Gardner Lake Survey Summary

Gardner Lake is a 203-acre impoundment located 3 miles West and 1 mile North of Buffalo. Primary species in Gardner include Black Crappie, Northern Pike and Walleye. Other species present include Channel Catfish, Common Carp and Yellow Perch. Gardner was stocked with Gizzard Shad as a forage species starting in 2016.

Black Crappie. Gardner had been suffering from low water and partial winterkills in recent years which may be affecting crappie numbers as only 2.8 fish per net was recorded in 2023. This is the lowest catch rate in recent years. Maximum size in the sample were just under 12 inches.

Northern Pike. Twenty-one pike were sampled in this year's survey. Fish ranged in size from 10-37 inches.

Walleye. Walleye numbers have not been affected by the low water as a gill nets sampled 13.3 walleye per net. Walleye sampled ranged in size from 4 to 29 inches. Consistent recruitment was noted in the ageing data, as year classes from age 2 to 8 were observed. Gardner was stocked with 31, 000 small fingerlings in the spring of 2023.

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Gardner, Harding County
SFG-Lake-581-000
2023

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 01, 2023	4 net-nights
boat shocker (day)	Aug 29, 2023	4200 seconds
frame net (std 3/4 in)	Jun 13, 2023	8 net-nights
frame net (std 3/4 in)	May 23, 2023	6 net-nights

Common Fish Species Present

Largemouth Bass

Channel Catfish

Black Crappie

Walleye

Northern Pike

Common Carp

Bluegill

Yellow Perch

Shorthead Redhorse

Rock Bass

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 Crappie	6	1.3	0.8	80		80		93	8
	Channel Catfish	1	0.3	0.4	100		100		99	
	Common Carp	7	1.8	1.2	100		0		84	2
	Gizzard Shad	1	0.0	0.0	0					
	Northern Pike	15	3.5	2.2	64	22	0		92	2
	Walleye	53	13.3	6.0	87	7	15	8	86	1
	Yellow Perch	3	0.8	0.8	33		0		95	2
boat shocker (day)	Walleye*	44	37.7	13.6	38	16	0		89	1
frame net (std 3/4 in)	Black Crappie	35	1.6	0.9	74	15	65	16	90	2
	Bluegill	19	1.4	0.8	79		5		98	3
	Channel Catfish	10	0.3	0.2	0		0		80	1
	Northern Pike	6	0.4	0.3	100		40		92	4
	Rock Bass	8	0.6	0.5	25		0		91	4
	Shorthead Redhorse	10	0.7	0.6	100		20		82	3
	Smallmouth Bass	7	0.4	0.4	33		17		78	2
	Walleye	15	1.0	0.4	79		29		81	3
	Yellow Perch	1	0.1	0.1	0		0		86	

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**

		CPUE										
Gear	Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
AFS gill net (1/2 inch)*	Black Crappie						4.0					4.00
	Walleye						2.0					2.00
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	0.0	1.3	6.39
	Channel Catfish				5.5	1.3	1.8	2.3	1.3	0.0	0.3	1.79
	Common Carp				11.0	6.5	1.8	0.0	3.3	3.0	1.8	3.91
	Gizzard Shad				0.0	0.0	28.0	11.8	0.0	0.3	0.0	5.73
	Largemouth Bass				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
	Northern Pike				2.0	0.8	1.8	2.0	1.7	3.7	3.5	2.21
	Walleye				5.0	2.8	3.3	8.3	7.3	6.3	13.3	6.61
	Yellow Perch				1.0	1.8	3.0	1.0	0.0	0.0	0.8	1.09
boat shocker (day)	Largemouth Bass		61.2			9.6				0.0	0.0	17.70
	Walleye*		0.0			16.9				37.0	37.7	22.90
frame net (std 3/4 in)	Black Crappie		24.4	138.8		17.0	10.0	35.1	3.2	4.5	1.6	29.33
	Bluegill		0.0	0.0		0.0	0.0	0.0	0.0	0.0	1.4	0.18
	Channel Catfish		0.0	0.0		0.2	0.2	0.1	0.0	0.0	0.3	0.10
	Common Carp		0.1	0.0		0.3	0.7	0.3	1.0	0.5	0.0	0.36
	Gizzard Shad		0.0	0.0		0.0	0.0	2.8	0.0	0.0	0.0	0.35
	Green Sunfish		0.0	0.0		0.0	0.0	0.1	0.0	0.0	0.0	0.01
	Northern Pike		0.3	0.2		1.3	0.2	0.1	9.2	1.5	0.4	1.65
	Rock Bass		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.6	0.08
	Shorthead Redhorse		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.7	0.09
	Smallmouth Bass		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.4	0.05
	Walleye		1.1	0.0		1.5	0.2	0.1	6.6	2.0	1.0	1.56
	White Sucker		0.0	0.0		0.0	0.2	0.0	0.0	0.0	0.0	0.03
	Yellow Perch		0.3	0.2		0.0	0.0	0.4	0.2	0.0	0.1	0.15
std exp gill net	Black Crappie		7.0	11.0								9.00
	Channel Catfish		0.0	1.0								0.50
	Common Carp		4.0	10.5								7.25
	Gizzard Shad		0.0	0.0								0.00
	Largemouth Bass		0.0	2.0								1.00
	Northern Pike		4.0	20.0								12.00

		CPUE										
Gear	Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
std exp gill net	Spottail Shiner		0.0	0.0								0.00
	Walleye		2.0	7.0								4.50
	Yellow Perch		9.5	15.0								12.25

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	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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		80
		PSD-P				63	85	57	43	71		80
		Wr				93	84	96	99	93		93
	Channel Catfish	PSD				27	40	100	100	100		100
		PSD-P				0	20	29	33	0		100
		Wr				89	87	88	84	80		99
	Common Carp	PSD				64	96	71		70	89	100
		PSD-P				0	0	0		0	0	0
		Wr				87	82	84		89	84	84
	Largemouth Bass	PSD							0			
		PSD-P							0			
	Northern Pike	PSD				75	67	43	88	100	82	64
		PSD-P				25	33	0	13	40	18	0
		Wr				84	86	100	90	80	73	92
	Walleye	PSD				90	100	85	6	23	53	87
		PSD-P				20	82	46	0	0	26	15
		Wr				83	81	88	86	84	82	86
	Yellow Perch	PSD				0	0	25	0			33
		PSD-P				0	0	8	0			0
		Wr				82	98	90	94			95
boat shocker (day)	Largemouth Bass	PSD		12			82					
		PSD-P		6			0					
		Wr		121			110					

			Year									
Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
boat shocker (day)	Walleye	PSD					22				88	38
		PSD-P					22				3	0
		Wr					95				88	89
frame net (std 3/4 in)	Black Crappie	PSD		66	99		94	100	95	50	100	74
		PSD-P		7	61		18	35	80	44	83	65
		Wr		101	106		88	92	87	85	86	90
	Bluegill	PSD										79
		PSD-P										5
		Wr										98
	Channel Catfish	PSD					0	100	100			0
		PSD-P					0	100	0			0
		Wr					89	89	78			80
	Common Carp	PSD		100			50	75	0	80	50	
		PSD-P		0			0	0	0	0	0	
		Wr		89			89	91	91	97	94	
	Northern Pike	PSD		0	100		25	100	100	78	100	100
		PSD-P		0	100		0	0	0	9	33	40
		Wr		119	107		85	91	94	84	80	92
	Rock Bass	PSD										25
		PSD-P										0
		Wr										91
	Shorthead Redhorse	PSD										100
		PSD-P										20
		Wr										82
	Walleye	PSD		64			100	100	100	18	100	79
		PSD-P		9			78	100	100	6	100	29
		Wr		79			80	92	78	75	83	81
	Yellow Perch	PSD		0	100				0	0		0
		PSD-P		0	0				0	0		0
		Wr		98					84	142		86
std exp gill net	Black Crappie	PSD		21	77							
		PSD-P		0	64							
		Wr		108	102							
	Channel Catfish	PSD			0							
		PSD-P			0							
		Wr			92							

			Year									
Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
std exp gill net	Common Carp	PSD		88	38							
		PSD-P		0	0							
		Wr		91	91							
	Largemouth Bass	PSD			0							
		PSD-P			0							
		Wr			112							
	Northern Pike	PSD		13	18							
		PSD-P		0	5							
		Wr		86	85							
	Walleye	PSD		50	86							
		PSD-P		25	7							
		Wr		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)	

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).

