Diamond Lake Survey Summary

Diamond Lake, located 13 miles north and 2 miles west of Humboldt, SD, is managed as a walleye and yellow perch fishery; other fish species (e.g., black bullhead, common carp, and saugeye) are also present.

- **Walleye**. Walleye abundance remained exceptionally low in 2024 (CPUE = 0.0 fish per gill net). A severe winterkill event the previous year (winter of 2022-2023) is likely responsible for the low catch rates. Fisheries personnel stocked saugeye fry and juvenile walleyes in 2024 to address the low relative abundance. They should grow fast due to the current lack of competition in Diamond Lake.

- **Yellow Perch**. Gill netting efforts failed to produce any yellow perch in 2024. Approximately 1,800 adult yellow perch (from Deerfield Reservoir in the Black Hills) were stocked into Diamond Lake in May of 2023, temporarily increasing catch rates (CPUE = 9.3 fish per net in June of 2023). This year's survey results indicate that overwinter survival was minimal, however. There is evidence that these Deerfield yellow perch did poorly in all southeastern South Dakota lakes where they were stocked, however, reasons for their poor performance are unknown. A subsequent stocking of 1,020 adult yellow perch from a nearby source (Long Lake, Lake County) was done this fall since the 2023 stocking was unsuccessful.

For more detailed results see the computer-generated South Dakota Statewide Fisheries Survey for Diamond Lake (below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Diamond, Minnehaha County
LBS-Lake-223-800
2024

Lake Information

Name: Diamond

County: Minnehaha

Legal Description: T104N-R52W-Sec. 5

Surface Area: 295 Acres

Maximum Depth: 12 Feet

Mean Depth: 8 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 27, 2024	6 net-nights

Common Fish Species Present

Yellow Perch

Walleye

Black Bullhead

Common Carp

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 Bullhead	97	15.8	4.0	57	7	0			
	Common Carp	93	2.7	2.8	13		0			

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	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Avg
AFS std frame net	Black Bullhead			2.4								2.40
	Common Carp			1.2								1.20
	Walleye			3.0								3.00
	White Sucker			0.2								0.20
AFS std gill net	Bigmouth Buffalo			0.0	0.0	0.0		2.5		0.3	0.0	0.47
	Black Bullhead			13.7	8.5	3.3		35.3		1.2	15.8	12.97
	Common Carp			2.8	4.7	1.8		2.3		0.0	2.7	2.38
	Sunfish Hybrid			0.0	0.0	0.0		0.2		0.0	0.0	0.03
	Walleye			2.2	4.8	12.2		3.7		0.0	0.0	3.82
	White Sucker			0.0	0.0	0.0		0.3		0.0	0.0	0.05
	Yellow Bullhead			0.0	0.0	0.0		0.2		0.0	0.0	0.03
	Yellow Perch			0.8	6.0	1.5		12.5		9.3	0.0	5.02
std exp gill net	Black Bullhead	76.0	50.3									63.15
	Common Carp	7.7	12.0									9.85
	Sunfish Hybrid	0.7	0.3									0.50
	Walleye	4.3	6.7									5.50
	Yellow Perch	7.0	14.3									10.65

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	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
AFS std frame net	Black Bullhead	PSD			100							
		PSD-P			17							
	Common Carp	PSD			83							
		PSD-P			67							
	Walleye	PSD			33							
		PSD-P			13							
		Wr			80							
AFS std gill net	Black Bullhead	PSD			99	53	15		46		0	57
		PSD-P			4	14	0		0		0	0
	Common Carp	PSD			100	82	45		93			13
		PSD-P			53	64	27		21			0
	Walleye	PSD			46	86	88		68			
		PSD-P			8	10	18		18			
		Wr			84	98	100		87			
	Yellow Perch	PSD			100	19	67		27		4	
		PSD-P			40	3	22		0		0	
		Wr			92	106	110		108		83	
std exp gill net	Black Bullhead	PSD	63	74								
		PSD-P	0	1								
	Common Carp	PSD	13	83								
		PSD-P	4	25								
	Walleye	PSD	8	20								
		PSD-P	8	0								
		Wr	77	79								
	Yellow Perch	PSD	57	70								
		PSD-P	0	35								
		Wr	100	93								

Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	79	257 (15)	397 (3)		465 (33)	486 (22)	542 (6)				
2018	29			386 (10)	392 (9)	451 (7)	611 (1)	575 (1)			591 (1)
2017	13		265 (1)	350 (8)	460 (3)	520 (1)					

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	11		188 (11)								
2017	5			226 (3)	266 (1)		301 (1)				

Fish Condition

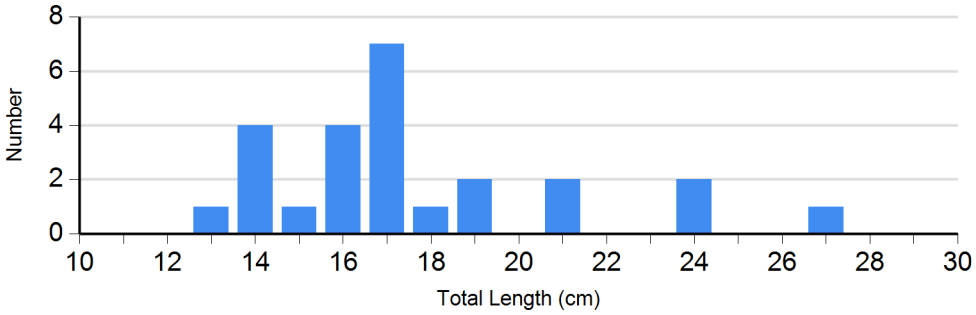
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Walleye Gill Net	2021	7	87 (2.7)	11	85 (1.2)	4	94 (7.1)	0	
Yellow Perch Gill Net	2021	55	109 (2.4)	20	106 (2.2)	0		0	
	2023	54	83 (1.2)	2	84 (3.5)	0		0	

