

**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**Belle Fourche Reservoir, Butte County**  
**LBF-Lake-768-000**  
**2015**

**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
frame net (std 3/4 in)	May 19, 2015	16 net-nights
std exp gill net (150 ft)	August 25, 2015	12 net-nights

## **Common Fish Species Present**

---

Channel Catfish

Black Crappie

Gizzard Shad

Walleye

White Crappie

Yellow Perch

White Bass

Common Carp

Smallmouth Bass

Shorthead Redhorse

---

## 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
frame net (std 3/4 in)	Channel Catfish	0.1	0.1	100		0		80	0
	Common Carp	1.3	0.6	100		50	18	87	2
	Walleye	1.5	0.7	100		58	16	70	1
	White Bass	1.8	0.7	100		57	15	96	4
	White Crappie	15.0	6.8	100		100		98	0
	Yellow Perch	0.1	0.1	100		0		82	0
std exp gill net (150 ft)	Channel Catfish	3.3	0.4	90		40	12	96	3
	Common Carp	0.7	0.3	25		0		95	3
	Freshwater Drum	0.2	0.2	100		100		87	0
	Shorthead Redhorse	0.7	0.4	100		50		101	3
	Smallmouth Bass	0.8	0.6	40		20		104	2
	Spottail Shiner	0.0	0.0						
	Walleye	20.3	4.3	18	3	1		84	1
	White Bass	6.7	2.6	100		100		103	1
Yellow Perch	9.5	3.7	16	5	2		90	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	
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015		
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	2.1	2.0				15.1	0.1	0.1	0.1	0.1	0.1	2.8
	Common Carp	0.6	1.6				9.9		1.4	6.1	1.3		3.5
	Freshwater Drum						0.1						0.1
	Gizzard Shad	0.1							0.2	0.3			0.2
	Green Sunfish									0.3			0.3
	Rainbow Trout									0.0			0.0
	Rainbow Trout (Hatchery)	0.0											0.0
	River Carpsucker	5.1	5.6				1.2	0.4	0.6	0.4			2.2
	Rudd	0.5	0.3						0.1	0.1			0.3
	Shorthead Redhorse	0.4	0.4				0.6		0.2	0.1			0.3
	Smallmouth Bass	0.6	0.3							0.1			0.3
	Walleye	3.0	1.6				1.4	1.3	1.3	2.0	1.5		1.7
	White Bass	0.3	1.1				2.0	0.3	1.7	11.0	1.8		2.6
	White Crappie						2.1	3.8	19.8	16.9	15.0		11.5
	White Sucker	0.1	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								0.1
	Channel Catfish	13.5	6.5	4.2	1.6				3.8				5.9
	Common Carp	3.0	1.3	1.7	1.0				1.4				1.7
	Freshwater Drum	0.0		0.2	0.1				1.4				0.4

		CPUE										
Gear	Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Avg
std exp gill net	Gizzard Shad	0.8	0.3	0.7	0.0				0.4			0.4
	River Carpsucker	2.0	1.7	0.7	0.1				0.6			1.0
	Shorthead Redhorse		0.0	0.3	0.5				3.0			1.0
	Smallmouth Bass								1.2			1.2
	Spottail Shiner		0.0	0.0	0.0				0.0			0.0
	Walleye	25.3	14.0	16.2	6.1				24.6			17.2
	White Bass	0.0	1.7	0.2	1.1				3.4			1.3
	White Crappie				0.0							0.0
	Yellow Perch	1.5	0.8	1.7	10.9				3.4			3.7
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									
			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
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	75	69				100	90	100	100	100
		PSD-P	21	0				44	0	31	63	58
		Wr	72	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					
			PSD-P			0	0					
			Wr			93						
Walleye		PSD	45	69	46	71				44		
		PSD-P	0	0	1	0				1		
		Wr	82	80	80	83				85		
Yellow Perch		PSD	83	100	30	3				76		
		PSD-P	17	60	0	0				6		
		Wr	88	88	97	99				97		

Gear	Species	Index	Year										
			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
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+
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)				
2006	204	251 (8)	330 (22)	355 (53)	385 (56)	406 (67)					

