Angostura Reservoir Lake Survey Summary

Angostura is a 4,612 acre reservoir located seven miles southeast of Hot Springs. Angostura is managed as a multiple species fishery but is dominated by walleye, smallmouth bass, channel catfish, black crappie and gizzard shad. Other common species found in angostura include largemouth bass, bluegill, northern pike, yellow perch and freshwater drum.

Black crappie. Black crappie were not very abundant during the frame net survey (1.8 per net). Fish ranged from 7 to 11 inches.

Channel catfish. The most abundant species in the gill net sample were channel catfish (16.0 per net). Fish were small on average with only 2 percent of the adult population over 16 inches. Catfish numbers remain consistent on an annual basis.

Smallmouth bass. Gill nets sampled a large number of smallmouth bass (7.9 per net). Sizes were large, with 61% of the adult fish being over 14 inches. Growth was impressive with the average 4-year-old bass, being over 14 inches in length.

Walleye. Walleye numbers were 4.5 per gill net, up from 2.9 in last year. Growth was fast with the average fish exceeding the 15 inch minimum length limit by their third year. Fish ranged from 9.5 to 23.8 inches. Angostura is stocked annually with around 5 million fry.

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Angostura Reservoir, Fall River County
ANR-Lake-4-000
2023

Lake Information

Name: Angostura Reservoir

County: Fall River

Surface Area: 4,835 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Aug 15, 2023	10 net-nights

Common Fish Species Present

Channel Catfish

Black Crappie

Largemouth Bass

Gizzard Shad

Walleye

Smallmouth Bass

Shorthead Redhorse

River Carpsucker

Common Carp

Freshwater Drum

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	1	0.1	0.1	100		100		106	
	Channel Catfish	160	8.8	1.5	34	7	3		84	1
	Common Carp	23	2.3	0.9	91		0		86	2
	Freshwater Drum	21	1.6	1.2	75		0		83	2
	Gizzard Shad	9	0.8	0.6	100				99	2
	River Carpsucker	39	3.9	1.0	95		92		99	2
	Shorthead Redhorse	45	4.5	1.4	100		11		83	1
	Smallmouth Bass	79	7.7	3.8	95		61	8	96	1
	Walleye	45	4.3	1.2	63	11	7		81	1
	Yellow Perch	2	0.2	0.3	50		0		87	4

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 std frame net	Black Crappie				8.7							8.70
	Bluegill				0.4							0.40
	Common Carp				0.4							0.40
	River Carpsucker				0.5							0.50
	Walleye				0.6							0.60
AFS std gill net	Black Crappie				1.8	0.5	0.8	1.0	0.9	0.4	0.1	0.79
	Bluegill				0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.04
	Channel Catfish				4.6	10.9	6.1	6.5	10.2	7.8	8.8	7.84
	Common Carp				1.5	1.8	5.8	3.3	1.7	2.0	2.3	2.63
	Freshwater Drum				0.6	1.5	5.6	3.3	1.3	0.9	1.6	2.11
	Gizzard Shad				5.1	2.1	0.8	0.6	0.2	0.2	0.8	1.40
	Largemouth Bass				0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.06
	Northern Pike				0.5	0.1	0.3	0.5	0.1	0.0	0.0	0.21
	River Carpsucker				3.0	2.1	2.5	4.4	3.5	1.6	3.9	3.00
	Rock Bass				0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.01
	Shorthead Redhorse				1.1	0.8	0.0	0.9	3.5	0.9	4.5	1.67
	Smallmouth Bass				6.3	5.8	5.3	4.5	4.2	5.2	7.7	5.57
	Spottail Shiner				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
	Walleye				11.0	12.1	6.5	7.6	12.4	2.7	4.3	8.09
	White Sucker				0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.01
	Yellow Perch				0.0	0.4	0.6	0.9	0.1	0.0	0.2	0.31
frame net (std 3/4 in)	Black Bullhead	1.1	0.0	0.0		0.0	0.0			0.0		0.18
	Black Crappie	7.0	5.9	8.3		22.8	8.7			2.0		9.12
	Bluegill	2.0	1.4	0.6		0.8	0.3			12.2		2.88
	Bluegill X Gr. Sunfish Hybrid	0.0	0.0	0.0		0.0	0.0			0.0		0.00
	Channel Catfish	1.3	0.3	6.3		7.9	13.0			0.8		4.93
	Common Carp	2.6	0.3	0.9		5.5	5.9			0.2		2.57
	Freshwater Drum	0.0	0.0	0.0		0.0	0.1			0.0		0.02
	Gizzard Shad	0.0	0.0	0.0		1.8	0.0			0.0		0.30
	Green Sunfish	0.0	0.0	0.0		0.0	0.0			0.0		0.00
	Largemouth Bass	0.0	0.0	0.6		0.0	0.0			0.0		0.10
	Northern Pike	0.1	0.0	0.0		0.0	0.0			0.4		0.08
	River Carpsucker	0.5	0.0	0.3		0.1	0.9			0.0		0.30

		CPUE										
Gear	Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
frame net (std 3/4 in)	Rock Bass	0.1	0.1	0.0		0.0	0.0			1.4		0.27
	Shorthead Redhorse	0.1	0.3	0.0		0.0	0.0			1.6		0.33
	Smallmouth Bass	1.4	0.0	0.4		0.5	1.1			4.0		1.23
	Walleye	1.3	1.3	1.9		3.2	1.6			0.8		1.68
	White Sucker	0.4	0.1	0.0		0.1	0.0			0.0		0.10
	Yellow Perch	0.0	0.0	0.0		0.0	0.0			0.0		0.00
std exp gill net	Black Crappie	3.3	2.3	4.3								3.30
	Bluegill	0.0	0.0	0.3								0.10
	Channel Catfish	16.8	8.8	10.8								12.13
	Common Carp	3.0	6.5	4.5								4.67
	Freshwater Drum	4.3	2.0	5.0								3.77
	Gizzard Shad	2.5	5.8	2.8								3.70
	Largemouth Bass	0.3	0.0	0.3								0.20
	Northern Pike	0.0	1.8	1.0								0.93
	River Carpsucker	2.0	2.0	1.5								1.83
	Shorthead Redhorse	8.5	4.8	4.5								5.93
	Smallmouth Bass	4.3	5.0	5.0								4.77
	Spottail Shiner	0.0	0.0	0.0								0.00
	Walleye	29.5	28.0	25.8								27.77
	White Sucker	0.3	0.8	0.5								0.53
	Yellow Perch	3.8	3.0	2.0								2.93

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				100						
		PSD-P				63						
		Wr				101						
	Common Carp	PSD				50						
		PSD-P				25						
		Wr				83						
	River Carpsucker	PSD				100						
		PSD-P				80						
		Wr				100						
	Walleye	PSD				86						
		PSD-P				71						
		Wr				80						
AFS std gill net	Black Crappie	PSD				100	100	100	75	100	100	100
		PSD-P				86	100	100	75	0	75	100
		Wr				110	97	99	100	107	98	106
	Channel Catfish	PSD				27	29	29	46	42	41	34
		PSD-P				0	1	4	2	3	4	3
		Wr				88	80	81	84	83	83	84
	Common Carp	PSD				50	50	61	92	100	95	91
		PSD-P				0	0	4	4	6	0	0
		Wr				87	81	81	86	87	87	86
	Gizzard Shad	PSD				100	100	100	100	100	100	100
		Wr				101	88	99	102	102	97	99
	Largemouth Bass	PSD				100				100		
		PSD-P				50				0		
		Wr				112				88		
	River Carpsucker	PSD				100	100	100	97	97	100	95
		PSD-P				100	100	95	97	97	100	92
		Wr				100	94	88	103	101	102	99
	Shorthead Redhorse	PSD				100	100		100	43	100	100
		PSD-P				78	67		100	26	44	11
		Wr				92	86		91	88	87	83
	Smallmouth Bass	PSD				68	85	62	53	88	92	95

