SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Eureka, McPherson County
WMC-Lake-1372-800
2018

Lake Information

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

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 19, 2018	3 net-nights
AFS std gill net	Jun 20, 2018	3 net-nights
frame net (std 3/4 in)	Jun 19, 2018	5 net-nights
frame net (std 3/4 in)	Jun 20, 2018	5 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Northern Pike

Bluegill

Common Carp

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	Common Carp	15	2.5	1.4	100		93		81	2
	Northern Pike	6	1.0	0.9	100		0		72	5
	Walleye	13	1.5	0.6	56		11		80	1
	Yellow Perch	22	3.7	0.7	73	15	0		95	1
frame net (std 3/4 in)	Bluegill	73	6.5	2.4	9	6	2		132	2
	Common Carp	1	0.0	0.0	0		0			
	Northern Pike	3	0.3	0.2	100		0		80	4
	Orangespotted Sunfish	42	0.0	0.0						
	Walleye	8	0.6	0.3	67		33		82	5
	Yellow Perch	225	2.7	2.0	0		0		104	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.

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std gill net	Common Carp										2.5	2.5
	Northern Pike										1.0	1.0
	Walleye										1.5	1.5
	Yellow Perch										3.7	3.7
frame net (std 3/4 in)	Bluegill										6.5	6.5
	Common Carp										0.0	0.0
	Northern Pike										0.3	0.3
	Orangespotted Sunfish										0.0	0.0
	Walleye										0.6	0.6
	Yellow Perch										2.7	2.7

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Common Carp	PSD										100
		PSD-P										93
		Wr										81
	Northern Pike	PSD										100
		PSD-P										0
		Wr										72
	Walleye	PSD										56
		PSD-P										11
		Wr										80
	Yellow Perch	PSD										73
		PSD-P										0
		Wr										95
frame net (std 3/4 in)	Bluegill	PSD										9
		PSD-P										2
		Wr										132
	Common Carp	PSD										0
		PSD-P										0
	Northern Pike	PSD										100
		PSD-P										0
		Wr										80
	Walleye	PSD										67
		PSD-P										33
		Wr										82
	Yellow Perch	PSD										0
		PSD-P										0
		Wr										104

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
2017	1	16	85 (2.2)									
2016	2	1	64	89								
2015	3	2	82 (.6)	105 (3.7)	130 (5.1)							
2014	4	2	80 (5.2)	95 (5)	113 (2.4)	134 (1.4)						
2011	7	2	75 (.4)	98 (5.2)	121 (9.5)	138 (4.5)	151 (1.8)	164 (2.2)	177 (.9)			
2009	9	1	73	93	109	130	141	152	163	175	187	
Weighted Mean		24	82	97	120	135	148	160	172	175	187	

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	1	16										
2016	2	1										
2015	3	2										
2014	4	2										
2011	7	2										
2009	9	1										
Weighted Mean		24										

Species: Walleye

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2017	1	2	147 (12)									
2017	1	4	154 (6)									
2015	3	2	140 (13.7)	209 (10.2)	284 (5.7)							
2015	3	4	120 (7)	201 (5.9)	270 (10.3)							
2013	5	3	207 (20.6)	267 (9.7)	329 (10.2)	383 (20.8)	419 (29.8)					
2013	5	4	200 (13.6)	265 (9.7)	322 (6.4)	367 (5.2)	407 (4.2)					
2011	7	1	181	258	365	424	457	516	559			
2009	9	1	220	262	328	425	475	513	548	577	632	
Weighted Mean		21	166	240	308	385	424	515	554	577	632	

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	1	2										
2017	1	4										
2015	3	2										
2015	3	4										
2013	5	3										
2013	5	4										
2011	7	1										
2009	9	1										
Weighted Mean		21										

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	1	1	105									
2017	1	14	93 (1.8)									

