South Buffalo Survey Summary

South Buffalo Lake, located 6.0 miles east of Eden, is managed as a multiple species fishery including panfish (i.e., bluegill and yellow perch), largemouth bass, northern pike, and walleye; other fish species are present and contribute to the fishery.

- **Bluegill.** Bluegill numbers were higher in 2019 than in surveys conducted from 2011 – 2017. At 21.8/frame net, relative abundance was considered moderate. Sampled bluegills ranged in length from 2.8 to 10.2 inches; most (94%) were 3.0 to 6.0 inches. Six year classes (2008, 2010, 2013, and 2015 – 2017) were present; those from the 2015 and 2016 cohorts were the most abundant accounting for more than 75% of bluegills in the sample. Mean length at capture of age 3 and 4 individuals was lower in 2019 than previous years at 5.1 and 5.0 inches, respectively.

- **Northern pike.** Fewer northern pike were sampled in 2019 than 2017. In 2019, the mean gill net CPUE of 2.1 suggested moderate relative abundance. Sampled northern pike ranged in length from 17.7 to 29.9 inches; 68% were ≥21.0 inches and 4% were 28 inches or longer. Northern pike respond to rising water levels and population increases are expected following high-water conditions experienced across northeast South Dakota in 2019.

- **Largemouth bass.** Fewer largemouth bass were sampled by day electrofishing in 2019 (11.0/hour) than in night samples collected in 2015 (27.8/hour) and 2013 (33.0/hour). In 2019, sampled fish ranged in length from 12.2 to 16.9 inches; 3 of the 11 fish sampled were ≥15.0 inches.

- **Walleye.** Walleye numbers were higher in 2019 than 2017. At 5.3/gill net, relative abundance was considered moderate. Sampled walleyes ranged in length from 12.2 to 27.6 inches; most (81%) were ≥15.0 inches and 16% were 20.0 inches or longer. Twelve year classes (2000, 2001, and 2008 – 2017) were present, most (8 of 12) were represented by a single individual. The 2014 cohort was the most abundant accounting for 42% of walleye in the sample. The 2019 sample suggests good walleye growth with age-3 fish having a mean length at capture of 14.6 inches.

- **Yellow perch**. Relative abundance of fish ≥5.0 inches was low (5.6/gill net). Of the 75 individuals sampled, none exceeded 8.0 inches. Yellow perch from three cohorts (2015 – 2018) comprised the entire sample, those from the 2017 (age-3) cohort were the most abundant accounting for 76% of perch collected. Growth is slow with mean length at capture values for age-3 fish that have ranged from 5.2 to 6.4 inches since 2011. In 2019, the mean length at capture of age-3 fish was 5.6 inches.

For more detailed results see the computer generated South Dakota Statewide Fisheries Survey for Buffalo South (Marshall; below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Buffalo South, Marshall County
UJA-Lake-917-000
2019

Lake Information

Name:	Buffalo South	**Maximum Depth:**	14 Feet
County:	Marshall	**Mean Depth:**	8 Feet
		OHWM Elevation:	1,835
Surface Area:	2,112 Acres	**Outlet Elevation:**	1,835

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 10, 2019	4 net-nights
AFS std gill net	Jun 12, 2019	4 net-nights
AFS std gill net	Jun 13, 2019	4 net-nights
boat shocker (day)	Jun 26, 2019	3600 seconds
frame net (std 3/4 in)	Jun 10, 2019	6 net-nights
frame net (std 3/4 in)	Jun 12, 2019	6 net-nights
frame net (std 3/4 in)	Jun 13, 2019	5 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Northern Pike

Largemouth Bass

Bluegill

Black Bullhead

Black Crappie

White Sucker

Common Carp

Golden Shiner

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)
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
Brown Trout	8	20	12	30	16	40	20	50	18	46
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Lake Trout	12	30	20	50	26	65	31	80	39	100
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
Rainbow Trout	10	25	16	40	20	50	26	65	31	80
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
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
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	Sample Size (n)*	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	42	3.5	2.1	98		64	11	91	2
	Black Crappie	25	1.6	0.8	53	18	42	18	107	4
	Bluegill	7	0.6	0.4	57		57		120	4
	Common Carp	1	0.1	0.1	100		100		122	
	Golden Shiner*	9	0.8							
	Largemouth Bass	3	0.3	0.3	100		67		115	4
	Northern Pike	25	2.1	0.6	68	15	4		90	2
	Walleye	64	5.3	1.2	81	7	16	7	91	1
	White Sucker	15	1.3	0.4	100		100		107	3
	Yellow Perch	75	5.6	1.5	0		0		106	1
boat shocker (day)	Largemouth Bass	11	11.0	6.6	100		27		114	5
frame net (std 3/4 in)	Black Bullhead	388	22.8	10.7	99		80	3	88	1
	Black Crappie	109	4.5	4.8	12	6	8	5	100	1
	Bluegill	372	21.8	10.2	6	2	2	1	105	1
	Northern Pike	5	0.3	0.2	100		20		87	6
	Walleye	2	0.1	0.2	100		0		82	7
	White Sucker	5	0.3	0.2	100		100		90	6
	Yellow Perch	5	0.2	0.2	0		0		90	7

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; **Night sampling prior to 2019; ***AFS standard frame nets used in 2017**

		CPUE										
Gear	Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg
AFS std gill net	Black Bullhead								21.3		3.5	12.4
	Black Crappie								1.4		1.6	1.5
	Bluegill								1.4		0.6	1.0
	Common Carp								0.1		0.1	0.1
	Golden Shiner*								0.1		0.8	0.5
	Largemouth Bass								0.3		0.3	0.3
	Northern Pike								4.1		2.1	3.1
	Walleye								3.5		5.3	4.4
	White Sucker								5.5		1.3	3.4
	Yellow Perch								2.9		5.6	4.3
boat shocker (day)**	Largemouth Bass				33.0		27.8				11.0	23.9
frame net (std 3/4 in)***	Black Bullhead		22.0		14.1		19.3		57.8		22.8	27.2
	Black Crappie		1.2		5.2		1.4		0.6		4.5	2.6
	Bluegill		14.9		10.1		9.6		8.5		21.8	13.0
	Common Carp		0.1		0.0		0.0		0.1		0.0	0.0
	Largemouth Bass		0.0		0.0		0.0		0.1		0.0	0.0
	Northern Pike		0.4		0.2		0.5		0.2		0.3	0.3
	Smallmouth Bass		0.1		0.1		0.1		0.1		0.0	0.1
	Walleye		0.1		0.2		0.2		0.2		0.1	0.2
	White Sucker		0.0		0.0		0.0		0.3		0.3	0.1
	Yellow Perch		8.7		0.9		2.0		0.3		0.2	2.4
std exp gill net	Black Bullhead		3.1		41.0		25.0					23.0
	Black Crappie		0.2		0.5		0.3					0.3
	Bluegill		0.3		0.8		0.0					0.4
	Emerald Shiner*		0.0		0.2		0.0					0.1
	Golden Shiner*		1.3		0.0		0.0					0.4
	Largemouth Bass		0.1		0.0		0.0					0.0
	Northern Pike		3.2		14.8		4.5					7.5
	Walleye		0.7		3.0		6.2					3.3
	White Sucker		1.8		4.8		7.7					4.8
	Yellow Perch		14.9		26.0		19.3					20.1

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.

