Hayes Lake Survey Summary

Hayes Lake is located approximately 32 miles west of Fort Pierre, or the east edge of the community of Hayes, South Dakota. Hayes Lake is approximately 66 acres with an average depth of 6.6 feet and a maximum depth of 15.4 feet. Fishing access is available along the shoreline near the U.S. Highway 14 rest area, off the old highway bridge (north of existing highway), and off the shoreline at boat ramp. The boat ramp and access road was rebuilt in 2018. Cattails encircle much of Hayes Lake, making shoreline fishing difficult. Ice fishing access is typically good. Submergent vegetation is abundant throughout the lake reaching out to depths of 7 feet deep. Hayes Lake has a history of summer/winter killing but continues to support a good fishery.

Dissolved oxygen was adequate at the time of survey throughout all depths. During many years, a summer thermocline will be established at a depth of 6 to 7 feet and water deeper will be void of oxygen. Water clarity was good at 33 inches at time of survey.

Hayes Lake fishery supports Bluegill, Largemouth Bass, Northern Pike, Black Bullhead, Green Sunfish, and Hybrid Sunfish (Green Sunfish x Bluegill). Black and White Crappie were stocked the spring of 2018 to provide an additional species for anglers.

Largemouth Bass in Hayes Lake had a catch rate of 69 fish/hour of electrofishing. Approximately 25% of the population is 15 inches or longer which indicates a range of sizes. Fish collected ranged from 2 to 20 inches with an average size Largemouth Bass in the population around 11 inches. The plumpness or condition was very good during the fall, indicating adequate food and production of eggs within the fish for the following spring spawning season. The growth rate for Largemouth Bass was at or slightly above the statewide average, especially for larger and older fish. An age-5 Largemouth Bass averaged 14.5 inches, approximately 1 inch larger than the statewide average.

Hayes Lake contains a strong Bluegill population with 13% of the population 8 inches or greater. Net catches of 34.3 fish/net increased from a low of 2.1 fish/net in 2011. Bluegill size ranged from 2.5 to 9 inches with the average being 6 inches. The condition of Bluegill was good and growth was near the statewide average. An age-4 Bluegill in Hayes is averaging about 7 inches. The Bluegill fishery for Hayes Lake is well established and is doing well with young fish recruiting to the population.

Black Bullhead abundance increased dramatically from an average net catch of 10 fish/net to 140 fish/net in 2018. Fish ranged from 5.5 to 12 inches with the average size Black Bullhead at 8.7 inches. Currently, many of the Black Bullhead were of larger size but not of size many anglers would enjoy catching them yet.

The Northern Pike population has remained stable over the last 10 years. The size of fish collected ranged from 12 to 26 inches and averaged 18 inches. There are larger fish available in Hayes Lake with a few in the 10 to 15 pound range.

Hayes Lake also contains a population of Green Sunfish and Hybrid Sunfish (Green x Bluegill). The population of both has remained low in abundance and has not caused any issue with the fishery such as increased competition for other species. Hopefully their abundance will continue to remain low.

Hayes Lake is a great fishery, especially for young anglers, because you may not know what you'll catch or the size of fish it'll be on your line. As long as water levels remain good in Hayes Lake, the fishery should continue to be strong. Future improvements are in the works such as a possible fishing dock and some additional shoreline access locations.

For more information, please contact South Dakota Game, Fish and Parks Ft. Pierre office – (605) 223-7700.

Prepared 01-29-2019 by KDP

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Hayes, Stanley County
BAD-Lake-3119-000
2018

Lake Information

Name: Hayes

County: Stanley

Legal Description: T5-R26-S29

Surface Area: 61 Acres

Maximum Depth: 17 Feet

Mean Depth: 6 Feet

Surveys and Investigations

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

Gear	Date	Effort
boat shocker (night)	Oct 02, 2018	3600 seconds
boat shocker (night)	Sep 27, 2018	3600 seconds
frame net (std 3/4 in)	Jun 12, 2018	5 net-nights
frame net (std 3/4 in)	Jun 13, 2018	5 net-nights

