

Lake Sinai Survey Summary

Lake Sinai, located 1 mile west and 1 ½ miles north of Sinai, SD, is managed as a walleye, yellow perch, and muskellunge fishery but other fish species (e.g., black crappie, bluegill, northern pike, smallmouth bass, white bass) are also present.

- **Walleye.** Walleye abundance increased for the first time in several years to a catch rate of 1.5 fish per gill net in 2023. Catches had been steadily declining from the high observed in 2017 (4.7 fish per net) to the low observed in 2022 (1.1 fish per net). Sampled fish lengths ranged from 7.5 to 28.0 inches with most (86%) measuring >15 inches. A sizable proportion (25%) also measured >20 inches in length. Aging analysis indicates that most of these larger individuals (>20 inches) were quite old (>10 years in age). Age 4 fish (produced in 2019) also stood out in this year's sample accounting for 26% of the catch. With an average length of 16.1 inches by age 4 this cohort fell slightly behind the statewide mean for growth.
- **Yellow Perch.** Gill netting efforts produced 0.3 yellow perch per net in 2023 which is identical to the previous year but below the long term mean (2.3 fish per net). Sampled fish ranged from 4.9 to 7.4 inches in length. Absent from this year's catches were yellow perch >8 inches long. These quality (>8 inches) and preferred (>10 inches) length fish accounted for a majority (96%) of the sample a few years ago (2021).
- **Muskellunge.** Introductory stockings of muskellunge into Lake Sinai began in 2011 to provide additional angling opportunity. Periodic stocking occurs every few years to maintain the current population. Although we do not target muskellunge with our current sampling gears, we did manage to catch a few in 2023. Frame nets sampled two muskellunge measuring 21.8 and 34.8 inches and gill nets sampled one muskellunge measuring 22.6 inches in length. A mean relative weight score of 85 indicates they were in average condition.

For more detailed results see the computer-generated South Dakota Statewide Fisheries Survey for Lake Sinai (below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Sinai, Brookings County

MBS-Lake-232-000

2023

Lake Information

Name: Sinai **Maximum Depth:** 33 Feet
County: Brookings **Mean Depth:** 17 Feet
Legal Description: T109N- R52W-Sec 3-4, 8-10
Surface Area: 1,778 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 28, 2023	24 net-nights
frame net (std 3/4 in)	Jun 28, 2023	5 net-nights
frame net (std 3/4 in)	Jun 29, 2023	5 net-nights

Common Fish Species Present

Muskellunge

Walleye

White Bass

Smallmouth Bass

Bluegill

Black Crappie

Northern Pike

Yellow Bullhead

Common Carp

Yellow Perch

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	Common Carp	12	0.5	0.2	100		100			
	Muskellunge	1	0.0	0.1	0		0	85		
	Northern Pike	2	0.1	0.1	100		0	88	9	
	Smallmouth Bass	9	0.3	0.2	38		0	83	2	
	Walleye	36	1.5	0.4	89		26	11	82	1
	White Bass	30	1.3	0.4	73	13	67	13	80	1
	White Sucker	1	0.0	0.1	100		100			
	Yellow Perch	9	0.3	0.2	0		0		95	6
frame net (std 3/4 in)	Black Bullhead	2	0.2	0.2	100		100			
	Black Crappie	6	0.6	0.4	100		83		126	46
	Bluegill	9	0.9	0.7	67		33		127	5
	Common Carp	1	0.1	0.1	100		100			
	Muskellunge	2	0.2	0.3	50		0		85	5
	Northern Pike	6	0.6	0.4	100		17		79	4
	Smallmouth Bass	18	1.5	0.5	73		40	21	89	3
	Walleye	9	0.9	0.6	89		56		82	5
	White Bass	31	3.1	2.0	90		90		76	3
	Yellow Bullhead	5	0.5	0.4	100		100			

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
		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
AFS std frame net	Black Bullhead				1.7							1.70
	Black Crappie				1.9							1.90
	Common Carp				0.7							0.70
	Smallmouth Bass				1.9							1.90
	Walleye				0.9							0.90
	White Bass				2.0							2.00
	Yellow Bullhead				0.7							0.70
AFS std gill net	Black Bullhead				0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.13
	Black Crappie				0.8	0.1	0.0	0.0	0.1	0.0	0.0	0.14
	Channel Catfish				0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.01
	Common Carp				0.3	0.6	0.2	0.6	0.5	0.0	0.5	0.39
	Muskellunge				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
	Northern Pike				0.2	0.0	0.3	0.1	0.1	0.4	0.1	0.17
	Smallmouth Bass				0.7	1.8	0.3	0.7	0.2	0.1	0.3	0.59
	Walleye				4.7	4.2	2.8	2.9	1.6	1.1	1.5	2.69
	White Bass				1.0	0.9	1.2	0.8	3.2	0.7	1.3	1.30
	White Sucker				0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.04
	Yellow Bullhead				0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.03
	Yellow Perch				2.5	5.3	1.8	3.0	3.0	0.3	0.3	2.31
fall night EF-WAE*	Walleye	94.5	79.0									86.75
frame net (std 3/4 in)	Black Bullhead	10.0	44.4	6.6		2.5	1.4	0.2	0.7	0.3	0.2	7.37
	Black Crappie	4.5	11.5	6.7		3.9	0.9	0.9	0.3	0.6	0.6	3.32
	Bluegill	0.3	2.6	0.4		0.2	0.0	0.0	0.2	1.6	0.9	0.69
	Channel Catfish	0.0	0.0	0.0		0.0	0.0	0.1	0.0	0.0	0.0	0.01
	Common Carp	0.0	0.2	0.4		0.6	0.8	0.2	0.5	1.0	0.1	0.42
	Green Sunfish	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.00
	Muskellunge	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.2	0.02
	Northern Pike	0.0	0.3	0.8		0.7	0.1	0.5	0.8	0.6	0.6	0.49
	Smallmouth Bass	0.9	2.7	6.1		4.4	4.6	2.4	7.2	2.5	1.5	3.59
	Sunfish Hybrid	0.0	0.1	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.01
	Walleye	2.8	1.6	1.2		4.3	2.2	1.4	0.8	1.0	0.9	1.80
	White Bass	0.0	0.0	1.1		10.3	3.7	11.0	6.6	6.9	3.1	4.74
	Yellow Bullhead	0.2	1.1	1.4		1.4	1.1	2.0	0.1	1.1	0.5	0.99

		CPUE										
Gear	Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
frame net (std 3/4 in)	Yellow Perch	0.3	1.8	0.0		0.1	0.1	0.2	0.0	0.0	0.0	0.28
std exp gill net	Black Bullhead	1.5	40.0	12.4								17.97
	Black Crappie	0.0	2.0	3.6								1.87
	Bluegill	0.3	0.0	0.0								0.10
	Common Carp	0.8	0.0	0.4								0.40
	Green Sunfish	0.0	0.0	0.0								0.00
	Northern Pike	0.0	1.0	0.6								0.53
	Smallmouth Bass	1.3	1.7	2.0								1.67
	Walleye	18.3	18.0	7.8								14.70
	White Sucker	0.0	0.0	0.0								0.00
	Yellow Perch	2.5	24.3	12.8								13.20

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											
			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023		
AFS std frame net	Black Crappie	PSD				100								
		PSD-P				95								
		Wr				91								
	Common Carp	PSD				100								
		PSD-P				86								
	Smallmouth Bass	PSD				95								
		PSD-P				37								
		Wr				89								
	Walleye	PSD				56								
		PSD-P				56								
		Wr				84								
	White Bass	PSD				100								
		PSD-P				85								
		Wr				92								
	Yellow Bullhead	PSD				100								
PSD-P					100									
AFS std gill net	Black Crappie	PSD				88	100		0	100				
		PSD-P				88	0		0	100				
		Wr				95	110				87			
	Common Carp	PSD				100	100	100	100	100	100			100
		PSD-P				100	86	50	100	60				100
	Muskellunge	PSD												0
		PSD-P												0
		Wr												85
	Northern Pike	PSD				100			100	100	100	75		100
		PSD-P				100			67	0	0	0		0
		Wr				91			96	85	82	81		88
	Smallmouth Bass	PSD				71	57	67	75	0	0			38
		PSD-P				71	48	67	38	0	0			0
		Wr				91	102	86	87	89	103			83
	Walleye	PSD				70	34	52	26	38	55			89
		PSD-P				28	18	30	9	6	18			26
		Wr				84	87	78	81	80	79			82

Gear	Species	Index	Year									
			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AFS std gill net	White Bass	PSD				90	100	100	78	81	43	73
		PSD-P				50	82	93	78	53	43	67
		Wr				95	95	89	87	86	84	80
	Yellow Bullhead	PSD						100	100			
		PSD-P						100	100			
	Yellow Perch	PSD				64	51	86	61	97	67	0
		PSD-P				24	11	41	31	33	0	0
		Wr				98	111	107	97	104	96	95
	frame net (std 3/4 in)	Black Crappie	PSD	91	20	92		97	89	100	67	100
PSD-P			84	14	47		85	44	56	33	80	83
Wr			99	104	94		97	101	90	103	88	126
Bluegill		PSD	0	12	100		0			100	62	67
		PSD-P	0	8	0		0			50	8	33
		Wr	114	118	109		130			130	119	127
Common Carp		PSD		100	100		100	100	100	80	100	100
		PSD-P		50	100		50	100	100	40	88	100
Muskellunge		PSD									0	50
		PSD-P									0	0
		Wr										85
Northern Pike		PSD		100	100		100	100	20	25	80	100
		PSD-P		67	14		57	0	20	13	40	17
		Wr		83	83		86	79	85	77	97	79
Smallmouth Bass		PSD	78	15	38		68	72	75	67	85	73
		PSD-P	78	11	24		52	37	54	33	40	40
		Wr	106	94	90		93	90	86	84	81	89
Walleye		PSD	61	100	73		65	41	43	63	75	89
		PSD-P	11	31	27		40	27	36	25	75	56
		Wr	89	84	74		86	85	76	80	74	82
White Bass		PSD			80		100	100	95	98	98	90
	PSD-P			80		93	97	92	48	95	90	
	Wr			91		98	87	87	82	78	76	
Yellow Bullhead	PSD	100	100	100		100	100	100	100	100	100	
	PSD-P	100	18	85		100	91	100	100	100	100	
	Wr	111										
Yellow Perch	PSD	67	39			100	100	50		0		
	PSD-P	33	0			0	0	50		0		

