

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Diamond, Minnehaha County

LBS-Lake-223-800

2021

## Lake Information

**Name:** Diamond **Maximum Depth:** 12 Feet  
**County:** Minnehaha **Mean Depth:** 8 Feet  
**Legal Description:** T104N-R52W-Sec. 5  
**Surface Area:** 295 Acres

## Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	May 18, 2021	6 net-nights

## **Common Fish Species Present**

Yellow Perch

Walleye

Black Bullhead

Bigmouth Buffalo

Common Carp

White Sucker

Yellow Bullhead

Sunfish Hybrid

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## 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
AFS std gill net	Bigmouth Buffalo	15	2.5	2.0	0		0		
	Black Bullhead	215	35.8	4.9	43	5	0		
	Common Carp	14	2.3	1.5	93		21		
	Sunfish Hybrid	1	0.0	0.0					
	Walleye	23	3.7	1.8	68	16	18	87	2
	White Sucker	2	0.3	0.5	100		100		
	Yellow Bullhead	1	0.2	0.2	100		0		
	Yellow Perch	75	12.5	3.7	27	7	0	108	2

## 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

Gear	Species	CPUE										Avg
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
AFS std frame net	Black Bullhead						2.4					2.40
	Common Carp						1.2					1.20
	Walleye						3.0					3.00
	White Sucker						0.2					0.20
AFS std gill net	Bigmouth Buffalo						0.0	0.0	0.0		2.5	0.63
	Black Bullhead						13.7	8.5	3.3		35.8	15.33
	Common Carp						2.8	4.7	1.8		2.3	2.90
	Sunfish Hybrid						0.0	0.0	0.0		0.0	0.00
	Walleye						2.2	4.8	12.2		3.7	5.73
	White Sucker						0.0	0.0	0.0		0.3	0.08
	Yellow Bullhead						0.0	0.0	0.0		0.2	0.05
	Yellow Perch						0.8	6.0	1.5		12.5	5.20
frame net (std 3/4 in)	Black Bullhead		90.8									90.80
	Black Crappie		3.8									3.80
	Common Carp		2.6									2.60
	Green Sunfish		0.8									0.80
	Orangespotted Sunfish		0.0									0.00
	Sunfish Hybrid		0.0									0.00
	Walleye		0.0									0.00
	Yellow Perch		10.8									10.80
std exp gill net	Black Bullhead		93.0	148.7	76.0	50.3						92.00
	Black Crappie		0.0	0.0	0.0	0.0						0.00
	Common Carp		13.7	14.3	7.7	12.0						11.93
	Sunfish Hybrid		0.0	0.0	0.0	0.0						0.00
	Walleye		0.0	0.0	4.3	6.7						2.75
	Yellow Perch		6.0	22.3	7.0	14.3						12.40

## 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											
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
AFS std frame net	Black Bullhead	PSD						100						
		PSD-P						17						
	Common Carp	PSD						83						
		PSD-P						67						
	Walleye	PSD						33						
		PSD-P						13						
	White Sucker	Wr						80						
		PSD						100						
			PSD-P						100					
	AFS std gill net	Bigmouth Buffalo	PSD											0
PSD-P													0	
Black Bullhead		PSD						99	53	15			43	
		PSD-P						4	14	0			0	
Common Carp		PSD						100	82	45			93	
		PSD-P						53	64	27			21	
Walleye		PSD						46	86	88			68	
		PSD-P						8	10	18			18	
White Sucker		Wr						84	98	100			87	
		PSD											100	
			PSD-P										100	
Yellow Bullhead		PSD											100	
		PSD-P											0	
Yellow Perch		PSD						100	19	67			27	
		PSD-P						40	3	22			0	
			Wr					92	106	110			108	
frame net (std 3/4 in)		Black Bullhead	PSD		17									
			PSD-P		3									
	Wr			79										
	Common Carp	PSD		0										
		PSD-P		0										
		Wr		87										
	Yellow Perch	PSD		2										

Gear	Species	Index	Year									
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
frame net (std 3/4 in)	Yellow Perch	PSD-P		0								
		Wr		98								
std exp gill net	Black Bullhead	PSD		0	4	63	74					
		PSD-P		0	0	0	1					
		Wr		91								
	Common Carp	PSD		2	84	13	83					
		PSD-P		0	2	4	25					
		Wr		90								
	Walleye	PSD			0	8	20					
		PSD-P			0	8	0					
		Wr				77	79					
	Yellow Perch	PSD		0	0	57	70					
		PSD-P		0	0	0	35					
		Wr		104	105	100	93					



## 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	79	257 (15)	397 (3)		465 (33)	486 (22)	542 (6)				
2018	29			386 (10)	392 (9)	451 (7)	611 (1)	575 (1)			591 (1)
2017	13		265 (1)	350 (8)	460 (3)	520 (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+
2018	11		188 (11)								
2017	5			226 (3)	266 (1)		301 (1)				
2014	67	147 (67)									

