SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Long, McPherson County
WMC-Lake-521-000
2022

Lake Information

Name:	Long	**Maximum Depth:**	10 Feet
County:	McPherson		
Surface Area:	445 Acres		

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 07, 2022	6 net-nights
frame net (std 3/4 in)	Jun 07, 2022	10 net-nights
frame net (std 3/4 in)	Jun 08, 2022	2 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Northern Pike

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.

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

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

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.

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

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 (in)	Stock (cm)	Quality (in)	Quality (cm)	Preferred (in)	Preferred (cm)	Memorable (in)	Memorable (cm)	Trophy (in)	Trophy (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	Walleye	14	2.3	1.5	100		50	22	101	2
	Yellow Perch	13	2.2	2.1	0		0		104	2
frame net (std 3/4 in)	Walleye	1	0.1	0.1	100		100		92	
	Yellow Perch	8	0.3	0.2	0		0		90	7

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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
AFS std frame net	Walleye					0.8						0.80
	Yellow Perch					2.6						2.60
AFS std gill net	Walleye					5.2		6.3			2.3	4.60
	Yellow Perch					1.0		1.3			2.2	1.50
frame net (std 3/4 in)	Walleye							0.8			0.1	0.45
	Yellow Perch							0.2			0.3	0.25

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 2017	2018	2019	2020	2021	2022
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AFS std frame net	Walleye	PSD					89					
		PSD-P					89					
		Wr					83					
	Yellow Perch	PSD					3					
		PSD-P					0					
		Wr					80					
AFS std gill net	Walleye	PSD					100		100			100
		PSD-P					87		89			50
		Wr					84		100			101
	Yellow Perch	PSD					0		38			0
		PSD-P					0		0			0
		Wr					77		93			104
frame net (std 3/4 in)	Walleye	PSD							100			100
		PSD-P							100			100
		Wr							95			92
	Yellow Perch	PSD							0			0
		PSD-P							0			0
		Wr							87			90

Back-Calculated Lengths

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

Species: Walleye

| Year Class | Age | N | Mean back-calculated length (SE) at age |
			1	2	3	4	5	6	7	8	9	10
2019	3	1	291	359	438							
2018	4	4	271 (23.5)	329 (20.2)	374 (16)	414 (21.7)						
2016	6	6	218 (15.3)	311 (21.4)	385 (28.5)	447 (27.3)	501 (26)	558 (23.2)				
2015	7	1	223	265	309	371	417	459	541			
2015	7	2	208 (49.3)	307 (51.9)	350 (46.9)	431 (24.7)	486 (39.7)	540 (28.4)	591 (14.6)			
2014	8	1	161	161	221	221	287	287	336	336		
Weighted Mean		15	232	305	365	414	468	517	515	336		

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

Species: Yellow Perch

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2020	2	1	64	91								
2019	3	7	76 (5.4)	99 (6.1)	120 (6.7)							
2019	3	13	93 (3.5)	118 (3.2)	145 (3.3)							
Weighted Mean		21	86	110	136							

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2020	2	1										
2019	3	7										
2019	3	13										
Weighted Mean		21										

Length at Capture

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

Species: Walleye

Year	N					Mean Length (expanded sample number) at capture by age					
		1	2	3	4	5	6	7	8	9	10+
2022	14			476 (1)	426 (4)		585 (6)	633 (2)	392 (1)		
2019	38			436 (2)	489 (3)	522 (1)	567 (10)		603 (17)		622 (5)
2017	32	198 (1)	459 (3)		530 (6)		577 (14)		609 (7)		645 (1)

Species: Yellow Perch

| Year	N					Mean Length (expanded sample number) at capture by age					
		1	2	3	4	5	6	7	8	9	10+
2022	13			157 (13)							
2019	7		185 (2)	201 (5)							
2017	5		158 (5)								

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)
Walleye Gill Net	2019	0		4	102 (2.2)	31	101 (1.4)	3	93 (0.5)
	2022	0		7	101 (2.0)	4	103 (1.5)	3	99 (4.2)
Yellow Perch Gill Net	2019	5	90 (4.6)	3	99 (2.7)	0		0	
	2022	13	104 (1.7)	0		0		0	

