

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Belle Fourche Reservoir, Butte County
LBF-Lake-768-000
2022

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 16, 2022	10 net-nights
rod and reel	May 10, 2022	7200 minutes

Common Fish Species Present

Walleye

Channel Catfish

Black Crappie

Gizzard Shad

White Crappie

White Bass

Yellow Perch

Freshwater Drum

Common Carp

Shorthead Redhorse

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	Channel Catfish	7	0.7	0.3	71		57		92	5
	Common Carp	22	2.2	0.7	100		18		86	2
	Freshwater Drum	30	3.0	0.9	100		47	14	95	4
	Gizzard Shad	10	0.0	0.0	0					
	River Carpsucker	2	0.2	0.2	100		100		103	5
	Shorthead Redhorse	4	0.4	0.2	100		100		92	3
	Walleye	29	2.8	1.2	68	14	0		79	1
	White Bass	52	5.2	3.4	100		100		83	2
	Yellow Perch	39	3.9	1.7	69	11	18	10	90	1
rod and reel	Channel Catfish	1	0.0		100		100			
	Largemouth Bass	4	0.0		75		0		90	2

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	
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
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	0.05
	Channel Catfish					4.1	2.6	0.3	1.6	2.1	0.7		1.90
	Common Carp					0.6	0.7	1.6	2.2	2.2	2.2		1.58
	Freshwater Drum					1.0	1.4	0.7	0.9	0.4	3.0		1.23
	Gizzard Shad					0.2	0.9	0.4	0.0	0.0	0.0		0.25
	Northern Pike					0.0	0.1	0.1	0.3	0.2	0.0		0.12
	River Carpsucker					0.6	0.3	0.7	0.2	0.2	0.2		0.37
	Shorthead Redhorse					0.8	0.3	2.4	0.4	0.2	0.4		0.75
	Smallmouth Bass					0.2	0.2	0.2	0.0	0.6	0.0		0.20
	Spottail Shiner					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		6.87
	White Bass					1.3	2.9	6.3	6.7	5.0	5.2		4.57
	White Crappie					0.2	0.0	0.0	0.0	0.1	0.0		0.05
Yellow Perch					1.3	1.7	0.3	1.9	2.4	3.9		1.92	
frame net (std 3/4 in)	Black Bullhead	0.0	0.0	0.0									0.00
	Black Crappie	1.0	0.8	0.0									0.60
	Channel Catfish	0.1	0.1	0.1									0.10
	Common Carp	1.4	6.1	1.3									2.93
	Freshwater Drum	0.0	0.0	0.0									0.00
	Gizzard Shad	0.2	0.3	0.0									0.17
	Green Sunfish	0.0	0.3	0.0									0.10
	Rainbow Trout	0.0	0.1	0.0									0.03
	River Carpsucker	0.6	0.4	0.0									0.33
	Rudd	0.1	0.1	0.0									0.07
	Shorthead Redhorse	0.2	0.1	0.0									0.10
	Smallmouth Bass	0.0	0.1	0.0									0.03
	Walleye	1.3	2.0	1.5									1.60
White Bass	1.7	11.0	1.8									4.83	

CPUE

Gear	Species	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Avg
frame net (std 3/4 in)	White Crappie	19.8	16.9	15.0								17.23
	Yellow Perch	0.0	0.4	0.1								0.17
rod and reel	Channel Catfish										0.0	0.00
	Largemouth Bass										0.0	0.00
std exp gill net	Black Crappie	0.0	0.0	0.0	0.5							0.13
	Channel Catfish	3.8	1.8	3.3	4.0							3.23
	Common Carp	1.4	0.3	0.7	1.0							0.85
	Freshwater Drum	1.4	2.0	0.2	0.3							0.98
	Gizzard Shad	0.4	0.7	0.0	0.3							0.35
	Northern Pike	0.0	0.0	0.0	0.0							0.00
	River Carpsucker	0.6	0.7	0.0	0.8							0.53
	Shorthead Redhorse	3.0	0.8	0.7	0.5							1.25
	Smallmouth Bass	1.2	0.7	0.8	0.0							0.68
	Spottail Shiner	0.0	0.0	0.0	0.0							0.00
	Walleye	24.6	8.5	20.3	23.0							19.10
	White Bass	3.4	3.5	6.7	5.8							4.85
	White Crappie	0.0	0.0	0.0	0.2							0.05
	White Sucker	0.0	0.2	0.0	0.0							0.05
	Yellow Perch	3.4	3.2	9.5	14.8							7.73

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											
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
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		
		PSD-P					30	31	100	81	62	57		
		Wr					86	92	93	91	89	92		
	Common Carp	PSD					100	100	100	95	91	100		
		PSD-P					0	0	14	27	9	18		
		Wr					93	87	84	85	80	86		
	Gizzard Shad	PSD					100	100	100	0	0	0		
		Wr					106	99	96					
	Shorthead Redhorse	PSD					100	100	100	100	100	100		
		PSD-P					86	33	82	100	50	100		
		Wr					99	96	104	101	95	92		
	Walleye	PSD					56	55	53	74	81	68		
		PSD-P					0	0	0	0	3	0		
		Wr					83	81	78	78	76	79		
	White Bass	PSD					100	100	98	100	100	100		
		PSD-P					100	100	95	97	100	100		
		Wr					94	95	86	84	87	83		
	White Crappie	PSD					100					100		
PSD-P						100					100			
Wr						104					94			
Yellow Perch	PSD					67	59	67	11	83	69			
	PSD-P					17	12	0	5	25	18			
	Wr					91	96	94	92	90	90			
frame net (std 3/4 in)	Black Crappie	PSD	100	100										
		PSD-P	80	83										
		Wr	90	98										
	Channel Catfish	PSD	100	100	100									
		PSD-P	0	0	0									
		Wr	81	89	80									
	Common Carp	PSD	100	100	100									

Gear	Species	Index	Year									
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
frame net (std 3/4 in)	Common Carp	PSD-P	50	33	50							
		Wr	88	80	87							
	Gizzard Shad	PSD	100	100								
		Wr	116	86								
	Shorthead Redhorse	PSD	100	100								
		PSD-P	100	100								
		Wr	85	83								
	Walleye	PSD	100	100	100							
		PSD-P	31	63	58							
		Wr	74	74	70							
	White Bass	PSD	100	99	100							
		PSD-P	100	99	57							
		Wr	87	96	96							
	White Crappie	PSD	100	100	100							
		PSD-P	99	100	100							
		Wr	93	98	98							
	Yellow Perch	PSD		67	100							
		PSD-P		67	0							
		Wr		67	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	84	100	90	96						
		PSD-P	5	36	40	29						
		Wr	90	89	96	87						
	Common Carp	PSD	100	50	25	67						
		PSD-P	29	0	0	0						
		Wr	84	84	95	80						
	Gizzard Shad	PSD	100	100		100						
		Wr	117	96		102						
	Shorthead Redhorse	PSD	73	80	100	100						
		PSD-P	40	40	50	100						
		Wr	100	102	101							
	Walleye	PSD	44	76	18	20						

Gear	Species	Index	Year									
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
std exp gill net	Walleye	PSD-P	1	10	1	0						
		Wr	85	81	84	81						
	White Bass	PSD	100	81	100	100						
		PSD-P	82	52	100	100						
	White Crappie	Wr	101	96	103	94						
		PSD				100						
		PSD-P				100						
	Yellow Perch	Wr				91						
		PSD	76	58	16	29						
		PSD-P	6	5	2	1						
		Wr	97	86	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)	
2014	196	217 (102)	331 (8)	390 (36)	413 (4)	466 (17)	476 (11)	538 (6)	513 (4)		482 (9)
2013	242	201 (2)	290 (75)	355 (20)	381 (63)	402 (39)	446 (8)	465 (24)	424 (2)		461 (10)

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).

