SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Deerfield, Pennington County
RAP-Lake-31-000
2021

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	Sep 21, 2021	4 net-nights
frame net (std 3/4 in)	Sep 21, 2021	8 net-nights

Common Fish Species Present

Rainbow Trout

Splake Trout

Brook Trout

White Sucker

Yellow Perch

Rock Bass

Golden Shiner

Creek Chub

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).

*** Methods/Species that ignore stock length**

			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	Brook Trout	8	0.0	0.0						
	Golden Shiner	1	0.0	0.0						
	Rainbow Trout	4	1.0	1.2	0		0		63	2
	Rock Bass	12	3.0	1.9	50	25	17		87	5
	White Sucker	75	18.8	8.2	100		63	8	93	2
	Yellow Perch	182	45.3	6.0	14	4	1		83	1
frame net (std 3/4 in)	Brook Trout	5	0.0	0.0						
	Creek Chub	6	0.0	0.0						
	Golden Shiner	82	0.0	0.0						
	Rainbow Trout	10	1.3	0.6	20		0		72	3
	Rock Bass	218	24.0	6.9	17	4	0		89	4
	White Sucker	659	82.4	41.4	90	2	56	3	91	1
	Yellow Perch	224	28.0	15.2	25	4	7	2		

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	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Avg
AFS std gill net	Brook Trout							0.0		0.0	0.0	0.00
	Golden Shiner							0.0		0.0	0.0	0.00
	Rainbow Trout							2.0		0.5	1.0	1.17
	Rock Bass							5.9		0.4	3.0	3.10
	White Sucker							16.5		10.0	18.8	15.10
	Yellow Perch							33.8		13.5	45.3	30.87
frame net (std 3/4 in)	Brook Trout	0.0	0.0	0.0		0.0					0.0	0.00
	Creek Chub	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
	Rainbow Trout	0.5	0.0	1.3		0.0					1.3	0.62
	Rock Bass	35.2	33.2	45.3		119.7					24.0	51.48
	Splake Trout	0.0	0.0	0.0		0.0					0.0	0.00
	White Sucker	16.5	3.7	4.2		7.2					82.4	22.80
	Yellow Perch	19.2	5.0	22.5		2.7					28.0	15.48
std exp gill net	Brook Trout	0.0	0.0	0.0	0.0	0.0						0.00
	Brown Trout (Utah)	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
	Lake Trout	0.0	0.0	0.0	0.5	0.0						0.10
	Rainbow Trout	3.3	10.5	2.3	7.3	1.3						4.94
	Rock Bass	22.0	8.5	7.3	5.5	8.7						10.40
	Splake Trout	0.0	0.0	0.0	0.0	0.0						0.00
	White Sucker	7.3	6.0	8.5	5.5	12.7						8.00
	Yellow Perch	49.5	80.8	87.3	41.8	58.3						63.54

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	Rainbow Trout	PSD							6		0	0
		PSD-P							0		0	0
		Wr							74		68	63
	Rock Bass	PSD							19		33	50
		PSD-P							9		0	17
		Wr							84		87	87
	White Sucker	PSD							99		100	100
		PSD-P							66		86	63
		Wr							94		99	93
	Yellow Perch	PSD							33		35	14
		PSD-P							1		3	1
		Wr							81		88	83
frame net (std 3/4 in)	Rainbow Trout	PSD	0		0							20
		PSD-P	0		0							0
		Wr	60		76							72
	Rock Bass	PSD	3	0	7		2					17
		PSD-P	0	0	2		0					0
		Wr	78	80	82							89
	White Sucker	PSD	96	95	100		86					90
		PSD-P	93	77	100		81					56
		Wr	94	96	91							91
	Yellow Perch	PSD	16	13	16		50					25
		PSD-P	0	0	1		0					7
		Wr	84	83	86							
std exp gill net	Rainbow Trout	PSD	0	0	0	0	0					
		PSD-P	0	0	0	0	0					
		Wr	66	80	75	75	77					
	Rock Bass	PSD	0	0	0	0	8					
		PSD-P	0	0	0	0	0					
		Wr	75	78	92	85	93					
	White Sucker	PSD	100	100	100	100	97					
		PSD-P	100	92	100	100	79					

			Year									
Gear	Species	Index	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
std exp gill net	White Sucker	Wr	99	101	103	100	103					
	Yellow Perch	PSD	26	28	18	36	50					
		PSD-P	0	0	0	0	4					
		Wr	92	81	91	85	96					