Gear	Species	Index	Year									
			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
frame net (std 3/4 in)	Yellow Perch	Wr	91	92			80	99	95			
std exp gill net	Black Crappie	PSD	0	17	78							
		PSD-P	0	0	0							
		Wr		113	96							
	Bluegill	PSD	100									
		PSD-P	0									
		Wr	123									
	Common Carp	PSD	100		100							
		PSD-P	67		100							
	Northern Pike	PSD		100	100							
		PSD-P		33	33							
		Wr		85	83							
	Smallmouth Bass	PSD	60	40	50							
		PSD-P	20	40	30							
		Wr	101	90	86							
	Walleye	PSD	92	83	46							
		PSD-P	1	13	26							
		Wr	91	85	81							
	Yellow Perch	PSD	40	11	77							
		PSD-P	20	0	8							
		Wr	106	99	98							

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Walleye

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2023	34	194 (1)	313 (3)		409 (9)	476 (2)	433 (6)	455 (4)			604 (10)
2022	11			318 (2)	380 (3)	367 (3)			426 (1)		685 (2)
2021	16		278 (6)	336 (3)	383 (3)	395 (1)	421 (2)				672 (1)
2020	36	204 (1)	302 (8)	329 (7)	365 (10)	385 (5)	575 (1)			565 (2)	536 (2)
2019	32		282 (5)	335 (10)	374 (3)	435 (2)		446 (1)	478 (1)	617 (6)	676 (4)
2018	50	210 (2)	297 (22)	356 (11)	416 (4)			533 (4)	553 (6)		714 (1)
2017	52	231 (5)	346 (14)	420 (11)	444 (2)		491 (3)	518 (12)		689 (2)	623 (3)
2016	61	204 (22)	298 (18)	367 (4)		506 (6)	520 (10)			637 (1)	
2015	55	209 (1)	340 (10)		469 (10)	470 (29)			541 (4)		593 (1)
2014	73	260 (5)		408 (22)	429 (43)			471 (2)	547 (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	30			227 (16)	253 (4)	265 (8)	244 (2)		304 (1)		
2015	75	103 (2)	179 (73)								
2014	29	119 (25)		248 (3)	265 (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).

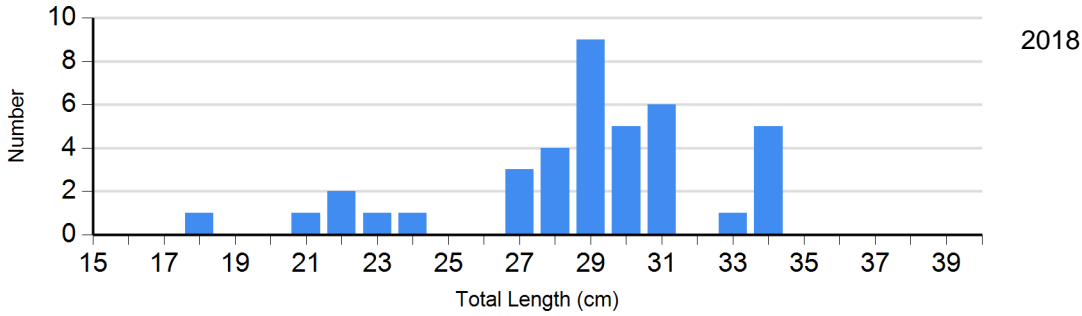
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2019	1	120	4	102 (4.0)	2	100 (2.7)	2	88 (7.7)
	2020	0		4	99 (2.7)	2	87 (3.6)	3	80 (2.2)
	2021	1	108	1	102	1	98	0	
	2022	0		1	85	4	89 (4.3)	0	
	2023	0		1	307	2	90 (2.8)	3	91 (3.2)
Bluegill Frame Net	2021	0		1	148	1	112	0	
	2022	5	120 (6.3)	7	118 (4.6)	1	118	0	
	2023	3	123 (5.8)	3	133 (9.6)	3	125 (7.2)	0	
Muskellunge Frame Net	2022	0		0		0		0	
	2023	1	81	1	89	0		0	
Northern Pike Gill Net	2019	0		1	89	2	100 (9.4)	0	
	2020	0		1	85	0		0	
	2021	0		1	82	0		0	
	2022	1	75	3	83 (3.2)	0		0	
	2023	0		2	88 (6.8)	0		0	
Walleye Gill Net	2019	16	81 (1.7)	7	77 (1.3)	4	75 (2.2)	6	74 (2.6)
	2020	26	80 (0.9)	6	83 (2.9)	1	100	2	84 (5.9)
	2021	10	81 (1.0)	5	79 (2.4)	0		1	80
	2022	5	82 (1.6)	4	78 (0.9)	0		2	75 (6.1)
	2023	4	78 (2.0)	22	84 (1.4)	3	83 (2.3)	6	79 (1.9)
White Bass Gill Net	2019	0		1	85	13	89 (1.0)	0	
	2020	2	86	0		6	87 (3.6)	1	88
	2021	6	89 (2.0)	9	89 (1.1)	15	83 (1.1)	2	81 (2.0)
	2022	4	87 (1.3)	0		2	85 (5.3)	1	75

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
White Bass Gill Net	2023	8	79 (2.8)	2	78 (1.8)	18	81 (0.9)	2	80
Yellow Perch Gill Net	2019	3	155 (49.8)	10	102 (3.0)	9	97 (2.4)	0	
	2020	14	96 (0.9)	11	100 (2.6)	11	96 (2.5)	0	
	2021	1	114	19	104 (1.8)	9	104 (2.3)	1	92
	2022	1	100	2	93 (7.7)	0		0	
	2023	8	95 (4.5)	0		0		0	

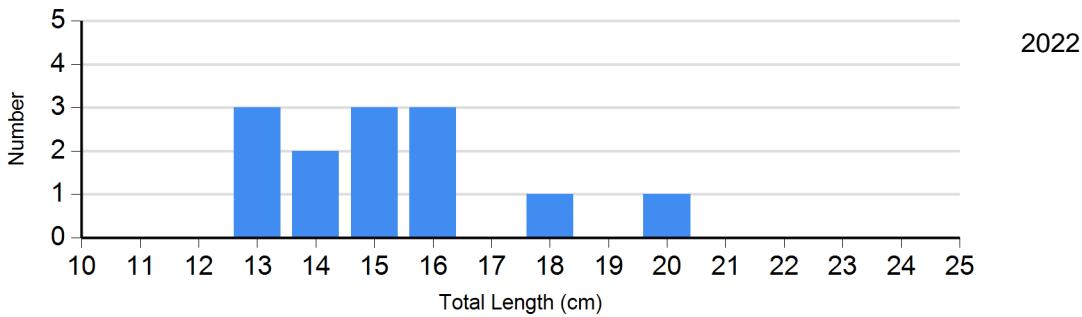
Length Frequency Distribution

Length frequency histogram of species sampled by year.

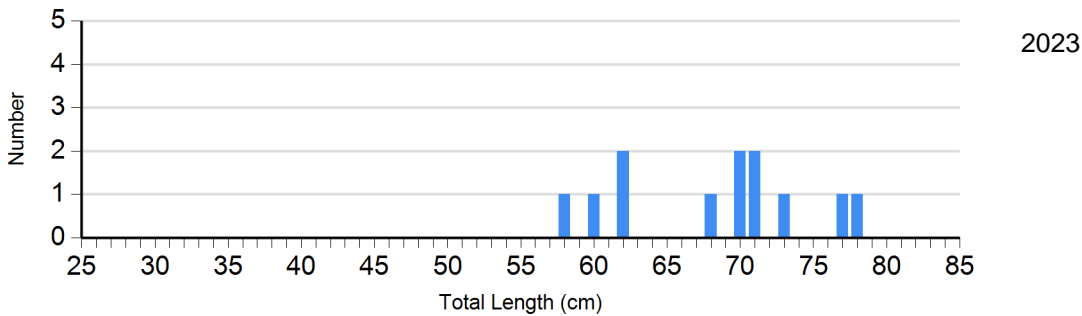
Species: Black Crappie
Gear: frame net (std 3/4 in)



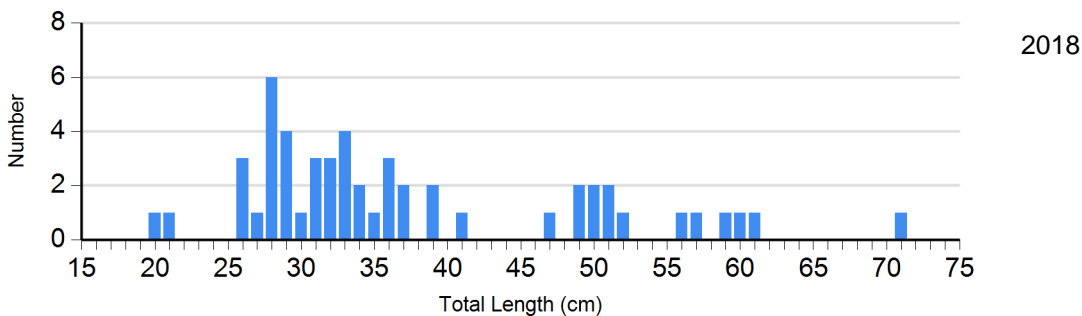
Species: Bluegill
Gear: frame net (std 3/4 in)