## **Fish Condition**

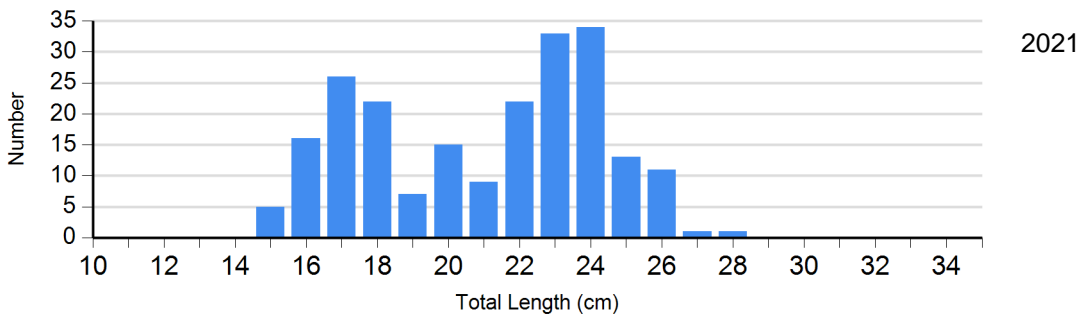
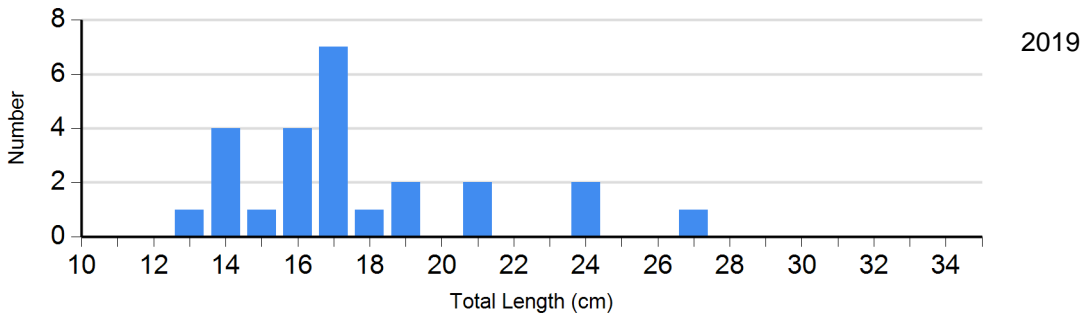
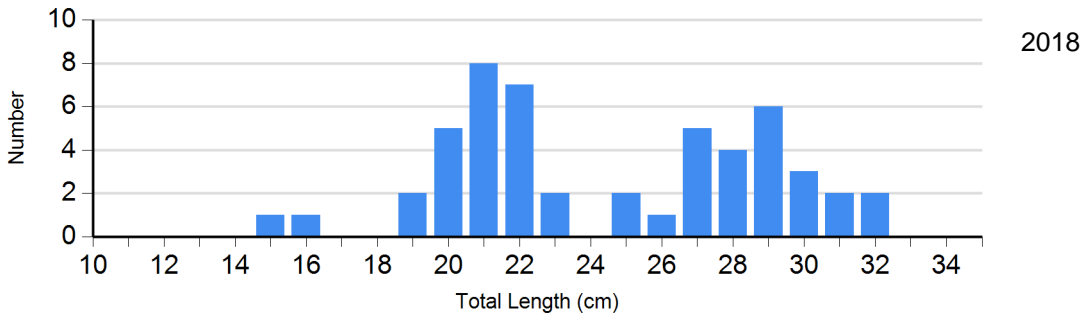
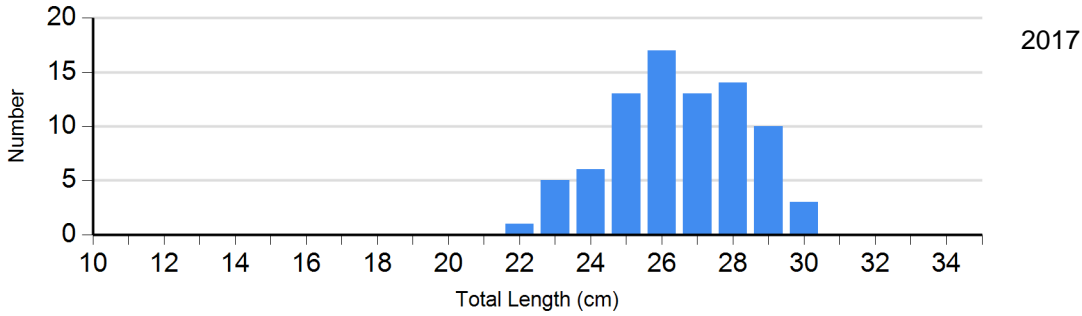
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Walleye Gill Net	2017	7	82 (1.7)	5	85 (3.8)	1	92	0	
	2018	4	94 (2.9)	22	99 (1.4)	3	95 (2.7)	0	
	2019	9	110 (1.3)	51	98 (0.9)	13	97 (1.9)	0	
	2021	7	87 (2.7)	11	85 (1.2)	4	94 (7.1)	0	
Yellow Perch Gill Net	2017	0		3	98 (3.2)	1	84	1	84
	2018	29	108 (5.7)	6	102 (4.1)	1	87	0	
	2019	3	127 (10.5)	4	101 (1.4)	2	101 (0.7)	0	
	2021	55	109 (2.4)	20	106 (2.2)	0		0	

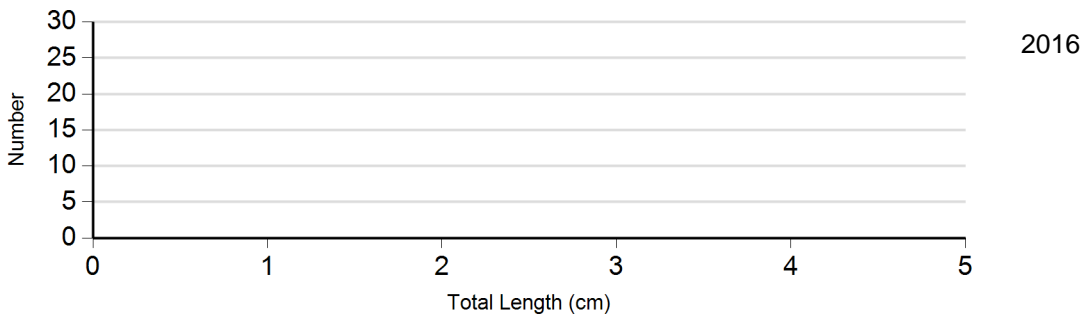
# Length Frequency Distribution

Length frequency histogram of species sampled by year.

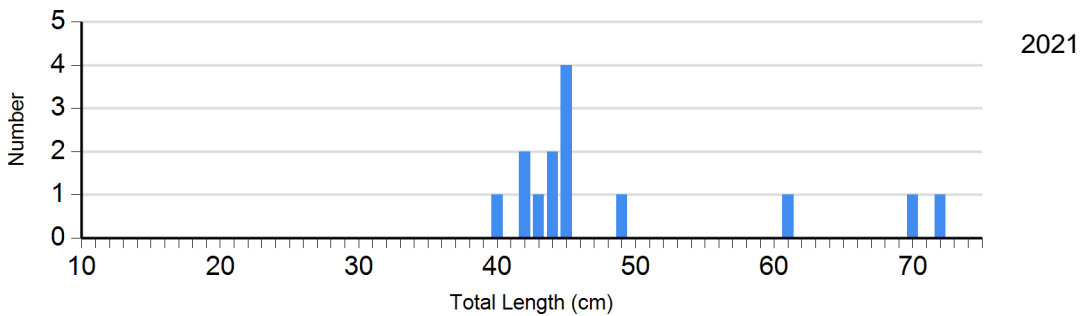
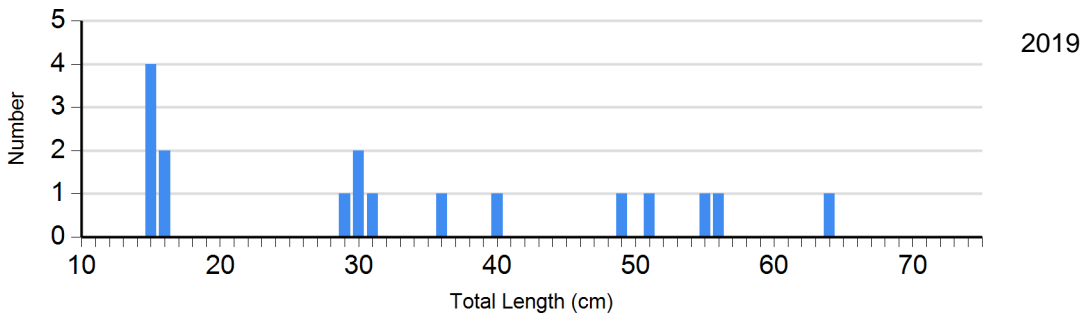
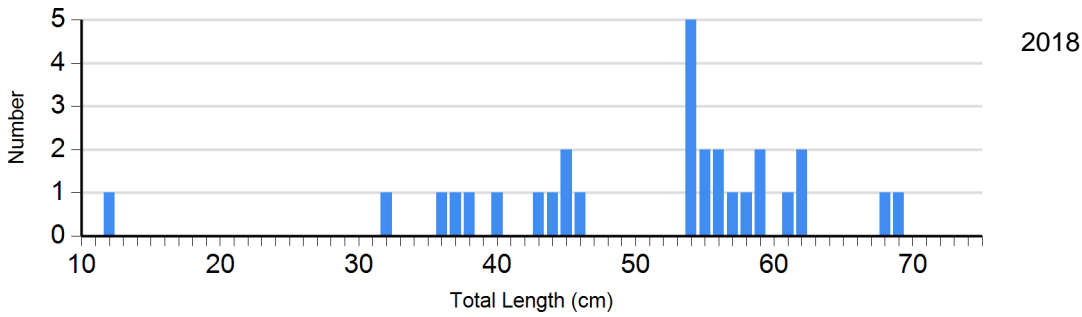
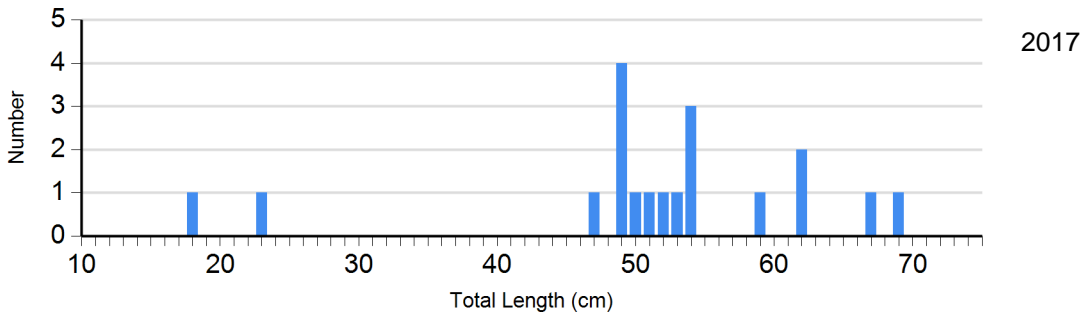
Species: Black Bullhead  
Gear: AFS std gill net