2016	2	2	88 (4.5)	125 (32.5)								
2016	2	8	101 (6.6)	173 (7.6)								
2015	3	1	118	157	198							
2014	4	2	96 (11.1)	148 (2.1)	188 (2.7)	209 (3.7)						
2013	5	2	123 (8.1)	160 (2.6)	185 (3.4)	206 (.3)	226 (2)					
2012	6	3	108 (8.8)	144 (7.3)	168 (7.6)	185 (9.3)	210 (6.9)	221 (3.3)				
2011	7	1	113	134	157	176	192	208	221			
2010	8	1	110	139	156	176	198	213	222	234		
2009	9	1	105	124	142	153	163	178	195	207	223	
Weighted Mean		36	100	154	173	189	204	210	213	221	223	

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	1	1										
2017	1	14										
2016	2	2										
2016	2	8										
2015	3	1										
2014	4	2										
2013	5	2										
2012	6	3										
2011	7	1										
2010	8	1										
2009	9	1										
Weighted Mean		36										

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+
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+
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+
2018	22	142 (1)	200 (9)	214 (1)	224 (2)	235 (2)	235 (3)	235 (1)	245 (1)	245 (1)	

Fish Condition

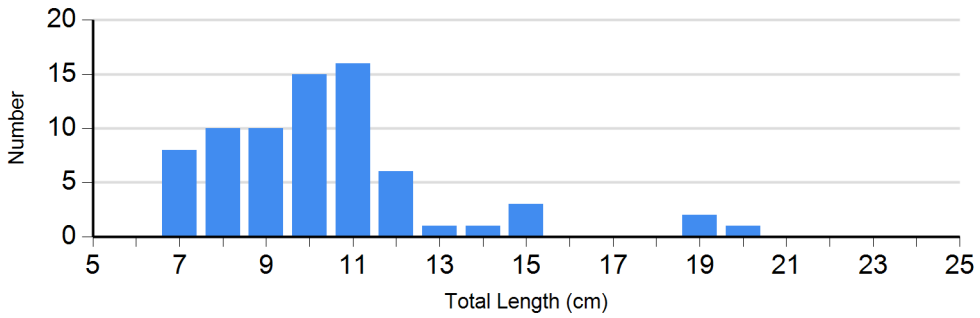
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Bluegill Frame Net	2018	59	132 (1.7)	5	134 (8.6)	1	127	0	
Common Carp Gill Net	2018	0		1	84	14	81 (1.5)	0	
Northern Pike Gill Net	2018	0		6	72 (3.8)	0		0	
Walleye Gill Net	2018	4	79 (1.2)	4	81 (0.6)	1	82	0	
Yellow Perch Gill Net	2018	6	95 (2.6)	16	95 (1.2)	0		0	

Length Frequency Distribution

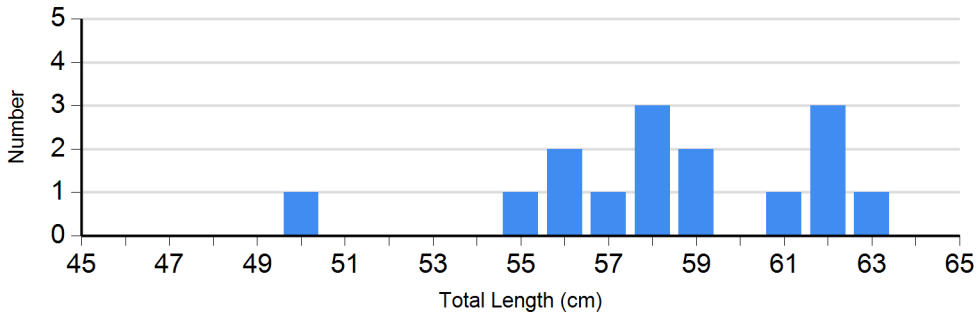
Length frequency histogram of species sampled by year.

