Piyas Lake Survey Summary

Piyas Lake, located 4.5 miles east and 2.0 miles south of Eden, is managed as a walleye and yellow perch fishery.

- **Walleye.** Although fewer walleyes were sampled in 2021 than in 2018, relative abundance remained high (9.0 per gill net). A wide length range (9.4 to 26.0 inches) was sampled, of those that were at least 10.0 inches 55% were ≥15.0 inches and 6% were ≥20.0 inches. Six year classes (2013 and 2016 – 2020) contributed to the catch. Individuals from the naturally produced 2019 (age-2) cohort, which had a mean length at capture of 14.8 inches, were the most abundant accounting for 64% of walleyes in the sample. The 2021 sample suggested good walleye growth with a mean length at capture at age 3 of 17.5 inches.

- **Yellow Perch**. Yellow perch numbers were higher in 2021 than in 2018. At 61.3 per gill net, relative abundance was high. Sampled yellow perch ranged in length from 5.1 to 10.2 inches, nearly half (48%) were ≥8.0 inches while only 3% were ≥10.0 inches. The entire sample was comprised of fish from year classes produced in 2018 (age 3) and 2019 (age 2). The 2018 (age-3) cohort, which made up 60% of yellow perch in the sample, has experienced slower growth to age 3 than previous cohorts sampled from 2012 - 2021. In 2021, the mean length at capture of age-3 yellow perch was 8.5 inches compared to a mean length at capture of 9.9 inches in 2015 and 11.3 inches in 2012. Slower growth is not uncommon for larger cohorts in northeast South Dakota.

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

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Piyas, Marshall County
UJA-Lake-840-000
2021

Lake Information

Name: Piyas

County: Marshall

Surface Area: 1,956 Acres

Maximum Depth: 14 Feet

Surveys and Investigations

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

Gear	Date	Effort
AFS std gill net	Jun 29, 2021	4 net-nights
AFS std gill net	Jun 30, 2021	4 net-nights
AFS std gill net	Jul 01, 2021	4 net-nights

Common Fish Species Present

Walleye

Northern Pike

Yellow Perch

White Sucker

Black Crappie

Black Bullhead

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	2	0.2	0.2	50		0		123	27
	Black Crappie	18	1.0	0.6	33		8		116	3
	Walleye	109	9.0	2.2	55	7	6	4	94	1
	White Sucker	53	4.4	1.7	100		100		94	1
	Yellow Perch	735	61.3	8.6	48	2	3	1	103	0

10-Year Catch Per Unit Effort by Gear and Species

Catch per unit effort (CPUE) and average (Avg) of species across 10 years using different gear types.

		CPUE										
Gear	Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
AFS std gill net	Black Bullhead							0.2			0.2	0.20
	Black Crappie							1.6			1.0	1.30
	Walleye							11.7			9.0	10.35
	White Sucker							7.5			4.4	5.95
	Yellow Perch							30.1			61.3	45.70
std exp gill net	Black Bullhead	0.5			0.7							0.60
	Walleye	4.8			11.2							8.00
	White Sucker	1.8			9.3							5.55
	Yellow Perch	281.0			115.2							198.10

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							55			55
		PSD-P							29			6
		Wr							95			94
	Yellow Perch	PSD							78			48
		PSD-P							3			3
		Wr							107			103
std exp gill net	Walleye	PSD	45			73						
		PSD-P	10			1						
		Wr	97			84						
	Yellow Perch	PSD	46			67						
		PSD-P	2			37						
		Wr	108			109						

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	109	269 (10)	375 (70)	445 (19)	513 (6)	539 (2)			639 (2)		
2018	153	255 (71)	374 (19)	445 (2)	483 (20)	525 (7)	549 (32)			646 (1)	719 (1)
2015	123	197 (56)	339 (16)	417 (50)						602 (1)	
2012	28	285 (6)	380 (19)	516 (1)	537 (1)	516 (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	735		172 (291)	215 (444)							
2018	331		214 (326)		307 (1)		348 (1)	361 (3)			
2015	883	110 (197)	177 (268)	251 (162)	259 (241)	294 (18)					
2012	1714	149 (749)	215 (949)	286 (16)							