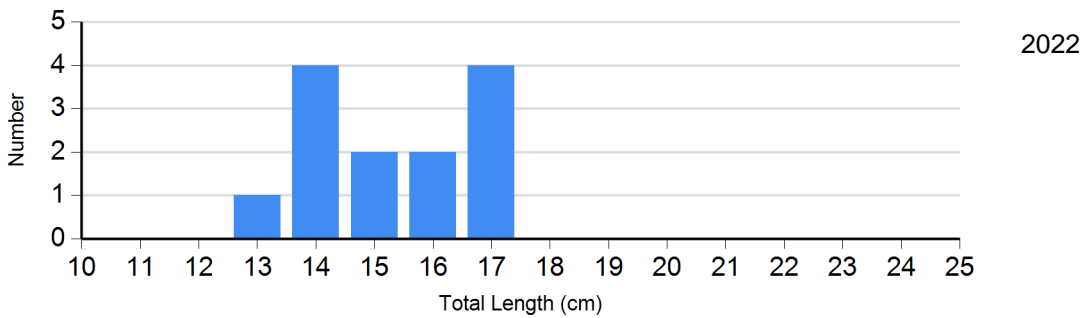# Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net
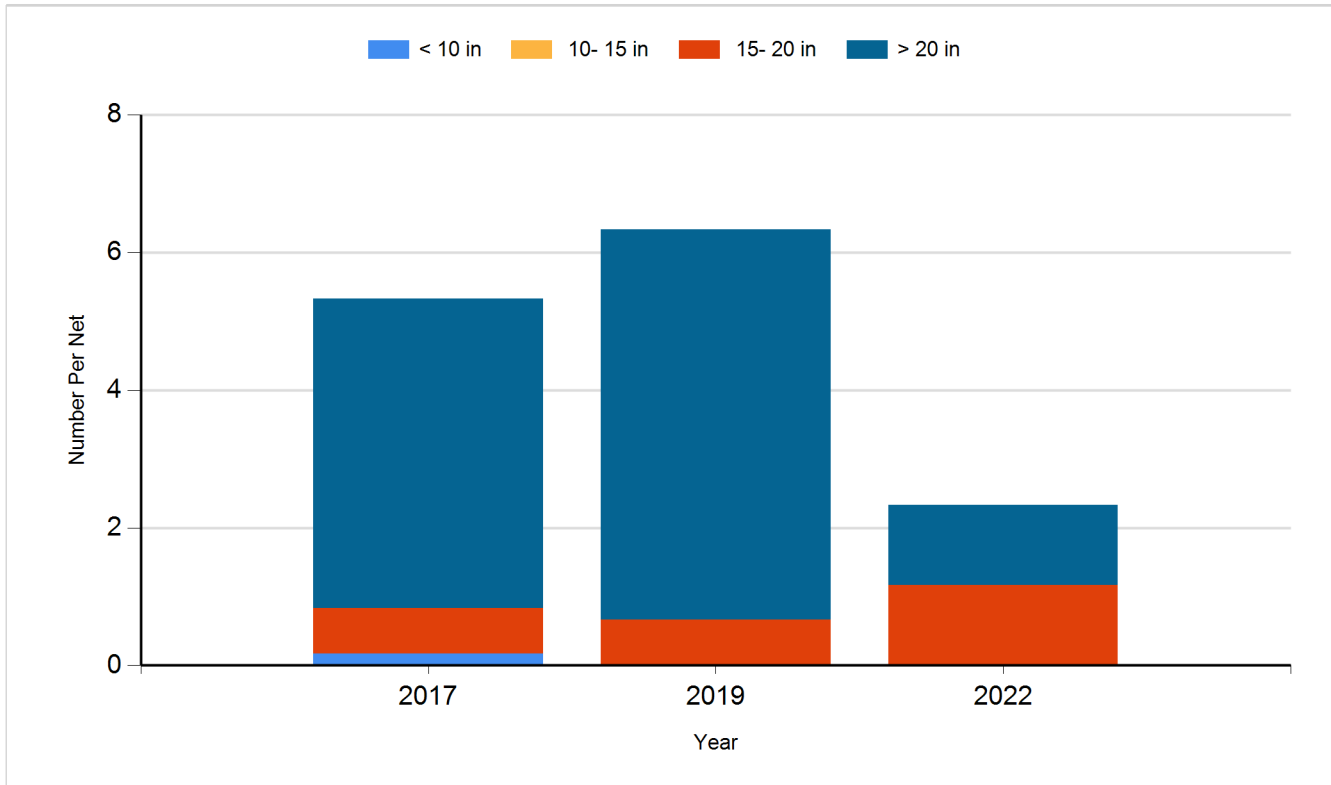

