

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Deerfield, Pennington County
RAP-Lake-31-000
2022

Lake Information

Name: Deerfield
County: Pennington
Surface Area: 416 Acres

Surveys and Investigations

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

Gear	Date	Effort
AFS std frame net	May 24, 2022	7 net-nights
AFS std gill net	May 24, 2022	4 net-nights

Common Fish Species Present

Rainbow Trout

Splake Trout

Brook Trout

White Sucker

Yellow Perch

Rock Bass

Green Sunfish

Lake Trout

Golden Shiner

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 frame net	Brook Trout	2	0.0	0.0						
	Golden Shiner	3	0.0	0.0						
	Rainbow Trout	5	0.6	0.6	0		0		67	13
	Rock Bass	88	14.9	6.1	49	7	12	5	84	2
	White Sucker	636	105.1	50.2	76	2	32	2	98	1
	Yellow Perch	497	84.7	47.5	29	2	13	2	68	
AFS std gill net	Brook Trout	21	0.0	0.0						
	Golden Shiner	1	0.0	0.0						
	Green Sunfish	2	0.5	0.8	0		0		59	4
	Lake Trout	1	0.3	0.4	100		100		83	
	Rainbow Trout	3	0.8	0.4	33		0		63	10
	Rock Bass	2	0.5	0.8	0		0		88	5
	White Sucker	99	24.8	14.1	93	4	62	7	97	1
	Yellow Perch	220	54.8	27.2	24	4	1		76	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.

* Methods/Species that ignore stock length

Gear	Species	CPUE										Avg
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
AFS std frame net	Brook Trout										0.0	0.00
	Golden Shiner										0.0	0.00
	Rainbow Trout										0.6	0.60
	Rock Bass										14.9	14.90
	White Sucker										105.1	105.10
	Yellow Perch										84.7	84.70
AFS std gill net	Brook Trout						0.0		0.0	0.0	0.0	0.00
	Golden Shiner						0.0		0.0	0.0	0.0	0.00
	Green Sunfish						0.0		0.0	0.0	0.5	0.13
	Lake Trout						0.0		0.0	0.0	0.3	0.08
	Rainbow Trout						2.0		0.5	1.0	0.8	1.08
	Rock Bass						5.9		0.4	1.8	0.5	2.15
	White Sucker						16.5		10.0	15.5	24.8	16.70
	Yellow Perch						33.8		13.5	45.3	54.8	36.85
frame net (std 3/4 in)	Brook Trout	0.0	0.0		0.0					0.0		0.00
	Creek Chub	0.0	0.0		0.0					0.0		0.00
	Golden Shiner	0.0	0.0		0.0					0.0		0.00
	Rainbow Trout	0.0	1.3		0.0					1.3		0.65
	Rock Bass	33.2	45.3		119.7					25.5		55.93
	White Sucker	3.7	4.2		7.2					82.6		24.43
	Yellow Perch	5.0	22.5		2.7					28.6		14.70
std exp gill net	Brook Trout	0.0	0.0	0.0	0.0							0.00
	Brown Trout (Utah)	0.0	0.0	0.0	0.0							0.00
	Golden Shiner	0.0	0.0	0.0	0.0							0.00
	Lake Trout	0.0	0.0	0.5	0.0							0.13
	Rainbow Trout	10.5	2.3	7.3	1.3							5.35
	Rock Bass	8.5	7.3	5.5	8.7							7.50
	Splake Trout	0.0	0.0	0.0	0.0							0.00
	White Sucker	6.0	8.5	5.5	12.7							8.18
	Yellow Perch	80.8	87.3	41.8	58.3							67.05

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 frame net	Rainbow Trout	PSD													0		
		PSD-P														0	
		Wr														67	
	Rock Bass	PSD														49	
		PSD-P														12	
		Wr														84	
	White Sucker	PSD														76	
		PSD-P														32	
		Wr														98	
	Yellow Perch	PSD														29	
		PSD-P														13	
		Wr														68	
	AFS std gill net	Green Sunfish	PSD														0
			PSD-P														0
			Wr														59
Lake Trout		PSD														100	
		PSD-P														100	
		Wr														83	
Rainbow Trout		PSD								6		0	0	0	33		
		PSD-P								0		0	0	0	0		
		Wr								74		68	63	63			
Rock Bass		PSD								19		33	43	0			
		PSD-P								9		0	14	0			
		Wr								84		87	87	88			
White Sucker		PSD								99		100	97	93			
		PSD-P								66		86	63	62			
		Wr								94		99	93	97			
Yellow Perch		PSD								33		35	17	24			
		PSD-P								1		3	1	1			
		Wr								81		88	83	76			
frame net (std 3/4 in)		Rainbow Trout	PSD			0										20	
			PSD-P			0											0

Gear	Species	Index	Year									
			2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
frame net (std 3/4 in)	Rainbow Trout	Wr		76								72
	Rock Bass	PSD	0	7		2						26
		PSD-P	0	2		0						6
		Wr	80	82								89
	White Sucker	PSD	95	100		86						89
		PSD-P	77	100		81						58
		Wr	96	91								91
	Yellow Perch	PSD	13	16		50						24
		PSD-P	0	1		0						3
		Wr	83	86								
std exp gill net	Lake Trout	PSD			100							
		PSD-P			50							
		Wr			99							
	Rainbow Trout	PSD	0	0	0	0						
		PSD-P	0	0	0	0						
		Wr	80	75	75	77						
	Rock Bass	PSD	0	0	0	8						
		PSD-P	0	0	0	0						
		Wr	78	92	85	93						
	White Sucker	PSD	100	100	100	97						
		PSD-P	92	100	100	79						
		Wr	101	103	100	103						
	Yellow Perch	PSD	28	18	36	50						
		PSD-P	0	0	0	4						
		Wr	81	91	85	96						

