

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Herman, Lake County

LBS-Lake-136-000

2021

## Lake Information

<b>Name:</b>	Herman	<b>Maximum Depth:</b>	13 Feet
<b>County:</b>	Lake	<b>Mean Depth:</b>	5 Feet
<b>Legal Description:</b>	T106N-R35W-Sec, 10-11, 14-15, 22-23	<b>OHWM Elevation:</b>	1,669
<b>Surface Area:</b>	1,279 Acres	<b>Outlet Elevation:</b>	1,668

## Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 14, 2021	6 net-nights

## **Common Fish Species Present**

Walleye

Yellow Perch

Black Bullhead

Common Carp

White Sucker

White Bass

Channel Catfish

Northern Pike

Bigmouth Buffalo

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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	CI-80
AFS std gill net	Bigmouth Buffalo	4	0.7	0.5	50		25			
	Black Bullhead	72	12.0	5.7	90	5	6			
	Channel Catfish	9	1.5	1.4	100		22	91	3	
	Common Carp	47	7.8	2.7	89	7	9			
	Northern Pike	4	0.7	0.6	75		25	73	2	
	Walleye	3	0.5	0.5	33		0	87	2	
	White Bass	12	2.0	0.9	100		58	24	91	3
	White Sucker	29	4.8	1.7	100		97			
	Yellow Perch	15	2.5	1.3	80		33		106	4

## 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 gill net	Bigmouth Buffalo						0.8	0.3	0.7		0.7	0.63
	Black Bullhead						8.0	2.2	0.3		12.0	5.63
	Channel Catfish						0.5	1.5	1.3		1.5	1.20
	Common Carp						5.3	2.3	0.5		7.8	3.98
	Northern Pike						0.0	0.0	0.0		0.7	0.18
	Walleye						1.2	0.5	0.7		0.5	0.73
	White Bass						8.0	8.0	1.3		2.0	4.83
	White Sucker						10.2	4.5	6.8		4.8	6.58
	Yellow Perch						2.7	5.8	3.8		2.5	3.70
fall night EF-WAE*	Walleye	42.5	18.5									30.50
	Yellow Perch	0.0	0.0									0.00
frame net (std 3/4 in)	Bigmouth Buffalo	4.5	6.4									5.45
	Black Bullhead	228.3	16.0									122.15
	Black Crappie	0.8	0.2									0.50
	Bluegill	1.0	0.2									0.60
	Channel Catfish	2.7	0.0									1.35
	Common Carp	2.2	0.7									1.45
	Green Sunfish	0.2	0.0									0.10
	Northern Pike	0.3	2.3									1.30
	Smallmouth Bass	0.1	0.0									0.05
	Walleye	0.3	1.1									0.70
	White Bass	0.9	3.7									2.30
	White Sucker	3.0	4.5									3.75
Yellow Perch	8.9	0.1									4.50	
std exp gill net	Bigmouth Buffalo	0.8	1.3	0.3	0.0	0.0						0.48
	Black Bullhead	32.0	12.3	35.0	40.0	14.0						26.66
	Black Crappie	0.0	0.0	0.0	0.0	0.3						0.06
	Channel Catfish	1.0	0.0	0.3	0.0	0.0						0.26
	Common Carp	1.5	1.3	1.3	0.0	0.3						0.88
	Green Sunfish	0.3	0.0	0.0	0.0	0.0						0.06
	Northern Pike	1.8	0.0	0.7	0.7	1.0						0.84
	Smallmouth Bass	0.0	0.0	0.0	0.0	0.0						0.00
	Walleye	12.0	2.0	4.0	1.0	6.3						5.06

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
std exp gill net	White Bass	6.0	0.7	0.3	2.0	7.3						3.26
	White Sucker	4.5	5.0	6.7	13.0	14.0						8.64
	Yellow Perch	33.3	0.7	4.0	8.3	18.0						12.86

## 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 gill net	Bigmouth Buffalo	PSD						40	0	25		50
		PSD-P						0	0	0		25
	Black Bullhead	PSD						71	100	100		90
		PSD-P						48	69	0		6
	Channel Catfish	PSD						67	22	88		100
		PSD-P						33	11	0		22
		Wr						105	97	92		91
	Common Carp	PSD						6	100	67		89
		PSD-P						3	14	67		9
	Northern Pike	PSD										75
		PSD-P										25
		Wr										73
	Walleye	PSD						43	33	100		33
		PSD-P						29	33	0		0
		Wr						82	81	92		87
	White Bass	PSD						63	100	75		100
		PSD-P						46	54	75		58
		Wr						83	79	93		91
	White Sucker	PSD						97	96	78		100
		PSD-P						87	96	71		97
	Yellow Perch	PSD						81	80	17		80
PSD-P							6	54	17		33	
Wr							105	97	112		106	
frame net (std 3/4 in)	Bigmouth Buffalo	PSD	9	97								
		PSD-P	2	8								
		Wr	98	97								
	Black Bullhead	PSD	67	92								
		PSD-P	0	13								
		Wr	89	87								
	Channel Catfish	PSD	96									
		PSD-P	33									
		Wr	94									
	Common Carp	PSD	73	100								

Gear	Species	Index	Year															
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021						
frame net (std 3/4 in)	Common Carp	PSD-P	9	29														
		Wr	92	93														
	Northern Pike	PSD	67	57														
		PSD-P	0	4														
		Wr	83	70														
	Walleye	PSD	0	73														
		PSD-P	0	0														
		Wr	85	91														
	White Bass	PSD	100	100														
		PSD-P	100	100														
		Wr	98	86														
	White Sucker	PSD	100	100														
		PSD-P	93	100														
		Wr	78	88														
	Yellow Perch	PSD	54	100														
		PSD-P	4	0														
		Wr	93	112														
	std exp gill net	Bigmouth Buffalo	PSD	33	100	100												
PSD-P			0	0	0													
Wr			115	95														
Black Bullhead		PSD	50	68	18	97	60											
		PSD-P	0	0	2	8	19											
		Wr	92	102														
Channel Catfish		PSD	100		100													
		PSD-P	25		100													
		Wr	91		100													
Common Carp		PSD	67	100	100		100											
		PSD-P	0	0	100		100											
		Wr	90	97														
Northern Pike		PSD	71		50	50	67											
		PSD-P	0		50	0	0											
		Wr	87		83	86	84											
Walleye		PSD	58	50	67	33	21											
		PSD-P	8	0	17	0	5											
		Wr	93	93	95	79	85											
White Bass		PSD	100	100	100	83	95											
		PSD-P	96	100	100	67	14											

Gear	Species	Index	Year									
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
std exp gill net	White Bass	Wr	99	91	89	88	93					
		PSD	100	100	80	97	93					
	White Sucker	PSD-P	61	87	80	97	88					
		Wr	93	106								
		PSD	71	0	100	40	33					
	Yellow Perch	PSD-P	3	0	0	36	11					
		Wr	91	112	100	106	104					

## 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+
2018	5	204 (2)			335 (2)	537 (1)					
2013	7	219 (1)	330 (3)	412 (2)		483 (1)					
2012	53	260 (19)	396 (18)	430 (3)	413 (6)	474 (4)		499 (2)		525 (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	35	167 (7)	224 (5)	261 (16)	300 (5)		323 (2)				
2013	2	135 (1)	193 (1)								
2012	133	163 (35)	223 (76)	235 (24)							

## **Fish Condition**

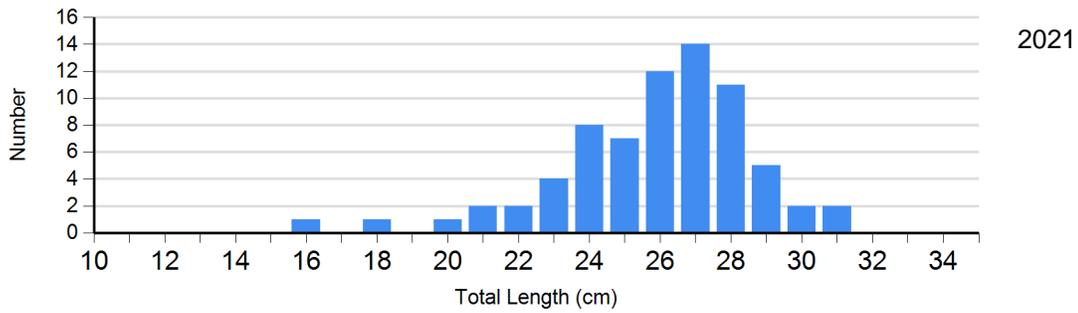
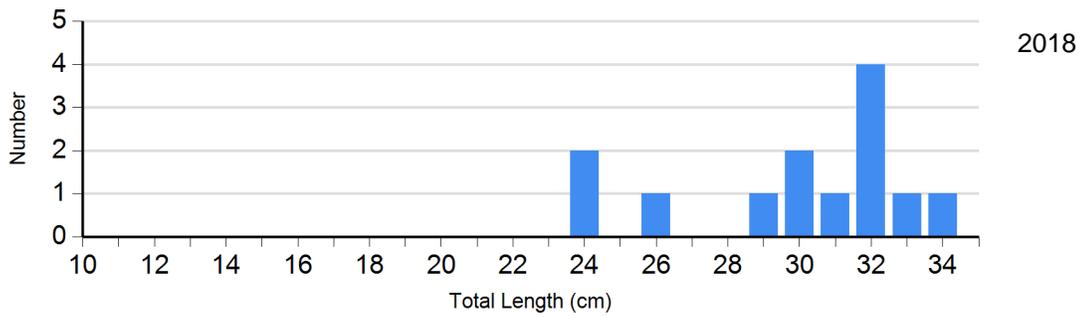
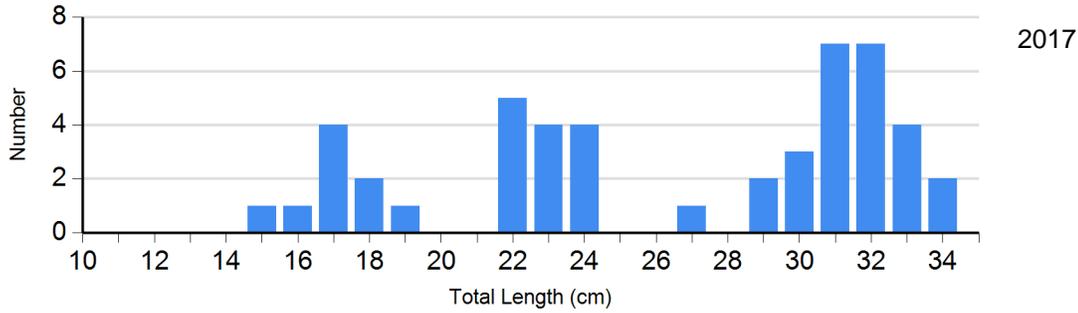
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	2017	1	119	1	92	0		1	102
	2018	7	98 (3.4)	1	90	0		1	101
	2019	1	95	7	92 (2.4)	0		0	
	2021	0		7	91 (2.7)	2	91 (5.8)	0	
Northern Pike Gill Net	2021	1	73	2	73 (2.6)	1	71	0	
Walleye Gill Net	2017	4	82 (2.0)	1	82	1	87	1	80
	2018	2	74 (4.8)	0		1	95	0	
	2019	0		4	92 (2.8)	0		0	
	2021	2	88 (2.8)	1	85	0		0	
White Bass Gill Net	2017	18	89 (2.0)	8	87 (1.7)	22	77 (3.6)	0	
	2018	0		22	77 (1.0)	26	81 (1.3)	0	
	2019	2	102 (0.7)	0		5	89 (1.6)	1	91
	2021	0		5	92 (0.9)	7	90 (3.4)	0	
Yellow Perch Gill Net	2017	3	110 (4.8)	12	104 (3.8)	1	101	0	
	2018	7	95 (4.6)	9	99 (1.9)	14	99 (1.9)	5	89 (2.9)
	2019	19	114 (3.0)	0		3	105 (6.7)	1	101
	2021	3	117 (3.5)	7	107 (4.1)	5	98 (2.0)	0	

