Deerfield Reservoir

Deerfield Reservoir is a 416-acre impoundment located 22 miles northwest of Hill City on Deerfield Road. The primary species in the lake are Yellow Perch, Lake Trout, Rainbow Trout and Brook Trout. There are several secondary species such as White Sucker, Rock Bass and Splake Trout.

Yellow Perch. Yellow Perch dominate the lake. Catch rates this year were 626.8 fish per frame net, and 3.3 fish per gill net. The perch population suffers slow growth due to the high abundance. The average perch being caught is from 6-7 inches. Game Fish and Parks is actively trapping and transferring yellow perch from Deerfield every spring. Spring of 2023, GFP trapped and transferred roughly 50,000 yellow perch from the lake. These perch were stocked in other waters to increase angling opportunities.

Rainbow Trout. Deerfield is home to a small population of natural spawning rainbow trout. Due to the small natural population, rainbow trout are also stocked into Deerfield every year. 13,391 rainbow trout were stocked in 2023. The average sample size for 2023 per gill net was 1.0 and sample size in the frame nets were 1.2 with an average length of 13 inches.

Lake Trout. Deerfield is home to some large lake trout. In 2023, 536 retired brood stock lake trout were stocked into the reservoir. The average sample size for the gill nets in 2023 were 0.5 fish per net.

Brook Trout. Deerfield has a heathy population of brook trout. The average size in the sample nets was 9 inches.

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Deerfield, Pennington County
RAP-Lake-31-000
2023

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 gill net	May 23, 2023	4 net-nights
frame net (std 3/4 in)	May 23, 2023	6 net-nights

Common Fish Species Present

Rainbow Trout

Splake Trout

Brook Trout

Yellow Perch

White Sucker

Rock Bass

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.

- 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.

$$PSD = \left(\frac{number\ of\ fish \geq quality\ length}{number\ of\ fish \geq stock\ length}\right) \times 100$$

$$PSD - P = \left(\frac{number\ of\ fish \geq preferred\ length}{number\ of\ fish \geq stock\ length}\right) \times 100$$

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.

$$Wr = \left(\frac{W}{Ws}\right) \times 100$$

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 (in)	Stock (cm)	Quality (in)	Quality (cm)	Preferred (in)	Preferred (cm)	Memorable (in)	Memorable (cm)	Trophy (in)	Trophy (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	Brook Trout	13	0.0	0.0						
	Lake Trout	2	0.5	0.8	100		50		105	12
	Rainbow Trout	4	1.0	0.9	0		0		61	7
	Rock Bass	1	0.3	0.4	0		0		77	
	White Sucker	8	2.0	1.5	100		75		95	3
	Yellow Perch	13	3.3	1.9	15		0		72	3
frame net (std 3/4 in)	Brook Trout	13	0.0	0.0						
	Golden Shiner	109	0.0	0.0						
	Rainbow Trout	8	1.2	0.7	14		0		66	6
	Rock Bass	145	23.5	7.6	36	6	11	4	90	2
	White Sucker	510	85.0	48.5	90	2	60	3	94	1
	Yellow Perch	3761	626.8	416.1	24	1	3	0	72	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

		CPUE										
Gear	Species	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Avg
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	0.0	0.00
	Golden Shiner					0.0		0.0	0.0	0.0	0.0	0.00
	Green Sunfish					0.0		0.0	0.0	0.5	0.0	0.10
	Lake Trout					0.0		0.0	0.0	0.3	0.5	0.16
	Rainbow Trout					2.0		0.5	1.0	0.8	1.0	1.06
	Rock Bass					5.9		0.4	1.8	0.5	0.3	1.78
	White Sucker					16.5		10.0	15.5	24.8	2.0	13.76
	Yellow Perch					33.8		13.5	45.3	54.8	3.3	30.14
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	1.3		0.0					1.3		1.2	0.95
	Rock Bass	45.3		119.7					25.5		23.5	53.50
	White Sucker	4.2		7.2					82.6		85.0	44.75
	Yellow Perch	22.5		2.7					28.6		626.8	170.15
std exp gill net	Brook Trout	0.0	0.0	0.0								0.00
	Golden Shiner	0.0	0.0	0.0								0.00
	Lake Trout	0.0	0.5	0.0								0.17
	Rainbow Trout	2.3	7.3	1.3								3.63
	Rock Bass	7.3	5.5	8.7								7.17
	Splake Trout	0.0	0.0	0.0								0.00
	White Sucker	8.5	5.5	12.7								8.90
	Yellow Perch	87.3	41.8	58.3								62.47

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	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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	Lake Trout	PSD									100	100
		PSD-P									100	50
		Wr									83	105
	Rainbow Trout	PSD					6		0	0	33	0
		PSD-P					0		0	0	0	0
		Wr					74		68	63	63	61
	Rock Bass	PSD					19		33	43	0	0
		PSD-P					9		0	14	0	0
		Wr					84		87	87	88	77
	White Sucker	PSD					99		100	97	93	100
		PSD-P					66		86	63	62	75
		Wr					94		99	93	97	95
	Yellow Perch	PSD					33		35	17	24	15
		PSD-P					1		3	1	1	0
		Wr					81		88	83	76	72
frame net (std 3/4 in)	Rainbow Trout	PSD	0								20	14
		PSD-P	0								0	0
		Wr	76								72	66
	Rock Bass	PSD	7		2						26	36
		PSD-P	2		0						6	11

