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.** Walleyes numbers were high (11.7/gill net) in 2018. A wide length range (8.7 to 28.0 inches) was sampled as eight year classes (2007, 2009, and 2012 – 2017) were present. Walleyes from the naturally-produced 2017 (age-1) cohort, which had a mean length of 10.0 inches, were the most abundant. Smaller but noticeable nodes in the length frequency were apparent for well represented cohorts produced in 2016 (mean length = 14.7 inches), 2014 (mean length = 19.0 inches), and 2012 (mean length = 21.6 inches); all of which, coincided with fry stockings. Walleye growth appears to be good with mean length at capture values >16.0 inches at age-3 in surveys conducted since 2009.

- **Yellow Perch**. Yellow perch numbers were considerably lower in 2018 than in surveys conducted in 2012 and 2015. However at 30.1/gill net, relative abundance remained high. Sampled yellow perch ranged in length from 5.5 to 14.6 inches; four year classes (2011, 2012, 2014, and 2016) were represented. Those from the 2016 (age-2) cohort, which had a mean length at capture of 8.4 inches, were the most abundant accounting for 98% of yellow perch in the sample.

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

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Piyas, Marshall County
UJA-Lake-840-000
2018

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	Jul 03, 2018	4 net-nights
AFS std gill net	Jul 04, 2018	4 net-nights
AFS std gill net	Jul 05, 2018	3 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)
Bigmouth Buffalo	11	28	18	46	24	61	30	76	37	94
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
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Common Carp	11	28	16	41	21	53	26	66	33	84
Freshwater Drum	8	20	12	30	15	38	20	51	25	63
Gizzard Shad	7	18	11	28						
Green Sunfish	3	8	6	15	8	20	10	25	12	30
Lake Herring	5	13	8	20	11	28	14	35	17	43
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
Rock Bass	4	10	7	18	9	23	11	28	13	33
Rudd	6	15	10	25	12	30	15	38	19	48
Saugeye	9	23	14	35	18	46	22	56	27	69
Shorthead Redhorse	6	15	10	25	13	33	16	41	20	51
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
White Sucker	6	15	10	25	13	33	16	41	20	51
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	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
AFS std gill net	Black Bullhead	0.2	0.2	50		50		117	13
	Black Crappie	1.6	0.4	0		0		126	3
	Walleye	11.7	2.0	55	6	29	6	95	1
	White Sucker	7.5	1.5	98		98		93	1
	Yellow Perch	30.1	9.2	78	3	3	1	107	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.

		CPUE										
Gear	Species	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
AFS std gill net	Black Bullhead										0.2	0.2
	Black Crappie										1.6	1.6
	Walleye										11.7	11.7
	White Sucker										7.5	7.5
	Yellow Perch										30.1	30.1
std exp gill net	Black Bullhead	0.0			0.5			0.7				0.4
	Walleye	4.0			4.8			11.2				6.7
	White Sucker	0.0			1.8			9.3				3.7
	Yellow Perch	16.7			281.0			115.2				137.6

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	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AFS std gill net	Walleye	PSD										55
		PSD-P										29
		Wr										95
	Yellow Perch	PSD										78
		PSD-P										3
		Wr										107
std exp gill net	Walleye	PSD	67			45			73			
		PSD-P	0			10			1			
		Wr	98			97			84			
	Yellow Perch	PSD	10			46			67			
		PSD-P	4			2			37			
		Wr	111			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+
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)					
2009	24		363 (9)	431 (15)							

Species: Yellow Perch

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
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)							
2009	117	115 (17)	154 (93)	253 (7)	319 (1)						

Fish Condition

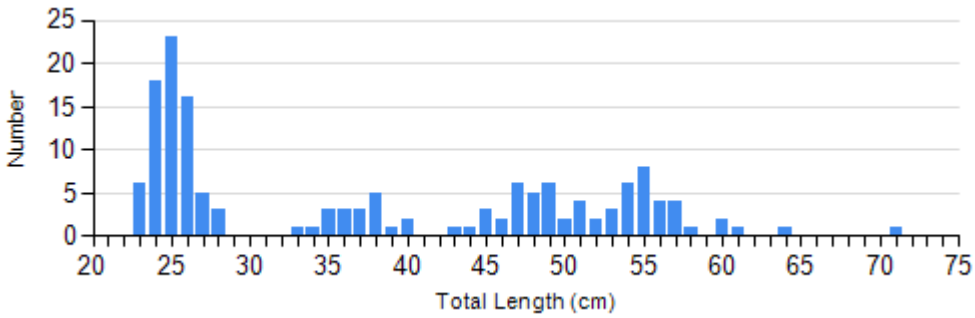
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2015	18	83 (1.7)	48	84 (0.6)	1	78	0	
	2018	58	96 (0.7)	34	96 (1.1)	35	91 (1.1)	2	87 (1.0)
Yellow Perch Gill Net	2015	227	111 (0.8)	210	111 (0.7)	238	108 (0.7)	16	97 (1.8)
	2018	74	105 (0.9)	248	107 (0.5)	4	104 (2.3)	5	95 (4.9)

