

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Brakke, Lyman County

MED-Lake-667-000

2019

Lake Information

Name: Brakke **Maximum Depth:** 17 Feet
County: Lyman **Mean Depth:** 5 Feet
Legal Description: T105-R76-S21
Surface Area: 115 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 24, 2019	1 net-nights
AFS std gill net	Jun 25, 2019	1 net-nights
boat shocker (night)	Oct 03, 2019	3600 seconds
fall night EF-WAE	Oct 03, 2019	3600 seconds
frame net (std 3/4 in)	Jun 24, 2019	5 net-nights
frame net (std 3/4 in)	Jun 25, 2019	5 net-nights

Common Fish Species Present

Largemouth Bass

Bluegill

Black Crappie

Walleye

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.

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

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 Crappie	12	3.5	10.8	29		0		93	9
	Northern Pike	5	2.5	4.6	40		20		81	7
	Walleye	4	2.0	0.0	25		0		87	4
	Yellow Perch	14	7.0	3.1	57	22	0		98	2
boat shocker (night)	Largemouth Bass	116	62.0	25.0	13	7	8		112	1
frame net (std 3/4 in)	Black Crappie	533	52.5	15.3	87	2	20	2	87	1
	Bluegill	293	29.3	8.8	99		51	4	105	1
	Northern Pike	4	0.4	0.2	75		25		83	8
	Walleye	18	1.8	0.7	72	18	33	18	83	4
	Yellow Perch	35	3.3	0.9	70	12	9		97	17

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
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
AFS std gill net	Black Crappie										3.5	3.50
	Northern Pike										2.5	2.50
	Walleye										2.0	2.00
	Yellow Perch										7.0	7.00
boat shocker (night)	Largemouth Bass	79.0			9.0			20.0			62.0	42.50
	Walleye	26.0			13.0			18.0			0.0	14.25
frame net (std 3/4 in)	Black Bullhead	0.0			0.1			0.0			0.0	0.03
	Black Crappie	9.7			5.7			43.4			52.5	27.83
	Bluegill	10.0			10.0			10.7			29.3	15.00
	Largemouth Bass	0.6			0.1			0.6			0.0	0.33
	Northern Pike	2.1			1.7			1.0			0.4	1.30
	Walleye	3.5			0.5			0.1			1.8	1.48
	Yellow Perch	0.3			0.3			0.8			3.3	1.18
std exp gill net	Black Crappie	4.0			0.0			227.5				77.17
	Bluegill	1.0			0.0			2.5				1.17
	Northern Pike	2.0			1.5			1.5				1.67
	Walleye	9.0			1.0			0.0				3.33
	Yellow Perch	15.5			3.0			21.0				13.17

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											
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
AFS std gill net	Black Crappie	PSD											29	
		PSD-P											0	
		Wr											93	
	Northern Pike	PSD												40
		PSD-P												20
		Wr												81
	Walleye	PSD												25
		PSD-P												0
		Wr												87
	Yellow Perch	PSD												57
		PSD-P												0
		Wr												98
boat shocker (night)	Largemouth Bass	PSD	42			89				40			13	
		PSD-P	24			67				15			8	
		Wr	118			113				110			112	
	Walleye	PSD	92			100				20				
		PSD-P	44			85				7				
		Wr	91			95				92				
frame net (std 3/4 in)	Black Crappie	PSD	57			65				35			87	
		PSD-P	20			23				1			20	
		Wr	106			99				98			87	
	Bluegill	PSD	95			99				31			99	
		PSD-P	27			69				4			51	
		Wr	114			102				140			105	
	Largemouth Bass	PSD	100			100				100				
		PSD-P	83			100				83				
		Wr	109			89				105				
	Northern Pike	PSD	81			94				90			75	
		PSD-P	33			35				30			25	
		Wr	94			86				87			83	
	Walleye	PSD	100			100				100			72	
		PSD-P	43			100				100			33	

Gear	Species	Index	Year									
			2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
frame net (std 3/4 in)	Walleye	Wr	87			85			68			83
	Yellow Perch	PSD	0			33			0			70
		PSD-P	0			0			0			9
		Wr	106			80			100			97
std exp gill net	Black Crappie	PSD	0			0			35			
		PSD-P	0			0			2			
		Wr	117									
	Bluegill	PSD	0						0			
		PSD-P	0						0			
		Wr	112						177			
	Northern Pike	PSD	100			100			100			
		PSD-P	25			0			33			
		Wr	87			87			100			
	Walleye	PSD	67			100						
		PSD-P	17			100						
		Wr	90			85						
	Yellow Perch	PSD	3			17			2			
		PSD-P	0			0			0			
		Wr	93			90			100			

Back-Calculated Lengths

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

Species: Black Crappie

Year Class	Age	N	Mean back-calculated length (SE) at age																	
			1	2	3	4	5	6	7	8	9	10								
2018	1	2	88 (2.3)																	
2017	2	7	81 (3.1)	132 (3.1)																
2016	3	10	70 (2.2)	143 (5.8)	180 (5.9)															
2015	4	16	75 (1.5)	139 (2.8)	180 (3.6)	213 (3.1)														
2014	5	6	76 (2.9)	136 (5.6)	188 (7.3)	222 (10.5)	245 (10)													
2013	6	7	85 (3.6)	145 (9.2)	185 (11)	216 (5.9)	237 (6.3)	251 (4.9)												
Weighted Mean		48	77	139	182	216	241	251												
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20								
2018	1	2																		
2017	2	7																		
2016	3	10																		
2015	4	16																		
2014	5	6																		
2013	6	7																		
Weighted Mean		48																		

Species: Bluegill

Year Class	Age	N	Mean back-calculated length (SE) at age											
			1	2	3	4	5	6	7	8	9	10		
2017	2	11	60 (1.1)	138 (2.8)										
2016	3	18	51 (1.5)	108 (2.5)	176 (3)									
2015	4	3	56 (2.3)	117 (5.1)	171 (5.4)	195 (2.5)								
2014	5	5	55 (5.8)	111 (8.1)	156 (4.3)	188 (4.6)	210 (3.7)							
2013	6	8	48 (1.8)	93 (2.3)	142 (3)	177 (2.3)	203 (1.8)	219 (2.1)						
Weighted Mean		45	53	114	165	184	206	219						

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	2	11										
2016	3	18										
2015	4	3										
2014	5	5										
2013	6	8										
Weighted Mean		45										

