

**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**Belle Fourche Reservoir, Butte County**  
**LBF-Lake-768-000**  
**2016**

**Lake Information**

**Name:** Belle Fourche Reservoir  
**County:** Butte  
**Surface Area:** 6,570 Acres

**Surveys and Investigations**

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

Gear	Date	Effort
std exp gill net	August 23, 2016	12 net-nights

## **Common Fish Species Present**

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Channel Catfish

Black Crappie

Gizzard Shad

Walleye

White Crappie

Yellow Perch

White Bass

Common Carp

River Carpsucker

Shorthead Redhorse

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## 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).

$$CPUE = \frac{\text{number of fish}}{\text{effort}}$$

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)
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

Species Name	Stock		Quality		Preferred		Memorable		Trophy	
	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)	(in)	(cm)
Blue Catfish	12	30	20	51	30	76	35	89	45	114
Bluegill	3	8	6	15	8	20	10	25	12	30
Bluegill X Gr. Sunfish Hybrid	3	8	6	15	8	20	10	25	12	30
Brown Bullhead	5	13	8	20	11	28	14	36	17	43
Burbot	8	20	15	38	21	53	26	67	32	82
Channel Catfish	11	28	16	41	24	61	28	71	36	91
Common Carp	11	28	16	41	21	53	26	66	33	84
Flathead Catfish	14	35	20	51	28	71	34	86	40	102
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
Longnose Gar	16	41	27	69	36	91	45	114	55	140
Muskellunge	20	51	30	76	38	97	42	107	50	127
Northern Pike	14	35	21	53	28	71	34	86	44	112
Paddlefish	16	41	26	66	33	84	41	104	51	130
Pumpkinseed	3	8	6	15	8	20	10	25	12	30
Redear Sunfish	4	10	7	18	9	23	11	28	13	33
River Carpsucker	7	18	11	28	14	36	18	46	22	56
Rock Bass	4	10	7	18	9	23	11	28	13	33
Rudd	6	15	10	25	12	30	15	38	19	48
Sauger	8	20	12	30	15	38	20	51	25	63
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
Smallmouth Buffalo	11	28	18	46	24	61	30	76	37	94
Spotted Bass	7	18	11	28	14	35	17	43	20	51
Striped Bass	12	30	20	51	30	76	35	89	45	114
Striped Bass Hybrid (wiper)	8	20	12	30	15	38	20	51	25	63
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 Perch	5	13	8	20	10	25	12	30	15	38
White Sucker	6	15	10	25	13	33	16	41	20	51
Yellow Bass	4	10	7	18	9	23	11	28	13	33
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).

Gear	Species	Abundance		Stock Density Indices			Condition		
		CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
std exp gill net	Black Crappie	0.5	0.5	67		0		129	11
	Channel Catfish	4.0	0.9	96		29	10	87	2
	Common Carp	1.0	0.2	67		0		80	0
	Freshwater Drum	0.3	0.2	100		50			
	Gizzard Shad	0.3	0.2	100				102	8
	River Carpsucker	0.8	0.5	100		100		96	0
	Shorthead Redhorse	0.5	0.3	100		100			
	Spottail Shiner	0.0	0.0						
	Walleye	23.0	2.4	20	3	0		81	0
	White Bass	5.8	4.6	100		100		94	1
	White Crappie	0.2	0.2	100		100		91	0
	Yellow Perch	14.8	4.9	29	5	1		85	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.

Gear	Species	CPUE										Avg	
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016		
frame net (1/2 inch)	Black Crappie		0.1		1.0								0.6
	Channel Catfish		2.6		0.1								1.4
	Common Carp		0.7		0.3								0.5
	Freshwater Drum		0.1		0.1								0.1
	Northern Pike				0.1								0.1
	River Carpsucker		3.4		0.4								1.9
	Shorthead Redhorse		0.3		0.6								0.5
	Walleye		4.0		2.6								3.3
	White Bass		2.4		2.0								2.2
	White Crappie				0.3								0.3
Yellow Perch		0.1		1.0								0.6	
frame net (std 3/4 in)	Black Bullhead						0.1						0.1
	Black Crappie	0.3				0.7	1.5	1.0	0.8				0.9
	Channel Catfish	2.0				15.1	0.1	0.1	0.1	0.1			2.9
	Common Carp	1.6				9.9		1.4	6.1	1.3			4.1
	Freshwater Drum					0.1							0.1
	Gizzard Shad							0.2	0.3				0.3
	Green Sunfish								0.3				0.3
	Rainbow Trout								0.0				0.0
	River Carpsucker	5.6				1.2	0.4	0.6	0.4				1.6
	Rudd	0.3							0.1	0.1			0.2
	Shorthead Redhorse	0.4				0.6		0.2	0.1				0.3
	Smallmouth Bass	0.3							0.1				0.2
	Walleye	1.6				1.4	1.3	1.3	2.0	1.5			1.5
	White Bass	1.1				2.0	0.3	1.7	11.0	1.8			3.0
	White Crappie					2.1	3.8	19.8	16.9	15.0			11.5
	White Sucker	0.1											0.1
	Yellow Perch	0.1						0.5		0.4	0.1		0.3
std exp gill net	Black Crappie		0.2	0.0							0.5		0.2
	Channel Catfish	6.5	4.2	1.6				3.8			4.0		4.0
	Common Carp	1.3	1.7	1.0				1.4			1.0		1.3
	Freshwater Drum		0.2	0.1				1.4			0.3		0.5
	Gizzard Shad	0.3	0.7	0.0				0.4			0.3		0.3