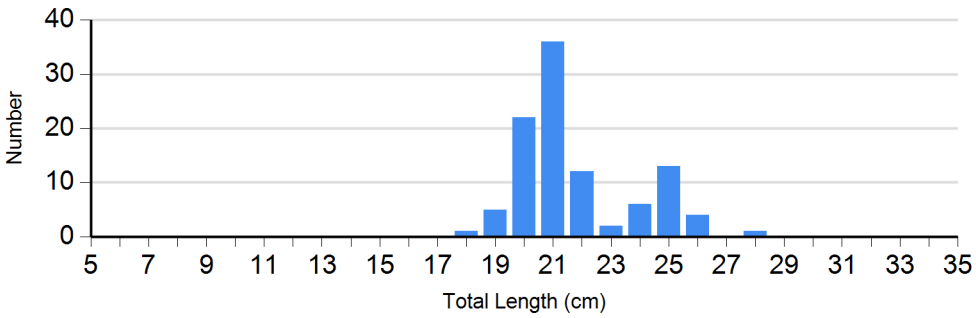
		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2019	0		39	92 (1.0)	21	91 (1.1)	0	
	2020	14	109	43	86 (0.8)	221	86 (0.3)	3	76
	2021	8	91 (1.8)	1	78	6	78 (1.3)	1	81
	2022	0		3	83 (3.2)	14	87 (1.2)	1	82
	2023	6	98 (1.8)	2	105 (1.7)	15	85 (1.4)	0	
Bluegill Frame Net	2023	4	97 (3.5)	14	99 (3.2)	1	95	0	
Channel Catfish Gill Net	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	
	2023	0		0		1	99	0	
Common Carp Gill Net	2019	2	82	5	84 (3.4)	0		0	
	2021	3	91 (5.1)	7	88 (2.0)	0		0	
	2022	1	89	8	83 (1.8)	0		0	
	2023	0		7	84 (1.9)	0		0	
Northern Pike Gill Net	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	
	2022	2	73 (2.6)	7	72 (1.4)	2	77 (7.3)	0	
	2023	5	93 (5.2)	9	91 (0.9)	0		0	
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	

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Walleye Gill Net	2022	9	86 (1.5)	5	83 (1.7)	3	73 (0.8)	2	71 (3.6)
	2023	7	85 (1.3)	38	87 (0.9)	8	85 (2.4)	0	
Yellow Perch Gill Net	2019	9	90 (2.2)	2	89 (1.7)	1	95	0	
	2020	4	94 (2.8)	0		0		0	
	2023	2	96 (2.5)	1	94	0		0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

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



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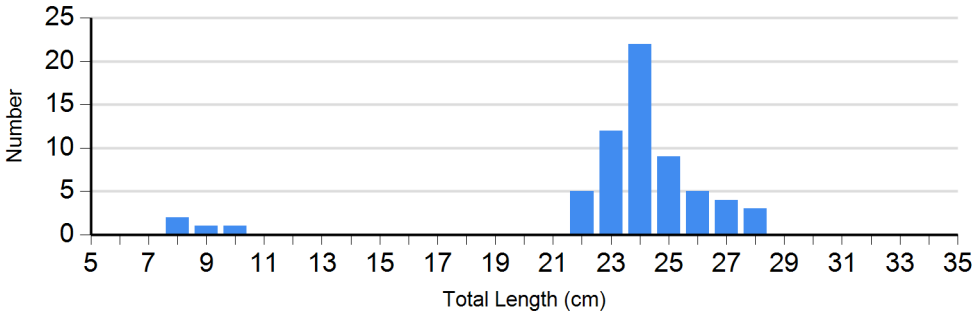
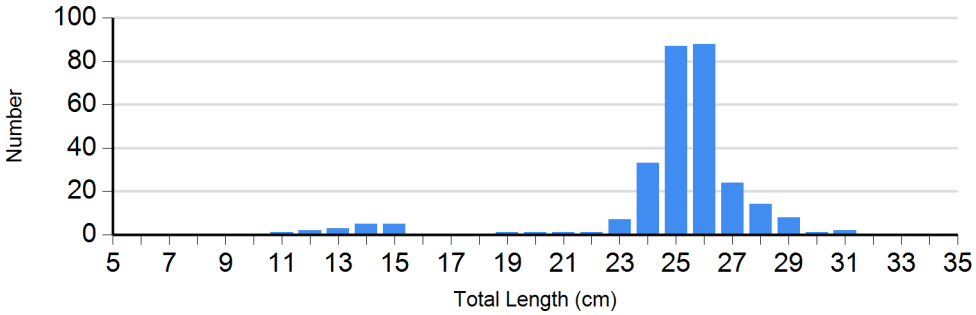


2019



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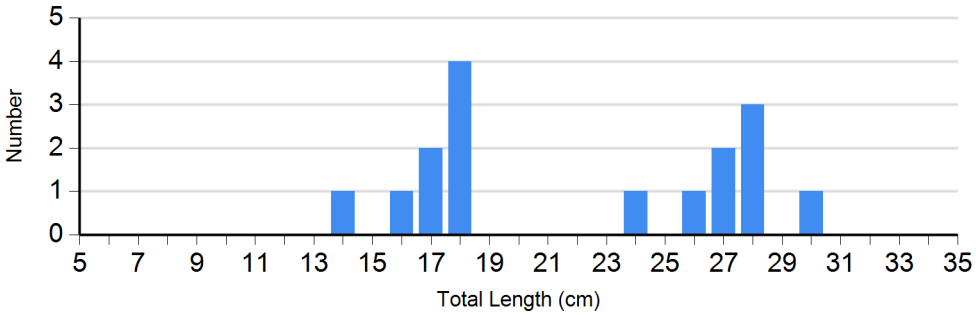

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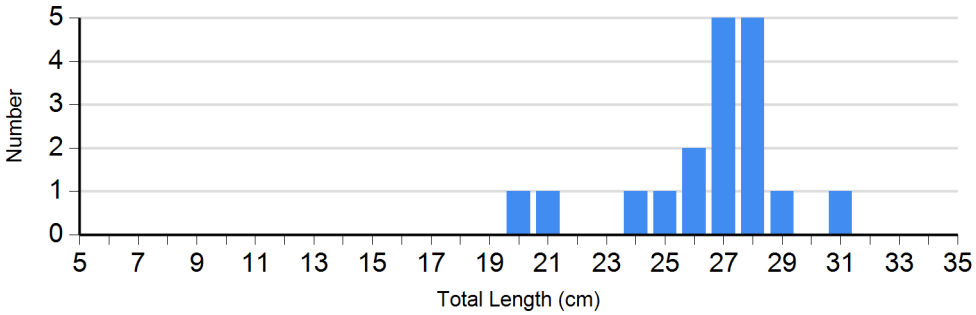

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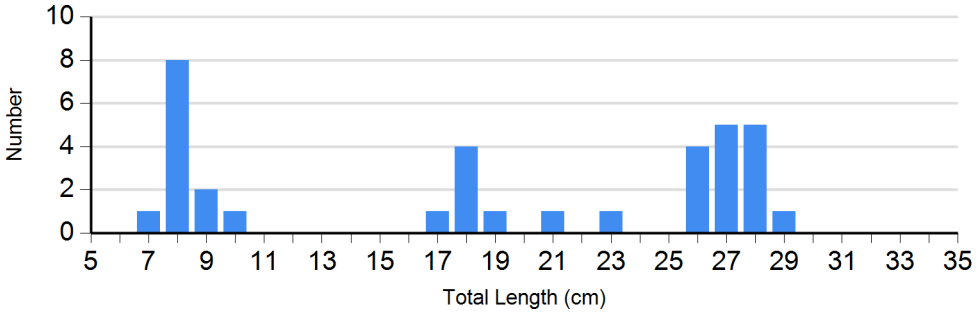
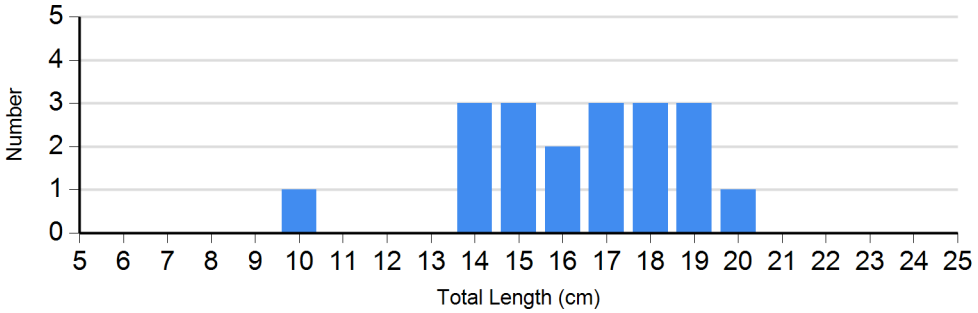


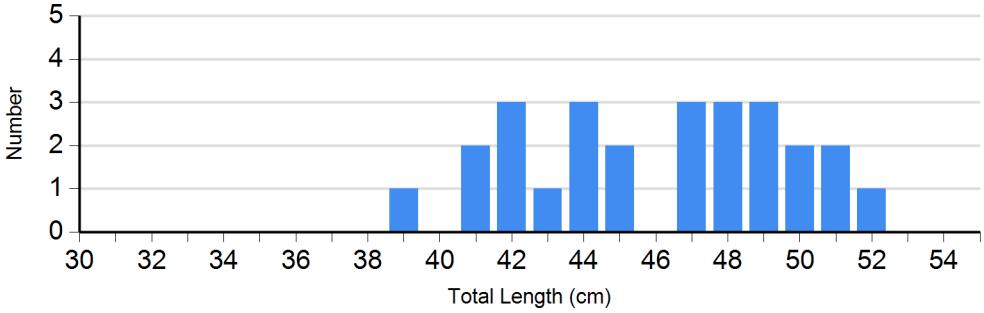
2023

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



2023

Species: Common Carp
Gear: AFS std gill net



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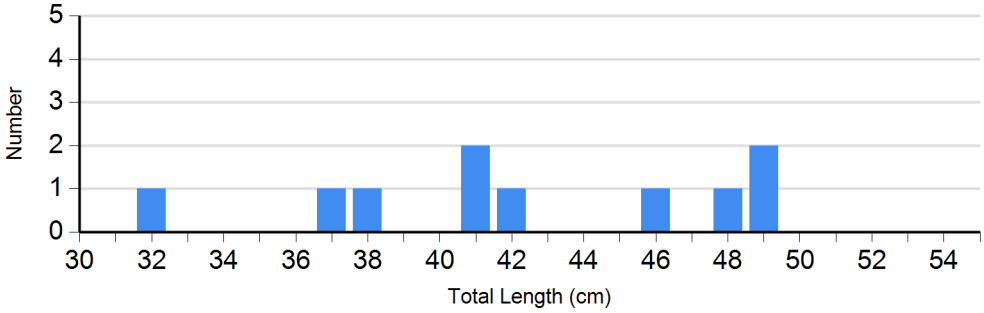
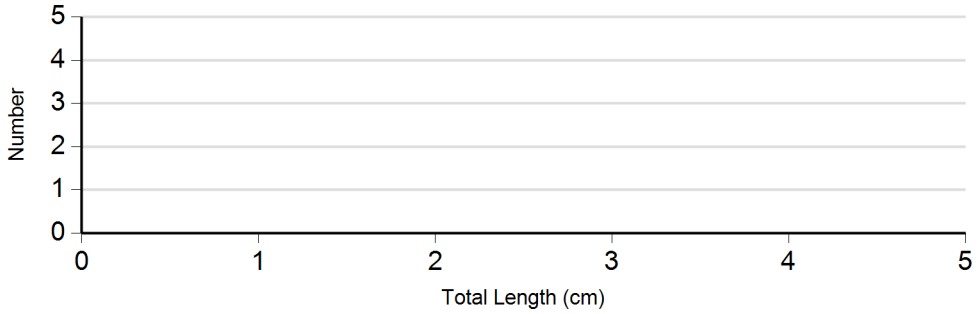