			Year									
Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
AFS std gill net	Smallmouth Bass	PSD-P				18	22	19	19	45	35	61
		Wr				98	95	96	96	95	93	96
	Walleye	PSD				65	62	42	67	68	85	63
		PSD-P				5	6	6	2	6	15	7
		Wr				88	84	87	87	86	81	81
frame net (std 3/4 in)	Black Crappie	PSD	95	100	79		100	100			100	
		PSD-P	68	94	60		86	97			50	
		Wr	98	99	111		91	89			98	
	Channel Catfish	PSD	10	0	32		9	15			0	
		PSD-P	0	0	0		0	0			0	
		Wr	85	79	96		79	90			79	
	Common Carp	PSD	62	100	50		47	66			100	
		PSD-P	5	0	0		0	2			100	
		Wr	82	73	99		80	85			88	
	Gizzard Shad	PSD					100					
		Wr					79					
	Largemouth Bass	PSD			100							
		PSD-P			75							
		Wr			109							
	River Carpsucker	PSD	100		100		100	100				
		PSD-P	100		100		100	88				
		Wr	90		108		107	101				
	Shorthead Redhorse	PSD	0	100							38	
		PSD-P	0	100							38	
		Wr	75	78							88	
	Smallmouth Bass	PSD	91		67		80	100			40	
		PSD-P	18		0		0	60			5	
		Wr	95		93		85	92			85	
	Walleye	PSD	100	100	69		94	71			100	
		PSD-P	20	80	38		59	36			25	
		Wr	85	80	86		74	80			83	
std exp gill net	Black Crappie	PSD	54	56	76							
		PSD-P	54	56	18							
		Wr	108	118	105							
	Channel Catfish	PSD	27	11	28							
		PSD-P	1	0	0							

			Year									
Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
std exp gill net	Channel Catfish	Wr	82	87	83							
	Common Carp	PSD	67	58	33							
		PSD-P	0	0	0							
		Wr	83	87	82							
	Gizzard Shad	PSD	100	100	100							
		Wr	90	97	93							
	Largemouth Bass	PSD	0		100							
		PSD-P	0		0							
		Wr	119		120							
	River Carpsucker	PSD	100	100	100							
		PSD-P	88	100	83							
		Wr	91	93	105							
	Shorthead Redhorse	PSD	97	100	100							
		PSD-P	18	26	67							
		Wr	86	90								
	Smallmouth Bass	PSD	82	80	70							
		PSD-P	24	15	25							
		Wr	95	97	101							
	Walleye	PSD	59	58	36							
		PSD-P	6	14	5							
		Wr	85	92	85							

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+
2016	116		189 (26)	251 (56)	264 (10)	298 (4)	308 (20)				
2014	108		207 (14)	241 (20)	264 (60)	309 (4)	269 (11)	320 (2)			

Species: Walleye

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2019	51	276 (20)	377 (21)	422 (3)	481 (3)			467 (1)	512 (2)	518 (1)	
2018	95	303 (26)	392 (44)	442 (17)	474 (2)	544 (2)			588 (1)	496 (1)	633 (2)
2017	84	285 (18)	392 (54)	431 (9)					568 (3)		
2016	204	308 (126)	397 (62)		445 (8)	524 (6)			606 (2)		
2015	228	279 (92)	390 (21)	447 (25)	460 (46)	515 (16)	523 (10)	610 (6)	584 (4)	515 (6)	623 (2)
2014	236	290 (60)	381 (63)	426 (82)	464 (17)	525 (4)	599 (4)	617 (2)		576 (2)	485 (2)

Fish Condition

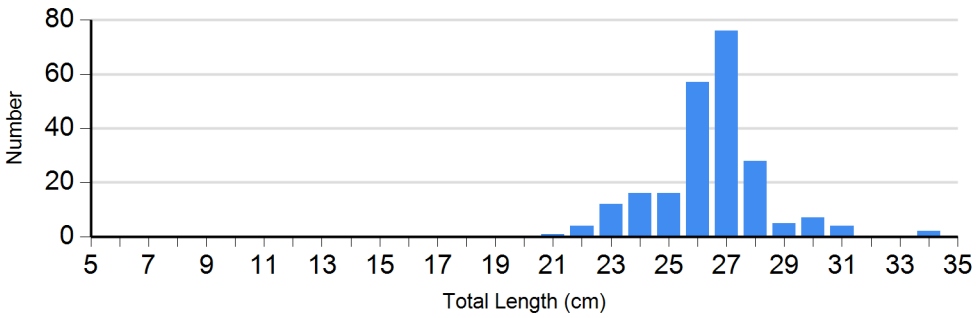
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2019	0		2	94	66	89 (0.6)	10	85 (2.7)
	2022	0		5	101 (2.9)	5	95 (3.2)	0	
Channel Catfish Gill Net	2019	35	75 (1.3)	12	88 (2.3)	2		0	
	2020	28	83 (1.6)	23	85 (1.9)	1	89	0	
	2021	59	82 (1.1)	40	83 (1.6)	3	87 (4.4)	0	
	2022	46	80 (1.0)	29	87 (1.8)	3	87 (0.5)	0	
	2023	58	83 (1.0)	27	85 (1.8)	3	85 (3.7)	0	
Common Carp Gill Net	2019	18	81 (1.6)	26	81 (1.1)	2		0	
	2020	2	84 (1.1)	23	86 (3.4)	1	80	0	
	2021	0		16	87 (1.9)	1	83	0	
	2022	1	89	19	87 (1.5)	0		0	
	2023	2	88 (4.3)	21	85 (1.2)	0		0	
Walleye Gill Net	2019	30	88 (1.1)	19	88 (1.7)	3	74 (1.4)	0	
	2020	20	91 (2.7)	40	86 (0.8)	1	80	0	
	2021	40	87 (1.2)	77	86 (0.7)	5	81 (1.2)	2	87 (8.9)
	2022	4	85 (2.9)	19	81 (0.8)	4	77 (3.0)	0	
	2023	16	83 (1.1)	24	81 (1.1)	3	73 (3.2)	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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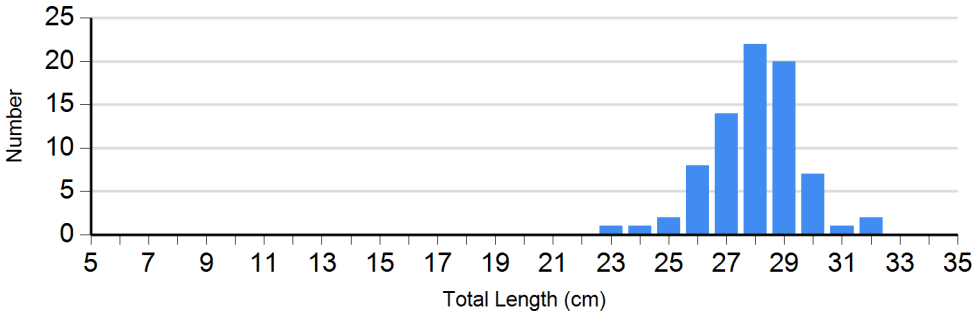

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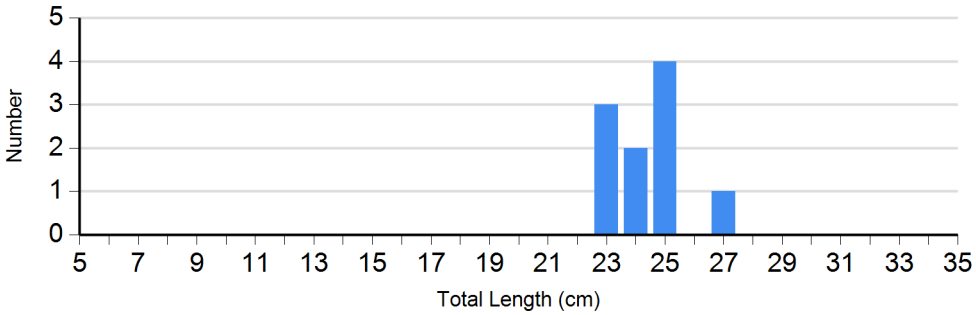