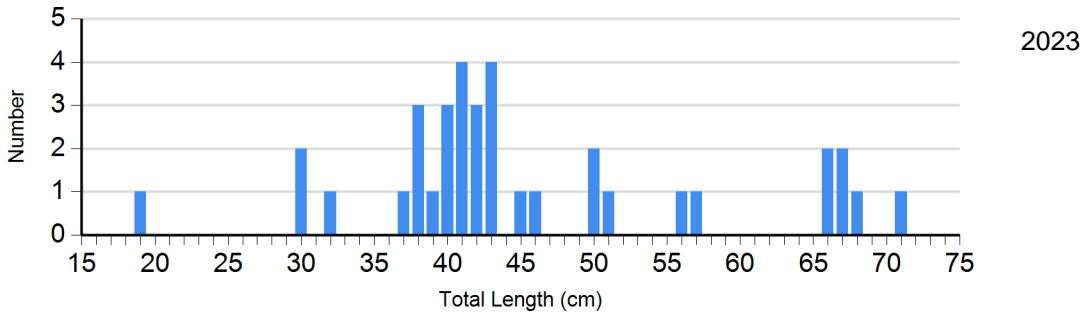
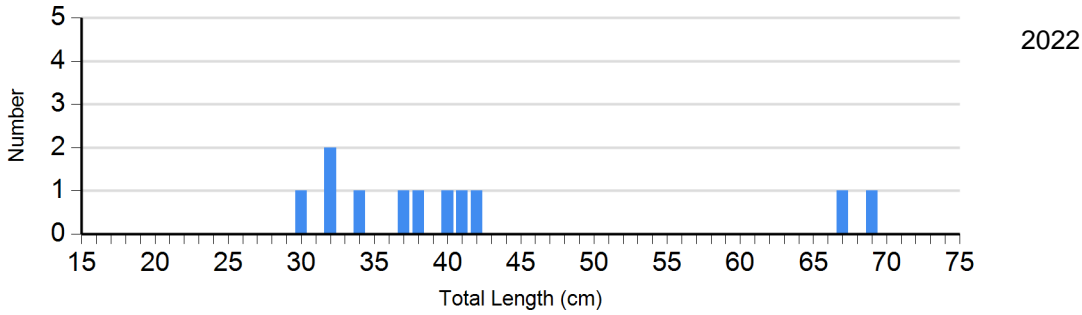
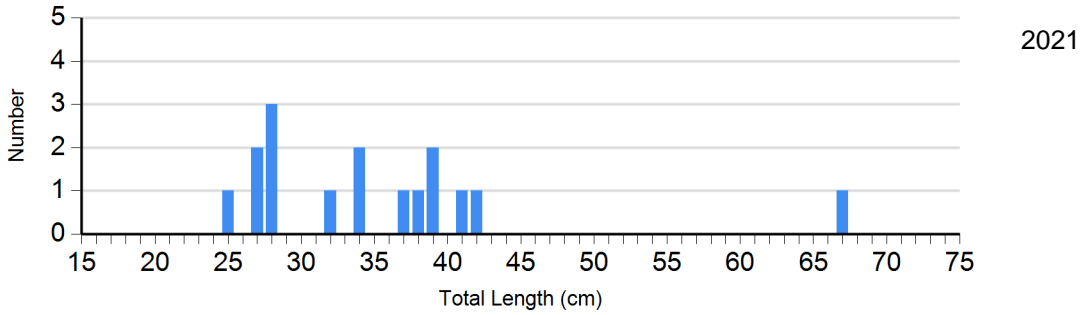
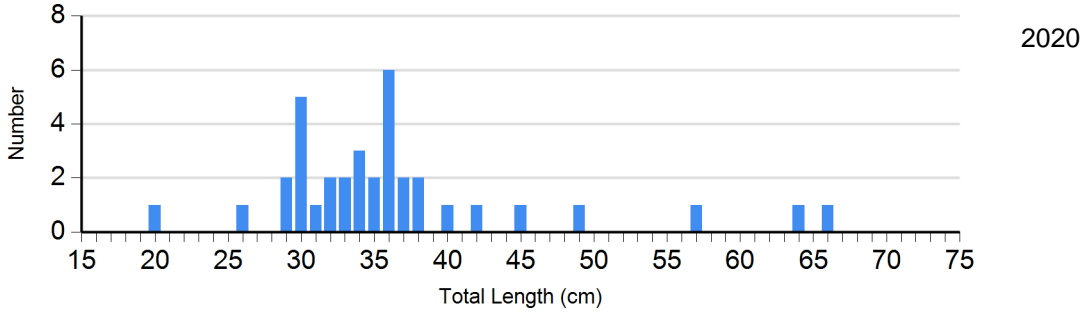
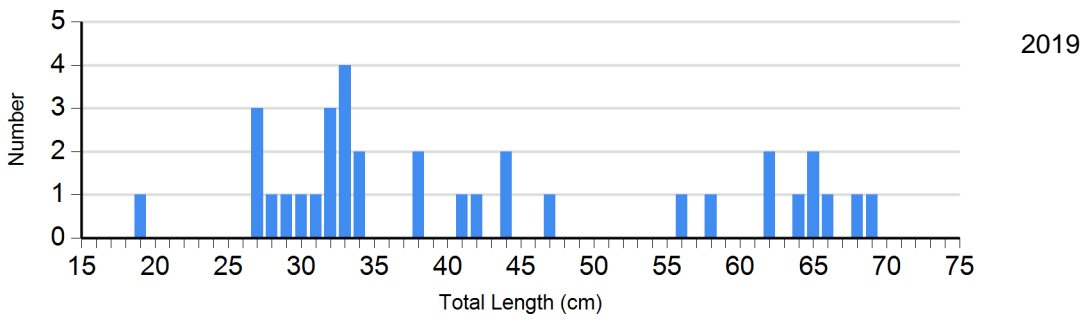


Species: Common Carp
Gear: AFS std gill net

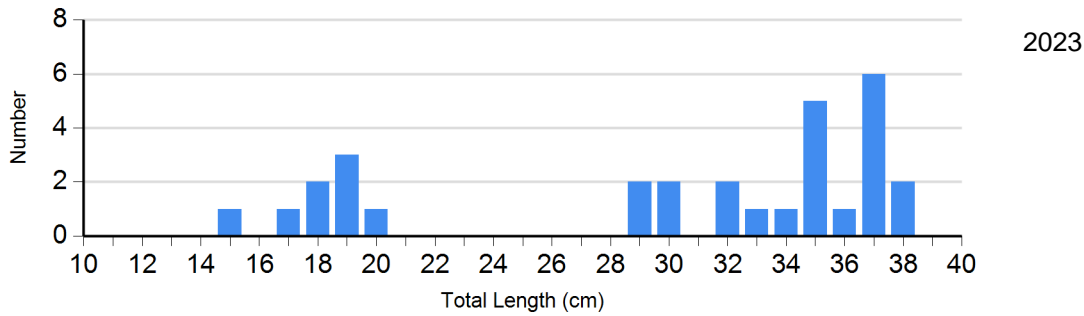
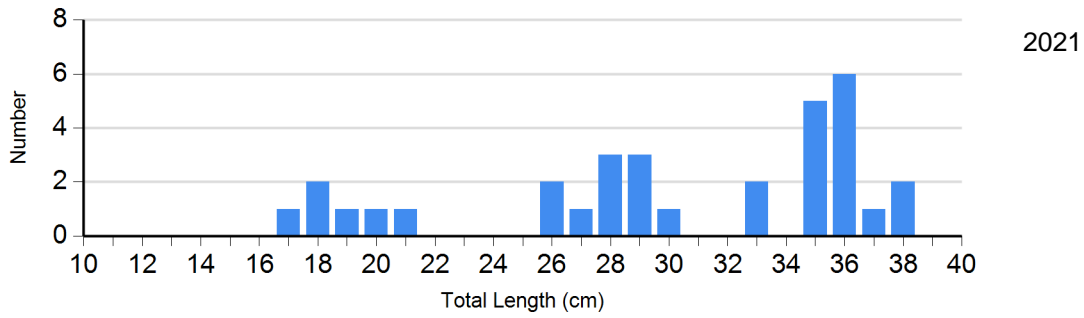
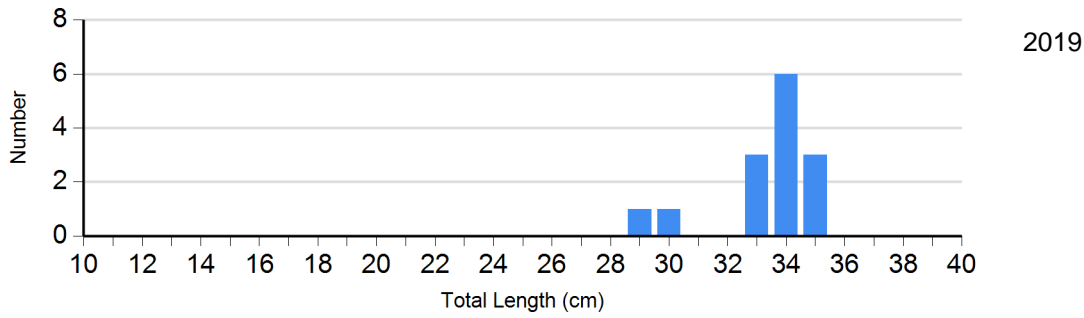
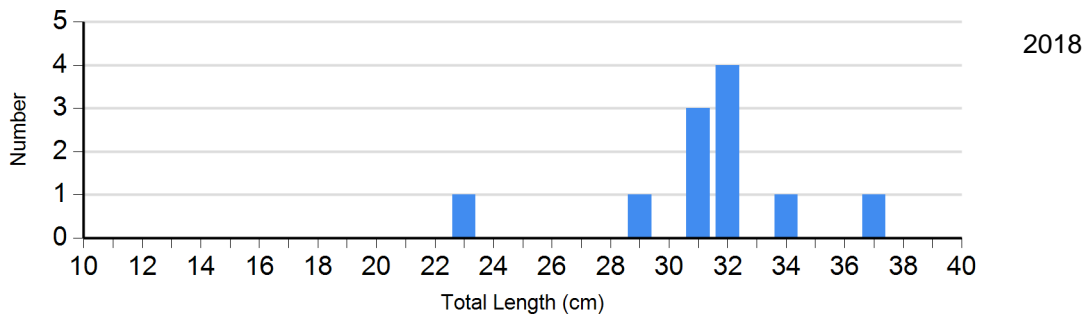