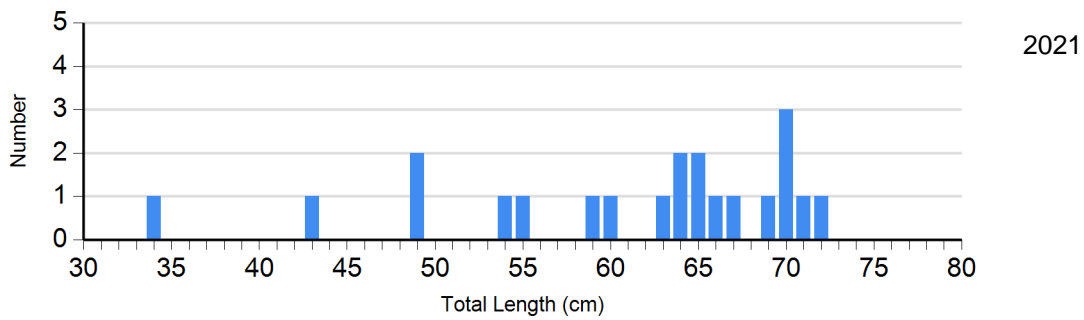
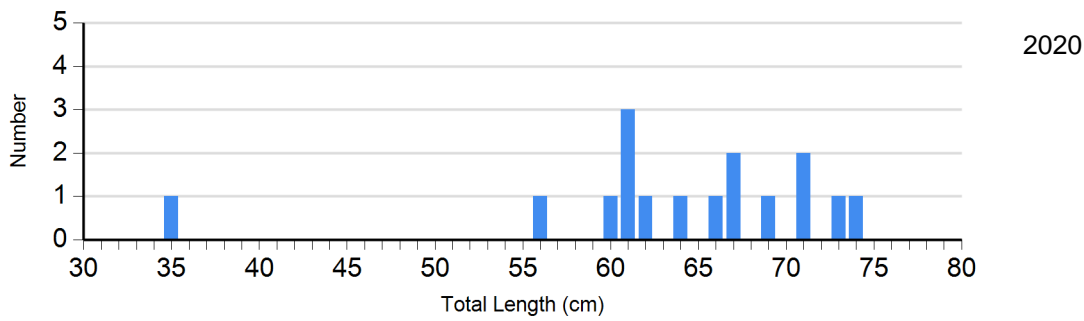
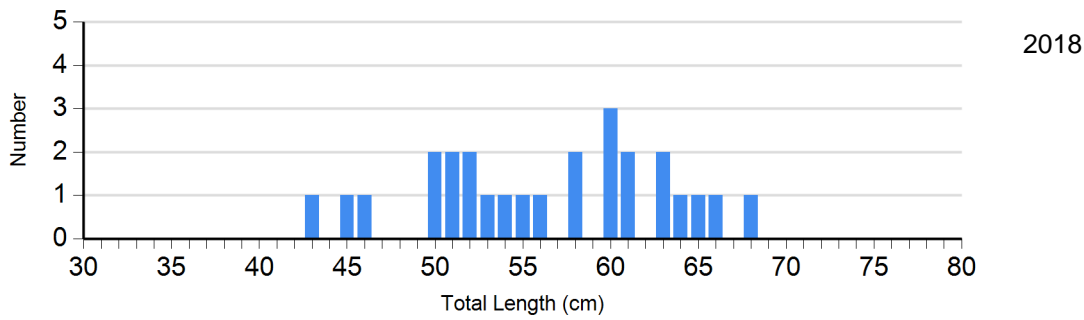
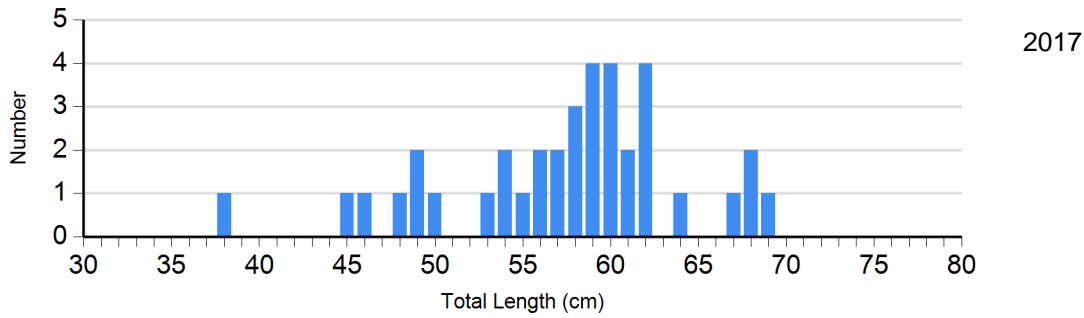
Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Channel Catfish Gill Net	2018	0		18	91 (1.7)	8	95 (1.5)	0	
	2019	0		0		3	93 (5.4)	0	
	2020	1	86	2	72 (12.3)	9	94 (2.7)	4	97 (3.3)
	2021	1	89	7	84 (1.4)	11	93 (2.3)	2	83
	2022	2	86 (6.6)	1	96	3	93 (8.6)	1	96
Common Carp Gill Net	2018	0		7	87 (2.0)	0		0	
	2019	0		12	85 (2.1)	2	81 (1.4)	0	
	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	
Walleye Gill Net	2018	41	84 (0.8)	51	79 (0.8)	0		0	
	2019	25	78 (0.7)	28	77 (0.9)	0		0	
	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	
White Bass Gill Net	2018	0		0		14	96 (1.5)	15	93 (1.4)
	2019	1	99	2	108 (3.2)	38	87 (0.7)	16	81 (1.5)
	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)
Yellow Perch Gill Net	2018	7	96 (2.8)	8	98 (2.6)	2	93 (2.3)	0	
	2019	1	100	2	90 (3.9)	0		0	

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
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	
	2022	12	90 (1.7)	20	91 (1.5)	7	90 (2.0)	0	

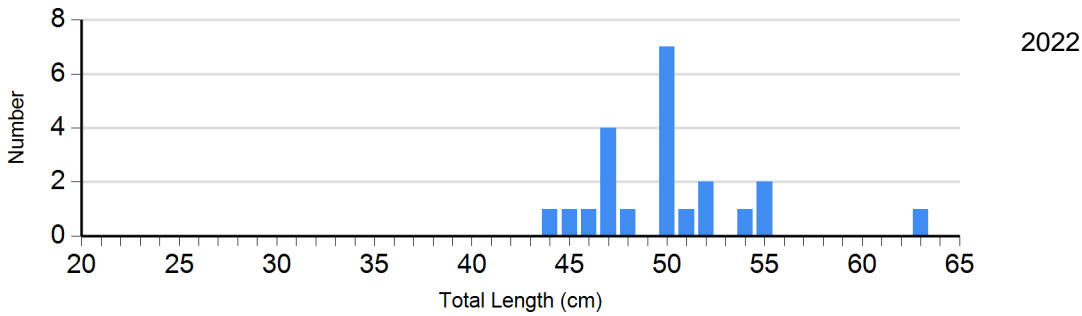
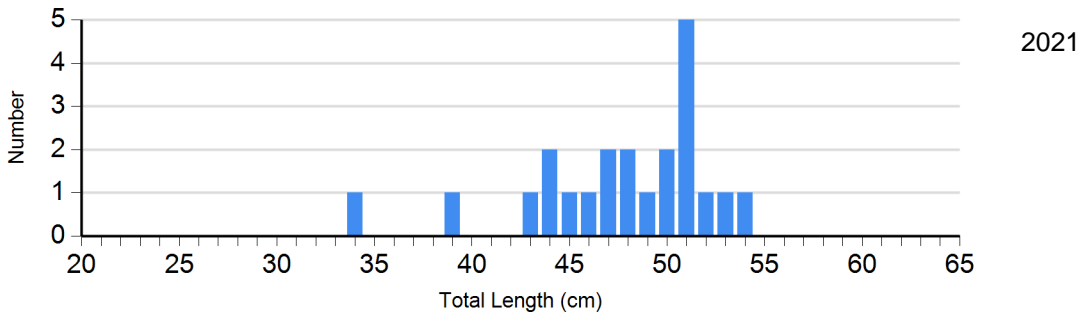
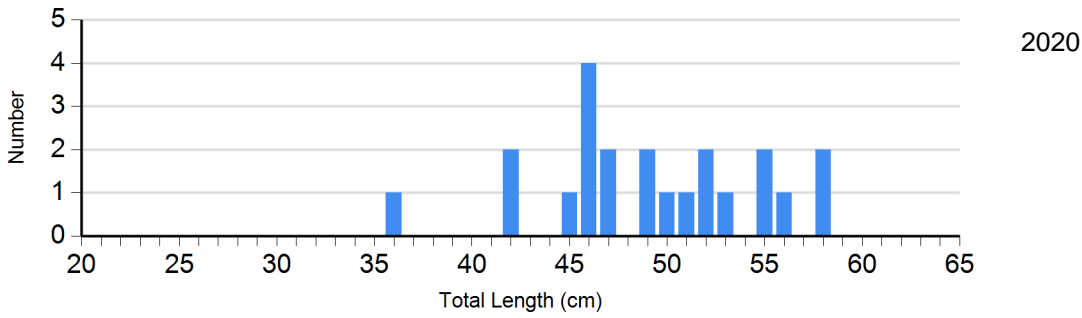
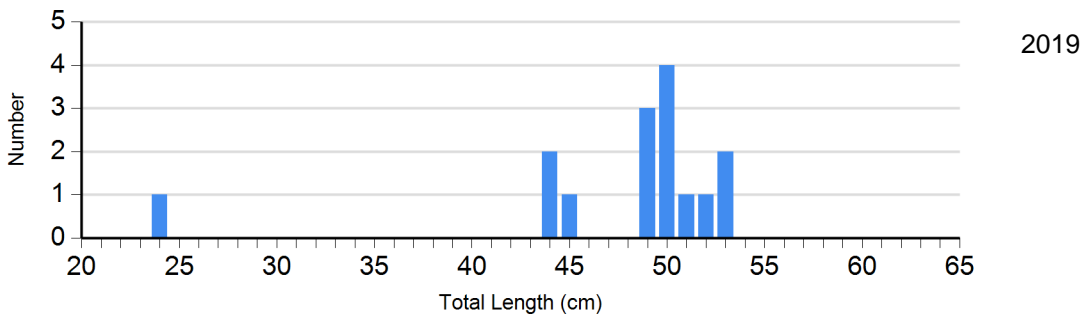
Length Frequency Distribution

Length frequency histogram of species sampled by year.

