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**. Black crappies were the third most abundant fish species in the 2024 frame net catch (5.4 per net). Those sampled ranged in length from 4.3 to 13.0 inches, of those that were at least 5.0 inches, 79% were ≥ 8.0 inches and 47% were ≥ 10.0 inches. Individuals from seven cohorts produced from 2014 to 2022 contributed to the catch. The 2021 (age-3) year class was the single most represented cohort accounting for 42% of fish in the sample. Meanwhile, fish from the 2018 (age-6) year class made up an additional 23%. The mean length at capture of age-3 fish was 7.9 inches.

- **Bluegill.** Bluegill numbers were considerably higher in 2024 than in 2021. At 157.4 per frame net, relative abundance was high. Sampled bluegills ranged in length from 3.5 to 9.4 inches, 57% were ≥ 6.0 inches and 10% were ≥ 8.0 inches. Five year classes (2016, 2017, 2020, 2021, and 2022) were represented. Individuals from 2021 (age-3) cohort were the most abundant accounting for 65% of bluegills in the sample, while those from the 2020 (age-4) year class made up an additional 25%. Since 2015, mean length at capture at age 4 has ranged from 5.0 to 8.4 inches. In 2024, the mean length at capture of age-4 fish was 6.6 inches.

- **Northern pike.** More northern pike were sampled in 2024 than in 2021. At 5.5 per gill net, relative abundance was considered high for South Buffalo Lake. Sampled northern pike ranged in length from 11.8 to 28.7 inches, of those that were at least 14.0 inches, 67% were ≥ 21.0 inches and 2% were ≥ 28 inches.

- **Walleye.** Walleye numbers were similar to those observed in 2021. At 3.2 per gill net, relative abundance was considered low to moderate. Sampled walleyes ranged in length from 9.1 to 27.6 inches, of those that were at least 10.0 inches, 76% were ≥ 15.0 inches and 16% were ≥ 20.0 inches. Nine year classes contributed to the gill net catch. The naturally produced 2019 (age-5) cohort was the most represented accounting for 41% of walleyes in the sample. The oldest walleye sampled was from the 2010 (age-14) 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 2015. In 2024, the mean length at capture of age-4 walleyes was 17.4 inches.

- **Yellow perch**. The mean gill net CPUE of 9.2 suggested moderate relative abundance. Sampled individuals ranged in length from 5.1 to 8.7 inches, 1% were ≥ 8.0 inches. Individuals from three cohorts (2018, 2020, and 2021) comprised the entire sample. Those from the 2021 (age-3) cohort, which had a mean length at capture of 6.1 inches, were the most abundant accounting for 92% of perch collected.

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
2024

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 11, 2024	4 net-nights
AFS std gill net	Jun 12, 2024	4 net-nights
AFS std gill net	Jun 13, 2024	4 net-nights
fall night EF-WAE	Oct 09, 2024	3500 seconds
frame net (std 3/4 in)	Jun 11, 2024	6 net-nights
frame net (std 3/4 in)	Jun 12, 2024	6 net-nights
frame net (std 3/4 in)	Jun 13, 2024	6 net-nights

Common Fish Species Present

Walleye

Yellow Perch

Northern Pike

Largemouth Bass

Bluegill

Black Bullhead

Black Crappie

White Sucker

Smallmouth Bass

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	48	4.0	1.5	85	8	19	9	100	2
	Black Crappie	2	0.2	0.2	100		50		102	9
	Bluegill	10	0.8	0.4	50	28	30		117	4
	Common Carp	1	0.1	0.1	100		100			
	Largemouth Bass	1	0.1	0.1	100		100		122	
	Northern Pike	68	5.5	0.9	67	8	2		88	1
	Walleye	39	3.2	1.0	76	11	16	9	92	1
	White Sucker	18	1.5	0.6	100		89		111	2
	Yellow Perch	110	9.2	2.8	1		0		103	1
frame net (std 3/4 in)	Black Bullhead	170	9.3	3.3	88	4	22	4	91	1
	Black Crappie	99	5.4	1.6	79	6	47	7	104	1
	Bluegill	2833	157.4	25.8	57	1	10	1	112	1
	Largemouth Bass	1	0.0	0.0	0		0			
	Northern Pike	29	1.5	0.4	81	12	22	13	83	3
	Smallmouth Bass	1	0.1	0.1	0		0		112	
	Walleye	9	0.4	0.2	75		63		88	2
	Yellow Perch	45	2.5	1.9	13	8	0		90	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; ** SDGFP standard gill net used in 2015 (Avg. excludes 2015); *** AFS standard frame nets used 2017 (Avg. excludes 2017)**

		CPUE										
Gear	Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Avg
AFS std gill net*	Black Bullhead	25.0		21.3		3.5		6.4			4.0	8.80
	Black Crappie	0.3		1.4		1.6		2.9			0.2	1.53
	Bluegill	0.0		1.4		0.6		1.5			0.8	1.08
	Common Carp	0.0		0.1		0.1		0.0			0.1	0.08
	Golden Shiner*	0.0		0.1		0.8		0.0			0.0	0.23
	Largemouth Bass	0.0		0.3		0.3		0.2			0.1	0.23
	Northern Pike	4.5		4.1		2.1		2.8			5.5	3.63
	Walleye	6.2		3.5		5.3		3.3			3.2	3.83
	White Sucker	7.7		5.5		1.3		2.4			1.5	2.68
	Yellow Perch	19.3		2.9		5.6		18.1			9.2	8.95
boat shocker	Largemouth Bass	27.8				11.0						19.40
fall night EF-WAE**	Walleye								188.0		17.4	102.70
frame net (std 3/4 in)***	Black Bullhead	19.3		57.8		22.8		11.7			9.3	15.78
	Black Crappie	1.4		0.6		4.5		6.8			5.4	4.53
	Bluegill	9.6		8.5		21.8		59.3			157.4	62.03
	Common Carp	0.0		0.1		0.0		0.0			0.0	0.00
	Largemouth Bass	0.0		0.1		0.0		0.0			0.0	0.00
	Northern Pike	0.5		0.2		0.3		1.6			1.5	0.98
	Smallmouth Bass	0.1		0.1		0.0		0.0			0.1	0.05
	Walleye	0.2		0.2		0.1		0.4			0.4	0.28
	White Sucker	0.0		0.3		0.3		0.2			0.0	0.13
	Yellow Perch	2.0		0.3		0.2		2.0			2.5	1.68

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. *** SDGFP standard gill net used in 2015; ** AFS standard frame nets used 2017**

			Year									
Gear	Species	Index	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
AFS std gill net*	Northern Pike	PSD	37		39		68		67			67
		PSD-P	15		6		4		9			2
		Wr	83		85		90		84			88
	Walleye	PSD	32		43		81		68			76
		PSD-P	8		14		16		48			16
		Wr	88		89		91		88			92
	Yellow Perch	PSD	29		6		0		12			1
		PSD-P	0		0		0		0			0
		Wr	100		102		106		101			103
frame net (std 3/4 in)**	Black Crappie	PSD	96		91		12		100			79
		PSD-P	92		82		8		48			47
		Wr	97		95		100		101			104
	Bluegill	PSD	45		33		6		73			57
		PSD-P	45		25		2		11			10
		Wr	121		105		105		112			112

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+
2024	96		133 (9)	203 (42)	263 (1)	274 (2)	300 (22)	307 (17)			331 (1)

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2024	2780		95 (24)	124 (1113)	168 (1367)			210 (241)	244 (36)		
2021	1036		108 (45)	165 (17)	160 (739)	190 (160)	194 (24)		248 (45)		261 (6)
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)	

