

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Sinai, Brookings County

MBS-Lake-232-000

2021

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 29, 2021	5 net-nights
AFS std gill net	Jun 30, 2021	5 net-nights
frame net (std 3/4 in)	Jun 29, 2021	5 net-nights
frame net (std 3/4 in)	Jun 30, 2021	5 net-nights

Common Fish Species Present

Muskellunge

Walleye

Smallmouth Bass

White Bass

Yellow Perch

Northern Pike

Black Bullhead

Common Carp

Black Crappie

Bluegill

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 Crappie	1	0.1	0.1	100		100		87	
	Common Carp	5	0.5	0.3	100		60			
	Northern Pike	1	0.1	0.1	100		0		82	
	Smallmouth Bass	2	0.2	0.3	0		0		89	0
	Walleye	16	1.6	1.1	38	20	6		80	1
	White Bass	32	3.2	1.6	81	11	53	13	86	1
	White Sucker	1	0.1	0.1	100		100			
frame net (std 3/4 in)	Yellow Perch	30	3.0	0.9	97		33	13	104	2
	Black Bullhead	7	0.7	0.5	100		86			
	Black Crappie	3	0.3	0.2	67		33		103	4
	Bluegill	2	0.2	0.2	100		50		130	23
	Common Carp	5	0.5	0.3	80		40			
	Northern Pike	9	0.8	0.3	25		13		77	3
	Smallmouth Bass	72	7.2	3.4	67	8	33	8	84	1
	Walleye	8	0.8	0.6	63		25		80	3
	White Bass	66	6.6	2.6	98		48	9	82	1
	Yellow Bullhead	2	0.2	0.2	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	
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
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	0.18	
	Black Crappie						0.8	0.1	0.0	0.0	0.1	0.20	
	Channel Catfish						0.0	0.0	0.0	0.1	0.0	0.02	
	Common Carp						0.3	0.6	0.2	0.6	0.5	0.44	
	Northern Pike						0.2	0.0	0.3	0.1	0.1	0.14	
	Smallmouth Bass						0.7	1.8	0.3	0.7	0.2	0.74	
	Walleye						4.7	4.2	2.8	2.9	1.6	3.24	
	White Bass						1.0	0.9	1.2	0.8	3.2	1.42	
	White Sucker						0.1	0.0	0.0	0.1	0.1	0.06	
	Yellow Bullhead						0.0	0.0	0.1	0.1	0.0	0.04	
	Yellow Perch						2.5	5.3	1.8	3.0	3.0	3.12	
fall night EF-WAE*	Walleye	16.0	55.5	94.5	79.0							61.25	
frame net (std 3/4 in)	Black Bullhead	0.4	2.5	10.0	44.4	6.6		2.5	1.4	0.2	0.7	7.63	
	Black Crappie	11.1	2.5	4.5	11.5	6.7		3.9	0.9	0.9	0.3	4.70	
	Bluegill	4.9	1.0	0.3	2.6	0.4		0.2	0.0	0.0	0.2	1.07	
	Channel Catfish	0.1	0.0	0.0	0.0	0.0		0.0	0.0	0.1	0.0	0.02	
	Common Carp	1.7	1.4	0.0	0.2	0.4		0.6	0.8	0.2	0.5	0.64	
	Green Sunfish	0.1	0.1	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.02	
	Northern Pike	0.6	0.2	0.0	0.3	0.8		0.7	0.1	0.5	0.8	0.44	
	Smallmouth Bass	16.8	2.9	0.9	2.7	6.1		4.4	4.6	2.4	7.2	5.33	
	Sunfish Hybrid	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.00	
	Walleye	4.9	1.3	2.8	1.6	1.2		4.3	2.2	1.4	0.8	2.28	
	White Bass	0.0	0.0	0.0	0.0	1.1		10.3	3.7	11.0	6.6	3.63	
	Yellow Bullhead	0.0	0.0	0.2	1.1	1.4		1.4	1.1	2.0	0.2	0.82	
	Yellow Perch	2.7	0.0	0.3	1.8	0.0		0.1	0.1	0.2	0.0	0.58	
std exp gill net	Black Bullhead	0.3	0.3	1.5	40.0	12.4						10.90	

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
std exp gill net	Black Crappie	0.3	0.0	0.0	2.0	3.6						1.18
	Bluegill	0.0	0.0	0.3	0.0	0.0						0.06
	Common Carp	0.8	0.0	0.8	0.0	0.4						0.40
	Green Sunfish	0.3	0.0	0.0	0.0	0.0						0.06
	Northern Pike	0.5	0.8	0.0	1.0	0.6						0.58
	Smallmouth Bass	2.5	0.3	1.3	1.7	2.0						1.56
	Walleye	36.8	23.0	18.3	18.0	7.8						20.78
	White Sucker	0.0	0.3	0.0	0.0	0.0						0.06
	Yellow Perch	33.8	4.5	2.5	24.3	12.8						15.58

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													
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021				
AFS std frame net	Black Bullhead	PSD							100							
		PSD-P							53							
		Wr							91							
	Black Crappie	PSD								100						
		PSD-P								95						
		Wr								91						
	Common Carp	PSD								100						
		PSD-P								86						
		Wr								84						
	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						
AFS std gill net	Black Bullhead	PSD							100	100						
		PSD-P							71	100						
		Wr							95	110					87	
	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	
		PSD-P								100	86	50	100	60		
		Wr								91		96	85	82		
	Northern Pike	PSD								100		100	100	100		
		PSD-P								100		67	0	0		
		Wr								91		96	85	82		
	Smallmouth Bass	PSD								71	57	67	75	0		
		PSD-P								71	48	67	38	0		
		Wr								91	102	86	87	89		
	Walleye	PSD								70	34	52	26	38		
		PSD-P								28	18	30	9	6		
		Wr								84	87	78	81	80		
White Bass	PSD								90	100	100	78	81			

Gear	Species	Index	Year										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
AFS std gill net	White Bass	PSD-P							50	82	93	78	53
		Wr							95	95	89	87	86
	Yellow Perch	PSD							64	51	86	61	97
		PSD-P							24	11	41	31	33
		Wr							98	111	107	97	104
	frame net (std 3/4 in)	Black Bullhead	PSD	75	100	26	13	88		100	100	100	100
PSD-P			0	48	19	6	20		88	86	50	86	
Wr			93	99									
Black Crappie		PSD	98	92	91	20	92		97	89	100	67	
		PSD-P	5	84	84	14	47		85	44	56	33	
		Wr	103	102	99	104	94		97	101	90	103	
Bluegill		PSD	98	100	0	12	100		0			100	
		PSD-P	49	100	0	8	0		0			50	
		Wr	115	126	114	118	109		130			130	
Common Carp		PSD	18	93		100	100		100	100	100	80	
		PSD-P	6	0		50	100		50	100	100	40	
		Wr	100	106									
Northern Pike		PSD	0	50		100	100		100	100	20	25	
		PSD-P	0	0		67	14		57	0	20	13	
		Wr	75	78		83	83		86	79	85	77	
Smallmouth Bass		PSD	24	52	78	15	38		68	72	75	67	
		PSD-P	17	14	78	11	24		52	37	54	33	
		Wr	88	98	106	94	90		93	90	86	84	
Walleye		PSD	14	54	61	100	73		65	41	43	63	
		PSD-P	8	46	11	31	27		40	27	36	25	
		Wr	78	91	89	84	74		86	85	76	80	
White Bass		PSD					80		100	100	95	98	
		PSD-P					80		93	97	92	48	
		Wr					91		98	87	87	82	
Yellow Perch	PSD	100		67	39			100	100	50			
	PSD-P	33		33	0			0	0	50			
	Wr	99		91	92			80	99	95			
std exp gill net	Black Bullhead	PSD	100	100	50	8	90						
		PSD-P	0	0	33	0	0						
		Wr	99										
	Black Crappie	PSD	100		0	17	78						

Gear	Species	Index	Year									
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
std exp gill net	Black Crappie	PSD-P	0		0	0	0					
		Wr	99			113	96					
	Bluegill	PSD			100							
		PSD-P			0							
		Wr			123							
	Common Carp	PSD	67		100			100				
		PSD-P	67		67			100				
		Wr	88									
	Northern Pike	PSD	50	33		100	100					
		PSD-P	0	0		33	33					
		Wr	84	76		85	83					
	Smallmouth Bass	PSD	20	100	60	40	50					
		PSD-P	10	0	20	40	30					
		Wr	89	108	101	90	86					
	Walleye	PSD	7	5	92	83	46					
		PSD-P	1	0	1	13	26					
		Wr	77	87	91	85	81					
	Yellow Perch	PSD	99	94	40	11	77					
		PSD-P	39	72	20	0	8					
		Wr	96	110	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+
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)		
2013	92		294 (14)	343 (75)	455 (1)	416 (1)		424 (1)			
2012	150	195 (4)	307 (133)	419 (5)	404 (3)	450 (5)					602 (2)

Species: Yellow Perch

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2015	75	103 (2)	179 (73)								
2014	29	119 (25)		248 (3)	265 (1)						
2013	18		231 (5)	260 (4)	274 (8)		322 (1)				
2012	135		221 (37)	247 (88)	278 (11)						

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).

