SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Herman, Lake County

LBS-Lake-136-000

2018

Lake Information

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

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jul 05, 2018	6 net-nights

Common Fish Species Present

Walleye

Yellow Perch

White Bass

White Sucker

Common Carp

Black Bullhead

Channel Catfish

Bigmouth Buffalo

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	Bigmouth Buffalo	5	0.3	0.3	0		0			
	Black Bullhead	13	2.2	0.5	100		69			
	Channel Catfish	9	1.5	1.0	22		11		97	4
	Common Carp	14	2.3	0.7	100		14			
	Walleye	5	0.5	0.3	33		33		81	10
	White Bass	48	8.0	3.0	100		54	11	79	1
	White Sucker	27	4.5	1.6	96		96			
	Yellow Perch	35	5.8	1.9	80	11	54	13	97	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.

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std gill net	Bigmouth Buffalo									0.8	0.3	0.6
	Black Bullhead									8.0	2.2	5.1
	Channel Catfish									0.5	1.5	1.0
	Common Carp									5.3	2.3	3.8
	Walleye									1.2	0.5	0.9
	White Bass									8.0	8.0	8.0
	White Sucker									10.2	4.5	7.4
	Yellow Perch									2.7	5.8	4.3
fall night EF-WAE	Walleye	6.5	1.0	26.5	42.5	18.5						19.0
	Yellow Perch				0.0							0.0
frame net (std 3/4 in)	Bigmouth Buffalo	10.1	9.5	4.4	4.5	6.4						7.0
	Black Bullhead	109.1	71.6	275.1	228.3	16.0						140.0
	Black Crappie	0.1	0.6	1.5	0.8	0.2						0.6
	Bluegill	0.8	0.2	0.1	1.0	0.2						0.5
	Channel Catfish	0.2	2.5	0.4	2.7							1.5
	Common Carp		0.5	7.3	2.2	0.7						2.7
	Green Sunfish		0.1		0.2							0.2
	Northern Pike	0.2	1.5	3.1	0.3	2.3						1.5
	Smallmouth Bass		0.3		0.1							0.2
	Walleye	1.4	1.0	0.4	0.3	1.1						0.8
	White Bass	1.9	1.7	3.4	0.9	3.7						2.3
	White Sucker	11.1	31.0	11.9	3.0	4.5						12.3
	Yellow Perch	0.6	0.8		8.9	0.1						2.6
std exp gill net	Bigmouth Buffalo		0.8	0.0	0.8	1.3	0.3					0.6
	Black Bullhead	6.0	14.0	18.0	32.0	12.3	35.0	40.0	14.0			21.4
	Black Crappie								0.3			0.3
	Channel Catfish	0.3	0.3	0.3	1.0		0.3					0.4
	Common Carp			9.3	1.5	1.3	1.3		0.3			2.7
	Green Sunfish				0.3							0.3
	Northern Pike	1.3	0.8	2.3	1.8		0.7	0.7	1.0			1.2
	Smallmouth Bass			0.3								0.3
	Walleye	2.7	4.5	6.0	12.0	2.0	4.0	1.0	6.3			4.8
	White Bass	2.0	1.5	1.3	6.0	0.7	0.3	2.0	7.3			2.6
	White Sucker	15.0	13.0	10.0	4.5	5.0	6.7	13.0	14.0			10.2

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
std exp gill net	Yellow Perch	14.7	31.0	26.3	33.3	0.7	4.0	8.3	18.0			17.0

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Bigmouth Buffalo	PSD									40	0
		PSD-P									0	0
	Black Bullhead	PSD									71	100
		PSD-P									48	69
	Channel Catfish	PSD									67	22
		PSD-P									33	11
		Wr									105	97
	Common Carp	PSD									6	100
		PSD-P									3	14
	Walleye	PSD									43	33
		PSD-P									29	33
		Wr									82	81
	White Bass	PSD									63	100
		PSD-P									46	54
		Wr									83	79
	White Sucker	PSD									97	96
		PSD-P									87	96
	Yellow Perch	PSD									81	80
		PSD-P									6	54
		Wr									105	97
fall night EF-WAE	Walleye	Wr	86	127	84	84	75					
frame net (std 3/4 in)	Bigmouth Buffalo	PSD	95	81	75	9	97					
		PSD-P	9	5	5	2	8					
		Wr	101	99	93	98	97					
	Black Bullhead	PSD	41	70	14	67	92					
		PSD-P	0	5	1	0	13					
		Wr	112	99	98	89	87					
	Channel Catfish	PSD	0	92	100	96						
		PSD-P	0	0	25	33						
		Wr	116	93	94	94						
	Common Carp	PSD		100	22	73	100					
		PSD-P		100	3	9	29					

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
frame net (std 3/4 in)	Common Carp	Wr		94	103	92	93					
	Walleye	PSD	46	30	25	0	73					
		PSD-P	8	20	0	0	0					
		Wr	89	86	79	85	91					
	White Bass	PSD	100	88	97	100	100					
		PSD-P	76	71	74	100	100					
		Wr	86	98	91	98	86					
	White Sucker	PSD	100	100	99	100	100					
		PSD-P	100	99	96	93	100					
		Wr	94	94	86	78	88					
	Yellow Perch	PSD	80	38		54	100					
		PSD-P	0	38		4	0					
		Wr	106	103		93	112					
std exp gill net	Bigmouth Buffalo	PSD		67	0	33	100	100				
		PSD-P		0	0	0	0	0				
		Wr		90		115	95					
	Black Bullhead	PSD	17	68	24	50	68	18	97	60		
		PSD-P	0	2	0	0	0	2	8	19		
		Wr	114	99	98	92	102					
	Channel Catfish	PSD	0	100	100	100		100				
		PSD-P	0	0	0	25		100				
		Wr		107	94	91		100				
	Common Carp	PSD			0	67	100	100		100		
		PSD-P			0	0	0	100		100		
		Wr			103	90	97					
	Walleye	PSD	75	28	56	58	50	67	33	21		
		PSD-P	13	0	11	8	0	17	0	5		
		Wr	92	84	86	93	93	95	79	85		
	White Bass	PSD	17	50	75	100	100	100	83	95		
		PSD-P	17	33	75	96	100	100	67	14		
		Wr	94	96	91	99	91	89	88	93		
	White Sucker	PSD	100	100	97	100	100	80	97	93		
		PSD-P	76	94	67	61	87	80	97	88		
		Wr	103	102	95	93	106					
	Yellow Perch	PSD	89	51	41	71	0	100	40	33		
		PSD-P	0	45	0	3	0	0	36	11		

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
std exp gill net	Yellow Perch	Wr	107	107	102	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)	
2011	18	275 (4)		400 (9)	430 (2)		542 (3)				
2010	19		276 (11)	349 (5)		470 (3)					
2009	7		274 (1)		433 (5)		550 (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)							
2011	79	151 (44)	218 (33)	223 (2)							
2010	124	155 (60)	191 (1)	260 (63)							

Fish Condition

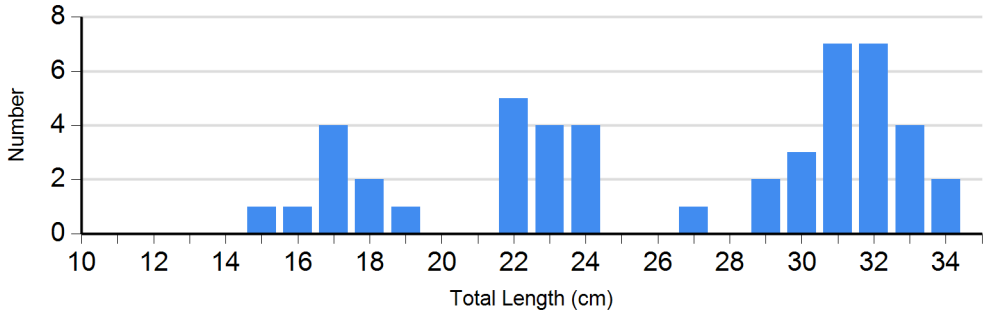
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Channel Catfish Gill Net	2014	0		0		1	100	0	
	2017	1	119	1	92	0		1	102
	2018	7	98 (3.4)	1	90	0		1	101
Walleye Gill Net	2014	4	100 (3.4)	6	91 (2.5)	2	94 (1.8)	0	
	2015	2	74 (7.6)	1	89	0		0	
	2016	15	87 (1.2)	3	78 (8.2)	1	78	0	
	2017	4	82 (2.0)	1	82	1	87	1	80
	2018	2	74 (4.8)	0		1	95	0	
White Bass Gill Net	2018	0		22	77 (1.0)	26	81 (1.3)	0	
White Bass Gill Net	2014	0		0		1	89	0	
	2015	1	88	1	86	0		4	88 (2.0)
	2016	1	93	18	94 (1.4)	3	91 (3.2)	0	
	2017	18	89 (2.0)	8	87 (1.7)	22	77 (3.6)	0	
Yellow Perch Gill Net	2014	0		12	100 (1.7)	0		0	
	2015	15	106 (2.6)	1	108	9	104 (2.0)	0	
	2016	36	103 (1.5)	12	106 (0.6)	5	101 (1.1)	1	102
	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)

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Black Bullhead
Gear: AFS std gill net



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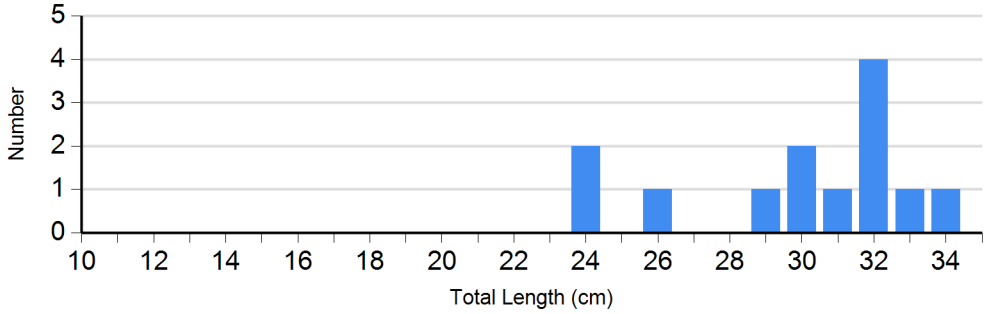