Fish Condition

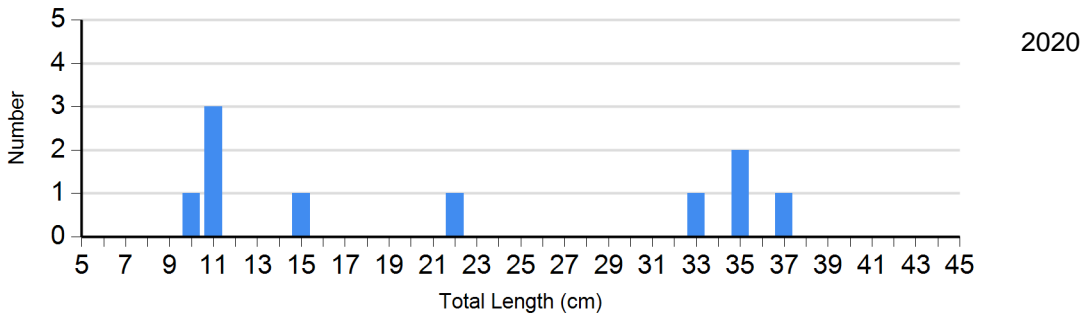
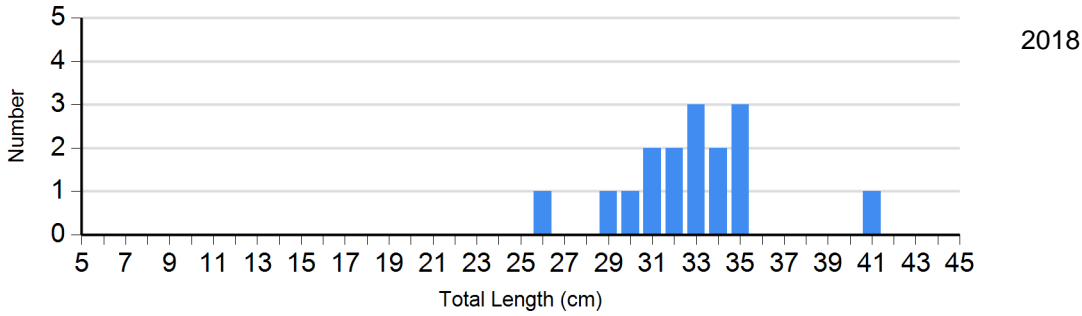
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Lake Trout Gill Net	2022	0		0		1	83	0	
Rainbow Trout Gill Net	2018	15	74 (1.8)	1	83	0		0	
	2020	4	68 (0.8)	0		0		0	
	2021	4	63 (1.6)	0		0		0	
	2022	2	56 (0.4)	1	78	0		0	
White Sucker Gill Net	2018	1		44	95 (1.3)	39	94 (1.1)	48	94 (1.3)
	2020	0		11	98 (3.4)	40	99 (1.9)	29	99 (1.8)
	2021	2		21	87 (1.8)	27	97 (1.8)	12	97 (2.6)
	2022	7	91 (1.4)	31	93 (1.1)	39	100 (1.2)	22	100 (1.6)
Yellow Perch Gill Net	2018	180	87 (0.6)	88	69 (0.7)	1	96	1	86
	2020	70	92 (1.1)	35	79 (1.1)	0		3	81 (2.1)
	2021	151	84 (0.7)	28	75 (1.0)	1		1	
	2022	166	81 (0.8)	51	66 (1.3)	1		1	

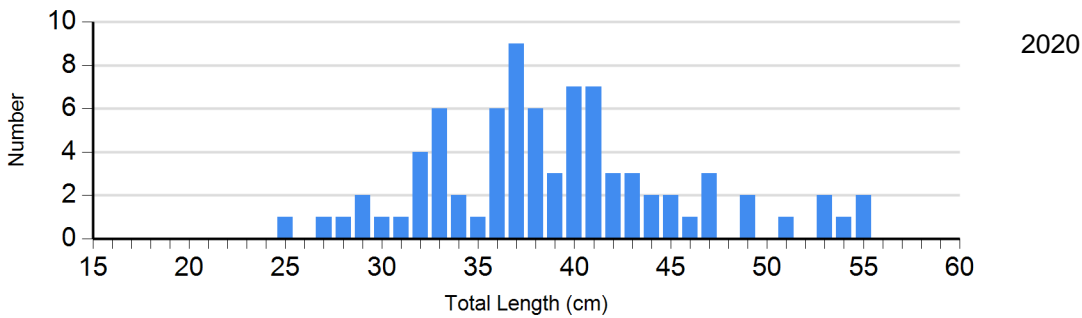
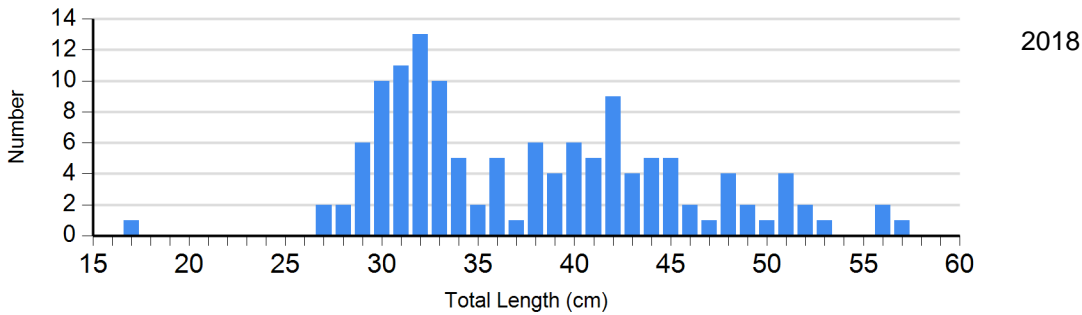
Length Frequency Distribution

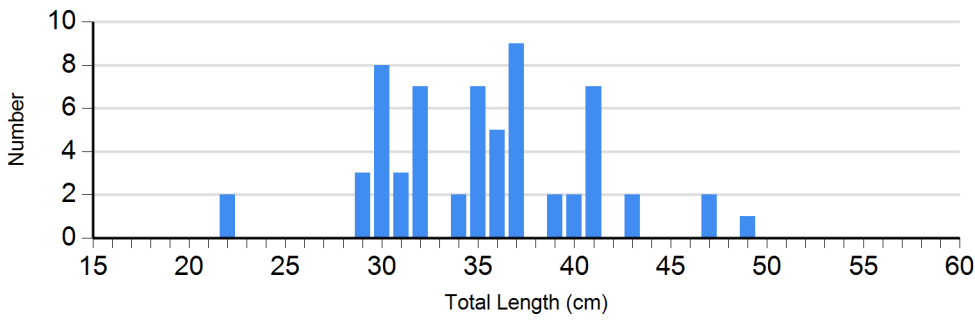
Length frequency histogram of species sampled by year.

