South Buffalo Lake 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.

- **Black crappie**. Although not abundant (6.8 per frame net), more black crappies were sampled in 2021 than in previous surveys from 2012 – 2019. Those sampled ranged in length from 8.0 to 12.2 inches, nearly half (48%) were 10.0 inches or longer.

- **Bluegill.** Bluegills were more than five times more numerous than any other species in the 2021 frame net catch. At 59.6 per frame net, relative abundance was considered high. Sampled bluegills ranged in length from 3.1 to 10.2 inches, 87% were ≥6.0 inches and 11% were ≥8.0 inches. Nine year classes (2008, 2010, 2011, 2013, and 2015 – 2019) were represented. Individuals from 2017 (age-4) cohort were the most abundant accounting for 70% of bluegills in the sample, while those form the 2016 (age-5) year class made up an additional 18%. Since 2013, mean length at capture at age 4 has ranged from 5.0 to 8.4 inches. In 2021, the mean length at capture of age-4 fish was 6.6 Inches.

- **Northern pike.** Northern pike numbers were similar to those observed in 2019. In 2021, the mean gill net CPUE of 2.8 suggested moderate relative abundance. Sampled northern pike ranged in length from 10.2 to 38.6 inches, of those that were at least 14.0 inches 67% were ≥21.0 inches and 9% were ≥28 inches.

- **Largemouth bass.** Spring electrofishing for largemouth bass was not completed in 2021.

- **Walleye.** Fewer walleyes were sampled in 2021 than in 2019. At 3.3 per gill net, relative abundance was considered low to moderate for South Buffalo Lake. Sampled walleyes ranged in length from 10.2 to 26.8 inches, 68% were ≥15.0 inches and 48% were ≥20.0 inches. Thirteen year classes (2003, 2005, and 2009 – 2019), each represented by 10 or fewer individuals, contributed to the catch. The oldest walleye sampled was from the 2003 (age-18) cohort. Although sample sizes are low, walleye growth appears to be good with mean length at capture values at age 4 from 15.5 to 18.5 inches since 2013. In 2021, the mean length at capture of age-4 walleyes was 18.5 inches.

- **Yellow perch**. The mean gill net CPUE of 18.0 suggested moderate to high relative abundance. Sampled individuals ranged in length from 4.7 to 9.1 inches, of those that were at least 5.0 inches 13% were ≥8.0 inches. Yellow perch from three cohorts (2017 – 2019) comprised the entire sample, those from the 2018 (age-3) cohort were the most abundant accounting for 85% of perch collected. Growth is slow with mean length at capture values for age-3 fish that have ranged from 5.6 to 6.7 inches since 2013. In 2021, the mean length at capture of age-3 fish was 6.7 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
2021

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 15, 2021	4 net-nights
AFS std gill net	Jun 16, 2021	4 net-nights
AFS std gill net	Jun 17, 2021	4 net-nights
frame net (std 3/4 in)	Jun 15, 2021	6 net-nights
frame net (std 3/4 in)	Jun 16, 2021	6 net-nights
frame net (std 3/4 in)	Jun 17, 2021	6 net-nights

Common Fish Species Present

Walleye

Northern Pike

Largemouth Bass

Bluegill

Yellow Perch

Black Bullhead

Black Crappie

White Sucker

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).

			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	77	6.4	1.8	70	8	40	8	86	2
	Black Crappie	35	2.9	1.2	97		31	12	108	1
	Bluegill	18	1.5	0.5	100		11		120	3
	Largemouth Bass	2	0.2	0.2	50		50		126	4
	Northern Pike	34	2.8	0.7	67	13	9		84	2
	Walleye	40	3.3	0.8	68	11	48	12	88	1
	White Sucker	29	2.4	1.2	100		100		108	2
	Yellow Perch	217	18.0	3.5	13	3	0		101	1
frame net (std 3/4 in)	Black Bullhead	212	11.8	6.5	86	3	62	5	85	1
	Black Crappie	122	6.8	2.7	100		48	6	101	1
	Bluegill	1073	59.6	12.7	87	1	11	1	112	1
	Northern Pike	29	1.6	0.5	52	14	14		76	2
	Walleye	8	0.4	0.2	63		63		86	2
	White Sucker	3	0.2	0.2	100		100		94	3
	Yellow Perch	36	2.0	0.6	19	10	0		91	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.

*** Method/species that ignore stock length ** Includes day and night samples *** AFS standard frame net used in 2017**

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
AFS std gill net	Black Bullhead						21.3		3.5		6.4	10.40
	Black Crappie						1.4		1.6		2.9	1.97
	Bluegill						1.4		0.6		1.5	1.17
	Common Carp						0.1		0.1		0.0	0.07
	Golden Shiner*						0.1		0.8		0.0	0.30
	Largemouth Bass						0.3		0.3		0.2	0.27
	Northern Pike						4.1		2.1		2.8	3.00
	Walleye						3.5		5.3		3.3	4.03
	White Sucker						5.5		1.3		2.4	3.07
	Yellow Perch						2.9		5.6		18.0	8.83
boat shocker **	Largemouth Bass		33.0		27.8				11.0			23.90
frame net (std 3/4 in)***	Black Bullhead		14.1		19.3		57.8		22.8		11.8	25.16
	Black Crappie		5.2		1.4		0.6		4.5		6.8	3.70
	Bluegill		10.1		9.6		8.5		21.8		59.6	21.92
	Common Carp		0.0		0.0		0.1		0.0		0.0	0.02
	Largemouth Bass		0.0		0.0		0.1		0.0		0.0	0.02
	Northern Pike		0.2		0.5		0.2		0.3		1.6	0.56
	Smallmouth Bass		0.1		0.1		0.1		0.0		0.0	0.06
	Walleye		0.2		0.2		0.2		0.1		0.4	0.22
	White Sucker		0.0		0.0		0.3		0.3		0.2	0.16
	Yellow Perch		0.9		2.0		0.3		0.2		2.0	1.08
std exp gill net	Black Bullhead		41.0		25.0							33.00
	Black Crappie		0.5		0.3							0.40
	Bluegill		0.8		0.0							0.40
	Emerald Shiner*		0.2		0.0							0.10
	Largemouth Bass		0.0		0.0							0.00
	Northern Pike		14.8		4.5							9.65
	Walleye		3.0		6.2							4.60
	White Sucker		4.8		7.7							6.25
	Yellow Perch		26.0		19.3							22.65

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.