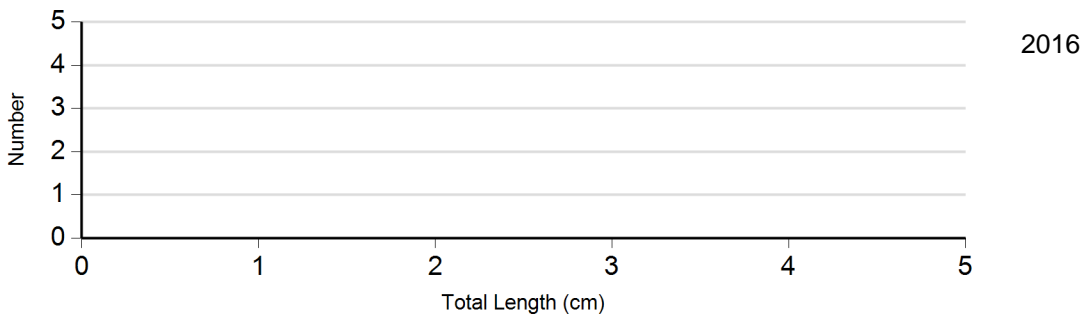
Species: Black Bullhead  
Gear: std exp gill net



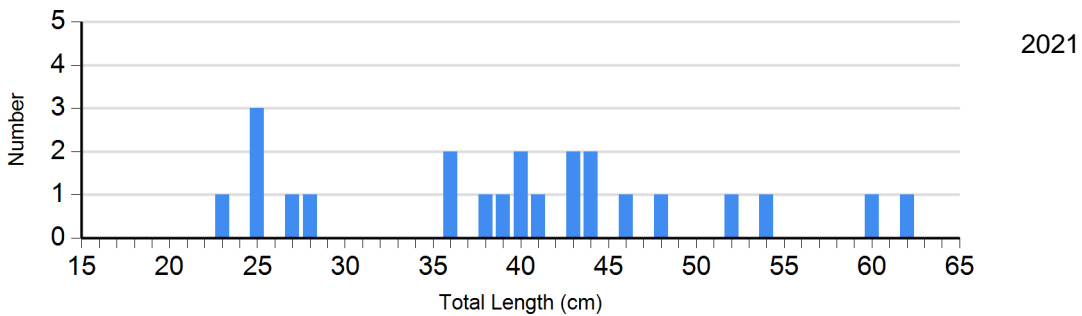
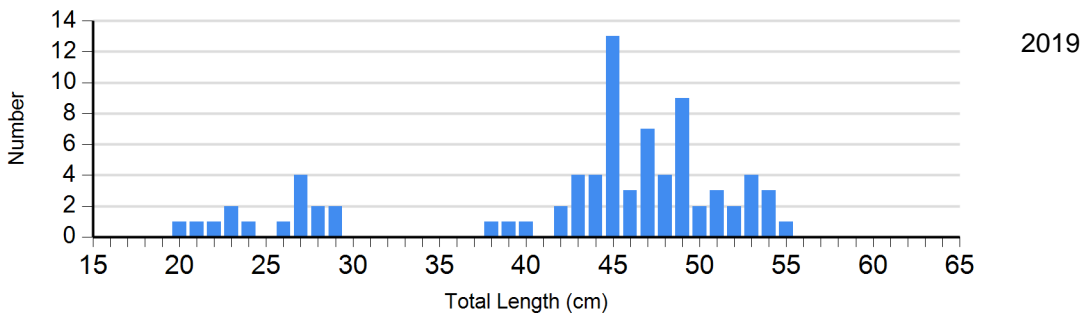
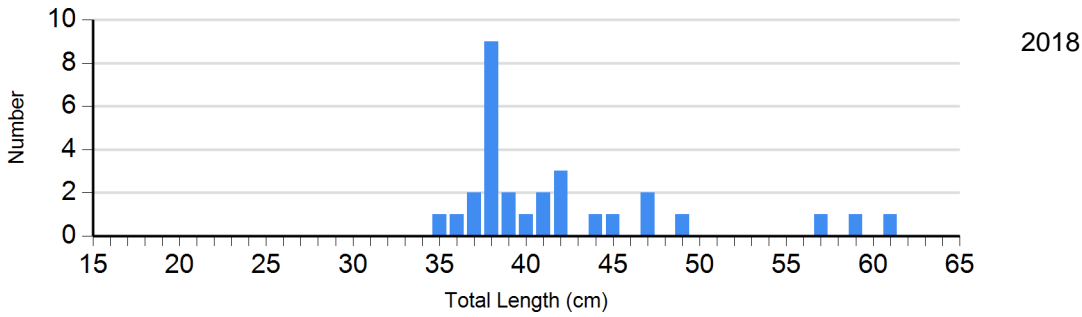
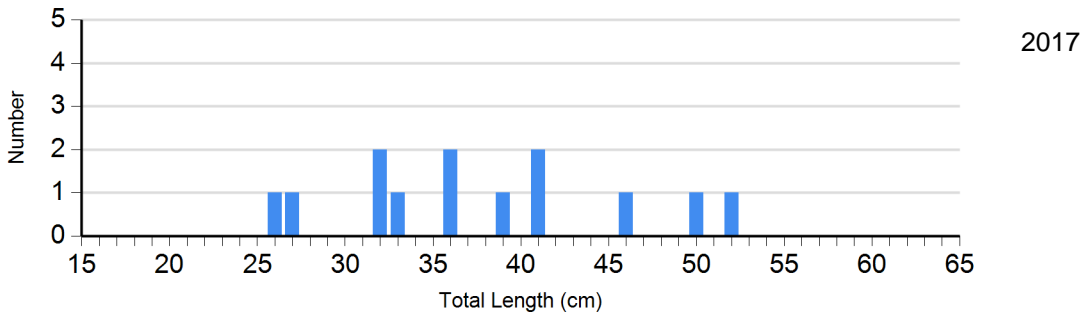
Species: Common Carp  
Gear: AFS std gill net