Common Fish Species Present

Largemouth Bass

Bluegill

Black Bullhead

Northern Pike

Black Crappie

Sunfish Hybrid

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	6	15	9	23	12	30	15	38	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	CPUE	CI-80	PSD	CI-80	PSD-P	CI-80	Wr	CI-80
boat shocker (night)	Largemouth Bass	69.0	11.5	42	6	25	5	112	1
frame net (std 3/4 in)	Black Bullhead	139.8	53.6	35	2	24	2	90	1
	Black Crappie	0.1	0.1	100		100		97	
	Bluegill	34.3	10.9	46	4	13	3	104	1
	Largemouth Bass	0.2	0.2	0		0			
	Northern Pike	1.4	0.9	21		0		94	9
	Sunfish Hybrid	0.0	0.0						

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
boat shocker (night)	Largemouth Bass			78.0			3.0				69.0	50.0
frame net (std 3/4 in)	Black Bullhead	10.3		9.7			10.0				139.8	42.5
	Black Crappie										0.1	0.1
	Bluegill			2.1			10.0				34.3	15.5
	Green Sunfish	0.0		0.4			2.2					0.9
	Largemouth Bass										0.2	0.2
	Northern Pike			1.1			0.8				1.4	1.1
	Sunfish Hybrid										0.0	0.0

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
boat shocker (night)	Largemouth Bass	PSD			28			100				42
		PSD-P			3			33				25
		Wr			114			108				112
frame net (std 3/4 in)	Black Bullhead	PSD	26		79			44				35
		PSD-P	0		5			1				24
		Wr	104		102			93				90
	Black Crappie	PSD										100
		PSD-P										100
		Wr										97
	Bluegill	PSD			10			65				46
		PSD-P			10			13				13
		Wr			131			113				104
	Green Sunfish	PSD	0		100			86				
		PSD-P	0		50			77				
		Wr			101			124				
	Largemouth Bass	PSD										0
		PSD-P										0
	Northern Pike	PSD			0			63				21
		PSD-P			0			0				0
		Wr			89			82				94

Back-Calculated Lengths

Mean species back-calculated total length (mm) at age, standard error (SE), and sample size (N).

Species: Black Crappie

Year Class	Age	N	Mean back-calculated length (SE) at age 1	2	3	4	5	6	7	8	9	10
2014	4	1	103	132	179	220						
Weighted Mean		1	103	132	179	220						

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2014	4	1										
Weighted Mean		1										

Species: Bluegill

Year Class	Age	N	Mean back-calculated length (SE) at age 1	2	3	4	5	6	7	8	9	10
2016	2	20	57 (2)	105 (3)								
2015	3	9	51 (3.4)	104 (4)	148 (3.3)							
2014	4	9	47 (2.1)	86 (2.4)	136 (3.5)	175 (3)						
2013	5	9	45 (1.4)	83 (2.8)	138 (3.3)	182 (4.9)	199 (3.8)					
Weighted Mean		47	52	97	141	179	199					

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2016	2	20										
2015	3	9										
2014	4	9										
2013	5	9										
Weighted Mean		47										

Species: Largemouth Bass

Year Class	Age	N	Mean back-calculated length (SE) at age									
			1	2	3	4	5	6	7	8	9	10
2017	1	4	84 (4.7)									
2016	2	33	69 (2.4)	154 (5.2)								
2015	3	10	80 (6.1)	173 (11.6)	228 (11.2)							
2014	4	3	80 (15.7)	173 (37)	282 (36.4)	358 (19.1)						
2013	5	4	69 (16.9)	151 (36.7)	266 (39.1)	354 (23.5)	392 (19.4)					
2012	6	2	58 (4)	116 (31.6)	207 (47.1)	284 (52.9)	342 (24.8)	387 (5)				
2011	7	1	61	157	279	333	357	378	398			
2010	8	4	61 (5.3)	156 (11.6)	277 (17.3)	342 (17)	383 (14.9)	407 (12.1)	431 (13.3)	447 (11.8)		
2009	9	2	65 (8.2)	157 (4.2)	270 (12.3)	327 (12.6)	353 (11.8)	377 (12.6)	405 (11.5)	428 (10.7)	443 (12.4)	
2008	10	1	90	135	184	235	294	326	372	389	409	426
Weighted Mean		64	71	157	249	332	367	386	413	433	432	426

Year Class	Age	N	11	12	13	14	15	16	17	18	19	20
2017	1	4										
2016	2	33										
2015	3	10										
2014	4	3										
2013	5	4										
2012	6	2										
2011	7	1										
2010	8	4										
2009	9	2										
2008	10	1										
Weighted Mean		64										

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+
2018	1				253 (1)						