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2024	39		274 (8)	389 (6)	443 (3)	478 (16)	468 (2)				629 (4)
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)

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2024	110			155 (101)	159 (8)		229 (1)				
2021	217		144 (5)	169 (185)	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)			

Fish Condition

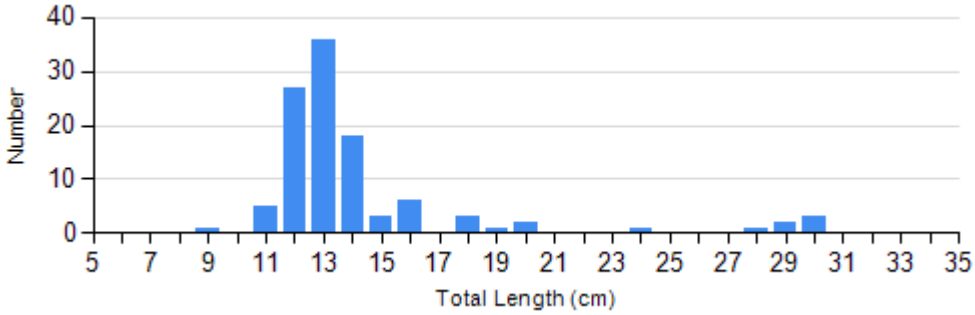
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2021	0		64	104 (0.8)	51	99 (0.8)	7	94 (2.5)
	2024	20	112 (1.5)	31	108 (1.3)	19	102 (1.6)	27	93 (1.1)
Bluegill Frame Net	2021	293	116 (1.5)	662	112 (0.5)	86	112 (0.9)	27	112 (1.2)
	2024	1210	111 (0.8)	1339	113 (1.0)	234	114 (0.9)	50	
Northern Pike Gill Net	2021	11	83 (1.2)	19	84 (3.1)	2	79 (1.4)	1	92
	2024	22	90 (1.2)	43	86 (1.3)	1	90	0	
Walleye Gill Net	2021	13	92 (1.6)	8	84 (2.5)	14	88 (1.6)	5	89 (2.5)
	2024	9	94 (1.5)	23	92 (1.1)	4	88 (1.5)	2	93 (2.3)
Yellow Perch Gill Net	2021	191	102 (0.6)	26	95 (1.3)	0		0	
	2024	109	103 (0.9)	1	101	0		0	

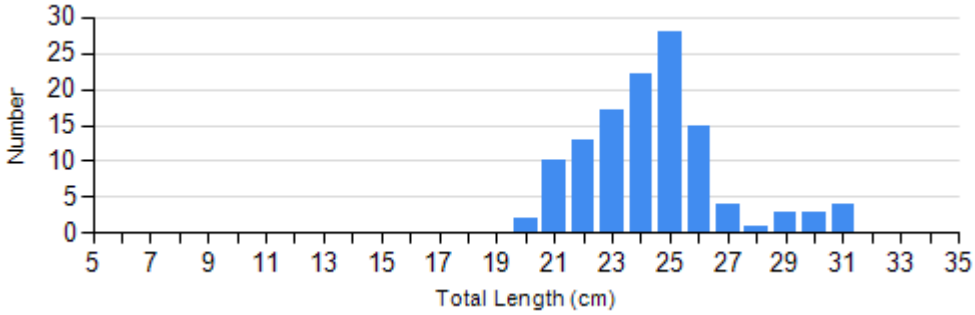
Length Frequency Distribution

Length frequency histogram of species sampled by year.

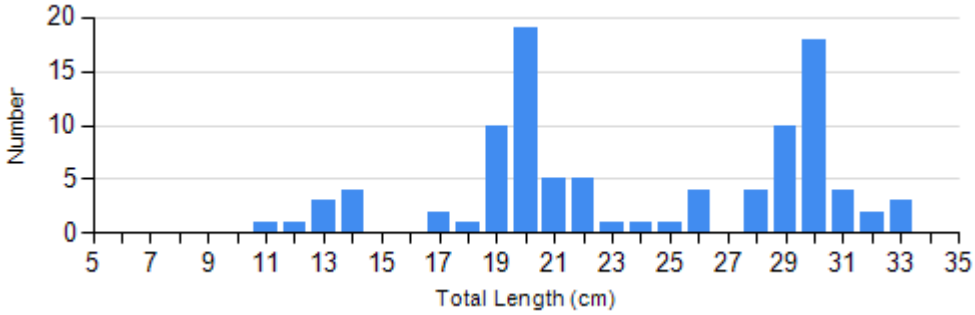
Species: Black Crappie
Gear: frame net (std 3/4 in)



2019

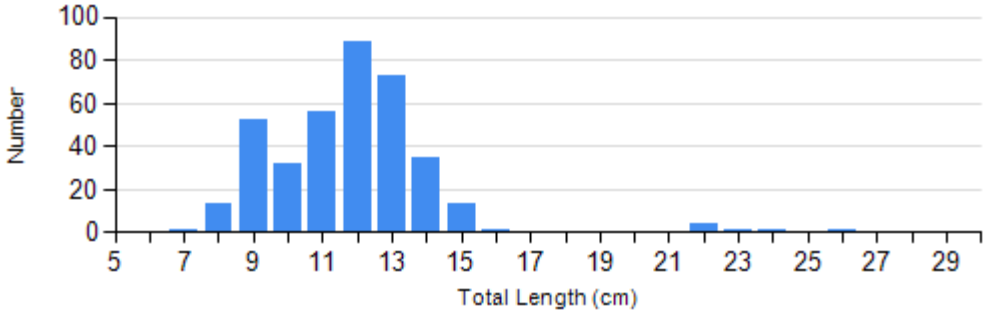


2021



2024

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



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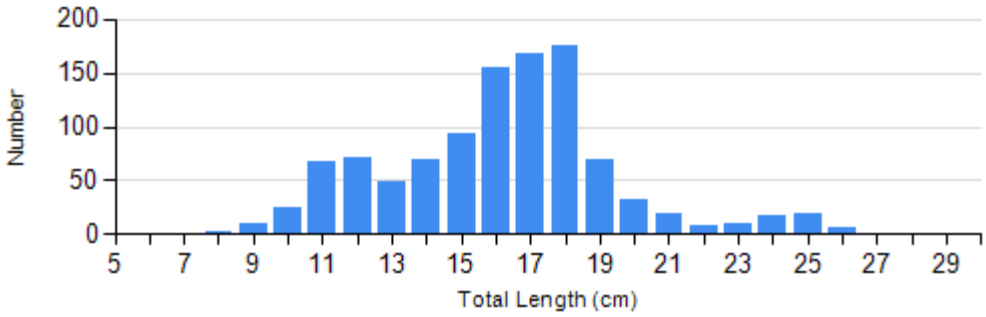