*** Methods/Species that ignore stock length; **AFS standard frame nets used in 2017**

			Year									
Gear	Species	Index	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
AFS std gill net	Northern Pike	PSD								39		68
		PSD-P								6		4
		Wr								85		90
	Walleye	PSD								43		81
		PSD-P								14		16
		Wr								89		91
	Yellow Perch	PSD								6		0
		PSD-P								0		0
		Wr								102		106
boat shocker (day)	Largemouth Bass	PSD				48		61				100
		PSD-P				24		21				27
		Wr				111		113				114
frame net (std 3/4 in)**	Bluegill	PSD		71		99		45		33		6
		PSD-P		6		64		45		25		2
		Wr		117		118		121		105		105
std exp gill net	Northern Pike	PSD		69		48		37				
		PSD-P		14		4		15				
		Wr		91		84		83				
	Walleye	PSD		54		17		32				
		PSD-P		23		6		8				
		Wr		92		88		88				
	Yellow Perch	PSD		2		10		29				
		PSD-P		0		0		0				
		Wr		95		102		100				

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+
2019	372		95 (79)	130 (165)	126 (121)		228 (5)			241 (1)	265 (1)
2017	212	50 (13)	85 (146)	150 (3)	197 (31)		225 (1)	248 (2)	241 (4)	248 (10)	243 (1)
2015	166	85 (12)	108 (80)	140 (2)	214 (5)	207 (1)		231 (41)	235 (21)	234 (7)	
2013	182			167 (25)	183 (20)	203 (80)	216 (50)	234 (1)	257 (2)	232 (6)	
2011	269			132 (80)	169 (130)	181 (44)	182 (8)	211 (6)		257 (1)	265 (3)

Species: Largemouth Bass; *age structures collected only from those $\leq$ 14.0 inches

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019*	2			315 (1)	347 (1)						
2015	28		244 (9)	262 (2)	370 (11)	371 (3)	427 (1)			463 (1)	463 (1)
2013	33		239 (16)	320 (7)	356 (2)		415 (3)		451 (1)	475 (3)	476 (1)

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	64		316 (1)	371 (12)	397 (6)	451 (27)	501 (11)	453 (1)	496 (1)	505 (1)	655 (4)
2017	42		252 (1)	319 (18)	393 (14)	424 (1)		448 (2)	536 (1)	608 (1)	675 (4)
2015	44	168 (3)	270 (23)	346 (5)	404 (5)	387 (5)	540 (1)	525 (1)			645 (1)
2013	18		275 (5)	313 (10)	461 (1)	451 (1)					671 (1)
2011	17		254 (7)	377 (5)			521 (4)				641 (1)

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	75		139 (17)	143 (57)	175 (1)						
2017	35		134 (2)	147 (16)	182 (16)			233 (1)			
2015	139	97 (13)	133 (41)	162 (3)		199 (8)	196 (60)	211 (14)			
2013	157			155 (2)	159 (64)	178 (87)	197 (3)		204 (1)		
2011	588		101 (239)	133 (264)	153 (82)	184 (2)	203 (2)				

Fish Condition

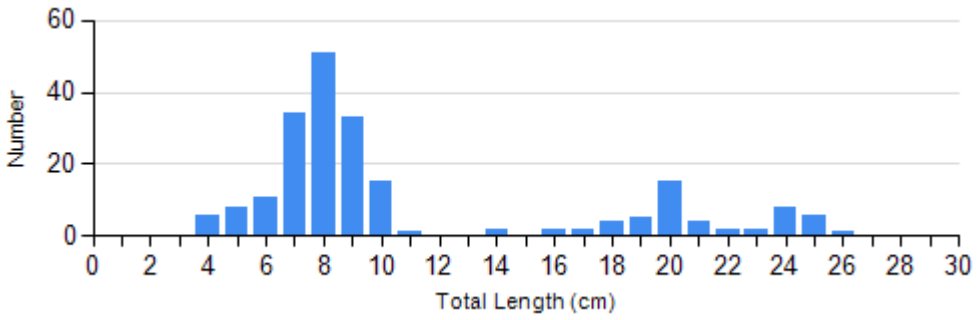
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Bluegill Frame Net	2015	90	128 (2.3)	0		70	115 (1.1)	3	103 (2.3)
	2017	102	100 (1.6)	13	116 (3.0)	31	116 (1.5)	7	108 (2.6)
	2019	350	105 (0.7)	14	112 (2.1)	6	101 (3.7)	1	95
Largemouth Bass Electro Fishing	2015	11	116 (2.0)	11	111 (2.4)	6	110 (3.4)	0	
	2019	0		8	115 (4.7)	3	112 (6.4)	0	
Northern Pike Gill Net	2015	17	83 (1.4)	6	80 (1.5)	4	87 (2.4)	0	
	2017	30	86 (1.2)	16	81 (1.6)	1	101	2	103 (4.0)
	2019	8	93 (2.2)	16	89 (1.5)	1	82	0	
Walleye Gill Net	2015	25	89 (1.0)	9	88 (1.7)	2	91 (1.8)	1	69
	2017	24	89 (1.1)	12	94 (1.8)	2	90 (2.2)	4	79 (2.6)
	2019	12	91 (1.4)	42	91 (0.8)	7	92 (2.3)	3	88 (2.0)
Yellow Perch Gill Net	2015	82	102 (1.0)	34	95 (1.2)	0		0	
	2017	33	103 (1.5)	2	90 (0.3)	0		0	
	2019	67	106 (1.1)	0		0		0	

Length Frequency Distribution

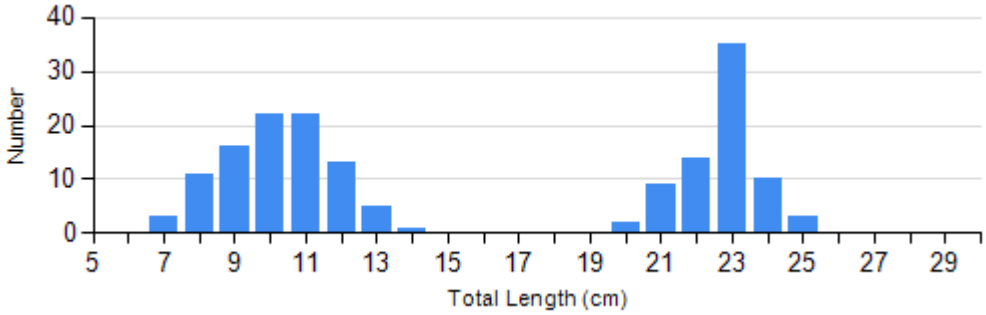
Length frequency histogram of species sampled by year.