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

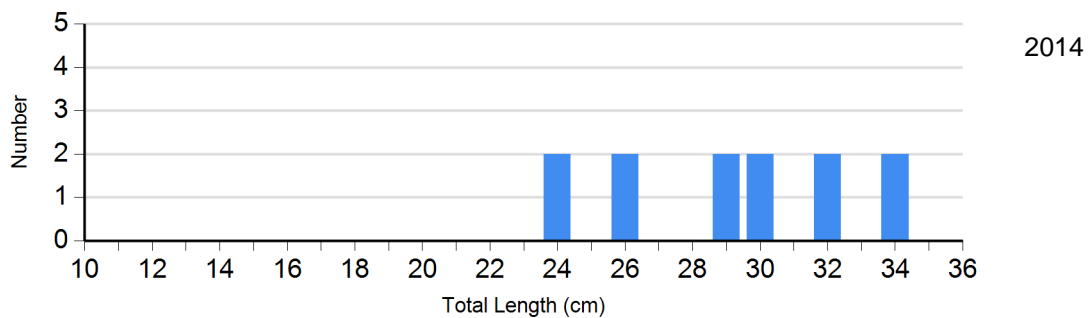
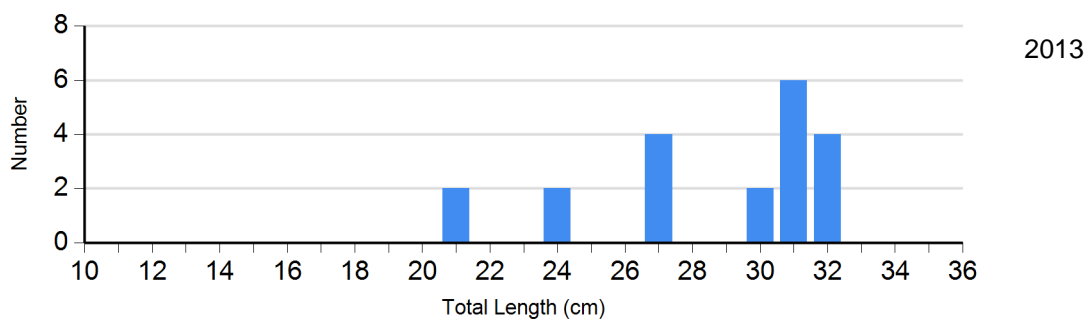
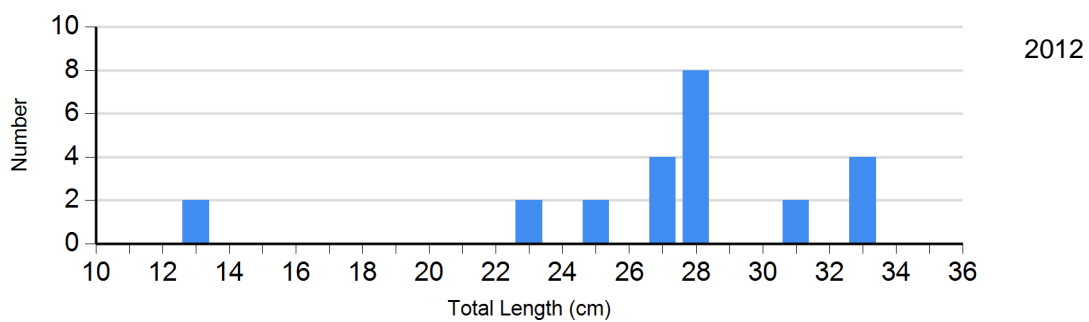
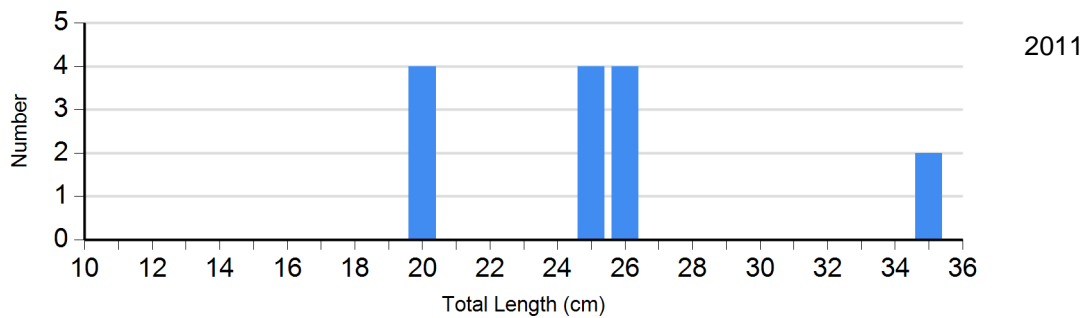
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

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	2011	0		4	103 (0.6)	8	98 (2.0)	2	83 (0.0)
	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	2011	64	79 (0.5)	60	76 (1.1)	4	67 (2.7)	0	
	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	
Yellow Perch Gill Net	2011	22	104 (2.7)	84	95 (0.8)	10	93 (2.5)	0	
	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	