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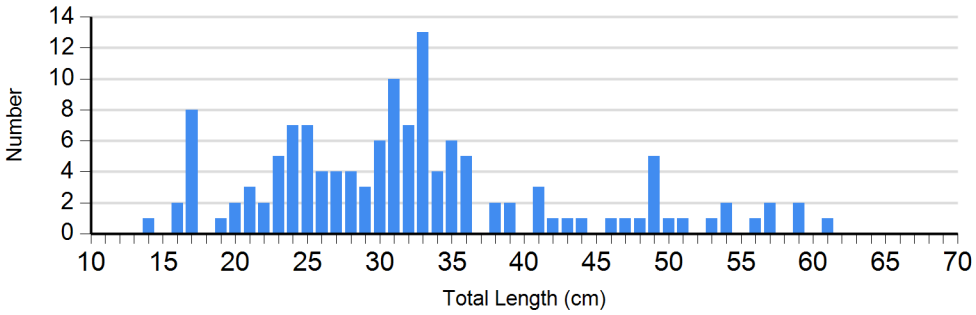
Species: Channel Catfish
Gear: AFS std gill net



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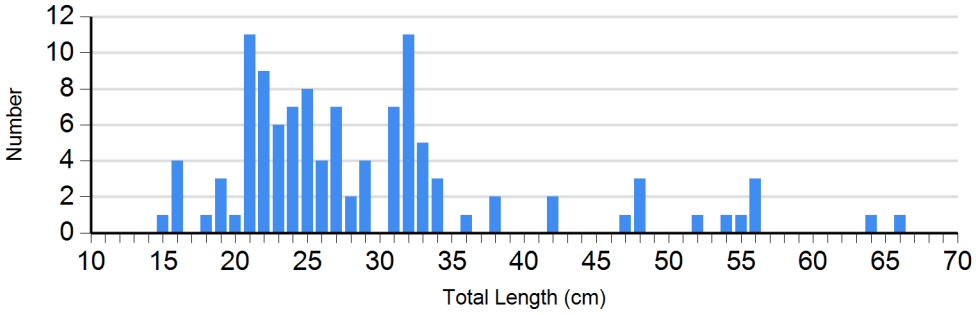
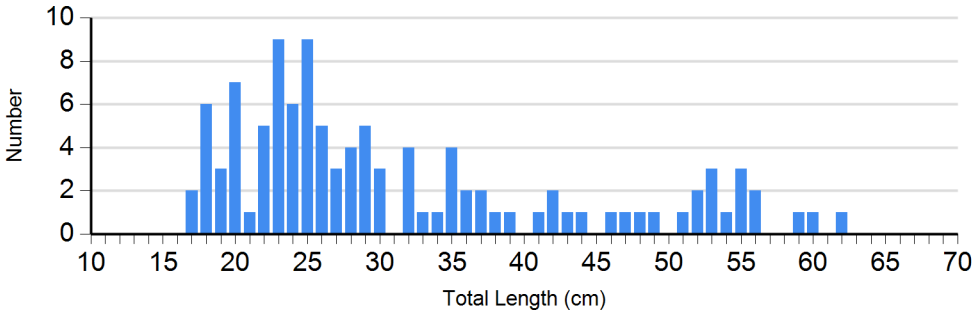
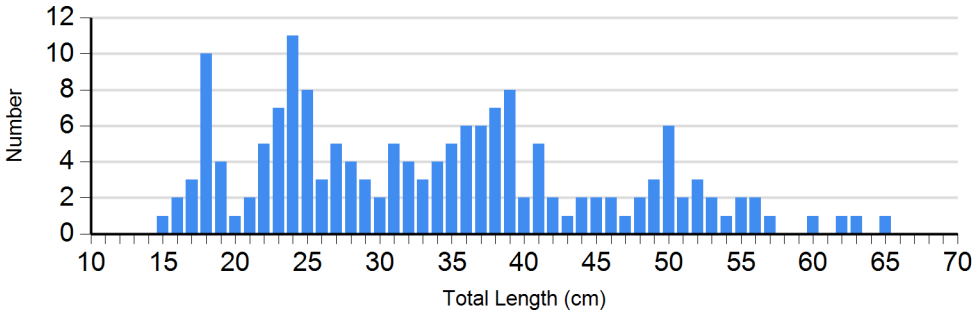