Species: Bluegill
Gear: AFS std frame net

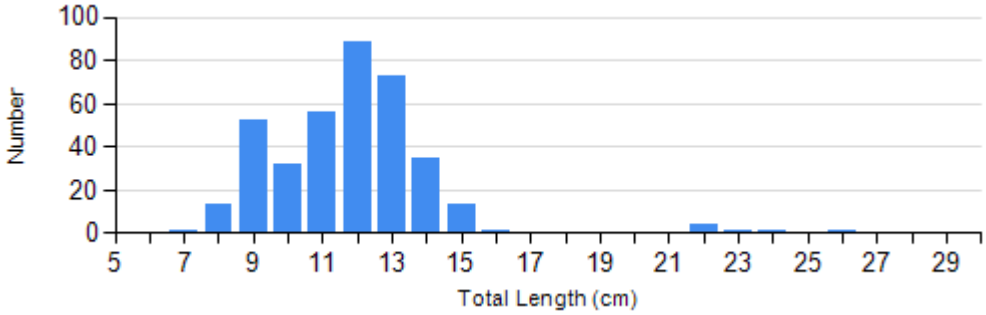


2017

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

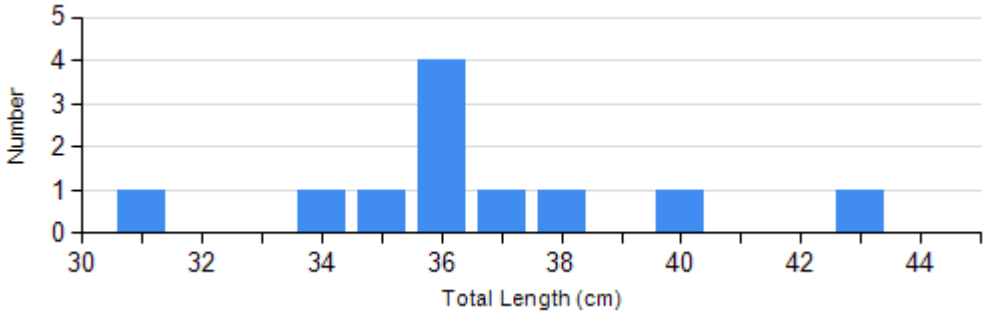


2015



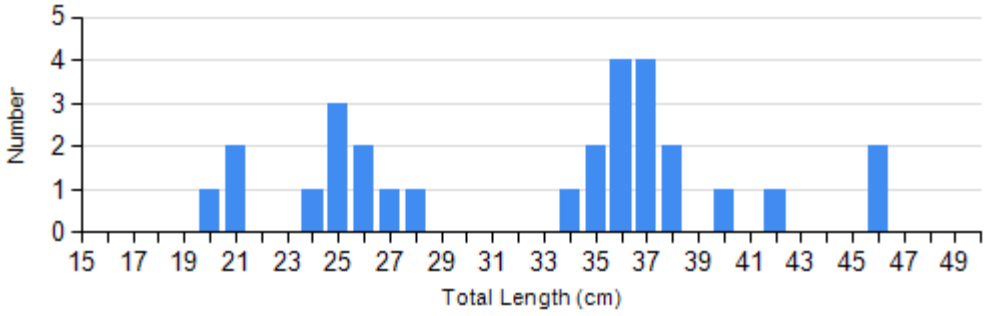
2019

Species: Largemouth Bass
Gear: boat shocker (day)



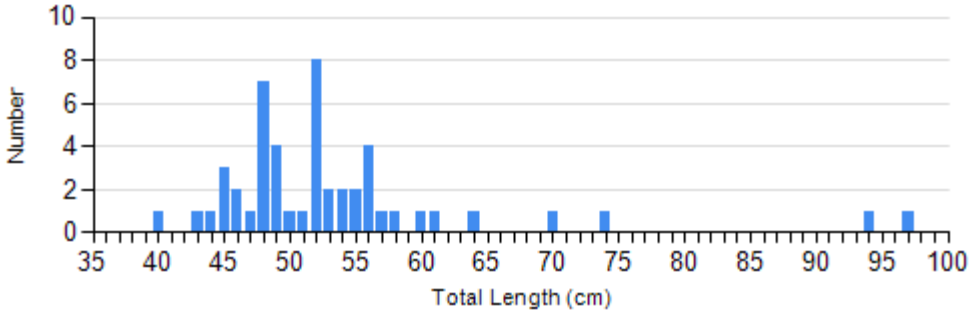
2019

Species: Largemouth Bass
Gear: boat shocker (night, AC)

