

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Buffalo North, Marshall County
UJA-Lake-917-700
2022

Lake Information

Name: Buffalo North

County: Marshall

Surface Area: 414 Acres

OHWM Elevation: 1,835

Outlet Elevation: 1,835

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 14, 2022	6 net-nights
fall night EF-WAE	Sep 26, 2022	3400 seconds
frame net (std 3/4 in)	Jun 14, 2022	12 net-nights

Common Fish Species Present

Bluegill

Walleye

Yellow Perch

Black Bullhead

Northern Pike

Black Crappie

White Sucker

Largemouth Bass

Green Sunfish

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.
- **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	23	3.8	2.3	87		26	15	90	4
	Black Crappie	14	2.3	2.1	79		21		111	4
	Bluegill	42	7.0	3.3	62	11	0		120	3
	Golden Shiner	5	0.0	0.0						
	Largemouth Bass	3	0.5	0.3	100		100		116	4
	Northern Pike	48	8.0	1.9	65	10	13	8	86	1
	Walleye	13	2.2	1.2	100		85		90	2
	White Sucker	4	0.7	0.5	100		100		108	1
	Yellow Perch	132	22.0	7.9	16	5	0		99	1
frame net (std 3/4 in)	Black Bullhead	174	14.5	4.2	95	2	42	5	84	1
	Black Crappie	37	3.1	1.5	100		19	10	103	1
	Bluegill	710	59.2	14.4	74	2	2	1	106	1
	Green Sunfish	1	0.1	0.1	100		0		122	
	Northern Pike	15	1.3	0.4	73		20		82	3
	Walleye	2	0.2	0.2	100		50		91	5
	White Sucker	4	0.3	0.5	100		100		101	4
	Yellow Perch	45	3.8	2.0	44	11	0		81	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	
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
AFS std frame net	Black Bullhead				31.8								31.80
	Black Crappie				0.3								0.30
	Bluegill				33.8								33.80
	Golden Shiner				0.0								0.00
	Northern Pike				0.2								0.20
	Walleye				0.4								0.40
	White Sucker				0.2								0.20
	Yellow Perch				1.1								1.10
AFS std gill net	Black Bullhead				22.2			1.0			3.8		9.00
	Black Crappie				0.8			0.3			2.3		1.13
	Bluegill				1.0			1.7			7.0		3.23
	Common Carp				0.2			0.2			0.0		0.13
	Golden Shiner				0.0			0.0			0.0		0.00
	Largemouth Bass				0.3			0.0			0.5		0.27
	Northern Pike				3.2			5.0			8.0		5.40
	Walleye				3.0			3.7			2.2		2.97
	White Sucker				3.0			0.0			0.7		1.23
	Yellow Perch				14.7			15.2			22.0		17.30
fall night EF-WAE*	Walleye									50.5		50.50	
frame net (std 3/4 in)	Black Bullhead	128.4						11.6			14.5		51.50
	Black Crappie	4.8						2.7			3.1		3.53
	Bluegill	47.1						50.0			59.2		52.10
	Green Sunfish	0.0						0.0			0.1		0.03
	Northern Pike	0.3						0.5			1.3		0.70
	Walleye	0.2						0.0			0.2		0.13
	White Sucker	0.0						0.0			0.3		0.10
	Yellow Perch	25.4						0.5			3.8		9.90
std exp gill net	Black Bullhead	62.3											62.30
	Black Crappie	1.3											1.30
	Bluegill	0.3											0.30
	Common Carp	0.3											0.30
	Northern Pike	11.7											11.70
	Walleye	4.0											4.00

CPUE

Gear	Species	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
std exp gill net	White Sucker	0.7										0.70
	Yellow Perch	68.0										68.00

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											
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
AFS std frame net	Black Bullhead	PSD				99								
		PSD-P				17								
		Wr				84								
	Black Crappie	PSD				75								
		PSD-P				75								
		Wr				88								
	Bluegill	PSD				88								
		PSD-P				32								
		Wr				113								
	Northern Pike	PSD				100								
		PSD-P				50								
		Wr				43								
	Walleye	PSD				80								
		PSD-P				40								
		Wr				87								
	White Sucker	PSD				100								
		PSD-P				100								
		Wr				93								
Yellow Perch	PSD				23									
	PSD-P				0									
	Wr				86									
AFS std gill net	Black Bullhead	PSD				99				83			87	
		PSD-P				1				0			26	
		Wr				80				95			90	
	Black Crappie	PSD				100				0			79	
		PSD-P				100				0			21	
		Wr				97				104			111	
	Bluegill	PSD				67				10			62	
		PSD-P				17				0			0	
		Wr				115				104			120	
	Largemouth Bass	PSD				0							100	
		PSD-P				0							100	
		Wr				118							116	

Gear	Species	Index	Year										
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
AFS std gill net	Northern Pike	PSD				84			60			65	
		PSD-P				21			3			13	
		Wr				86			90			86	
	Walleye	PSD				89			100			100	
		PSD-P				33			55			85	
		Wr				90			92			90	
	White Sucker	PSD				100						100	
		PSD-P				100						100	
		Wr				107						108	
	Yellow Perch	PSD				3			0			16	
		PSD-P				0			0			0	
		Wr				90			103			99	
	frame net (std 3/4 in)	Black Bullhead	PSD	70						95			95
			PSD-P	4						14			42
			Wr	81						88			84
Black Crappie		PSD	96						37			100	
		PSD-P	7						20			19	
		Wr	101						96			103	
Bluegill		PSD	56						14			74	
		PSD-P	2						1			2	
		Wr	102						102			106	
Green Sunfish		PSD										100	
		PSD-P										0	
		Wr										122	
Northern Pike		PSD	100						100			73	
		PSD-P	33						0			20	
		Wr	87						83			82	
Walleye		PSD	100									100	
		PSD-P	50									50	
		Wr	82									91	
White Sucker		PSD										100	
		PSD-P										100	
		Wr										101	
Yellow Perch		PSD	3						0			44	
		PSD-P	1						0			0	
		Wr	88						94			81	

Gear	Species	Index	Year															
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022						
std exp gill net	Black Bullhead	PSD	61															
		PSD-P	1															
		Wr	81															
	Black Crappie	PSD	100															
		PSD-P	0															
		Wr	107															
	Bluegill	PSD	0															
		PSD-P	0															
		Wr	111															
	Northern Pike	PSD	60															
		PSD-P	6															
		Wr	91															
	Walleye	PSD	67															
		PSD-P	8															
		Wr	90															
	White Sucker	PSD	100															
		PSD-P	50															
		Wr	95															
Yellow Perch	PSD	1																
	PSD-P	0																
	Wr	91																

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+
2022	37			209 (2)	231 (24)	247 (9)	259 (2)				

Species: Bluegill

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2022	710		92 (55)	114 (77)	157 (216)	175 (287)	190 (55)	193 (19)		251 (2)	223 (2)
2019	550		83 (5)	116 (326)	134 (195)	180 (3)	190 (12)		206 (8)	221 (2)	214 (2)
2016	434	78 (50)	95 (5)	144 (34)		192 (167)	192 (90)	245 (1)	212 (52)	198 (34)	256 (1)

Species: Walleye

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2022	13			428 (2)				571 (1)	559 (1)		659 (9)
2019	22				432 (8)		514 (2)		553 (6)	618 (2)	581 (4)
2016	18					393 (10)	478 (2)	517 (2)	656 (1)		595 (3)
2013	16		212 (4)	358 (7)	471 (4)						585 (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+
2022	132			145 (17)	176 (85)	200 (30)					
2019	91			144 (30)	149 (59)		176 (1)			176 (1)	
2016	88			149 (16)		176 (13)	183 (53)	184 (5)			
2013	211		106 (1)	141 (64)	157 (109)	171 (36)					