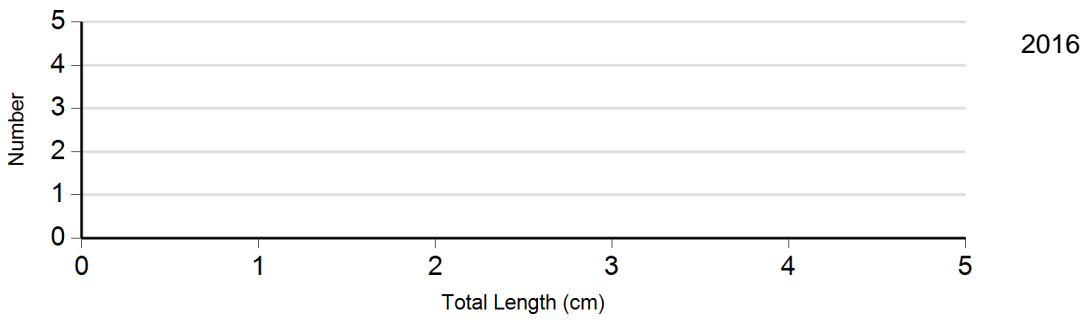
Species: Common Carp  
Gear: std exp gill net



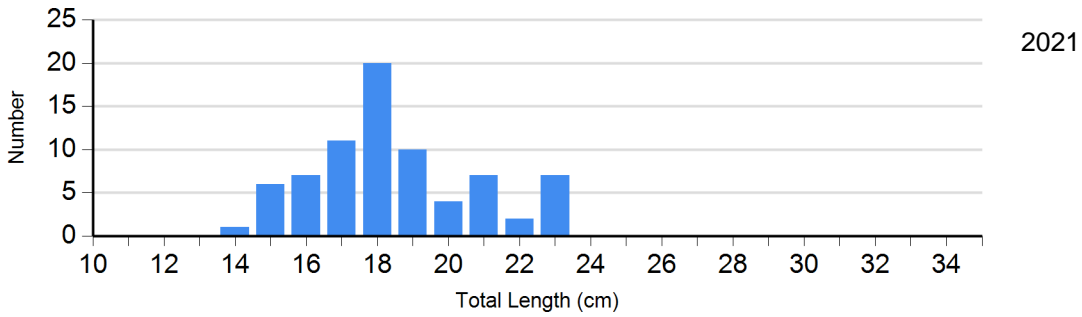
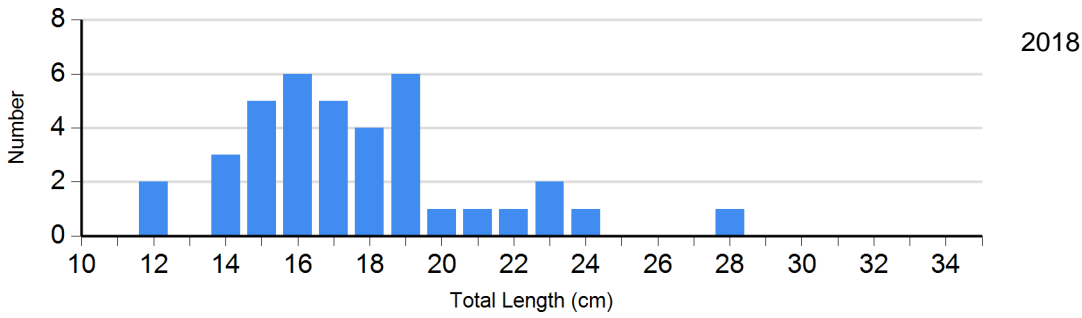
Species: Walleye  
Gear: AFS std gill net



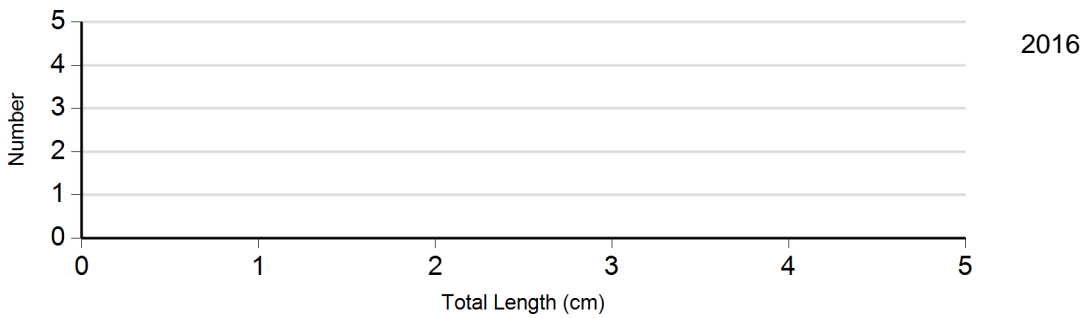
Species: Walleye  
Gear: std exp gill net



Species: Yellow Perch  
Gear: AFS std gill net



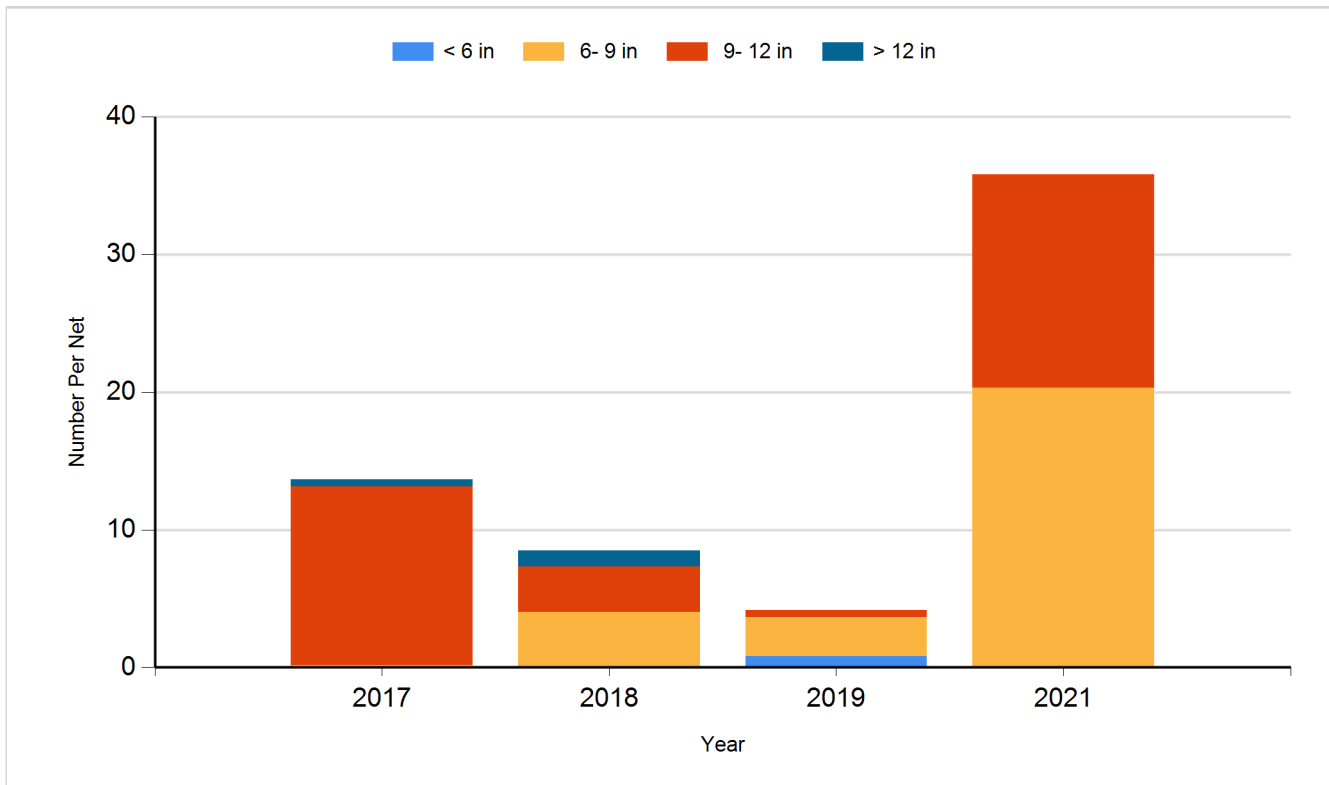
Species: Yellow Perch  
Gear: std exp gill net



