Belle Fourche Reservoir Lake Survey Summary

Belle Fourche reservoir is the largest reservoir in SD west of the Missouri River at over 8,000 acres and is located nine miles east of the town of Belle Fourche. The reservoir contains multiple species but is primarily a walleye, channel catfish, yellow perch fishery with gizzard shad as a forage species. The lake is run by the United States Bureau of Reclamation (BOR) as an Irrigation reservoir, so the lake experiences higher water in the spring and lower water by early fall on an annual basis.

Walleye. Walleye numbers averaged 8.2 fish per gill net, up slightly from 7.5 last year. Fish ranged from 8 to 20 inches with the bulk of the population between 16-20 inches. To increase walleye growth and condition adult yellow perch and gizzard shad were stocked this spring to help add to the forage base. The slot-length regulation has been removed and is replaced with a 15-inch minimum with a daily limit of two fish. In addition, only one fish may be over 20 inches.

Yellow perch. Sixty-five perch were sampled in the ten-gill net survey, this is up from 45 last year and 39 in 2022. Fish ranged from 5.5 to 11 inches. In the past three years, over 76,000 adult yellow perch have been stocked to increase forage base for walleye and provide more angling opportunity. In addition to the adult stockings, multiple Christmas tree spawning habitat projects have taken place the last couple of years.

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Belle Fourche Reservoir, Butte County
LBF-Lake-768-000
2024

Lake Information

Name: Belle Fourche Reservoir

County: Butte

Surface Area: 6,570 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Aug 13, 2024	10 net-nights
boat shocker (day)	Jul 29, 2024	6228 seconds

Common Fish Species Present

Walleye

Channel Catfish

Black Crappie

Gizzard Shad

White Crappie

Yellow Perch

White Bass

Freshwater Drum

Common Carp

Smallmouth 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	Channel Catfish	9	0.8	0.5	88		88		95	4
	Common Carp	11	1.1	0.6	100		45		85	4
	Freshwater Drum	13	1.3	0.7	100		77		89	2
	Gizzard Shad	6	0.3	0.2	100				109	14
	Northern Pike	4	0.4	0.4	25		0		89	4
	River Carpsucker	6	0.6	0.4	100		100		108	4
	Rudd	5	0.4	0.4	0		0			
	Shorthead Redhorse	4	0.4	0.3	100		100		97	4
	Smallmouth Bass	9	0.8	0.5	25		0		96	4
	Walleye	82	7.7	1.4	94		4		73	1
	White Bass	21	2.1	0.8	95		86		84	3
	White Crappie	1	0.1	0.1	100		100		76	
	Yellow Perch	65	6.5	2.1	51	9	18	7	89	1
boat shocker (day)	Walleye*	65	39.0	11.0	100		17	7	70	1

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 gill net (1/2 inch)*	Black Crappie					0.3						0.30
	Gizzard Shad					2.3						2.30
	Spottail Shiner					0.5						0.50
	Walleye					0.3						0.30
	White Crappie					0.3						0.30
	Yellow Perch					1.3						1.30
AFS std gill net	Black Crappie			0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.04
	Channel Catfish			4.1	2.6	0.3	1.6	2.1	0.7	0.7	0.8	1.61
	Common Carp			0.6	0.7	1.6	2.2	2.2	2.2	2.8	1.1	1.68
	Freshwater Drum			1.0	1.4	0.7	0.9	0.4	3.0	0.4	1.3	1.14
	Gizzard Shad			0.2	0.9	0.4	0.0	0.0	0.0	0.1	0.3	0.24
	Northern Pike			0.0	0.1	0.1	0.3	0.2	0.0	0.0	0.4	0.14
	River Carpsucker			0.6	0.3	0.7	0.2	0.2	0.2	0.5	0.6	0.41
	Rudd			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.05
	Shorthead Redhorse			0.8	0.3	2.4	0.4	0.2	0.4	0.8	0.4	0.71
	Smallmouth Bass			0.2	0.2	0.2	0.0	0.6	0.0	1.1	0.8	0.39
	Spottail Shiner			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
	Walleye			12.7	9.2	5.9	4.3	6.3	2.8	7.1	7.7	7.00
	White Bass			1.3	2.9	6.3	6.7	5.0	5.2	2.8	2.1	4.04
	White Crappie			0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.06
	Yellow Perch			1.3	1.7	0.3	1.9	2.4	3.9	4.1	6.5	2.76
boat shocker (day)	Walleye*									28.4	39.0	33.70
frame net (std 3/4 in)	Black Crappie	0.0										0.00
	Channel Catfish	0.1										0.10
	Common Carp	1.3										1.30
	Gizzard Shad	0.0										0.00
	Green Sunfish	0.0										0.00
	Rainbow Trout	0.0										0.00
	River Carpsucker	0.0										0.00
	Rudd	0.0										0.00
	Shorthead Redhorse	0.0										0.00
	Smallmouth Bass	0.0										0.00
	Walleye	1.5										1.50

		CPUE										
Gear	Species	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Avg
frame net (std 3/4 in)	White Bass	1.8										1.80
	White Crappie	15.0										15.00
	Yellow Perch	0.1										0.10
rod and reel	Channel Catfish								0.0			0.00
	Largemouth Bass								0.0			0.00
std exp gill net	Black Crappie	0.0	0.5									0.25
	Channel Catfish	3.3	4.0									3.65
	Common Carp	0.7	1.0									0.85
	Freshwater Drum	0.2	0.3									0.25
	Gizzard Shad	0.0	0.3									0.15
	River Carpsucker	0.0	0.8									0.40
	Shorthead Redhorse	0.7	0.5									0.60
	Smallmouth Bass	0.8	0.0									0.40
	Spottail Shiner	0.0	0.0									0.00
	Walleye	20.3	23.0									21.65
	White Bass	6.7	5.8									6.25
	White Crappie	0.0	0.2									0.10
	White Sucker	0.0	0.0									0.00
	Yellow Perch	9.5	14.8									12.15

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 gill net	Black Crappie	PSD			100	100						
		PSD-P			0	50						
		Wr			123	110						
	Channel Catfish	PSD			97	100	100	94	95	71	100	88
		PSD-P			30	31	100	81	62	57	57	88
		Wr			86	92	93	91	89	92	97	95
	Common Carp	PSD			100	100	100	95	91	100	96	100
		PSD-P			0	0	14	27	9	18	43	45
		Wr			93	87	84	85	80	86	87	85
	Gizzard Shad	PSD			100	100	100	0	0	0	100	100
		Wr			106	99	96				97	109
	Smallmouth Bass	PSD			50	100	50		100		91	25
		PSD-P			0	0	50		17		64	0
		Wr			96	94	87		92		95	96
	Walleye	PSD			56	55	53	74	81	68	90	94
		PSD-P			0	0	0	0	3	0	4	4
		Wr			83	81	78	78	76	79	77	73
	White Bass	PSD			100	100	98	100	100	100	79	95
		PSD-P			100	100	95	97	100	100	50	86
		Wr			94	95	86	84	87	83	94	84
	White Crappie	PSD			100				100		100	100
		PSD-P			100				100		100	100
		Wr			104				94		104	76
	Yellow Perch	PSD			67	59	67	11	83	69	29	51
		PSD-P			17	12	0	5	25	18	10	18
		Wr			91	96	94	92	90	90	87	89
boat shocker (day)	Walleye	PSD									98	100
		PSD-P									4	17
		Wr									75	70
frame net (std 3/4 in)	Channel Catfish	PSD	100									
		PSD-P	0									
		Wr	80									

			Year									
Gear	Species	Index	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
frame net (std 3/4 in)	Common Carp	PSD	100									
		PSD-P	50									
		Wr	87									
	Walleye	PSD	100									
		PSD-P	58									
		Wr	70									
	White Bass	PSD	100									
		PSD-P	57									
		Wr	96									
	White Crappie	PSD	100									
		PSD-P	100									
		Wr	98									
	Yellow Perch	PSD	100									
		PSD-P	0									
		Wr	82									
rod and reel	Channel Catfish	PSD								100		
		PSD-P								100		
std exp gill net	Black Crappie	PSD		67								
		PSD-P		0								
		Wr		129								
	Channel Catfish	PSD	90	96								
		PSD-P	40	29								
		Wr	96	87								
	Common Carp	PSD	25	67								
		PSD-P	0	0								
		Wr	95	80								
	Gizzard Shad	PSD		100								
		Wr		102								
	Smallmouth Bass	PSD	40									
		PSD-P	20									
		Wr	104									
	Walleye	PSD	18	20								
		PSD-P	1	0								
		Wr	84	81								
	White Bass	PSD	100	100								
		PSD-P	100	100								

			Year									
Gear	Species	Index	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
std exp gill net	White Bass	Wr	103	94								
	White Crappie	PSD		100								
		PSD-P		100								
		Wr		91								
	Yellow Perch	PSD	16	29								
		PSD-P	2	1								
		Wr	90	85								

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+
2020	46	219 (3)	305 (7)	383 (15)	425 (10)	439 (7)	446 (4)				
2019	53	224 (4)	319 (15)	381 (11)	403 (7)	436 (4)	453 (12)				
2018	102	243 (16)	340 (29)	384 (13)	403 (15)	425 (25)	462 (1)		462 (2)	453 (1)	
2017	126	241 (21)	321 (15)	363 (23)	401 (62)	441 (3)			494 (1)		494 (2)
2016	292	241 (26)	318 (75)	365 (174)	397 (4)	437 (13)					
2015	252	226 (8)	310 (200)	393 (2)	440 (21)	435 (9)	441 (2)		473 (7)	525 (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).