				Year									
Gear	Species	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
frame net (std 3/4 in)	Rock Bass	Wr	82							89		90
	White Sucker	PSD	100		86					89		90
		PSD-P	100		81					58		60
		Wr	91							91		94
	Yellow Perch	PSD	16		50					24		24
		PSD-P	1		0					3		3
		Wr	86									72
std exp gill net	Lake Trout	PSD		100								
		PSD-P		50								
		Wr		99								
	Rainbow Trout	PSD	0	0	0							
		PSD-P	0	0	0							
		Wr	75	75	77							
	Rock Bass	PSD	0	0	8							
		PSD-P	0	0	0							
		Wr	92	85	93							
	White Sucker	PSD	100	100	97							
		PSD-P	100	100	79							
		Wr	103	100	103							
	Yellow Perch	PSD	18	36	50							
		PSD-P	0	0	4							
		Wr	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	S-Q N	S-Q Wr (SE)	Q-P N	Q-P Wr (SE)	P-M N	P-M Wr (SE)	M N	M Wr (SE)
Lake Trout Gill Net	2022	0		0		1	83	0	
	2023	0		1	115	1	96	0	
Rainbow Trout Gill Net	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	
	2023	4	61 (5.1)	0		0		0	
White Sucker Gill Net	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)
	2023	0		2	90 (4.1)	3	95 (4.8)	3	99 (1.5)
Yellow Perch Gill Net	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	
	2023	11	73 (2.5)	2	66 (2.0)	0		0	

Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Rainbow Trout
Gear: AFS std gill net
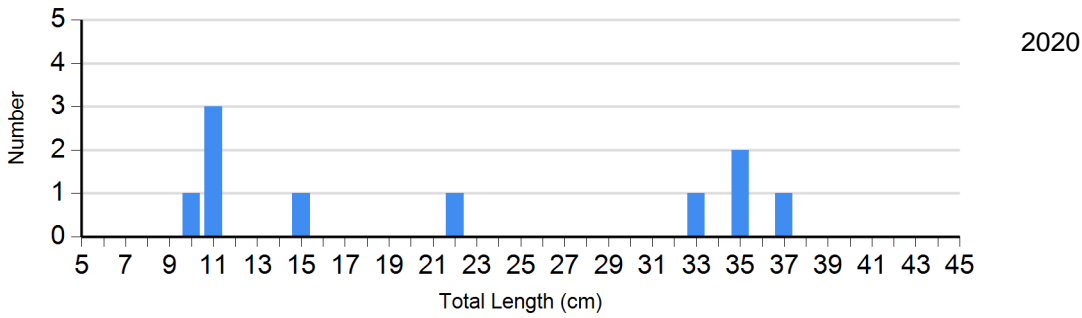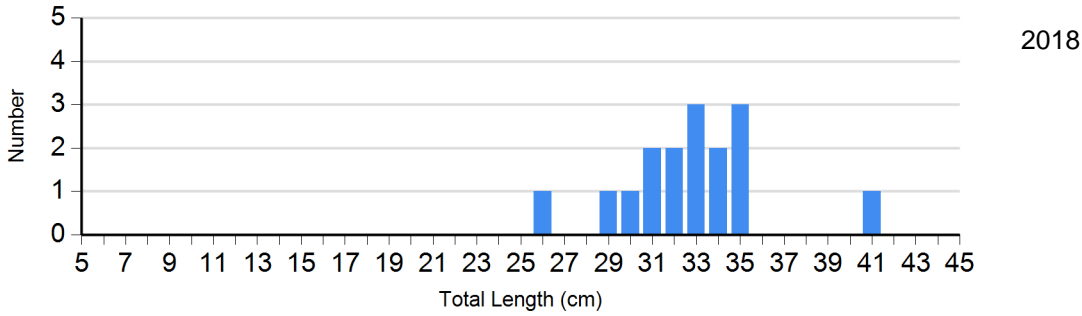
Species: White Sucker
Gear: AFS std gill net
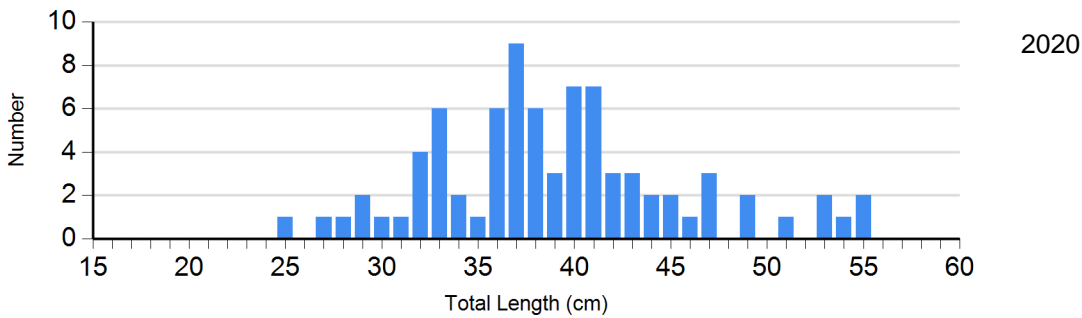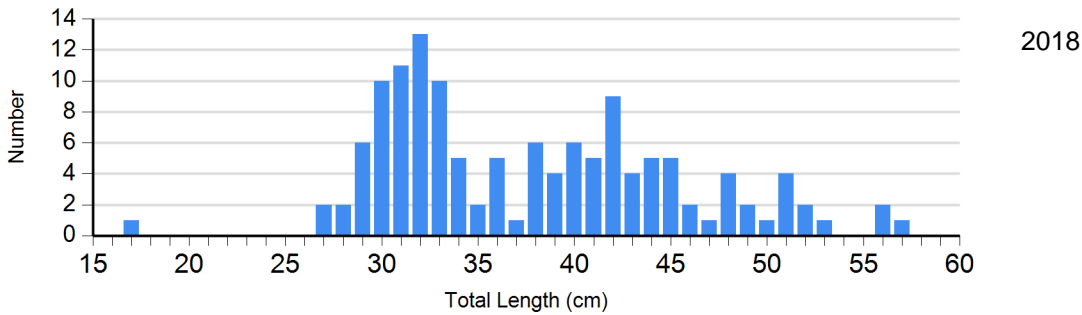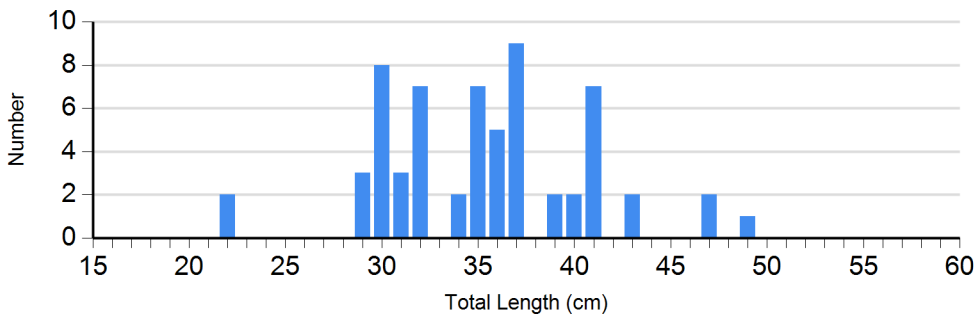
2021
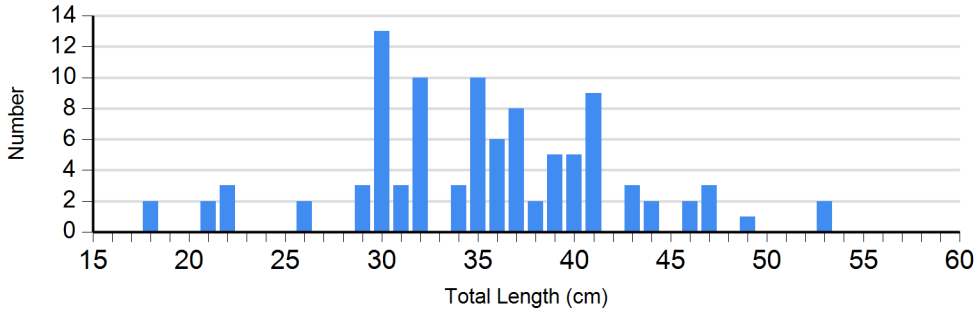
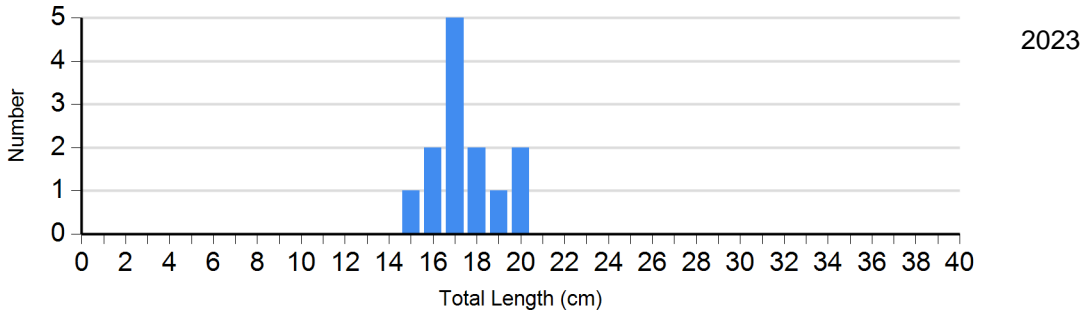