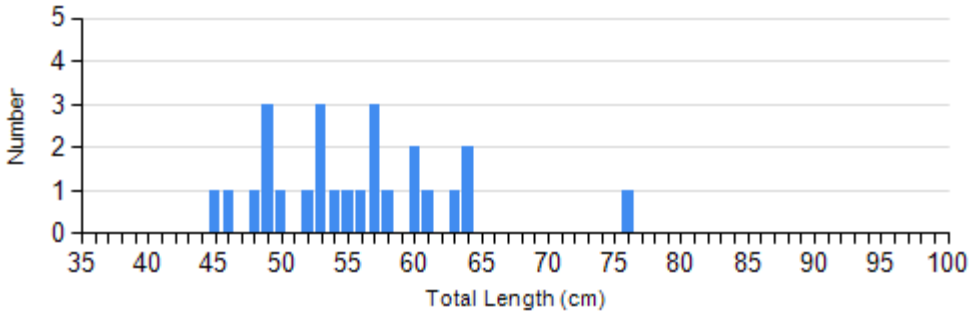


2015

Species: Northern Pike
Gear: AFS std gill net

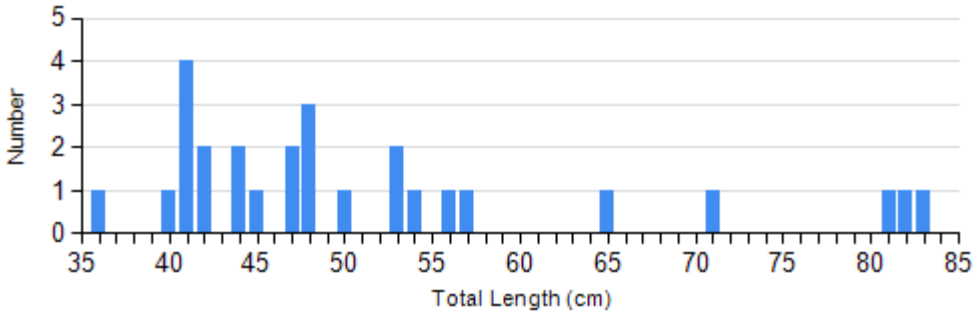


2017



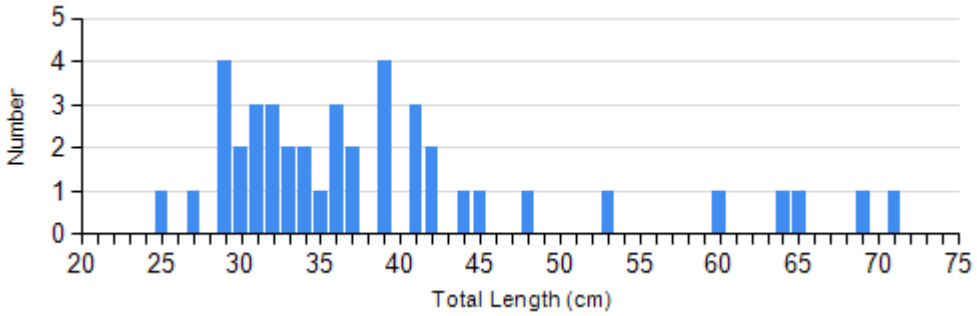
2019

Species: Northern Pike
Gear: std exp gill net

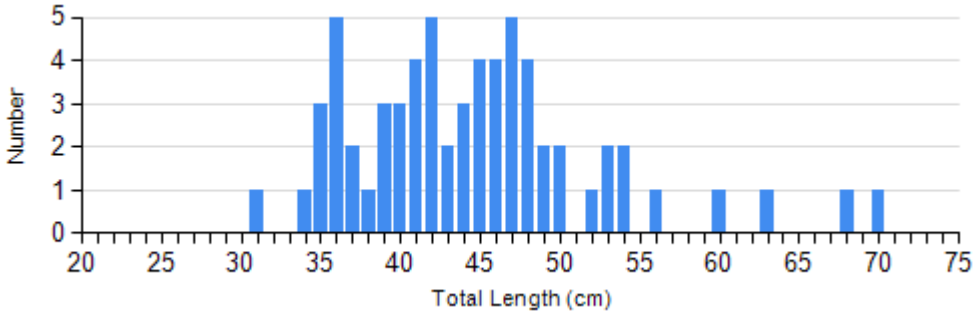


2015

Species: Walleye
Gear: AFS std gill net

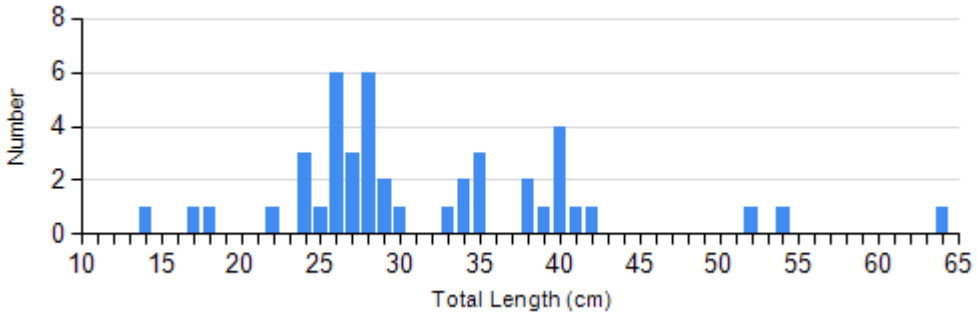


2017



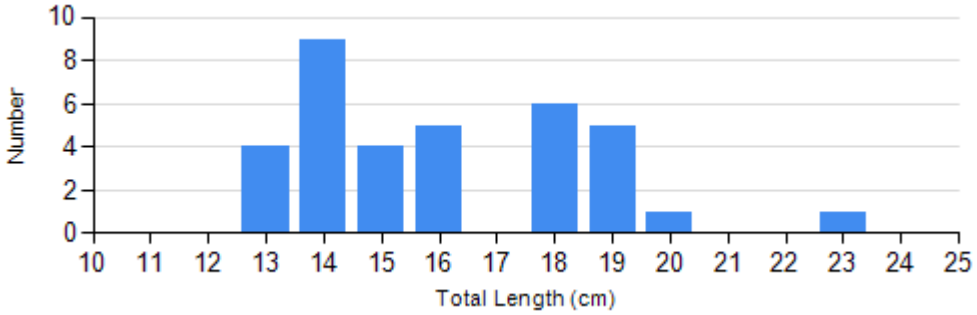
2019

Species: Walleye
Gear: std exp gill net