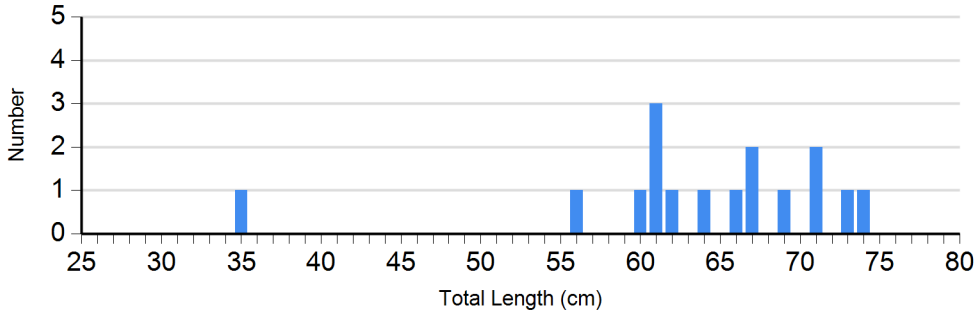
		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Channel Catfish Gill Net	2020	1	86	2	72 (12.3)	9	94 (2.7)	4	97 (3.3)
	2021	1	89	7	84 (1.4)	11	93 (2.3)	2	83
	2022	2	86 (6.6)	1	96	3	93 (8.6)	1	96
	2023	0		3	89 (4.0)	2	100 (0.0)	2	105 (7.6)
	2024	1	86	0		4	98 (4.0)	3	95 (5.2)
Common Carp Gill Net	2020	1	89	15	87 (2.5)	6	80 (3.5)	0	
	2021	2		18	79 (1.5)	2	87	0	
	2022	0		18	87 (1.8)	4	83 (3.8)	0	
	2023	1		15	90 (2.4)	12	82 (1.1)	0	
	2024	0		6	90 (2.3)	5	74	0	
Walleye Gill Net	2020	11	82 (2.3)	32	77 (0.8)	0		0	
	2021	12	81 (1.1)	49	75 (0.9)	2	60 (11.8)	0	
	2022	9	82 (1.8)	19	78 (1.1)	0		0	
	2023	7	82 (2.0)	61	77 (0.6)	3	78 (1.2)	0	
	2024	5	81 (0.7)	69	73 (0.7)	3	76 (3.0)	0	
White Bass Gill Net	2020	0		2	101 (4.0)	39	87 (1.1)	26	79 (1.3)
	2021	0		0		29	91 (1.3)	21	82 (1.0)
	2022	0		0		25	89 (1.3)	27	78 (2.4)
	2023	6	99 (2.3)	8	98 (2.1)	6	97 (4.2)	8	81 (2.4)
	2024	1	101	2	94 (0.3)	12	82 (2.7)	6	80 (3.4)
Yellow Perch Gill Net	2020	17	93 (2.1)	1	84	1	79	0	
	2021	4	80 (1.8)	14	96 (3.1)	6	81 (1.5)	0	

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Yellow Perch Gill Net	2022	12	90 (1.7)	20	91 (1.5)	7	90 (2.0)	0	
	2023	29	88 (1.7)	8	82 (2.6)	4	92 (1.6)	0	
	2024	32	91 (1.4)	21	87 (2.0)	12	85 (1.5)	0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Channel Catfish
Gear: AFS std gill net



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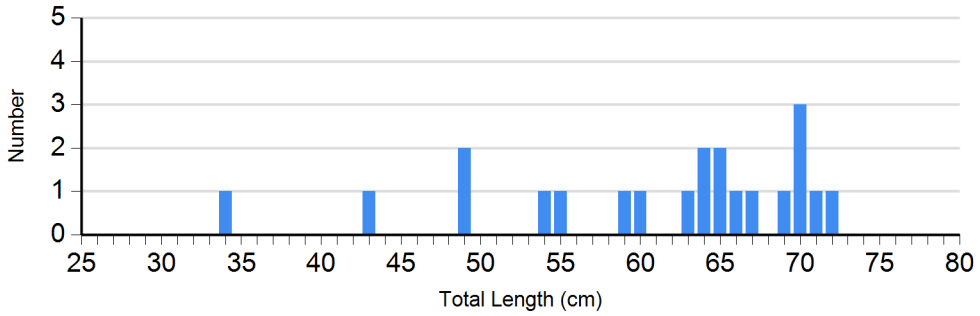

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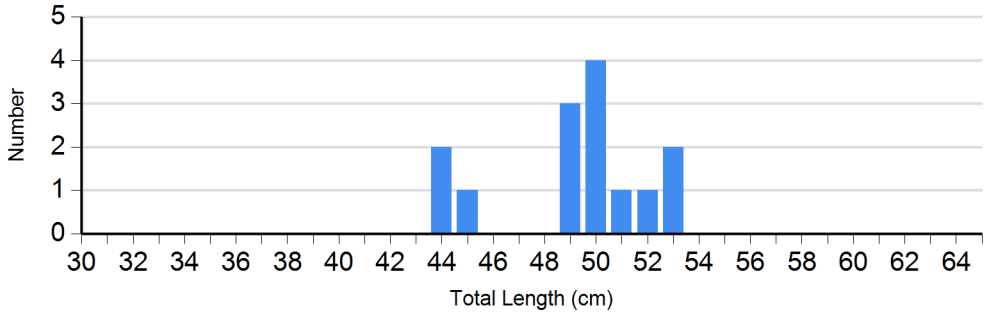
Species: Common Carp
Gear: AFS std gill net



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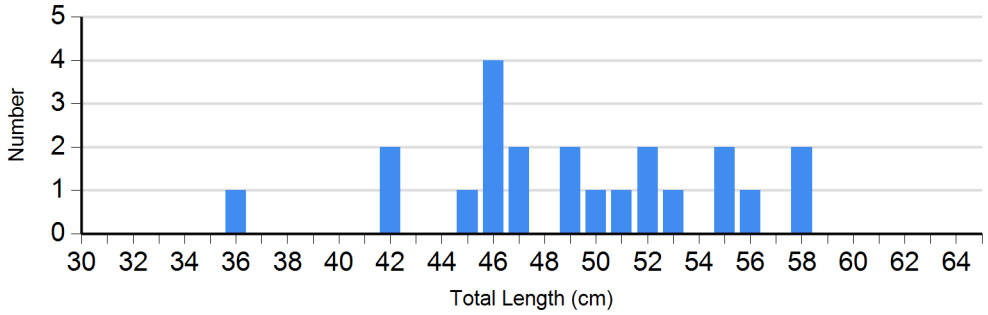

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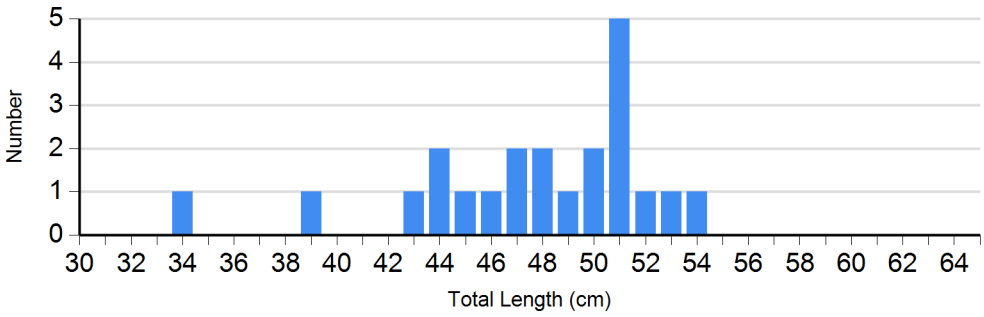

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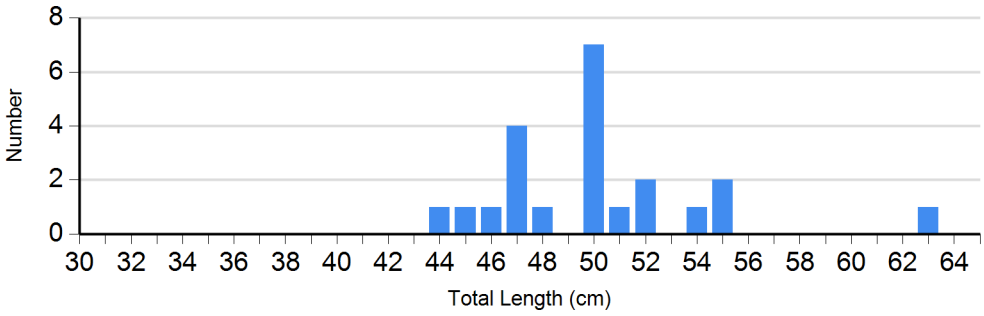

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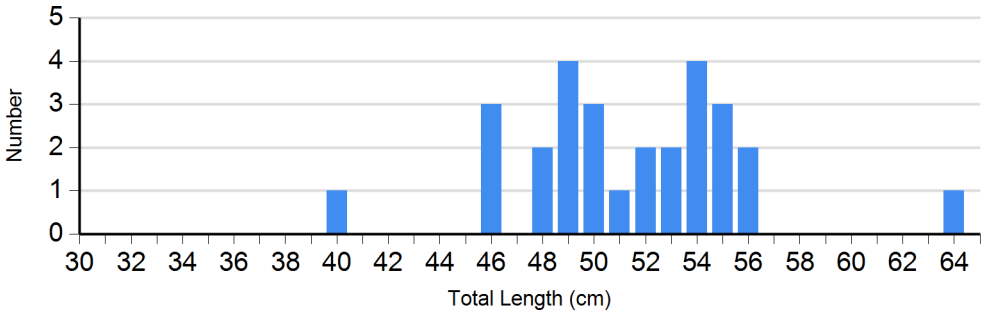

