

Elm Lake Survey Summary

Elm Lake, located 9.0 miles west and 1 mile north of Frederick, is managed as a black crappie and walleye fishery; however, other fish species (e.g., channel catfish, northern pike) are present and may contribute to the fishery.

- **Black crappie.** Black crappie populations are assessed using frame nets in northeast South Dakota; no frame nets were used during the 2020 Elm Lake survey.
- **Channel catfish.** The opportunity exists for anglers to catch channel catfish from Elm Lake. In 2020, gill nets sampled 22 individuals that ranged in length from 17.7 to 29.5 inches, 23% (5 of 22) were 24.0 inches or longer.
- **Walleye.** Walleye (includes saugeye) numbers were higher in 2020 than 2019. However, at 3.1/gill net, relative abundance remained low. Sampled walleyes ranged in length from 8.3 to 19.7 inches, of those that were at least 10.0 inches only 30% were 15.0 inches or longer. Although not abundant, individuals from each of the cohorts that coincided with recent saugeye stockings (2016 – 2019) contributed to the catch, those from the 2018 (age-2) year class were the most numerous accounting for 33% of fish in the sample. Since 2012, mean length at capture of age-3 fish has ranged from 10.9 to 15.9 inches. In 2020, the mean length at capture for age-3 fish was 14.2 inches.

For more detailed results see the computer generated South Dakota Statewide Fisheries Survey for Elm (Brown; below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Elm, Brown County

ELM-Lake-5-800

2020

Lake Information

Name: Elm **Maximum Depth:** 34 Feet
County: Brown **Mean Depth:** 18 Feet
Surface Area: 1,221 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Aug 11, 2020	6 net-nights
AFS std gill net	Aug 12, 2020	6 net-nights
fall night EF-WAE	Oct 08, 2020	3600 seconds

Common Fish Species Present

Walleye

Black Crappie

Common Carp

Channel Catfish

Black Bullhead

White Sucker

Yellow Perch

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.
- **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.

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

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		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 Bullhead	17	1.4	0.6	47	20	0		94	2
	Black Crappie	12	1.0	0.5	100		100		106	3
	Channel Catfish	22	1.8	0.8	100		23	15	97	2
	Common Carp	61	5.1	1.8	97		11	6	88	1
	Northern Pike	3	0.2	0.2	0		0		79	8
	Walleye	42	3.1	0.9	30	12	0		84	1
	White Sucker	12	1.0	0.3	92		92		100	2
	Yellow Perch	10	0.8	0.5	80		0		103	3
fall night EF-WAE*	Walleye	55	55.0	13.2					88	1

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.

Gear	Species	CPUE										Avg
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
AFS std gill net	Black Bullhead						32.1		10.8	1.9	1.4	11.55
	Black Crappie						0.8		0.8	0.2	1.0	0.70
	Channel Catfish						1.6		3.3	0.7	1.8	1.85
	Common Carp						3.5		3.5	3.2	5.1	3.83
	Northern Pike						0.7		0.1	0.2	0.2	0.30
	Walleye						1.0		3.3	1.1	3.1	2.13
	White Sucker						2.9		3.1	1.0	1.0	2.00
	Yellow Perch						0.4		0.6	0.4	0.8	0.55
fall night EF-WAE	Walleye						117.5		114.0	153.0	55.0	109.88
frame net (std 3/4 in)	Black Bullhead		1,255.8		333.4		181.2					590.13
	Black Crappie		11.4		3.2		10.0					8.20
	Bluegill		0.0		0.0		0.0					0.00
	Channel Catfish		4.4		5.6		1.6					3.87
	Common Carp		0.1		0.1		9.3					3.17
	Northern Pike		2.6		0.2		0.8					1.20
	Orangespotted Sunfish		0.0		0.0		0.0					0.00
	Sunfish Hybrid		0.0		0.0		0.0					0.00
	Walleye		4.1		0.2		0.3					1.53
	White Sucker		0.9		0.3		0.2					0.47
	Yellow Perch		0.6		0.3		0.0					0.30
std exp gill net	Black Bullhead		281.8		166.8							224.30
	Black Crappie		0.2		3.5							1.85
	Bluegill		0.0		0.0							0.00
	Channel Catfish		0.3		1.0							0.65
	Common Carp		0.0		0.3							0.15
	Northern Pike		0.8		1.3							1.05
	Orangespotted Sunfish		0.0		0.0							0.00
	Walleye		4.2		1.7							2.95
	White Sucker		6.3		2.2							4.25
Yellow Perch		7.8		1.2							4.50	