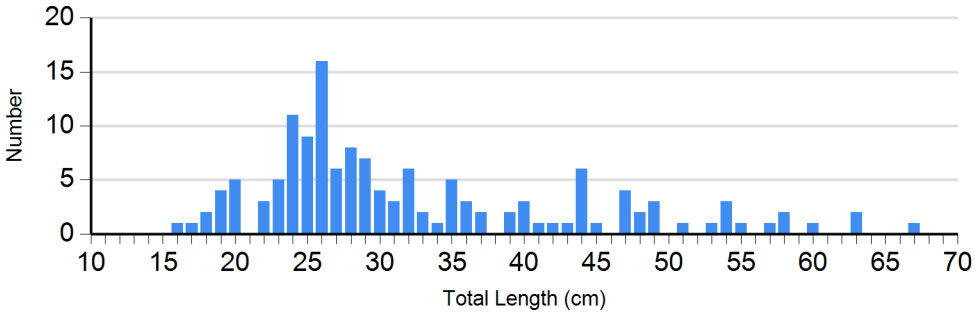
2019



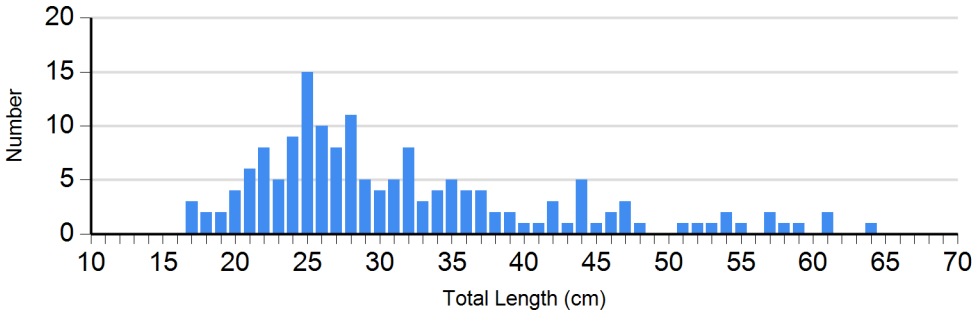
2020



2021



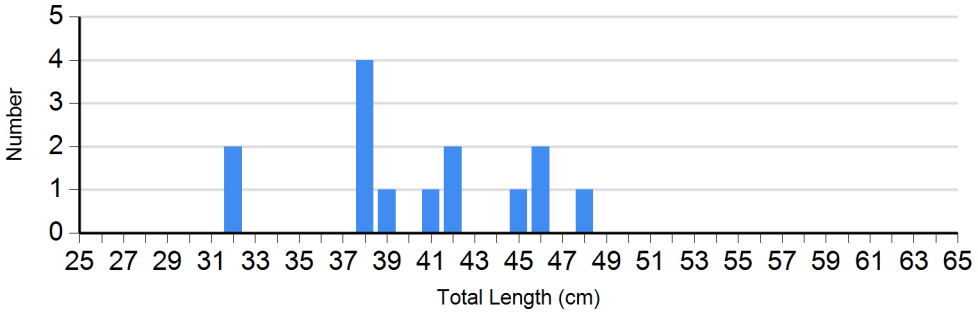
2022



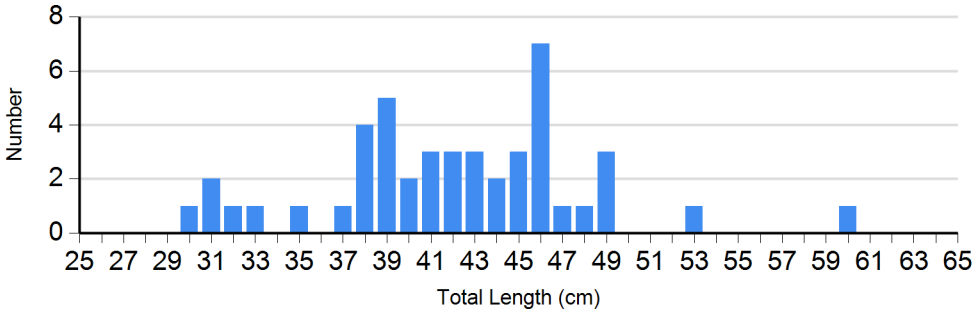
2023

Species: Common Carp
Gear: AFS std gill net

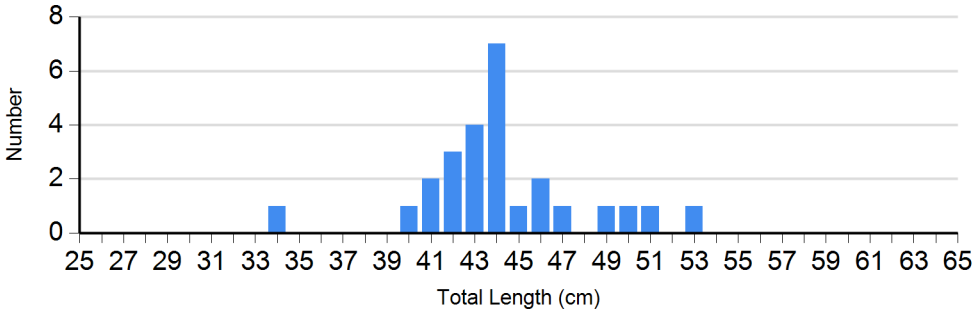
2018



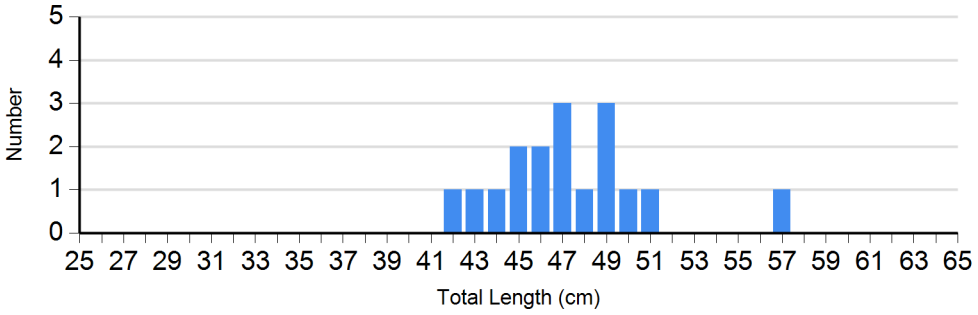
2019



2020



2021



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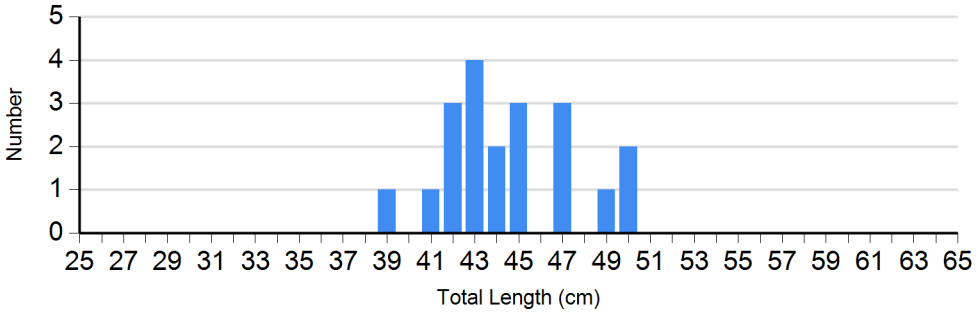
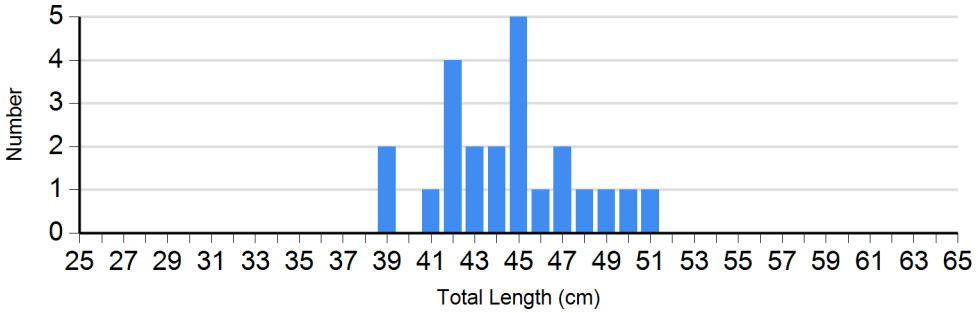
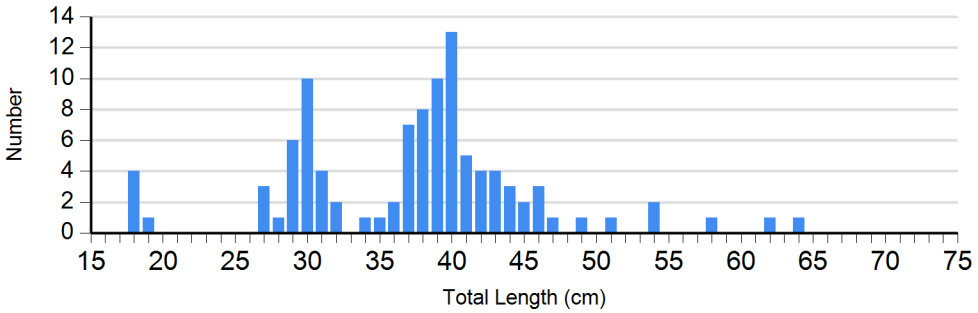


