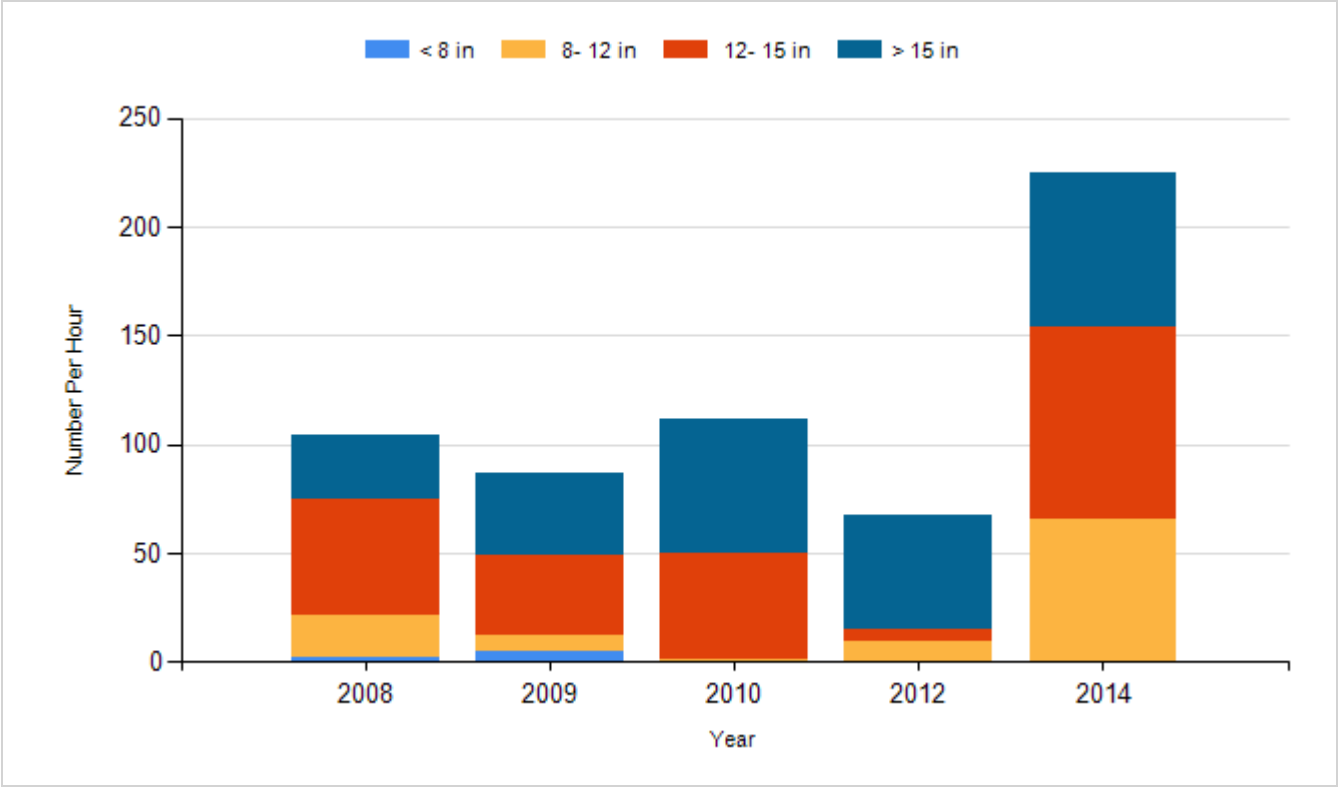
Species: Bluegill
Gear: AFS std frame net



