Cottonwood Lake Survey Summary

Cottonwood Lake is one of the few natural lakes found in north-central South Dakota. Cottonwood Lake is located approximately eight and a half miles east of Agar, South Dakota and is approximately 574 acres in size. The watershed for Cottonwood Lake is large, encompassing an estimated 47,000 acres, thus water levels dramatically change over time. Trying to keep a solid fishery is difficult due to changing water levels.

South Dakota Game, Fish and Parks owns a large Game Production Area on the north and west side of the lake. A concrete boat ramp and dock, out-house, and shore fishing surrounds the north and west side of the lake. Ice fishing opportunities exists throughout the lake.

Cottonwood Lake was sample by frame nets, gill nets and electrofishing in 2019. Walleye, Black Crappie, Yellow Perch, Black Bullhead, and Common Carp were collected during these surveys.

- **Walleye:** The population has either flourished or has struggled for Cottonwood Lake. The current Walleye population is low in abundance. The years of 2011 and 2013 the population was strong and could repeat in the future if conditions are right again. Very poor recruitment of natural and stocked (2015 and 2017 stockings) walleye has occurred into the population since the 2009-2010 stockings. This is likely due to low water levels within the lake. Continued Walleye stockings are planned in the future years.

- **Black Crappie:** The Black Crappie population is doing well with a good portion of the population above 10 inches in length (frame net catch of 6.9 fish/net). Growth rates is good with fish approaching 10 inches at age-5. A few smaller fish were sampled indicating natural production occurring. Black Crappie populations tend to cycle up and down naturally.

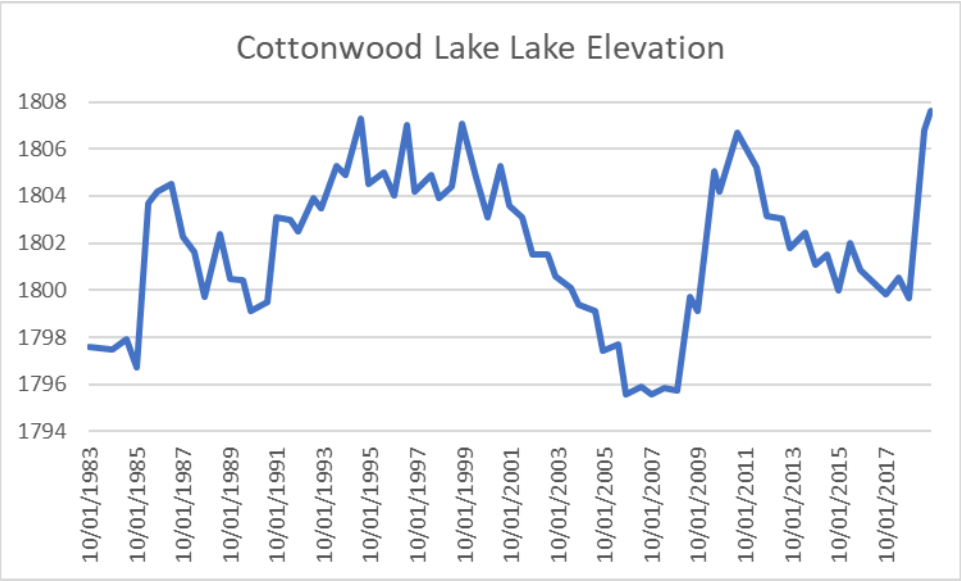
- **Yellow Perch:** The Yellow Perch population is currently low in abundance as indicated by a catch of 2.3/fish per net. Yellow Perch abundance has always remained low for Cottonwood Lake possibly due to water levels fluctuating at a poor time of the year and lack of flooded vegetation. A range of sizes and ages of fish were collected during survey.

- **Black Bullhead:** The Black Bullhead population is currently in fair abundance with sizes attractive to anglers. A portion of the population exceeding 12 inches.

- **Other Species:** A few Smallmouth Bass were collected by frame nets. A fall electrofish survey was completed to sample Smallmouth Bass but none was found. The intention of the Smallmouth Bass stocking is to help aid in controlling the Common Carp population and provide an additional species for anglers to catch. Common Carp are abundant within the Cottonwood Lake watershed.

For more detailed results see the computer-generated South Dakota Statewide Fisheries Survey for Cottonwood Lake below. Please contact South Dakota Game, Fish and Parks Ft. Pierre office – (605) 223-7700 for additional information.

Prepared 02-18-2020 by KDP



Data courtesy of SD DENR- Surface Water

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Cottonwood, Sully County
LLO-Lake-2428-000
2019

Lake Information

Name:	Cottonwood	**Maximum Depth:**	18 Feet
County:	Sully	**Mean Depth:**	9 Feet
Legal Description:	T116-R75-S20	**OHWM Elevation:**	1,804
Surface Area:	574 Acres	**Outlet Elevation:**	1,804

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	May 29, 2019	4 net-nights
AFS std gill net	May 30, 2019	4 net-nights
boat shocker (day)	Sep 05, 2019	3600 seconds
frame net (std 3/4 in)	May 29, 2019	6 net-nights
frame net (std 3/4 in)	May 30, 2019	6 net-nights

Common Fish Species Present

Walleye

Black Crappie

Black Bullhead

Common Carp

Yellow Perch

Smallmouth Bass

White Sucker

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	Black Bullhead	11	1.4	0.5	45		27		104	7
	Common Carp	27	3.4	1.7	100		52	15	91	2
	Walleye	4	0.3	0.2	0		0		95	15
	Yellow Perch	18	2.3	0.6	78		39	19	109	11
frame net (std 3/4 in)	Black Bullhead	222	18.3	5.9	21	4	8	3	95	1
	Black Crappie	83	6.9	3.7	100		23	7	103	2
	Common Carp	27	2.3	0.6	100		67	14	87	2
	Smallmouth Bass	3	0.3	0.2	67		0		96	7
	Walleye	2	0.2	0.2	100		50		94	7
	White Sucker	1	0.1	0.1	100		100		85	

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	Black Bullhead								8.0			8.00
	Black Crappie								59.8			59.80
	Common Carp								0.3			0.30
	Northern Pike								0.1			0.10
	Smallmouth Bass								0.9			0.90
	Walleye								1.6			1.60
	White Crappie								0.2			0.20
AFS std gill net	Black Bullhead								5.6		1.4	3.50
	Black Crappie								2.5		0.0	1.25
	Common Carp								16.4		3.4	9.90
	Walleye								1.1		0.3	0.70
	Yellow Perch								1.9		2.3	2.10
frame net (std 3/4 in)	Black Bullhead	3.7	4.8		8.7						18.3	8.88
	Black Crappie	0.1	0.3		5.5						6.9	3.20
	Common Carp	0.0	0.8		4.1						2.3	1.80
	Northern Pike	0.0	0.0		1.5						0.0	0.38
	Smallmouth Bass	0.0	0.0		0.9						0.3	0.30
	Walleye	0.2	7.9		8.5						0.2	4.20
	White Sucker	0.0	0.0		0.2						0.1	0.08
	Yellow Perch	2.0	8.2		2.5						0.0	3.18
std exp gill net	Black Bullhead	0.0	8.0		11.3							6.43
	Common Carp	0.5	0.3		16.5							5.77
	Northern Pike	0.0	0.0		2.0							0.67
	Walleye	0.0	29.0		7.8							12.27
	Yellow Perch	8.5	6.0		7.8							7.43