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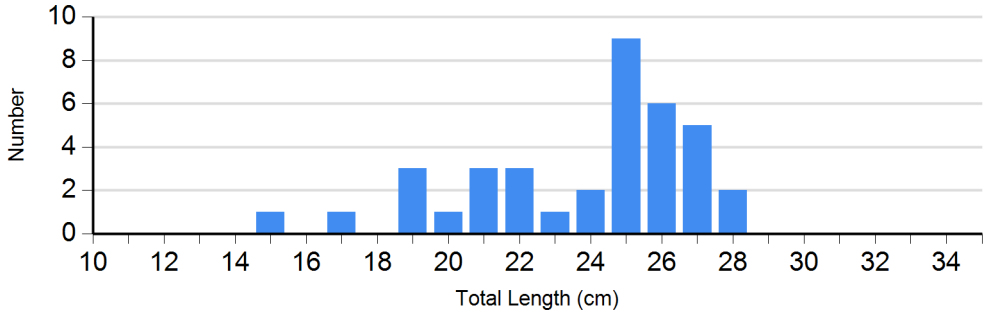
Species: Black Bullhead
Gear: std exp gill net



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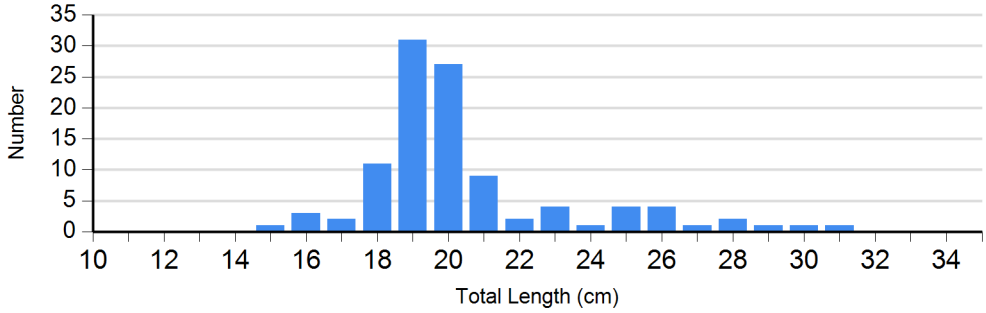

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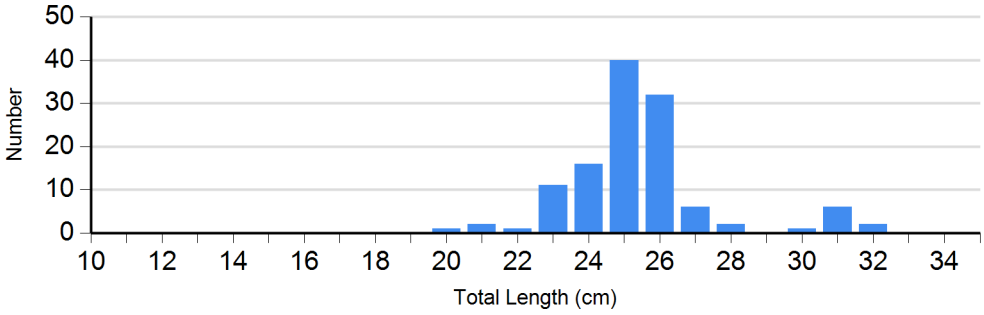

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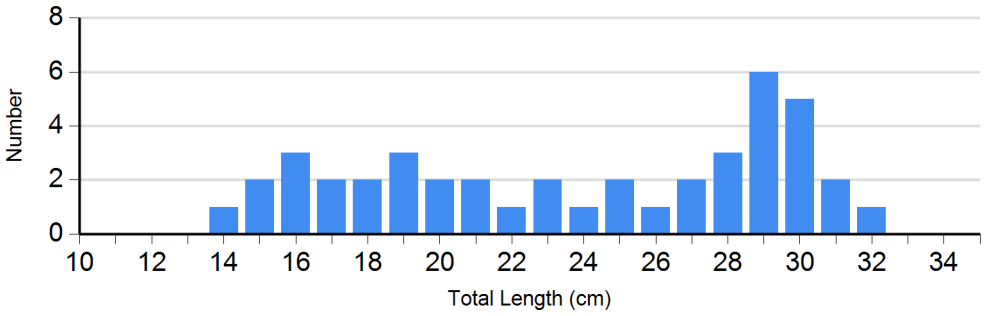

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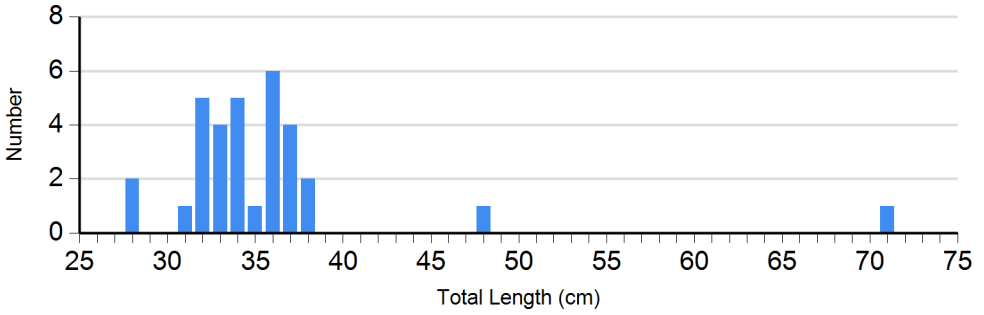
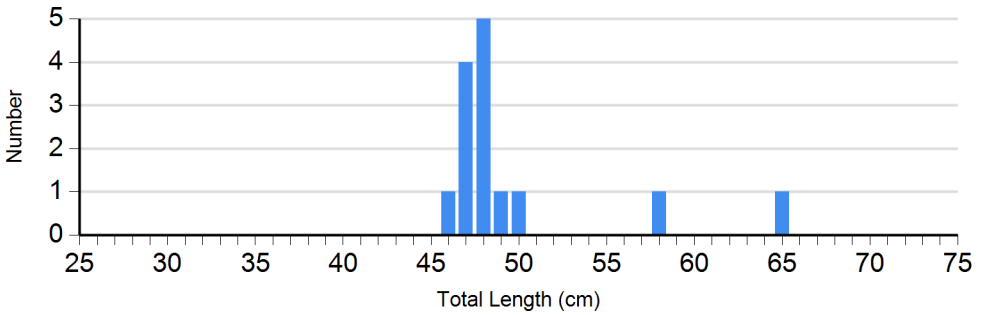
Species: Common Carp
Gear: AFS std gill net

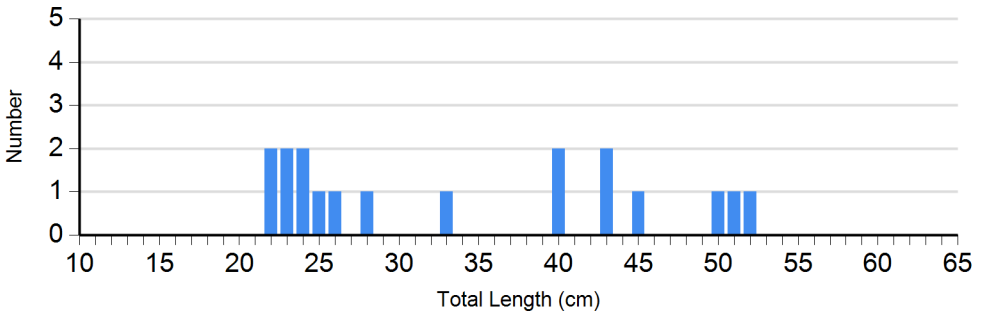


2017



2018

Species: Walleye
Gear: std exp gill net



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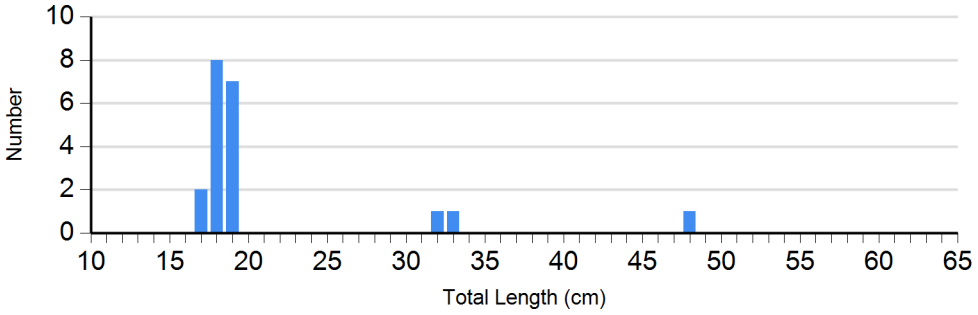

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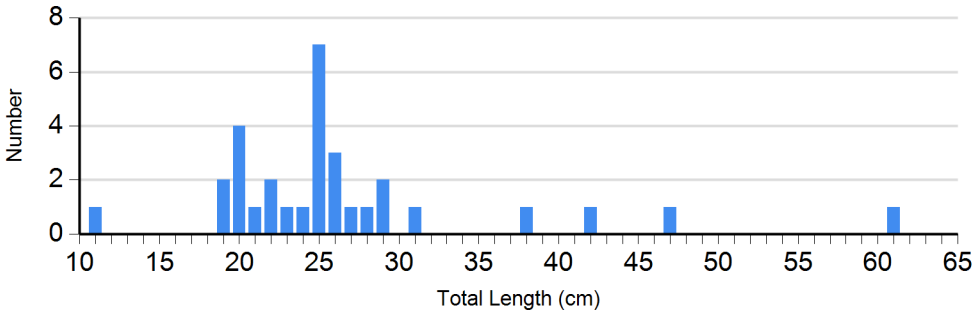
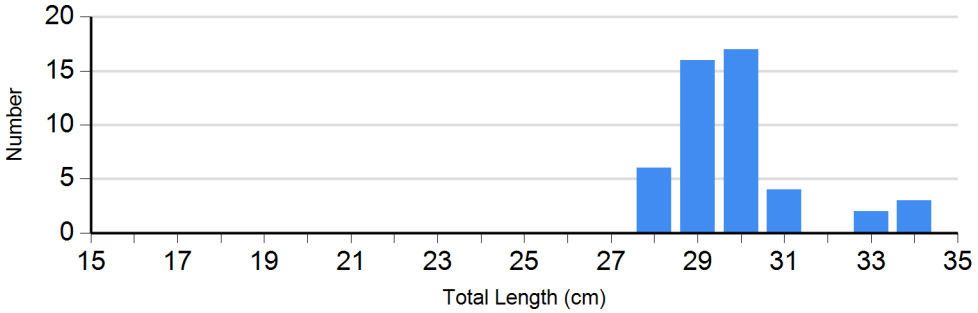