Species: Largemouth Bass

Year Class	Age	Mean back-calculated length (SE) at age												
		N	1	2	3	4	5	6	7	8	9	10		
2019	0	10												
2018	1	25	102 (2.9)											
2017	2	9	96 (4.9)	179 (7.9)										
2016	3	4	77 (6.5)	197 (28.7)	264 (17)									
2015	4	3	90 (7.9)	188 (18.6)	283 (24.7)	341 (20.5)								
2014	5	1	89	212	312	378	419							
2013	6	1	107	254	341	428	449	469						
Weighted Mean		53	97	191	284	366	434	469						
Year Class	Age	N	11	12	13	14	15	16	17	18	19	20		
2019	0	10												
2018	1	25												
2017	2	9												
2016	3	4												
2015	4	3												
2014	5	1												
2013	6	1												
Weighted Mean		53												

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+
2019	533	110 (8)	151 (42)	205 (83)	232 (253)	247 (69)	258 (78)				
2016	437	110 (3)	162 (234)	202 (169)		236 (27)	254 (4)				
2013	101		123 (55)	192 (11)	237 (22)	271 (12)	265 (1)				
2010	98	116 (1)	154 (39)	212 (39)	254 (6)	274 (10)	294 (3)				

Species: Bluegill

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	293		163 (43)	191 (120)	206 (11)	226 (47)	230 (73)				
2016	106	86 (62)	128 (12)	176 (30)		226 (1)		257 (1)			
2013	100			178 (22)	204 (41)	213 (4)	222 (18)	234 (6)	232 (5)	224 (4)	
2010	101		146 (7)	180 (41)	193 (33)	210 (14)	171 (4)			262 (1)	255 (1)

Species: Largemouth Bass

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	78	206 (59)	242 (10)	302 (4)	373 (3)	431 (1)	482 (1)				
2016	18	236 (1)	262 (9)	307 (5)		430 (3)					
2013	10	154 (1)	279 (1)	369 (3)	420 (2)	475 (1)	464 (2)				
2010	87	191 (14)	252 (32)	312 (21)	384 (6)	410 (2)	369 (2)	437 (3)	466 (3)	432 (3)	493 (1)

Species: Walleye

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2013	2							562 (1)			562 (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+
2013	6		154 (5)				242 (1)				

Mean Length (expanded sample number) at capture by age

Year	N	1	2	3	4	5	6	7	8	9	10+
2010	55	106 (4)	130 (47)	166 (2)	190 (1)			237 (1)			

Fish Condition

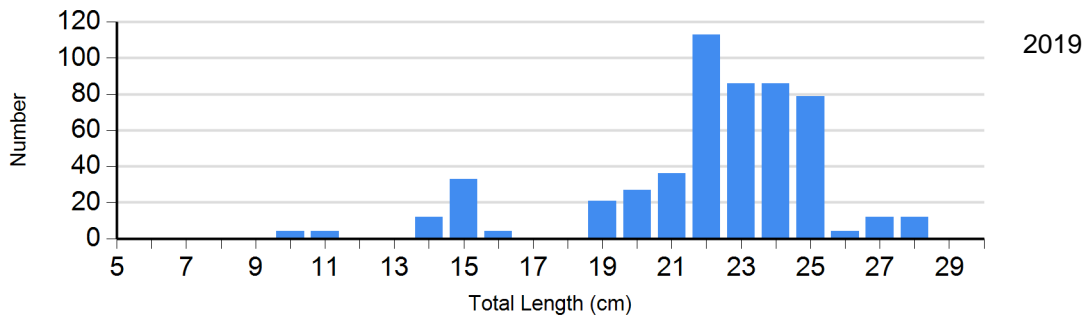
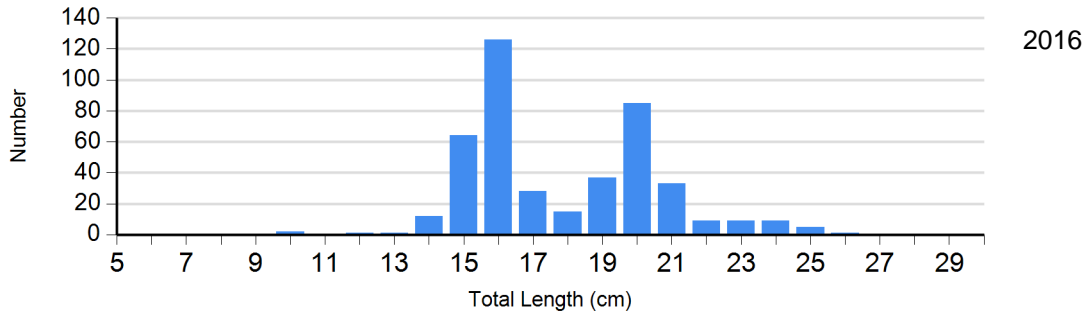
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2016	283	100 (0.8)	145	94 (0.8)	6	87 (7.7)	0	
	2019	70	99 (1.5)	348	86 (0.6)	107	81 (1.4)	0	
Bluegill Frame Net	2016	74	157 (6.2)	29	104 (1.6)	3	94 (3.2)	1	99
	2019	2	111	143	108 (1.1)	148	102 (1.1)	0	
Largemouth Bass Electro Fishing	2016	12	113 (2.4)	5	107 (2.0)	3	100 (7.3)	0	
	2019	54	111 (0.9)	3	114 (2.7)	5	119 (3.1)	0	
Northern Pike Gill Net	2016	0		2	104 (16.4)	1	94	0	
	2019	3	86 (3.1)	1	87	1	61	0	
Walleye Gill Net	2019	3	86 (3.4)	1	91	0		0	
Yellow Perch Gill Net	2016	41	101 (2.1)	1	84	0		0	
	2019	6	98 (1.1)	8	97 (1.9)	0		0	

