SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

Deerfield, Pennington County
RAP-Lake-31-000
2018

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	Aug 07, 2018	4 net-nights
AFS std gill net	Aug 08, 2018	4 net-nights

Common Fish Species Present

Rainbow Trout

Splake Trout

Brook Trout

Yellow Perch

White Sucker

Rock Bass

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.

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

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

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	4	0.0	0.0						
	Golden Shiner	6	0.0	0.0						
	Rainbow Trout	16	2.0	0.9	6		0		74	2
	Rock Bass	47	5.9	3.0	19	9	9		84	2
	White Sucker	132	16.5	4.9	99		66	6	94	1
	Yellow Perch	270	33.8	5.3	33	4	1		81	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	Brook Trout										0.0	0.0
	Golden Shiner										0.0	0.0
	Rainbow Trout										2.0	2.0
	Rock Bass										5.9	5.9
	White Sucker										16.5	16.5
	Yellow Perch										33.8	33.8
frame net (std 3/4 in)	Brook Trout		0.0				0.0		0.0			0.0
	Creek Chub					0.0	0.0		0.0			0.0
	Golden Shiner		0.0	0.0	0.0	0.0	0.0		0.0			0.0
	Lake Chub	0.0										0.0
	Rainbow Trout	0.5	4.5	1.2	0.5		1.3					1.6
	Rock Bass	4.3	87.8	111.3	35.2	33.2	45.3		119.7			62.4
	Splake Trout		0.0									0.0
	White Sucker	10.3	6.5	7.2	16.5	3.7	4.2		7.2			7.9
	Yellow Perch	1.0	14.0	18.7	19.2	5.0	22.5		2.7			11.9
std exp gill net	Brook Trout		0.0			0.0	0.0	0.0	0.0			0.0
	Brown Trout (Utah)	0.0		0.0								0.0
	Golden Shiner		0.0		0.0	0.0	0.0		0.0			0.0
	Lake Trout							0.5				0.5
	Rainbow Trout	8.5	7.5	5.3	3.3	10.5	2.3	7.3	1.3			5.8
	Rock Bass	40.0	48.0	15.5	22.0	8.5	7.3	5.5	8.7			19.4
	Splake Trout		0.0		0.0	0.0	0.0	0.0	0.0			0.0
	White Sucker	24.0	23.8	7.0	7.3	6.0	8.5	5.5	12.7			11.9
	Yellow Perch	38.0	66.8	9.8	49.5	80.8	87.3	41.8	58.3			54.0

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	Rainbow Trout	PSD										6
		PSD-P										0
		Wr										74
	Rock Bass	PSD										19
		PSD-P										9
		Wr										84
	White Sucker	PSD										99
		PSD-P										66
		Wr										94
	Yellow Perch	PSD										33
		PSD-P										1
		Wr										81
frame net (std 3/4 in)	Rainbow Trout	PSD	0	0	0	0		0				
		PSD-P	0	0	0	0		0				
		Wr	65	60	64	60		76				
	Rock Bass	PSD	6	0	2	3	0	7		2		
		PSD-P	0	0	1	0	0	2		0		
		Wr	81	86	80	78	80	82				
	White Sucker	PSD	100	100	100	96	95	100		86		
		PSD-P	98	100	100	93	77	100		81		
		Wr	95	91	93	94	96	91				
	Yellow Perch	PSD	0	25	13	16	13	16		50		
		PSD-P	0	0	0	0	0	1		0		
		Wr	91	89	92	84	83	86				
std exp gill net	Rainbow Trout	PSD	6	0	0	0	0	0	0	0		
		PSD-P	0	0	0	0	0	0	0	0		
		Wr	75	69	74	66	80	75	75	77		
	Rock Bass	PSD	1	14	0	0	0	0	0	8		
		PSD-P	0	9	0	0	0	0	0	0		
		Wr	83	89	81	75	78	92	85	93		
	White Sucker	PSD	100	100	96	100	100	100	100	97		
		PSD-P	96	96	96	100	92	100	100	79		

			Year									
Gear	Species	Index	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
std exp gill net	White Sucker	Wr	101	100	100	99	101	103	100	103		
	Yellow Perch	PSD	55	39	38	26	28	18	36	50		
		PSD-P	1	0	0	0	0	0	0	4		
		Wr	91	91	92	92	81	91	85	96		

Fish Condition

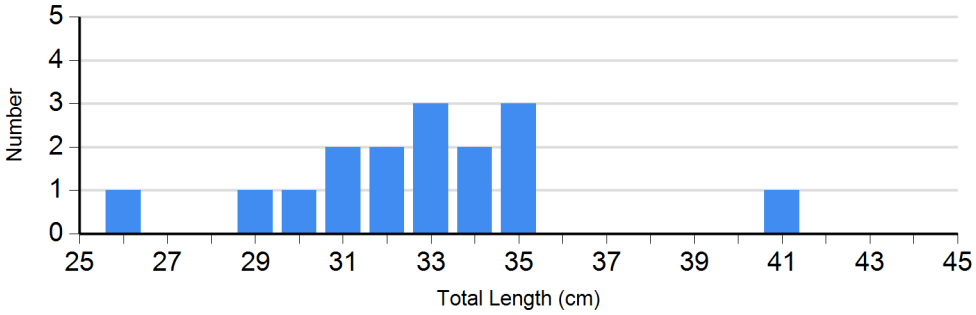
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		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	2014	9	75 (2.8)	0		0		0	
	2015	29	75 (1.2)	0		0		0	
	2016	4	77 (4.6)	0		0		0	
	2018	15	74 (1.8)	1	83	0		0	
White Sucker Gill Net	2014	0		0		3	111 (4.6)	31	103 (3.1)
	2015	0		0		1	104	21	99 (5.6)
	2016	1		7	110	11	105 (0.7)	19	101 (1.6)
	2018	1		44	95 (1.3)	39	94 (1.1)	48	94 (1.3)
Yellow Perch Gill Net	2014	285	95 (0.7)	64	74 (0.8)	0		0	
	2015	107	91 (1.8)	60	73 (1.1)	0		0	
	2016	87	98 (0.9)	81	93 (7.8)	5	93 (4.2)	2	93 (5.9)
	2018	180	87 (0.6)	88	69 (0.7)	1	96	1	86