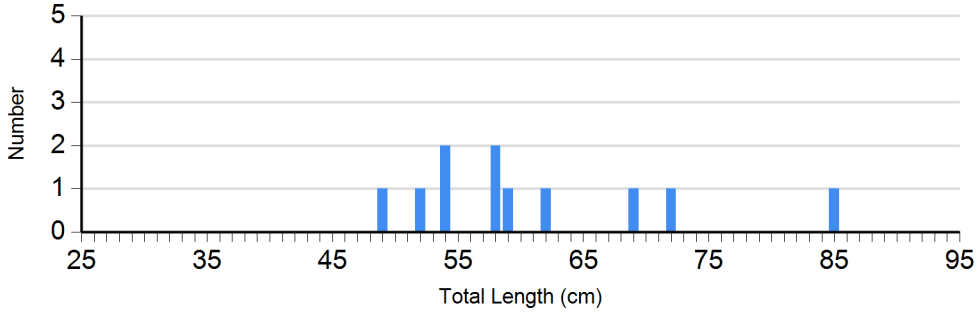
2021

Species: Largemouth Bass
Gear: boat shocker (day)

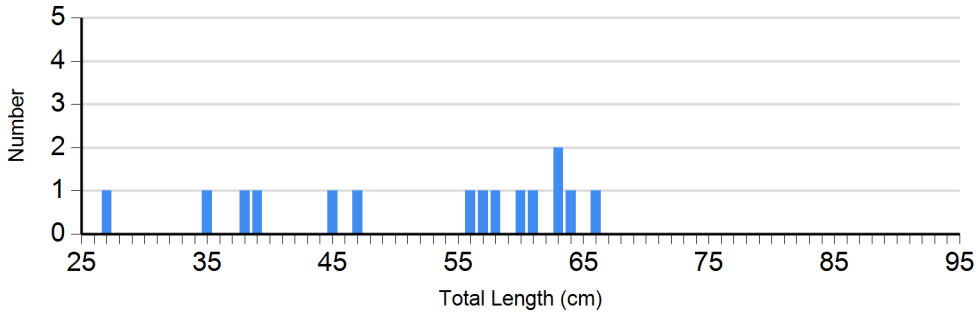


2018

Species: Northern Pike
Gear: AFS std gill net

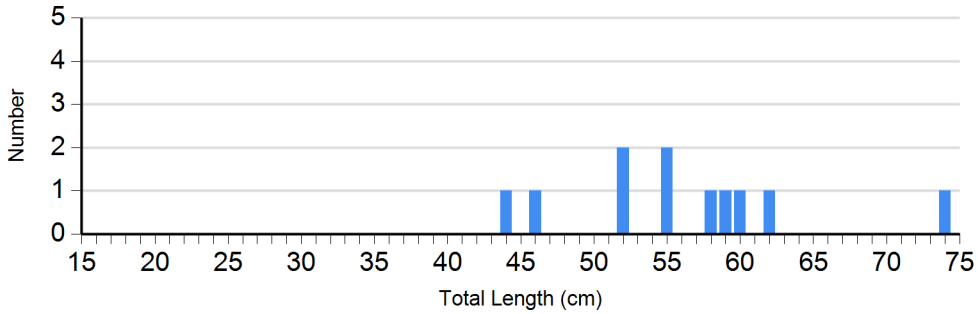


2022

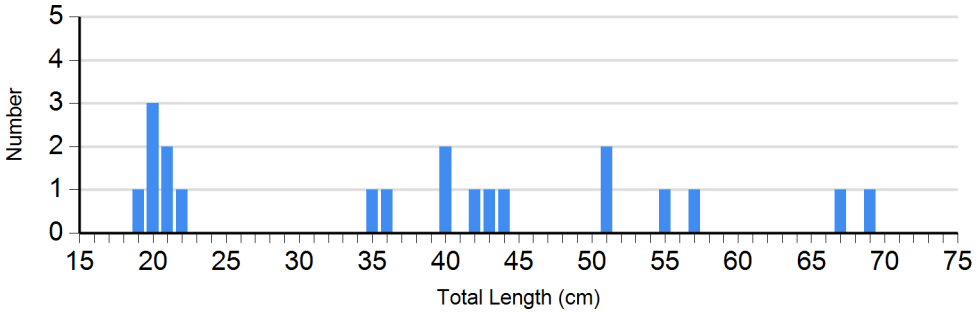


2023

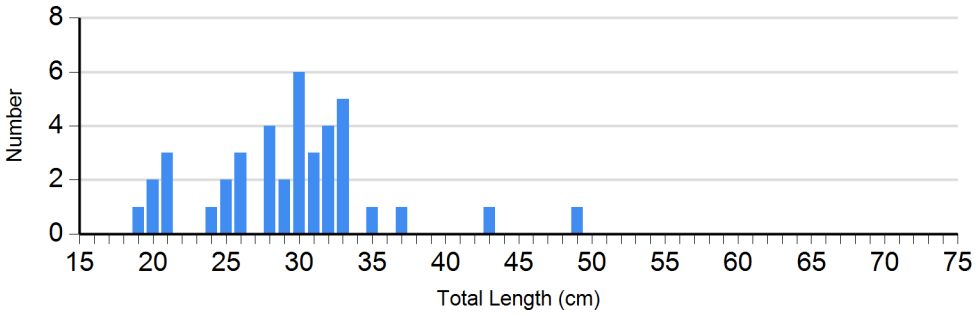
Species: Walleye
Gear: AFS std gill net



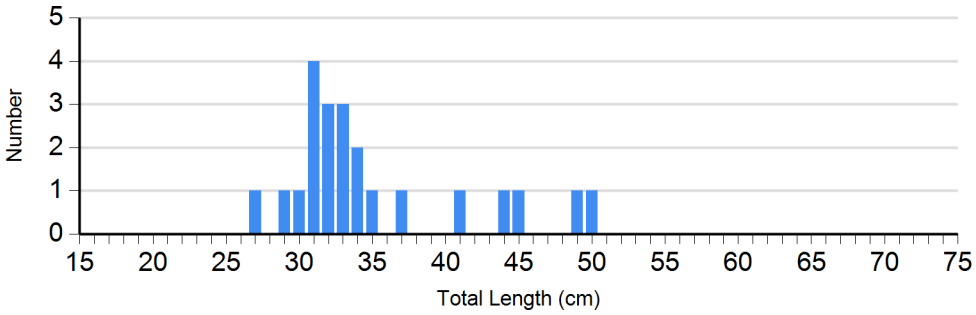
2018



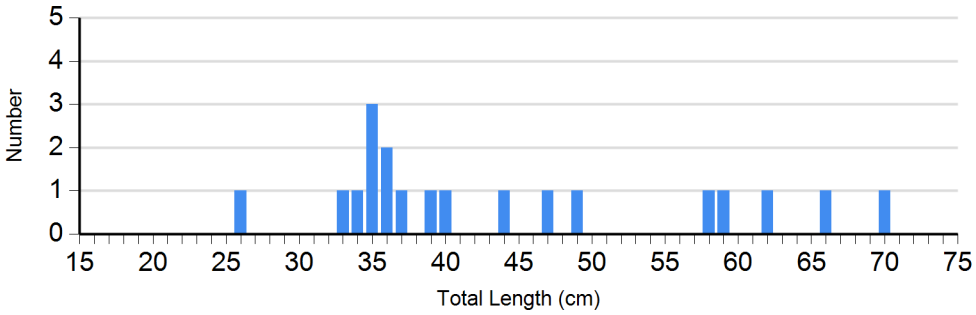
