SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Eureka, McPherson County
WMC-Lake-1372-800
2021

Lake Information

Name: Eureka
County: McPherson
Surface Area: 202 Acres
Maximum Depth: 15 Feet
Mean Depth: 7 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 02, 2021	2 net-nights
AFS std gill net	Jun 03, 2021	2 net-nights
frame net (std 3/4 in)	Jun 02, 2021	5 net-nights
frame net (std 3/4 in)	Jun 03, 2021	5 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Northern Pike

Bluegill

Common Carp

Channel Catfish

Black Bullhead

Orangespotted Sunfish

Terminology

Catch per unit effort (**CPUE**) refers to the relative abundance of a species. It is defined as the number of fish captured per unit of effort (i.e., number of fish captured per net-night or number of fish captured per hour electrofishing). In this report CPUE is typically given for only stock-length fish (see length categories table for stock lengths).

A statewide effort to help make netting efforts comparable to all waters sampled across the state, occurred in 2017, with a switch to American Fisheries Society gill nets. Past gill netting efforts were completed with different style/types of nets and are not comparable side by side.

- **AFS std gill net** – 80 ft experimental gill net containing eight panels (10 ft each) of varying monofilament meshes of 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25 and 2.50 inches.
- **std experimental gill net for non-Missouri River waters** - 150 ft experimental gill net containing six panels (25 ft each) of varying monofilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.
- s**td experimental gill net for Missouri River reservoirs** – 300 ft experimental gill net containing six panels (50 ft each) of varying multifilament meshes of 0.5, 0.75, 1.00, 1.25, 1.50 and 2.00 inches.

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

Population size structure is quantified using the indices proportional size distribution of quality-length fish (**PSD**) and proportional size distribution of preferred-length fish (**PSD-P**). These indices indicate the proportion of stock-length fish that are equal to or greater than a given length. Minimum lengths for stock, quality and preferred length fish are given in the length categories table.

$$PSD = \left(\frac{number\ of\ fish \geq quality\ length}{number\ of\ fish \geq stock\ length}\right) \text{x } 100$$

$$PSD - P = \left(\frac{number\ of\ fish \geq preferred\ length}{number\ of\ fish \geq stock\ length}\right) \text{x } 100$$

Relative weight (**Wr**) is used to quantify fish plumpness. Relative weight is the ratio of what a fish weighs (W) compared to a length-specific standard weight (Ws) multiplied by 100. Relative weight values of 95-105 are commonly cited as optimum values, but values in the 80s are common during summer sampling in South Dakota.

$$Wr = \left(\frac{W}{Ws}\right) \text{x } 100$$

Confidence intervals (**CI**) are provided for many of the estimates calculated in this report. The confidence interval provides a range in which the true mean is expected to fall. For example, with an 80% CI we are 80% confident that the interval contains the true value.

Length categories include stock (**S**), quality (**Q**), preferred (**P**), memorable (**M**) and trophy (**T**). Length categories for most species have been defined based on a percentage of the world record length for that species. Some species mentioned in this report do not have defined length categories. Length categories for species used in this report are provided in the following table. Measurements are the minimum total length for each category and are reported in inches (in) and centimeters (cm).

	Stock		Quality		Preferred		Memorable		Trophy	
Species Name	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)
Black Bullhead	6	15	9	23	12	30	15	38	18	46
Black Crappie	5	13	8	20	10	25	12	30	15	38
Bluegill	3	8	6	15	8	20	10	25	12	30
Brown Trout	8	20	12	30	16	40	20	50	18	46
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Lake Trout	12	30	20	50	26	65	31	80	39	100
Largemouth Bass	8	20	12	30	15	38	20	51	25	63
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Rainbow Trout	10	25	16	40	20	50	26	65	31	80
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
Smallmouth Bass	7	18	11	28	14	35	17	43	20	51
Walleye	10	25	15	38	20	51	25	63	30	76
White Bass	6	15	9	23	12	30	15	38	18	46
White Crappie	5	13	8	20	10	25	12	30	15	38
Yellow Bullhead	4	10	7	18	9	23	11	28	14	36
Yellow Perch	5	13	8	20	10	25	12	30	15	38

Catch Summary of Stock Length Fish

Catch per unit effort (CPUE), proportional size distribution (PSD), proportional size distribution of preferred length fish (PSD-P), and relative weight (Wr) for species sampled in survey with 80% confidence interval (CI-80).

*** Methods/Species that ignore stock length**

			Abundance		Stock Density Indices				Condition	
Gear	Species	Sample Size (n)	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	1	0.3	0.4	0		0		78	
	Channel Catfish	1	0.3	0.4	100		0		102	
	Common Carp	4	1.0	0.7	100		25		85	6
	Northern Pike	3	0.8	0.8	33		0		78	6
	Walleye	41	10.3	3.1	95		2		84	1
	Yellow Perch	3	0.8	0.8	33		0		80	3
frame net (std 3/4 in)	Bluegill	20	2.0	1.4	40	18	10		109	3
	Channel Catfish	1	0.1	0.1	100		100		124	
	Common Carp	1	0.1	0.1	100		100		76	
	Northern Pike	5	0.5	0.2	60		0		87	2
	Orangespotted Sunfish	12	0.0	0.0						
	Walleye	8	0.8	0.5	100		25		83	3
	Yellow Perch	4	0.4	0.3	75		75		80	3

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**

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
AFS std gill net	Black Bullhead							0.0			0.3	0.15
	Channel Catfish							0.0			0.3	0.15
	Common Carp							2.5			1.0	1.75
	Northern Pike							1.0			0.8	0.90
	Walleye							1.5			10.3	5.90
	Yellow Perch							3.7			0.8	2.25
frame net (std 3/4 in)	Bluegill							6.5			2.0	4.25
	Channel Catfish							0.0			0.1	0.05
	Common Carp							0.0			0.1	0.05
	Northern Pike							0.3			0.5	0.40
	Orangespotted Sunfish							0.0			0.0	0.00
	Walleye							0.6			0.8	0.70
	Yellow Perch							2.7			0.4	1.55

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.