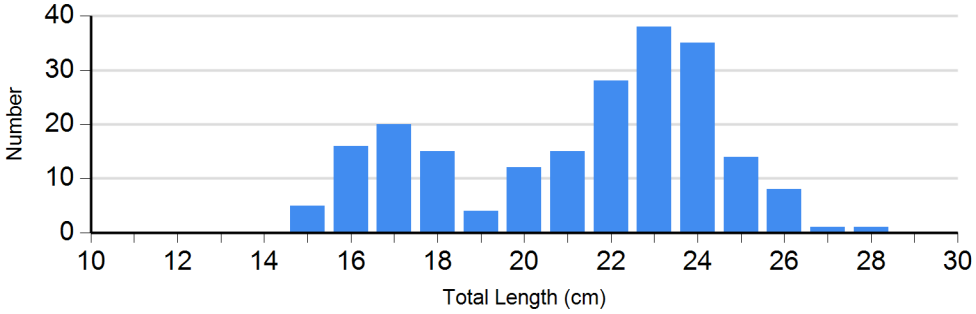
Length Frequency Distribution

Length frequency histogram of species sampled by year.

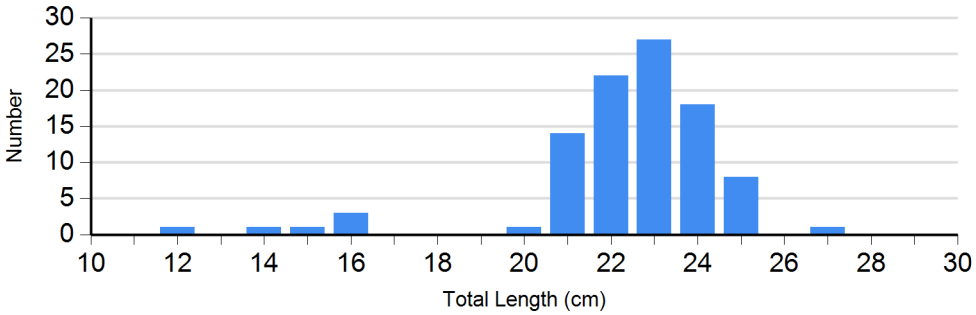
Species: Black Bullhead
Gear: AFS std gill net



2019

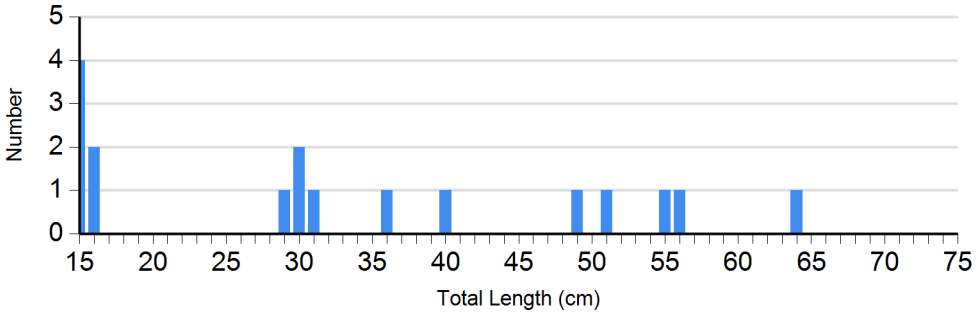


2021

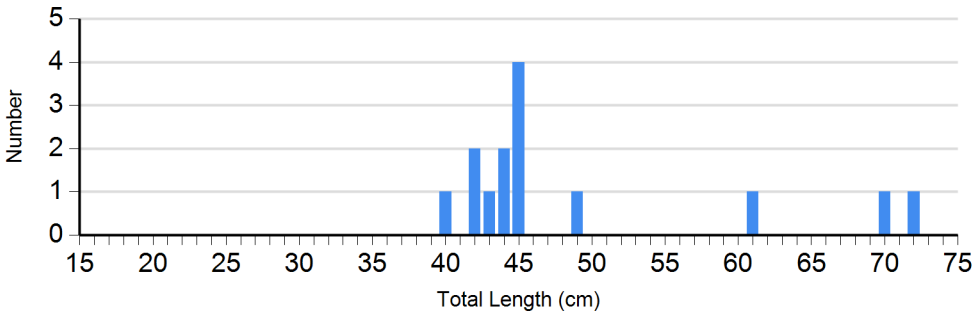


2024

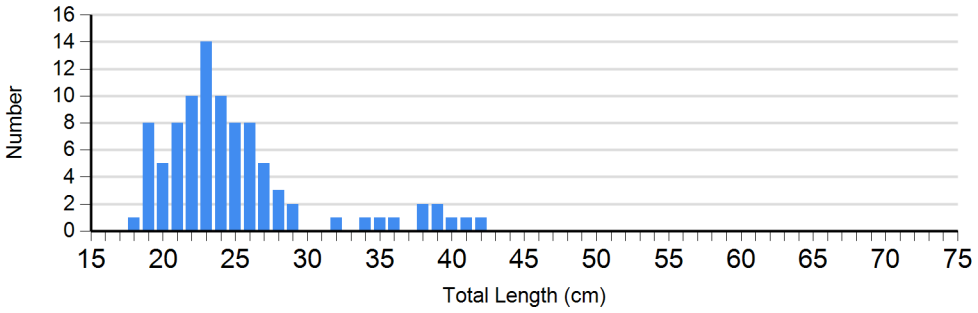
Species: Common Carp
Gear: AFS std gill net