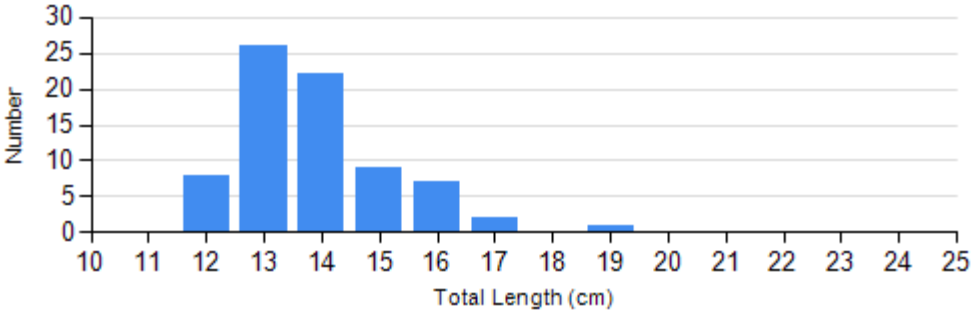


2015

Species: Yellow Perch
Gear: AFS std gill net

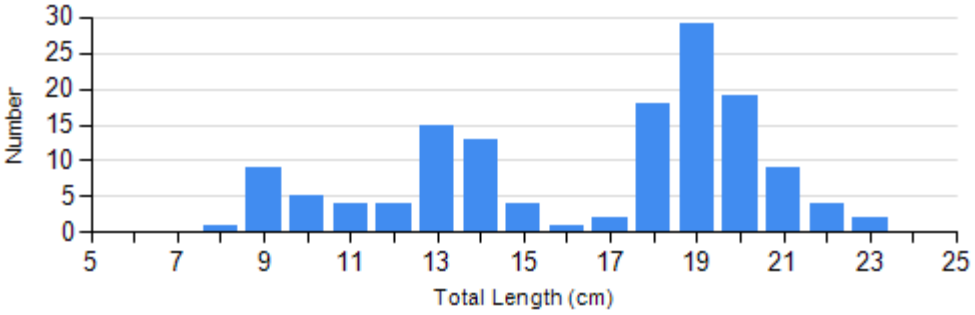


2017



2019

Species: Yellow Perch
Gear: std exp gill net

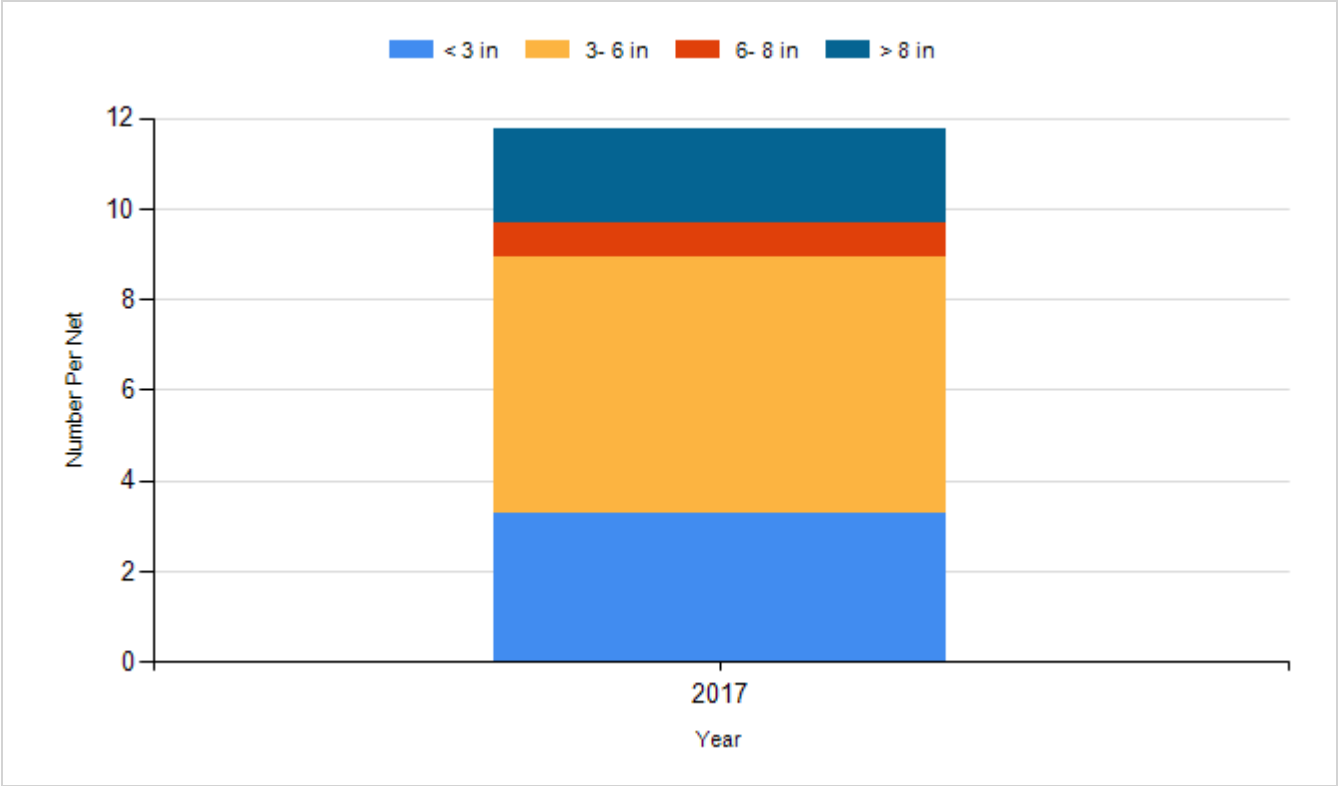


2015

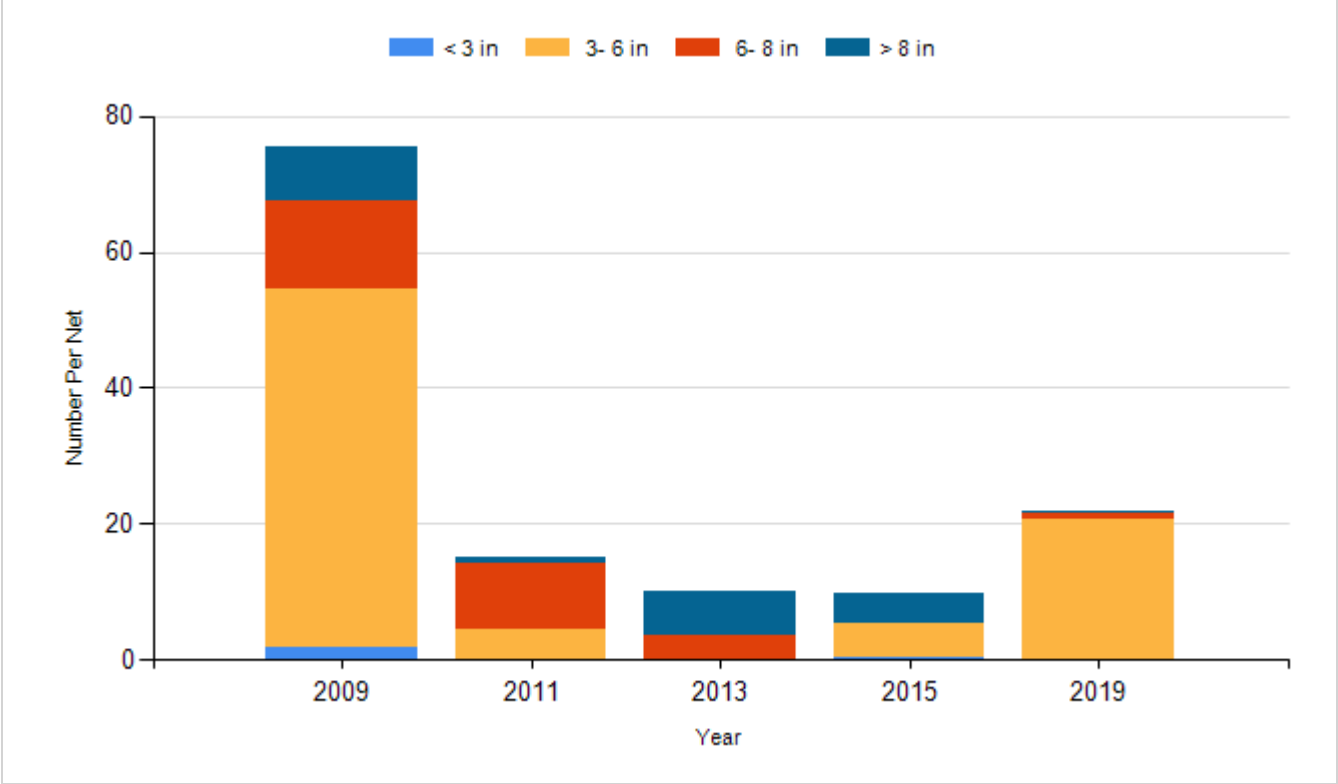
Historic Fish Sizes and Relative Abundance

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

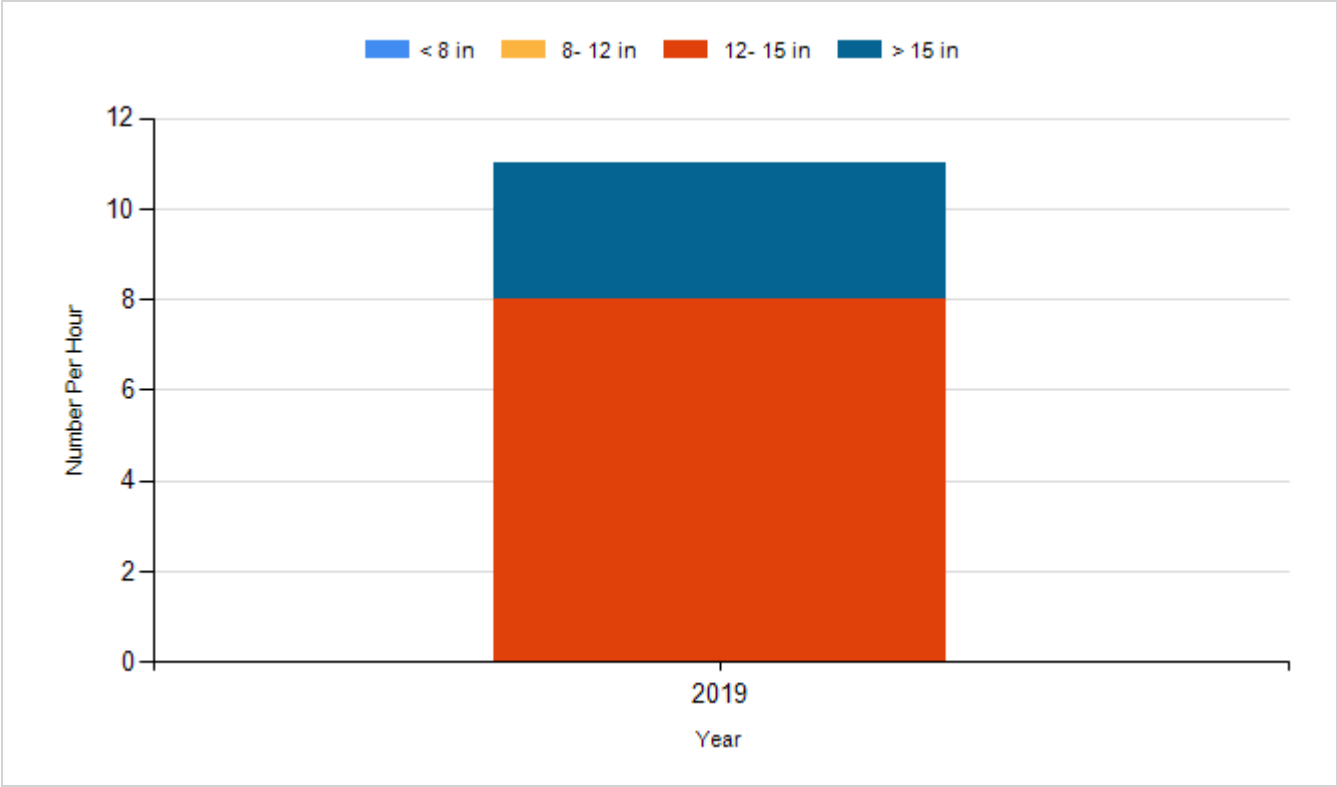
Species: Bluegill
Gear: AFS std frame net



