

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

Sunfish Hybrid

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.
- **std 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.

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

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)
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**

Gear	Species	Sample Size (n)	Abundance		Stock Density Indices			Condition		
			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	
	Sunfish Hybrid	1	0.1	0.1	100		0			
	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

Gear	Species	CPUE										Avg	
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
AFS std frame net	Black Bullhead			57.8									57.80
	Black Crappie			0.6									0.60
	Bluegill			8.5									8.50
	Common Carp			0.1									0.10
	Largemouth Bass			0.1									0.10
	Northern Pike			0.2									0.20
	Smallmouth Bass			0.1									0.10
	Walleye			0.2									0.20
	White Sucker			0.3									0.30
	Yellow Perch			0.3									0.30
AFS std gill net	Black Bullhead			21.3		3.5		6.4			4.0		8.80
	Black Crappie			1.4		1.6		2.9			0.2		1.53
	Bluegill			1.4		0.6		1.5			0.8		1.08
	Common Carp			0.1		0.1		0.0			0.1		0.08
	Golden Shiner			0.0		0.0		0.0			0.0		0.00
	Largemouth Bass			0.3		0.3		0.2			0.1		0.23
	Northern Pike			4.1		2.1		2.8			5.5		3.63
	Walleye			3.5		5.3		3.3			3.2		3.83
	White Sucker			5.5		1.3		2.4			1.5		2.68
	Yellow Perch			2.9		5.6		18.1			9.2		8.95
boat shocker (day)	Largemouth Bass					11.0							11.00
boat shocker (night, AC)	Largemouth Bass	27.8											27.80
fall night EF-WAE*	Walleye								188.0		17.4		102.70
frame net (std 3/4 in)	Black Bullhead	19.3				22.8		11.7			9.3		15.78
	Black Crappie	1.4				4.5		6.8			5.4		4.53
	Bluegill	9.6				21.8		59.3			157.4		62.03
	Largemouth Bass	0.0				0.0		0.0			0.0		0.00
	Northern Pike	0.5				0.3		1.6			1.5		0.98
	Smallmouth Bass	0.1				0.0		0.0			0.1		0.05
	Sunfish Hybrid	0.0				0.0		0.0			0.1		0.03
	Walleye	0.2				0.1		0.4			0.4		0.28
	Western Painted Turtle	0.0				0.0		0.0			0.0		0.00

		CPUE										
Gear	Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Avg
frame net (std 3/4 in)	White Sucker	0.0				0.3		0.2			0.0	0.13
	Yellow Perch	2.0				0.2		2.0			2.5	1.68
std exp gill net	Black Bullhead	25.0										25.00
	Black Crappie	0.3										0.30
	Bluegill	0.0										0.00
	Emerald Shiner	0.0										0.00
	Northern Pike	4.5										4.50
	Walleye	6.2										6.20
	White Sucker	7.7										7.70
	Yellow Perch	19.3										19.30

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												
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024			
AFS std frame net	Black Bullhead	PSD			100										
		PSD-P			86										
		Wr			85										
	Black Crappie	PSD			91										
		PSD-P			82										
		Wr			95										
	Bluegill	PSD			33										
		PSD-P			25										
		Wr			105										
	Largemouth Bass	PSD			50										
		PSD-P			0										
		Wr			121										
	Northern Pike	PSD			75										
		PSD-P			25										
		Wr			72										
	Smallmouth Bass	PSD			100										
		PSD-P			100										
		Wr			113										
	Walleye	PSD			67										
		PSD-P			0										
		Wr			88										
White Sucker	PSD			100											
	PSD-P			100											
	Wr			94											
Yellow Perch	PSD			33											
	PSD-P			17											
	Wr			88											
AFS std gill net	Black Bullhead	PSD			100			98		70				85	
		PSD-P			69			64		40				19	
		Wr			83			91		86				100	
	Black Crappie	PSD			71			53		97				100	
		PSD-P			53			42		31				50	
		Wr			106			107		108				102	

Gear	Species	Index	Year												
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024			
AFS std gill net	Bluegill	PSD			94			57		100				50	
		PSD-P			65			57		11				30	
		Wr			118			120		120				117	
	Largemouth Bass	PSD			75			100		50				100	
		PSD-P			25			67		50				100	
		Wr			119			115		126				122	
	Northern Pike	PSD			39			68		67				67	
		PSD-P			6			4		9				2	
		Wr			85			90		84				88	
	Walleye	PSD			43			81		68				76	
		PSD-P			14			16		48				16	
		Wr			89			91		88				92	
	White Sucker	PSD			100			100		100				100	
		PSD-P			100			100		100				89	
		Wr			107			107		108				111	
	Yellow Perch	PSD			6			0		12				1	
		PSD-P			0			0		0				0	
		Wr			102			106		101				103	
boat shocker (day)	Largemouth Bass	PSD						100							
		PSD-P						27							
		Wr						114							
boat shocker (night, AC)	Largemouth Bass	PSD	61												
		PSD-P	21												
		Wr	113												
frame net (std 3/4 in)	Black Bullhead	PSD	99					99		87				88	
		PSD-P	33					80		53				22	
		Wr	88					88		85				91	
	Black Crappie	PSD	96						12		100				79
		PSD-P	92						8		48				47
		Wr	97						100		101				104
	Bluegill	PSD	45						6		73				57
		PSD-P	45						2		11				10
		Wr	121						105		112				112
	Largemouth Bass	PSD													0
		PSD-P													0
	Northern Pike	PSD	13						100		52				81

Gear	Species	Index	Year												
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024			
frame net (std 3/4 in)	Northern Pike	PSD-P	0					20		14				22	
		Wr	80					87		76				83	
	Smallmouth Bass	PSD	100												0
		PSD-P	100												0
		Wr	114												112
	Walleye	PSD	50						100		63				75
		PSD-P	50						0		63				63
		Wr	130						82		86				88
	White Sucker	PSD							100		100				
		PSD-P							100		100				
		Wr							90		94				
	Yellow Perch	PSD	85						0		19				13
		PSD-P	3						0		0				0
		Wr	88						90		91				90
	std exp gill net	Black Bullhead	PSD	97											
PSD-P			10												
Wr			90												
Black Crappie		PSD	100												
		PSD-P	100												
		Wr	94												
Northern Pike		PSD	37												
		PSD-P	15												
		Wr	83												
Walleye		PSD	32												
		PSD-P	8												
		Wr	88												
White Sucker		PSD	98												
		PSD-P	85												
		Wr	106												
Yellow Perch	PSD	29													
	PSD-P	0													
	Wr	100													

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: Largemouth Bass

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)

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)				

Mean Length (expanded sample number) at capture by age

Year	N	1	2	3	4	5	6	7	8	9	10+
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

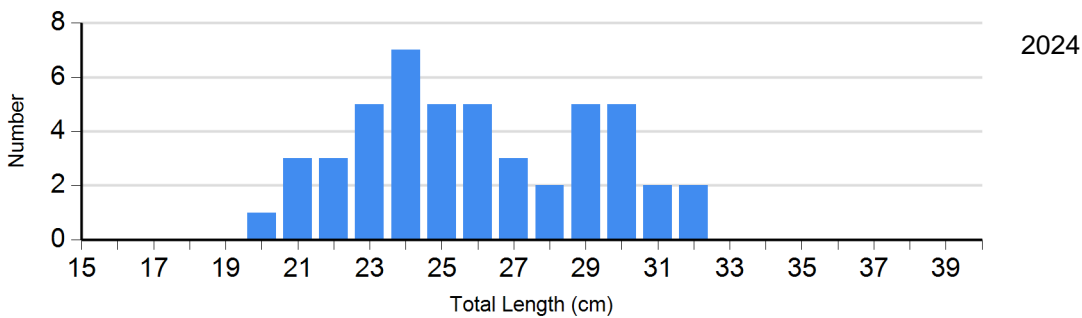
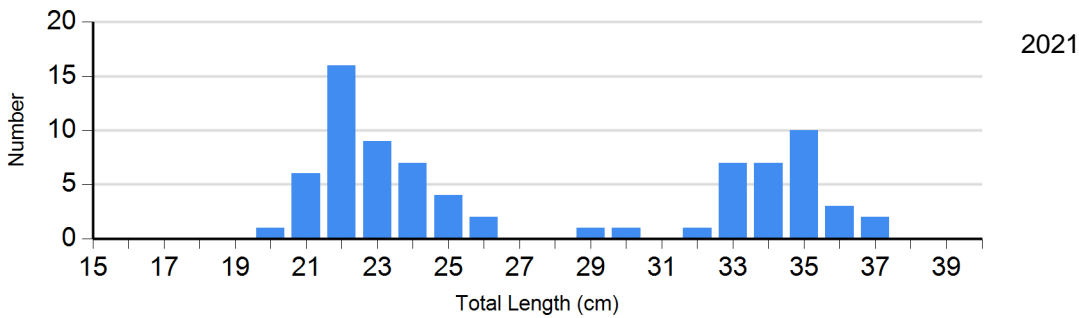
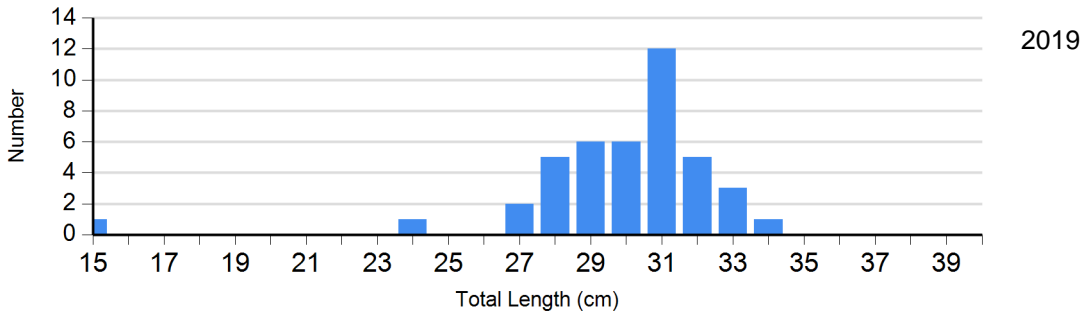
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2021	23	91 (1.8)	23	88 (2.6)	31	81 (1.7)	0	
	2024	7	104 (4.1)	32	100 (2.1)	9	97 (3.7)	0	
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)
White Sucker Gill Net	2021	0		0		7	115 (1.6)	22	106 (1.9)
	2024	0		2	106 (2.8)	1	102	15	112 (1.8)
Yellow Perch Gill Net	2021	191	102 (0.6)	26	95 (1.3)	0		0	
	2024	109	103 (0.9)	1	101	0		0	