2019

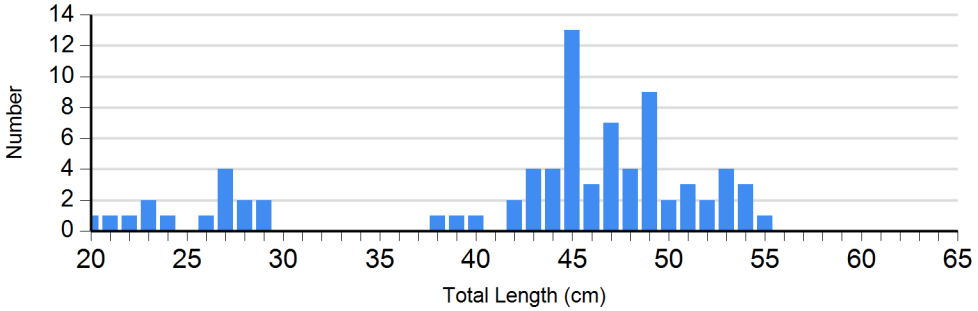


2021

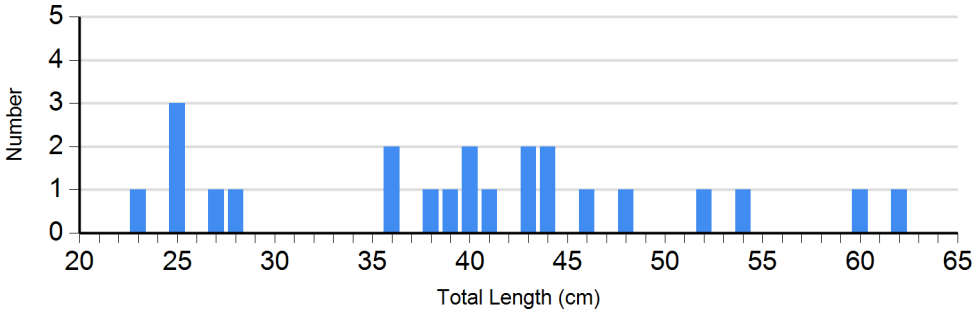


2024

Species: Walleye
Gear: AFS std gill net

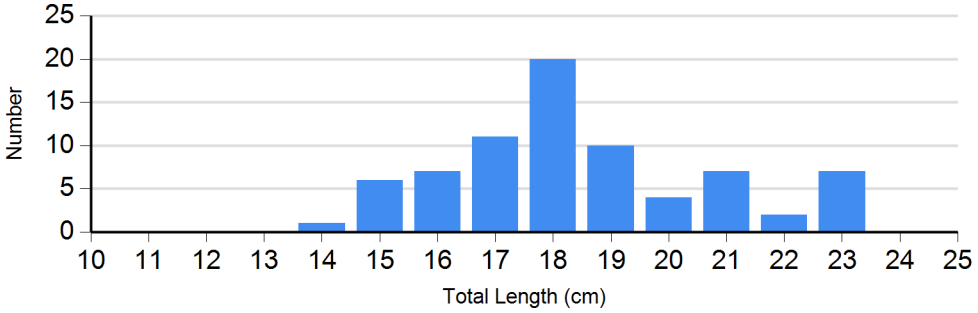


2019

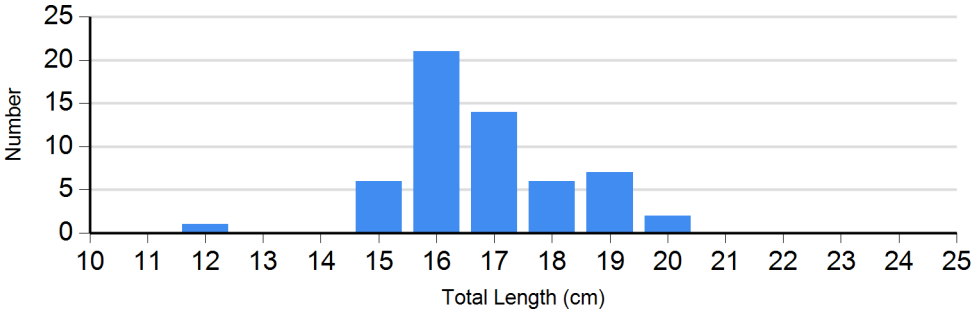


2021

Species: Yellow Perch