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	Black Bullhead	PSD								100		
		PSD-P								2		
		Wr								84		
	Black Crappie	PSD								91		
		PSD-P								10		
		Wr								102		
	Common Carp	PSD								100		
		PSD-P								75		
		Wr								91		
	Northern Pike	PSD								100		
		PSD-P								100		
		Wr								80		
	Smallmouth Bass	PSD								0		
		PSD-P								0		
		Wr								84		
	Walleye	PSD								89		
		PSD-P								11		
		Wr								64		
	White Crappie	PSD								50		
		PSD-P								50		
		Wr								86		
AFS std gill net	Black Bullhead	PSD								100		45
		PSD-P								16		27
		Wr								84		104
	Black Crappie	PSD								75		
		PSD-P								0		
		Wr								95		
	Common Carp	PSD								96		100
		PSD-P								19		52
		Wr								91		91
	Walleye	PSD								100		0
		PSD-P								11		0
		Wr								78		95

	Yellow Perch	PSD					93	78
		PSD-P					47	39
		Wr					91	109
frame net (std 3/4 in)	Black Bullhead	PSD	5	49	15			21
		PSD-P	0	0	2			8
		Wr	99	89	84			95
	Black Crappie	PSD	100	33	45			100
		PSD-P	100	0	14			23
		Wr	93	114	109			103
	Common Carp	PSD	0	60	35			100
		PSD-P	0	10	4			67
		Wr		92	92			87
	Northern Pike	PSD			83			
		PSD-P			6			
		Wr			84			
	Smallmouth Bass	PSD			18			67
		PSD-P			0			0
		Wr			88			96
	Walleye	PSD	100	35	28			100
		PSD-P	0	0	0			50
		Wr	87	91	71			94
	White Sucker	PSD			100			100
		PSD-P			100			100
		Wr			98			85
	Yellow Perch	PSD	8	23	100			
		PSD-P	0	11	20			
		Wr	105	94	93			
std exp gill net	Black Bullhead	PSD		25	2			
		PSD-P		0	0			
		Wr		92	91			
	Common Carp	PSD	0	100	9			
		PSD-P	0	0	2			
		Wr	110	107	94			
	Northern Pike	PSD			88			
		PSD-P			0			
		Wr			84			
	Walleye	PSD	0	26	45			
		PSD-P	0	0	0			
		Wr		90	75			

Yellow Perch	PSD	9	6	94
	PSD-P	0	0	6
	Wr	110	101	93

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
2016	3	1	88	161	212							
2015	4	8	86 (4)	171 (4.3)	208 (5.2)	227 (5.8)						
2014	5	26	86 (2.1)	171 (2.2)	213 (2.3)	234 (2.5)	247 (2.7)					
2013	6	2	67 (5.3)	160 (8.1)	206 (2.2)	229 (8.1)	241 (9.7)	247 (10.8)				
Weighted Mean		37	85	170	212	232	247	247				

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	83			216 (2)	225 (17)	244 (60)	245 (4)				
2017	707		199 (56)	216 (513)	230 (88)	275 (34)	314 (6)	321 (11)			
2013	132		178 (53)	195 (35)	244 (24)	252 (16)	256 (5)				

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	3	229 (1)	218 (1)	314 (1)							
2017	2							496 (2)			
2013	66		312 (38)	399 (10)	448 (18)						
2011	204	249 (62)	373 (142)								
2010	144	201 (144)									

Species: White Crappie

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2017	2		184 (1)			310 (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	18	167 (3)	221 (7)	238 (4)	273 (3)		273 (1)				
2013	62		185 (4)	238 (56)		291 (2)					
2011	36	152 (32)		194 (2)	226 (2)						
2010	78	129 (24)	151 (4)	179 (50)							

Fish Condition

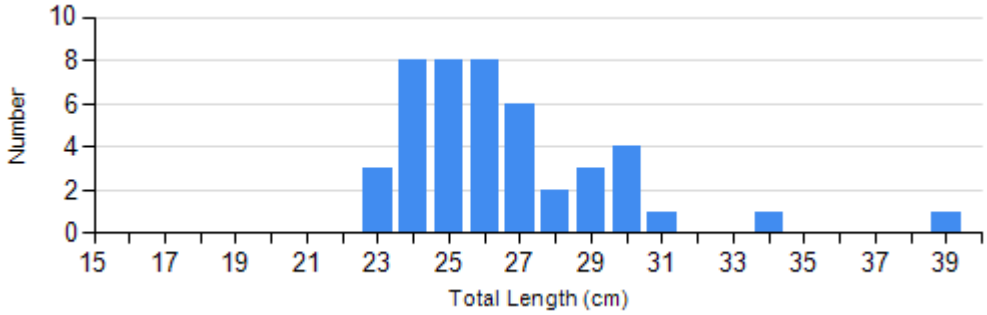
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Bullhead Gill Net	2017	0		38	87 (1.2)	6	79 (3.4)	1	38
	2019	6	107 (9.0)	2	114 (3.5)	3	92 (9.6)	0	
Black Crappie Frame Net	2017	62	106 (4.3)	587	104 (1.0)	47	90 (1.9)	22	95 (6.8)
	2019	0		64	104 (1.4)	19	100 (3.4)	0	
Common Carp Gill Net	2017	5	109 (15.0)	101	91 (0.6)	24	88 (1.3)	1	
	2019	0		13	91 (1.8)	14	90 (1.9)	0	
Walleye Gill Net	2017	0		8	78 (0.2)	1		0	
	2019	2	95 (11.8)	0		0		0	
White Crappie Frame Net	2017	1	86	0		0		1	86
Yellow Perch Gill Net	2017	1	94	7	92 (0.8)	7	89 (1.6)	0	
	2019	4	162 (25.9)	7	96 (4.3)	7	92 (2.2)	0	

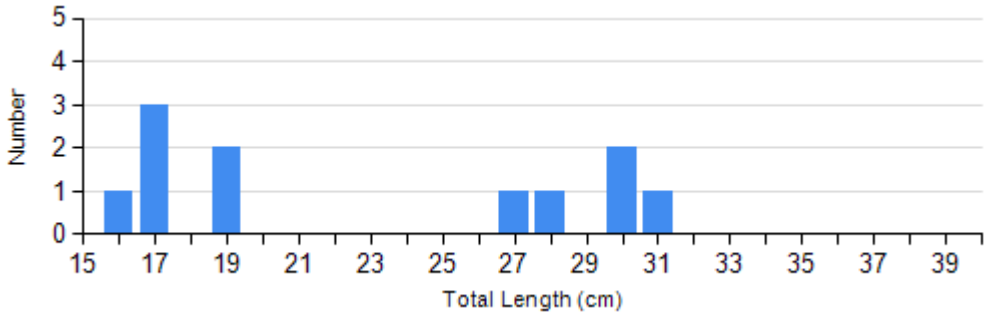
Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Bullhead
Gear: AFS std gill net