*** AFS standard frame net used in 2017**

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std gill net	Northern Pike	PSD						39		68		67
		PSD-P						6		4		9
		Wr						85		90		84
	Walleye	PSD						43		81		68
		PSD-P						14		16		48
		Wr						89		91		88
	Yellow Perch	PSD						6		0		13
		PSD-P						0		0		0
		Wr						102		106		101
frame net (std 3/4 in)*	Black Crappie	PSD		99		96		91		12		100
		PSD-P		83		92		82		8		48
		Wr		99		97		95		100		101
	Bluegill	PSD		99		45		33		6		87
		PSD-P		64		45		25		2		11
		Wr		118		121		105		105		112
std exp gill net	Northern Pike	PSD		48		37						
		PSD-P		4		15						
		Wr		84		83						
	Walleye	PSD		17		32						
		PSD-P		6		8						
		Wr		88		88						
	Yellow Perch	PSD		10		29						
		PSD-P		0		0						
		Wr		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+
2021	1073		96 (6)	165 (21)	167 (756)	190 (193)	191 (27)		248 (60)		261 (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)	

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2021	40		316 (10)	348 (2)	470 (2)	552 (2)	523 (2)	519 (10)	504 (5)	672 (2)	638 (5)
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)

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2021	216		144 (5)	170 (184)	204 (27)						
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)		

Fish Condition

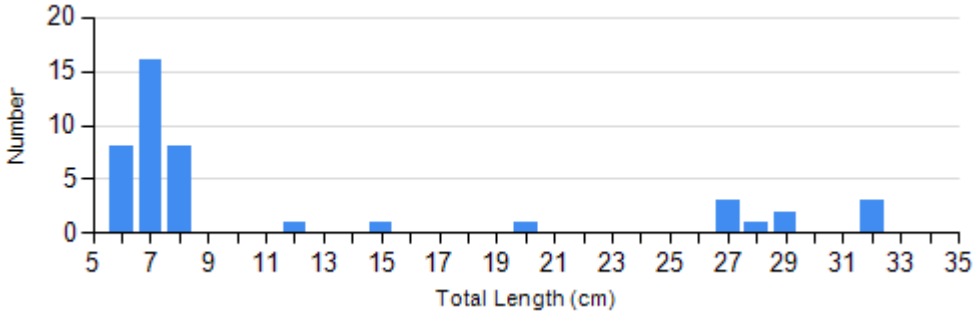
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2017	1	111	1	97	6	94 (2.4)	3	92 (2.5)
	2019	67	101 (1.2)	3	100 (2.6)	3	90 (3.2)	3	96 (1.1)
	2021	0		64	104 (0.8)	51	99 (0.8)	7	94 (2.5)
Bluegill Frame Net	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
	2021	138	116 (1.7)	814	112 (0.5)	81	112 (1.0)	40	112 (1.1)
Northern Pike Gill Net	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	
	2021	11	83 (1.2)	19	84 (3.1)	2	79 (1.4)	1	92
Walleye Gill Net	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)
	2021	13	92 (1.6)	8	84 (2.5)	14	88 (1.6)	5	89 (2.5)
Yellow Perch Gill Net	2017	33	103 (1.5)	2	90 (0.3)	0		0	
	2019	67	106 (1.1)	0		0		0	
	2021	189	102 (0.6)	27	95 (1.3)	0		0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: frame net (std 3/4 in) *AFS standard frame net used in 2017



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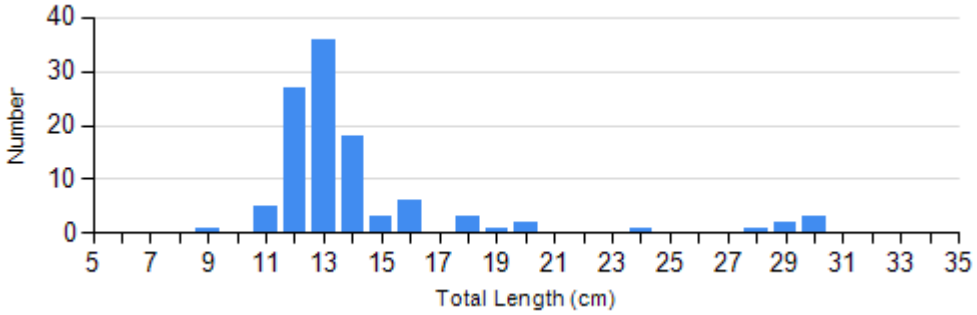

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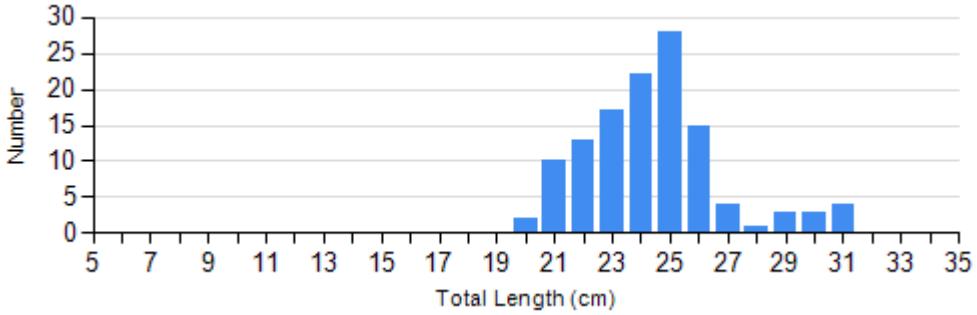
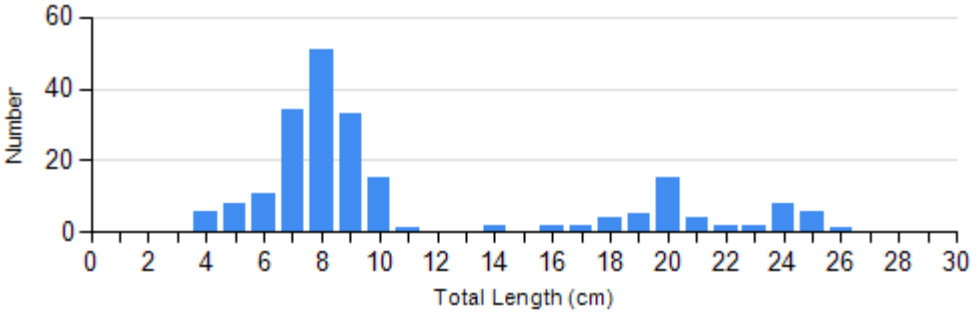


2021

Species: Bluegill
Gear: frame net (std 3/4 in) *AFS standard frame net used in 2017



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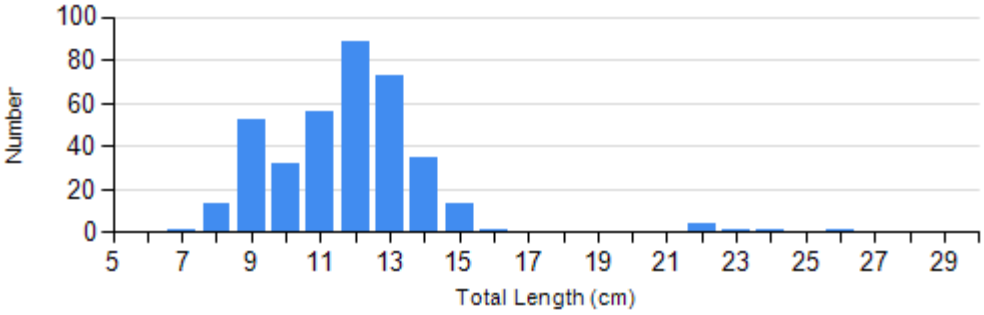