Fish Condition

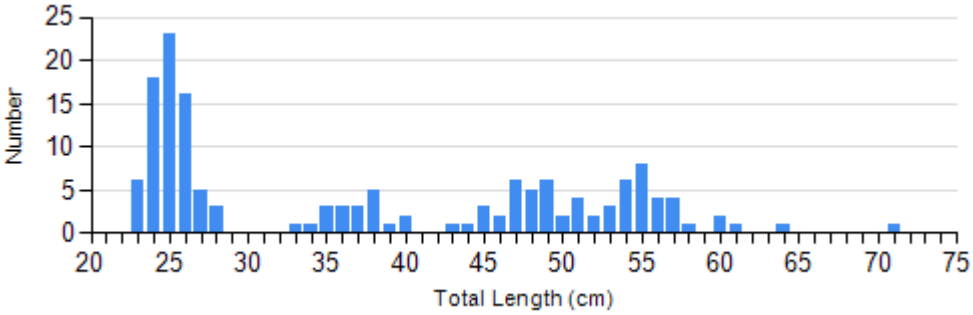
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2018	58	96 (0.7)	34	96 (1.1)	35	91 (1.1)	2	87 (1.0)
	2021	49	94 (0.8)	52	94 (0.7)	6	94 (1.7)	1	87
Yellow Perch Gill Net	2018	74	105 (0.9)	248	107 (0.5)	4	104 (2.3)	5	95 (4.9)
	2021	379	105 (0.5)	336	101 (0.5)	20	98 (1.2)	0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net



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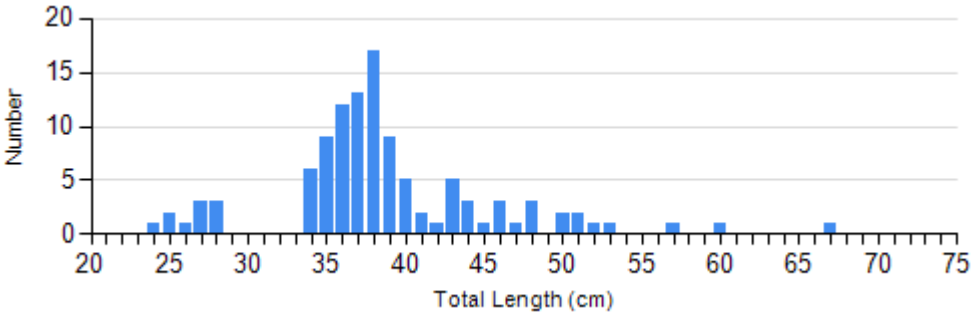
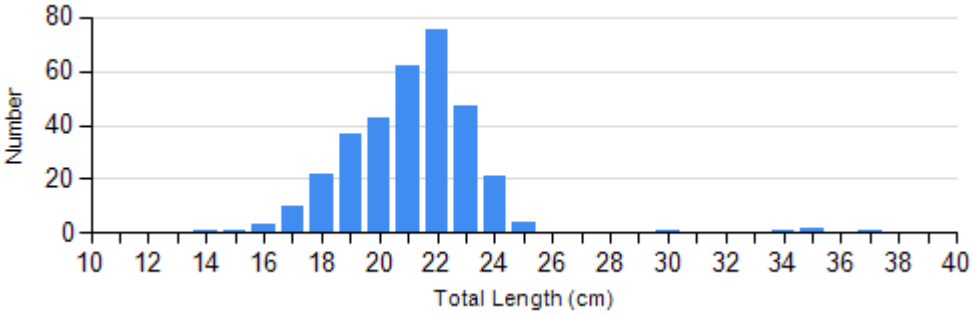