2019



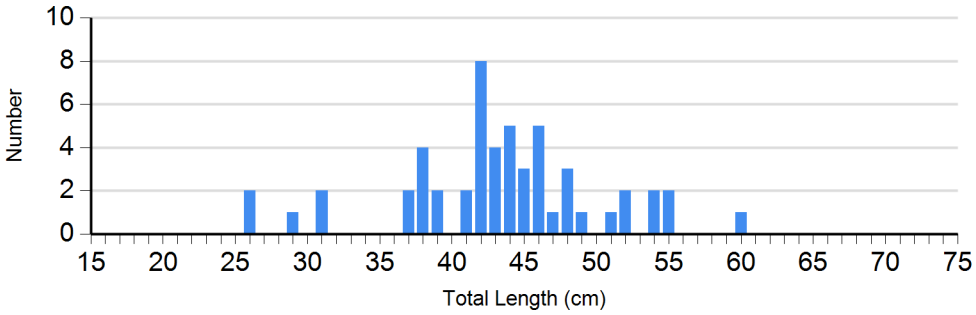
2020



2021

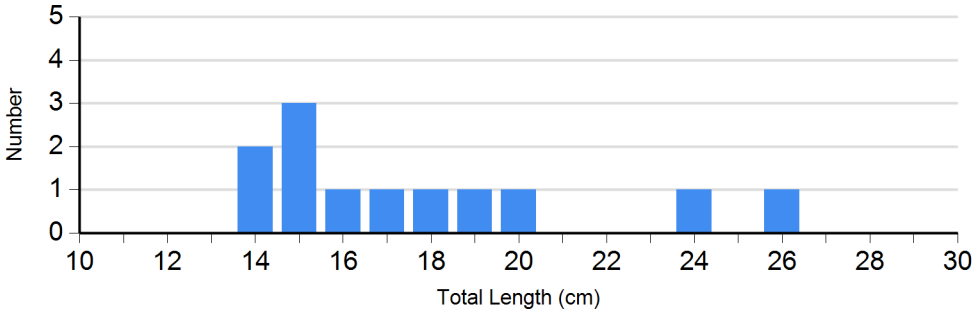


2022



2023

Species: Yellow Perch
Gear: AFS std gill net

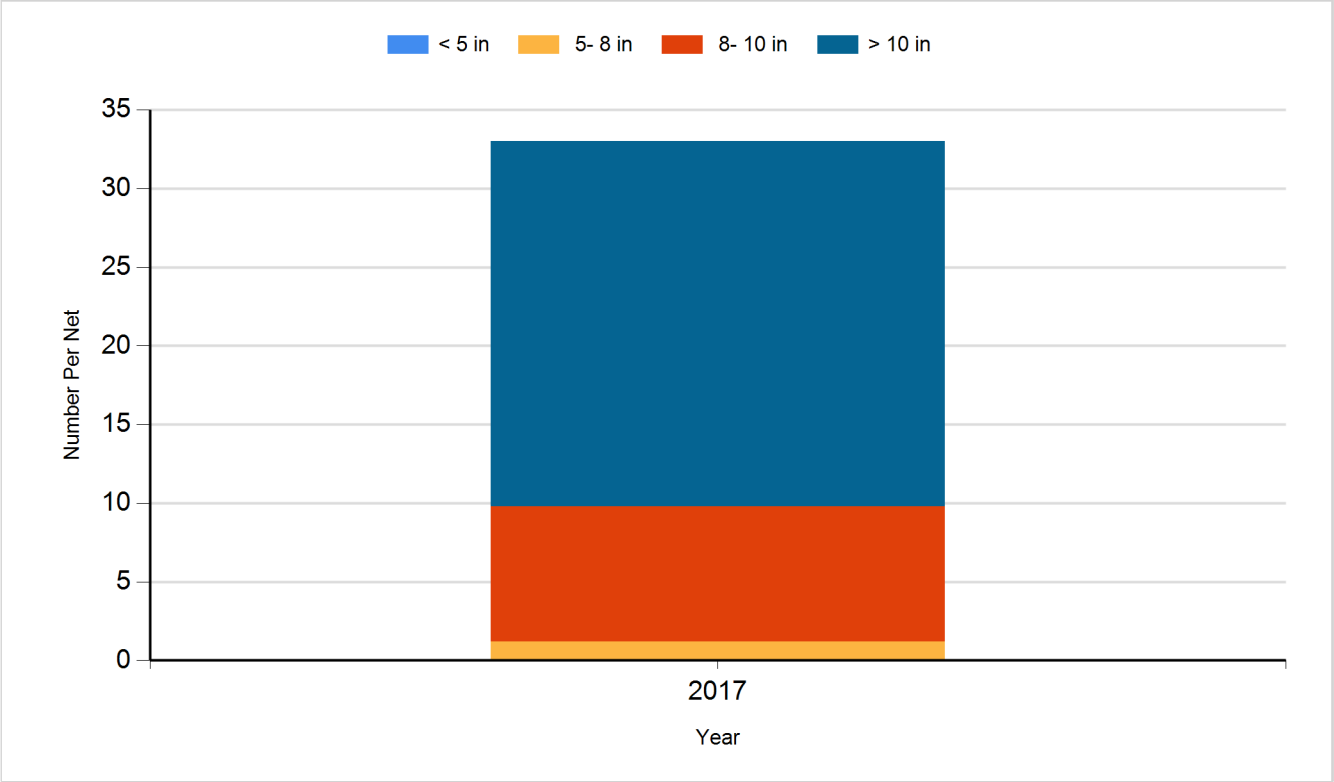


2019

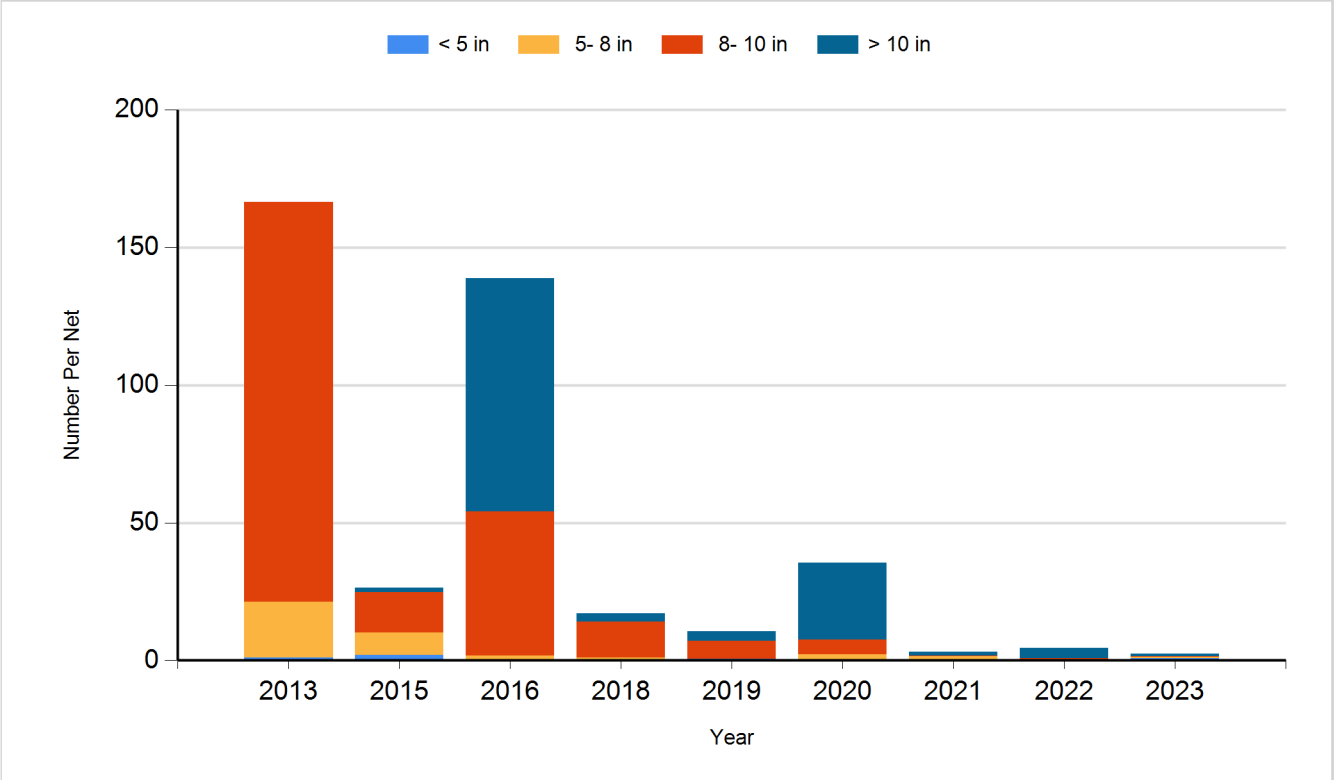
Historic Fish Sizes and Relative Abundance

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

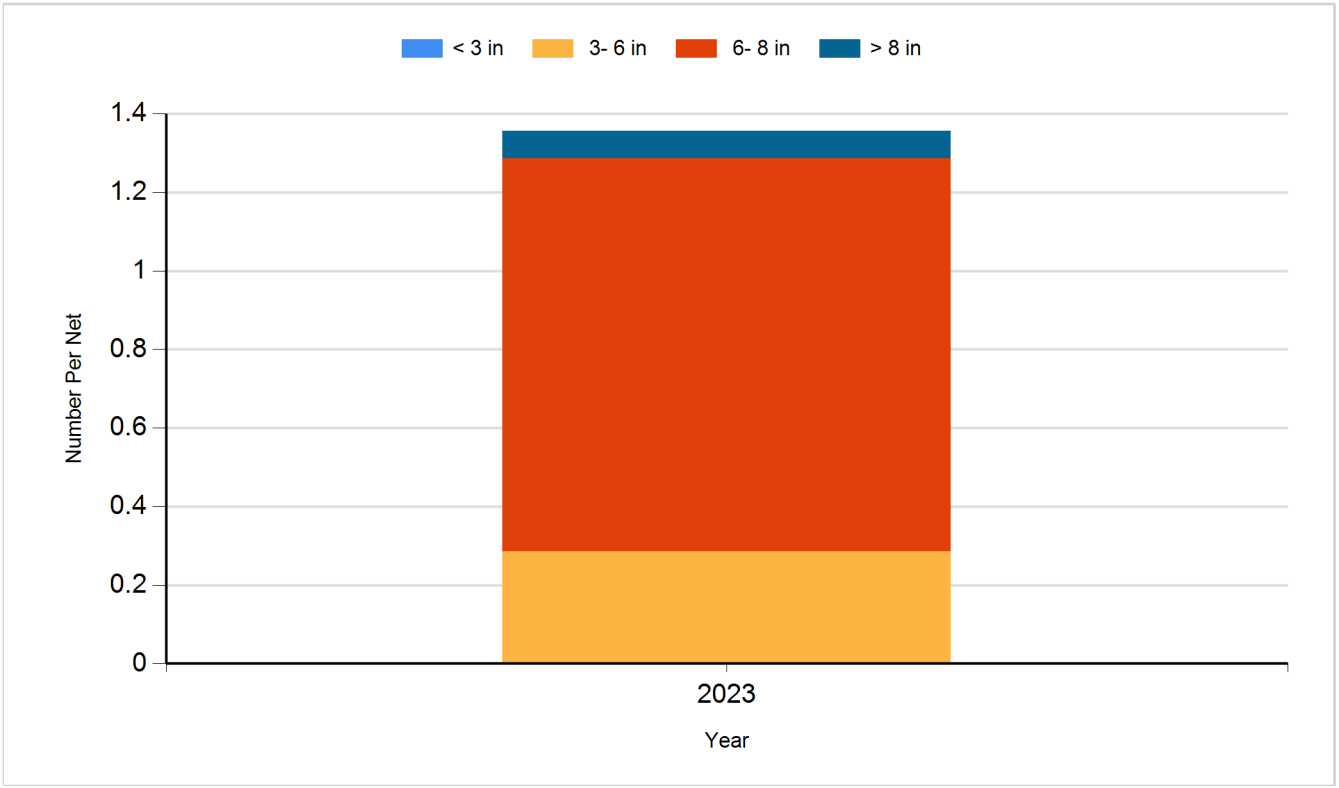
Species: Black Crappie
Gear: AFS std frame net