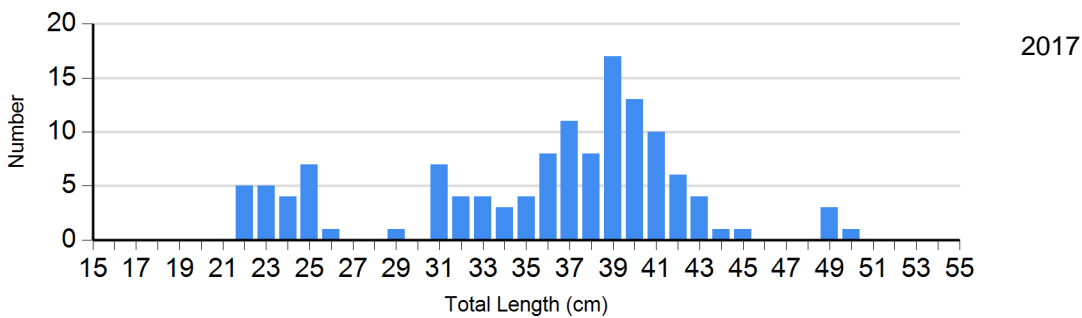
Species: Channel Catfish
Gear: AFS std gill net

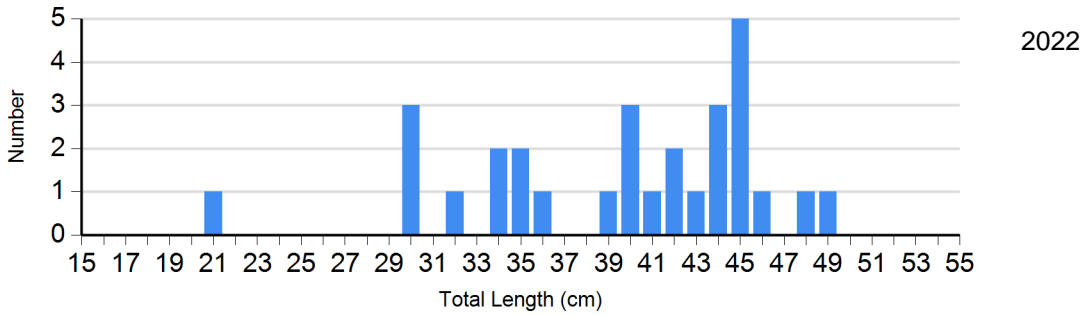
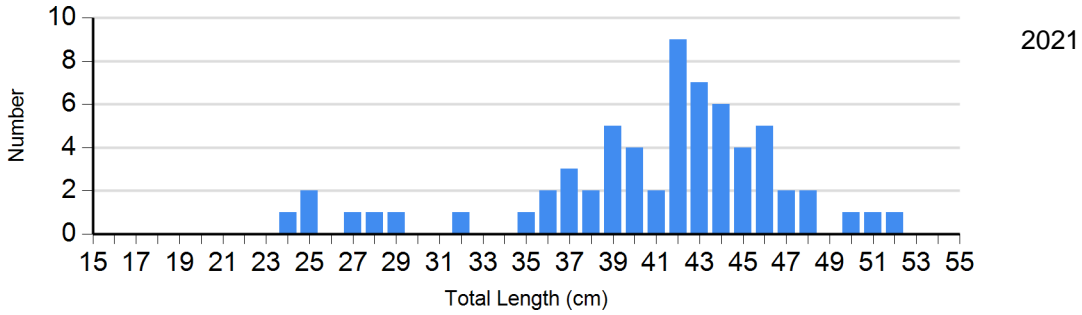
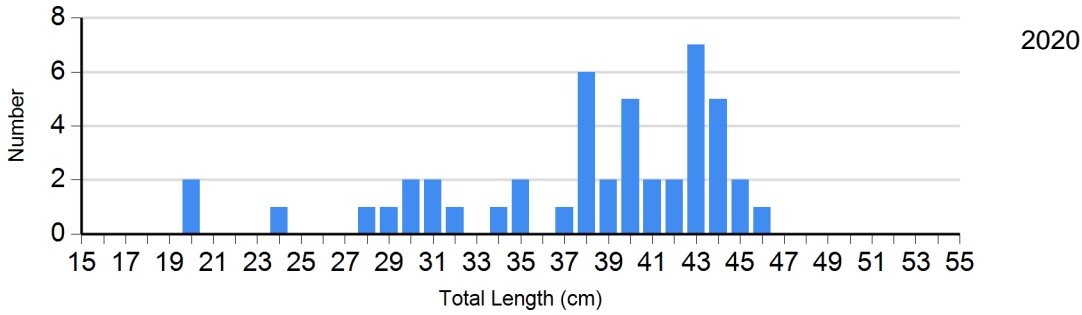
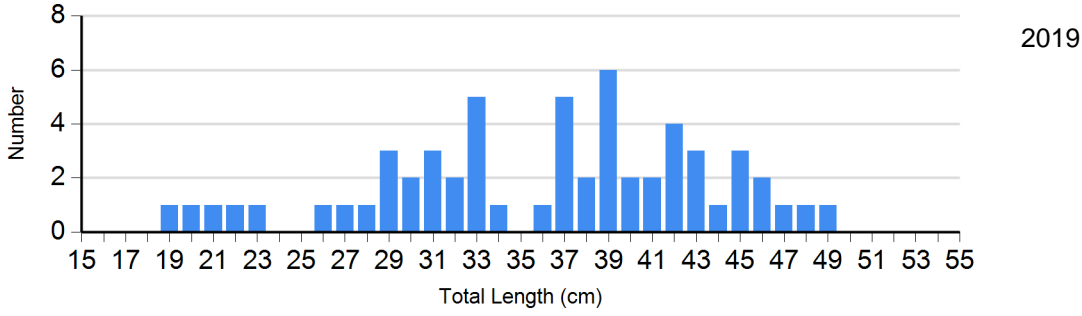
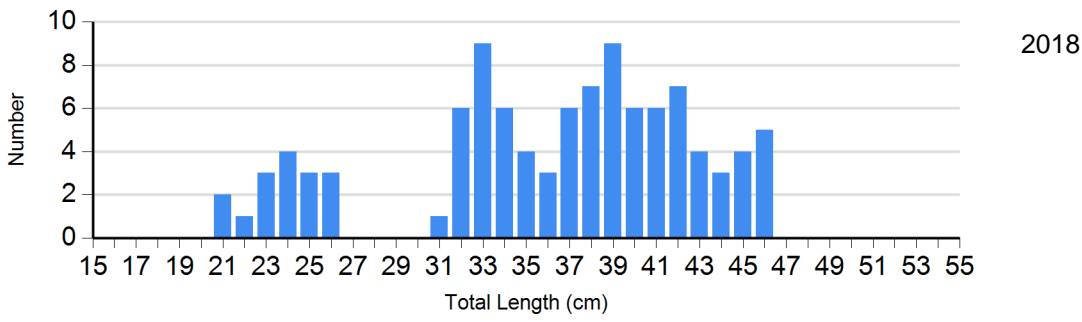


Species: Common Carp
Gear: AFS std gill net

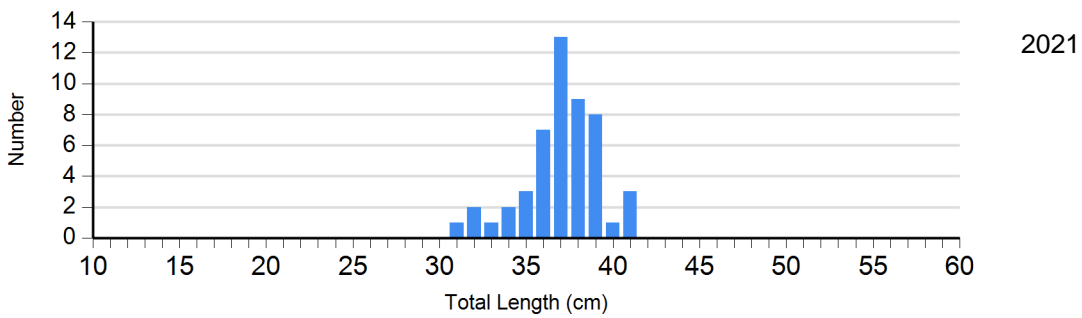
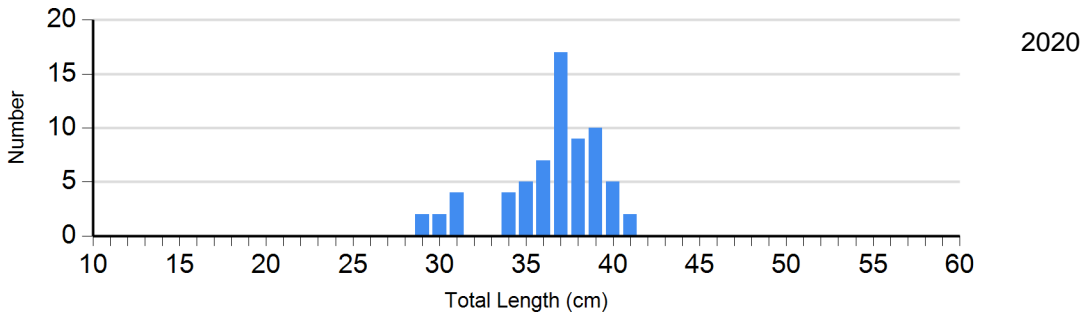
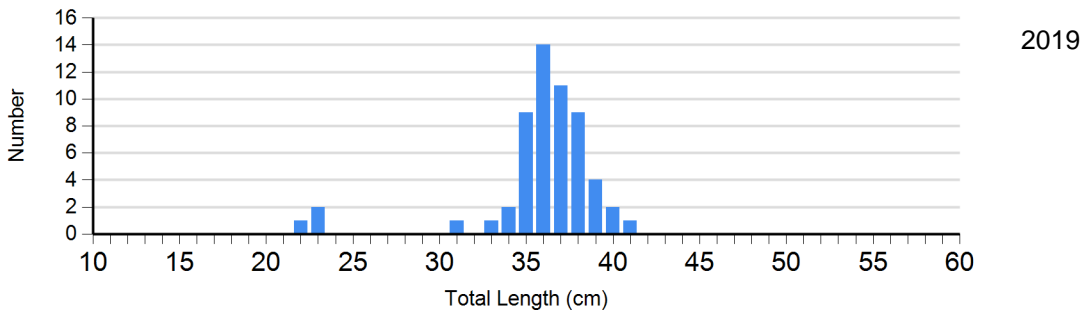
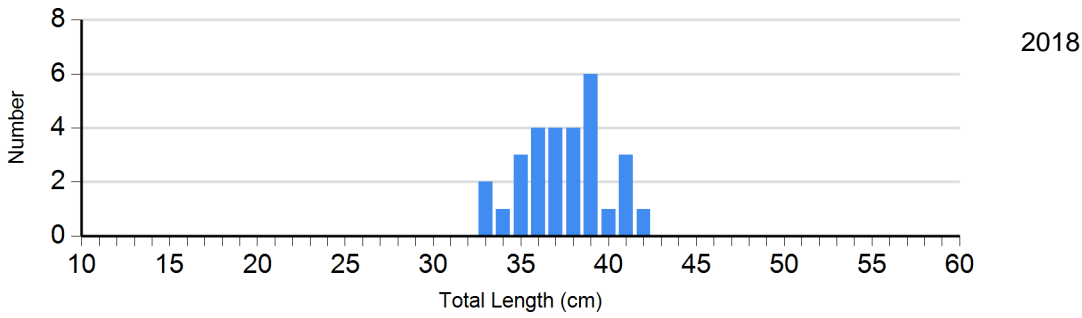
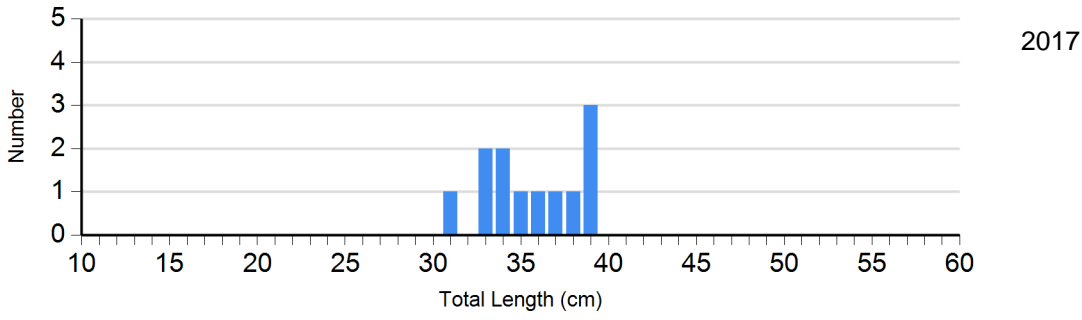


