

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-44

Name: Lake Henry

County: Bon Homme

Legal Description: T96-R58-Sec.9-10

Location from nearest town: 1 mile south, 1 mile east of Scotland, SD

Dates of present survey: August 15-17, 2011 (netting)

Date last surveyed: August 17-19, 2009 (netting) May 27, 2009 (electrofishing)

Managed Species	Other Species
Largemouth Bass	White Sucker
Yellow Perch	Common Carp
Channel catfish	Black Bullhead
Black Crappie	Green sunfish
Bluegill	Hybrid sunfish

PHYSICAL DATA

Surface Area: 165 acres (est.)

Watershed: 34,699 acres

Maximum depth: 35 feet (est.)

Mean depth: 18 feet (est.)

Volume: No data

Shoreline length: No data

Contour map available: No

Date mapped: NA

OHWM elevation: No data

Date set: NA

Outlet elevation: No data

Date set: NA

Lake elevation observed during the survey: Full

Beneficial use classifications: (4) warmwater permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation and stock watering.

Introduction

Lake Henry was created by the construction of a dam across Dawson Creek in 1937. It was named in honor of State Senator Henry Brown of Bon Homme County. The lake quickly became a popular water-based recreation spot for the area. By the late 1980s, however, decades of erosion from the watershed had degraded the lake and use had declined considerably.

Plans to renovate the lake began in 1991 after extensive damage to the spillway was discovered. In 1994, the dam was breached and the lake drained to allow spillway repairs and the removal of accumulated sediments. The renovation project quickly ground to a halt when funding was withdrawn and the lake remained dry for nearly a decade.

In 2002, funding for the project was restored. It was determined more economical to build a new dam rather than rebuild the old one. A new site was chosen $\frac{3}{8}$ of a mile downstream and construction began late in 2002. The dam was completed in 2003 and completely filled with water in 2005.

Ownership of Lake and Adjacent Shoreline Property

Lake Henry and all surrounding shoreline is owned and managed by the South Dakota Department of Game, Fish and Parks.

Fishing Access

Lake Henry has a two lane boat ramp with a dock located on the southeast corner of the lake near the dam face. There are toilets located near the boat ramp and on the north access area. A handicapped accessible fishing dock is located on the southwest side of the lake. Numerous shore access sites were developed on both sides of the lake and habitat structures were placed to benefit shore anglers. All of Lake Henry has been designated a no-wake zone. At no time may any boat create a visible wake or exceed five miles per hour. This was done to protect the shorelines from erosion and to maintain a quiet and peaceful environment.

Field Observations of Water Quality and Aquatic Vegetation

The water in Lake Henry was not as clear as previous years during the survey with a Secchi depth measurement of 0.84 m (33 in). Scattered beds of sago pondweed (*Potamogeton pectinatus*) were common throughout the lake. Cattails (*Typha spp.*) were present around the entire lake. Flooded trees were also present especially in the southeast part of the lake.

BIOLOGICAL DATA

Methods:

Lake Henry was sampled on August 15-17, 2011 with ten overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh ($\frac{3}{4}$ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. Nighttime electrofishing to assess the largemouth bass population was not conducted this year.

Results and Discussion:

Trap Net Catch

Together, bluegill and black crappie comprised an impressive 94.7 percent of the trap net sample in 2011 (Table 1). Six other species were also caught during the survey.

Table 1. Total catch from ten overnight trap net sets at Lake Henry, Bon Homme County, August 15-17, 2011.