Gear: AFS std gill net



2021

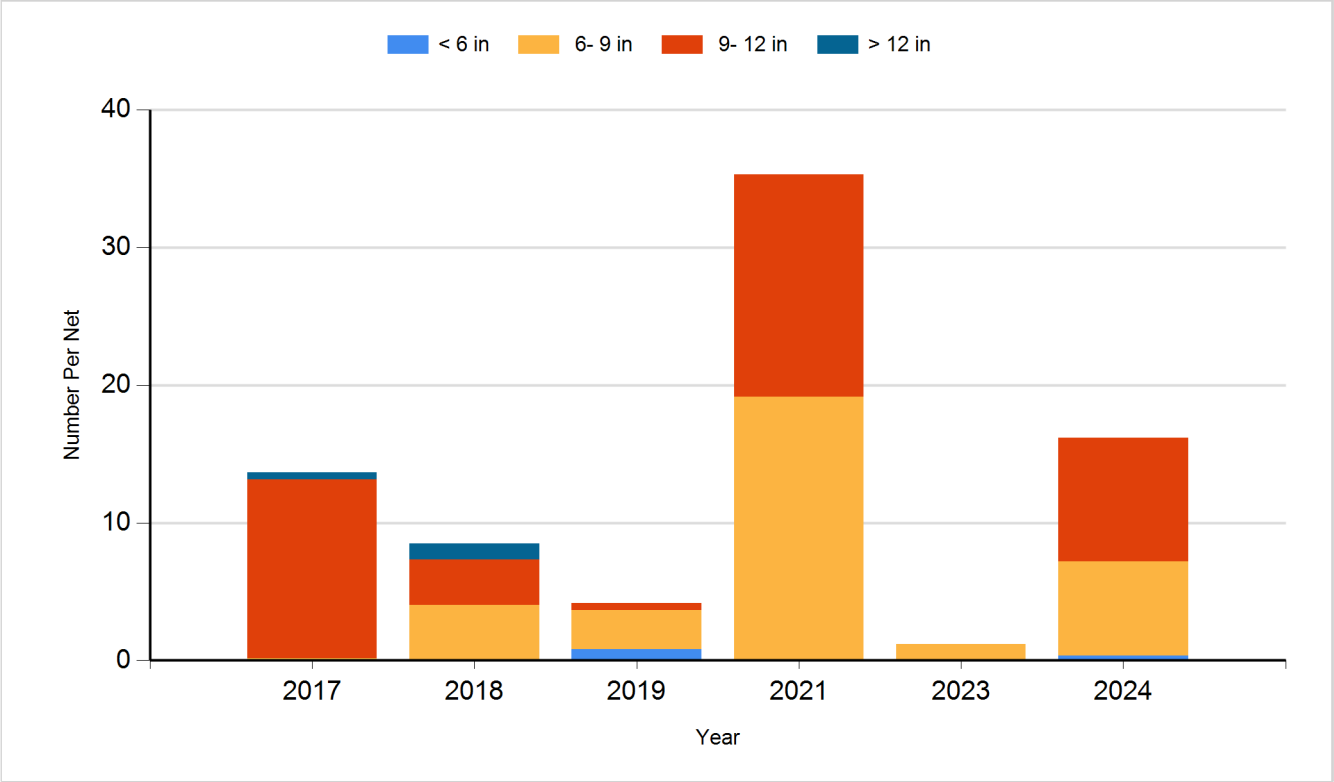

25
20
15
10
5
0
Number
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Total Length (cm)

2023

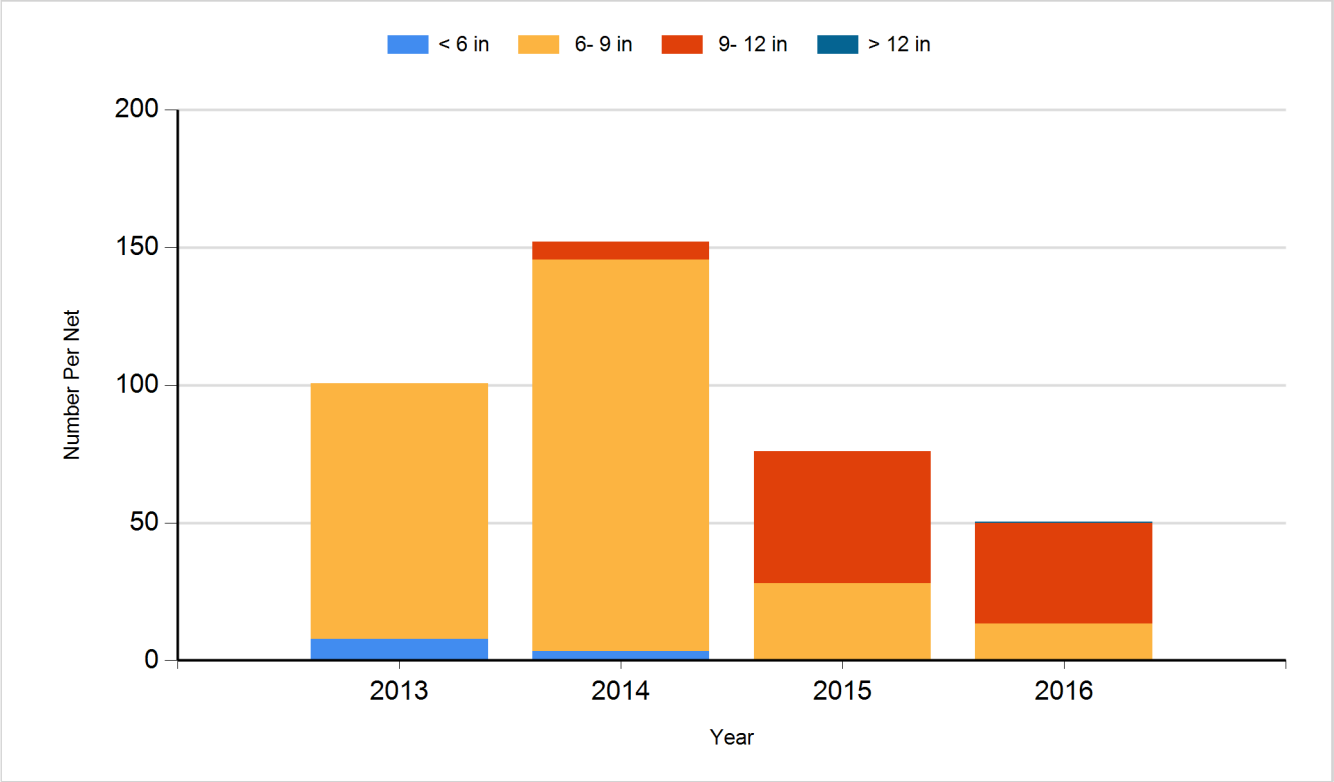
Historic Fish Sizes and Relative Abundance

