SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Long, McPherson County
WMC-Lake-521-000
2019

Lake Information

Name: Long

County: McPherson

Surface Area: 445 Acres

Maximum Depth: 10 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 11, 2019	3 net-nights
AFS std gill net	Jun 12, 2019	3 net-nights
frame net (std 3/4 in)	Jun 11, 2019	6 net-nights
frame net (std 3/4 in)	Jun 12, 2019	6 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.

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

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

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	Walleye	38	6.3	2.6	100		89		100	2
	Yellow Perch	8	1.3	0.8	38		0		93	4
frame net (std 3/4 in)	Walleye	10	0.8	0.4	100		100		95	3
	Yellow Perch	2	0.2	0.2	0		0		87	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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	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	5.75
	Yellow Perch								1.0		1.3	1.15
frame net (std 3/4 in)	Walleye										0.8	0.80
	Yellow Perch										0.2	0.20
std exp gill net	Walleye			14.0								14.00
	Yellow Perch			164.3								164.30

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	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
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
		PSD-P								87		89
		Wr								84		100
	Yellow Perch	PSD								0		38
		PSD-P								0		0
		Wr								77		93
frame net (std 3/4 in)	Walleye	PSD										100
		PSD-P										100
		Wr										95
	Yellow Perch	PSD										0
		PSD-P										0
		Wr										87
std exp gill net	Walleye	PSD			98							
		PSD-P			10							
		Wr			100							
	Yellow Perch	PSD			4							
		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: Walleye

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2016	3	2	213 (8.6)	321 (22.2)	419 (6.7)							
2015	4	3	198 (7)	312 (5.8)	379 (12.7)	460 (9.4)						
2014	5	1	203	376	441	479	507					
2013	6	1	281	340	471	510	537	577				
2013	6	10	235 (8.4)	370 (8.6)	448 (10.7)	491 (10.9)	530 (8.6)	556 (4.4)				
2012	7	1	258	332	401	437	484	516	537			
2011	8	1	222	388	469	498	536	571	587	599		
2011	8	15	220 (5.4)	358 (10.7)	441 (10.9)	493 (5.9)	531 (5.1)	558 (4.4)	579 (4.1)	593 (4.4)		
2009	10	3	234 (24.3)	368 (7.1)	429 (21.9)	468 (21.5)	522 (6)	552 (7.8)	581 (9.3)	601 (8.8)	619 (10)	632 (11.6)
2009	10	4	230 (4)	375 (19.8)	430 (24)	472 (28)	512 (28.5)	543 (24.2)	561 (23.7)	577 (21.8)	594 (17.4)	607 (16.8)
2007	12	1	214	341	391	436	487	515	550	573	590	607
2007	12	1	298	392	429	491	544	565	588	604	618	627
Weighted Mean		43	227	359	434	484	526	554	574	591	605	618

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2016	3	2										
2015	4	3										
2014	5	1										
2013	6	1										
2013	6	10										
2012	7	1										
2011	8	1										

2011	8	15										
2009	10	3										
2009	10	4										
2007	12	1	619	634								
2007	12	1	635	642								
Weighted Mean		43	627	638								

Species: Yellow Perch

			Mean back-calculated length (SE) at age									
Year Class	Age	N	1	2	3	4	5	6	7	8	9	10
2017	2	1	86	153								
2017	2	2	92 (4.3)	175 (5.9)								
2016	3	1	62	98	163							
2016	3	5	100 (5.7)	158 (5)	189 (4.4)							
Weighted Mean		9	92	155	185							

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	2	1										
2017	2	2										
2016	3	1										
2016	3	5										
Weighted Mean		9										

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+
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)
2012	45	246 (4)	423 (33)	485 (5)				573 (2)			577 (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+
2019	7		185 (2)	201 (5)							
2017	5		158 (5)								
2012	815	132 (679)	183 (136)								