Length Frequency Distribution

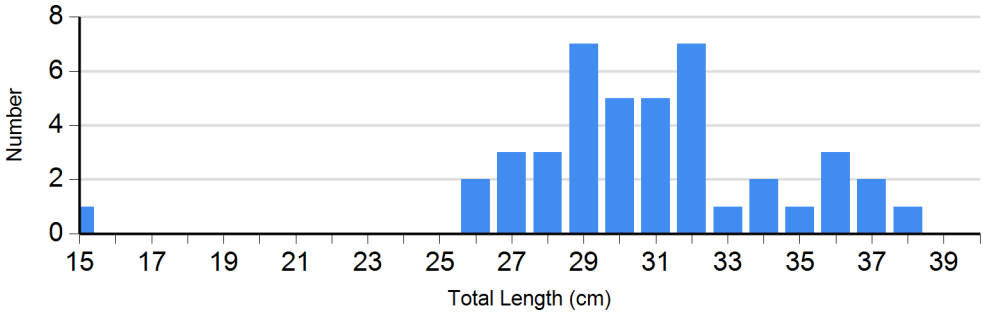
Length frequency histogram of species sampled by year.

Species: Rainbow Trout
Gear: AFS std gill net

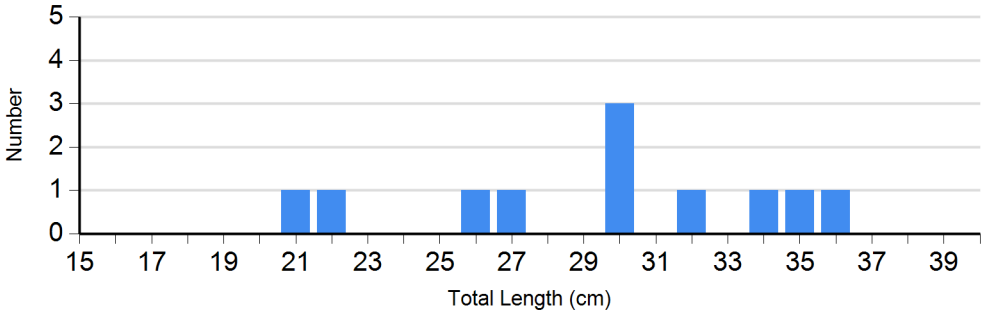


2018

Species: Rainbow Trout
Gear: std exp gill net



2013



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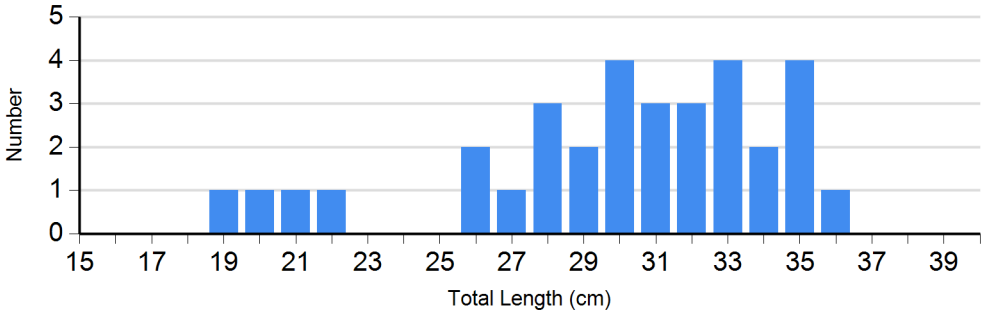
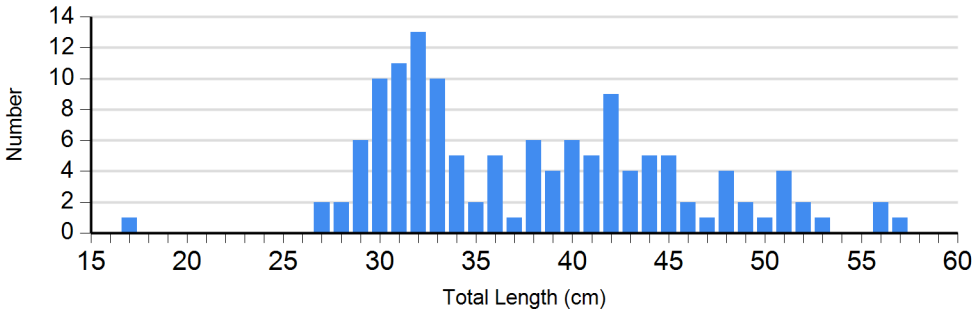