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

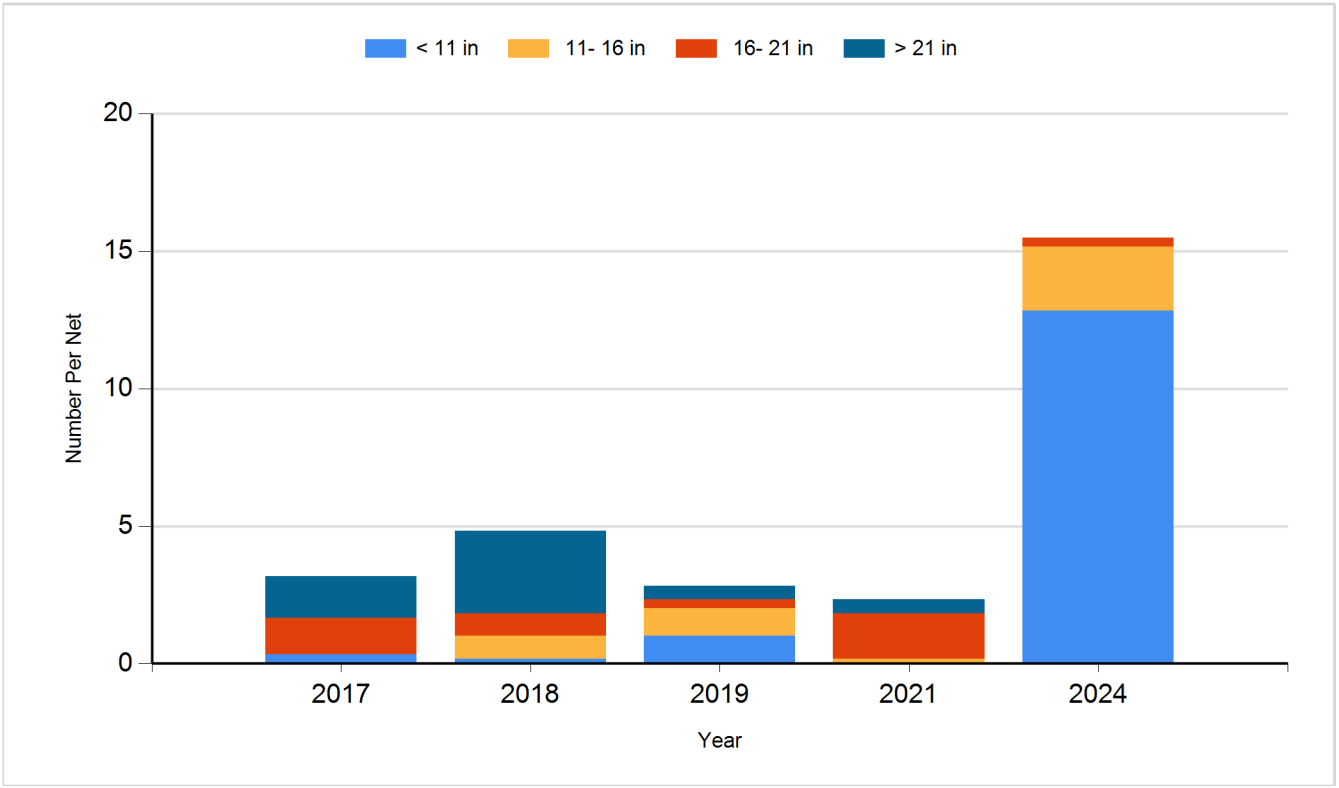
Species: Black Bullhead
Gear: AFS std gill net