		CPUE										
Gear	Species	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Avg
std exp gill net	River Carpsucker	1.7	0.7	0.1				0.6			0.8	0.8
	Shorthead Redhorse	0.0	0.3	0.5				3.0			0.5	0.9
	Smallmouth Bass							1.2				1.2
	Spottail Shiner	0.0	0.0	0.0				0.0			0.0	0.0
	Walleye	14.0	16.2	6.1				24.6			23.0	16.8
	White Bass	1.7	0.2	1.1				3.4			5.8	2.4
	White Crappie			0.0							0.2	0.1
	Yellow Perch	0.8	1.7	10.9				3.4			14.8	6.3
std exp gill net (150 ft)	Black Crappie				0.0							0.0
	Channel Catfish				3.9	2.9	4.0		1.8	3.3		3.2
	Common Carp				1.5	0.9	1.1		0.3	0.7		0.9
	Freshwater Drum				0.6	0.5	0.9		2.0	0.2		0.8
	Gizzard Shad				0.0		2.4		0.7			1.0
	Northern Pike						0.4					0.4
	River Carpsucker				0.3		0.4		0.7			0.5
	Shorthead Redhorse				0.8	1.1	0.7		0.8	0.7		0.8
	Smallmouth Bass				0.3	0.8	0.9		0.7	0.8		0.7
	Spottail Shiner				0.0	0.0	0.0		0.0	0.0		0.0
	Walleye				9.0	8.0	16.3		8.5	20.3		12.4
	White Bass				2.3	1.1	2.1		3.5	6.7		3.1
	White Crappie					0.4	0.4					0.4
	White Sucker								0.2			0.2
	Yellow Perch				14.9	7.3	8.6		3.2	9.5		8.7
std frame net (3/8 inch)	Black Crappie			2.7								2.7
	Channel Catfish			0.0								0.0
	Common Carp			0.1								0.1
	Green Sunfish			0.0								0.0
	River Carpsucker			2.6								2.6
	Shorthead Redhorse			0.1								0.1
	Smallmouth Bass			0.0								0.0
	Walleye			2.4								2.4
	White Bass			1.7								1.7
	White Crappie			1.0								1.0
	Yellow Perch			1.0								1.0

## 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.

Gear	Species	Index	Year										
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
frame net (1/2 inch)	Black Crappie	PSD		0		25							
		PSD-P		0		13							
		Wr		114		106							
	Northern Pike	PSD				100							
		PSD-P				100							
		Wr				73							
	Walleye	PSD		57		52							
		PSD-P		4		0							
		Wr		79		76							
	Yellow Perch	PSD		0		38							
		PSD-P		0		0							
		Wr		95		85							
frame net (std 3/4 in)	Black Crappie	PSD	100				100	92	100	100			
		PSD-P	100				71	83	80	83			
		Wr	82				98	99	90	98			
	Walleye	PSD	69				100	90	100	100	100		
		PSD-P	0				44	0	31	63	58		
		Wr	78				73	88	74	74	70		
	Yellow Perch	PSD	0					25		67	100		
		PSD-P	0					0		67	0		
		Wr	102					92		67	82		
	std exp gill net	Black Crappie	PSD		0	0							67
			PSD-P		0	0							0
			Wr		93								129
Walleye		PSD	69	46	71				44			20	
		PSD-P	0	1	0				1			0	
		Wr	80	80	83				85			81	
Yellow Perch		PSD	100	30	3				76			29	
		PSD-P	60	0	0				6			1	
		Wr	88	97	99				97			85	



Gear	Species	Index	Year									
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
std exp gill net (150 ft)	Black Crappie	PSD				0						
		PSD-P				0						
	Northern Pike	PSD						67				
		PSD-P						0				
		Wr						83				
	Walleye	PSD				68	50	44		76	18	
		PSD-P				1	3	1		10	1	
		Wr				77	77	78		81	84	
	Yellow Perch	PSD				45	81	55		58	16	
		PSD-P				6	9	10		5	2	
		Wr				96	97	94		86	90	
	std frame net (3/8 inch)	Black Crappie	PSD			26						
PSD-P					21							
Wr					109							
Walleye		PSD			82							
		PSD-P			18							
		Wr			82							
Yellow Perch		PSD			0							
		PSD-P			0							
		Wr			96							

## Length at Capture

Mean length at capture by age across years sampled, sample size (N).

Species: Black Crappie

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2012	24		138 (2)		254 (6)	299 (16)					

Species: Walleye

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2016	292	241 (26)	318 (75)	365 (174)	397 (4)	437 (13)					
2015	252	226 (8)	310 (200)	393 (2)	440 (21)	435 (9)	441 (2)		473 (7)	525 (2)	
2014	196	217 (102)	331 (8)	390 (36)	413 (4)	466 (17)	476 (11)	538 (6)	513 (4)		482 (9)
2013	242	201 (2)	290 (75)	355 (20)	381 (63)	402 (39)	446 (8)	465 (24)	424 (2)		461 (10)
2012	238	196 (10)	287 (21)	331 (47)	373 (106)	463 (4)	462 (35)			453 (7)	465 (8)
2011	124		259 (10)	312 (54)	417 (9)	440 (30)	404 (3)		488 (12)	473 (2)	504 (4)
2010	150		270 (46)	382 (12)	439 (64)	435 (4)	476 (4)	443 (9)	454 (4)	499 (4)	454 (2)
2009	118	201 (20)	331 (28)	399 (46)	455 (4)		458 (10)	449 (8)	485 (2)		
2008	202	237 (8)	333 (102)	397 (14)	416 (2)	428 (23)	434 (23)	461 (32)			
2007	226	244 (88)	337 (20)	371 (2)	410 (70)	426 (19)	425 (28)				