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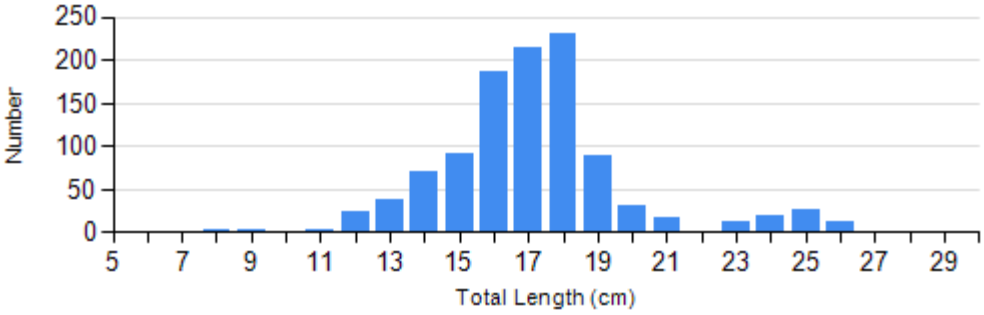
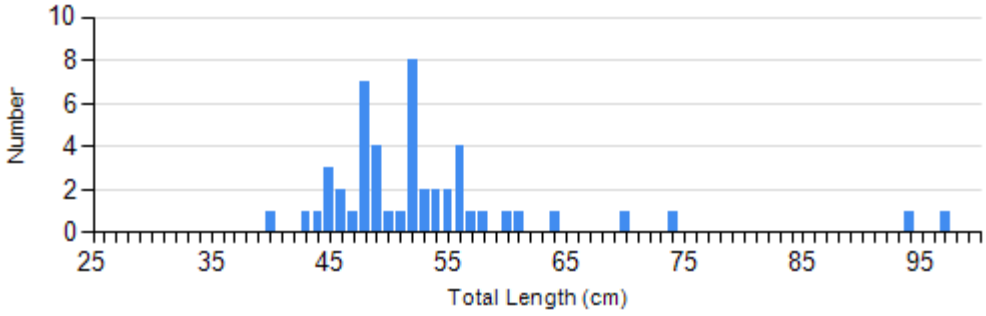


2021

Species: Northern Pike
Gear: AFS std gill net



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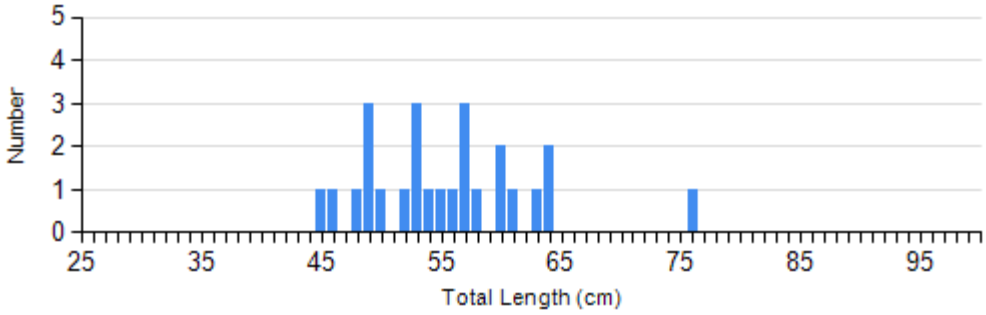

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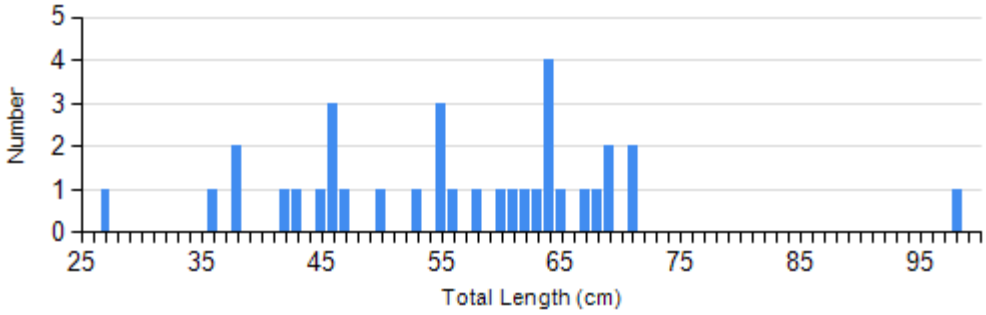
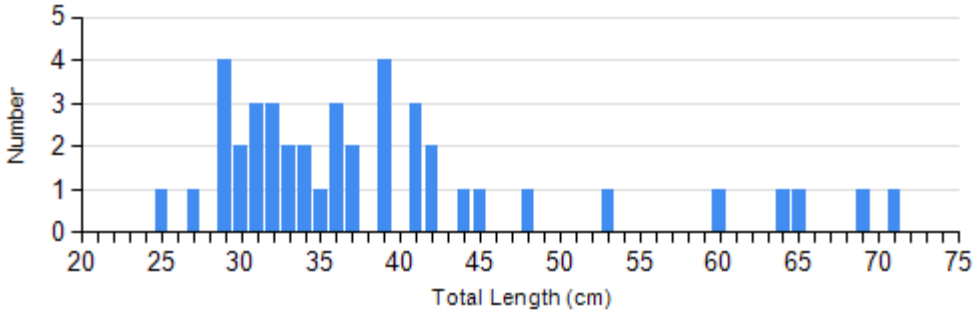


2021

Species: Walleye
Gear: AFS std gill net



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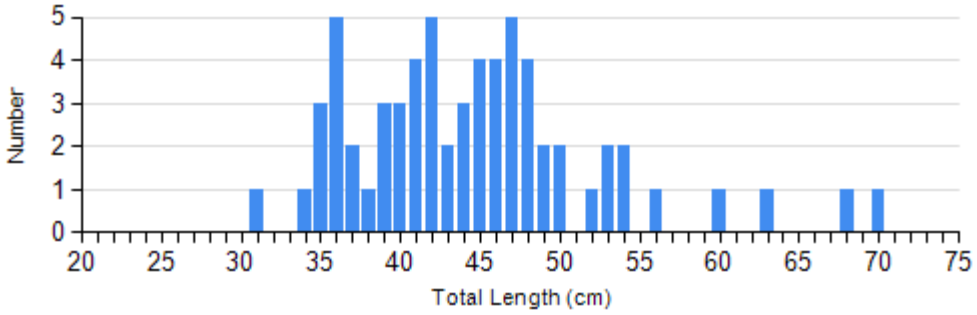
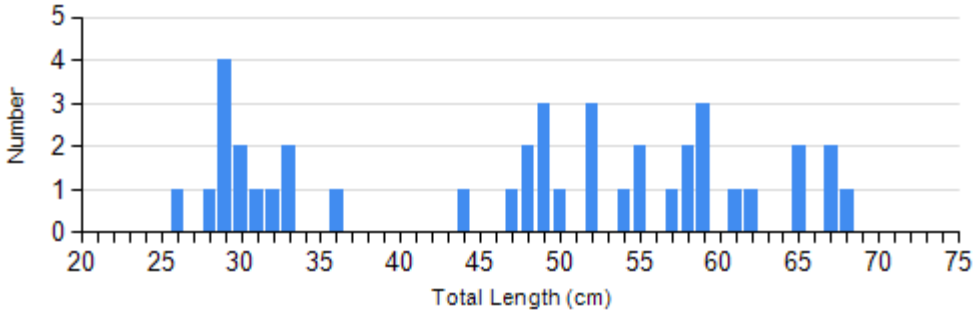
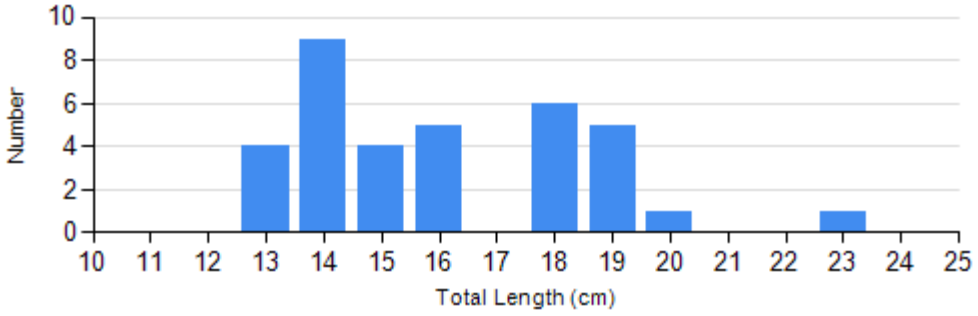