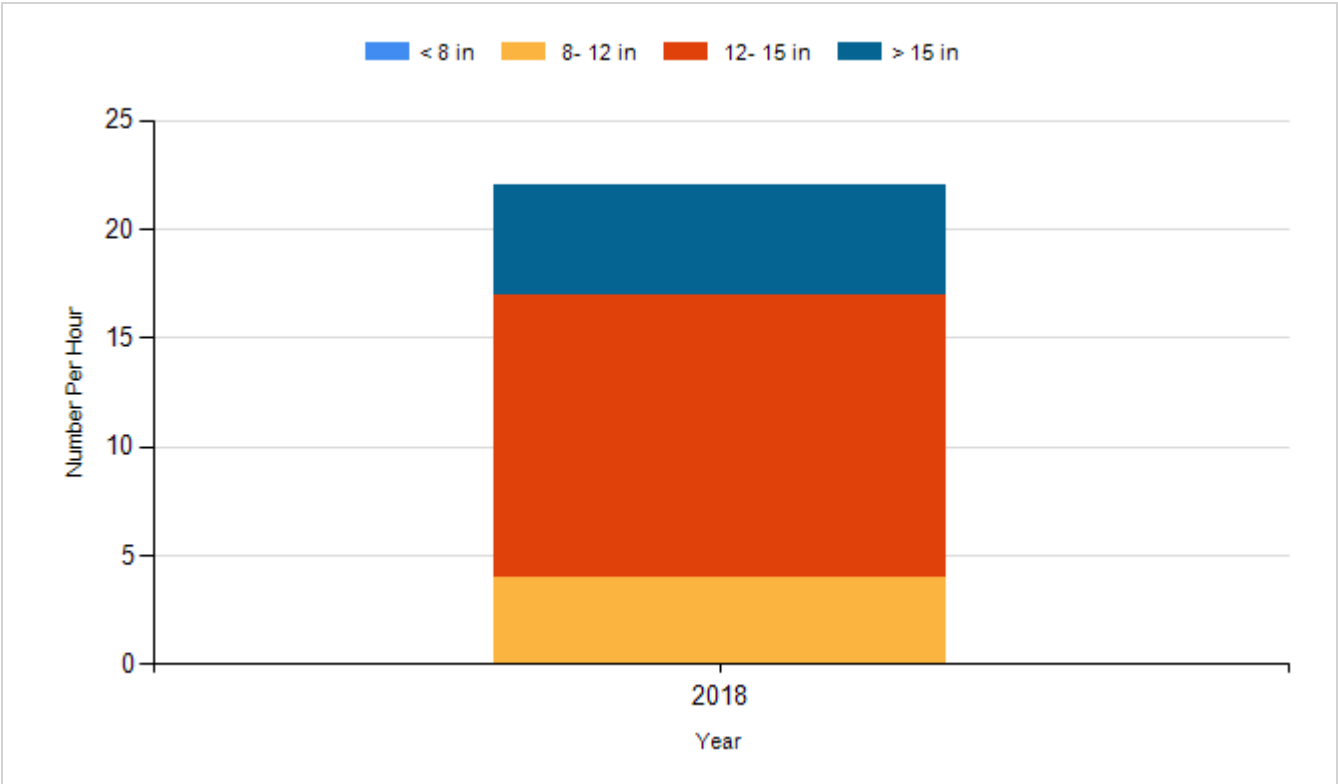
Species: Bluegill
Gear: frame net (std 3/4 in)



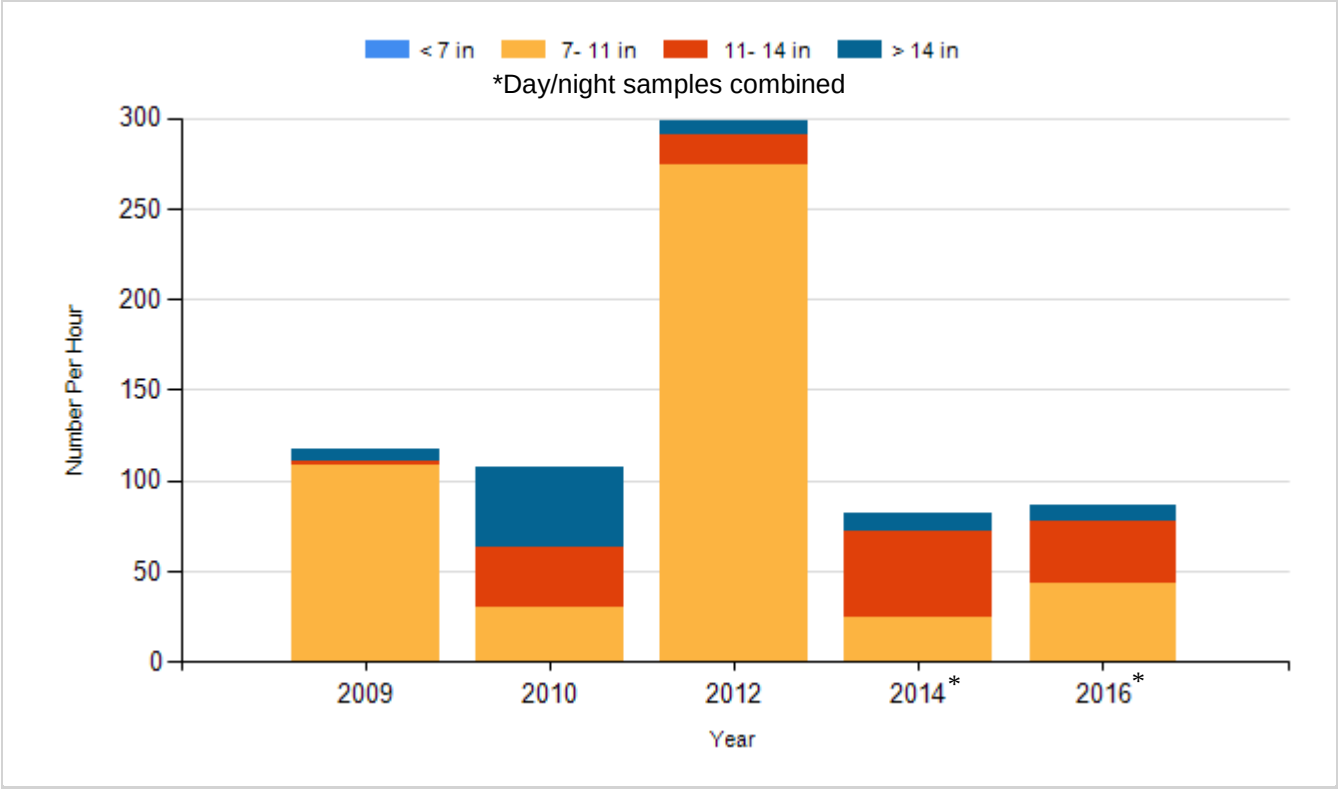
Species: Largemouth Bass
Gear: boat shocker