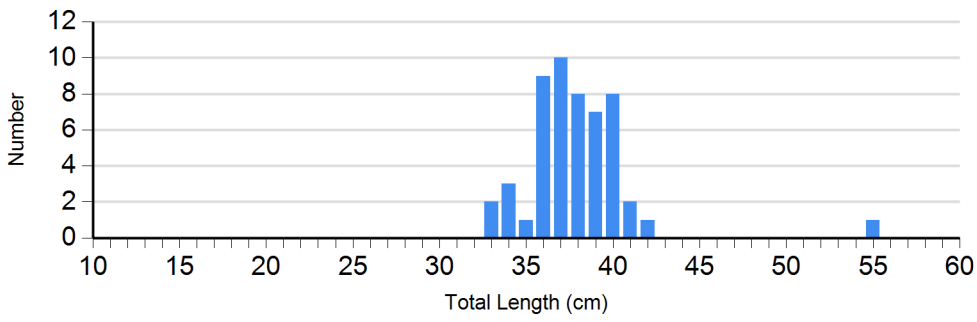
Species: Walleye
Gear: AFS std gill net



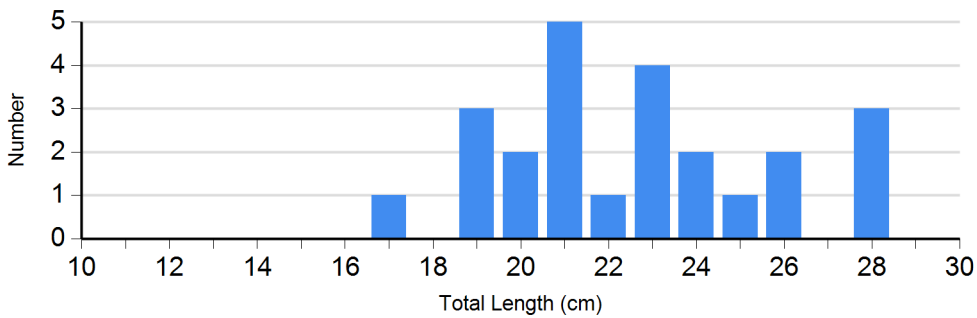
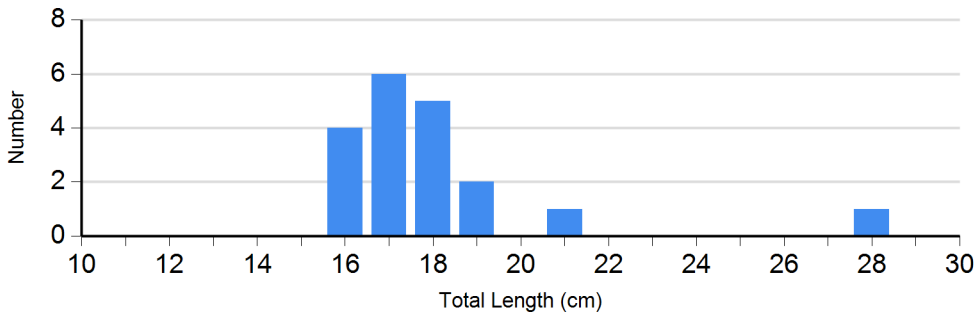
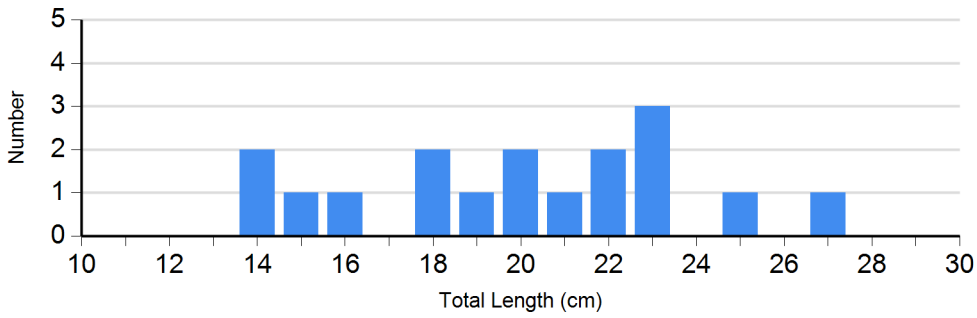
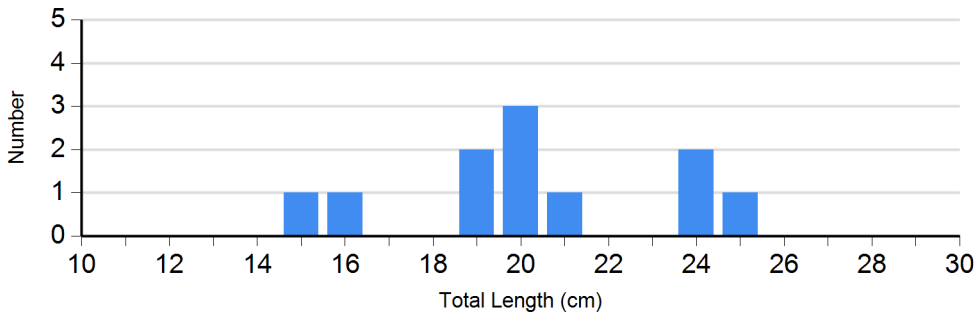


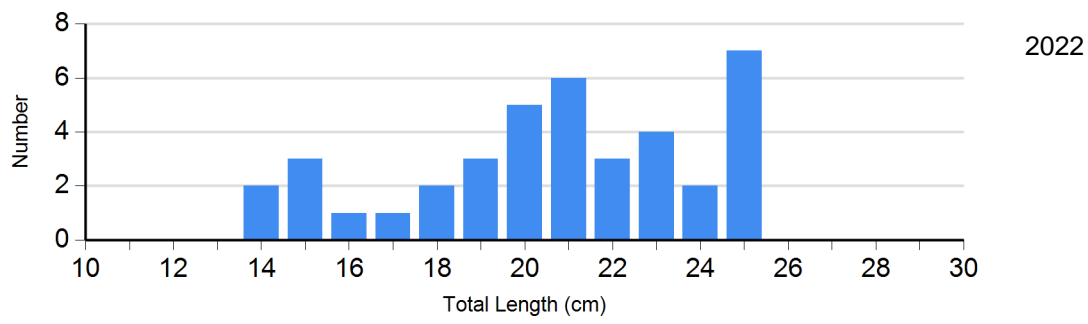
Species: White Bass
Gear: AFS std gill net