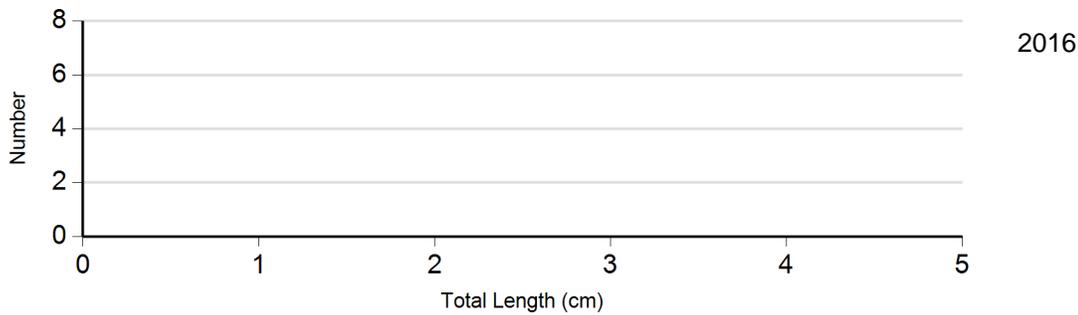
## Length Frequency Distribution

Length frequency histogram of species sampled by year.

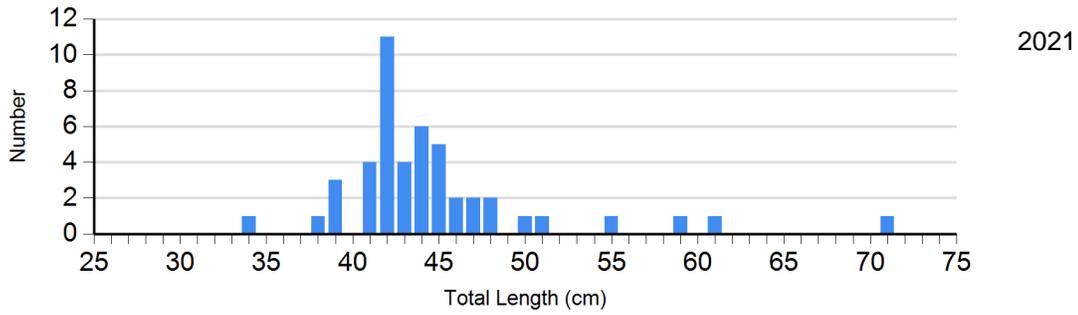
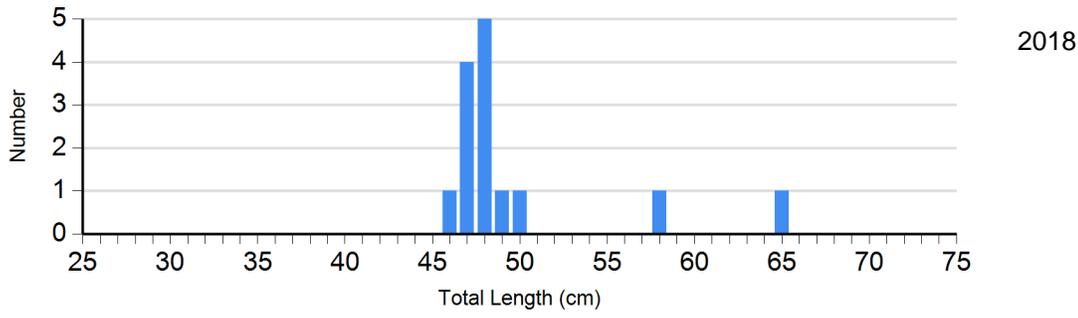
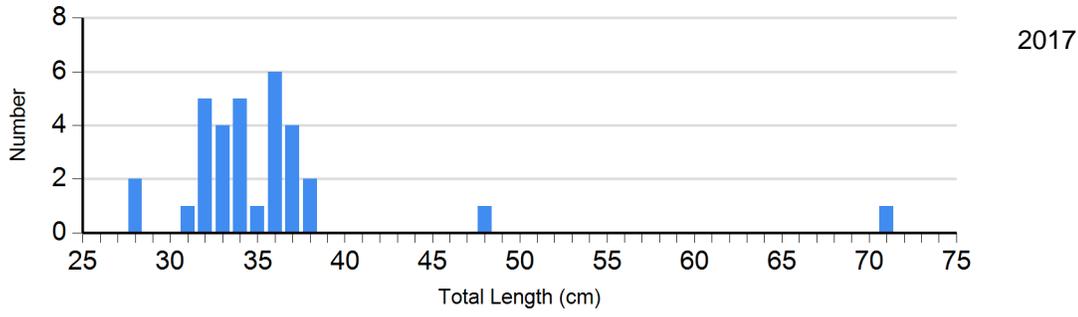
Species: Black Bullhead  
Gear: AFS std gill net



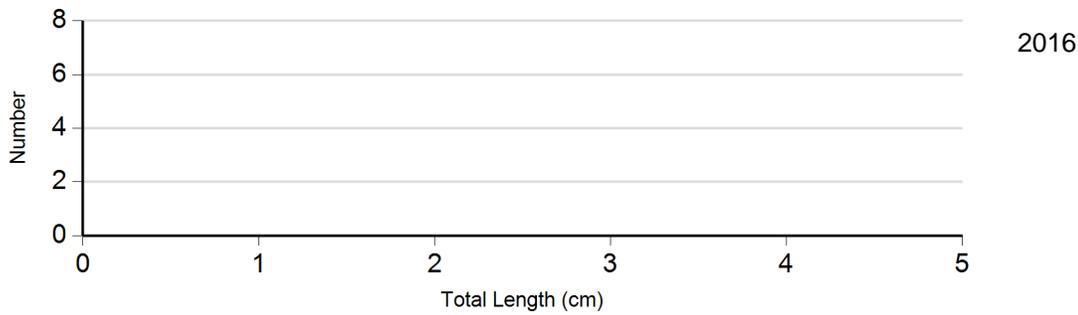
Species: Black Bullhead  
Gear: std exp gill net



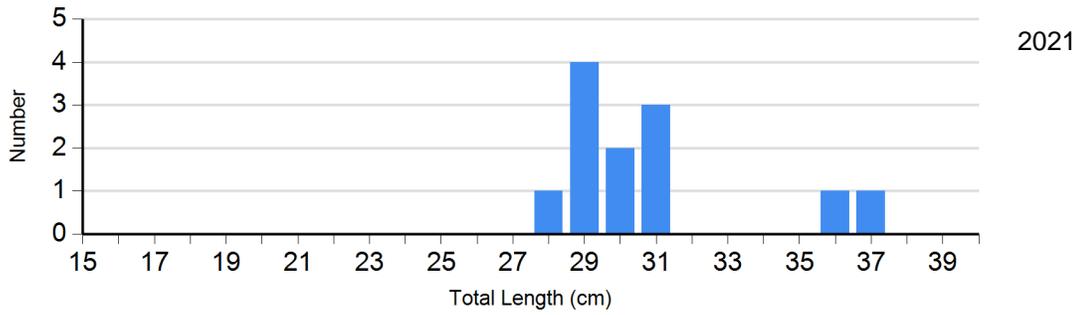
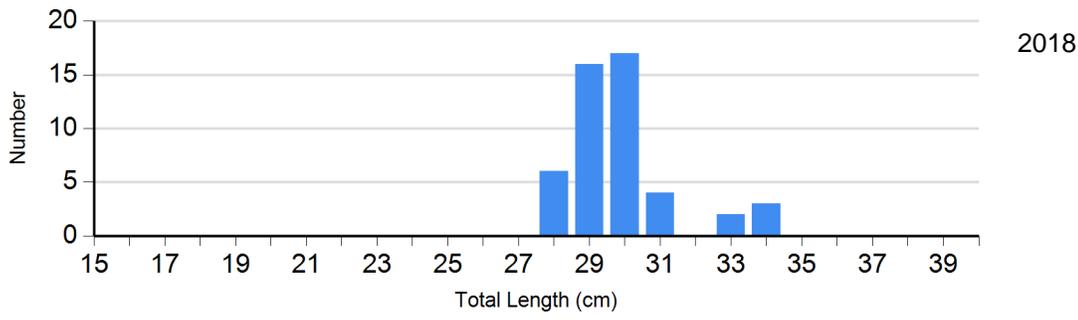
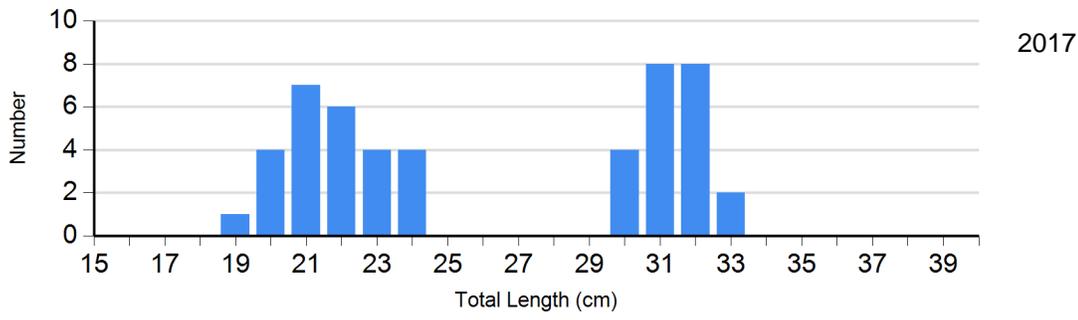
Species: Common Carp  
Gear: AFS std gill net



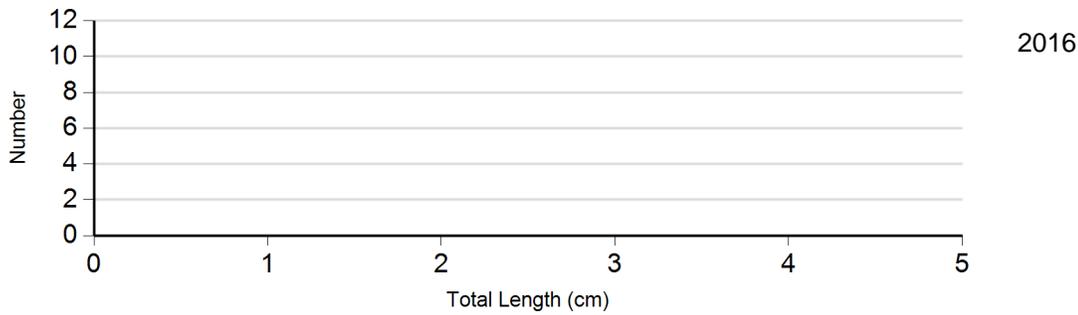
Species: Walleye  
Gear: std exp gill net