Length Frequency Distribution

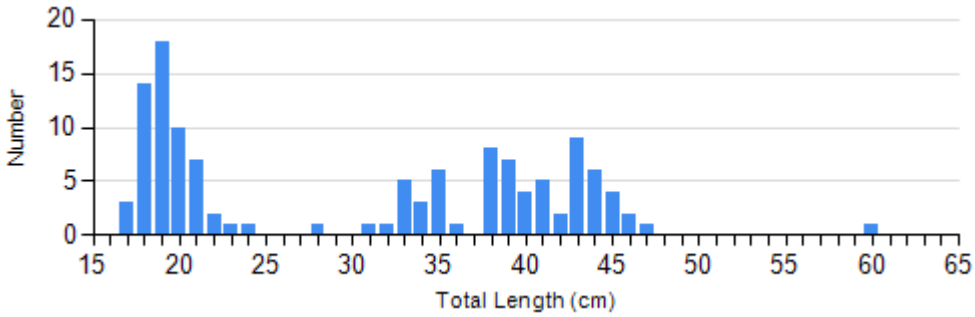
Length frequency histogram of species sampled by year.

Species: Walleye
Gear: AFS std gill net



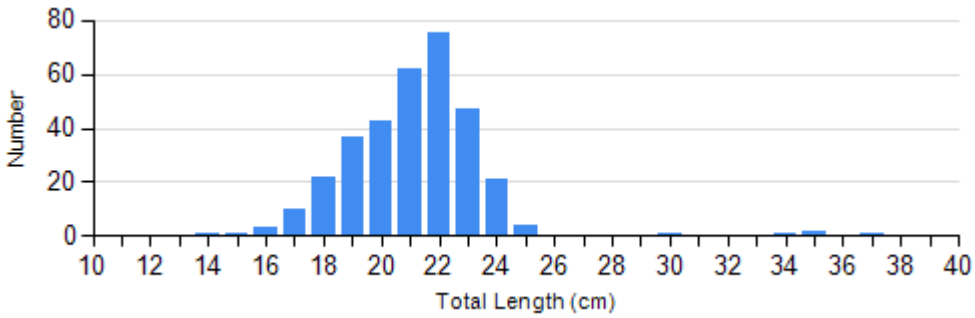
2018

Species: Walleye
Gear: std exp gill net