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									
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AFS std gill net	Channel Catfish	PSD						79		92	100	100
		PSD-P					26		18	13	23	
		Wr					107		96	102	97	
	Walleye	PSD					100		10	0	30	
		PSD-P					75		10	0	0	
		Wr					88		82	83	84	
std exp gill net	Channel Catfish	PSD		0		100						
		PSD-P		0		0						
		Wr		105		94						
	Walleye	PSD		44		90						
		PSD-P		4		0						
		Wr		84		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	42	244 (7)	301 (14)	361 (6)	420 (3)	369 (4)	394 (6)	508 (1)			
2019	20	214 (6)	242 (1)	292 (3)	275 (2)	340 (7)	364 (1)				
2018	46	230 (6)	280 (6)	277 (4)	322 (26)				531 (1)	539 (3)	
2016	29	196 (1)	214 (16)	392 (1)			591 (1)	547 (10)			
2014	13	243 (3)		405 (5)	507 (1)	460 (4)					
2012	28	211 (2)	222 (1)	350 (23)	537 (1)		492 (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).

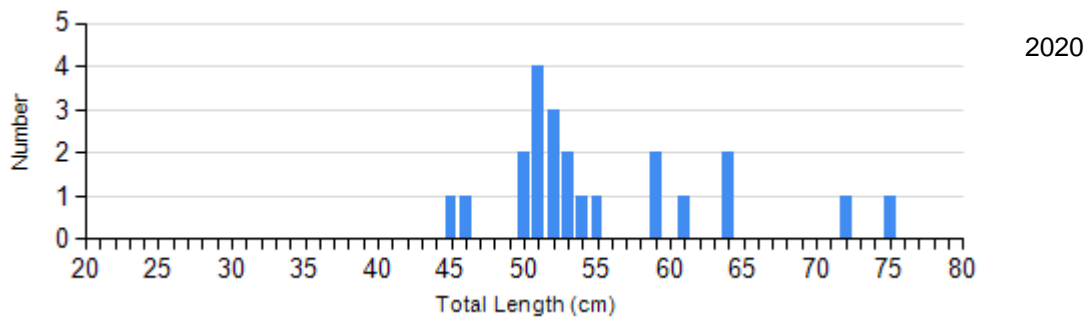
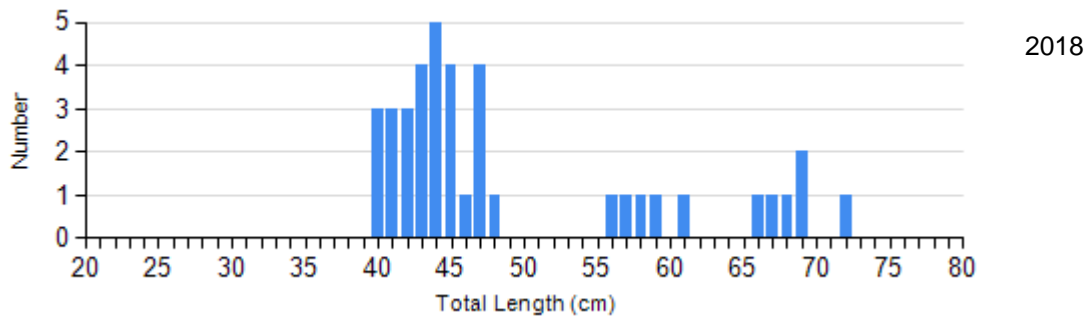
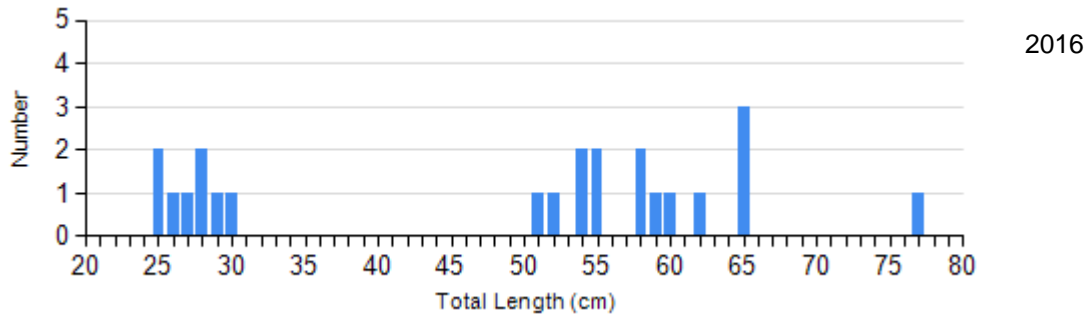
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Channel Catfish Gill Net	2016	4	92 (2.0)	10	111 (3.7)	4	111 (3.7)	1	
	2018	3	89 (1.5)	29	94 (1.7)	6	105 (2.0)	1	108
	2019	0		7	102 (3.9)	1	103	0	
	2020	0		17	96 (1.1)	3	99 (5.5)	2	105 (18.6)
Walleye Gill Net	2016	0		3	82 (4.1)	9	90 (1.7)	0	
	2018	36	82 (0.8)	0		4	87 (1.8)	0	
	2019	13	83 (1.5)	0		0		0	
	2020	26	83 (0.9)	11	87 (1.3)	0		0	