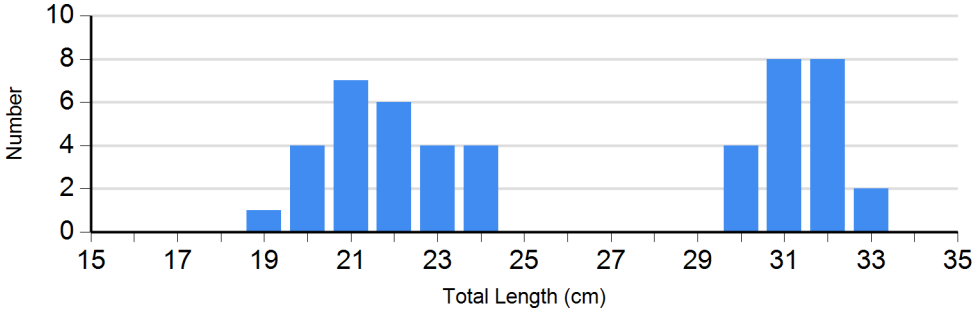
2016

Species: White Bass
Gear: AFS std gill net



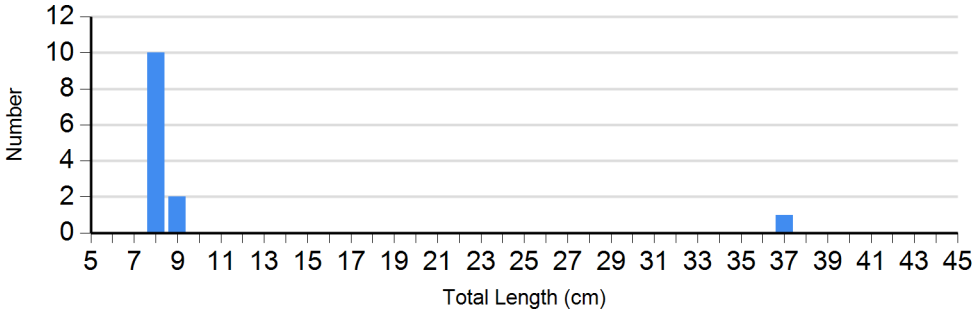
2018

Species: White Bass
Gear: AFS std gill net



2017

Species: White Bass
Gear: std exp gill net



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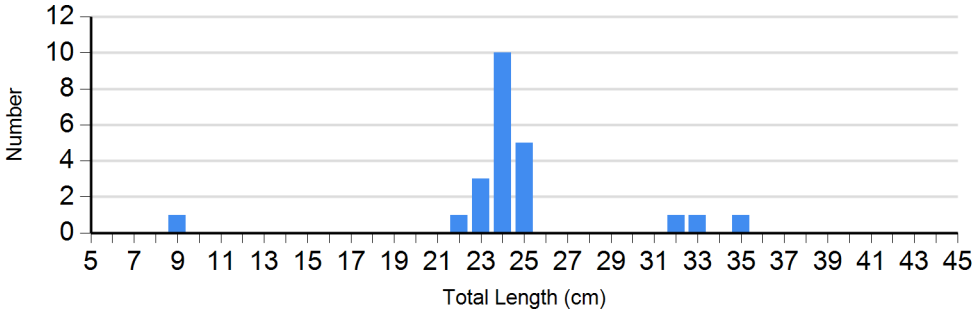
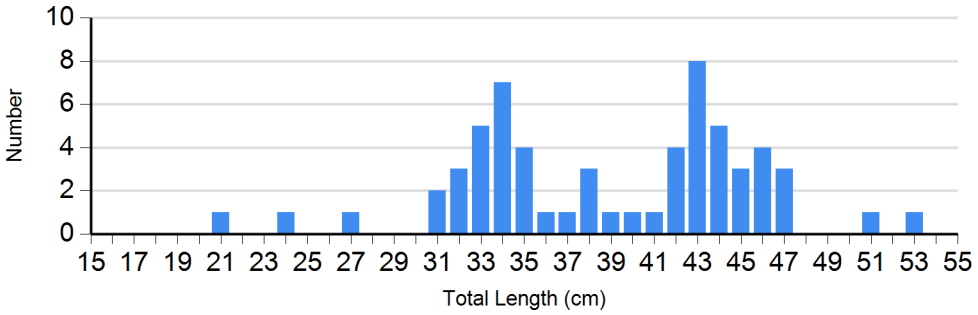


2016

Species: White Sucker
Gear: AFS std gill net



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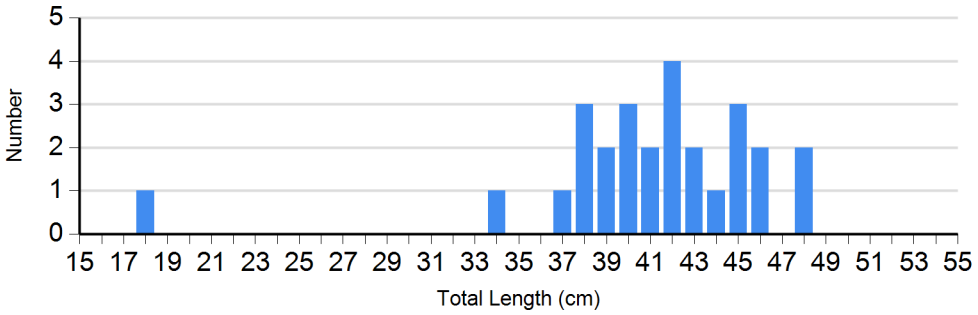

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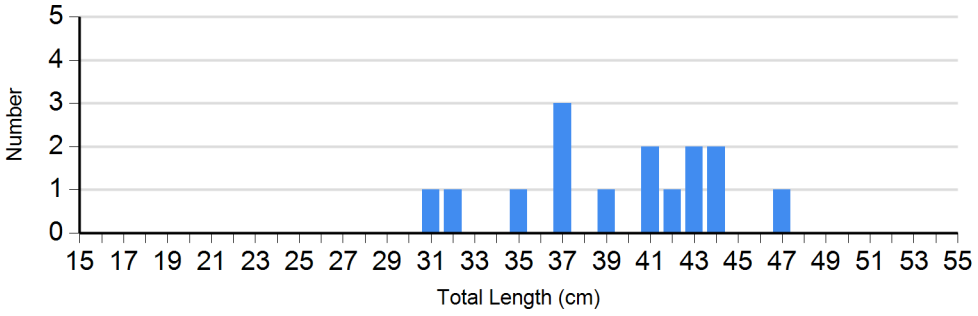
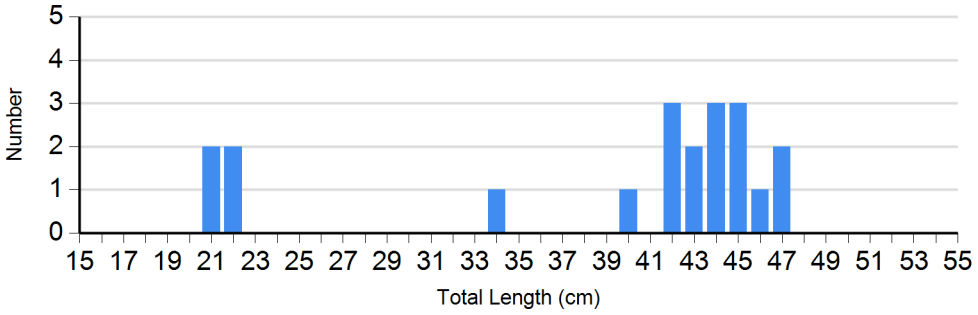
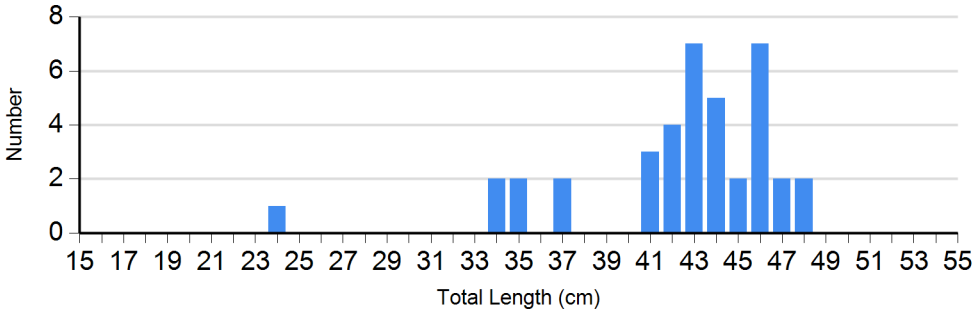
Species: White Sucker
Gear: std exp gill net