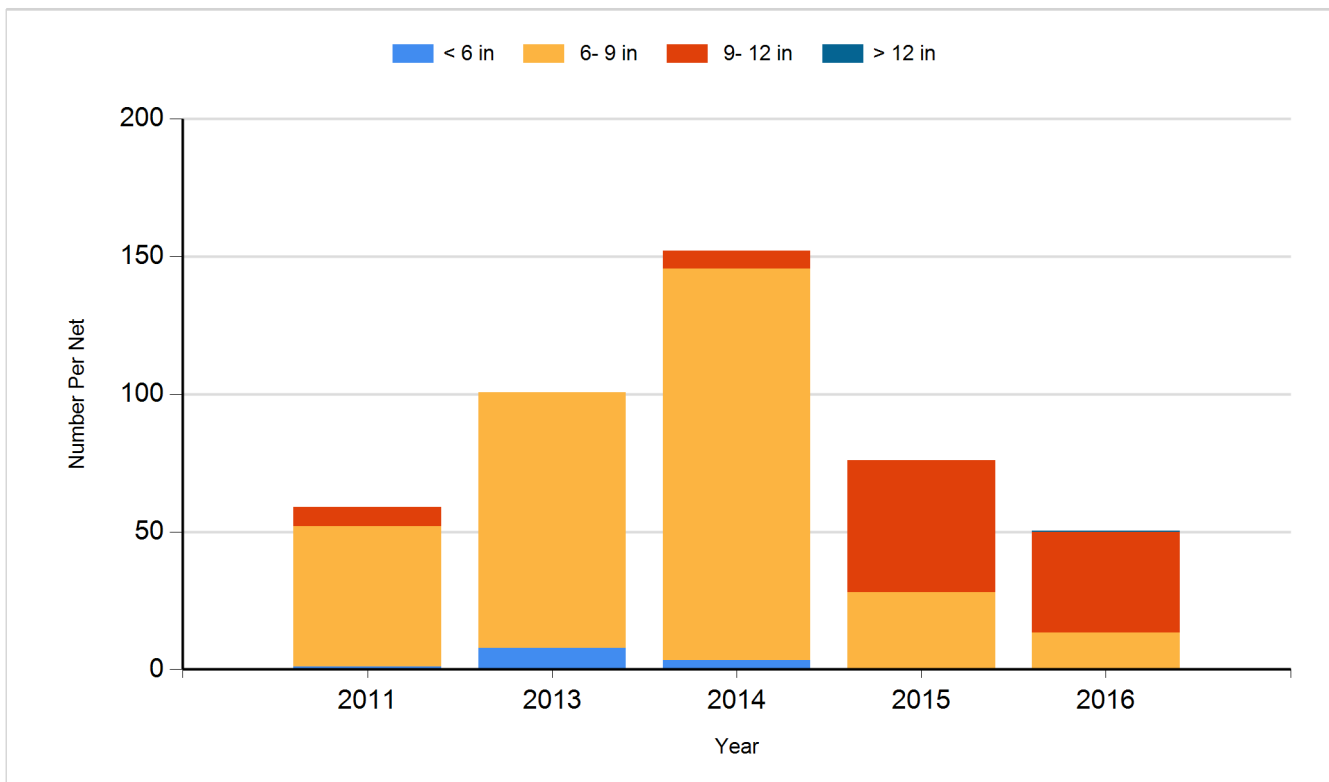
## Historic Fish Sizes and Relative Abundance

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

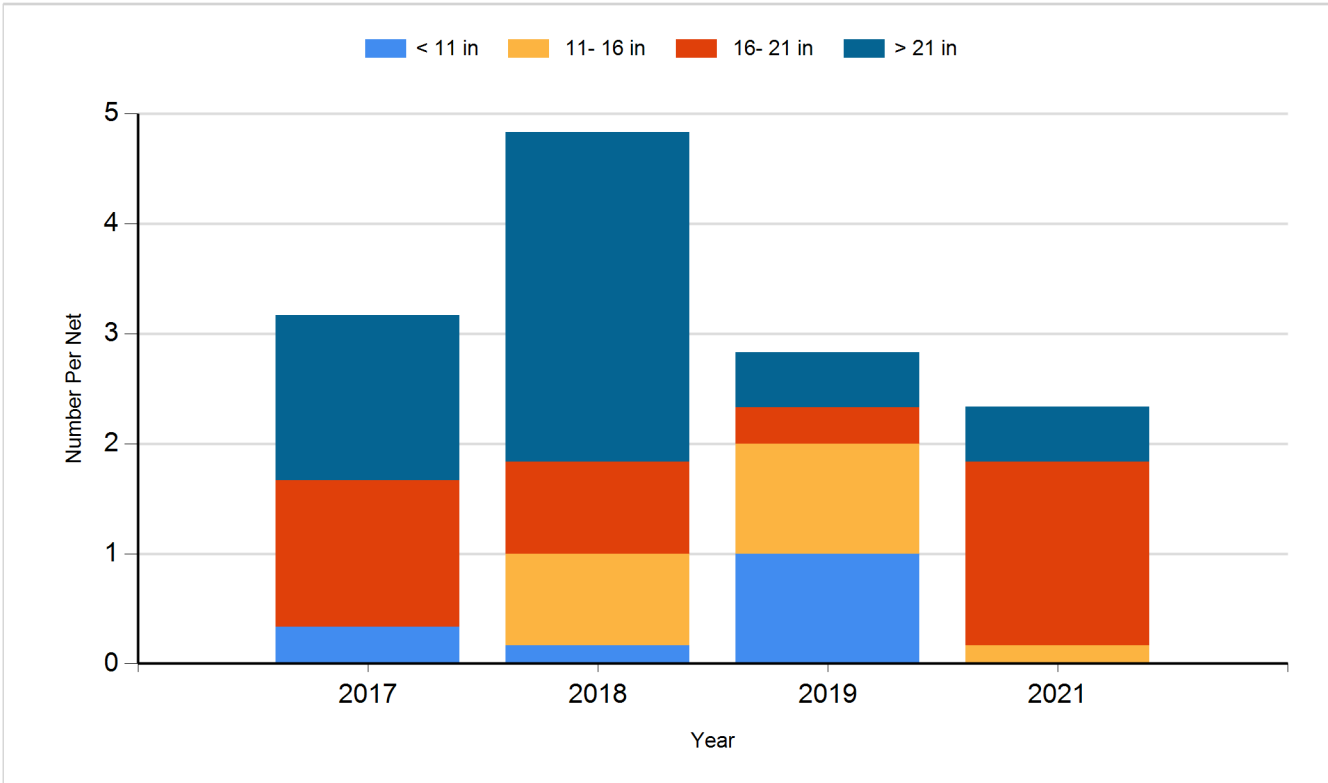
Species: Black Bullhead  
Gear: AFS std gill net