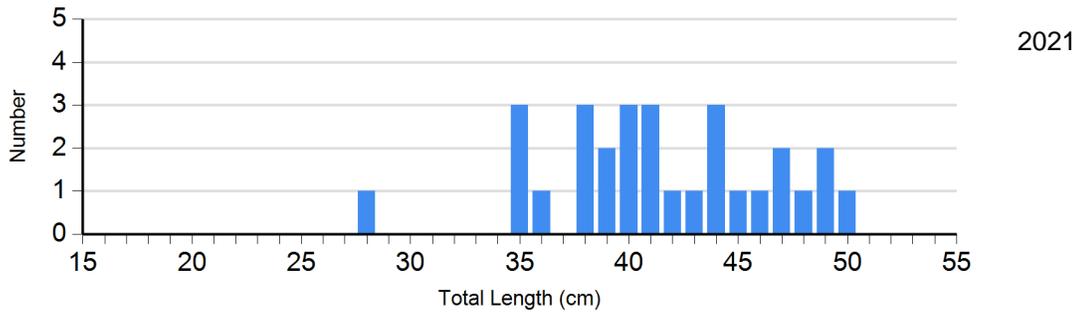
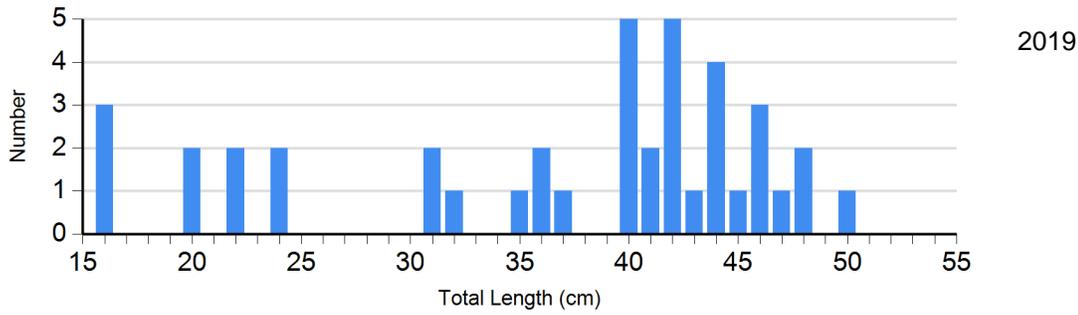
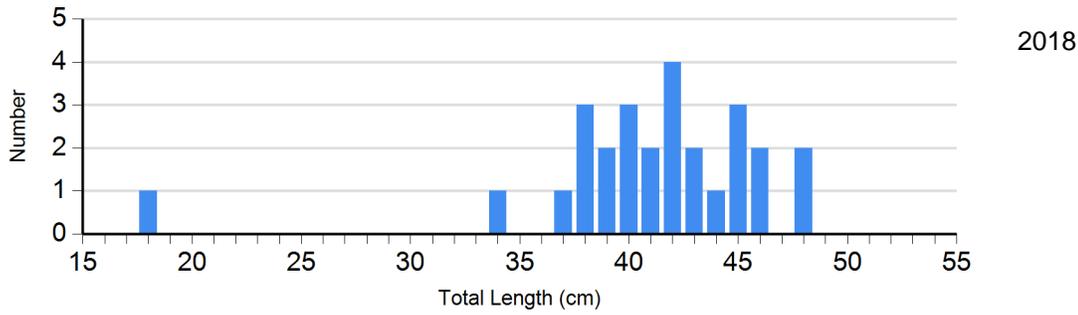
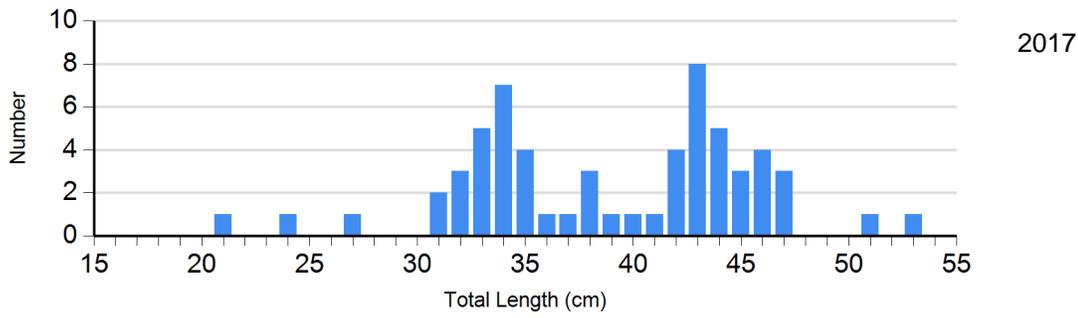
Species: White Bass  
Gear: AFS std gill net



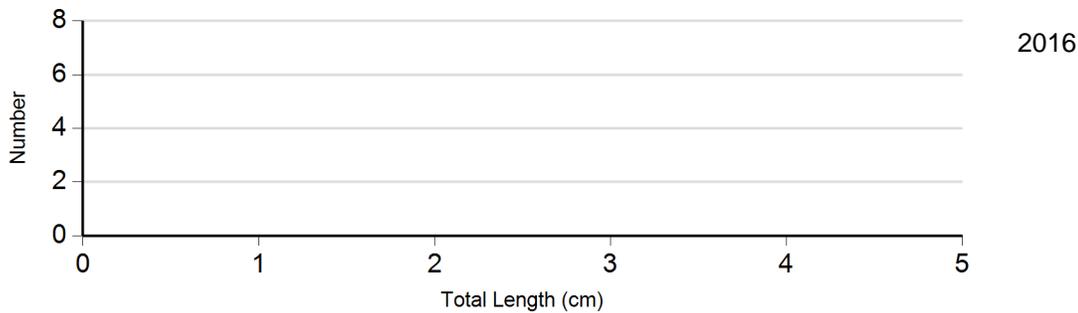
Species: White Bass  
Gear: std exp gill net



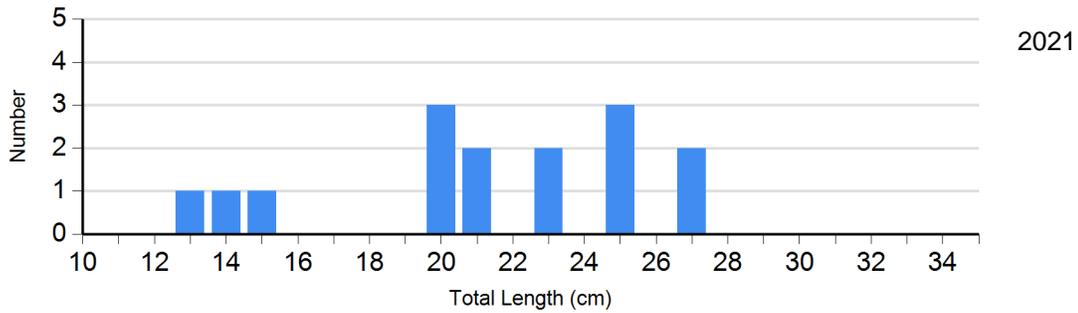
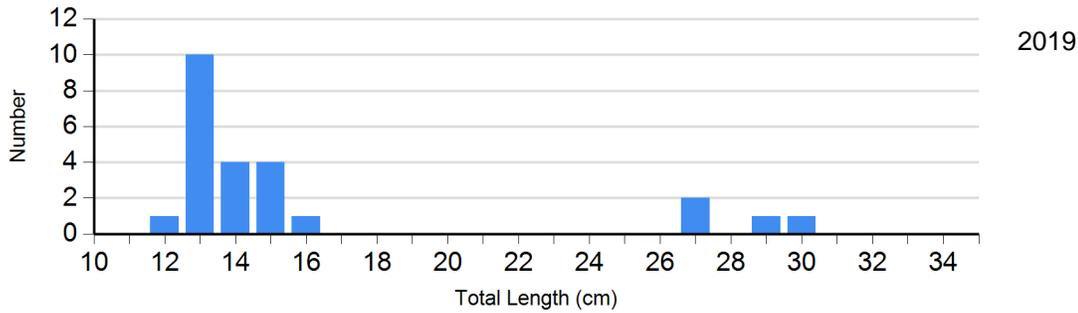
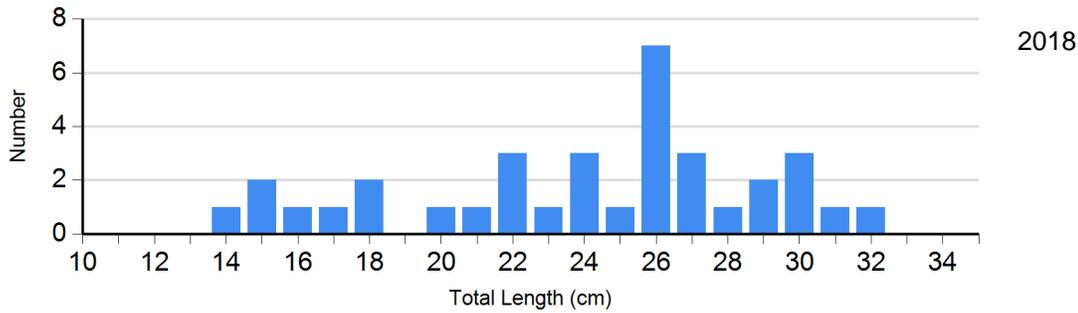
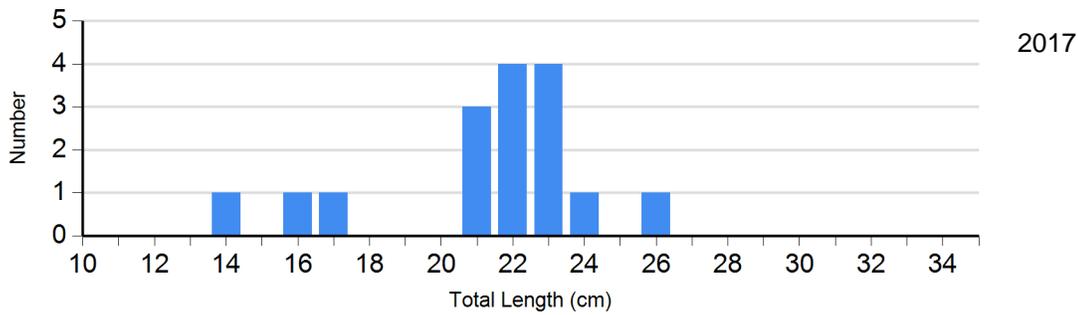
Species: White Sucker  
 Gear: AFS std gill net