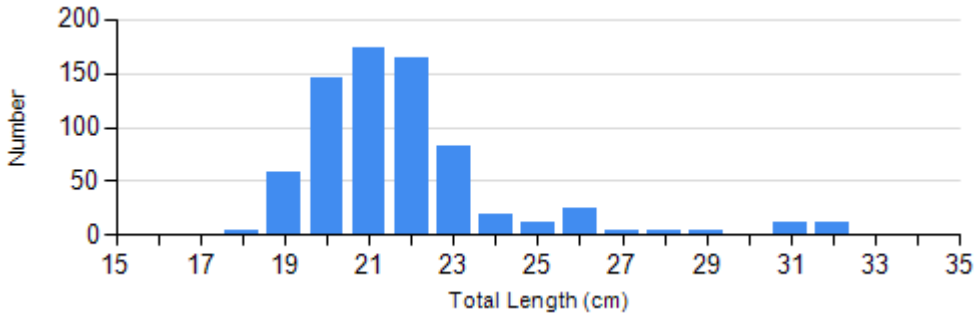


2017



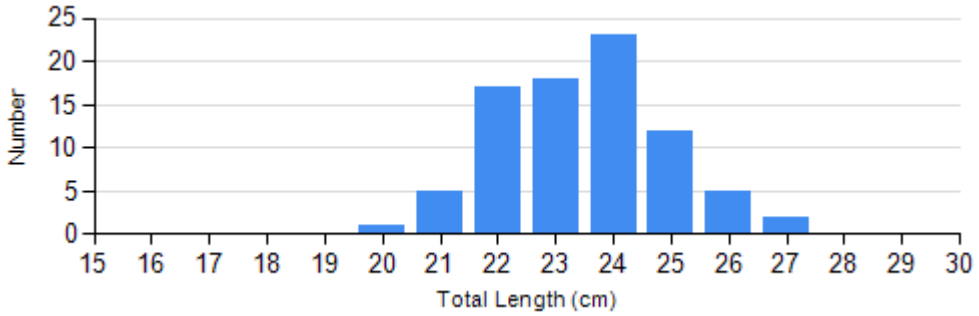
2019

Species: Black Crappie
Gear: AFS std frame net



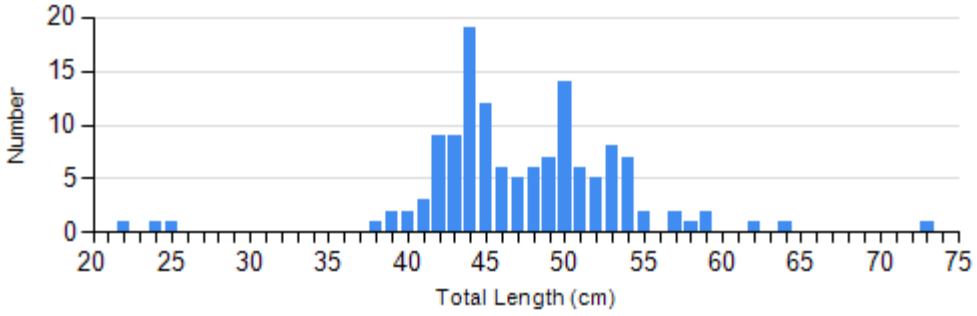
2017

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

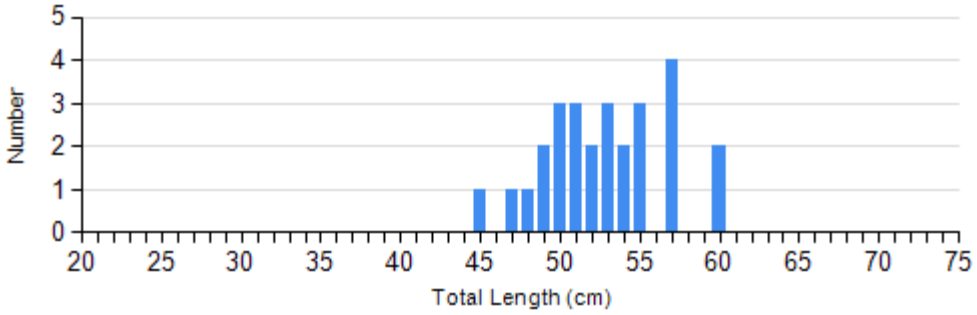


2019

Species: Common Carp
Gear: AFS std gill net

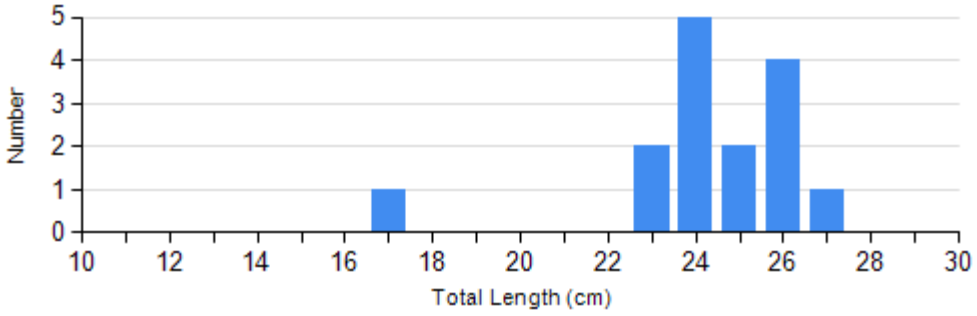