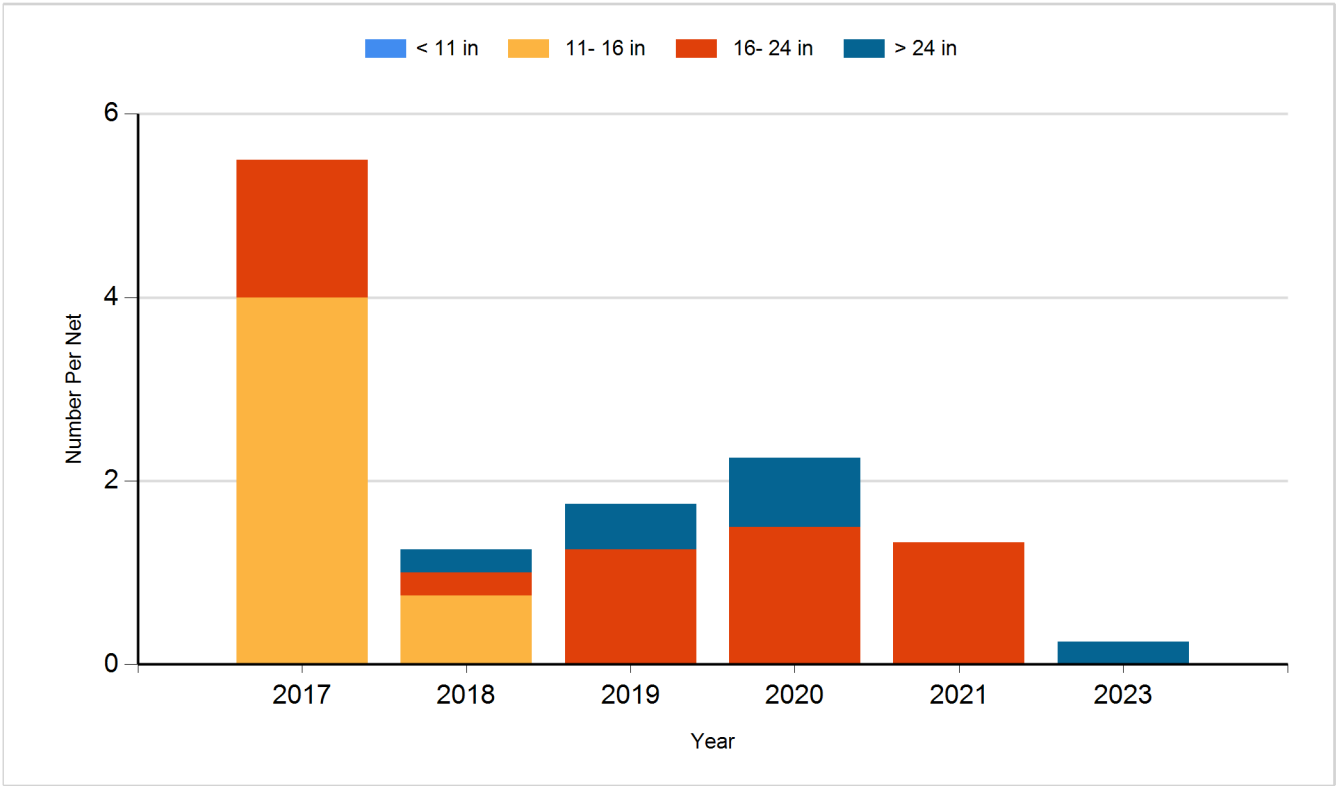
Species: Black Crappie
Gear: frame net (std 3/4 in)



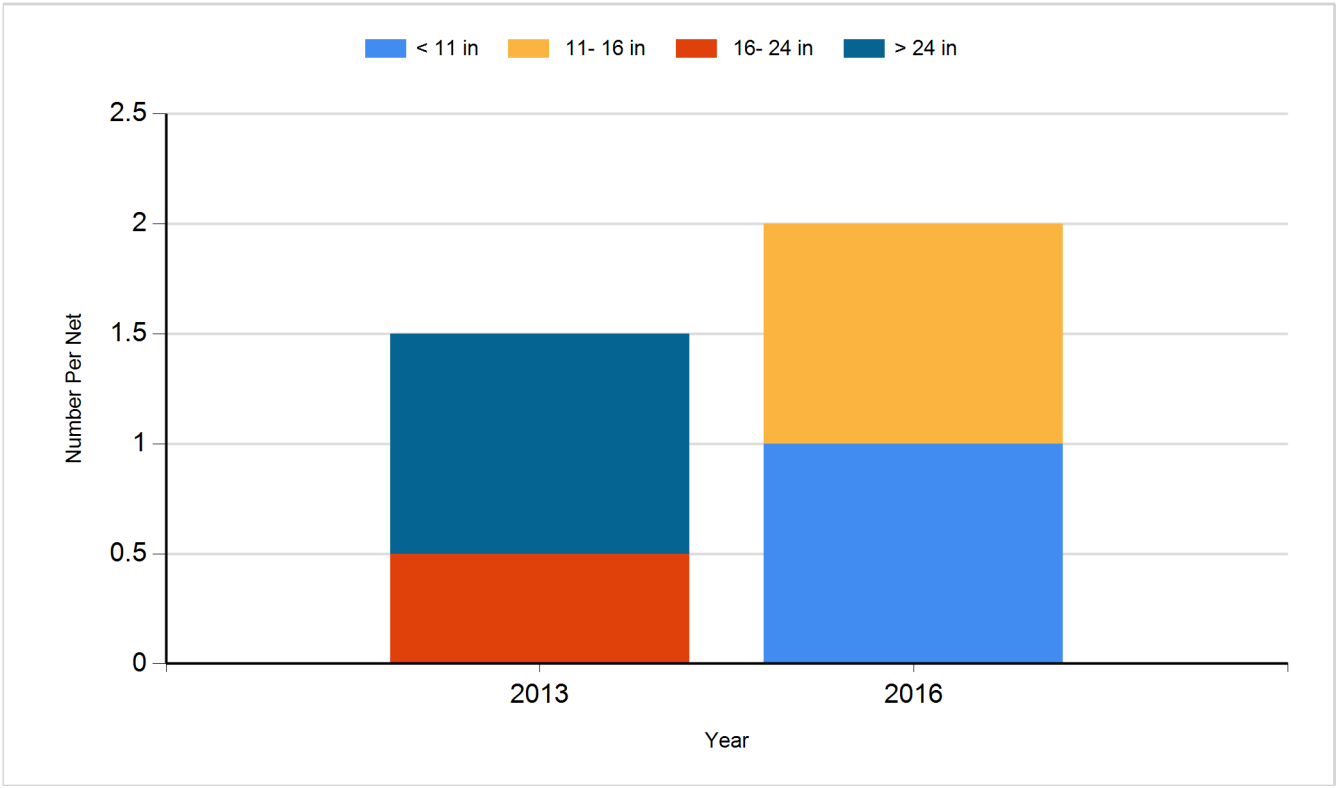
Species: Bluegill
Gear: frame net (std 3/4 in)



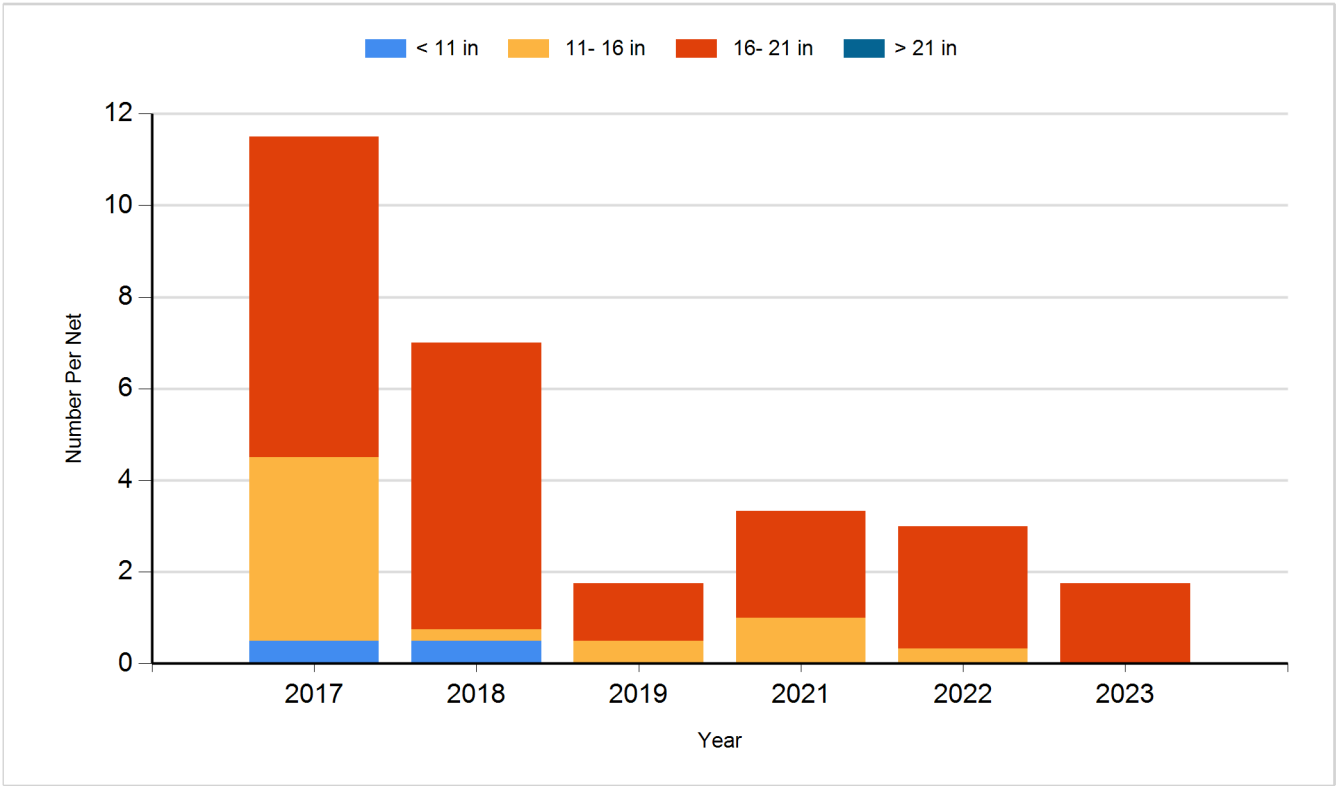
Species: Channel Catfish
Gear: AFS std gill net