Species: Bluegill

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	325		117 (168)	165 (31)	190 (77)	205 (49)					
2014	100		108 (26)	145 (12)	177 (12)	188 (16)	197 (18)	200 (13)	203 (2)		

Species: Largemouth Bass

		Mean Length (expanded sample number) at capture by age									
Year	N	1	2	3	4	5	6	7	8	9	10+
2018	159	156 (8)	216 (85)	280 (34)	395 (6)	428 (9)	413 (5)	414 (2)	459 (8)	466 (5)	435 (3)
2014	11	128 (8)	366 (1)		376 (1)	412 (1)					
2011	82	163 (4)	286 (76)					424 (1)	424 (1)		

Fish Condition

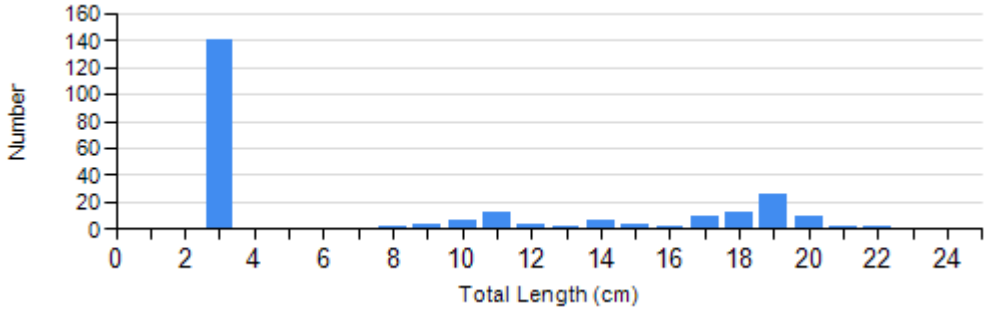
Mean relative weight (Wr) by sample size (N), length category stock to quality (S-Q), quality to preferred (Q-P), preferred to memorable (P-M), and memorable (M) for species collected across survey years with standard error (SE).

		Length Groups							
		S-Q		Q-P		P-M		M	
Species	Year	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)	N	Wr (SE)
Black Crappie Frame Net	2018	0		0		1	97	0	
Bluegill Frame Net	2014	35	114 (1.4)	52	113 (0.9)	13	113 (1.7)	0	
	2018	186	108 (1.5)	111	99 (1.2)	46	99 (1.9)	0	
Largemouth Bass Electro Fishing	2014	0		2	108 (12.9)	1	109	0	
	2018	80	107 (0.8)	24	115 (3.9)	33	119 (1.5)	1	132

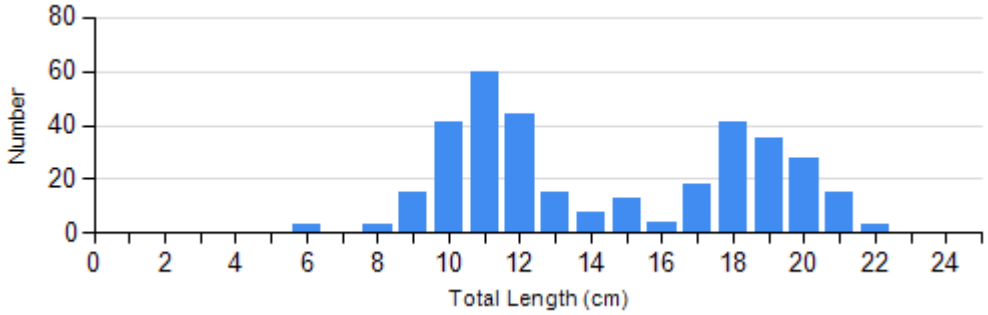
Length Frequency Distribution

Length frequency histogram of species sampled by year.