Species: Yellow Perch

Mean Length (expanded sample number) at capture by age											
Year	N	1	2	3	4	5	6	7	8	9	10+
2011	128	120 (16)	170 (12)	208 (39)	234 (56)	234 (5)					
2008	70	116 (50)	172 (14)	213 (6)							

## **Fish Condition**

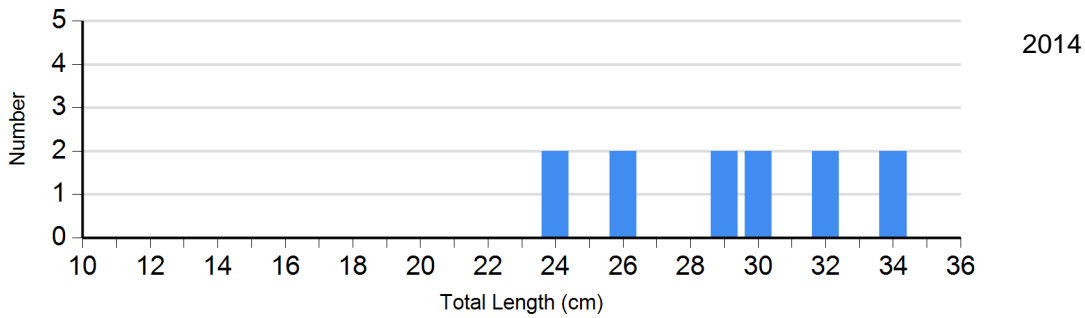
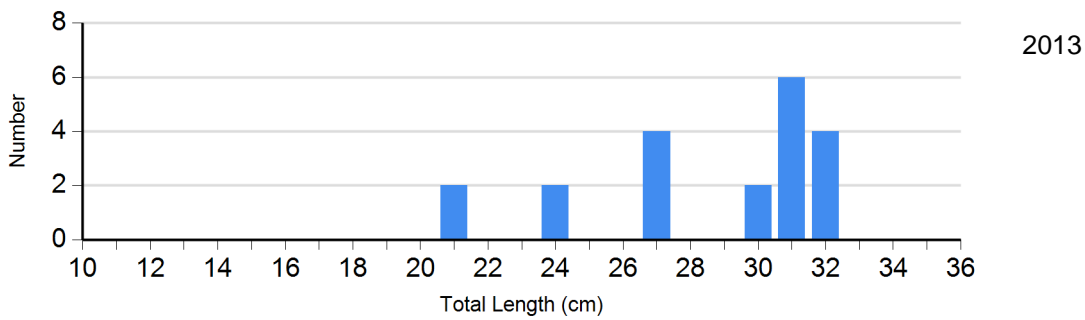
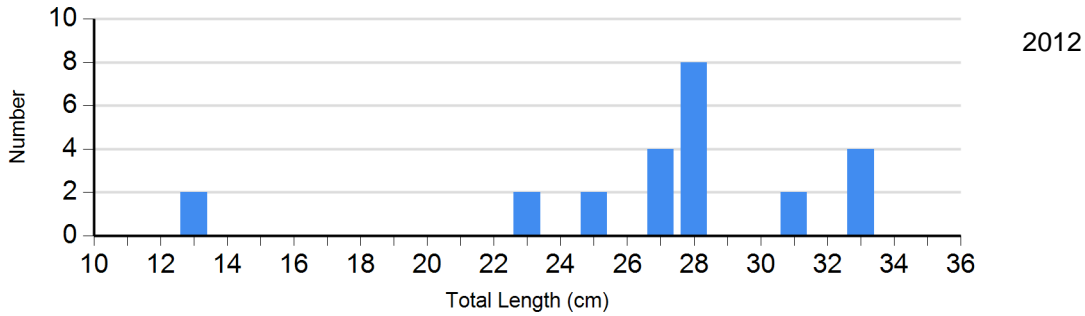
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

Species	Year	Length Groups							
		S-Q		Q-P		P-M		M	
		N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2012	2	106 (0.0)	2	107 (0.0)	14	100 (1.2)	6	90 (3.0)
	2013	0		4	100 (4.2)	4	92 (5.6)	12	86 (1.7)
	2014	0		2	104 (0.0)	4	101 (0.3)	6	94 (1.9)
Northern Pike Gill Net	2012	2	85 (0.0)	4	81 (1.9)	0		0	
Walleye Gill Net	2012	128	79 (0.3)	98	78 (0.6)	2	74 (0.0)	0	
	2013	138	88 (0.6)	106	81 (0.5)	2	80 (0.0)	0	
	2014	24	85 (1.3)	68	80 (0.6)	10	79 (0.7)	0	
	2015	200	85 (0.5)	42	81 (0.8)	2	76 (0.0)	0	
	2016	222	82 (0.3)	54	79 (0.7)	0		0	
Yellow Perch Gill Net	2012	54	97 (1.4)	54	93 (0.8)	12	91 (1.9)	0	
	2013	8	91 (0.8)	24	98 (2.2)	2	97 (0.0)	0	
	2014	16	84 (1.9)	20	86 (1.4)	2	98 (0.0)	0	
	2015	96	90 (0.8)	16	87 (0.9)	2	83 (0.0)	0	
	2016	126	87 (0.6)	50	82 (0.7)	2		0	