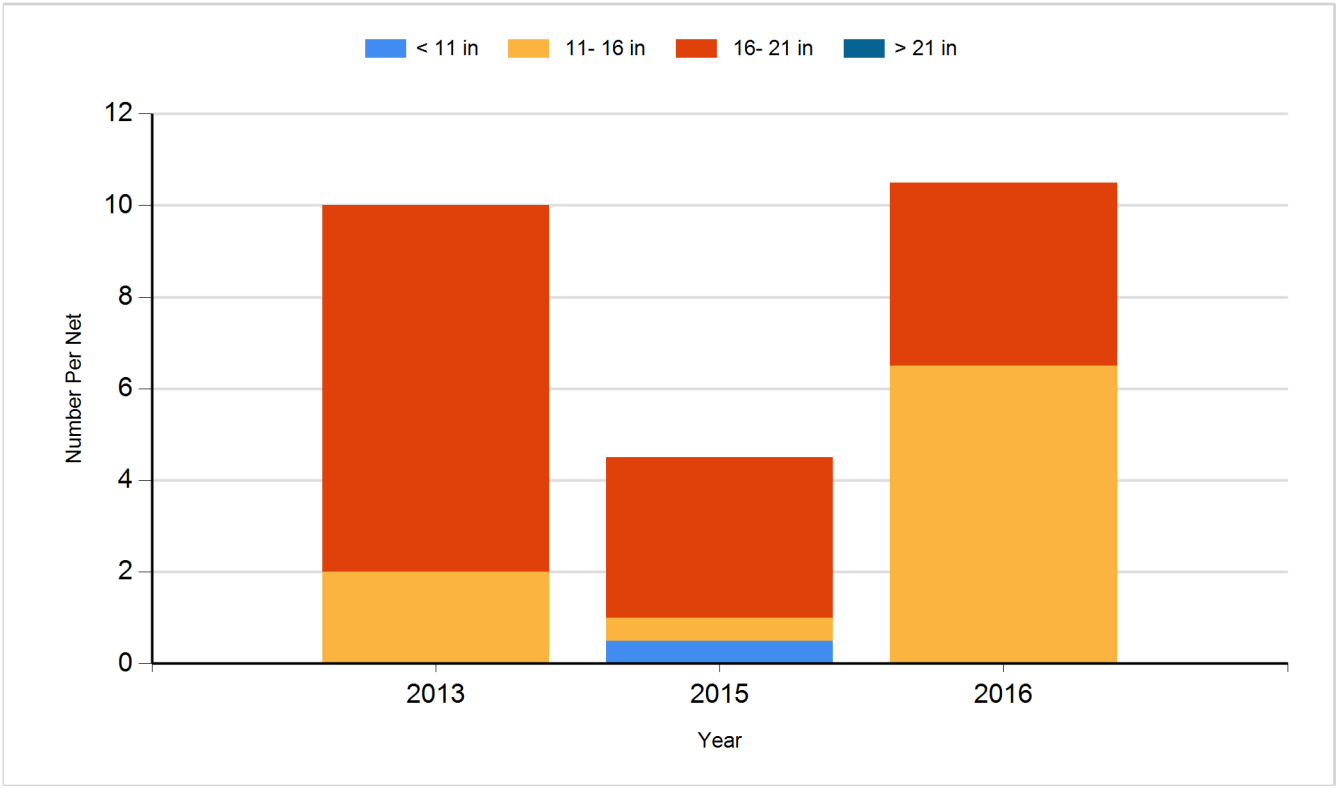
Species: Channel Catfish
Gear: std exp gill net



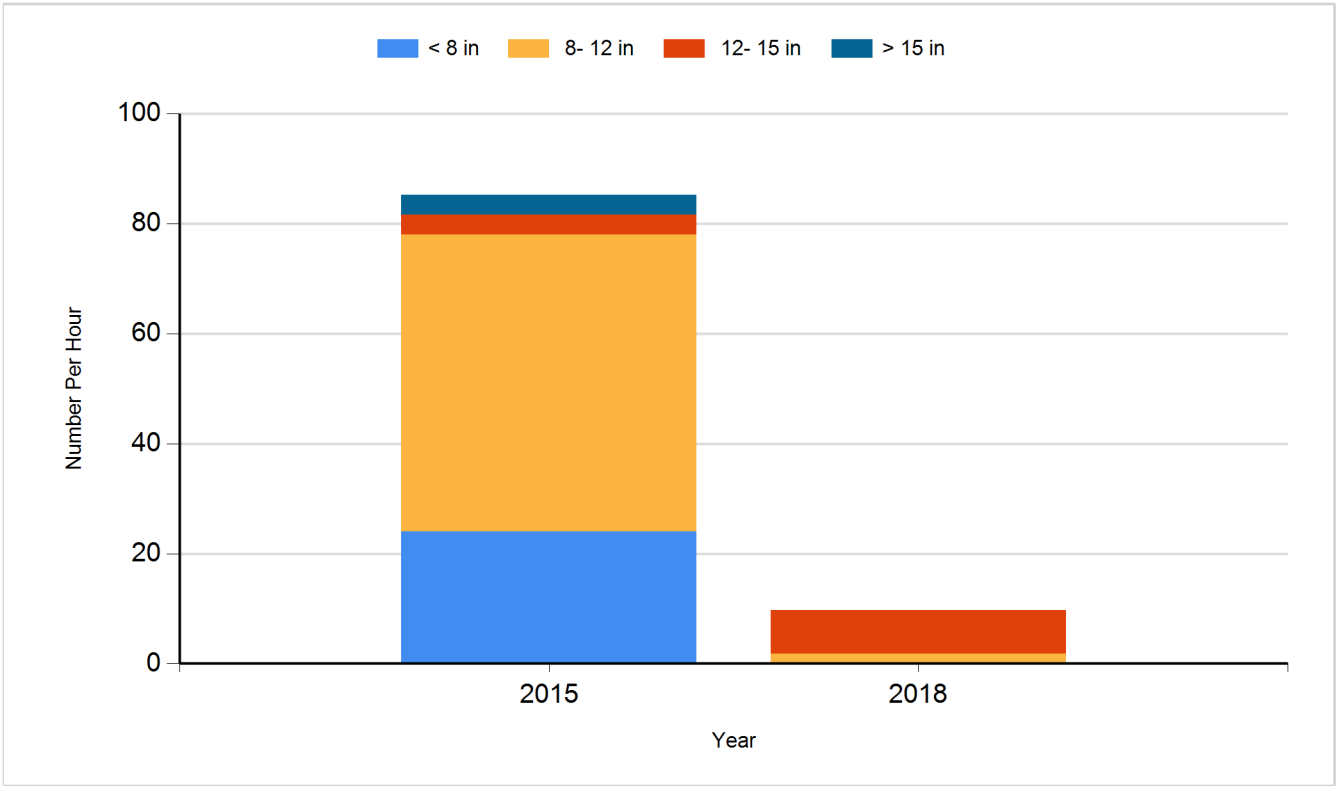
Species: Common Carp
Gear: AFS std gill net