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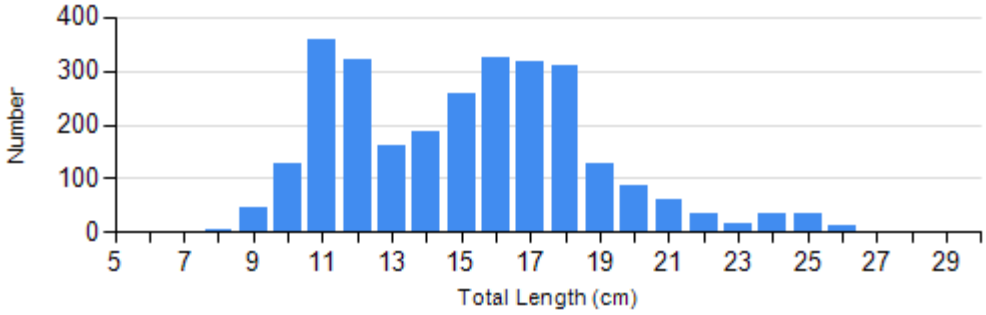
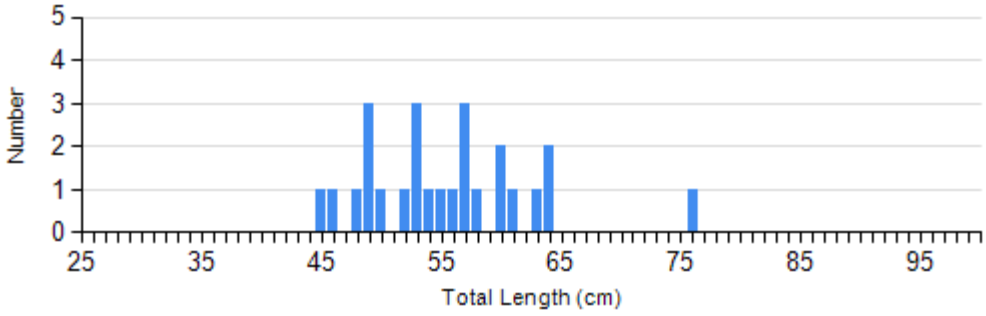


2024

Species: Northern Pike
Gear: AFS std gill net



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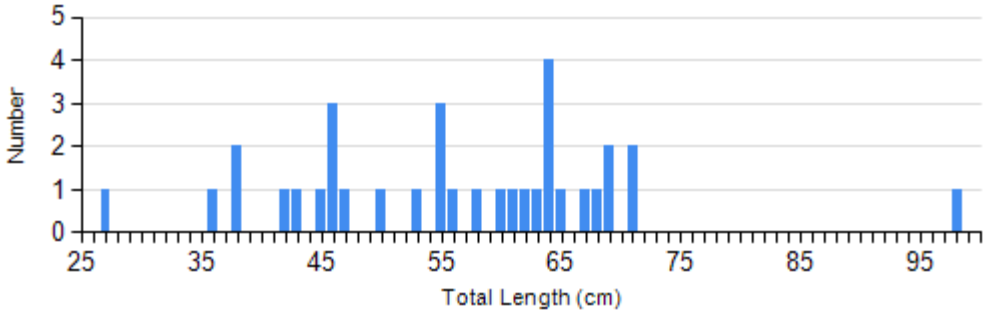
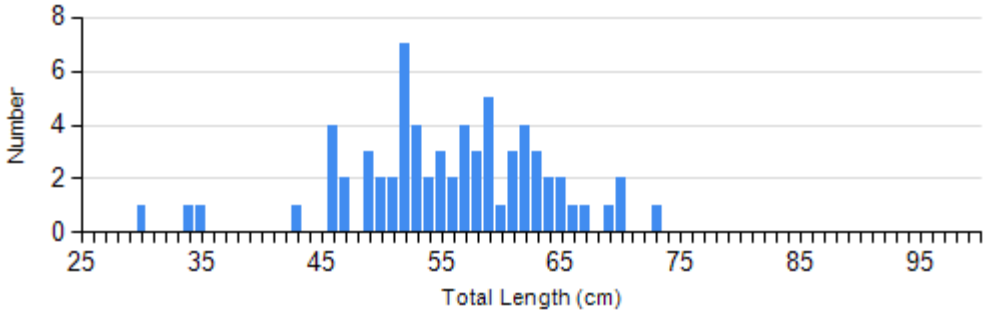
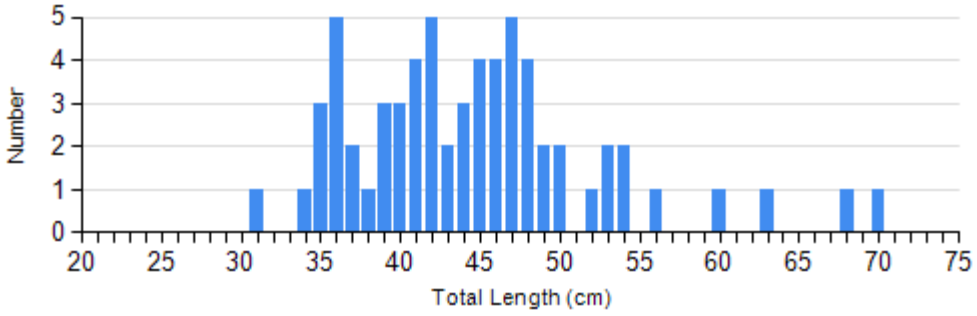