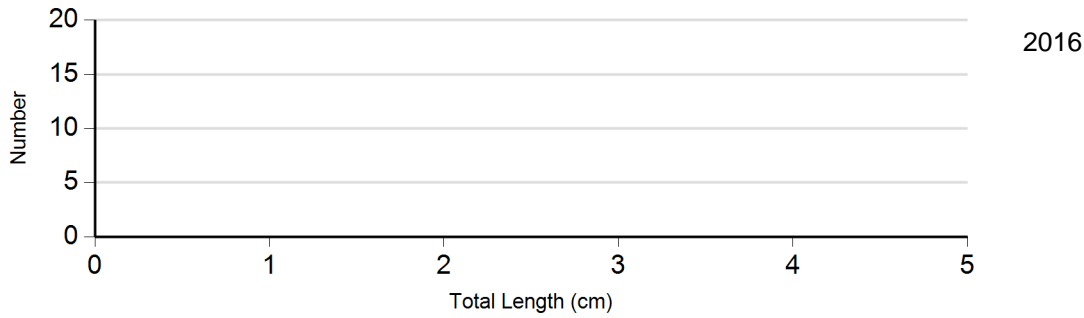
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2017	0		1	102	12	92 (1.2)	6	87 (1.1)
	2018	1	99	5	106 (2.9)	16	95 (1.5)	17	96 (1.7)
	2019	1	120	4	102 (4.0)	2	100 (2.7)	2	88 (7.7)
	2020	0		4	99 (2.7)	2	87 (3.6)	3	80 (2.2)
	2021	1	108	1	102	1	98	0	
Bluegill Frame Net	2018	2	130 (3.0)	0		0		0	
	2021	0		1	148	1	112	0	
Northern Pike Gill Net	2017	0		0		2	91 (3.6)	0	
	2019	0		1	89	2	100 (9.4)	0	
	2020	0		1	85	0		0	
	2021	0		1	82	0		0	
Walleye Gill Net	2017	14	81 (1.2)	20	85 (1.3)	9	87 (2.2)	4	88 (3.1)
	2018	33	87 (1.4)	8	83 (2.1)	8	92 (2.5)	1	89
	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
White Bass Gill Net	2017	1	96	4	95 (2.1)	4	93 (0.4)	1	96
	2018	0		2	94 (3.1)	9	95 (1.6)	0	
	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)
Yellow Perch Gill Net	2017	9	104 (3.6)	10	94 (2.1)	6	94 (2.2)	0	
	2018	31	112 (1.9)	25	111 (1.6)	7	105 (2.9)	0	

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
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

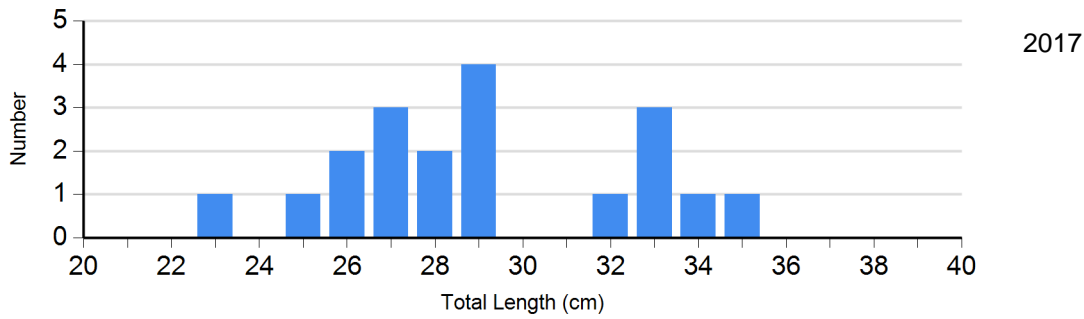
Length Frequency Distribution

Length frequency histogram of species sampled by year.

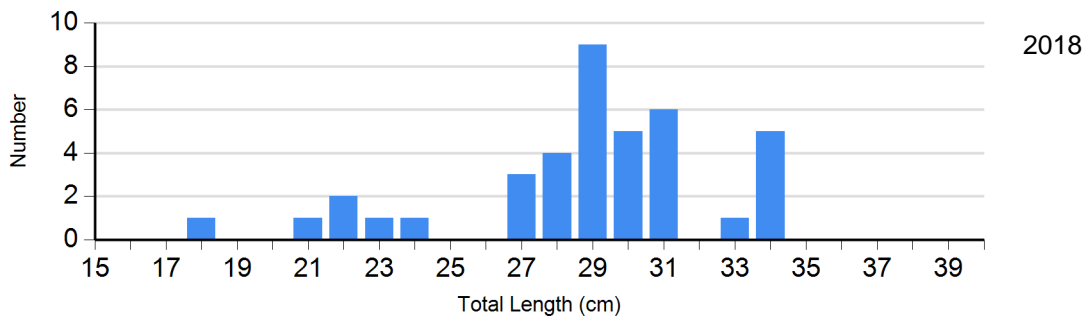
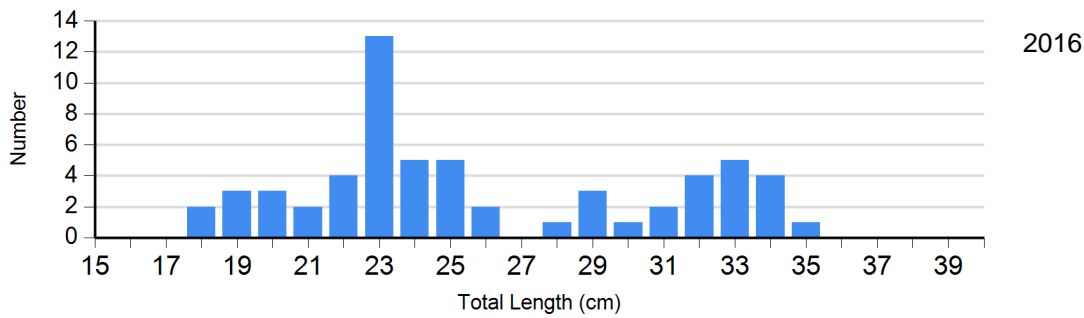
Species: Black Bullhead
Gear: std exp gill net



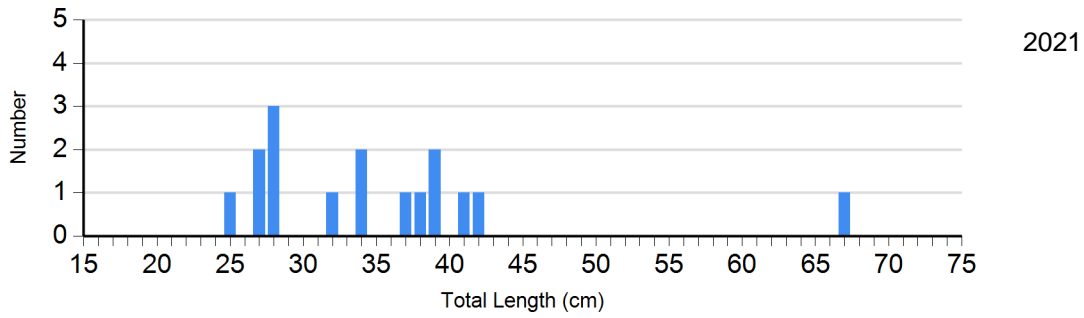
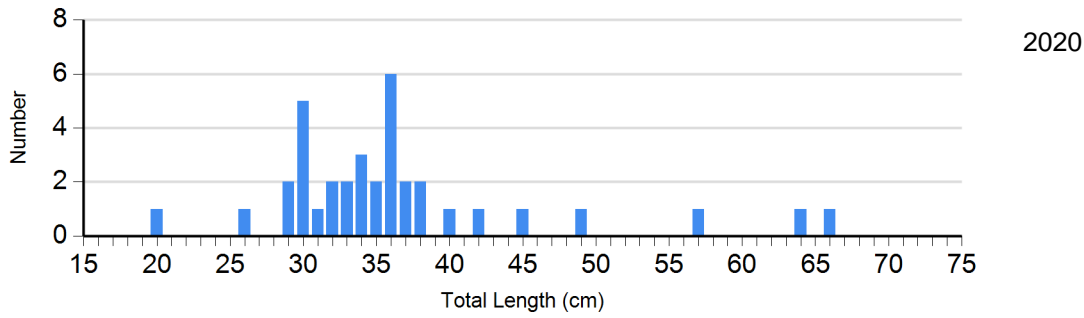
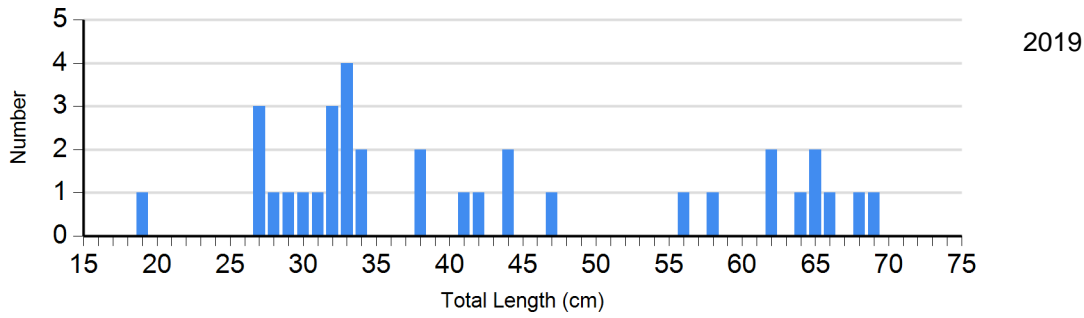
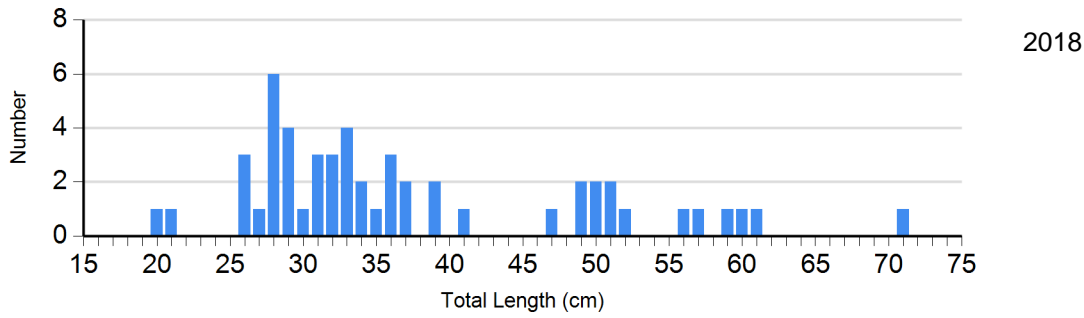
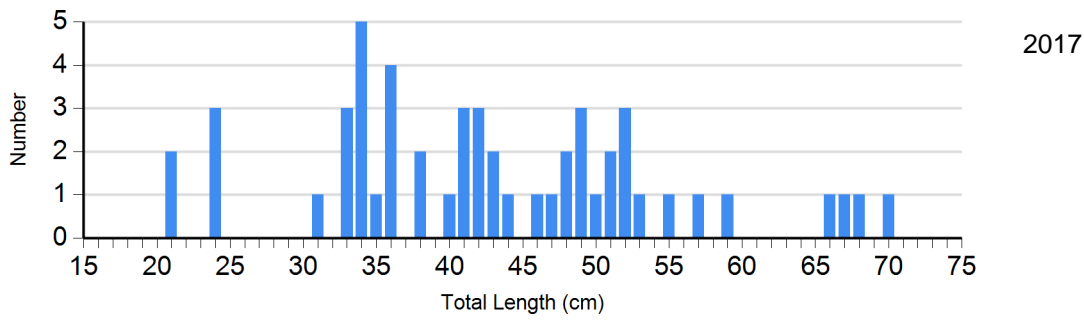
Species: Black Crappie
Gear: AFS std frame net