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



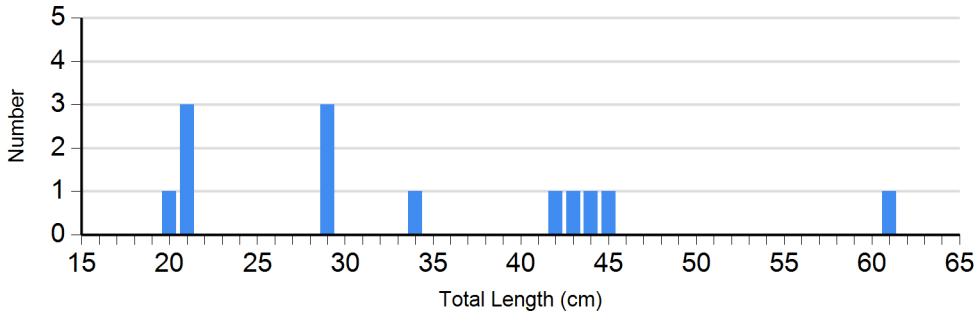
2018

Species: Common Carp
Gear: AFS std gill net



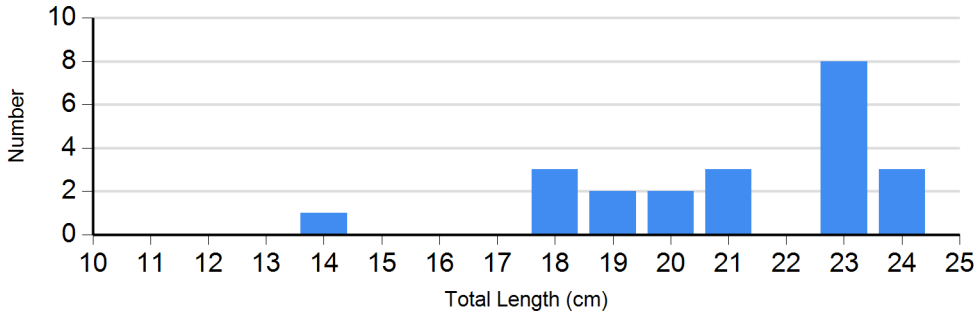
2018

Species: Walleye
