SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Elm, Brown County
ELM-Lake-5-800
2021

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
fall night EF-WAE	Oct 14, 2021	2400 seconds

Common Fish Species Present

Walleye

Black Crappie

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

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 frame net	Black Bullhead					181.2						181.20
	Black Crappie					10.0						10.00
	Channel Catfish					1.6						1.60
	Common Carp					9.3						9.30
	Northern Pike					0.8						0.80
	Walleye					0.3						0.30
	White Sucker					0.2						0.20
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
boat shocker (night)	Walleye*					117.5						117.50
fall night EF-WAE*	Walleye							114.0	153.0	55.0	126.0	112.00
frame net (std 3/4 in)	Black Bullhead	1,255.8		333.4								794.60
	Black Crappie	11.4		3.2								7.30
	Bluegill	0.0		0.0								0.00
	Channel Catfish	4.4		5.6								5.00
	Common Carp	0.1		0.1								0.10
	Northern Pike	2.6		0.2								1.40
	Orangespotted Sunfish	0.0		0.0								0.00
	Sunfish Hybrid	0.0		0.0								0.00
	Walleye	4.1		0.2								2.15
	White Sucker	0.9		0.3								0.60
	Yellow Perch	0.6		0.3								0.45
std exp gill net	Black Bullhead	281.8		166.8								224.30
	Black Crappie	0.2		3.5								1.85
	Channel Catfish	0.3		1.0								0.65
	Common Carp	0.0		0.3								0.15

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
std exp gill net	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.

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std frame net	Black Crappie	PSD					74					
		PSD-P					1					
		Wr					105					
	Walleye	PSD					20					
		PSD-P					0					
		Wr					95					
AFS std gill net	Black Crappie	PSD					90		89	50	100	
		PSD-P					0		67	50	100	
		Wr					105		100	116	106	
	Walleye	PSD					100		10	0	30	
		PSD-P					75		10	0	0	
		Wr					88		82	83	84	
boat shocker (night)	Walleye	PSD					0					
		PSD-P					0					
		Wr					86					
frame net (std 3/4 in)	Black Crappie	PSD	98		40							
		PSD-P	45		33							
		Wr	106		112							
	Walleye	PSD	17		100							
		PSD-P	3		33							
		Wr	81		93							
std exp gill net	Black Crappie	PSD	100		5							
		PSD-P	0		5							
		Wr	113		121							
	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: Black Crappie

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2016	180	153 (9)	203 (112)	229 (59)							
2014	55	146 (1)	170 (28)	190 (4)	236 (1)	279 (6)	282 (9)	271 (6)			
2012	193	156 (2)	216 (71)	238 (19)	258 (100)	302 (1)					

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

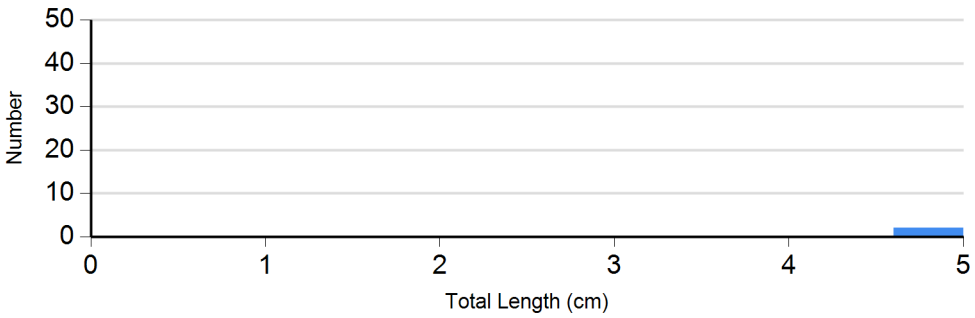
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	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

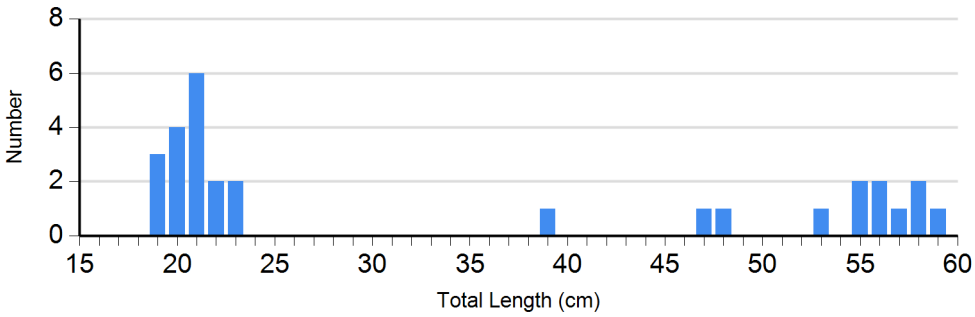
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net