Species	Number	Percent	CPUE ¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Bluegill	544	68.9	54.4	+26.9	16.2	18	0	93
Black Crappie	204	25.8	20.4	+12.1	15.3	6	0	96
White Sucker	18	2.3	1.8	+0.7	5.5	100	100	84
Black Bullhead	15	1.9	1.5	+0.8	73.1	80	40	92
Common Carp	4	0.5	0.4	+0.2	0.6	--	--	--
Largemouth Bass	3	0.4	0.3	+0.2	0.4	--	--	--
Green Sunfish	1	0.1	0.1	+0.1	1.0	--	--	--
Yellow Perch	1	0.1	0.1	+0.1	6.2	--	--	--

* Four years (2004, 2005, 2007, 2009)

Table 2. Catch per unit effort by length category for various fish species captured with trap nets at Lake Henry, Bon Homme County, August 15-17, 2011.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Bluegill	--	54.4	44.7	9.7	--	54.4	+26.9
Black Crappie	0.4	20.0	18.9	1.1	--	20.4	+12.1
White Sucker	--	1.8	--	--	1.8	1.8	+0.7
Black Bullhead	--	1.5	0.3	0.6	0.6	1.5	+0.8
Common Carp	0.2	0.2	0.1	0.1	--	0.4	+0.2
Largemouth Bass	0.2	0.1	--	0.1	--	0.3	+0.2
Green Sunfish	--	0.1	--	0.1	--	0.1	+0.1
Yellow Perch	--	0.1	0.1	--	--	0.1	+0.1

Length categories can be found in Appendix A.

Bluegill

Management objective: Maintain a bluegill fishery with a trap-net CPUE of at least 20 and RSD-18 of at least 20.

Bluegill abundance increased significantly to above the management objective in 2011 (Table 3). However, the population size structure declined with only 2% of the fish sampled longer than 18 cm (7 inches) (Table 3, Figure 1). Growth slowed and is now below statewide, regional and small lakes and impoundments means (Table 4). Declining growth rates and the absence of fish larger than 20 cm (8 in) are likely related to increased abundance.

¹ See Appendix A for definitions of CPUE, PSD, RSD-P and mean Wr.

Table 3. Bluegill trap-net CPUE, PSD, RSD-18, RSD-P, and mean Wr for Lake Henry, Bon Homme County, 2003-2011.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
CPUE		0.0	7.9		28.8		12.0		54.4
PSD		--	18		80		88		18
RSD-18		--	3		10		53		2
RSD-P		--	1		0		3		0
Mean Wr		--	114		97		88		93

Table 4. Average back-calculated lengths (mm) for each age class of bluegills in Lake Henry, Bon Homme County, 2011.

Year Class	Age	N	Back-calculation Age							
			1	2	3	4	5	6	7	8
2010	1	164	59							
2009	2	243	52	95						
2008	3	125	41	85	125					
2007	4	5	52	83	144	176				
2006	5	7	42	79	124	140	167			
All Classes		544	51	91	126	155	167			
Statewide Mean			55	103	141	166				
Region III Mean			60	116	157	180				
SLI* Mean			53	101	138	163				

*Small Lakes and Impoundments (<150 acres)

Black Crappie

Management objective: Maintain a crappie fishery with a trap-net CPUE of at least 20 and PSD of at least 40.

Black crappie CPUE declined in 2011 but still exceeded the management objective (Table 5). The fish sampled ranged in length from 12 to 26 cm (4.7-10.2 in) with an average length of 150 mm (5.9 in) (Figure 2). In 2010, a die-off of adult crappies was observed and this was confirmed by the length frequency charts (Figure 2). Growth of black crappies in Lake Henry continues to be better than in many of our small impoundments (Table 6).

Table 5. Black Crappie trap-net CPUE, PSD, RSD-P, and mean Wr for Lake Henry, Bon Homme County, 2003-2011.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
CPUE		0.5	1.6		28.2		30.8		20.4
PSD		--	56		27		67		6
RSD-P		--	31		4		2		0
Mean Wr		--	103		100		96		96

Table 6. Average back-calculated lengths (mm) for each age class of black crappie in Lake Henry, Bon Homme County, 2011.

Year Class	Age	N	Back-calculation Age							
			1	2	3	4	5	6	7	8
2010	1	193	94							
2009	2	9	80	194						
2008	3	2	74	154	214					
All Classes		204	83	174	214					
Statewide Mean			83	147	195	229	249			
Region III Mean			95	167	219	253	274			
SLI* Mean			78	134	180	209	226			

*Small Lakes and Impoundments (<150 acres)

Black Bullhead

Management objective: Maintain a bullhead fishery with a trap-net CPUE of no more than 100.