2021

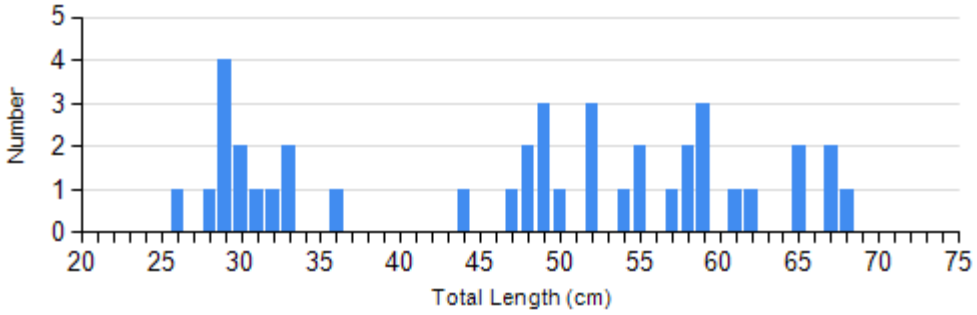


2024

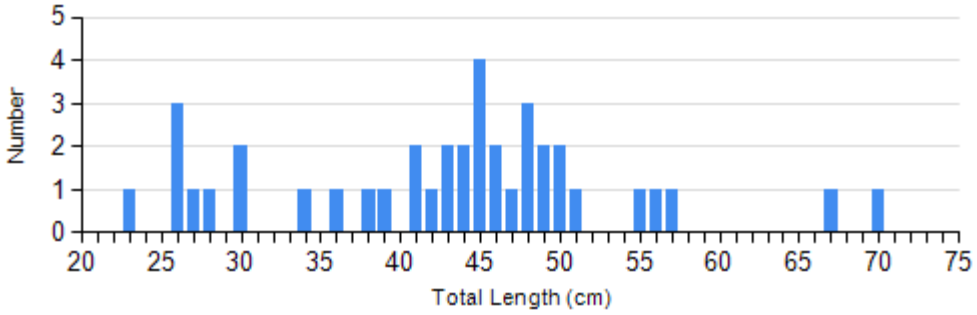
Species: Walleye
Gear: AFS std gill net



2019

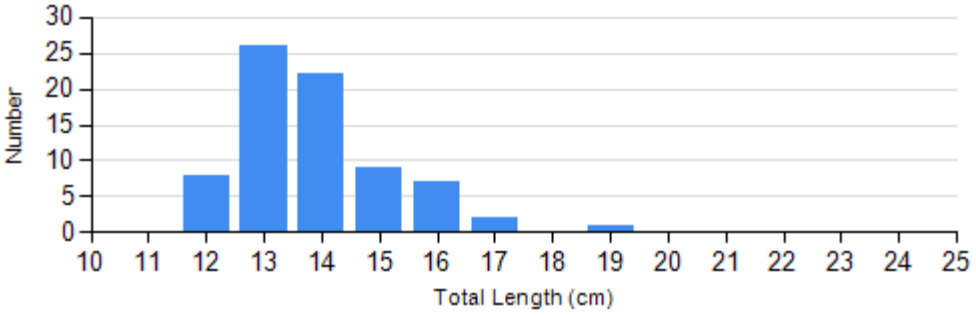


2021

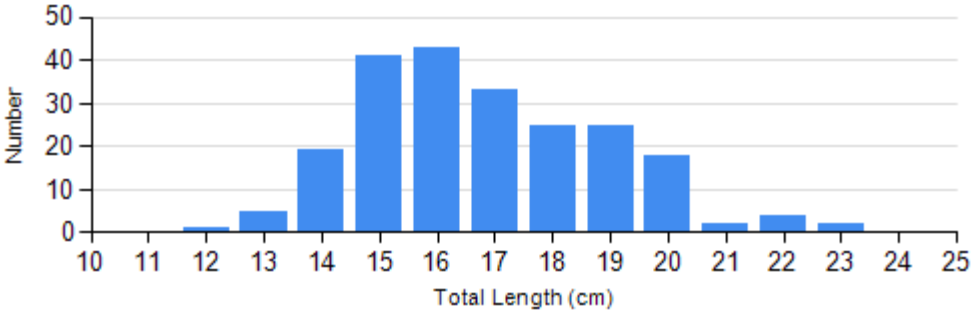


2024

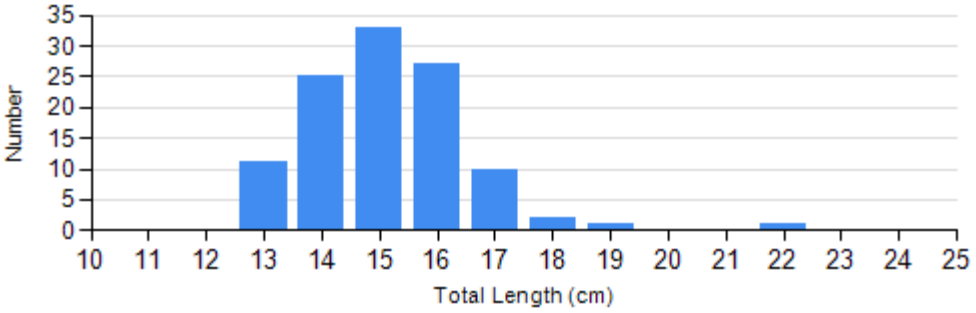
Species: Yellow Perch
Gear: AFS std gill net