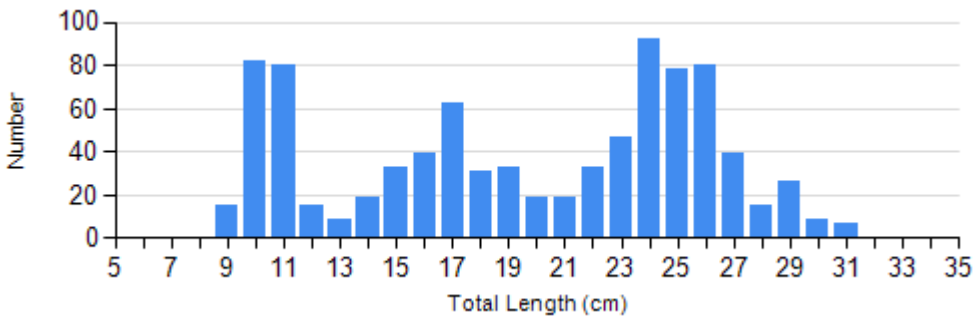
2015

Species: Yellow Perch
Gear: AFS std gill net



2018

Species: Yellow Perch
Gear: std exp gill net

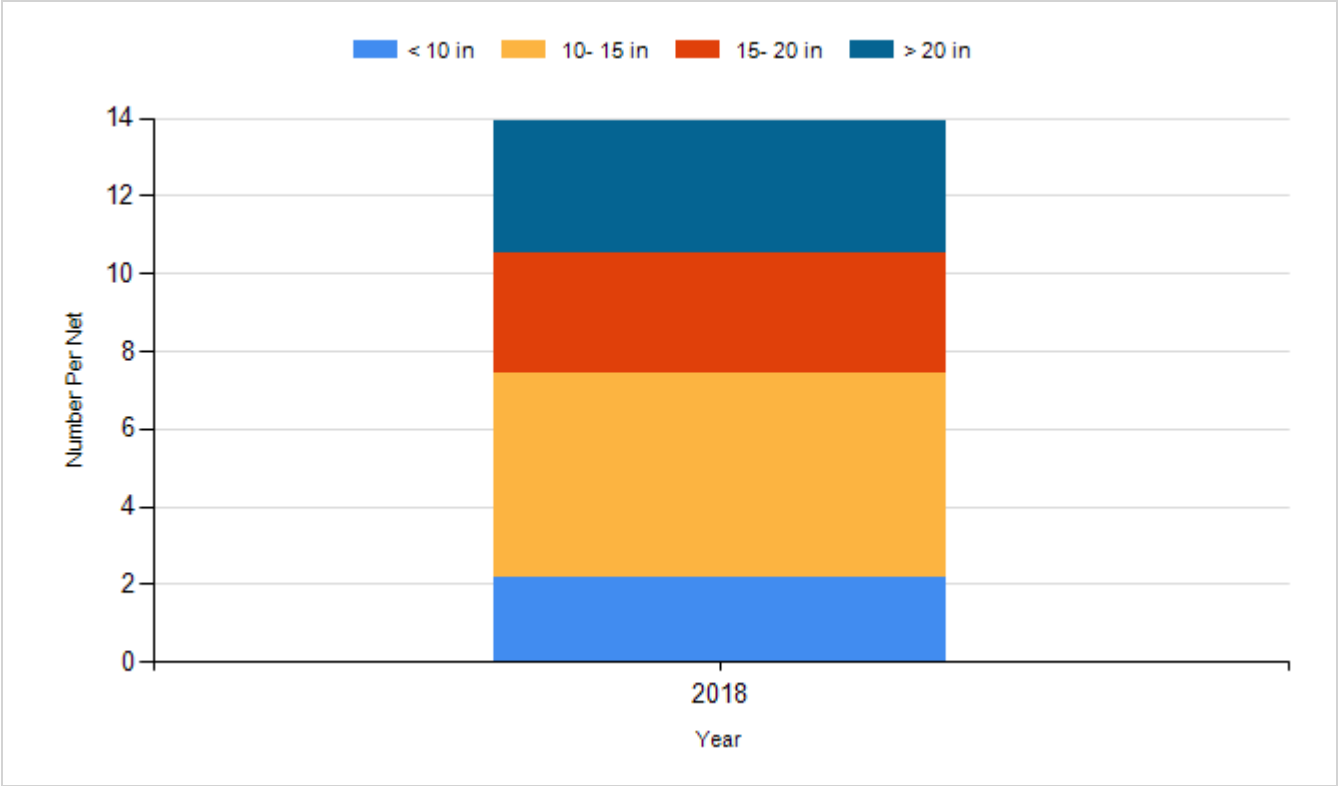


2015

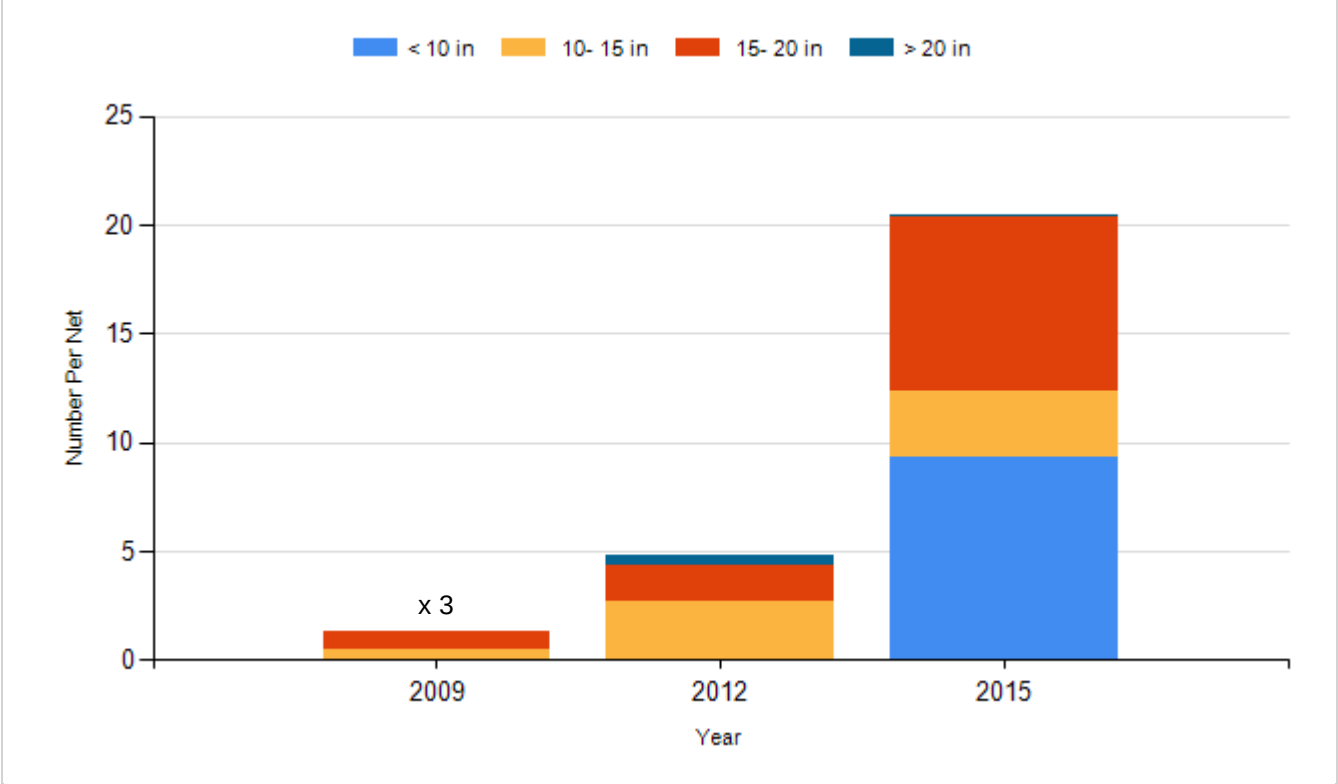
Historic Fish Sizes and Relative Abundance