Lake Henry contains a low-density bullhead population comprised of mostly larger fish (Figure 3) with a mean length is 296 mm (11.65 inches). The high-density largemouth bass population in the lake is apparently able to limit recruitment of small bullheads.

Table 7. Black bullhead trap-net CPUE, PSD, RSD-P, and mean Wr for Lake Henry, Bon Homme County, 2003-2011.

	2003	2004	2005	2006	2007	2008	2009	2010	2011
CPUE		73.3	210.2		6.5		2.3		1.5
PSD		1	77		97		93		80
RSD-P		0	0		22		66		40
Mean Wr		85	90		90		83		92

All Species

Yellow perch abundance has steadily decreased since their introduction after the renovation (Table 8). Surplus yellow perch were stocked in fall of 2011 to maintain a fishery. Common carp, white sucker, and black bullhead CPUE remain low.

Table 8. Electrofishing (EF) and trap-net (TN) CPUE for all fish species sampled in Lake Henry, Bon Homme County, 2003-2011

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011
COC (TN)		0.5	1.4		0.2		0.2		0.4
WHS (TN)		8.5	4.5		2.7		6.1		1.8
BLB (TN)		73.3	210.2		6.5		2.3		1.5
CCF (TN)		1.0	0.5		0.1		--		--
GSF (TN)		1.5	1.7		0.4		0.2		0.1
HYB (TN)		--	0.5		0.3		0.2		--
BLG (TN)		--	7.9		28.8		12.0		54.4
SMB (TN)		0.2	--		--		--		--
LMB (TN)		1.0	0.2		0.2		--		0.3
LMB (EF)		--	77.4		118.5		45.0		--
BLC (TN)		0.5	1.6		28.2		30.8		20.4
YEP (TN)		16.0	8.3		0.3		0.2		0.1

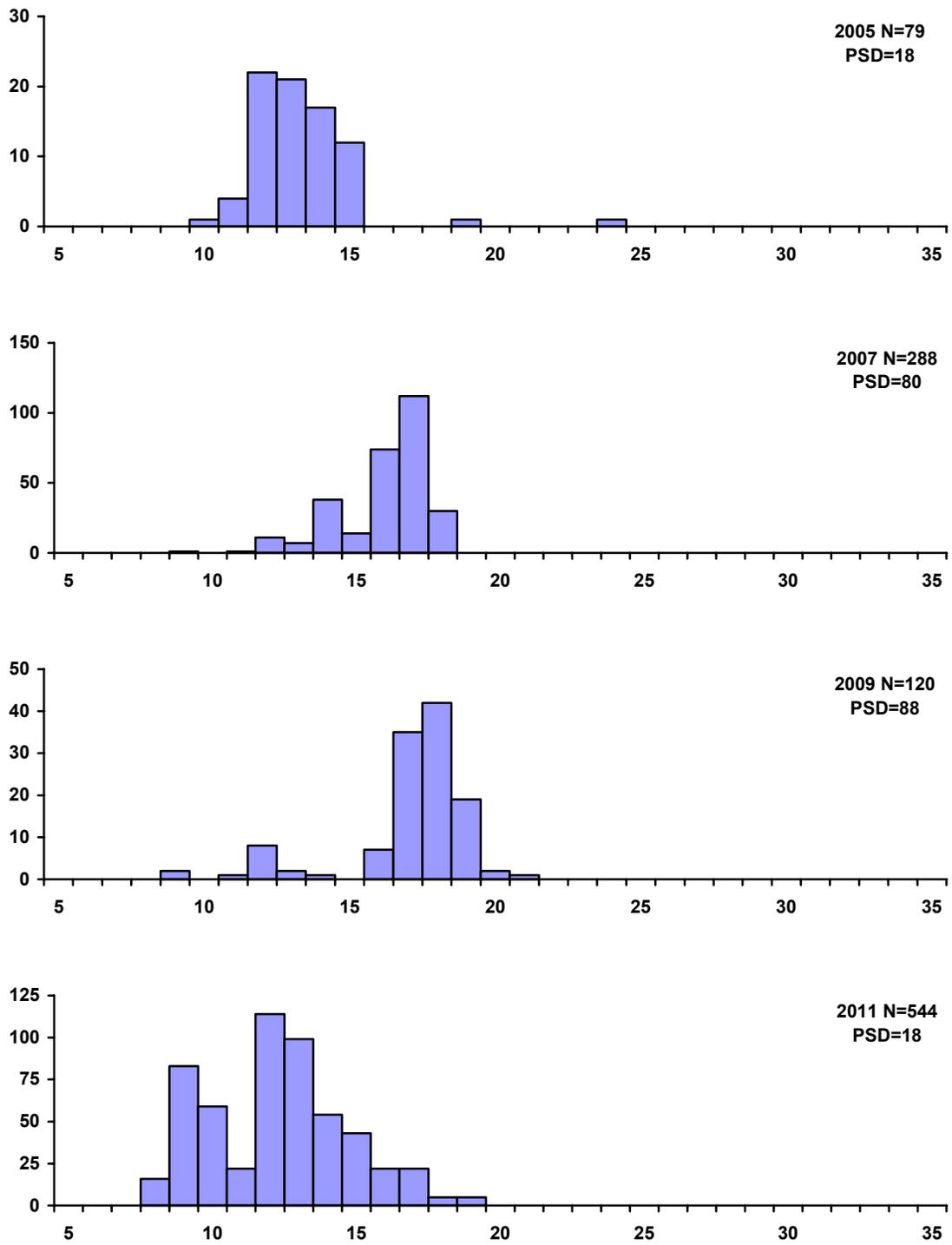
COC (Common Carp), WHS (White Sucker), BLB (Black Bullhead), CCF (Channel Catfish), GSF (Green Sunfish), HYB (Hybrid Sunfish), BLG (Bluegill), SMB (Smallmouth Bass), LMB (Largemouth Bass), BLC (Black Crappie), YEP (Yellow Perch),