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std gill net	Black Bullhead	PSD										0
		PSD-P										0
		Wr										78
	Channel Catfish	PSD										100
		PSD-P										0
		Wr										102
	Common Carp	PSD							100			100
		PSD-P							93			25
		Wr							81			85
	Northern Pike	PSD							100			33
		PSD-P							0			0
		Wr							72			78
	Walleye	PSD							56			95
		PSD-P							11			2
		Wr							80			84
	Yellow Perch	PSD							73			33
		PSD-P							0			0
		Wr							95			80
frame net (std 3/4 in)	Bluegill	PSD							9			40
		PSD-P							2			10
		Wr							132			109
	Channel Catfish	PSD										100
		PSD-P										100
		Wr										124
	Common Carp	PSD							0			100
		PSD-P							0			100
		Wr										76
	Northern Pike	PSD							100			60
		PSD-P							0			0
		Wr							80			87
	Walleye	PSD							67			100
		PSD-P							33			25
		Wr							82			83

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
frame net (std 3/4 in)	Yellow Perch	PSD							0			75
		PSD-P							0			75
		Wr							104			80

Back-Calculated Lengths

Mean species back-calculated total length (mm) at age, standard error (SE), and sample size (N).

Species: Bluegill

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2020	1	1	81									
2019	2	1	95	104								
2018	3	1	77	114	129							
2017	4	10	81 (2.8)	103 (2.8)	120 (2.8)	134 (3)						
2016	5	2	82 (.3)	117 (5.5)	138 (7.2)	157 (11.5)	167 (7.7)					
2015	6	1	83	114	132	148	159	169				
2014	7	1	83	104	122	139	152	173	196			
2013	8	2	96 (8.1)	122 (7)	143 (10.5)	168 (20.8)	187 (11.2)	202 (9)	217 (6.1)	226 (3)		
Weighted Mean		19	83	108	126	142	170	187	210	226		

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2020	1	1										
2019	2	1										
2018	3	1										
2017	4	10										
2016	5	2										
2015	6	1										
2014	7	1										
2013	8	2										
Weighted Mean		19										

Species: Walleye

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2017	4	16	205 (4.4)	285 (6.3)	343 (6.5)	394 (5.9)						
2015	6	1	213	277	325	357	401	433				
2015	6	17	200 (5.2)	270 (7.8)	319 (8.2)	361 (7.5)	396 (5.4)	430 (4.6)				
2013	8	1	191	248	312	356	404	425	450	475		
2013	8	4	233 (5.2)	306 (13.5)	363 (7.4)	399 (9.8)	425 (8.1)	458 (5.5)	480 (6.1)	499 (6.4)		
2011	10	1	154	212	266	307	344	379	415	439	460	479
2011	10	1	212	267	307	344	377	412	438	459	477	514
2009	12	1	245	268	296	342	377	415	436	459	478	497
Weighted Mean		42	205	277	330	375	398	431	457	479	472	497

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	4	16										
2015	6	1										
2015	6	17										
2013	8	1										
2013	8	4										
2011	10	1										
2011	10	1										
2009	12	1	514	531								
Weighted Mean		42	514	531								

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2017	4	1	104	136	163	184						
2017	4	3	103 (1.8)	132 (2.8)	157 (1)	186 (3.3)						
2014	7	2	107 (9.4)	153 (4.6)	193 (6.7)	228 (0)	250 (5.4)	272 (11.9)	285 (9.2)			
Weighted Mean		6	105	140	170	200	250	272	285			

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	4	1										
2017	4	3										
2014	7	2										
Weighted Mean		6										

Length at Capture

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

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2021	20	89 (1)	110 (1)	133 (1)	138 (11)	173 (2)	175 (1)	199 (1)	231 (2)		
2018	54	108 (45)	122 (2)	148 (2)	152 (2)			192 (2)		207 (1)	

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2021	41				405 (20)		440 (19)		484 (1)		525 (1)
2018	13	210 (4)		306 (4)		439 (4)		615 (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	3				195 (3)						
2018	22	142 (1)	200 (9)	214 (1)	224 (2)	235 (2)	235 (3)	235 (1)	245 (1)	245 (1)	