Fish Condition

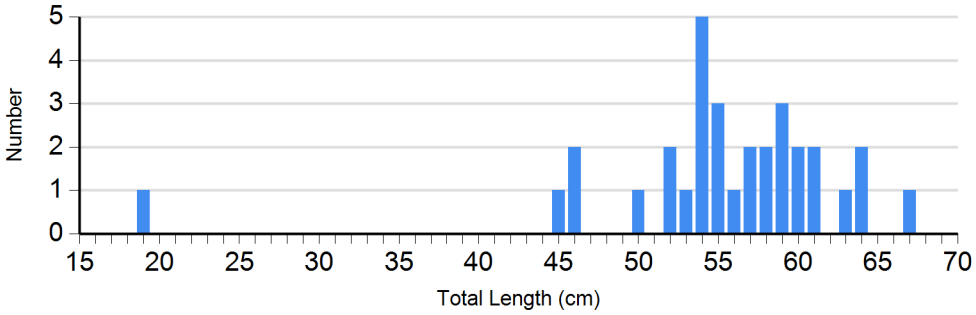
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Walleye Gill Net	2017	0		4	86 (1.7)	23	85 (1.5)	4	80 (2.5)
	2019	0		4	102 (2.2)	31	101 (1.4)	3	93 (0.5)
Yellow Perch Gill Net	2017	6	77 (3.1)	0		0		0	
	2019	5	90 (4.6)	3	99 (2.7)	0		0	

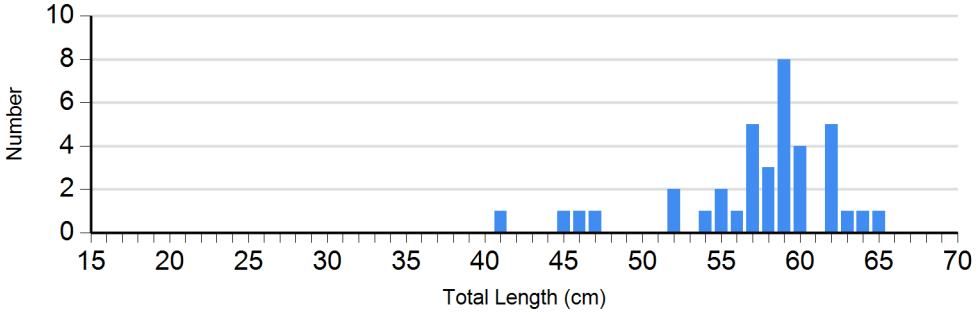
Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net