Length Frequency Distribution

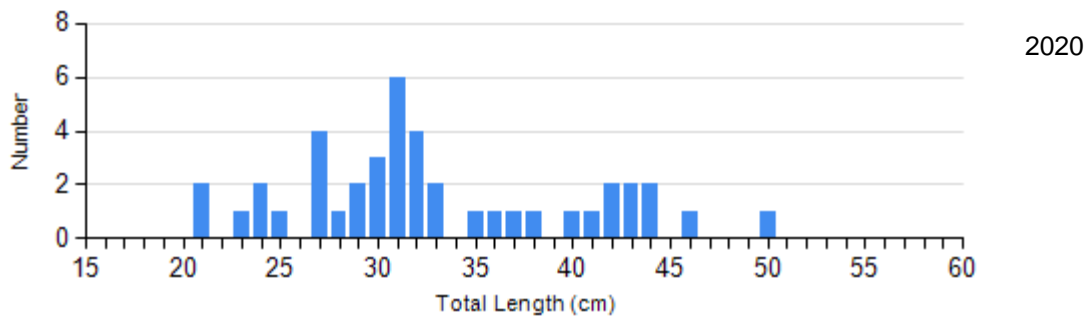
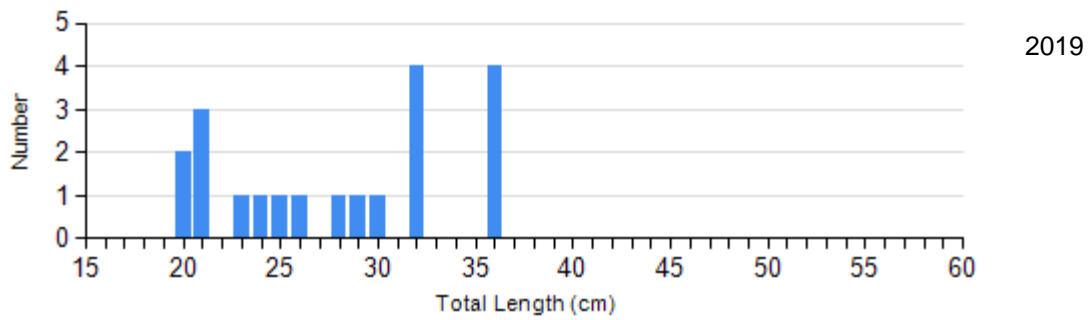
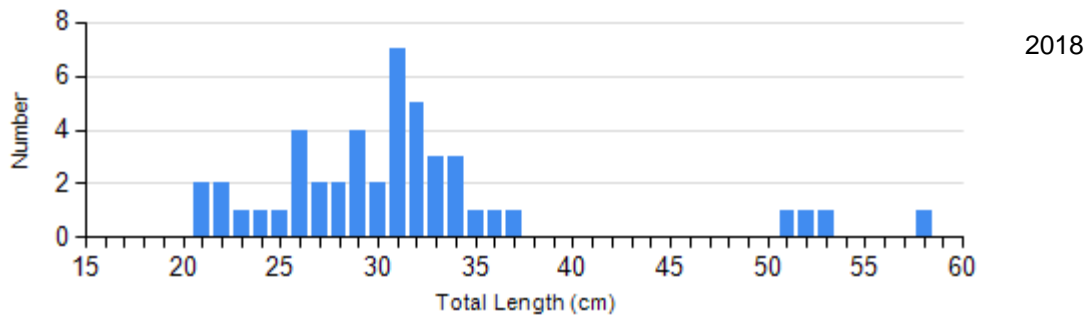
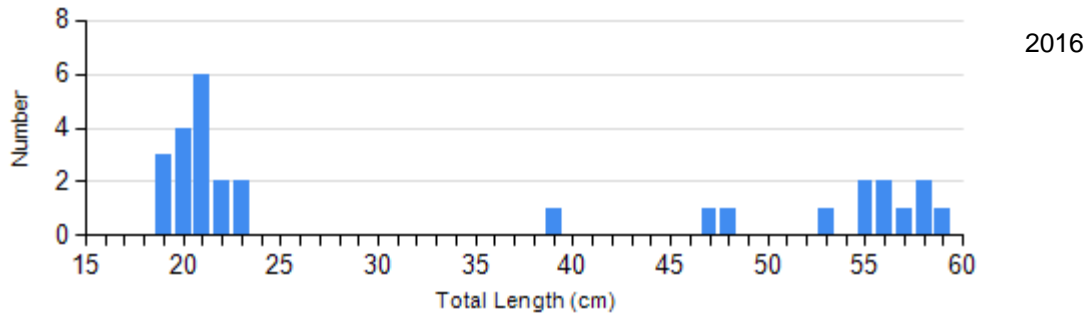
Length frequency histogram of species sampled by year.