Fish Condition

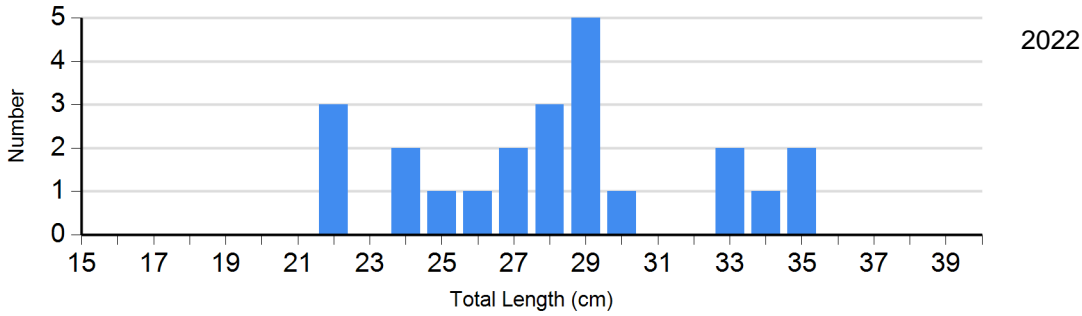
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	2019	1	107	5	93 (3.1)	0		0	
	2022	3	102 (6.0)	14	90 (3.6)	6	81 (3.9)	0	
Black Crappie Frame Net	2019	19	100 (2.2)	5	92 (2.0)	4	86 (1.3)	2	89 (1.0)
	2022	0		30	103 (1.3)	7	102 (1.7)	0	
Bluegill Frame Net	2019	475	101 (0.4)	68	106 (1.1)	7	104 (5.3)	0	
	2022	187	106 (1.2)	512	107 (0.7)	9	105 (1.0)	2	110
Northern Pike Gill Net	2019	12	93 (1.5)	17	88 (1.3)	0		1	75
	2022	17	86 (1.3)	25	85 (1.3)	6	90 (2.7)	0	
Walleye Gill Net	2019	0		10	94 (1.1)	11	90 (2.4)	1	82
	2022	0		2	89 (1.6)	3	87 (3.1)	8	91 (2.6)
White Sucker Gill Net	2022	0		0		2	109	2	108 (1.1)
Yellow Perch Gill Net	2019	91	103 (0.8)	0		0		0	
	2022	111	101 (0.9)	21	89 (1.6)	0		0	

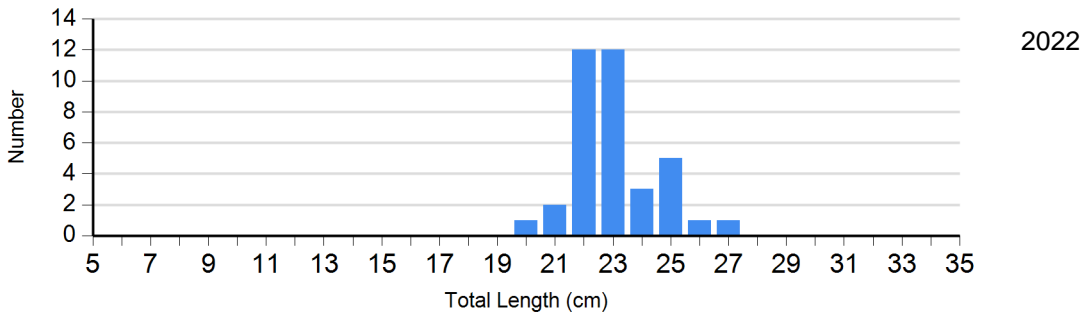
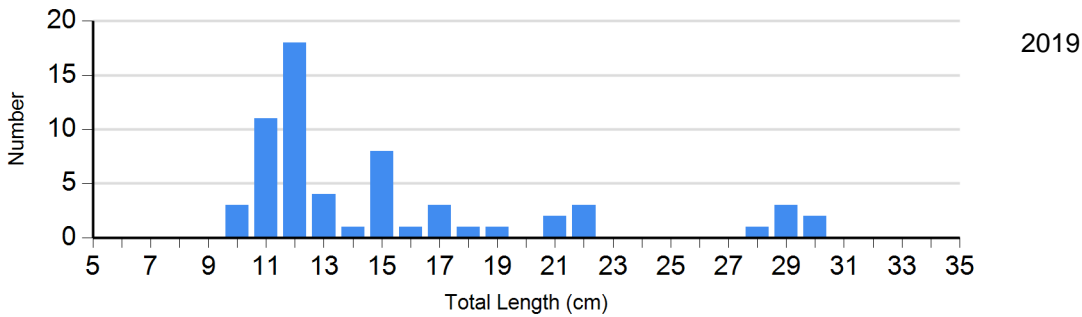
Length Frequency Distribution

Length frequency histogram of species sampled by year.

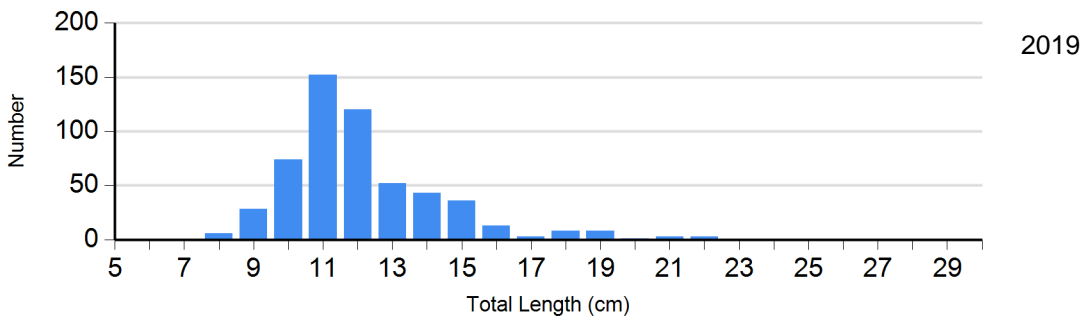
Species: Black Bullhead
Gear: AFS std gill net

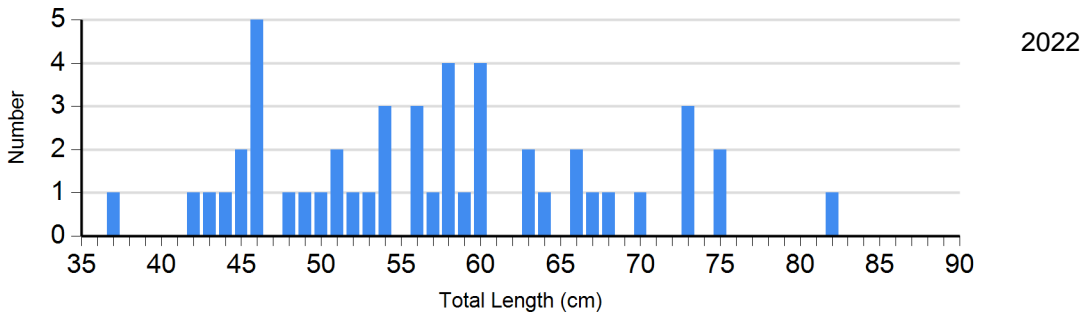
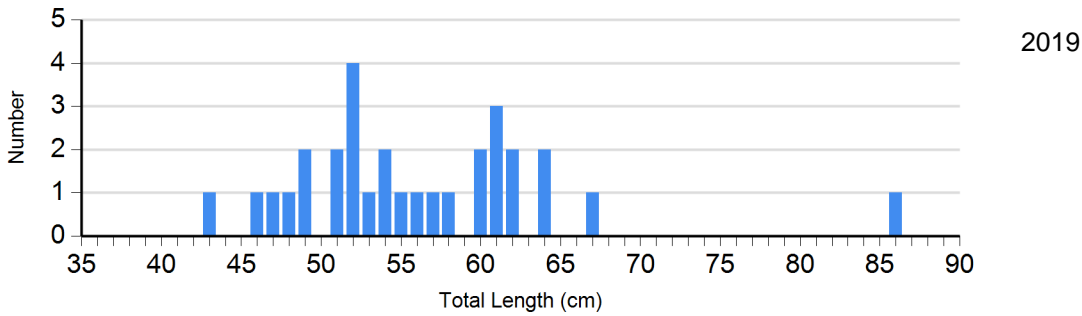
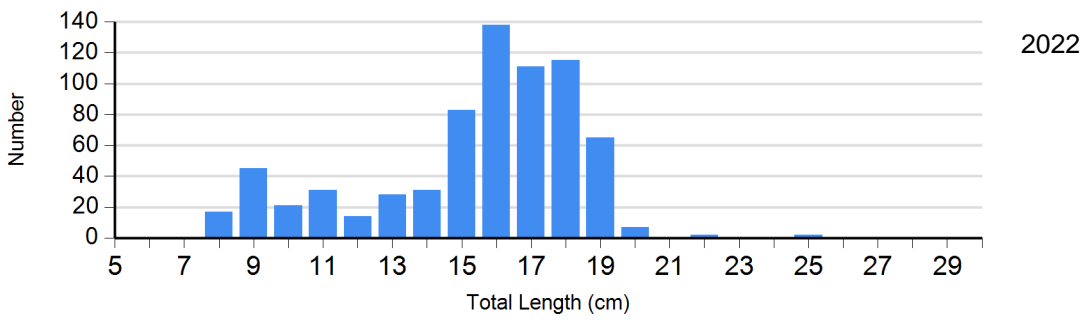


Species: Black Crappie
Gear: frame net (std 3/4 in)