2022

Species: Yellow Perch
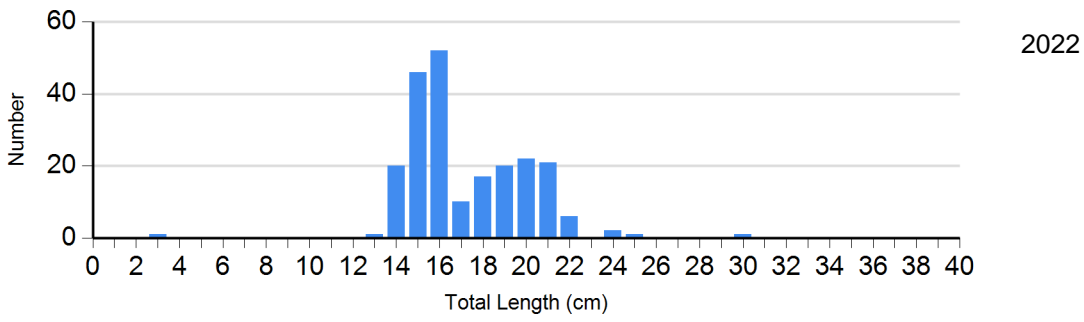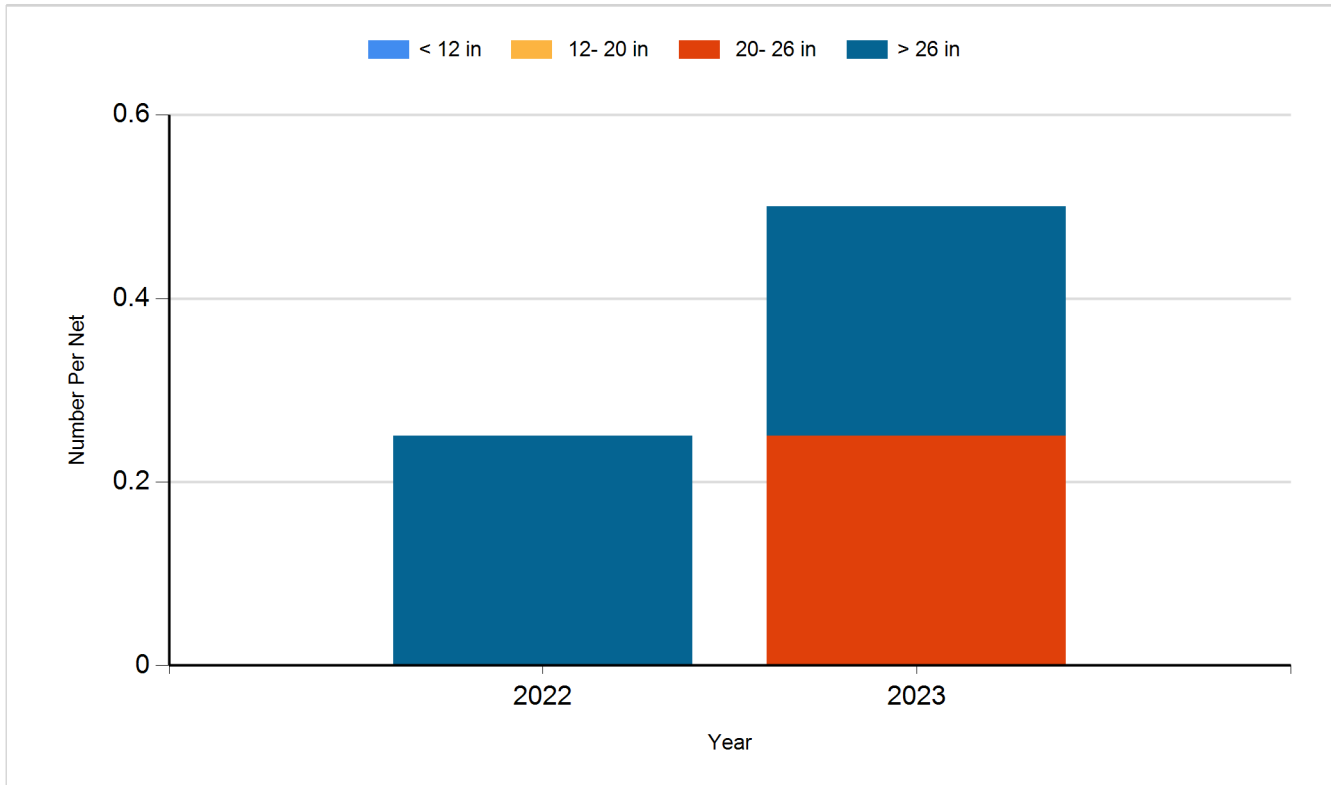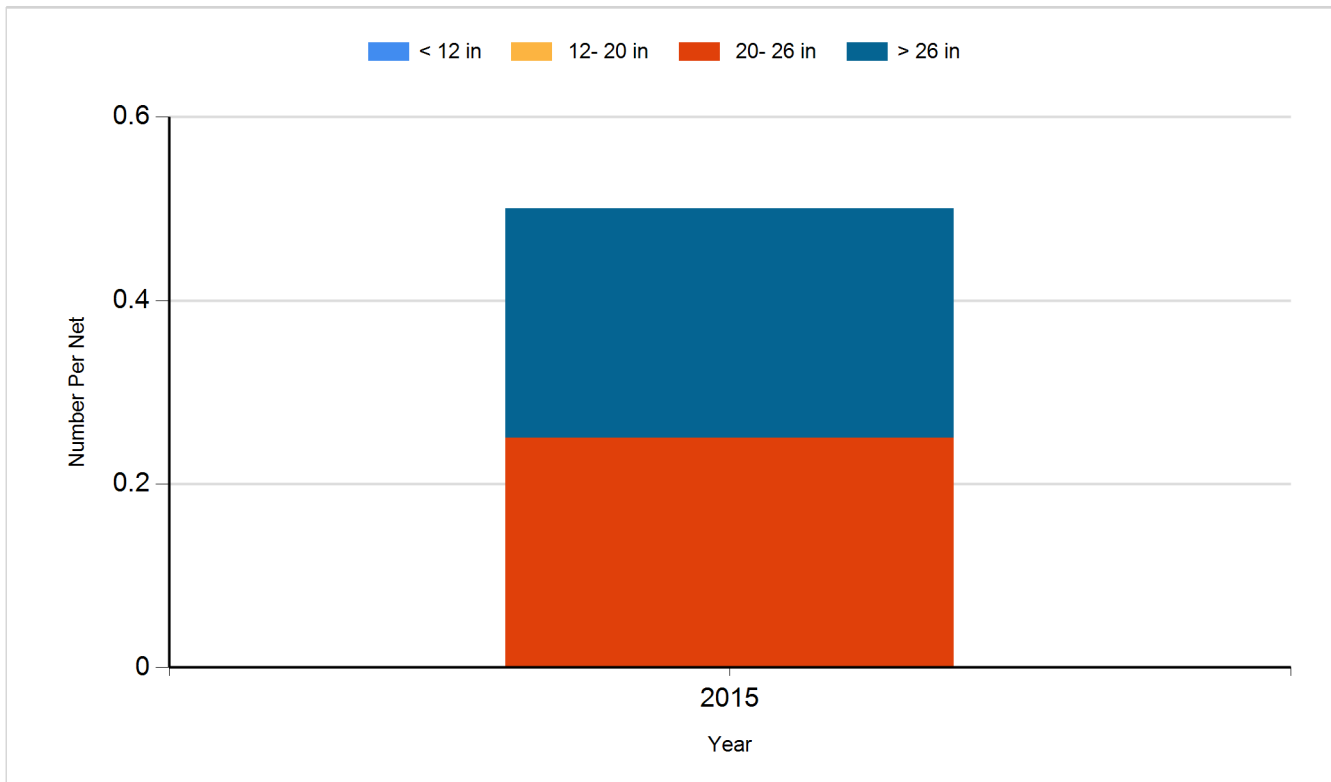Gear: AFS std gill net