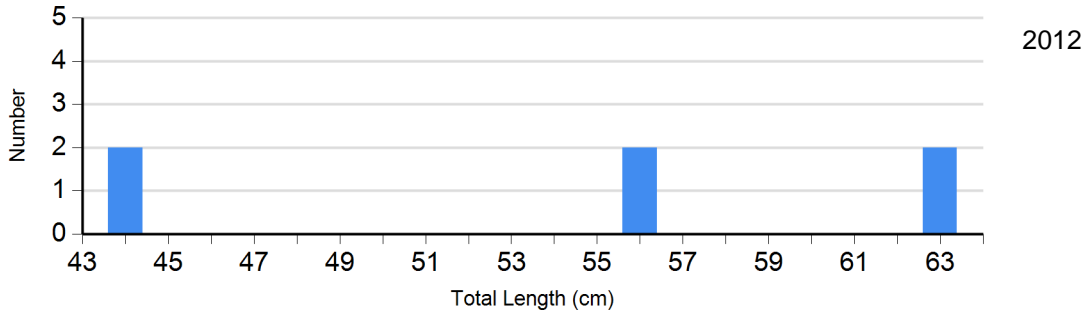
## Length Frequency Distribution

Length frequency histogram of species sampled by year.

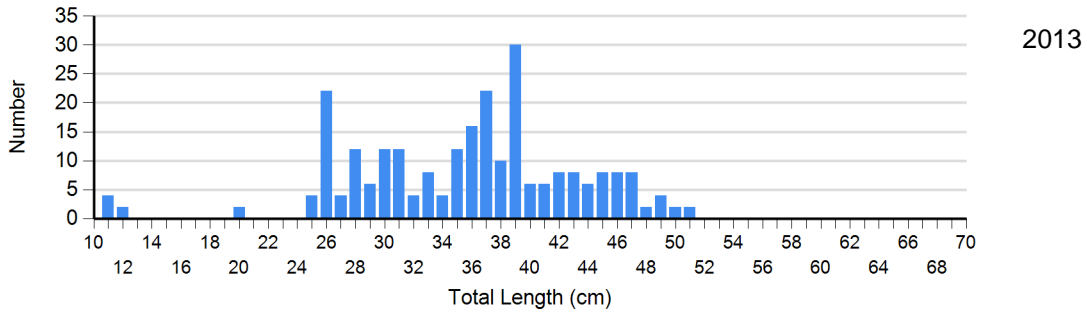
Species: Black Crappie  
Gear: frame net (std 3/4 in)



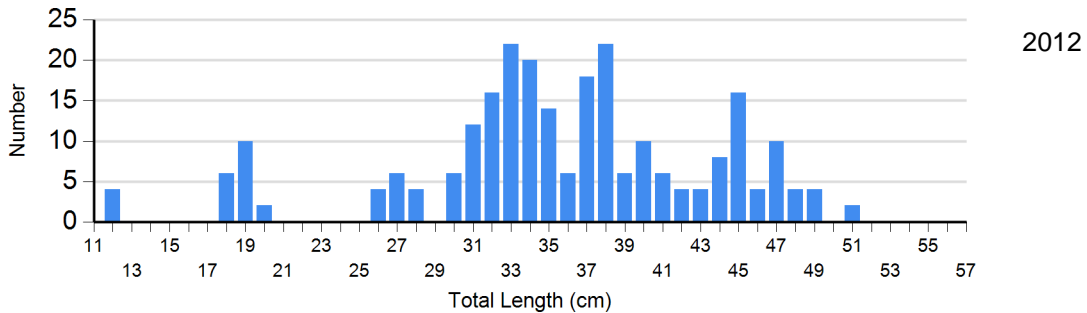
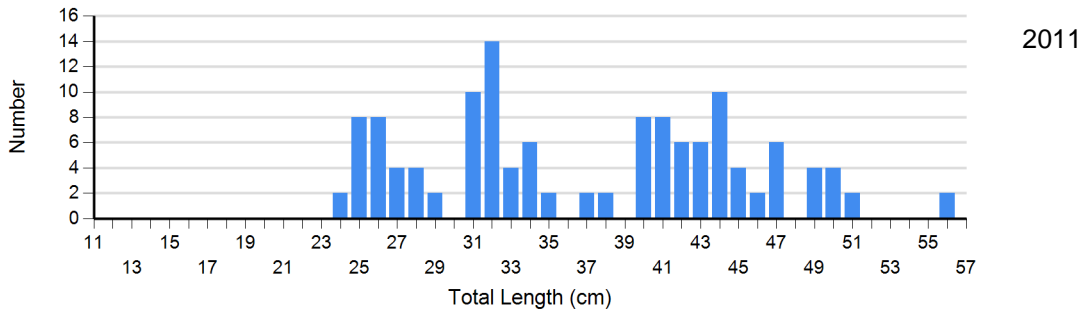
Species: Northern Pike  
Gear: std exp gill net (150 ft)