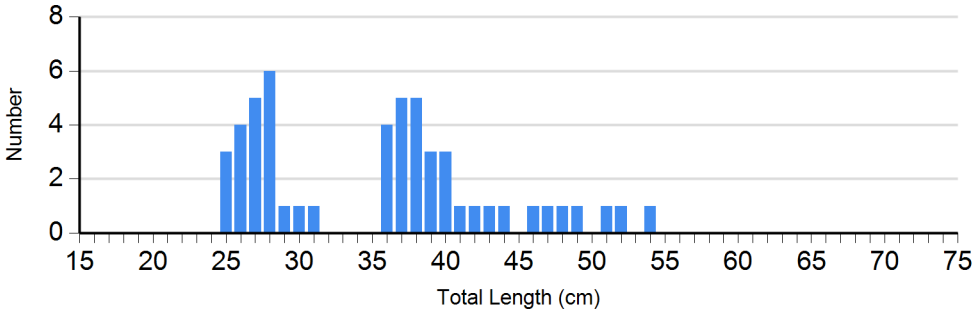


2023

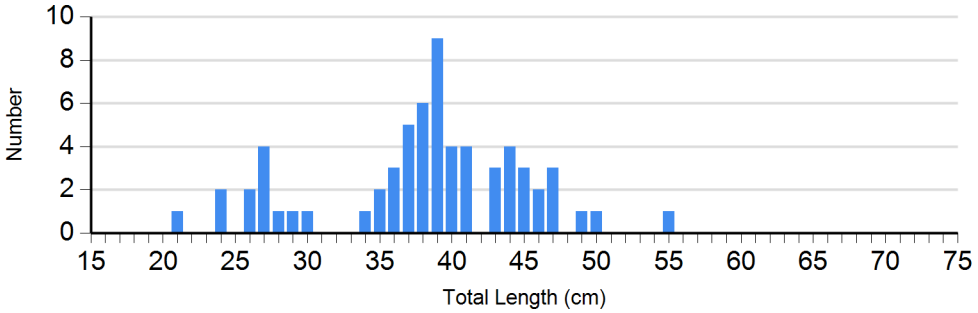
Species: Walleye
Gear: AFS std gill net



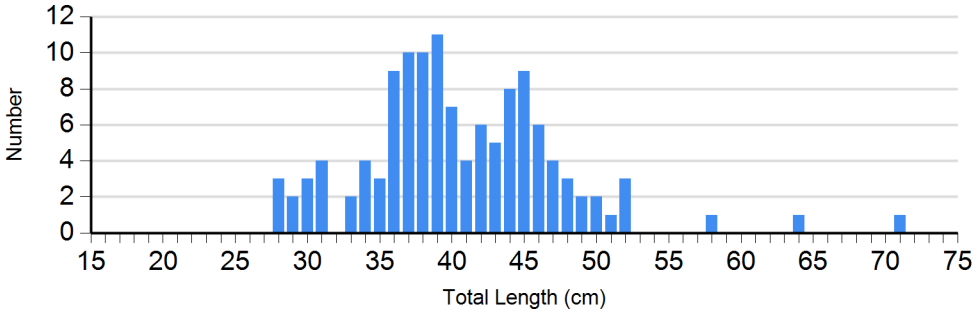
2018



2019



2020



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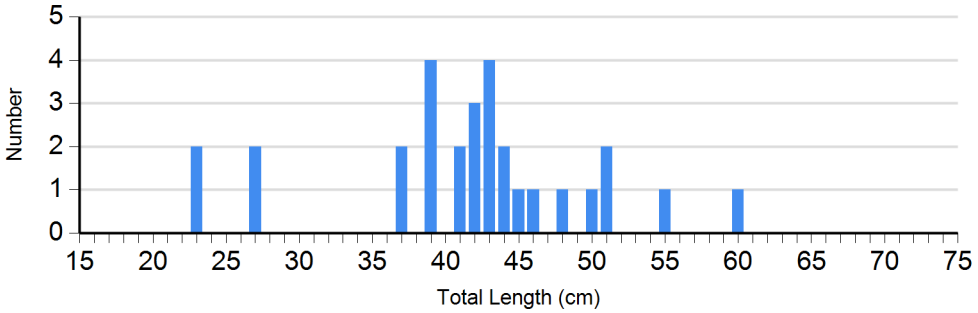

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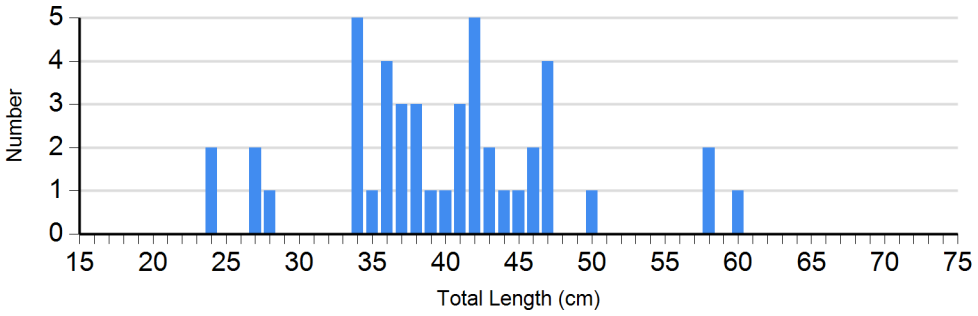
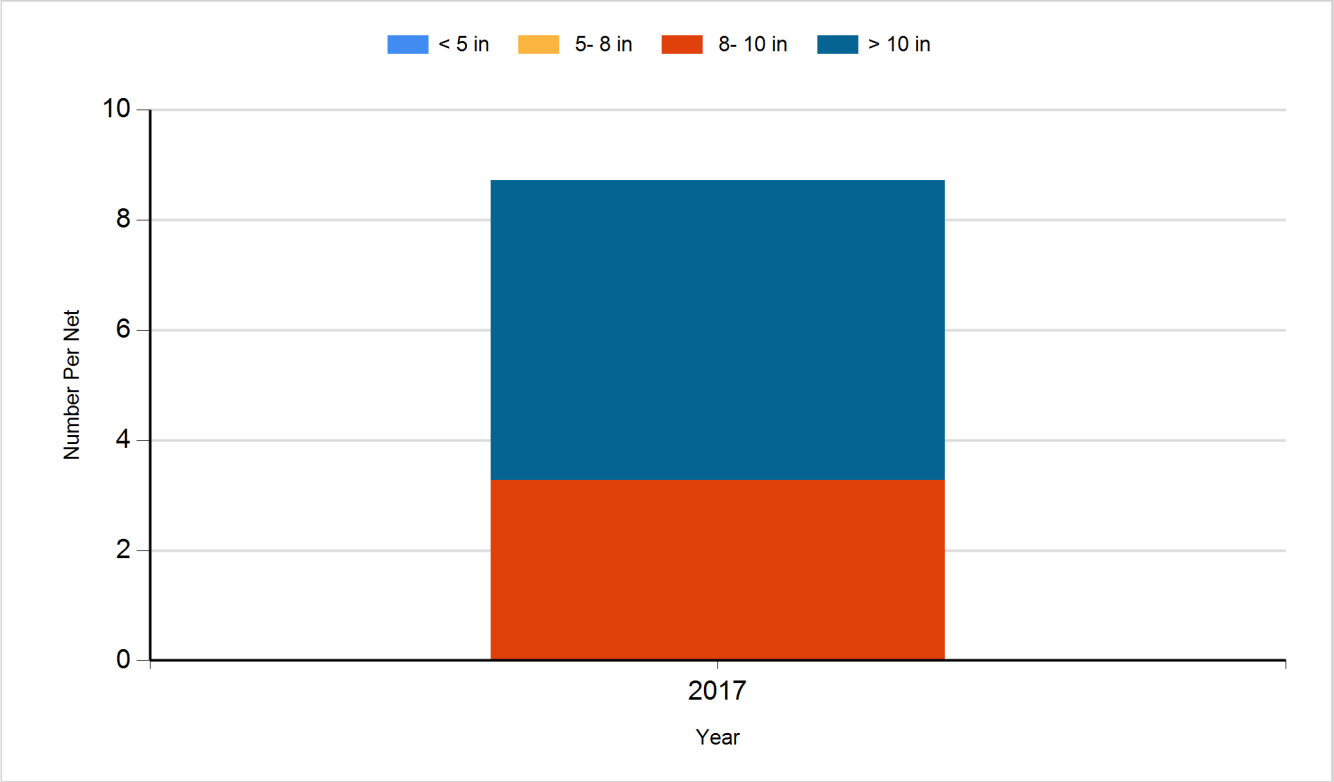