2018

2020

2021

2022

2023
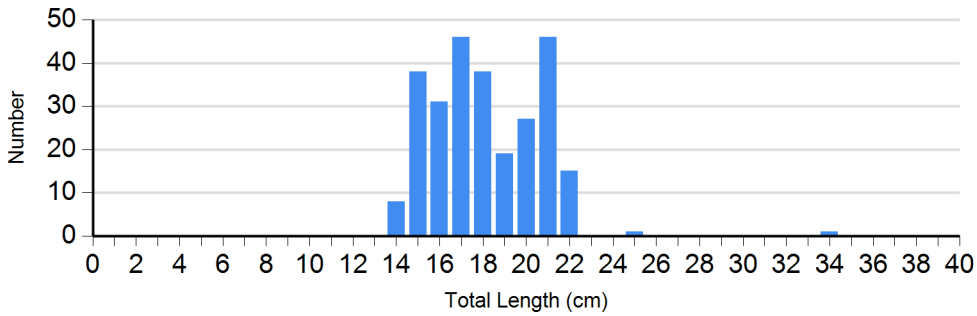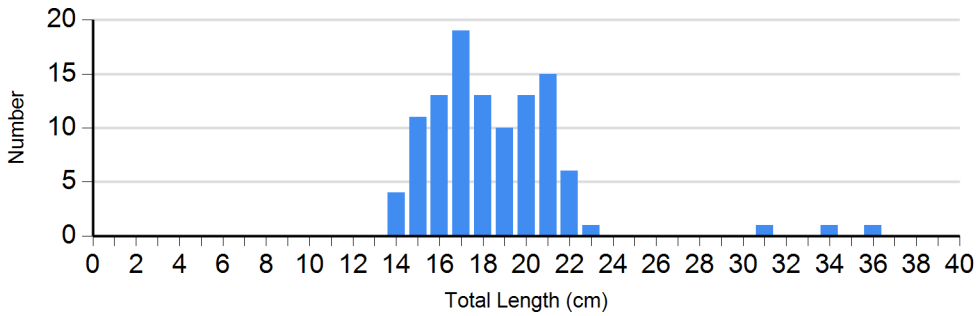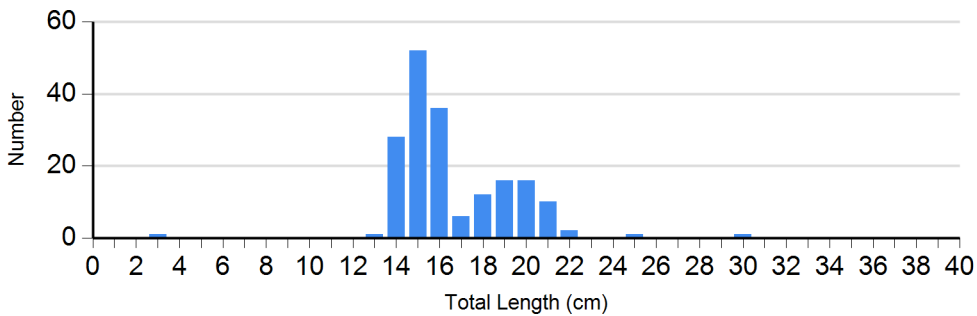
Historic Fish Sizes and Relative Abundance

