

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Gardner, Harding County

SFG-Lake-581-000

2021

Lake Information

Name: Gardner
County: Harding
Surface Area: 196 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Aug 10, 2021	3 net-nights
frame net (std 3/4 in)	May 27, 2021	5 net-nights

Common Fish Species Present

Channel Catfish

Black Crappie

Largemouth Bass

Walleye

Northern Pike

Common Carp

Yellow Perch

Gizzard Shad

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	7	2.3	0.6	86		71		93	2
	Channel Catfish	4	1.3	0.6	100		0		80	4
	Common Carp	10	3.3	1.3	70		0		89	3
	Gizzard Shad	3	0.0	0.0	0					
	Northern Pike	5	1.7	0.6	100		40		80	3
	Walleye	22	7.3	3.1	23	15	0		84	2
frame net (std 3/4 in)	Black Crappie	16	3.2	1.3	50	21	44	20	85	3
	Common Carp	5	1.0	0.7	80		0		97	9
	Northern Pike	46	9.2	4.5	78	9	9		84	3
	Walleye	34	6.6	1.9	18	11	6		75	1
	Yellow Perch	1	0.2	0.3	0		0		142	

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 gill net (1/2 inch)*	Black Crappie								4.0	0.5		2.25
	Channel Catfish								0.5	0.0		0.25
	Common Carp								1.0	0.0		0.50
	Gizzard Shad								18.0	3.0		10.50
	Northern Pike								0.0	0.5		0.25
	Spottail Shiner								0.5	1.0		0.75
	Walleye								2.0	0.0		1.00
	Yellow Perch								1.5	1.0		1.25
AFS std frame net	Black Crappie						33.0					33.00
	Northern Pike						0.2					0.20
	Yellow Perch						0.2					0.20
AFS std gill net	Black Crappie						32.5	3.3	3.5	1.8	2.3	8.68
	Channel Catfish						5.5	1.3	1.8	2.3	1.3	2.44
	Common Carp						11.0	6.5	1.8	0.0	3.3	4.52
	Gizzard Shad						0.0	0.0	28.0	11.8	0.0	7.96
	Largemouth Bass						0.0	0.0	0.0	0.0	0.0	0.00
	Northern Pike						2.0	0.8	1.8	2.0	1.7	1.66
	Walleye						5.0	2.8	3.3	8.3	7.3	5.34
	Yellow Perch						1.0	1.8	3.0	1.0	0.0	1.36
boat shocker (day)	Largemouth Bass				61.2				9.6			35.40
	Walleye*				0.0				16.9			8.45
frame net (std 3/4 in)	Black Bullhead		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.00
	Black Crappie		165.5		24.4	138.8		17.0	10.0	35.1	3.2	56.29
	Channel Catfish		0.0		0.0	0.0		0.2	0.2	0.1	0.0	0.07
	Common Carp		0.0		0.1	0.0		0.3	0.7	0.3	1.0	0.34
	Gizzard Shad		0.0		0.0	0.0		0.0	0.0	2.8	0.0	0.40
	Green Sunfish		0.0		0.0	0.0		0.0	0.0	0.1	0.0	0.01
	Northern Pike		0.7		0.3	0.2		1.3	0.2	0.1	9.2	1.71
	Walleye		1.8		1.1	0.0		1.5	0.2	0.1	6.6	1.61
	White Sucker		0.0		0.0	0.0		0.0	0.2	0.0	0.0	0.03
	Yellow Perch		0.0		0.3	0.2		0.0	0.0	0.4	0.2	0.16
std exp gill net	Black Crappie		3.0		7.0	11.0						7.00
	Channel Catfish		1.5		0.0	1.0						0.83
	Common Carp		10.0		4.0	10.5						8.17

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
std exp gill net	Gizzard Shad		0.0		0.0	0.0						0.00
	Largemouth Bass		0.0		0.0	2.0						0.67
	Northern Pike		3.0		4.0	20.0						9.00
	Spottail Shiner		0.0		0.0	0.0						0.00
	Walleye		4.0		2.0	7.0						4.33
	Yellow Perch		0.0		9.5	15.0						8.17

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										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
AFS std frame net	Black Crappie	PSD						96					
		PSD-P						70					
		Wr						94					
	Northern Pike	PSD						0					
		PSD-P						0					
		Wr						87					
	Yellow Perch	PSD						100					
		PSD-P						0					
		Wr						88					
AFS std gill net	Black Crappie	PSD						97	100	57	43	86	
		PSD-P						63	85	57	43	71	
		Wr						93	84	96	99	93	
	Channel Catfish	PSD						27	40	100	100	100	
		PSD-P						0	20	29	33	0	
		Wr						89	87	88	84	80	
	Common Carp	PSD						64	96	71		70	
		PSD-P						0	0	0		0	
		Wr						87	82	84		89	
	Gizzard Shad	PSD							0	7	100	0	
		Wr								104	98		
	Largemouth Bass	PSD										0	
		PSD-P										0	
	Northern Pike	PSD							75	67	43	88	100
		PSD-P							25	33	0	13	40
		Wr							84	86	100	90	80
	Walleye	PSD							90	100	85	6	23
		PSD-P							20	82	46	0	0
		Wr							83	81	88	86	84
	Yellow Perch	PSD							0	0	25	0	
		PSD-P							0	0	8	0	
Wr								82	98	90	94		
boat shocker (day)	Largemouth Bass	PSD					12			82			

Gear	Species	Index	Year										
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
boat shocker (day)	Largemouth Bass	PSD-P				6			0				
		Wr			121			110					
	Walleye	PSD						22					
		PSD-P						22					
		Wr					95						
frame net (std 3/4 in)	Black Crappie	PSD		88		66	99		94	100	95	50	
		PSD-P		0		7	61		18	35	80	44	
		Wr		98		101	106		88	92	87	85	
	Channel Catfish	PSD							0	100	100		
		PSD-P							0	100	0		
		Wr							89	89	78		
	Common Carp	PSD				100			50	75	0	80	
		PSD-P				0			0	0	0	0	
		Wr				89			89	91	91	97	
	Gizzard Shad	PSD										23	
		Wr										80	
	Northern Pike	PSD		75		0	100		25	100	100	78	
		PSD-P		25		0	100		0	0	0	9	
		Wr		86		119	107		85	91	94	84	
	Walleye	PSD		82		64			100	100	100	18	
		PSD-P		45		9			78	100	100	6	
		Wr		78		79			80	92	78	75	
	Yellow Perch	PSD				0	100					0	0
		PSD-P				0	0					0	0
		Wr				98						84	142
std exp gill net	Black Crappie	PSD		67		21	77						
		PSD-P		0		0	64						
		Wr		107		108	102						
	Channel Catfish	PSD		100			0						
		PSD-P		67			0						
		Wr		78			92						
	Common Carp	PSD		80		88	38						
		PSD-P		0		0	0						
		Wr		86		91	91						
	Gizzard Shad	PSD					0						
	Largemouth Bass	PSD					0						

Gear	Species	Index	Year									
			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
std exp gill net	Largemouth Bass	PSD-P					0					
		Wr					112					
	Northern Pike	PSD		100		13	18					
		PSD-P		83		0	5					
		Wr		92		86	85					
	Walleye	PSD		63		50	86					
		PSD-P		13		25	7					
		Wr		82		76	88					
	Yellow Perch	PSD				32	30					
		PSD-P				0	0					
		Wr				106	95					

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+
2015	518		135 (149)	192 (107)	224 (94)	238 (102)	244 (67)				

Species: Largemouth Bass

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2015	122	211 (71)	276 (37)	305 (10)			409 (4)				

Species: Walleye

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2020	40	208 (6)	300 (30)	365 (2)	467 (2)						
2019	16	218 (3)	359 (2)	423 (5)	514 (1)		543 (2)		557 (1)		683 (2)
2018	8				454 (2)			526 (2)	551 (2)		667 (2)
2016	20		346 (4)	412 (4)	455 (2)	413 (4)	446 (2)			536 (4)	
2013	16		232 (2)	363 (4)	383 (6)		495 (2)	522 (2)			

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).

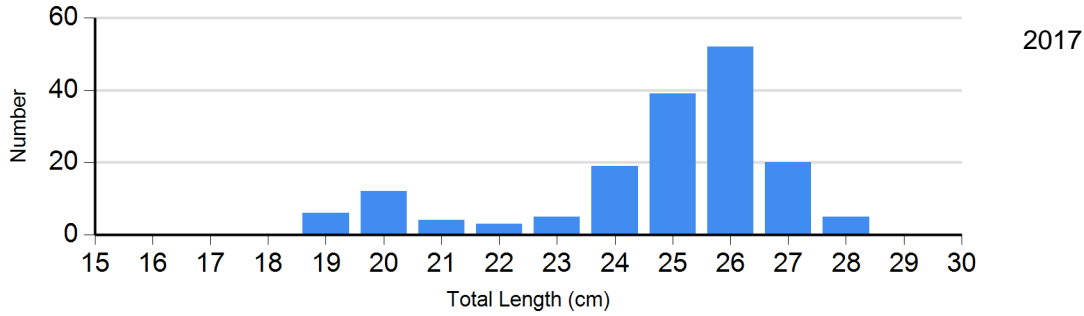
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2017	6	97 (6.3)	43	98 (1.0)	116	92 (0.5)	0	
	2018	6	92 (0.8)	78	88 (0.4)	18	86 (1.1)	0	
	2019	0		39	92 (1.0)	21	91 (1.1)	0	
	2020	14	109	43	86 (0.8)	221	86 (0.3)	3	76
	2021	8	91 (1.8)	1	78	6	78 (1.3)	1	81
Channel Catfish Gill Net	2017	8	86 (2.1)	3	98 (4.7)	0		0	
	2018	3	90 (3.7)	1	79	1	87	0	
	2019	0		5	85 (3.1)	2	94 (10.1)	0	
	2020	0		6	80 (2.1)	3	91 (3.7)	0	
	2021	0		4	80 (2.9)	0		0	
Common Carp Gill Net	2017	8	92 (2.5)	14	84 (1.6)	0		0	
	2018	1	79	25	83 (1.4)	0		0	
	2019	2	82	5	84 (3.4)	0		0	
	2021	3	91 (5.1)	7	88 (2.0)	0		0	
Largemouth Bass Electro Fishing	2018	2	110 (0.6)	9	110 (4.5)	0		0	
Northern Pike Gill Net	2017	1	94	2	82 (0.3)	1	77	0	
	2018	1	88	1	81	1	90	0	
	2019	4	108 (18.3)	3	89 (0.9)	0		0	
	2020	1	95	6	86 (1.5)	1	106	0	
	2021	0		3	80 (3.4)	1	82	1	
Walleye Gill Net	2017	1	80	7	85 (2.1)	2	79 (2.1)	0	
	2018	0		2	81 (0.4)	8	81 (1.7)	1	85