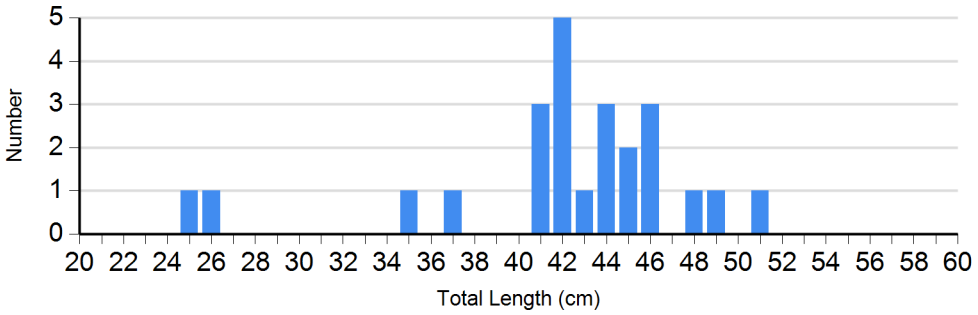
2015

Species: White Sucker
Gear: AFS std gill net



2018

Species: White Sucker
Gear: std exp gill net



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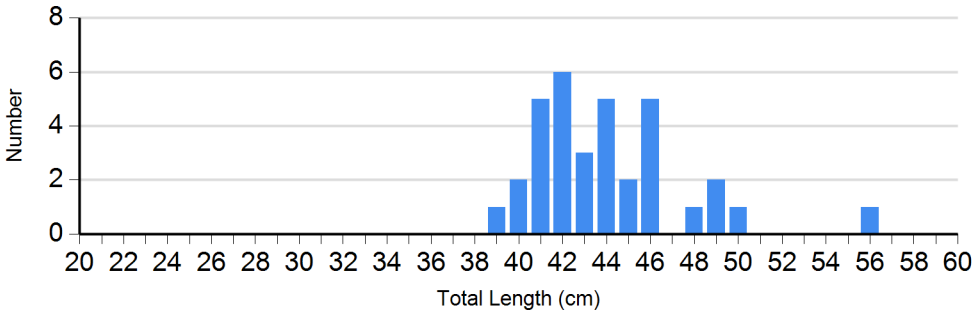

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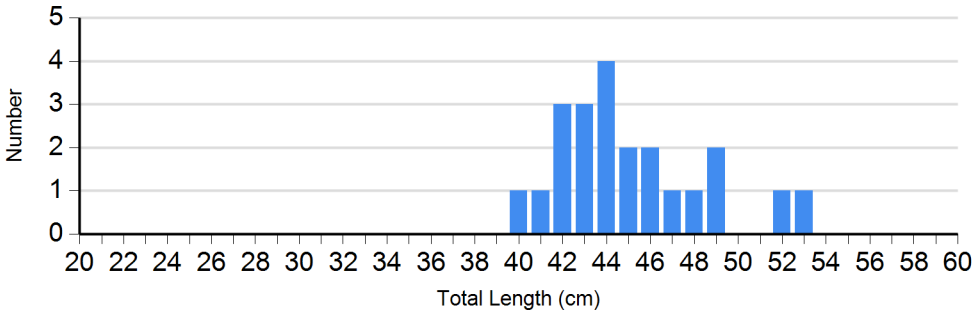
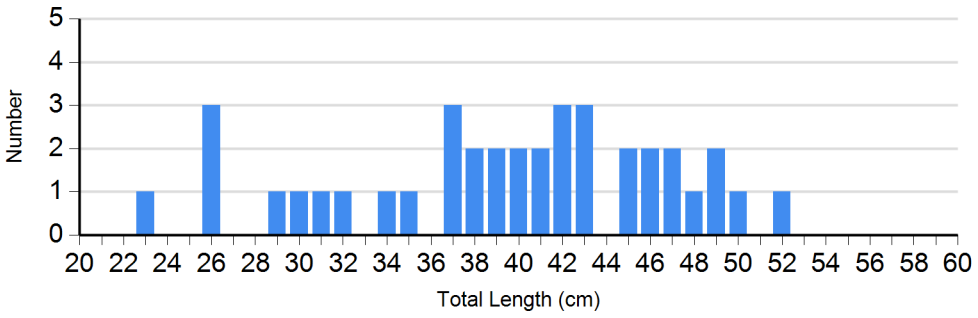
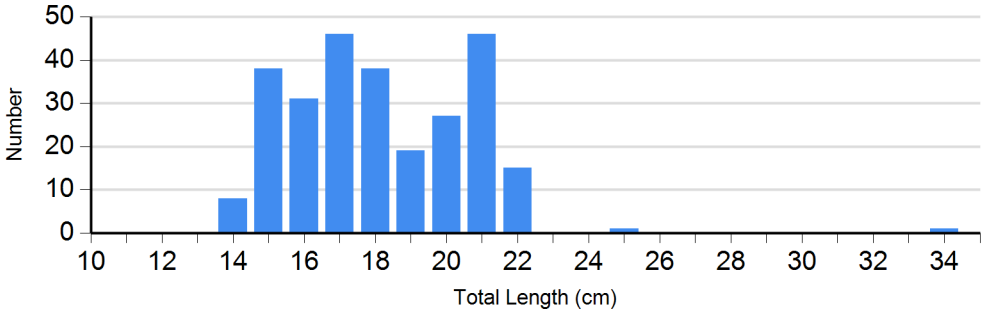