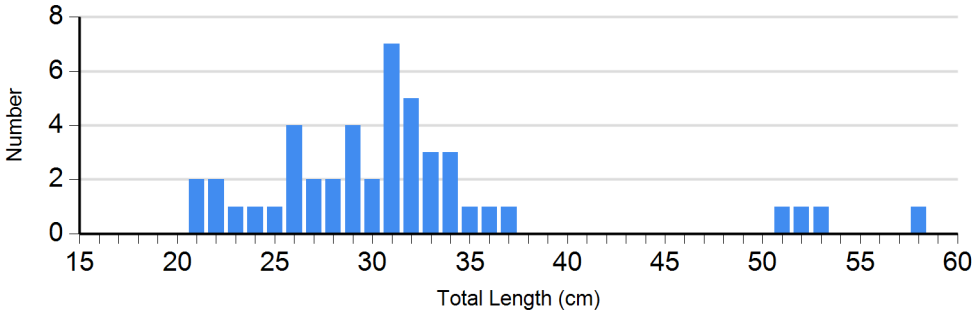


2016

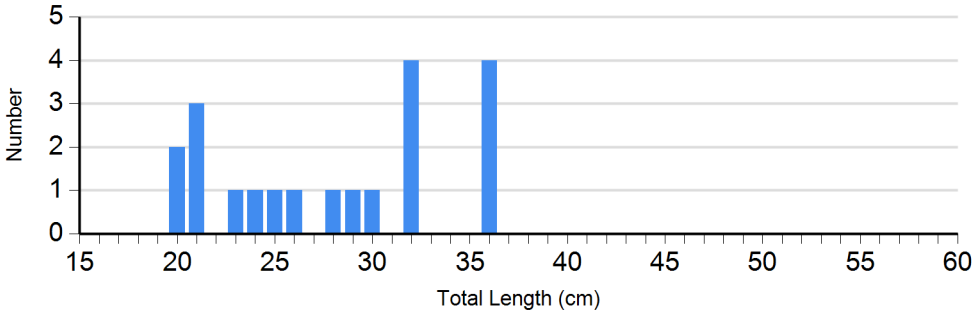
Species: Walleye
Gear: AFS std gill net



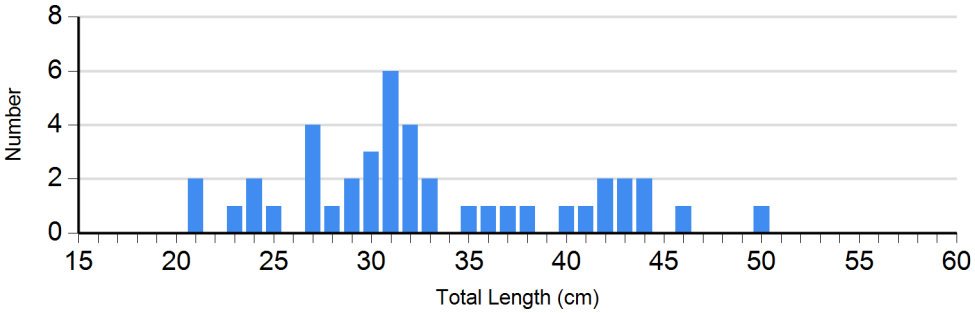