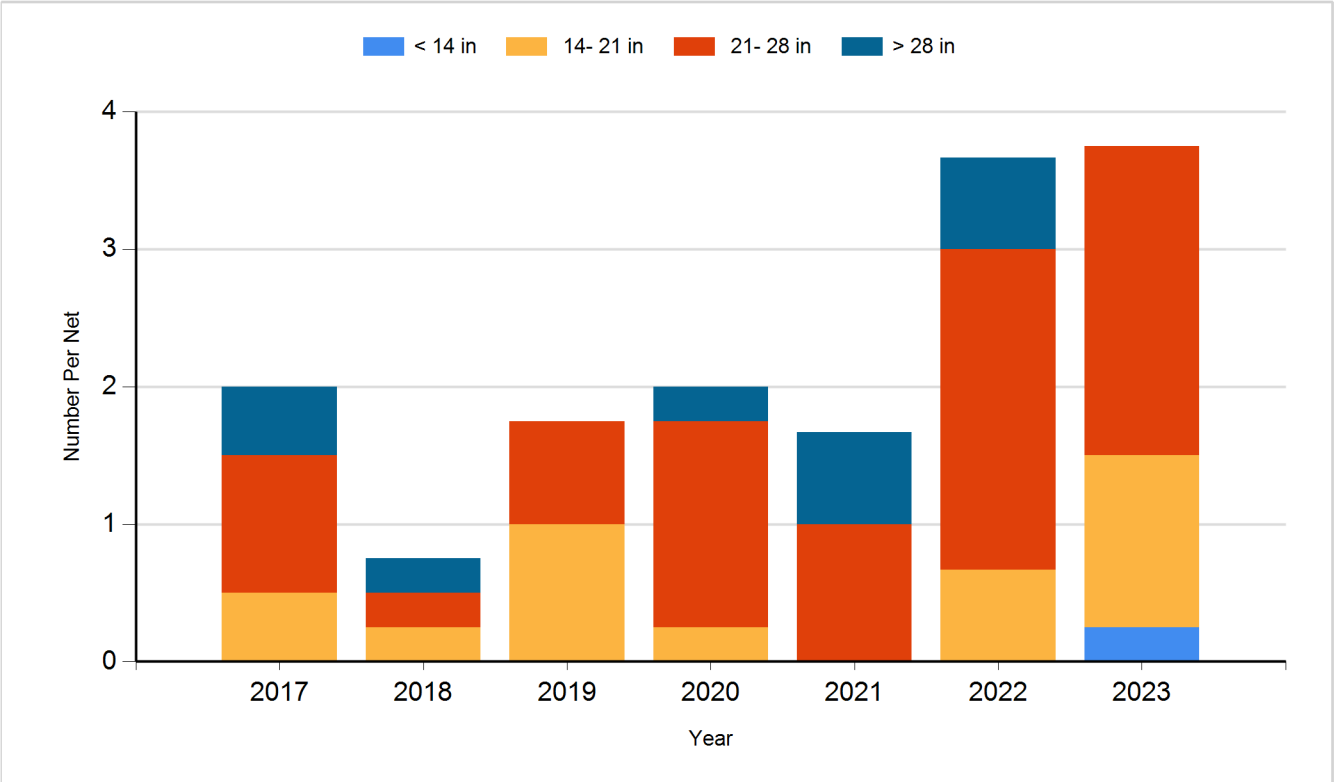
Species: Common Carp
Gear: std exp gill net



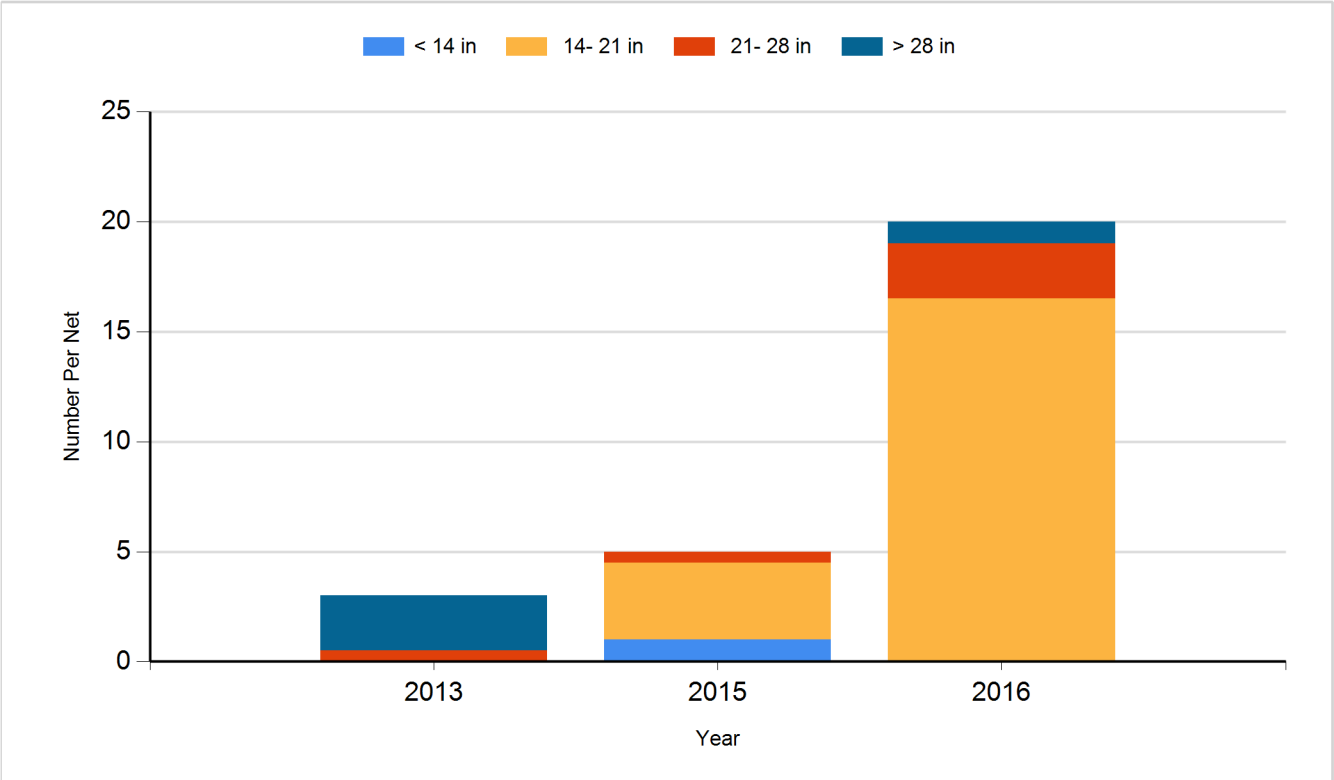
Species: Largemouth Bass
Gear: boat shocker (day)



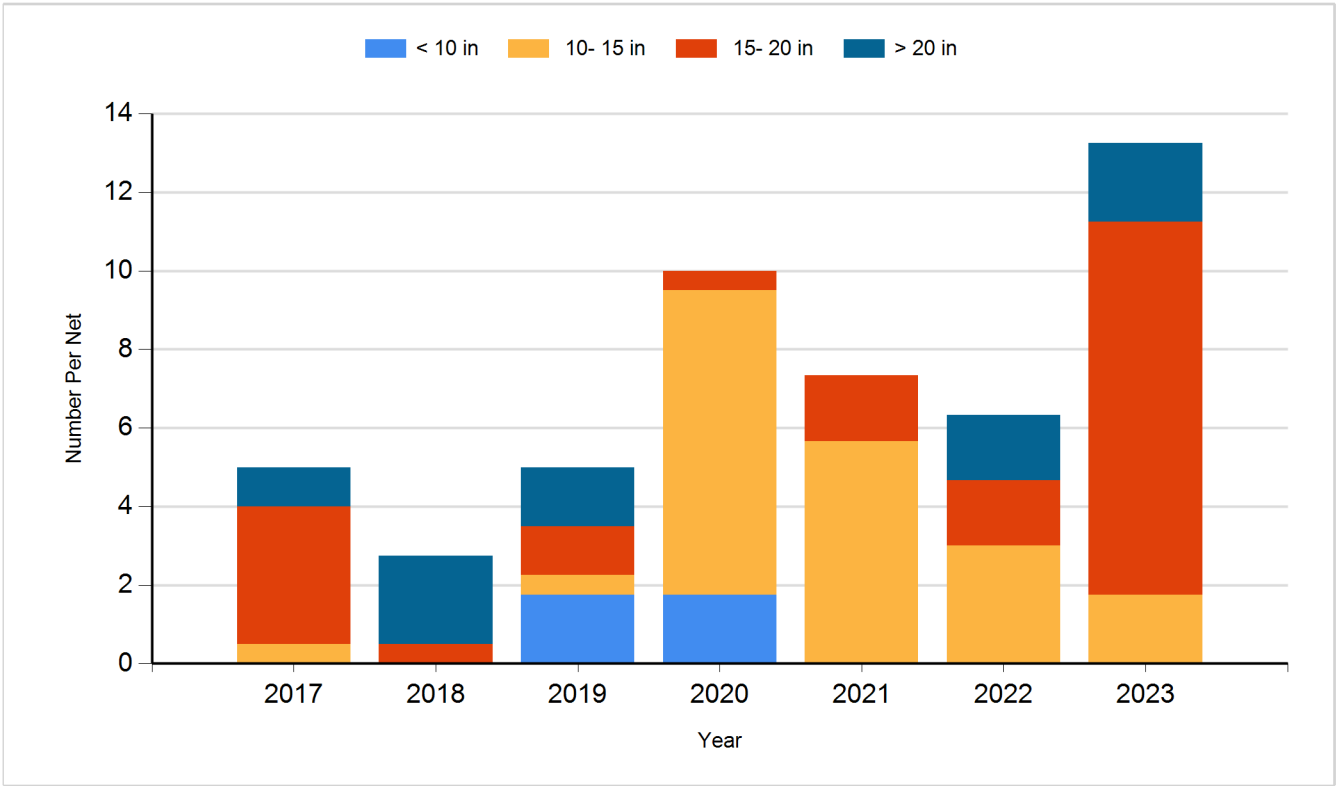
Species: Northern Pike
Gear: AFS std gill net