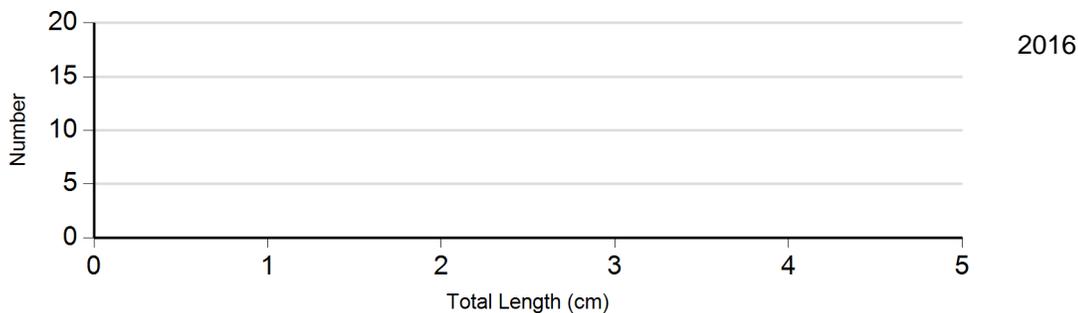
Species: White Sucker  
 Gear: std exp gill net



Species: Yellow Perch  
Gear: AFS std gill net



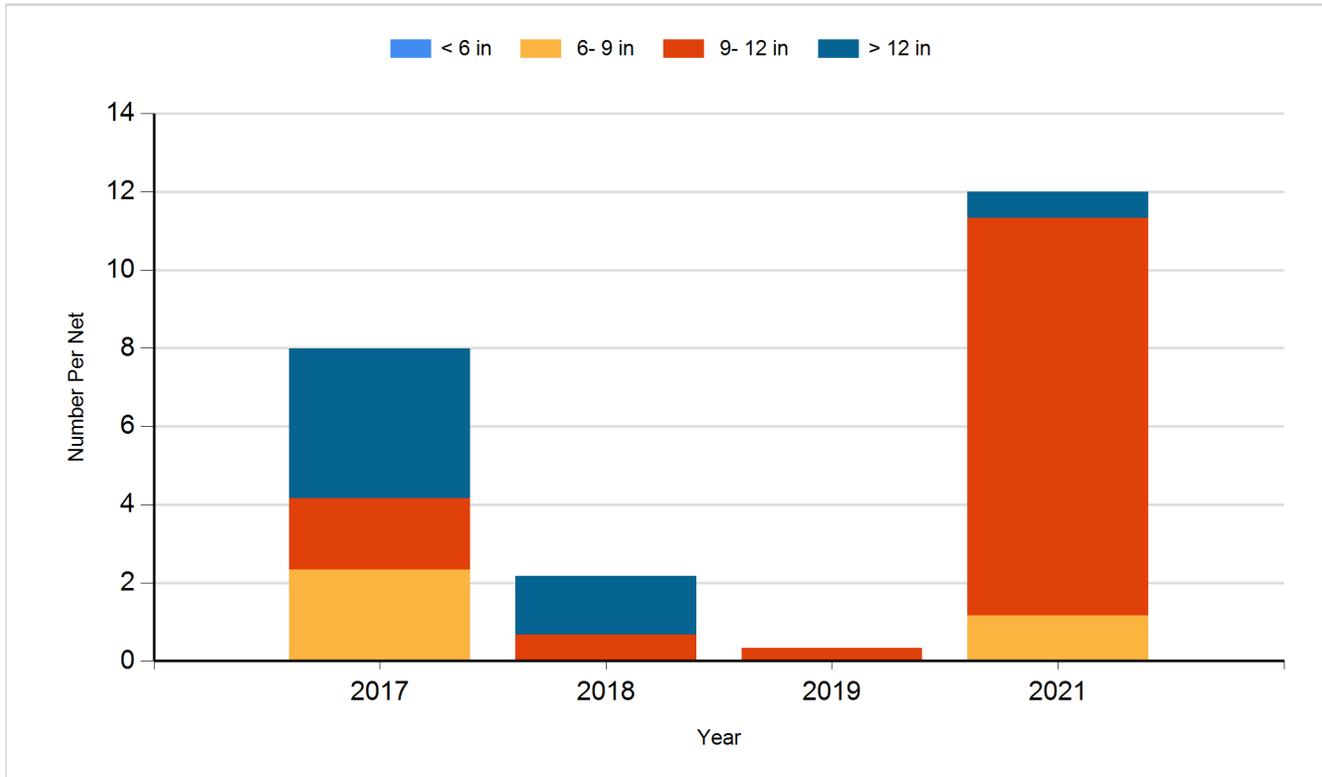
Species: Yellow Perch  
Gear: std exp gill net



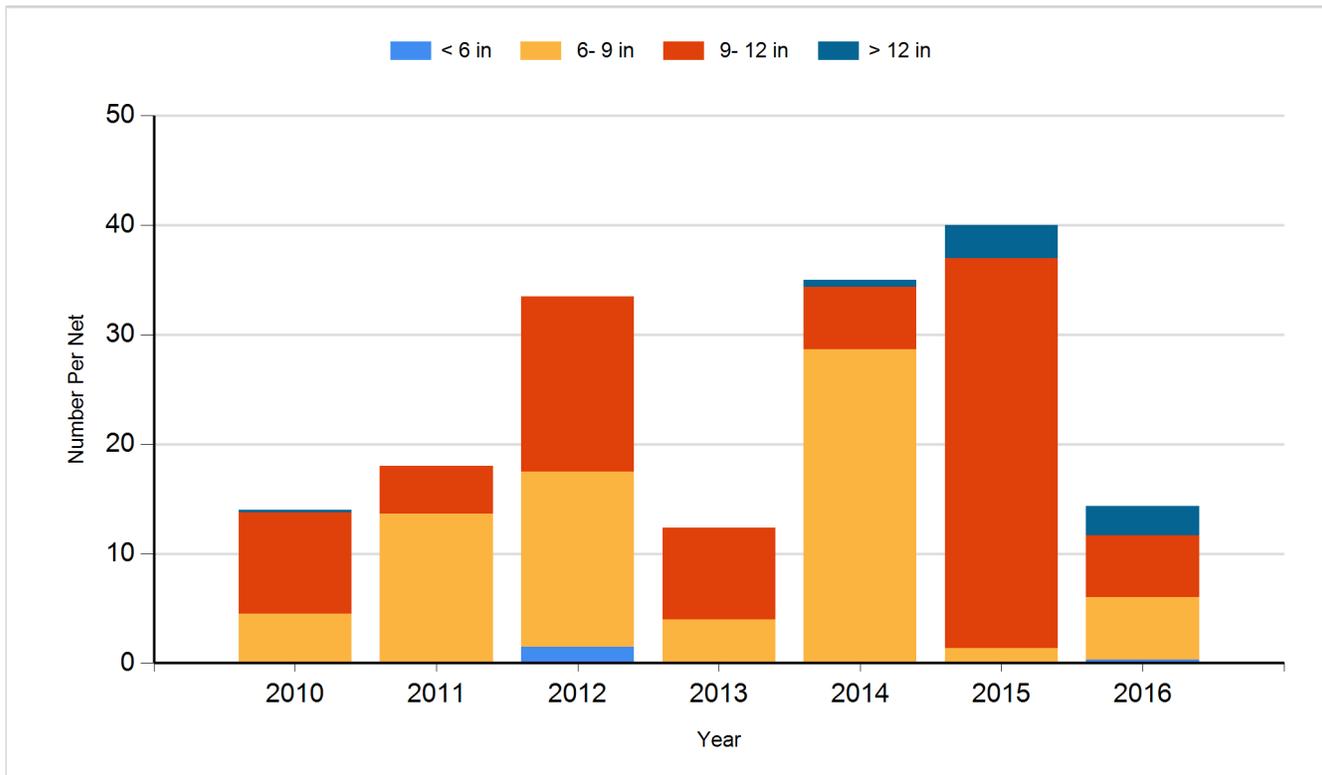
## Historic Fish Sizes and Relative Abundance

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

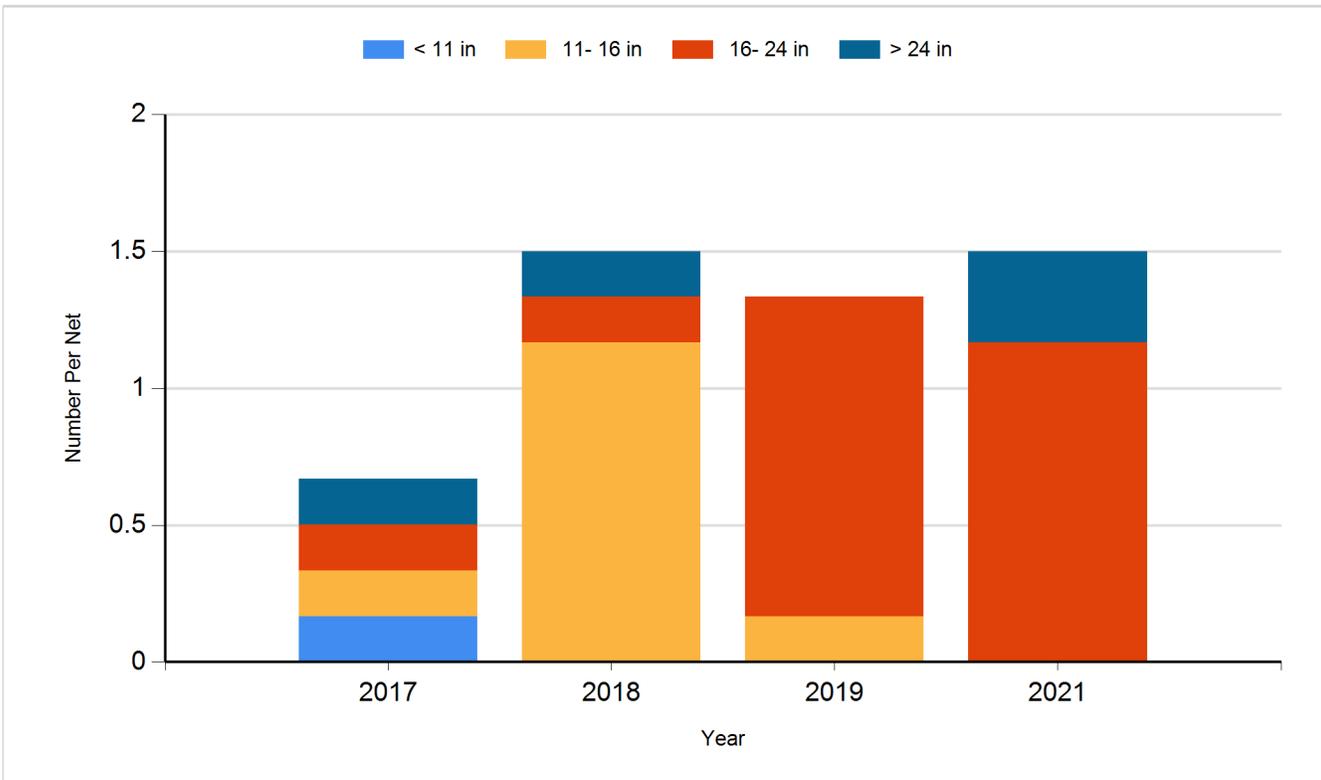
Species: Black Bullhead  
Gear: AFS std gill net