2019



2021

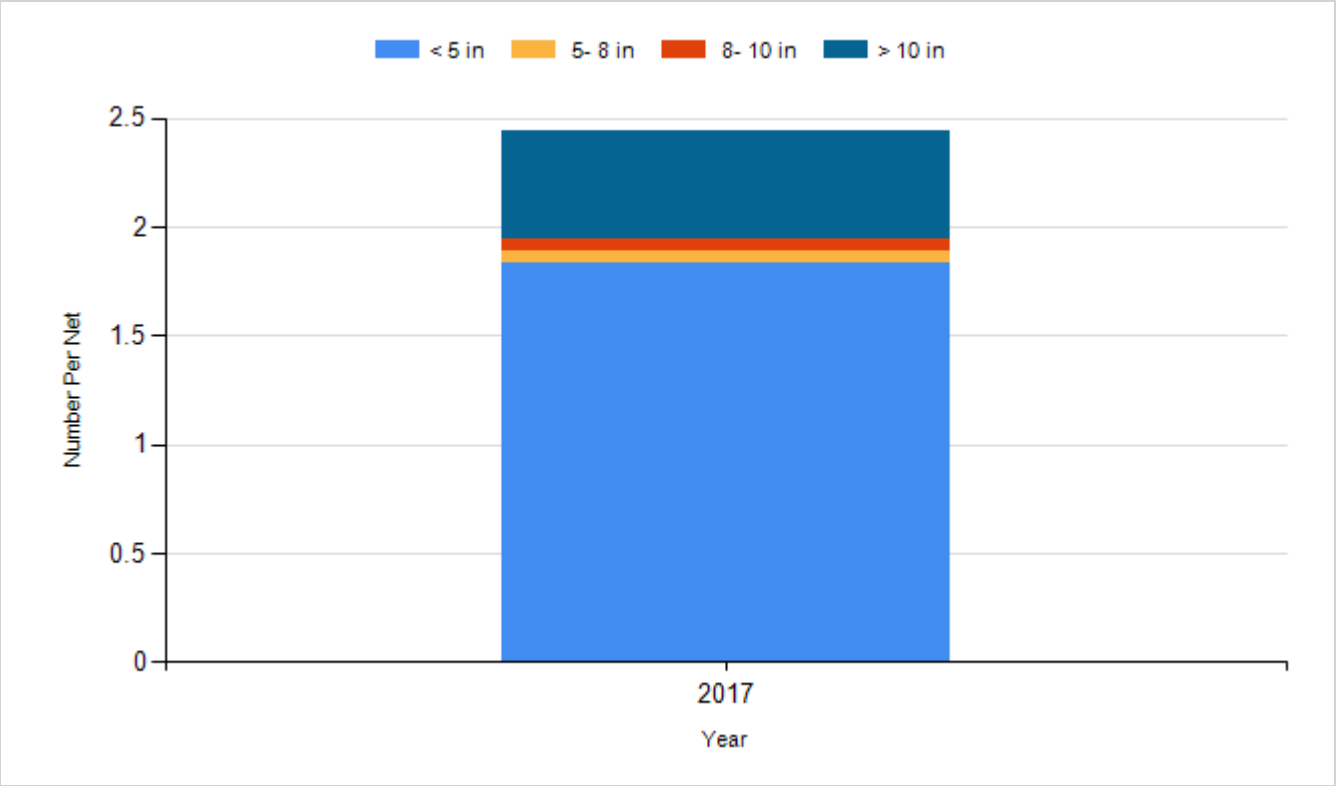


2024

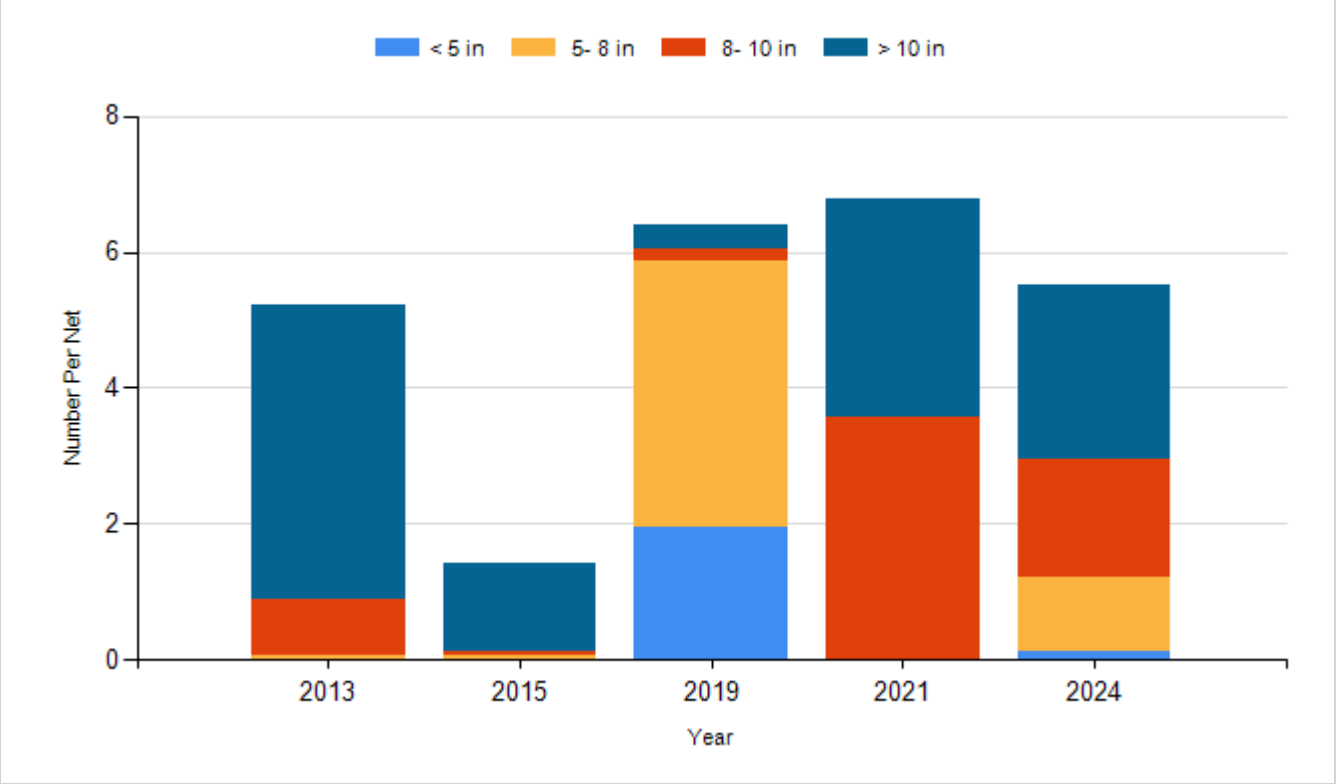
Historic Fish Sizes and Relative Abundance

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

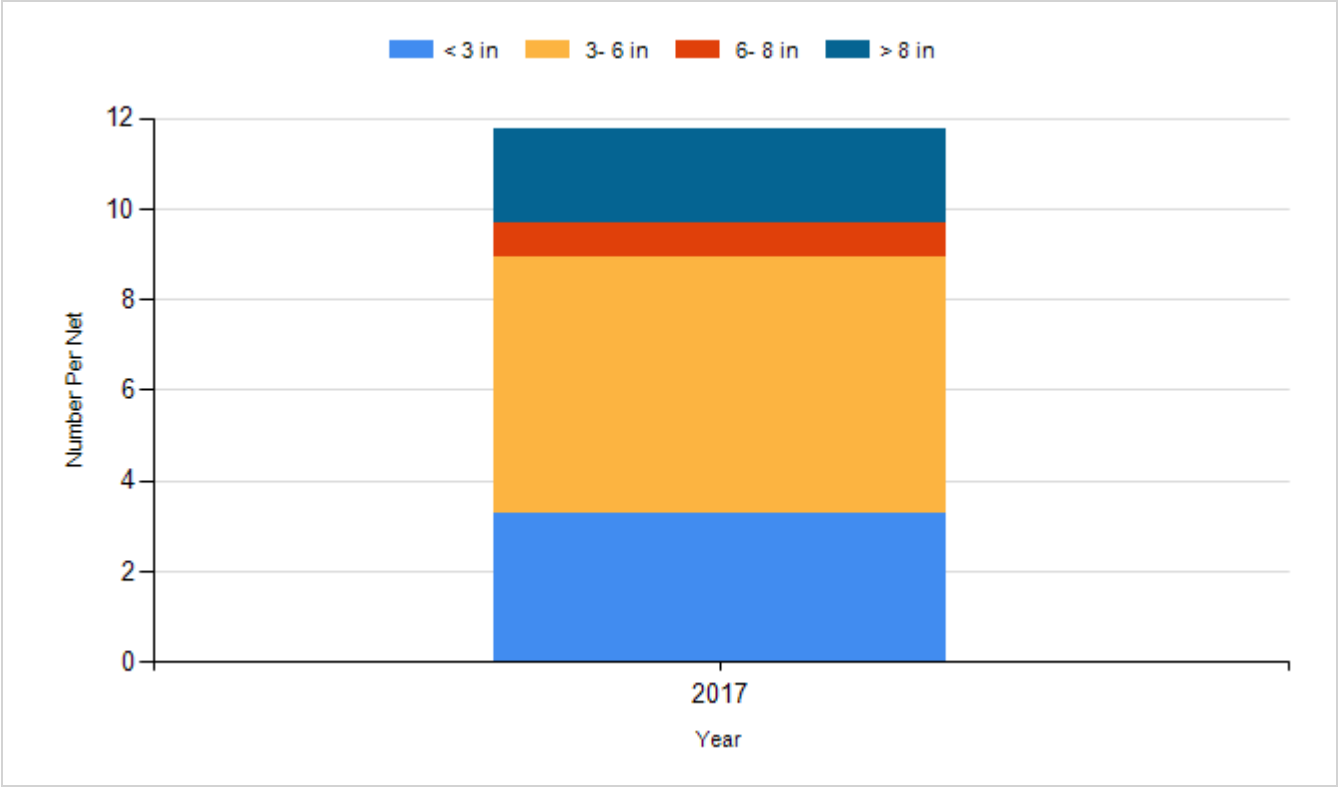
Species: Black Crappie
Gear: AFS std frame net



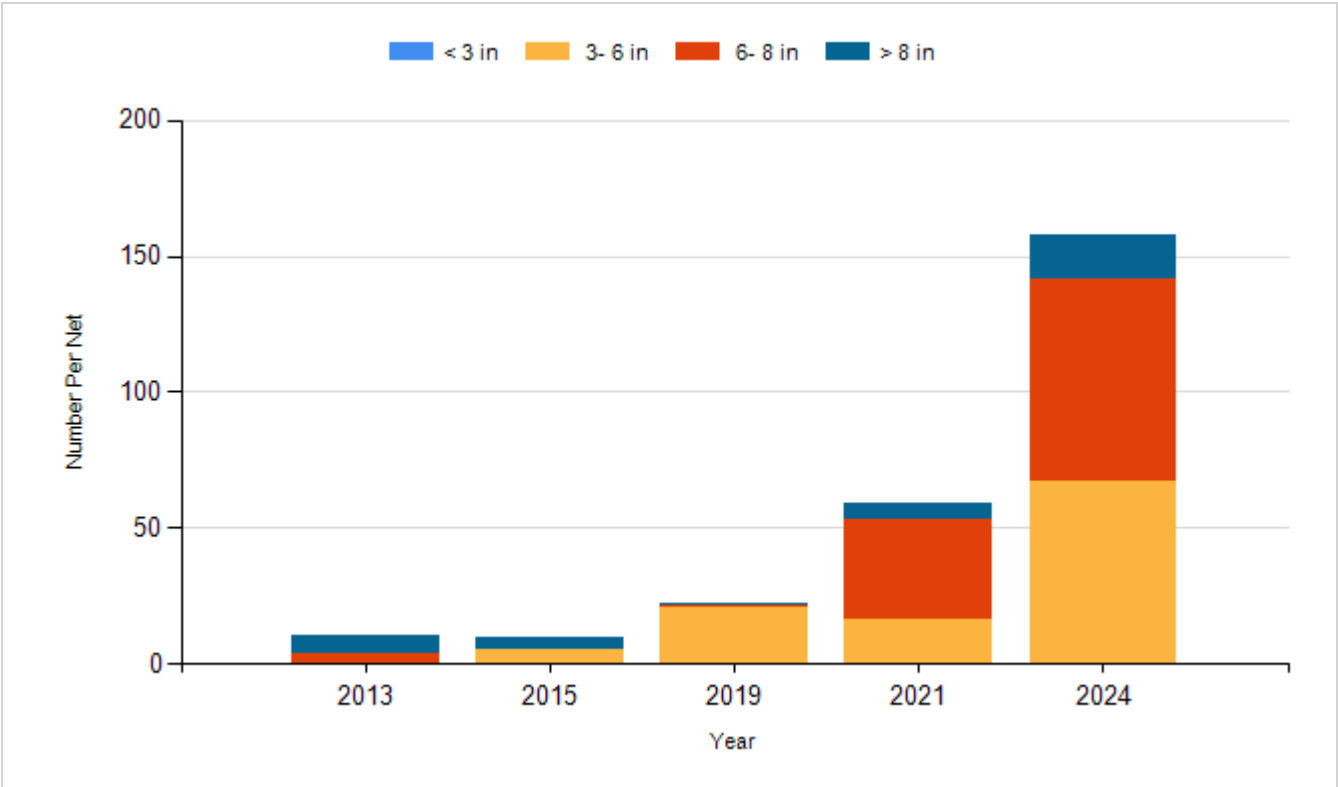
Species: Black Crappie
Gear: frame net (std 3/4 in)