Species: Walleye
Gear: AFS std gill net

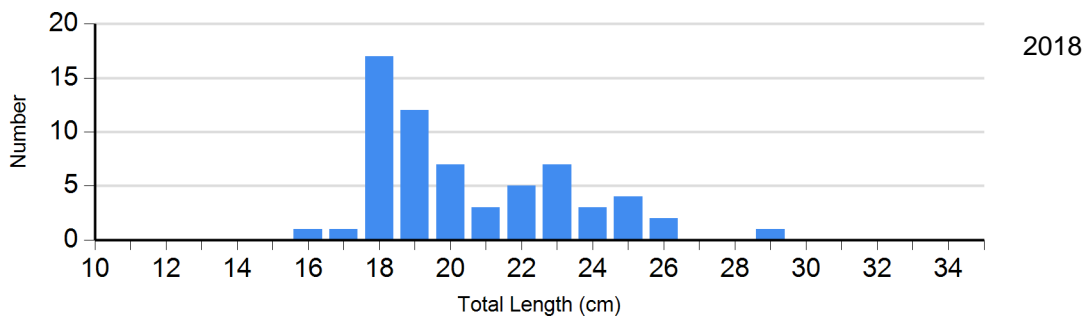


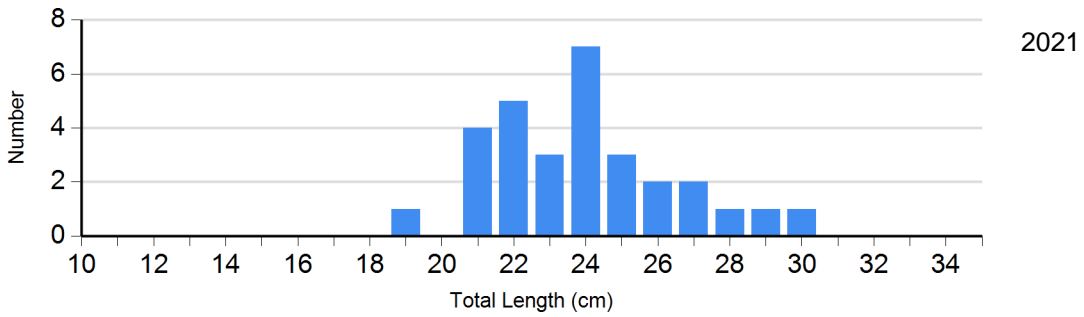
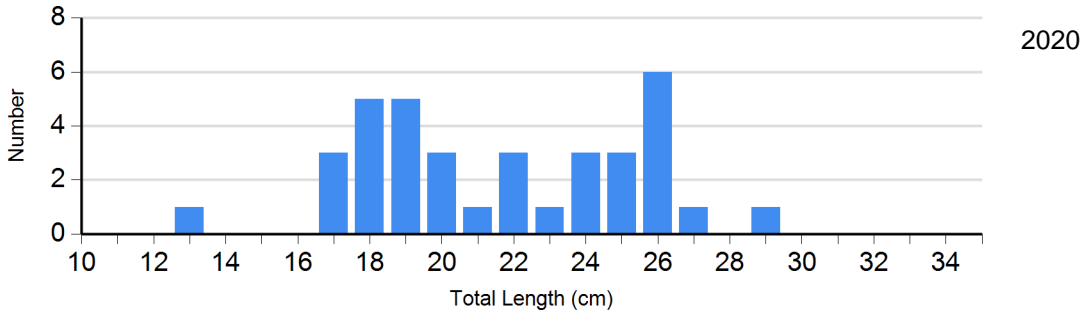
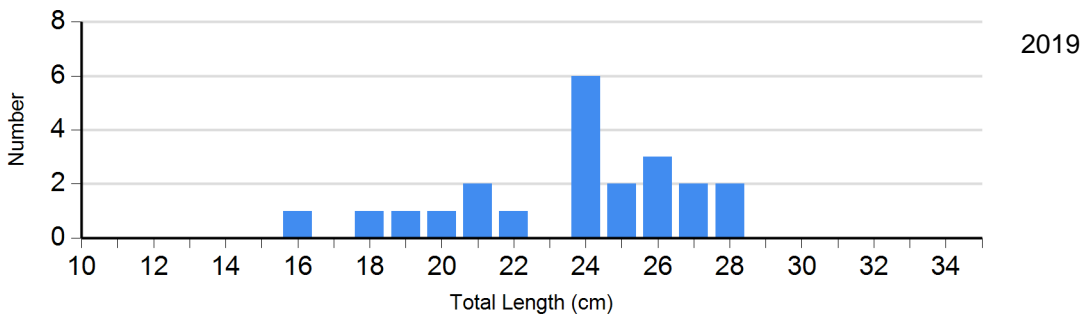