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	2019	2	84 (0.1)	5	88 (2.0)	4	92 (0.3)	2	84 (3.7)
	2020	31	86 (1.2)	2	82 (3.3)	0		0	
	2021	17	84 (1.4)	5	84 (2.4)	0		0	
Yellow Perch Gill Net	2017	2	82 (8.8)	0		0		0	
	2018	7	98 (2.1)	0		0		0	
	2019	9	90 (2.2)	2	89 (1.7)	1	95	0	
	2020	4	94 (2.8)	0		0		0	

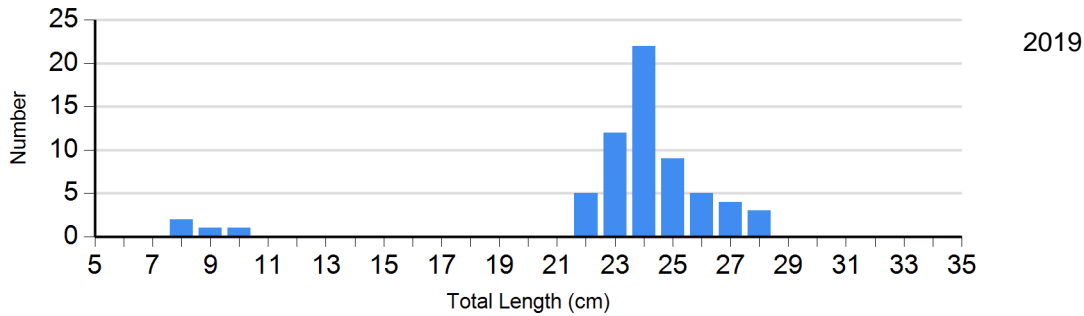
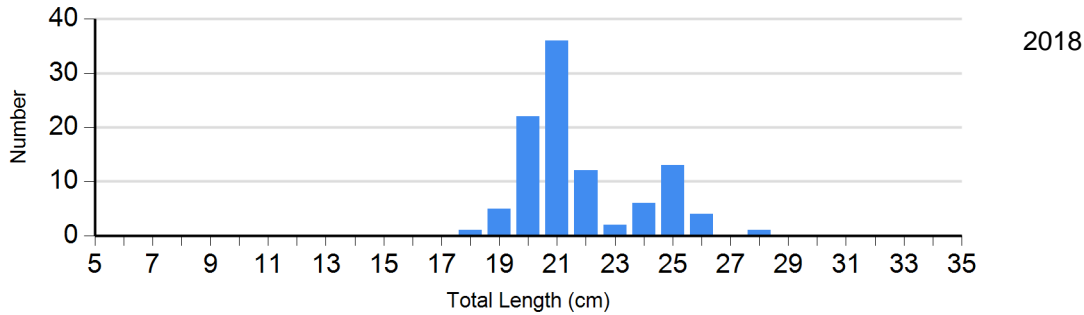
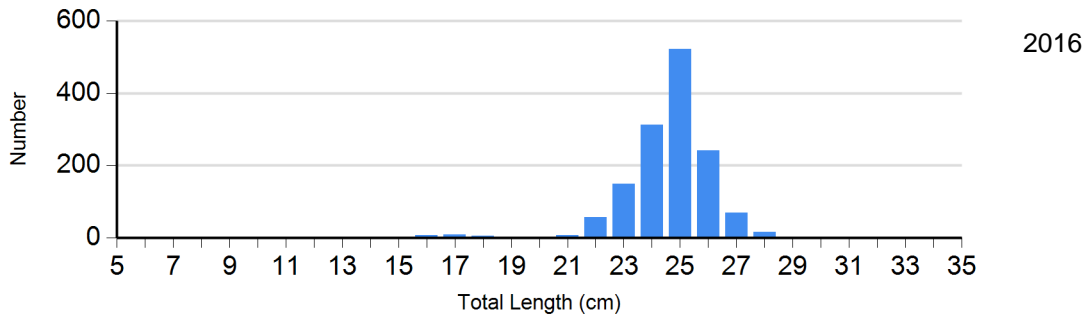
Length Frequency Distribution

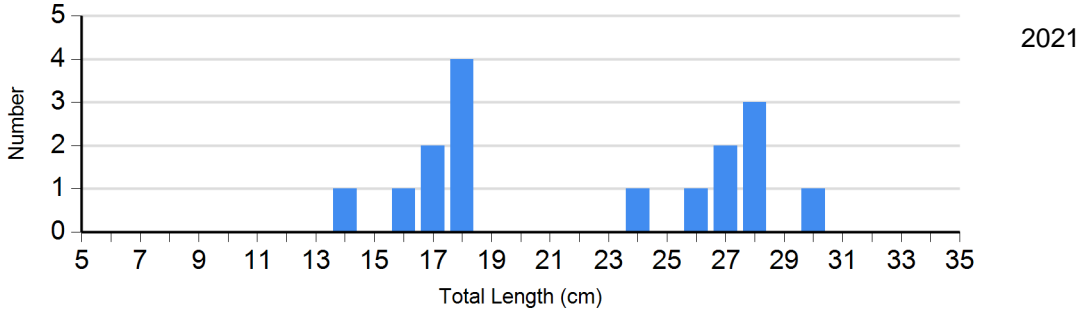
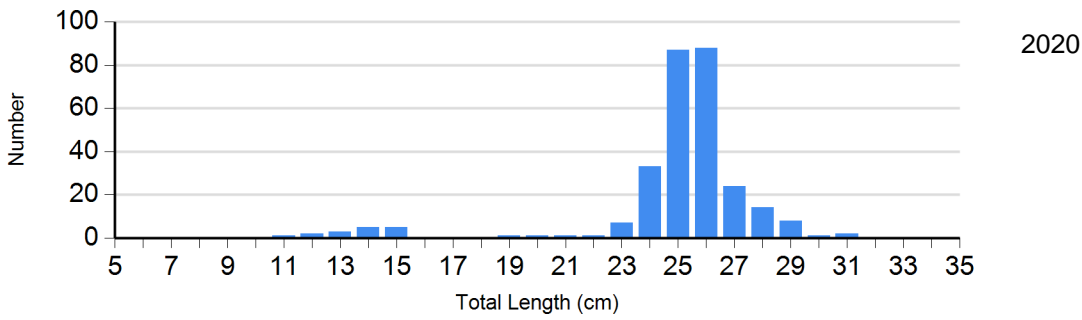
Length frequency histogram of species sampled by year.

Species: Black Crappie
Gear: AFS std frame net

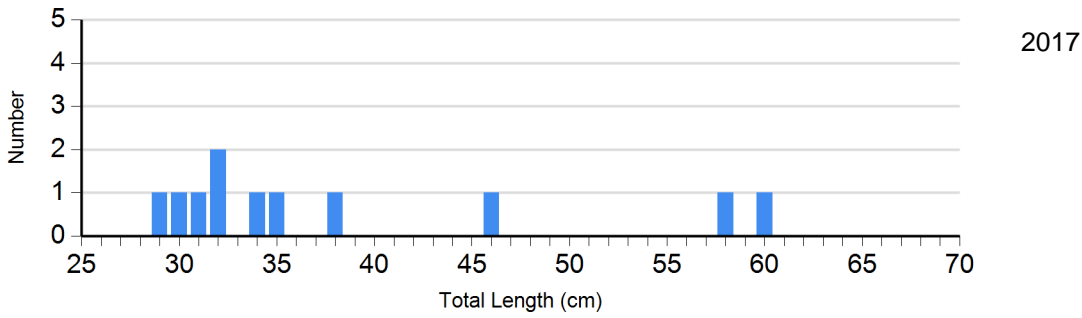


Species: Black Crappie
Gear: frame net (std 3/4 in)

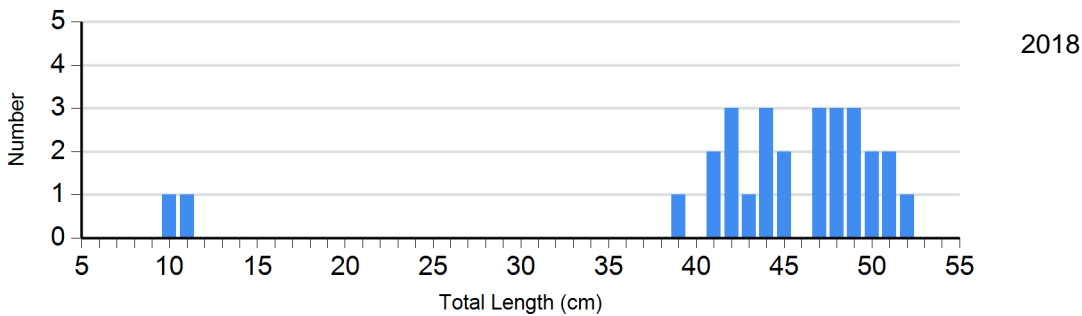
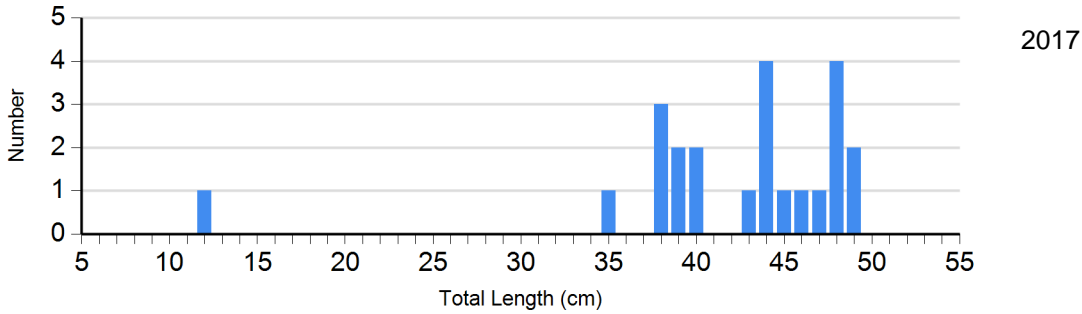