Species: Yellow Perch
Gear: AFS std gill net

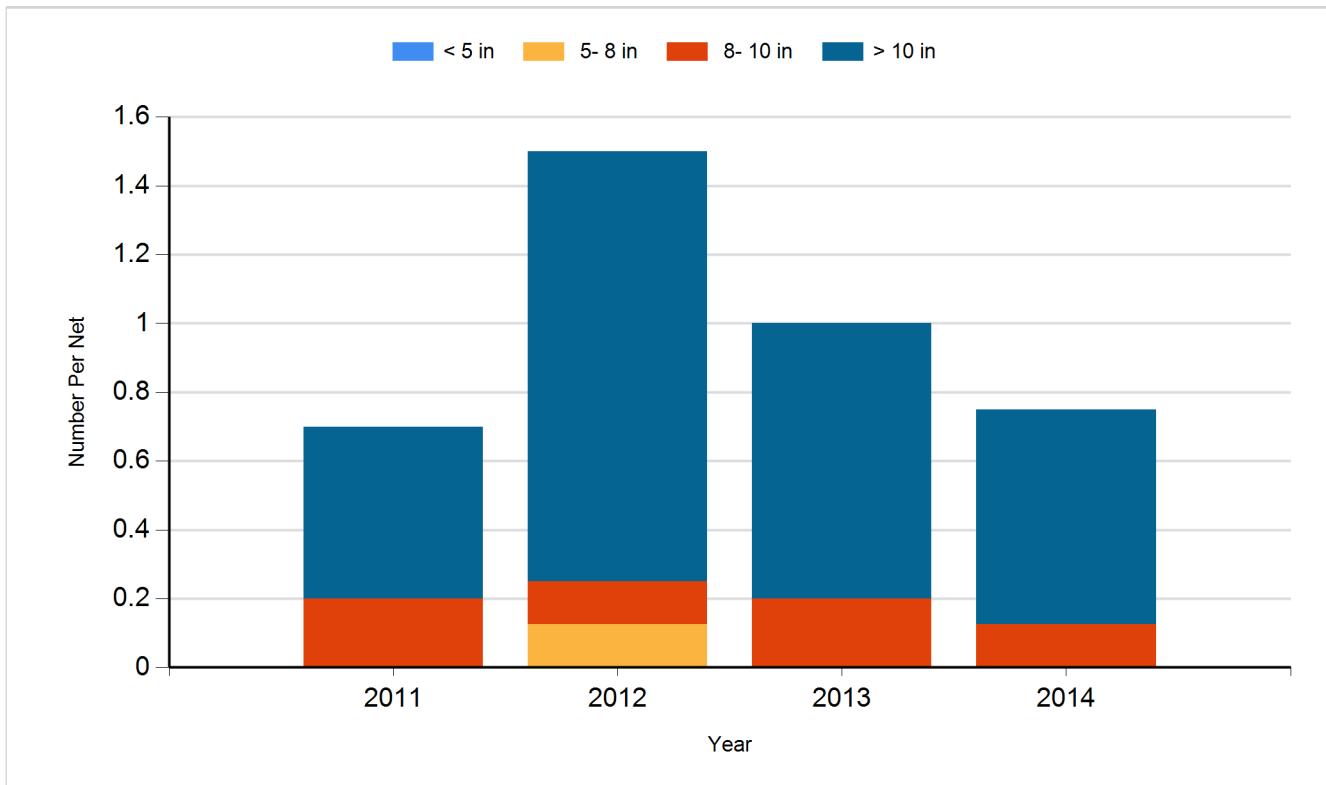




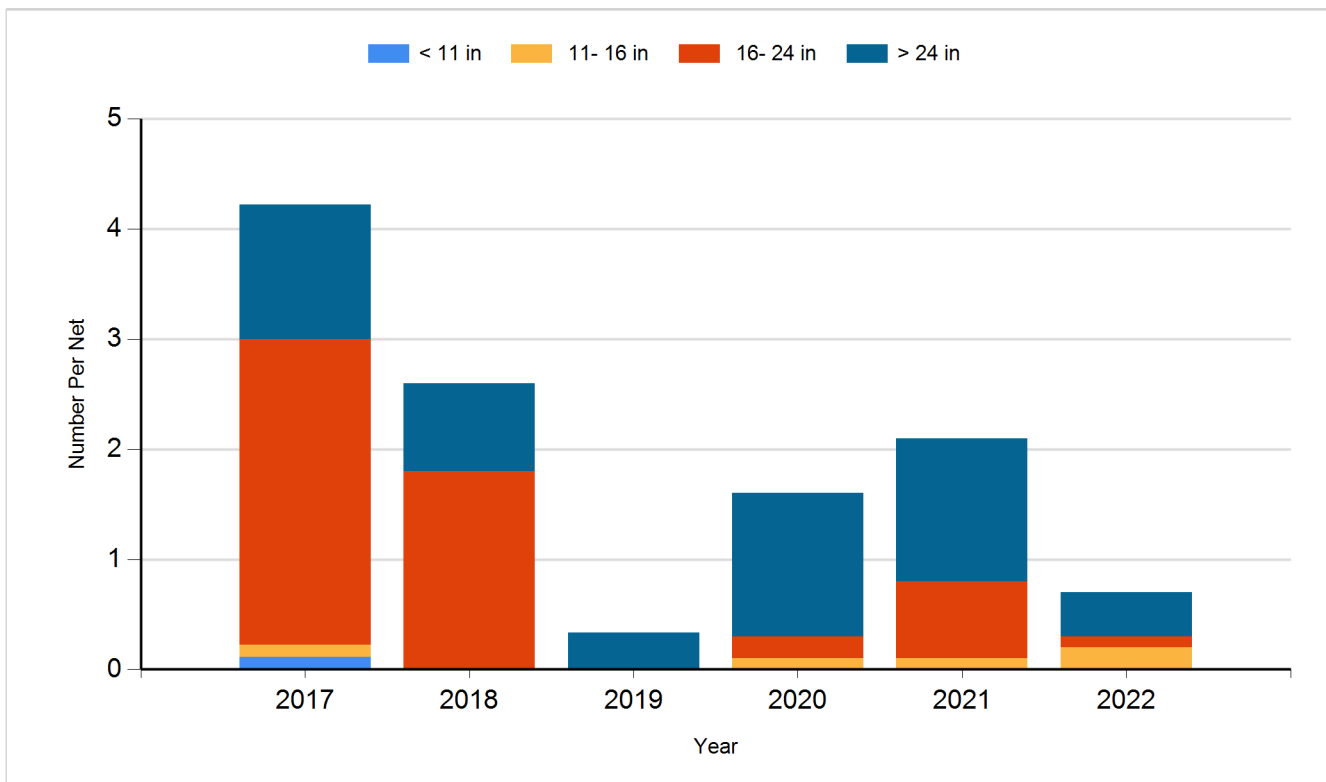
Historic Fish Sizes and Relative Abundance

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

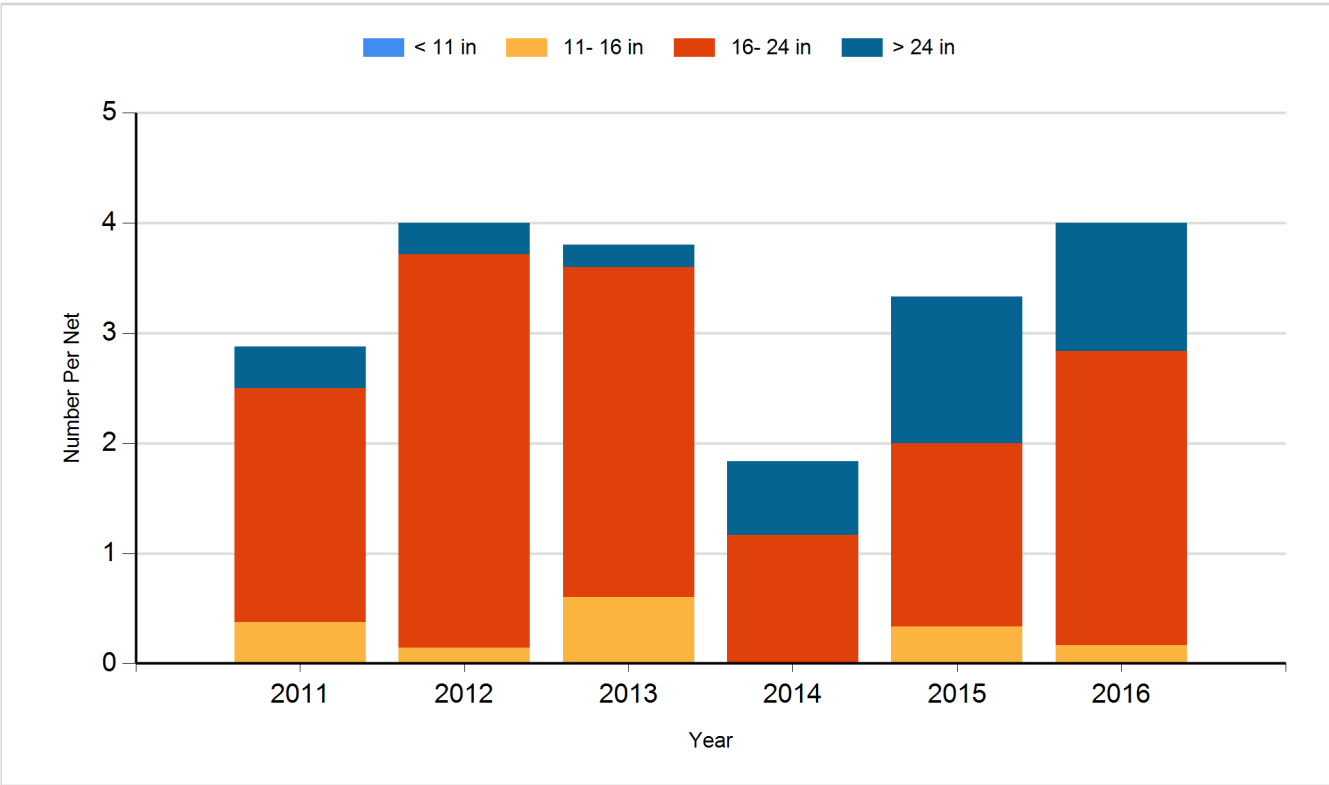
Species: Black Crappie
Gear: frame net (std 3/4 in)