2019

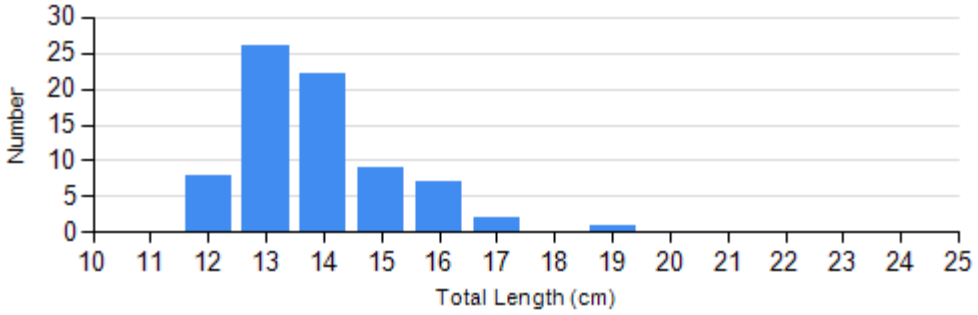


2021

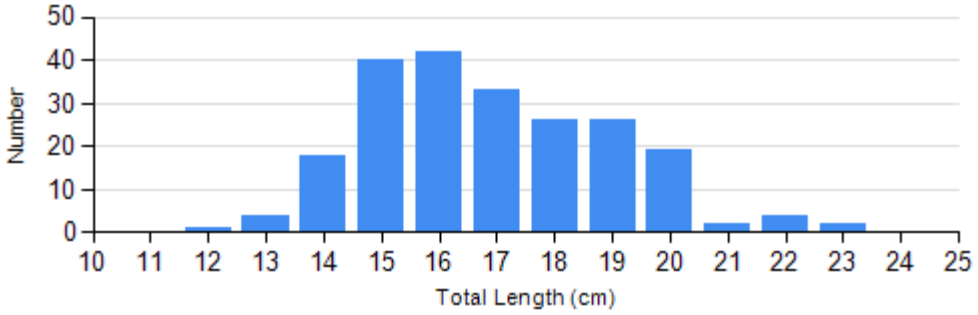
Species: Yellow Perch
Gear: AFS std gill net