2017

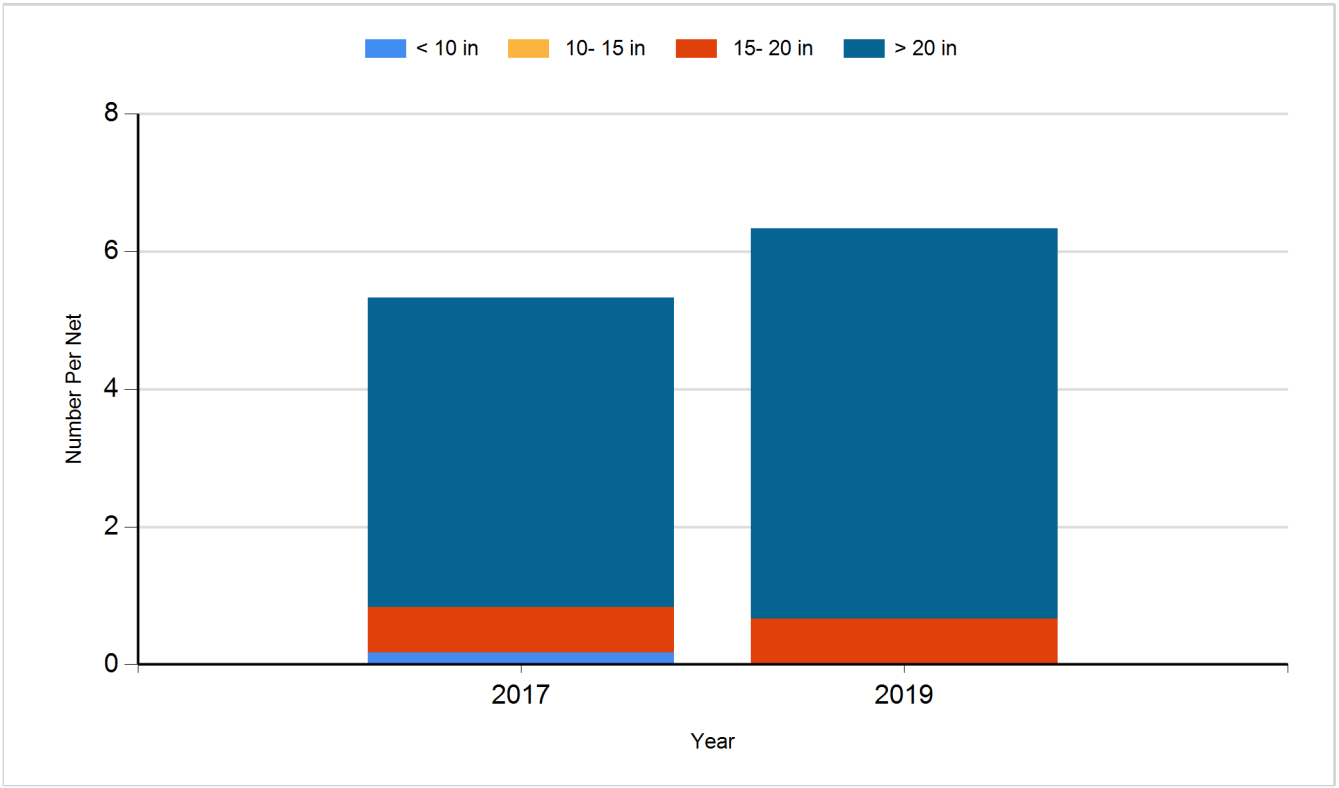


2019

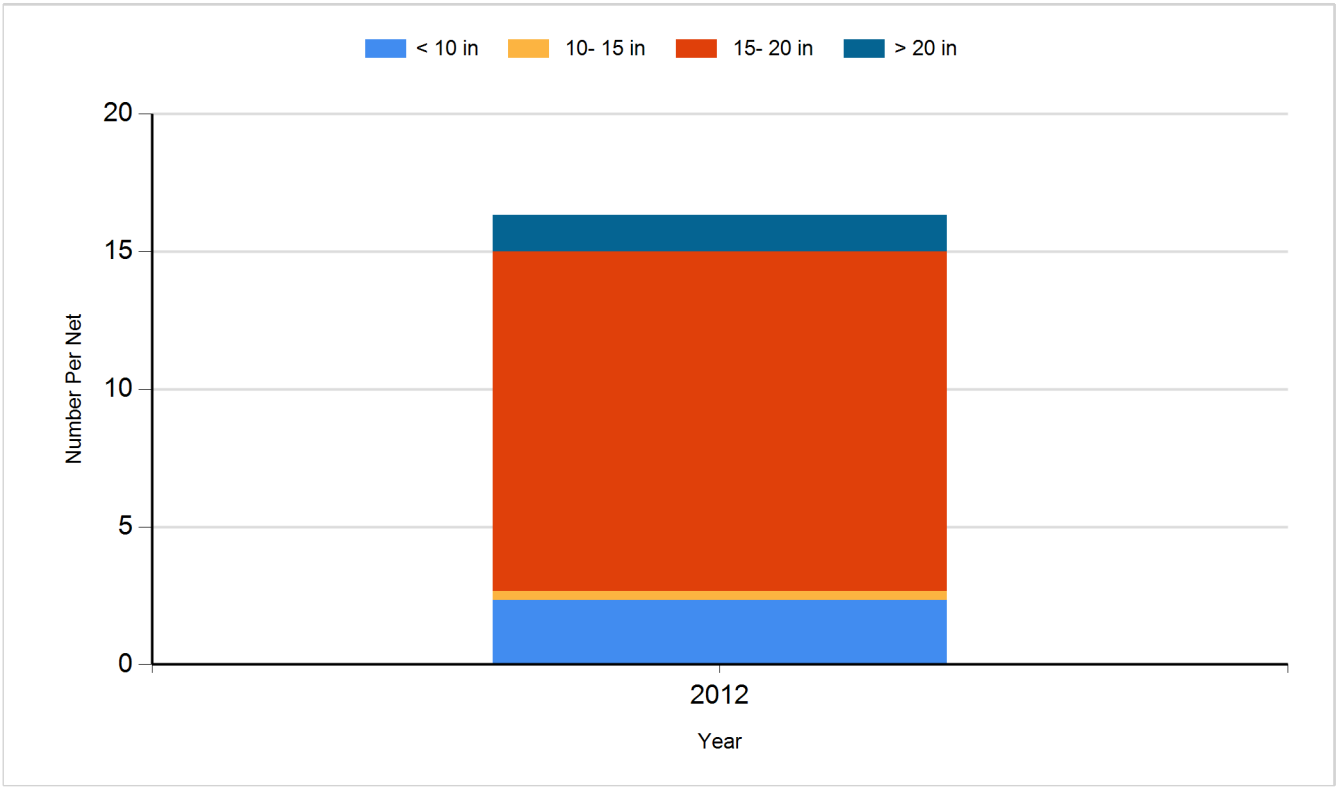
Historic Fish Sizes and Relative Abundance