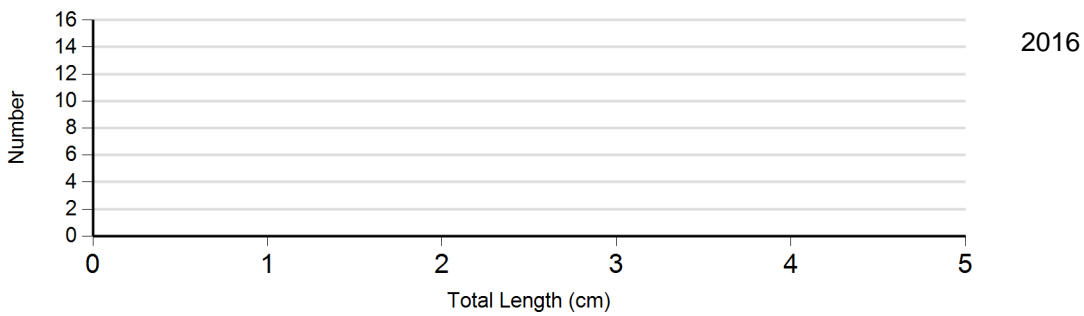
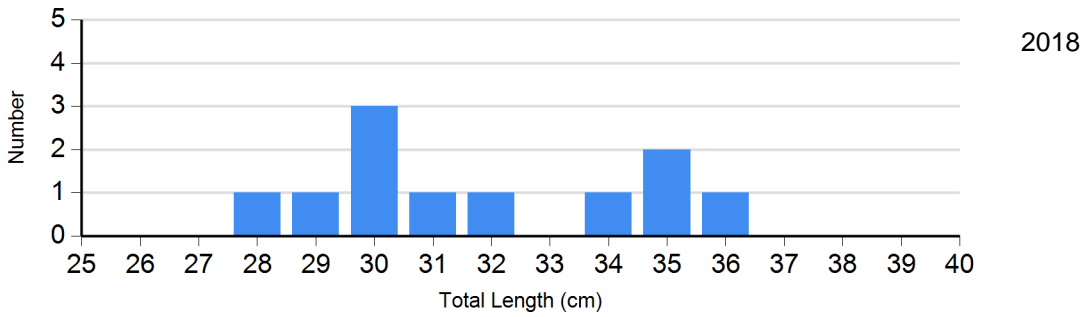
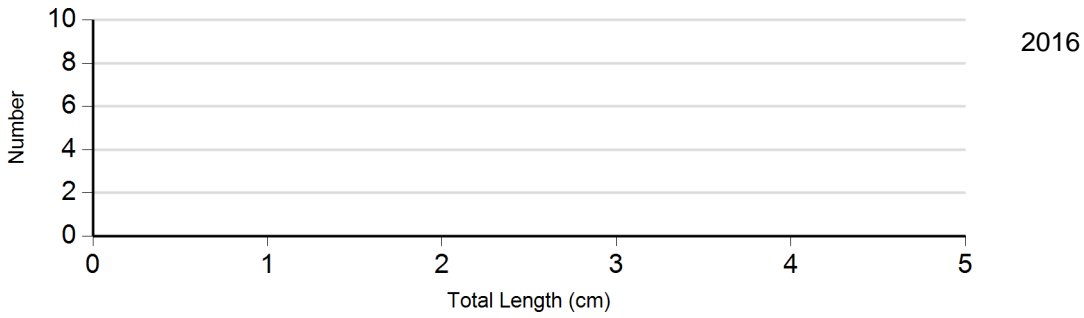
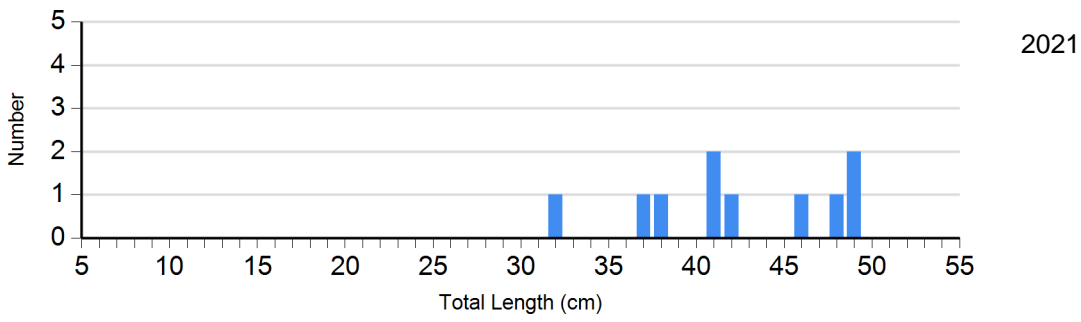


Species: Channel Catfish
Gear: AFS std gill net

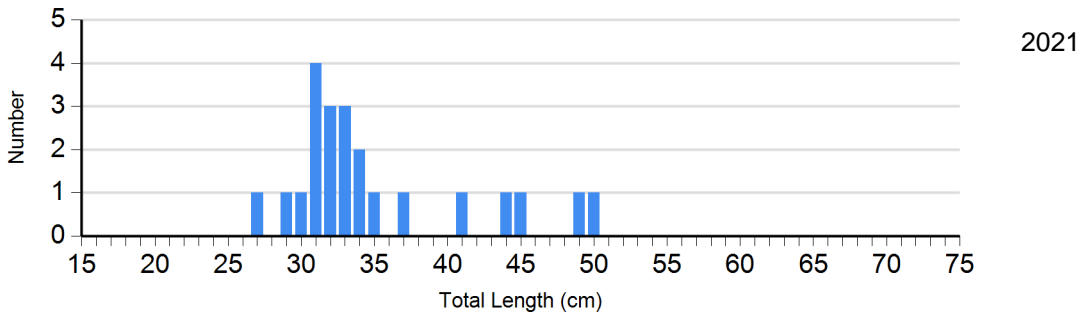
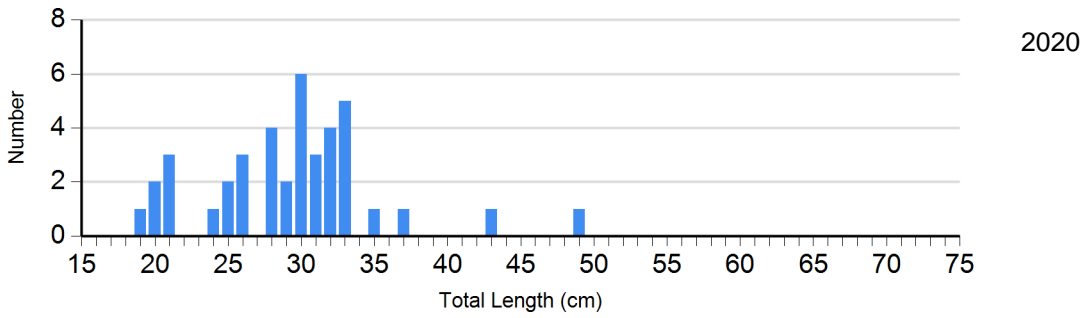
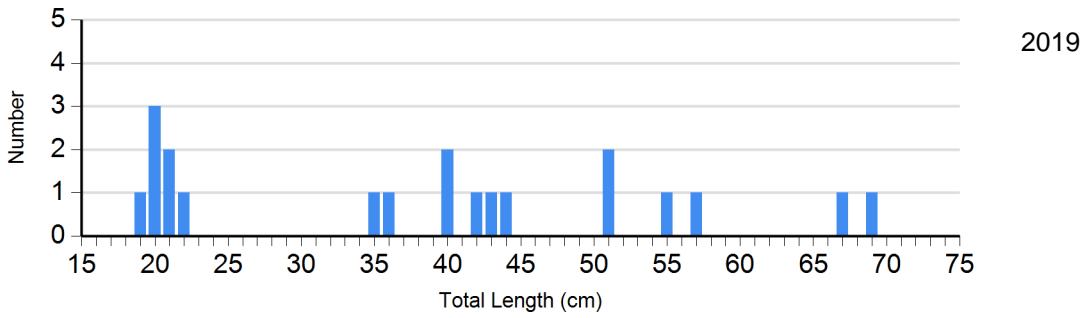
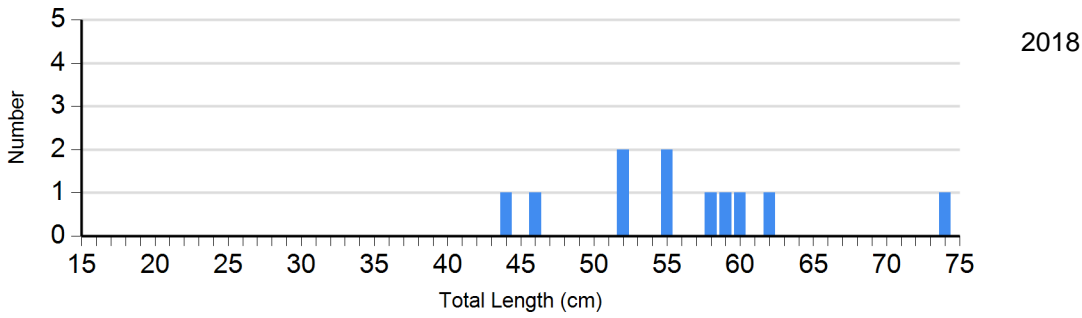
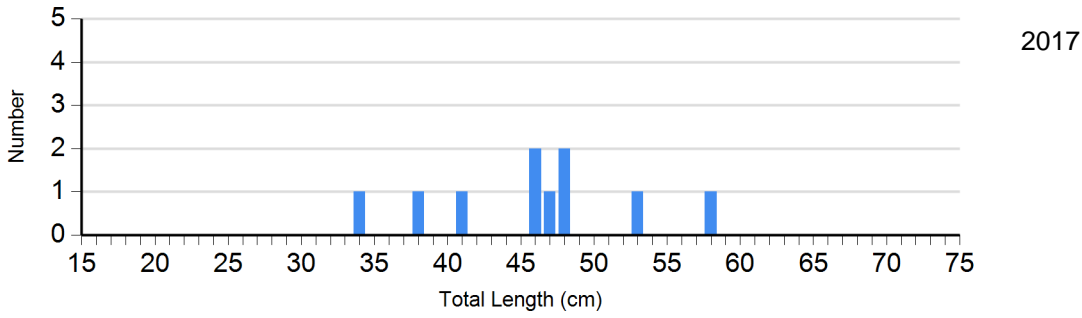