Fish Condition

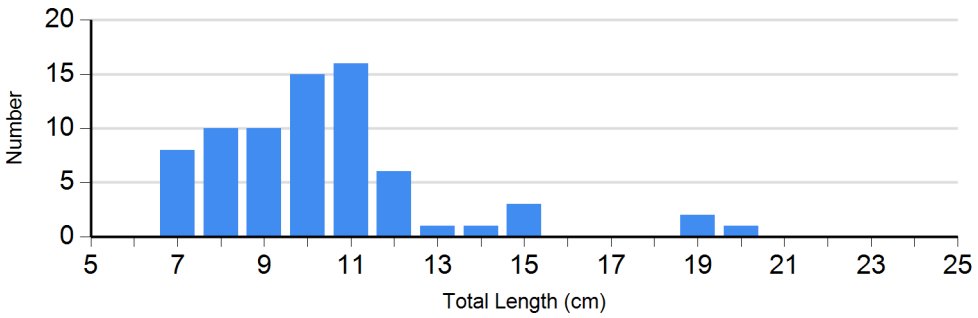
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2021	1	78	0		0		0	
Bluegill Frame Net	2018	59	132 (1.7)	5	134 (8.6)	1	127	0	
	2021	12	104 (1.6)	6	113 (3.8)	2	124 (2.0)	0	
Channel Catfish Gill Net	2021	0		1	102	0		0	
Common Carp Gill Net	2018	0		1	84	14	81 (1.5)	0	
	2021	0		3	88 (5.0)	1	75	0	
Northern Pike Gill Net	2018	0		6	72 (3.8)	0		0	
	2021	2	83 (1.0)	1	69	0		0	
Walleye Gill Net	2018	4	79 (1.2)	4	81 (0.6)	1	82	0	
	2021	2	88 (2.7)	38	83 (0.7)	1	86	0	
Yellow Perch Gill Net	2018	6	95 (2.6)	16	95 (1.2)	0		0	
	2021	2	82 (2.9)	1	77	0		0	

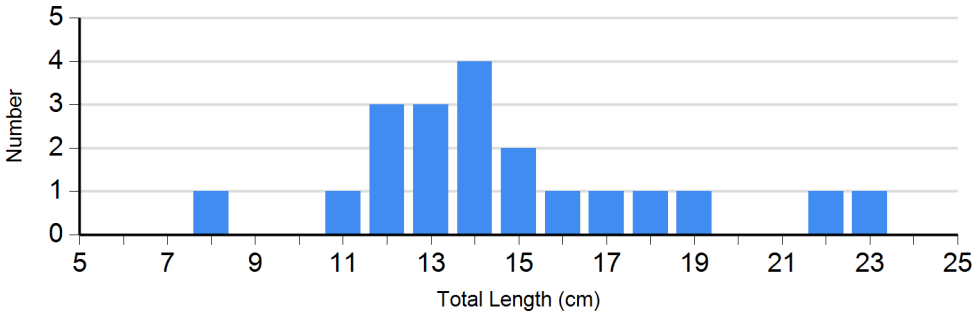
Length Frequency Distribution

Length frequency histogram of species sampled by year.