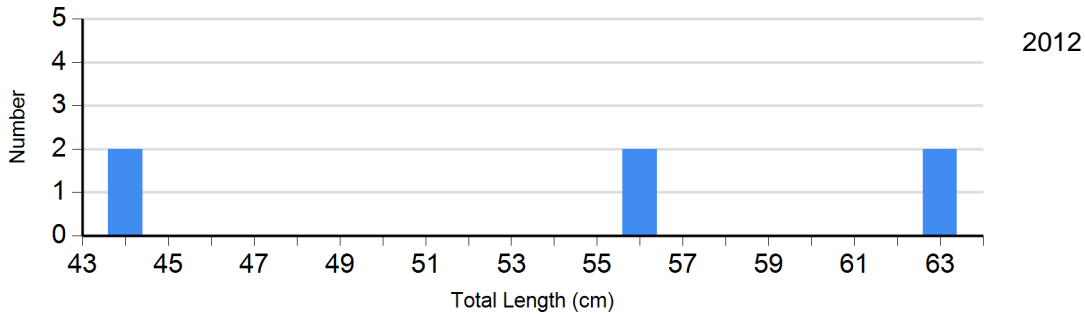
## Length Frequency Distribution

Length frequency histogram of species sampled by year.

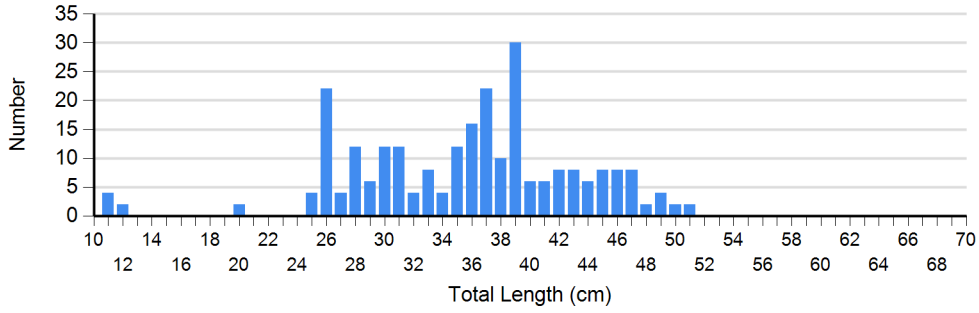
Species: Black Crappie  
Gear: frame net (std 3/4 in)



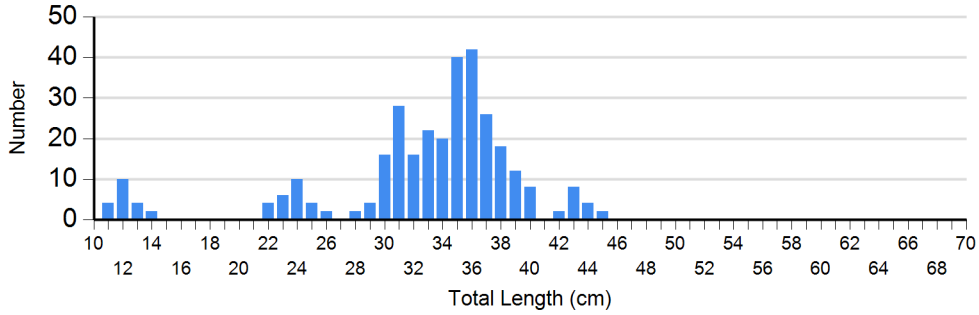
Species: Northern Pike  
Gear: std exp gill net (150 ft)