Fish Condition

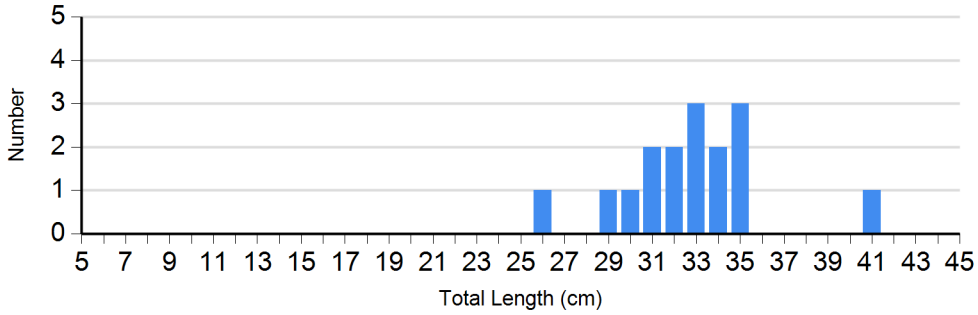
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
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	
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	0		28	87 (1.7)	33	97 (2.1)	14	97 (2.8)
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	156	84 (0.7)	23	75 (1.1)	1		1	

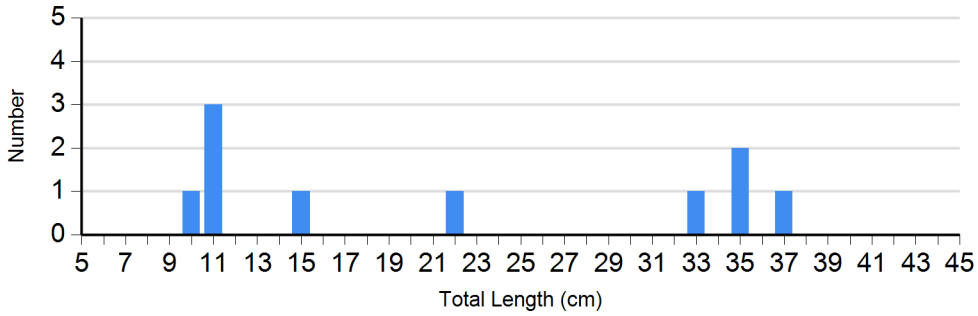
Length Frequency Distribution

Length frequency histogram of species sampled by year.