2017

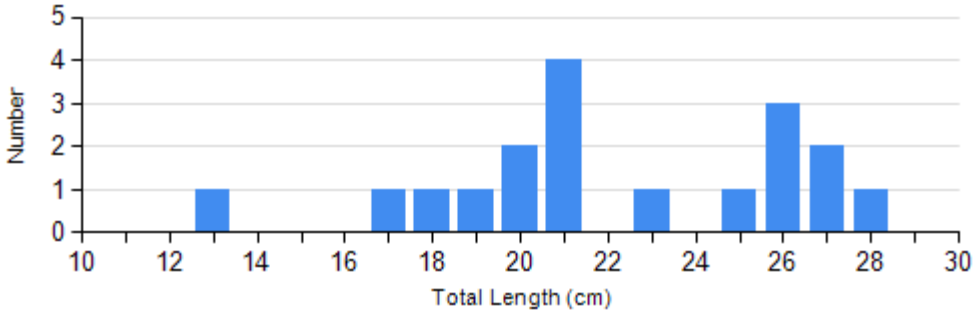


2019

Species: Yellow Perch
Gear: AFS std gill net



2017

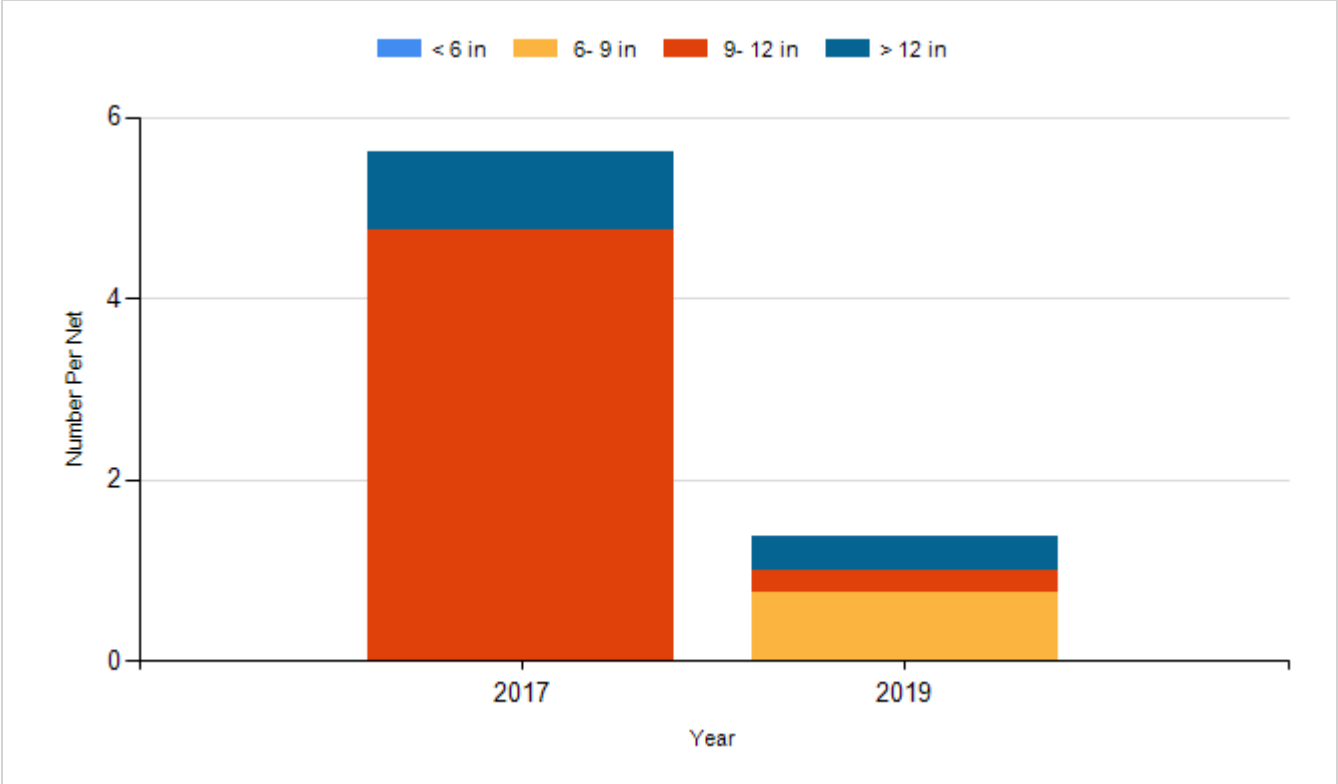


2019

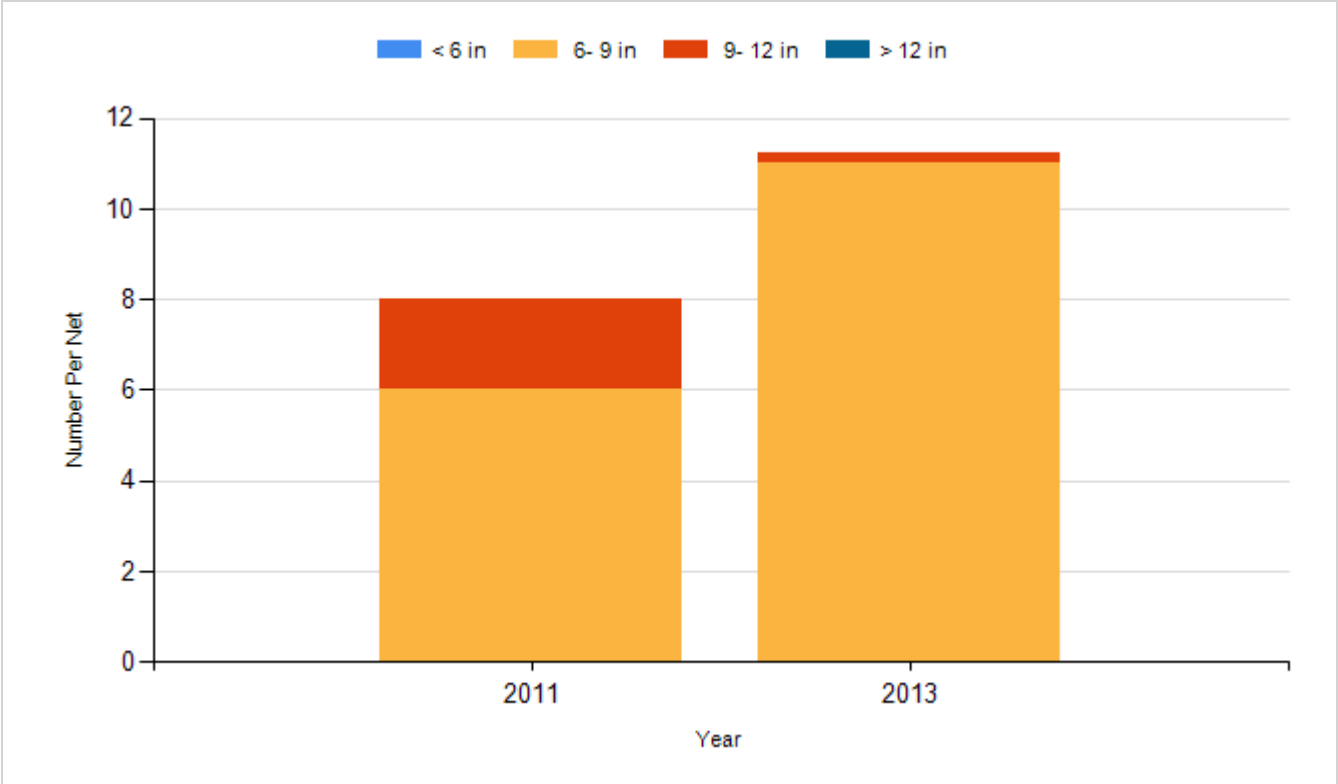
Historic Fish Sizes and Relative Abundance

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

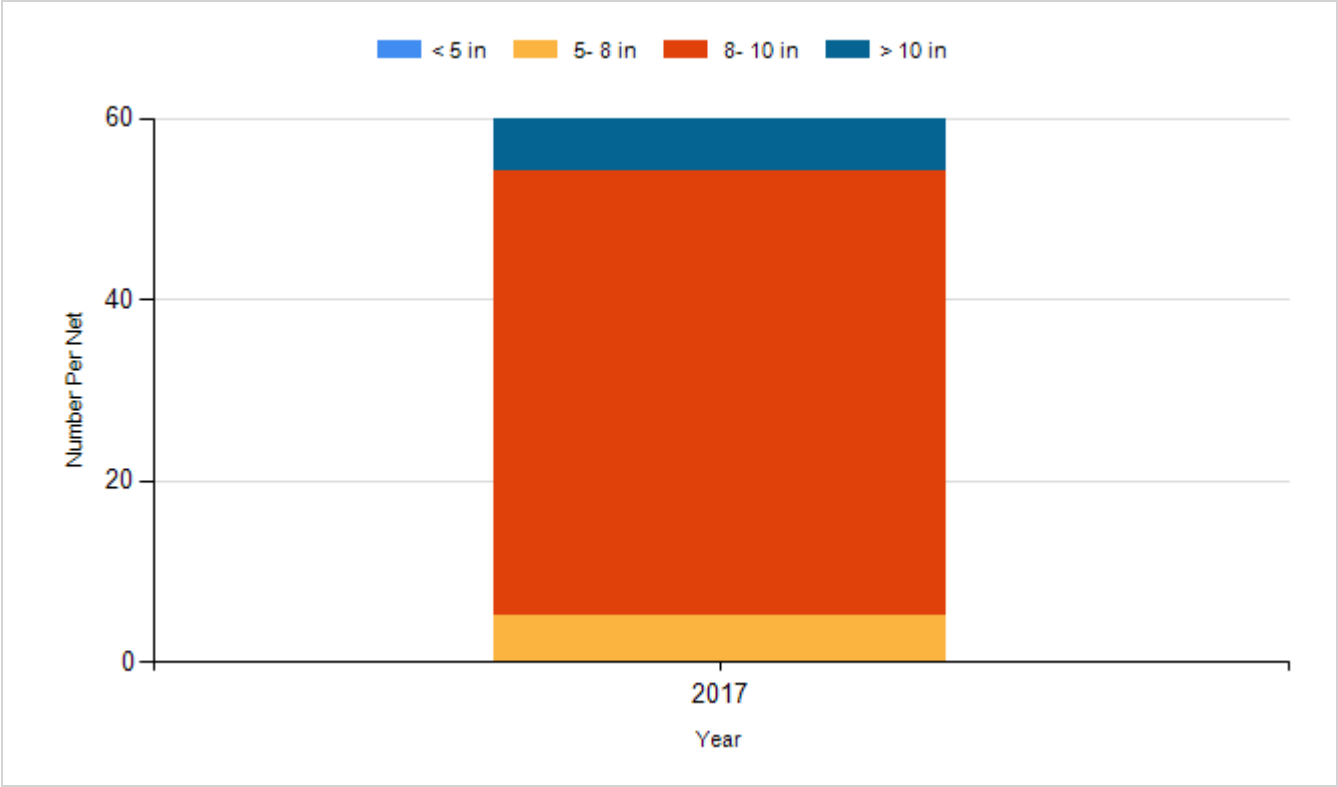
Species: Black Bullhead
Gear: AFS std gill net