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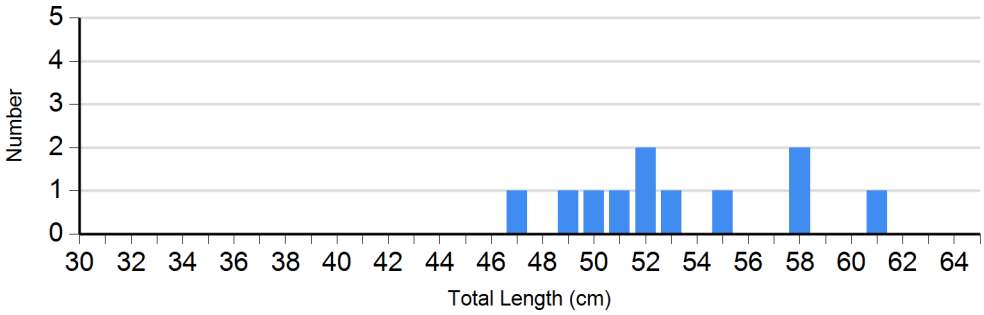
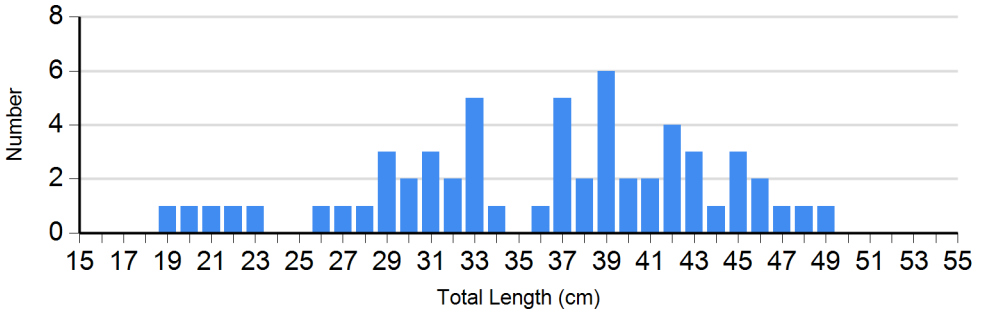


2024

Species: Walleye
Gear: AFS std gill net



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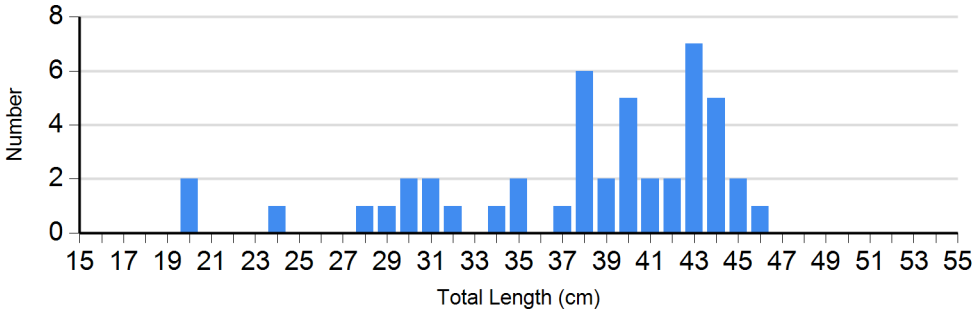

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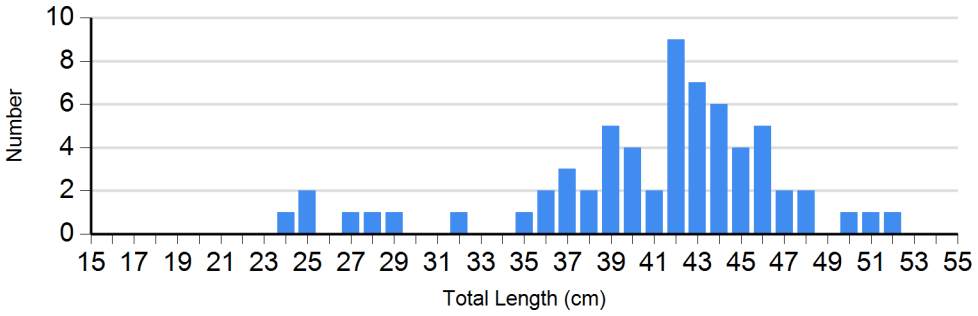
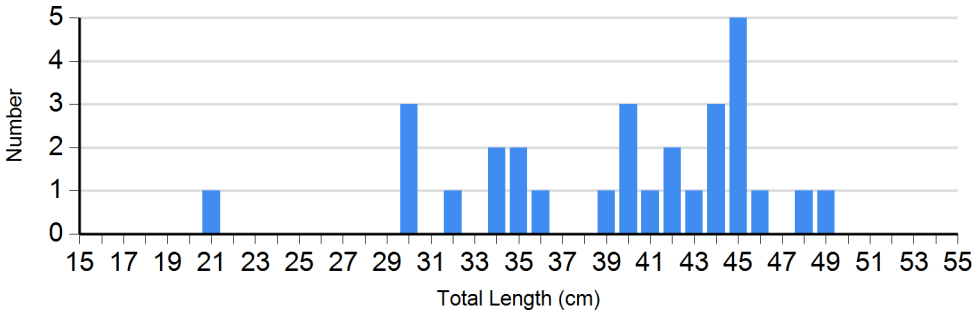
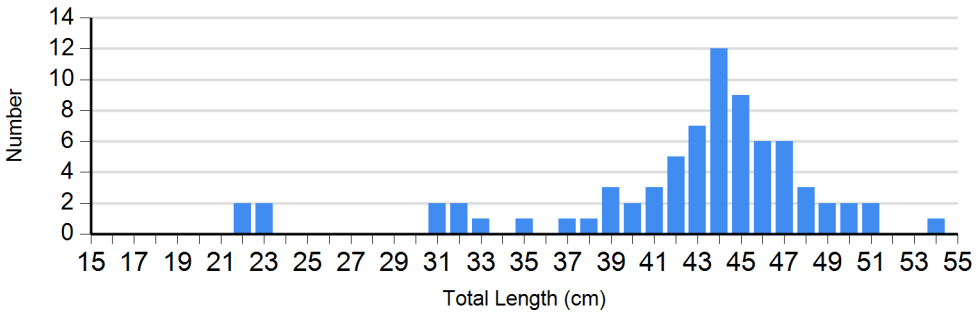


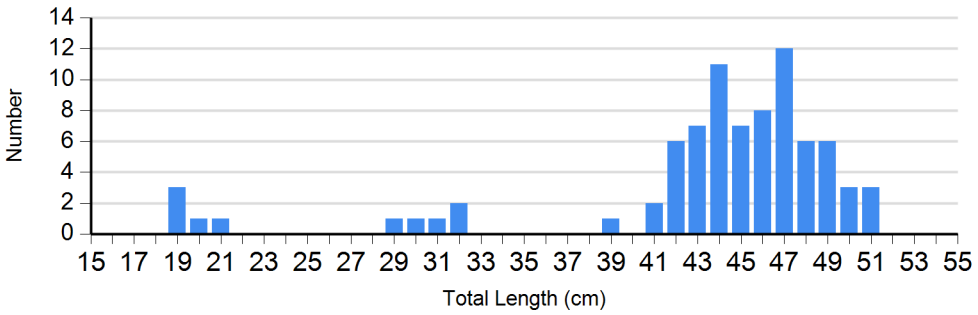
2021



2022

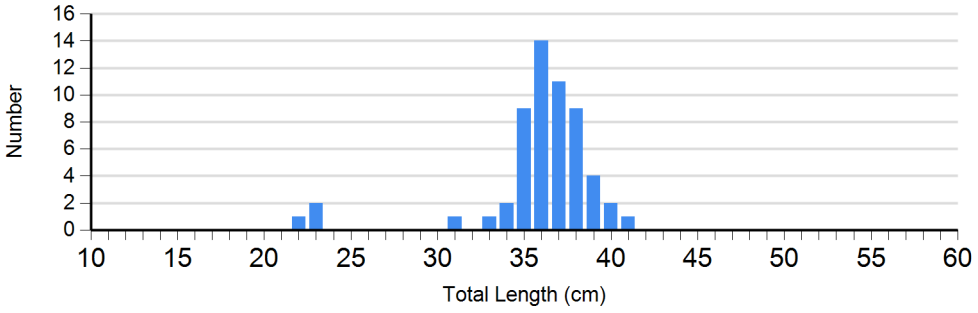


2023

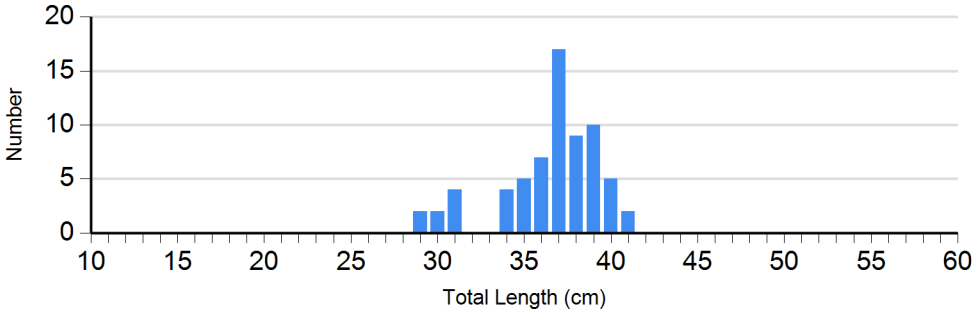


2024

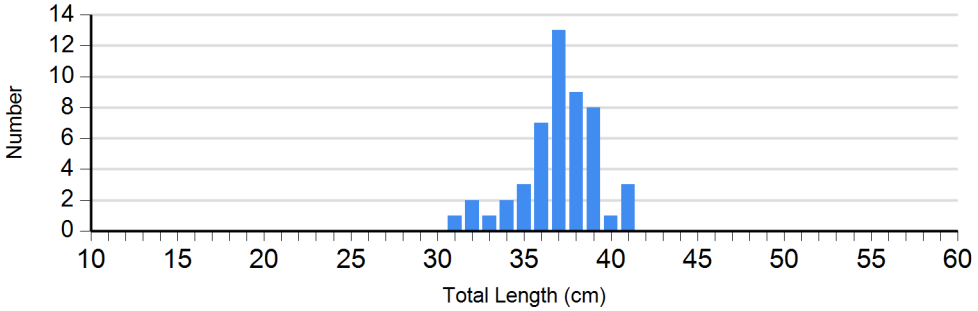
Species: White Bass
Gear: AFS std gill net