2015



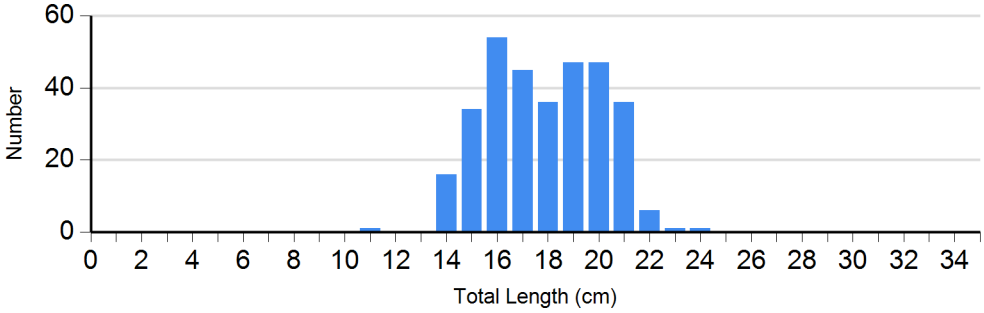
2016

Species: Yellow Perch
Gear: AFS std gill net

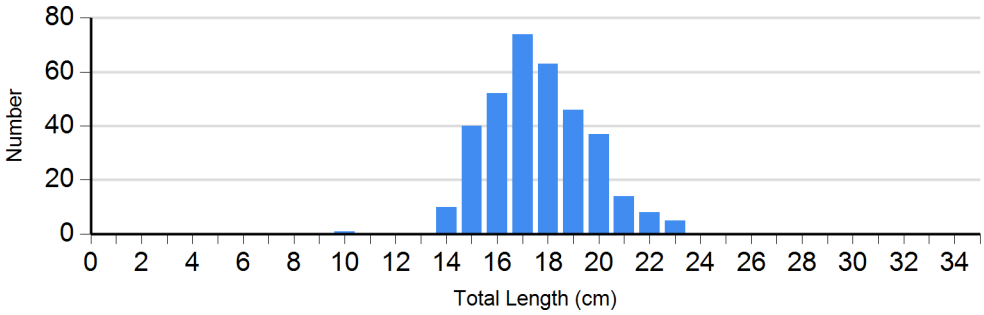


2018

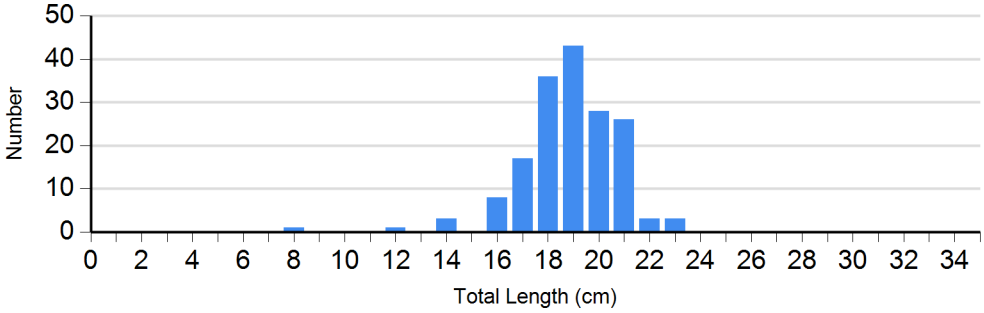
Species: Yellow Perch
Gear: std exp gill net