Species: Walleye  
Gear: std exp gill net

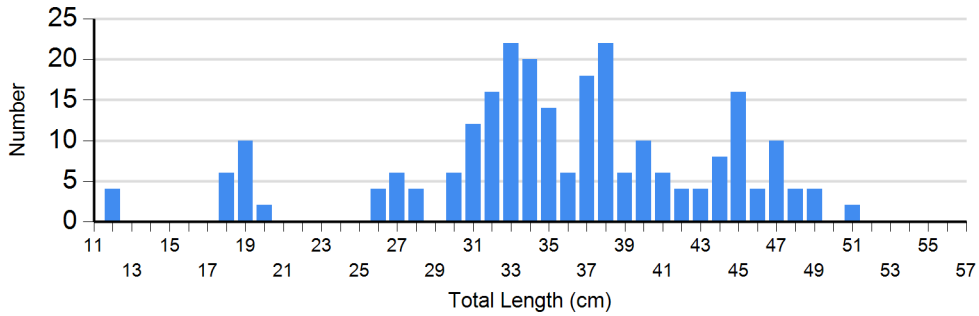


2013

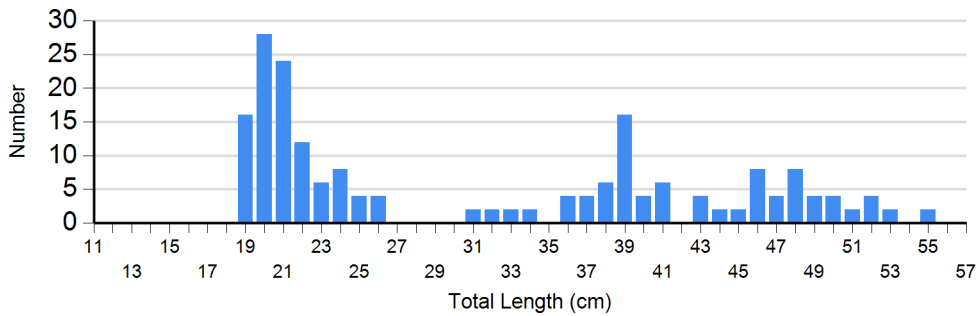


2016

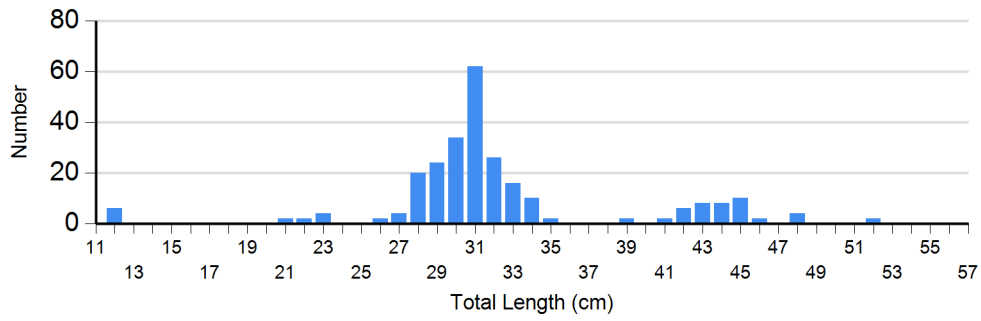
Species: Walleye  
Gear: std exp gill net (150 ft)



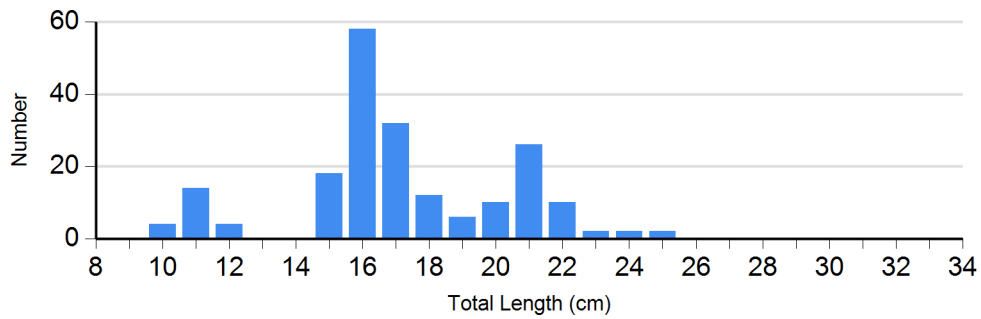
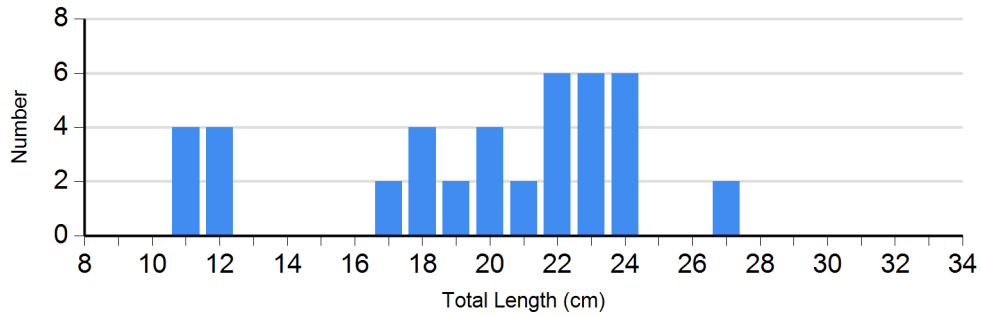
2012