Species: Rainbow Trout
Gear: AFS std gill net

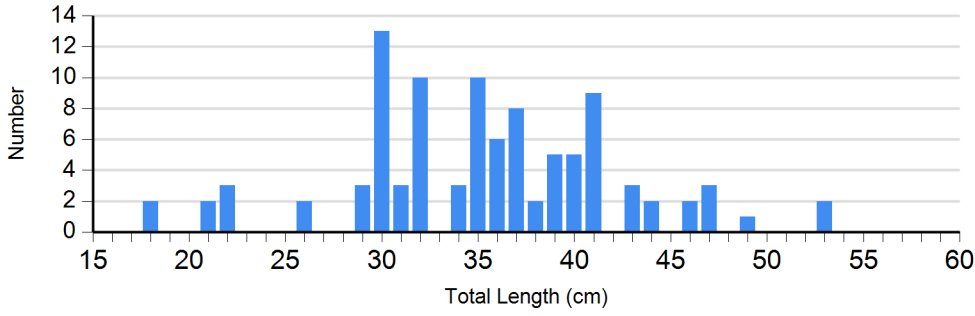


Species: White Sucker
Gear: AFS std gill net



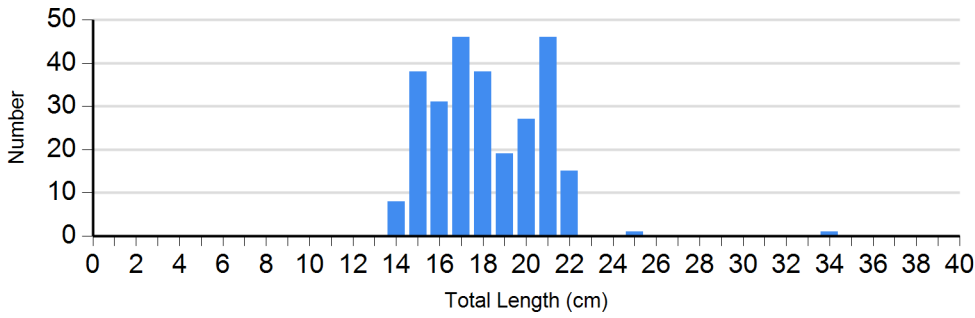


2021

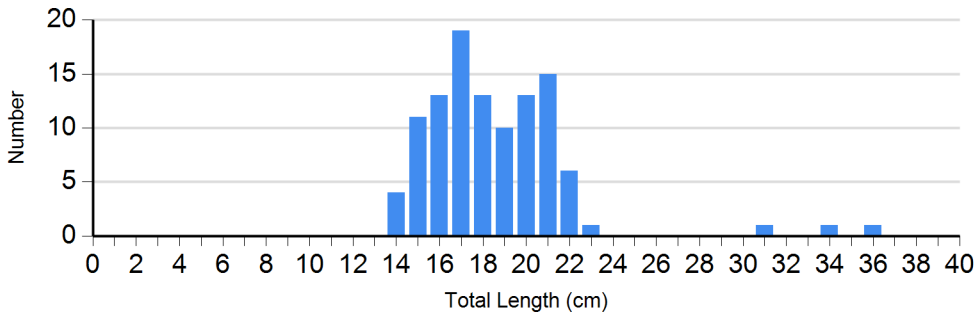


2022

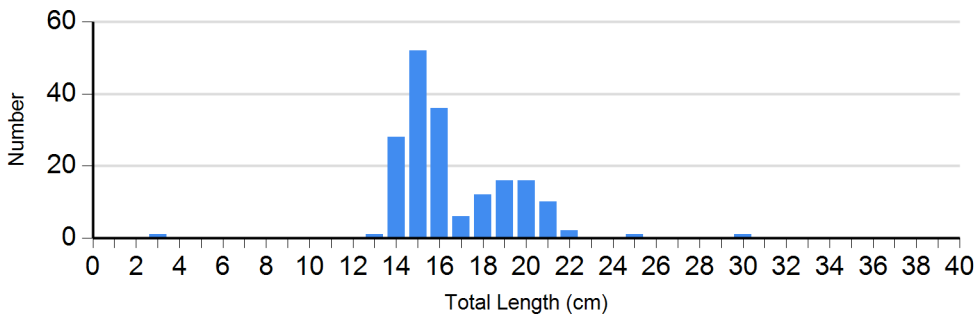
Species: Yellow Perch
Gear: AFS std gill net