2016



2018



2019

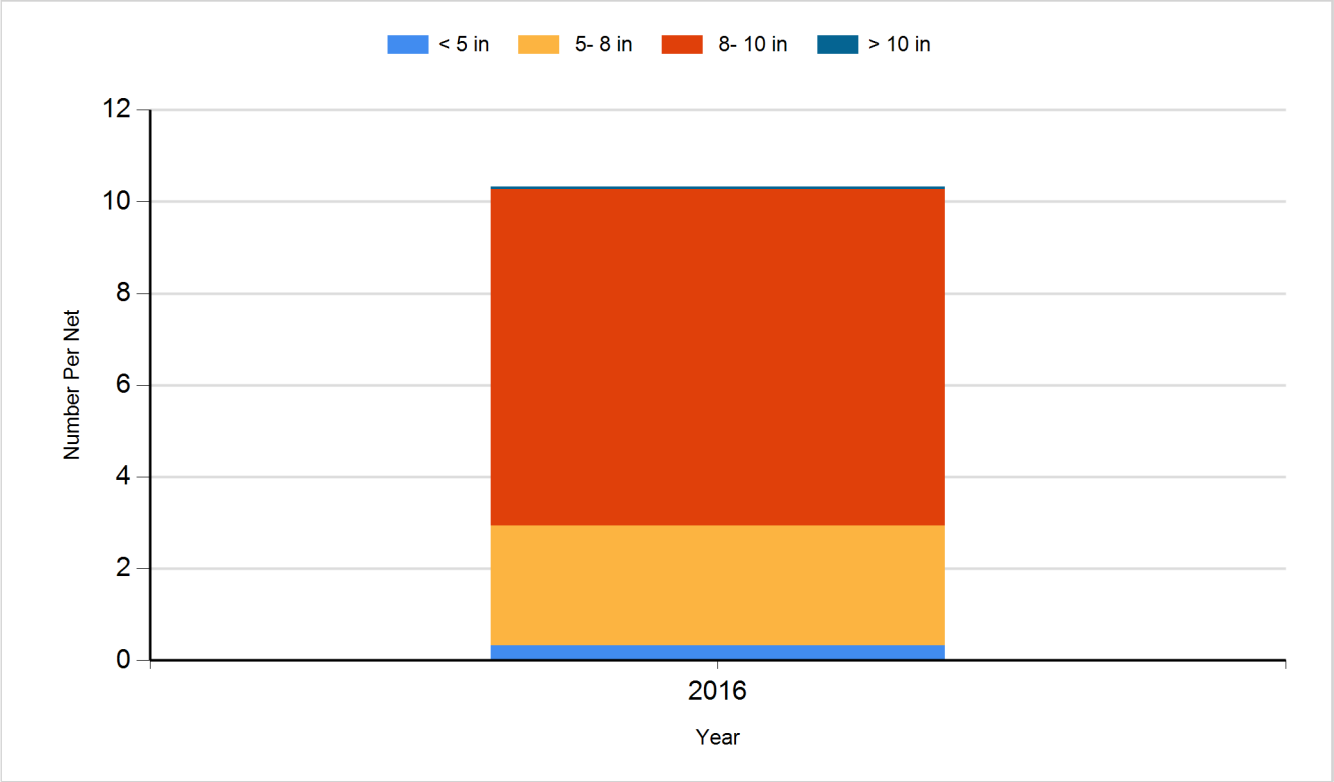


2020

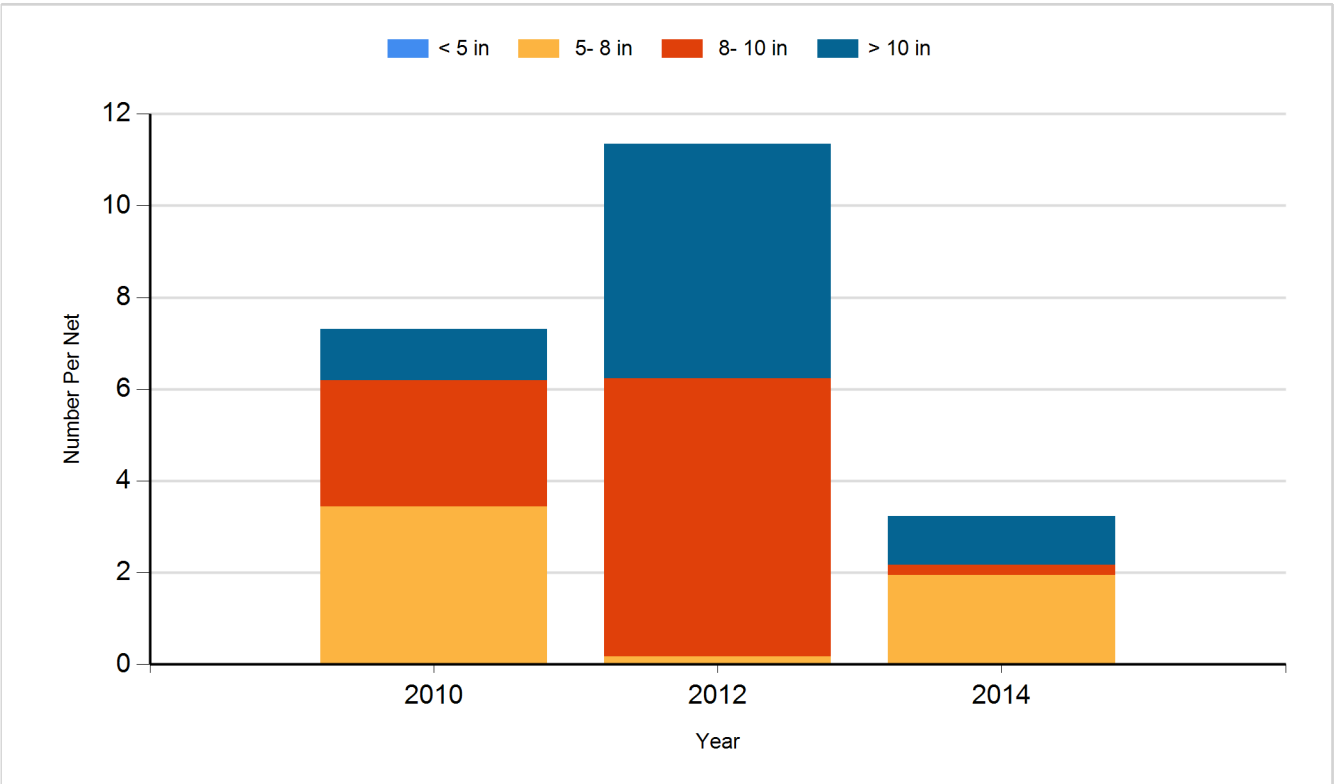
Historic Fish Sizes and Relative Abundance