2013



2014



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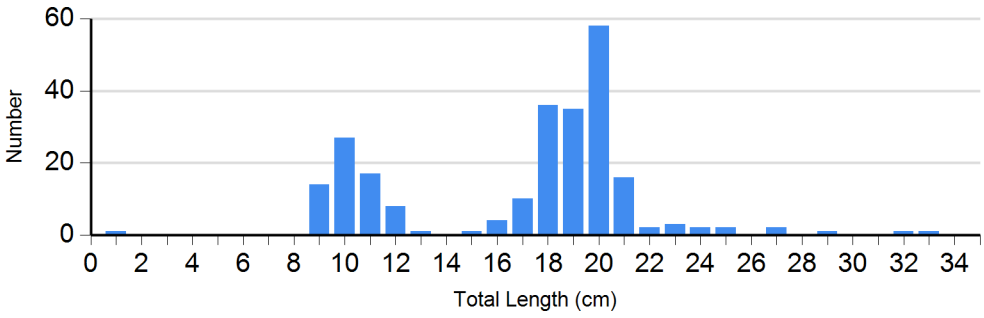
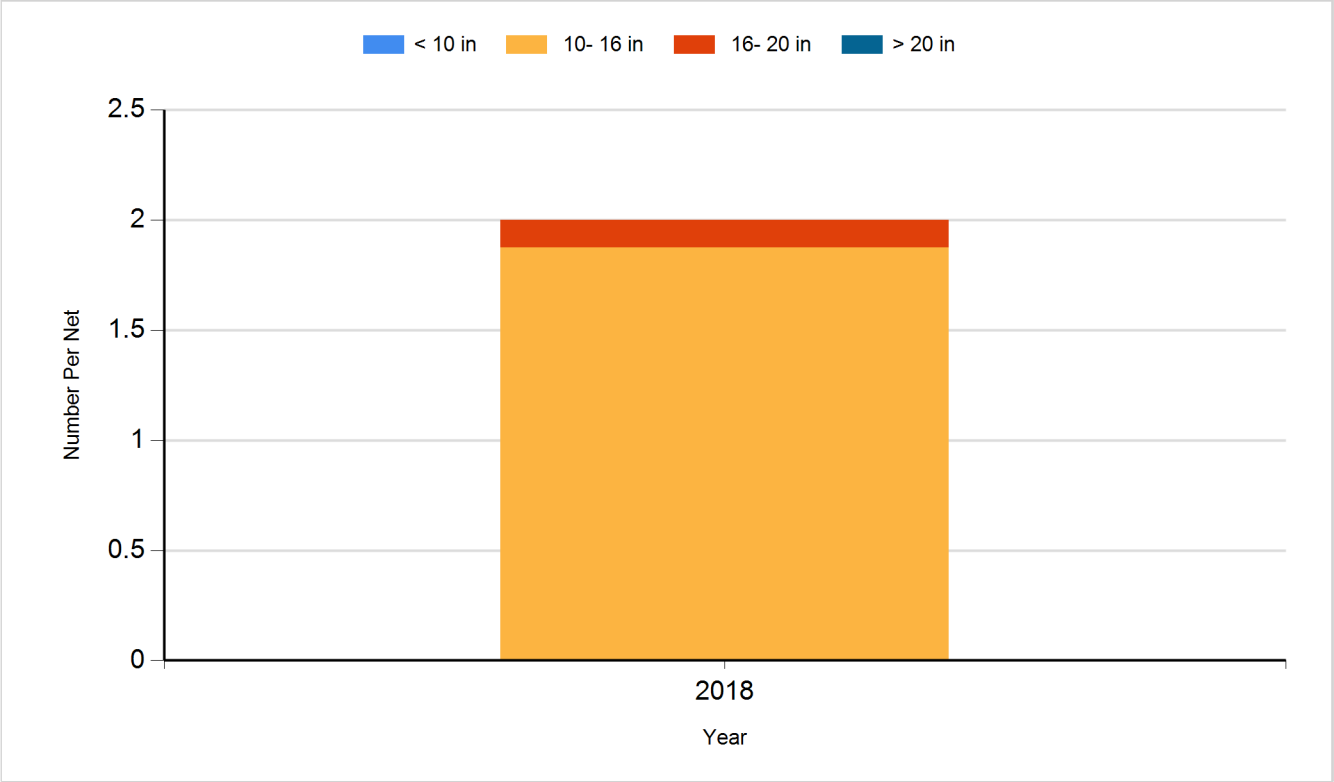


2016

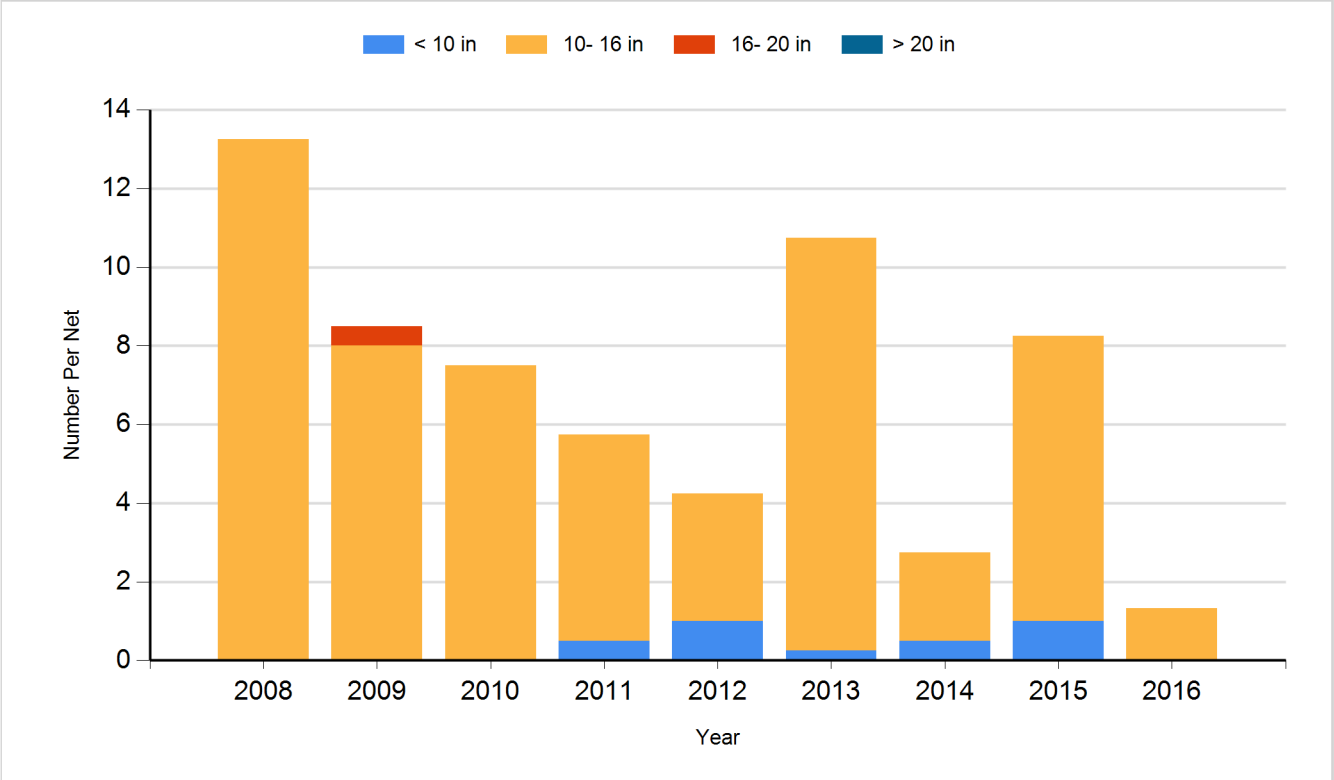
Historic Fish Sizes and Relative Abundance