MANAGEMENT RECOMMENDATIONS

1. Conduct biennial netting and electrofishing surveys to monitor the fishery.

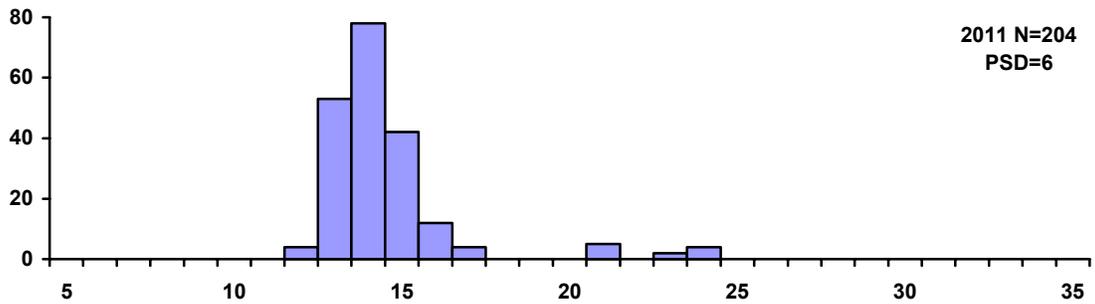
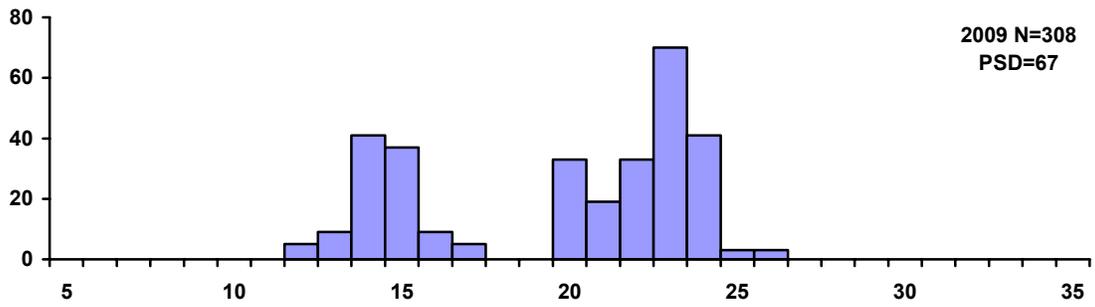
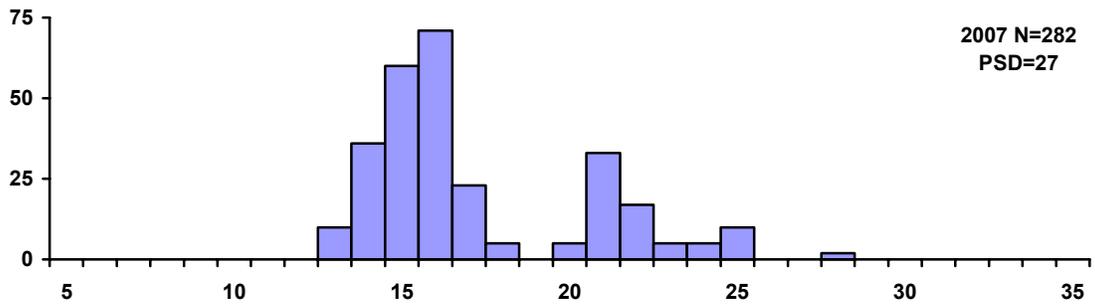
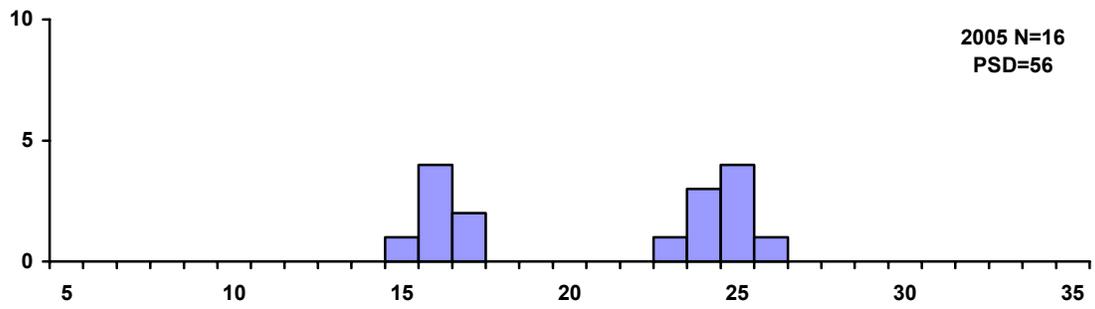
Table 9. Stocking record for Lake Henry, Bon Homme County, 2003-2011.

Year	Number	Species	Size
2003	12	Bluegill	Juvenile
	5	Bluegill	Adult
	204,460	Fathead Minnow	Adult
	18,510	Largemouth Bass	Juvenile
	105	Largemouth Bass	Adult
	39,262	Yellow Perch	Fingerling
	363	Yellow Perch	Adult
2004	1,829	Black Crappie	Adult
	1,510	Bluegill	Adult
	500	Channel Catfish	Adult
	1,029	Largemouth Bass	Adult
	400	Largemouth Bass	Juvenile
	1,016	Yellow Perch	Adult
	2,448	Yellow Perch	Fingerling
2011	1,747	Yellow Perch	Adult



Length-Centimeters

Figure 1. Length frequency histograms of bluegills from Lake Henry, Bon Homme County, 2005, 2007, 2009 and 2011.



Length-Centimeters

Figure 2. Length frequency histograms of black crappies from Lake Henry, Bon Homme County, 2005, 2007, 2009 and 2011.