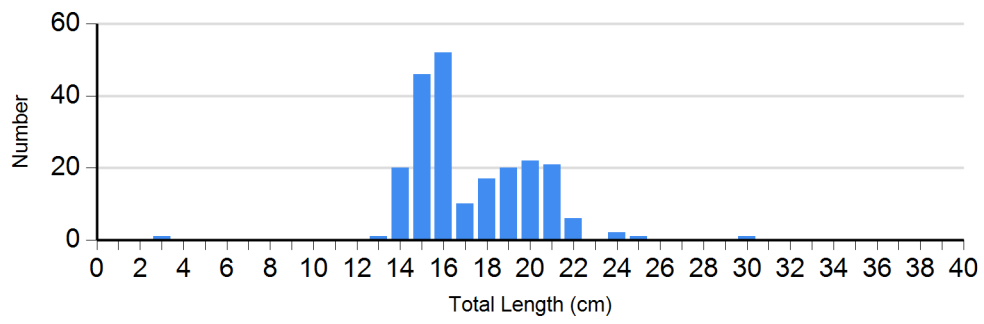
2018



2020



2021

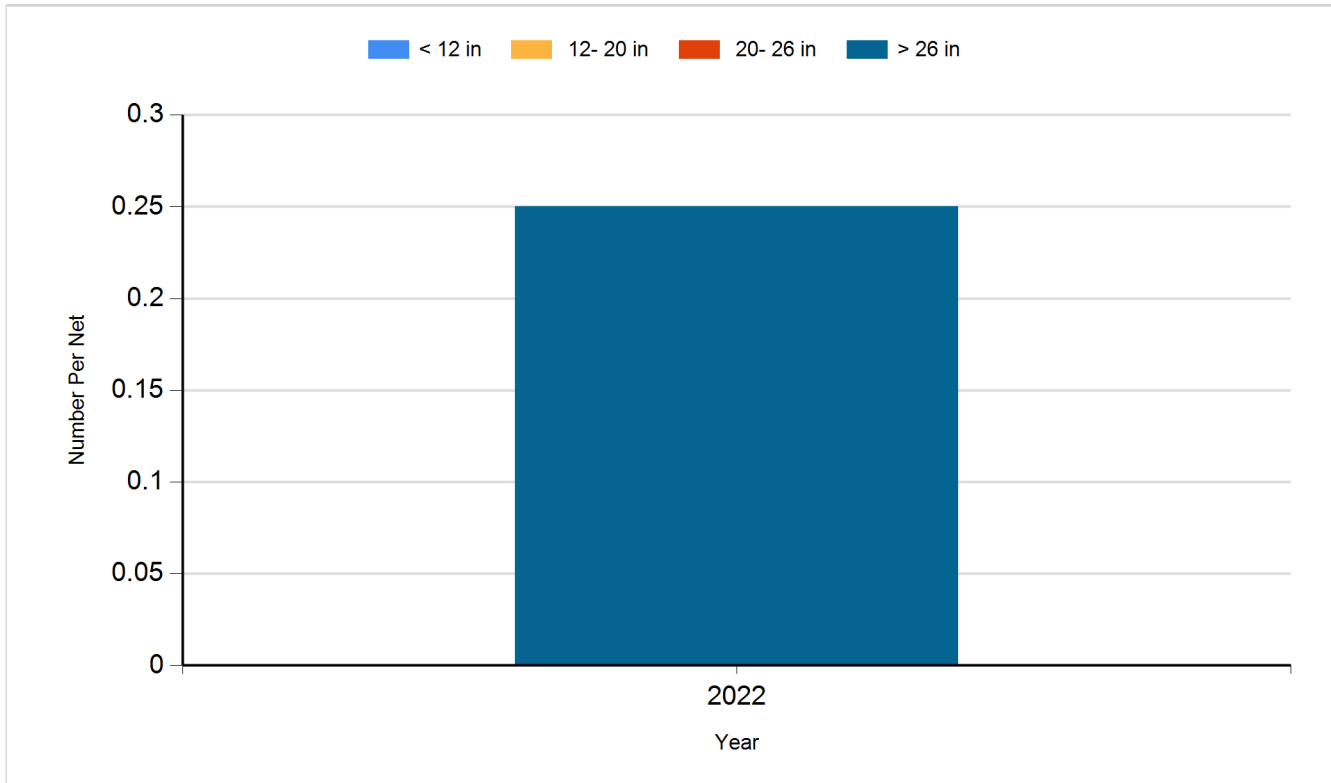


2022

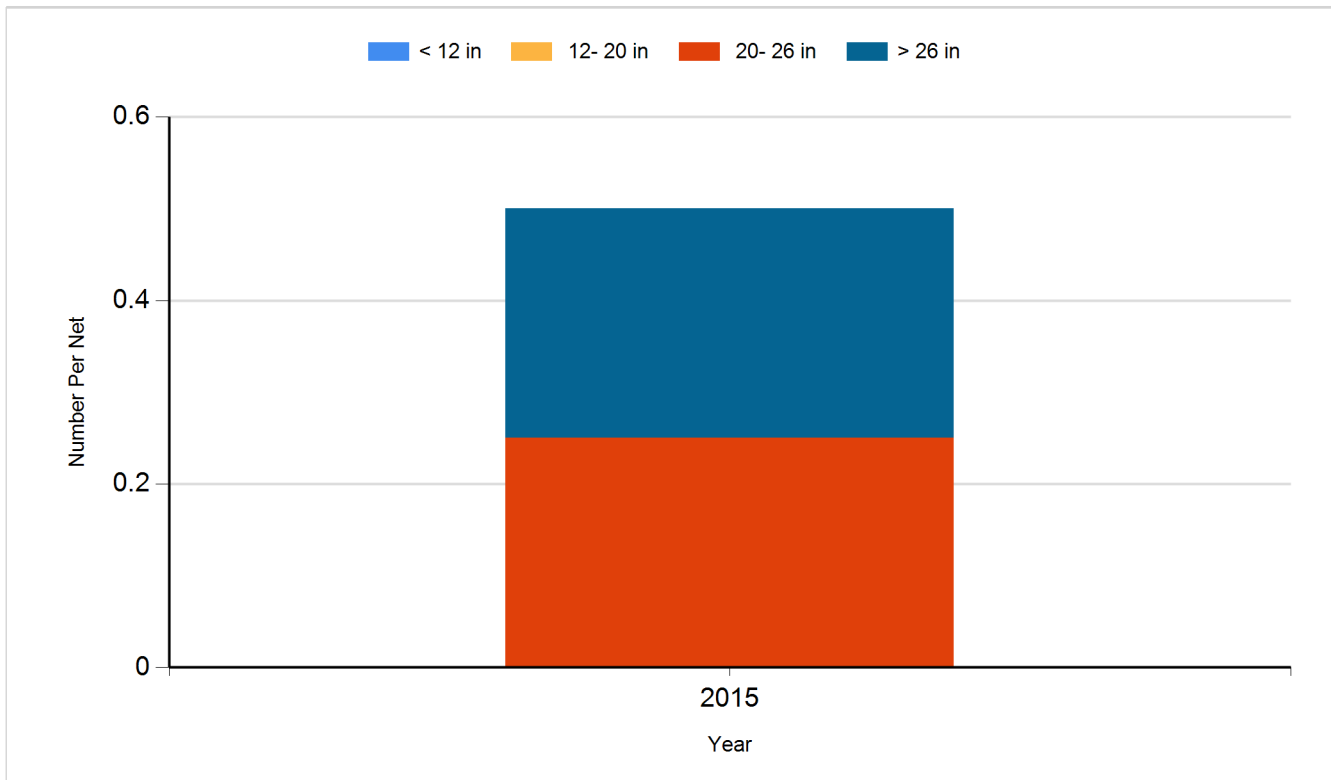
Historic Fish Sizes and Relative Abundance