Species: Common Carp
Gear: AFS std gill net

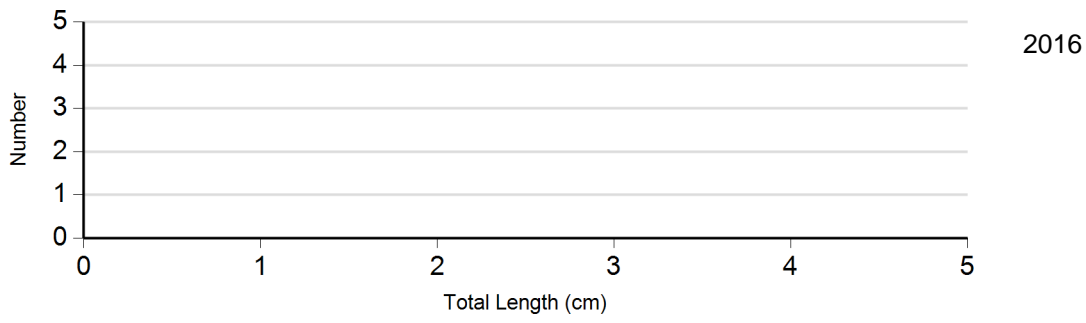




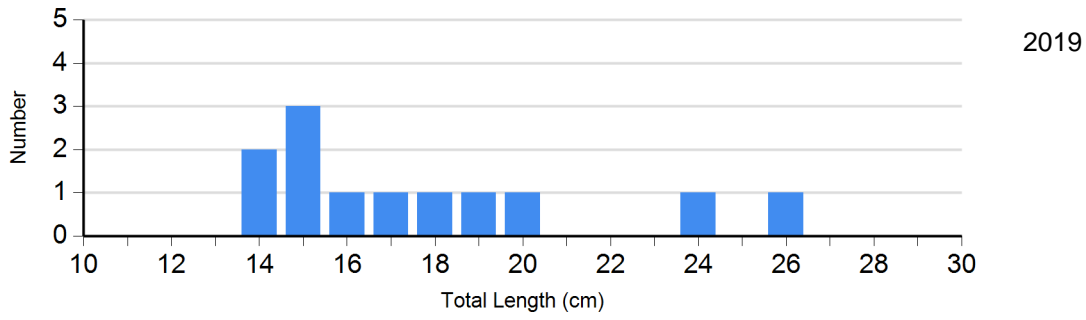
Species: Walleye
Gear: AFS std gill net



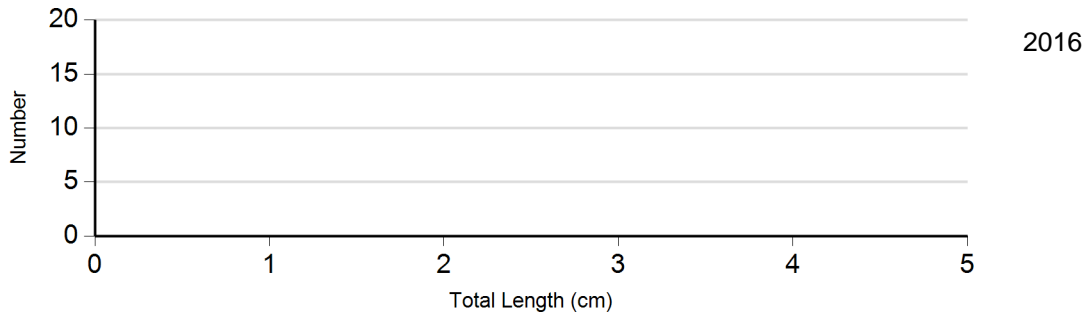
Species: Walleye
Gear: std exp gill net



Species: Yellow Perch
Gear: AFS std gill net



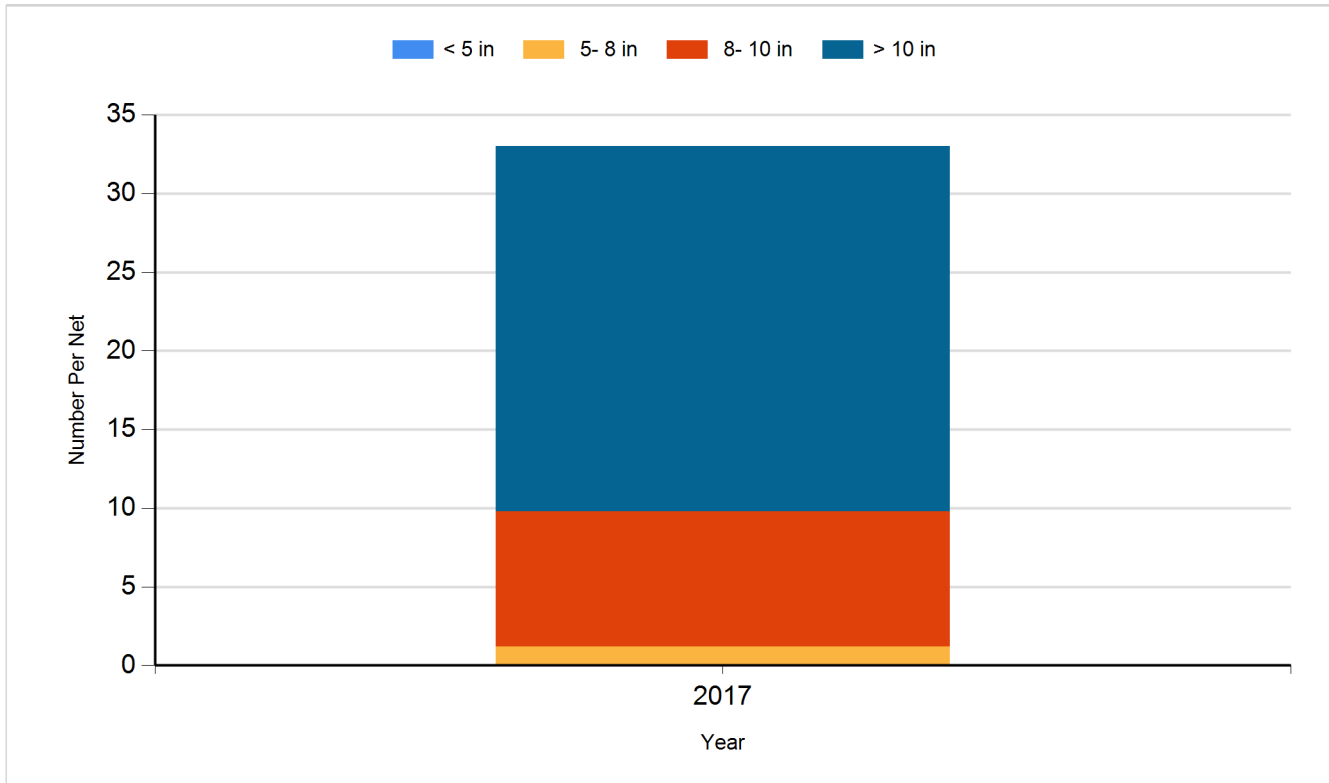
Species: Yellow Perch
Gear: std exp gill net



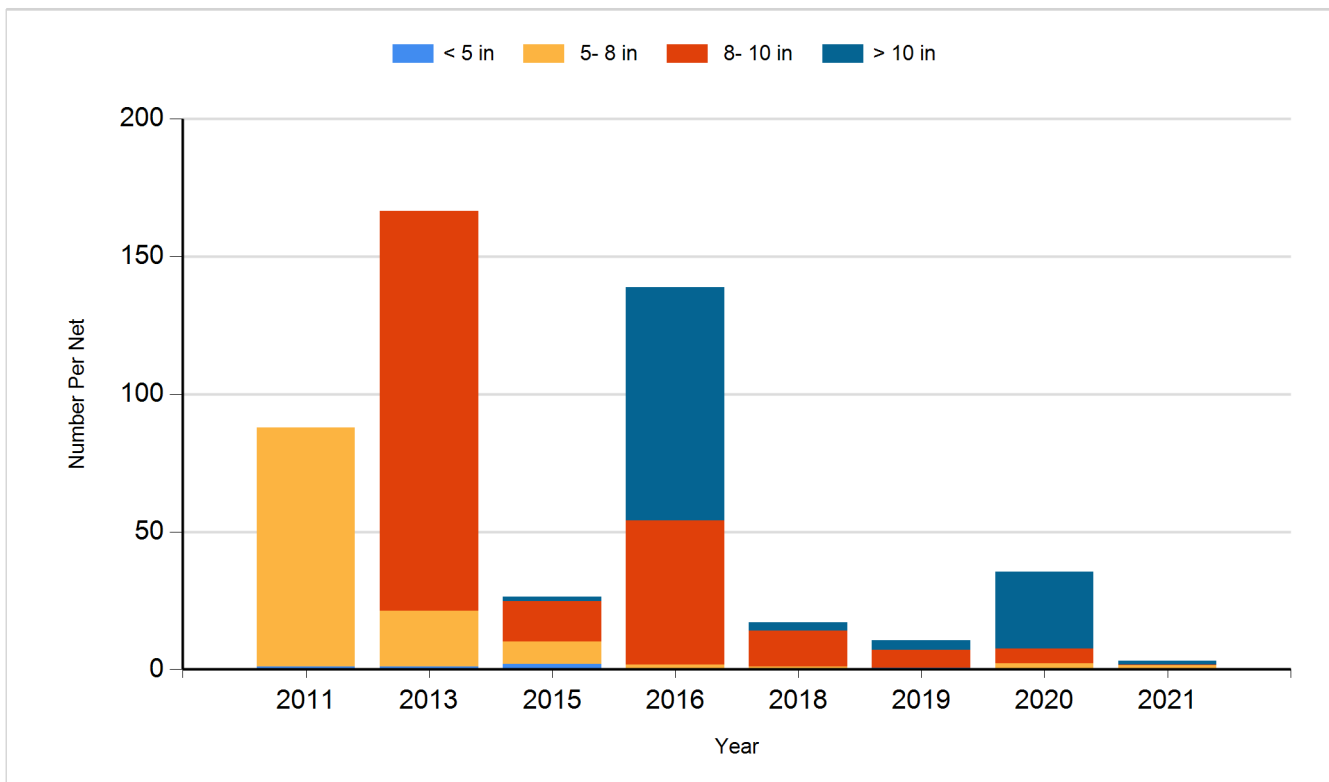
Historic Fish Sizes and Relative Abundance