2023

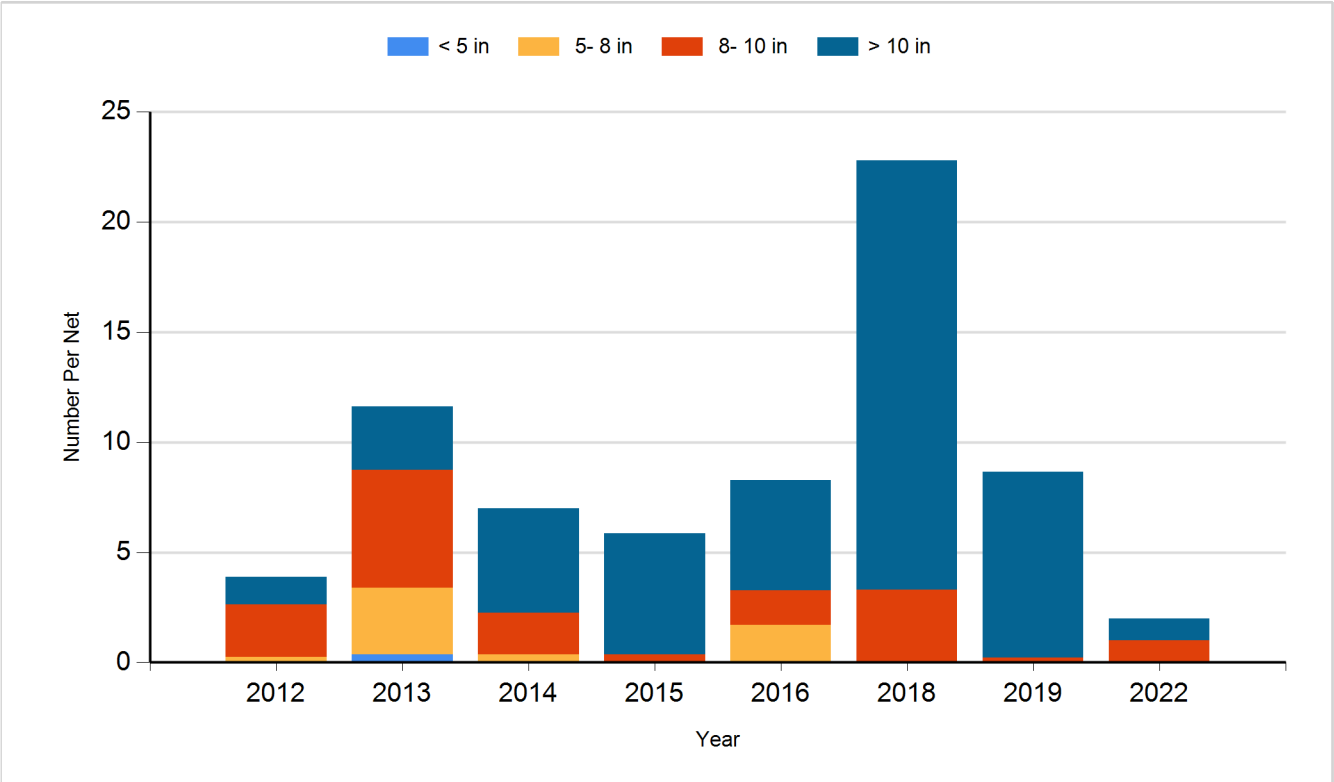
Historic Fish Sizes and Relative Abundance

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

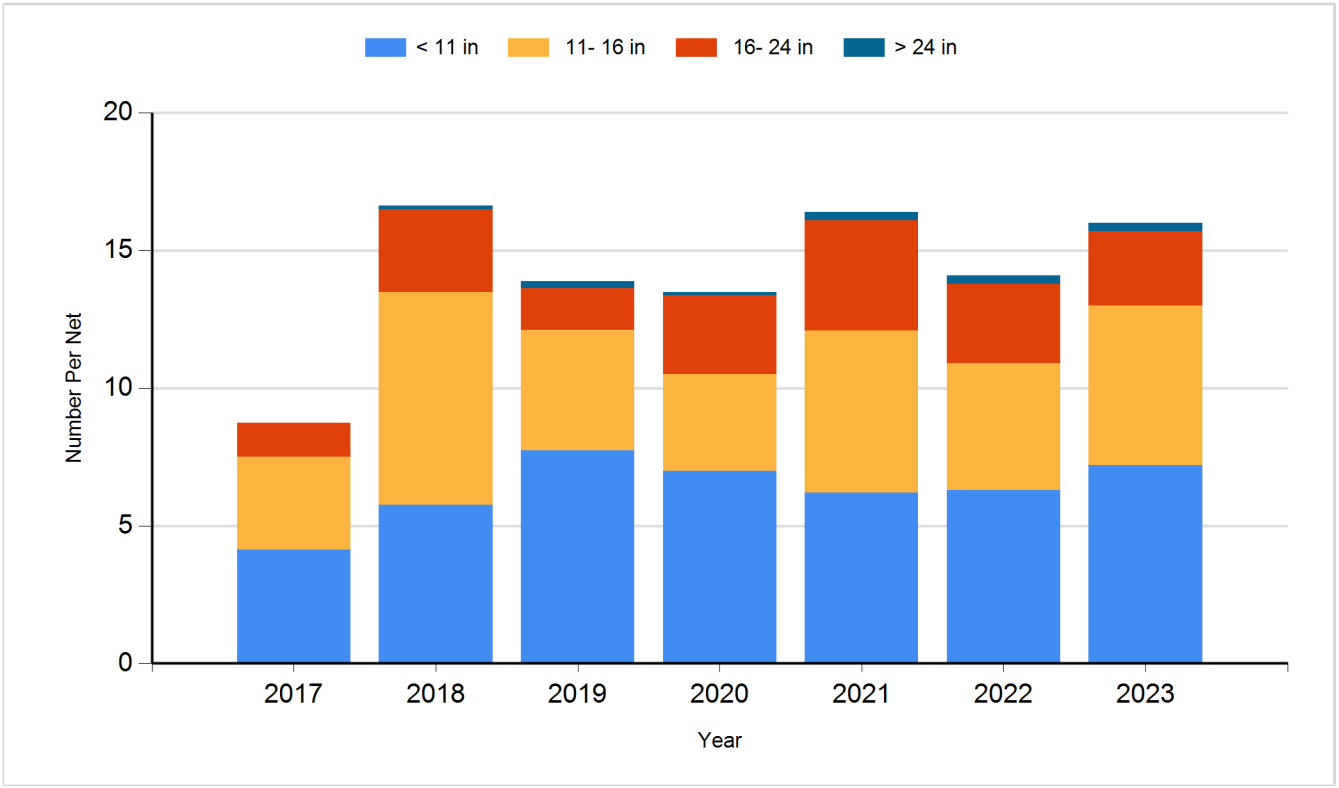
Species: Black Crappie
Gear: AFS std frame net



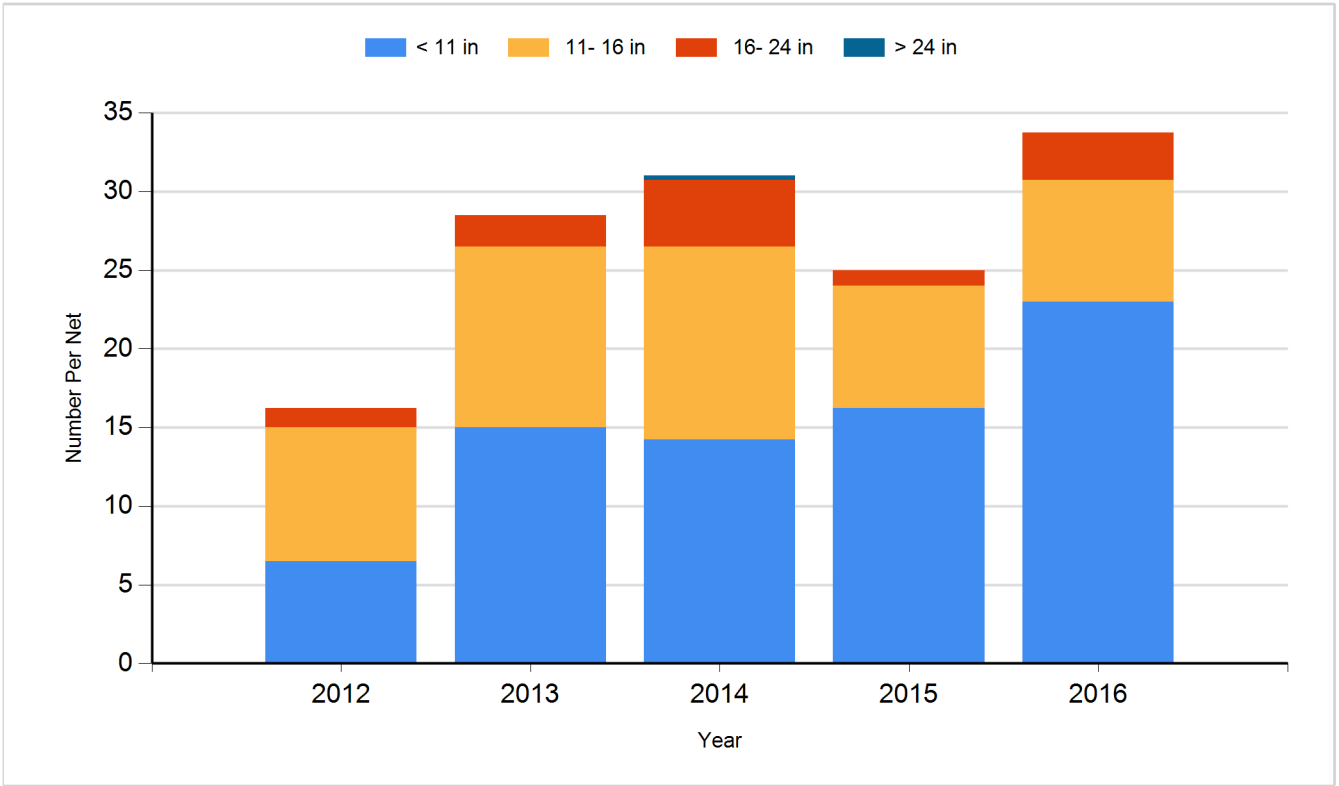
Species: Black Crappie
Gear: frame net (std 3/4 in)