Species: Rainbow Trout
Gear: AFS std gill net

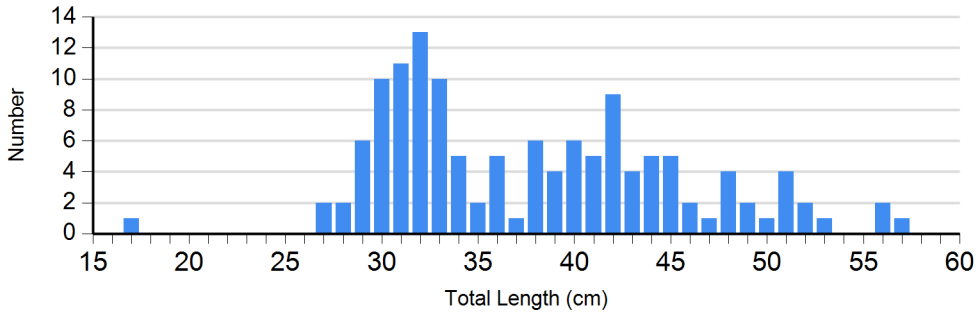


2018



2020

Species: White Sucker
Gear: AFS std gill net



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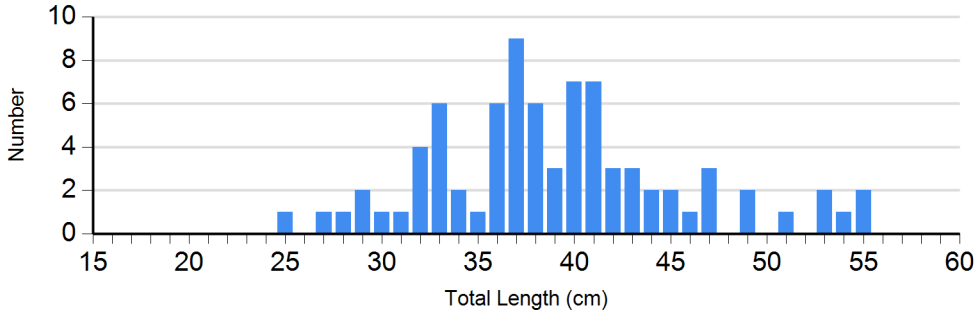
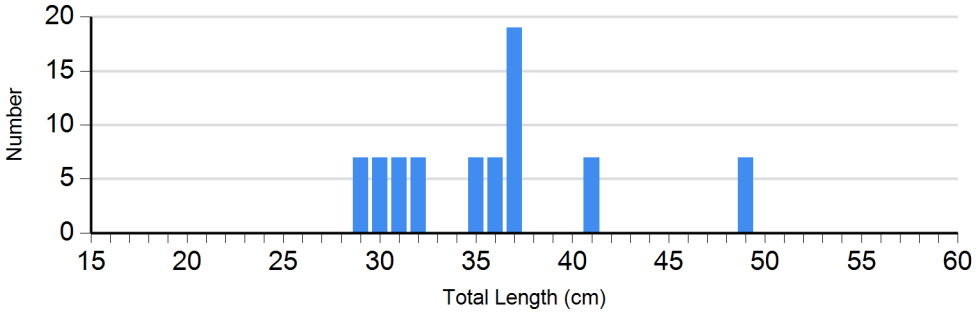
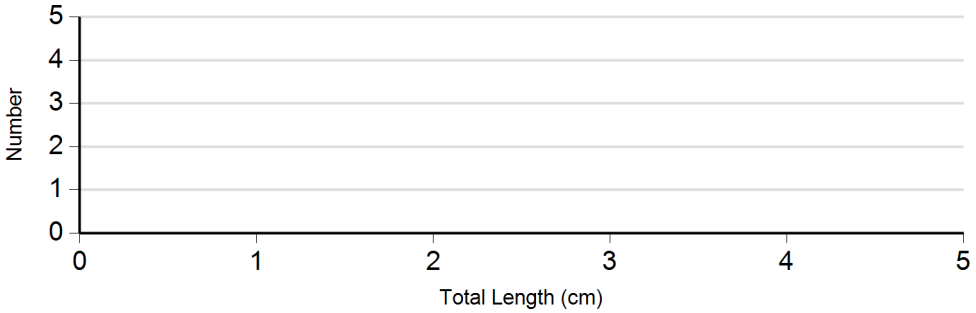


2020



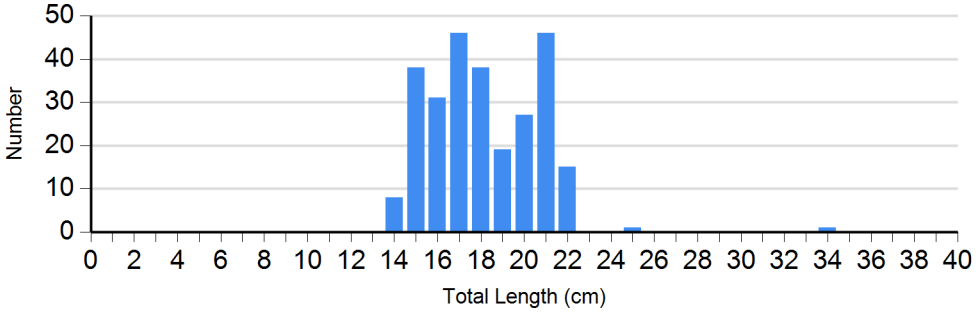
2021

Species: White Sucker
Gear: std exp gill net

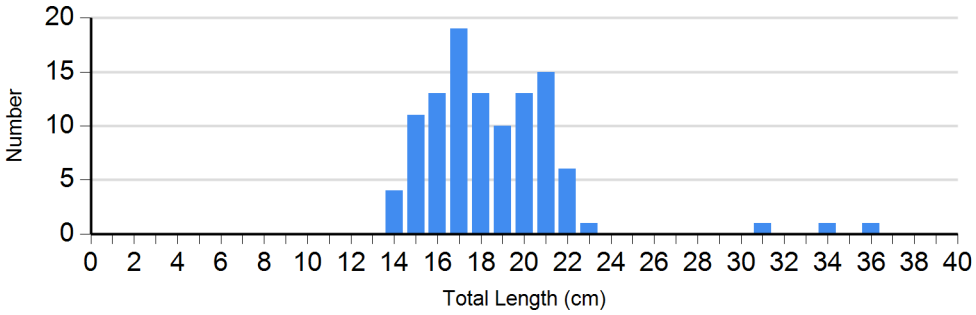


2016

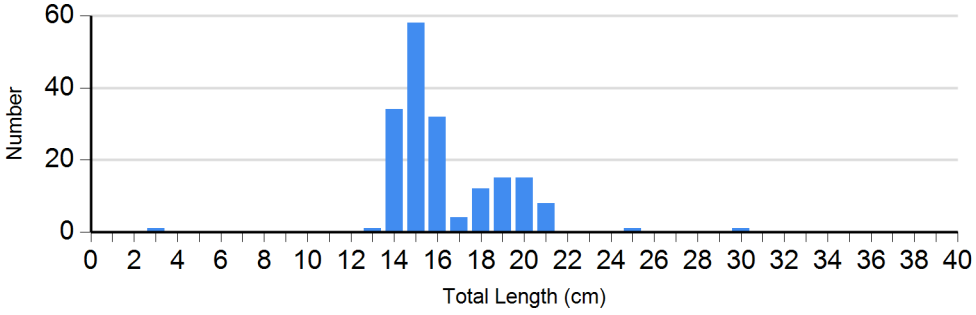
Species: Yellow Perch
Gear: AFS std gill net