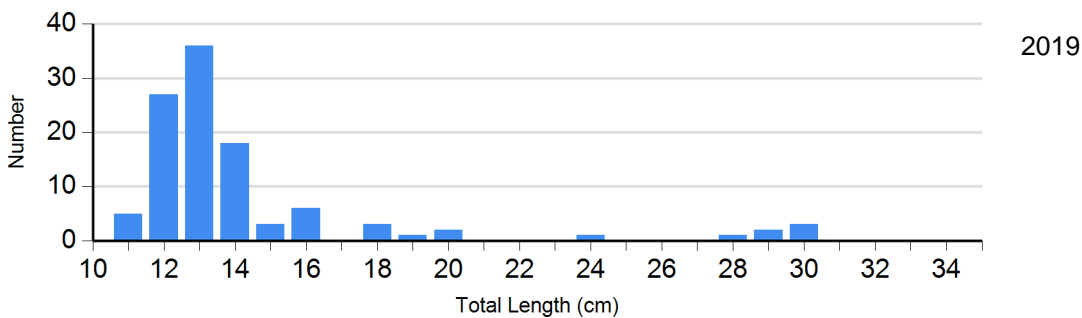
Length Frequency Distribution

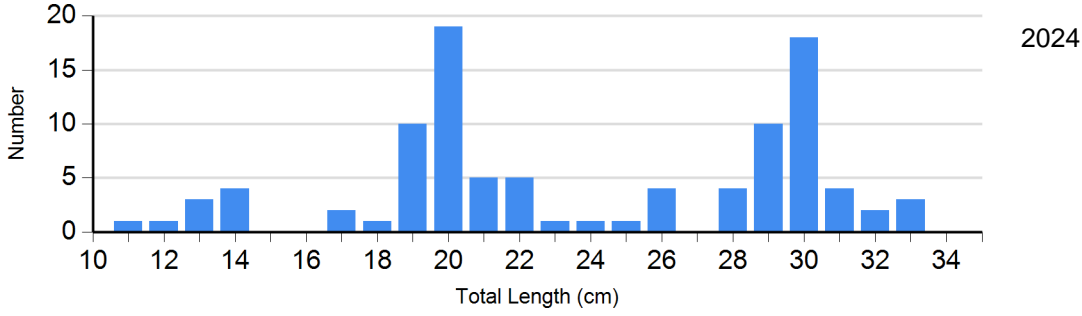
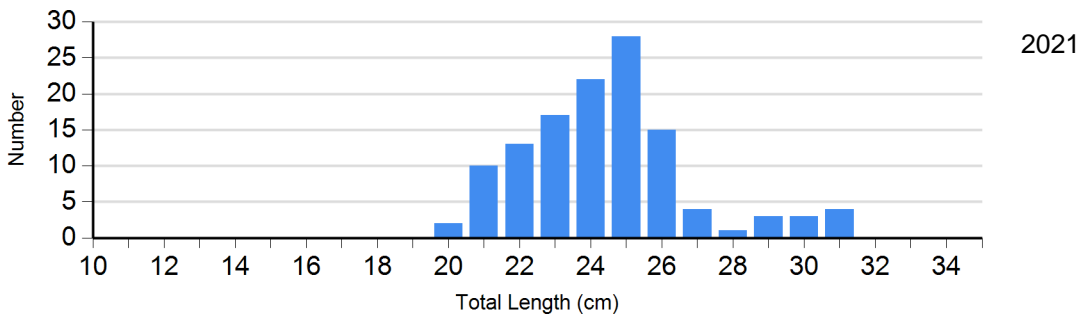
Length frequency histogram of species sampled by year.

Species: Black Bullhead
Gear: AFS std gill net

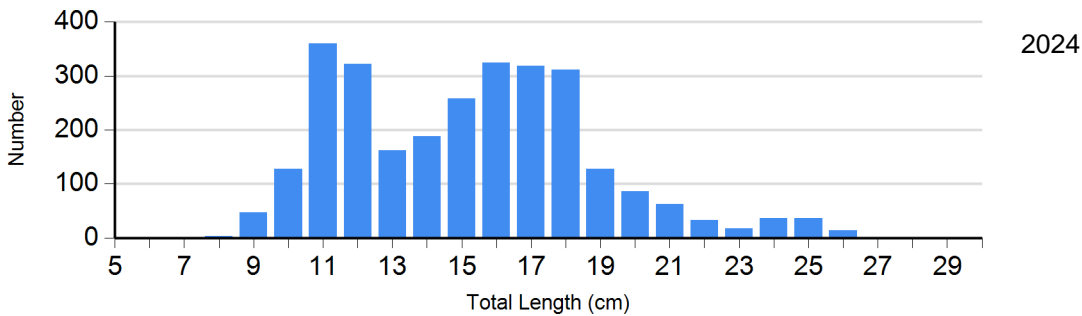
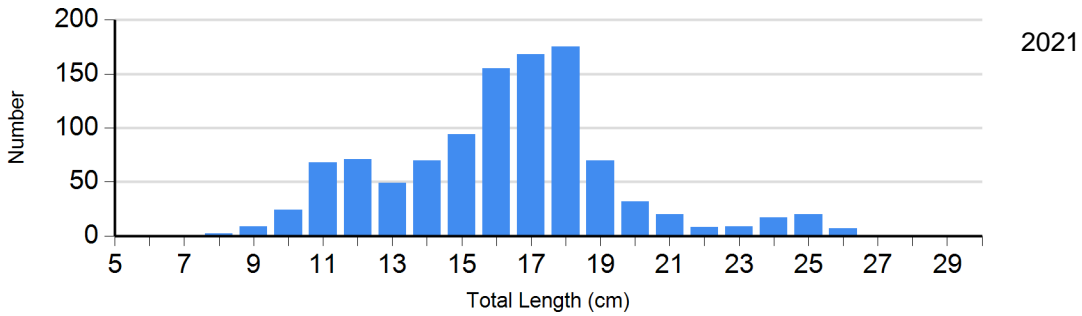
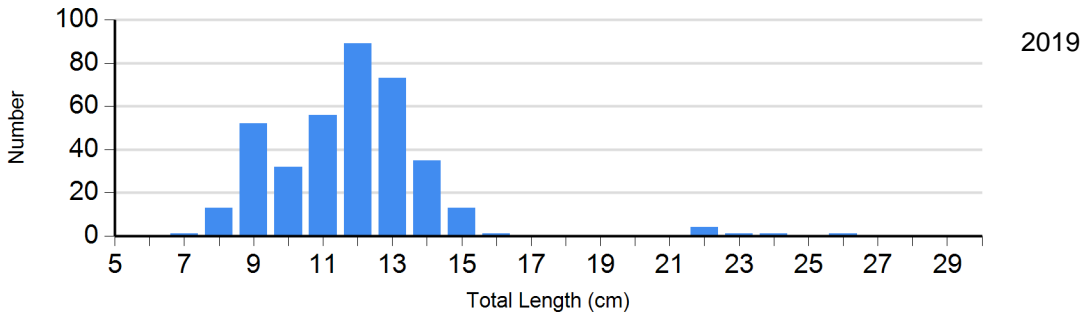


Species: Black Crappie
Gear: frame net (std 3/4 in)

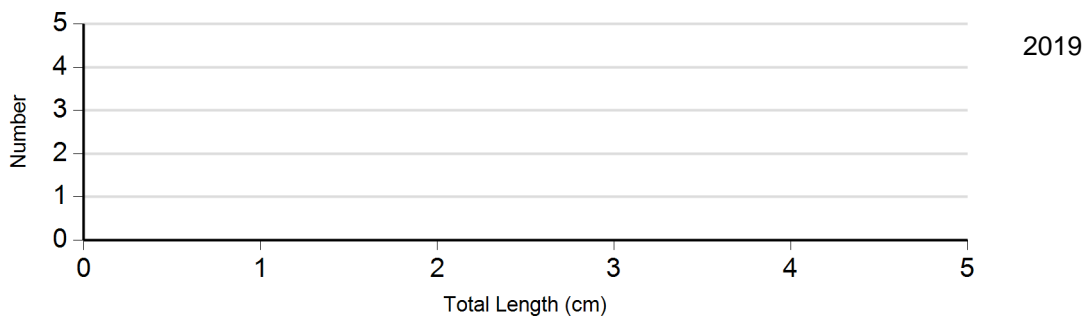




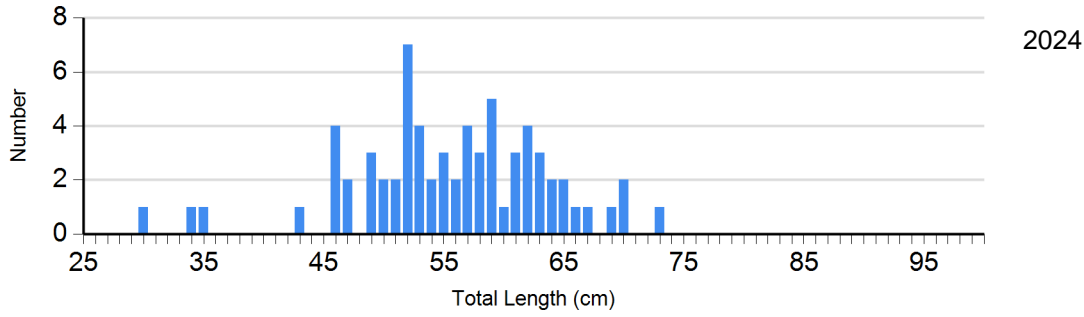
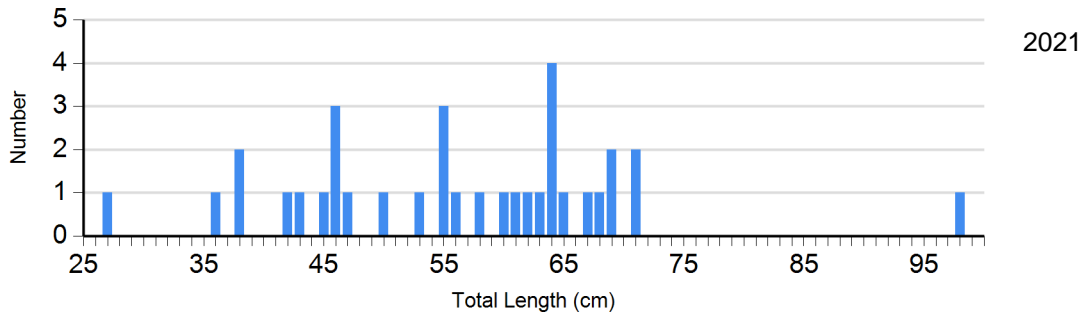
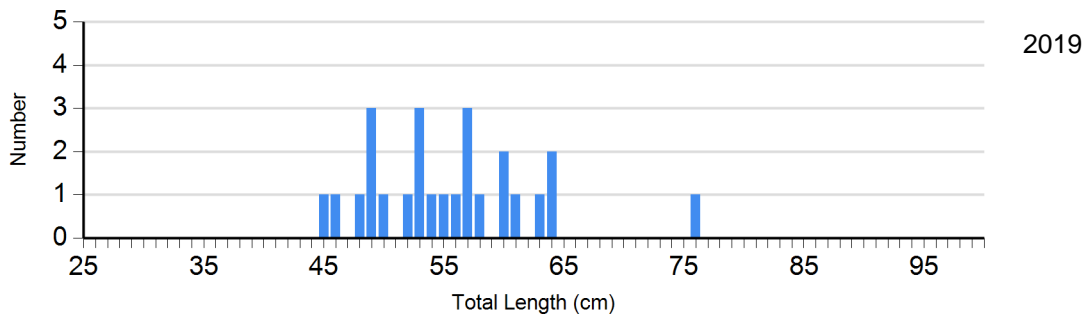
Species: Bluegill
 Gear: frame net (std 3/4 in)