2021

Species: Yellow Perch
Gear: AFS std gill net



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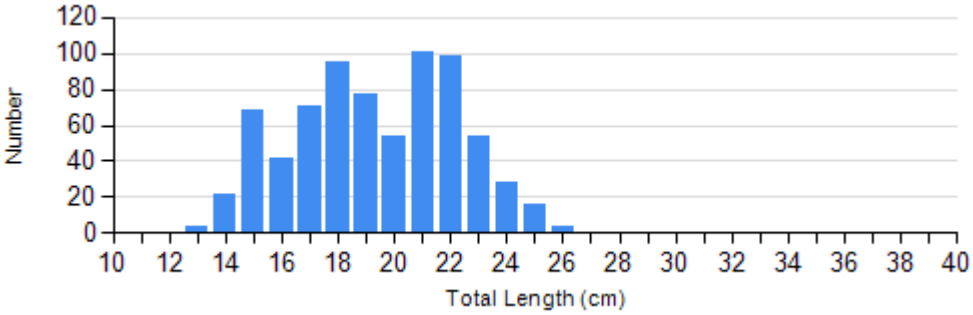
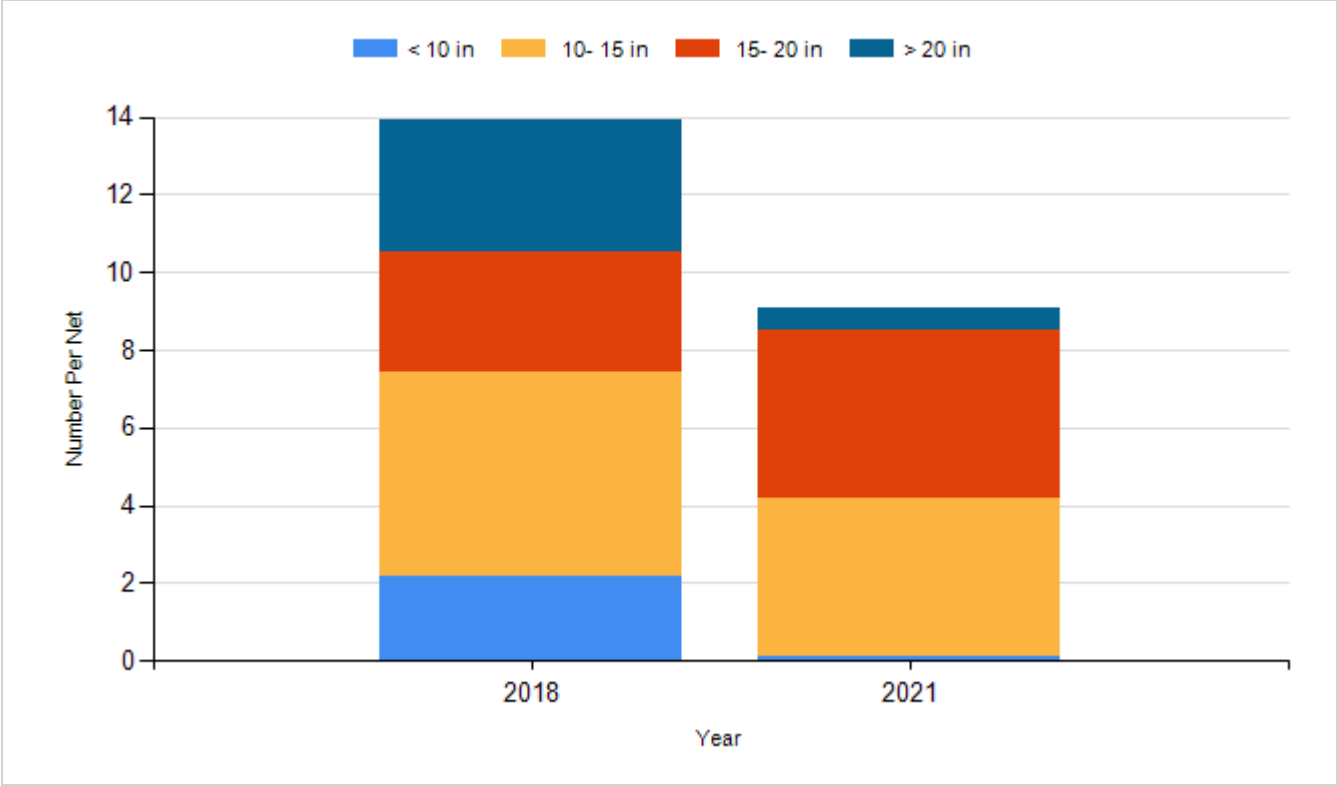