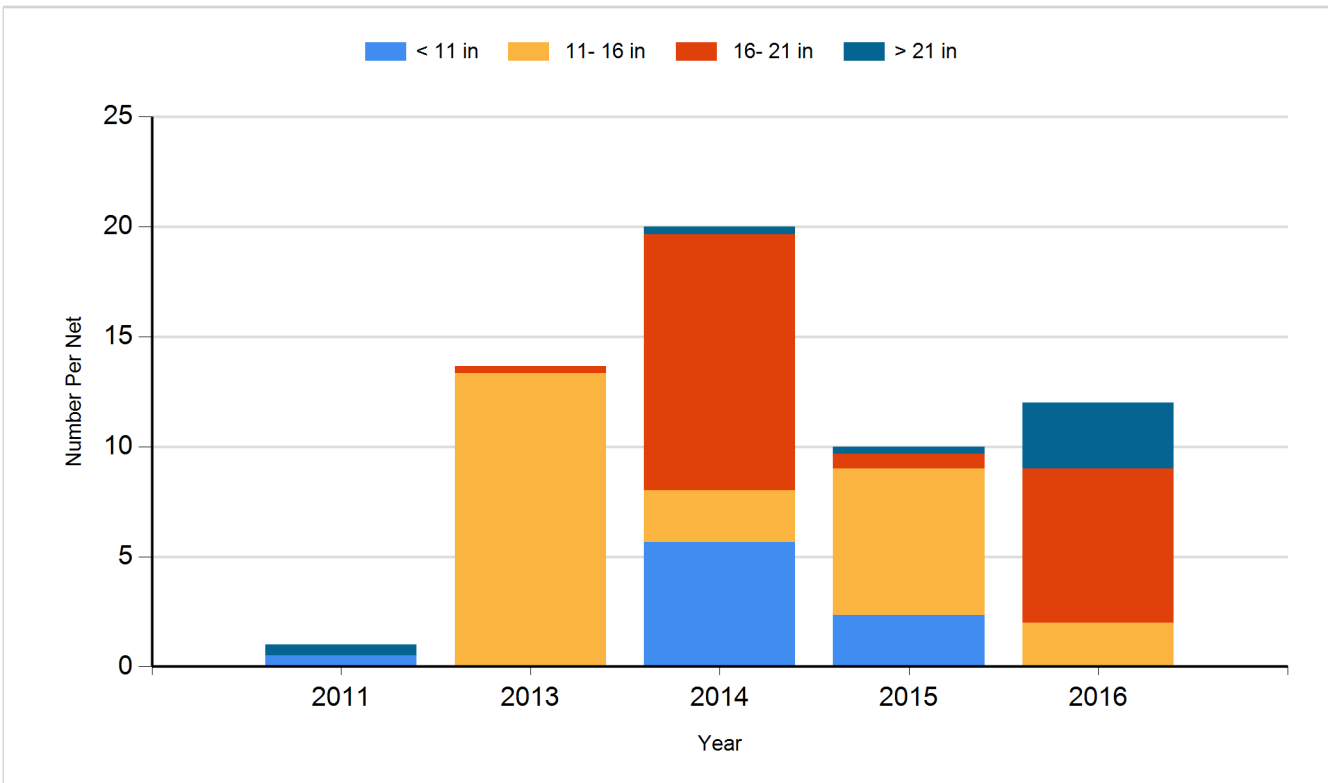
Species: Black Bullhead  
Gear: std exp gill net