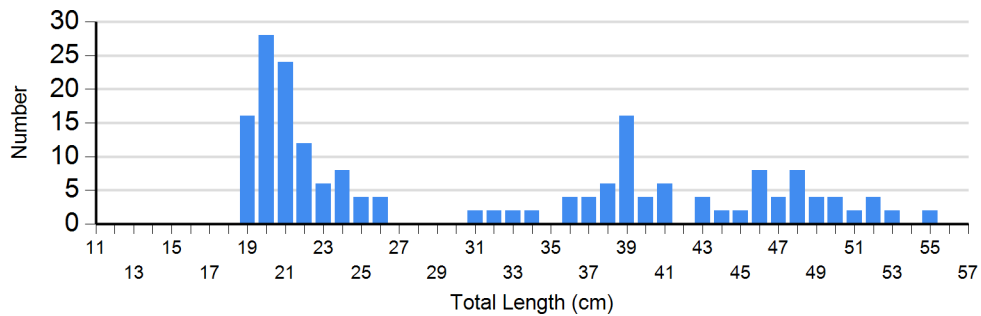


Species: Walleye  
Gear: std exp gill net

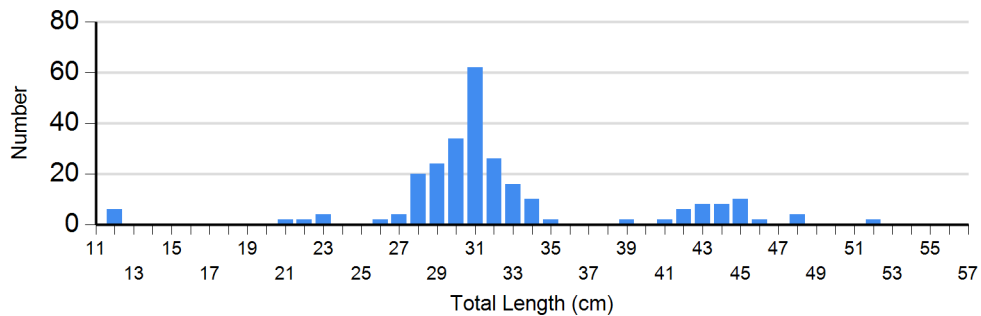


Species: Walleye  
Gear: std exp gill net (150 ft)