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

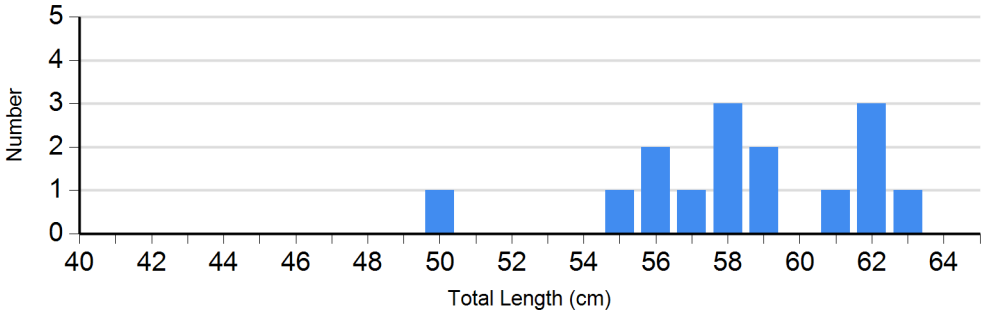


2018



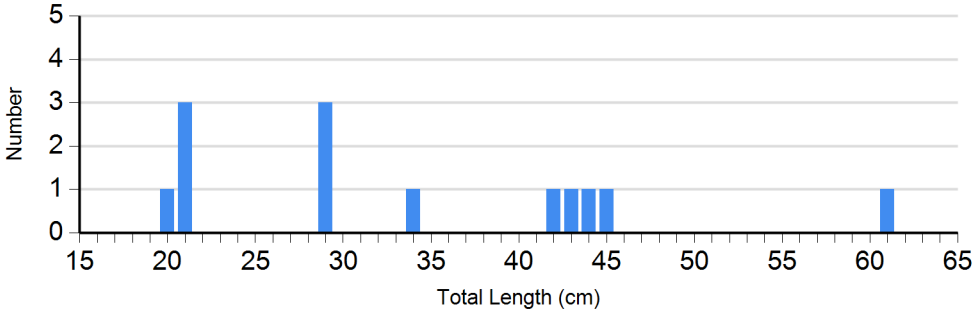
2021

Species: Common Carp
Gear: AFS std gill net

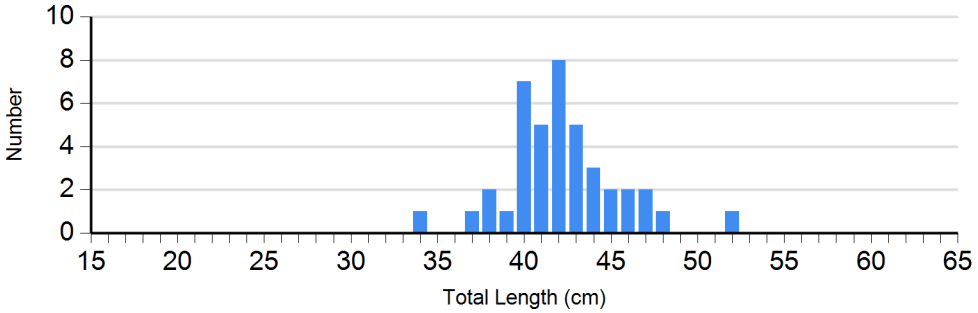


2018

Species: Walleye
Gear: AFS std gill net

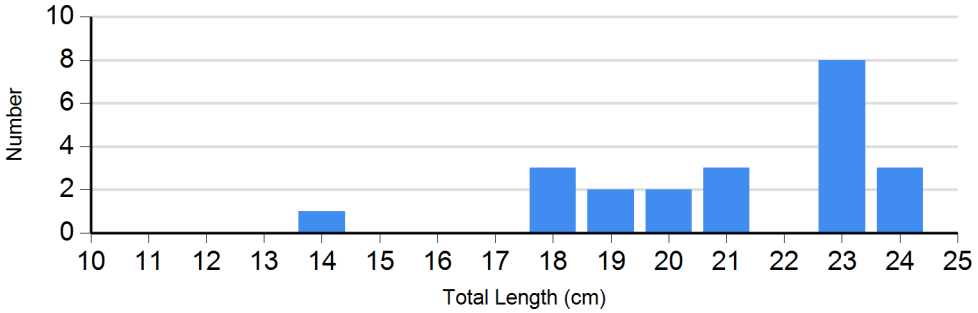


2018