2018

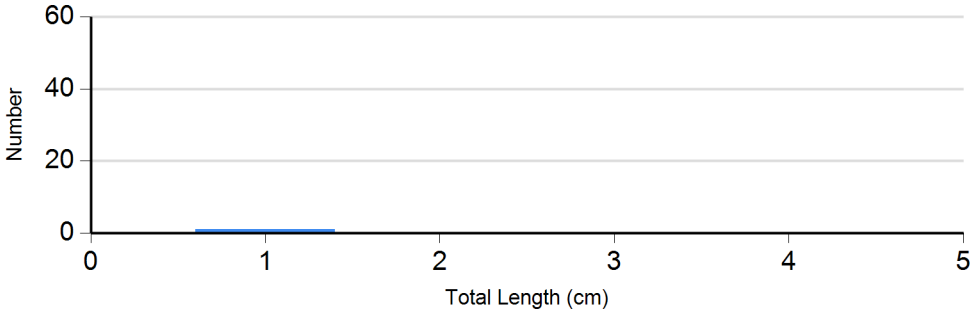


2020



2021

Species: Yellow Perch
Gear: std exp gill net

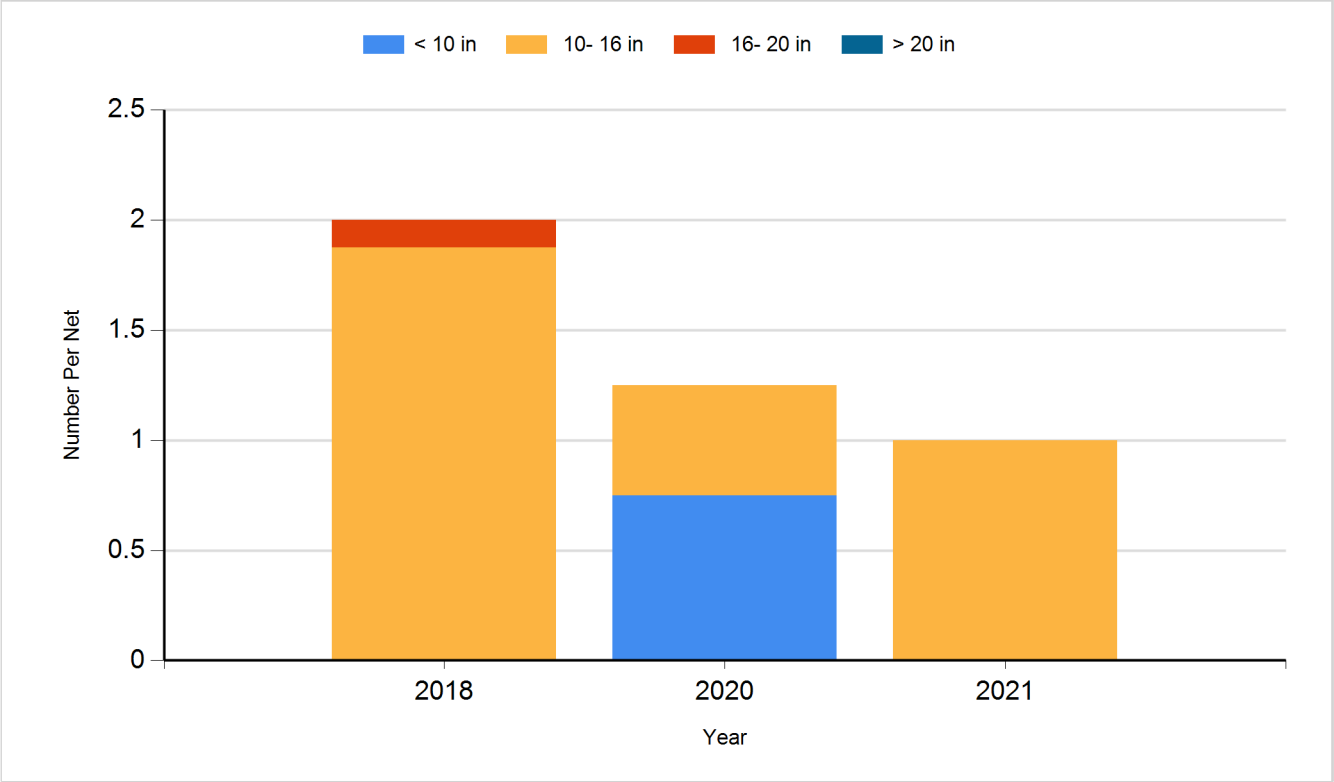


2016

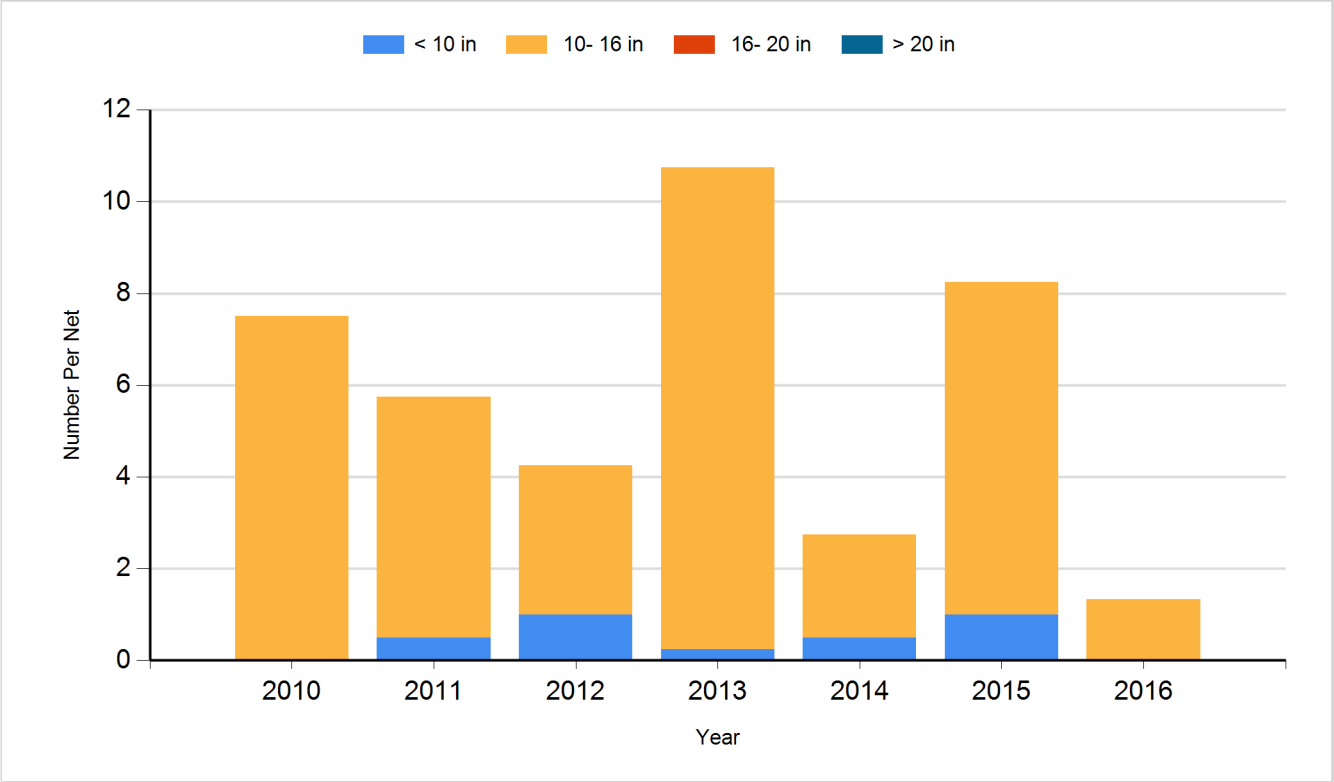
Historic Fish Sizes and Relative Abundance

