Waubay Lake Survey Summary

Waubay Lake, located on the southeastern edge of Grenville, is managed as a walleye and yellow perch fishery but other fish species (e.g., northern pike, smallmouth bass, white bass) are present and contribute to the fishery.

- **Walleye.** The 2021 mean gill net CPUE of 10.6 was the highest CPUE observed from 2016 – 2021. Sampled walleyes ranged in length from 8.3 to 28.3 inches; of those that were at least 10.0 inches 33% were ≥15.0 inches and 11% were ≥20.0 inches. Individuals from 11 year-classes contributed to the gill net catch. Those from the 2019 (age-2) cohort, which coincided with a fry stocking, were the most abundant accounting for 66% of walleyes in the sample. The oldest walleye collected was from the 2005 (age-16) year class. The strong 2019 year-class has experienced slower growth to age 2 than weaker cohorts sampled from 2018 – 2020. In 2021, age-2 walleyes had a mean length at capture of 12.1 inches compared to 13.9 inches in 2020, 13.4 inches in 2019, and 12.9 inches in 2018. Slowed growth is not uncommon when strong walleye cohorts are present in Waubay Lake.

- **White bass.** Although more white bass were sampled in 2021 than in 2020, the mean gill net CPUE of 4.4 remained well below the 2016 and 2017 CPUE's of 13.2 and 12.9. In 2021, 71 white bass from 10.5 to 16.5 inches were netted, most (99%) were ≥12.0 inches.

- **Yellow perch**. Yellow perch were the most abundant species in the 2021 gill net catch. At 14.4 per gill net, relative abundance was considered moderate to high for Waubay Lake. Sampled yellow perch ranged in length from 5.1 to 12.2 inches, 74% were ≥8.0 inches and 18% were ≥10.0 inches. Individuals from four year classes (2011 and 2018 – 2020) contributed to the catch, those from the 2019 (age-2) cohort were the most abundant accounting for 61% of fish in the sample. Yellow perch growth appears moderate with mean length at capture of age-3 yellow perch ≥9.2 inches since 2012. In 2021, the mean length at capture of age-3 fish was 9.6 inches.

For more detailed results see the computer-generated South Dakota Statewide Fisheries Survey for Waubay (Day; below).

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Waubay, Day County
UBS-Lake-411-000
2021

Lake Information

Name: Waubay

County: Day

Surface Area: 16,943 Acres

Maximum Depth: 31 Feet

Mean Depth: 13 Feet

OHWM Elevation: 1,787

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Aug 17, 2021	4 net-nights
AFS std gill net	Aug 18, 2021	4 net-nights
AFS std gill net	Aug 19, 2021	4 net-nights
AFS std gill net	Aug 20, 2021	4 net-nights

Common Fish Species Present

Yellow Perch

Northern Pike

Walleye

Smallmouth Bass

White Bass

Black Bullhead

Common Carp

Rock Bass

Bluegill

Black Crappie

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).

			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	69	4.3	2.0	99		9	5	102	1
	Black Crappie	8	0.5	0.3	88		13		114	5
	Bluegill	11	0.7	0.4	73		9		127	3
	Common Carp	32	2.0	0.8	94		22	12	99	2
	Rock Bass	11	0.7	0.4	73		18		107	2
	Smallmouth Bass	44	2.6	1.2	64	11	45	11	99	1
	Walleye	170	10.6	2.5	33	5	11	3	83	1
	White Bass	71	4.4	1.4	100		99		95	1
	White Sucker	1	0.1	0.1	100		100		102	
	Yellow Perch	231	14.4	2.7	74	4	18	4	108	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.

*** Includes day and night samples; **Methods/Species that ignore stock length**

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
AFS std gill net	Black Bullhead					0.4	0.3	0.3	0.4	5.7	4.3	1.90
	Black Crappie					0.0	0.0	0.0	0.0	0.2	0.5	0.12
	Bluegill					0.0	0.1	0.0	0.1	0.0	0.7	0.15
	Common Carp					0.1	0.5	0.3	1.0	0.8	2.0	0.78
	Lake Herring					0.3	0.1	0.1	0.0	0.1	0.0	0.10
	Northern Pike					0.1	0.1	0.0	0.0	0.0	0.0	0.03
	Rock Bass					0.4	0.8	0.3	0.9	0.5	0.7	0.60
	Smallmouth Bass					1.3	1.3	0.9	0.6	0.3	2.6	1.17
	Walleye					6.3	4.6	5.9	7.9	8.1	10.6	7.23
	White Bass					13.2	12.9	6.9	7.3	2.4	4.4	7.85
	White Sucker					0.0	0.1	0.0	0.0	0.0	0.1	0.03
	Yellow Perch					5.4	8.3	6.4	10.3	9.5	14.4	9.05
boat shocker*	Smallmouth Bass		62.8		8.0				16.0			28.93
fall night EF-WAE**	Walleye	5.0	1.0	15.0	1.2	1.5	7.0	0.0	10.5	9.0		5.60
frame net (std 3/4 in)	Black Bullhead	1.5	3.5	2.0								2.33
	Black Crappie	1.3	1.5	2.6								1.80
	Bluegill	0.9	0.4	0.3								0.53
	Common Carp	0.5	0.3	0.2								0.33
	Northern Pike	0.2	0.3	0.6								0.37
	Rock Bass	0.9	2.6	1.2								1.57
	Smallmouth Bass	5.1	6.2	3.5								4.93
	Walleye	2.9	2.5	2.8								2.73
	White Bass	5.1	3.8	2.5								3.80
	White Sucker	0.1	0.1	0.0								0.07
	Yellow Perch	0.1	0.0	0.0								0.03
std exp gill net	Black Bullhead	4.3	4.1	1.4	0.1							2.48
	Bluegill	0.3	0.0	0.0	0.0							0.08
	Common Carp	0.5	0.0	0.5	0.1							0.28
	Lake Herring	0.1	0.4	0.3	0.3							0.28
	Northern Pike	0.1	0.5	1.0	0.4							0.50
	Rock Bass	1.4	1.3	2.0	0.4							1.28
	Smallmouth Bass	0.0	0.3	0.3	0.0							0.15
	Walleye	11.1	11.8	19.3	14.1							14.08
	White Bass	1.5	17.6	8.1	23.9							12.78
	White Sucker	0.0	0.3	0.1	0.0							0.10
	Yellow Perch	28.1	21.9	18.5	19.5							22.00