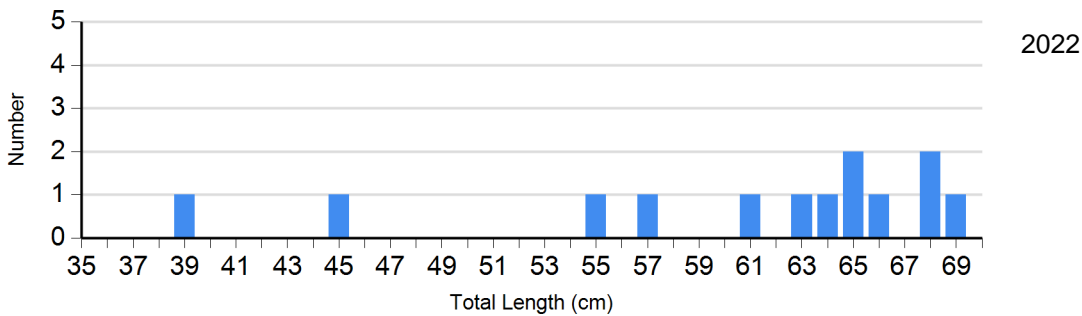
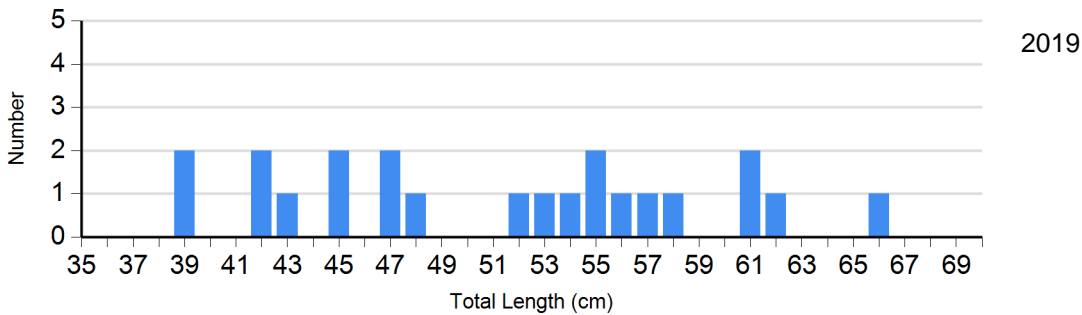


Species: Bluegill
Gear: frame net (std 3/4 in)

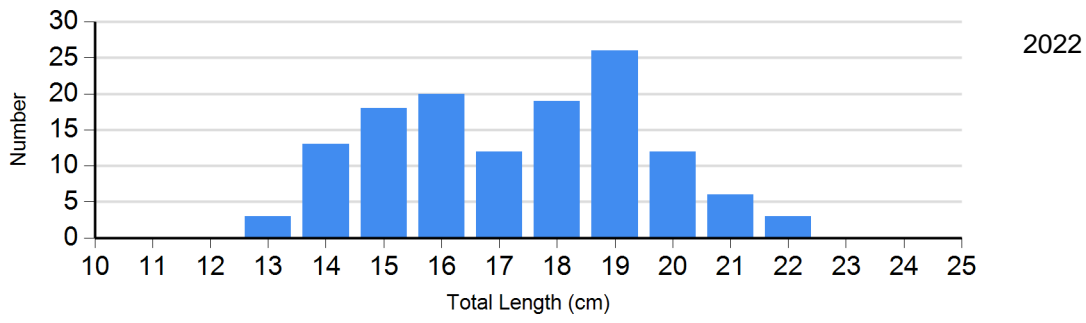
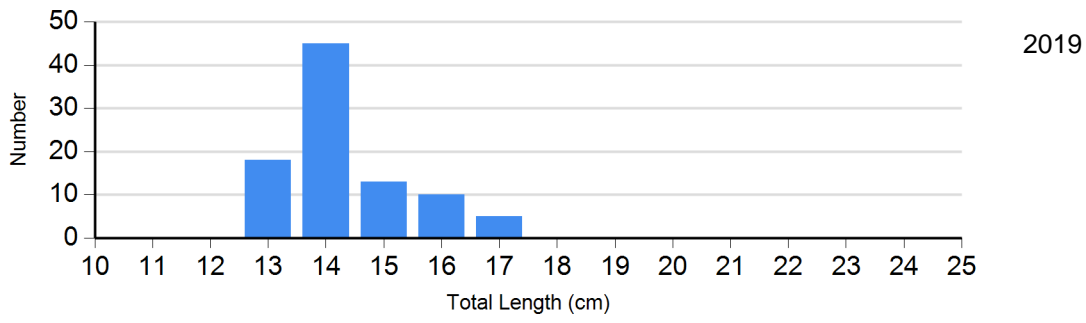




Species: Walleye
Gear: AFS std gill net



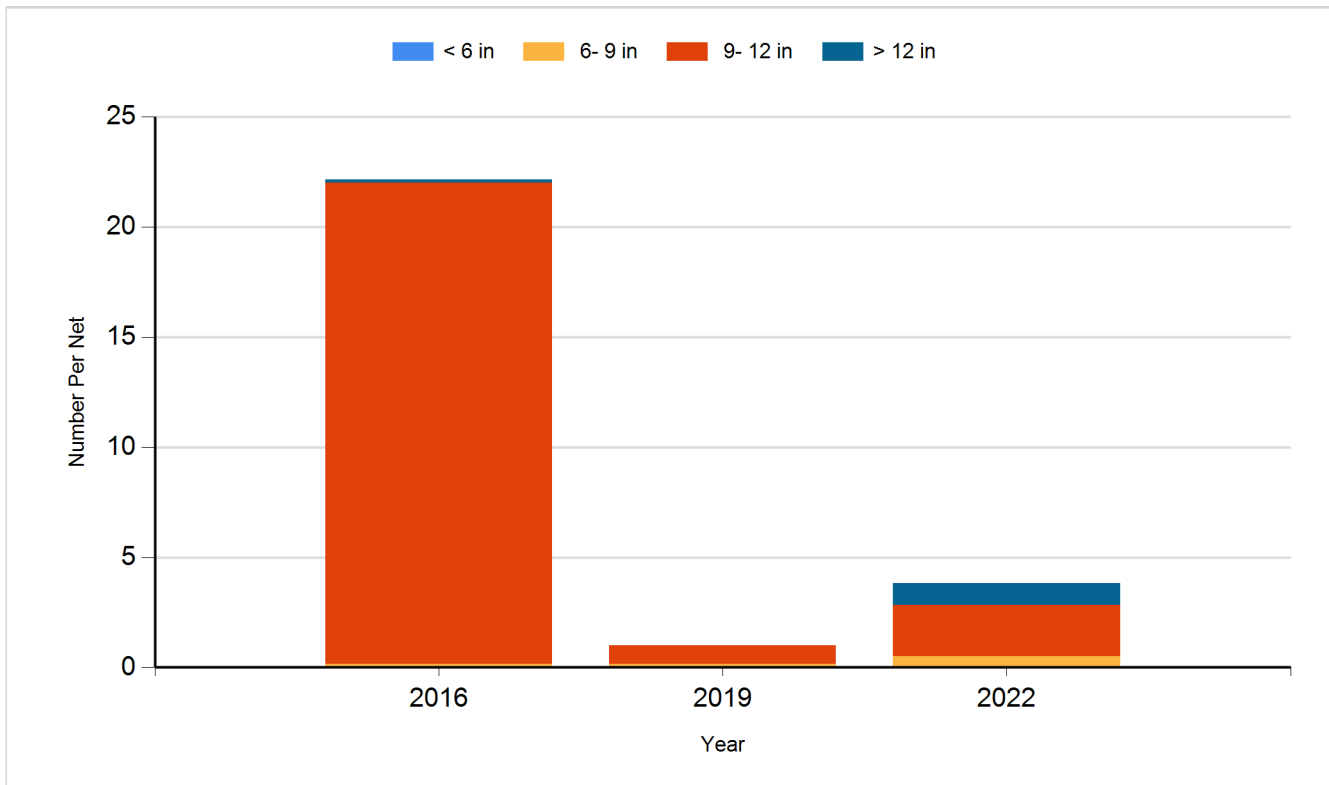
Species: Yellow Perch
Gear: AFS std gill net