Gear: AFS std gill net



2018

Species: Yellow Perch
Gear: AFS std gill net

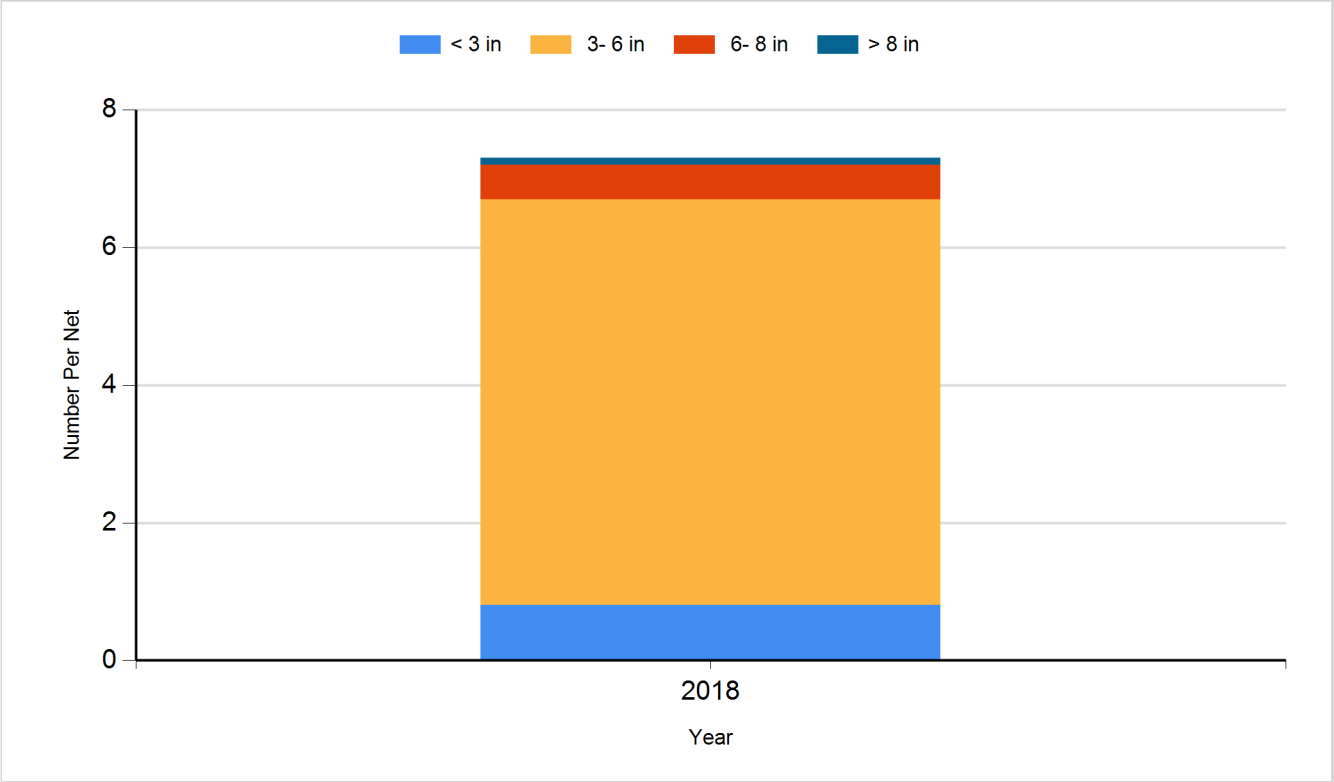


2018

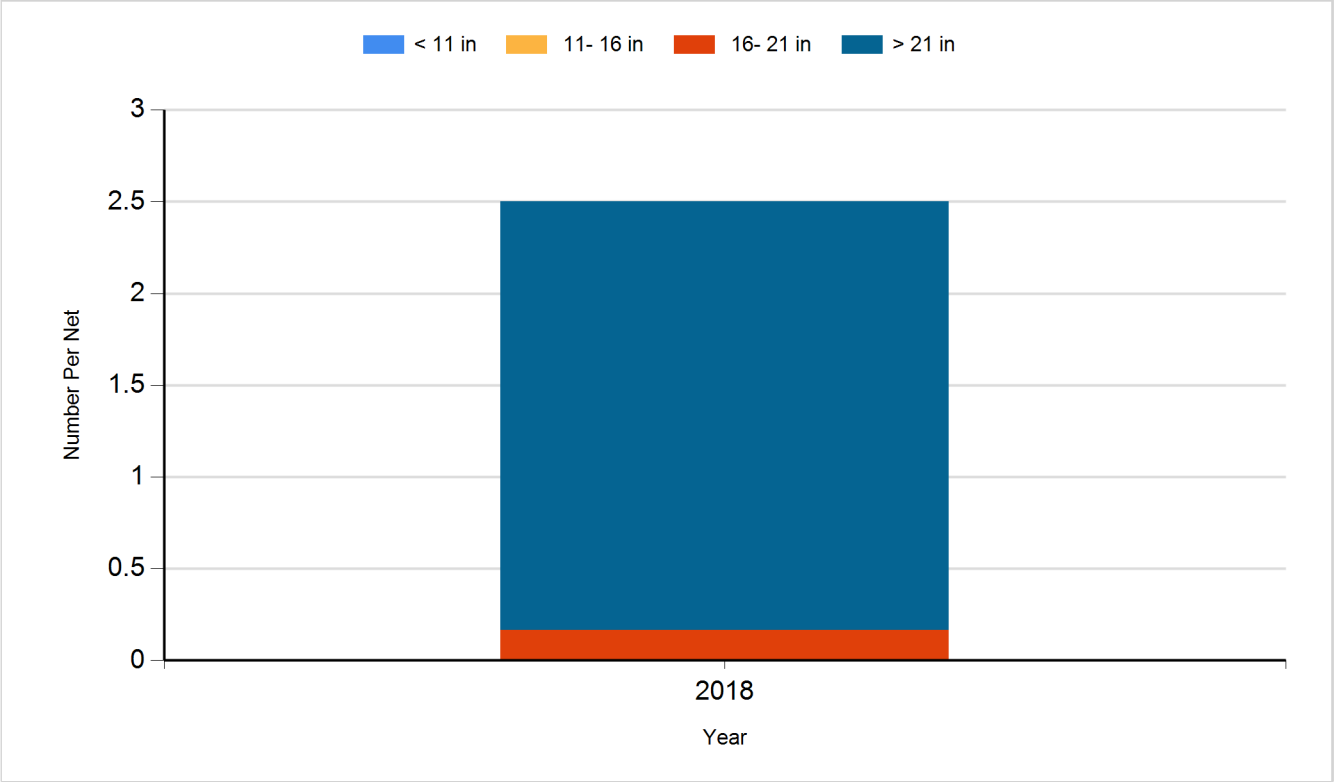
Historic Fish Sizes and Relative Abundance