Species: White Bass
 Gear: AFS std gill net



Species: Yellow Perch
 Gear: AFS std gill net

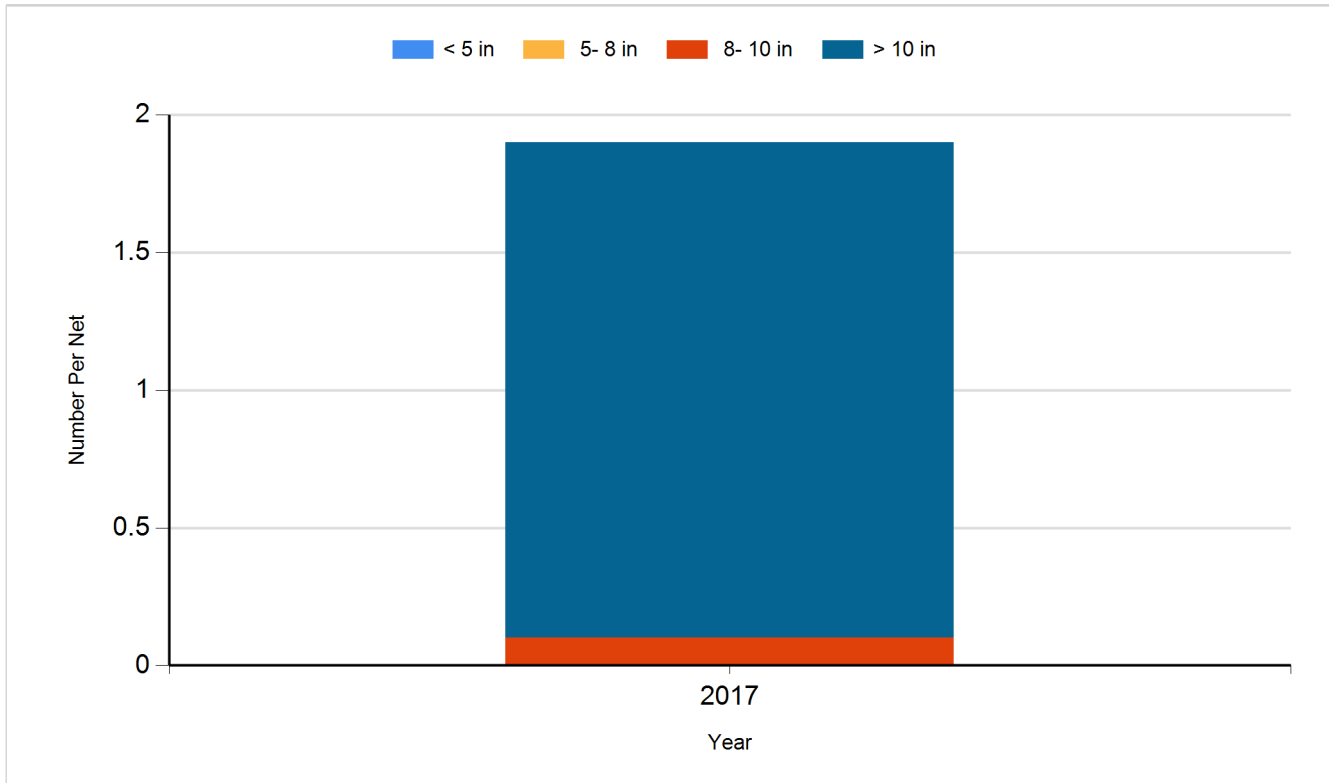




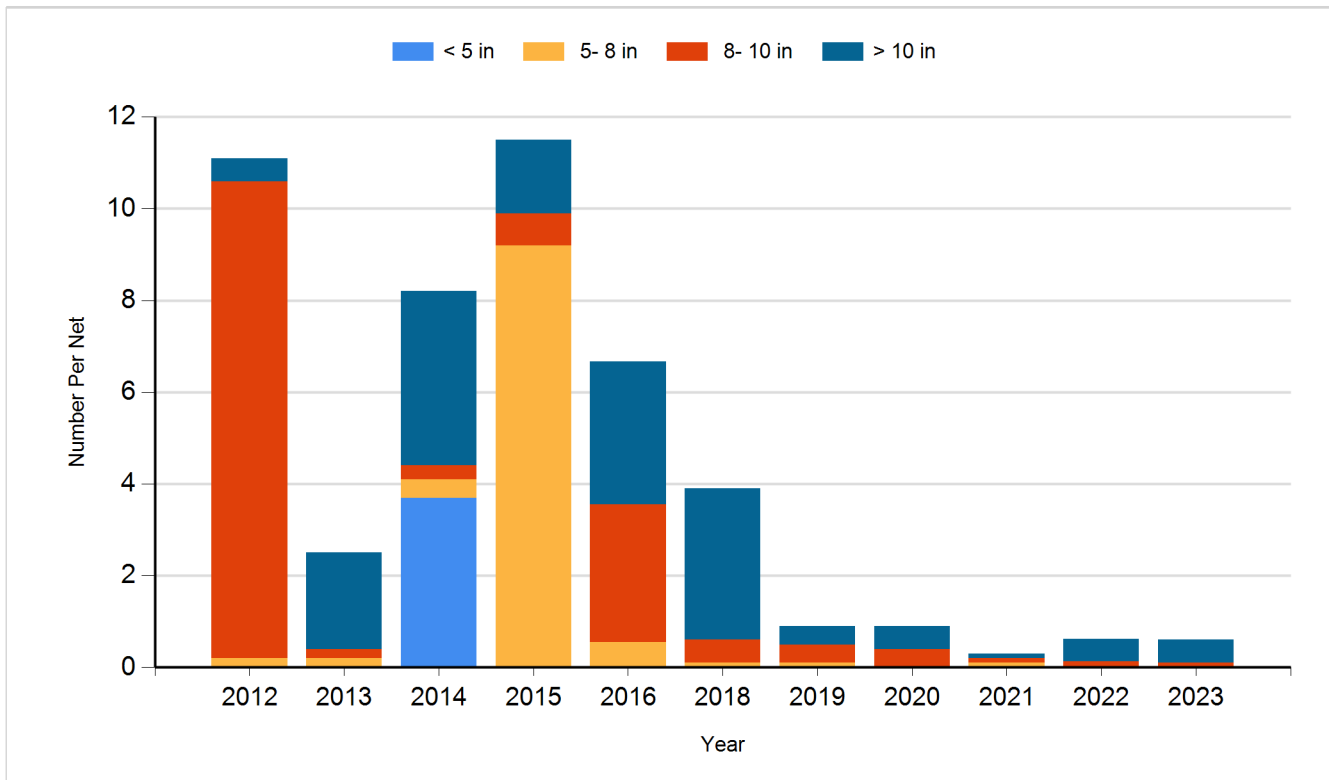
Historic Fish Sizes and Relative Abundance

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

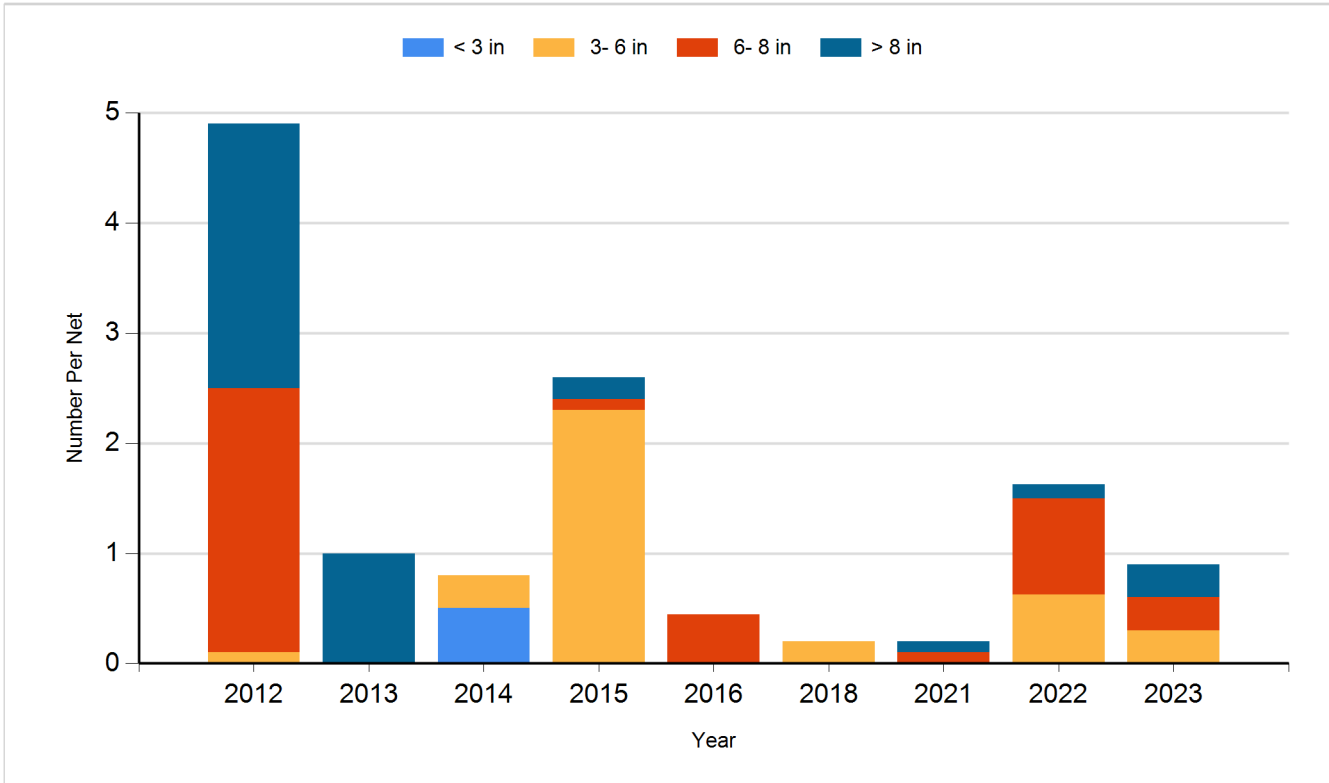
Species: Black Crappie
Gear: AFS std frame net



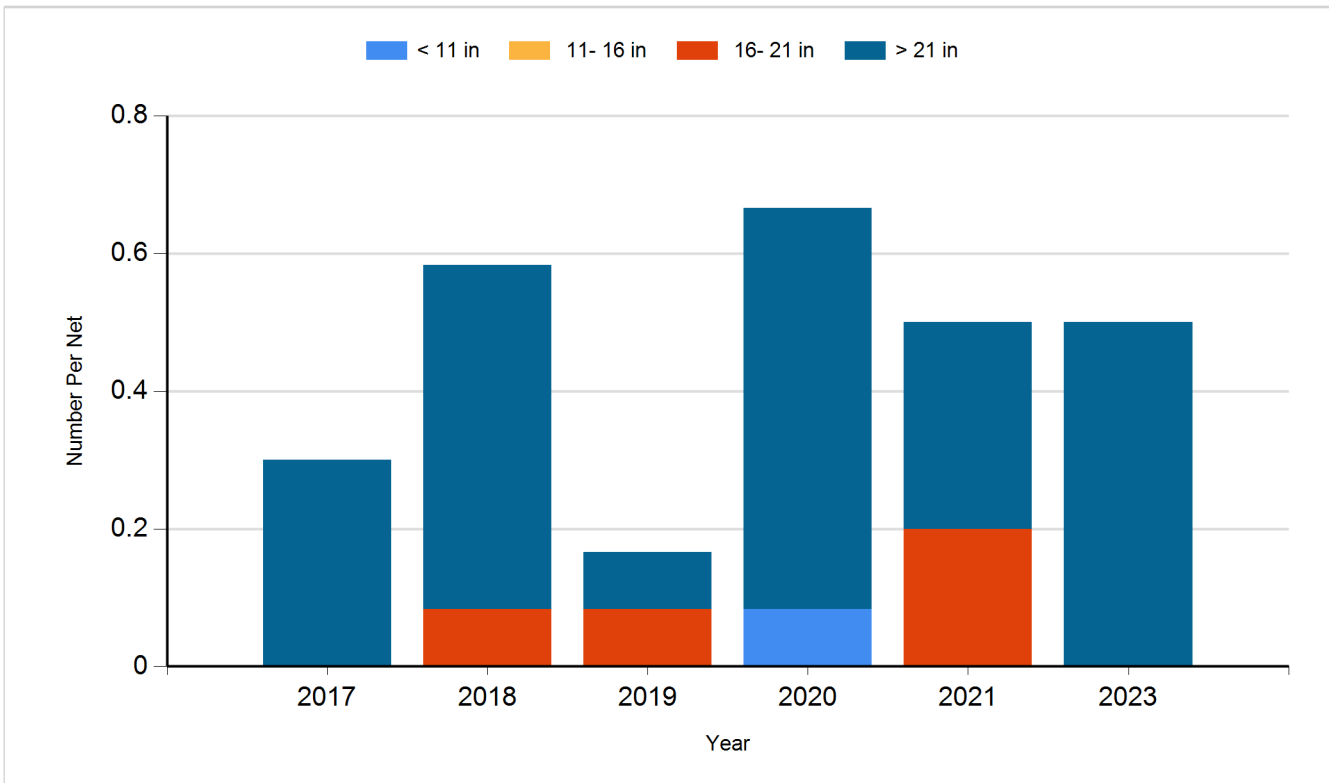
Species: Black Crappie
Gear: frame net (std 3/4 in)