2017



2019

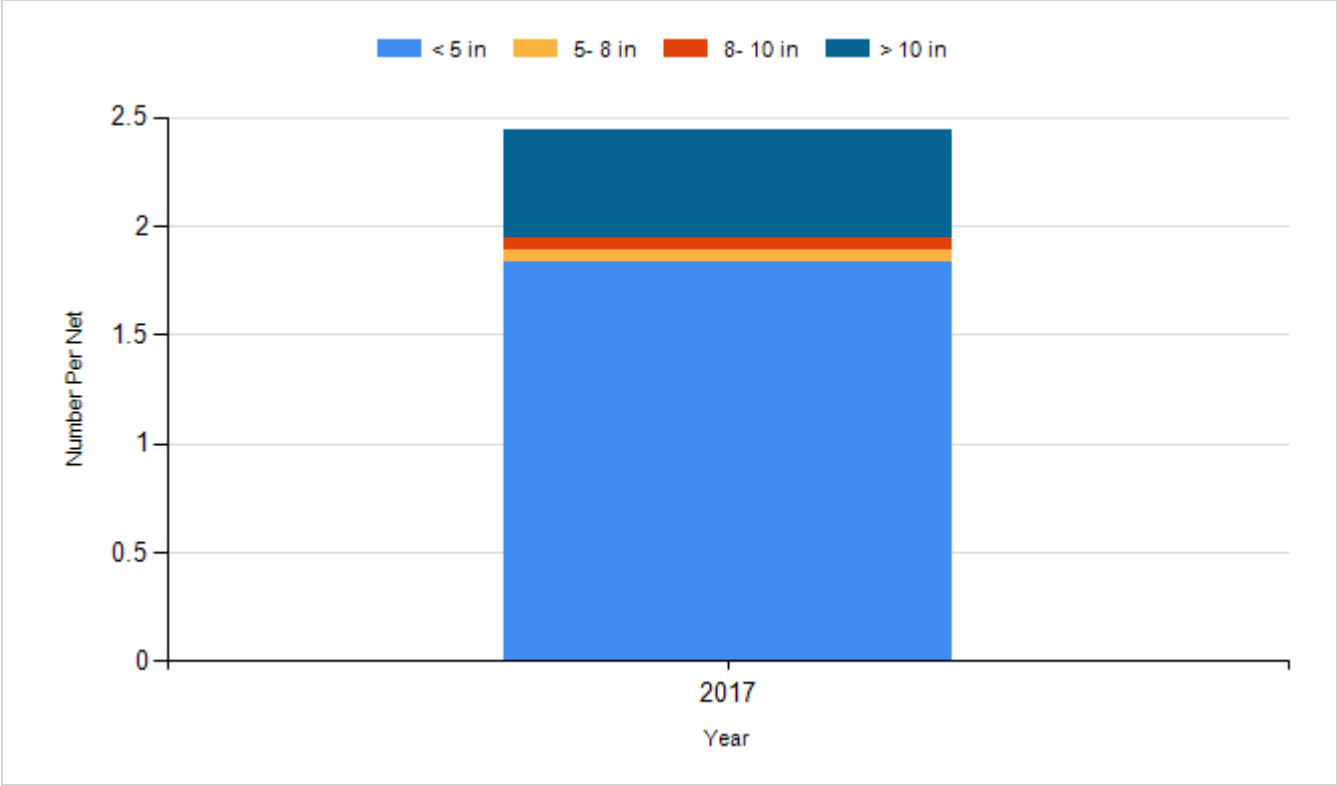


2021

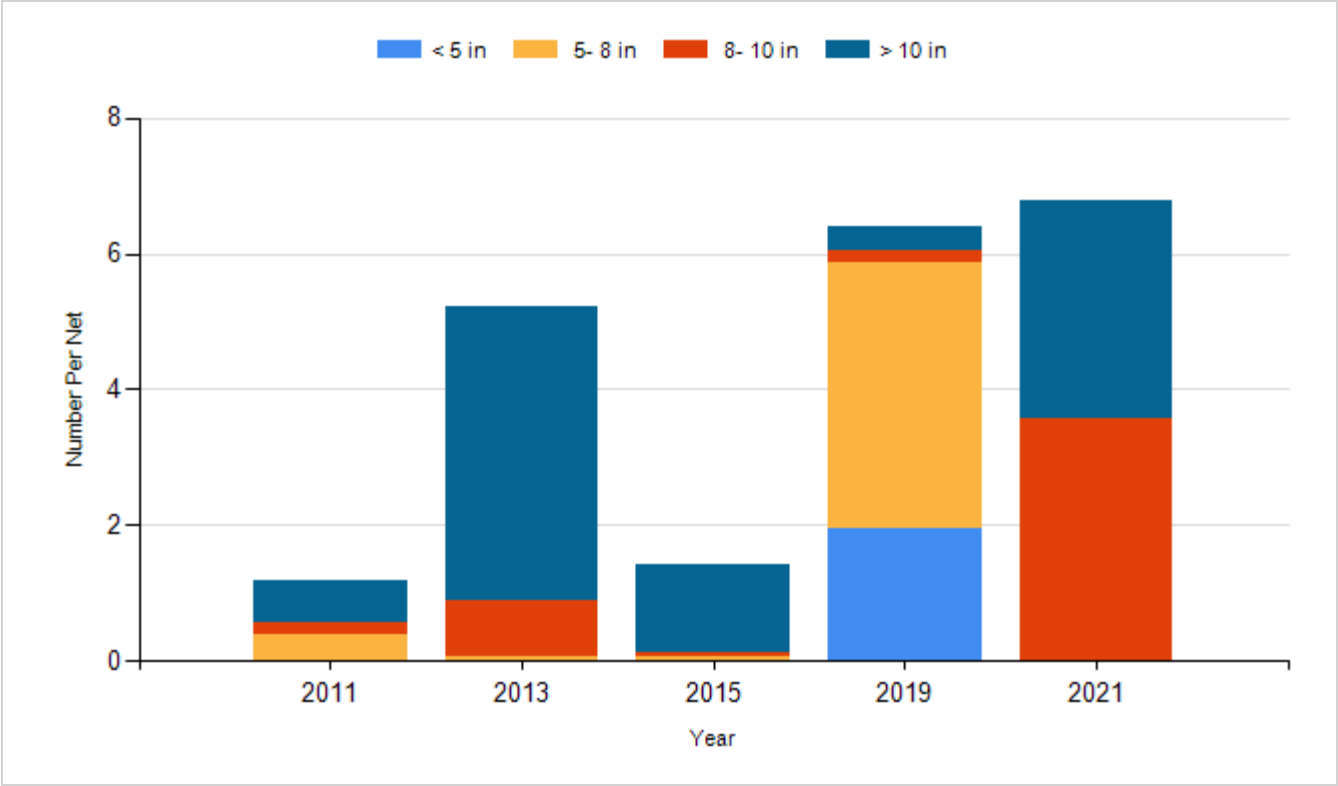
Historic Fish Sizes and Relative Abundance

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

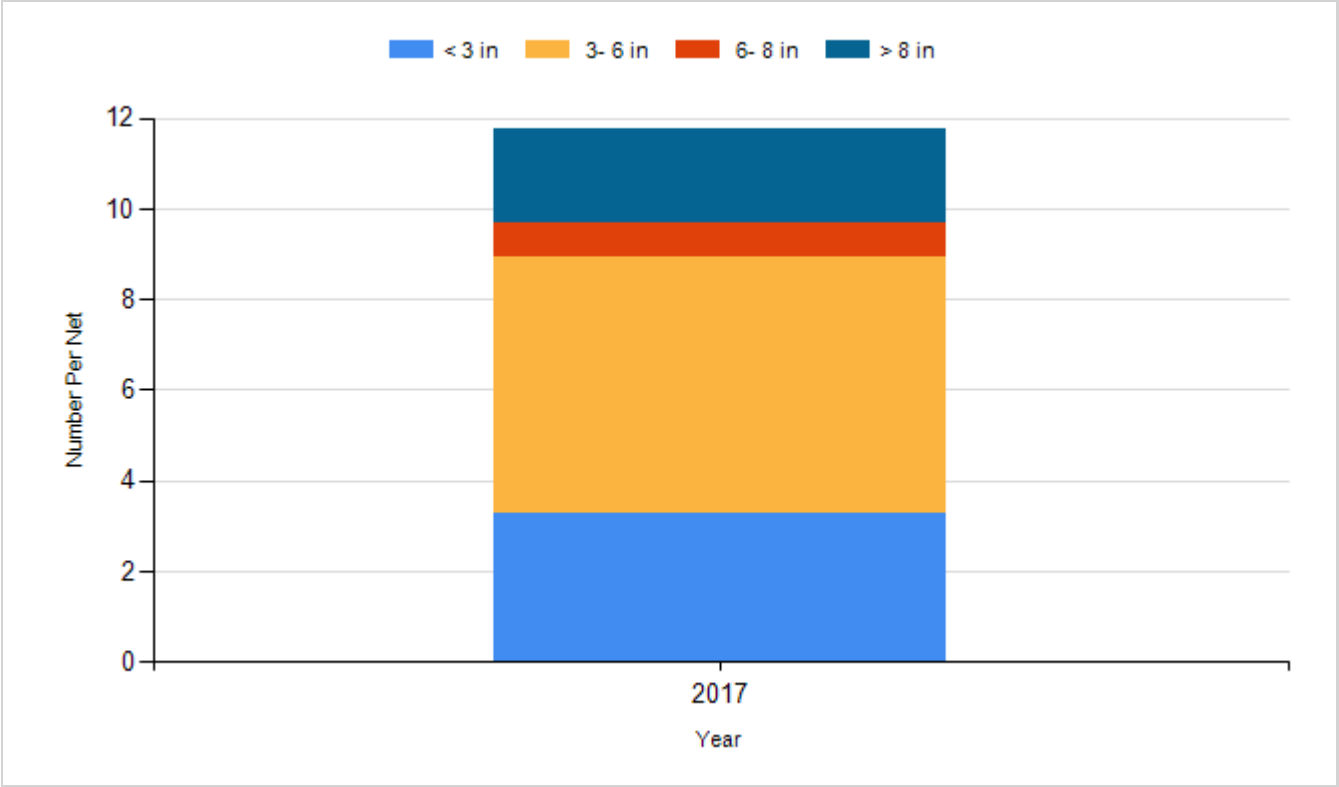
Species: Black Crappie
Gear: AFS std frame net



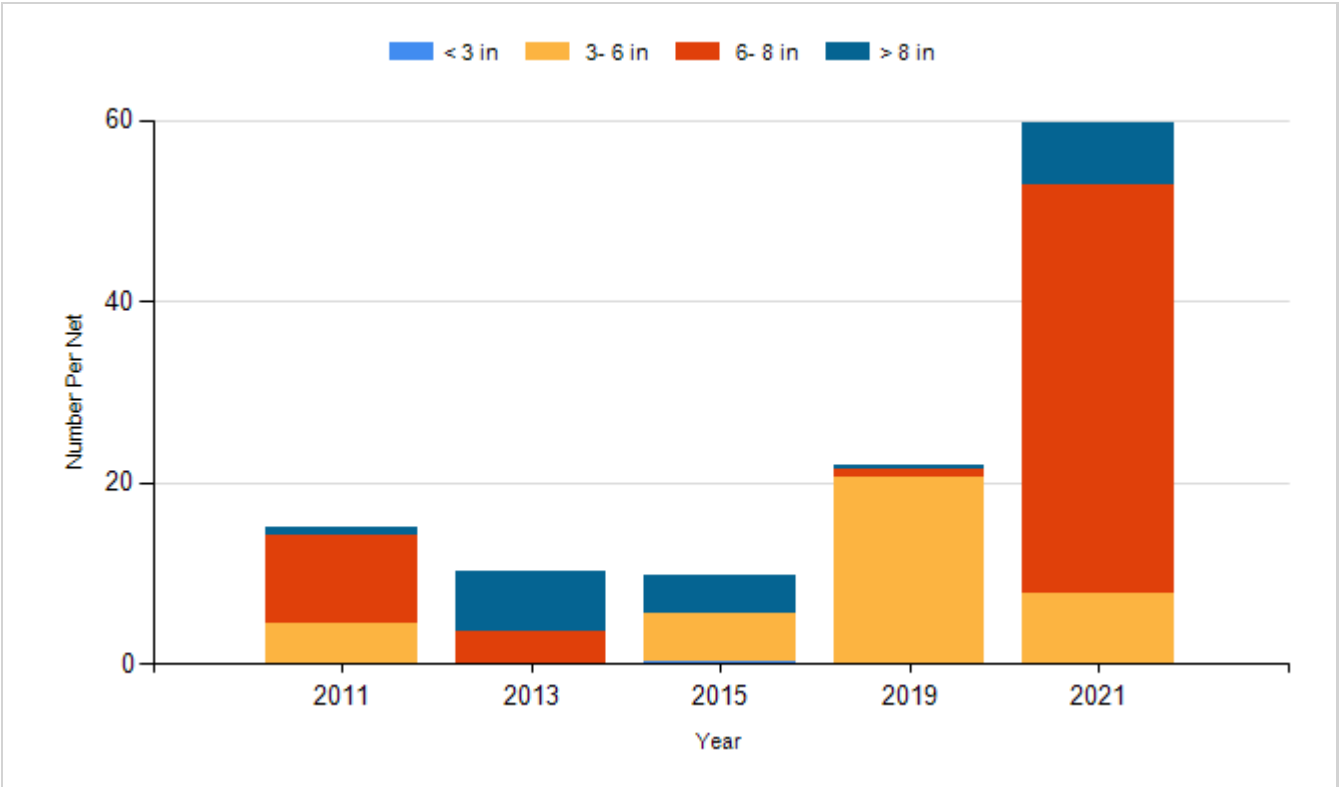
Species: Black Crappie
Gear: frame net (std 3/4 in)