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

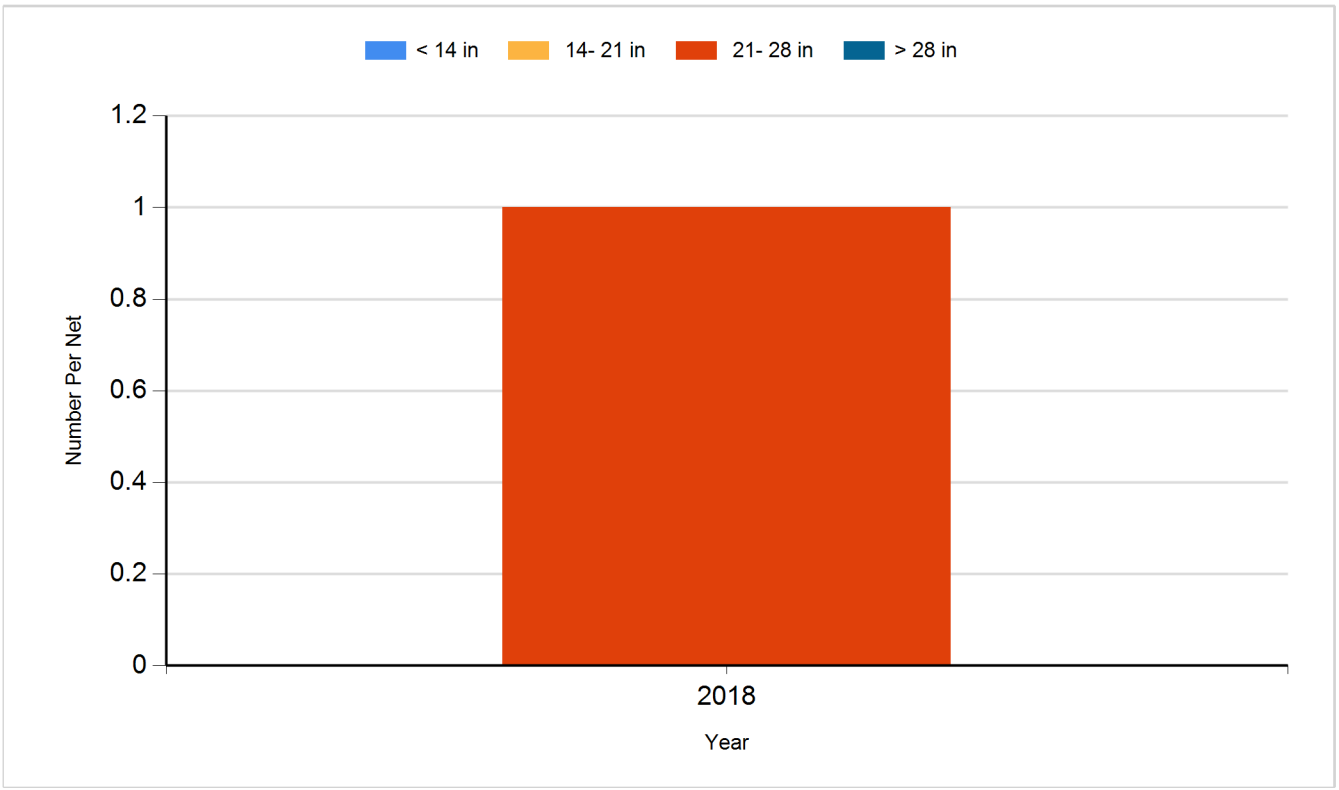
Species: Bluegill
Gear: frame net (std 3/4 in)