2021

Species: Yellow Perch
Gear: AFS std gill net

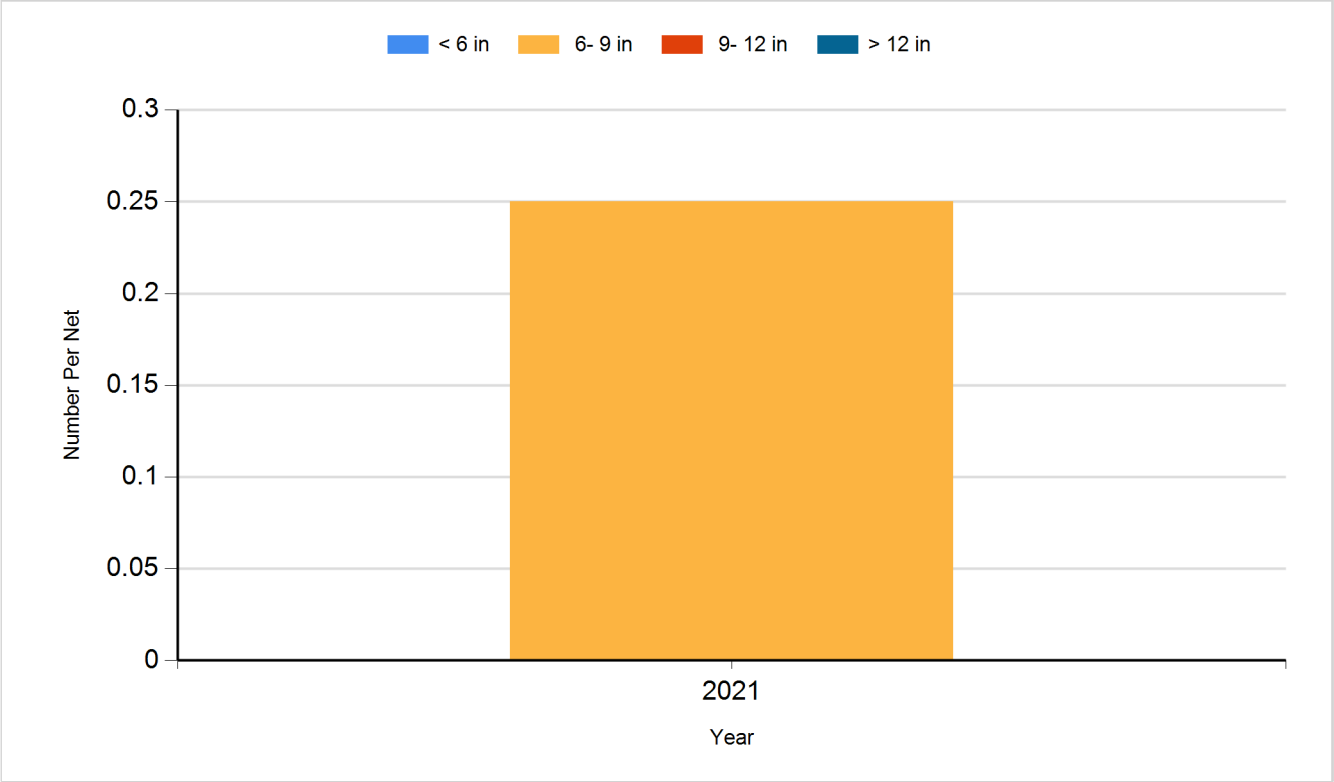


2018

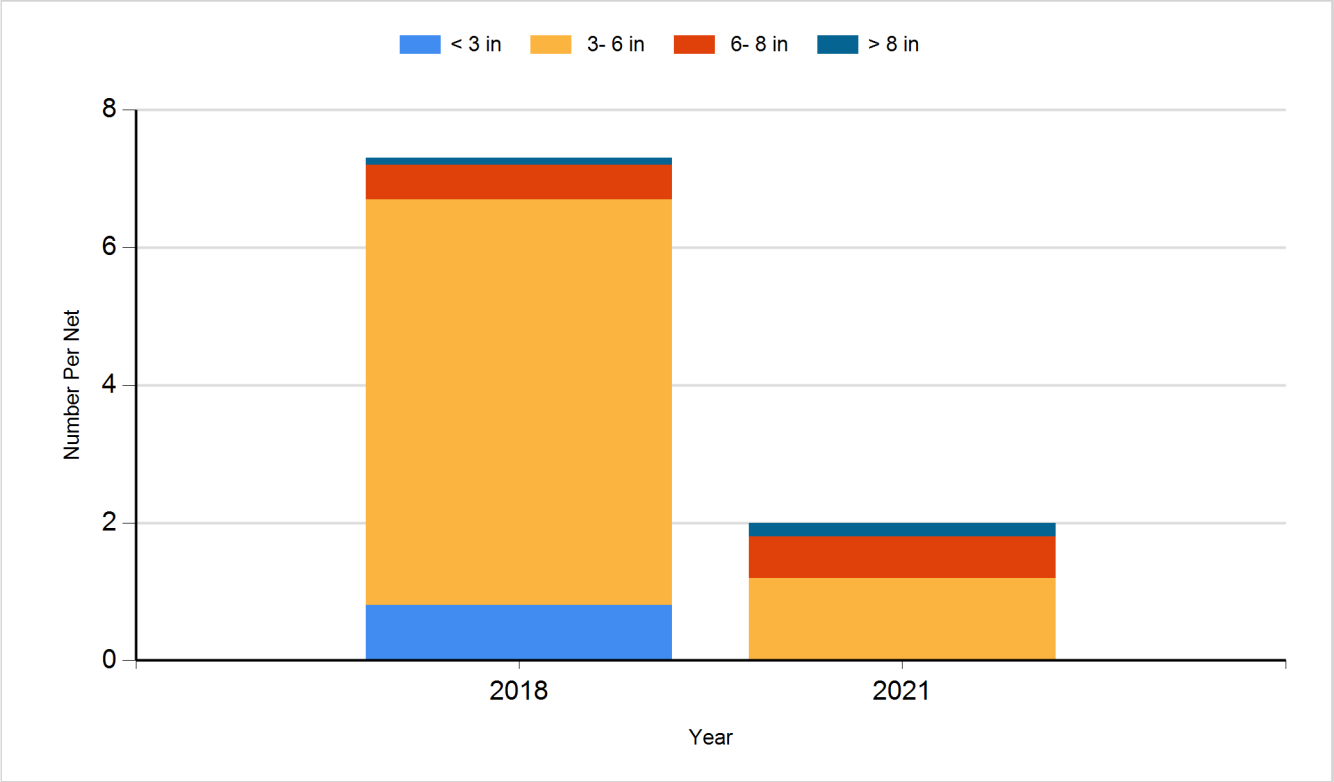
Historic Fish Sizes and Relative Abundance

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

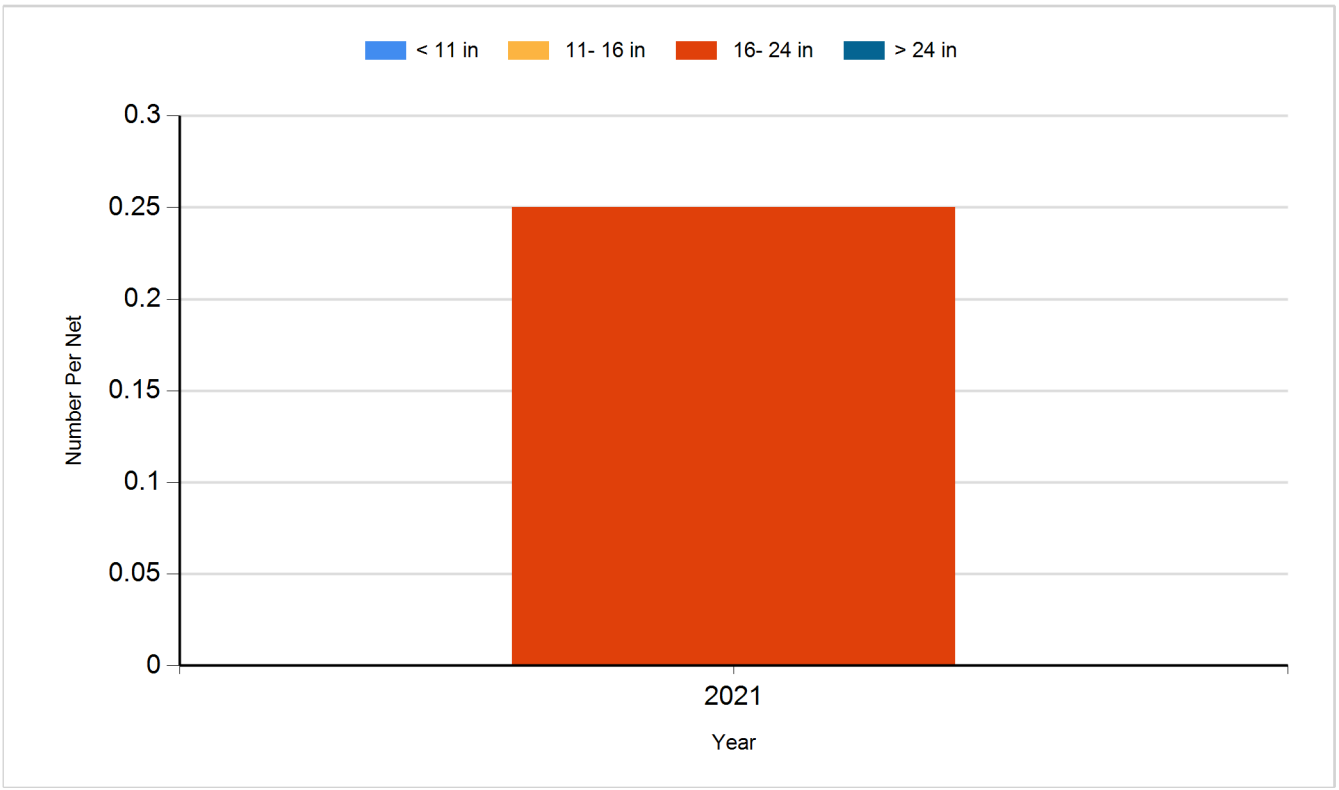
Species: Black Bullhead
Gear: AFS std gill net