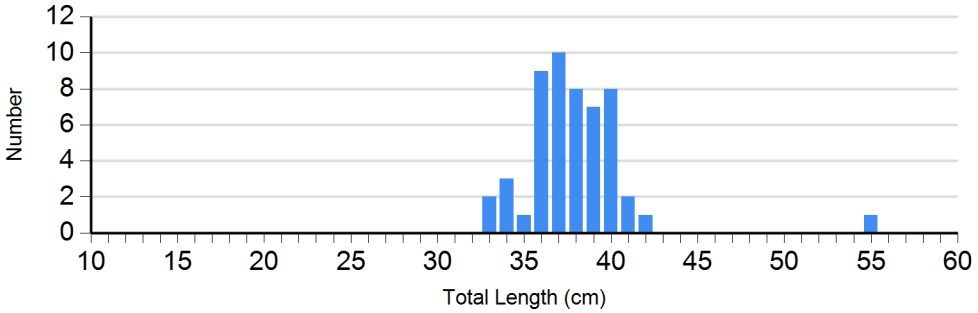
2019



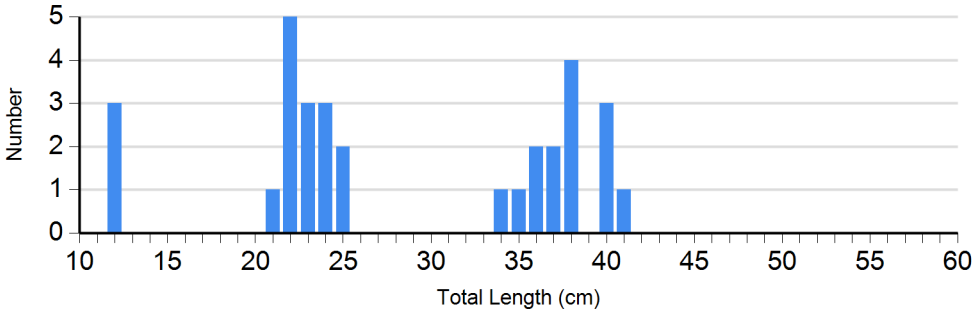
2020



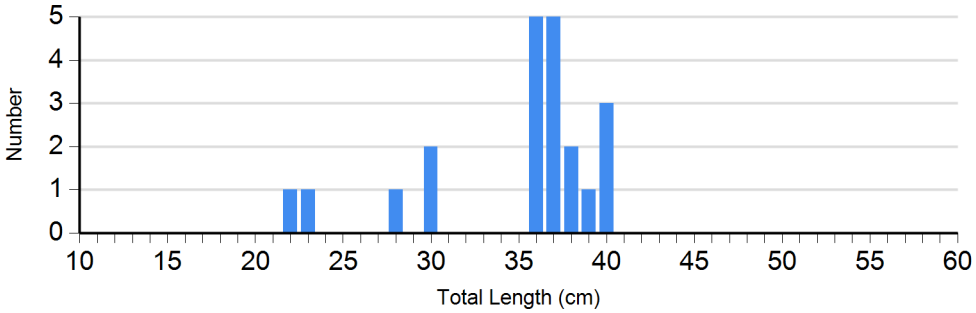
2021



2022

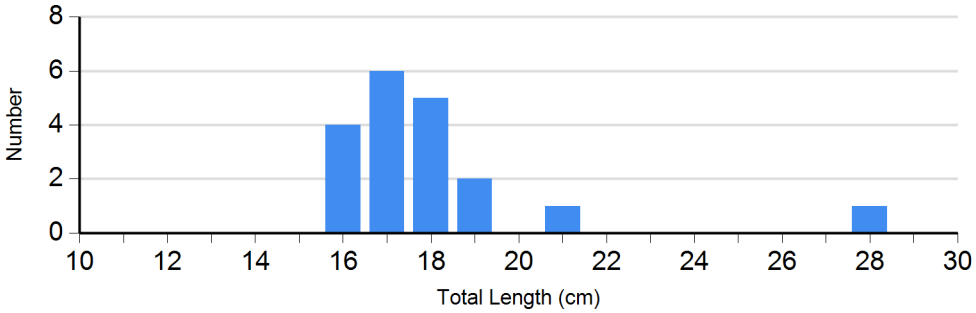


2023

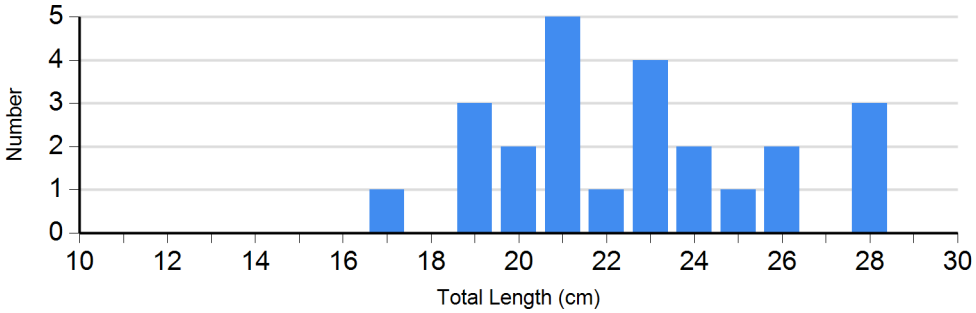


2024

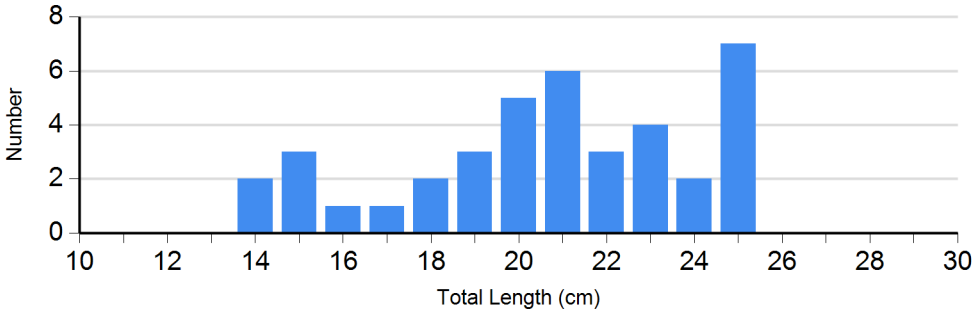
Species: Yellow Perch
Gear: AFS std gill net



2020



2021



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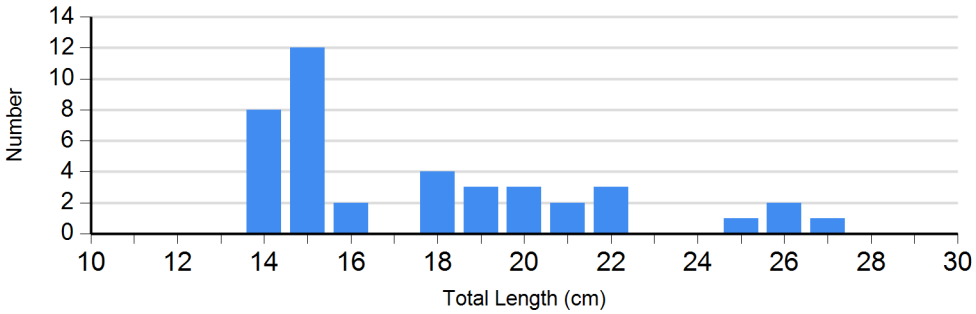