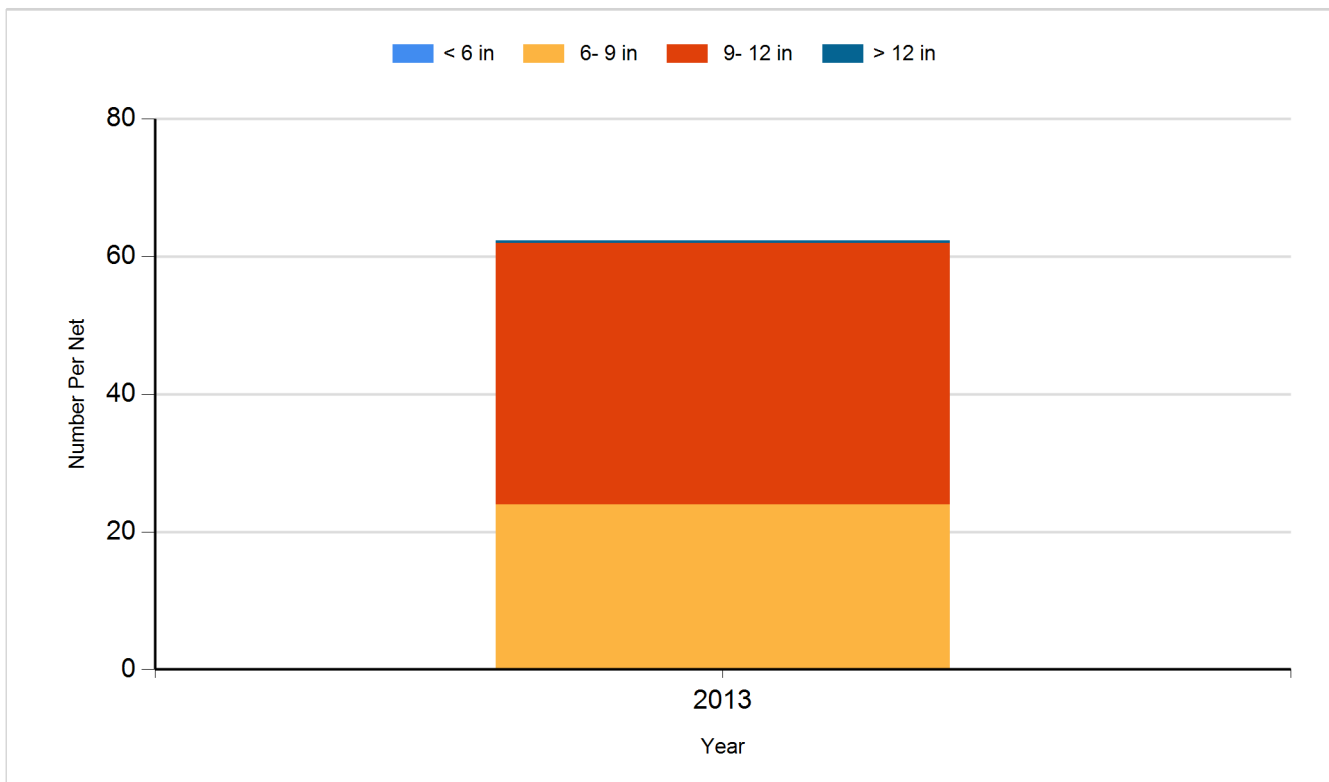
Historic Fish Sizes and Relative Abundance

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

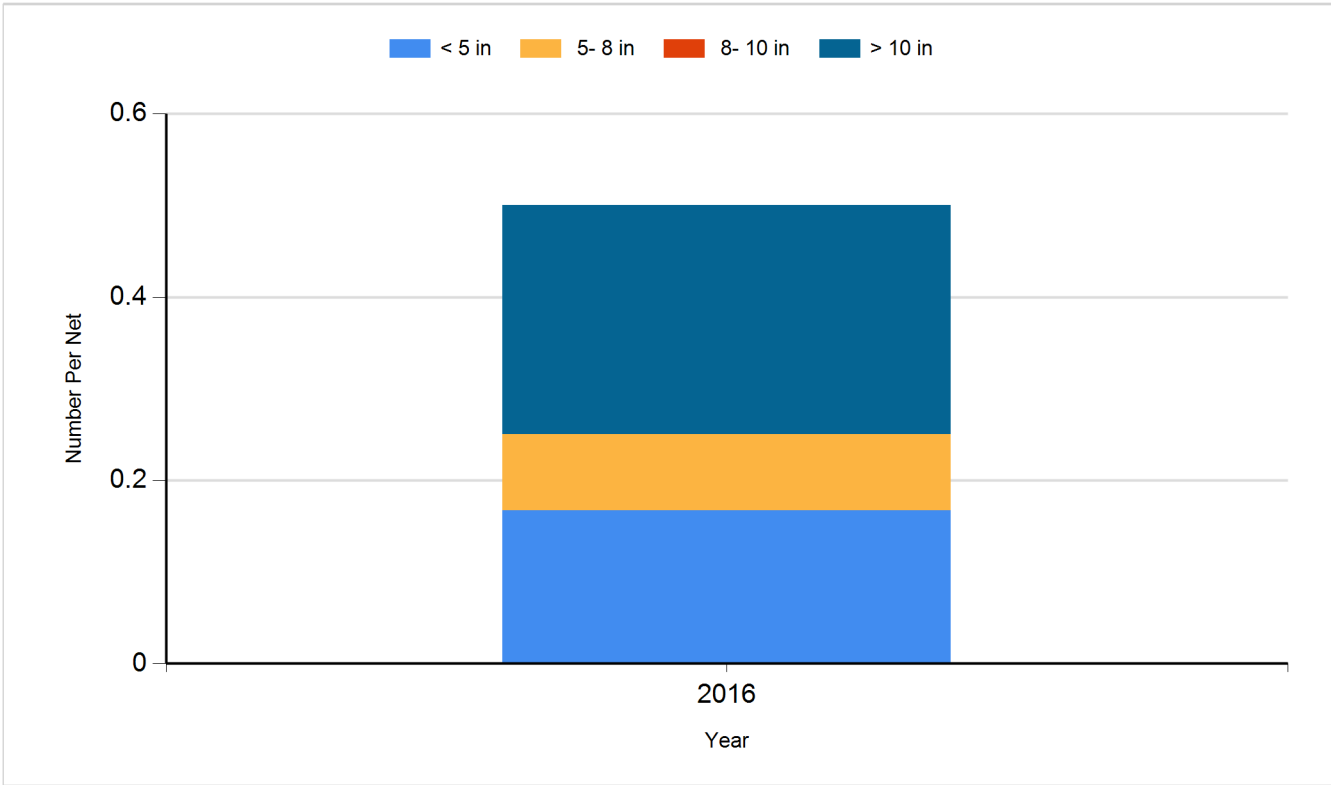
Species: Black Bullhead
Gear: AFS std gill net



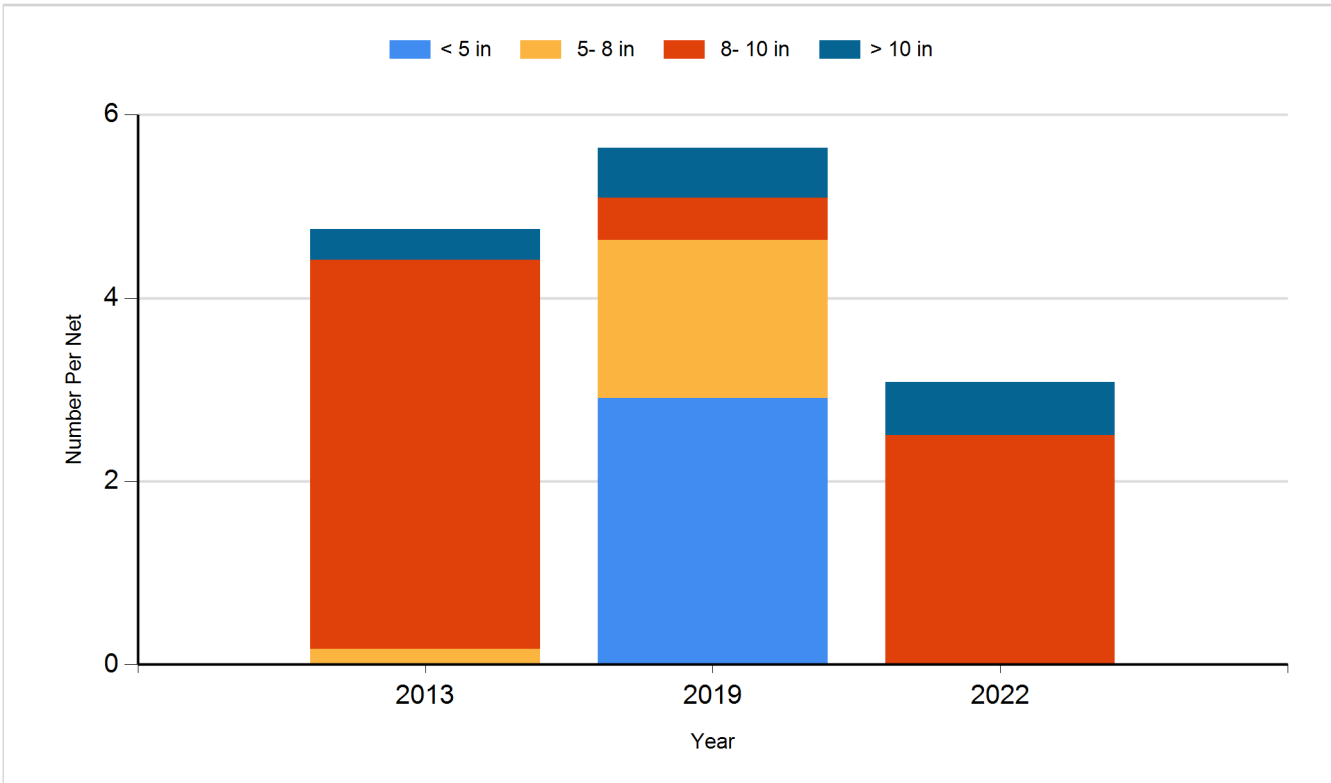
Species: Black Bullhead
Gear: std exp gill net