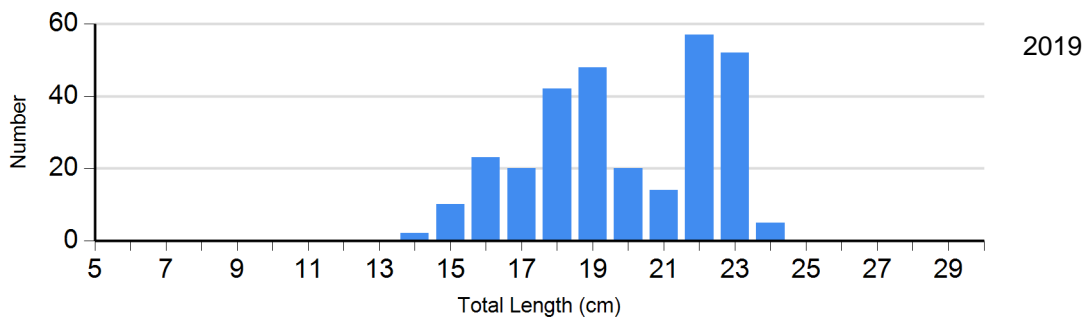
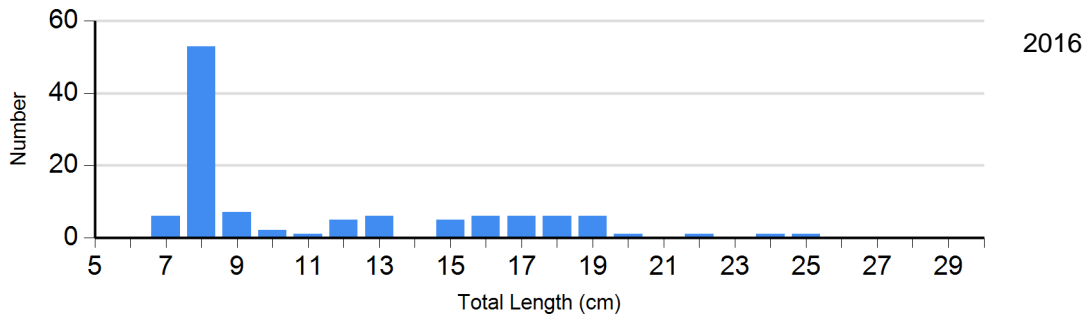
Length Frequency Distribution

Length frequency histogram of species sampled by year.

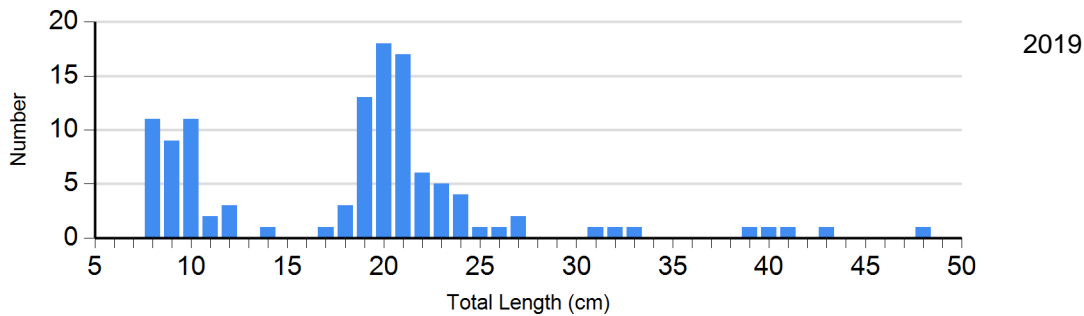
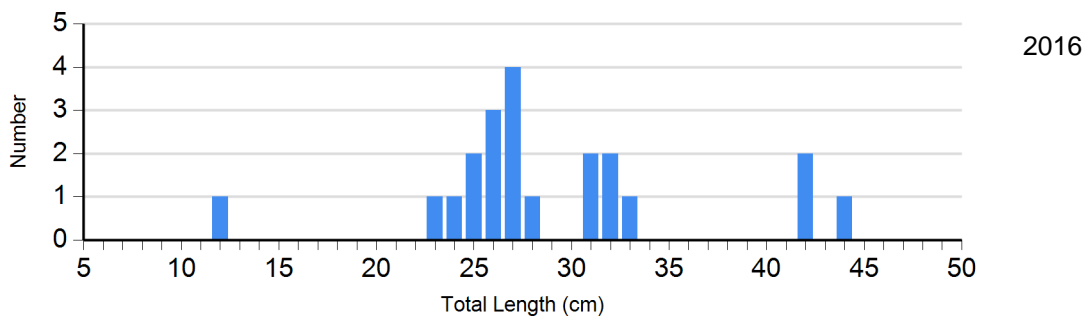
Species: Black Crappie
Gear: frame net (std 3/4 in)



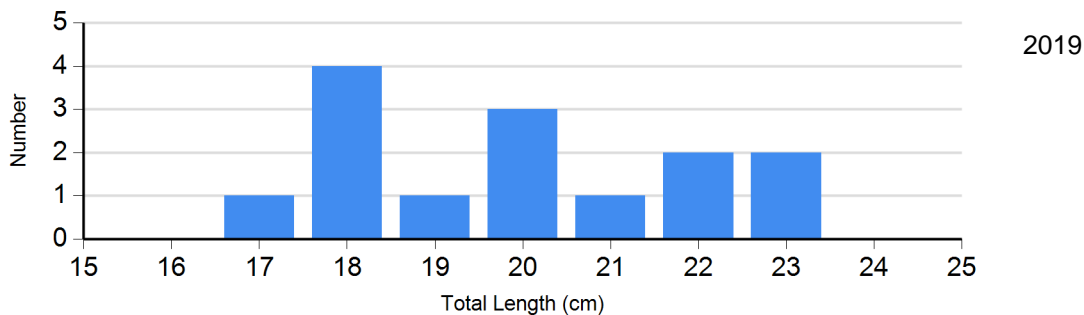
Species: Bluegill
Gear: frame net (std 3/4 in)



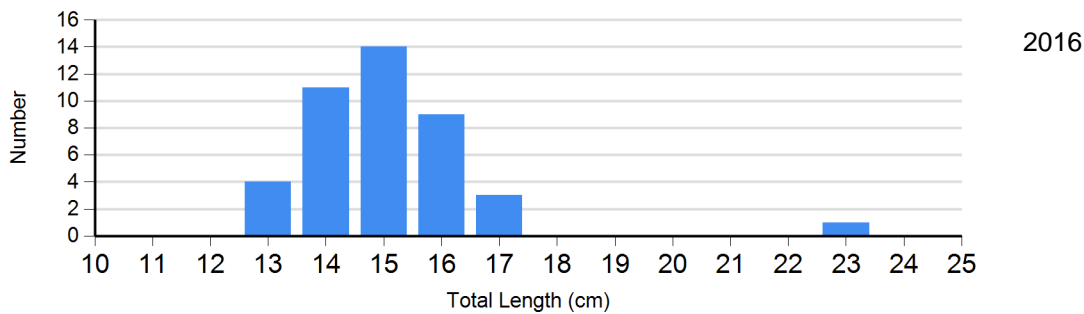
Species: Largemouth Bass
 Gear: boat shocker (night)