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

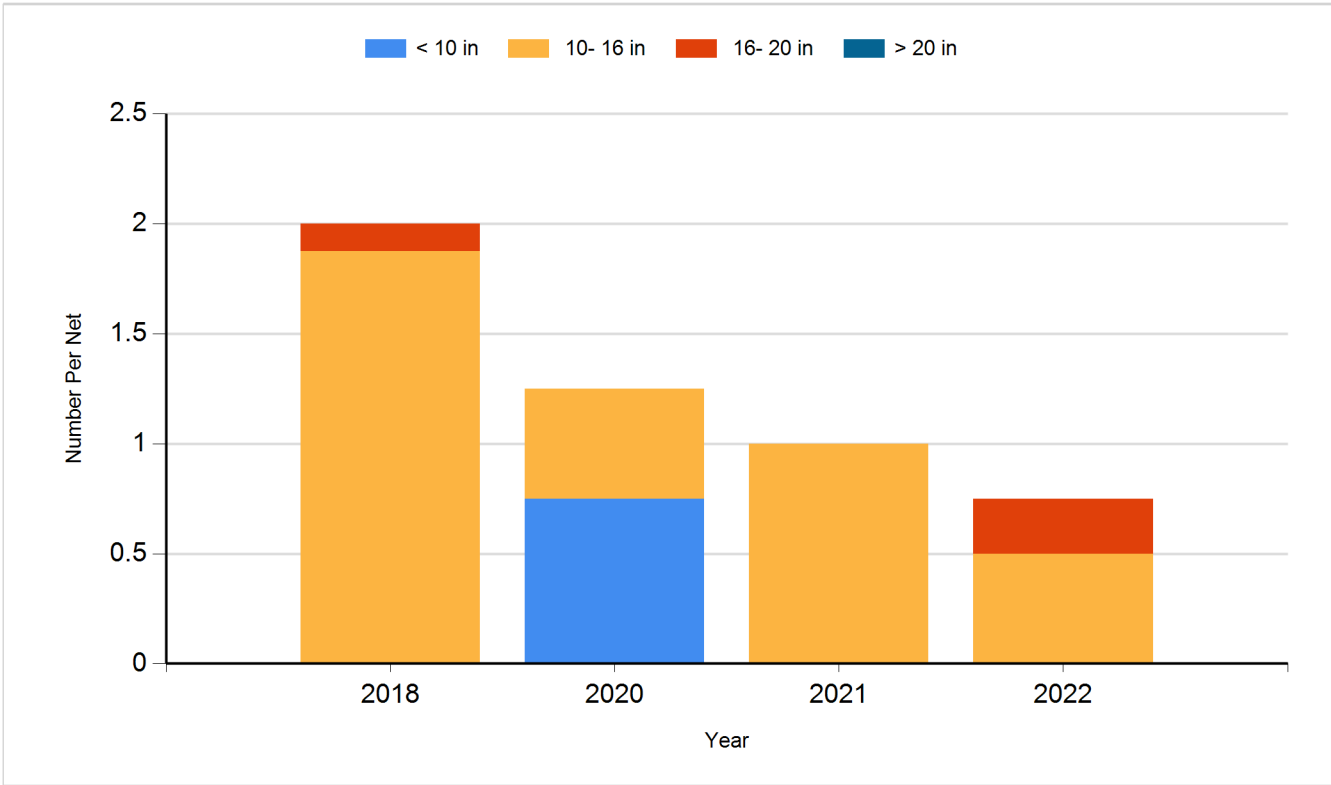
Species: Lake Trout
Gear: AFS std gill net