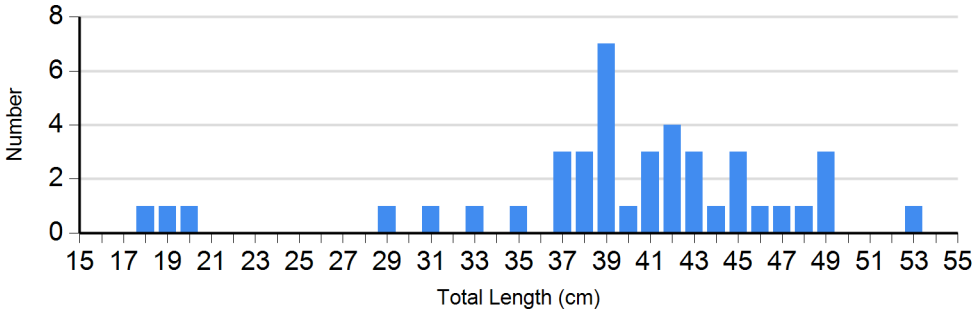
2013



2014

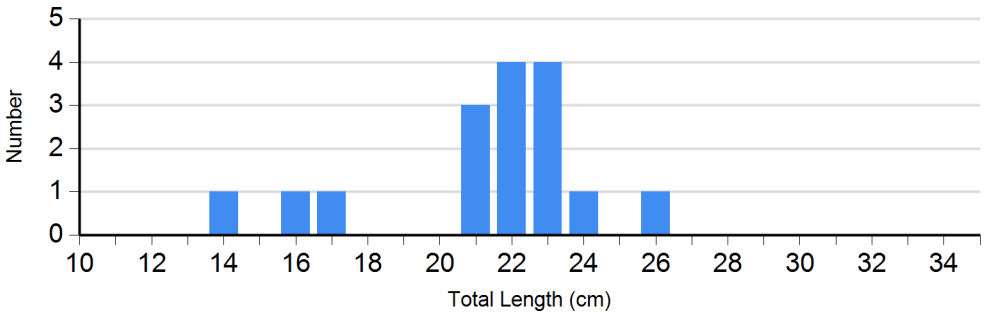


2015

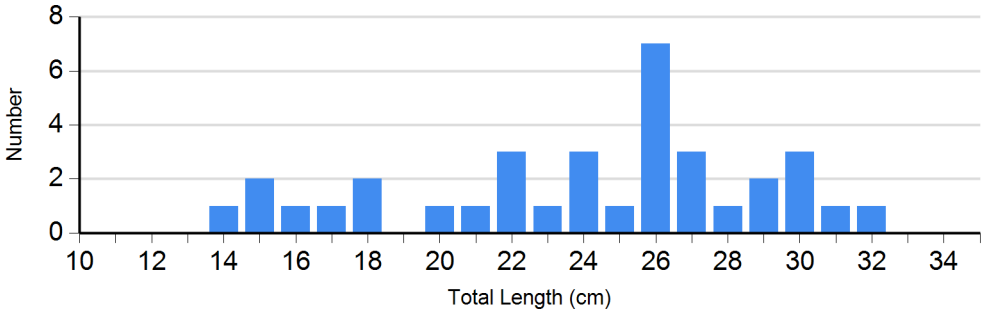


2016

Species: Yellow Perch
Gear: AFS std gill net

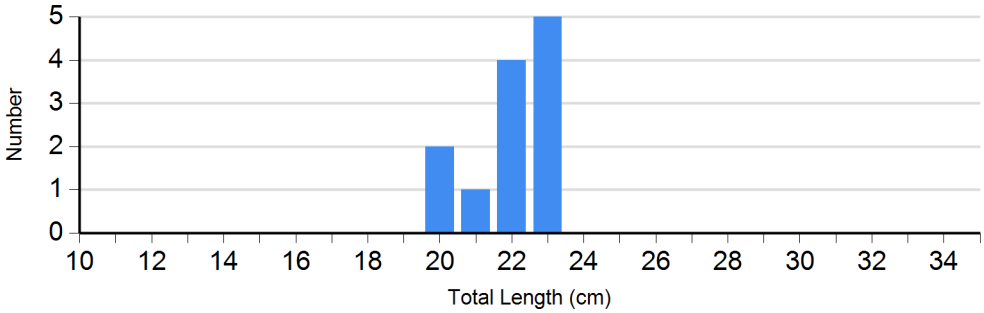


2017



2018

Species: Yellow Perch
Gear: std exp gill net



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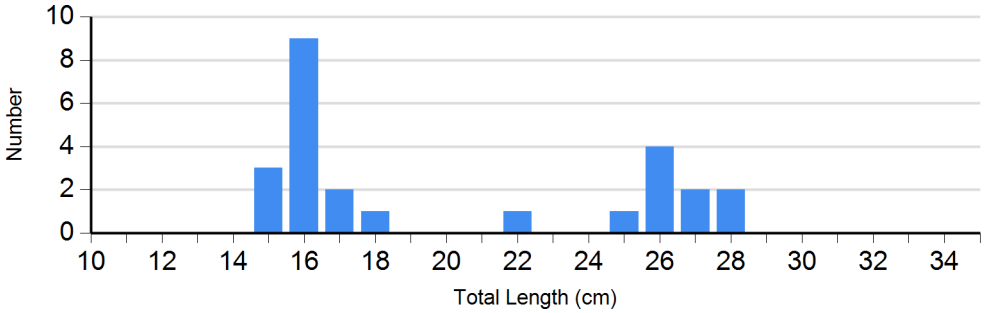
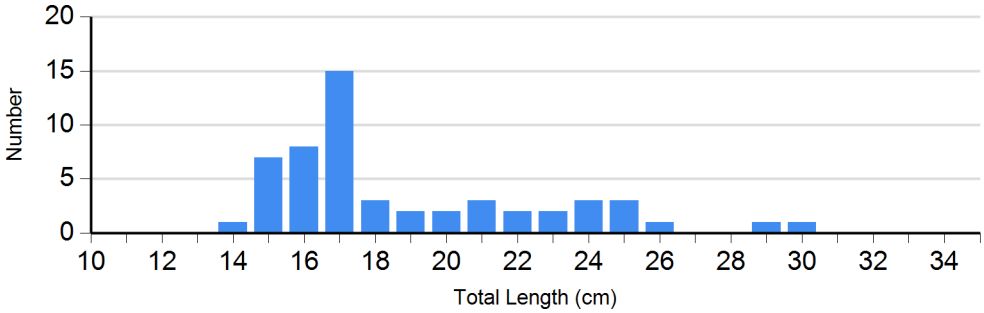


2015

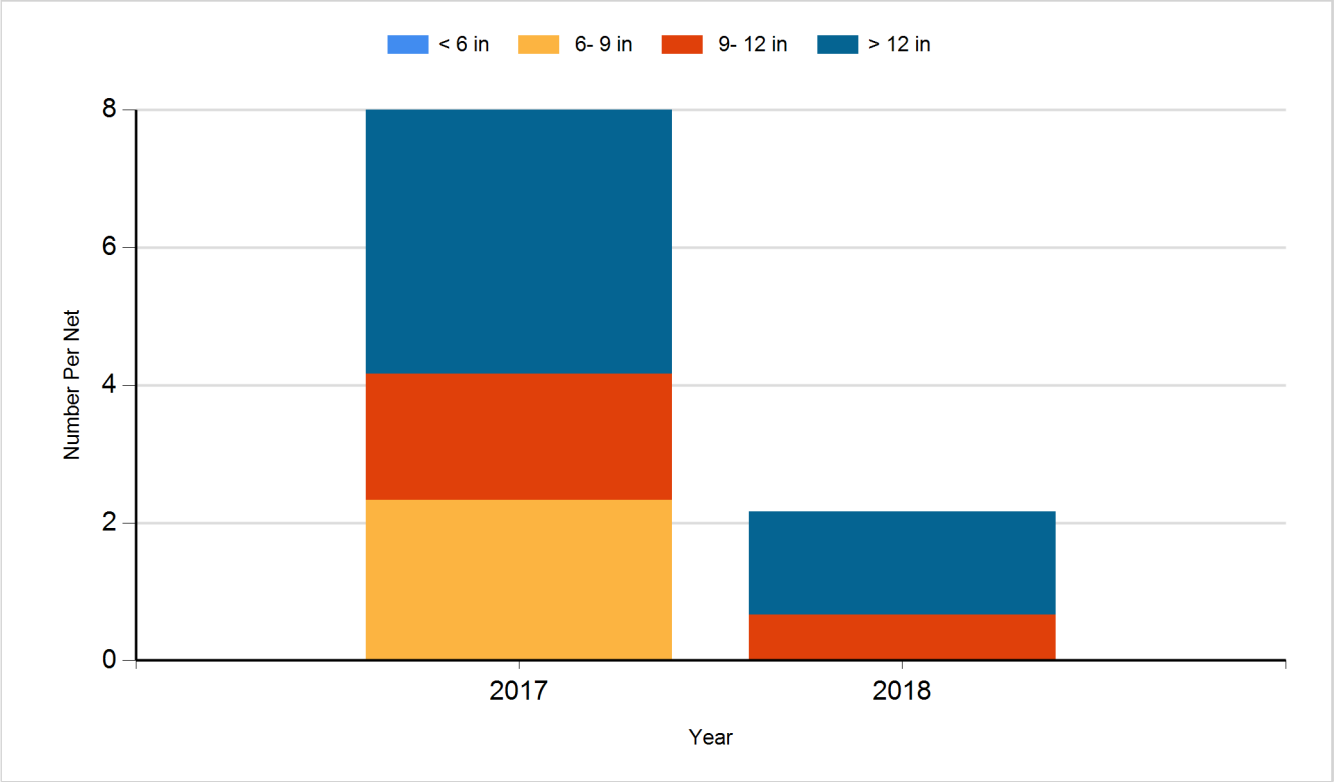


2016

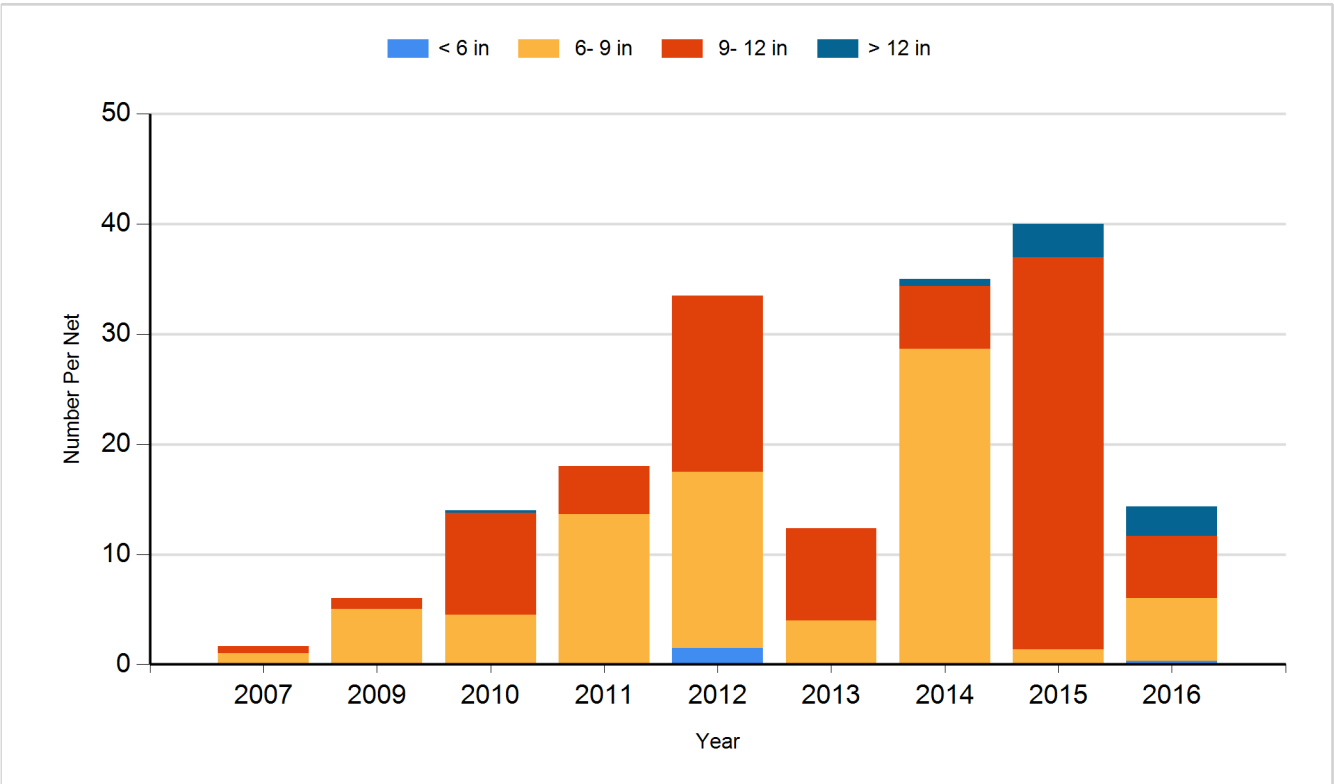
Historic Fish Sizes and Relative Abundance