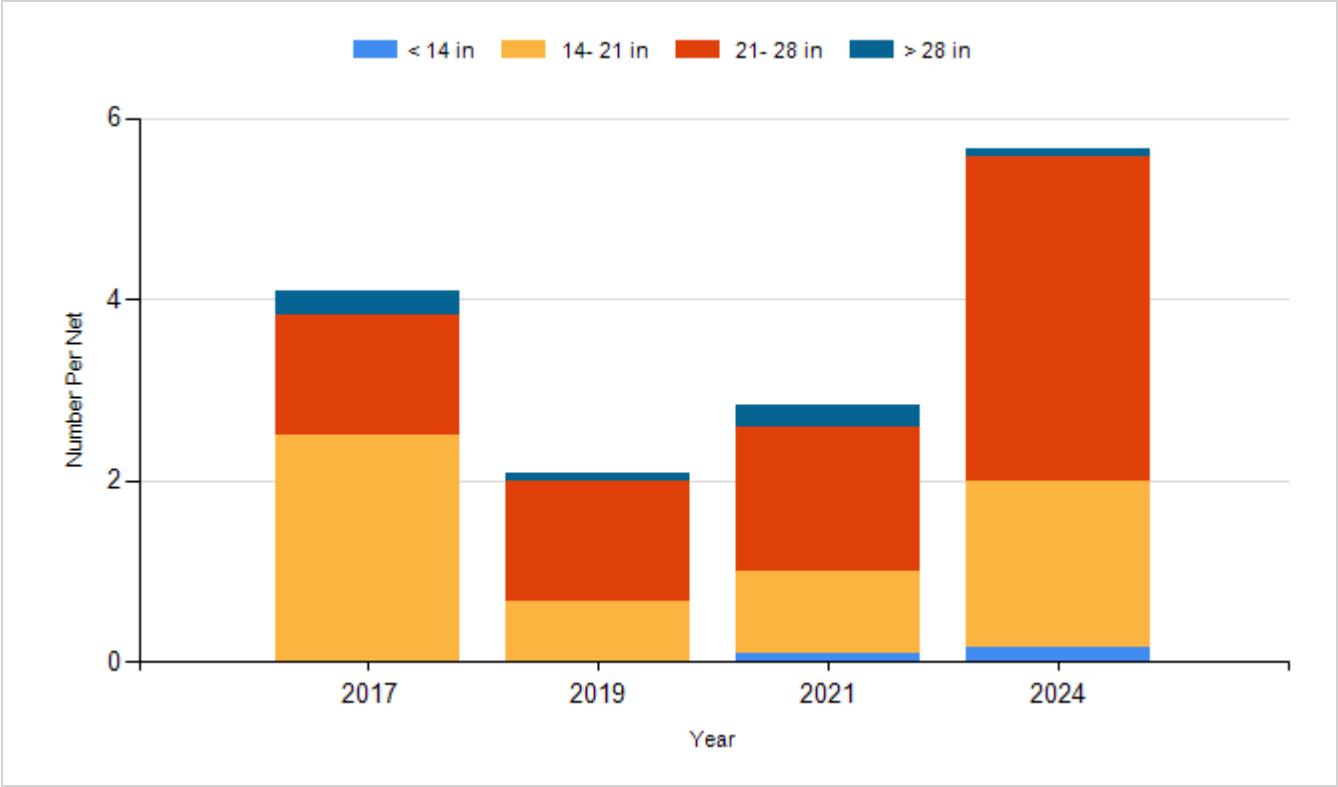
Species: Bluegill
Gear: AFS std frame net



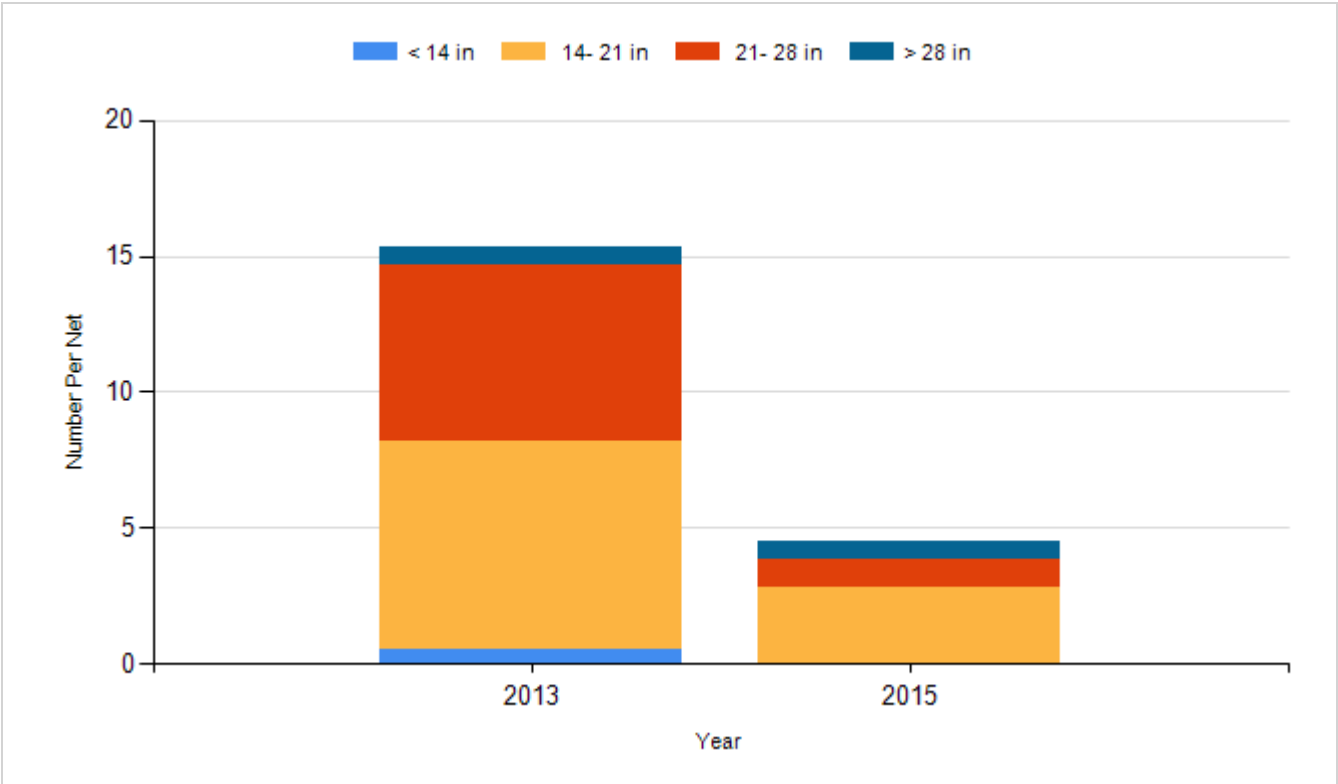
Species: Bluegill
Gear: frame net (std 3/4 in)