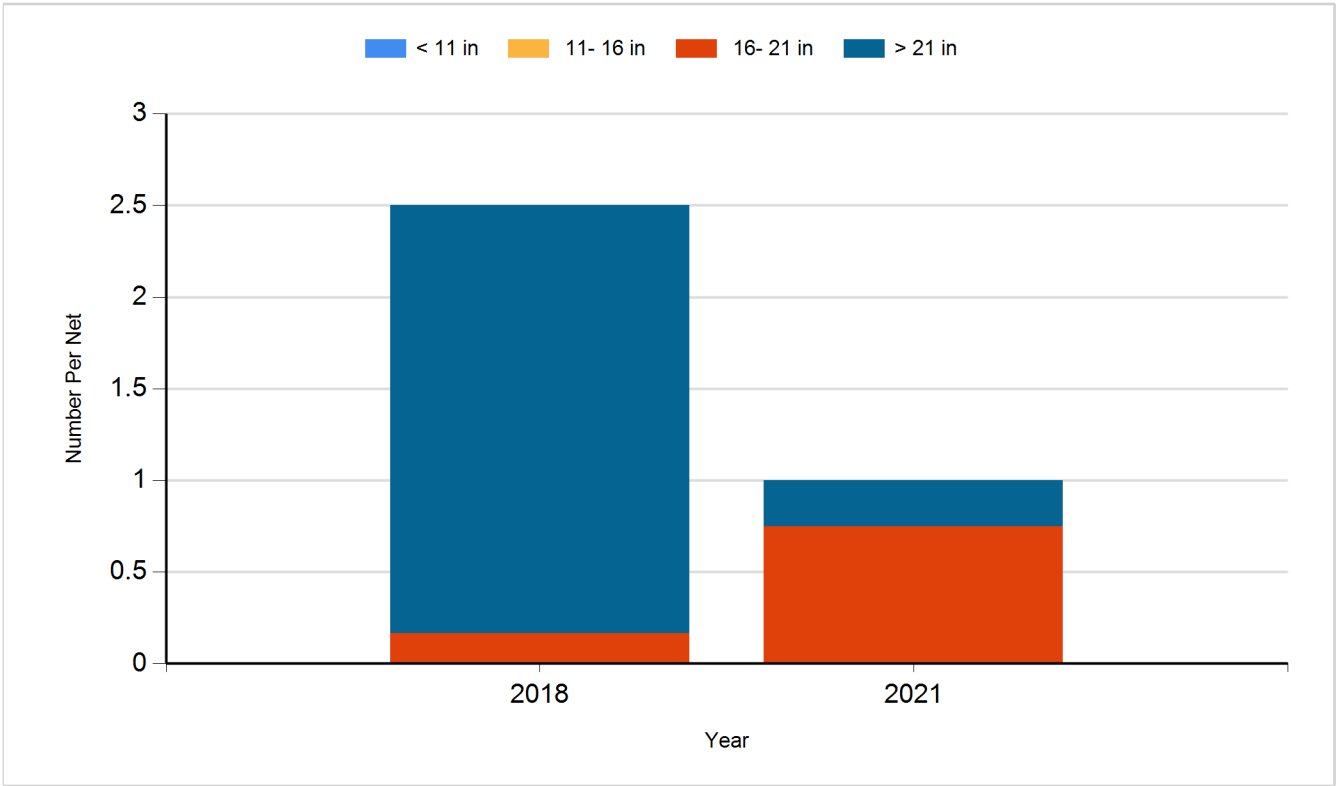
Species: Bluegill
Gear: frame net (std 3/4 in)