Species: Channel Catfish

Gear: AFS std gill net



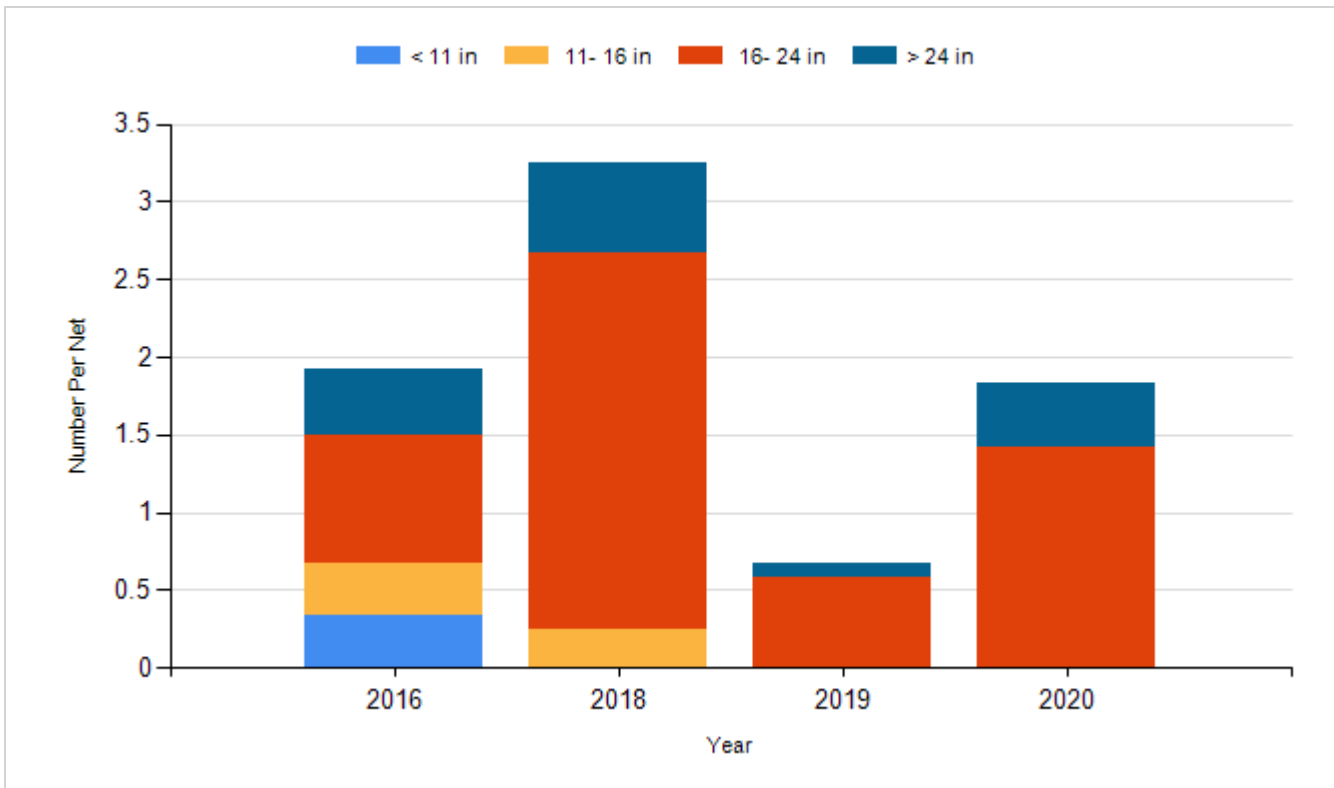
Species: Walleye