Species: Common Carp  
Gear: AFS std gill net

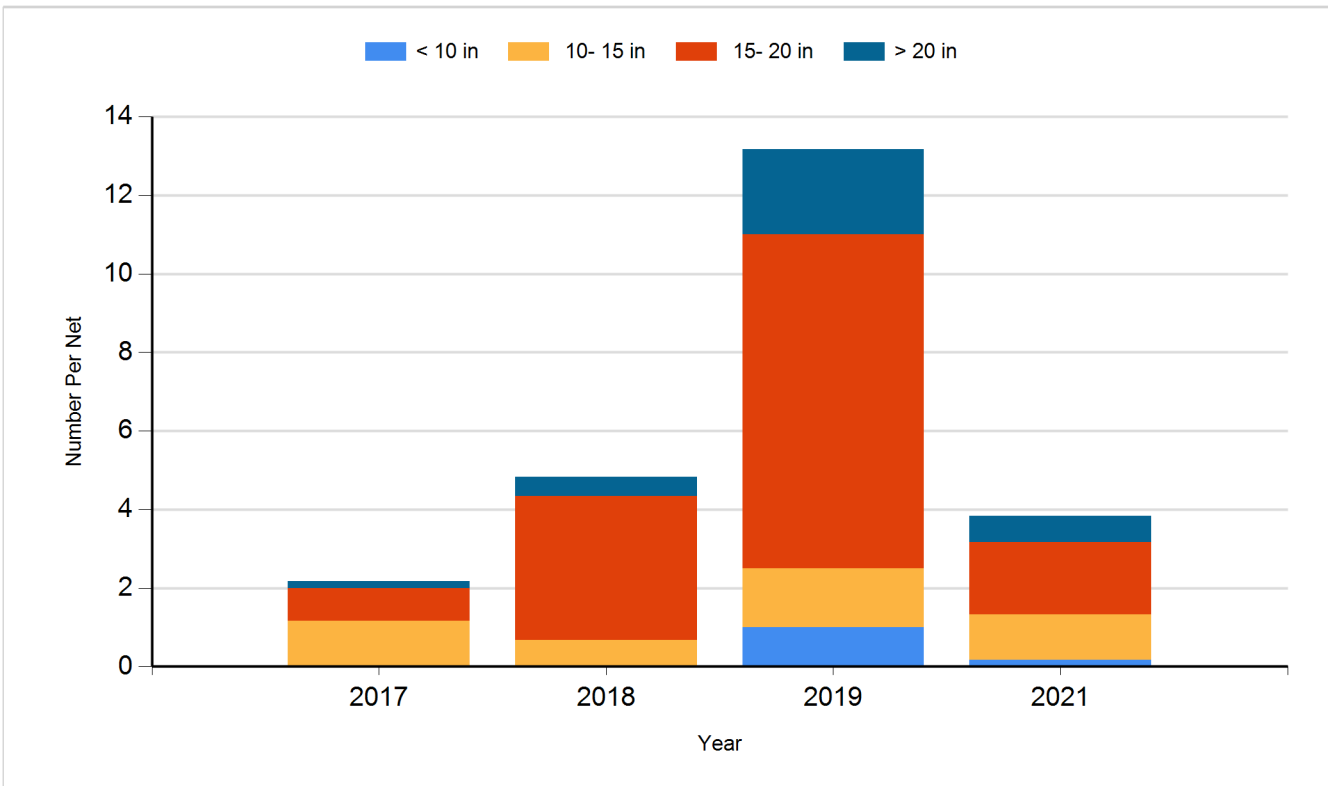


Species: Common Carp  
Gear: std exp gill net

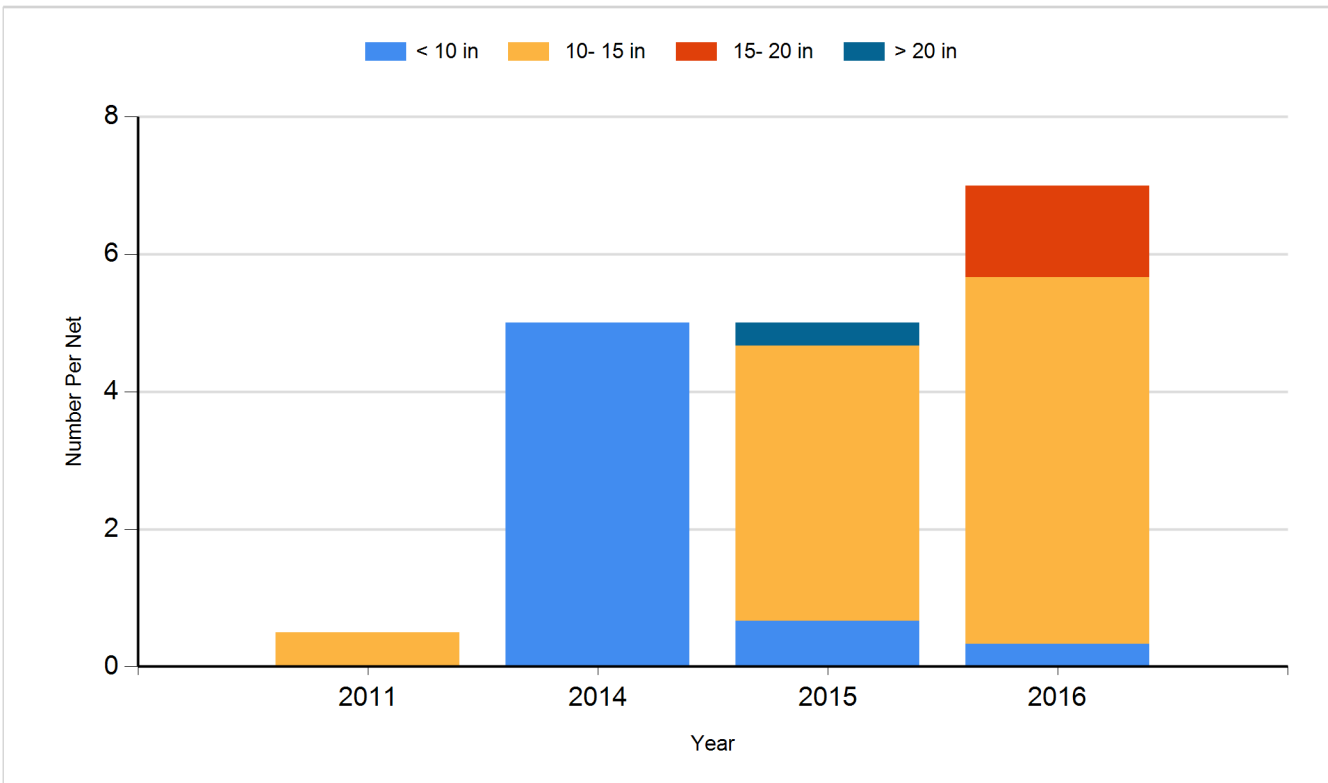




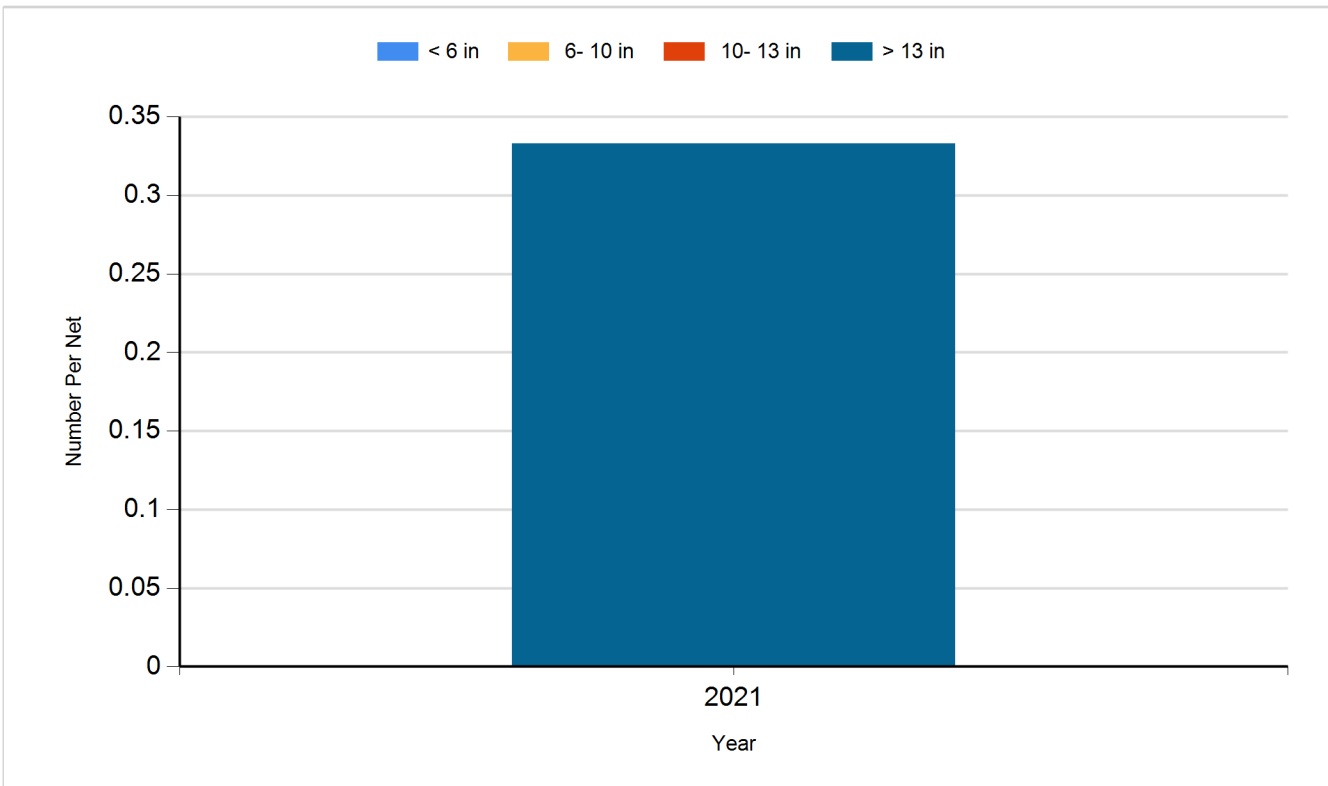
Species: Walleye  
Gear: AFS std gill net