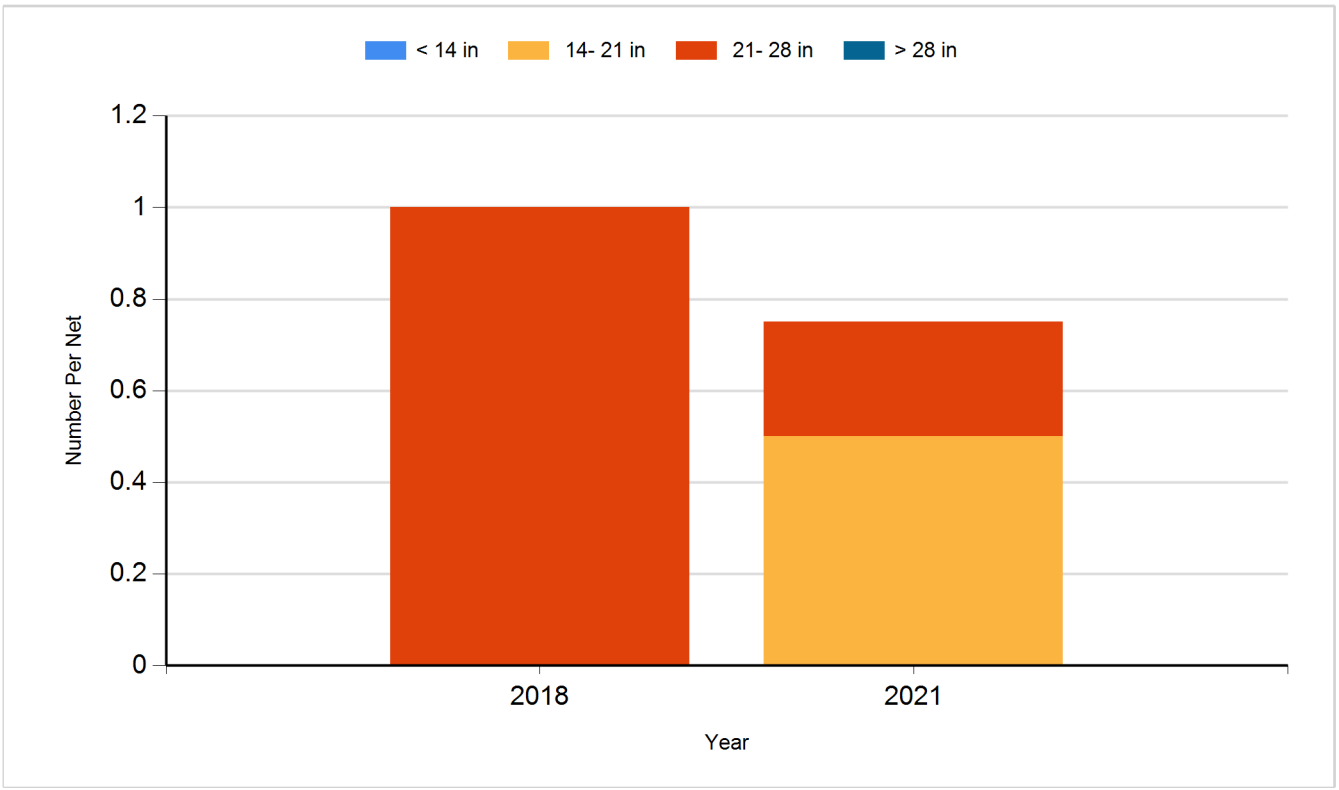
Species: Channel Catfish
Gear: AFS std gill net



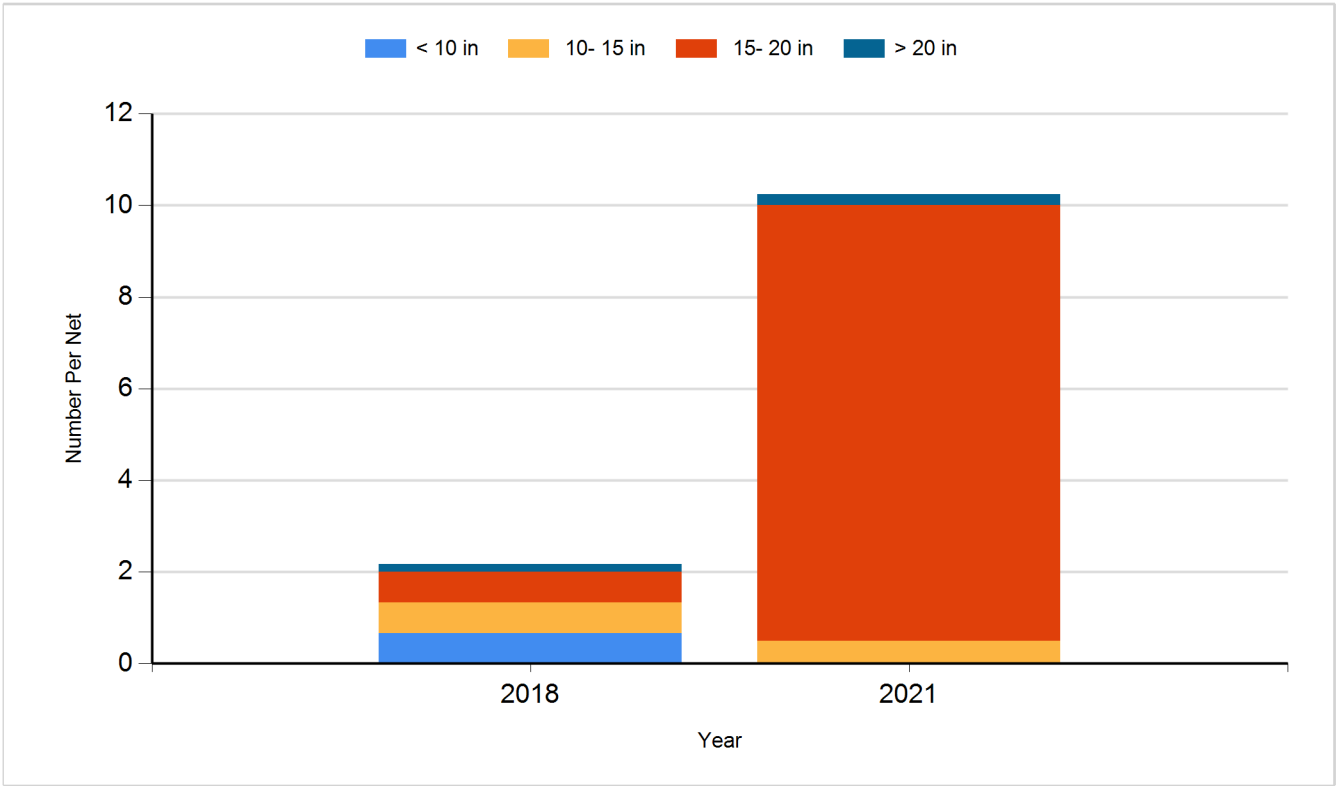
Species: Common Carp
Gear: AFS std gill net