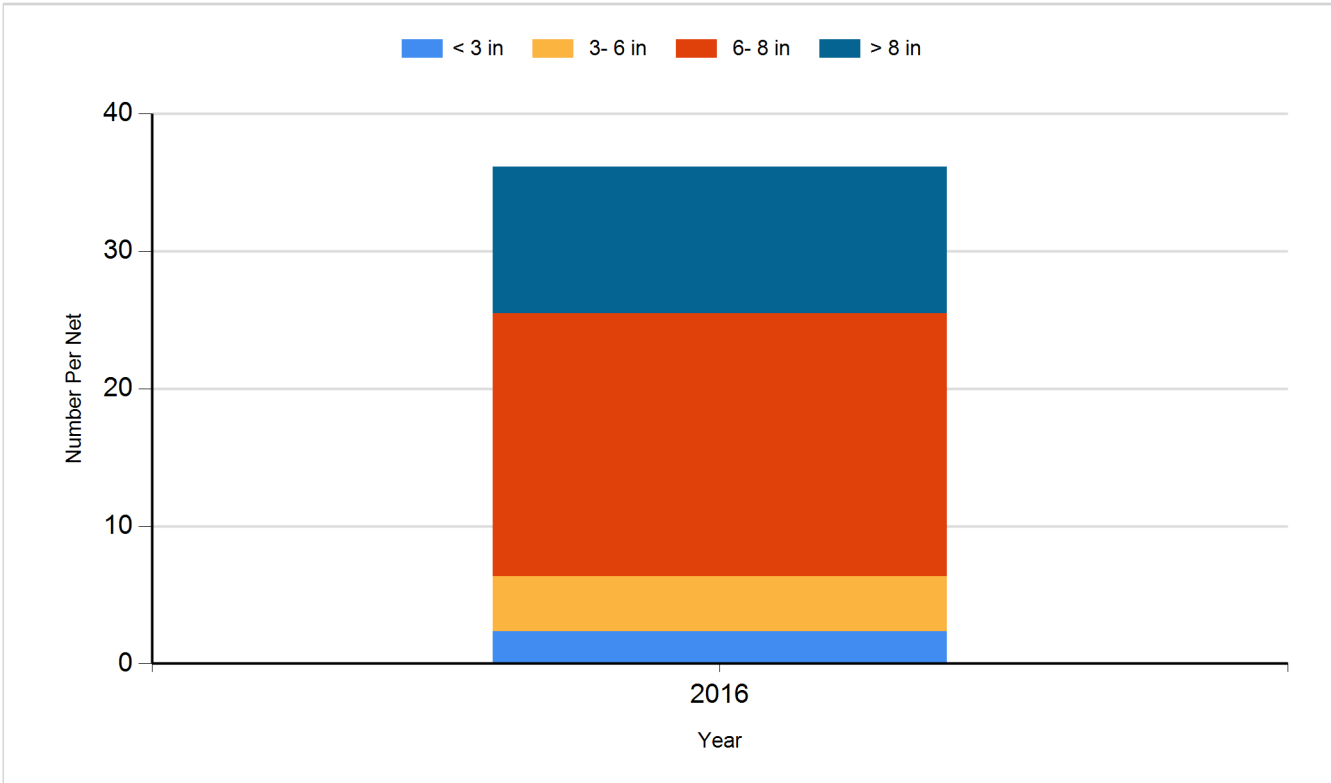
Species: Black Crappie
Gear: AFS std frame net



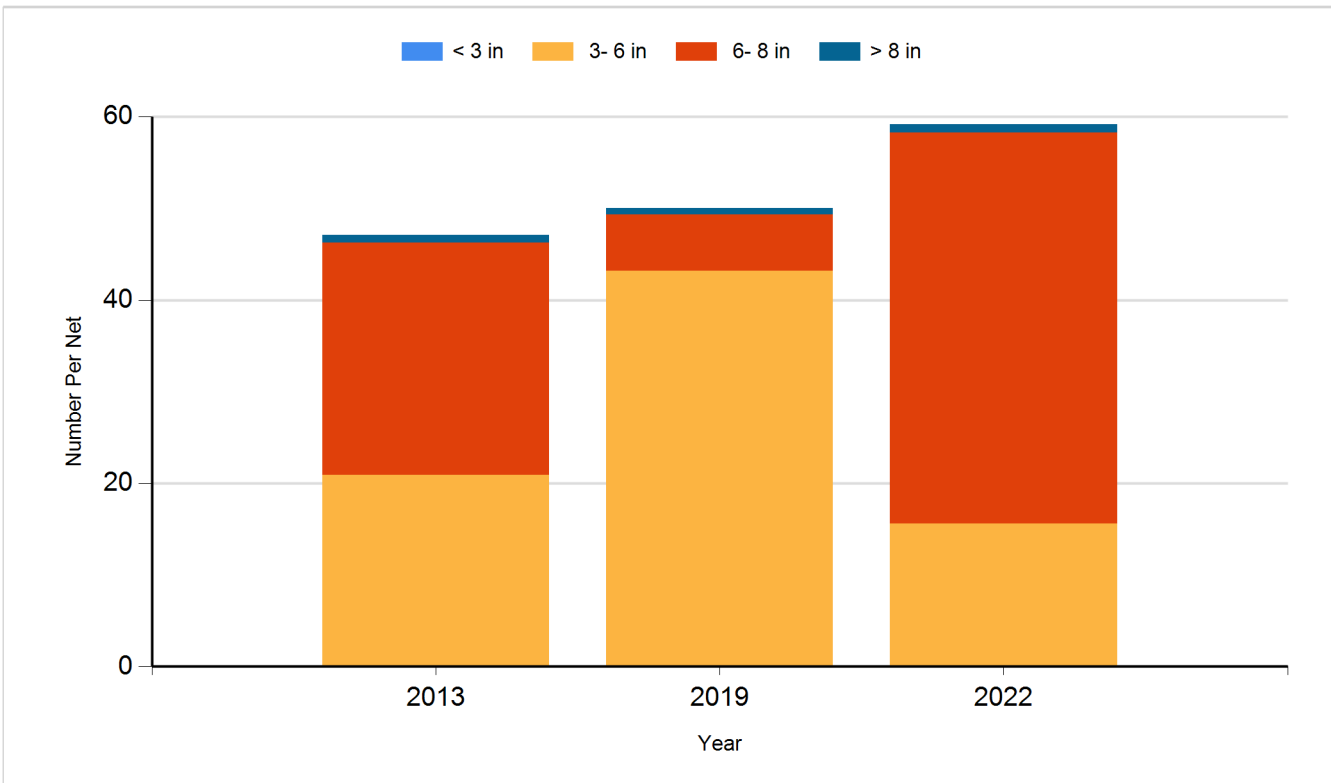
Species: Black Crappie
Gear: frame net (std 3/4 in)