Species: Yellow Perch
 Gear: AFS std gill net



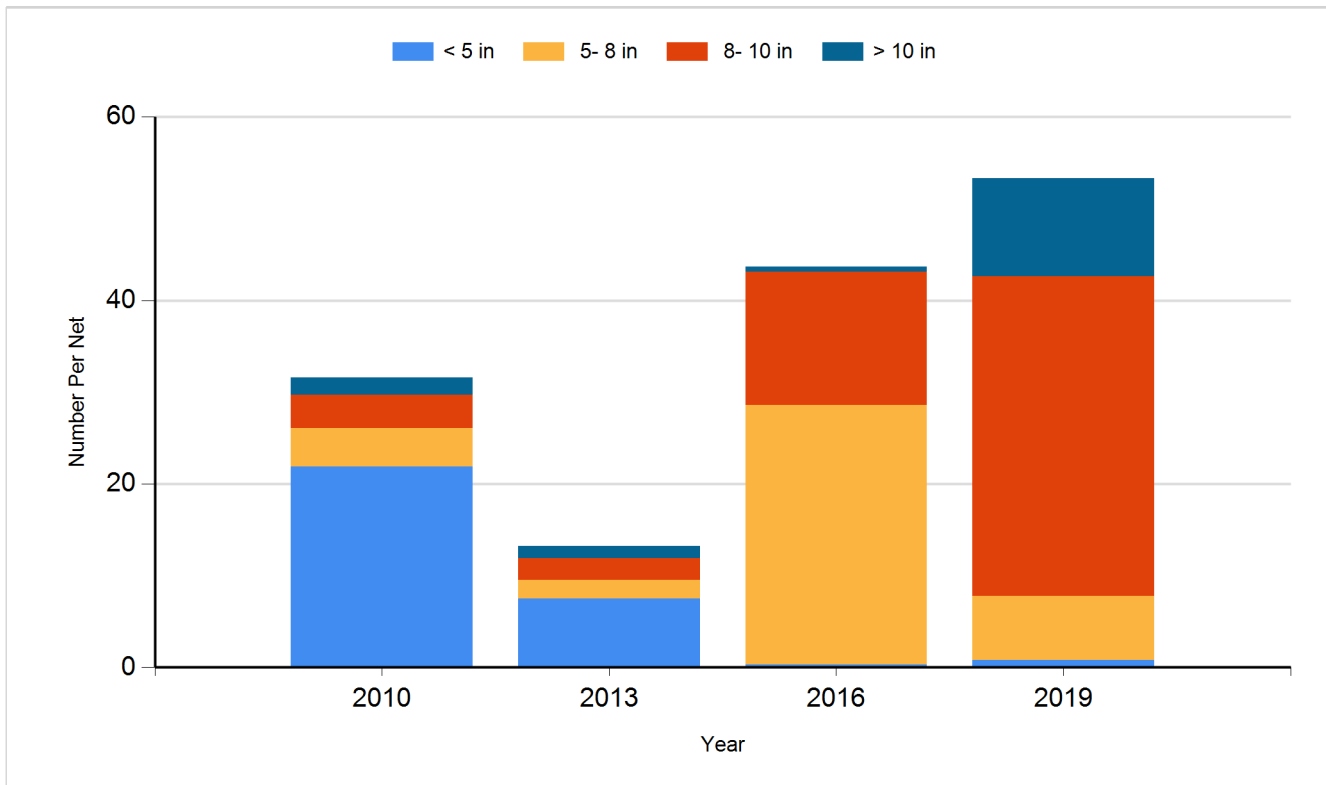
Species: Yellow Perch
 Gear: std exp gill net



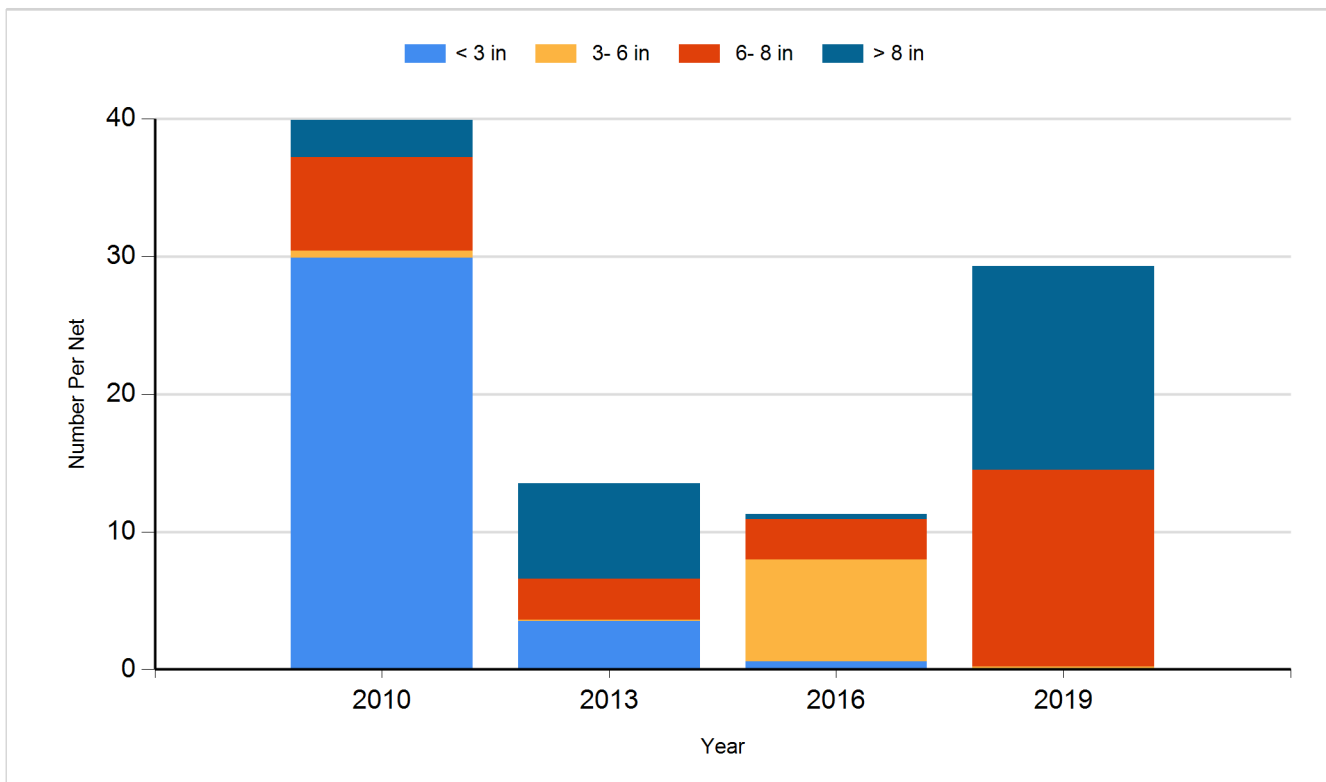
Historic Fish Sizes and Relative Abundance