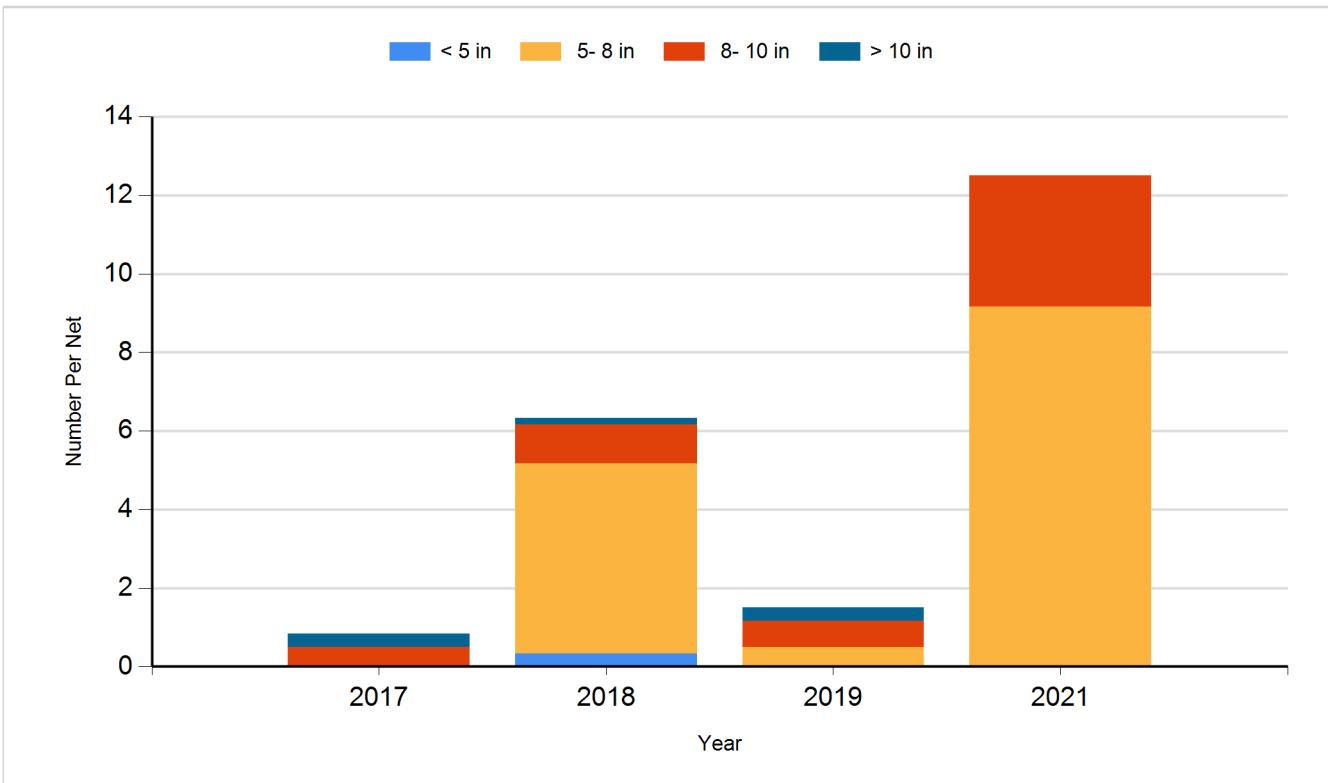
Species: Walleye  
Gear: std exp gill net



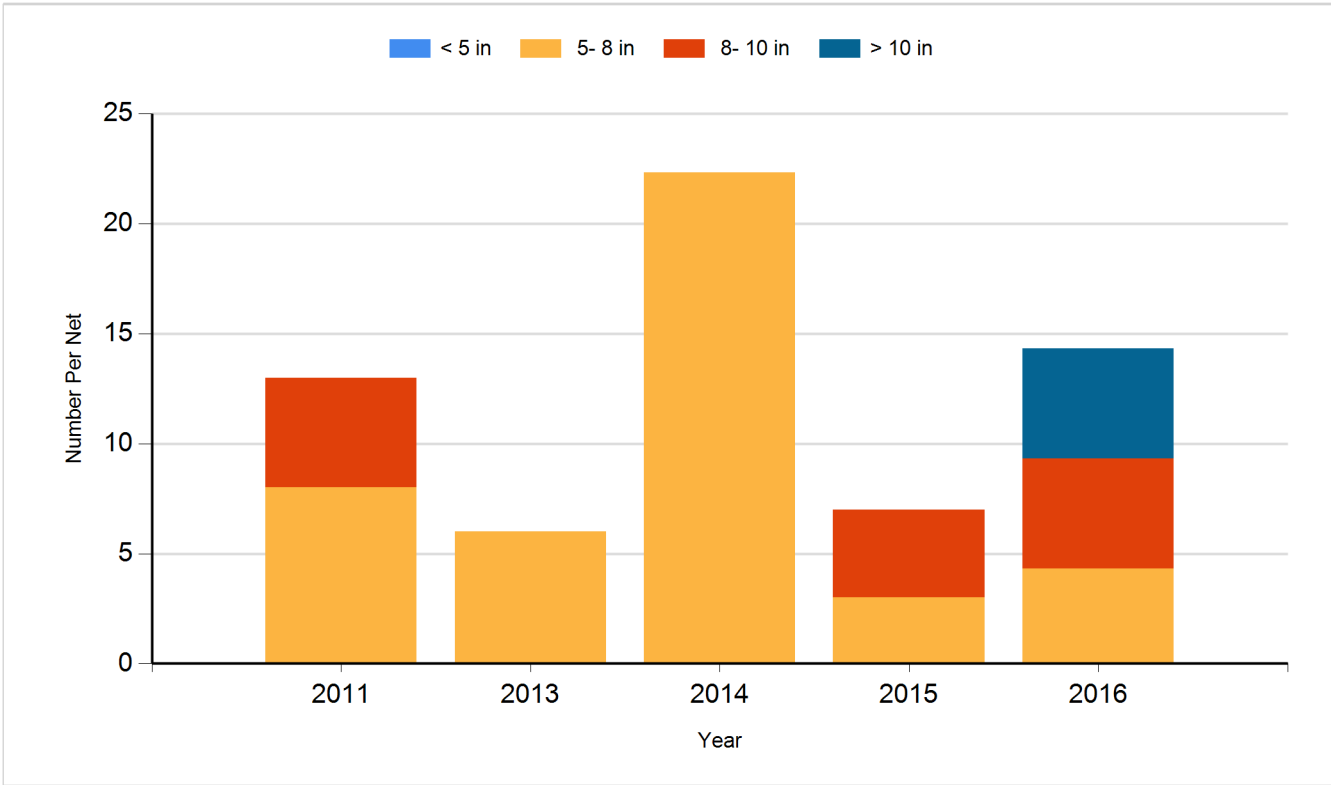
Species: White Sucker  
Gear: AFS std gill net



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
2018	Walleye	Large Fingerling	2,023
2019	Walleye	Small Fingerling	23,064