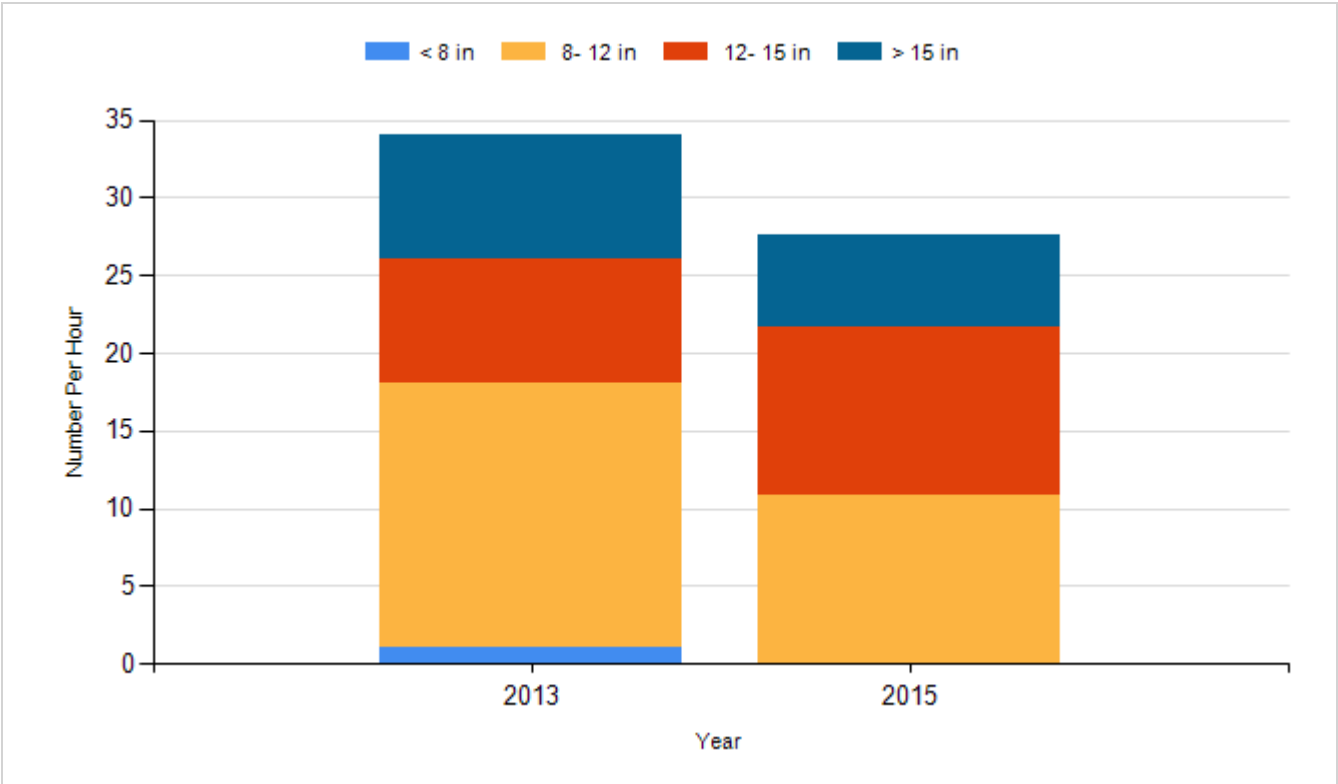
Species: Bluegill
Gear: frame net (std 3/4 in)



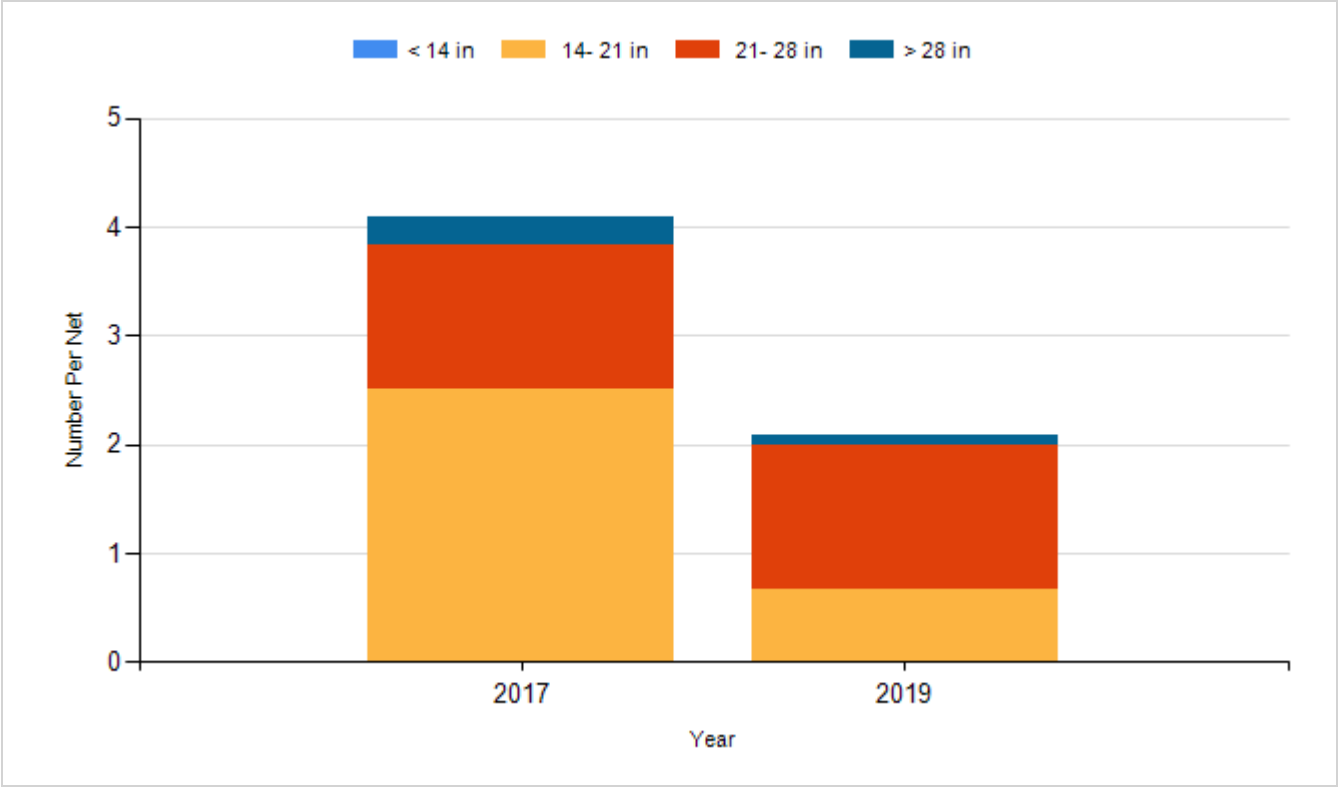
Species: Largemouth Bass
Gear: boat shocker (day)



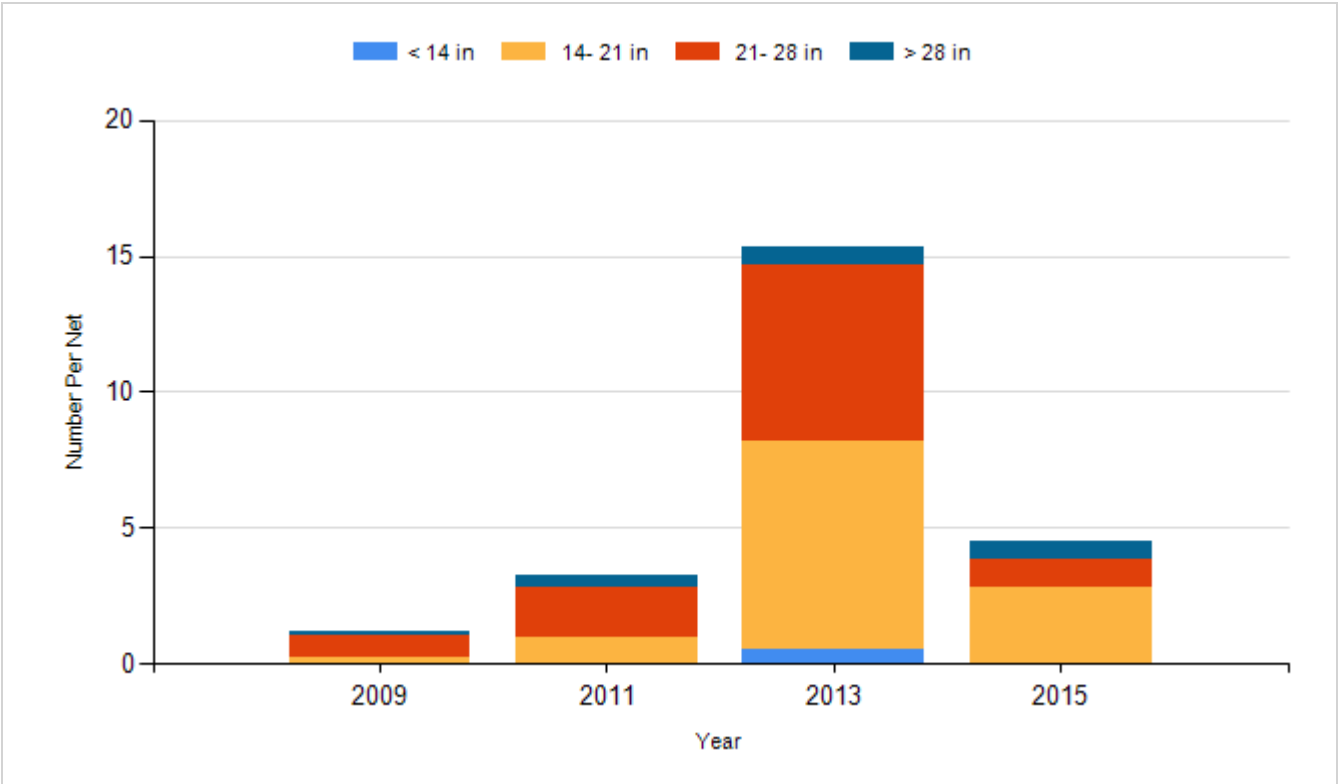
Species: Largemouth Bass
Gear: boat shocker (night, AC)