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AFS std gill net	Walleye	PSD					28	81	52	72	80	33
		PSD-P					5	3	1	3	7	11
		Wr					86	88	89	88	87	83
	White Bass	PSD					100	99	100	89	100	100
		PSD-P					100	99	98	88	100	99
		Wr					98	92	98	95	95	95
	Yellow Perch	PSD					71	62	88	12	61	74
		PSD-P					38	37	34	9	1	18
		Wr					109	109	109	111	112	108
std exp gill net	Walleye	PSD	48	28	17	8						
		PSD-P	7	2	1	0						
		Wr	83	82	84	85						
	White Bass	PSD	100	100	100	100						
		PSD-P	75	99	100	99						
		Wr	97	93	98	97						
	Yellow Perch	PSD	85	79	87	83						
		PSD-P	32	36	41	38						
		Wr	117	115	115	117						

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+
2021	170	211 (1)	307 (112)	402 (7)	424 (8)	469 (22)		583 (6)	480 (2)	585 (2)	580 (10)
2020	187	225 (72)	354 (17)	388 (9)	427 (41)	445 (2)	458 (8)	475 (2)	482 (4)	484 (27)	467 (4)
2019	130	253 (10)	341 (13)	395 (72)		460 (6)	466 (1)	553 (1)	467 (24)		548 (3)
2018	96	264 (7)	327 (37)	430 (7)	402 (8)	444 (2)	472 (3)	434 (33)			
2017	92	223 (21)	354 (1)	394 (4)	479 (2)		410 (58)		410 (2)	445 (1)	668 (2)
2016	100		320 (6)	396 (1)	396 (1)	365 (83)	334 (1)	485 (4)			691 (3)
2015	117	215 (4)	280 (1)		332 (104)		387 (4)				417 (4)
2014	157	228 (3)		304 (120)		386 (21)	399 (3)			435 (9)	
2013	113	235 (4)	259 (61)	350 (2)	374 (28)	427 (2)		374 (3)	447 (11)	416 (1)	724 (1)
2012	217	213 (131)	326 (14)	367 (30)	402 (7)	489 (1)	365 (2)	447 (30)			502 (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+
2021	231	147 (11)	205 (141)	244 (78)							316 (1)
2020	142	146 (37)	211 (104)		280 (1)						
2019	165	146 (145)		247 (9)	282 (6)	274 (1)	306 (2)	311 (1)			327 (1)
2018	102		211 (46)	242 (29)	257 (7)	281 (3)		296 (10)	274 (4)	295 (1)	
2017	133	152 (39)	207 (31)	247 (21)	269 (7)	273 (4)	279 (18)	300 (4)	286 (7)		
2016	87	153 (22)	205 (7)	238 (18)	258 (16)	267 (21)	242 (4)				
2015	159	136 (17)	190 (14)	237 (38)	248 (56)	261 (14)	267 (19)	312 (1)			
2014	152	138 (9)	186 (12)	233 (62)	261 (33)	251 (31)	299 (3)	343 (1)	303 (1)		
2013	175	150 (5)	198 (51)	237 (39)	250 (62)	244 (4)	280 (10)		323 (1)	269 (4)	
2012	228	144 (26)	217 (63)	244 (111)	264 (13)	261 (7)			305 (1)	335 (1)	270 (7)

Fish Condition

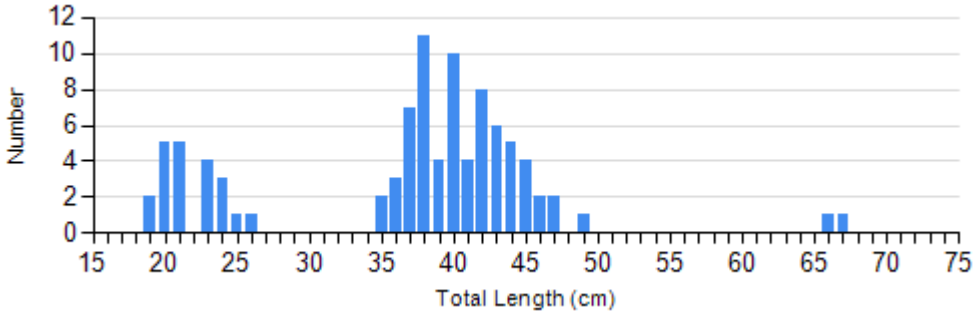
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2017	14	88 (1.5)	57	88 (0.7)	0		2	89 (3.6)
	2018	46	88 (0.8)	48	89 (0.9)	1	87	0	
	2019	36	88 (0.7)	87	87 (0.5)	3	86 (1.5)	1	90
	2020	24	85 (1.0)	89	87 (0.5)	9	87 (2.8)	0	
	2021	114	82 (0.5)	37	83 (0.8)	15	85 (1.7)	3	86 (3.3)
White Bass Gill Net	2017	2	97 (2.5)	0		120	94 (0.4)	84	90 (0.5)
	2018	0		2	97 (1.1)	39	98 (1.0)	69	99 (0.7)
	2019	13	100 (1.3)	1	105	41	96 (0.5)	61	94 (0.6)
	2020	0		0		11	96 (2.5)	25	94 (1.0)
	2021	0		1	94	39	96 (0.6)	31	94 (0.9)
Yellow Perch Gill Net	2017	51	109 (1.4)	33	113 (1.6)	39	111 (1.3)	10	96 (3.0)
	2018	12	112 (2.9)	55	111 (1.0)	32	106 (1.6)	3	91 (3.0)
	2019	145	112 (0.7)	5	115 (3.8)	10	116 (3.1)	5	97 (3.9)
	2020	56	115 (1.7)	85	110 (1.0)	1		0	
	2021	61	113 (1.3)	128	107 (0.8)	41	105 (0.9)	1	106