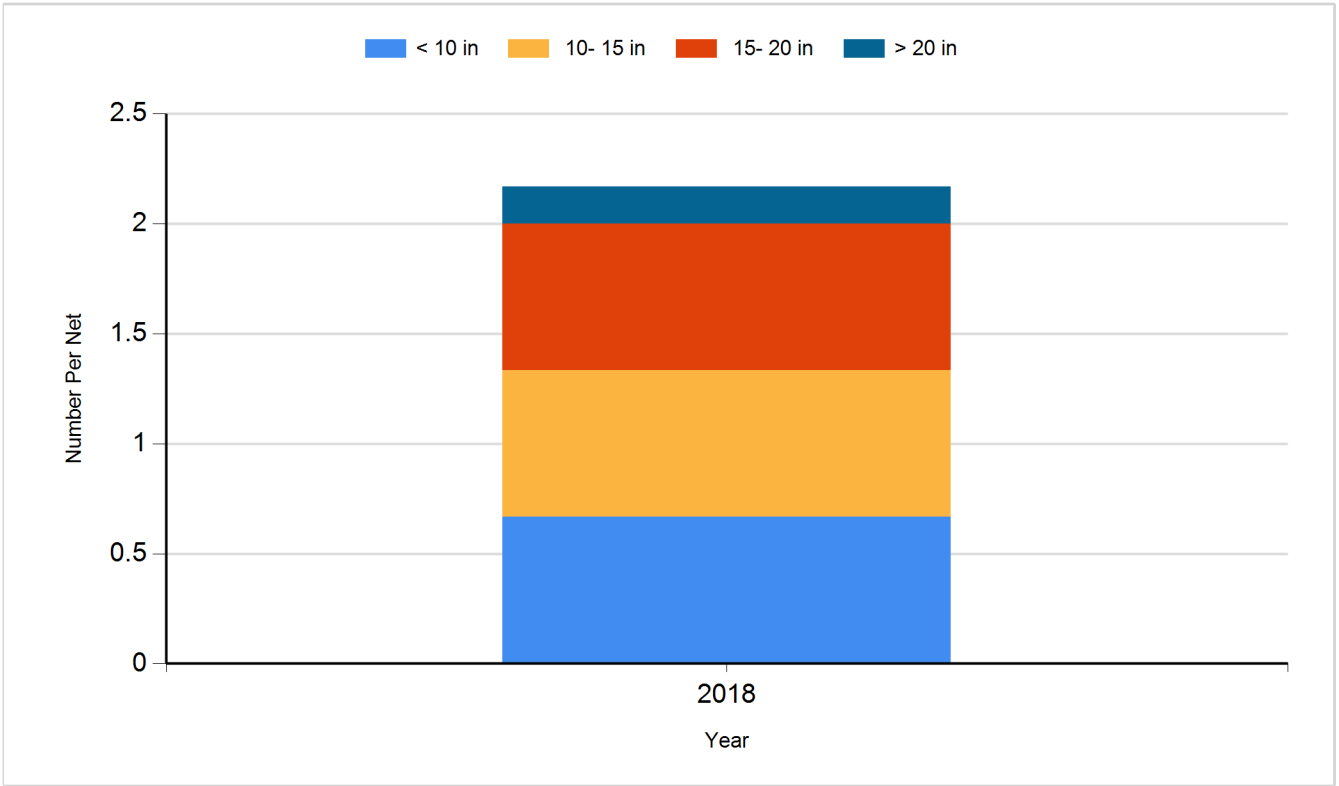
Species: Common Carp
Gear: AFS std gill net