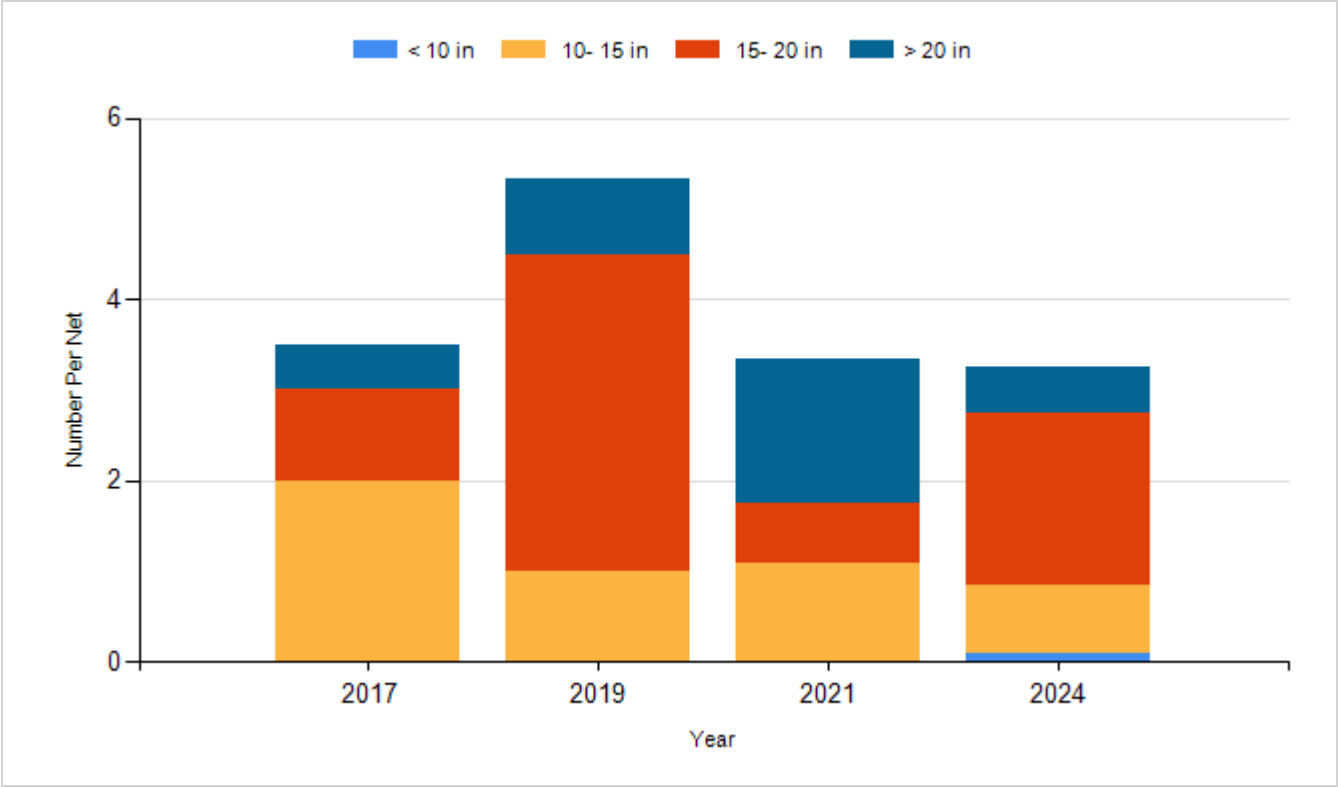
Species: Northern Pike
Gear: AFS std gill net



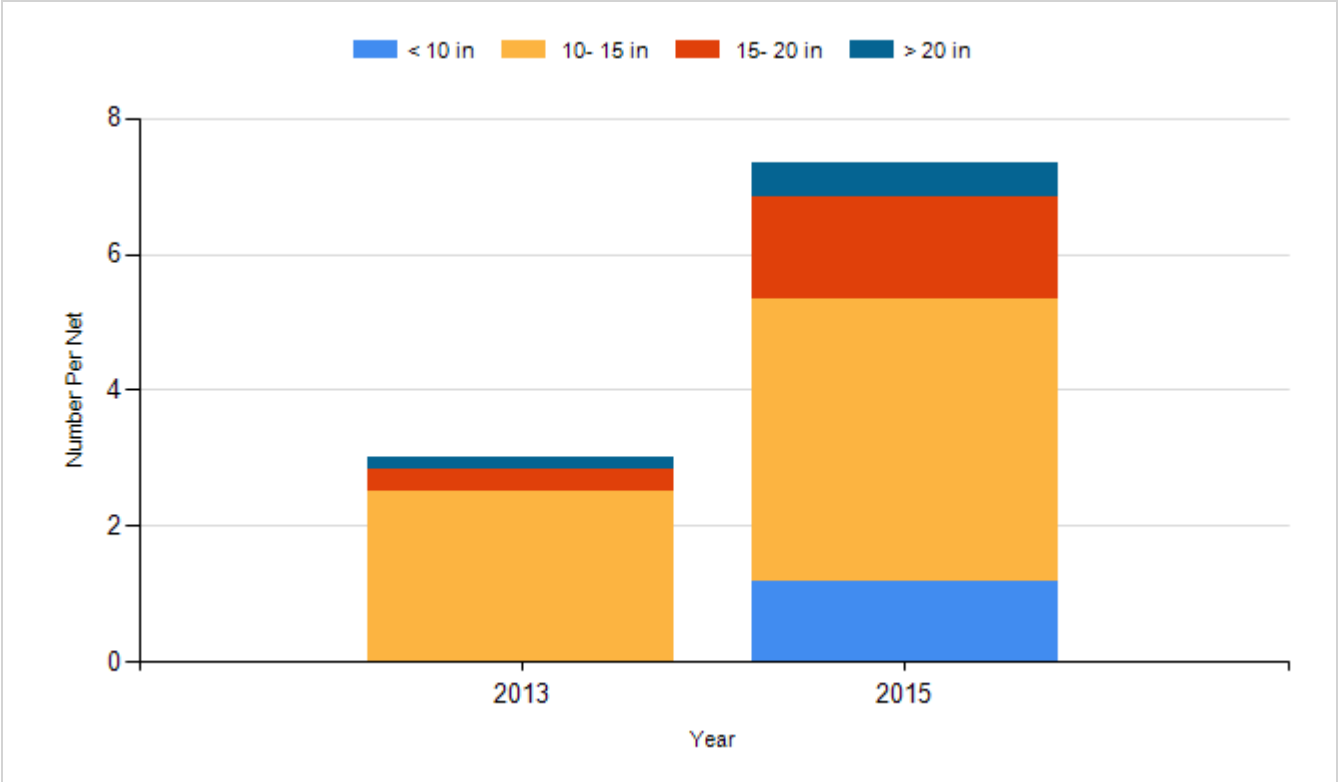
Species: Northern Pike
Gear: std exp gill net