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

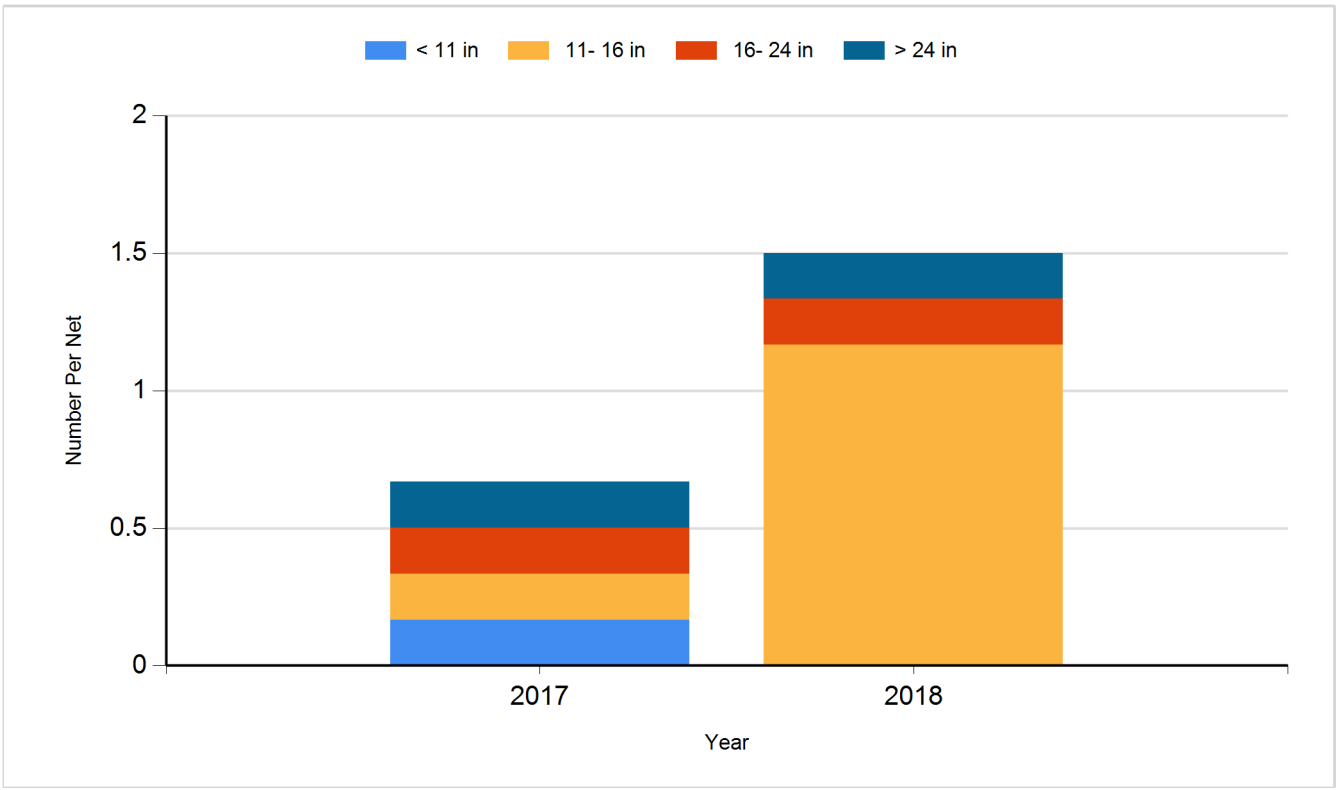
Species: Black Bullhead
Gear: AFS std gill net



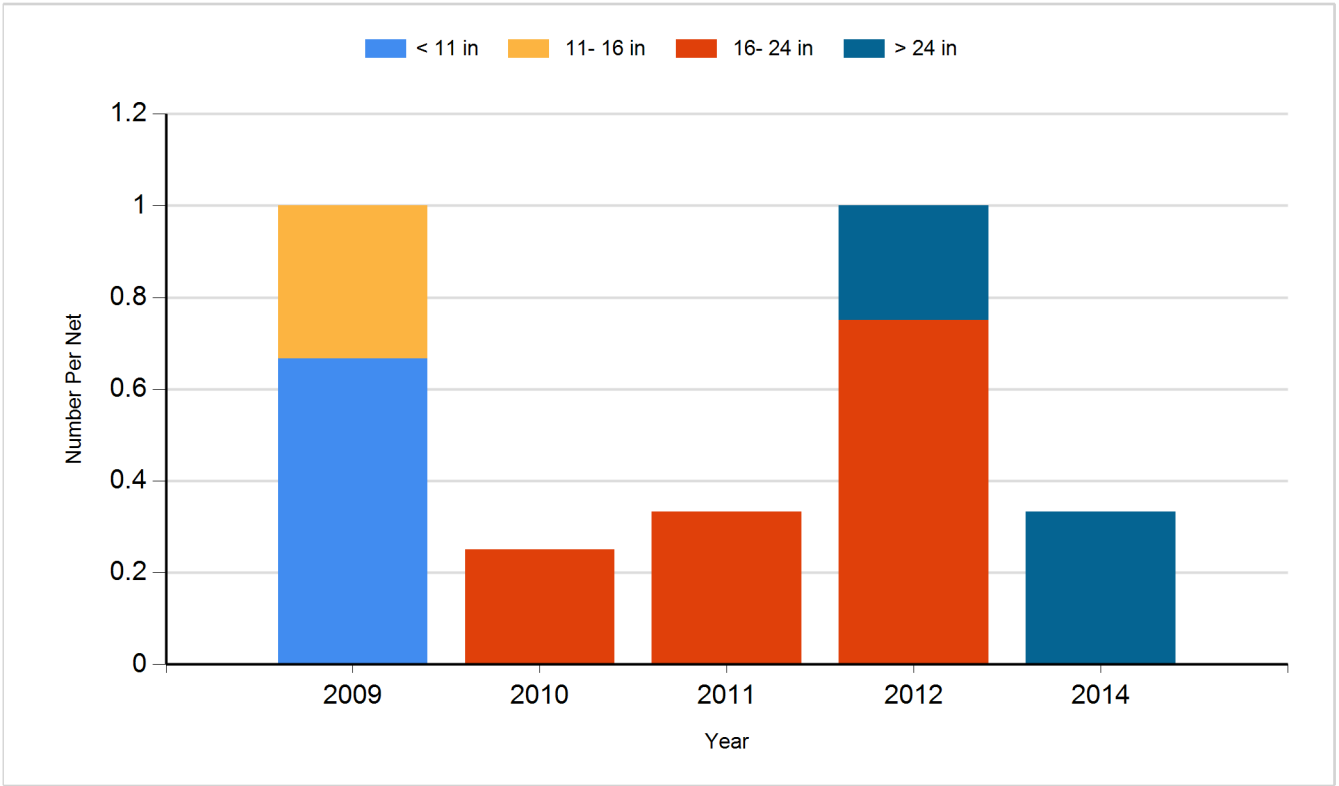
Species: Black Bullhead
Gear: std exp gill net



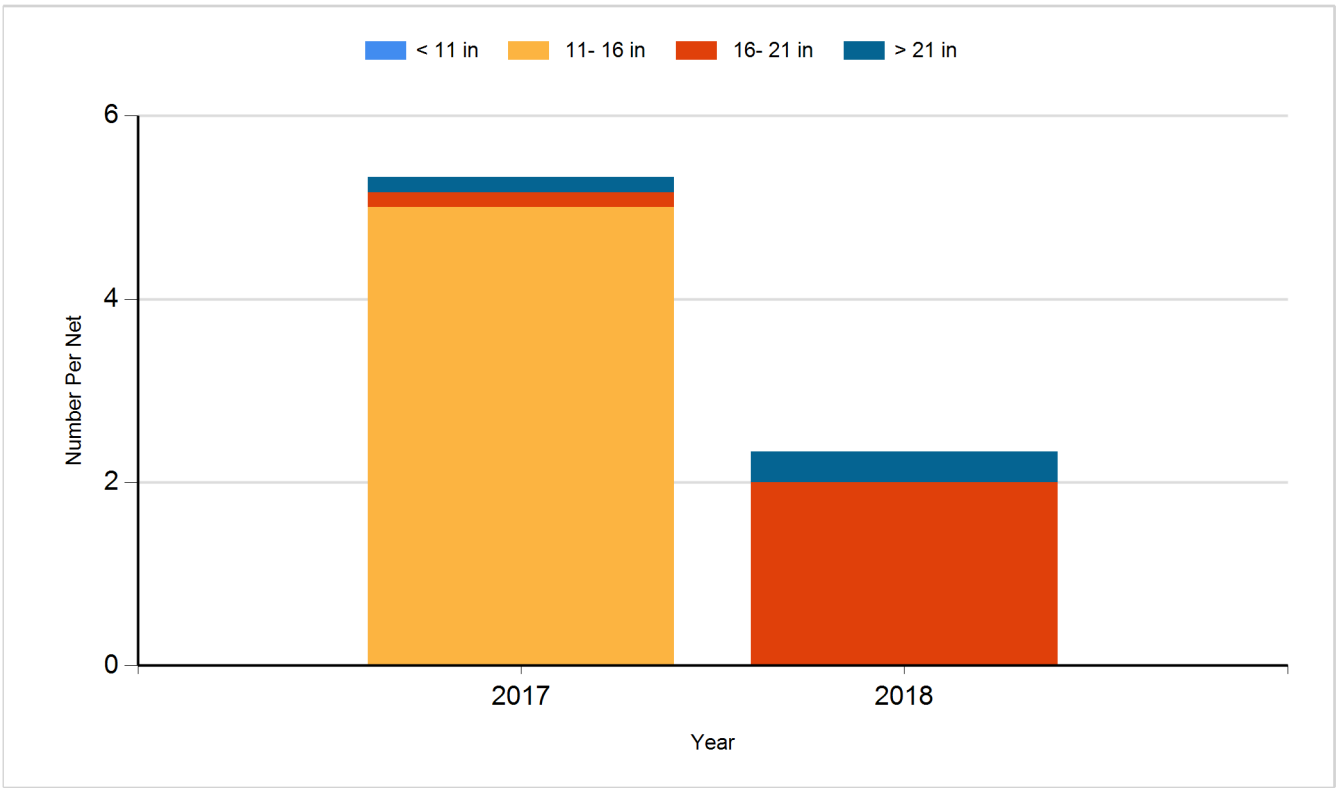
Species: Channel Catfish
Gear: AFS std gill net