Gear: AFS std gill net



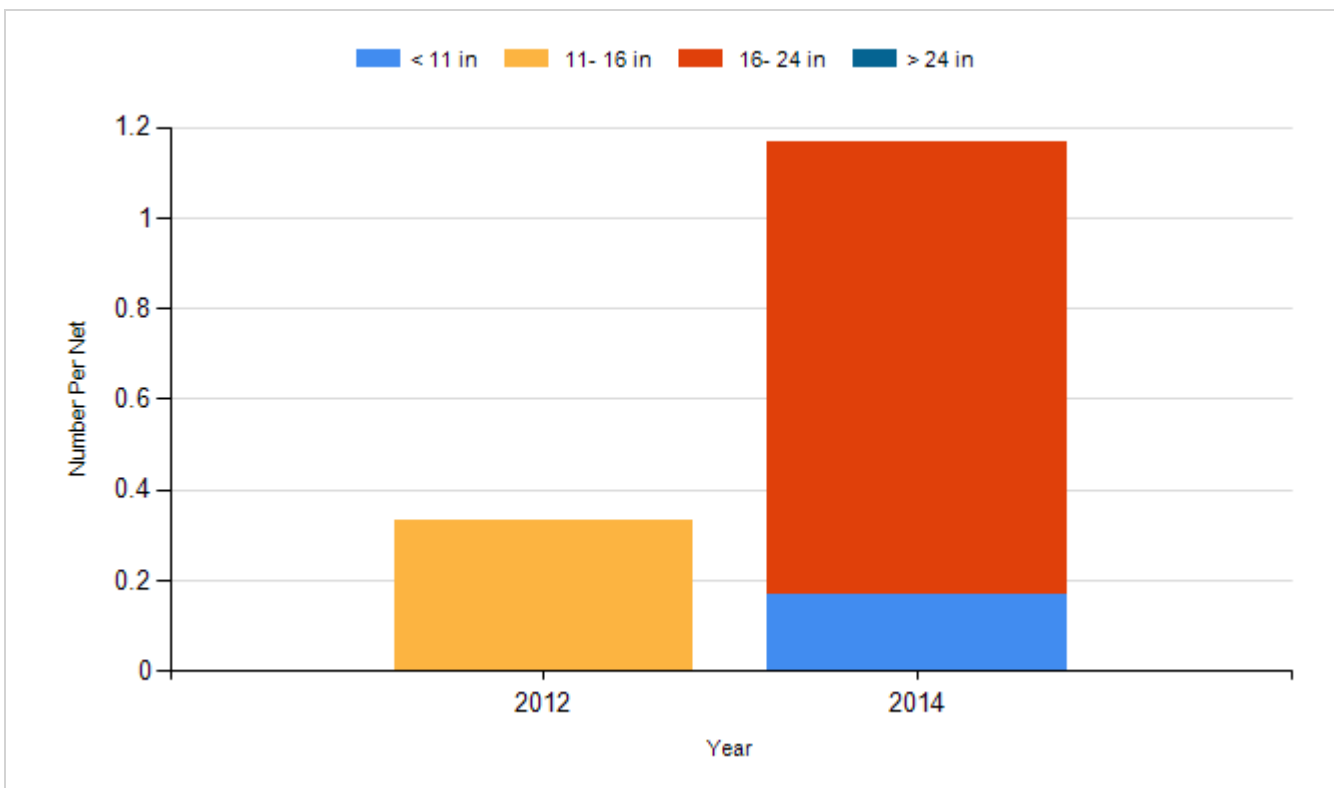
Historic Fish Sizes and Relative Abundance