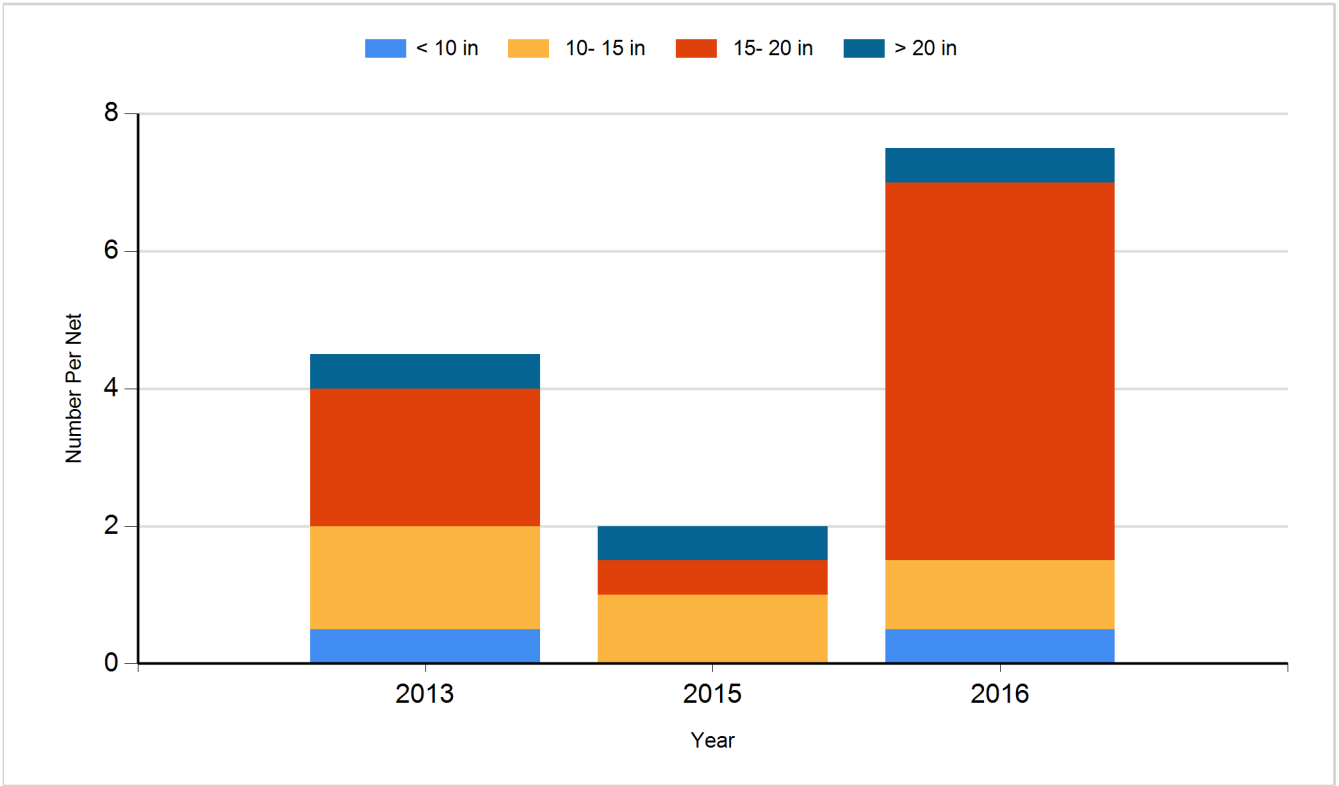
Species: Northern Pike
Gear: std exp gill net



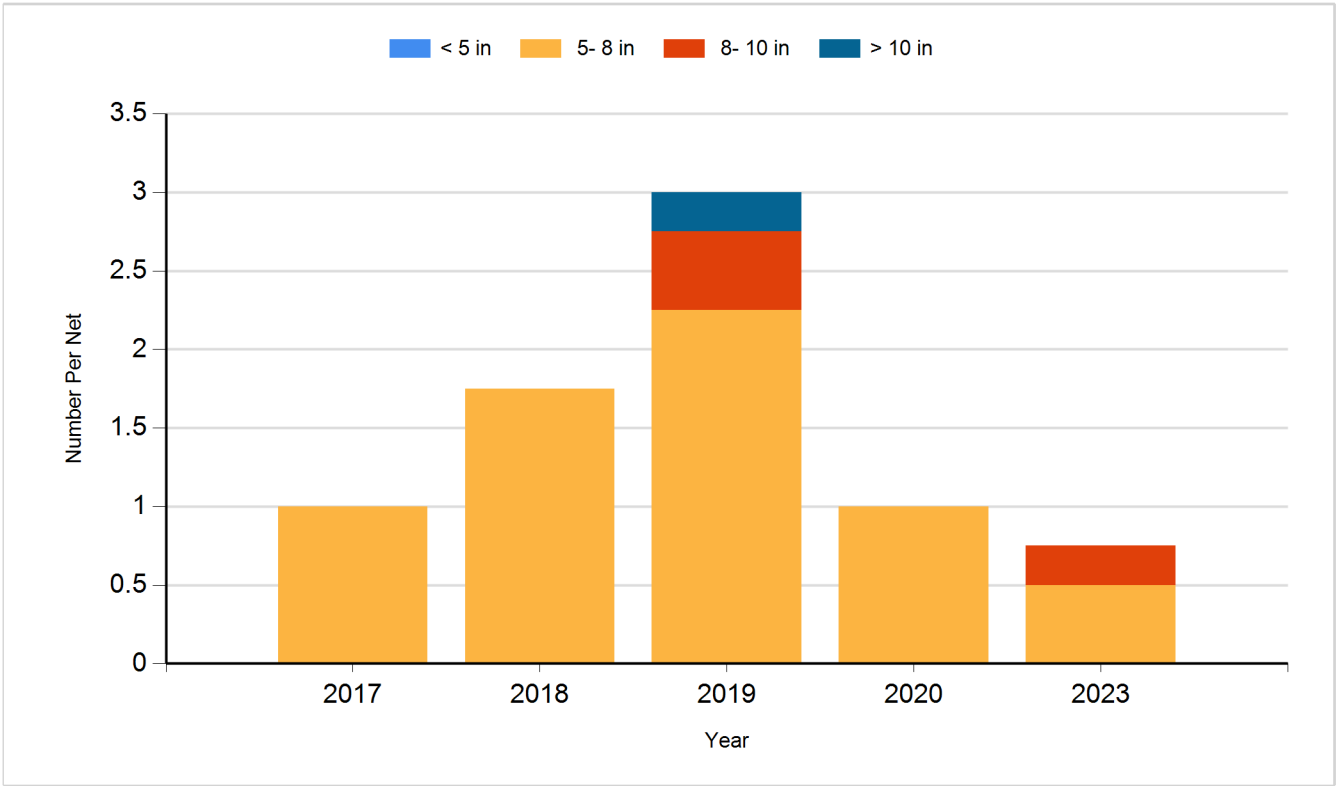
Species: Walleye
Gear: AFS std gill net



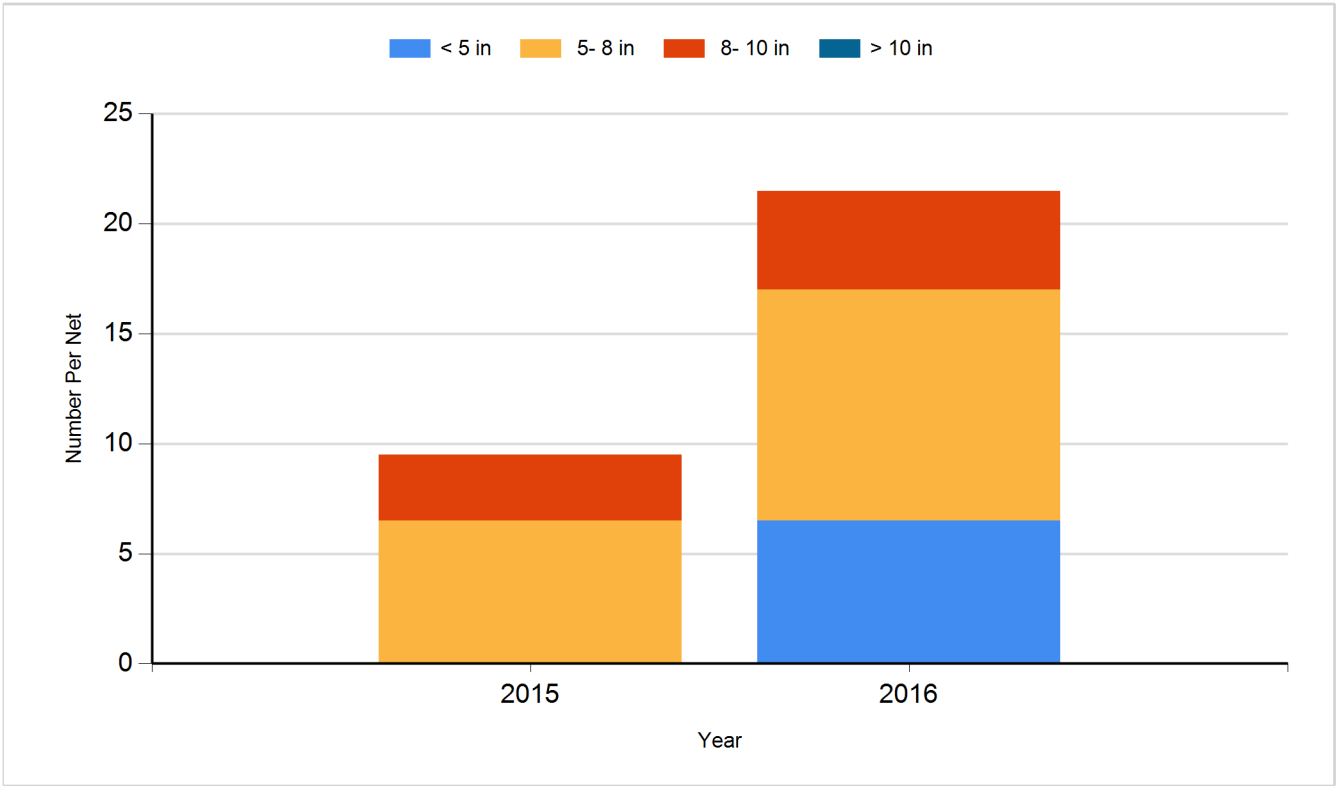
Species: Walleye
Gear: std exp gill net



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
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
2022	Gizzard Shad	Adult	21
2022	Walleye	Juvenile	32,160
2023	Walleye	Juvenile	31,001