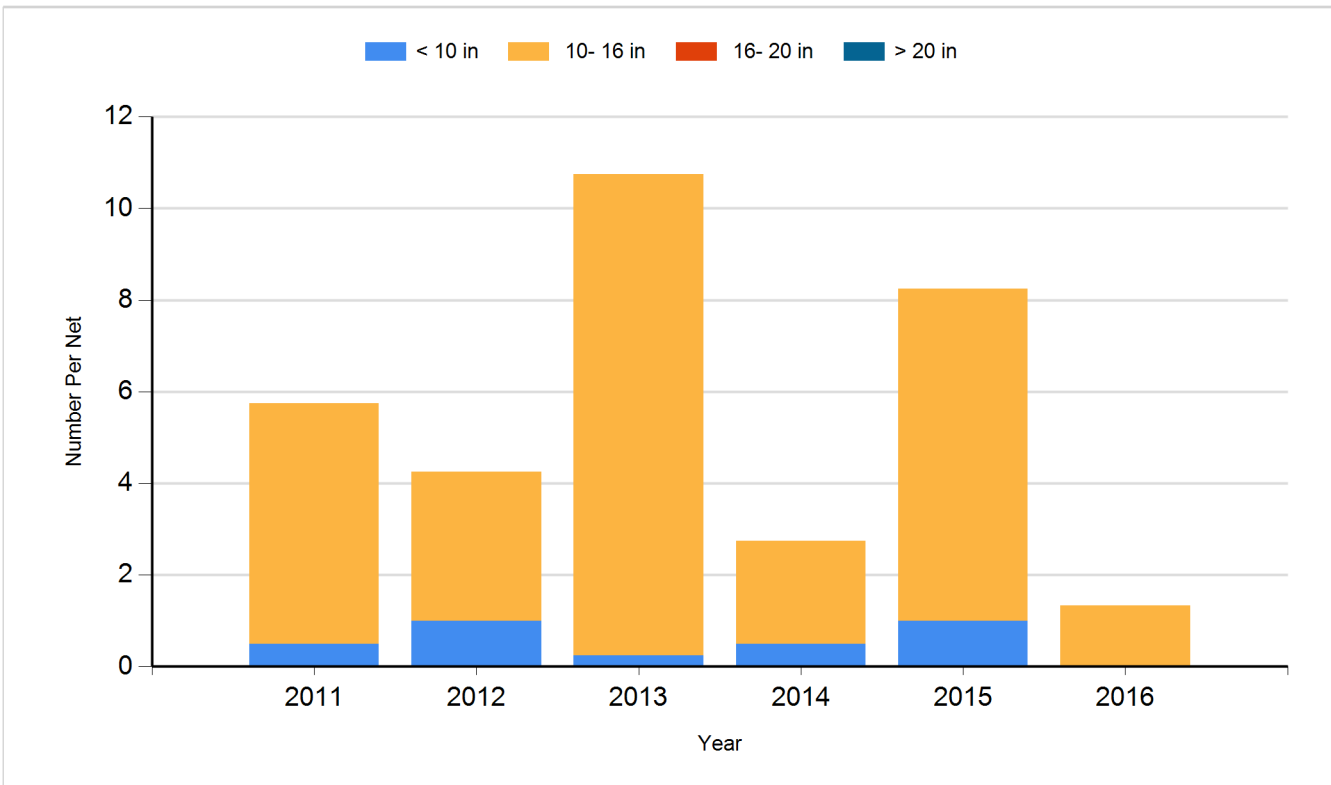
Species: Lake Trout
Gear: std exp gill net



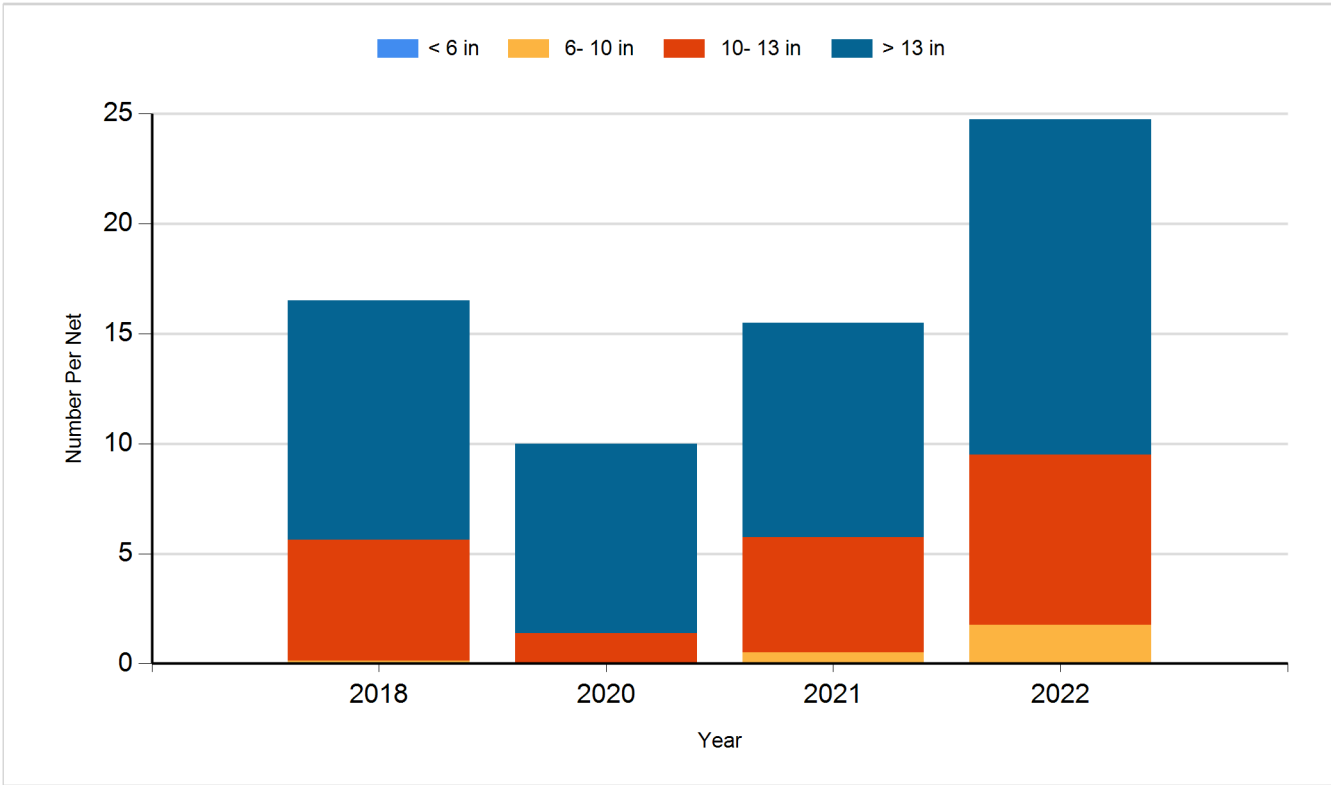
Species: Rainbow Trout
Gear: AFS std gill net