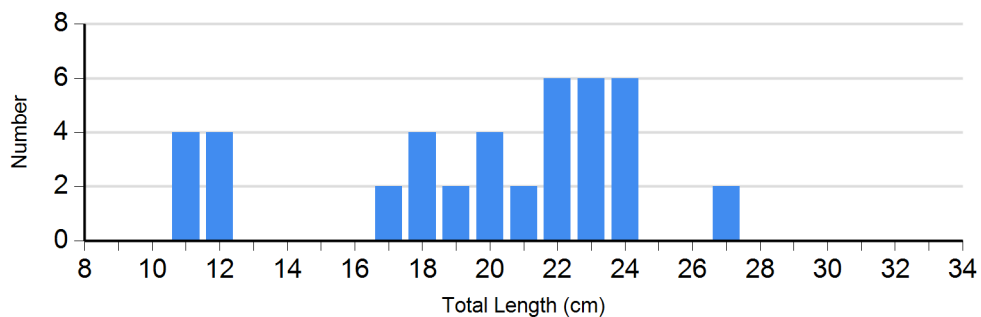


2014



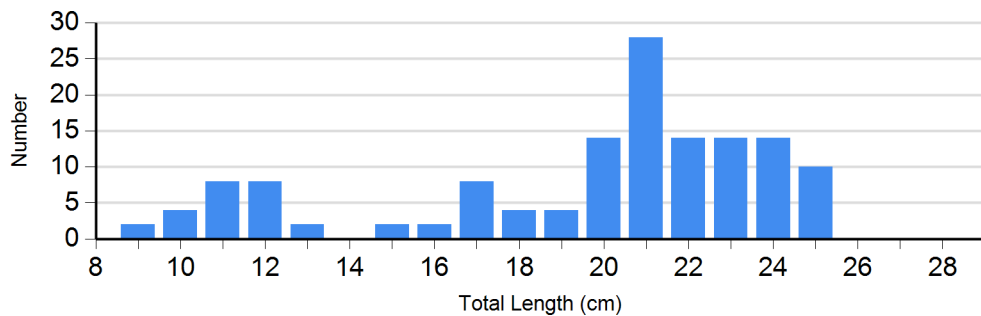
2015

Species: Yellow Perch  
Gear: std exp gill net

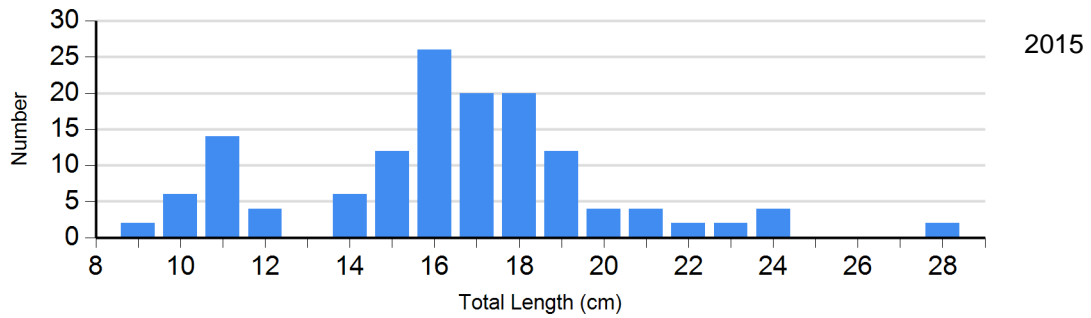
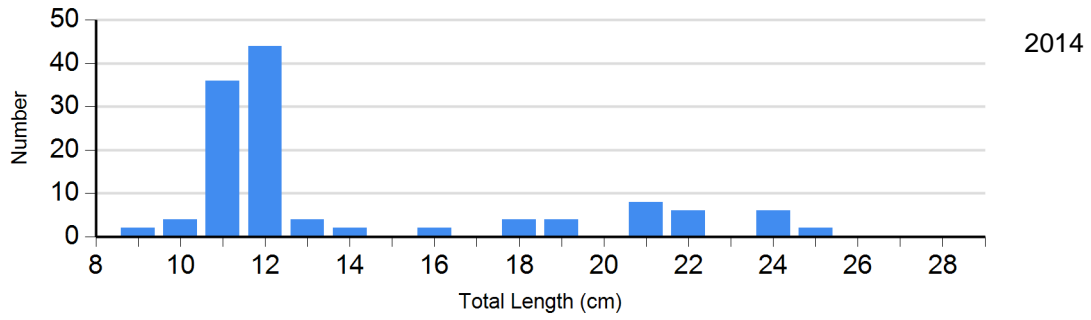
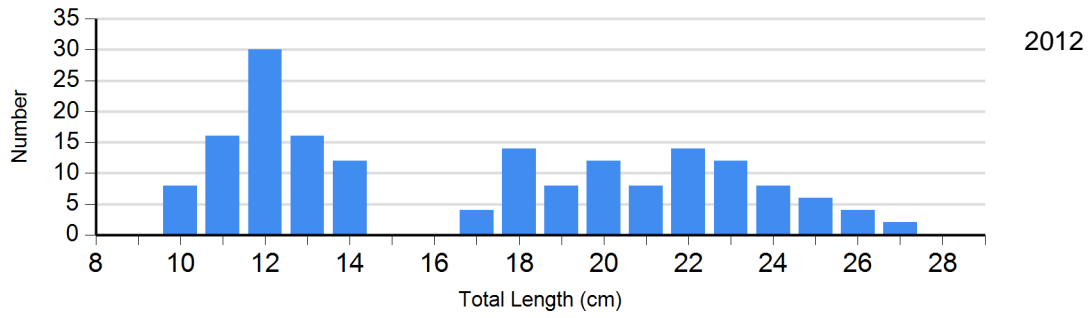