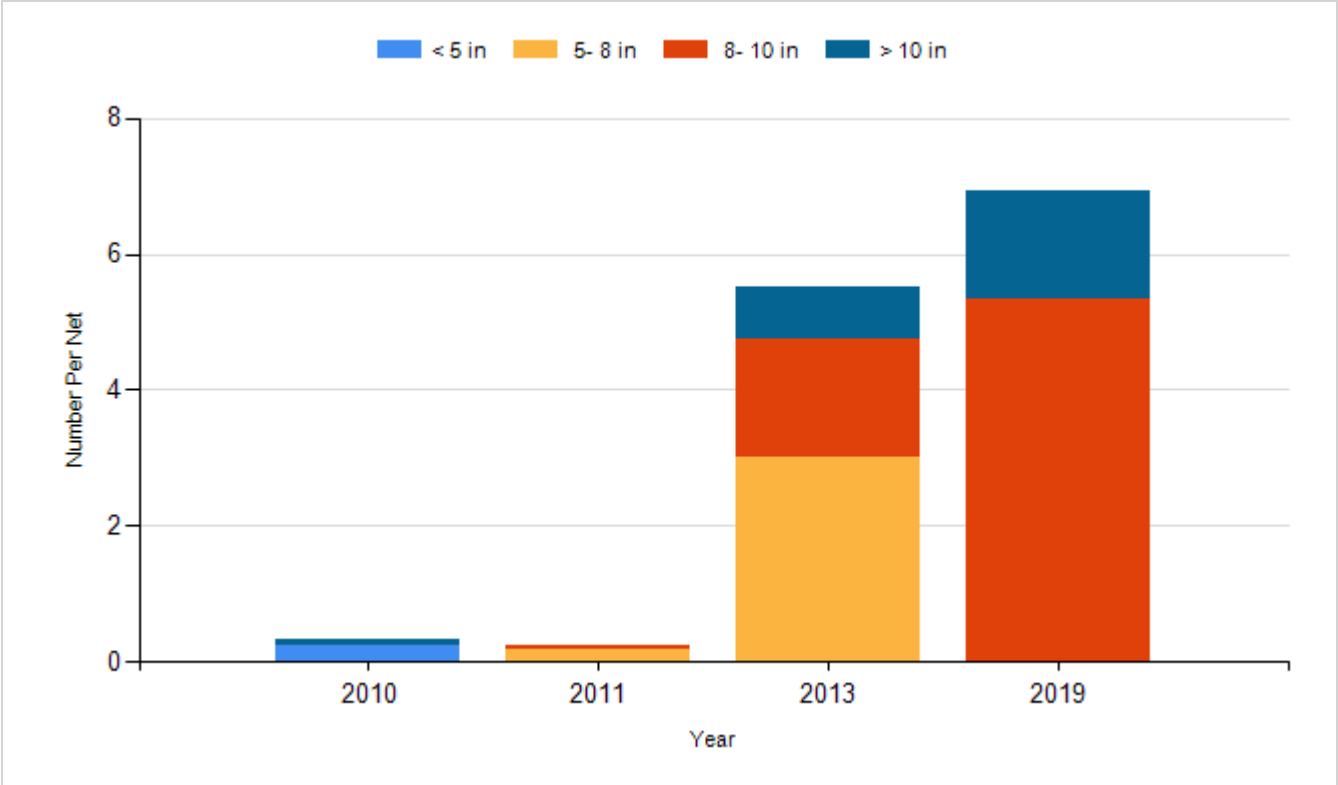
Species: Black Bullhead
Gear: std exp gill net



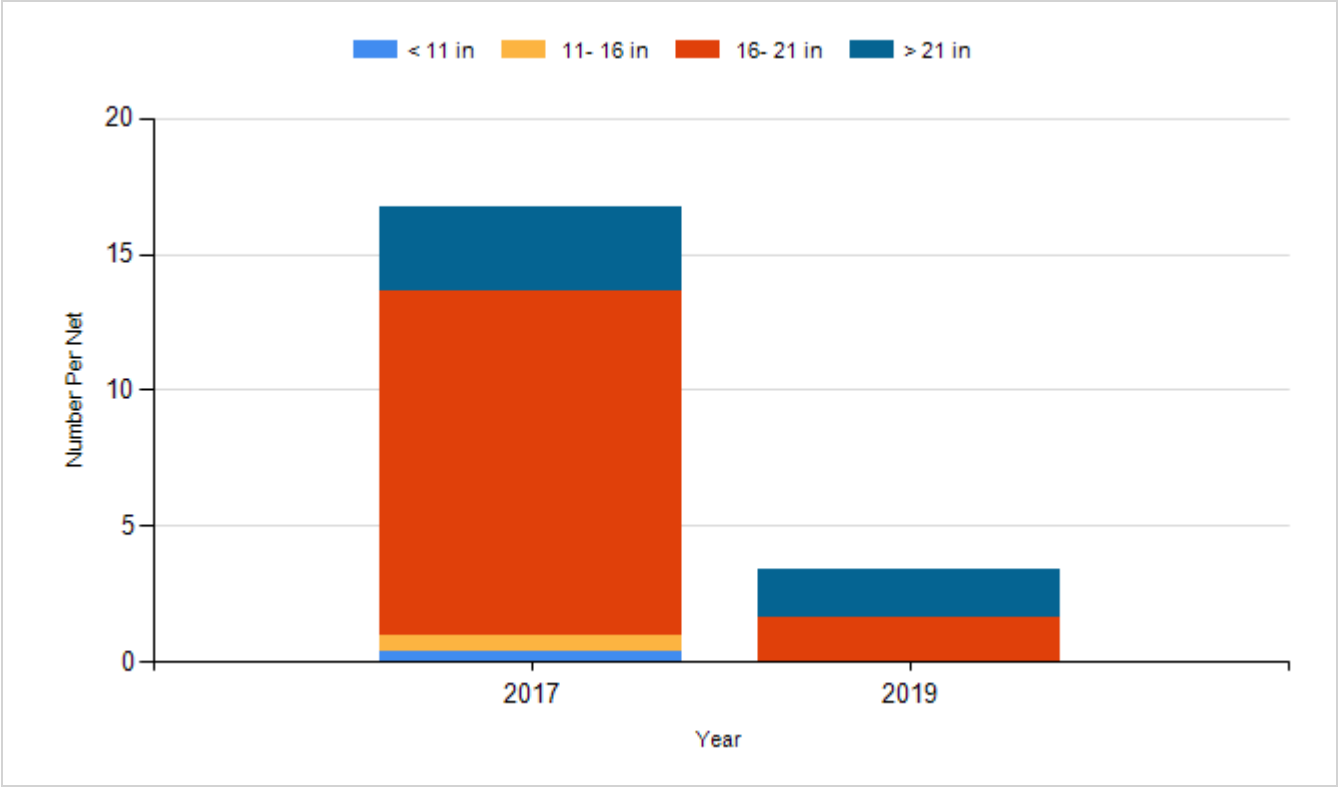
Species: Black Crappie
Gear: AFS std frame net