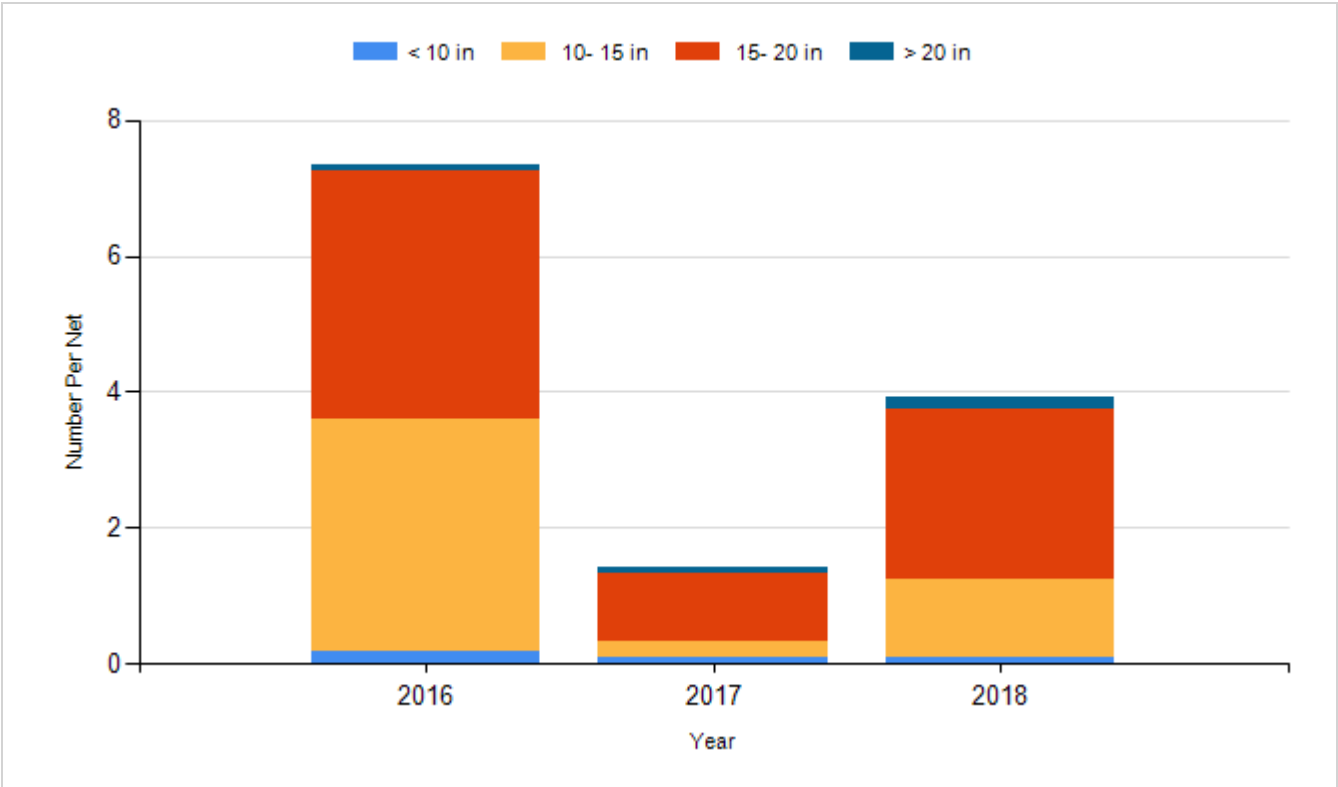
Species: Largemouth Bass
Gear: boat shocker