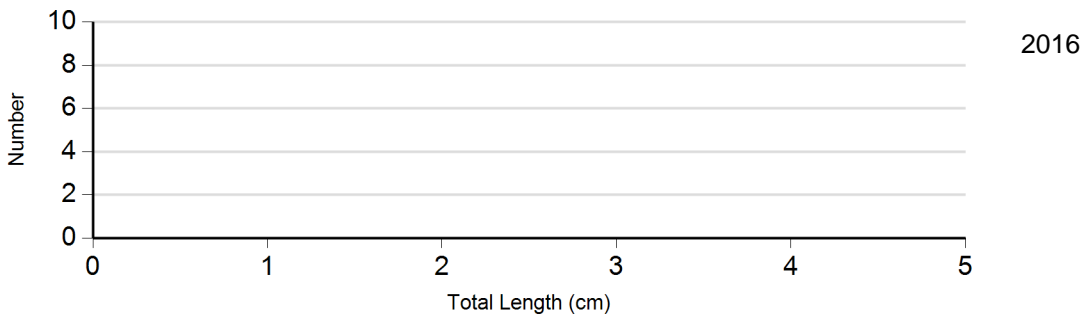
Species: Black Crappie
Gear: frame net (std 3/4 in)



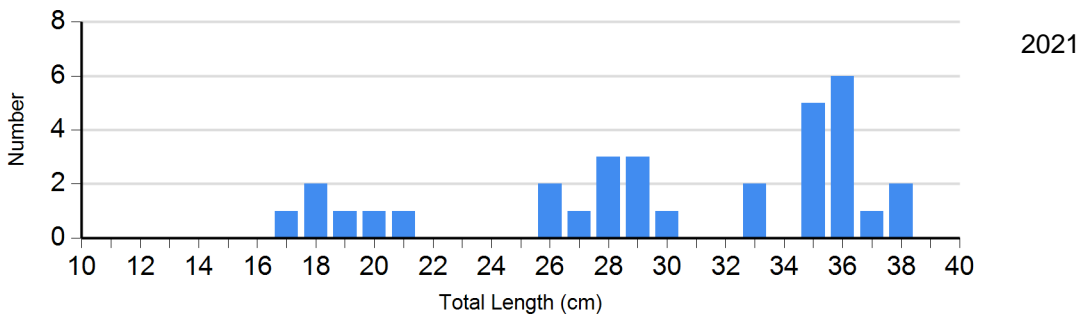
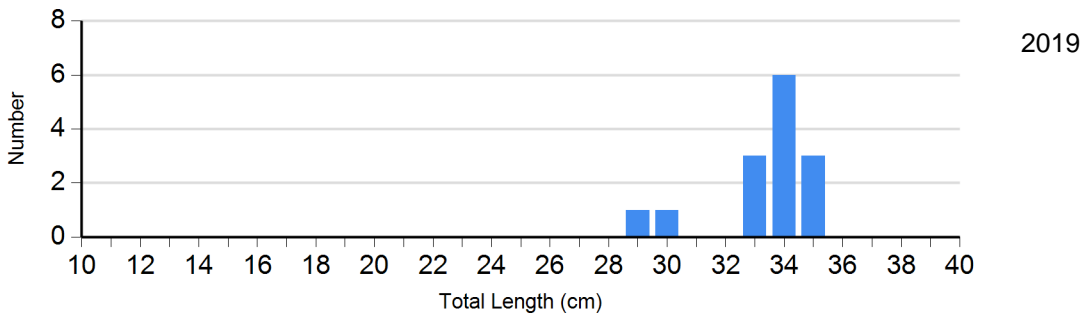
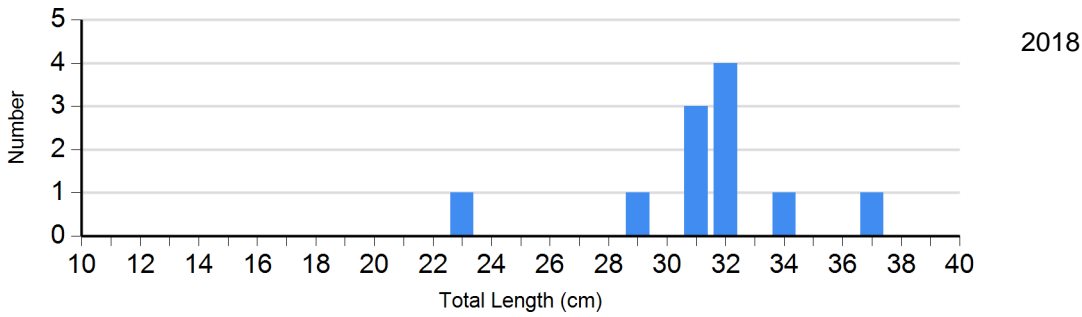
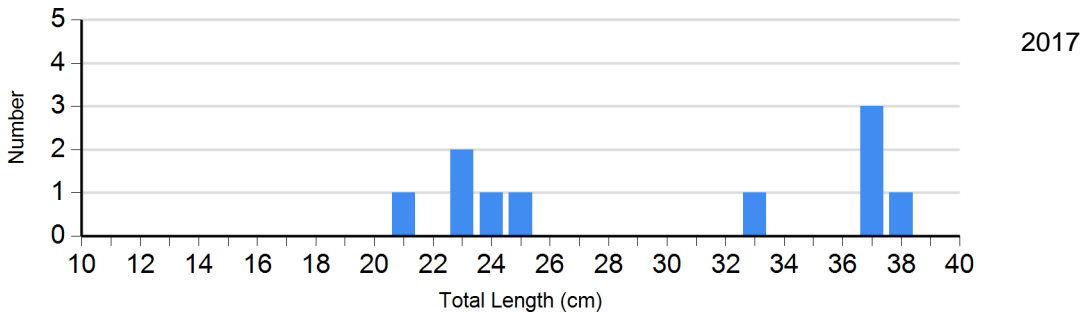
Species: Walleye
Gear: AFS std gill net



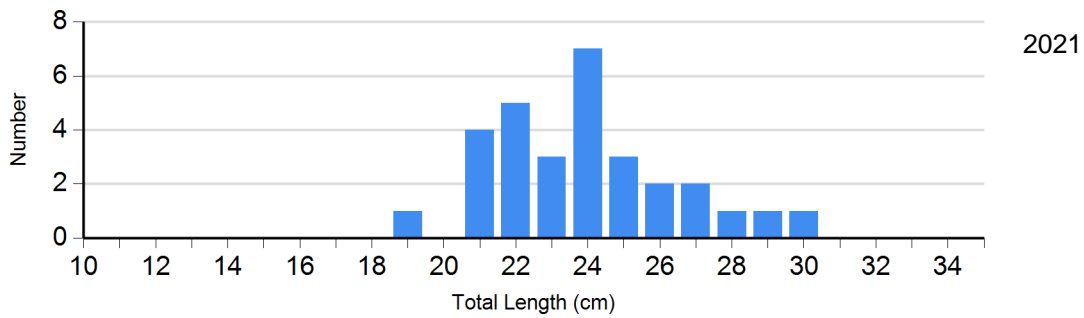
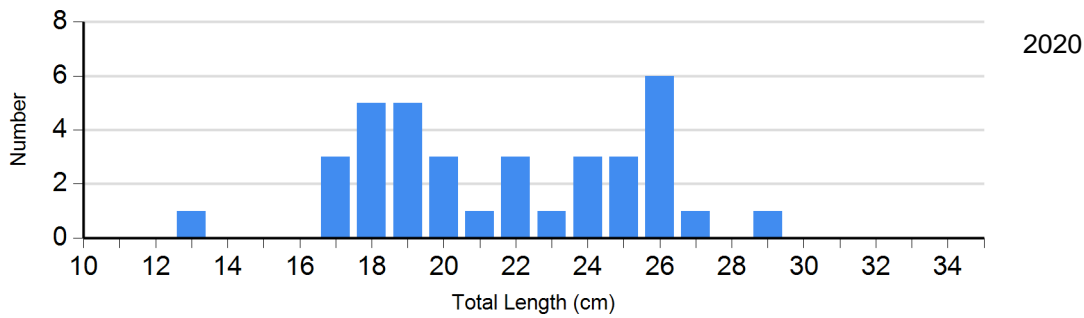
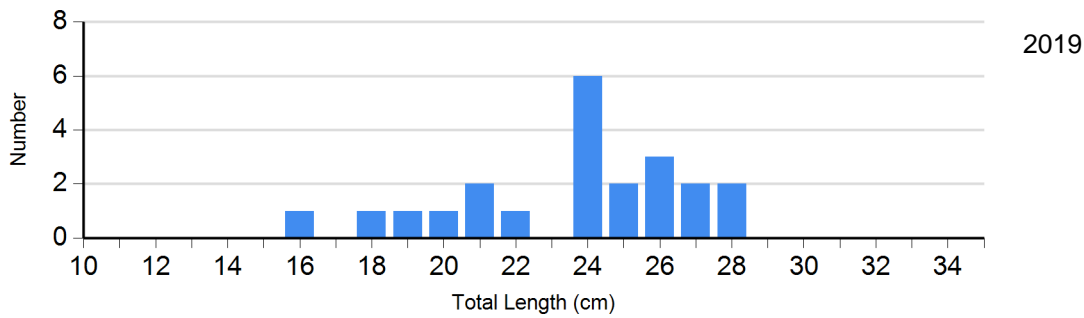
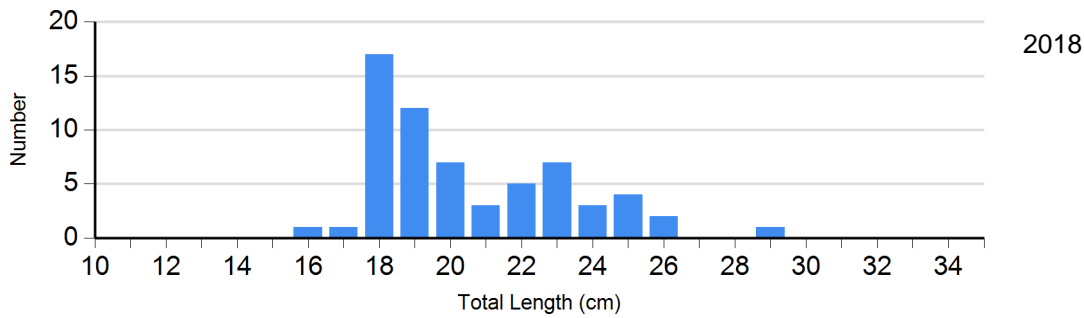
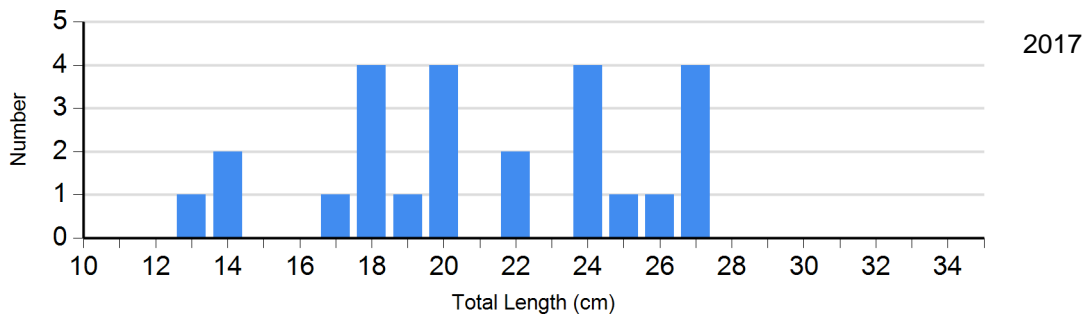
Species: Walleye
Gear: std exp gill net