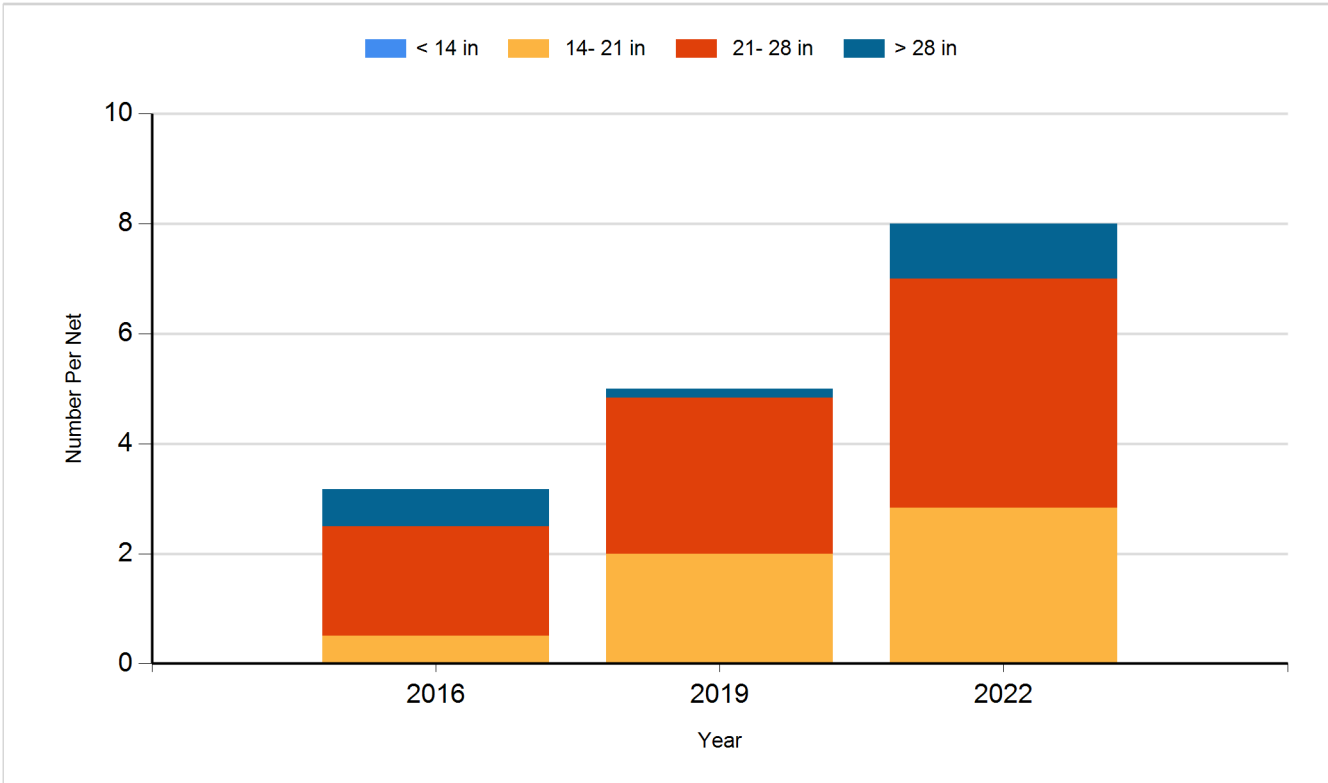
Species: Bluegill
Gear: AFS std frame net



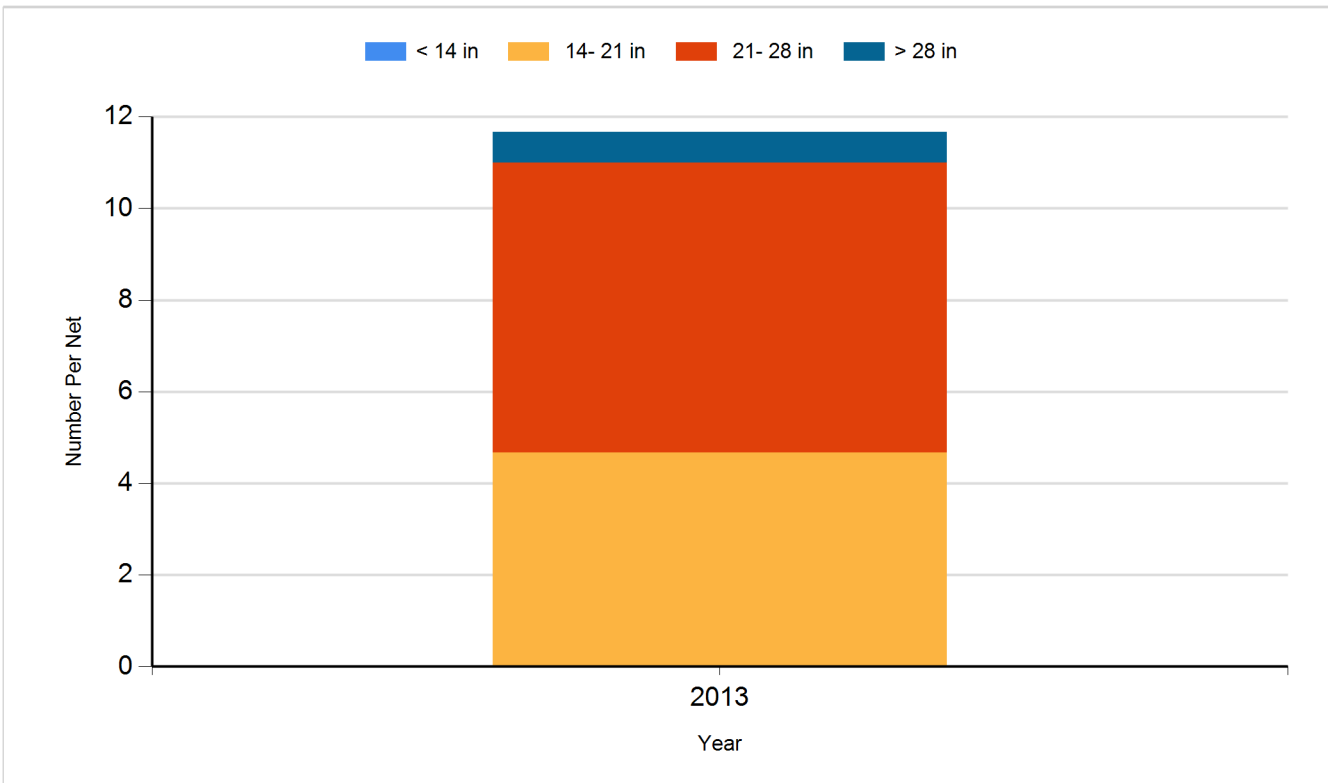
Species: Bluegill
Gear: frame net (std 3/4 in)



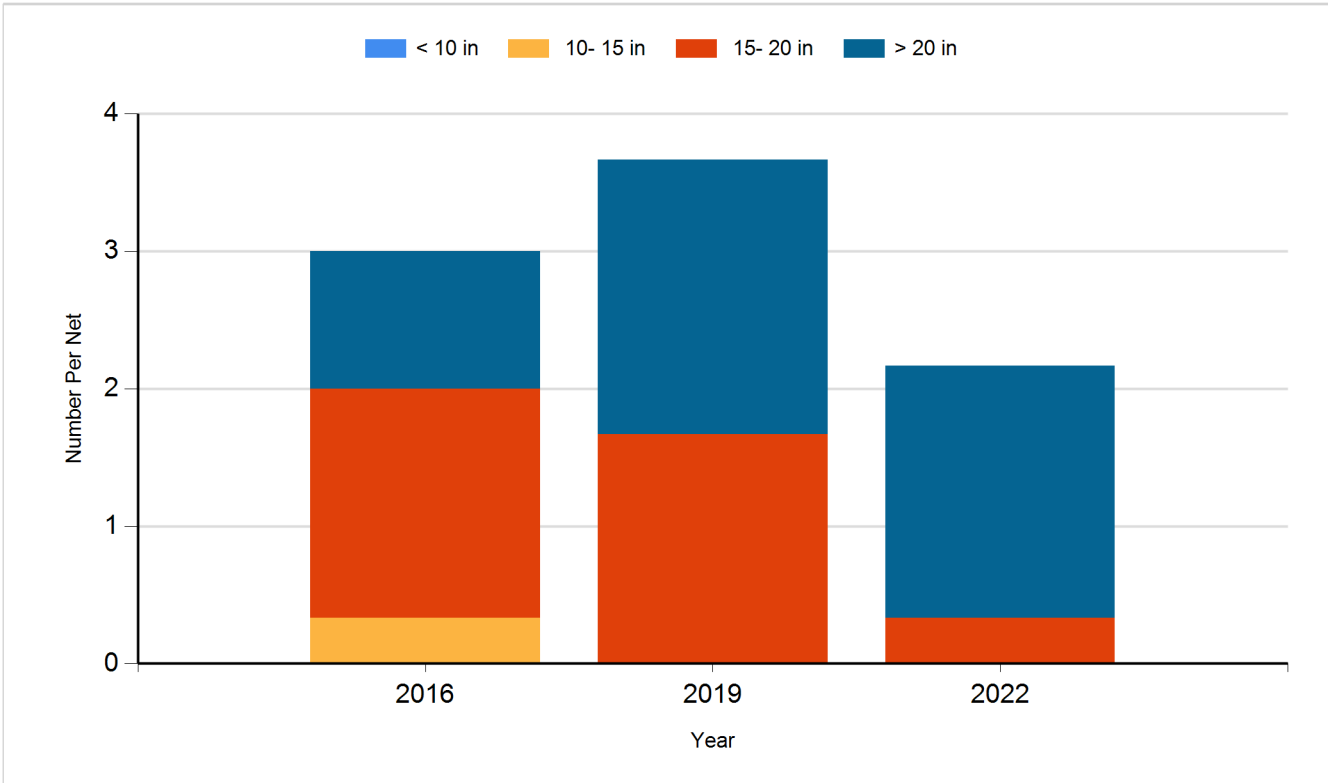
Species: Northern Pike
Gear: AFS std gill net