2013

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



2011

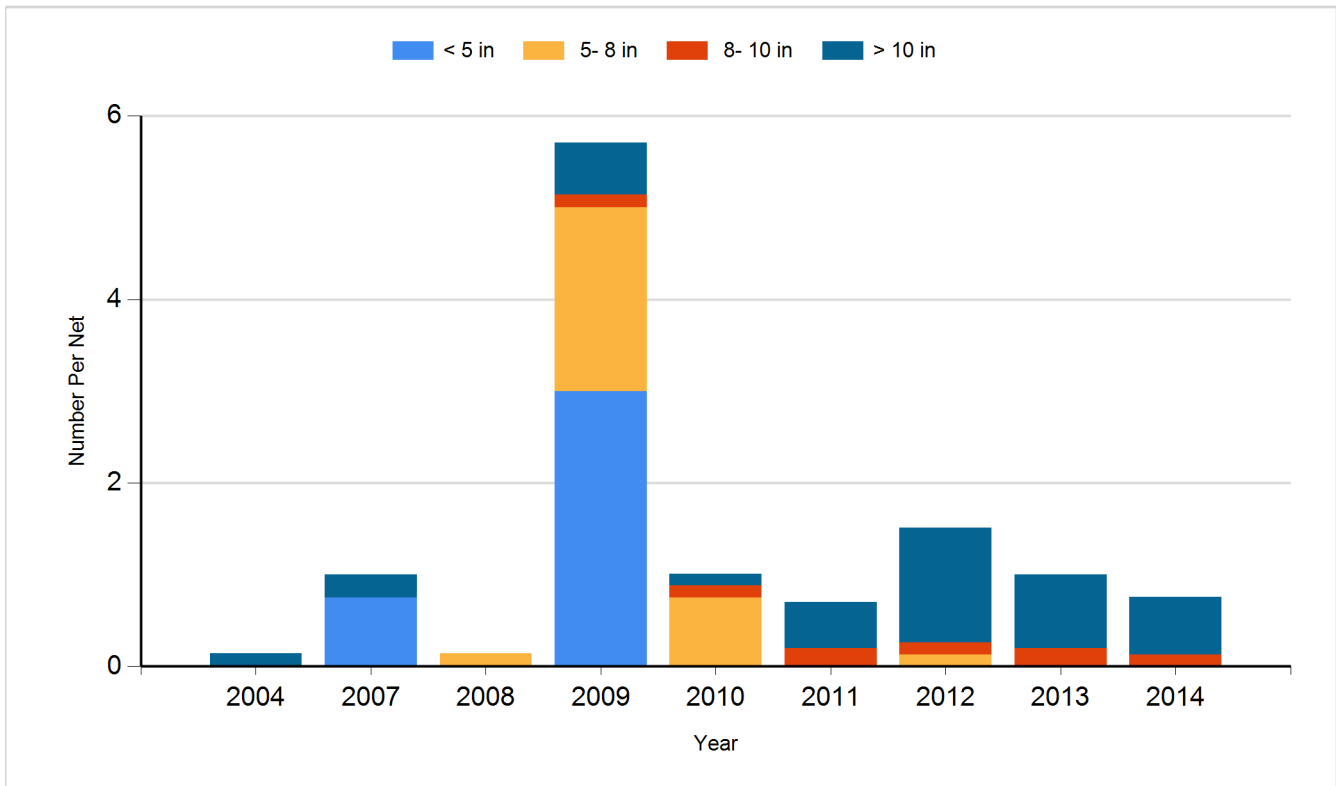




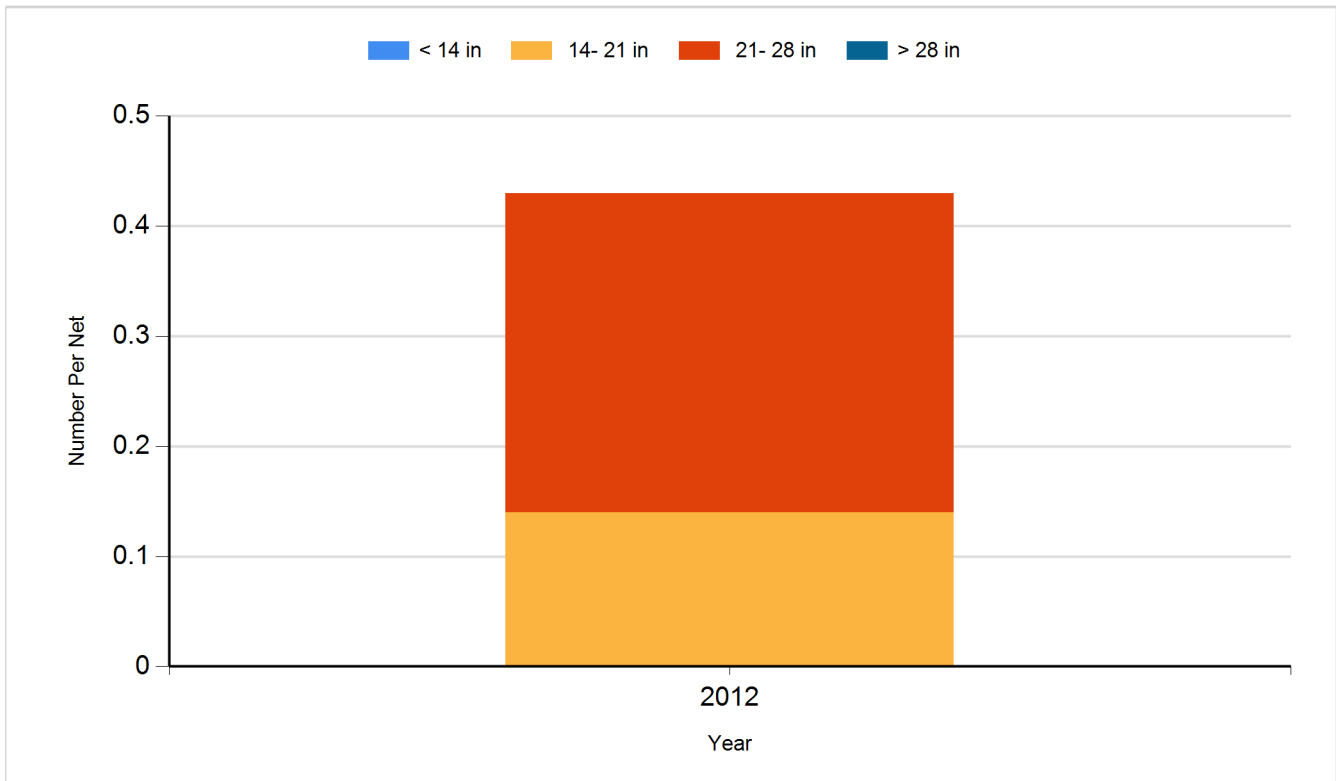