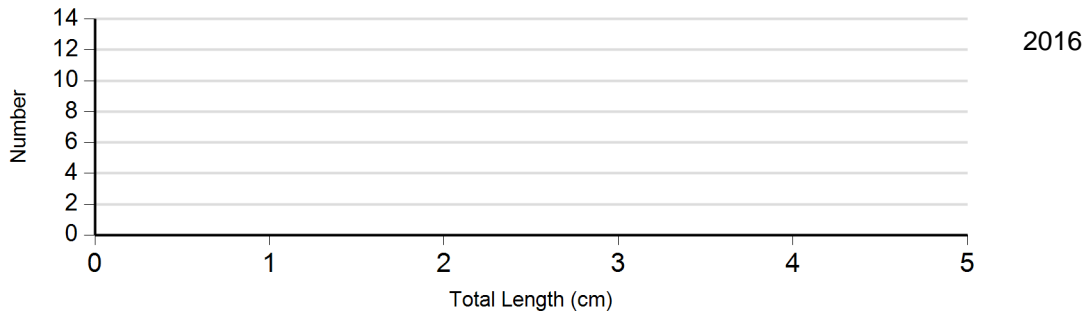
Species: White Bass
Gear: AFS std gill net



Species: Yellow Perch
Gear: AFS std gill net



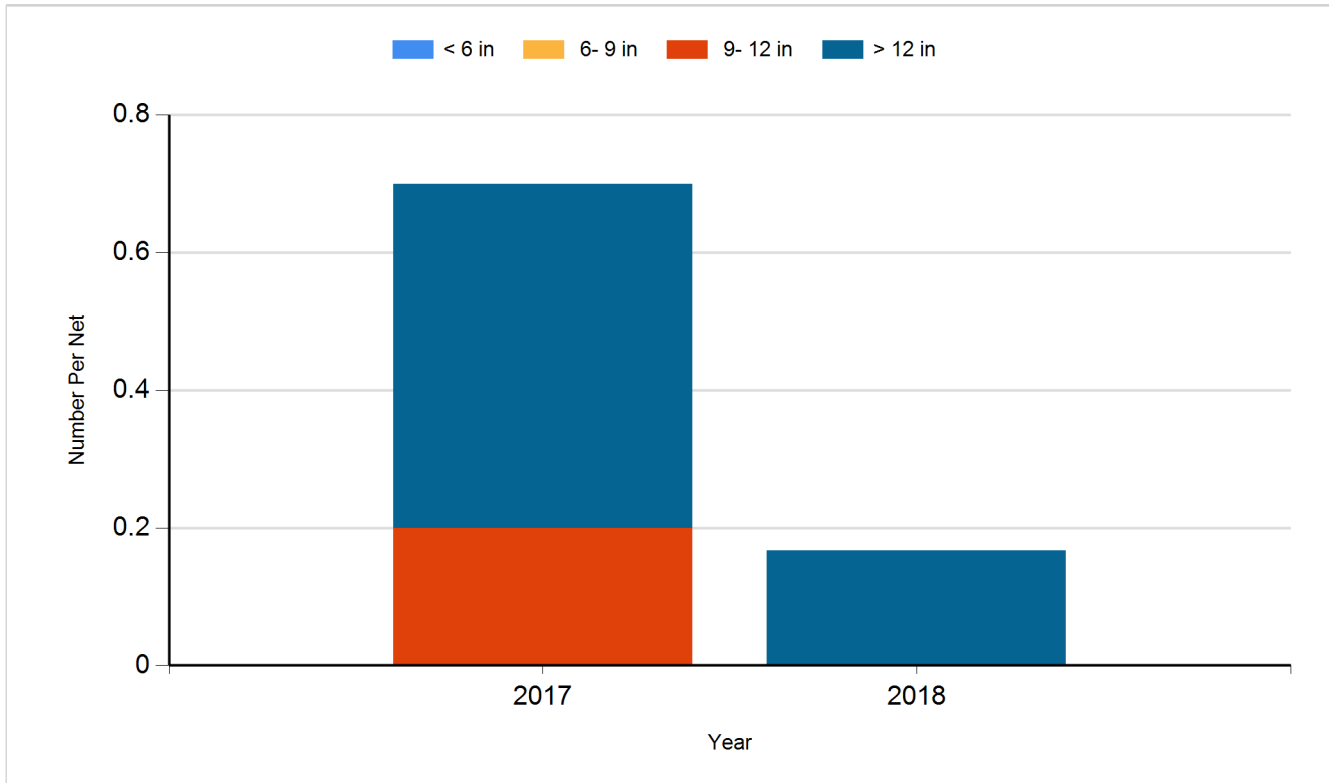
Species: Yellow Perch
Gear: std exp gill net



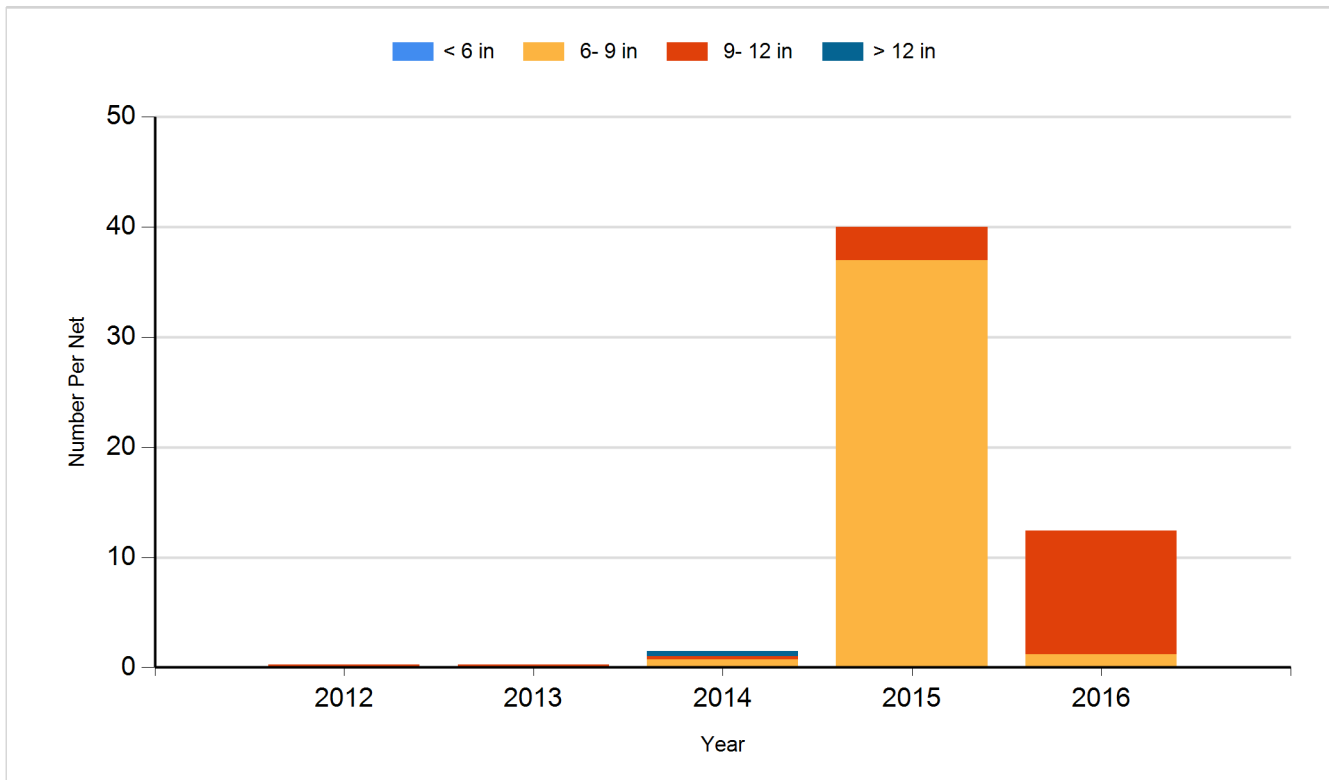
Historic Fish Sizes and Relative Abundance