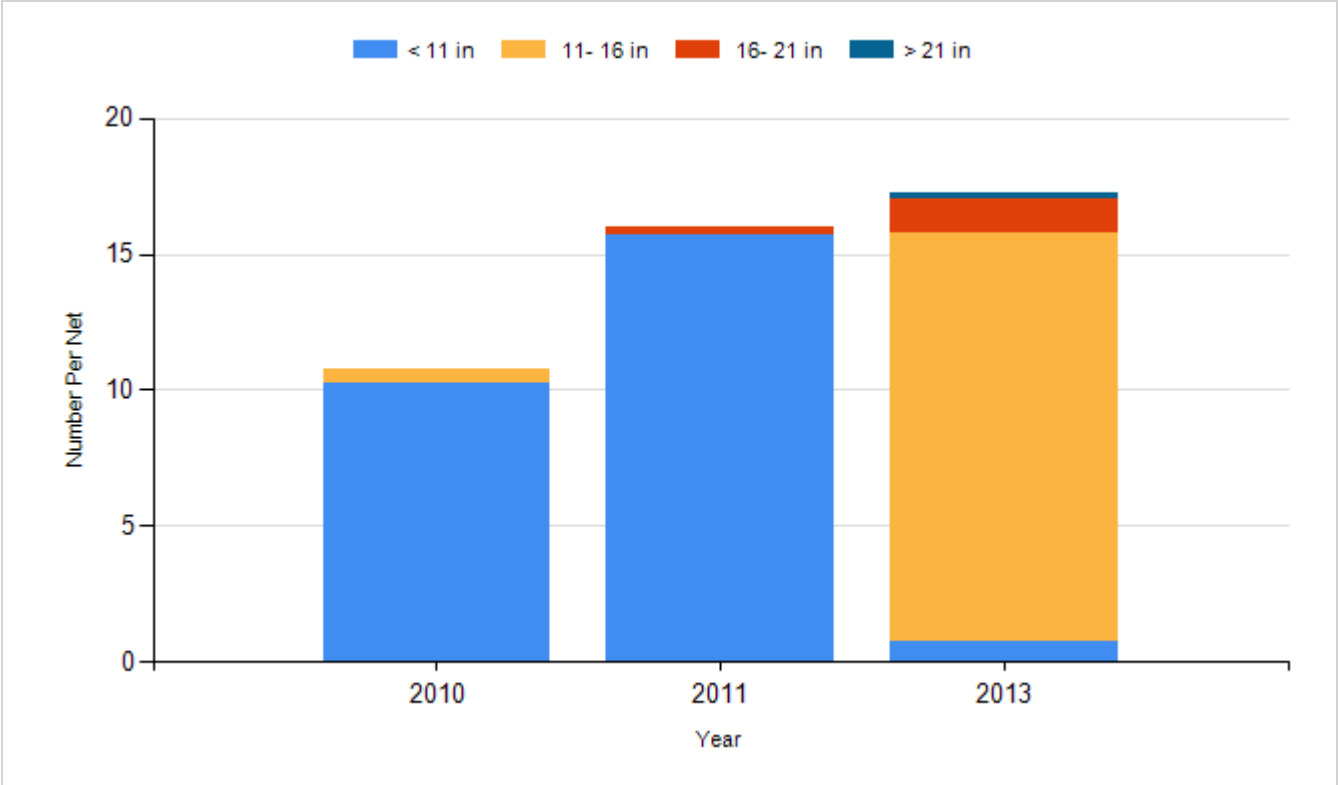
Species: Black Crappie
Gear: frame net (std 3/4 in)



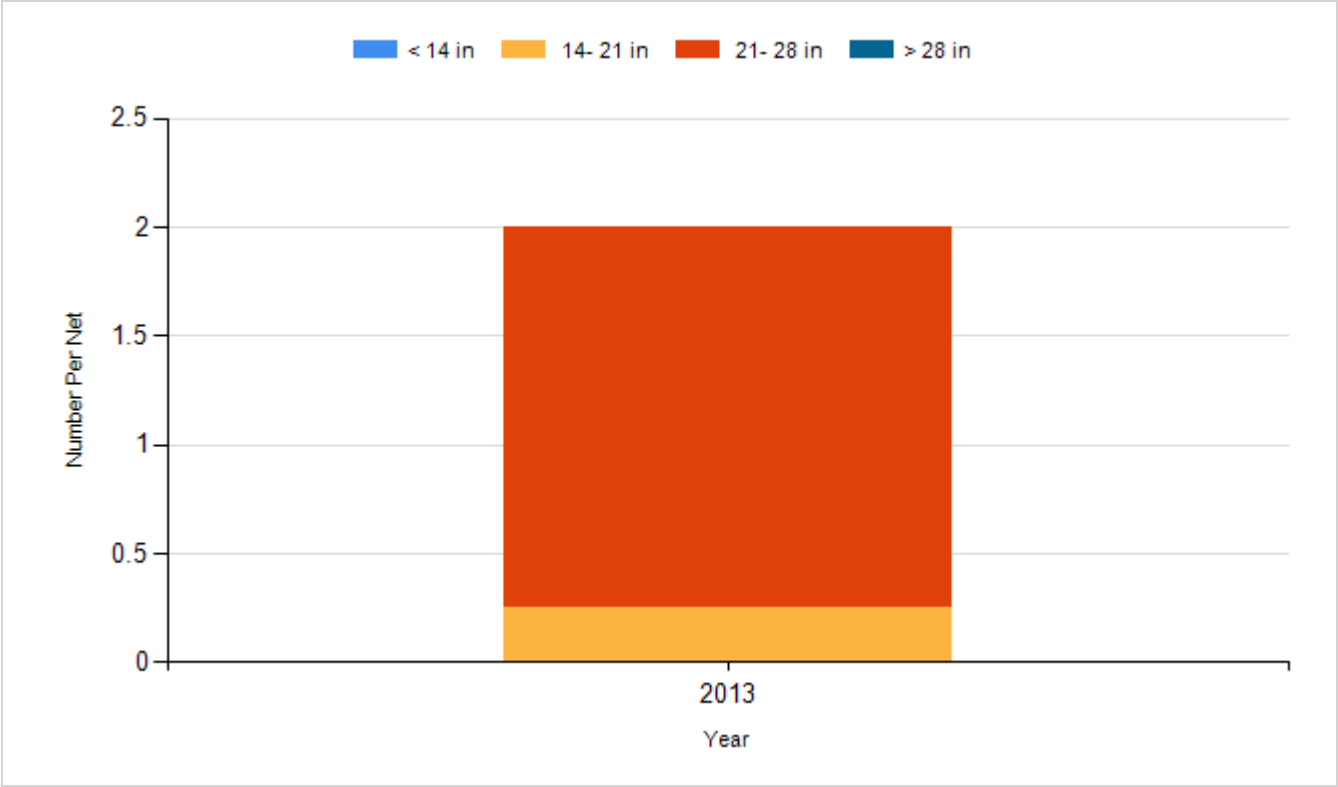
Species: Common Carp
Gear: AFS std gill net



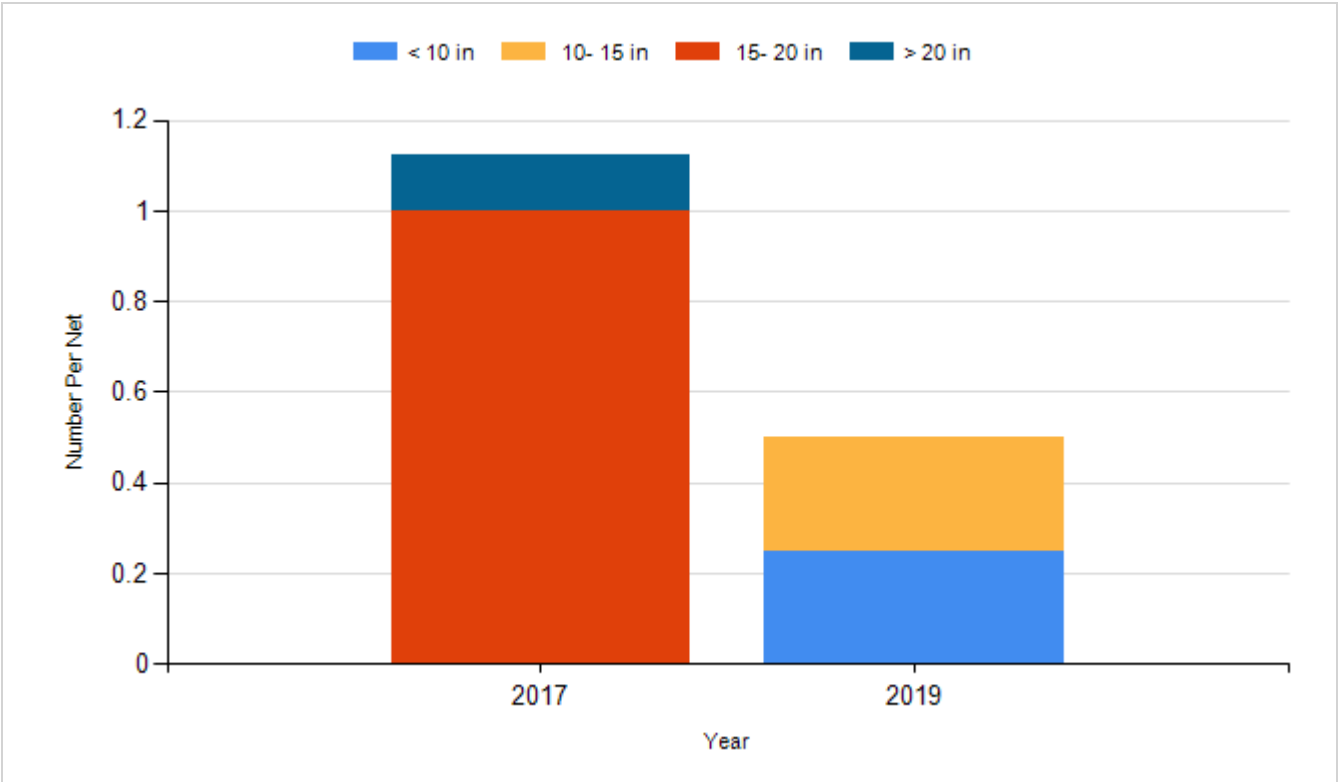
Species: Common Carp
Gear: std exp gill net