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

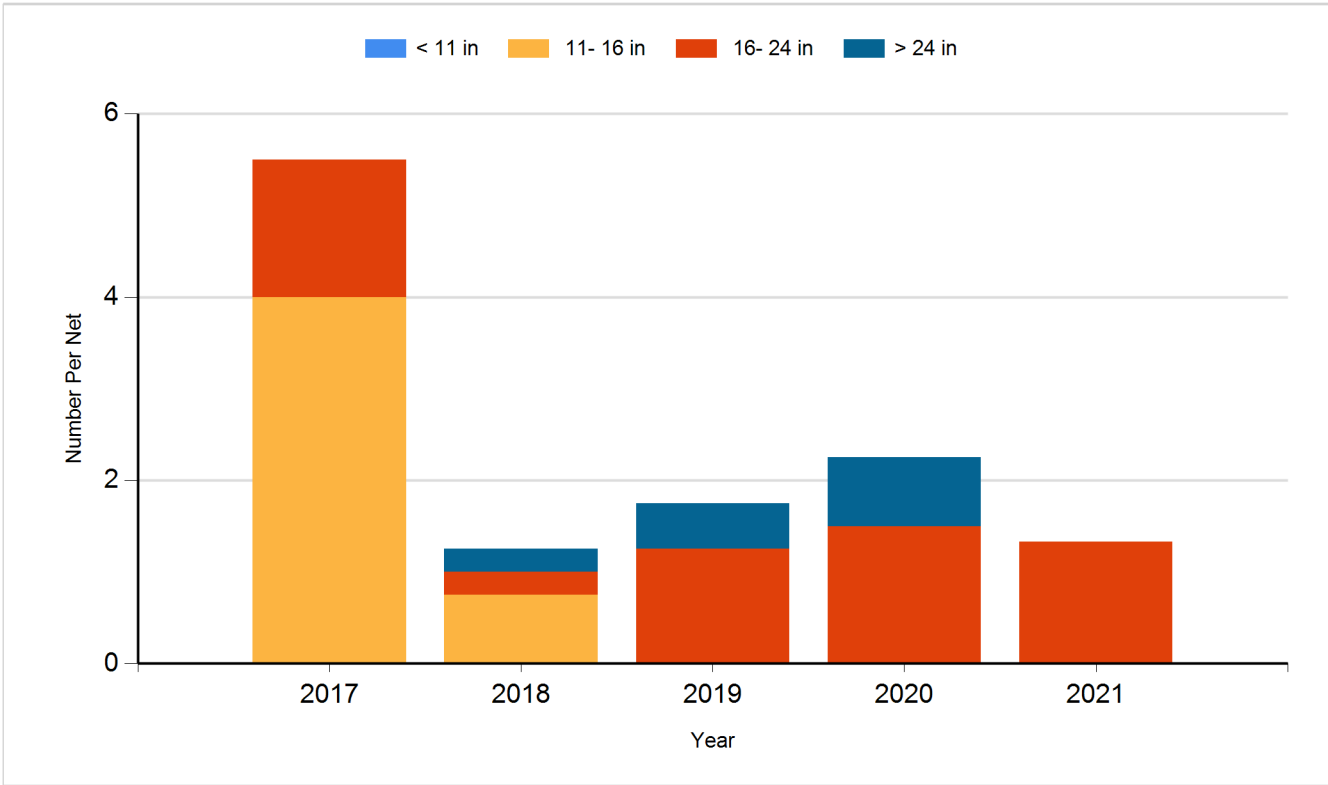
Species: Black Crappie
Gear: AFS std frame net



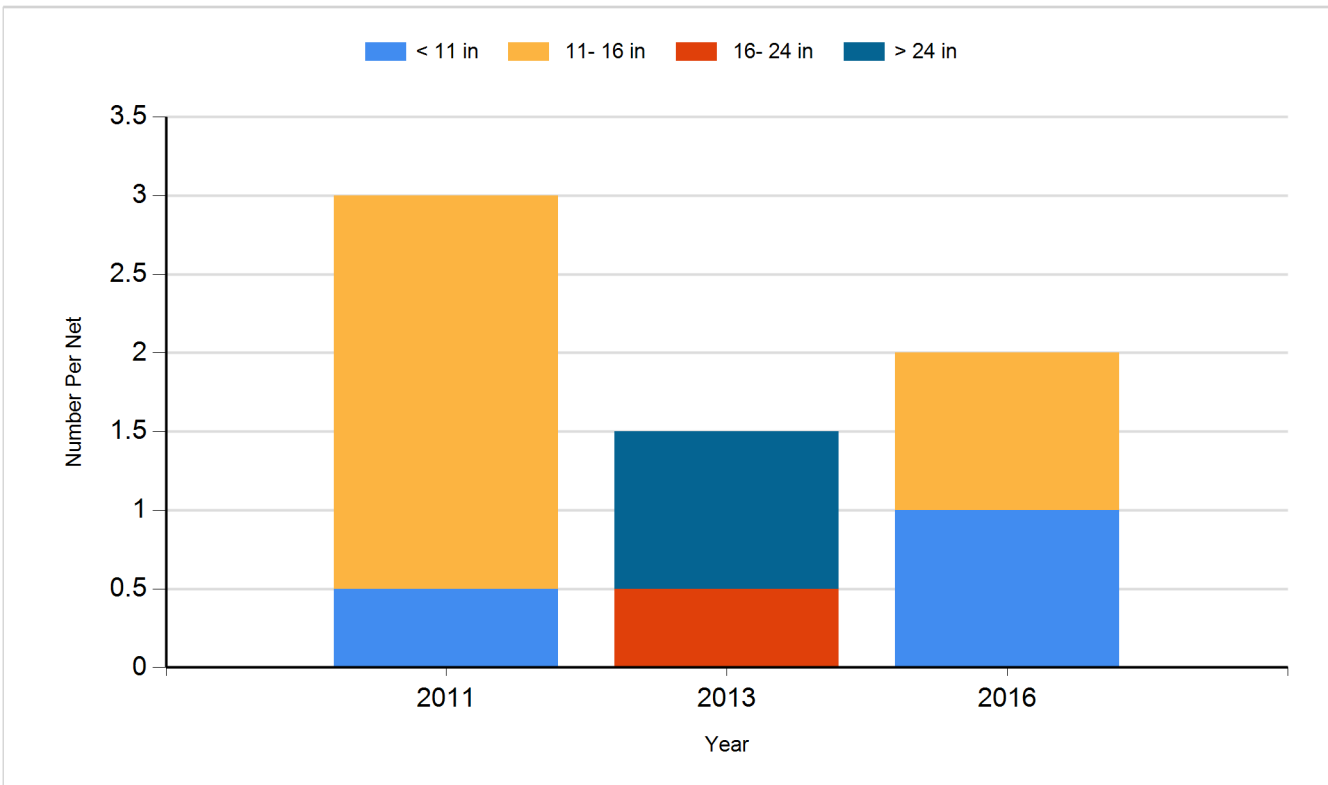
Species: Black Crappie
Gear: frame net (std 3/4 in)