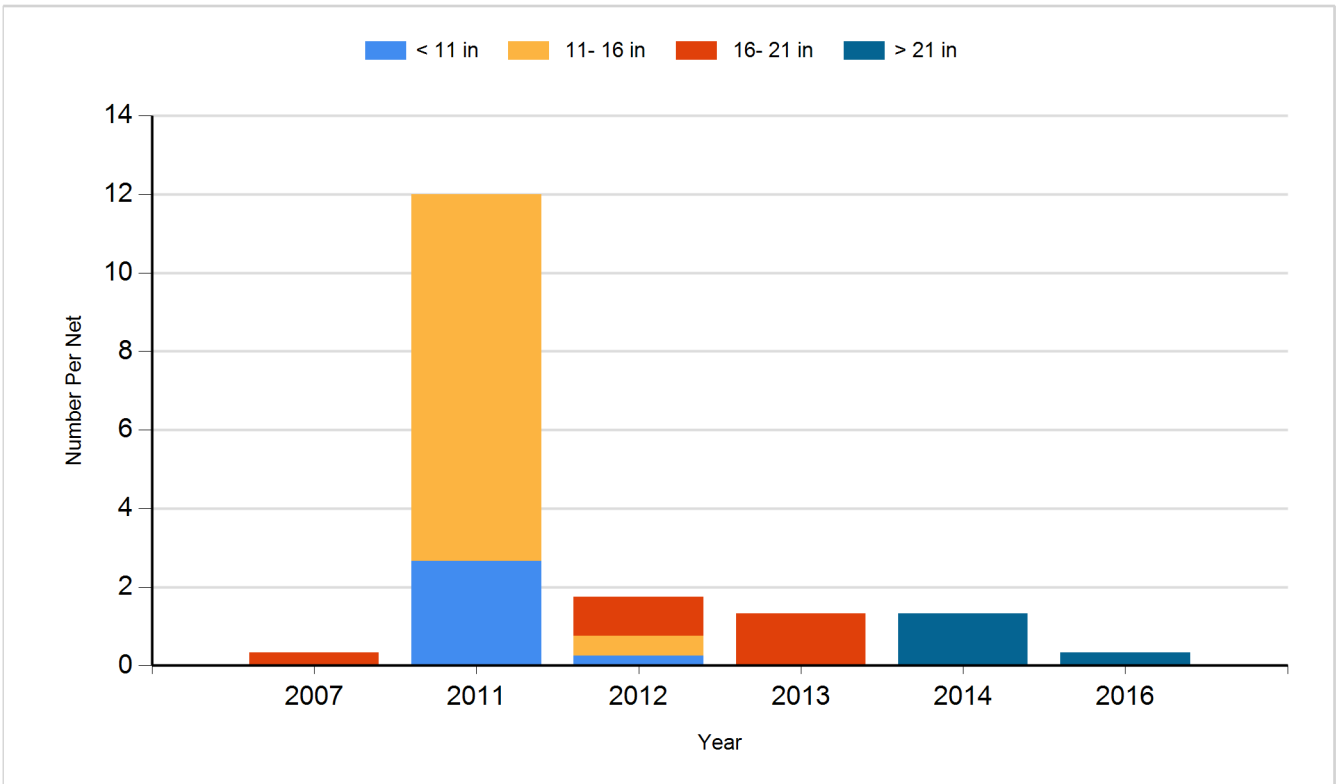
Species: Channel Catfish
Gear: std exp gill net



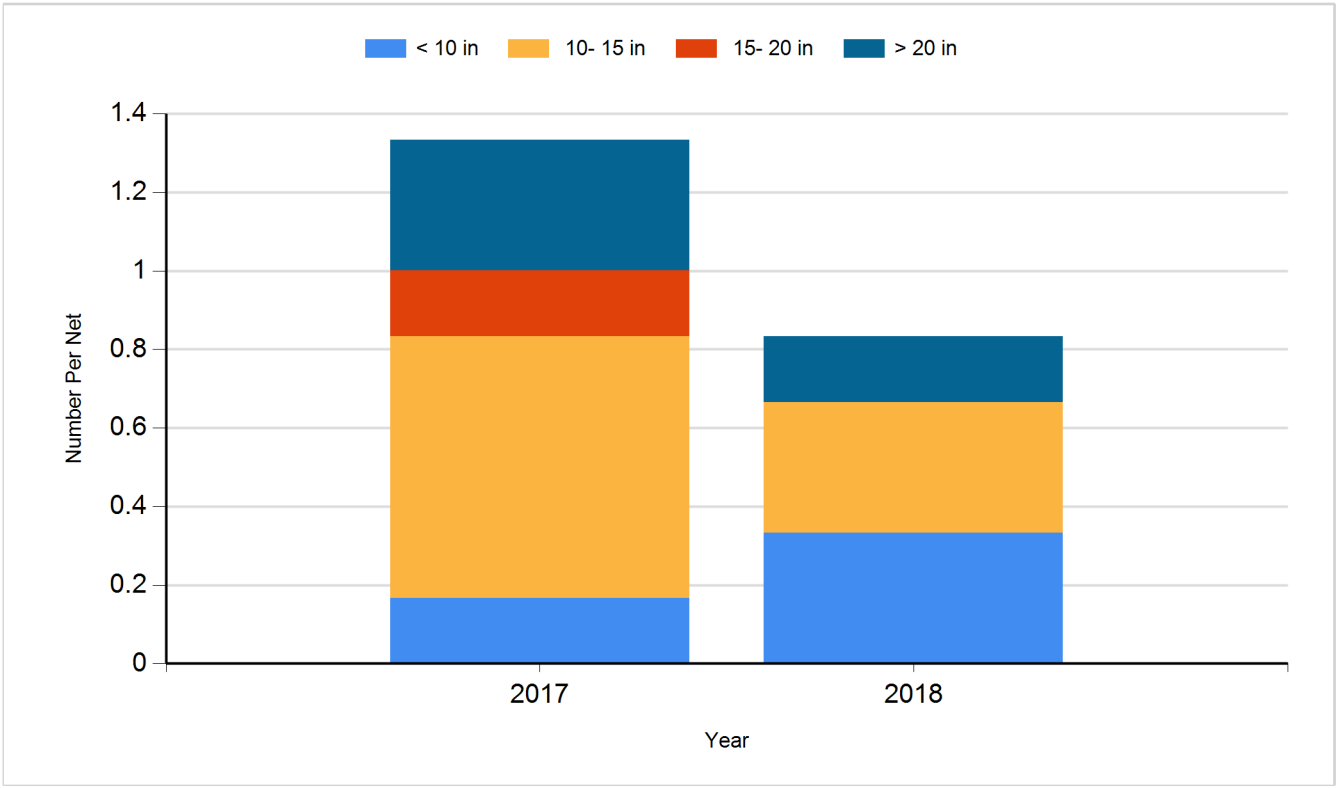
Species: Common Carp
Gear: AFS std gill net



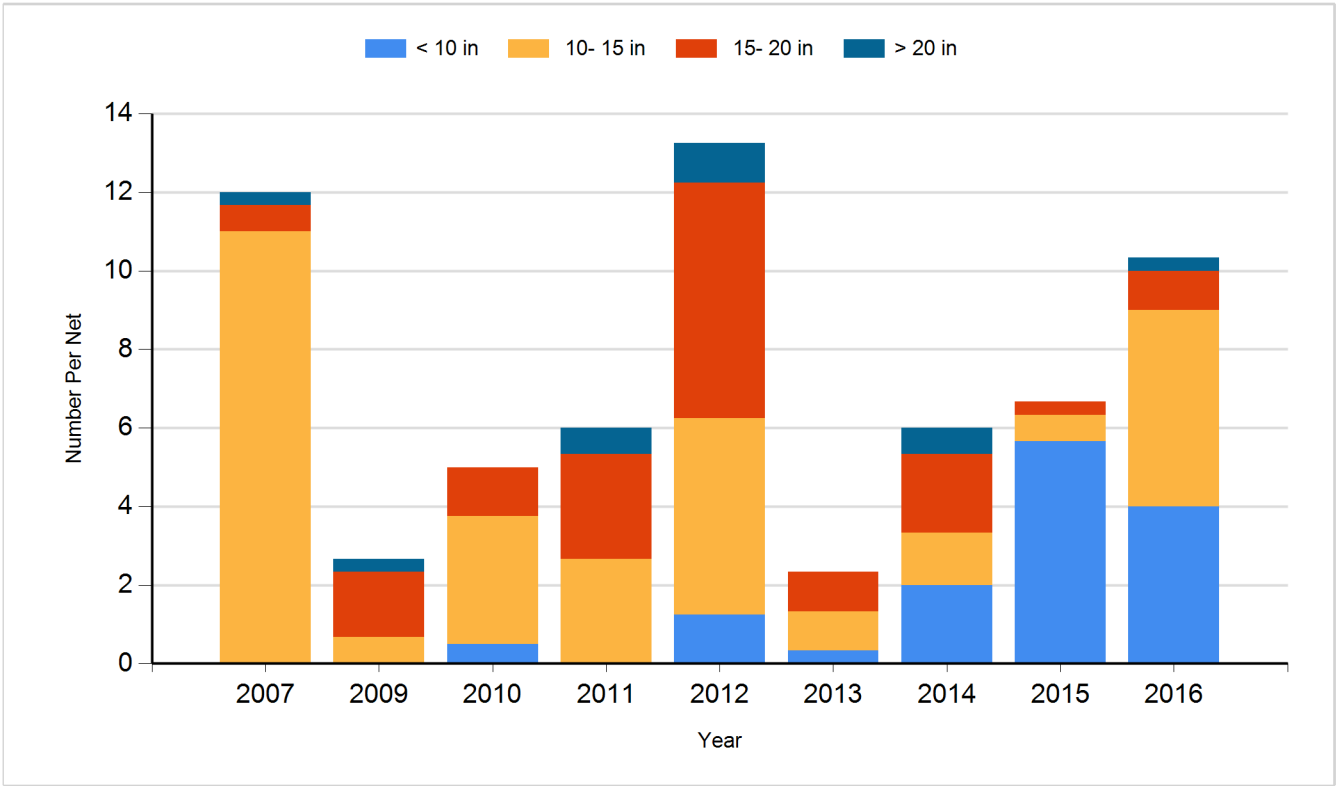
Species: Common Carp
Gear: std exp gill net