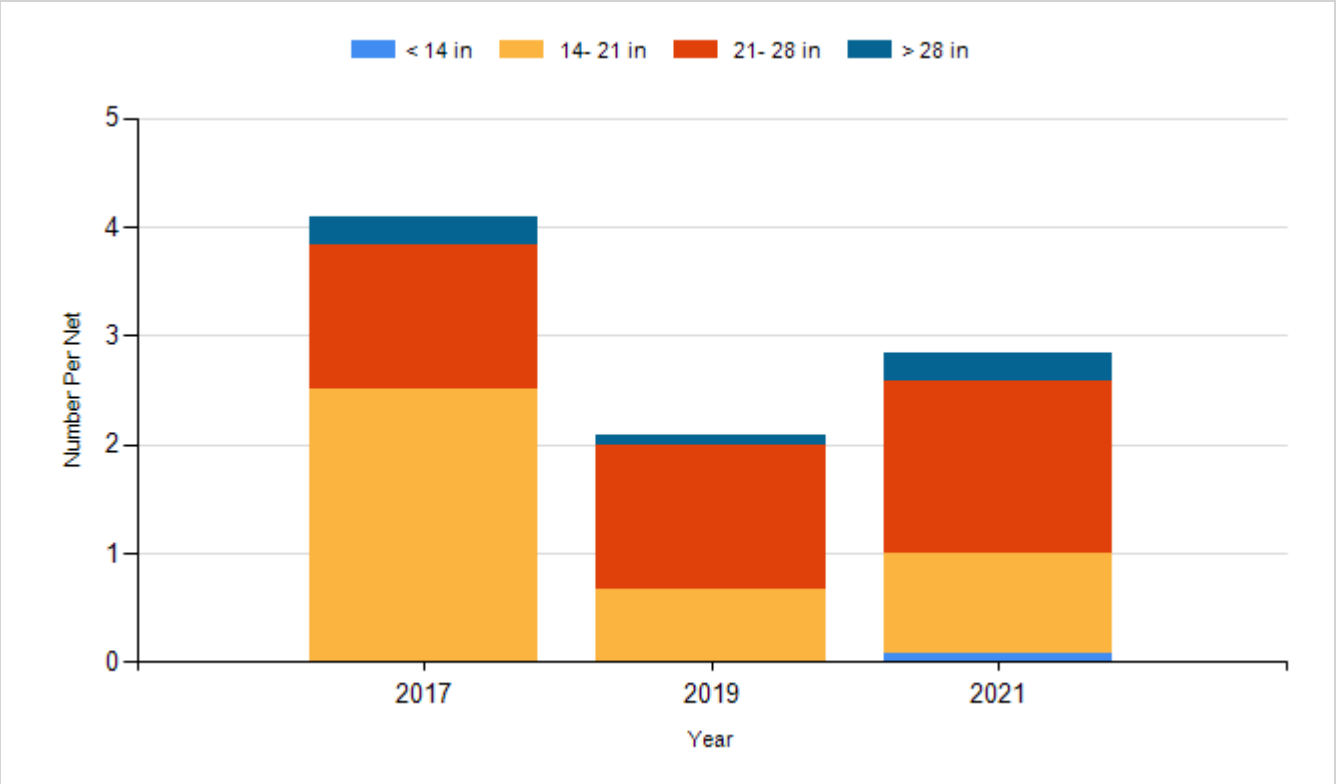
Species: Bluegill
Gear: AFS std frame net



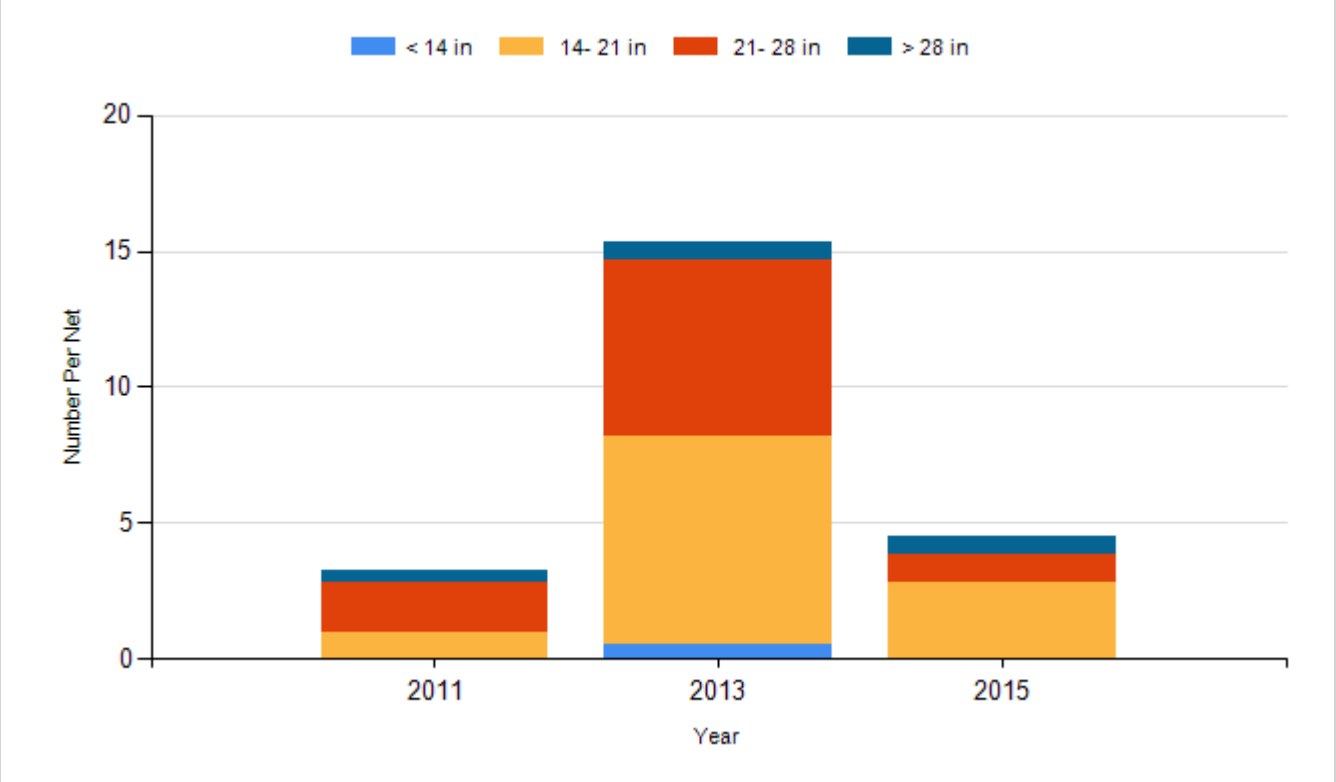
Species: Bluegill
Gear: frame net (std 3/4 in)