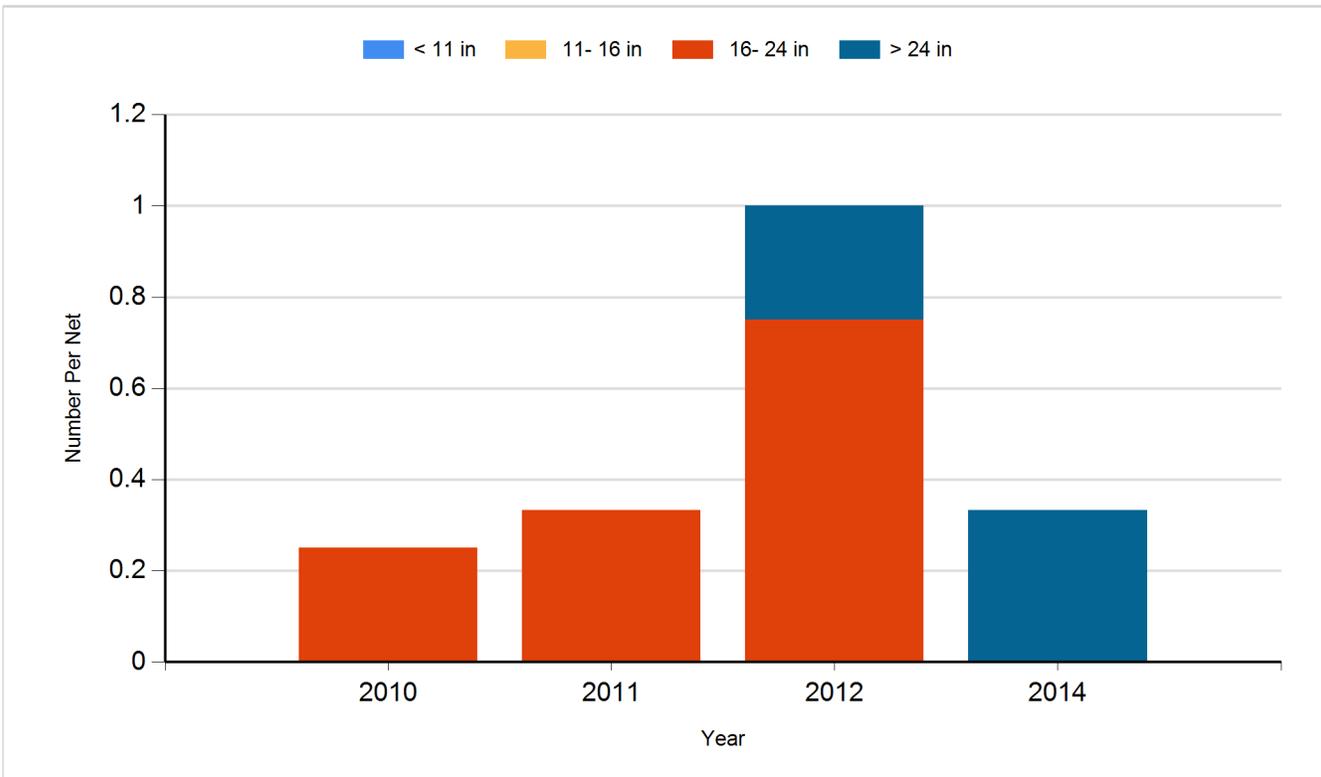
Species: Black Bullhead  
Gear: std exp gill net



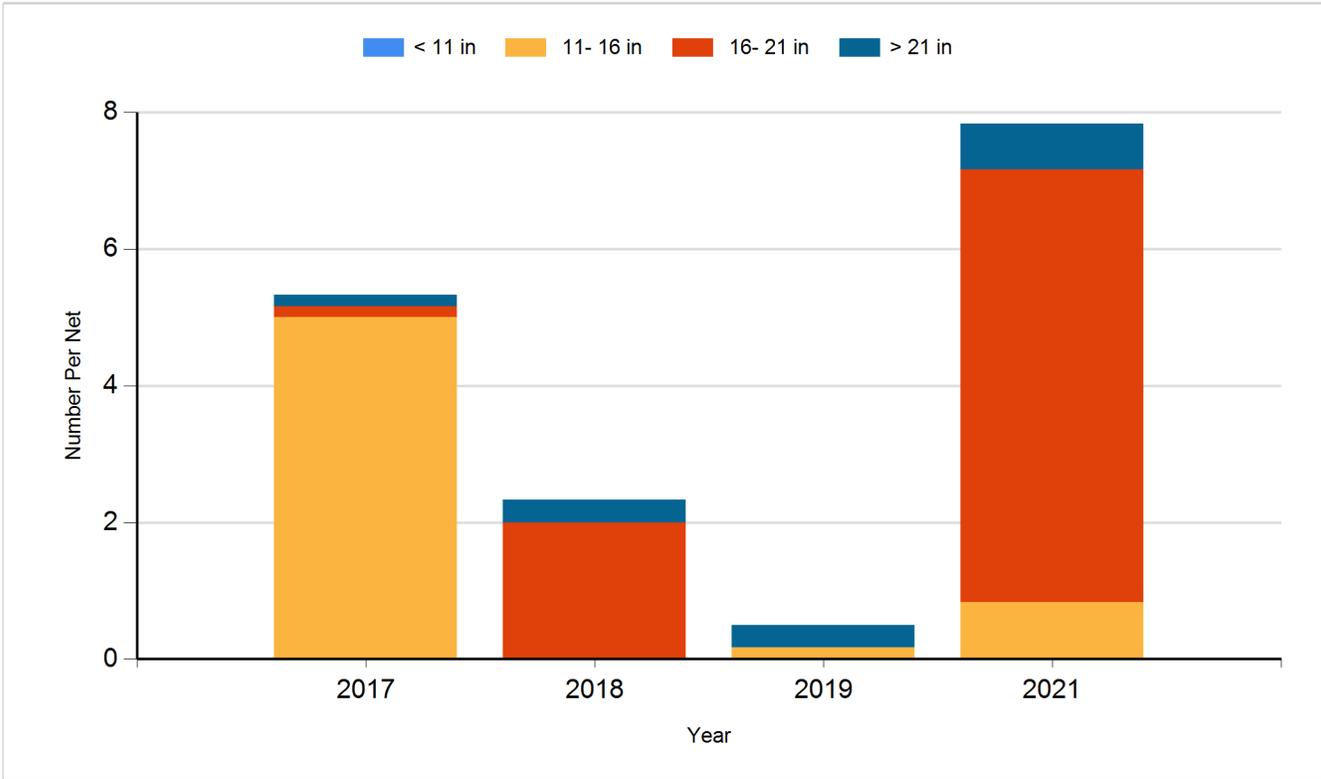
Species: Channel Catfish  
Gear: AFS std gill net



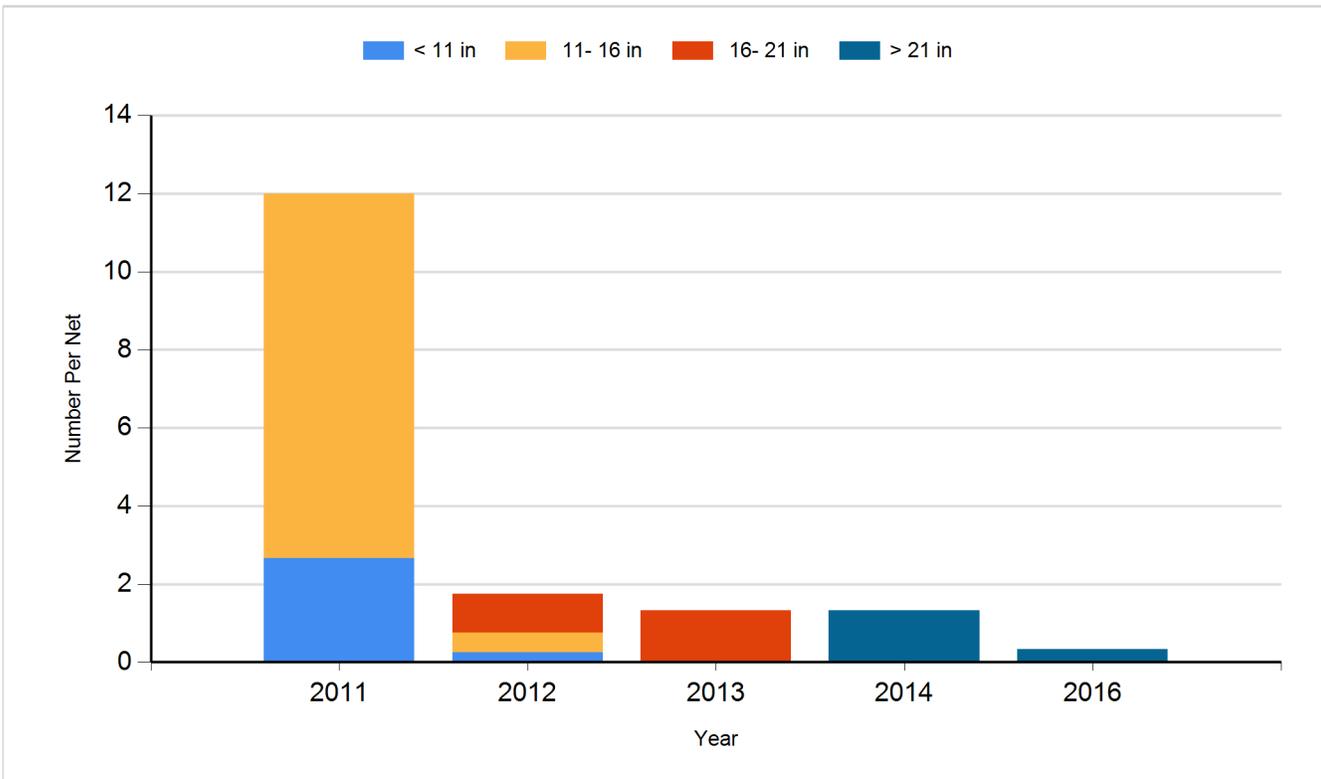
Species: Channel Catfish  
Gear: std exp gill net