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

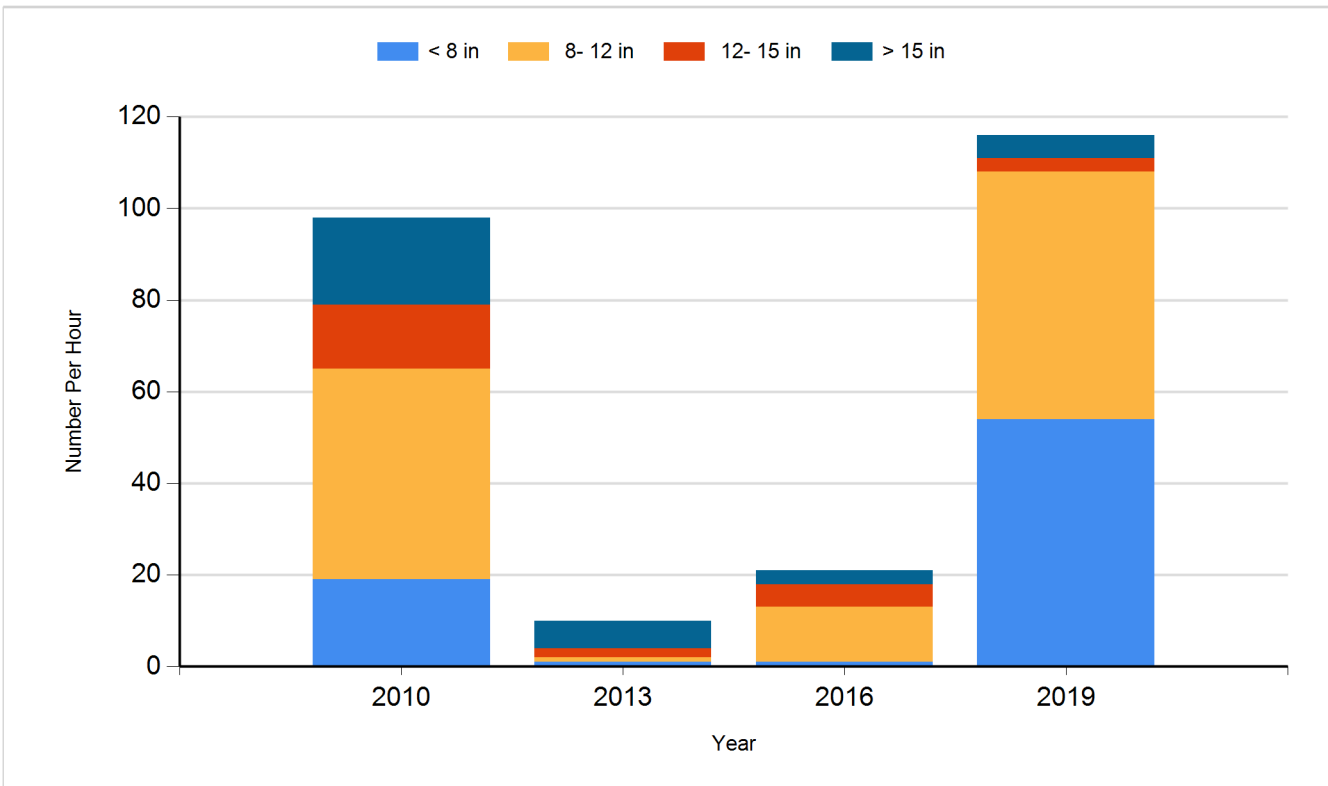
Species: Black Crappie
Gear: frame net (std 3/4 in)



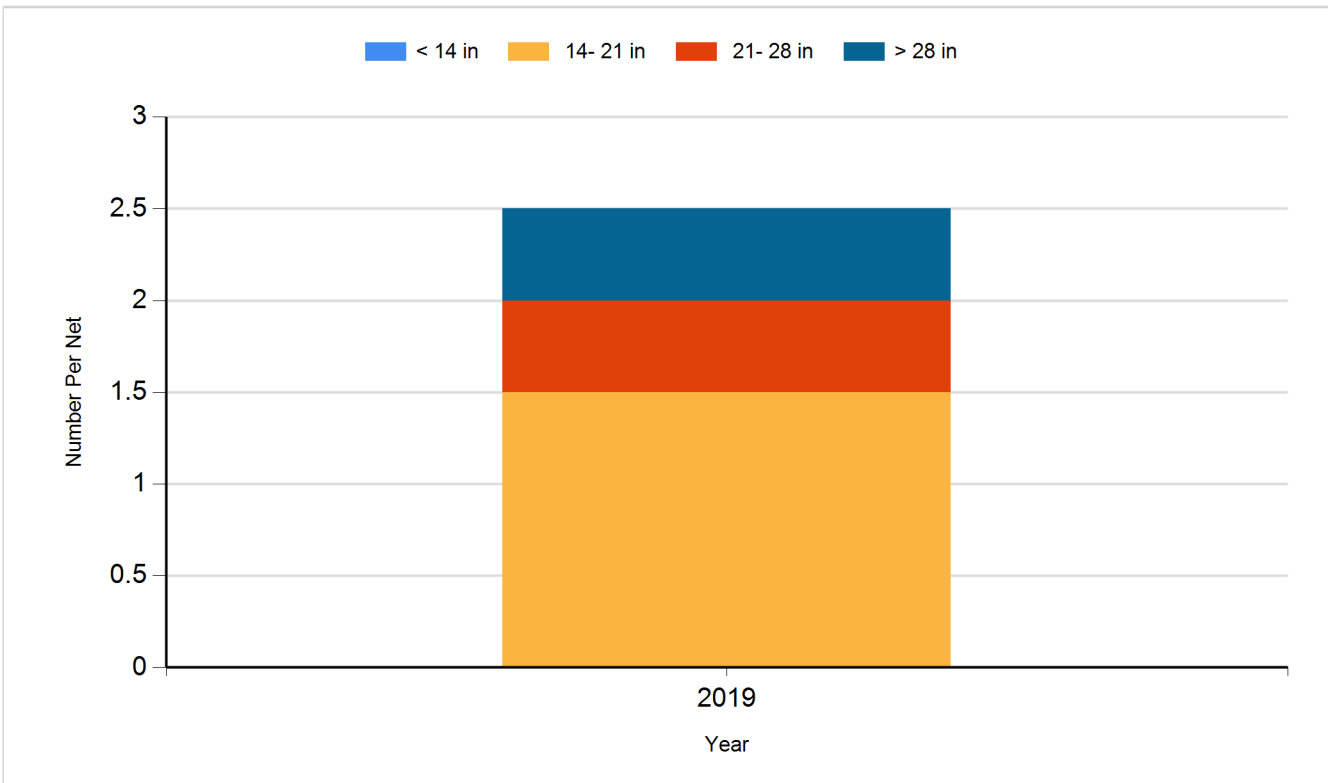
Species: Bluegill
Gear: frame net (std 3/4 in)