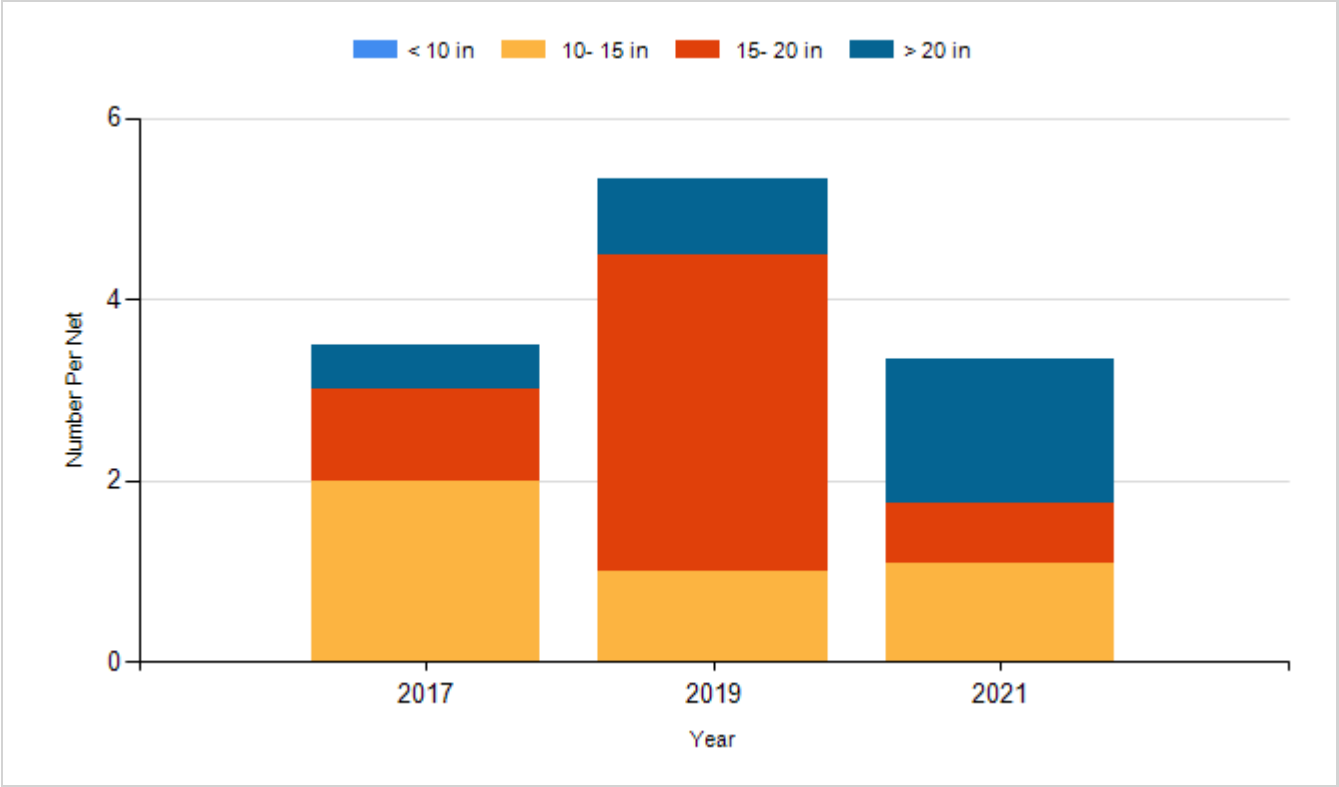
Species: Northern Pike
Gear: AFS std gill net



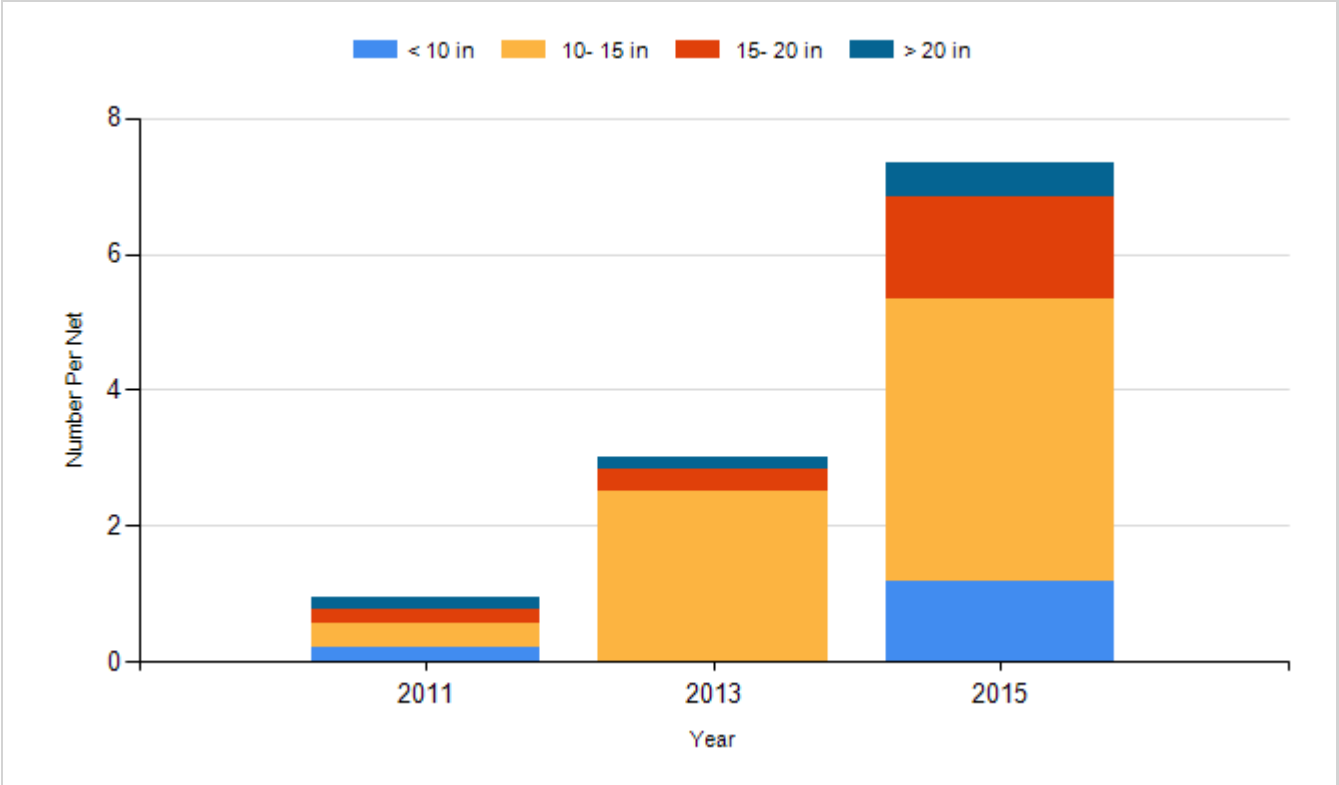
Species: Northern Pike
Gear: std exp gill net