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

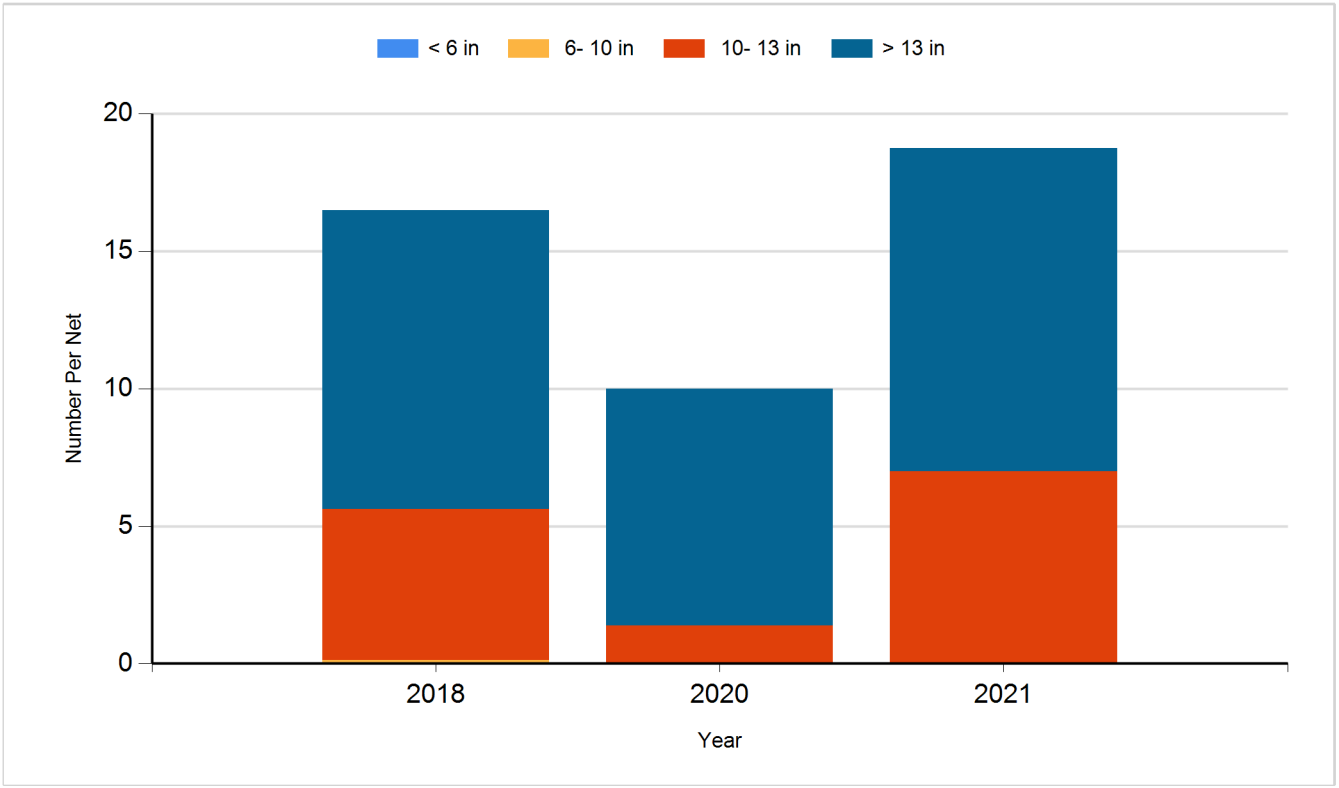
Species: Rainbow Trout
Gear: AFS std gill net