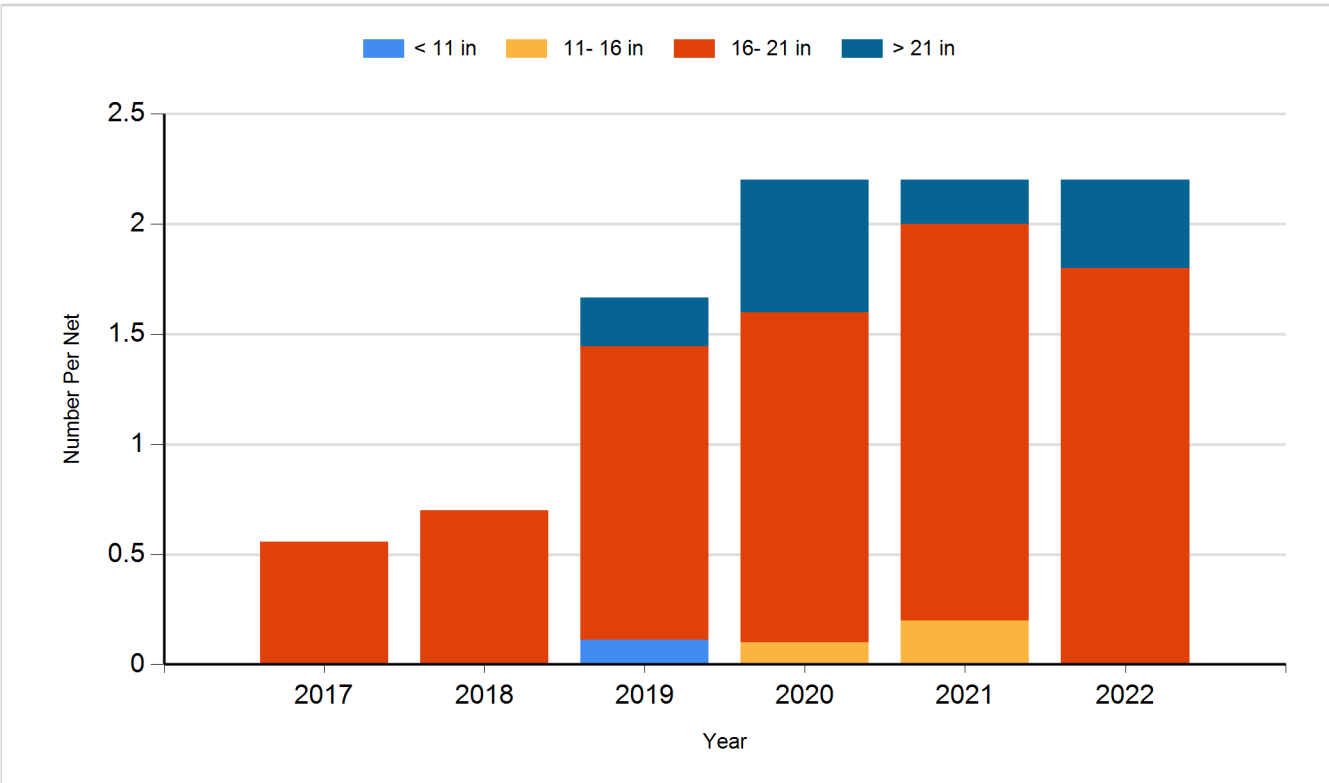
Species: Channel Catfish
Gear: AFS std gill net



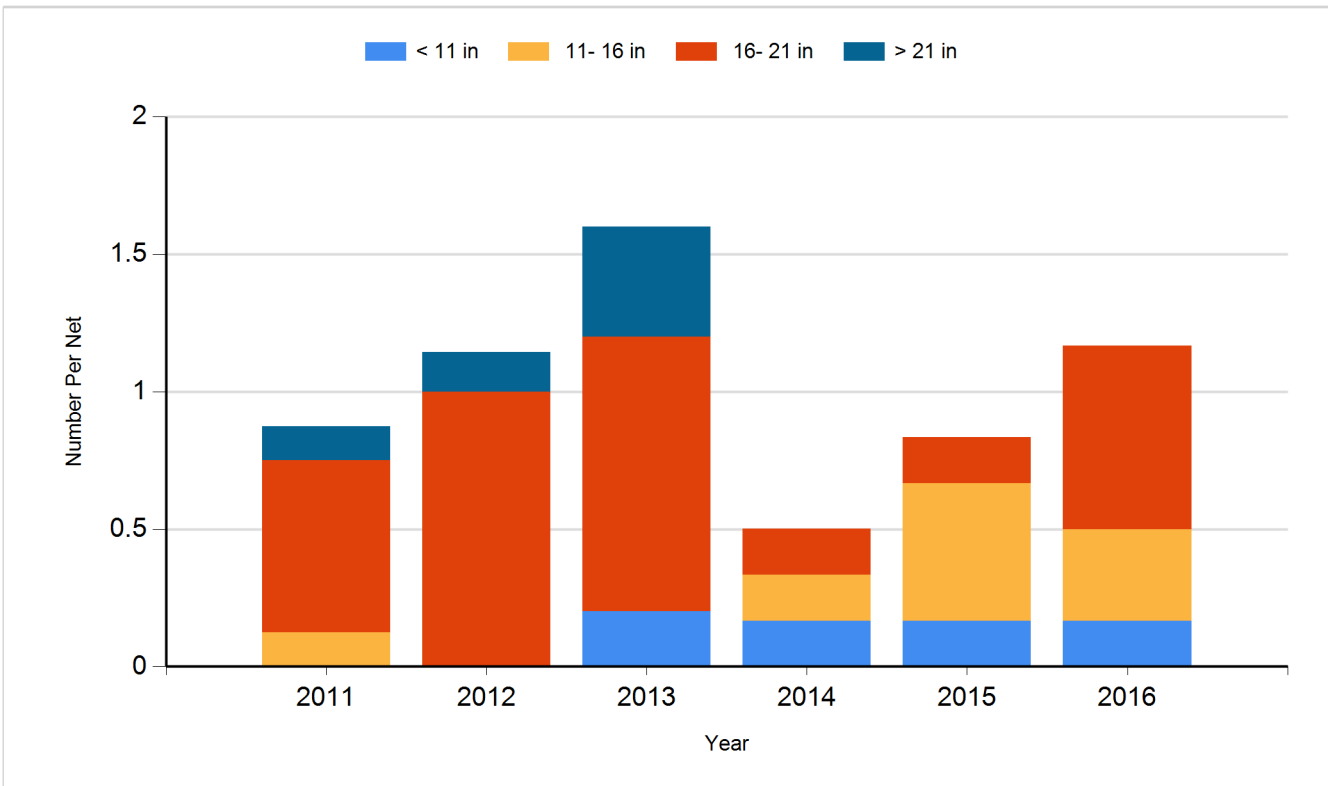
Species: Channel Catfish
Gear: std exp gill net



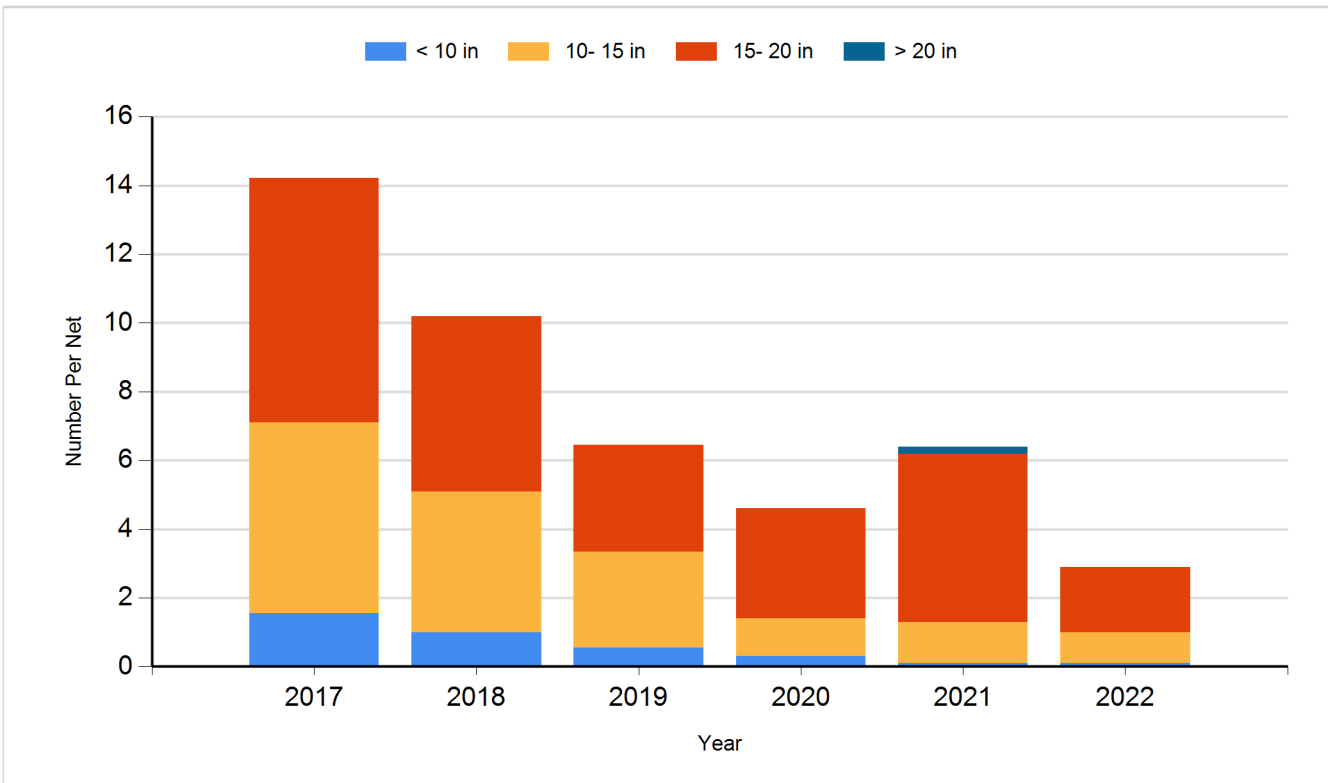
Species: Common Carp
Gear: AFS std gill net