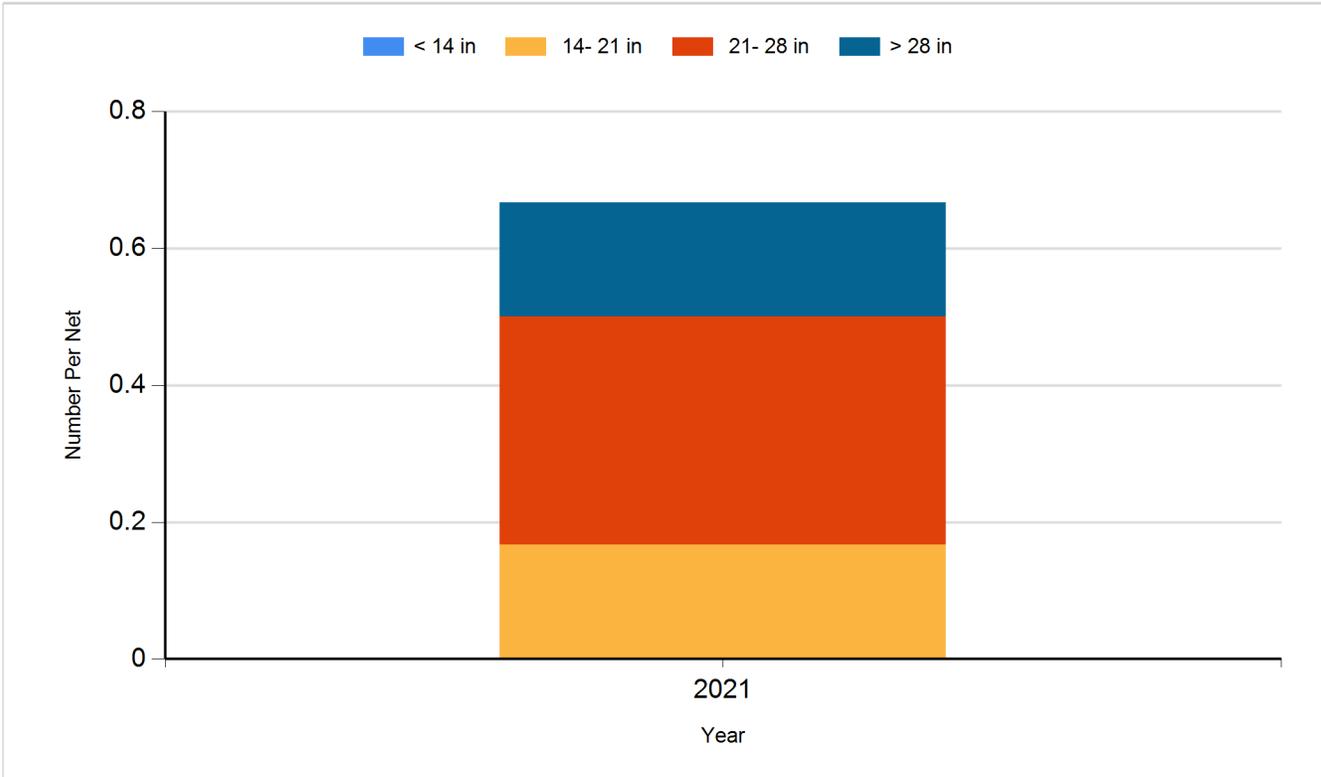
Species: Common Carp  
Gear: AFS std gill net



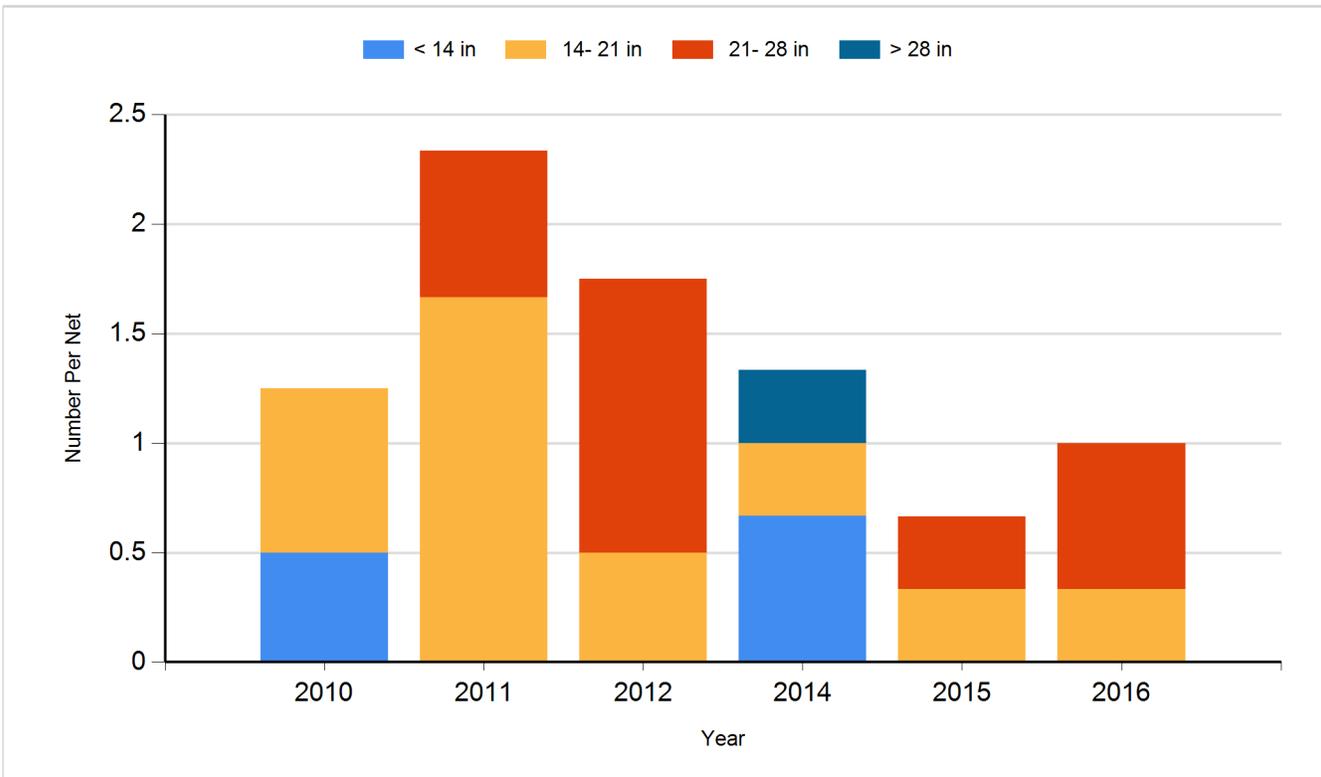
Species: Common Carp  
Gear: std exp gill net



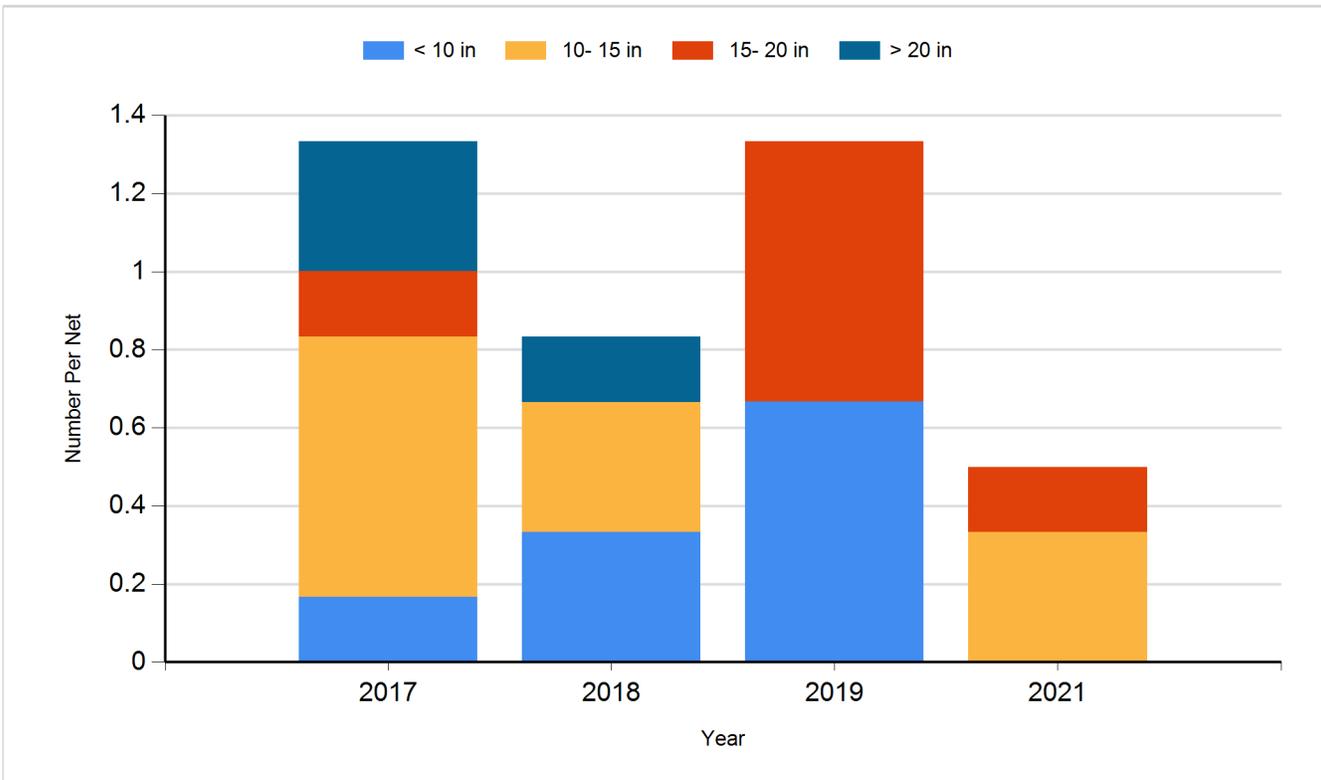
Species: Northern Pike  
Gear: AFS std gill net



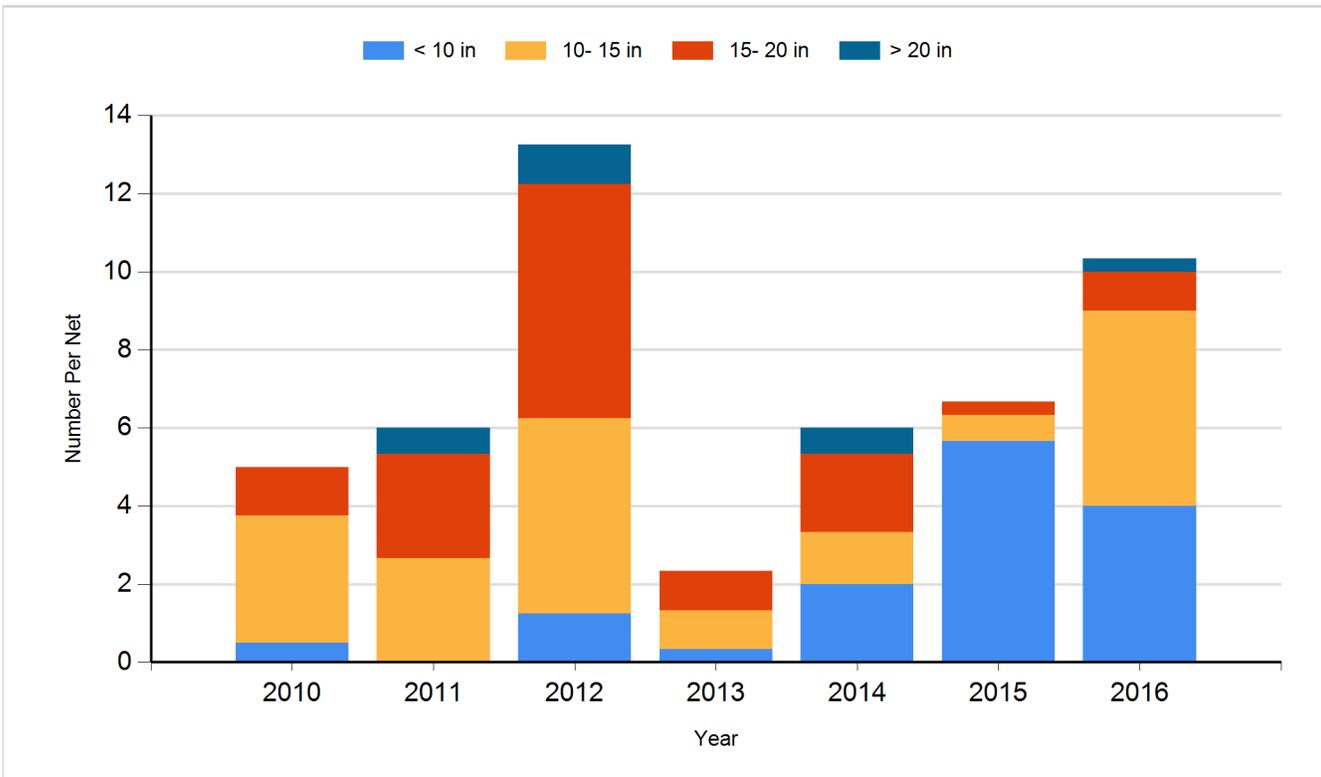
Species: Northern Pike  
Gear: std exp gill net