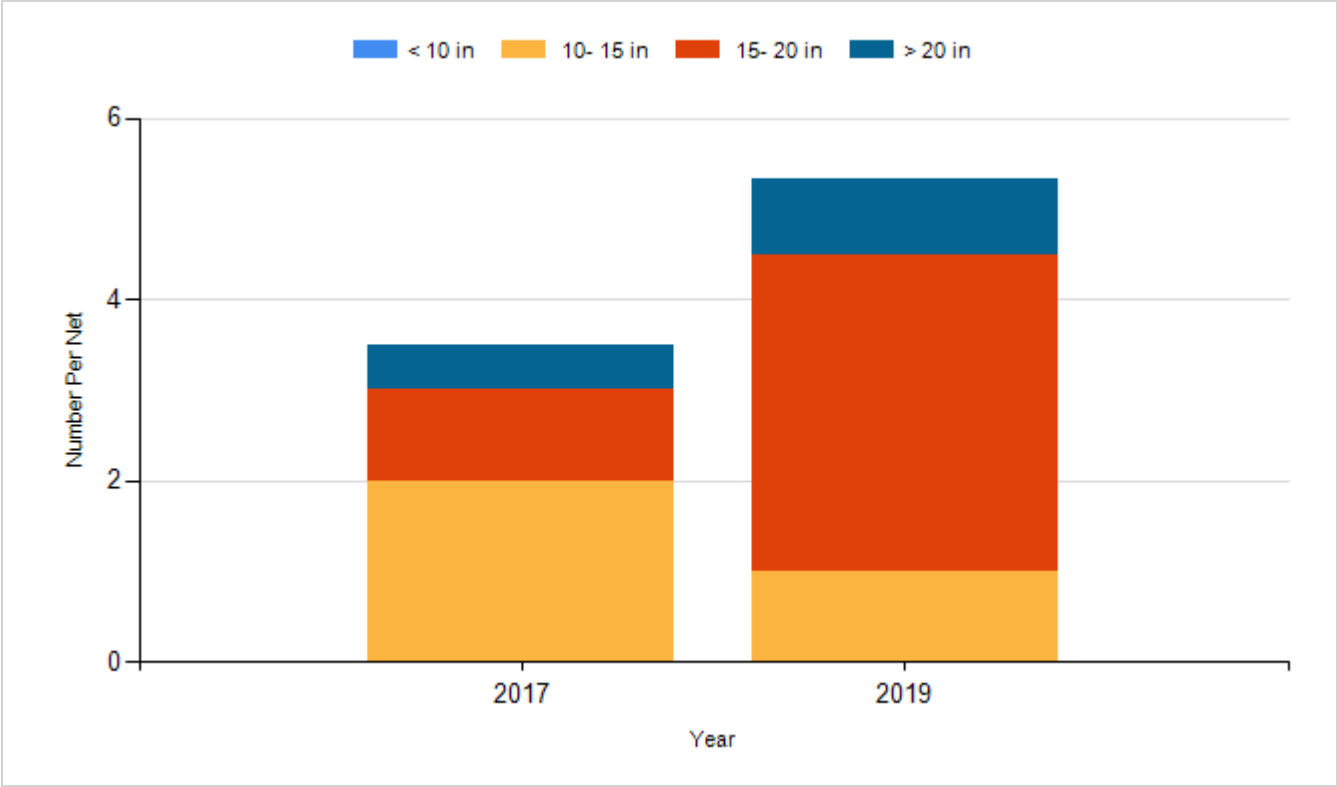
Species: Northern Pike
Gear: AFS std gill net



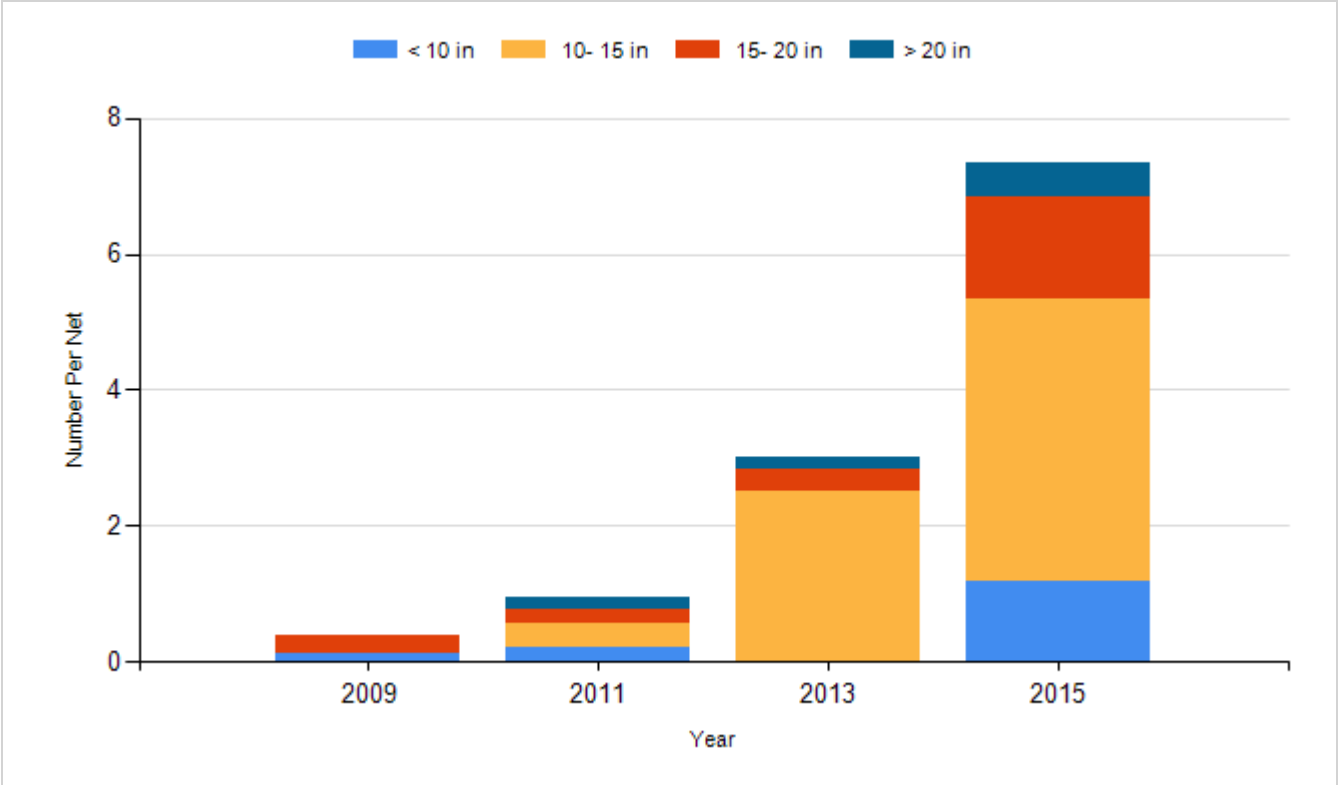
Species: Northern Pike
Gear: std exp gill net