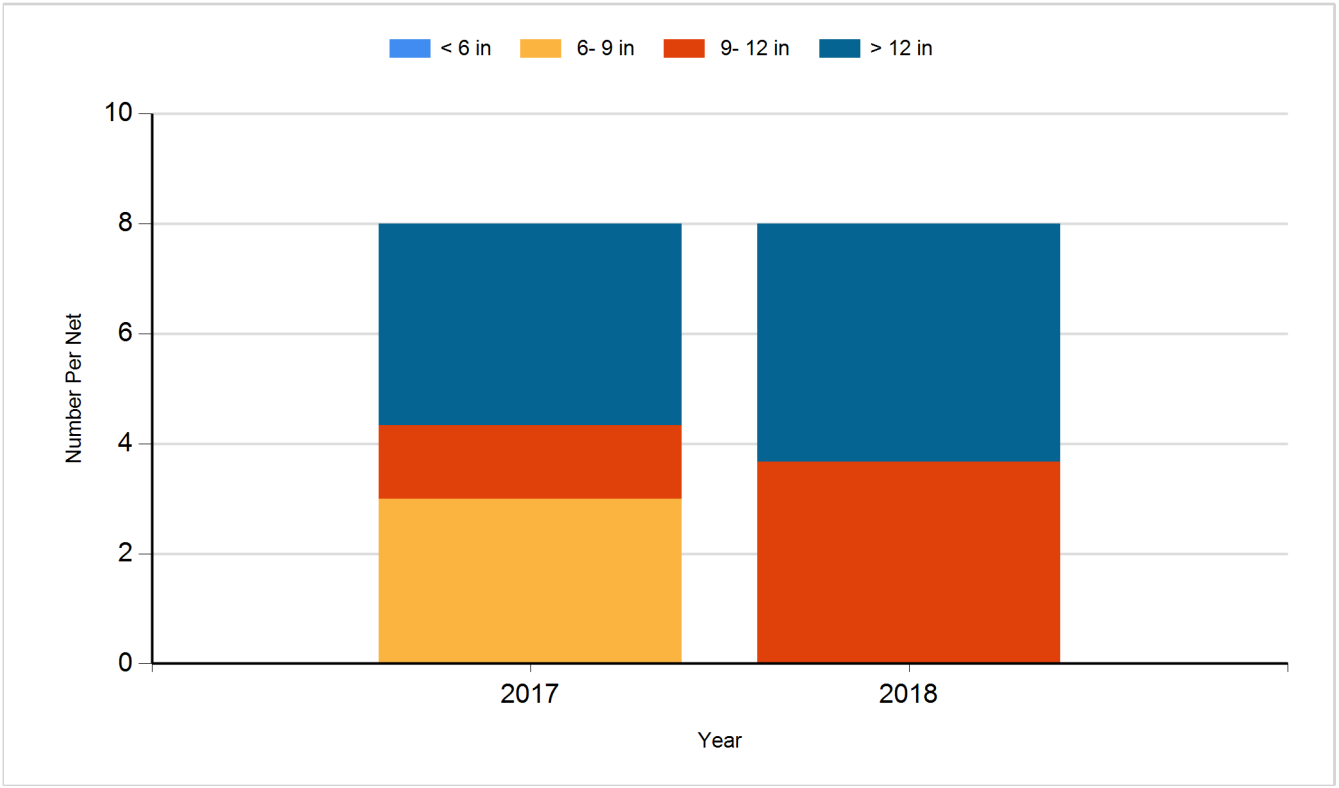
Species: Walleye
Gear: AFS std gill net



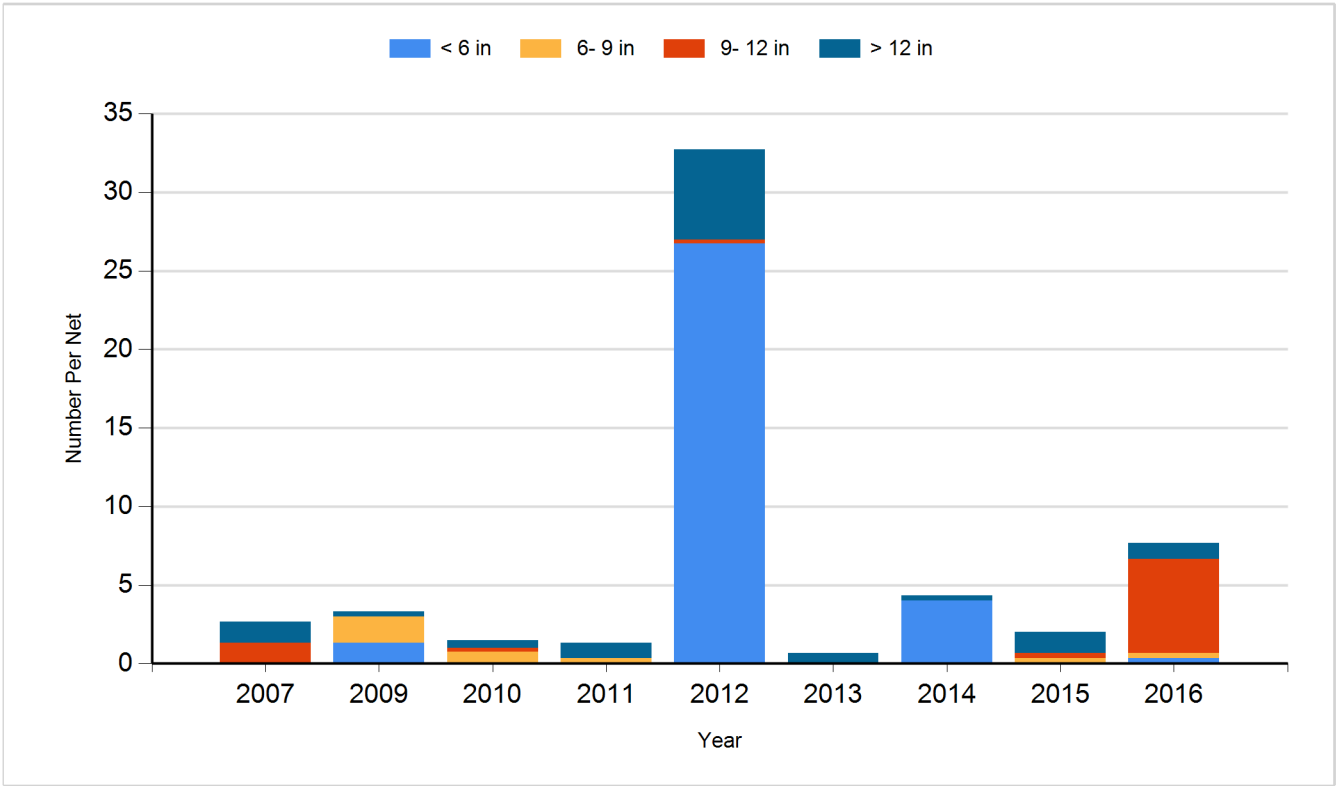
Species: Walleye
Gear: std exp gill net



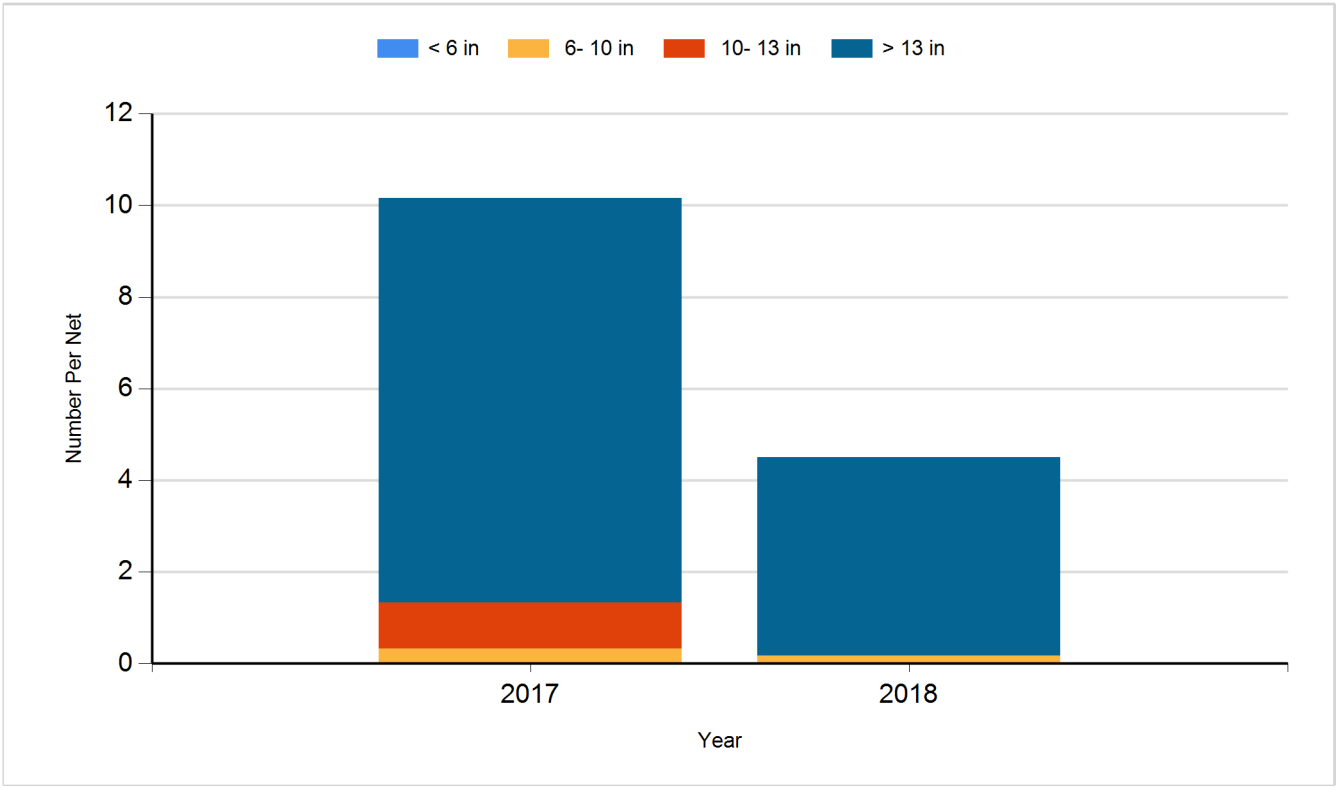
Species: White Bass
Gear: AFS std gill net