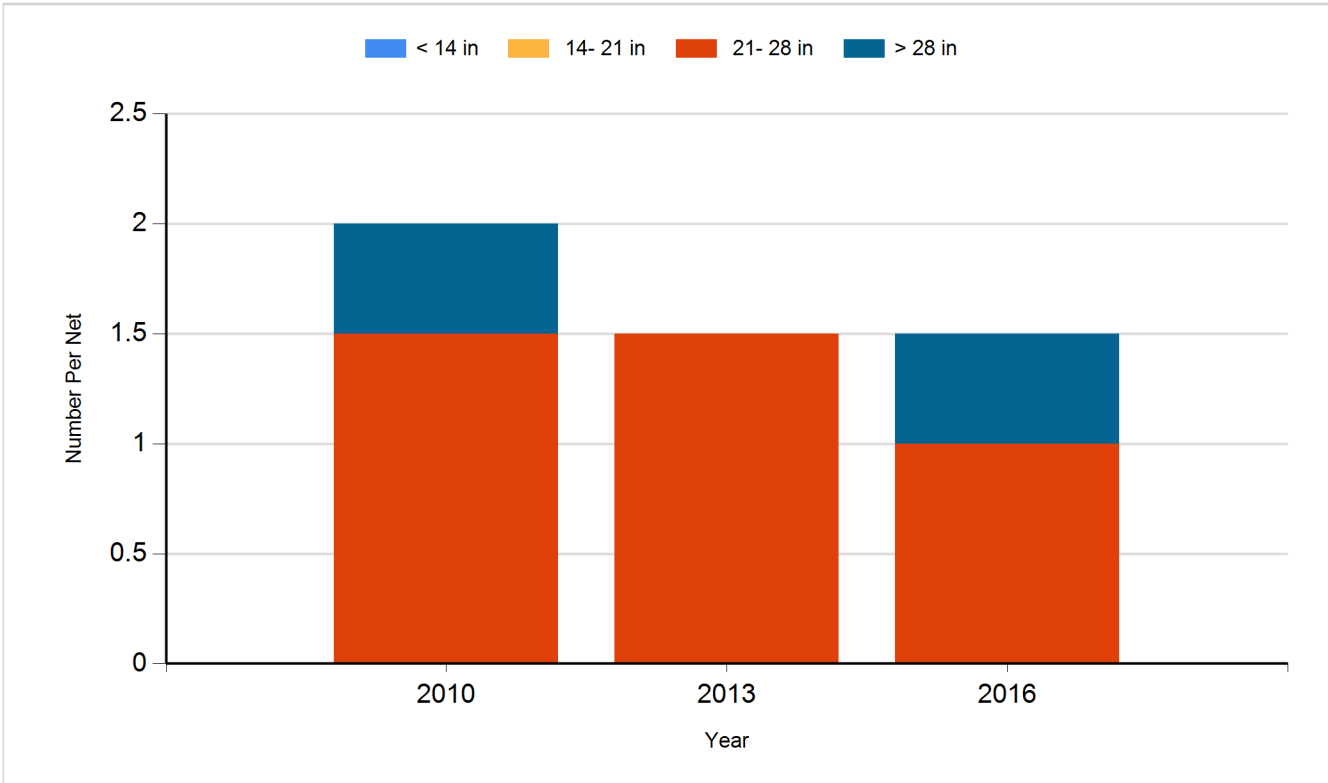
Species: Largemouth Bass
Gear: boat shocker (night)