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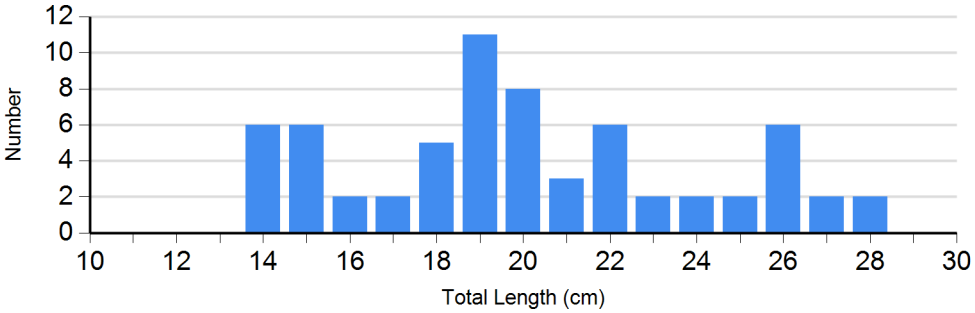
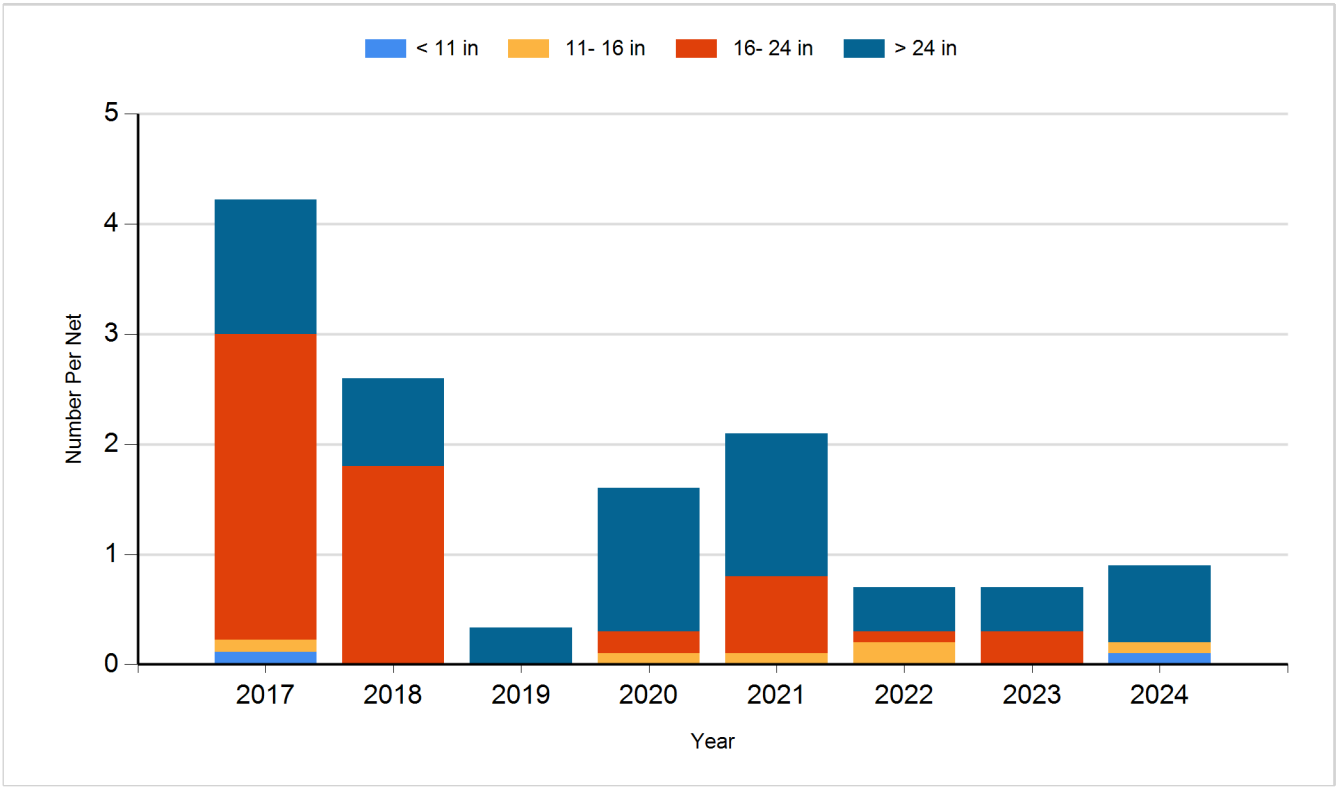

12
10
8
6
4
2
0
Number
10
12
14
16
18
20
22
24
26
28
30
Total Length (cm)

2024

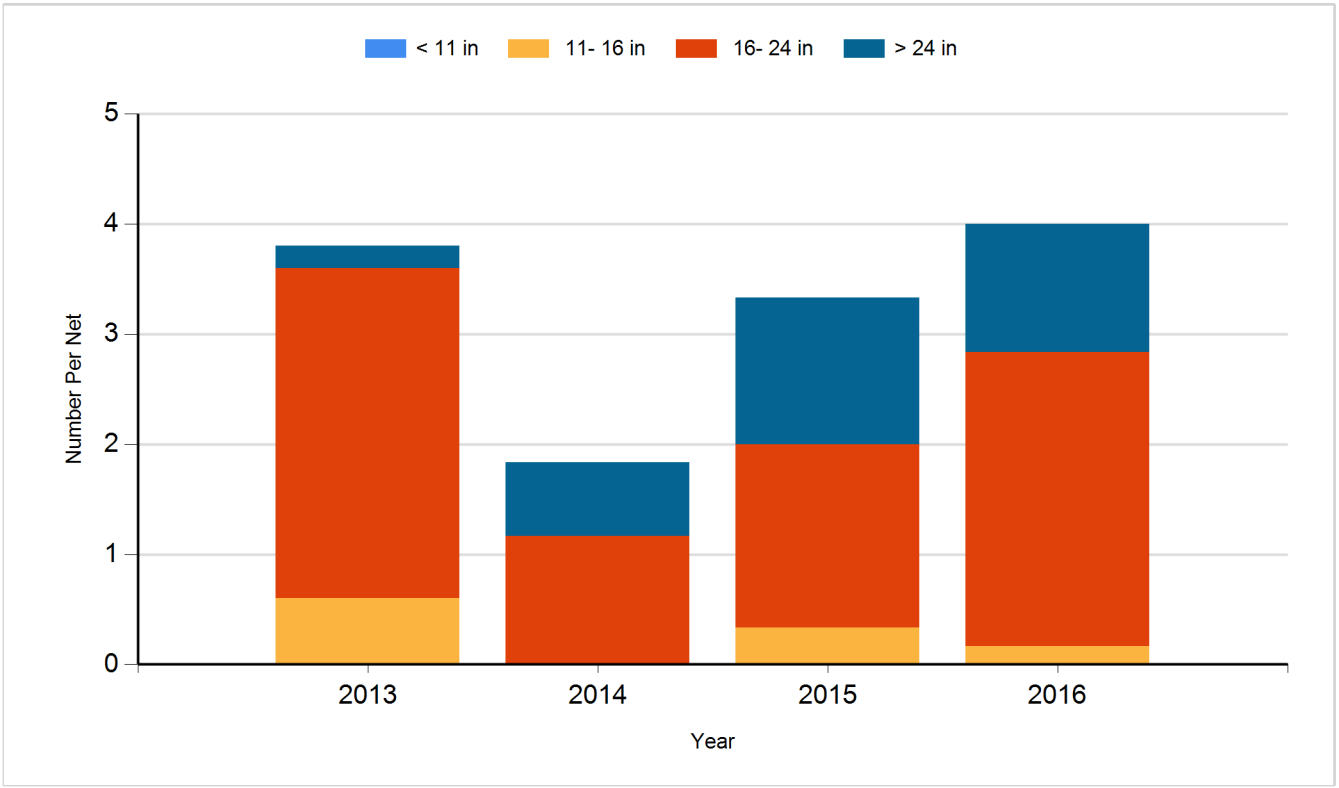
Historic Fish Sizes and Relative Abundance

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

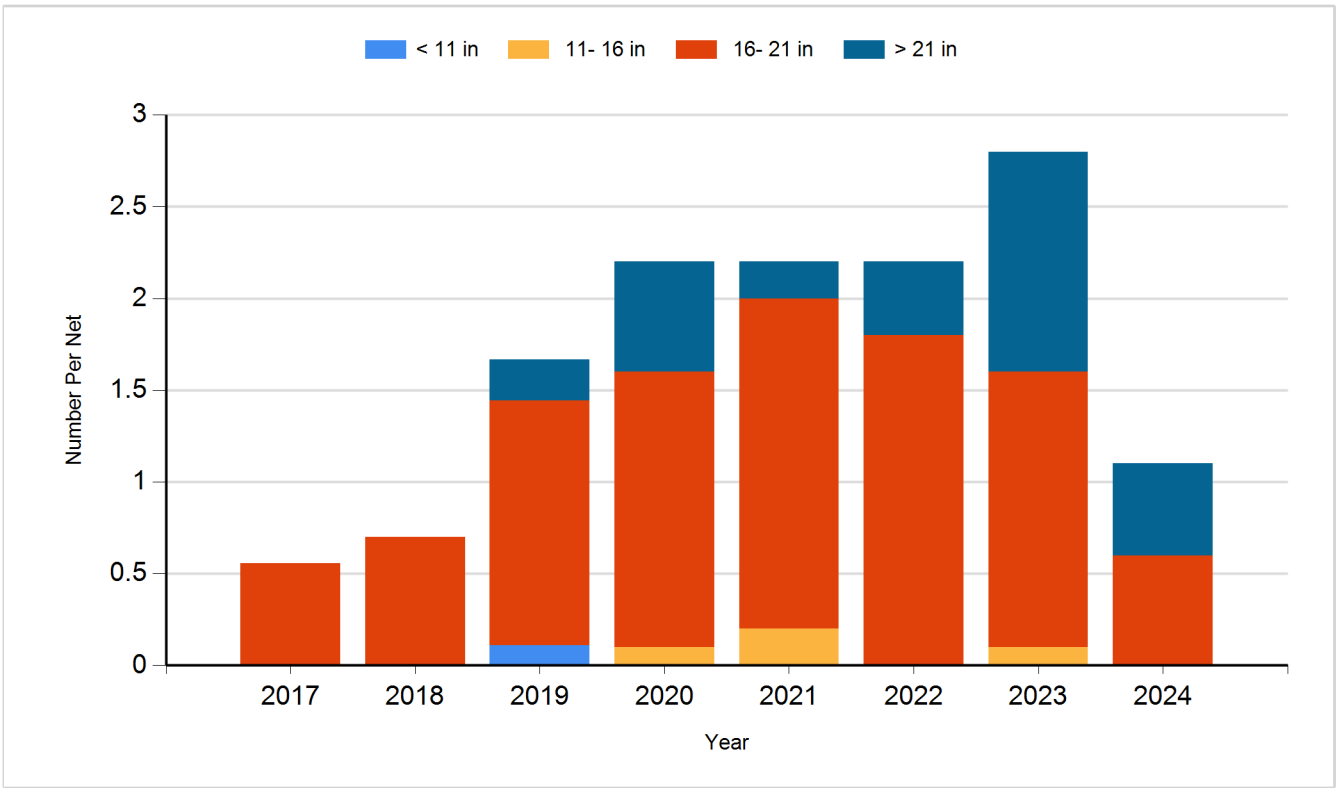
Species: Channel Catfish
Gear: AFS std gill net