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

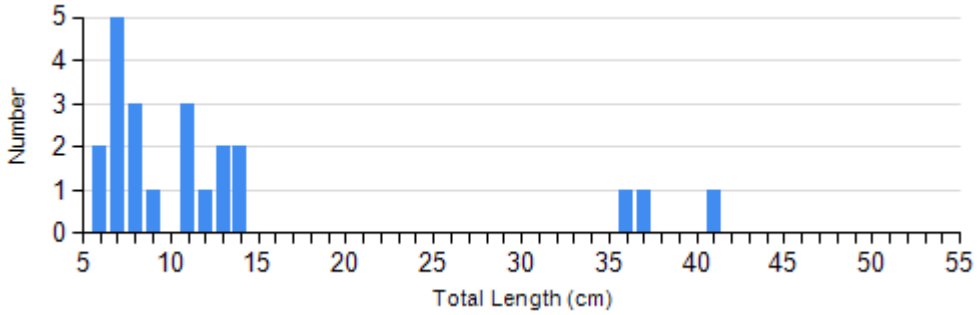


2014

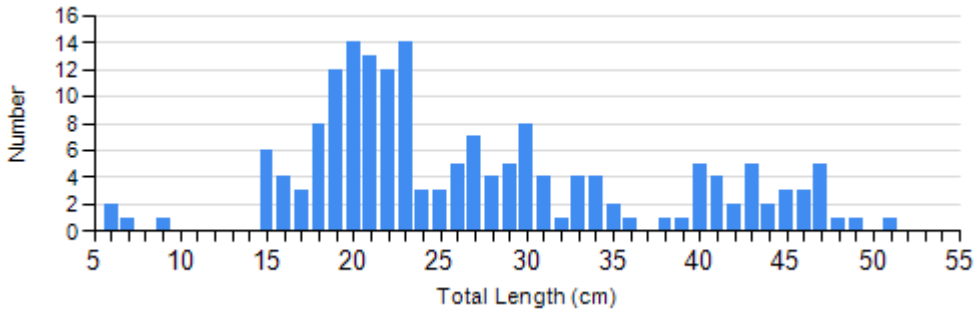


2018

Species: Largemouth Bass
Gear: boat shocker (night)