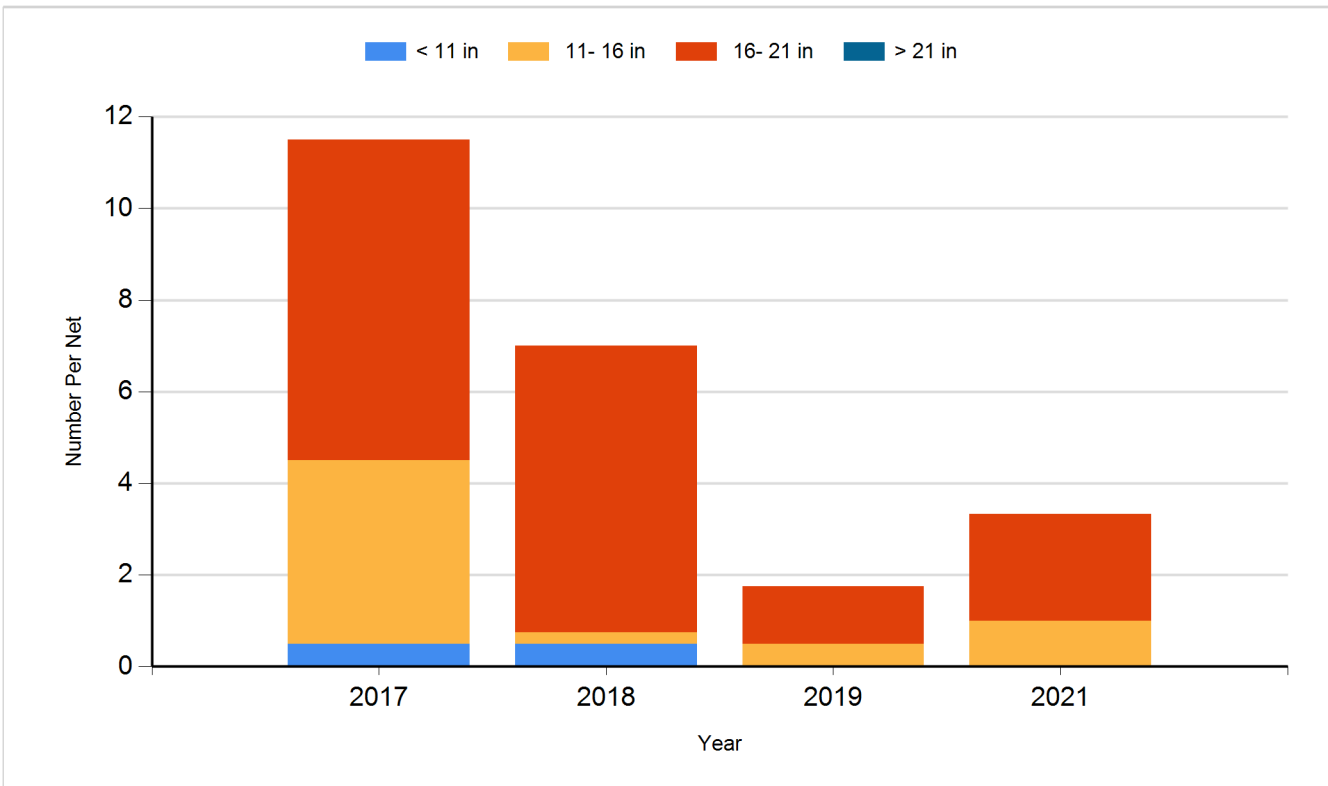
Species: Channel Catfish
Gear: AFS std gill net



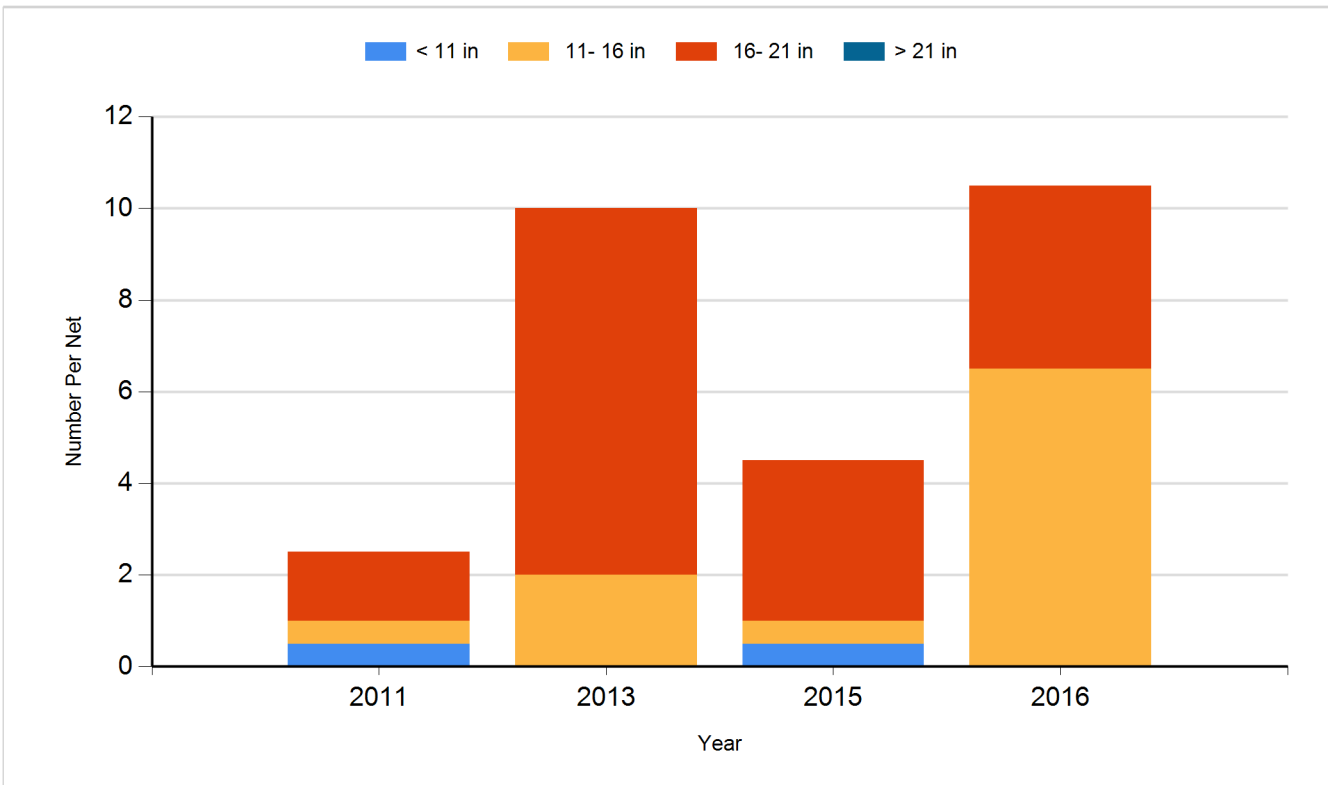
Species: Channel Catfish
Gear: std exp gill net



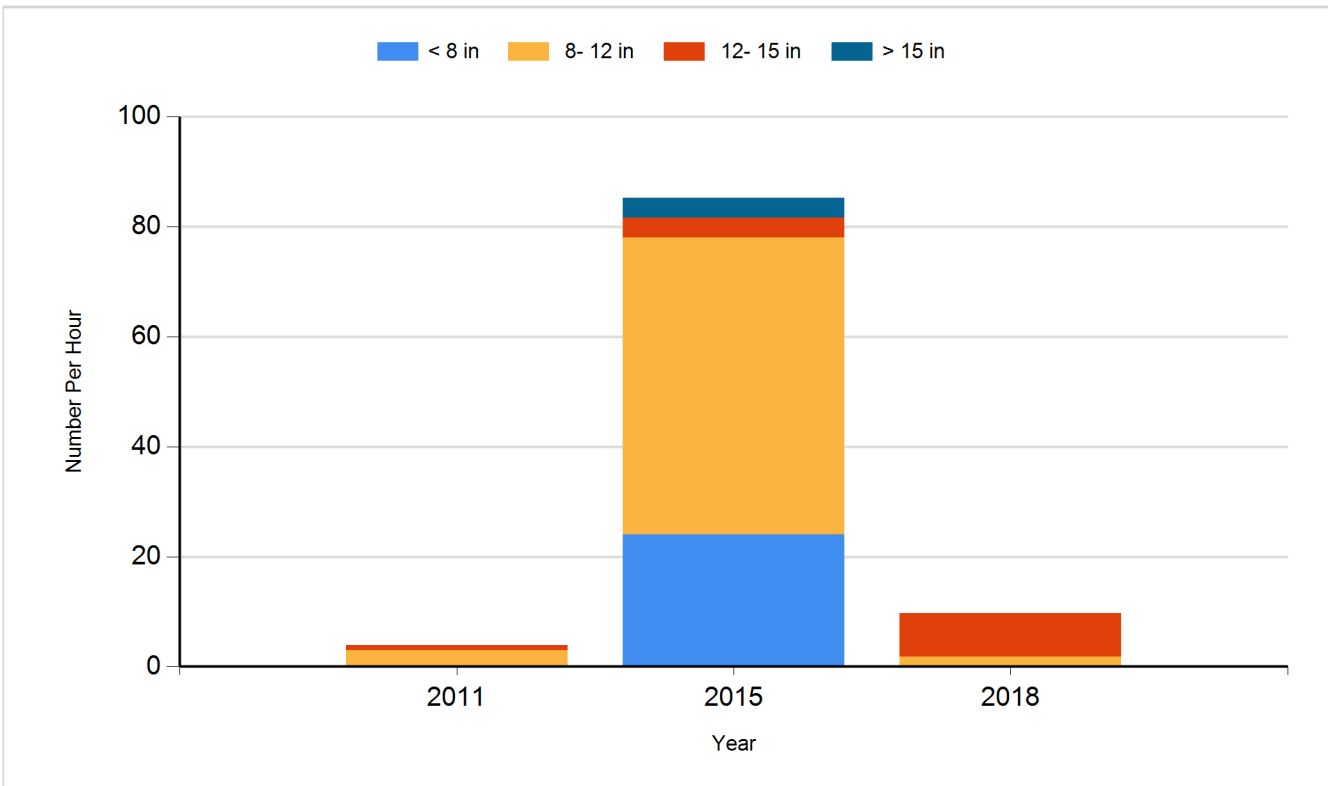
Species: Common Carp
Gear: AFS std gill net