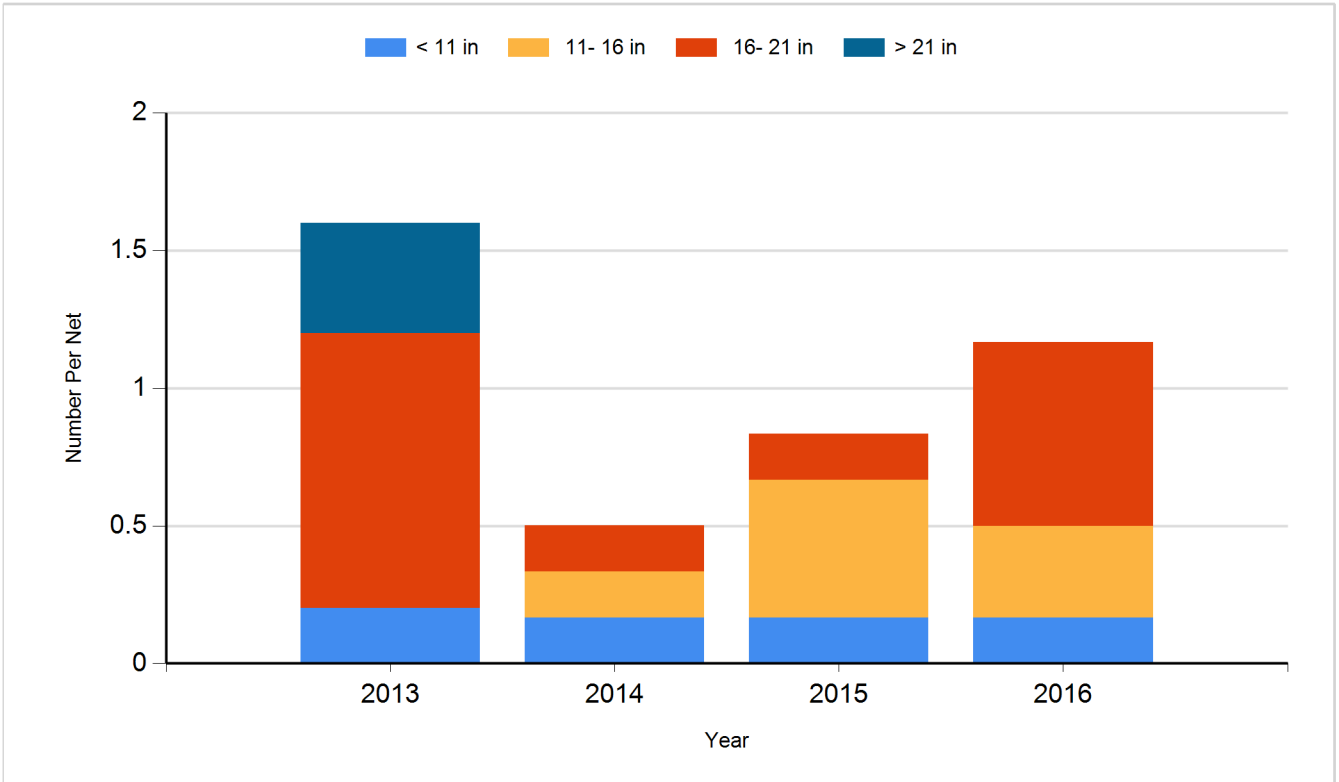
Species: Channel Catfish
Gear: std exp gill net



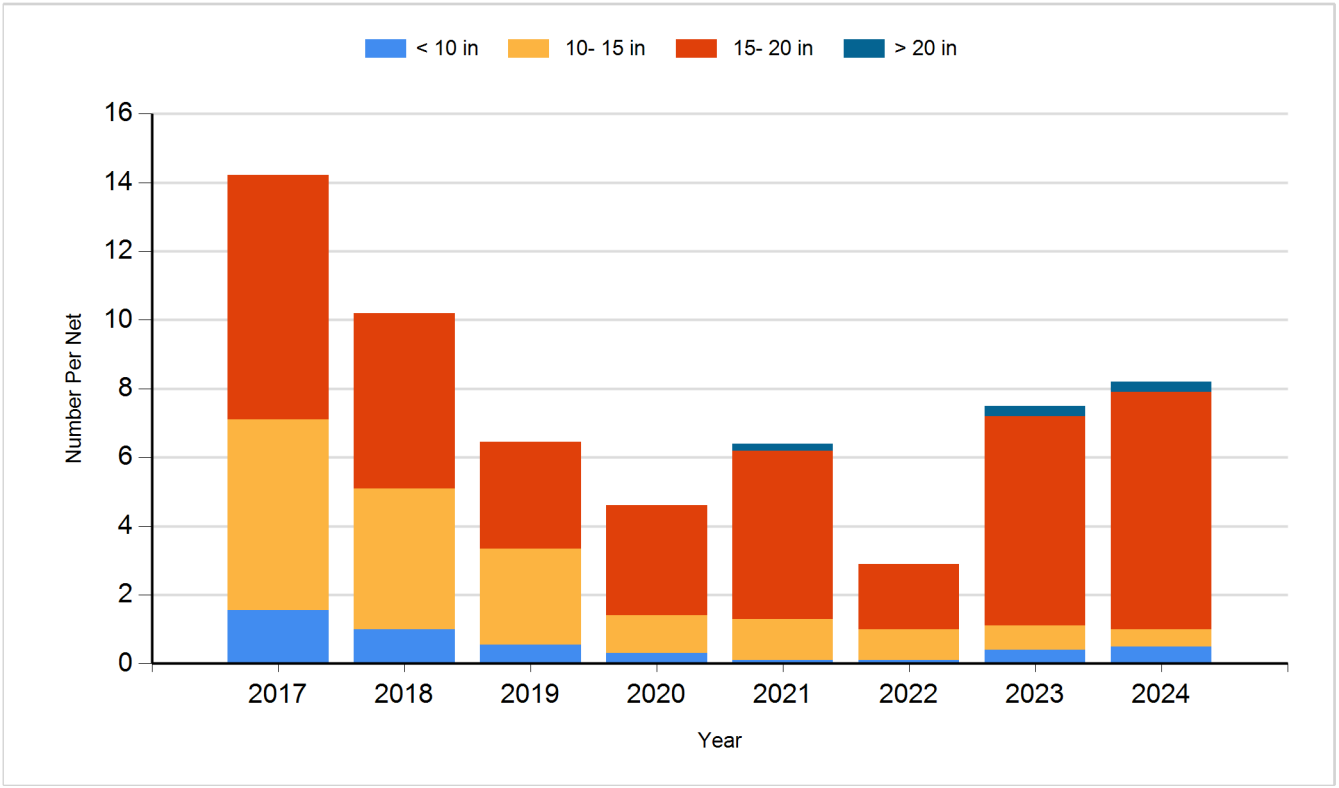
Species: Common Carp
Gear: AFS std gill net



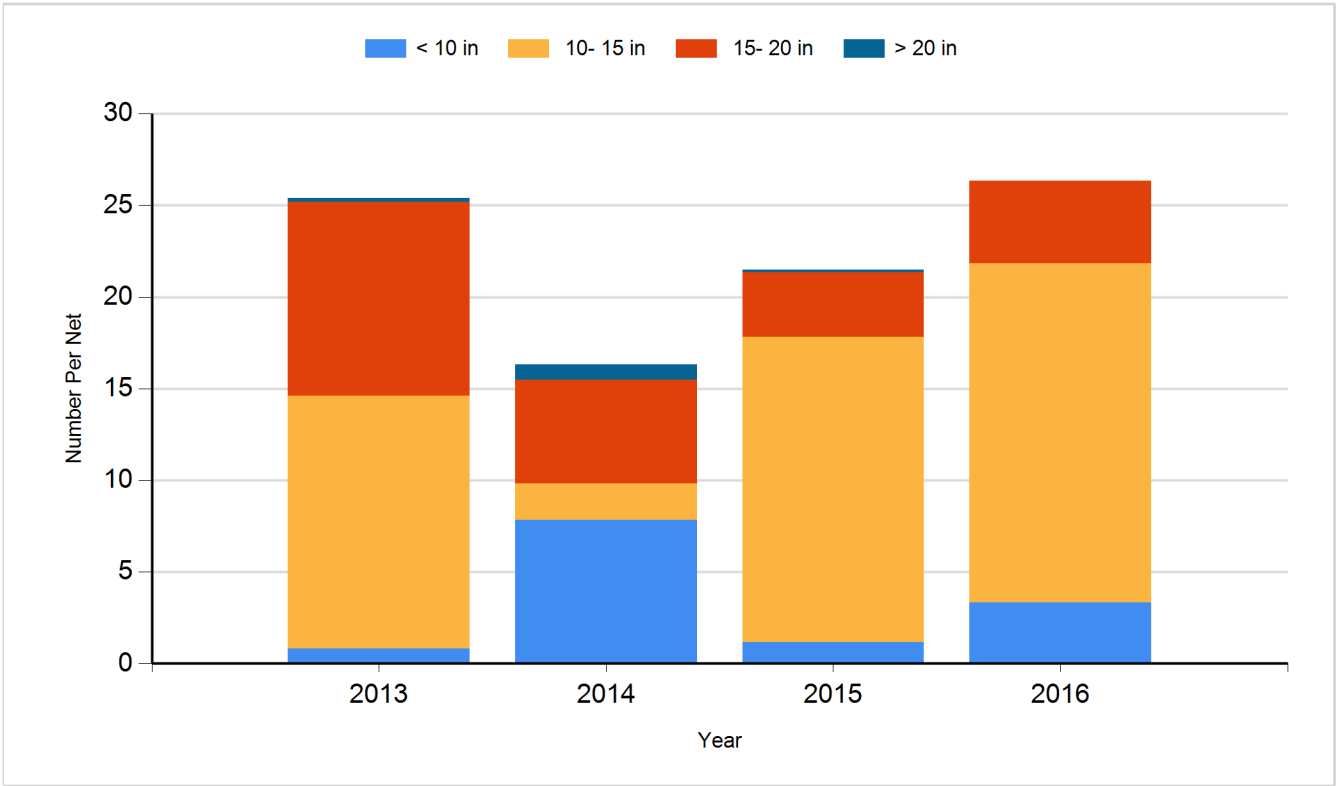
Species: Common Carp
Gear: std exp gill net