2017

2019

2022

Species: Yellow Perch
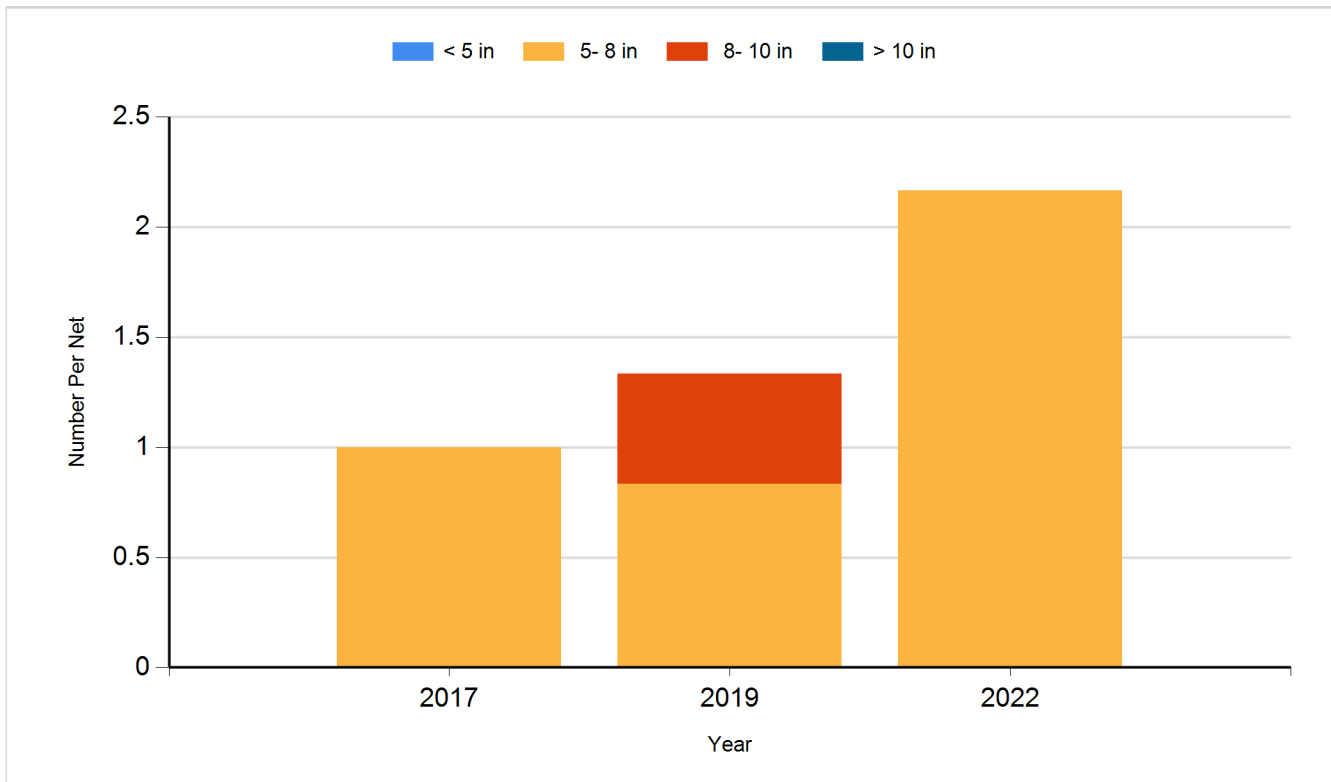Gear: AFS std gill net