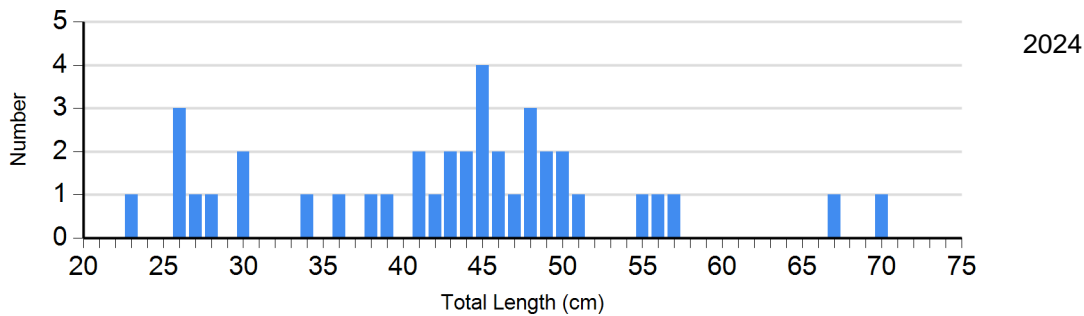
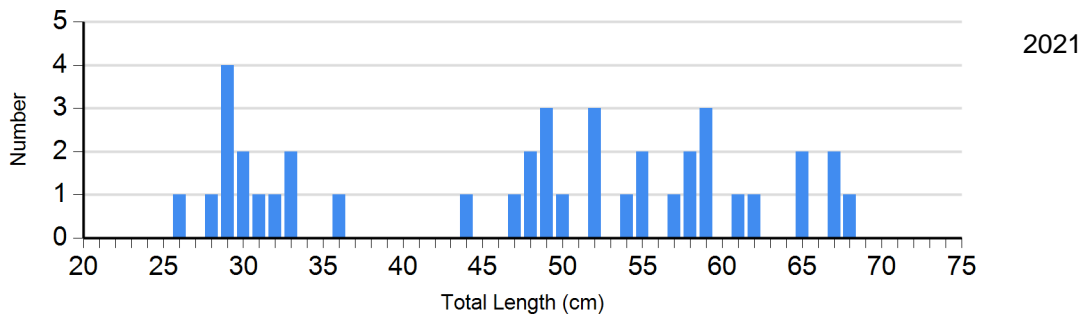
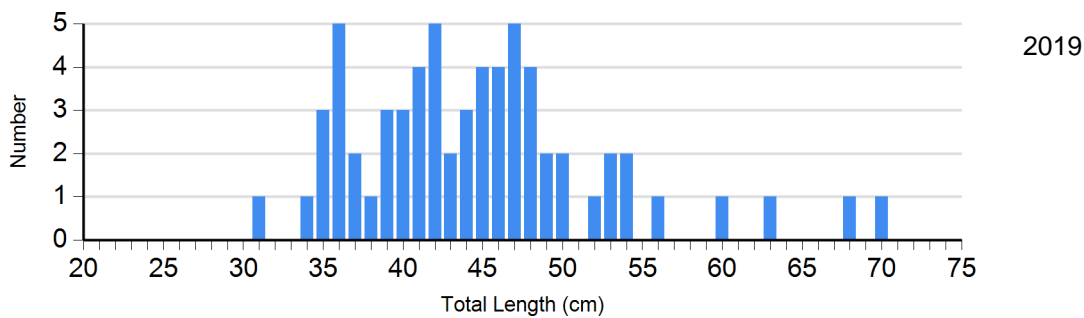
Species: Largemouth Bass
Gear: boat shocker (day)



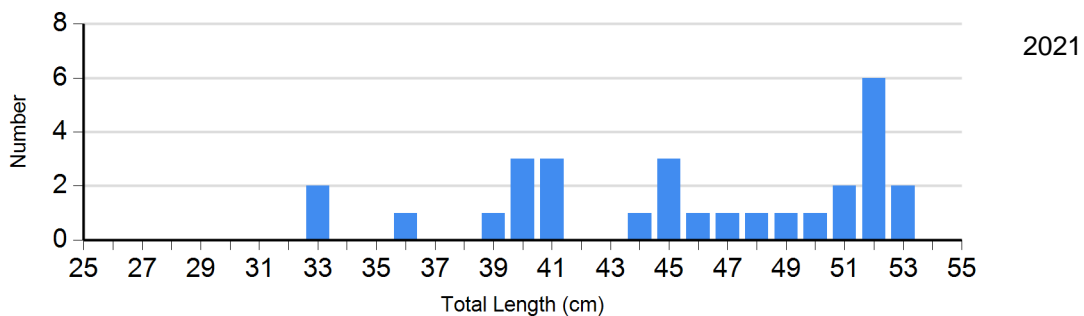
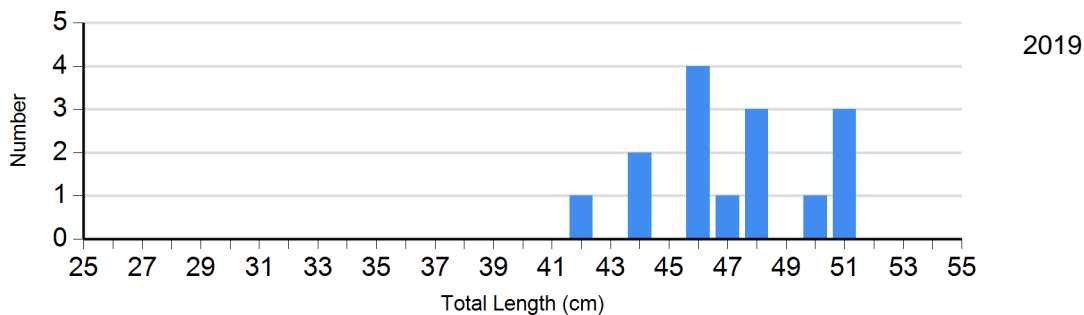
Species: Northern Pike
Gear: AFS std gill net

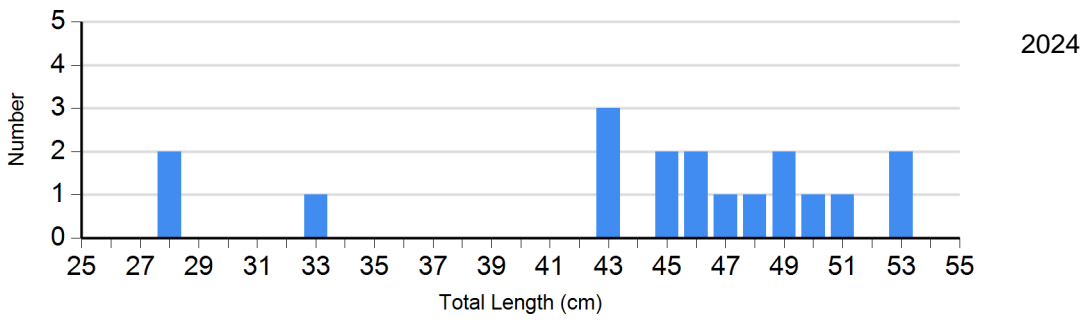


Species: Walleye
 Gear: AFS std gill net

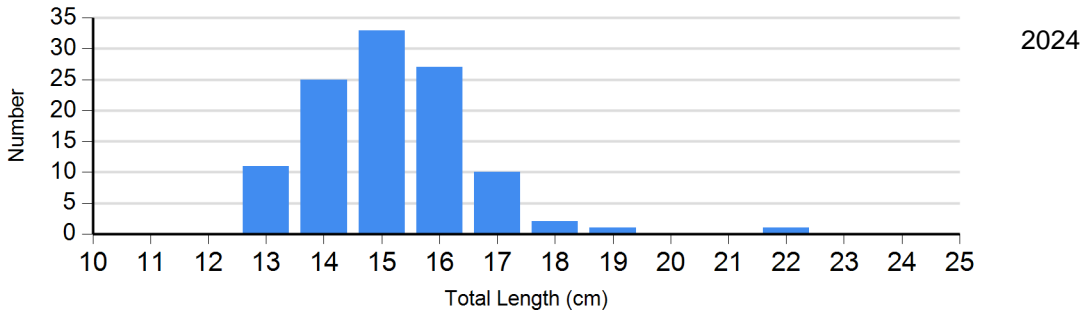
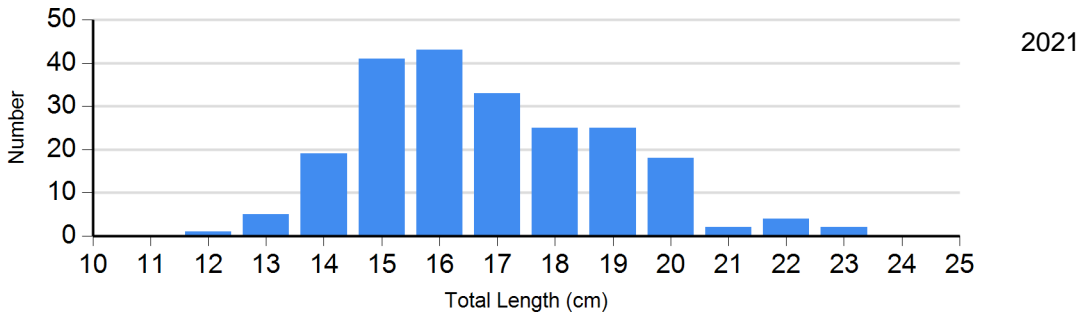
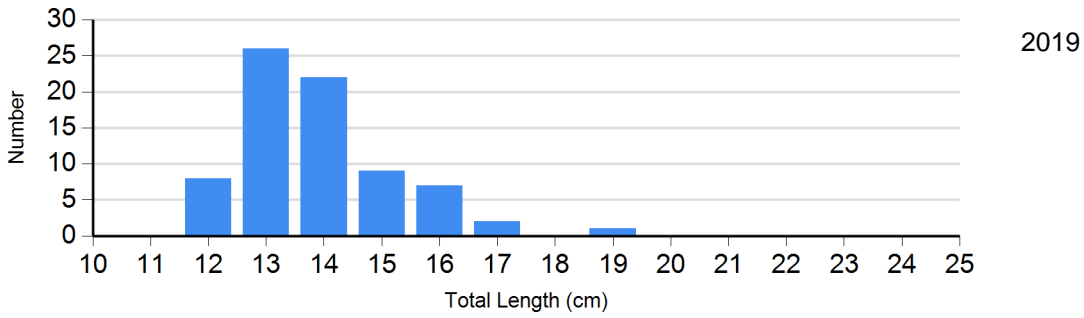