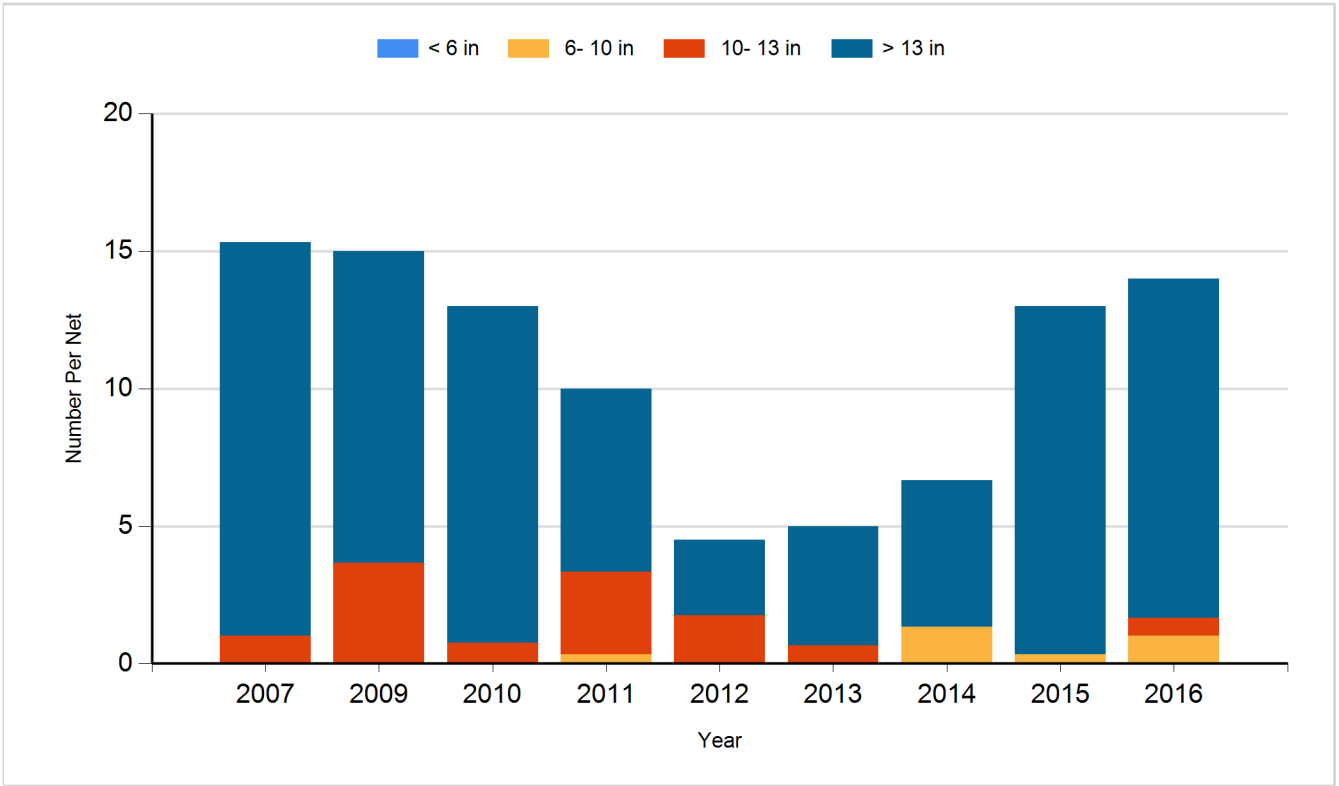
Species: White Bass
Gear: std exp gill net



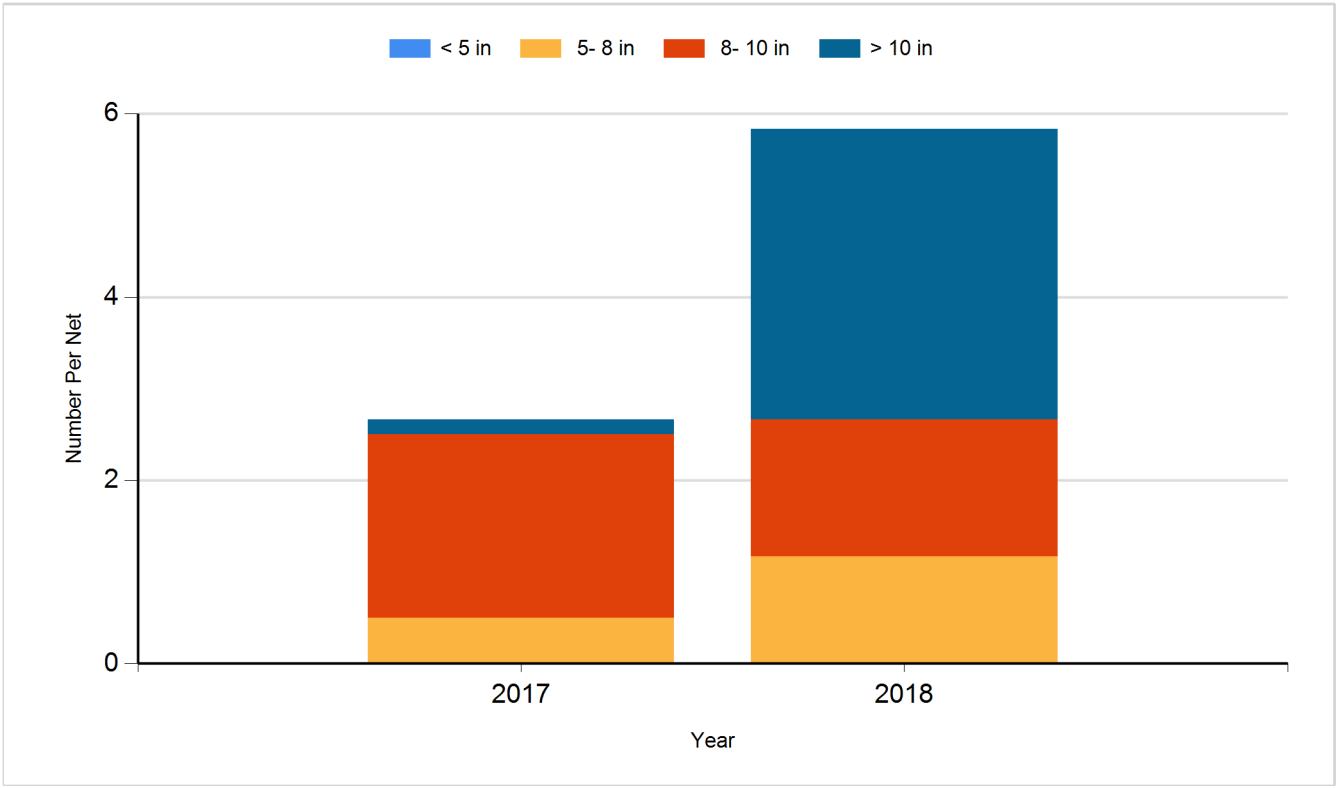
Species: White Sucker
Gear: AFS std gill net



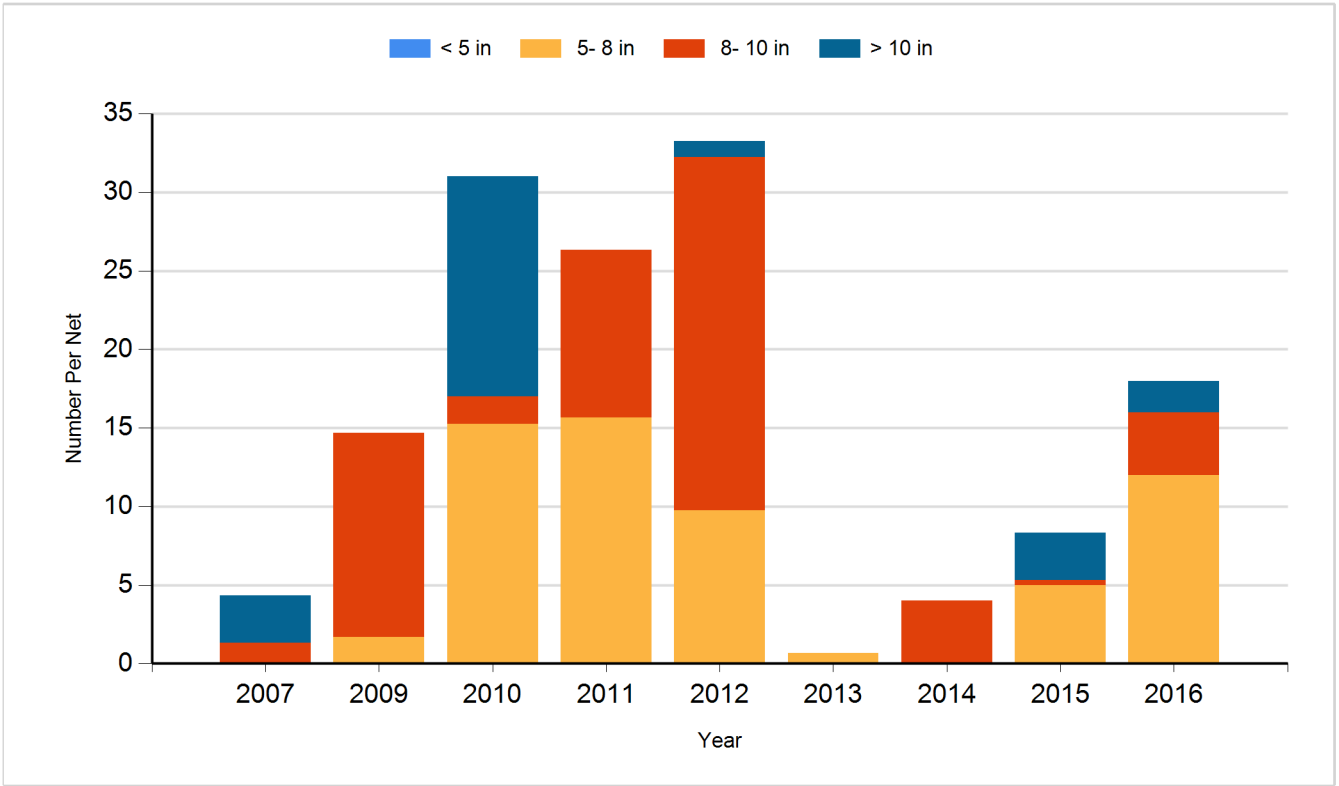
Species: White Sucker
Gear: std exp gill net



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
2007	Walleye	Fry	1,400,000
2008	Walleye	Fry	1,400,000
2009	Yellow Perch	Fry	7,539,000
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