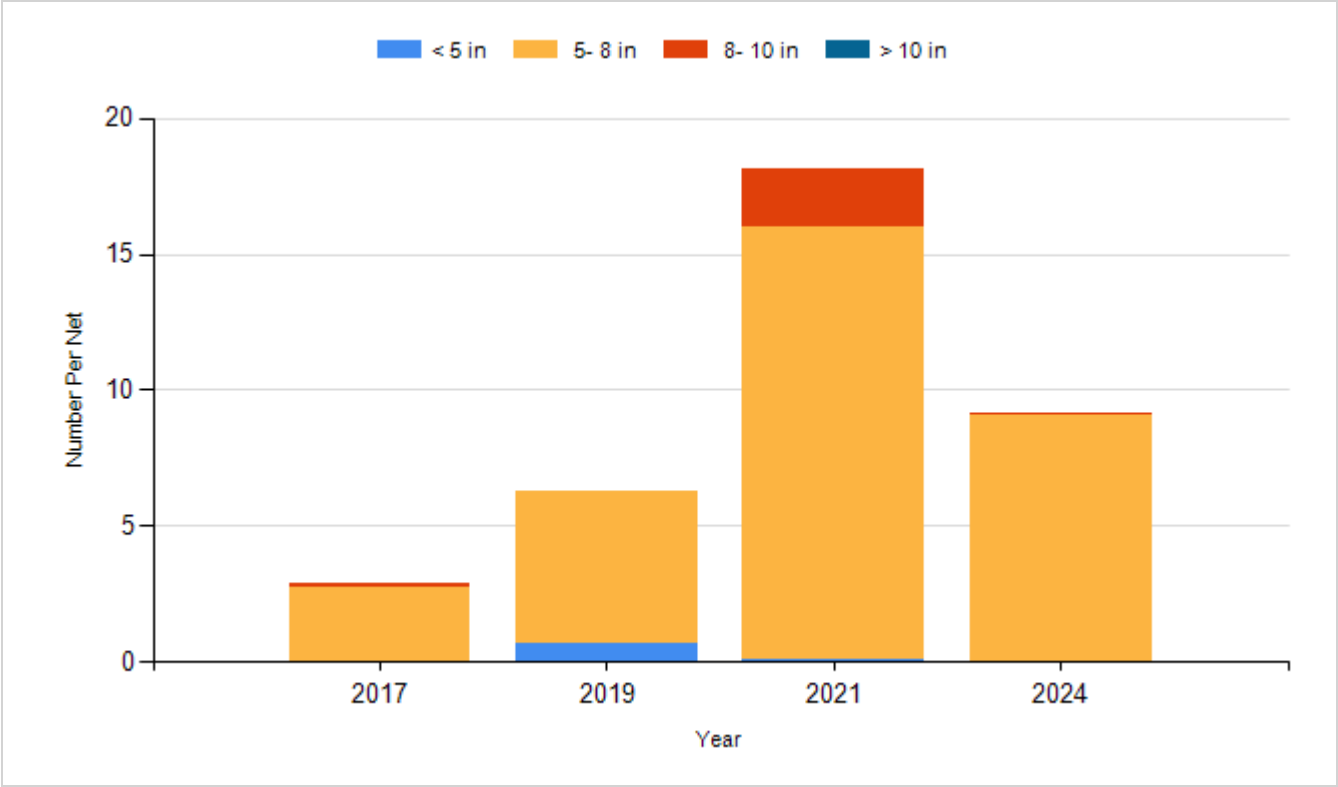
Species: Walleye
Gear: AFS std gill net



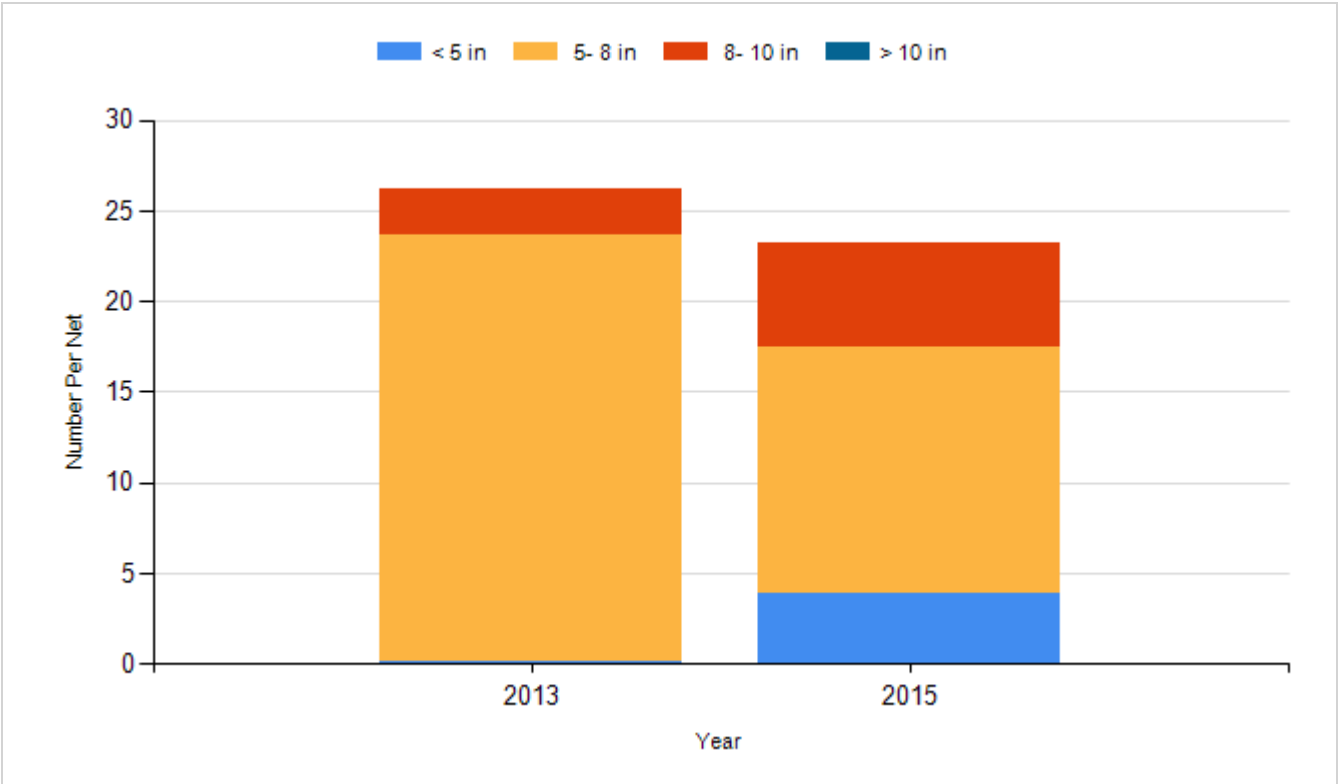
Species: Walleye
Gear: std exp gill net



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
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
2022	Walleye	Juvenile	89,428
2024	Walleye	Juvenile	119,600