Species: White Sucker
 Gear: AFS std gill net





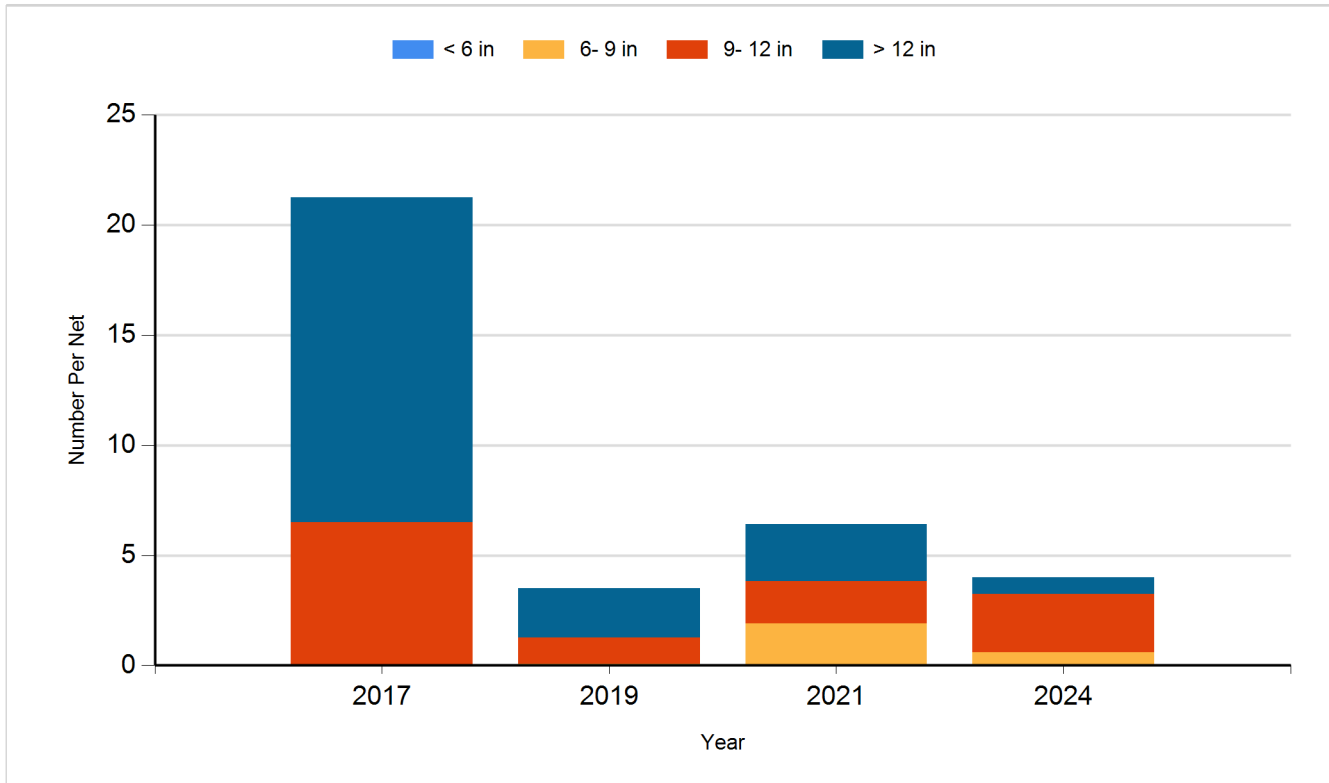
Species: Yellow Perch
 Gear: AFS std gill net



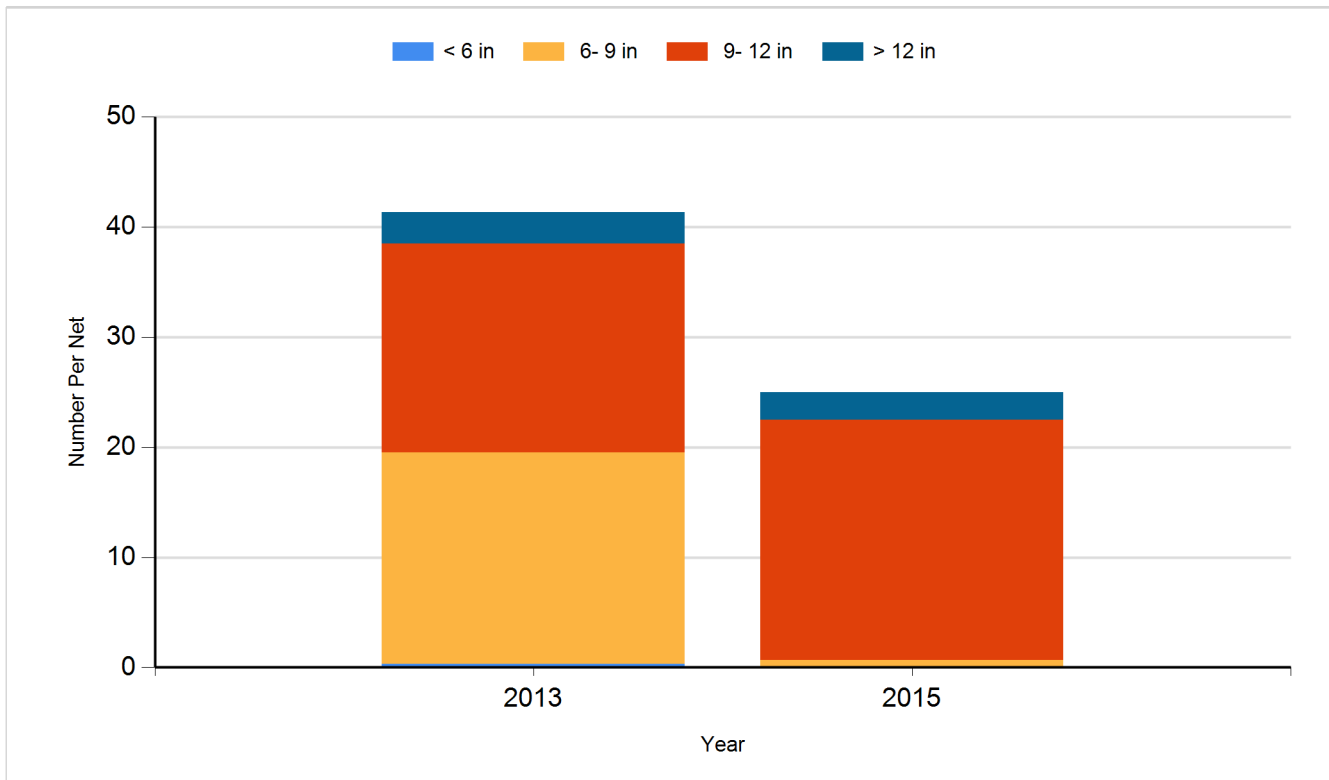
Historic Fish Sizes and Relative Abundance

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

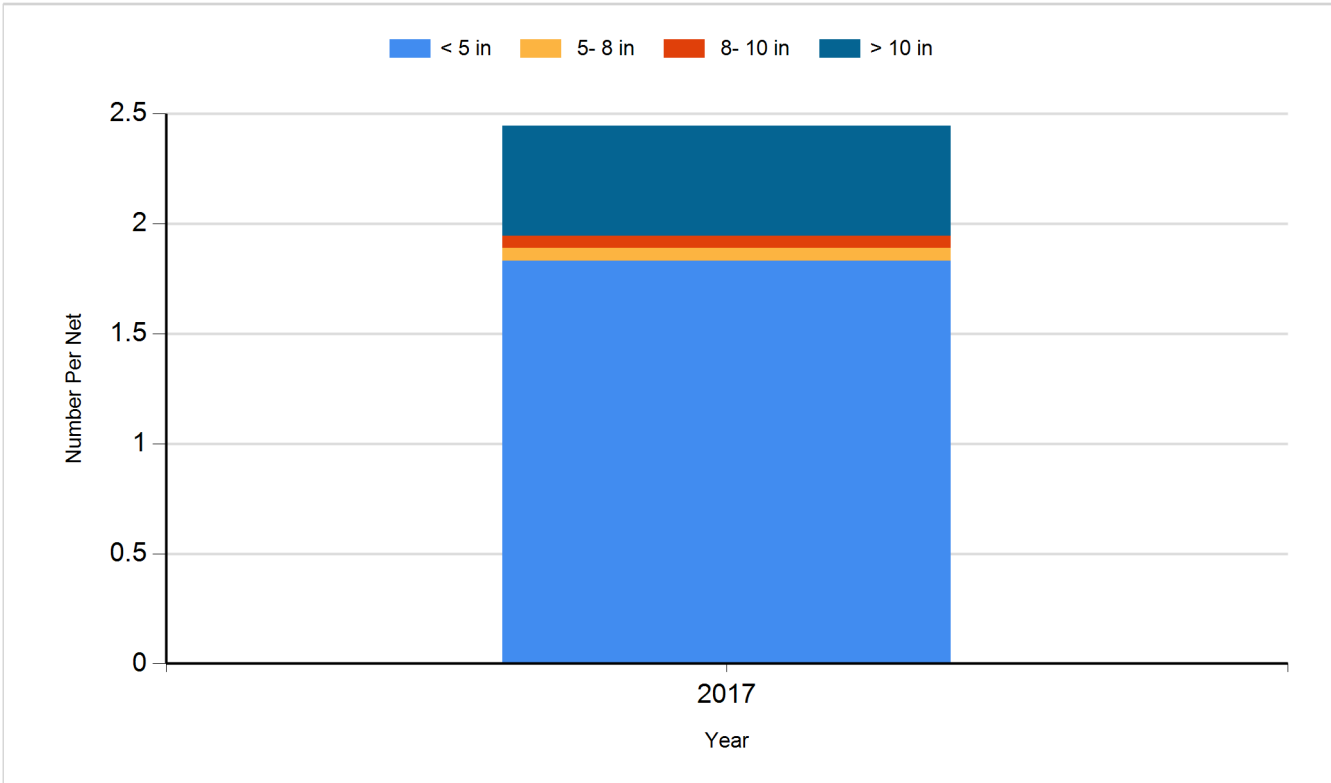
Species: Black Bullhead
Gear: AFS std gill net