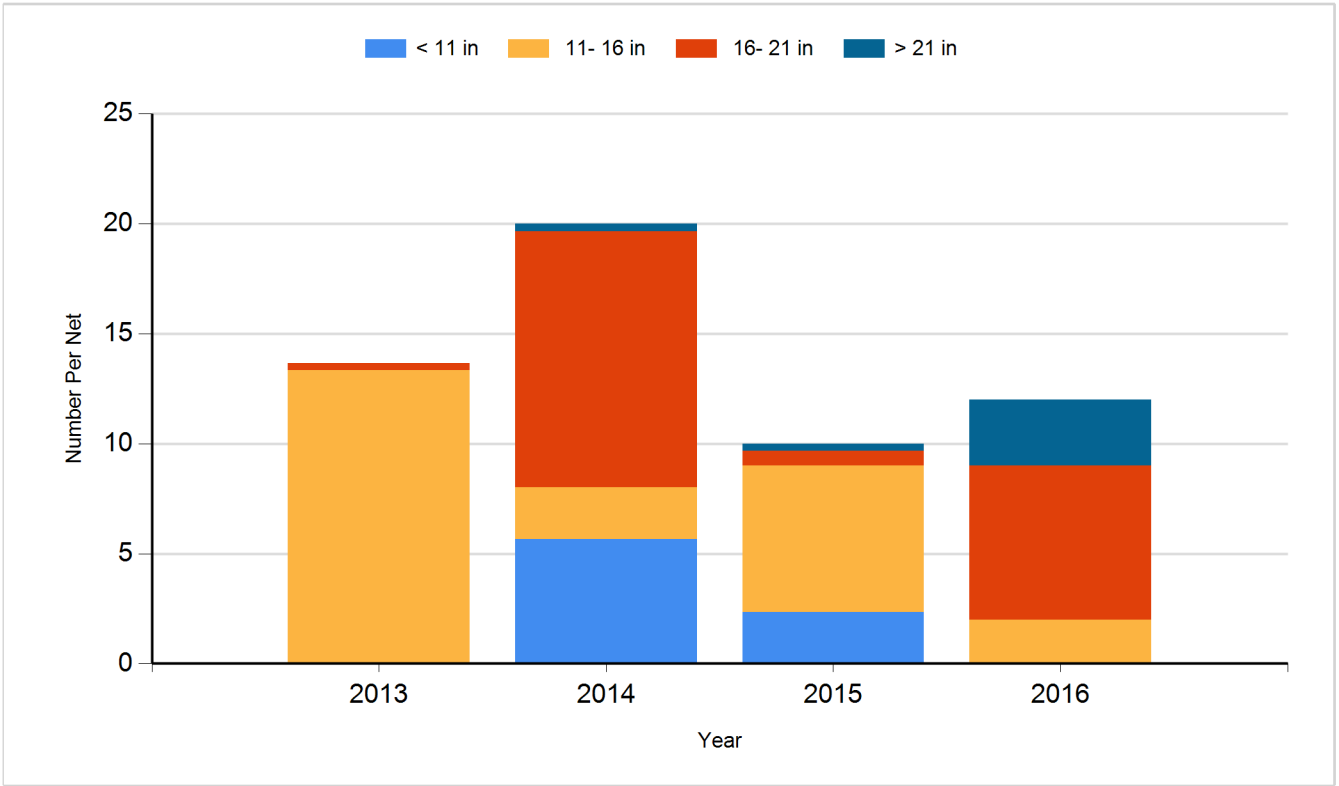
Species: Black Bullhead
Gear: std exp gill net



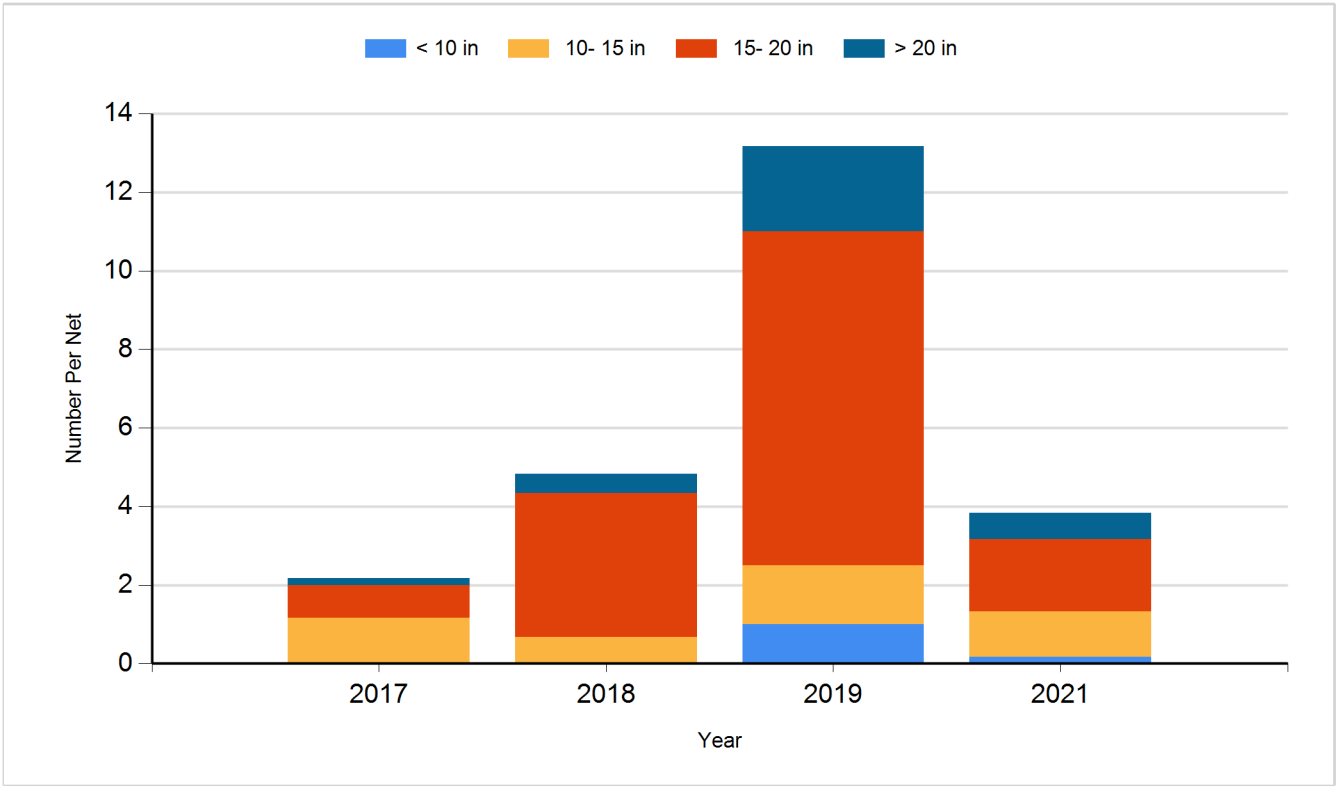
Species: Common Carp
Gear: AFS std gill net