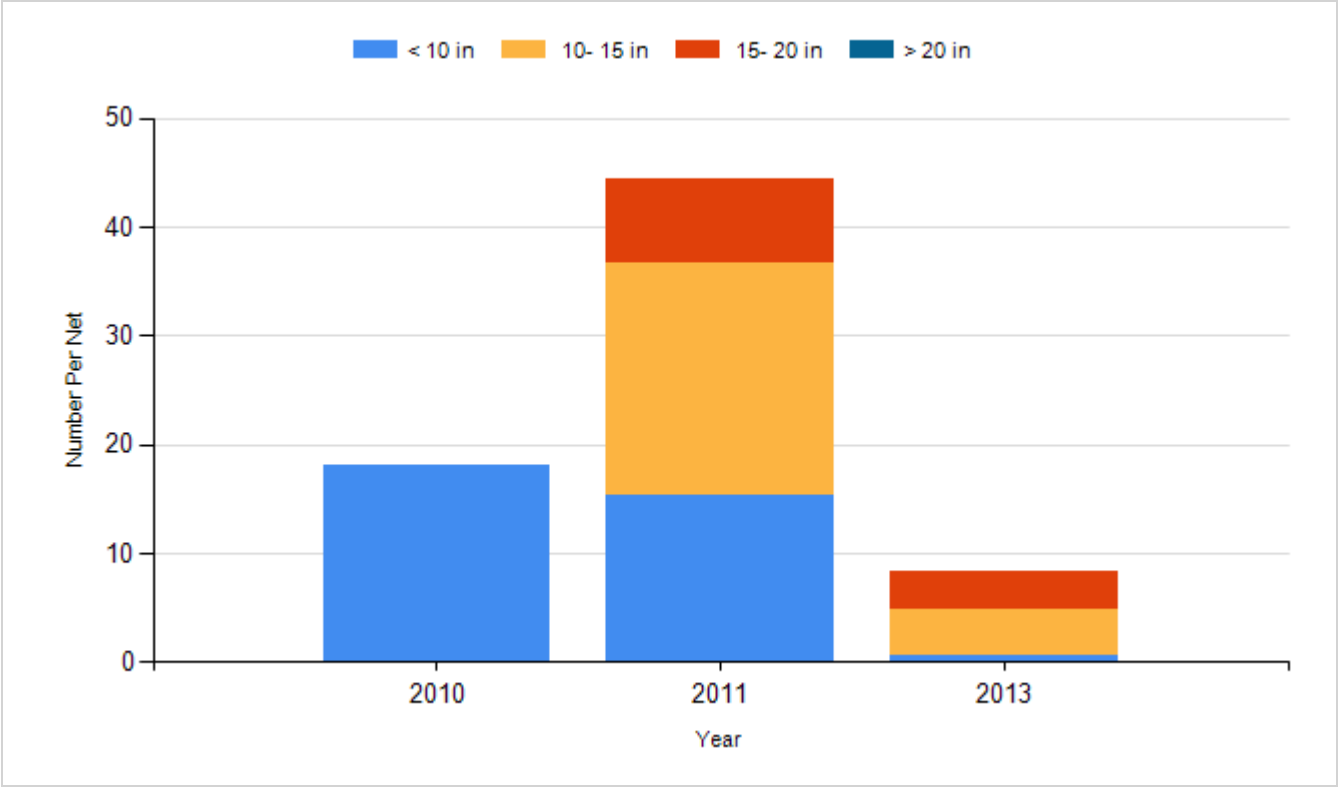
Species: Northern Pike
Gear: std exp gill net