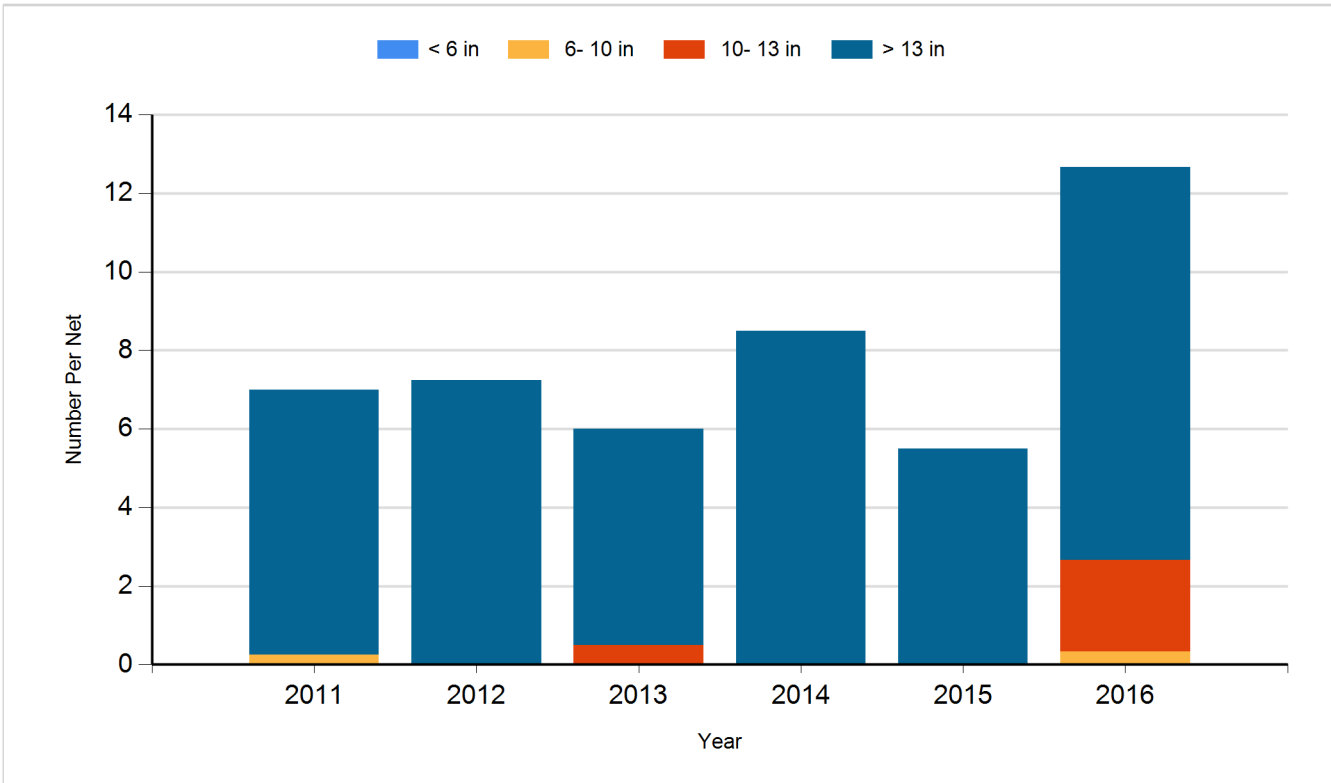
Species: Rainbow Trout
Gear: std exp gill net



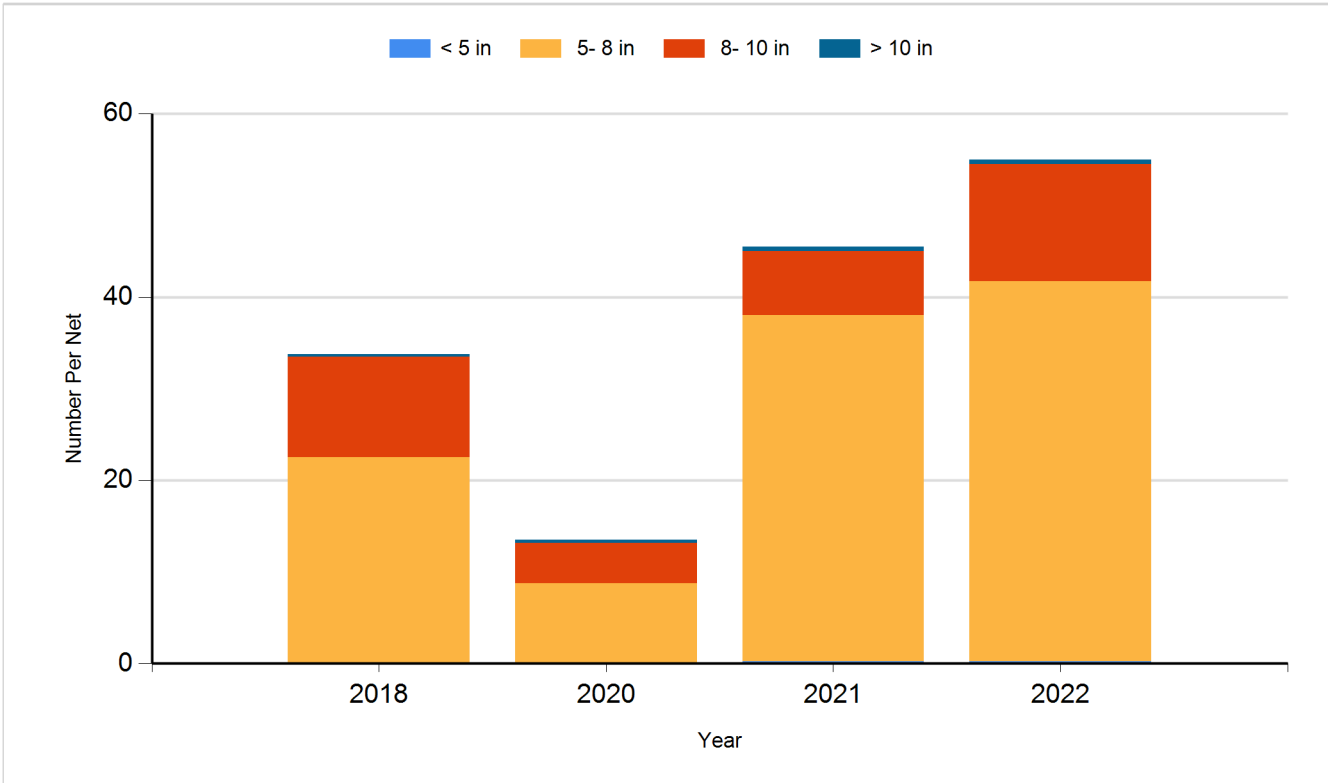
Species: White Sucker
Gear: AFS std gill net