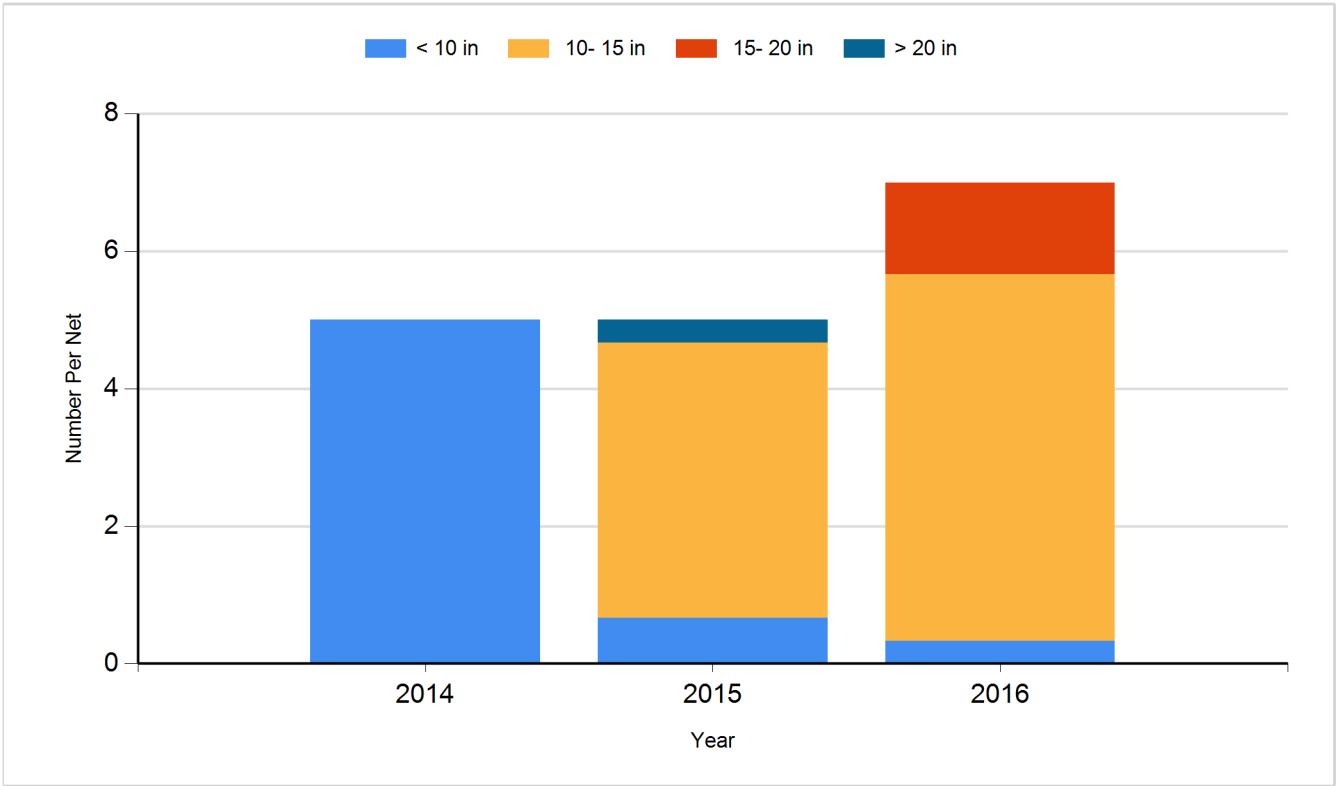
Species: Common Carp
Gear: std exp gill net