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

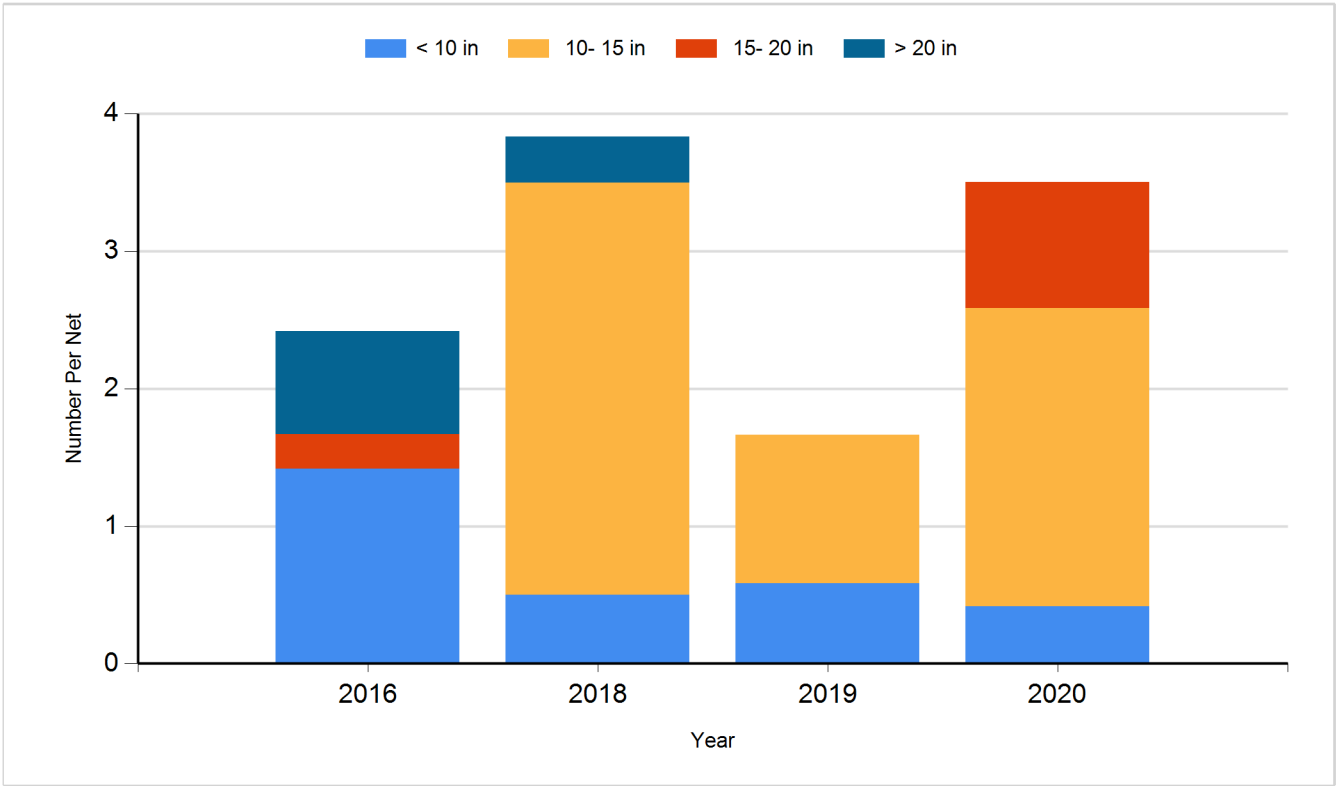
Species: Black Crappie
Gear: AFS std frame net