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

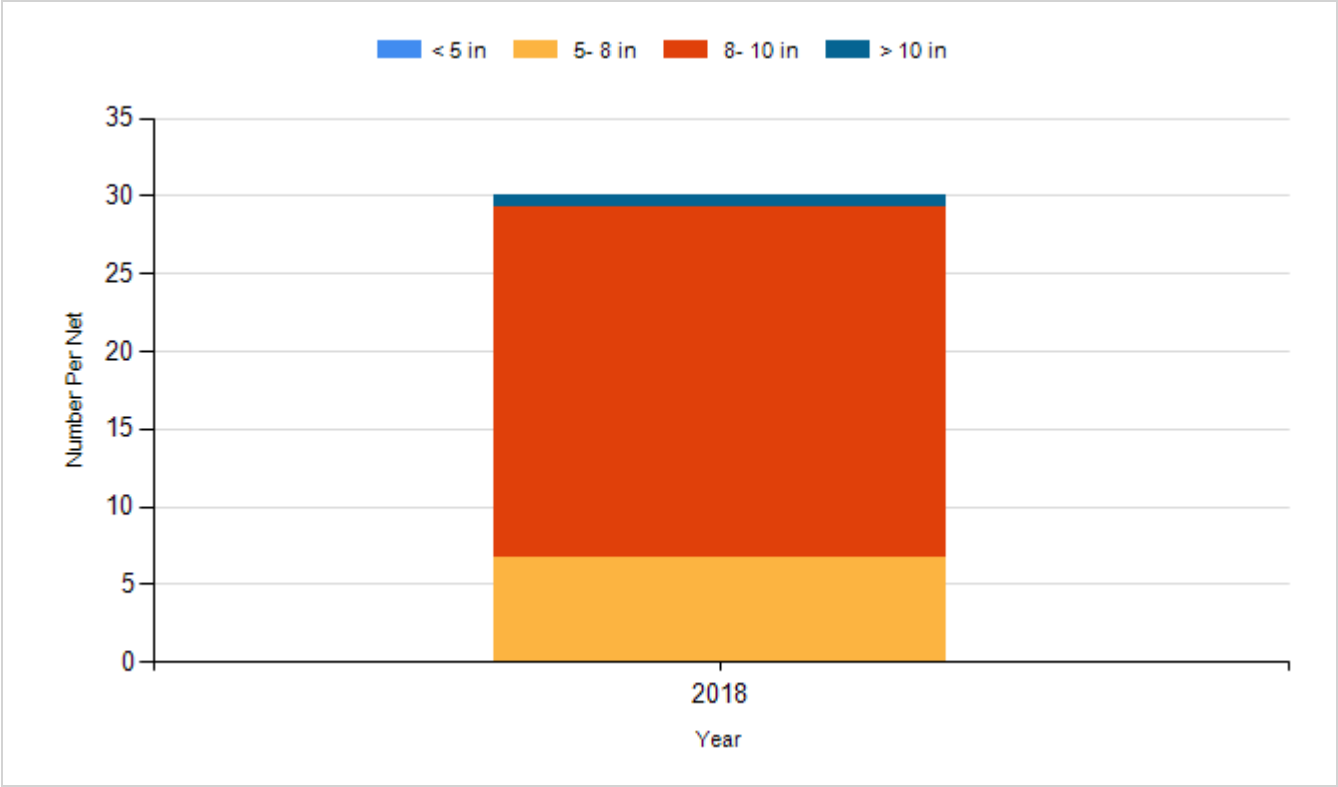
Species: Walleye
Gear: AFS std gill net



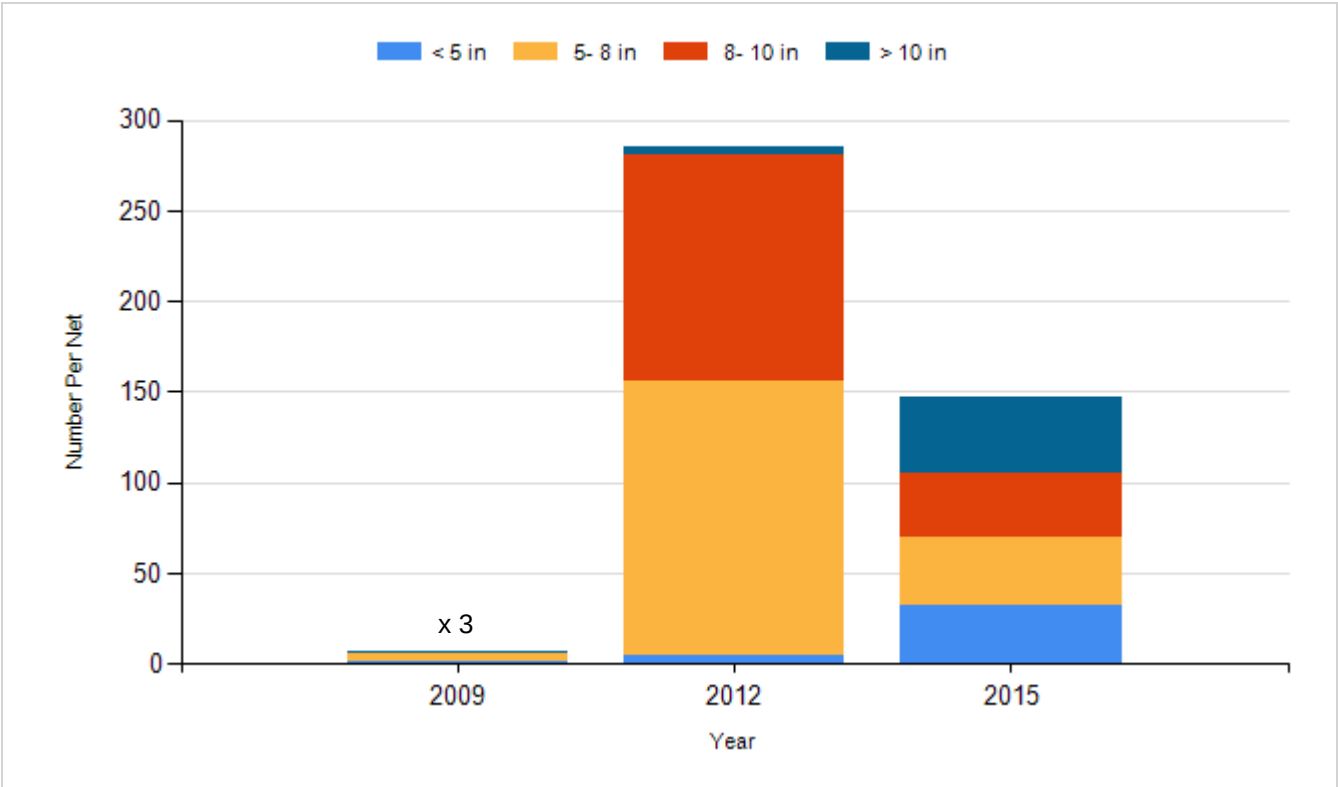
Species: Walleye
Gear: std exp gill net



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
2008	Walleye	Fry	1,500,000
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