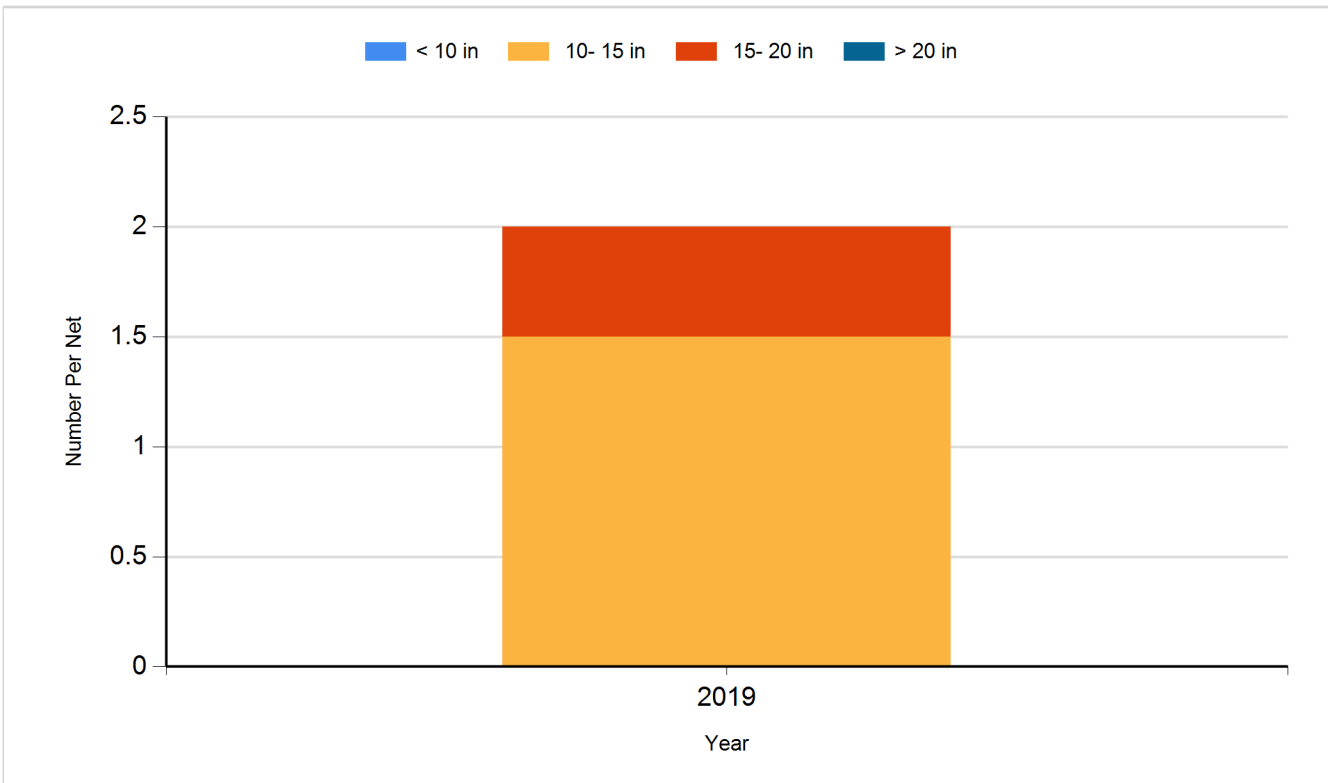
Species: Northern Pike
Gear: AFS std gill net



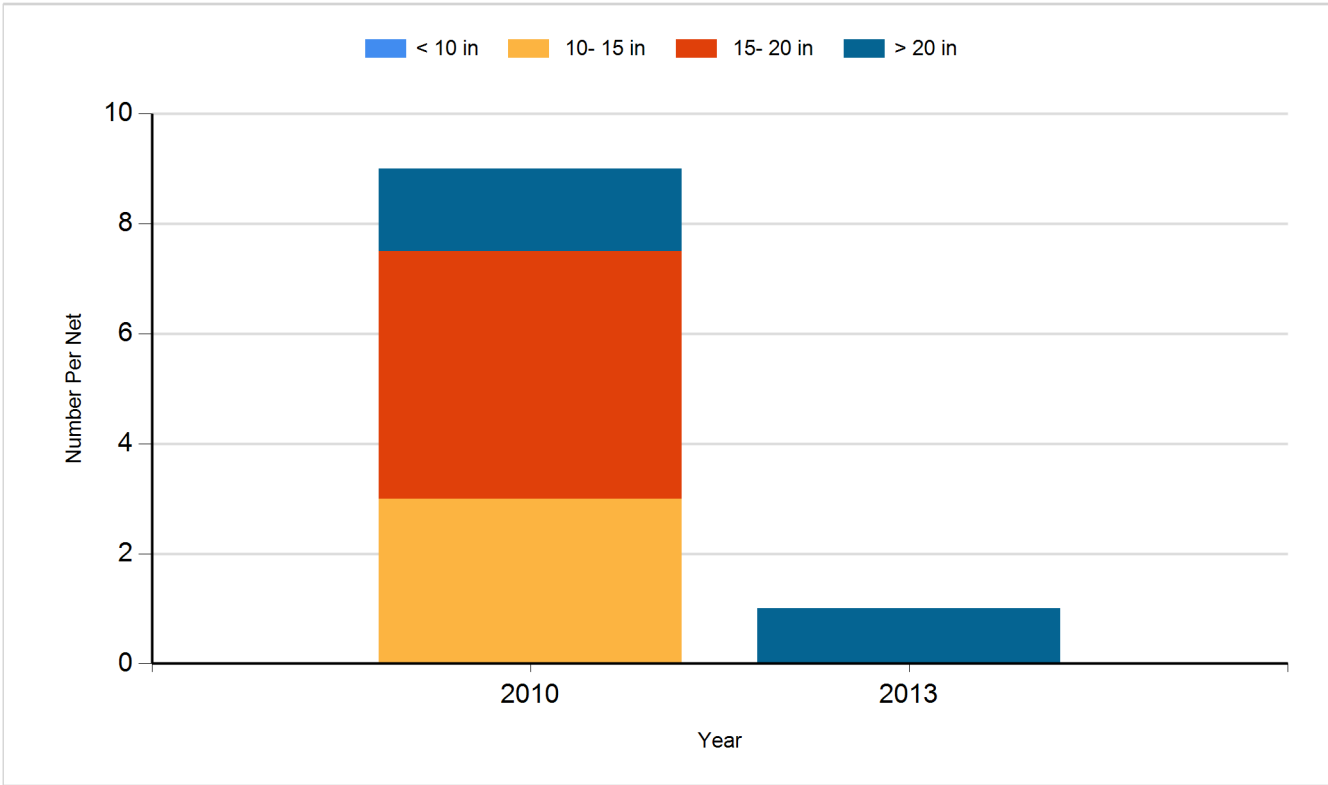
Species: Northern Pike
Gear: std exp gill net