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

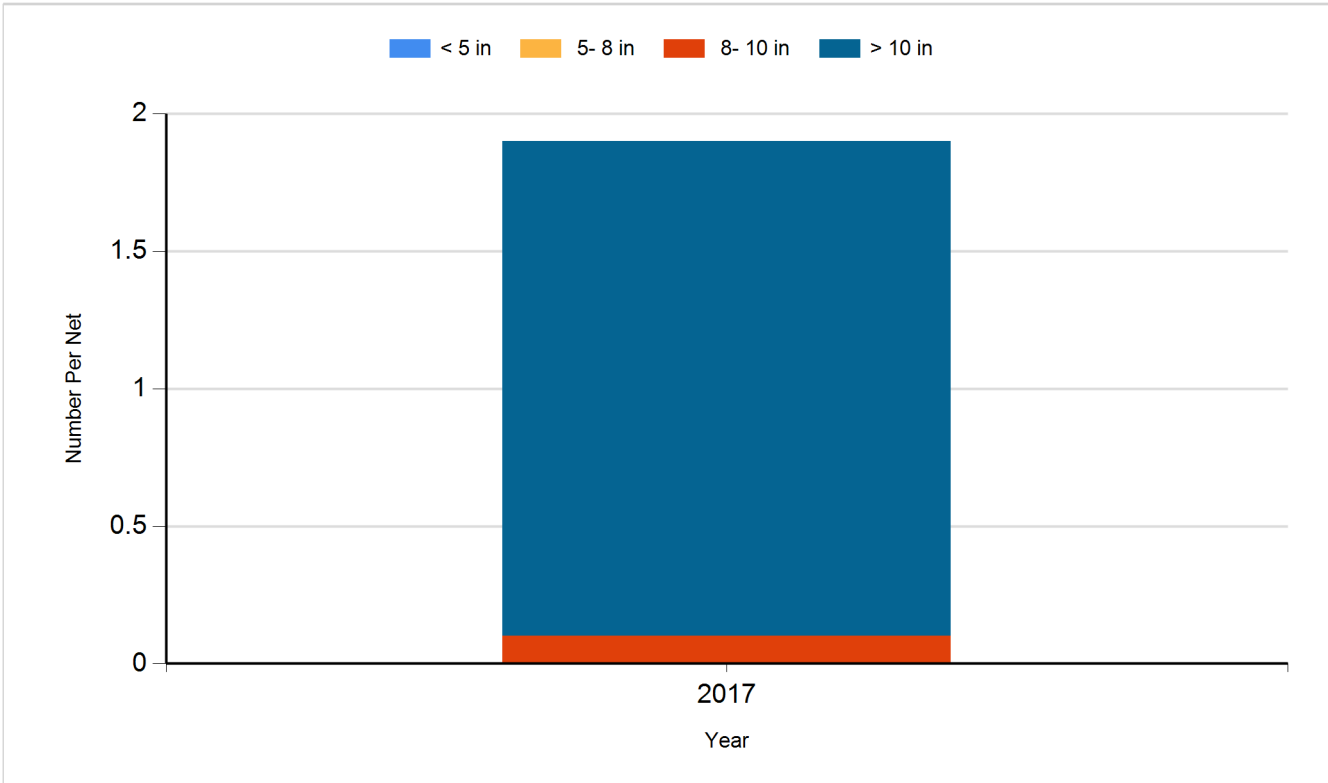
Species: Black Bullhead
Gear: AFS std gill net



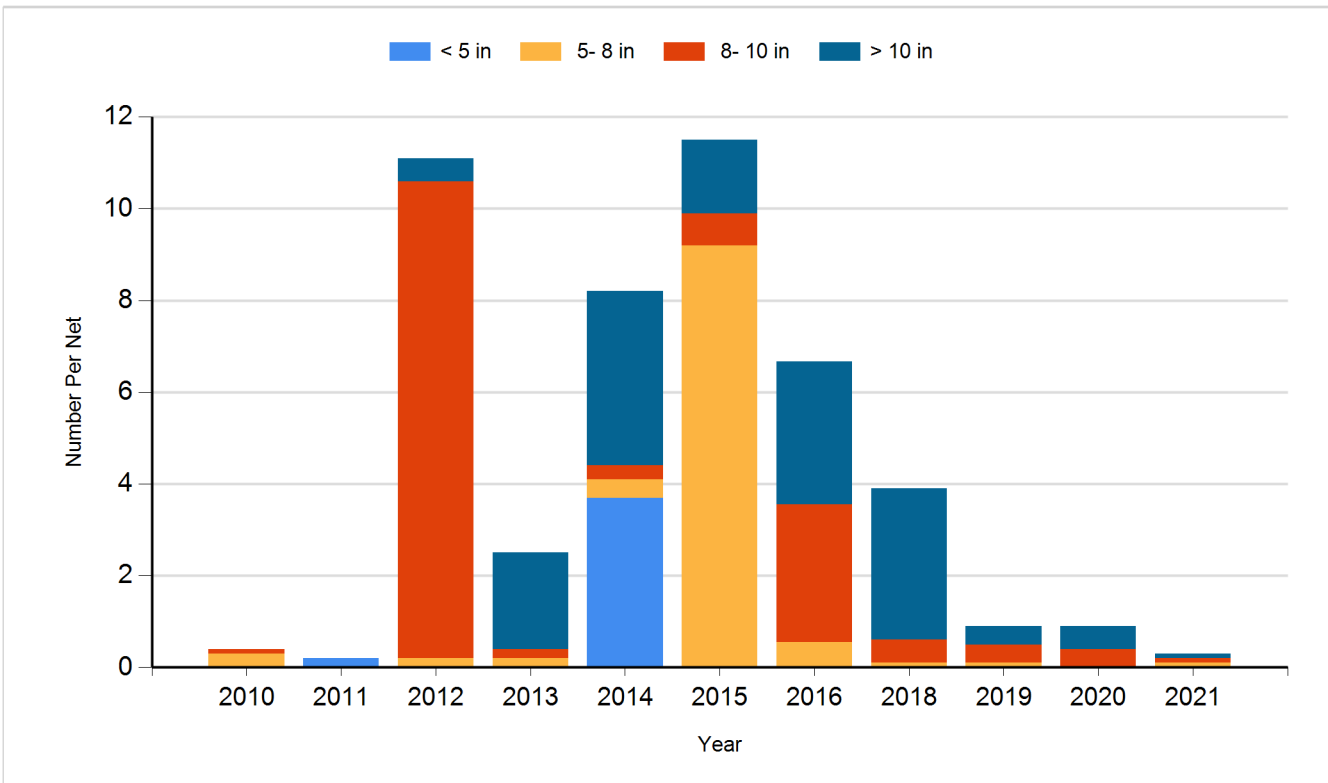
Species: Black Bullhead
Gear: std exp gill net



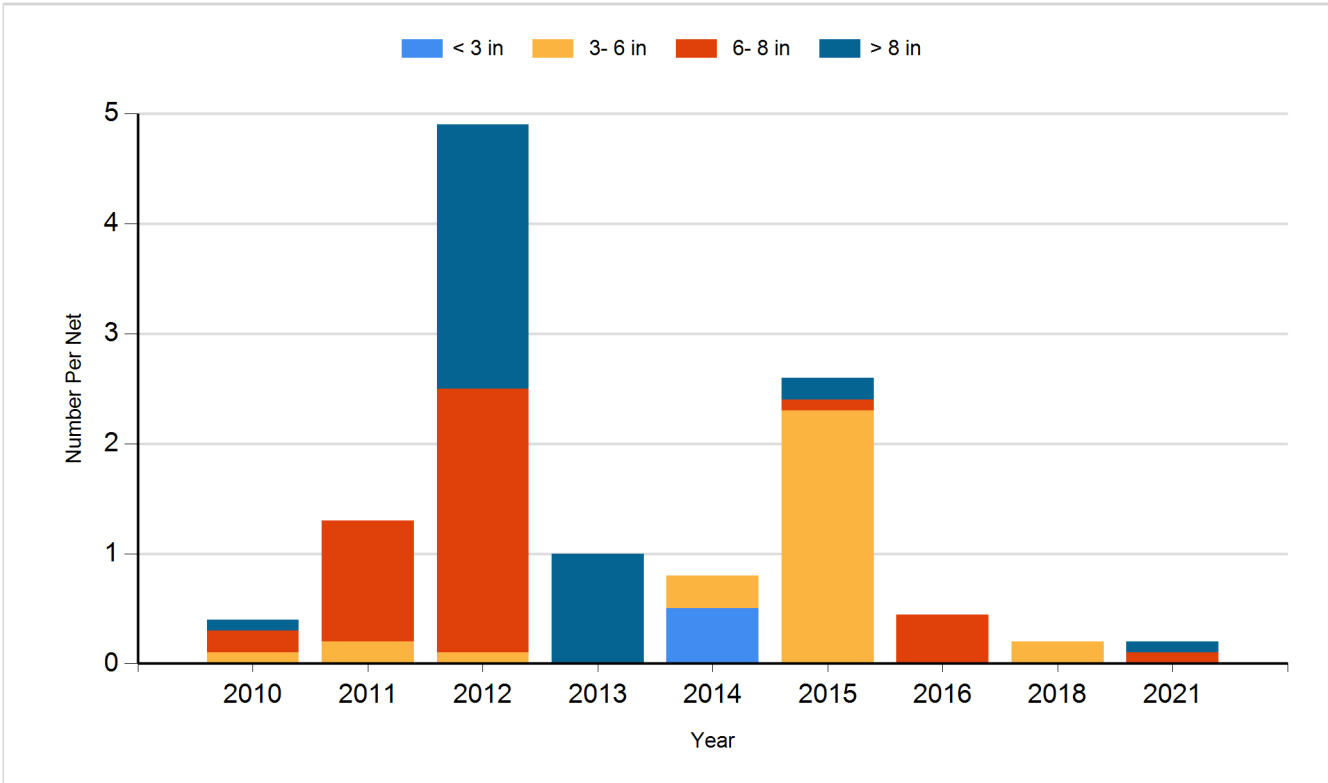
Species: Black Crappie
Gear: AFS std frame net