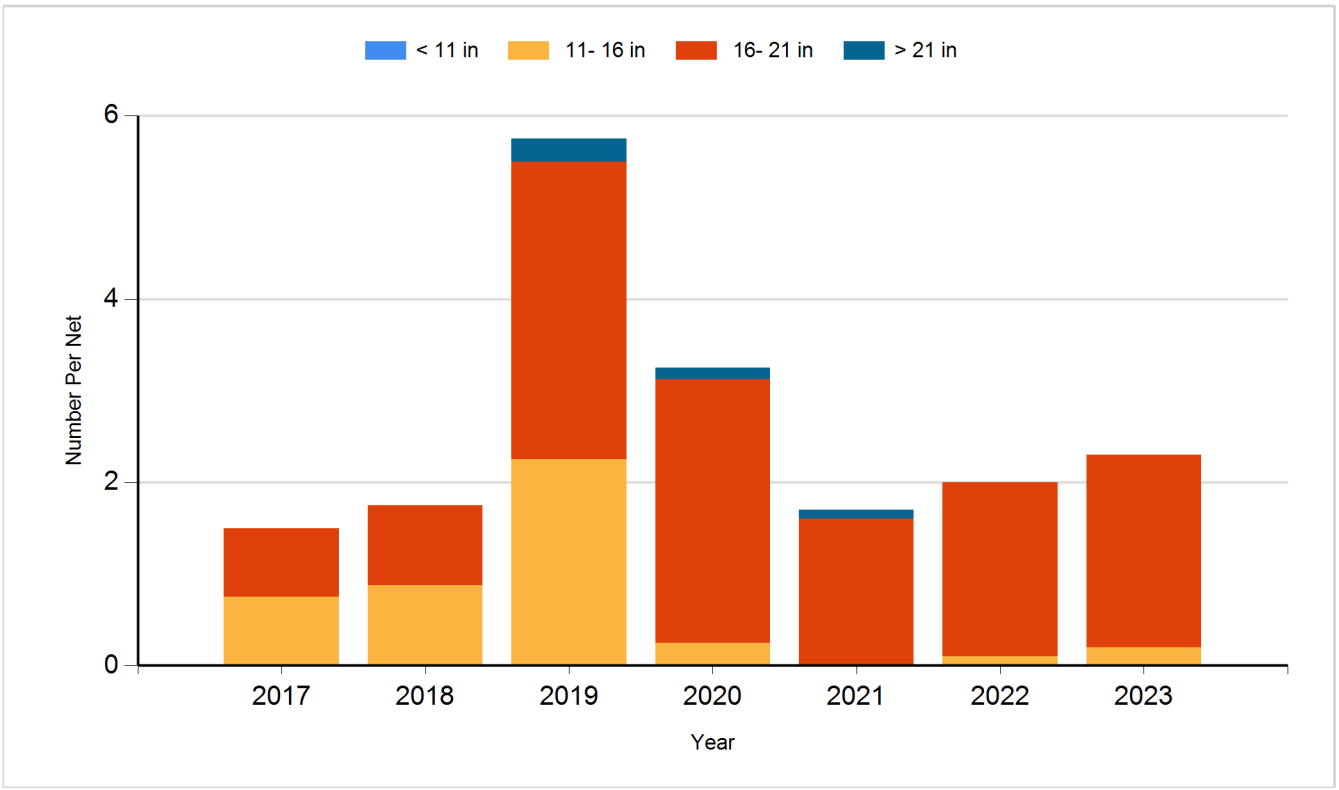
Species: Channel Catfish
Gear: AFS std gill net



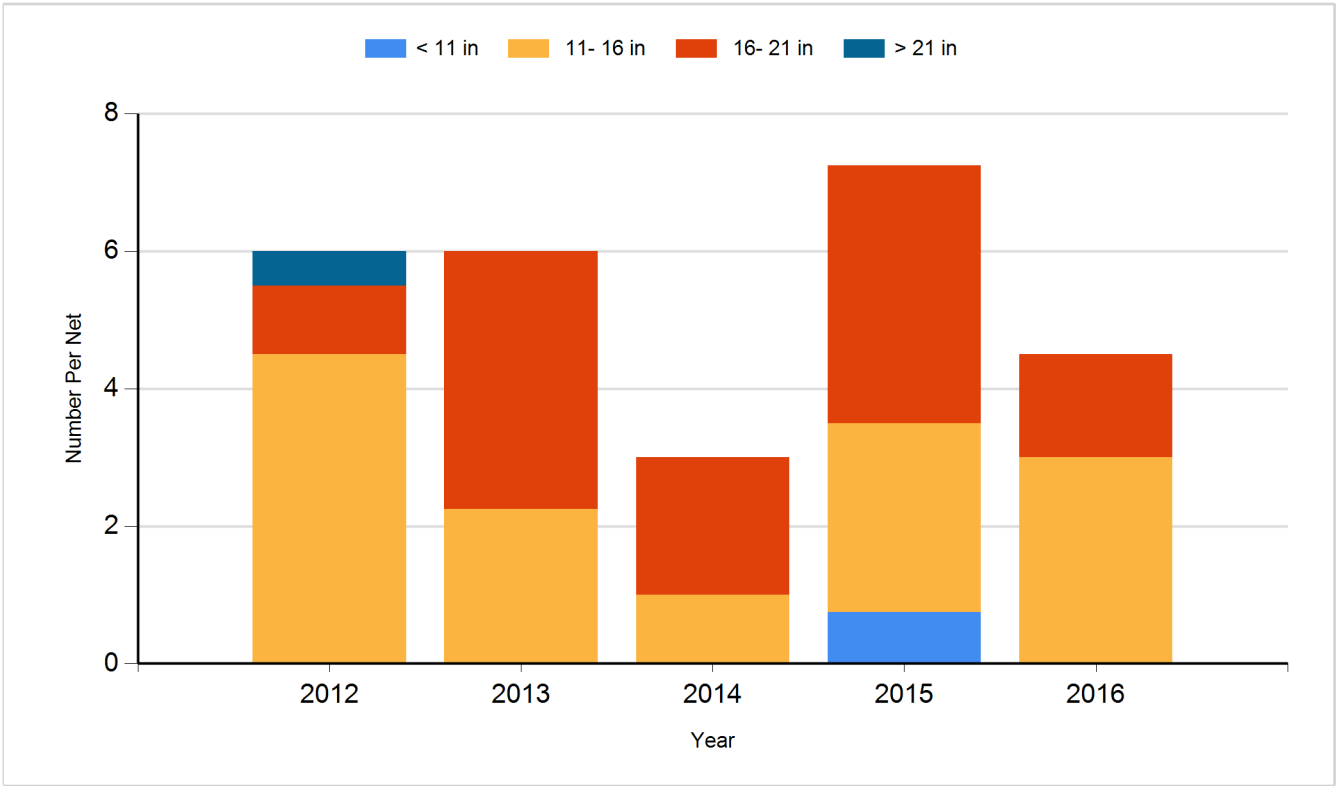
Species: Channel Catfish
Gear: std exp gill net