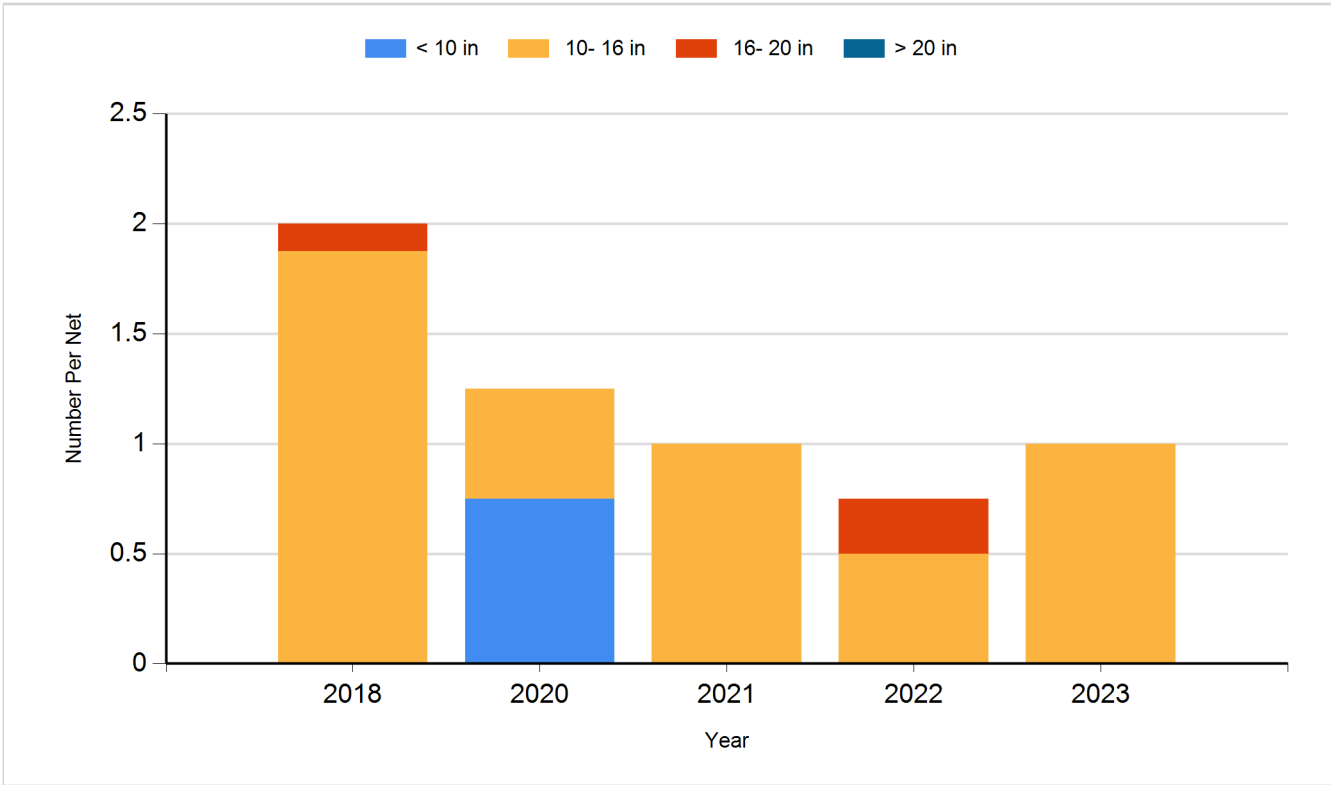Size distribution per net by color for species sampled by year.
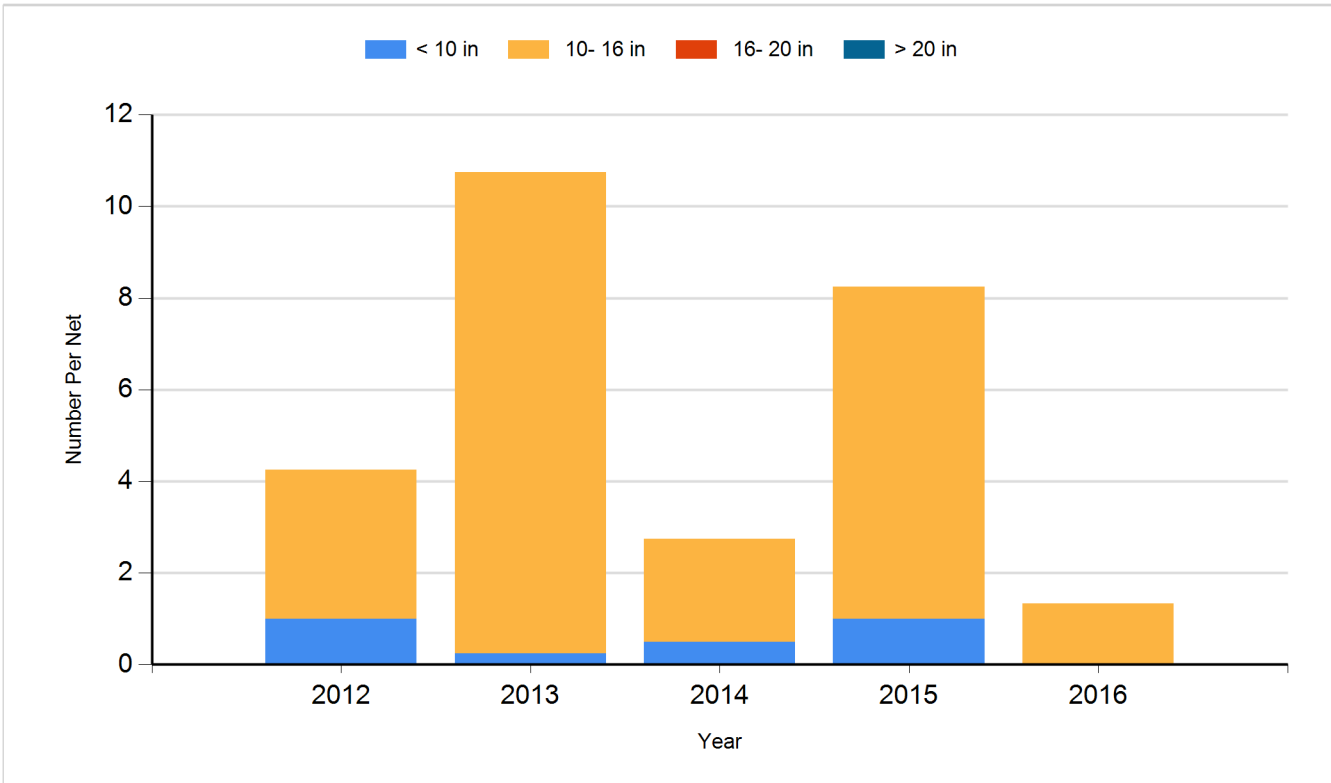