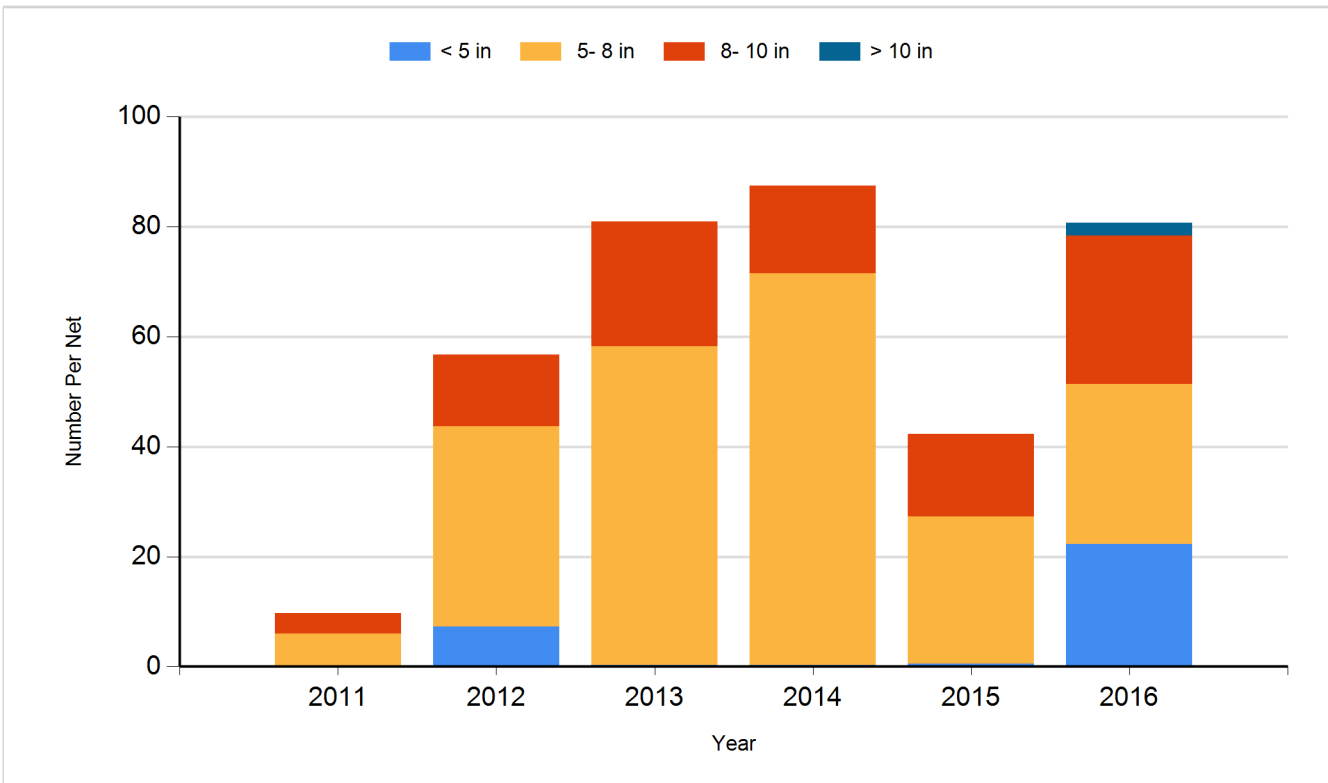
Species: White Sucker
Gear: std exp gill net



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	Rainbow Trout (Erwin x Arlee)	Catchable 11"	4,000
2011	Rainbow Trout (McConaugRainbow Trout)	Catchable 11"	4,000
2011	Rainbow Trout (Shasta)	Catchable 11"	4,000
2012	Rainbow Trout (Erwin x Arlee)	Catchable 11"	4,500
2012	Rainbow Trout (McConaugRainbow Trout)	Catchable 11"	4,000
2012	Rainbow Trout (Shasta)	Catchable 11"	4,000
2012	Splake Trout (Story)	Fingerling	5,853
2013	Rainbow Trout (Erwin x Arlee)	Catchable 11"	4,000
2013	Rainbow Trout (McConaugRainbow Trout)	Catchable 11"	4,000
2013	Rainbow Trout (Shasta)	Catchable 11"	4,000
2014	Rainbow Trout (Shasta)	Catchable 11"	12,000
2015	Lake Trout	Adult	823
2015	Rainbow Trout (Shasta)	Catchable 11"	12,000
2016	Lake Trout	Adult	400
2016	Rainbow Trout (Shasta)	Catchable 11"	9,516
2017	Rainbow Trout (Shasta)	Catchable 11"	9,687
2018	Rainbow Trout (Shasta)	Catchable	9,030
2019	Rainbow Trout (Shasta)	Catchable 11"	1,636
2019	Rainbow Trout (Shasta)	Catchable 15"	7,481
2020	Rainbow Trout (Gerrard)	Adult	4,826
2020	Rainbow Trout (Shasta)	Catchable 11"	918
2020	Rainbow Trout (Shasta)	Catchable 15"	3,998
2021	Rainbow Trout (Arlee)	Adult	3,694
2021	Rainbow Trout (Gerrard)	Adult	4,578
2021	Rainbow Trout (Shasta)	Adult	900
2022	Rainbow Trout (Arlee)	Adult	3,936
2022	Rainbow Trout (Gerrard)	Adult	4,115
2022	Rainbow Trout (Shasta)	Adult	1,298