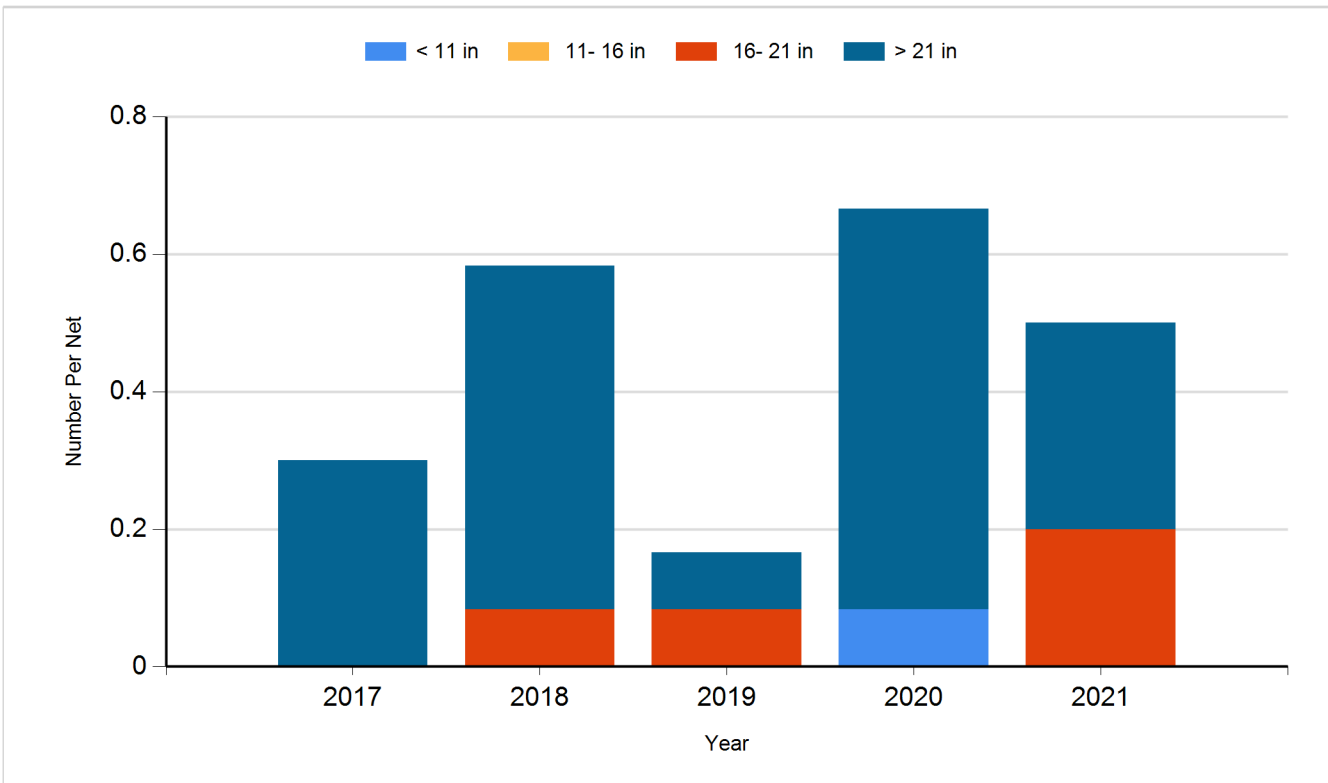
Species: Black Crappie
Gear: frame net (std 3/4 in)



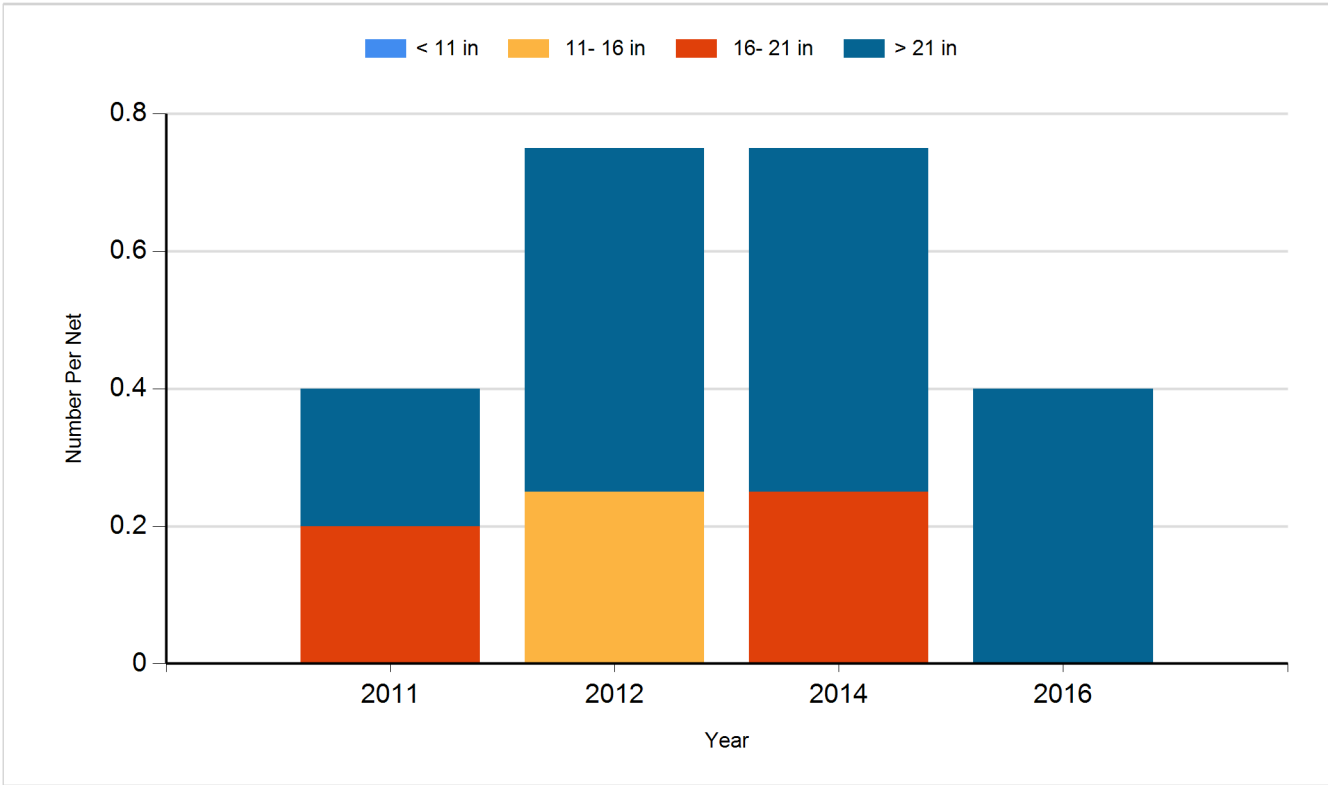
Species: Bluegill
Gear: frame net (std 3/4 in)



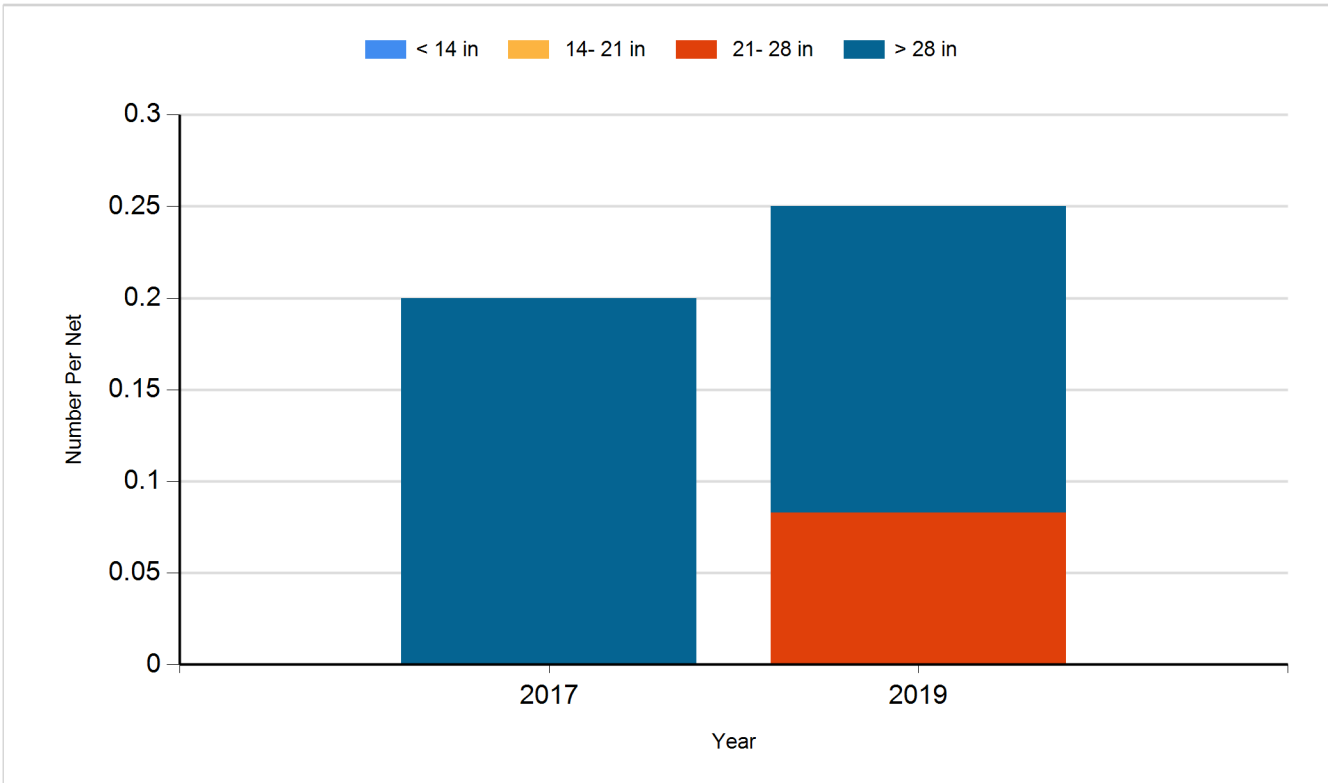
Species: Common Carp
Gear: AFS std gill net