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

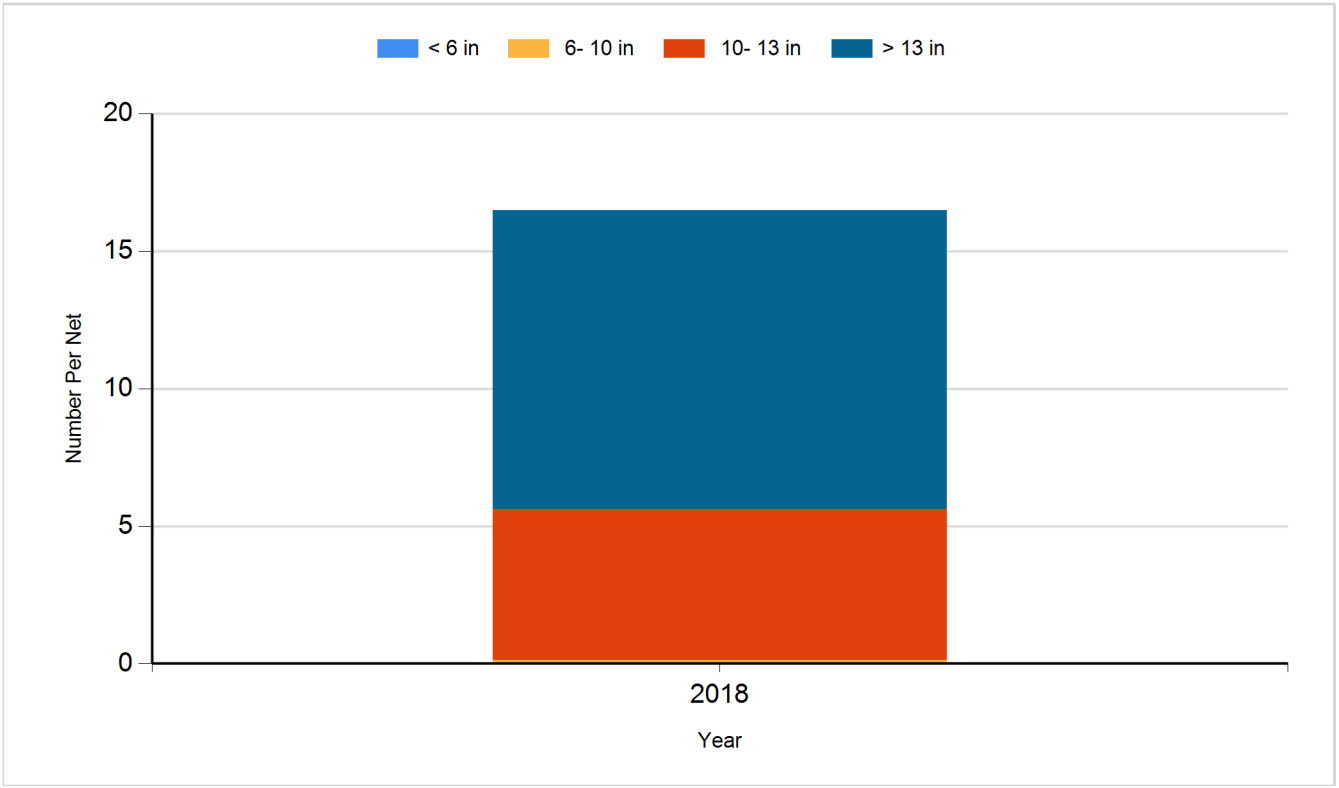
Species: Rainbow Trout
Gear: AFS std gill net