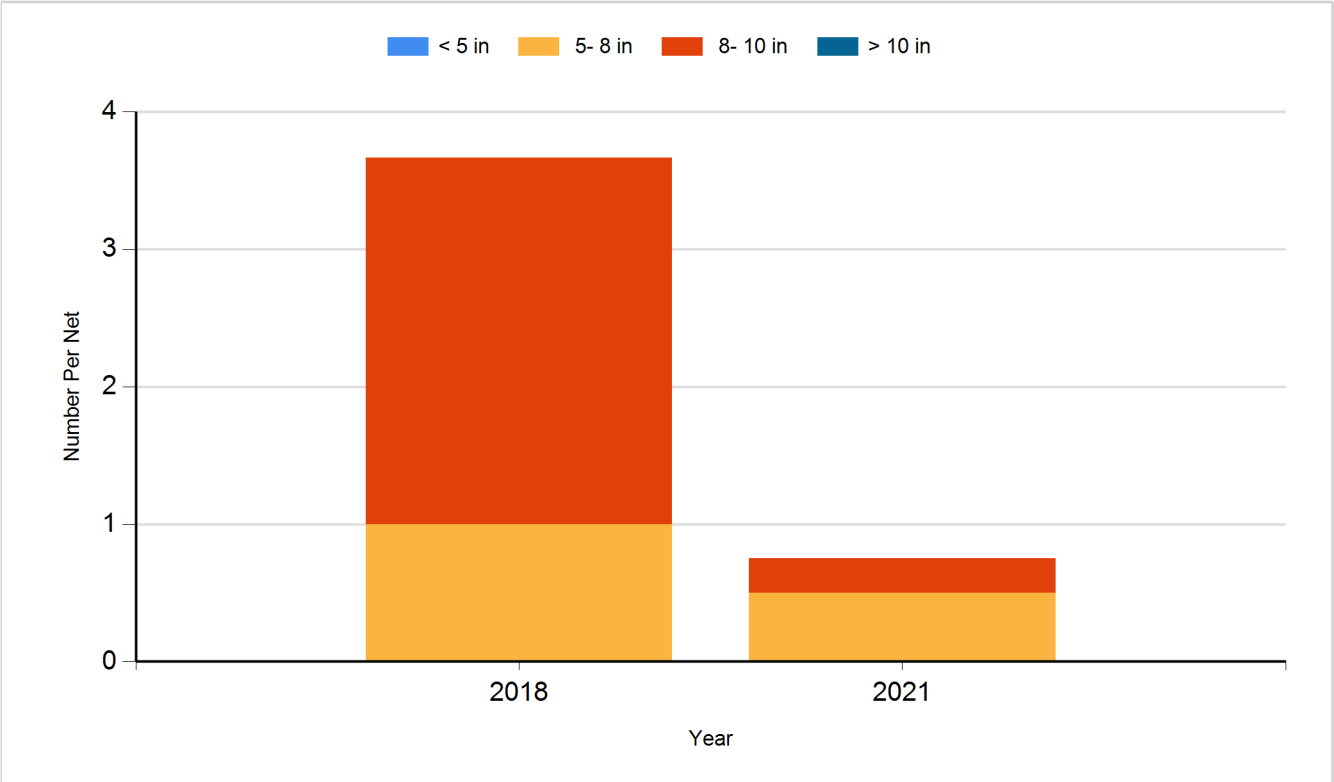
Species: Northern Pike
Gear: AFS std gill net



Species: Walleye
Gear: AFS std gill net



Species: Yellow Perch
Gear: AFS std gill net



Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2011	Walleye	Fry	100,000
2013	Walleye	Fry	100,000
2015	Walleye	Fry	95,000
2017	Walleye	Fry	100,000
2019	Walleye		100,000
2021	Walleye	Fry	100,000