2021

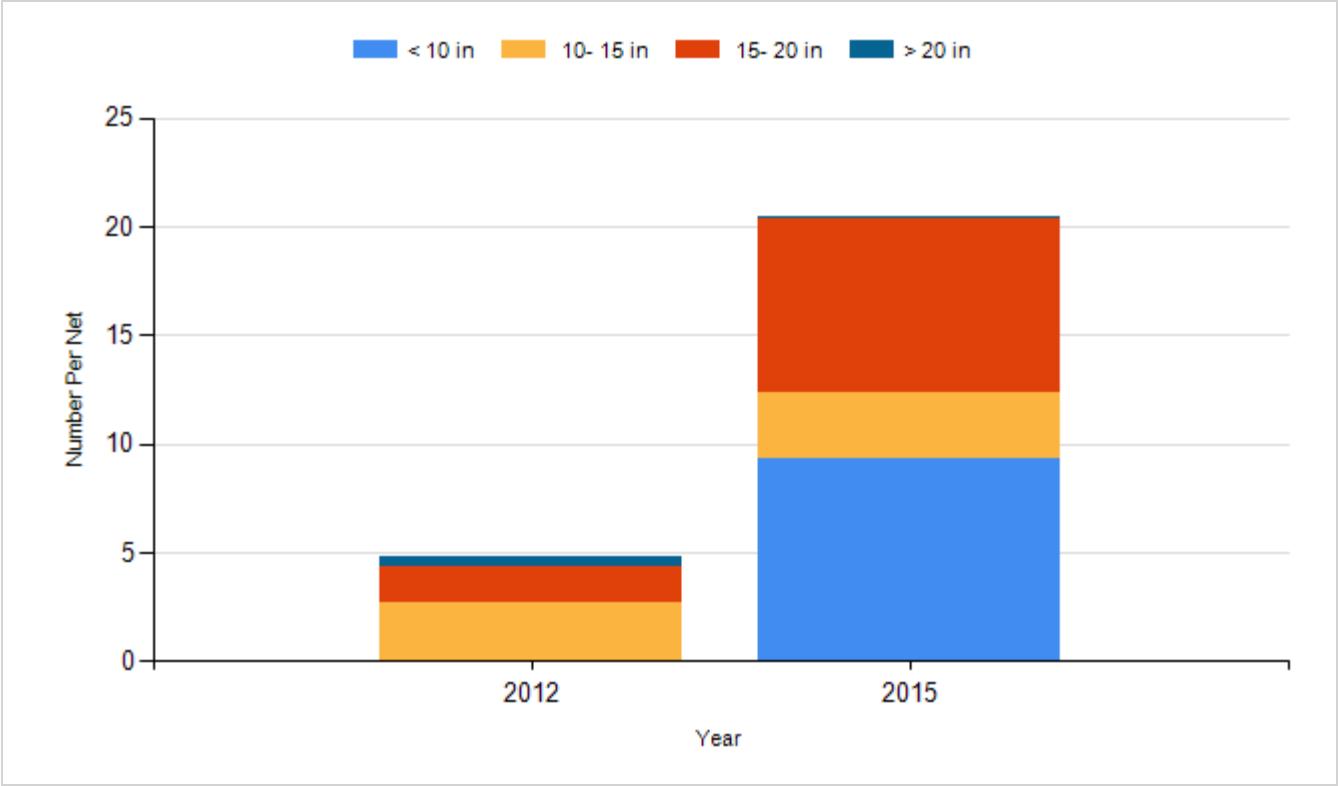
Historic Fish Sizes and Relative Abundance