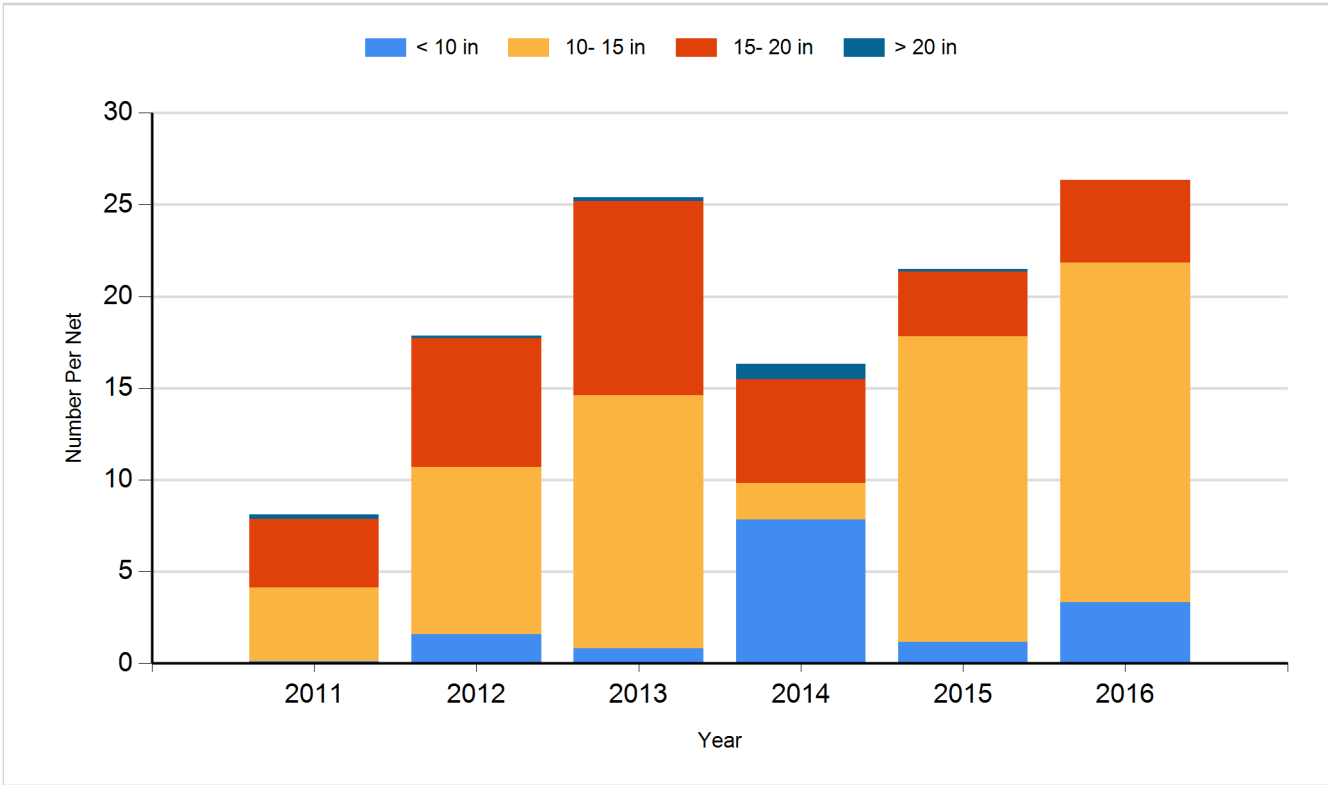
Species: Common Carp
Gear: std exp gill net