## Historic Fish Sizes and Relative Abundance

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

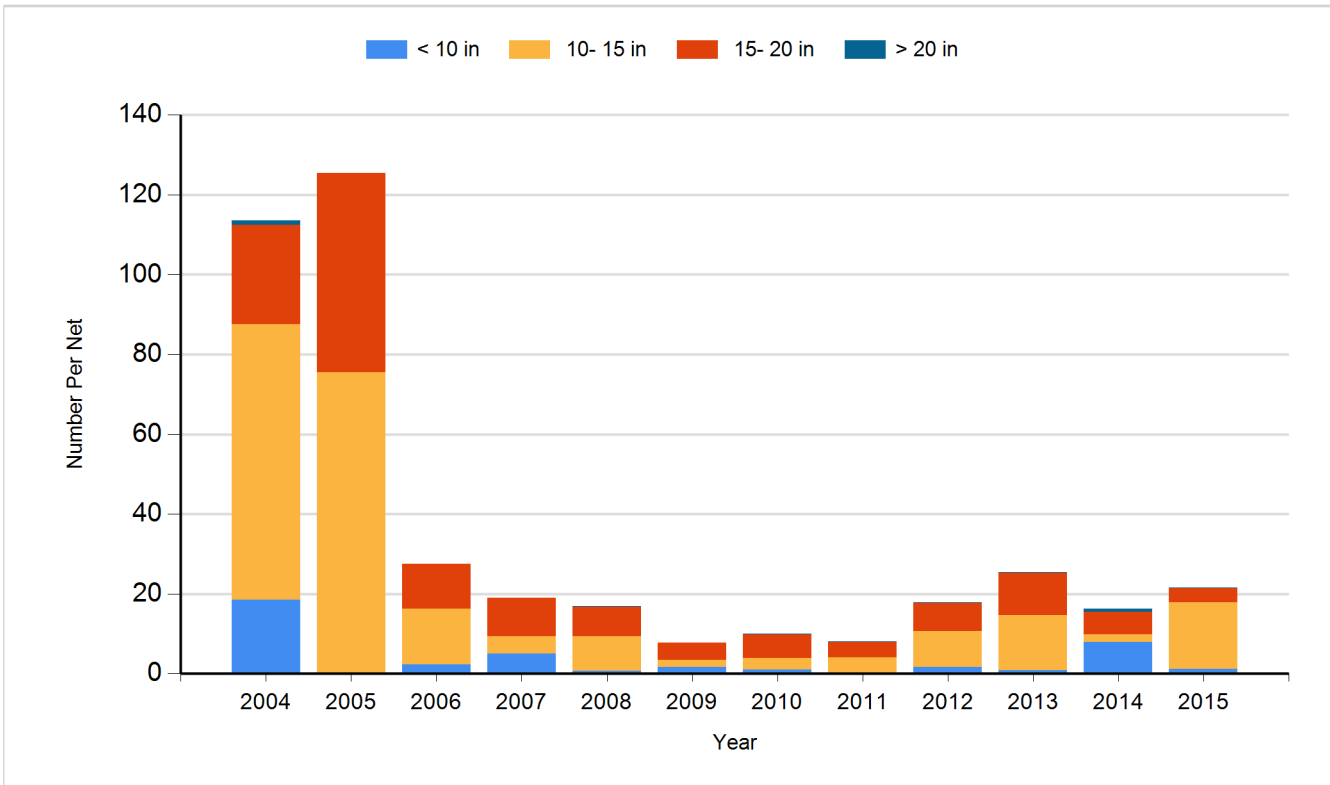
Species: Black Crappie  
Gear: Frame Net