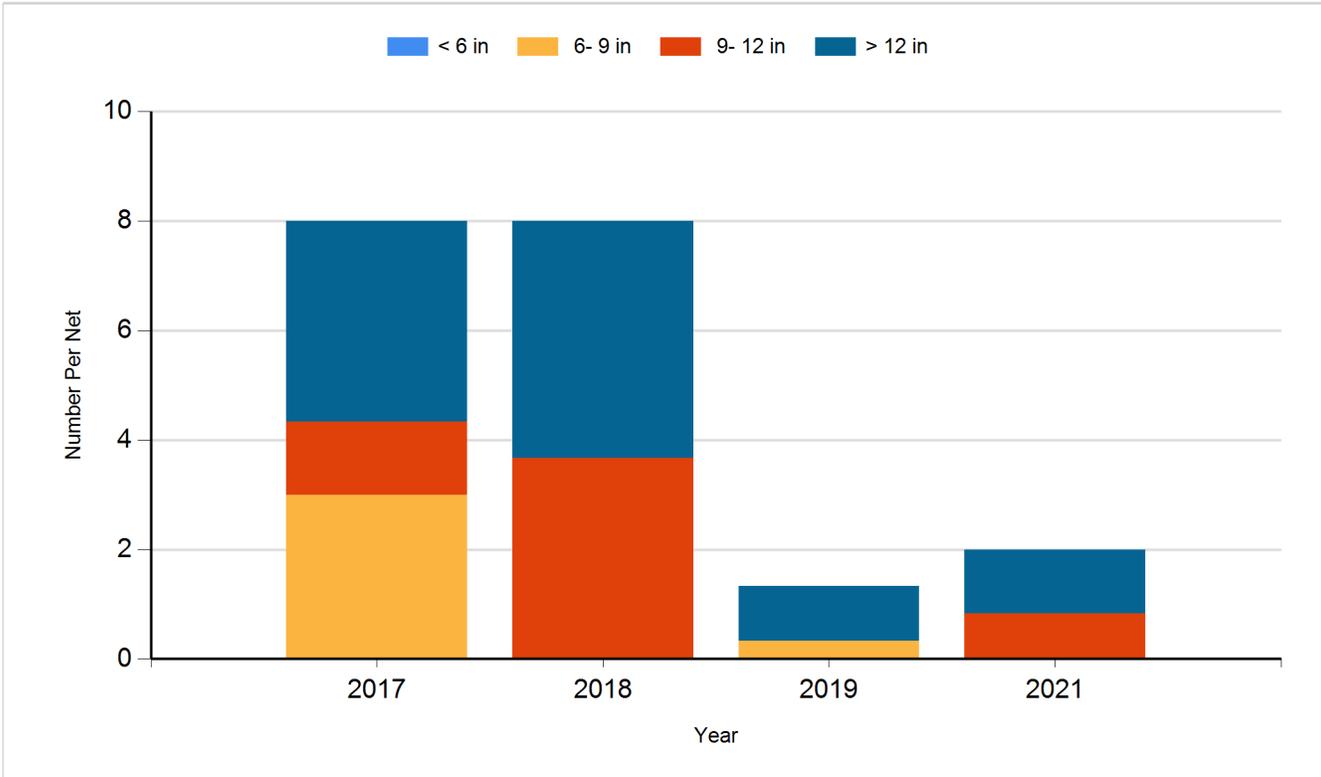
Species: Walleye  
Gear: AFS std gill net



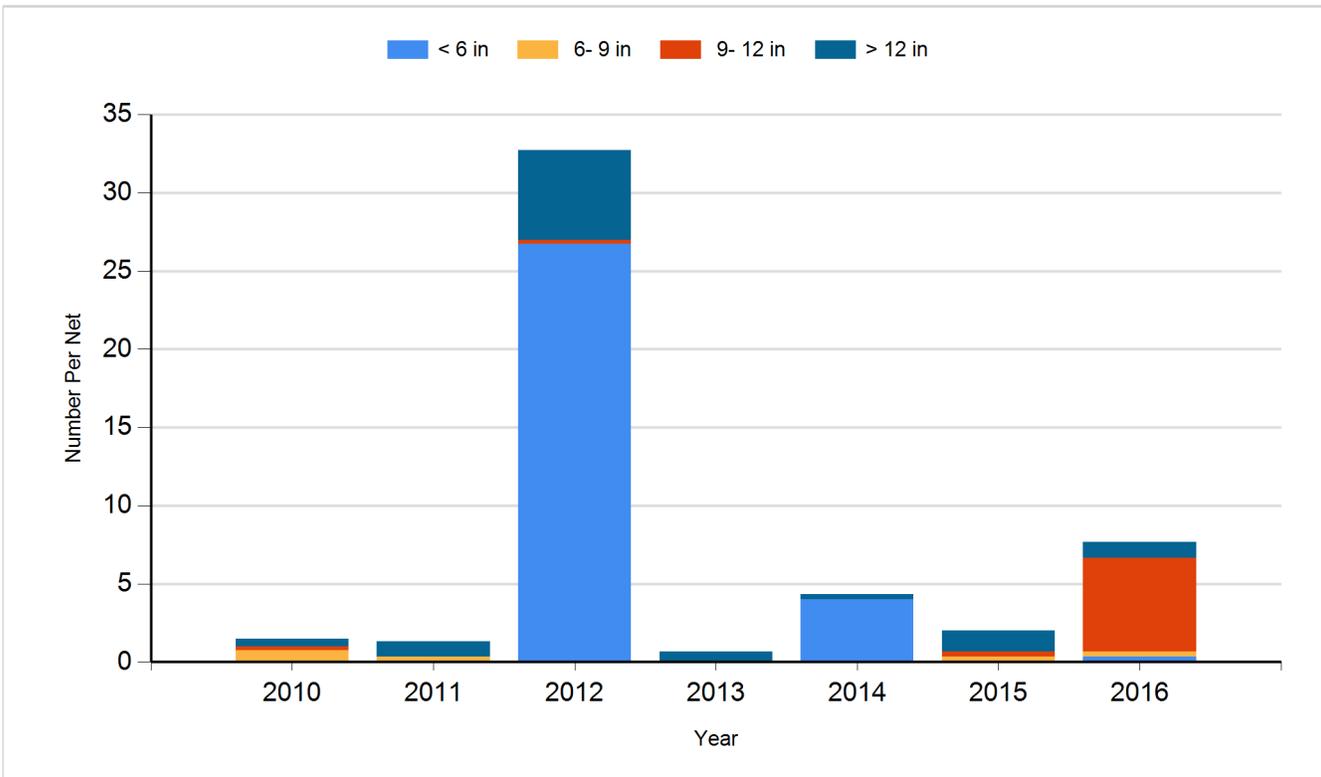
Species: Walleye  
Gear: std exp gill net



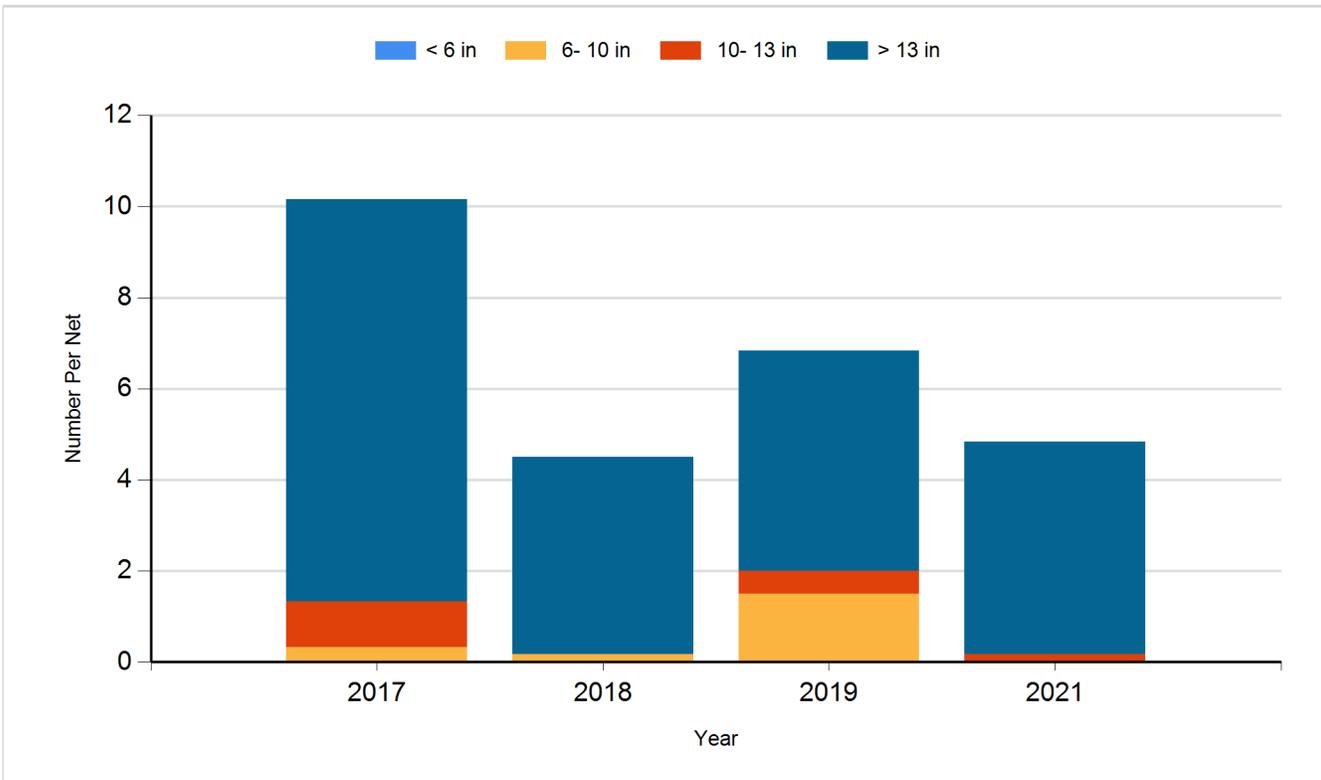
Species: White Bass  
Gear: AFS std gill net