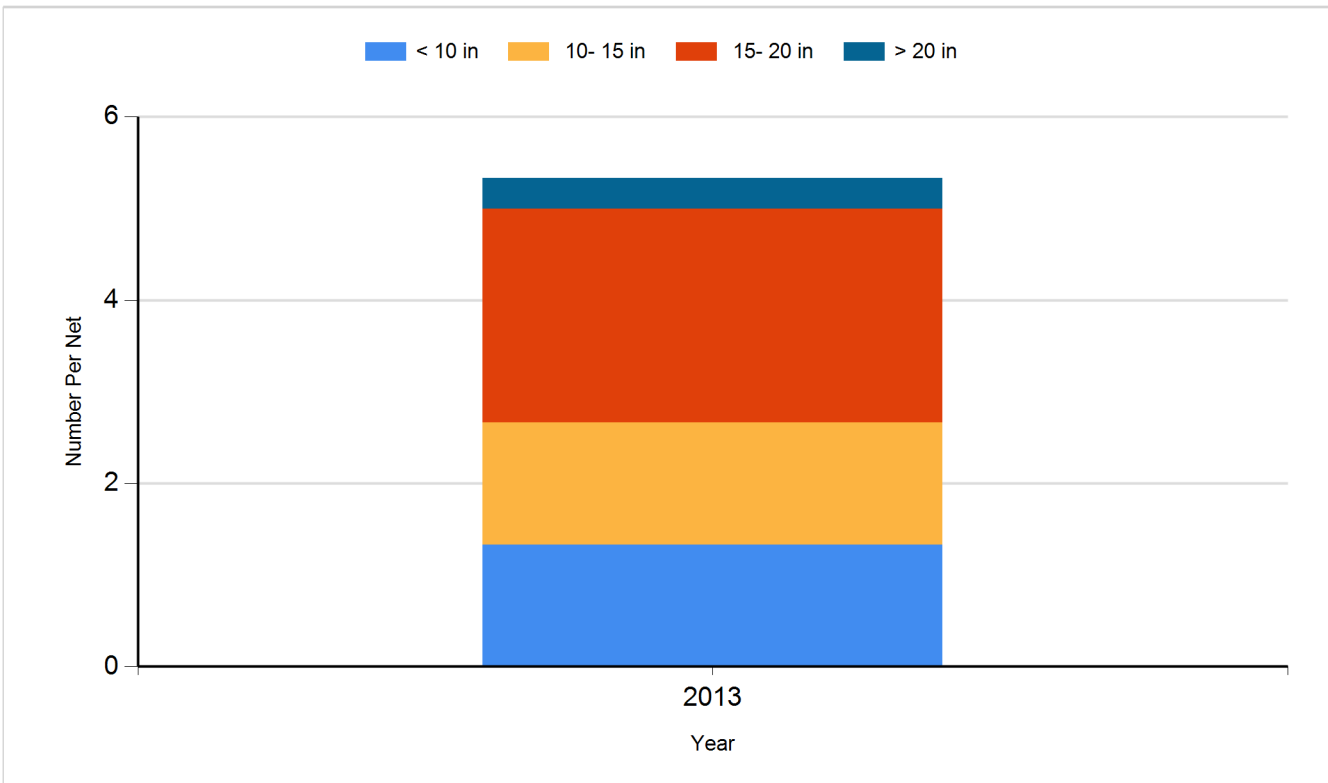
Species: Northern Pike
Gear: std exp gill net