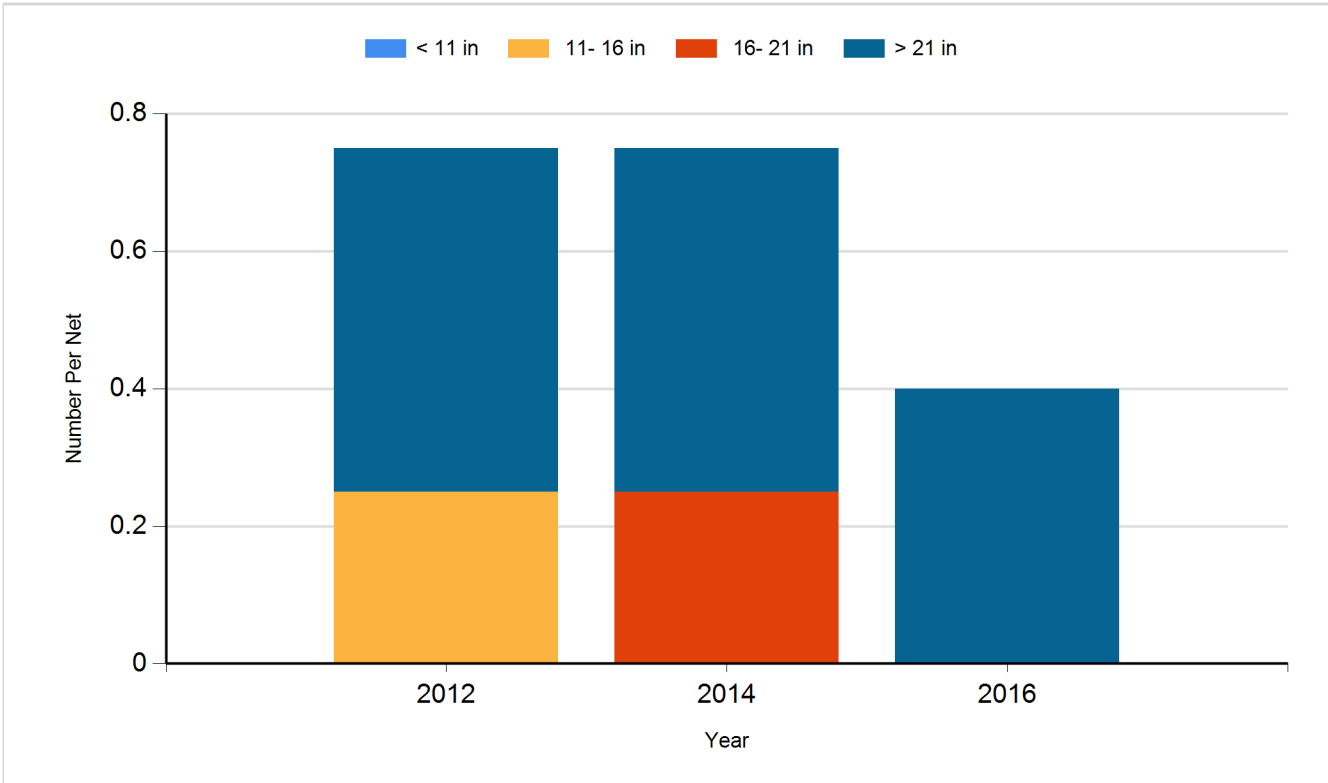
Species: Bluegill
Gear: frame net (std 3/4 in)



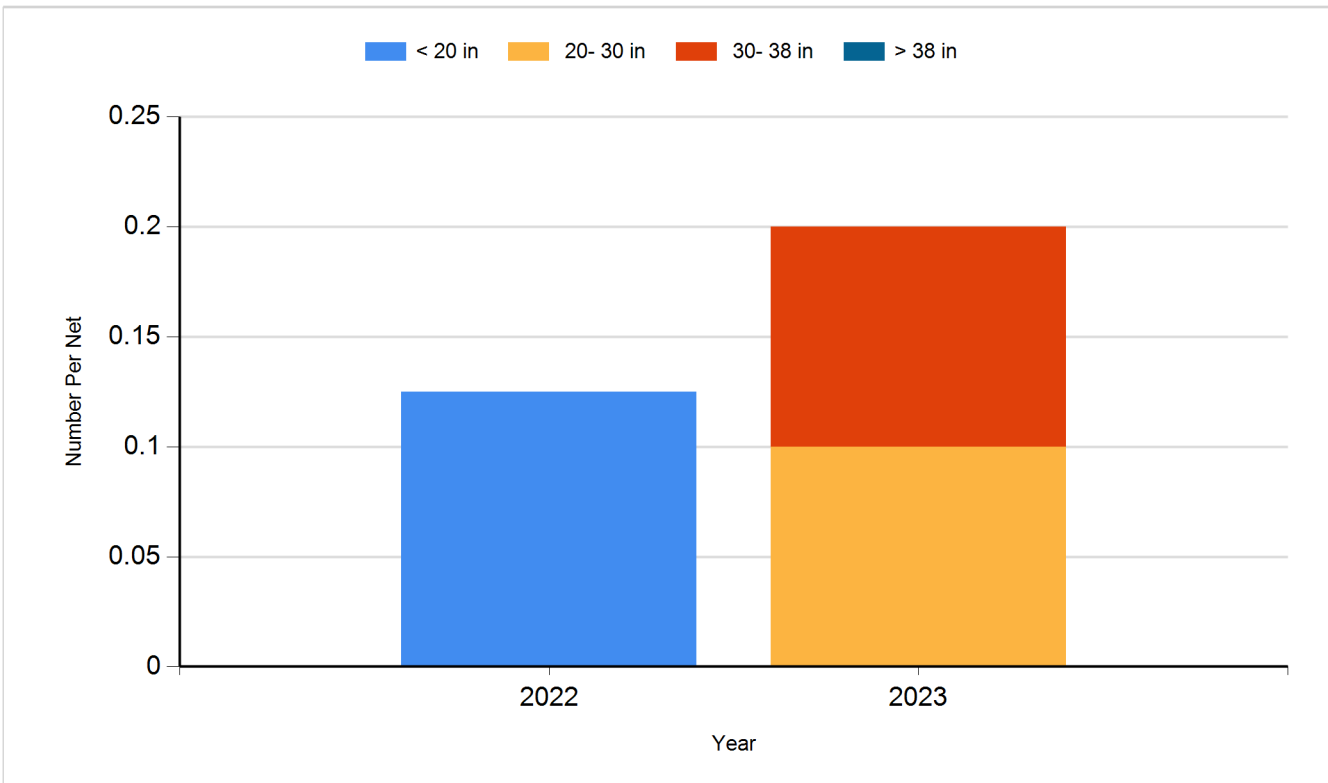
Species: Common Carp
Gear: AFS std gill net



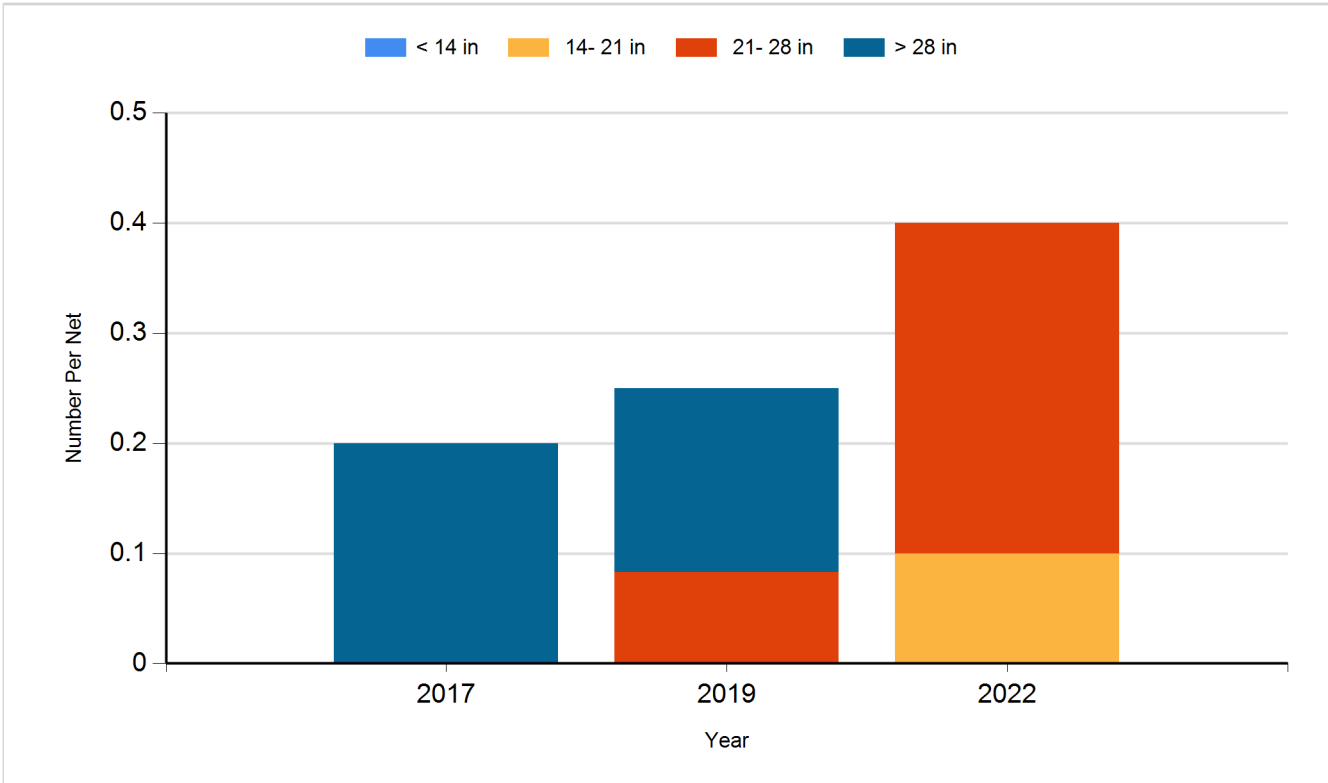
Species: Common Carp
Gear: std exp gill net