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net



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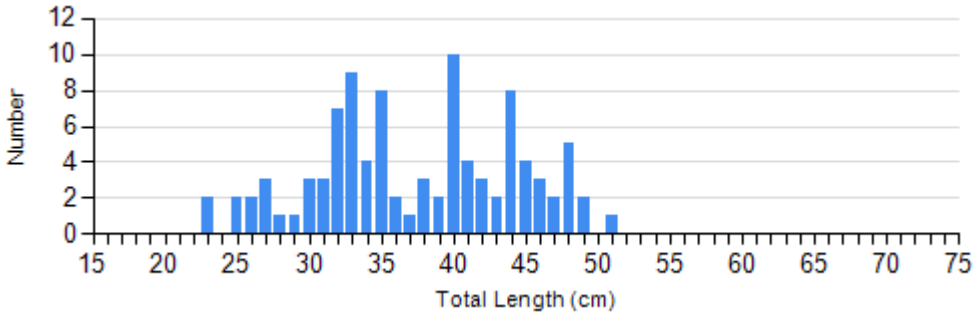

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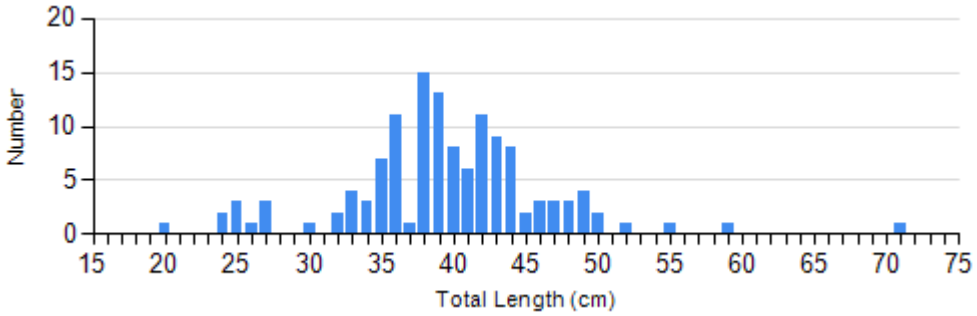

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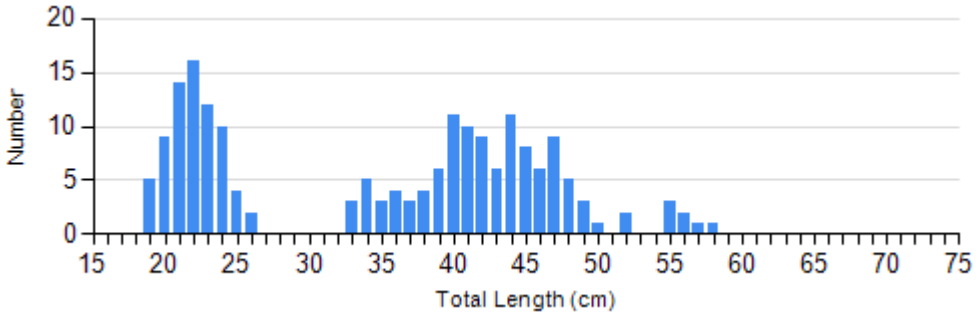

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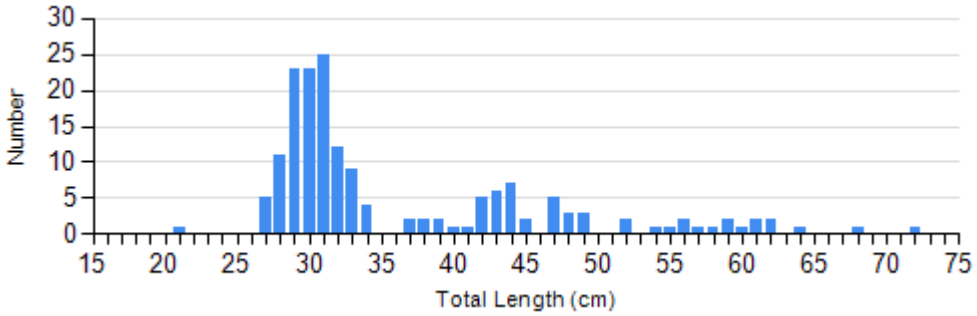
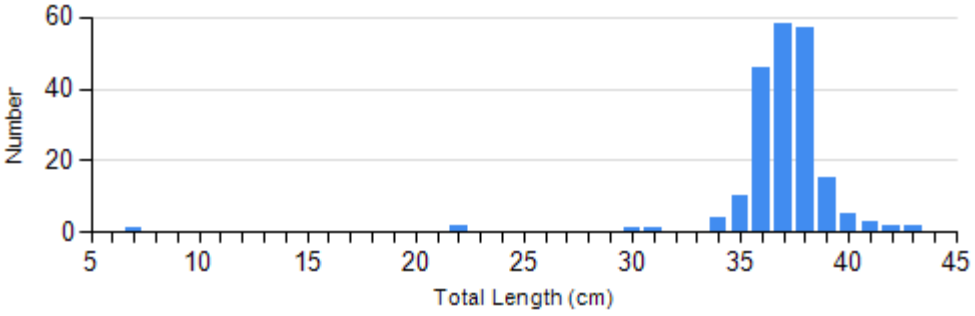


2021

Species: White Bass
Gear: AFS std gill net



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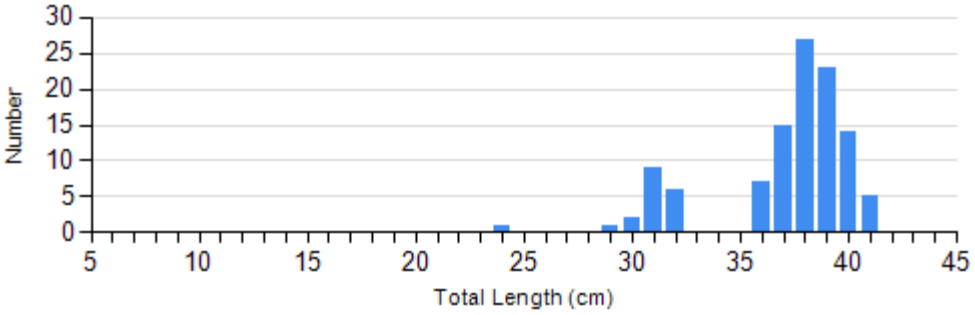