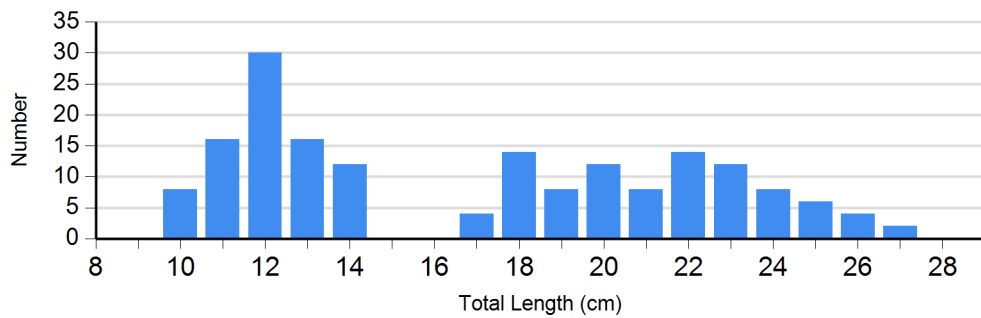
2014

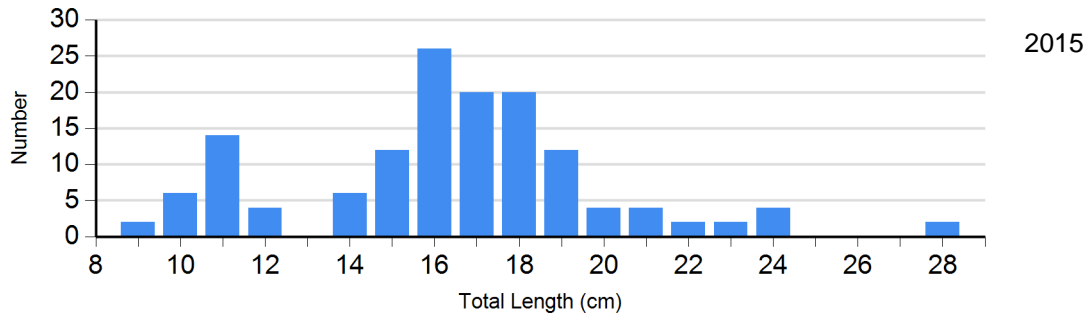
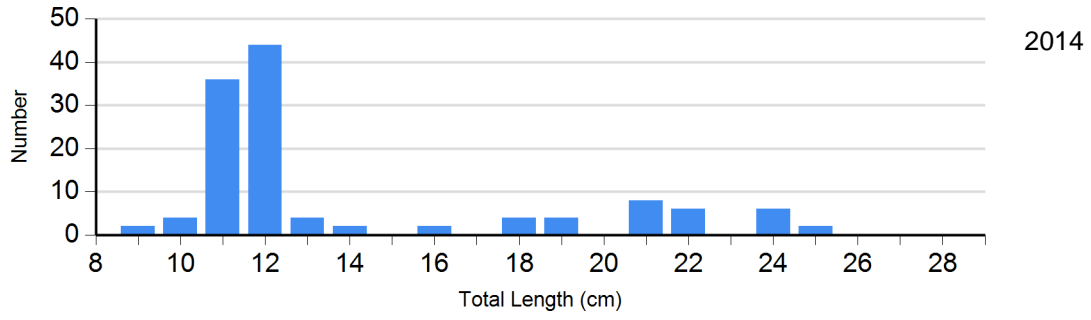


Species: Yellow Perch  
Gear: std exp gill net



Species: Yellow Perch  
Gear: std exp gill net (150 ft)