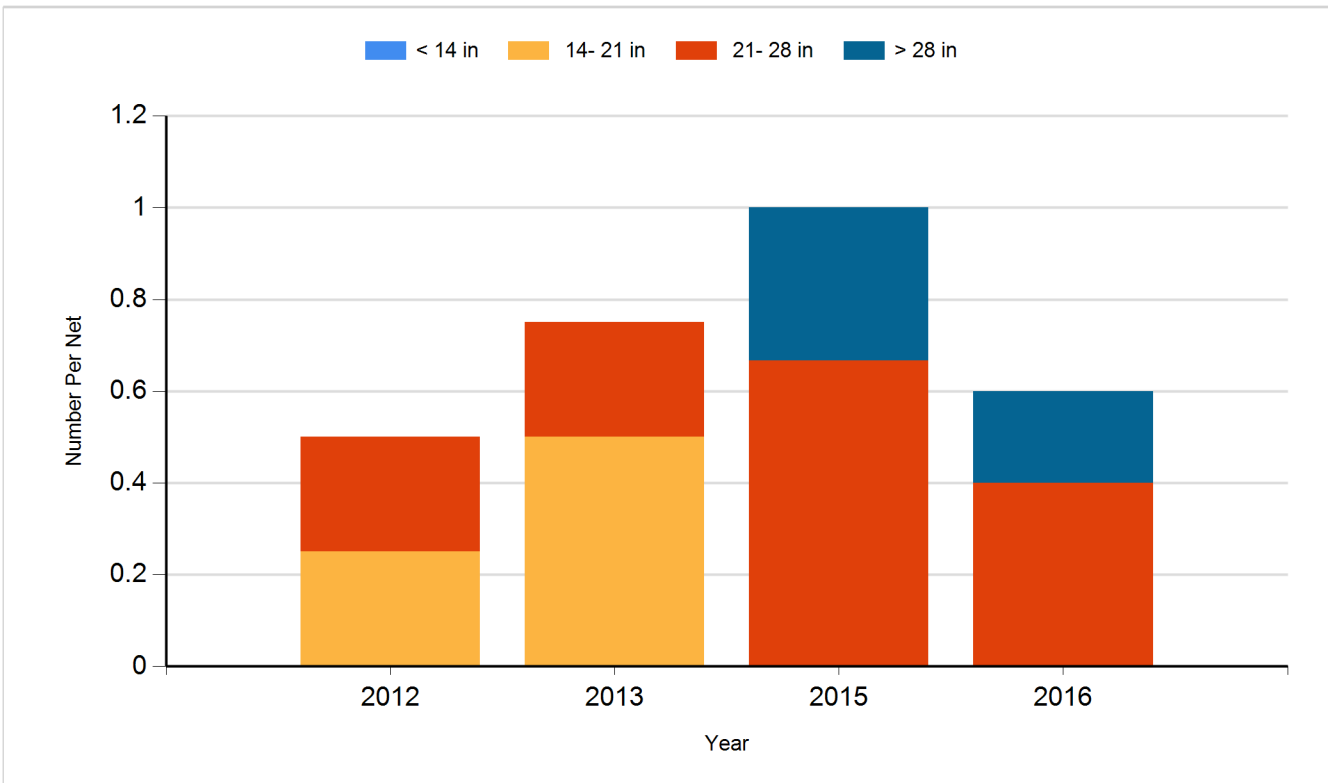
Species: Muskellunge
Gear: frame net (std 3/4 in)



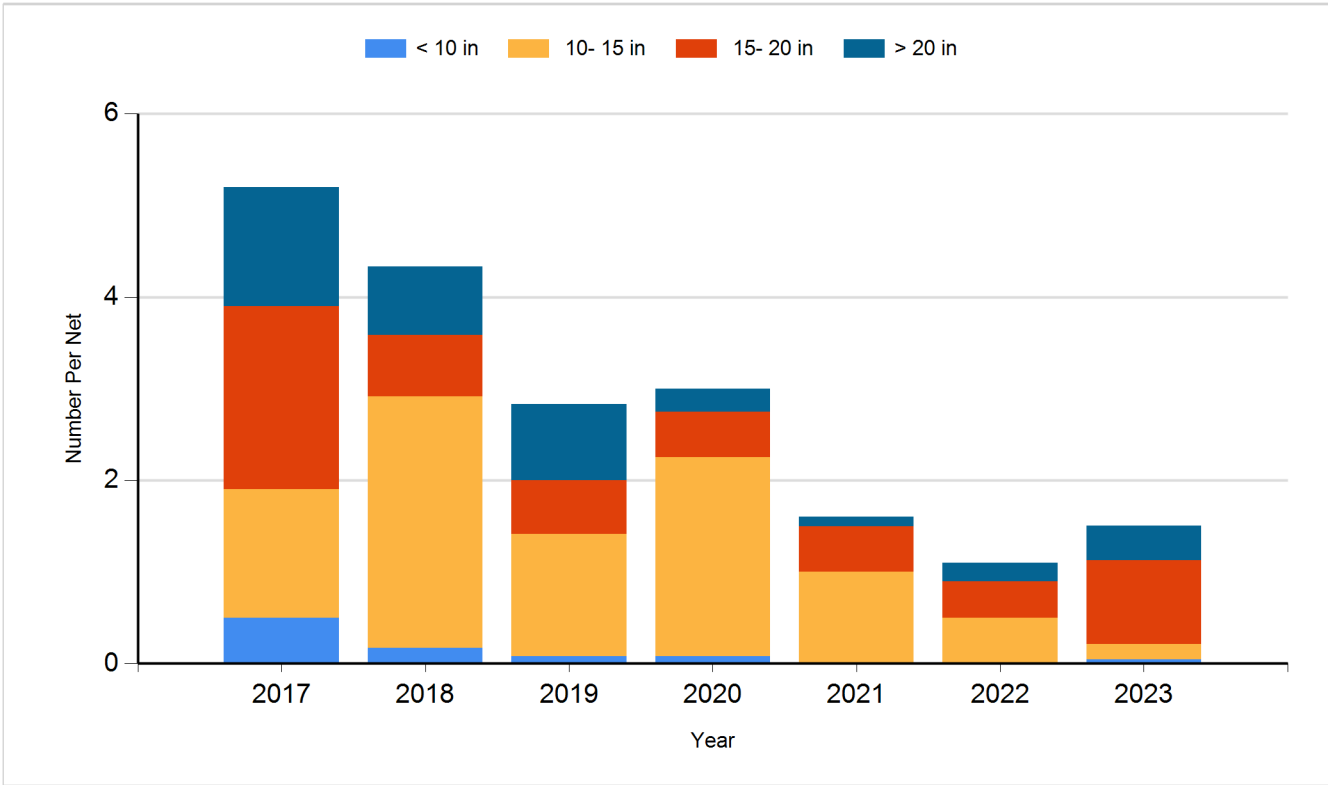
Species: Northern Pike
Gear: AFS std gill net



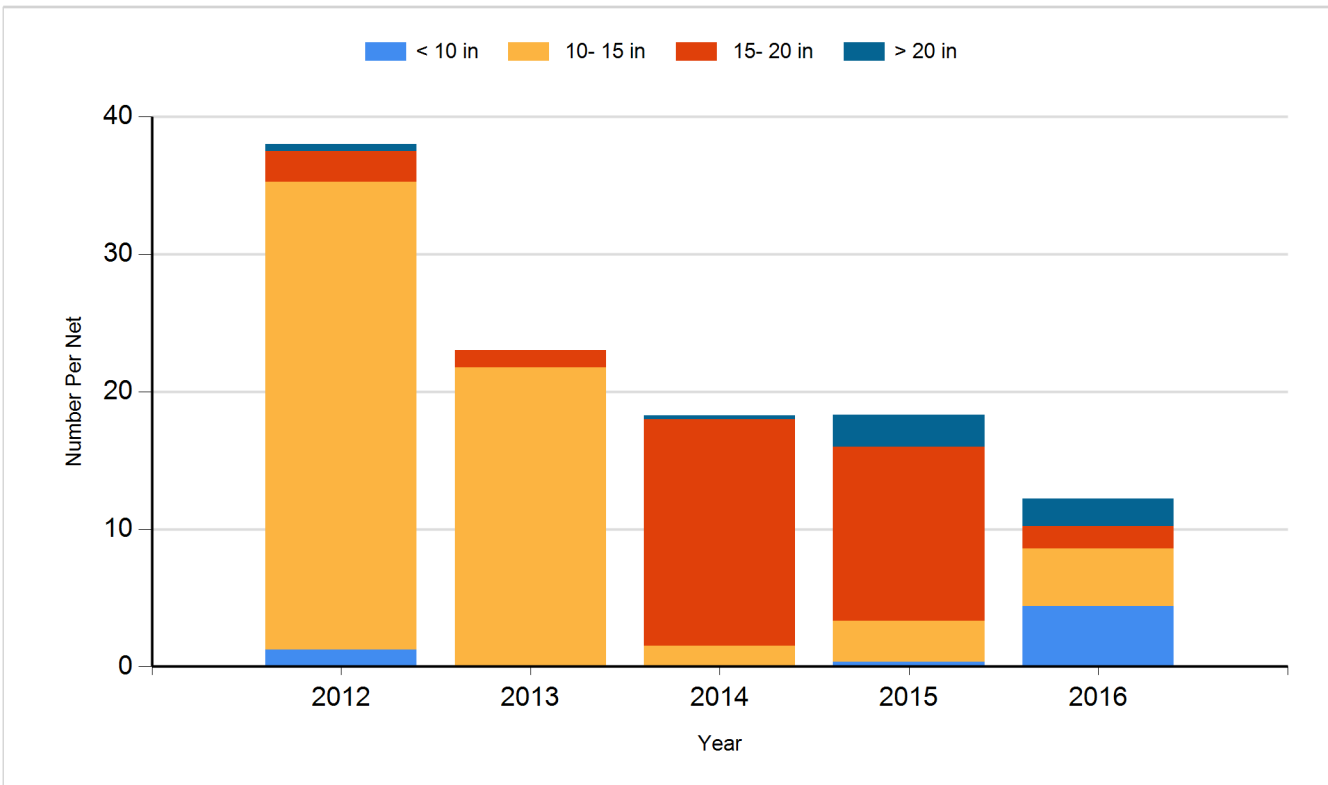
Species: Northern Pike
Gear: std exp gill net