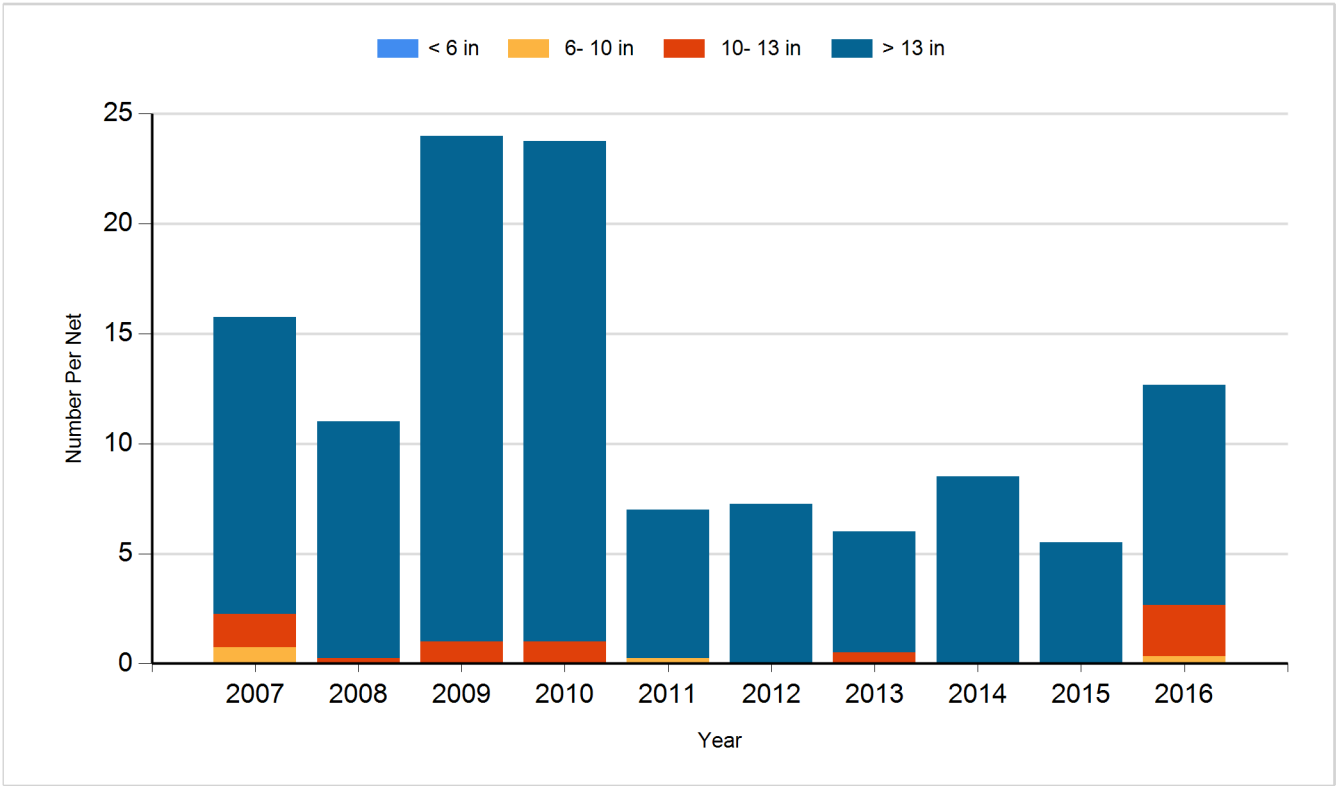
Species: Rainbow Trout
Gear: std exp gill net



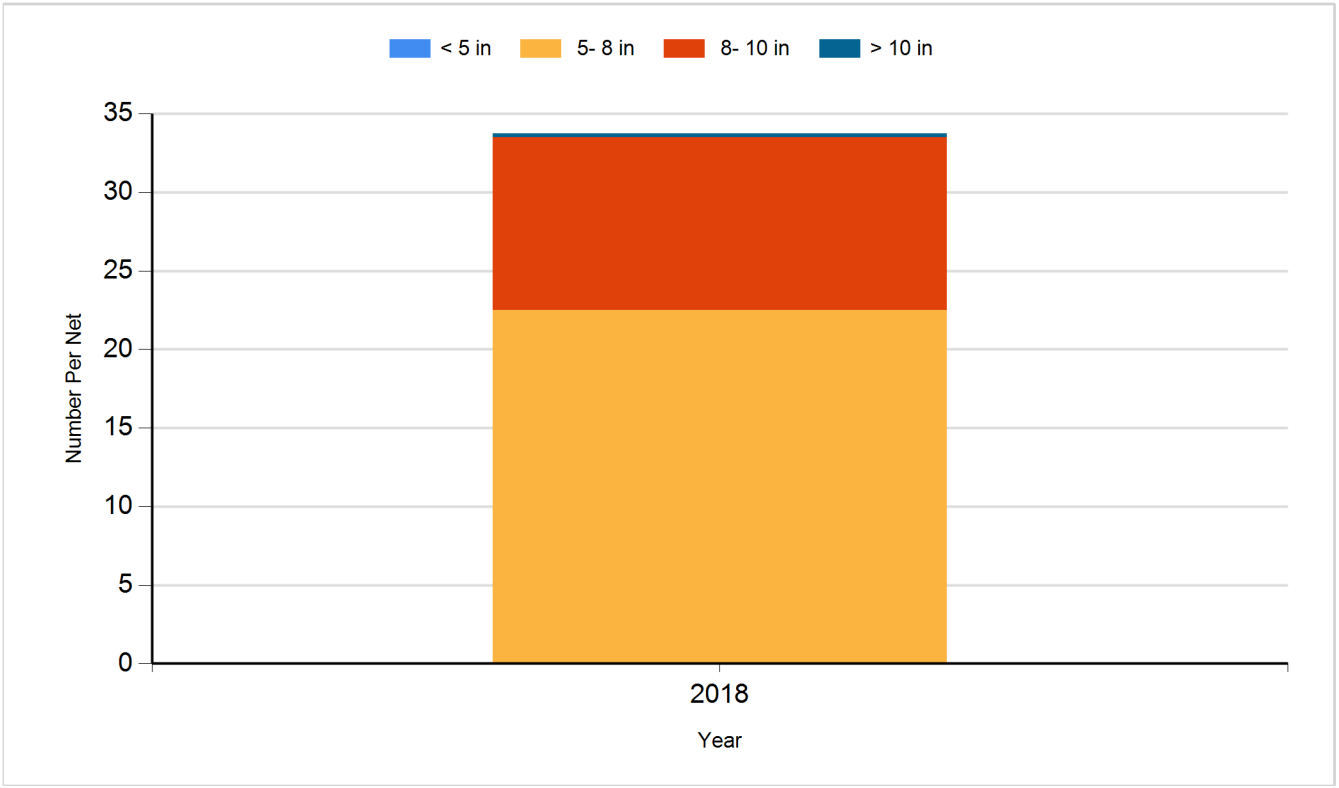
Species: White Sucker
Gear: AFS std gill net