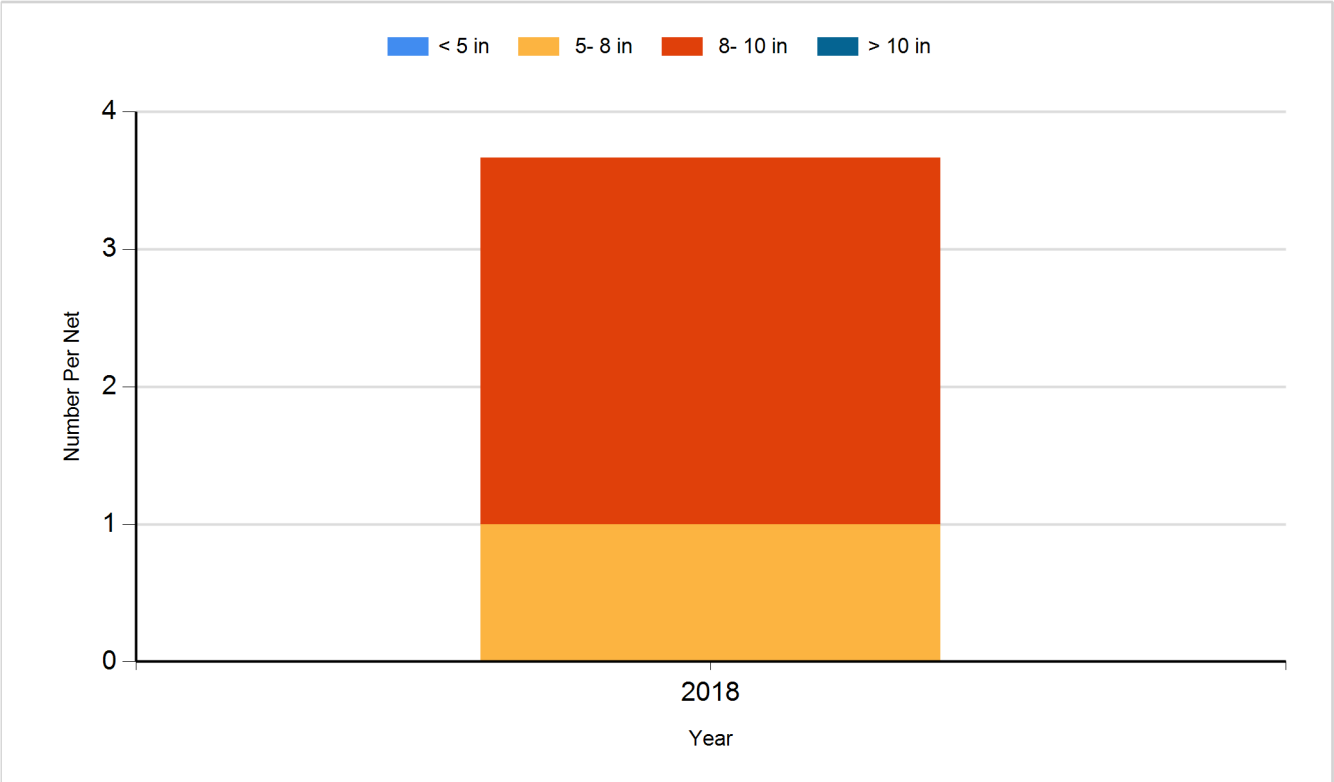
Species: Northern Pike
Gear: AFS std gill net



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
2007	Walleye	Small Fingerling	19,520
2009	Walleye	Small Fingerling	18,000
2011	Walleye	Fry	100,000
2013	Walleye	Fry	100,000
2015	Walleye	Fry	95,000
2017	Walleye	Fry	100,000