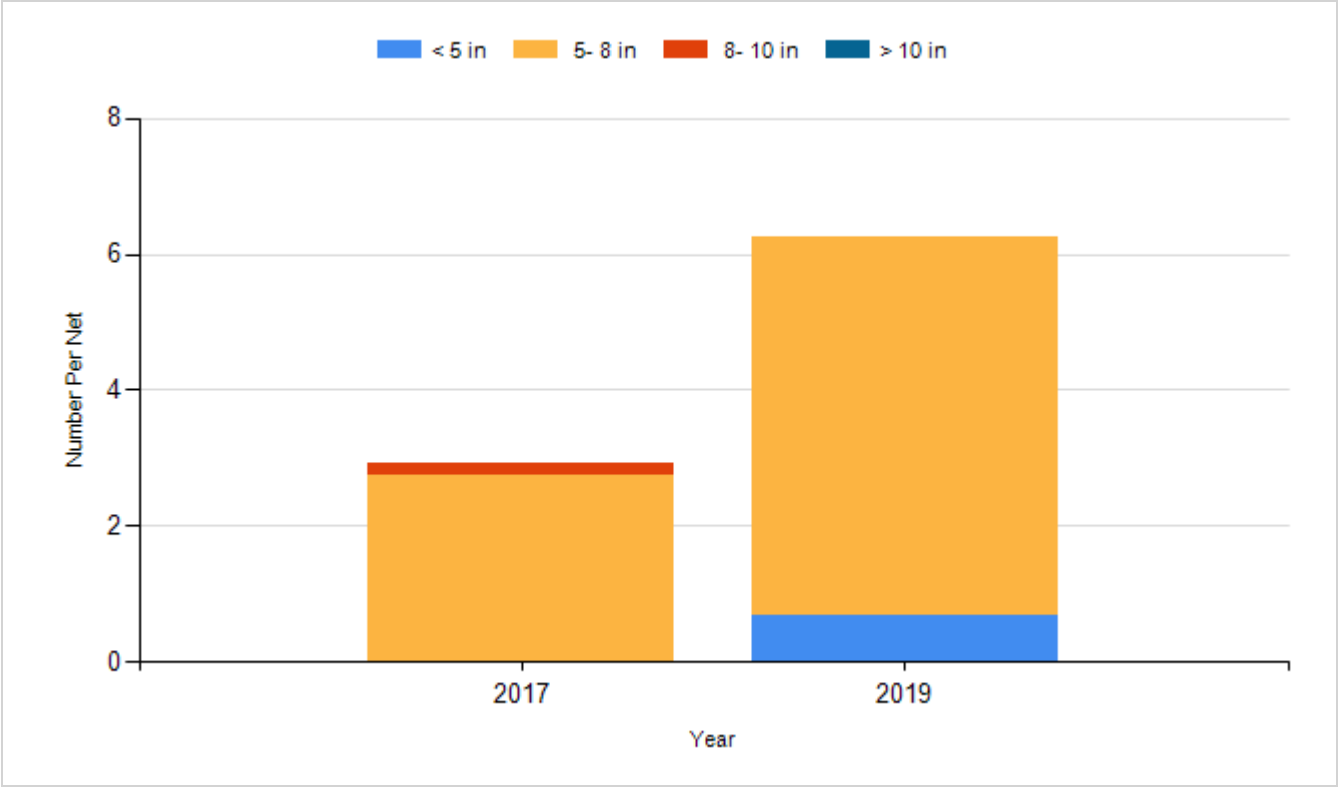
Species: Walleye
Gear: AFS std gill net



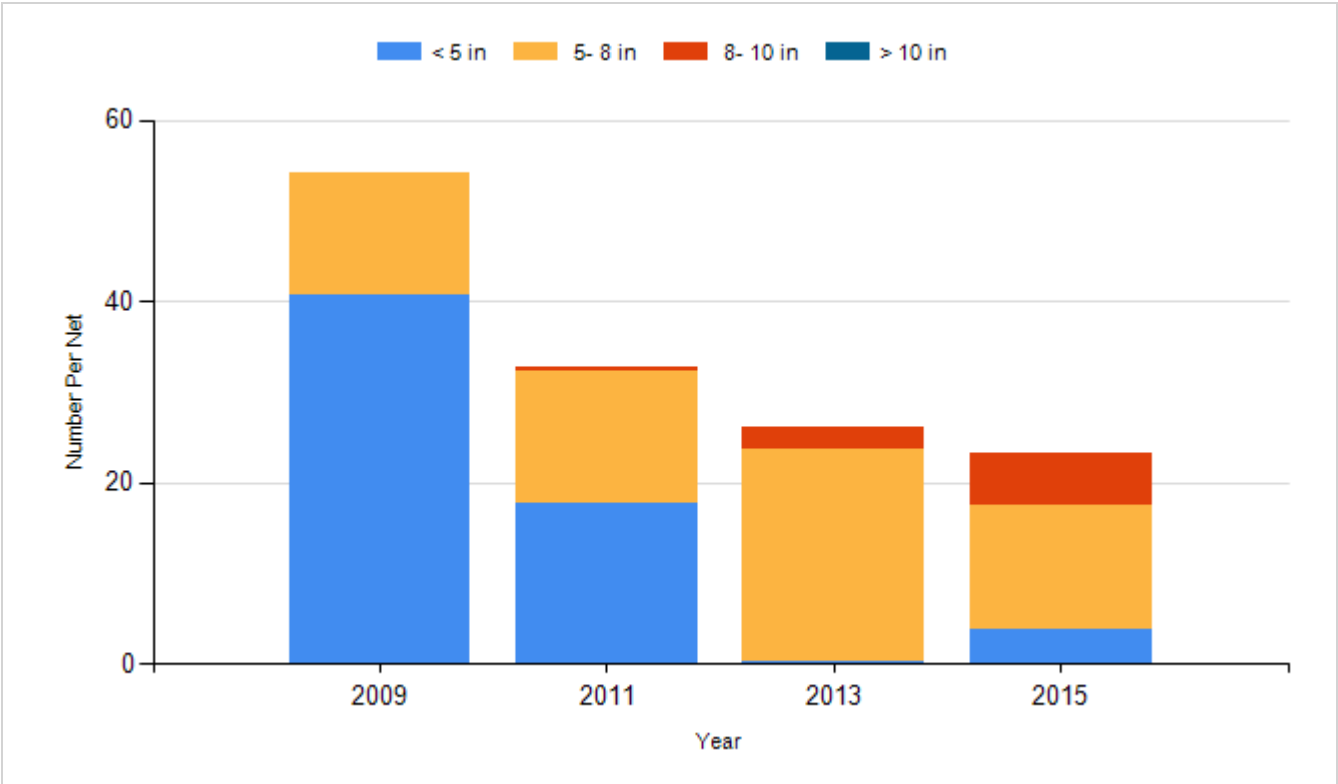
Species: Walleye
Gear: std exp gill net



Species: Yellow Perch
Gear: AFS std gill net



Species: Yellow Perch
Gear: std exp gill net



Fish Stocking

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

Year	Species	Size	Number
2008	Walleye	Small Fingerling	220,560
2010	Walleye	Small Fingerling	220,060
2012	Walleye	Small Fingerling	213,730
2014	Walleye	Small Fingerling	177,750
2016	Largemouth Bass	Adult	67
2016	Walleye	Fingerling	178,000
2018	Walleye	Small Fingerling	179,920