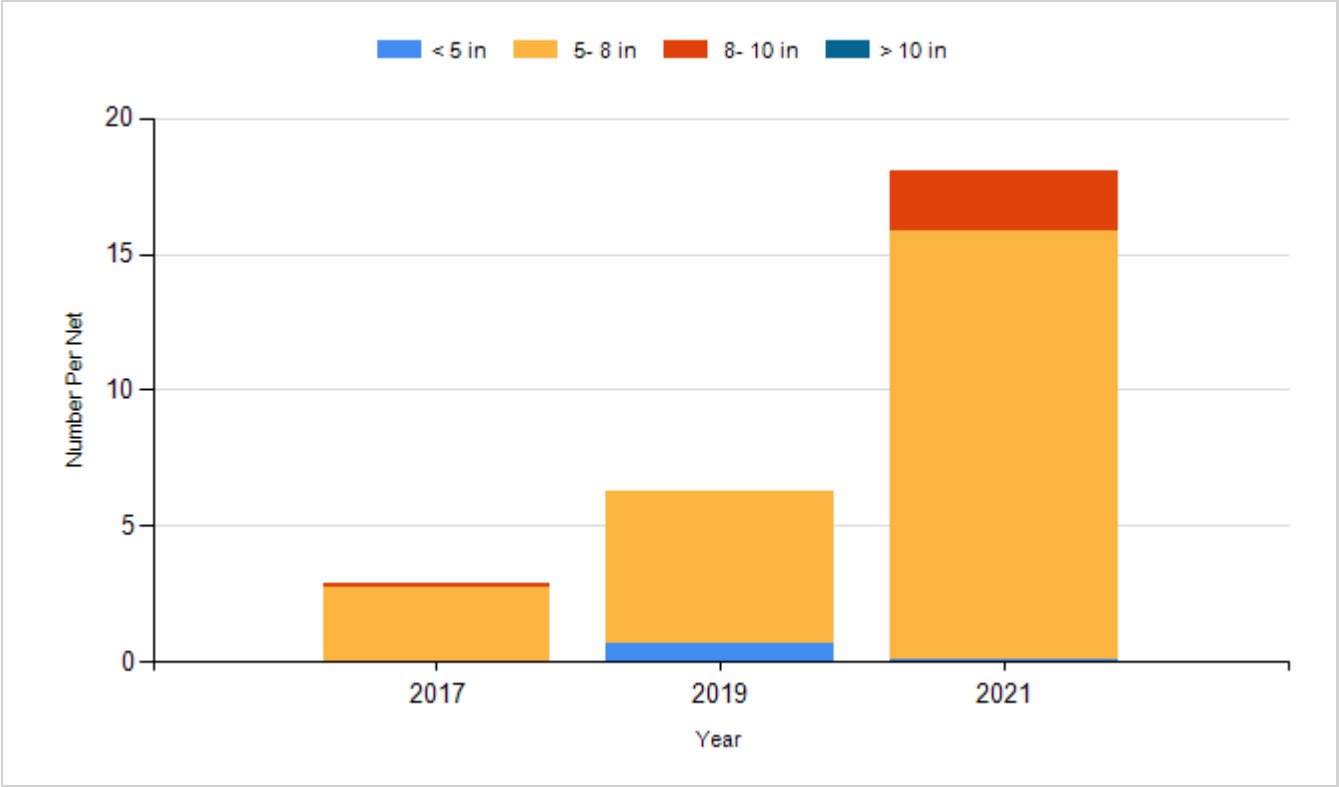
Species: Walleye
Gear: AFS std gill net



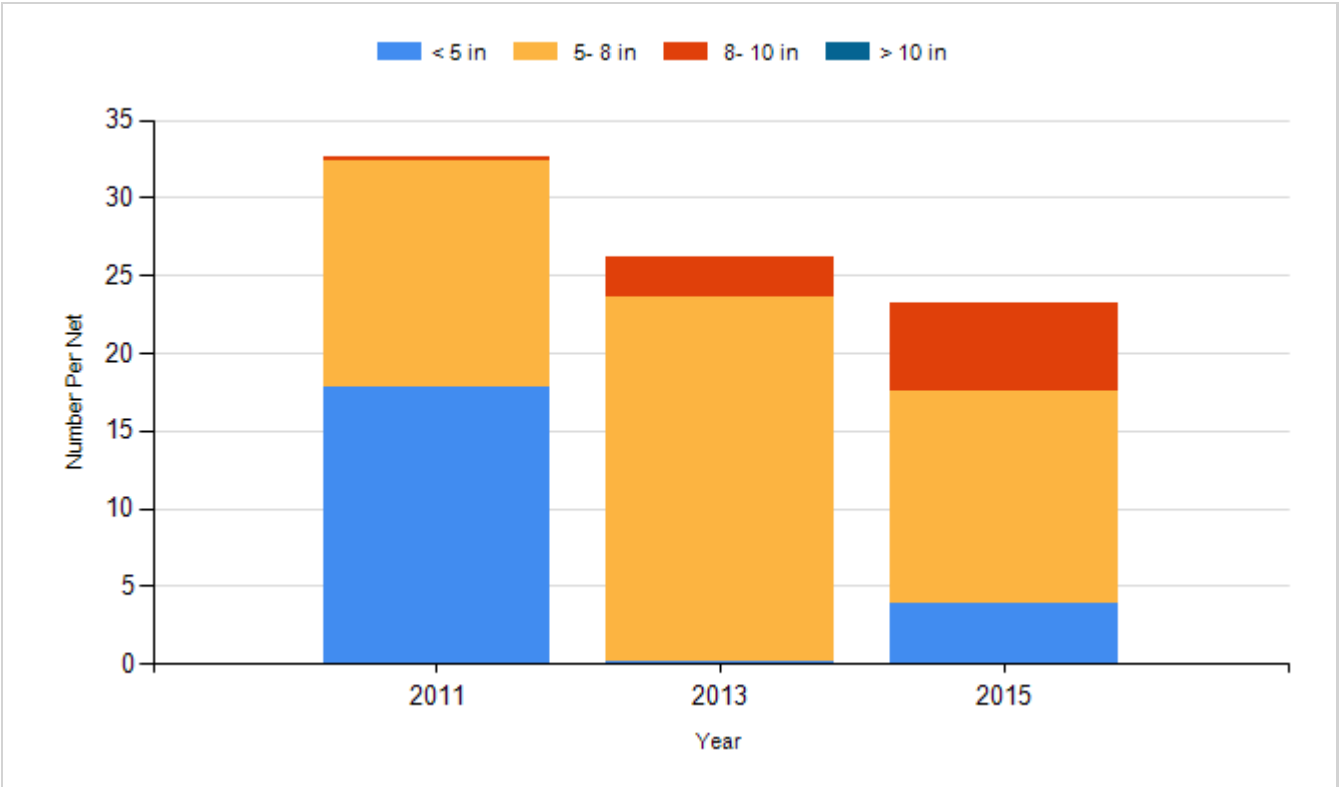
Species: Walleye
Gear: std exp gill net



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
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
2021	Walleye	Juvenile	207,460