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

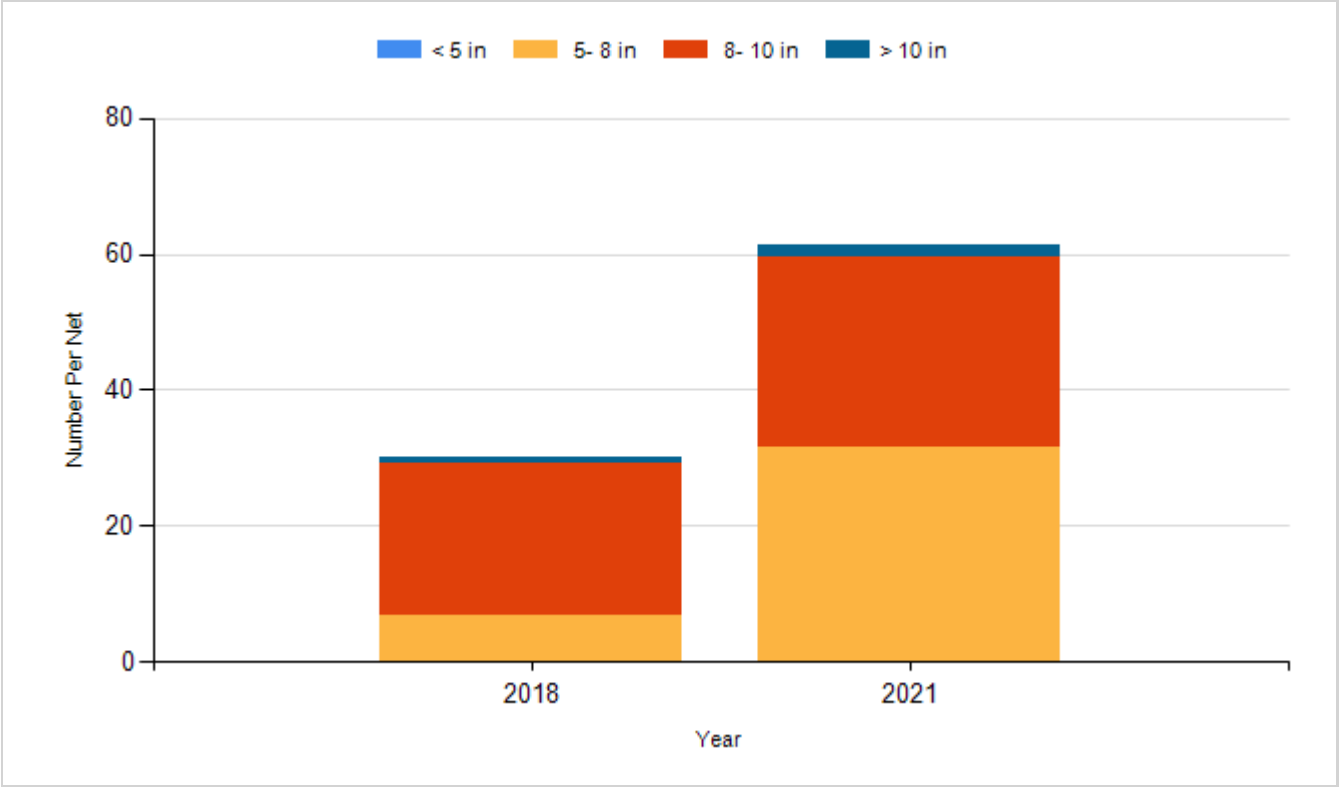
Species: Walleye
Gear: AFS std gill net



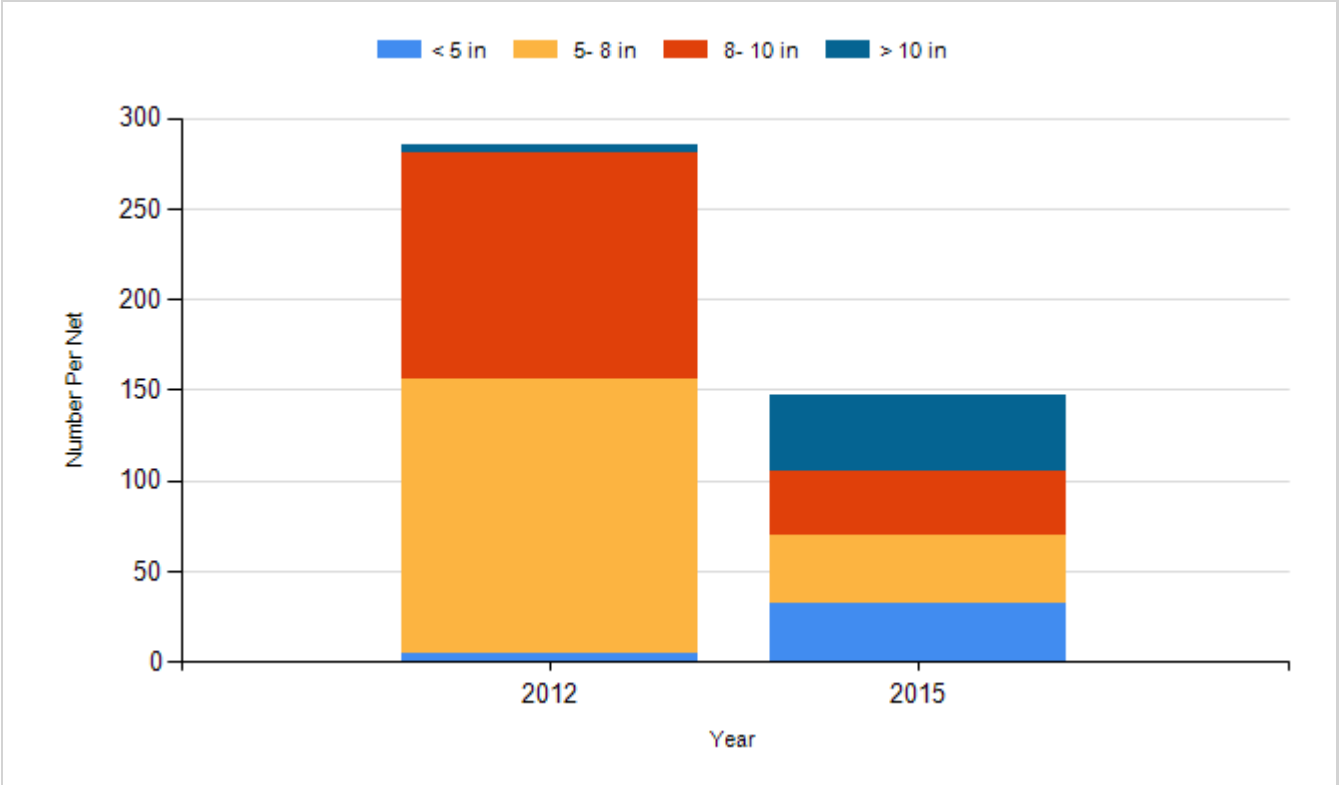
Species: Walleye
Gear: std exp gill net



Species: 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
2010	Walleye	Fry	1,300,000
2012	Walleye	Fry	650,000
2014	Walleye	Fry	750,000
2016	Walleye	Fry	750,000
2018	Walleye	Fry	750,000
2021	Walleye	Fry	750,000