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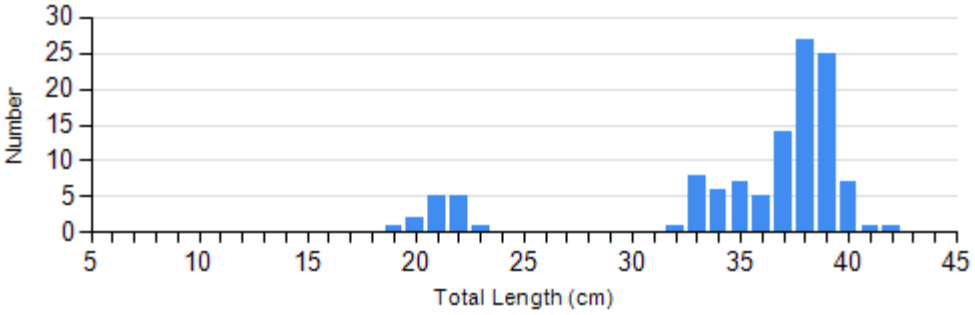

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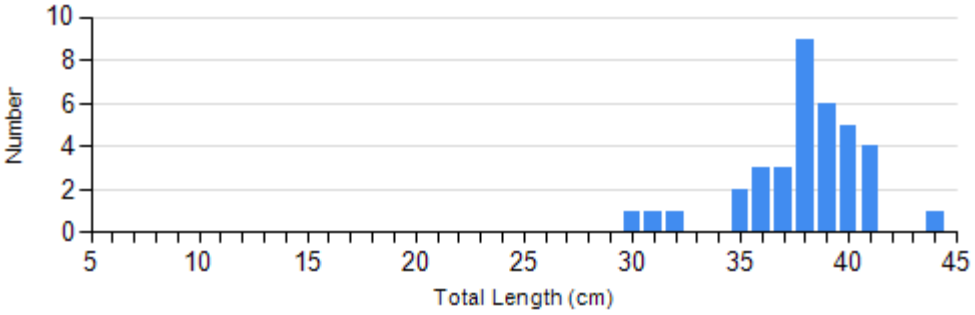

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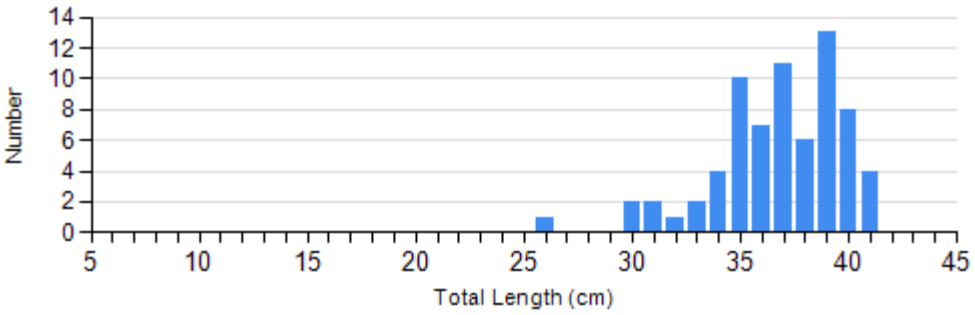
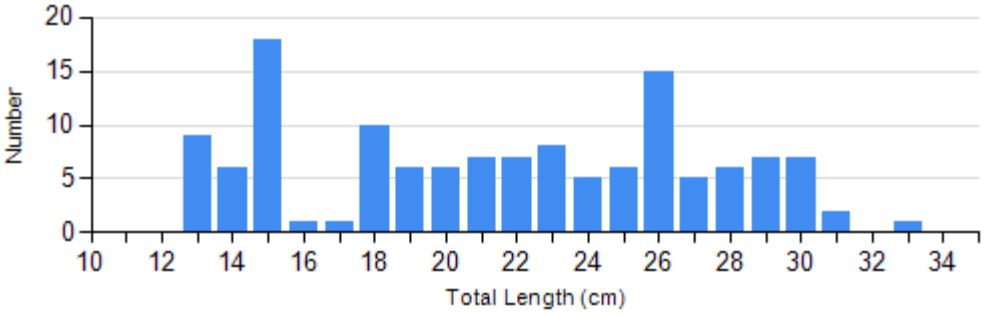


2021

Species: Yellow Perch
Gear: AFS std gill net



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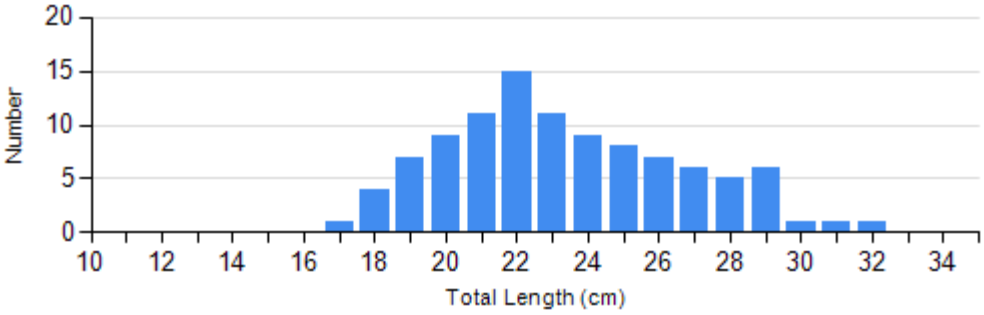