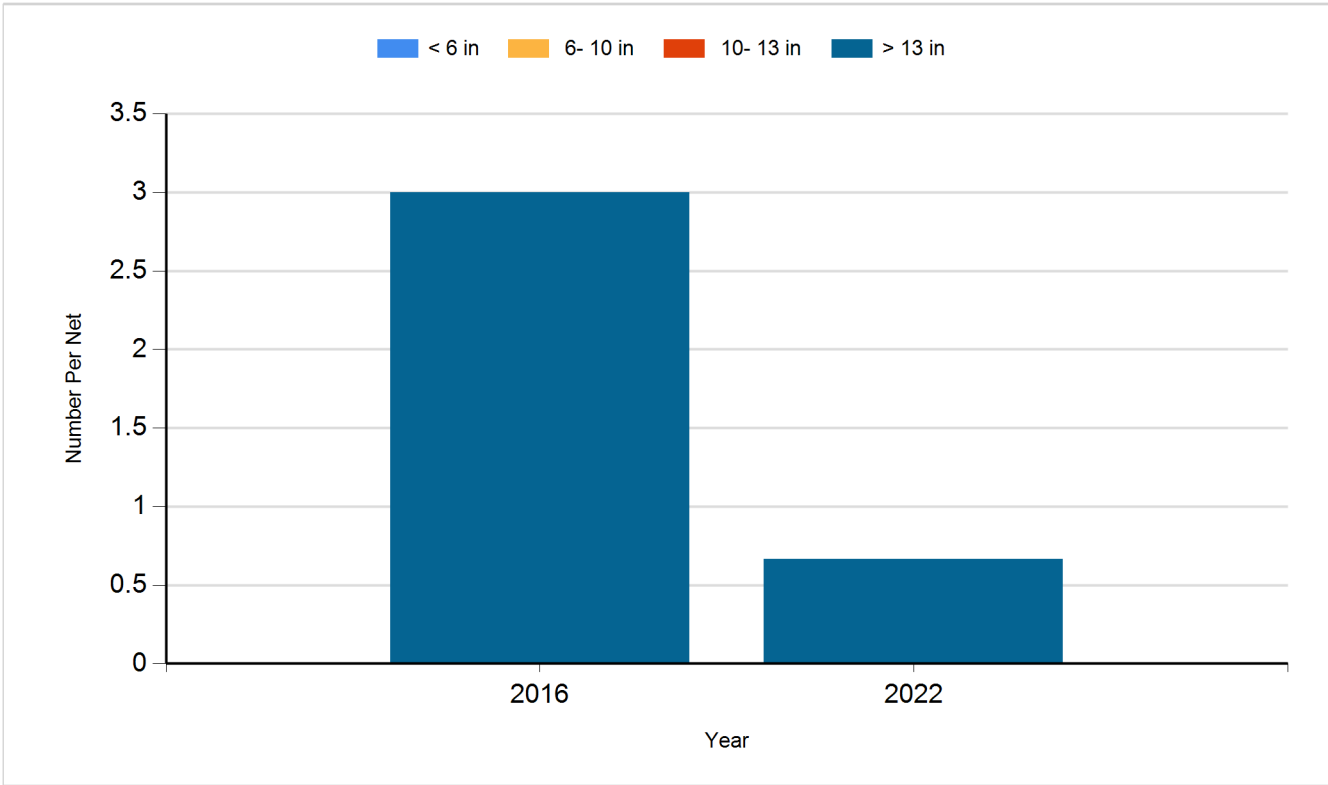
Species: Walleye
Gear: AFS std gill net



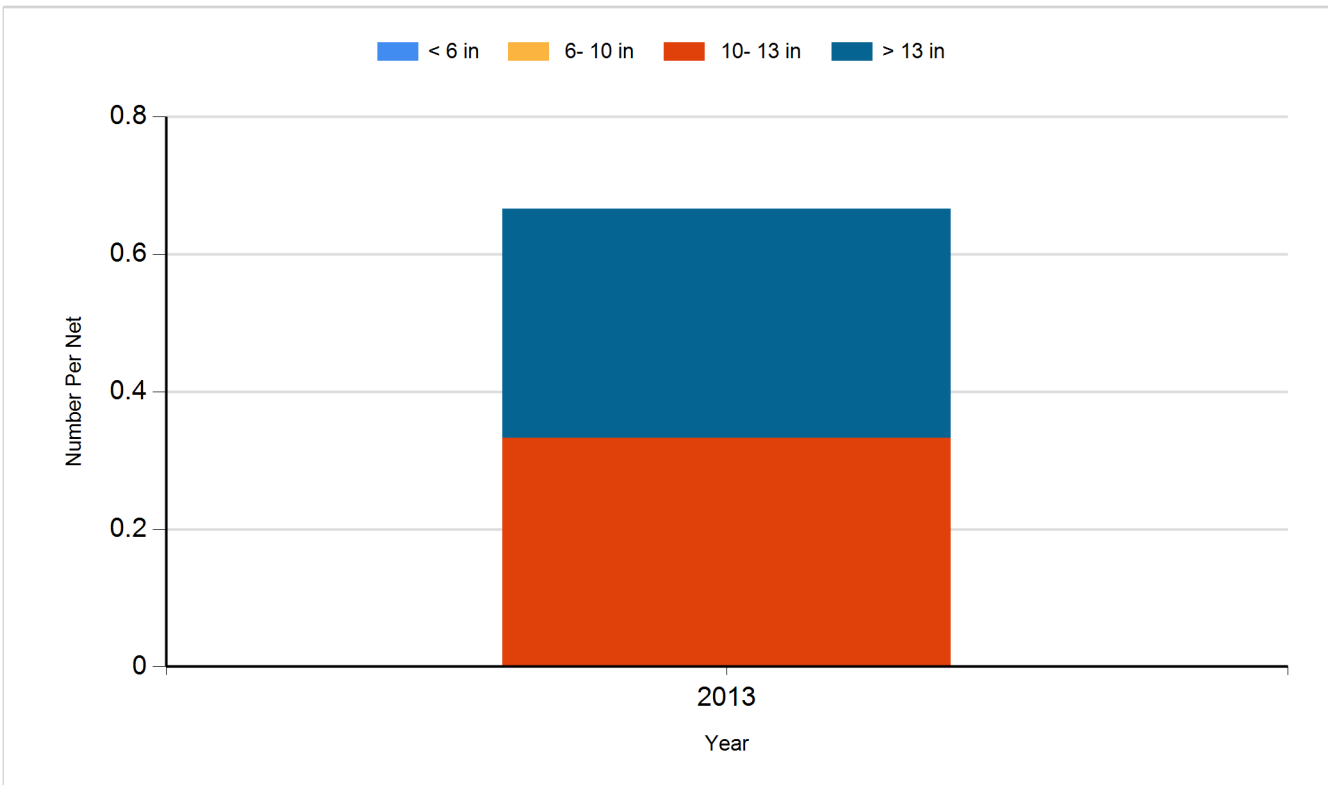
Species: Walleye
Gear: std exp gill net



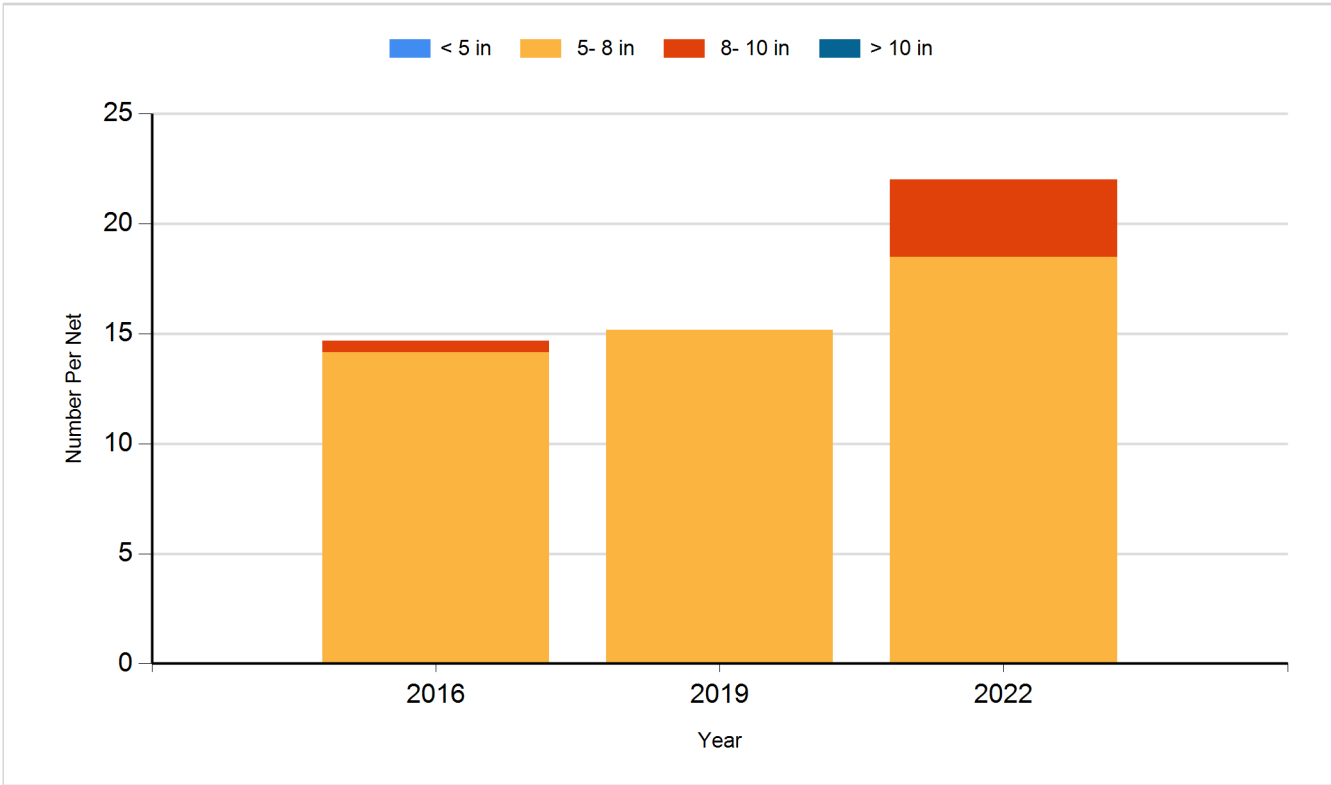
Species: White Sucker
Gear: AFS std gill net



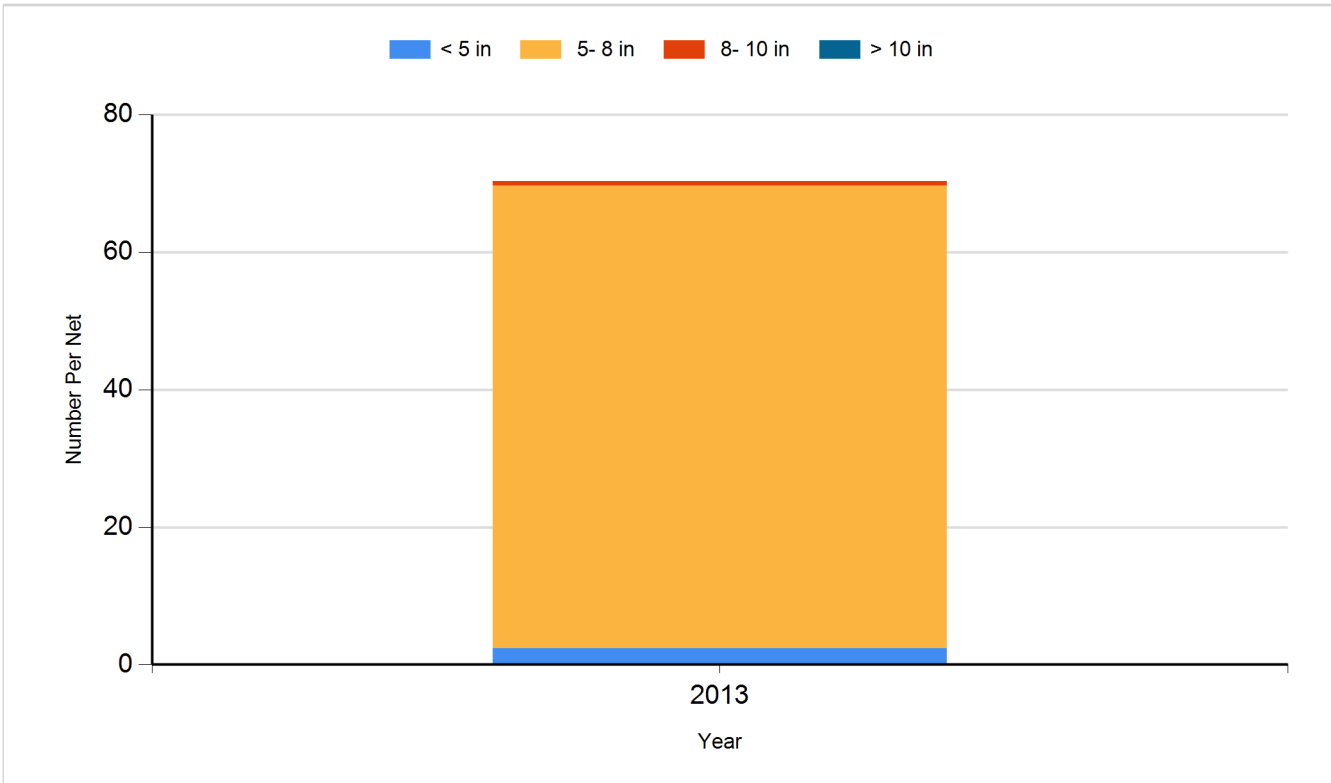
Species: White Sucker
Gear: std exp gill net



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
2011	Walleye	Fry	175,000
2013	Walleye	Fry	175,000
2015	Walleye	Fry	170,000
2017	Walleye	Fry	170,000
2019	Walleye		170,000
2021	Walleye	Fry	200,000
2022	Walleye	Juvenile	17,670