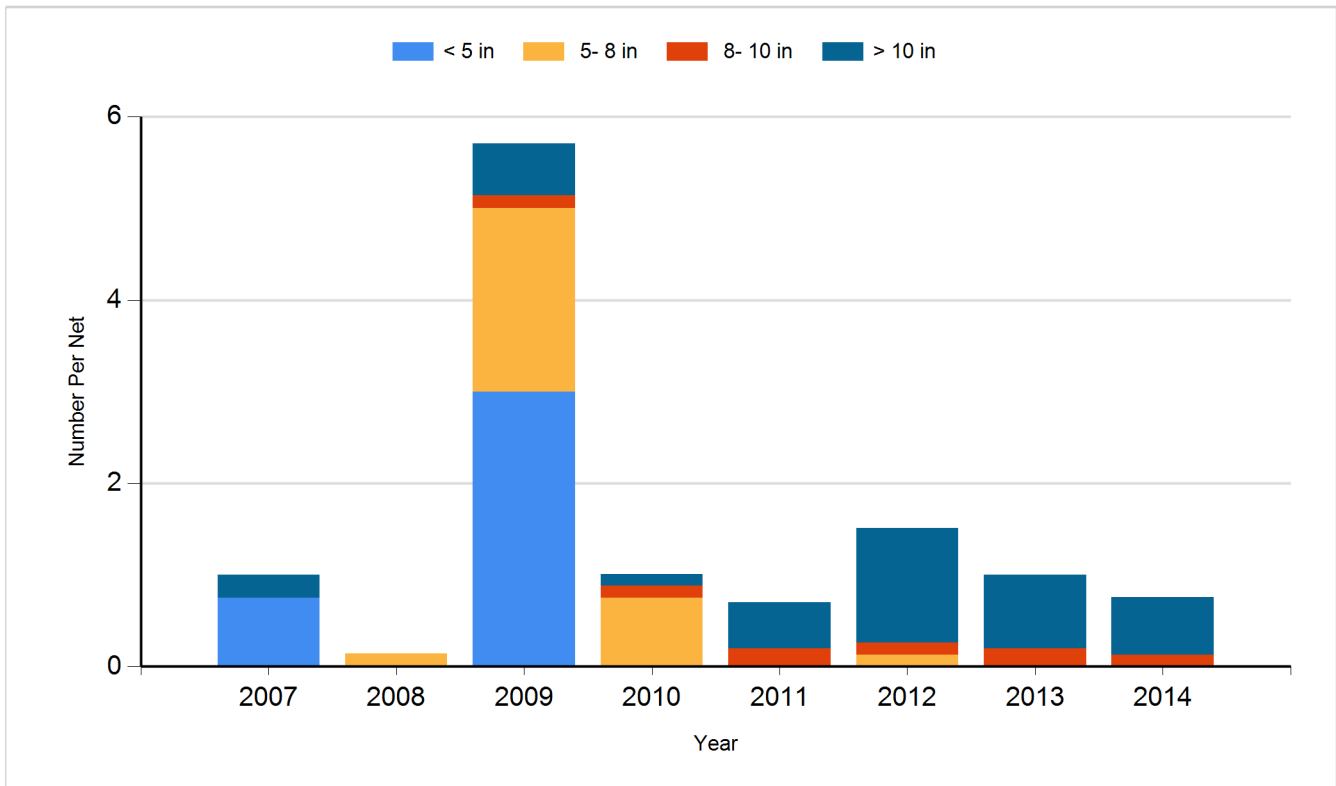




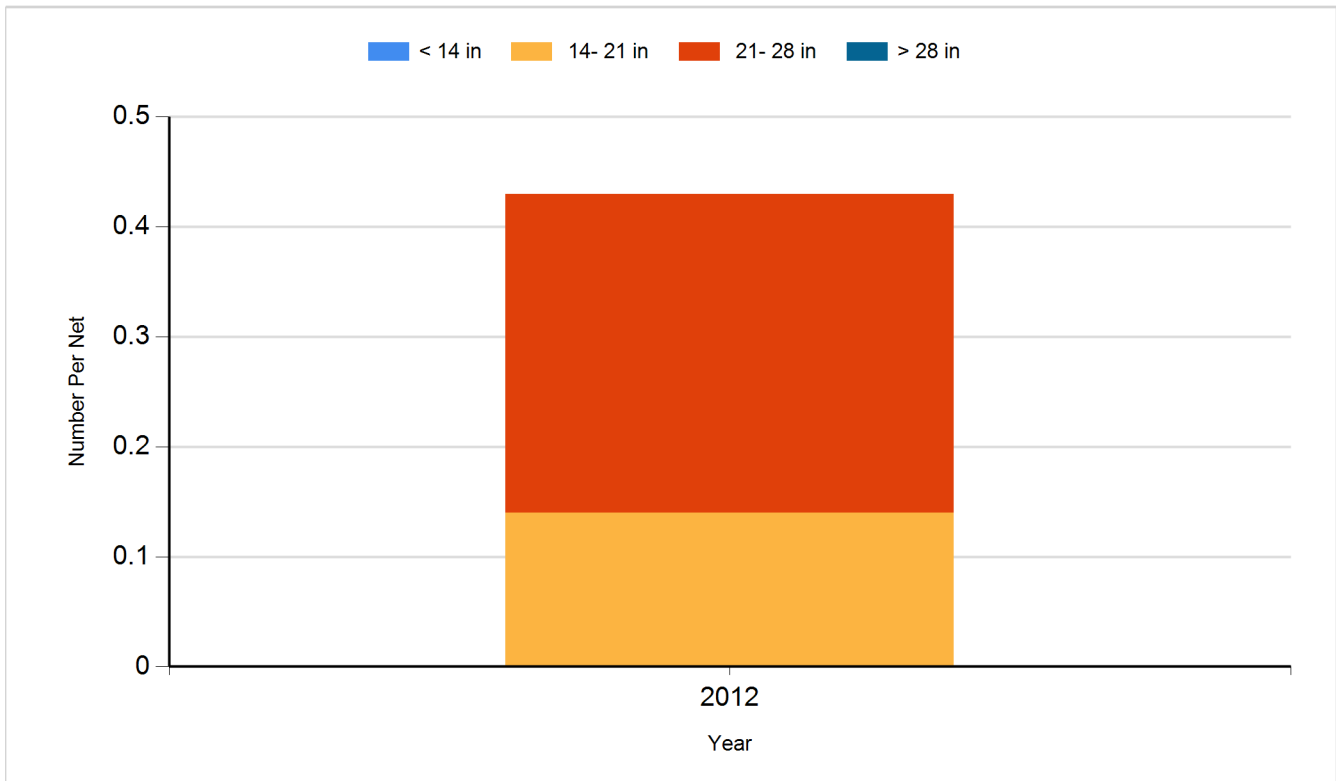
## Historic Fish Sizes and Relative Abundance