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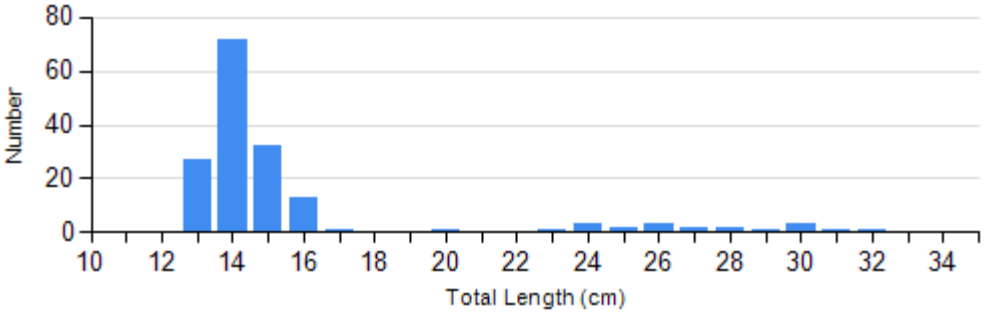

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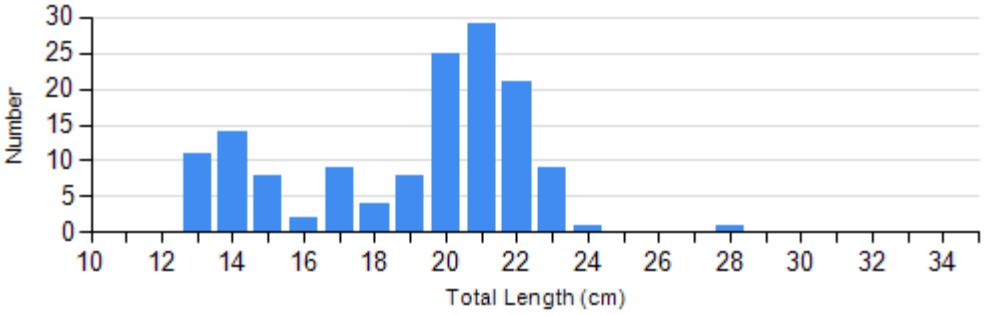

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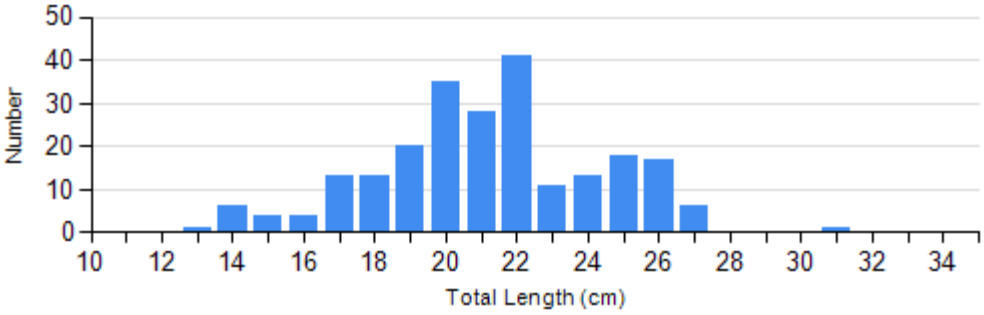
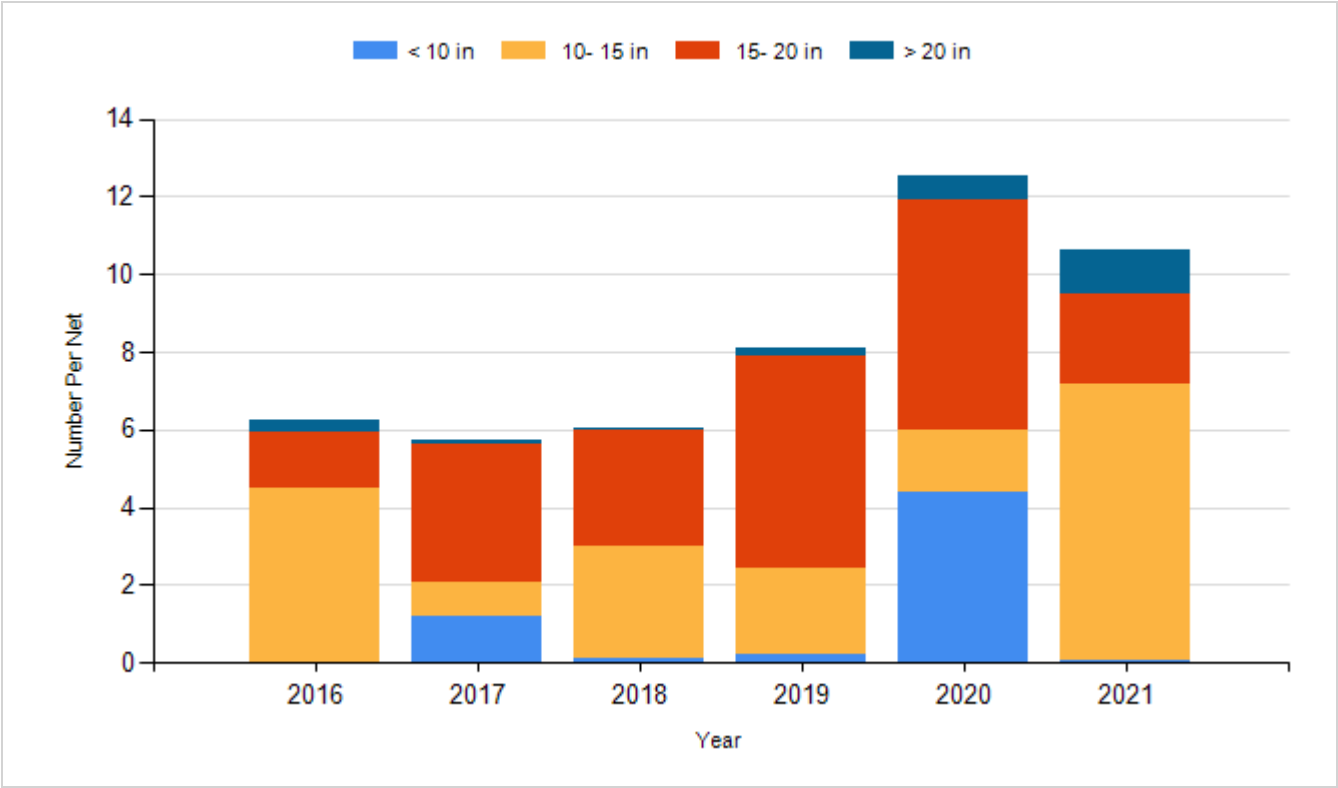