2014

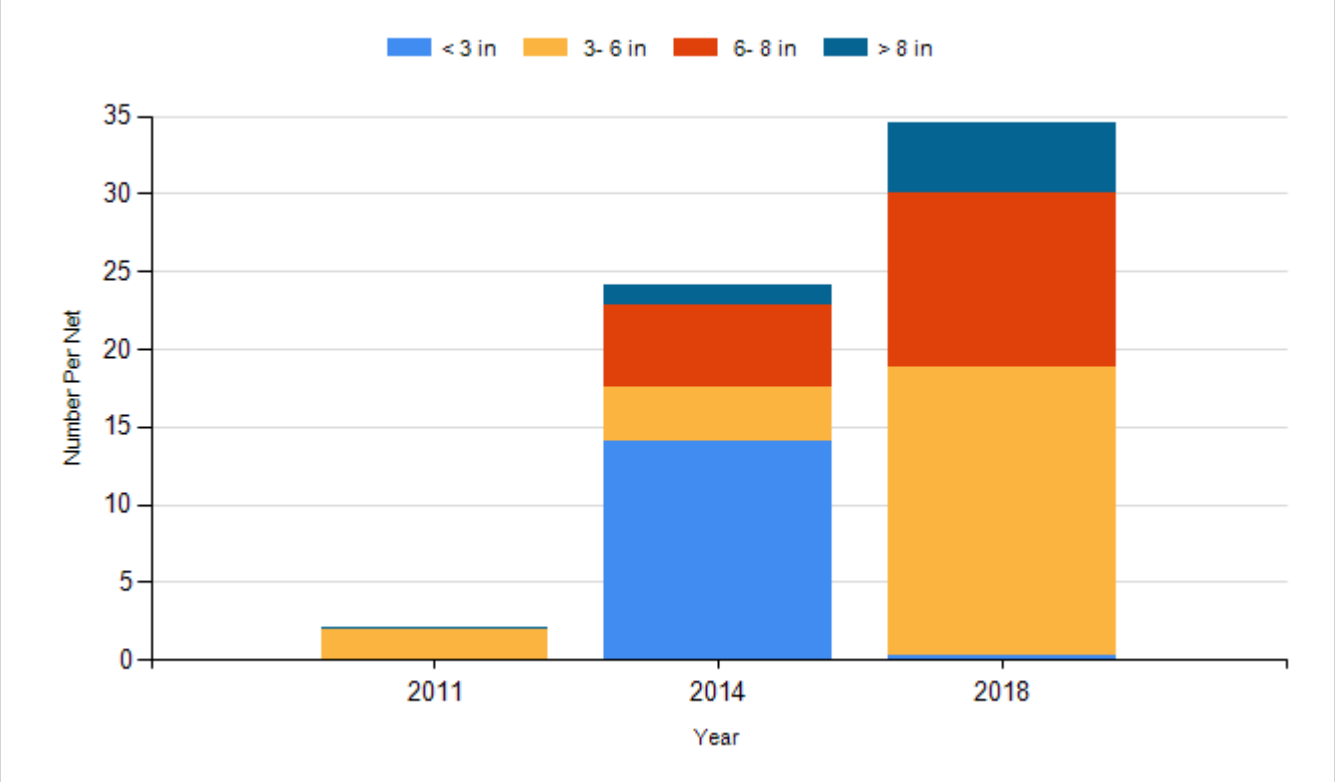


2018

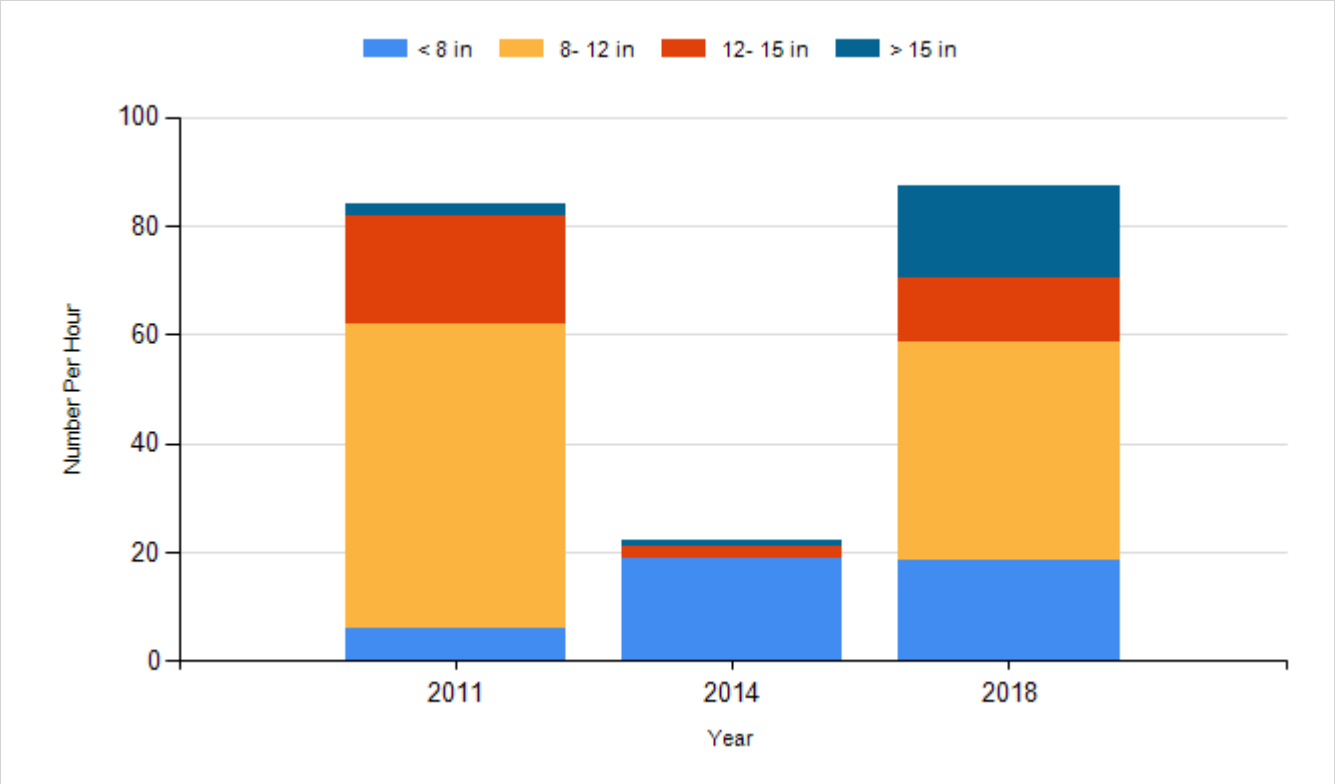
Historic Fish Sizes and Relative Abundance

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

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



Species: Largemouth Bass
Gear: boat shocker (night)



Fish Stocking

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

Year	Species	Size	Number
2009	Bluegill	Adult	450
2009	Largemouth Bass	Fingerling	6,510
2009	Largemouth Bass	Juvenile	54
2010	Largemouth Bass	Juvenile	561
2015	Largemouth Bass	Juvenile	500
2018	Black Crappie	Adult	50
2018	White Crappie	Adult	25