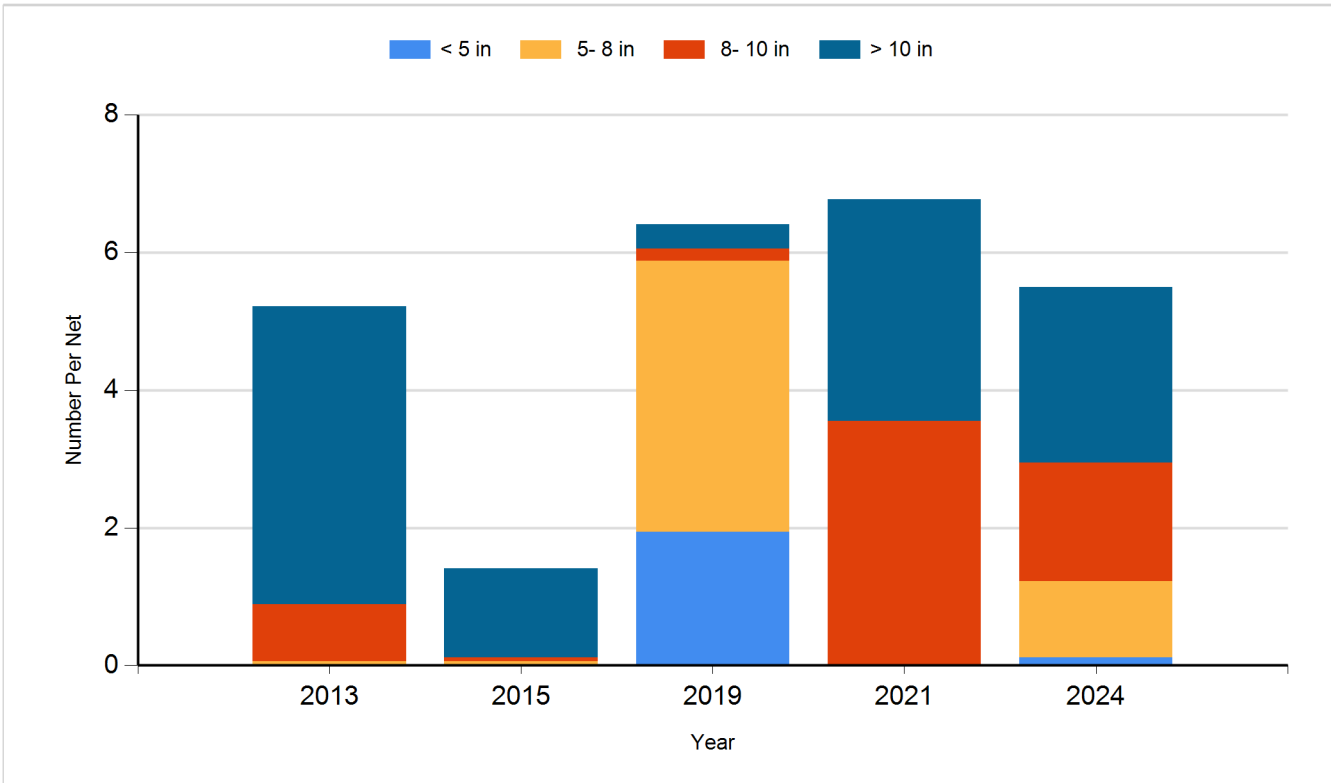
Species: Black Bullhead
Gear: std exp gill net



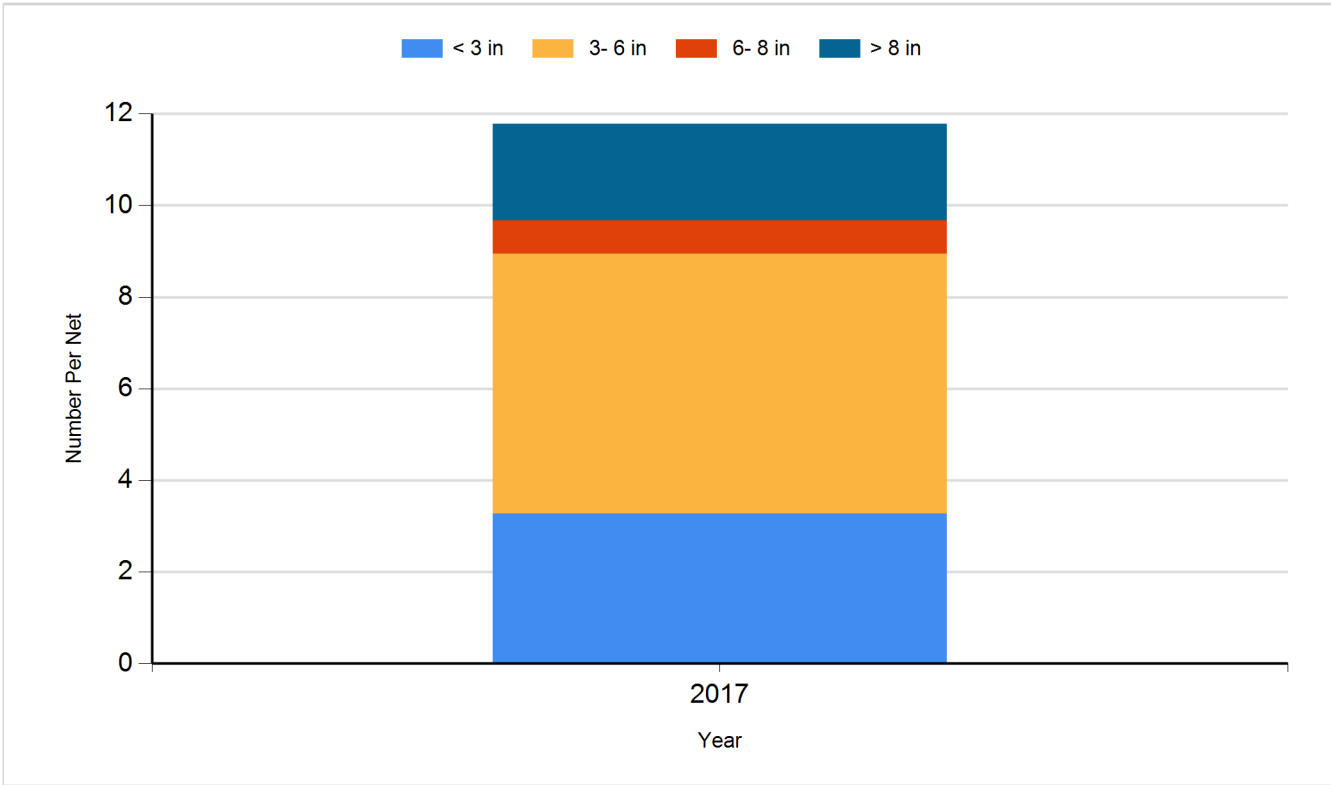
Species: Black Crappie
Gear: AFS std frame net



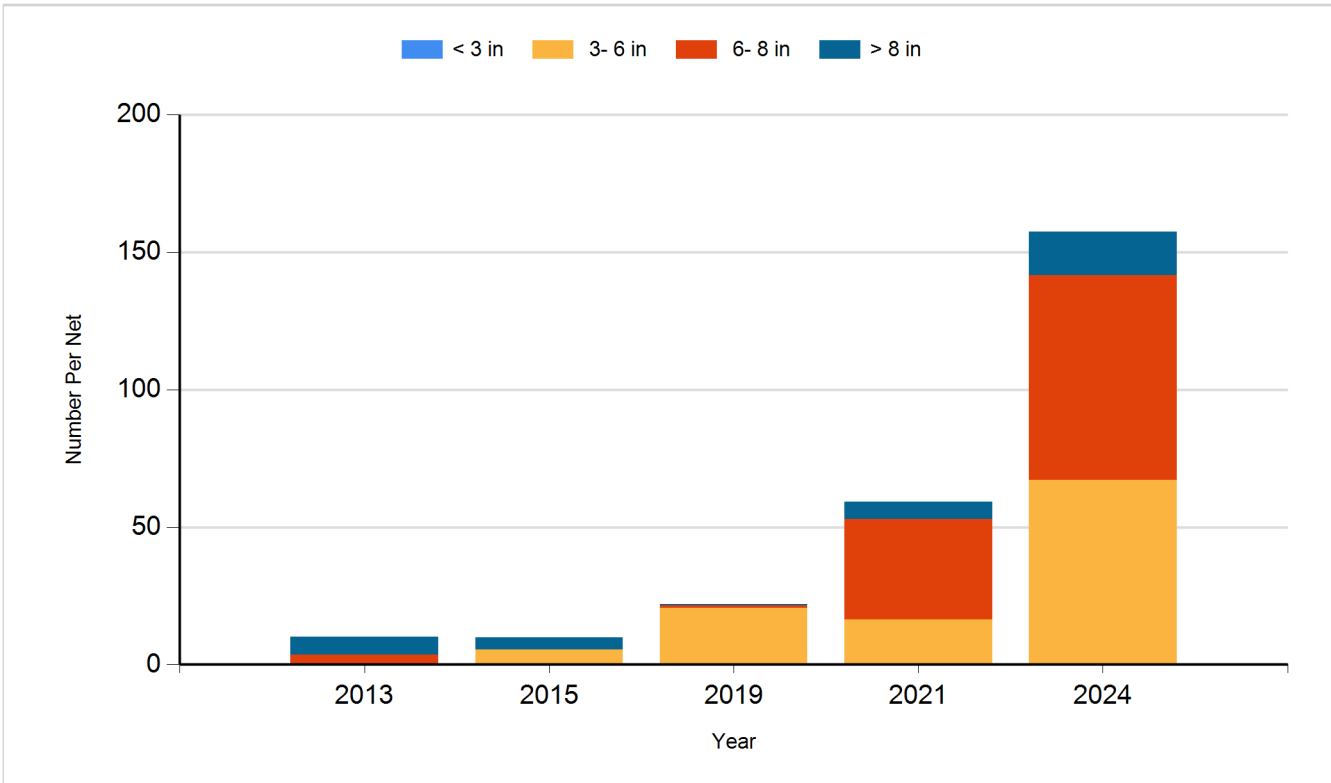
Species: Black Crappie
Gear: frame net (std 3/4 in)