2022
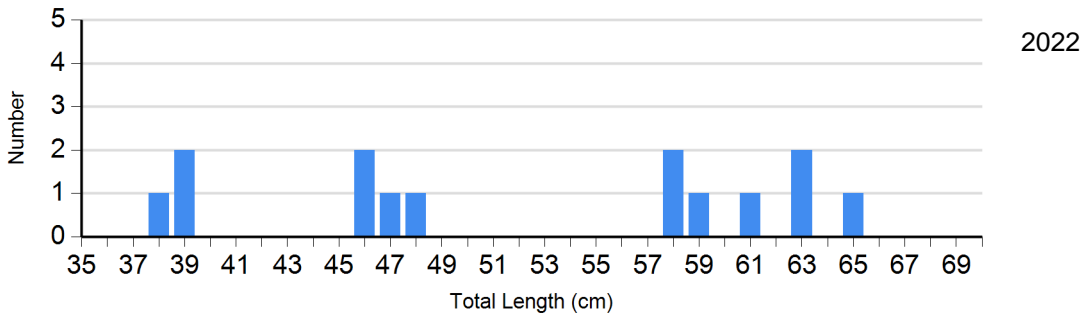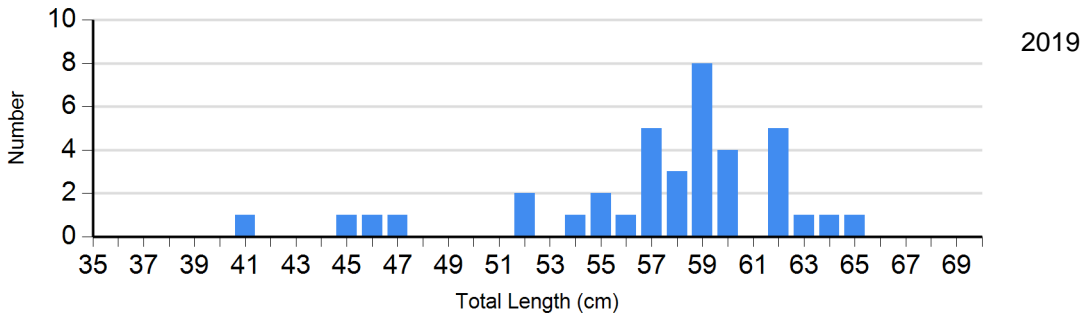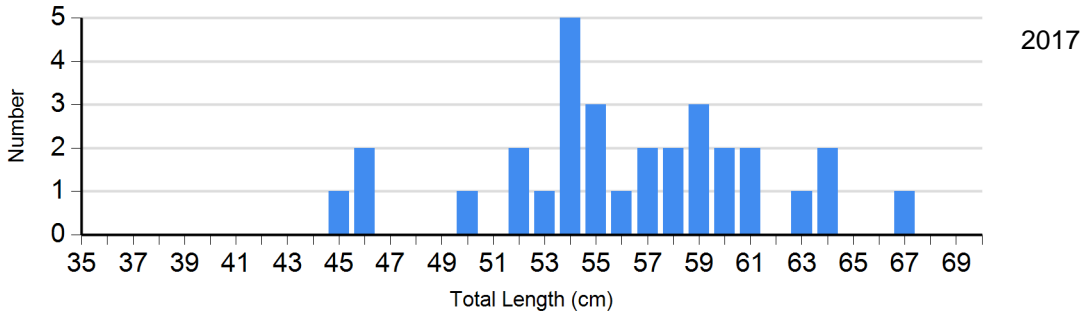
Historic Fish Sizes and Relative Abundance

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

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	190,000
2013	Walleye	Fry	200,000
2015	Walleye	Fry	190,000
2017	Walleye	Fry	200,000
2019	Walleye		190,000
2020	Bluegill	Adult	41
2021	Bluegill	Adult	275
2021	Walleye	Fry	400,000
2022	Bluegill	Adult	188
2022	Walleye	Fry	500,000