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

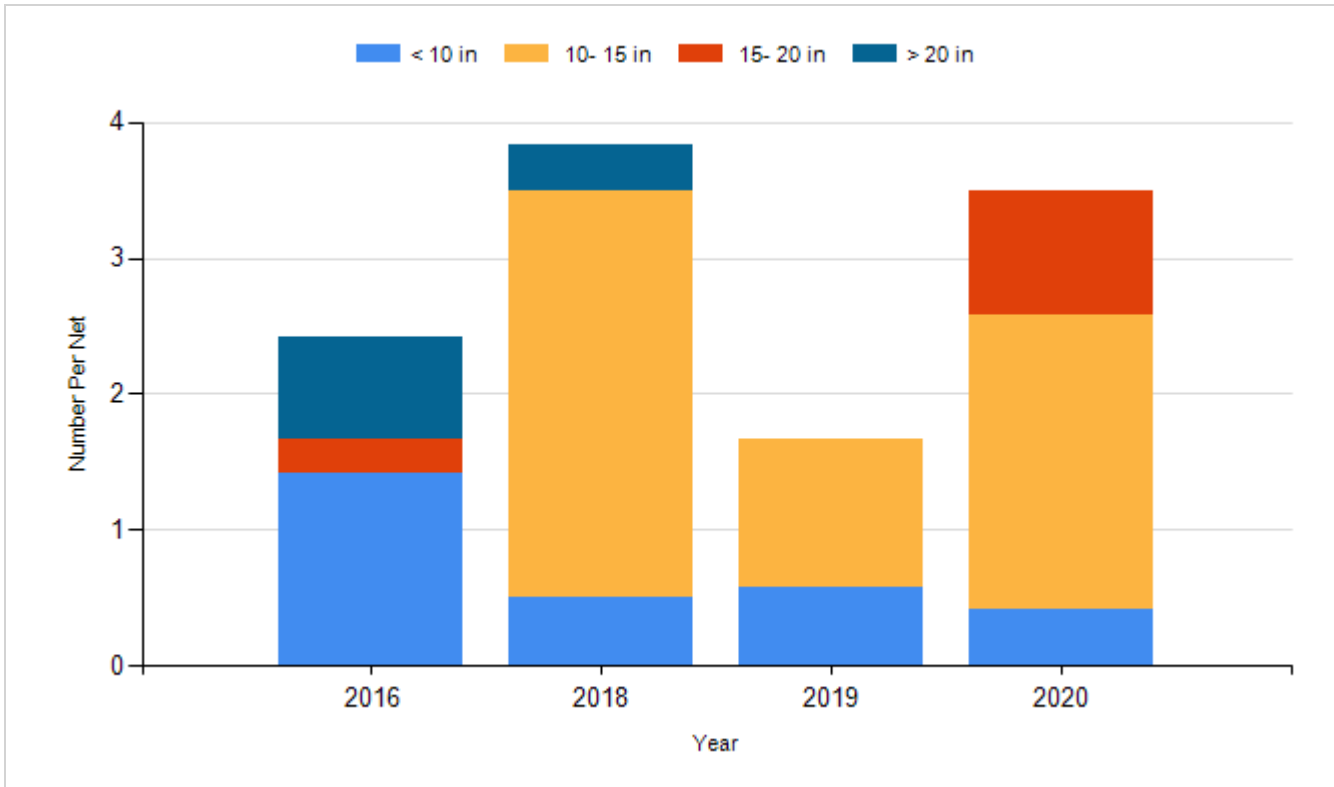
Species: Channel Catfish
Gear: AFS std gill net