2021

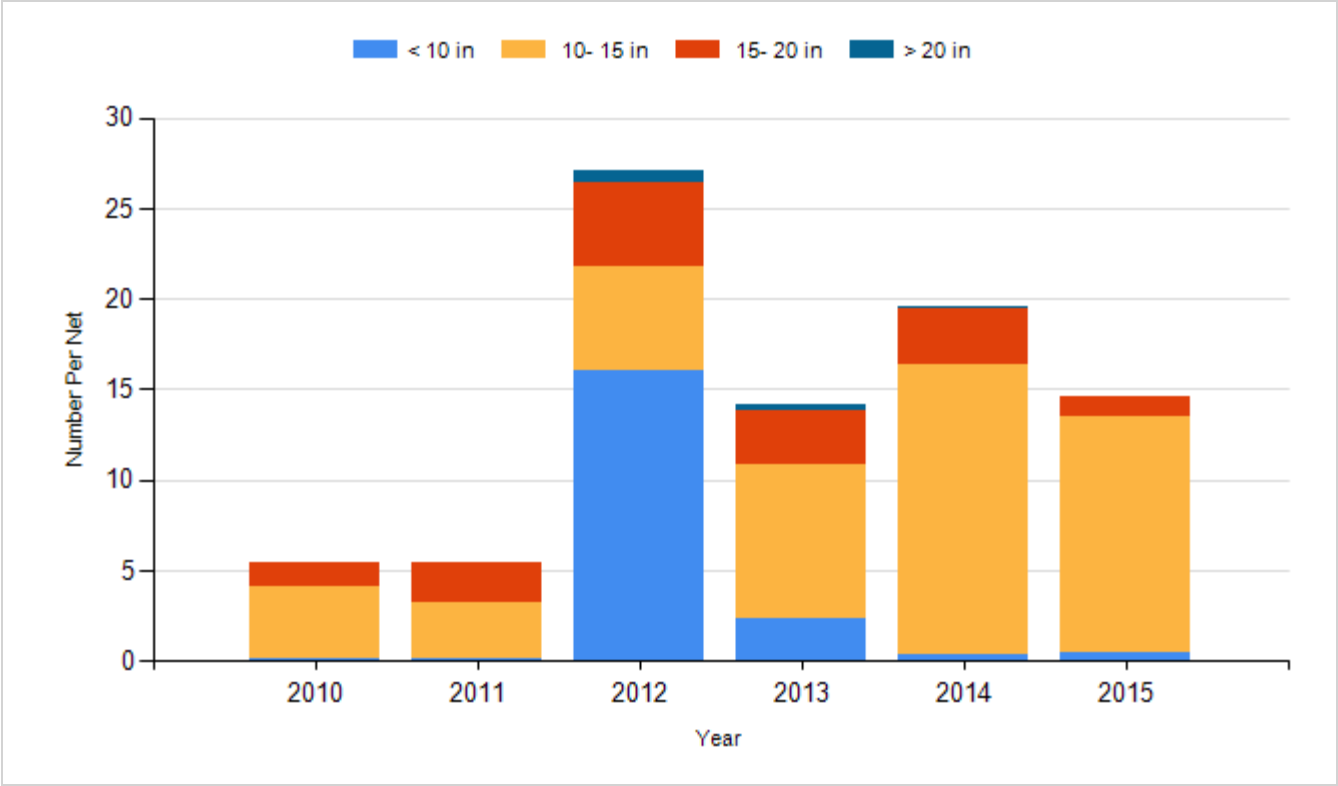
Historic Fish Sizes and Relative Abundance