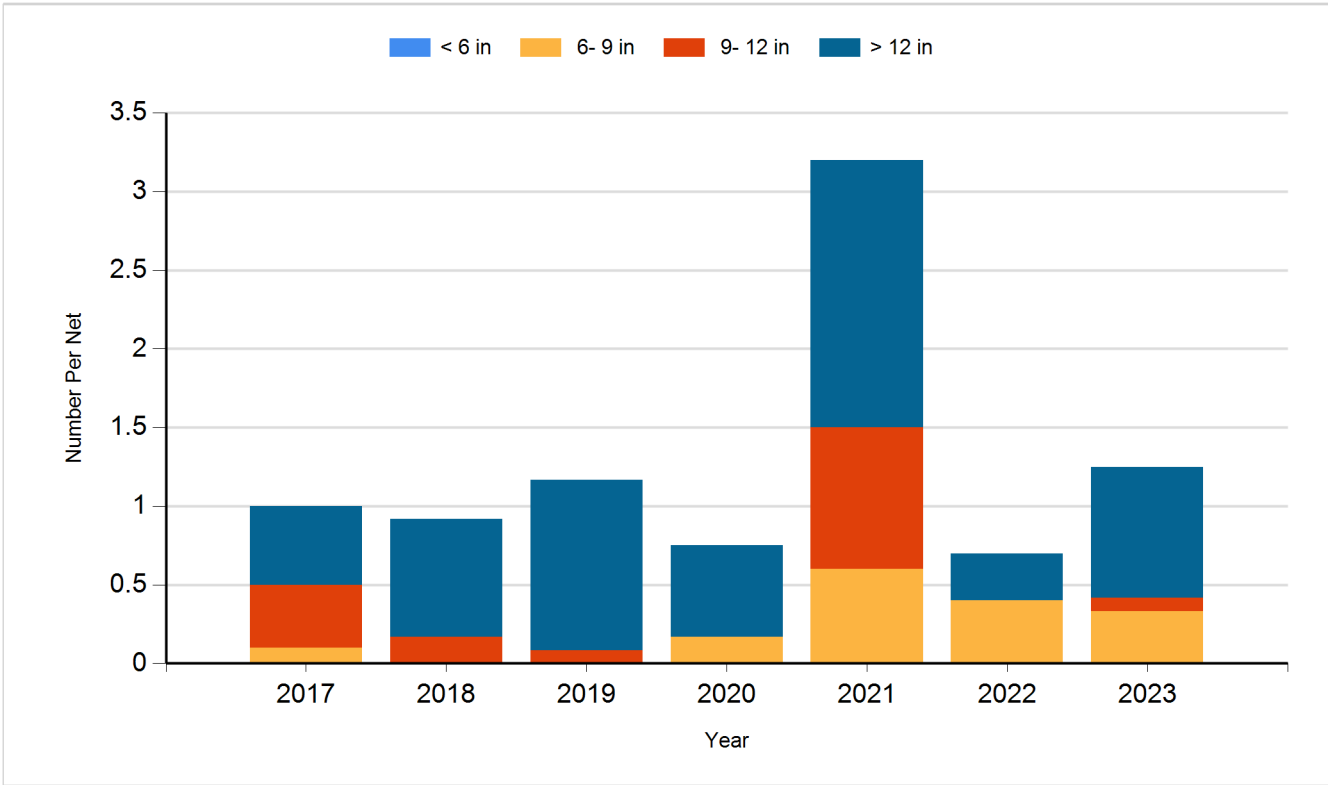
Species: Walleye
Gear: AFS std gill net



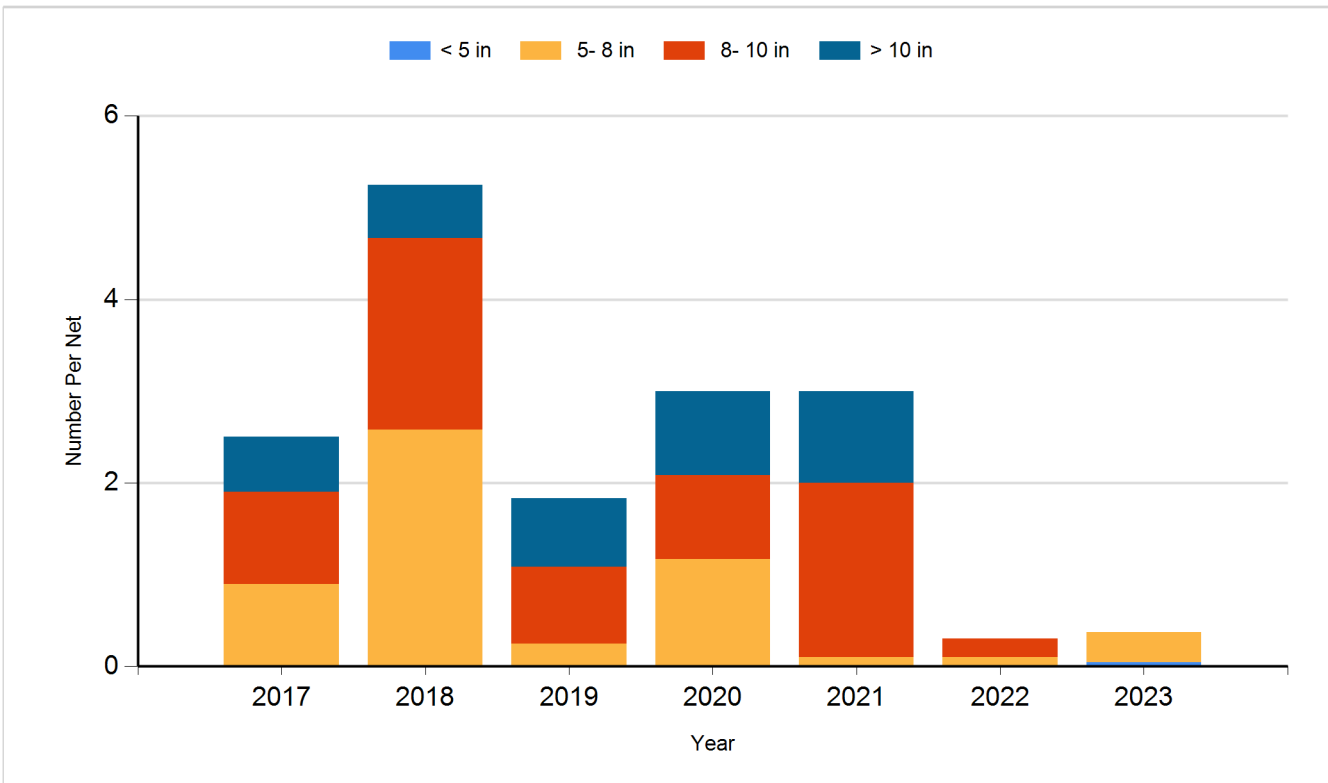
Species: Walleye
Gear: std exp gill net



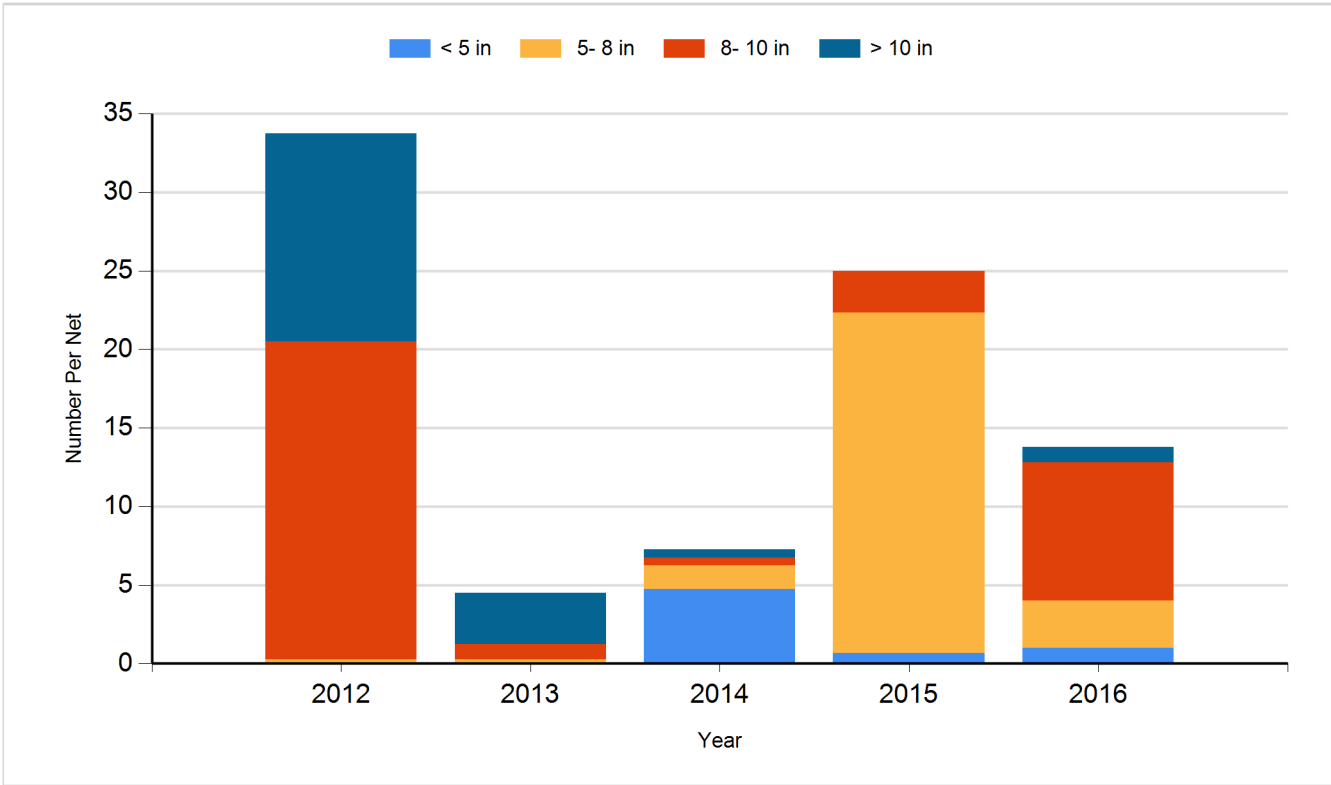
Species: White Bass
Gear: AFS std gill net



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
2012	Muskellunge	Adult	2
2013	Muskellunge	Fingerling	780
2014	Muskellunge	Large Fingerling	965
2015	Muskellunge	Large Fingerling	1,720
2015	Walleye	Small Fingerling	118,400
2017	Muskellunge	Large Fingerling	3,206
2017	Walleye	Small Fingerling	121,030
2019	Walleye	Small Fingerling	117,220
2021	Muskellunge	Juvenile	1,400
2022	Walleye	Juvenile	150,150
2023	Muskellunge	Adult	86