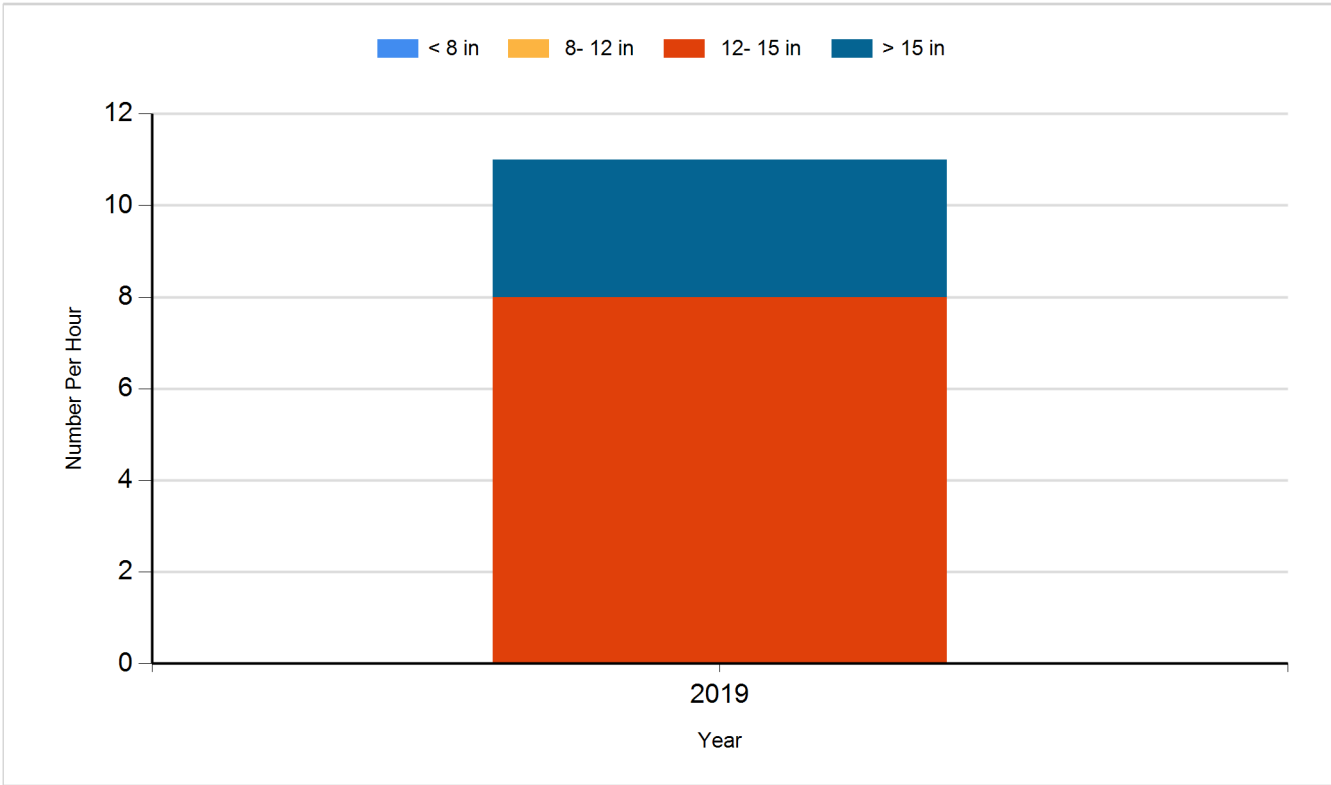
Species: Bluegill
Gear: AFS std frame net



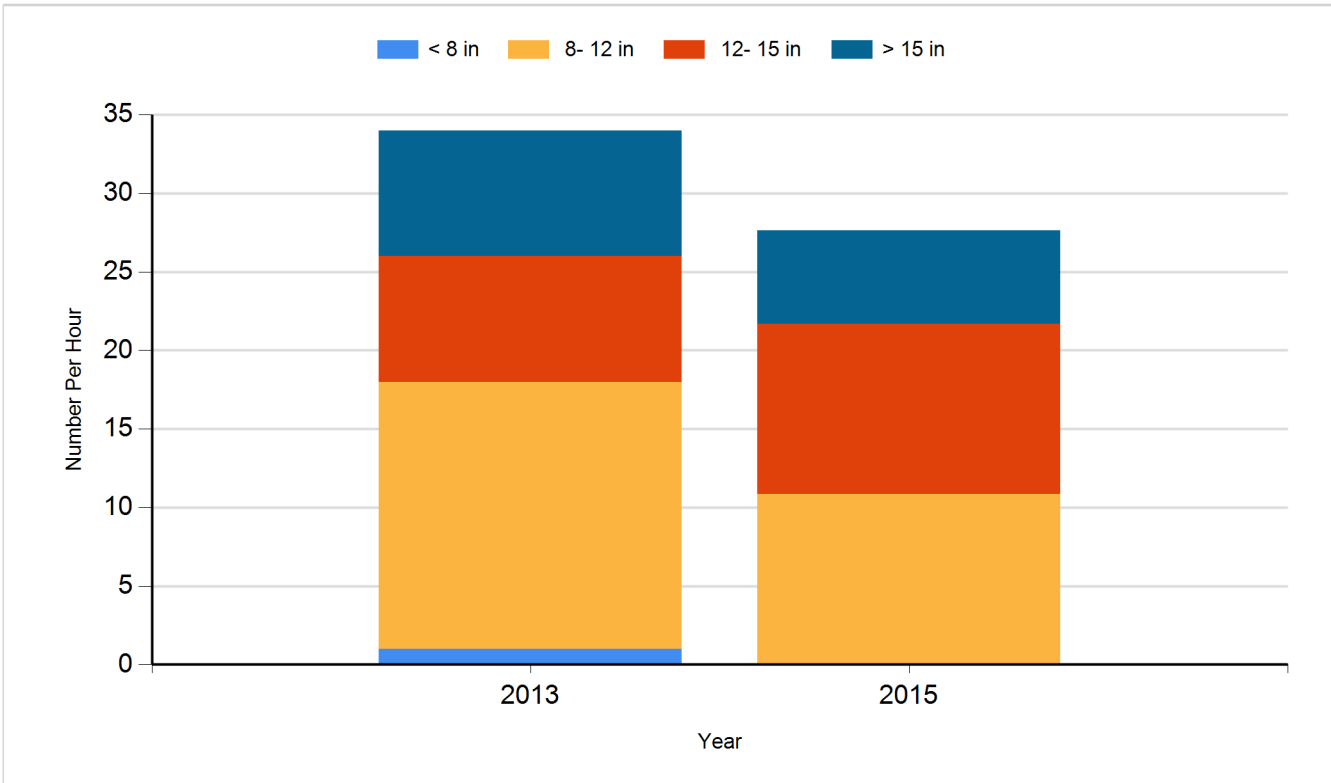
Species: Bluegill
Gear: frame net (std 3/4 in)



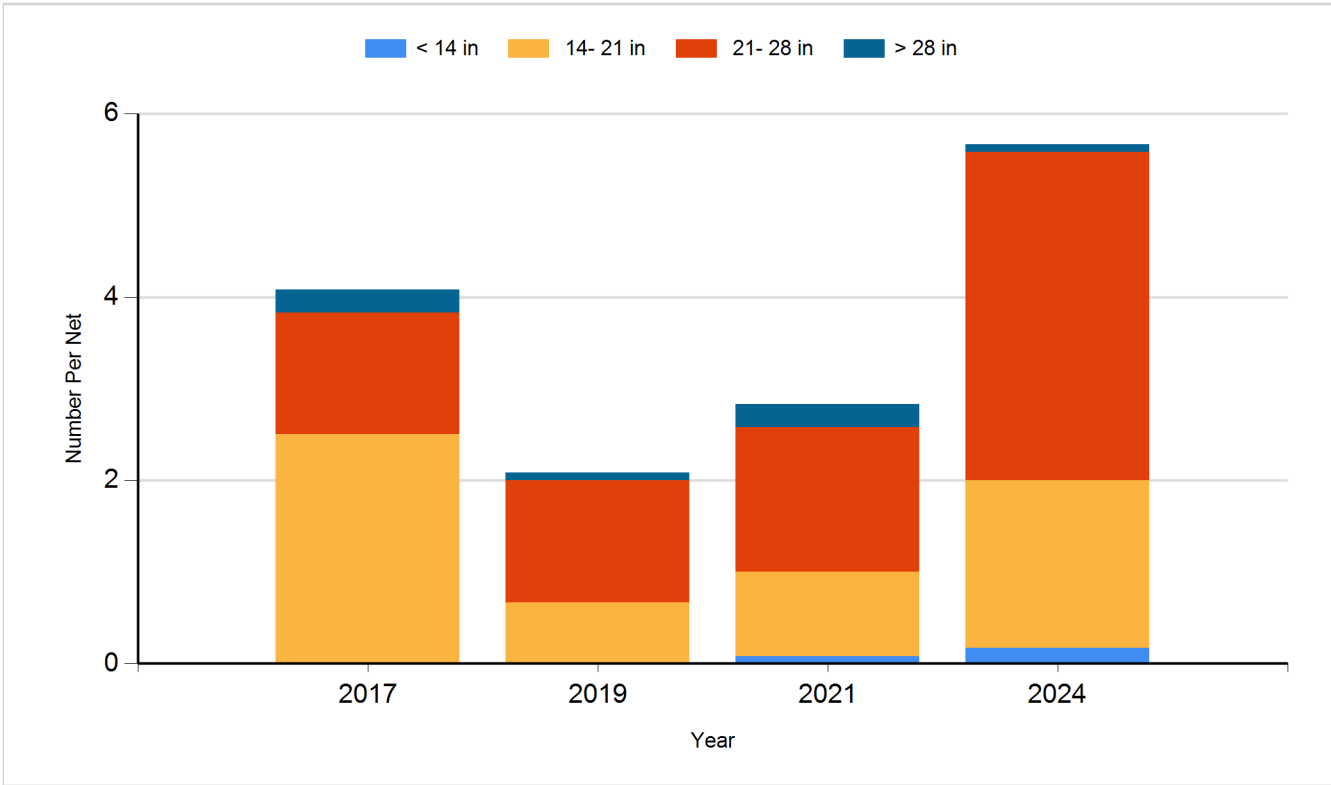
Species: Largemouth Bass
Gear: boat shocker (day)



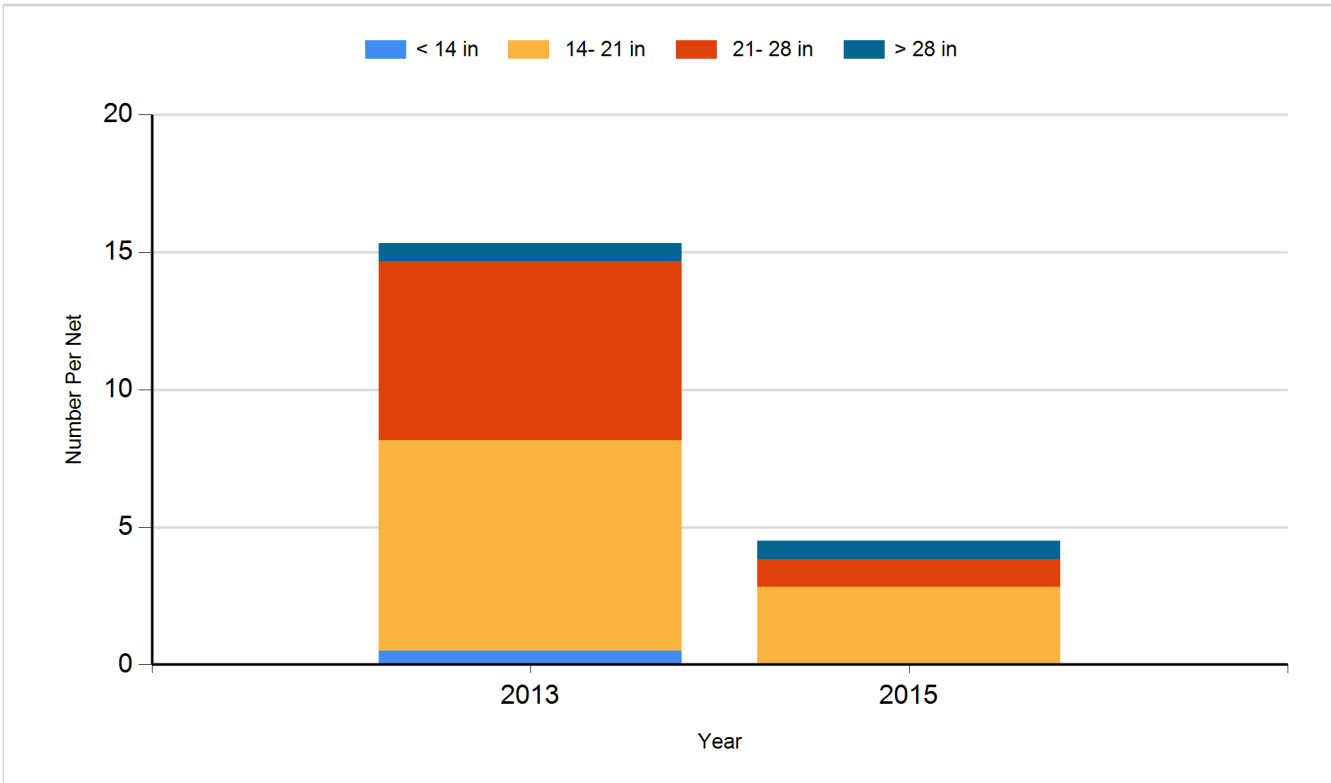
Species: Largemouth Bass
Gear: boat shocker (night, AC)