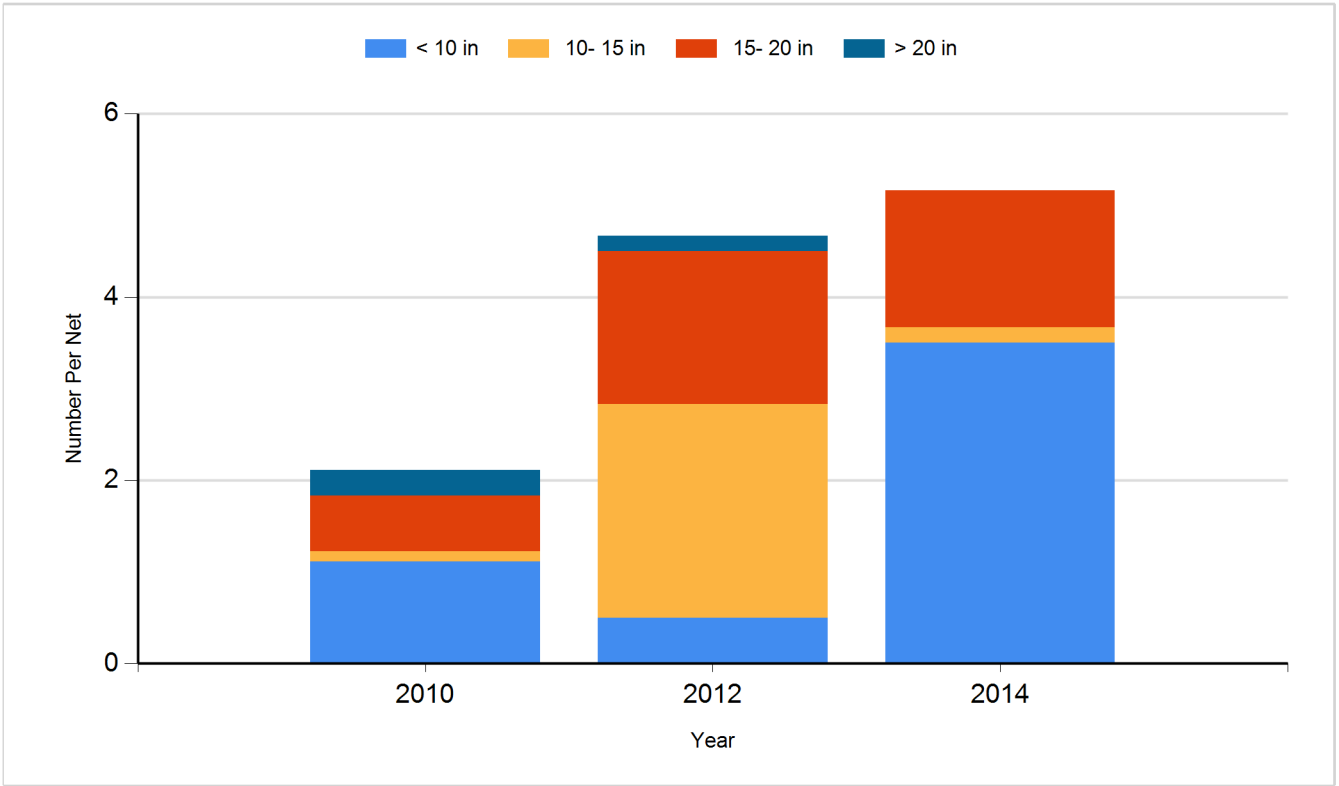
Species: Black Crappie
Gear: frame net (std 3/4 in)



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
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
2021	Saugeye	Juvenile	91,000