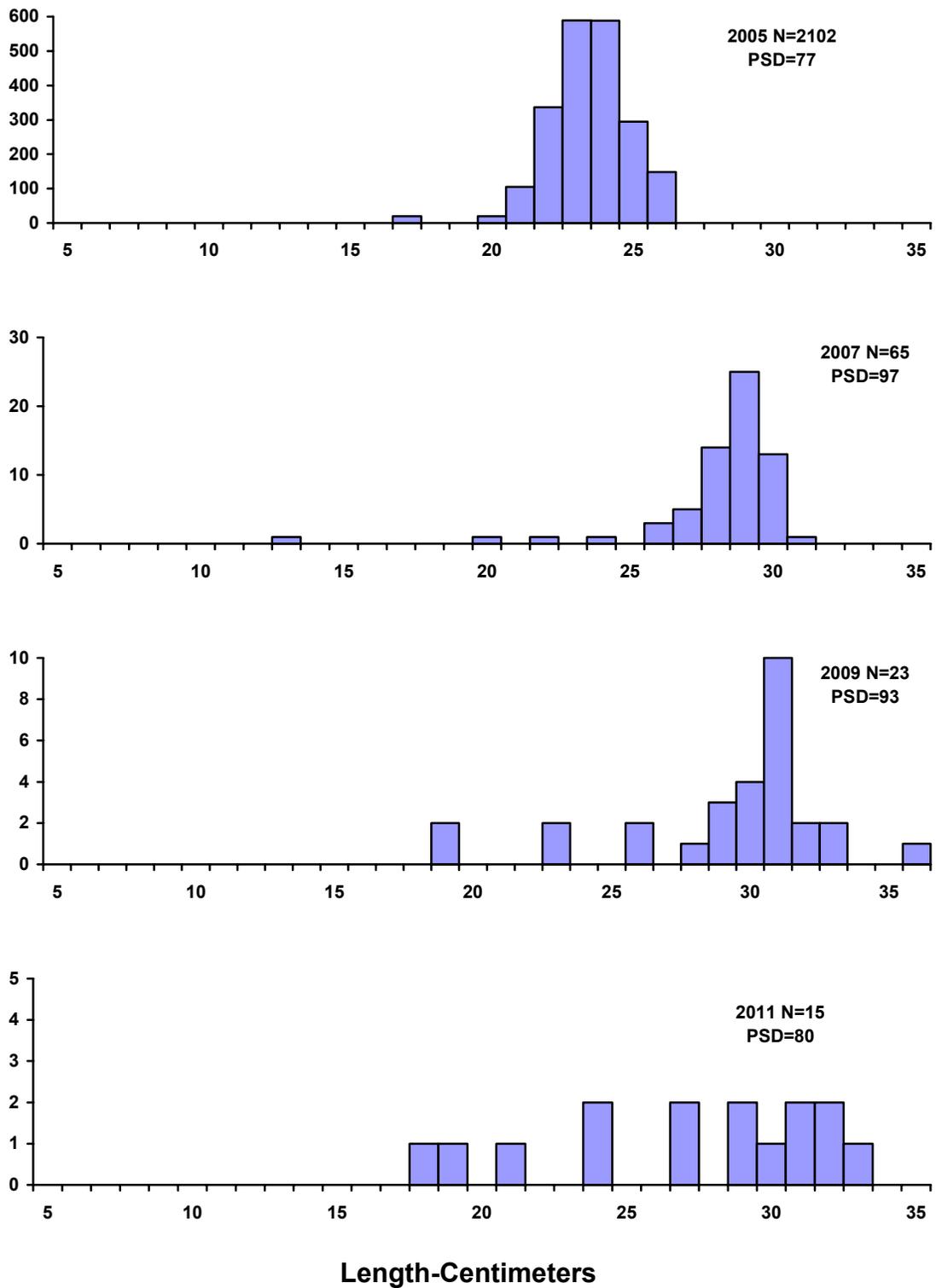


Figure 3. Length frequency histograms of black bullheads from Lake Henry, Bon Homme County, 2005, 2007, 2009 and 2011.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$\text{PSD} = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$\text{RSD-P} = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters (Inches in parenthesis).

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Black crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
White crappie	13 (5)	20 (8)	25(10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Smallmouth bass	18 (7)	28 (11)	35(14)	43 (17)	51 (20)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Bigmouth buffalo	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.