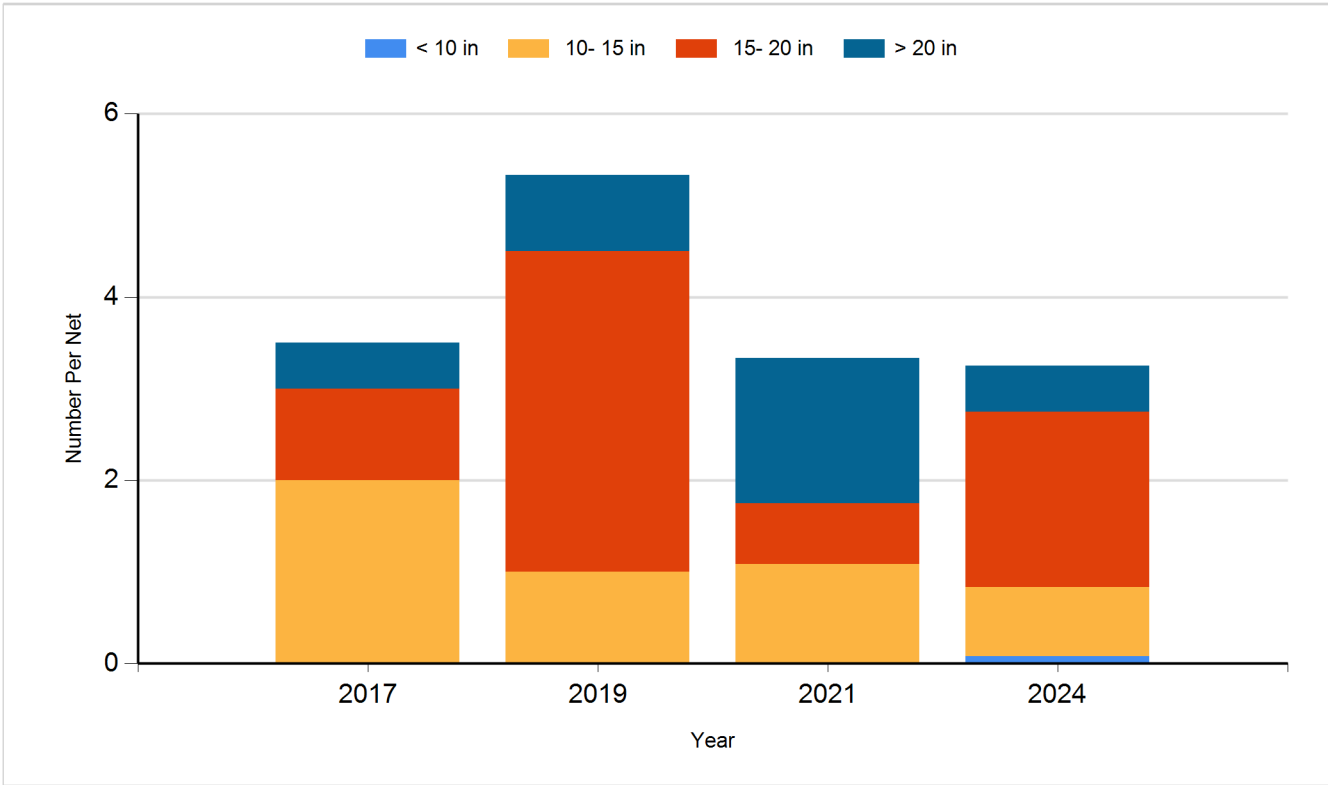
Species: Northern Pike
Gear: AFS std gill net



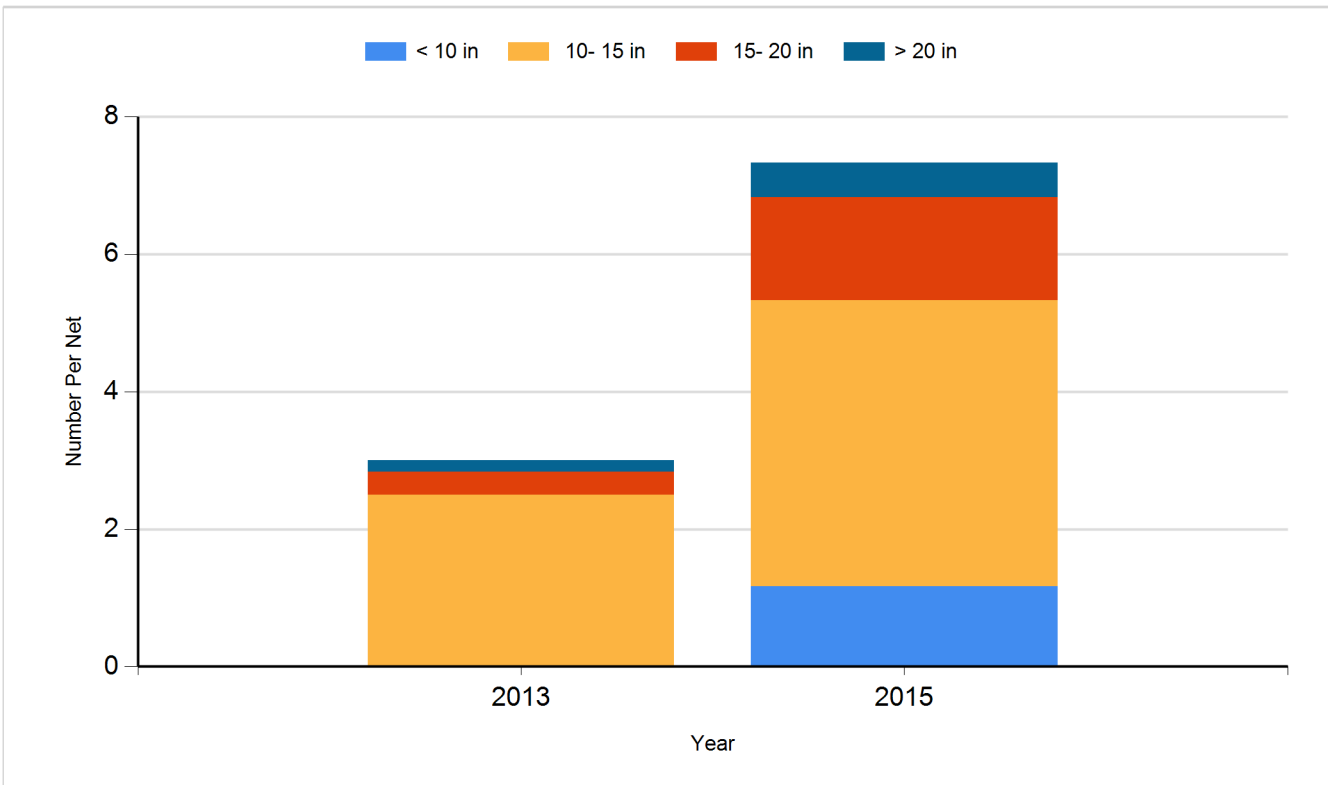
Species: Northern Pike
Gear: std exp gill net