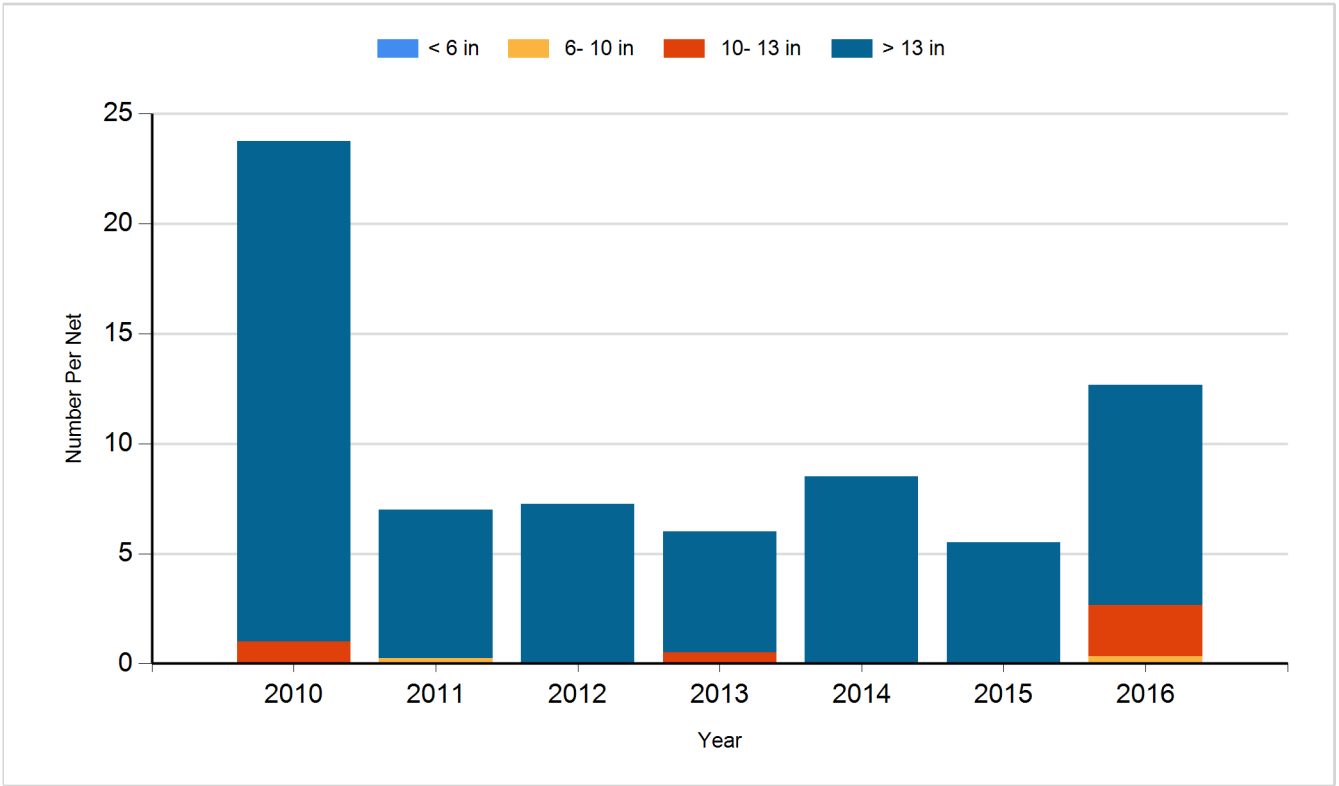
Species: Rainbow Trout
Gear: std exp gill net



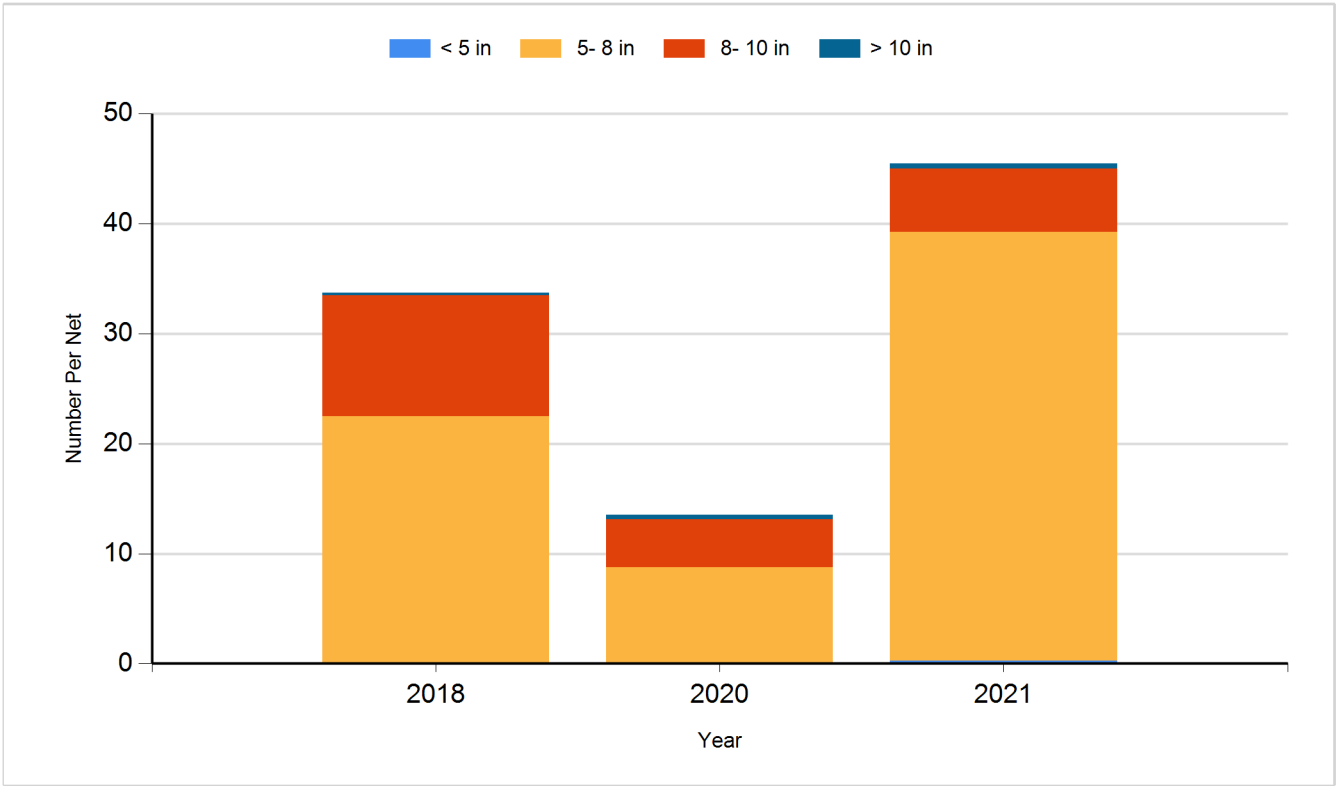
Species: White Sucker
Gear: AFS std gill net