Species: Lake Trout
Gear: AFS std gill net

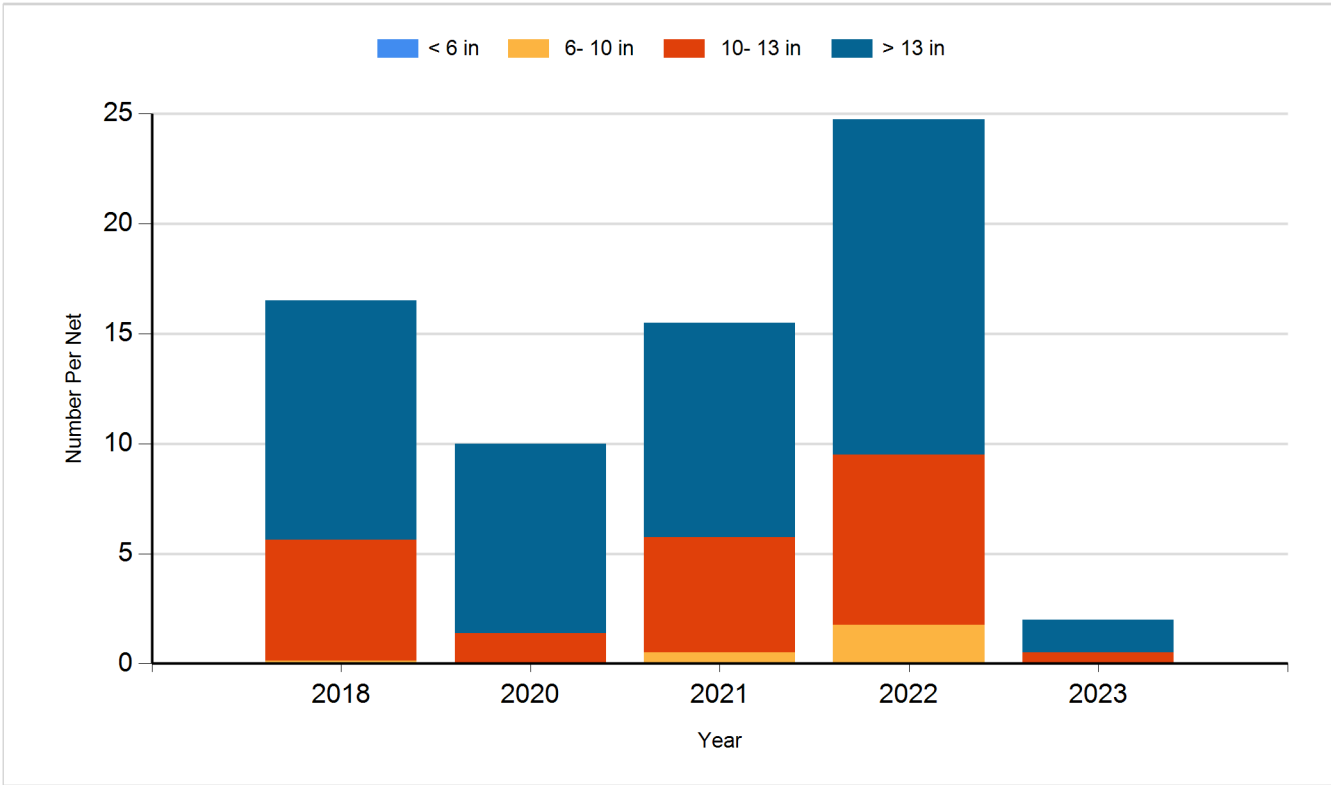Species: Lake Trout
Gear: std exp gill net