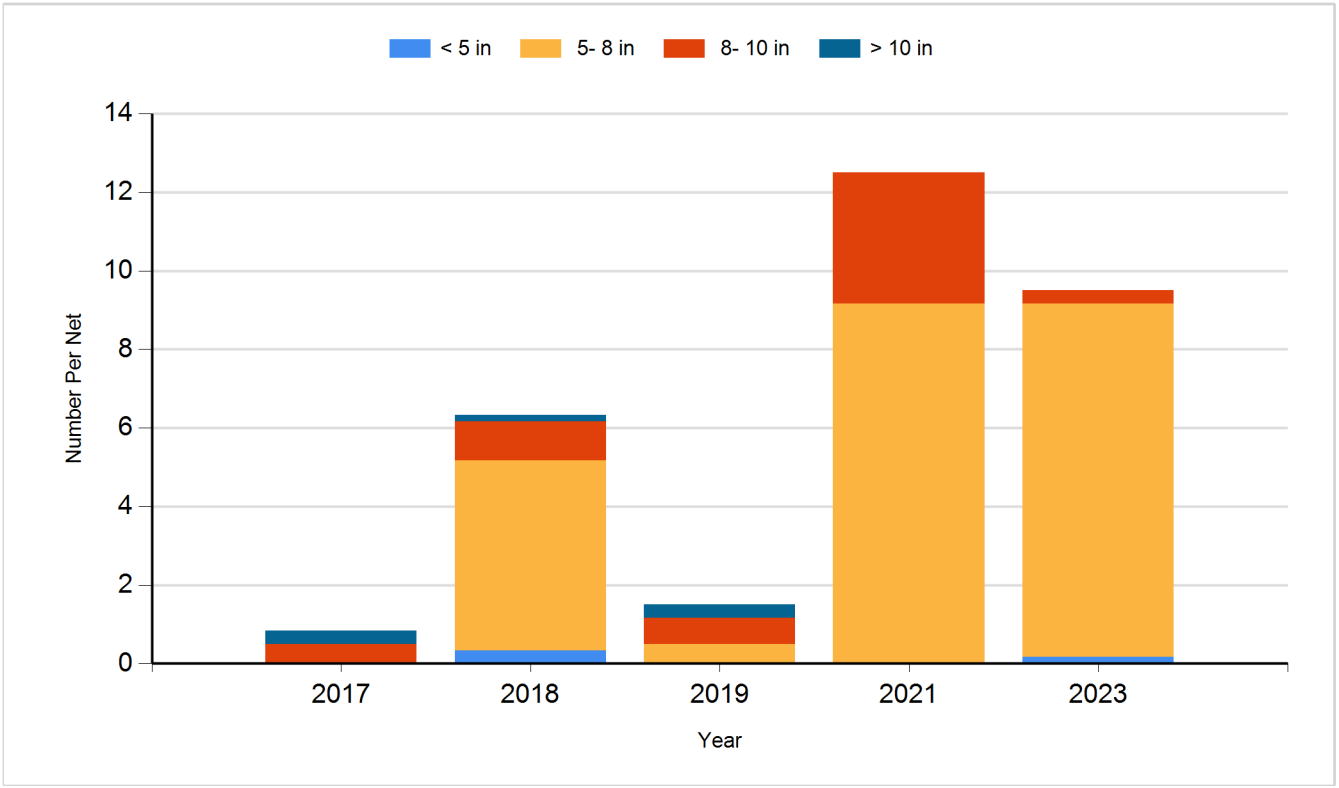
Species: Walleye
Gear: AFS std gill net



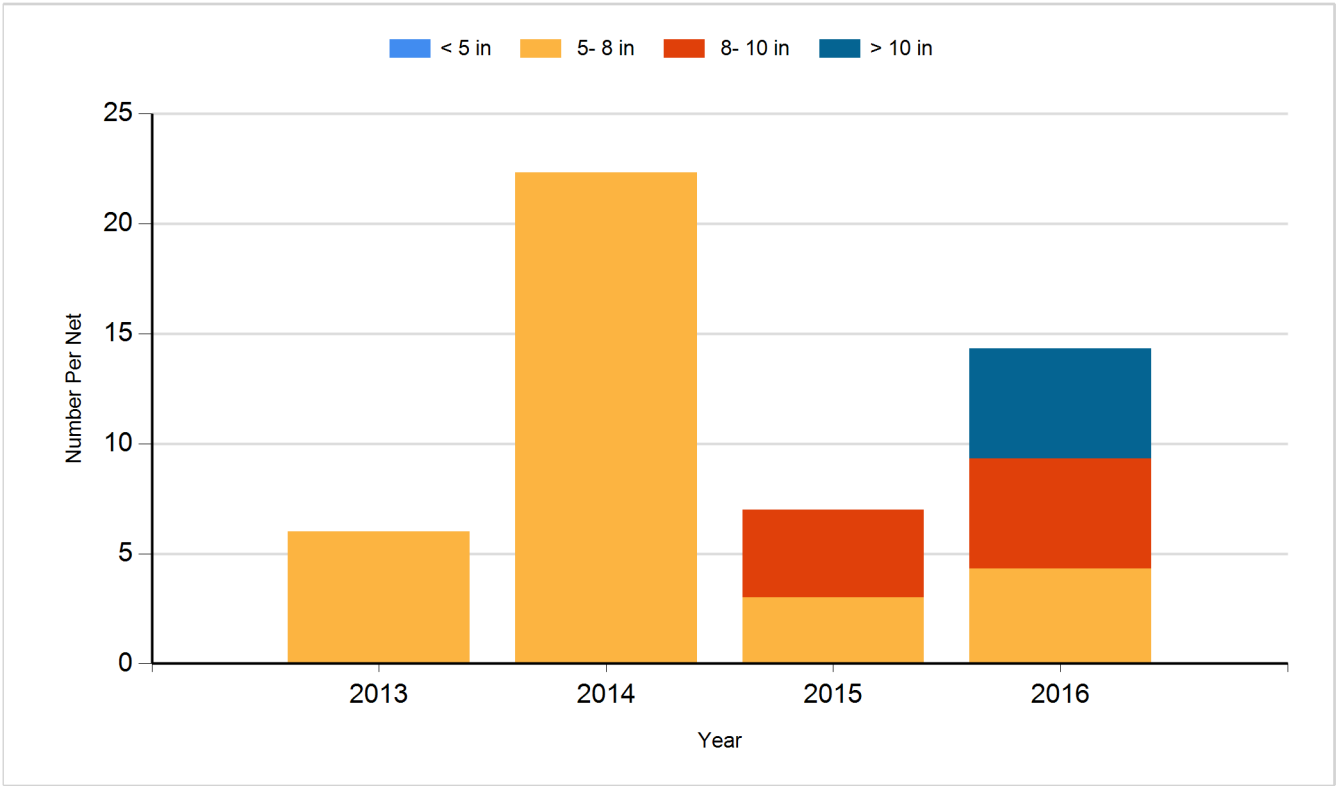
Species: Walleye
Gear: std exp gill net



Species: Yellow Perch
Gear: AFS std gill net



Species: Yellow Perch
Gear: std exp gill net



Fish Stocking

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2018	Walleye	Large Fingerling	2,023
2019	Walleye	Small Fingerling	23,064
2022	Saugeye	Juvenile	33,250
2023	Yellow Perch	Adult	1,800
2024	Saugeye	Fry	25,000
2024	Walleye	Adult	275
2024	Walleye	Juvenile	165
2024	Yellow Perch	Juvenile	1,020