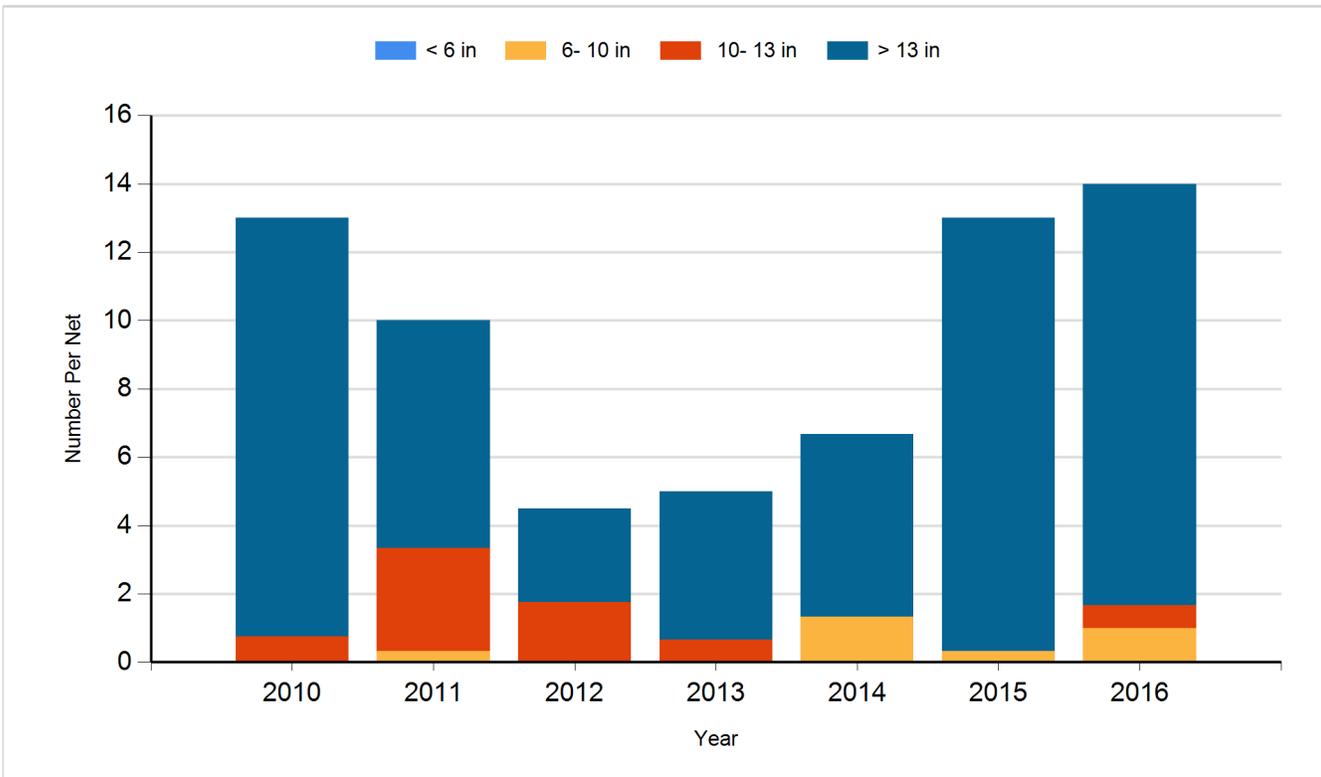
Species: White Bass  
Gear: std exp gill net



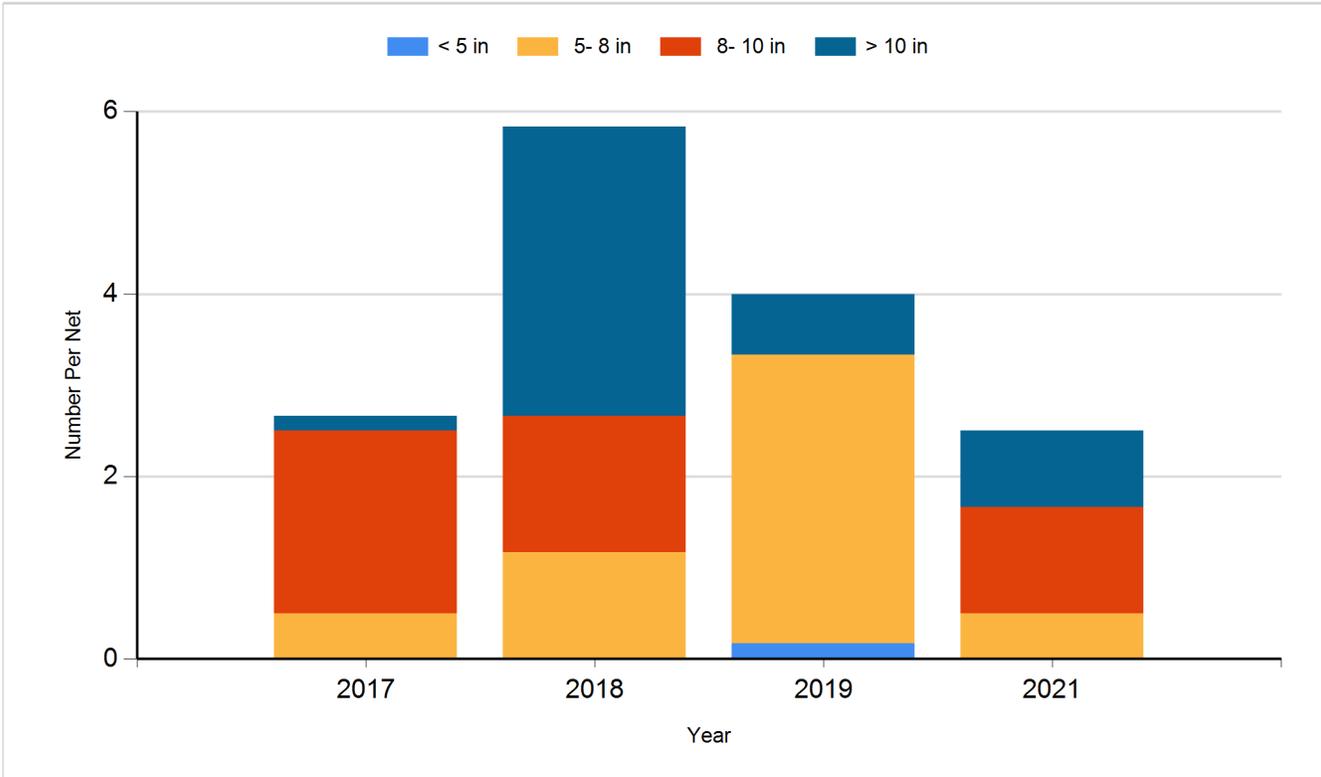
Species: White Sucker  
Gear: AFS std gill net



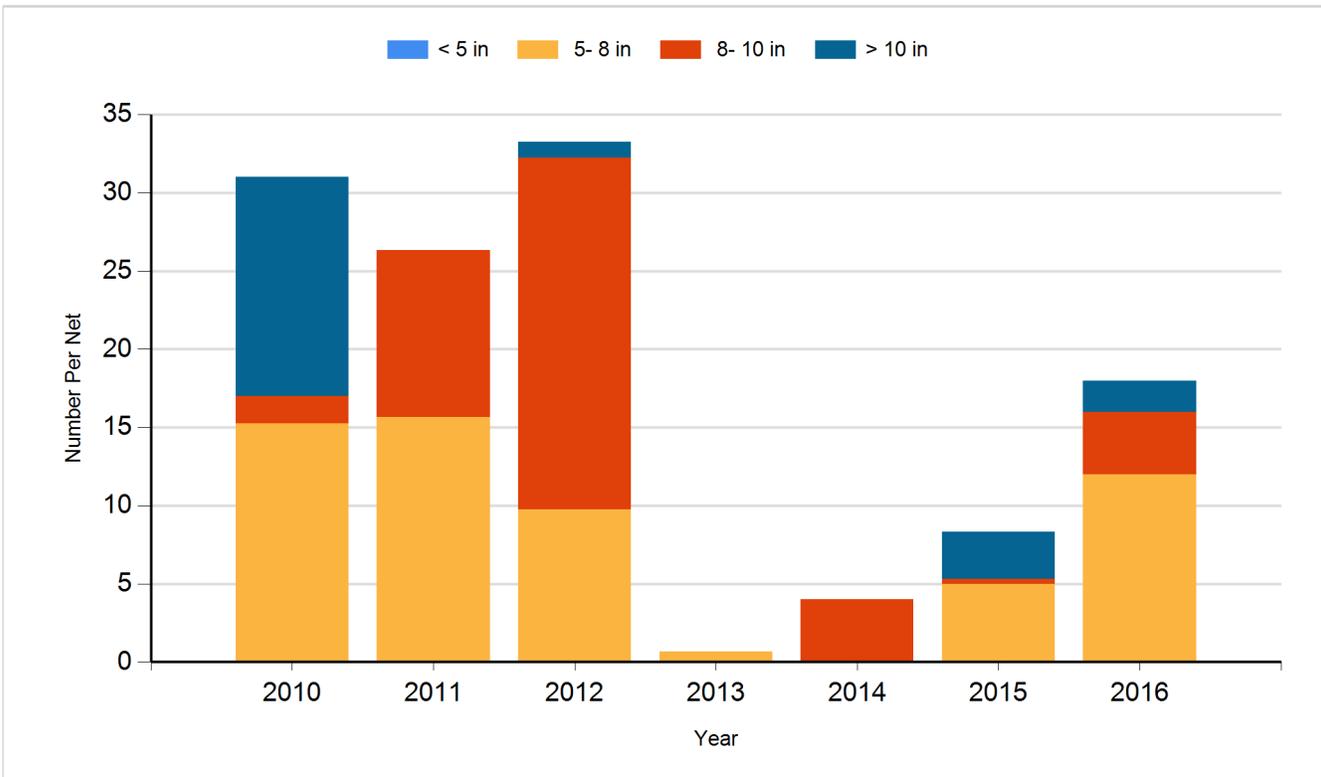
Species: White Sucker  
Gear: std exp gill net



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
2010	Walleye	Large Fingerling	1,312
2011	Walleye	Small Fingerling	135,790
2012	Walleye	Small Fingerling	130,130
2013	Walleye	Small Fingerling	135,200
2014	Walleye	Small Fingerling	95,920
2015	Walleye	Fry	337,604
2016	Walleye	Fry	340,000
2017	Walleye	Fry	340,000
2018	Walleye	Fry	340,000
2019	Walleye	Fry	340,000
2021	Walleye	Fry	2,700,000