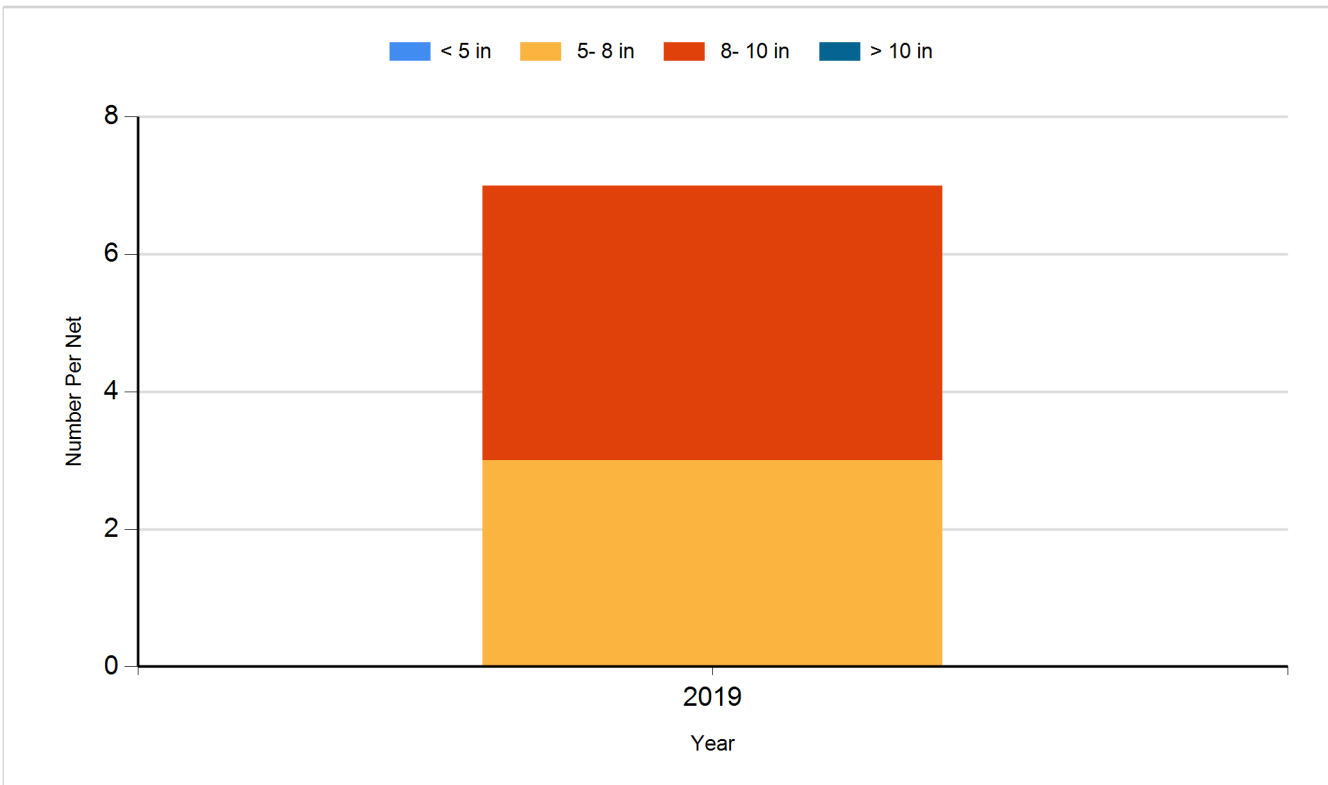
Species: Walleye
Gear: AFS std gill net



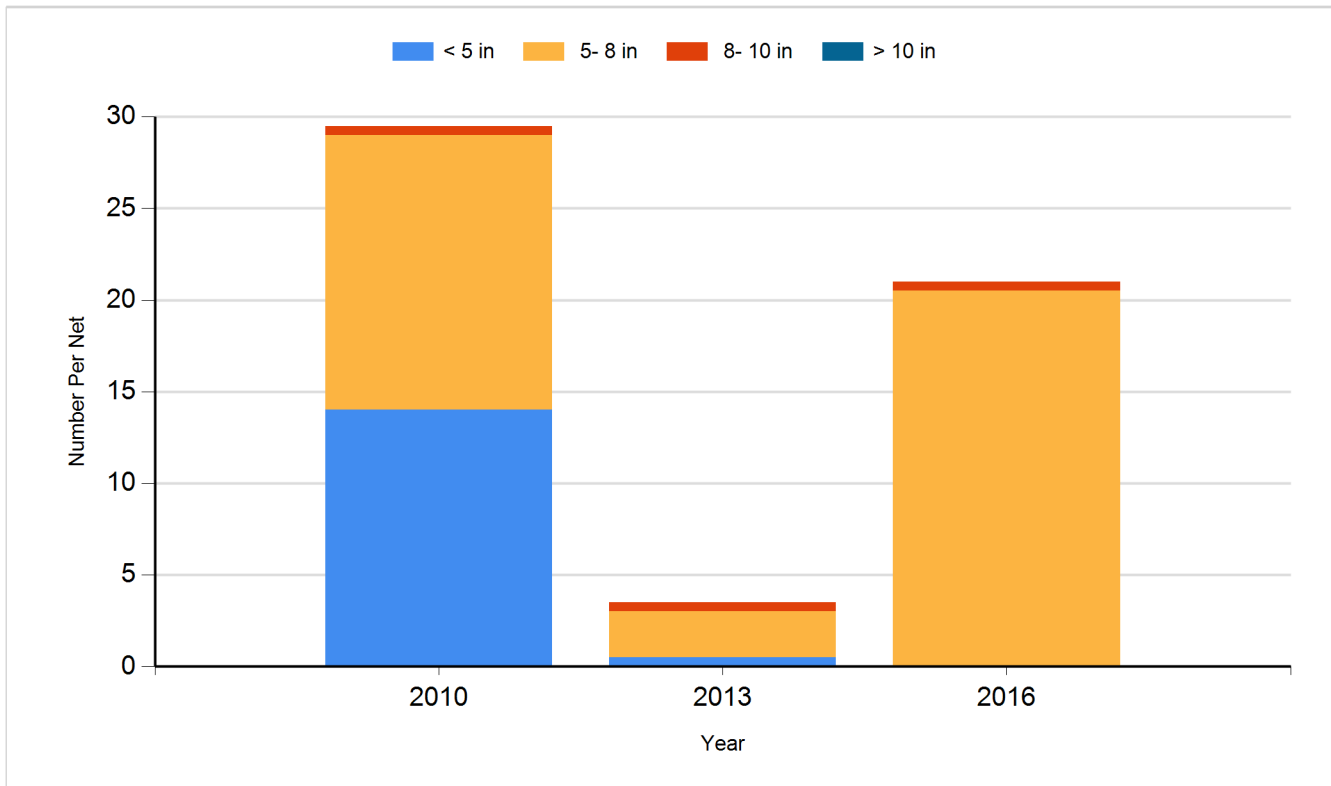
Species: Walleye
Gear: std exp gill net



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
2008	Walleye	Large Fingerling	1,170
2010	Walleye	Small Fingerling	13,000
2013	Walleye	Large Fingerling	3,089
2015	Walleye	Large Fingerling	864
2017	Walleye	Large Fingerling	2,720
2019	Walleye	Small Fingerling	9,185