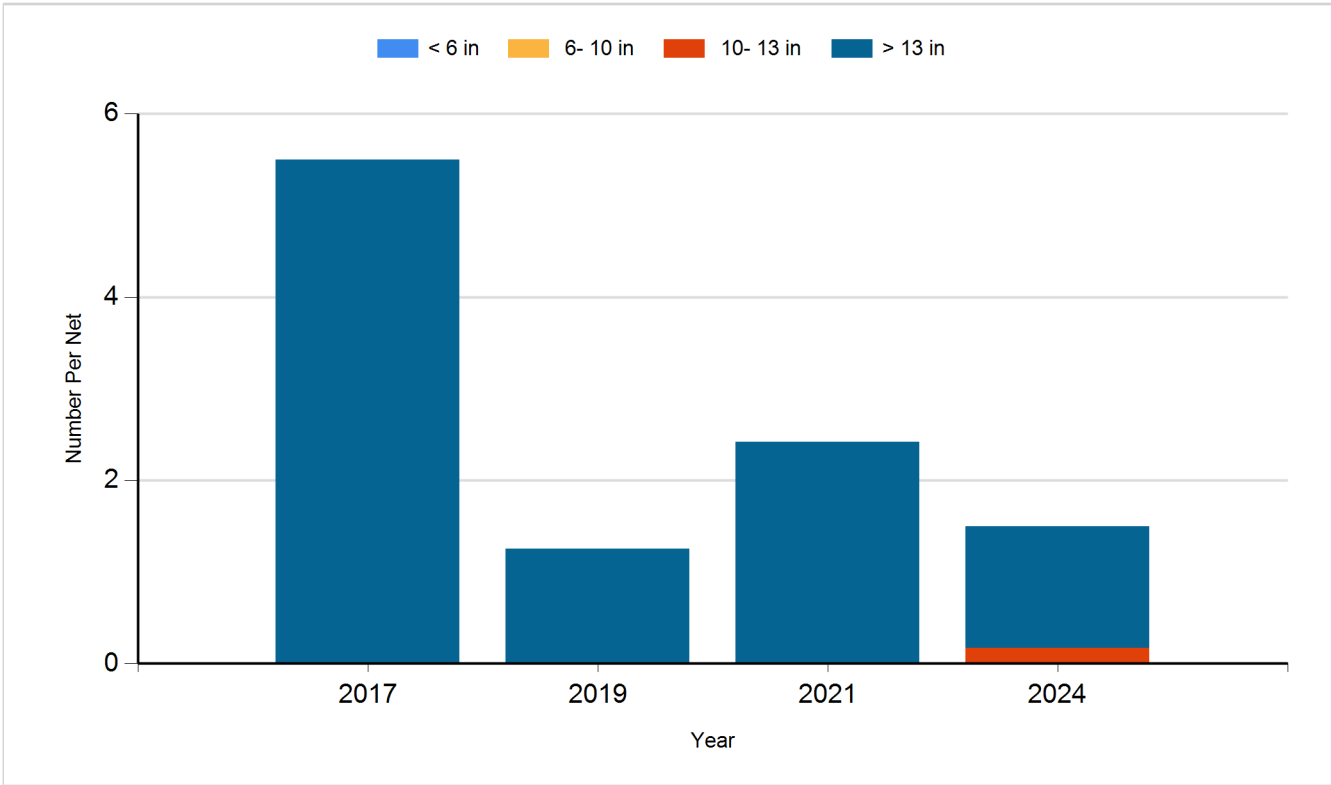
Species: Walleye
Gear: AFS std gill net



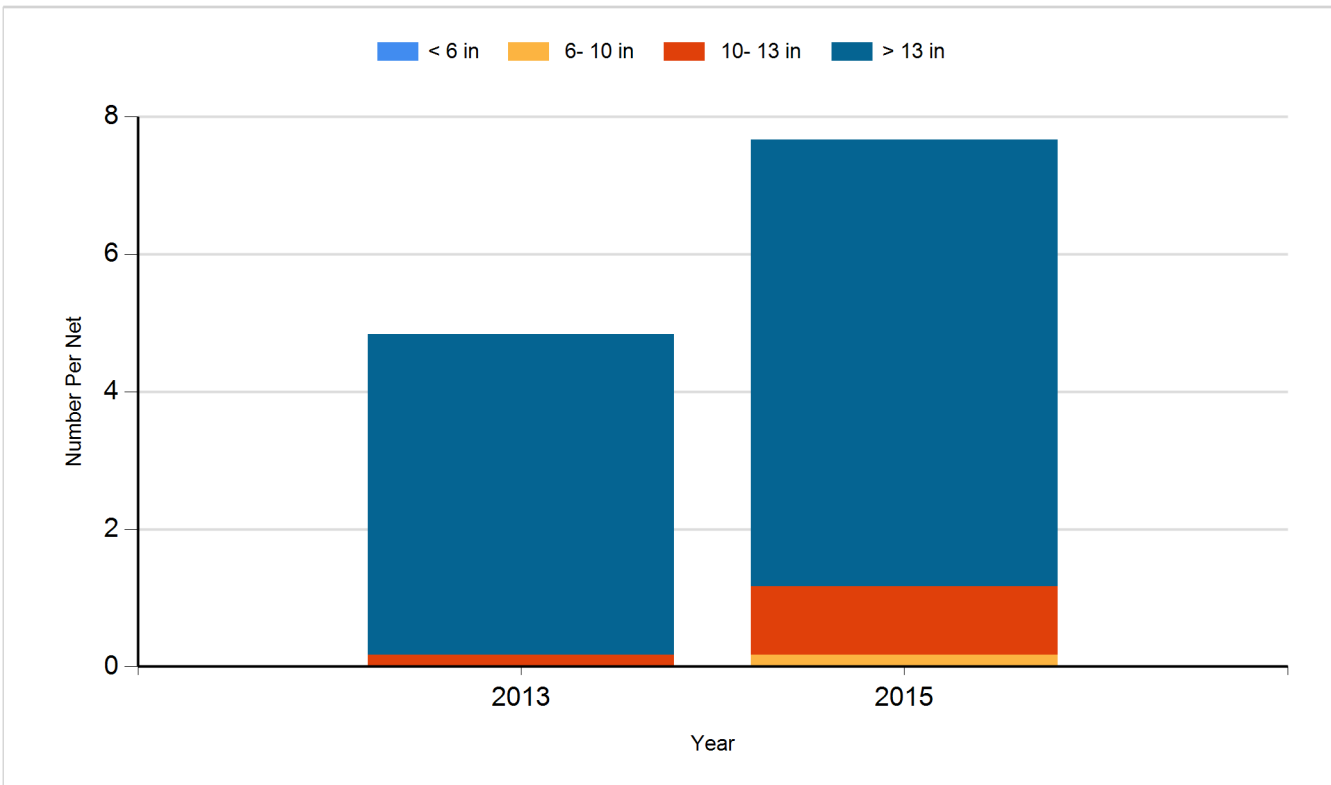
Species: Walleye
Gear: std exp gill net



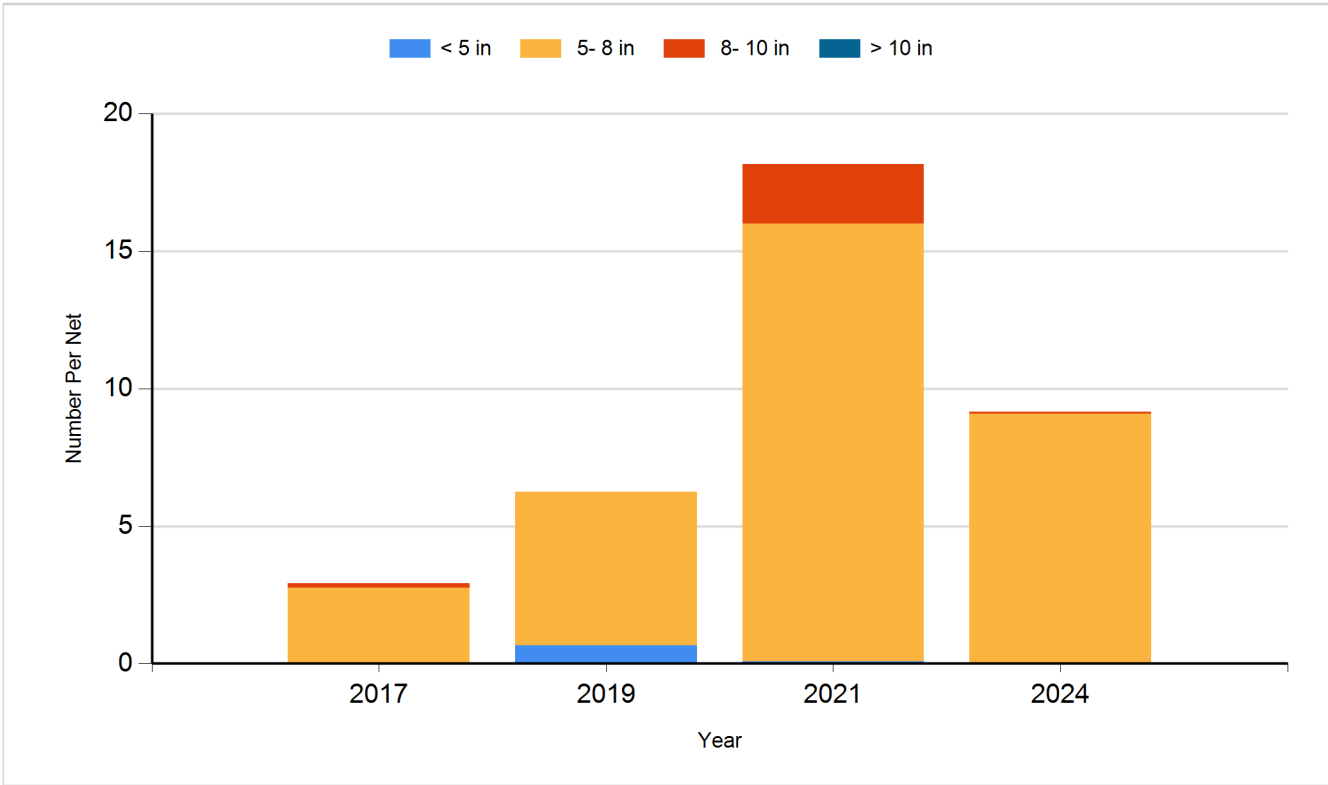
Species: White Sucker
Gear: AFS std gill net



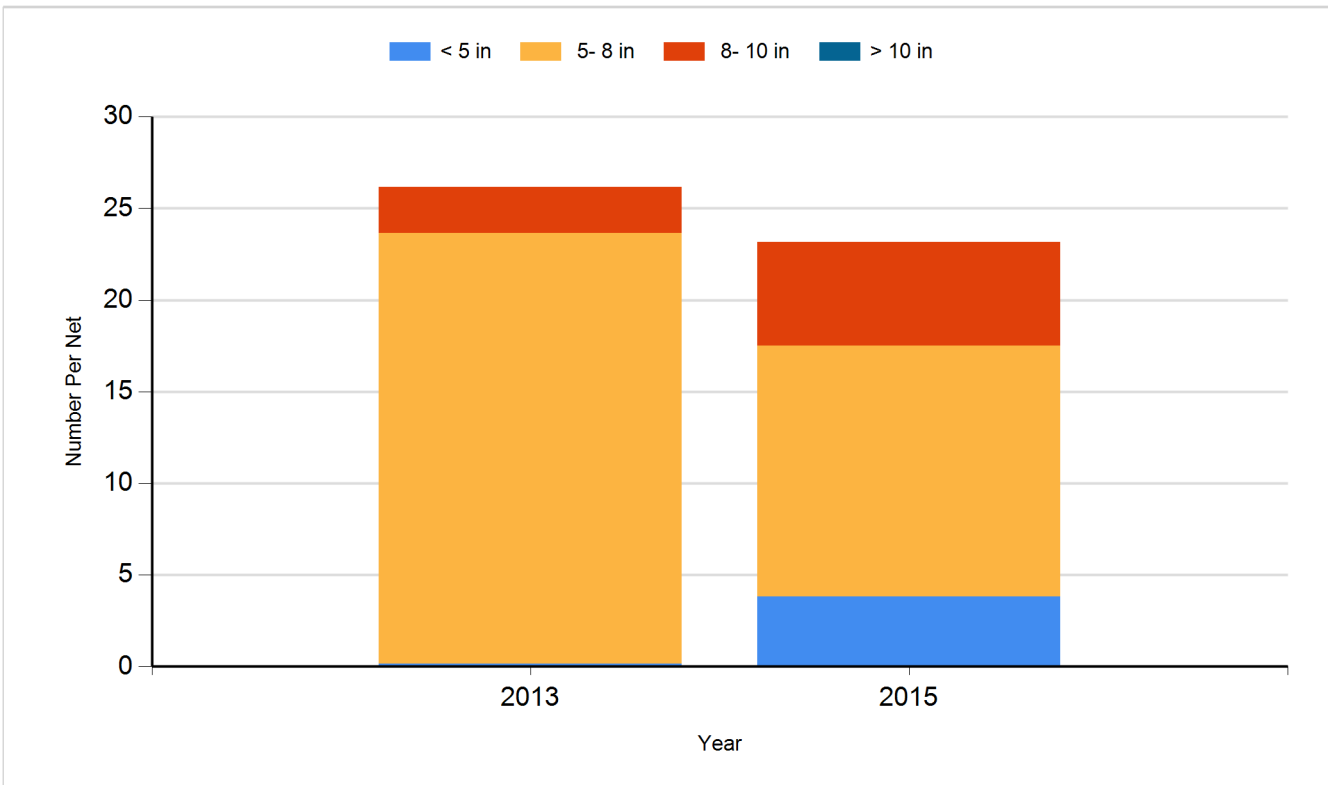
Species: White Sucker
Gear: std exp gill net



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