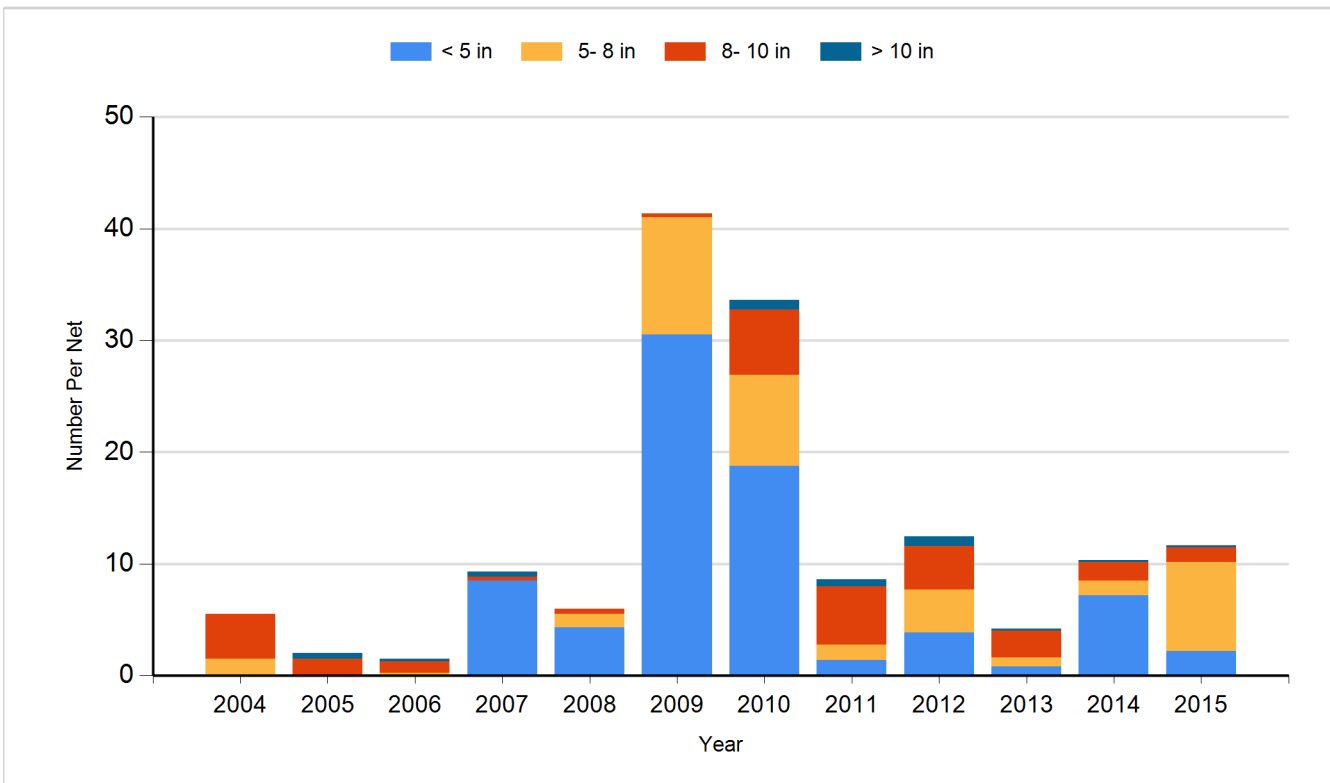
Species: Northern Pike  
Gear: Gill Net



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
2004	Gizzard Shad	Adult	120
2004	Tiger Muskellunge	Juvenile	1,605
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