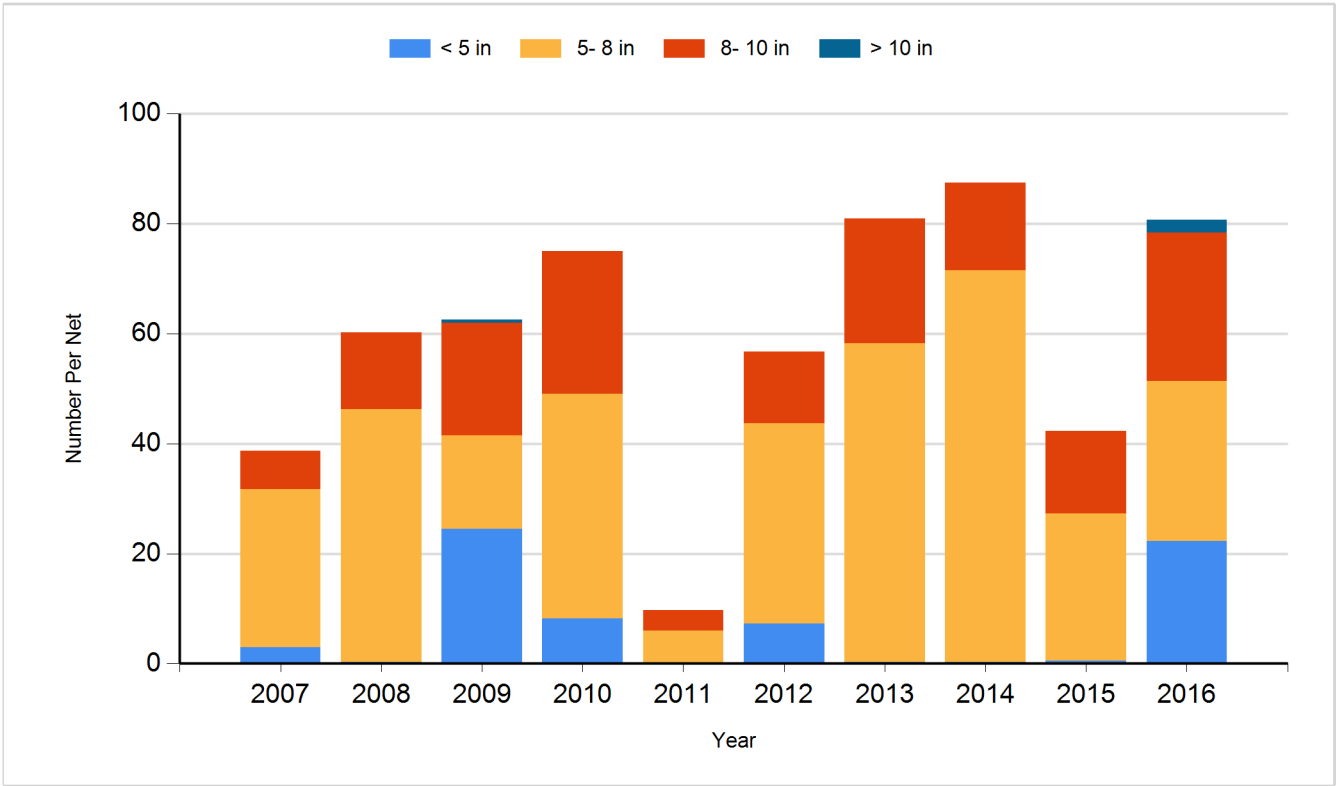
Species: White Sucker
Gear: std exp gill net



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
2007	Rainbow Trout (Erwin)	Catchable	4,200
2007	Rainbow Trout (McConaugRainbow Trout	Catchable 11"	767
2007	Rainbow Trout (Shasta)	Catchable	1,400
2007	Rainbow Trout (Shasta)	Catchable 11"	3,433
2008	Rainbow Trout (McConaugRainbow Trout	Catchable	1,400
2008	Rainbow Trout (McConaugRainbow Trout	Catchable 11"	1,940
2008	Rainbow Trout (Shasta)	Catchable 11"	2,140
2008	Rainbow Trout (Utah)	Catchable	2,000
2008	Rainbow Trout (Utah)	Catchable 11"	2,000
2009	Rainbow Trout (McConaugRainbow Trout	Catchable 11"	11,883
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