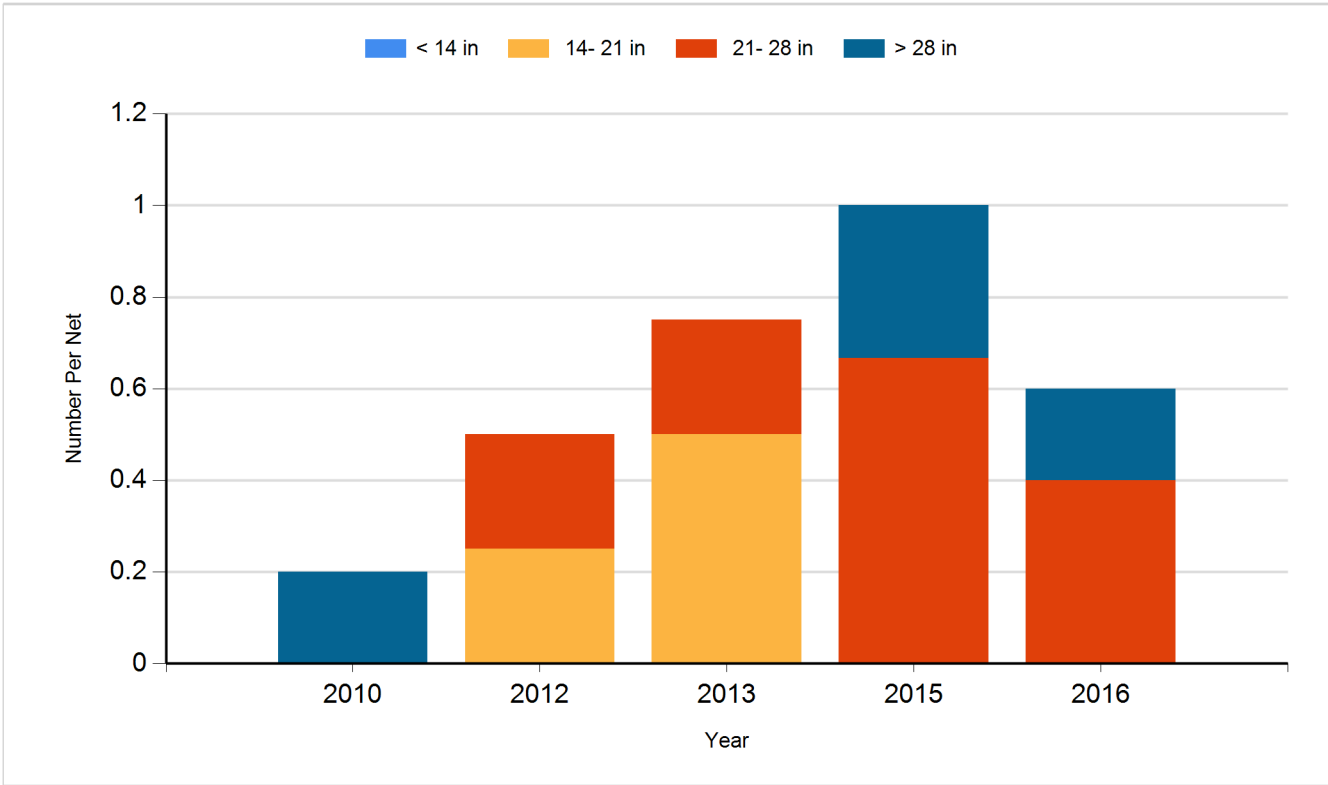
Species: Common Carp
Gear: std exp gill net



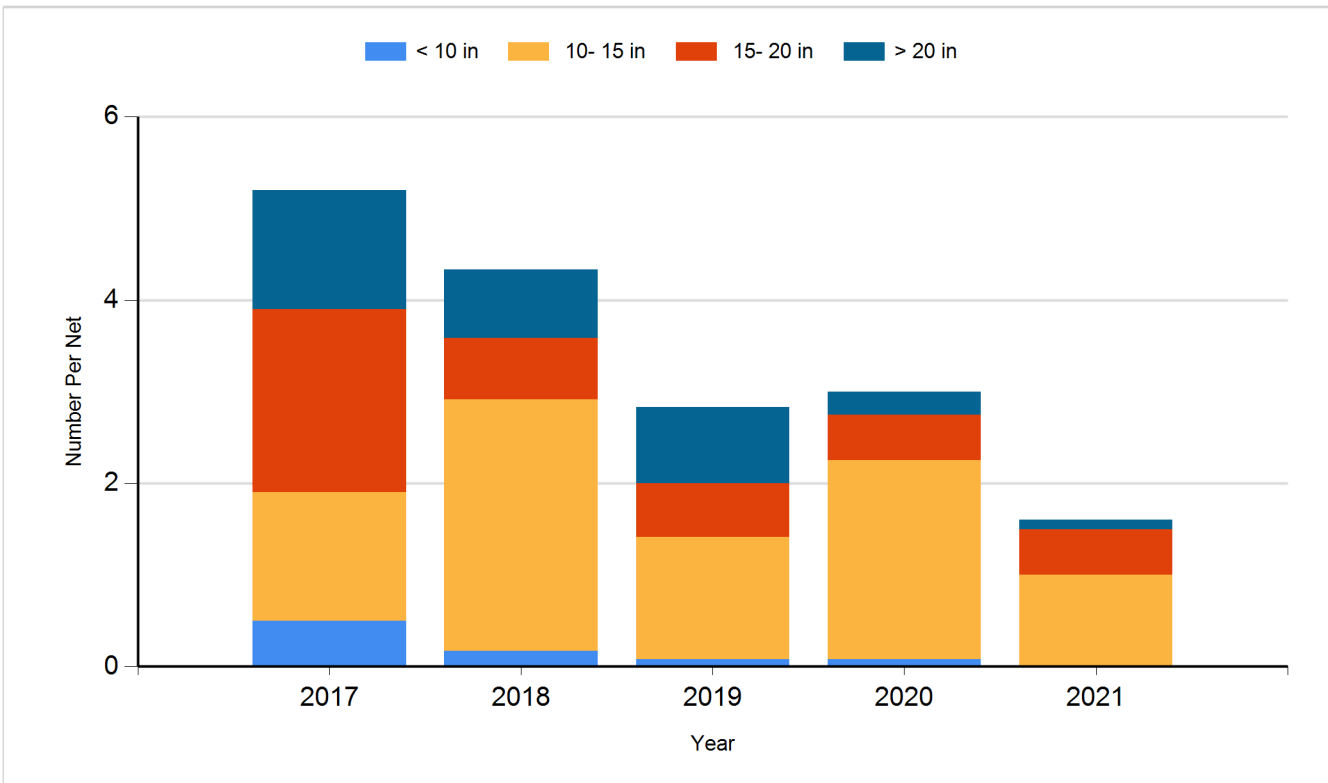
Species: Northern Pike
Gear: AFS std gill net



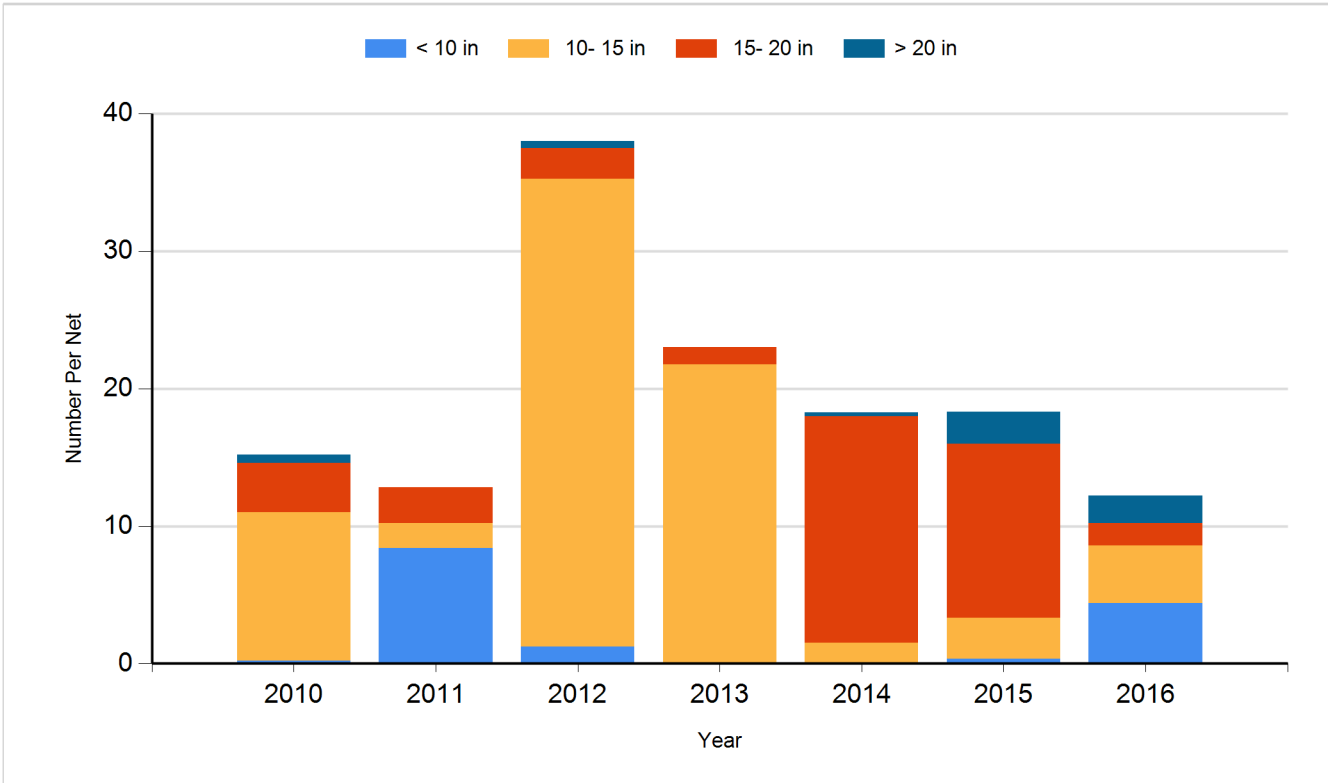
Species: Northern Pike
Gear: std exp gill net