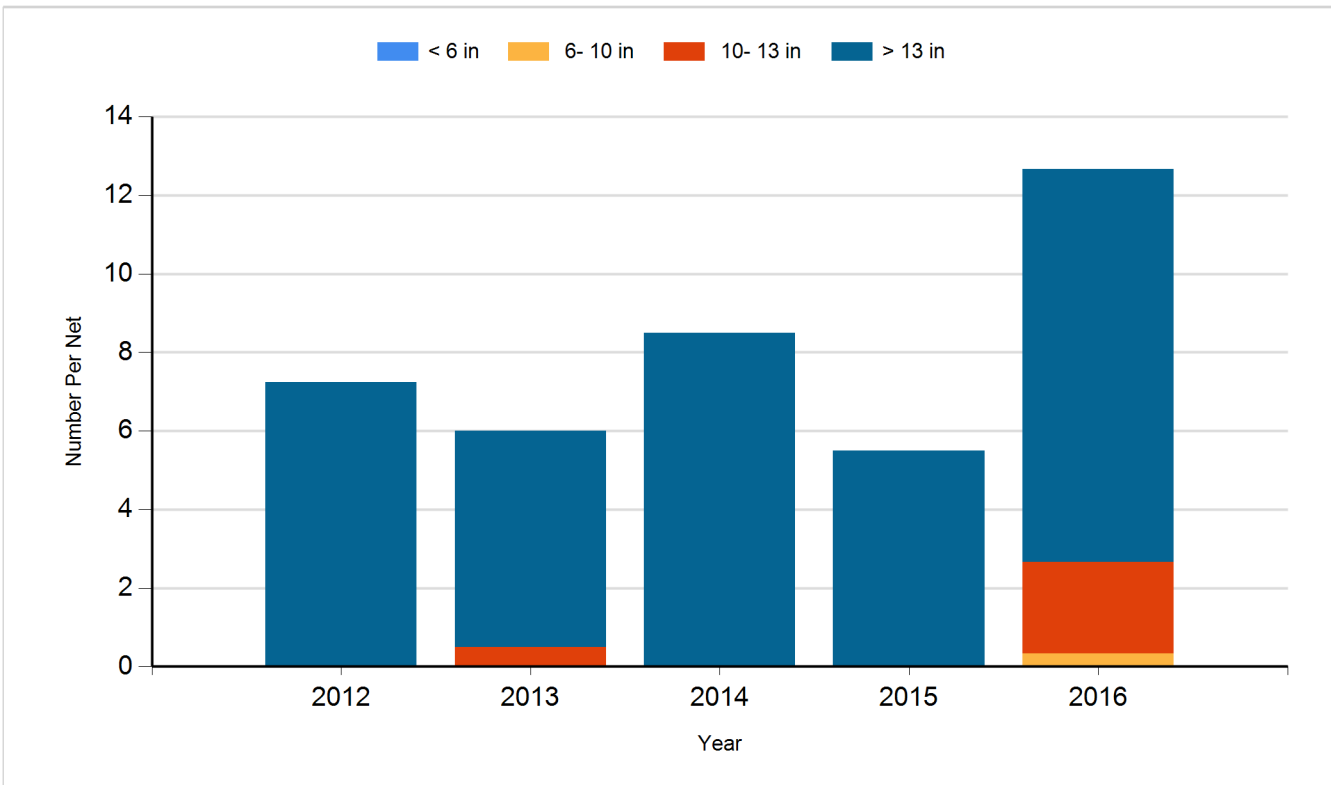Species: Rainbow Trout
Gear: AFS std gill net