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

Species: Black Crappie  
Gear: Frame Net

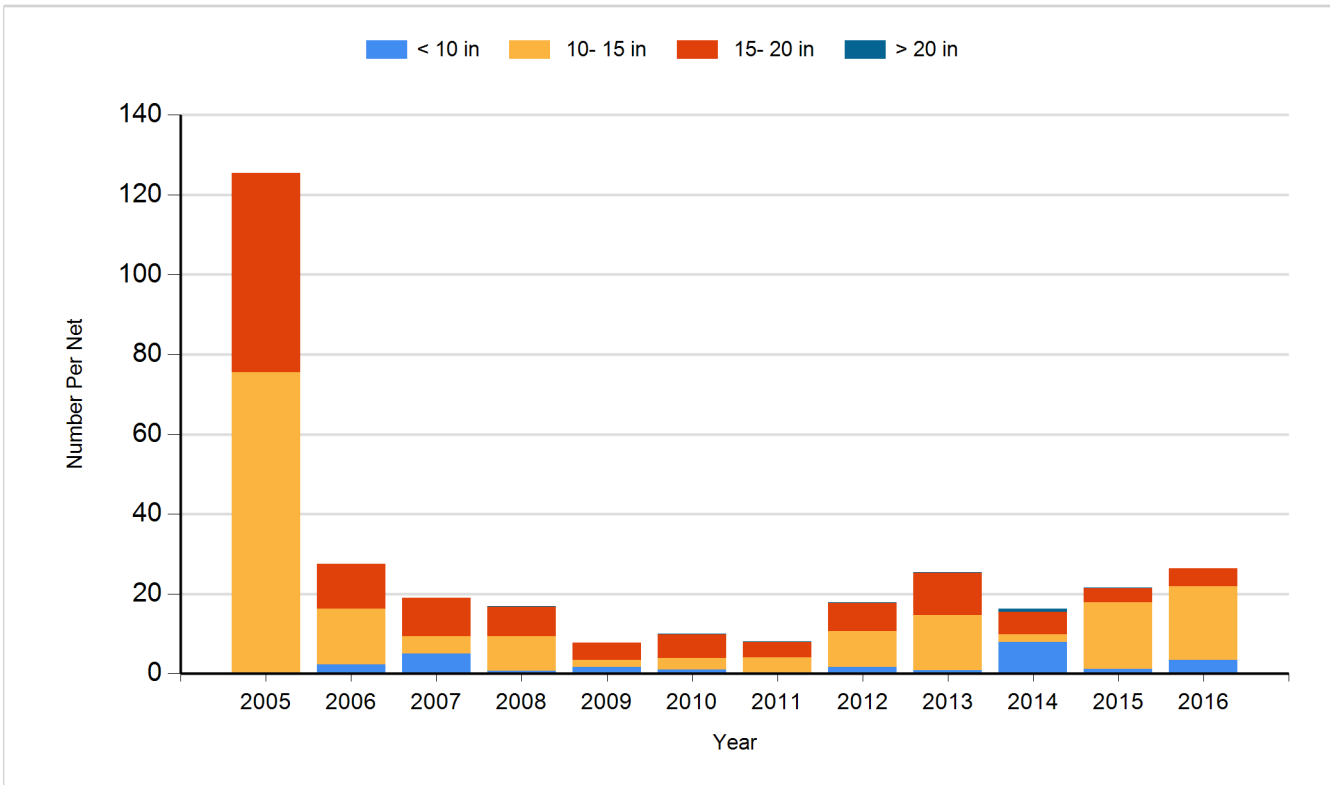


Species: Northern Pike  
Gear: Gill Net

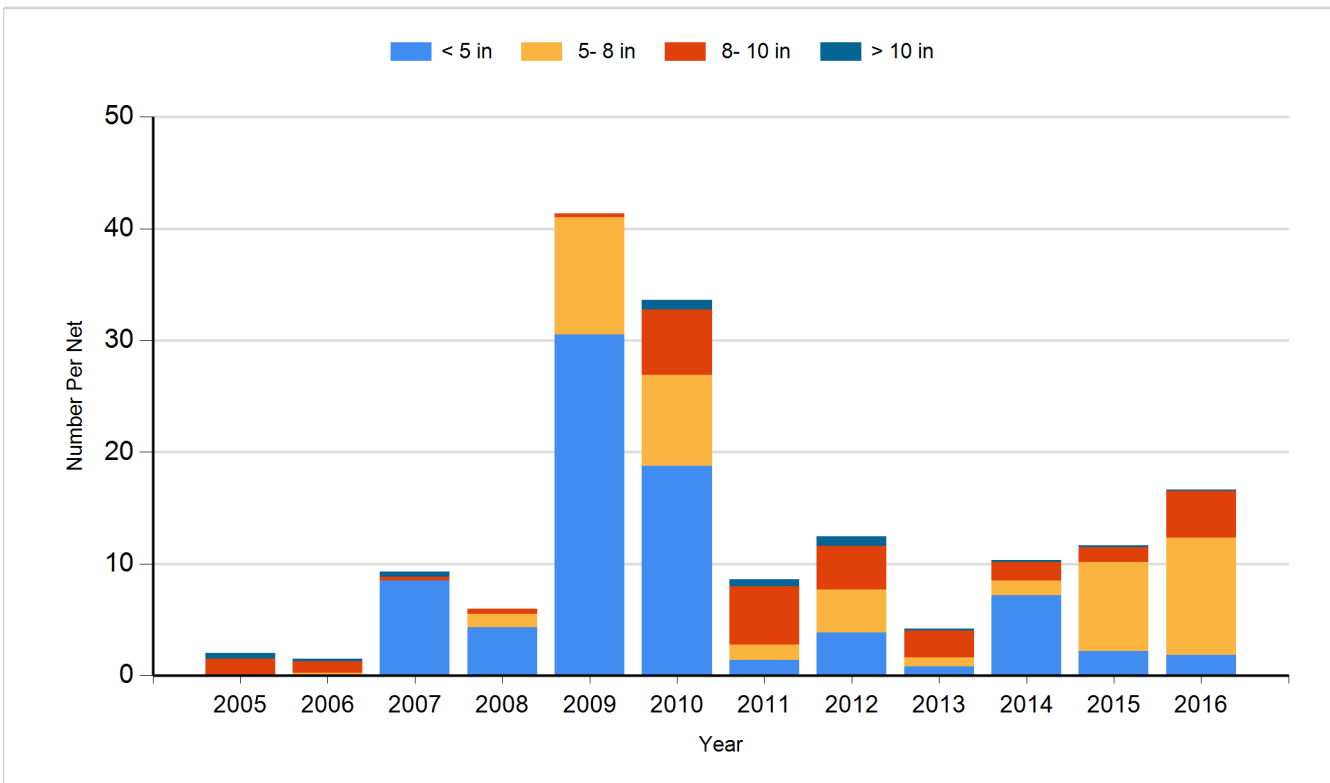




Species: Walleye  
Gear: Gill Net



Species: Yellow Perch  
Gear: Gill Net



## **Fish Stocking**

Number of fish stocked by year, species, and size.

Year	Species	Size	Number
2005	Gizzard Shad	Adult	182
2005	Splake Trout	Fingerling	2,263
2006	Yellow Perch	Adult	96
2007	Rainbow Trout (McConaugRainbow Trout	Fingerling	33,300
2007	Rainbow Trout (Shasta)	Fingerling	19,500
2008	Gizzard Shad	Adult	59
2008	Rainbow Trout (Shasta)	Fingerling	4,600
2009	Gizzard Shad	Adult	74
2010	Gizzard Shad	Adult	18
2010	Walleye	Fingerling	415,406
2011	Gizzard Shad	Adult	175
2012	Gizzard Shad	Adult	37
2012	Yellow Perch	Adult	2,507
2013	Bluegill	Adult	660
2013	Gizzard Shad	Adult	111
2014	Gizzard Shad	Adult	220
2014	Yellow Perch	Adult	2,150
2015	Yellow Perch	Adult	1,600