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

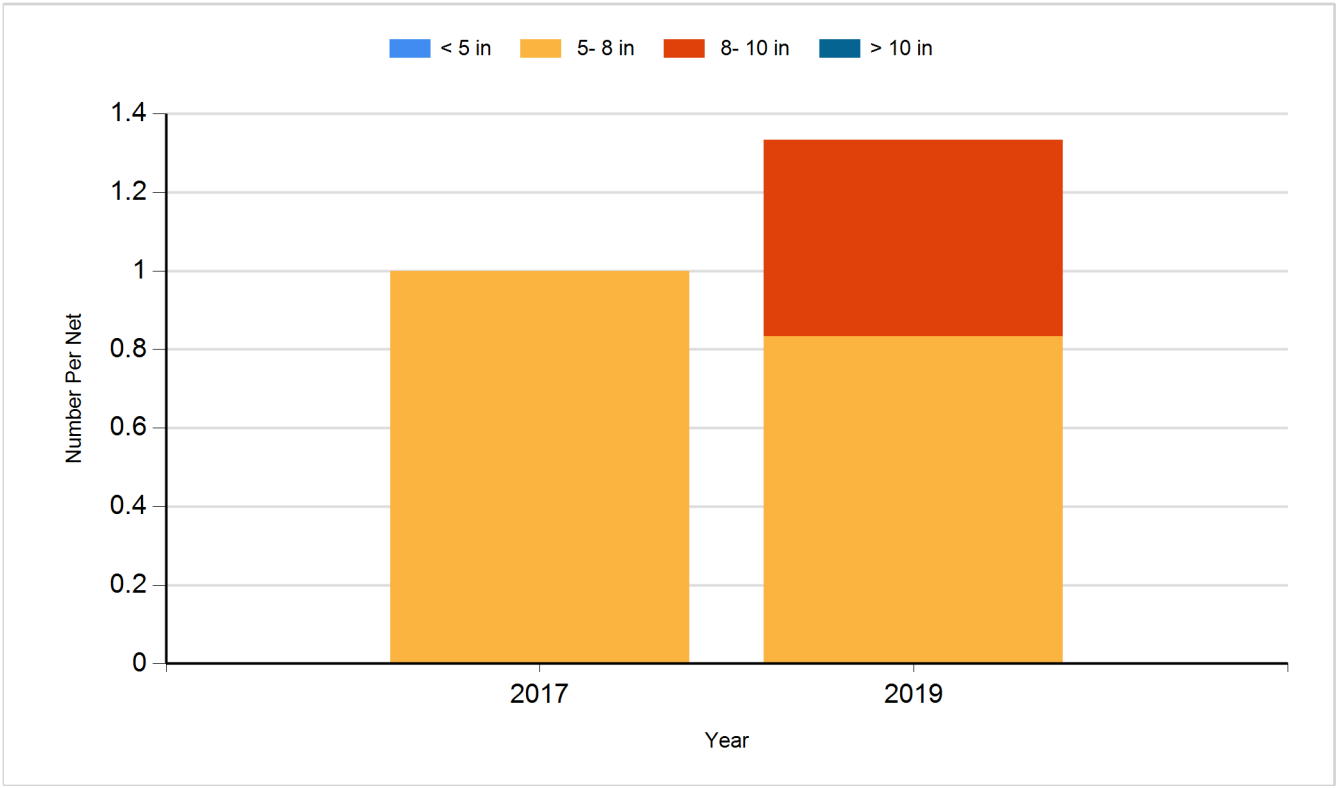
Species: Walleye
Gear: AFS std gill net



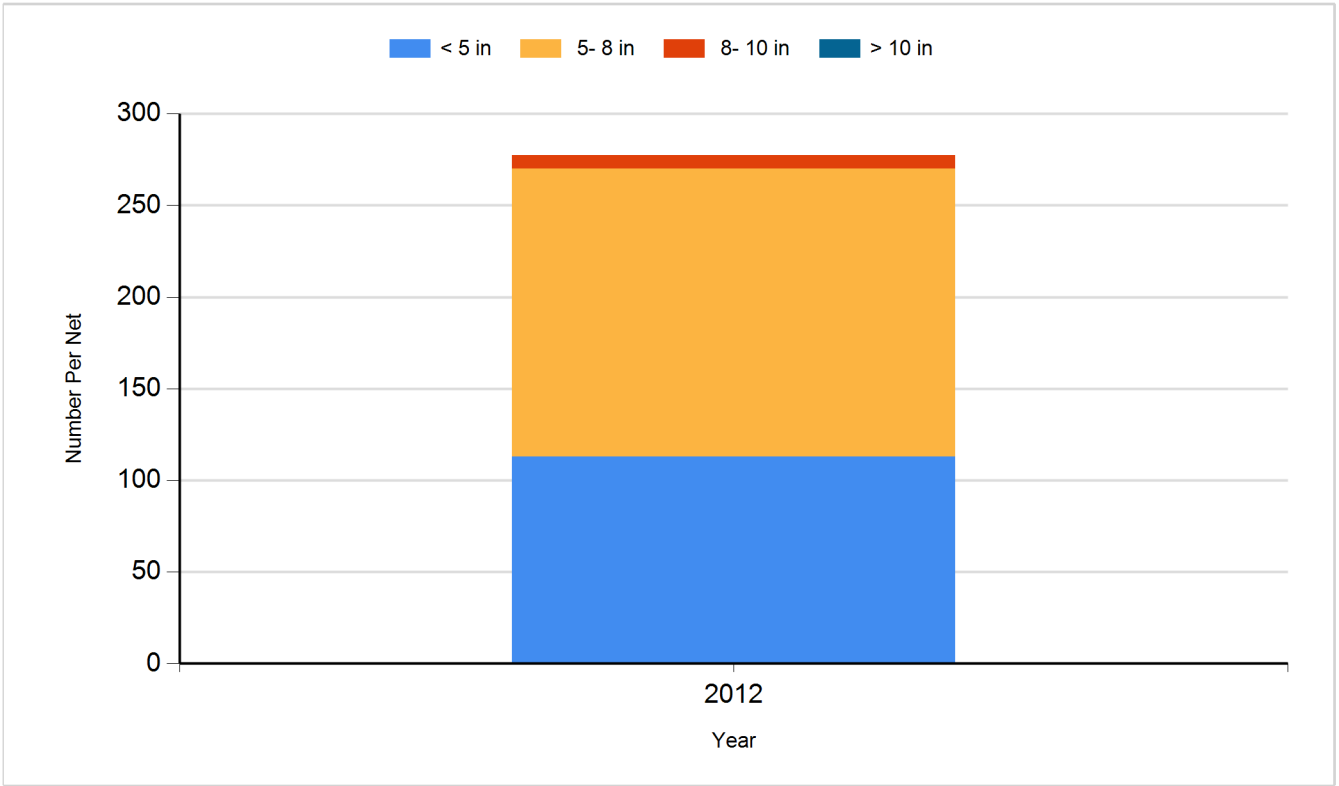
Species: Walleye
Gear: std exp gill net



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
2009	Walleye	Fry	200,000
2011	Walleye	Fry	190,000
2013	Walleye	Fry	200,000
2015	Walleye	Fry	190,000
2017	Walleye	Fry	200,000
2019	Walleye		190,000