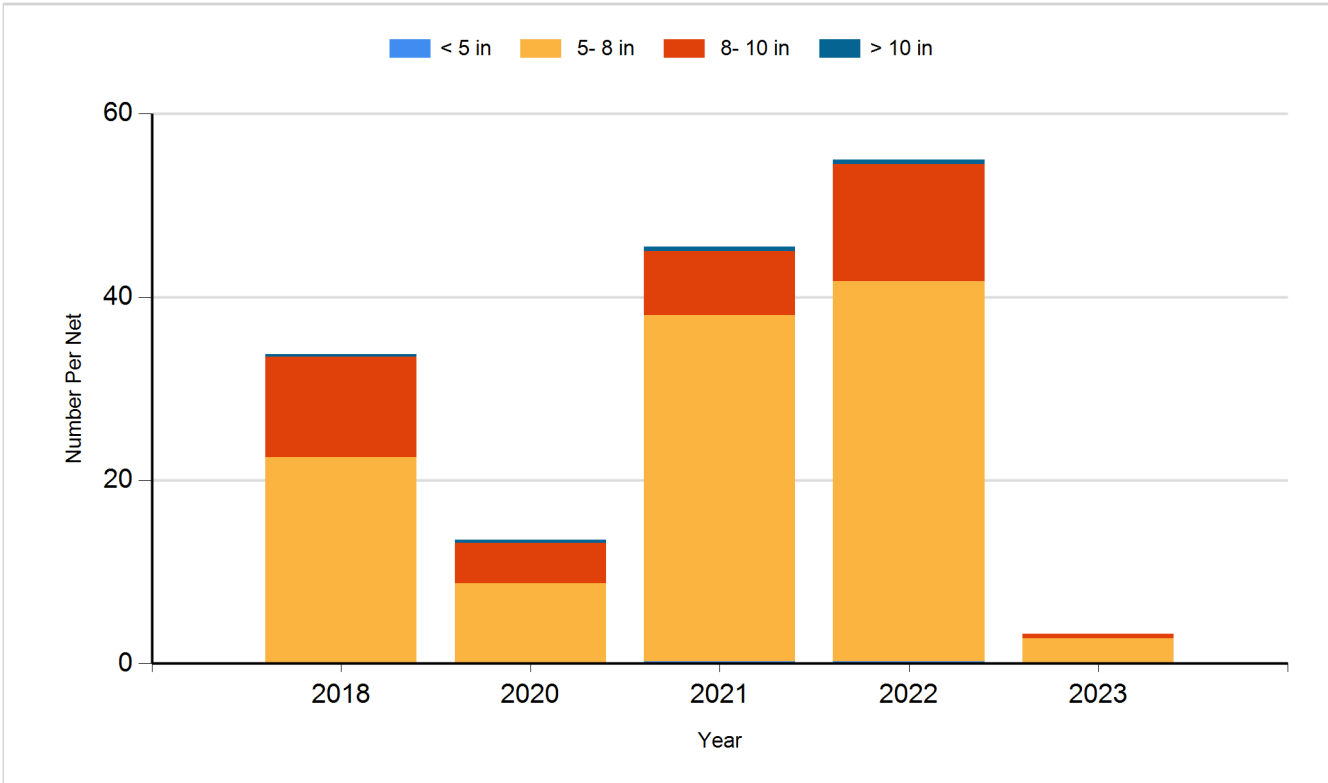Species: Rainbow Trout
Gear: std exp gill net
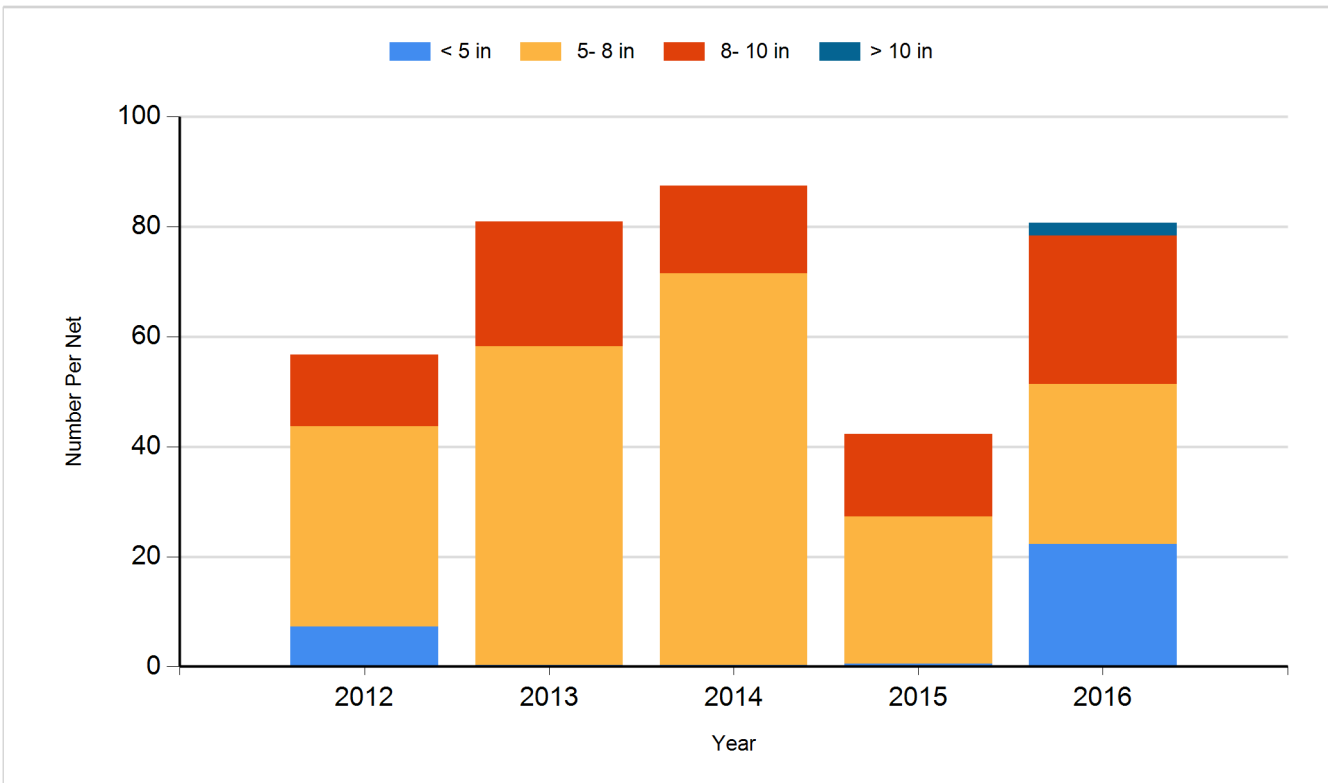
Species: White Sucker
Gear: AFS std gill net

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
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
2023	Lake Trout	Adult	536
2023	Rainbow Trout	Adult	13,418