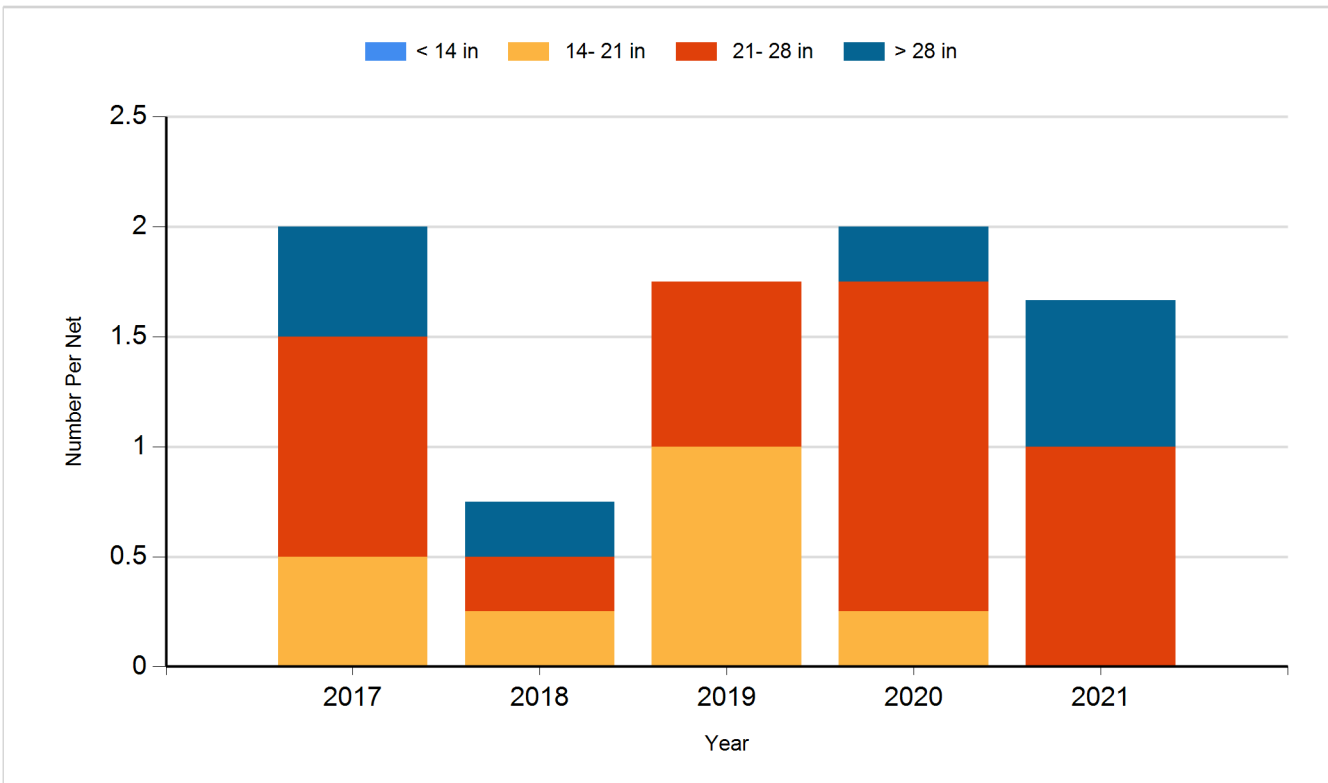
Species: Common Carp
Gear: std exp gill net



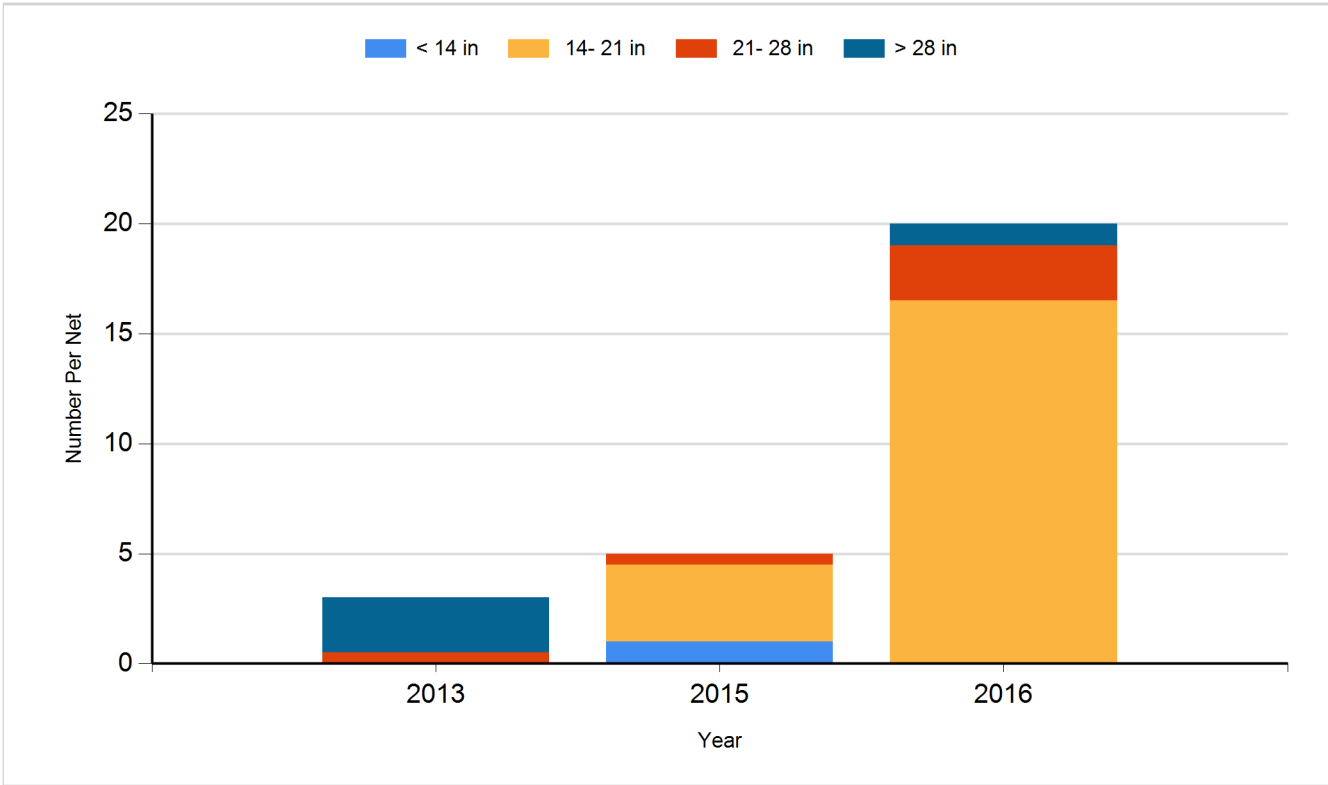
Species: Largemouth Bass
Gear: boat shocker (day)



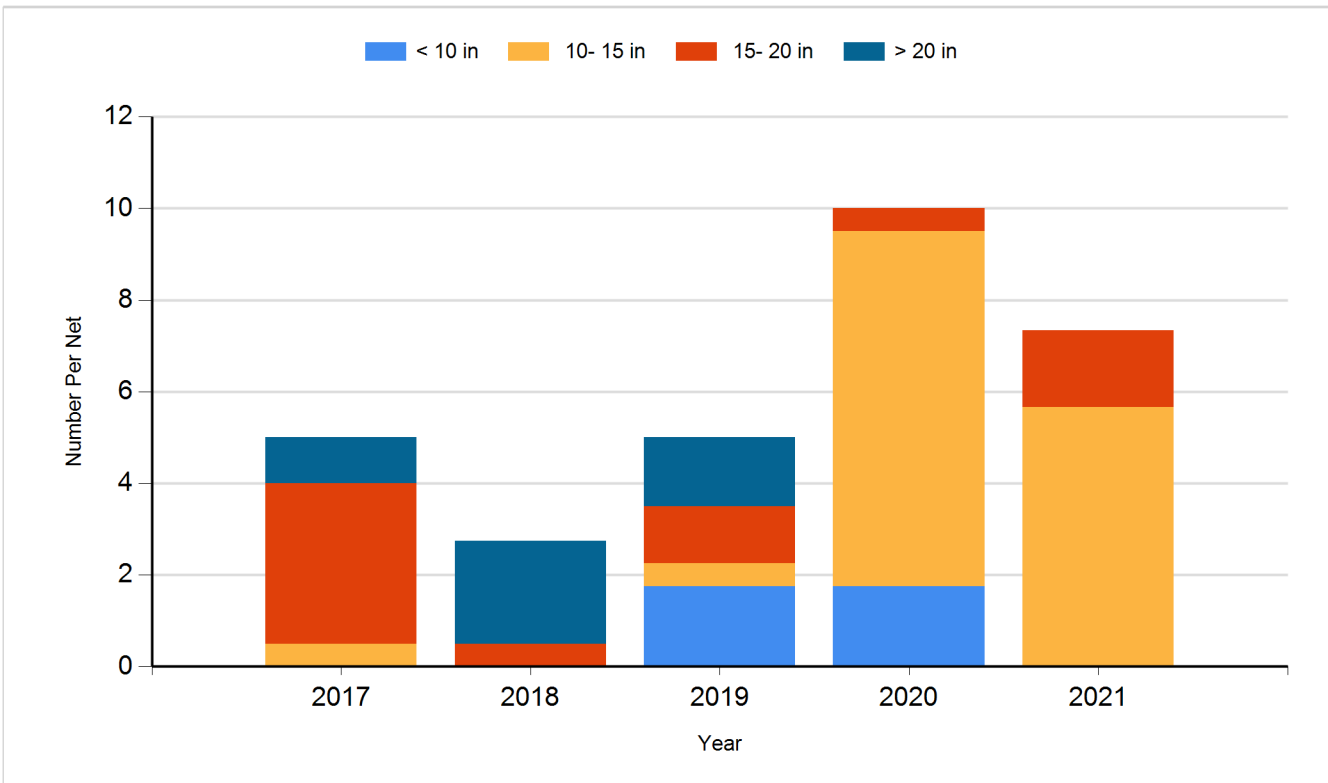
Species: Northern Pike
Gear: AFS std gill net