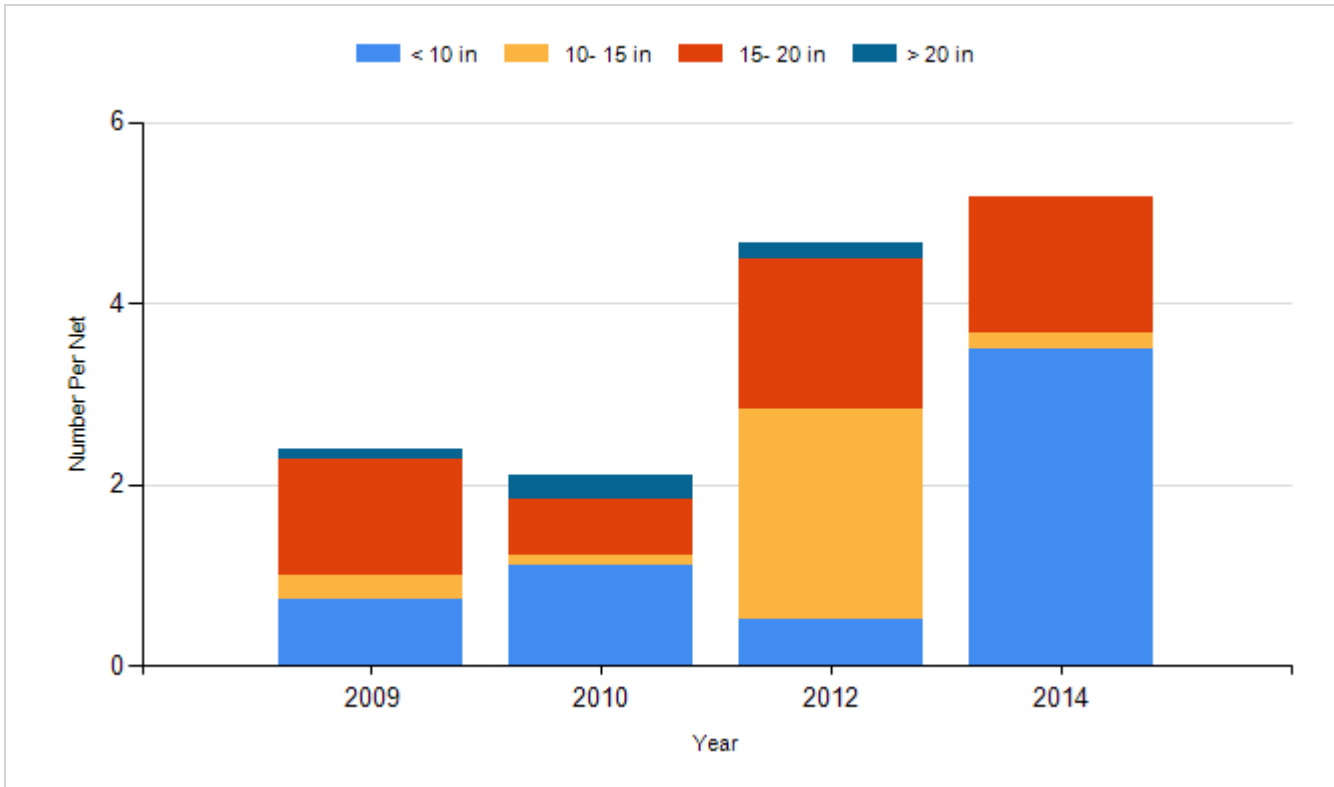
Species: Channel Catfish
Gear: std exp gill net



Species: Walleye
Gear: AFS std gill net



Species: Walleye
Gear: std exp gill net



Fish Stocking

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

Year	Species	Size	Number
2009	Walleye	Small Fingerling	121,260
2010	Walleye	Small Fingerling	122,820
2011	Walleye	Small Fingerling	121,860
2012	Walleye	Small Fingerling	119,050
2013	Walleye	Large	1,976
2013	Walleye	Large Fingerling	26,619
2014	Walleye	Small Fingerling	121,350
2015	Walleye	Small Fingerling	122,290
2016	Saugeye	Small Fingerling	121,080
2017	Saugeye	Small Fingerling	91,520
2018	Saugeye	Small Fingerling	91,120
2019	Saugeye	Small Fingerling	92,075