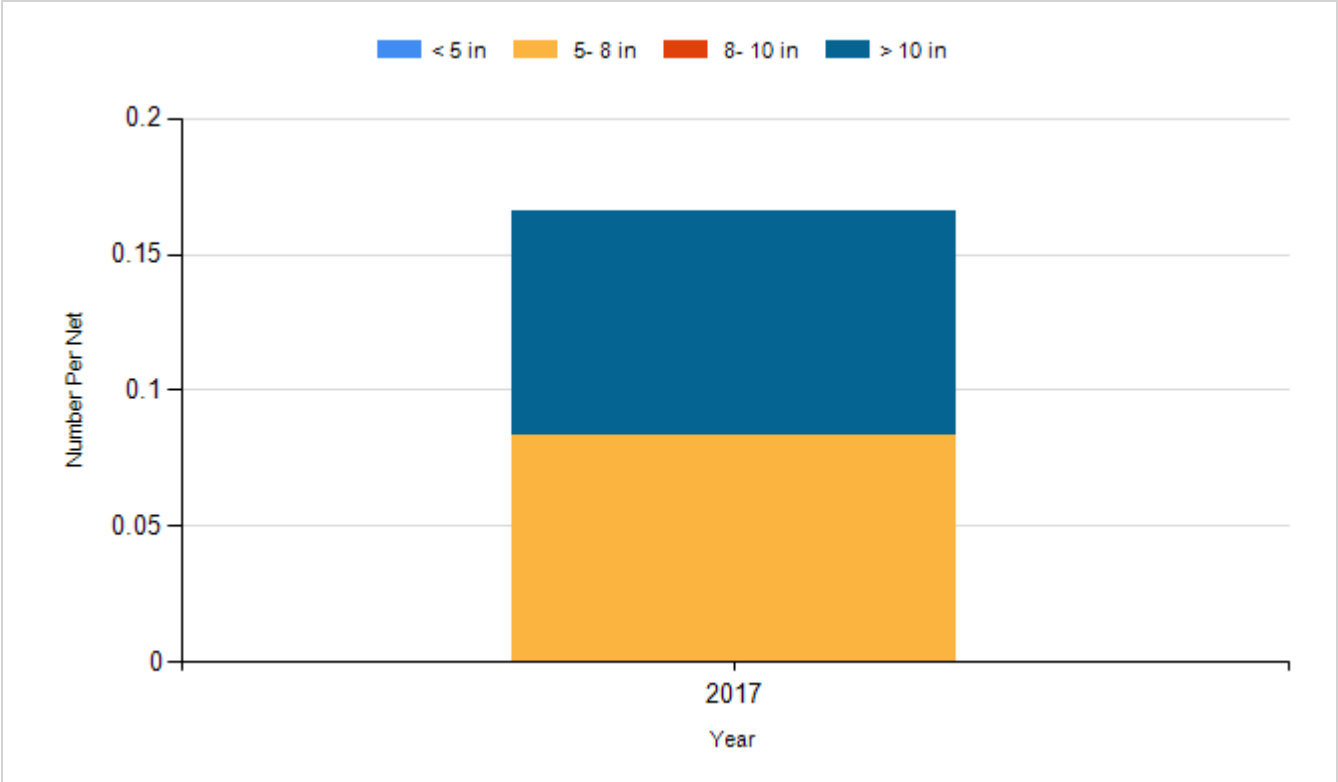
Species: Walleye
Gear: AFS std gill net



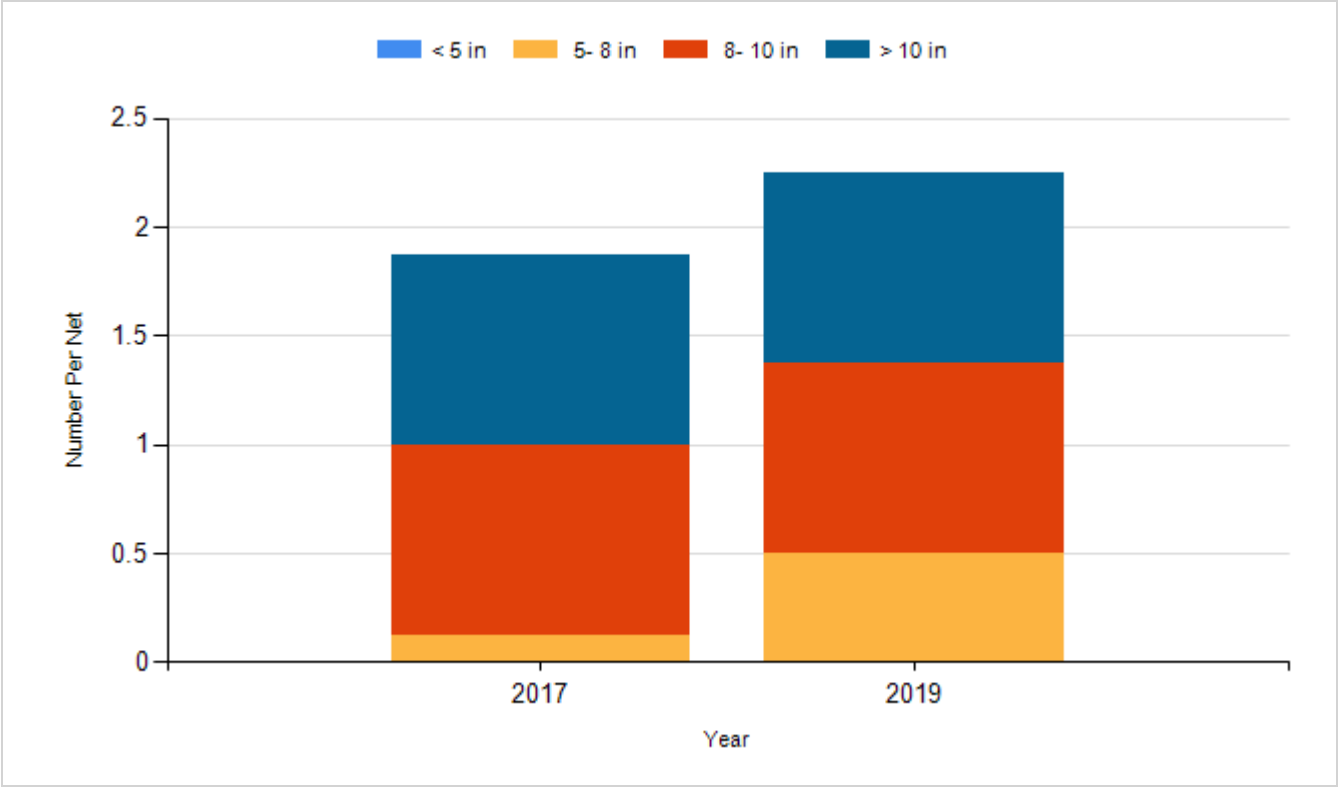
Species: Walleye
Gear: std exp gill net



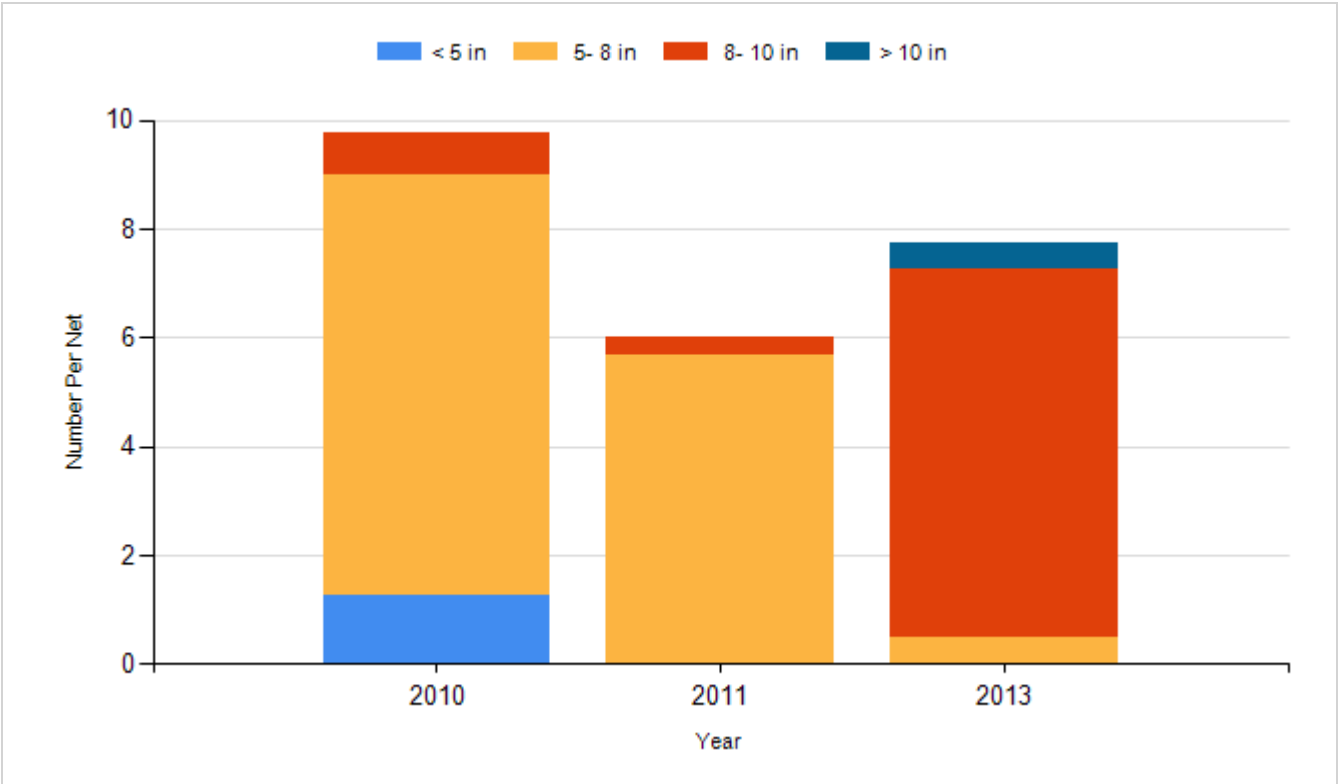
Species: White Crappie
Gear: AFS std frame net



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	Yellow Perch	Juvenile	75
2009	Walleye	Small Fingerling	45,750
2010	Walleye	Small Fingerling	45,260
2011	Walleye	Small Fingerling	44,660
2011	Yellow Perch	Adult	736
2012	Smallmouth Bass	Juvenile	250
2015	Walleye	Small Fingerling	45,500
2015	White Crappie	Adult	167
2016	Black Crappie	Adult	105
2016	White Crappie	Adult	106
2017	Walleye	Large Fingerling	4,800
2017	Yellow Perch	Adult	2,100
2018	Yellow Perch	Adult	2,550