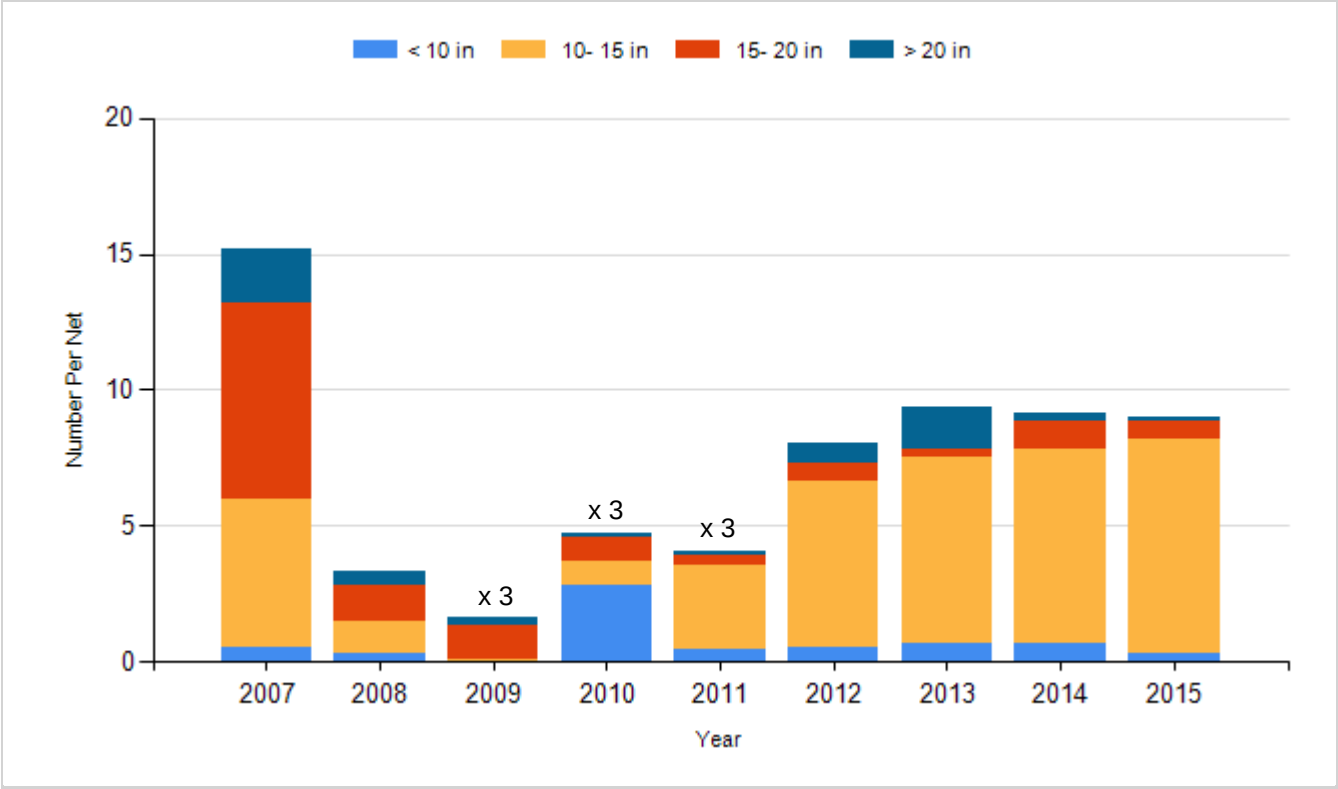
Species: Smallmouth Bass
Gear: boat shocker



Species: Walleye
Gear: AFS std gill net



Species: Walleye
Gear: std exp gill net



Fish Stocking

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

Year	Species	Size	Number
2009	Walleye	Large Fingerling	14,949
2011	Walleye	Large Fingerling	38,634
2011	Walleye	Small Fingerling	235,640
2013	Walleye	Small Fingerling	217,450
2015	Walleye	Large Fingerling	13,264
2017	Walleye	Large Fingerling	900
2018	Walleye	Large Fingerling	48,484