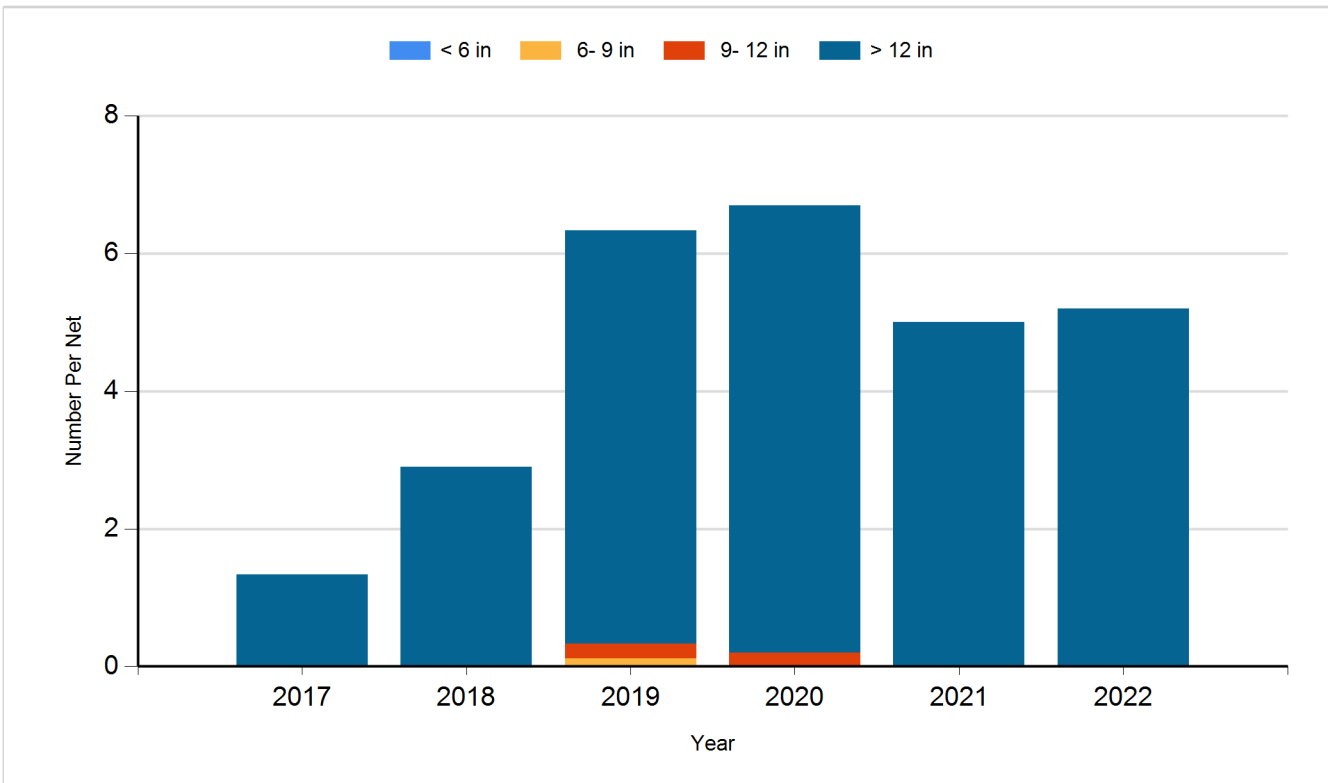
Species: Walleye
Gear: AFS std gill net



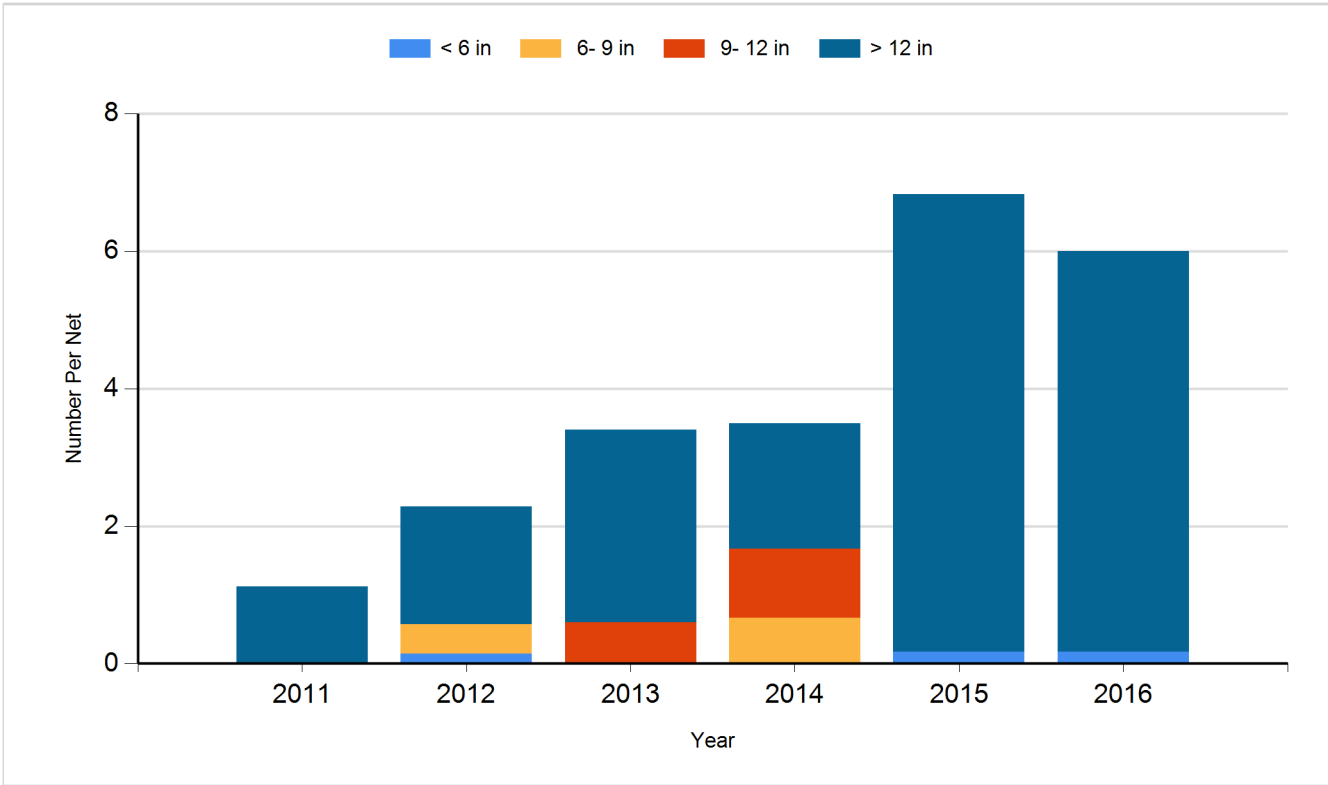
Species: Walleye
Gear: std exp gill net



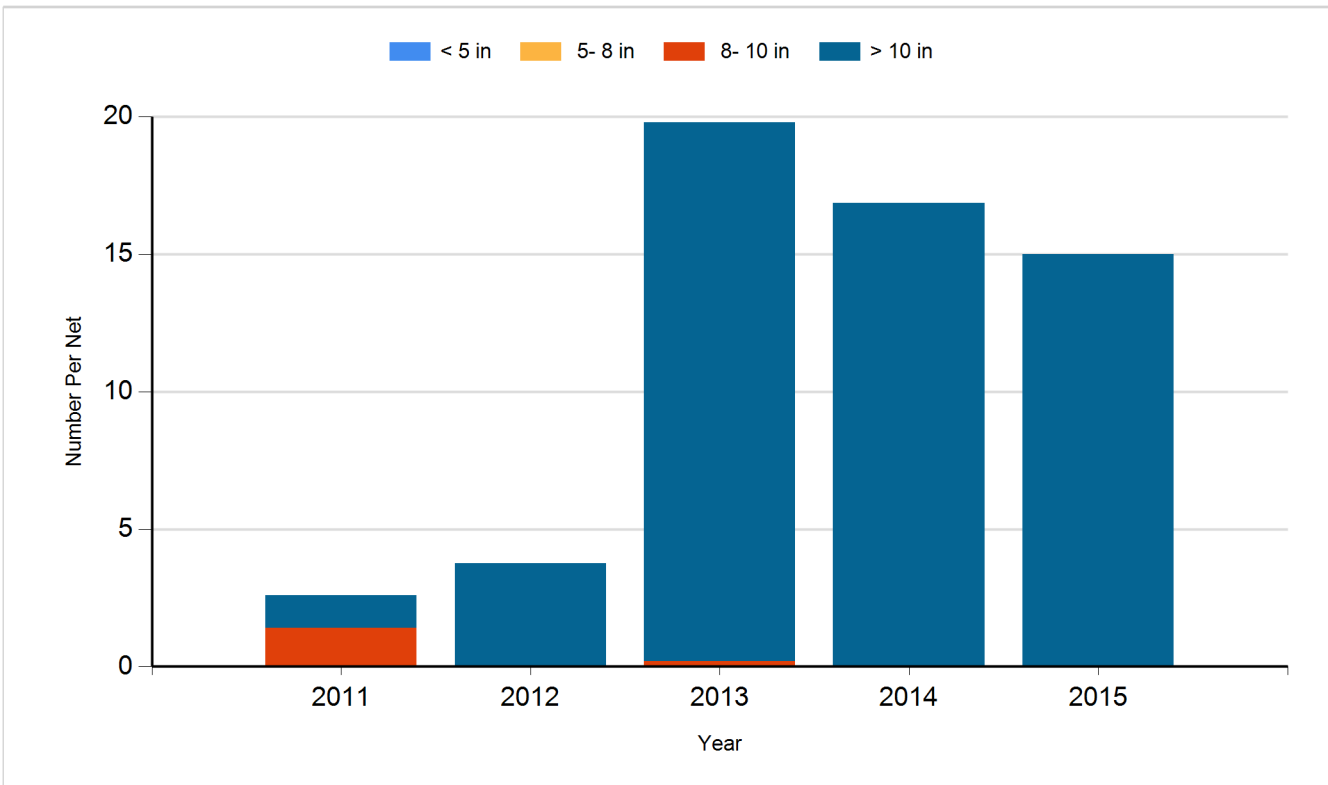
Species: White Bass
Gear: AFS std gill net



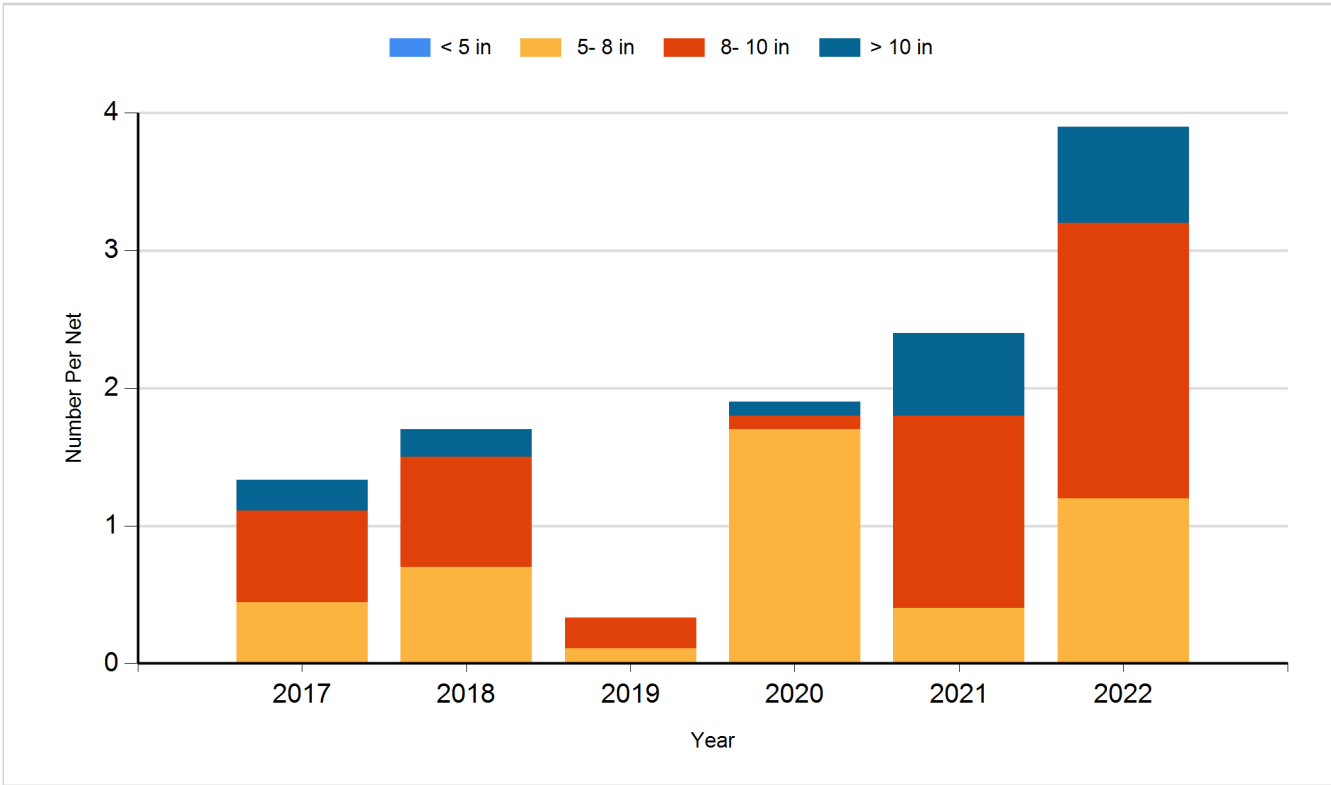
Species: White Bass
Gear: std exp gill net



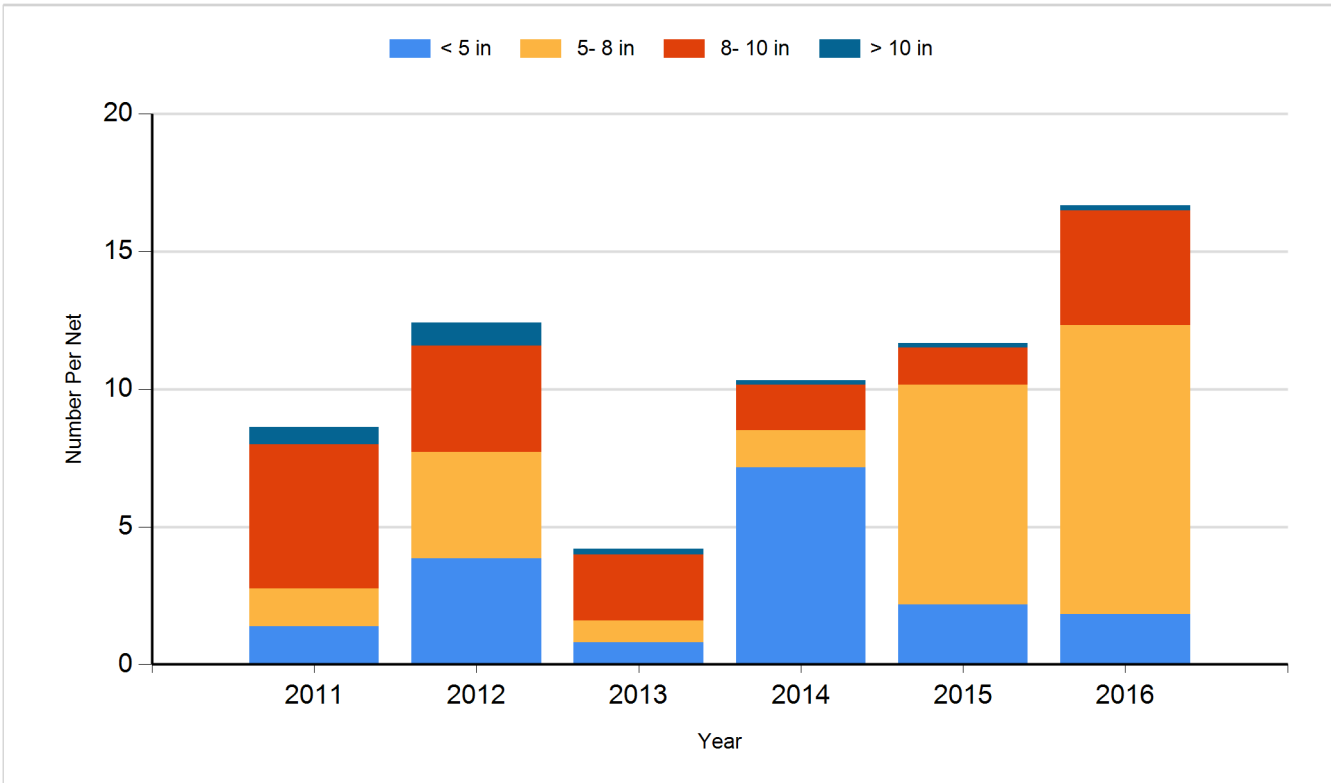
Species: White Crappie
Gear: frame net (std 3/4 in)



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
2011	Gizzard Shad	Adult	175
2012	Gizzard Shad	Adult	37
2012	Yellow Perch	Adult	2,507
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