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

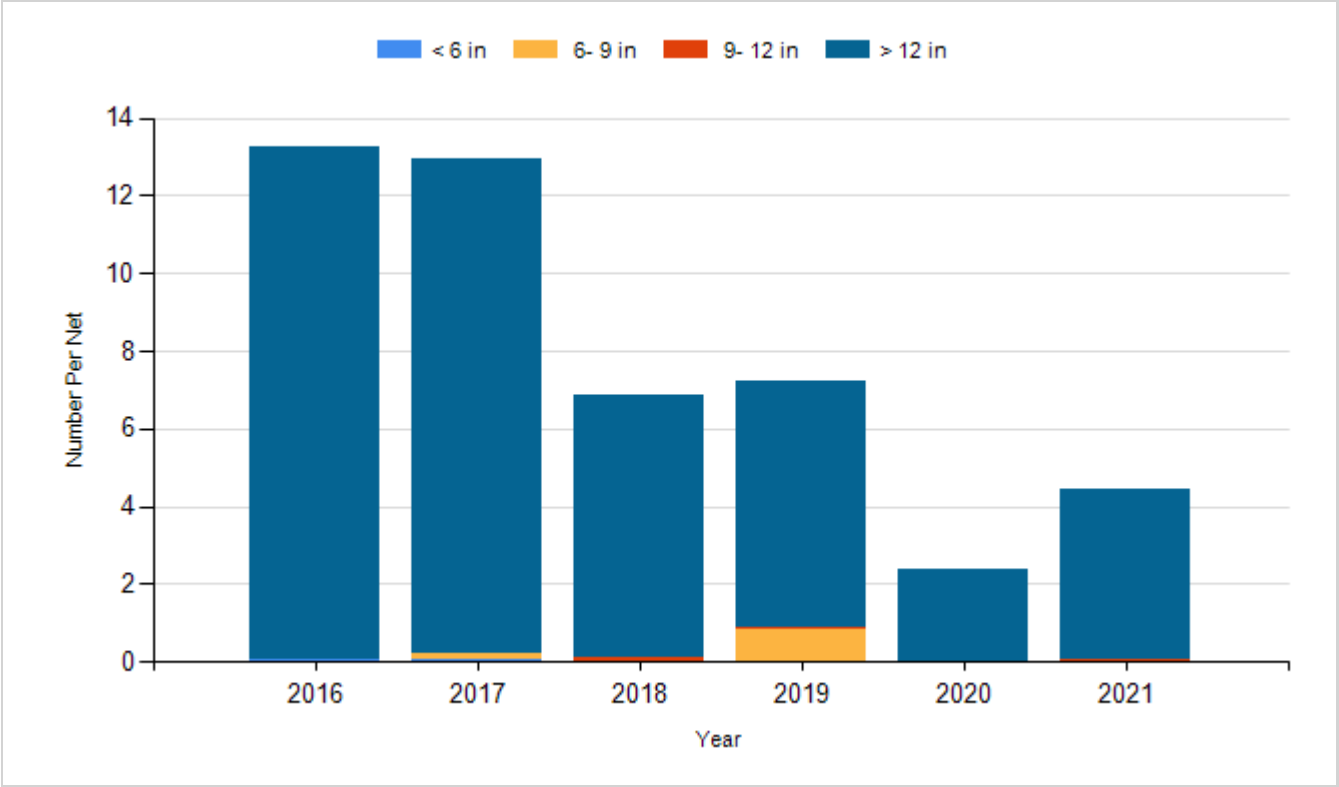
Species: Walleye
Gear: AFS std gill net



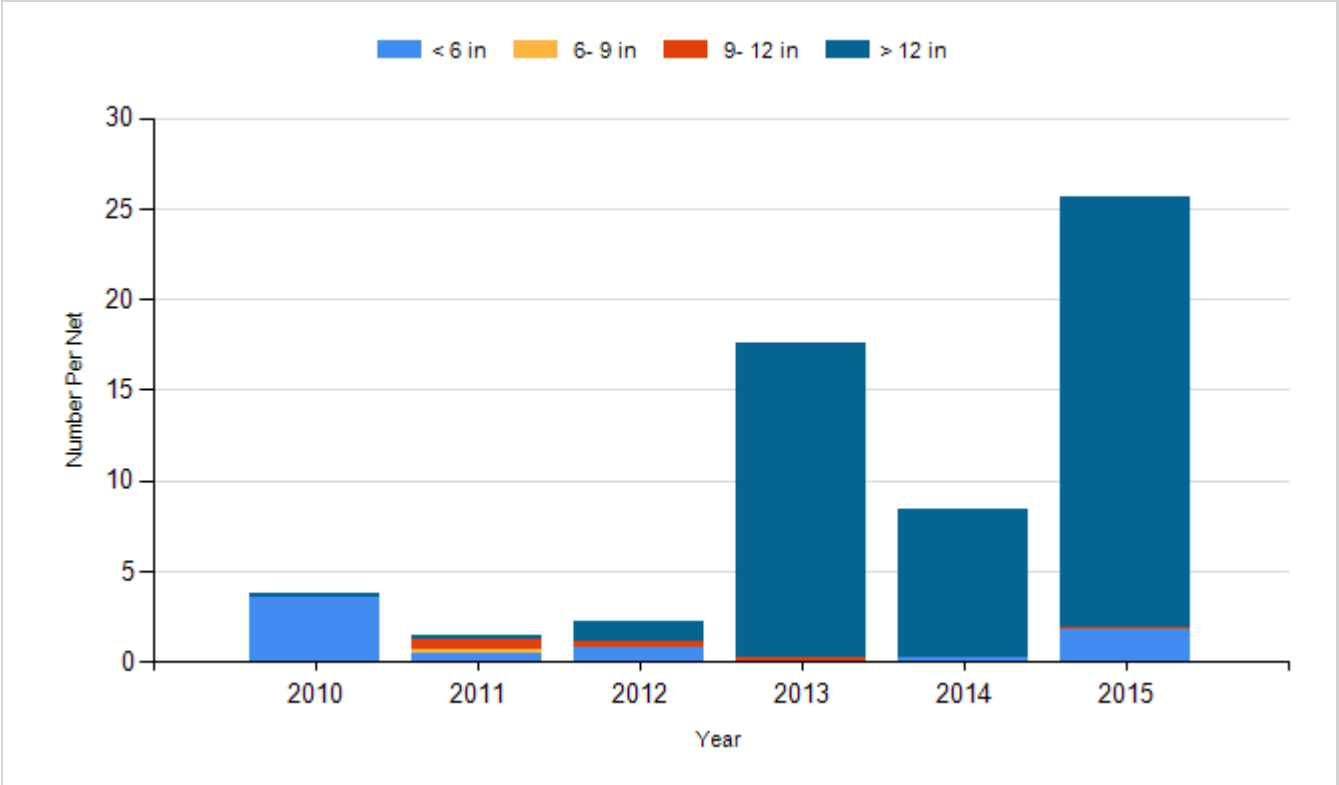
Species: Walleye
Gear: std exp gill net



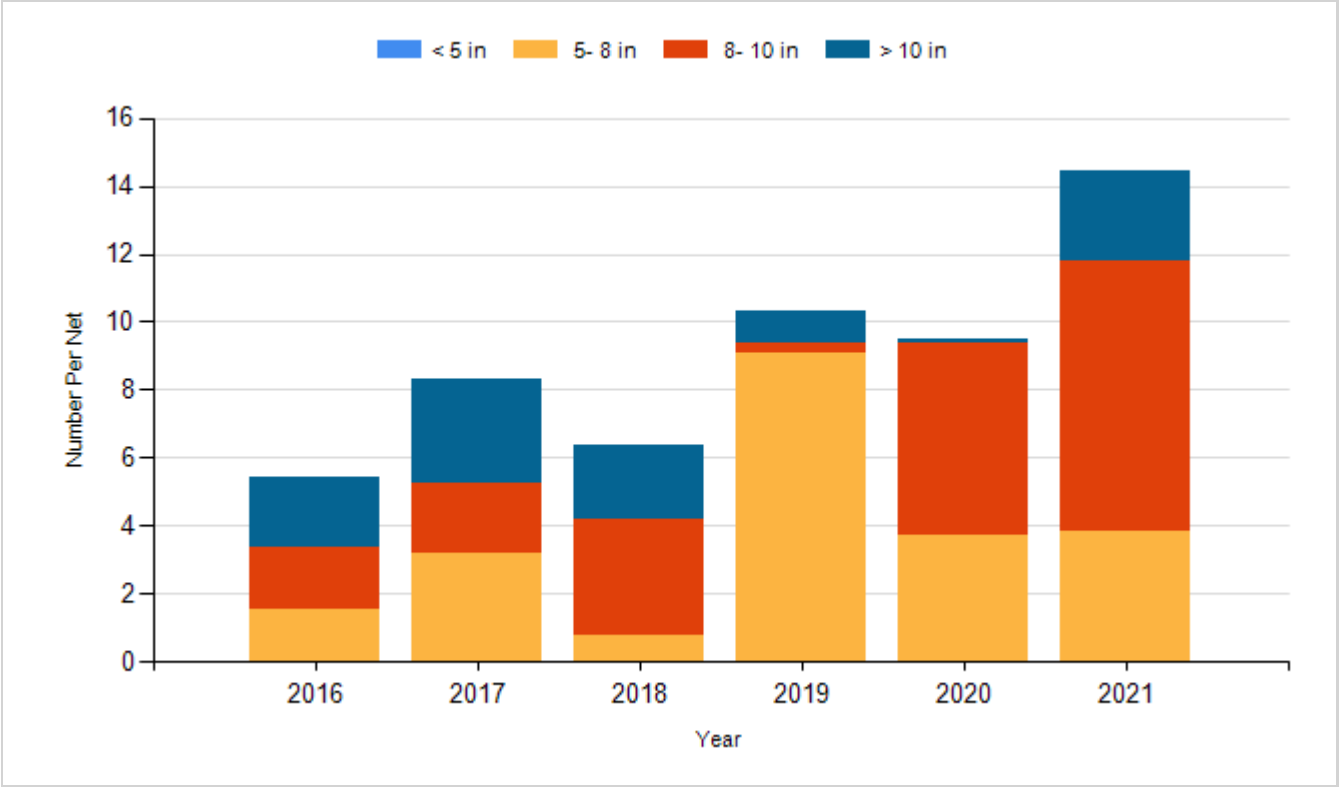
Species: White Bass
Gear: AFS std gill net



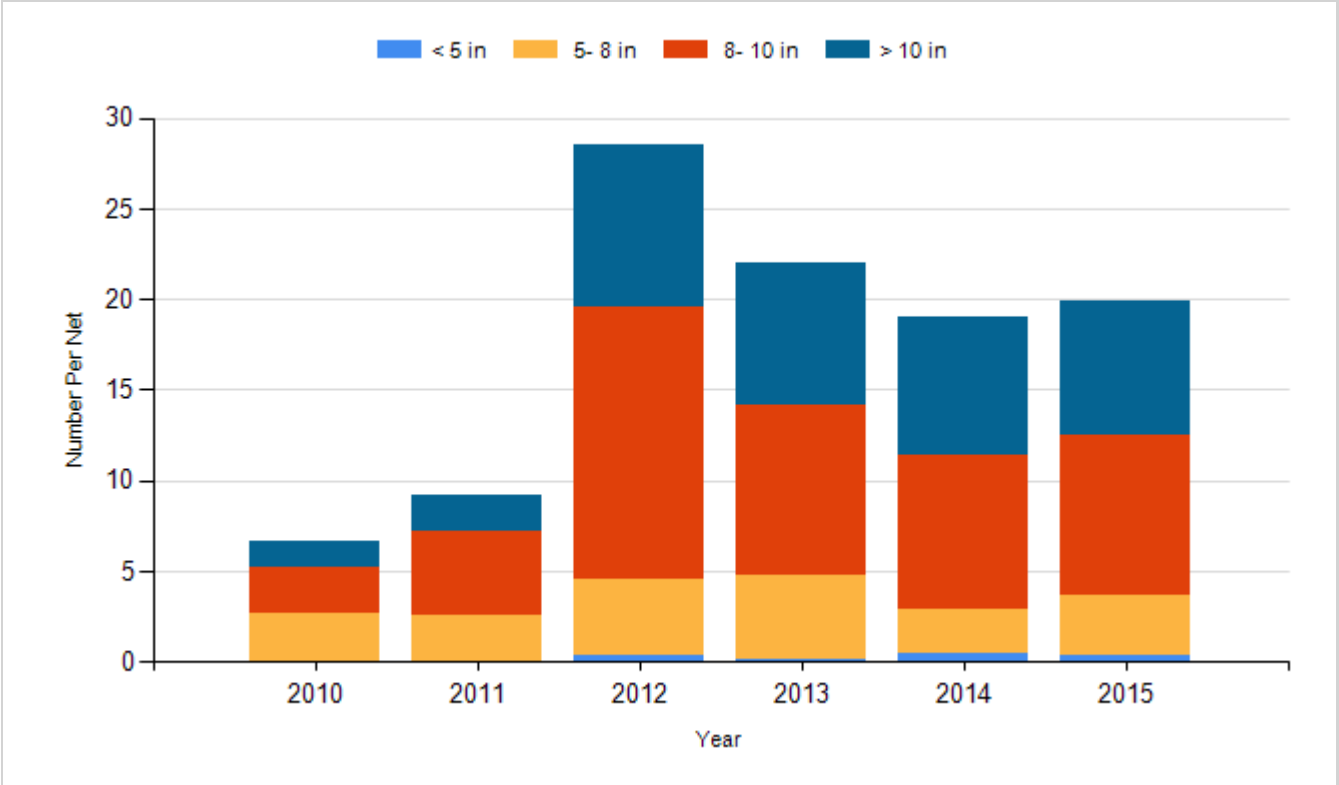
Species: White Bass
Gear: std exp gill net



Species: 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	Walleye	Fry	8,000,000
2012	Walleye	Fry	8,000,000
2014	Walleye	Fry	8,500,000
2016	Walleye	Fry	8,500,000
2017	Walleye	Fry	8,000,000
2019	Walleye	Fry	4,000,000
2021	Walleye	Fry	12,500,000
2021	Walleye	Juvenile	214,580