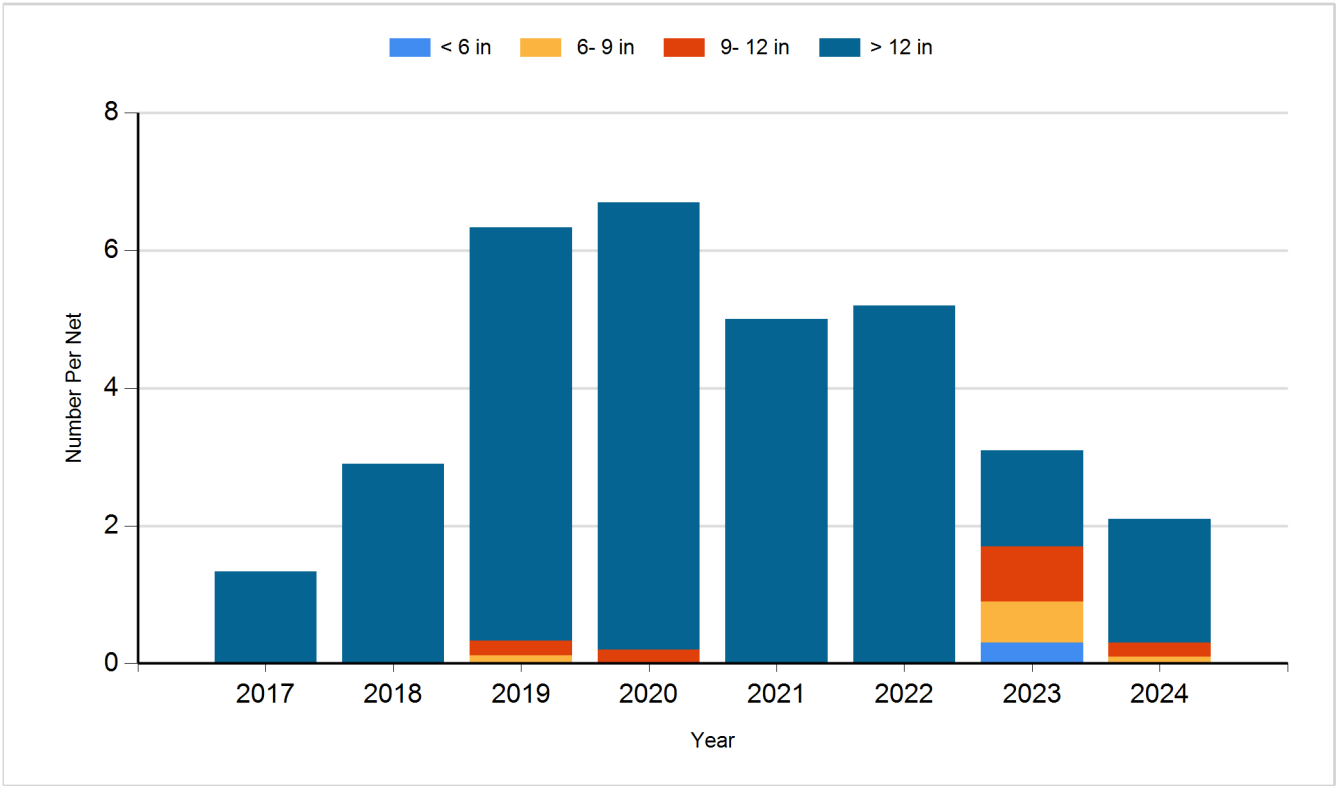
Species: Walleye
Gear: AFS std gill net



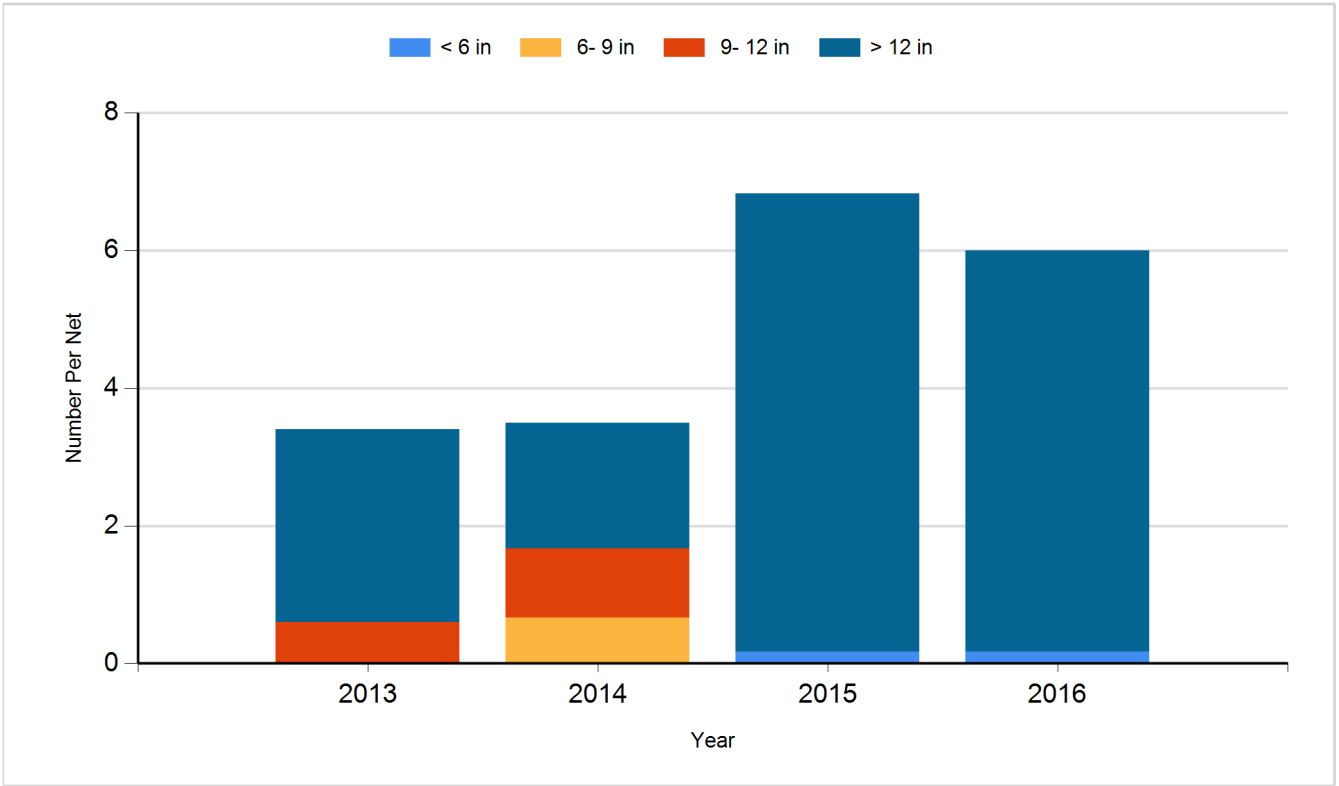
Species: Walleye
Gear: std exp gill net



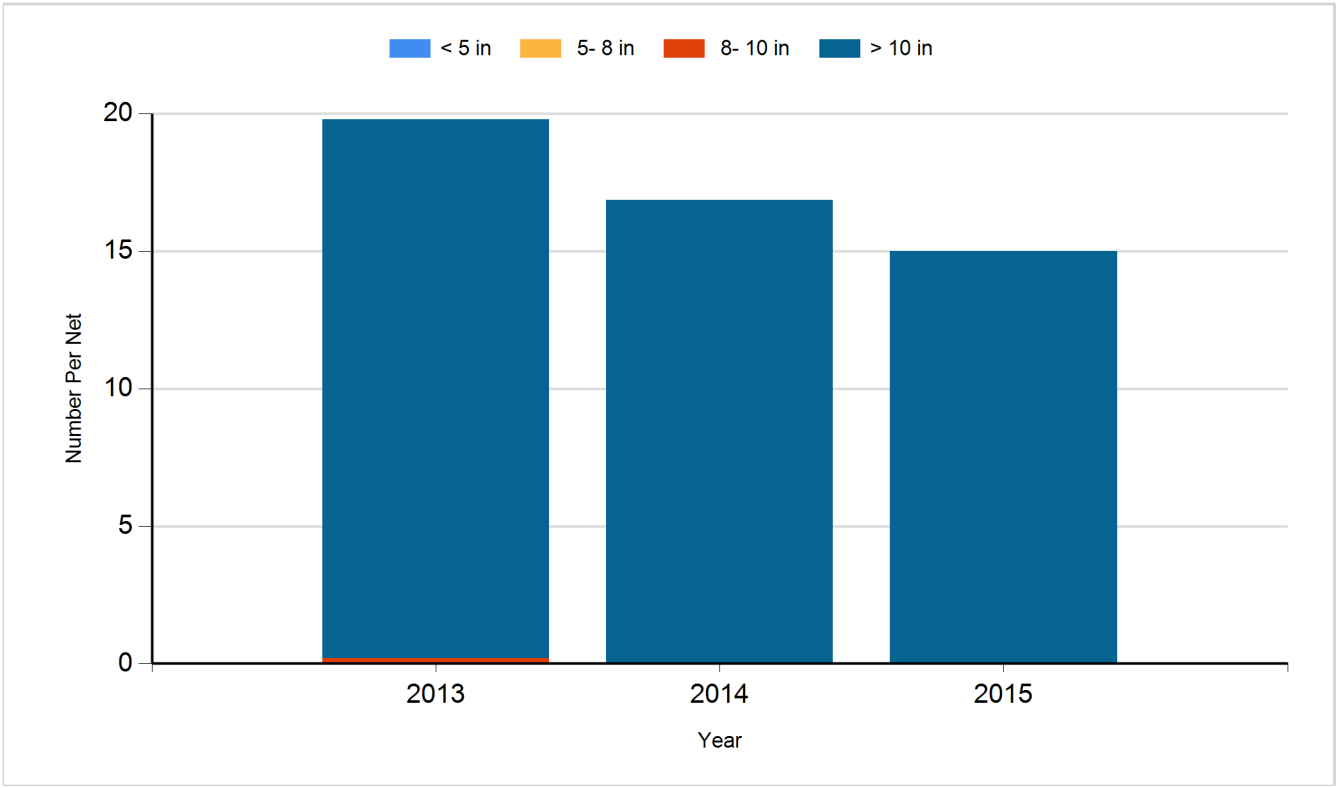
Species: White Bass
Gear: AFS std gill net



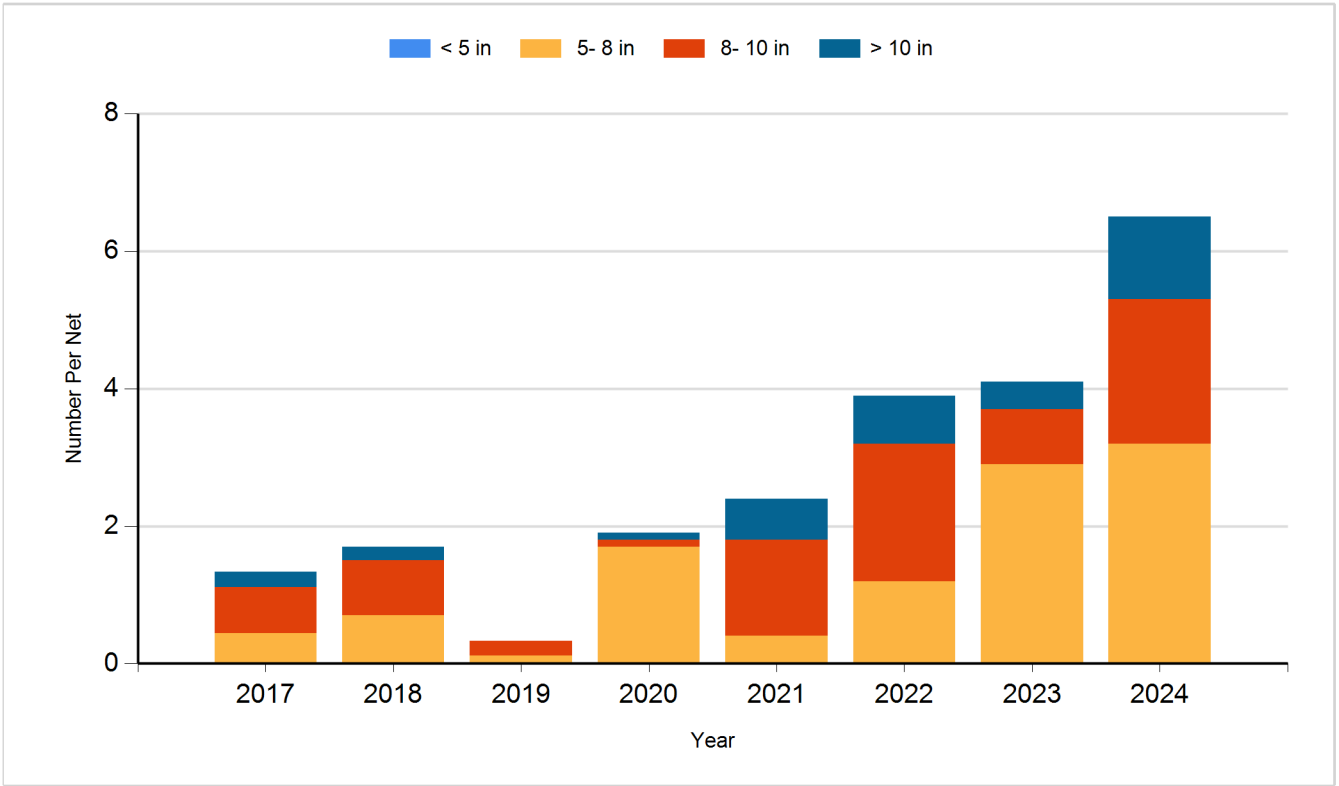
Species: White Bass
Gear: std exp gill net



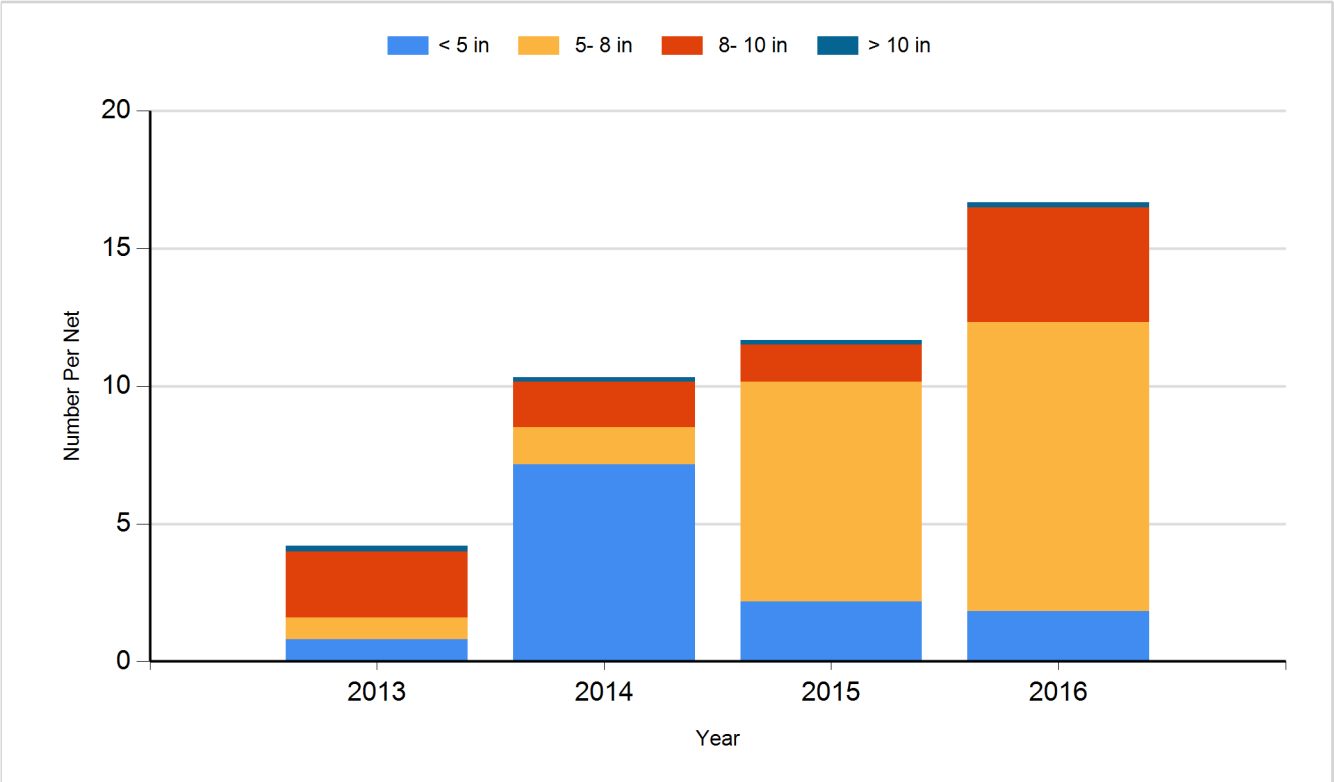
Species: White Crappie
Gear: frame net (std 3/4 in)



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
2013	Bluegill	Adult	660
2013	Gizzard Shad	Adult	111
2014	Gizzard Shad	Adult	220
2014	Yellow Perch	Adult	2,150
2015	Yellow Perch	Adult	1,600
2019	Yellow Perch	Adult	1,050
2021	Yellow Perch	Adult	3,000
2022	Yellow Perch	Adult	12,800
2023	Gizzard Shad		225
2023	Gizzard Shad	Adult	250
2023	Yellow Perch		8,000
2023	Yellow Perch	Adult	15,500
2024	Gizzard Shad		150
2024	Yellow Perch	Adult	40,000