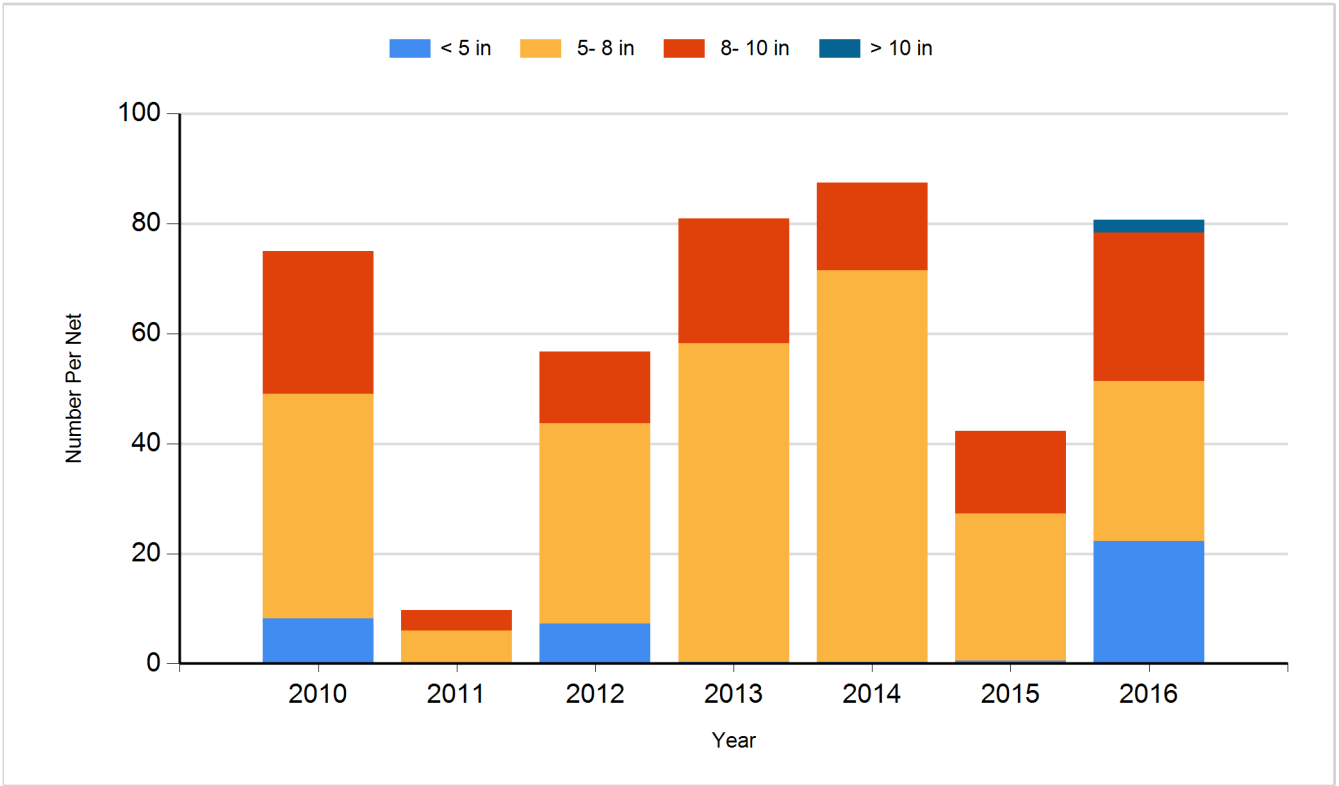
Species: White Sucker
Gear: std exp gill net



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
2010	Rainbow Trout (Erwin x Arlee)	Catchable	2,000
2010	Rainbow Trout (Erwin x Arlee)	Catchable 11"	1,997
2010	Rainbow Trout (McConaugRainbow Trout	Catchable 11"	3,868
2010	Rainbow Trout (Shasta)	Catchable 11"	3,999
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