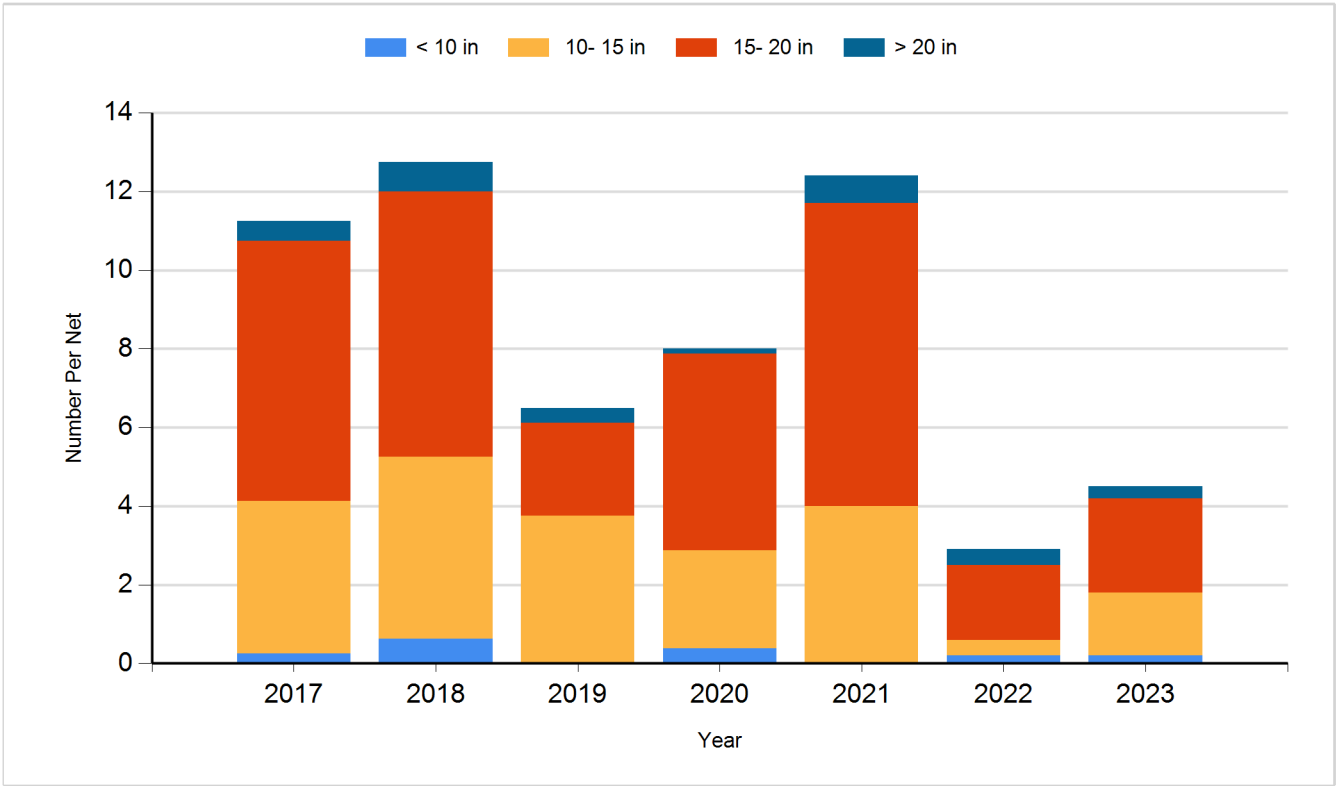
Species: Common Carp
Gear: AFS std gill net



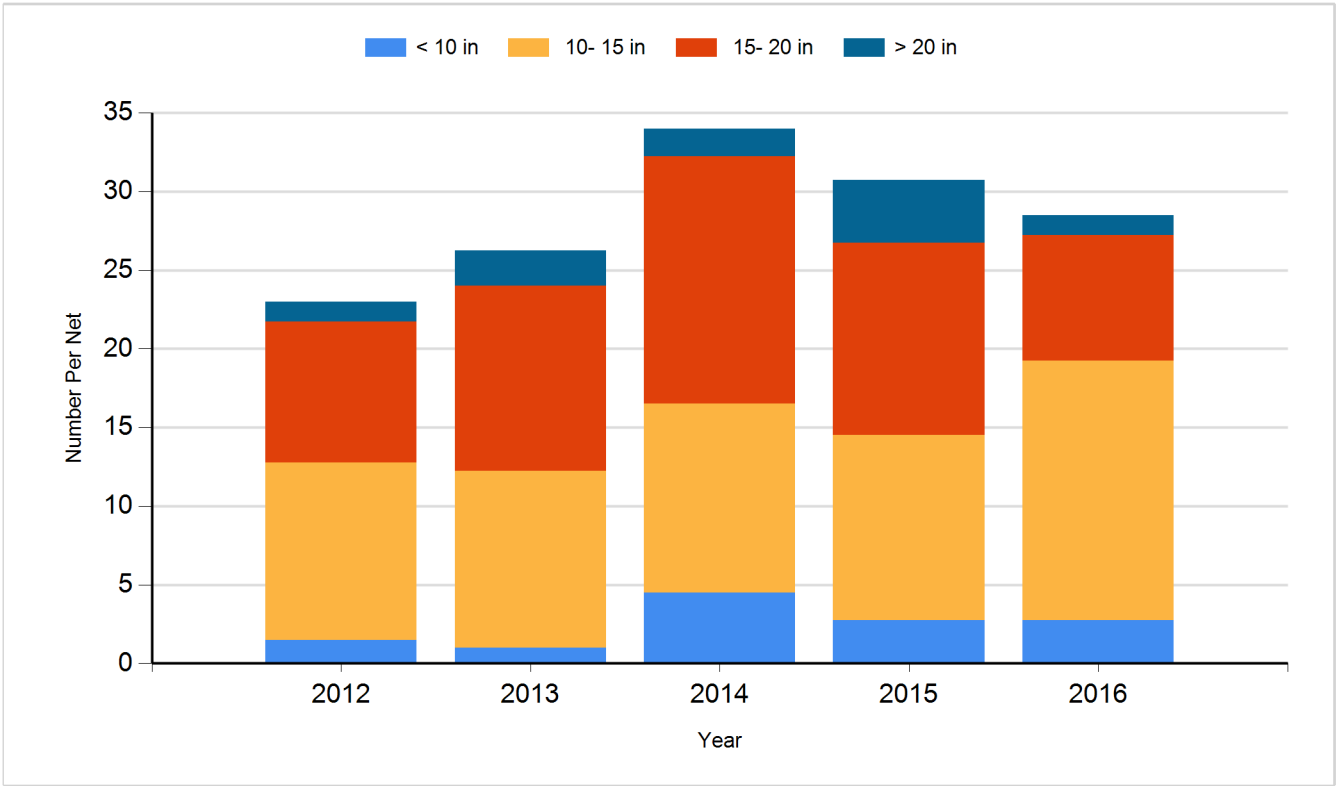
Species: Common Carp
Gear: std exp gill net



Species: Walleye
Gear: AFS std gill net



Species: Walleye
Gear: std exp gill net



Fish Stocking

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

Year	Species	Size	Number
2012	Walleye	Fingerling	476,423
2014	Walleye	Fingerling	549,725
2015	Walleye	Fry	4,702,776
2016	Walleye	Fry	4,809,475
2017	Walleye	Fry	4,609,032
2018	Walleye	Fry	5,000,000
2019	Walleye	Fry	5,422,140
2021	Walleye	Fry	5,503,520
2022	Walleye	Fry	4,750,000
2023	Walleye	Fry	5,000,000
2023	Yellow Perch	Adult	8,500