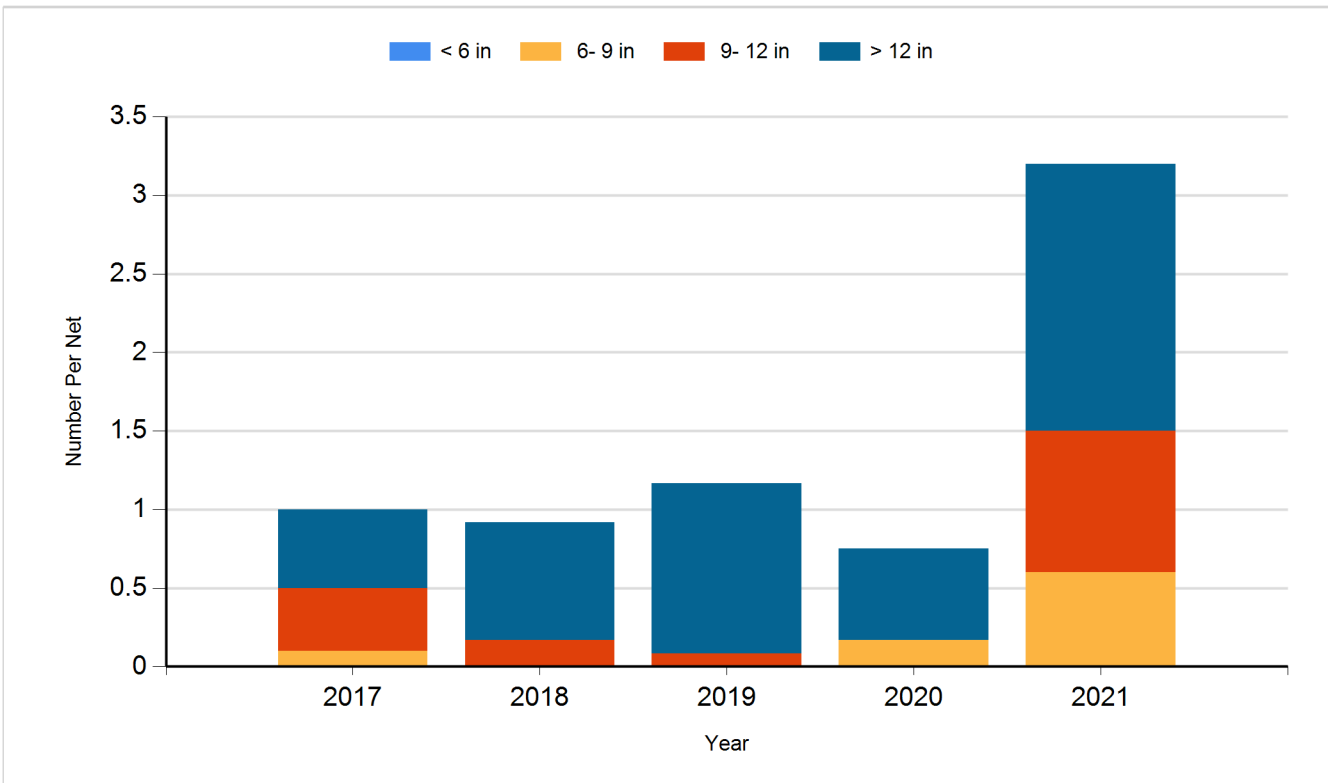
Species: Walleye
Gear: AFS std gill net



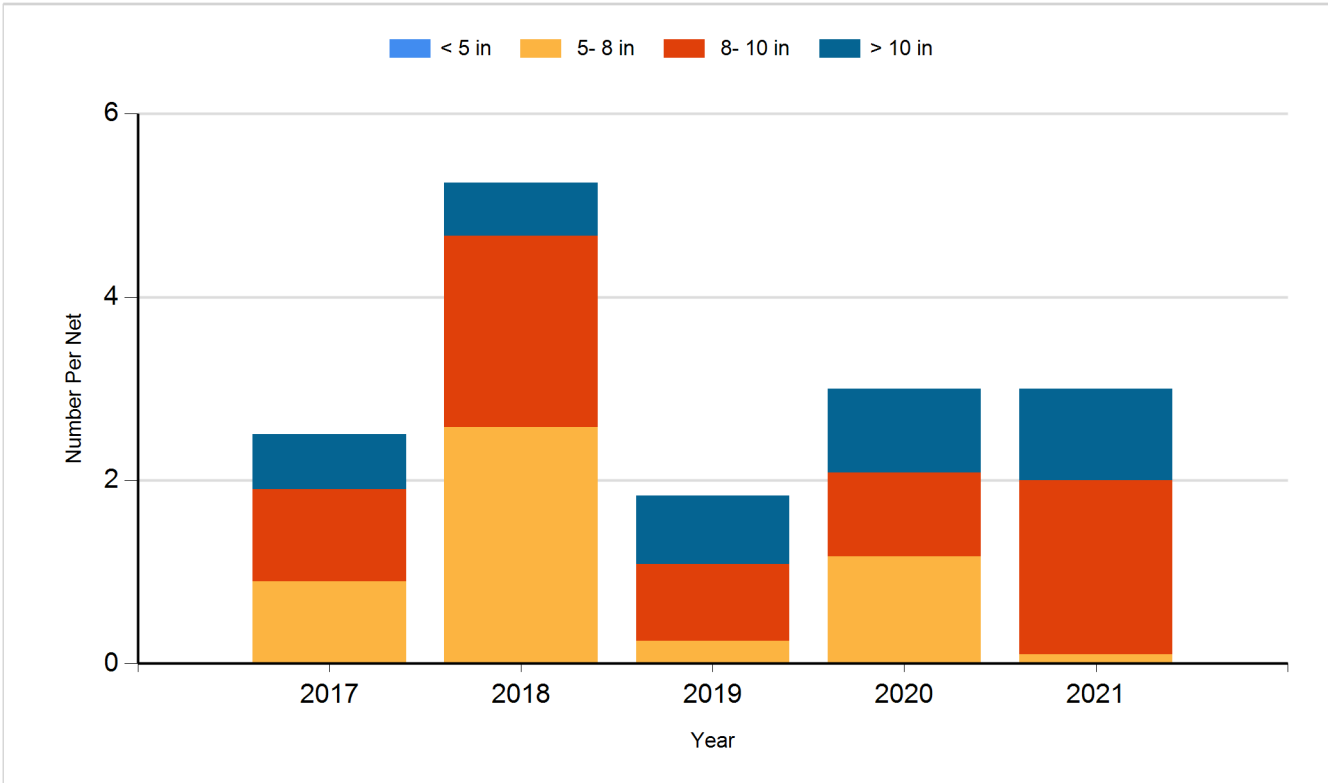
Species: Walleye
Gear: std exp gill net



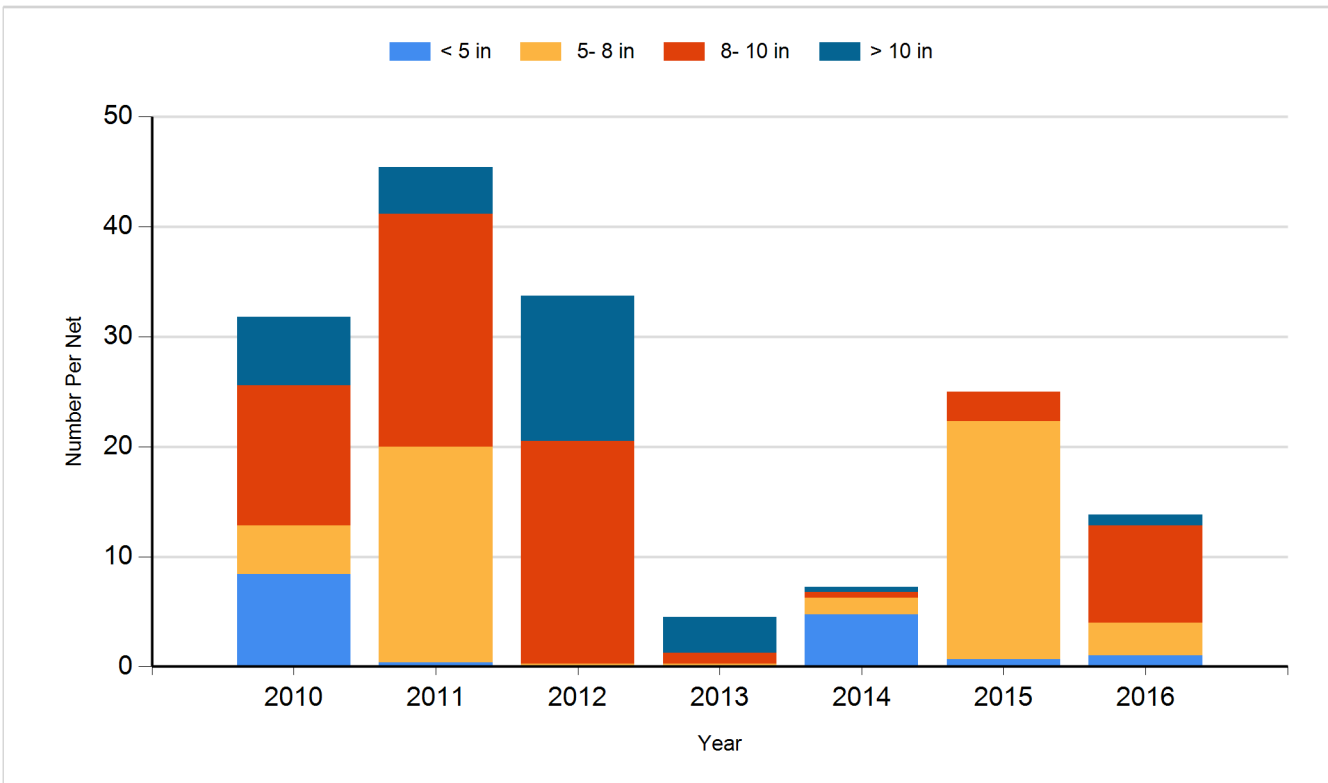
Species: White Bass
Gear: AFS std gill net



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
2010	Walleye	Small Fingerling	172,480
2011	Muskellunge	Large Fingerling	1,223
2012	Muskellunge	Adult	2
2013	Muskellunge	Fingerling	780
2014	Muskellunge	Large Fingerling	1,719
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