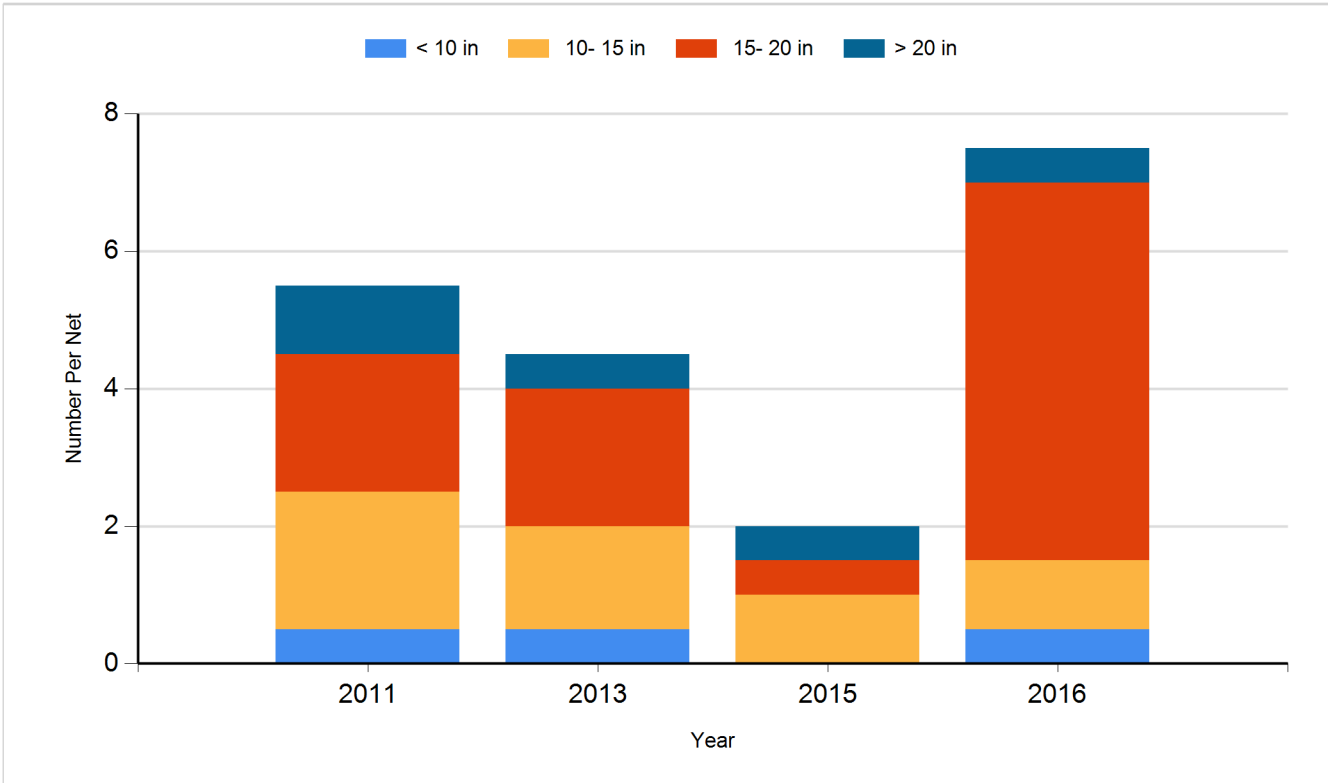
Species: Northern Pike
Gear: std exp gill net



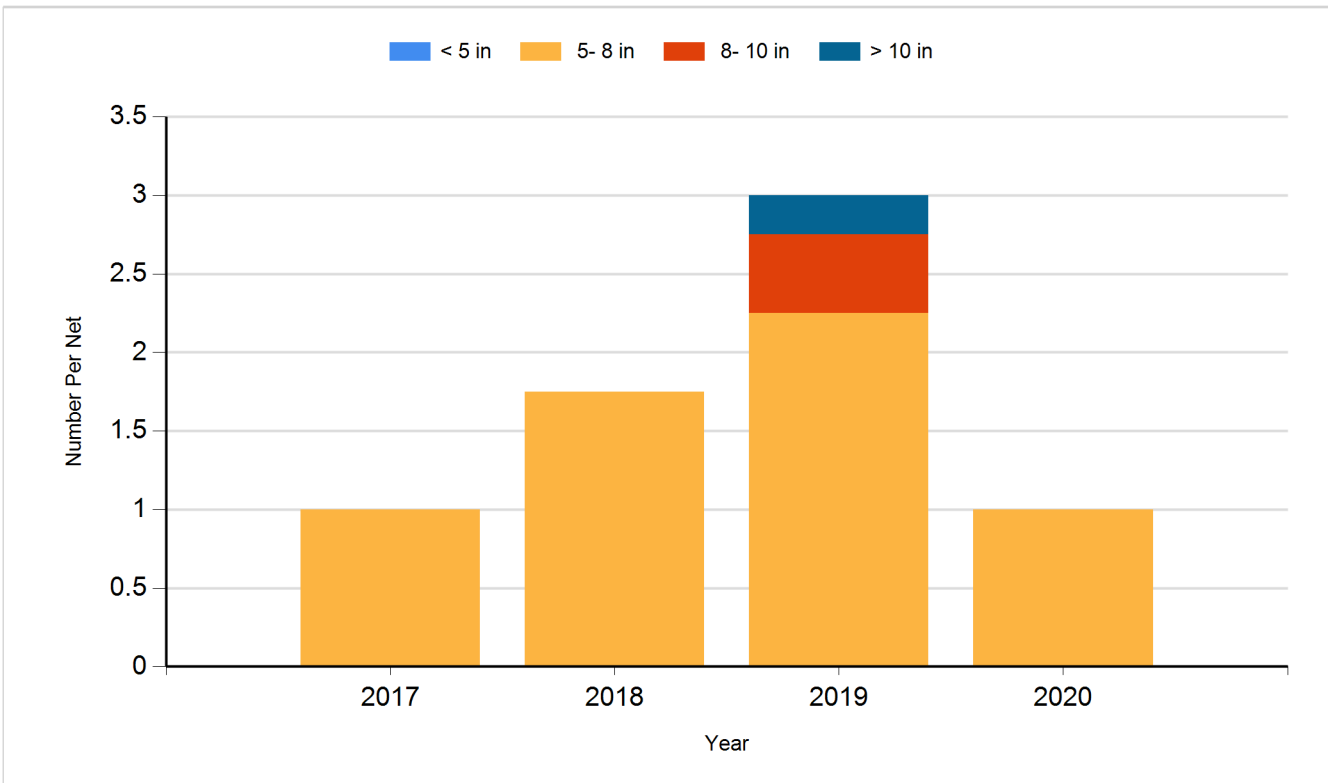
Species: Walleye
Gear: AFS std gill net



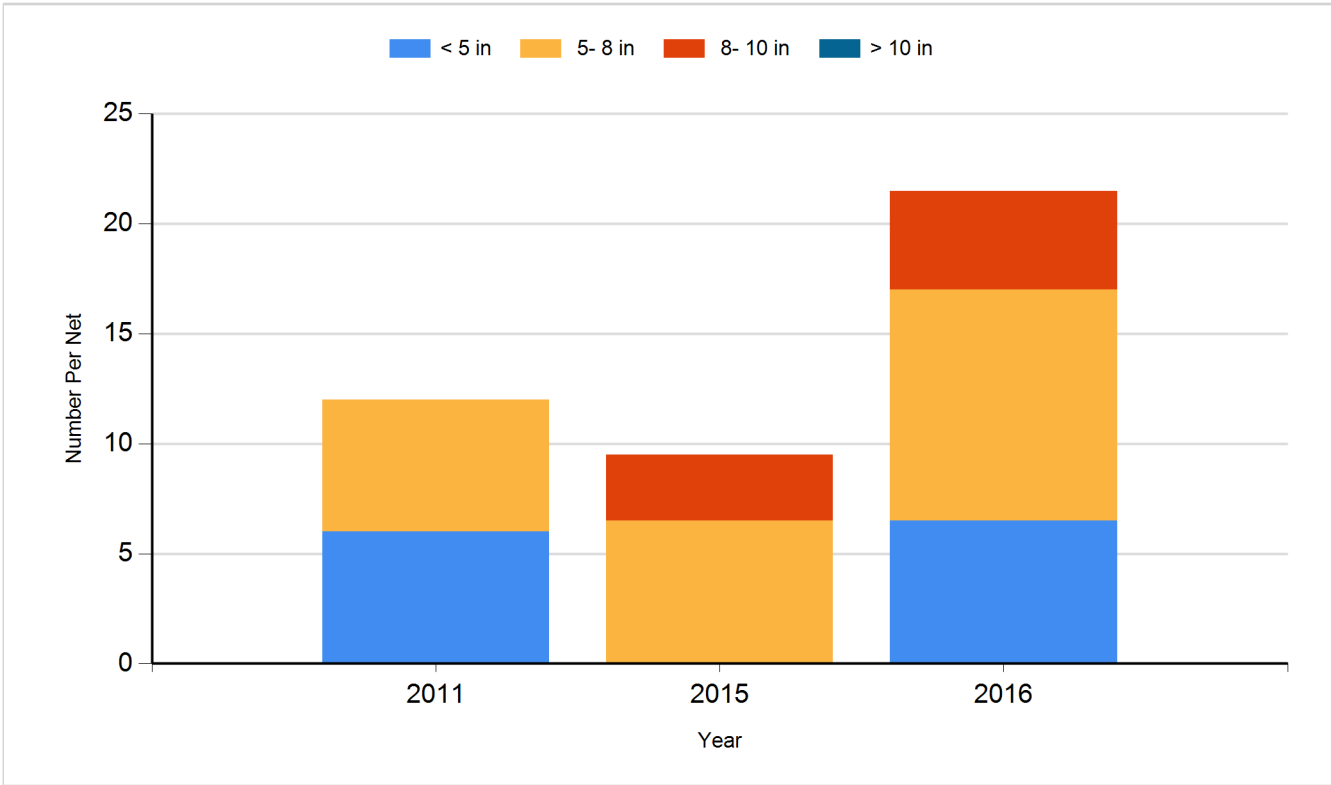
Species: Walleye
Gear: std exp gill net



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
2010	Walleye	Small Fingerling	20,700
2011	Walleye	Small Fingerling	19,900
2014	Channel Catfish	Adult	150
2014	Walleye	Fingerling	30,000
2014	Yellow Perch	Adult	800
2016	Gizzard Shad	Adult	33
2016	Walleye	Fingerling	25,500
2017	Gizzard Shad	Adult	125
2017	Walleye	Small Fingerling	30,800
2018	Gizzard Shad	Adult	44
2018	Walleye	Small Fingerling	29,600
2019	Gizzard Shad	Adult	65
2019	Walleye	Small Fingerling	30,600
2021	Gizzard Shad	Adult	20
2021	Walleye	Juvenile	30,000