

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Lake Henry, Bon Homme County
2102-F-21-R-47
2014



Figure 1. Lake Henry, Bon Homme County

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

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

Surface Area: 113 acres

Meandered (Y/N): no

OHWM elevation: no data

Outlet elevation: no data

Max. depth at outlet elevation: 37.2 feet

Observed water level: 2' low

Contour map available (Y/N): yes

Watershed area: 34,699 acres

Shoreline length: no data

Date set: NA

Date set: NA

Mean depth at outlet elevation: 13.7 feet

Lake volume: 1,513 acre-feet

Date mapped: 2011

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

Introduction

General

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 The renovation project quickly ground to a halt when funding was withdrawn and the lake remained dry for nearly a decade.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 Lakeshore Properties

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.

Water Quality and Aquatic Vegetation

The water in Lake Henry is typically clear and aquatic vegetation is abundant (Table 1).

Table 1. Water temperature, Secchi depth and observations/comments on water quality and aquatic vegetation in Lake Henry, Bon Homme County, 2005-2014.

| Year | Water Temp °C (°F) | Secchi Depth cm (in) | Observations/Comments (algae, aquatic vegetation, water quality, etc.) |
|-------------|---------------------------|-----------------------------|---|
| 2014 | 25 (77) | 100 (39) | Small amount of sago pondweed and bulrush |
| 2013 | 26 (78) | 43 (17) | No vegetation observations were recorded |
| 2011 | 25 (77) | 84 (33) | Sago pondweed and algae |
| 2009 | 26 (79) | 250 (98) | Sedges and rushes |
| 2007 | 25 (77) | 76 (30) | Sago and rushes |
| 2005 | 24 (76) | 46 (18) | Sago pondweed, coontail and duckweed |

Fish Community

The fish community in Lake Henry is comprised of species normally found in small South Dakota impoundments (Table 2).

Table 2. Fish species commonly found in Lake Henry, Bon Homme County.

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

Fish Management

Lake Henry is managed as a bass/catfish/panfish fishery. Once established after the lake was constructed, the largemouth bass and panfish populations have been self-sustaining. Only some bonus yellow perch and channel catfish have been stocked in the last 10 years (Table 4).

Table 3. Fish kill history for Lake Henry, Bon Homme County.

| Year | Severity | Comments |
|-------------|-----------------|---|
| 2010 | Light | Some BLC were killed following heavy runoff |

Table 4. Stocking history for Lake Henry, Bon Homme County, 2005-2014.

| Year | Number | Species | Size |
|-------------|---------------|-----------------|-------------|
| 2011 | 1,747 | Yellow Perch | Adult |
| 2012 | 1,416 | Yellow Perch | Adult |
| | 7,875 | Yellow Perch | Juvenile |
| 2013 | 3,300 | Channel Catfish | Fingerling |

Methods

Lake Henry was sampled on August 11-12, 2014 with 10 overnight trap nets. The trap nets are constructed with 19-mm-bar-mesh (¾ 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. Two hours of nighttime electrofishing were done on June 12, 2014 to sample the largemouth bass population.

Results and Discussion

Net Catch Results

Trap net catches in 2014 were similar to 2013 catches for the three most abundant species (Table 5). Channel catfish were sampled after being absent in the netting since 2007, likely a result of the 2013 stocking. Only one yellow perch was sampled in spite of considerable stocking in 2011 and 2012 (Table 4 and 5).

Table 5. Total catch from 10 overnight trap nets set in Lake Henry, Bon Homme County, August 11-12, 2014.

| Species | # | % | CPUE¹ | 80% C.I. | Mean CPUE* | PSD | RSD-P | Mean Wr |
|-----------------|----------|----------|-------------------------|-----------------|-------------------|------------|--------------|----------------|
| Bluegill | 246 | 55.9 | 24.6 | <u>+8.2</u> | 24.8 | 90 | 0 | 90 |
| Black Crappie | 161 | 36.6 | 16.1 | <u>+3.2</u> | 18.9 | 96 | 0 | 90 |
| White Sucker | 20 | 4.5 | 2.0 | <u>+0.7</u> | 3.4 | 100 | 100 | -- |
| Channel Catfish | 9 | 2.0 | 0.9 | <u>+0.4</u> | 0.3 | -- | -- | -- |
| Black Bullhead | 3 | 0.7 | 0.3 | <u>+0.2</u> | 36.9 | -- | -- | -- |
| Yellow Perch | 1 | 0.2 | 0.1 | <u>+0.1</u> | 1.5 | -- | -- | -- |

*10 years (2005-2014)

Table 6. CPUE by length category for selected species sampled with trap nets in Lake Henry, Bon Homme County, August 11-12, 2014.

| Species | Substock | Stock | S-Q | Q-P | P+ | All sizes | 80% C.I. |
|-----------------|-----------------|--------------|------------|------------|-----------|------------------|-----------------|
| Bluegill | -- | 24.6 | 2.4 | 22.2 | -- | 24.6 | <u>+8.2</u> |
| Black Crappie | 0.1 | 16.0 | 0.7 | 15.3 | -- | 16.1 | <u>+3.2</u> |
| White Sucker | -- | 2.0 | -- | -- | 2.0 | 2.0 | <u>+0.7</u> |
| Channel Catfish | -- | 0.9 | 0.8 | 0.1 | -- | 0.9 | <u>+0.4</u> |
| Black Bullhead | -- | 0.3 | -- | 0.1 | 0.2 | 0.3 | <u>+0.2</u> |
| Yellow Perch | -- | 0.1 | -- | 0.1 | -- | 0.1 | <u>+0.1</u> |

Length categories can be found in Appendix A.

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

Electrofishing Results

Table 7. Total catch from two hours of electrofishing in Lake Henry, Bon Homme County, June 12, 2014.

| Species | # | CPUE | 80% C.I. | Mean CPUE* | PSD | RSD-P | Mean Wr |
|-----------------|----------|-------------|---------------------|-----------------------|------------|--------------|--------------------|
| Largemouth Bass | 92 | 46.0 | +1.8 | 64.7 | 89 | 25 | 88 |

Table 8. CPUE by length category for selected species sampled with electrofishing in Lake Henry, Bon Homme County, June 12, 2014.

| Species | Substock | Stock | S-Q | Q-P | P+ | All sizes | 80% C.I. |
|-----------------|-----------------|--------------|------------|------------|-----------|----------------------|---------------------|
| Largemouth Bass | 8.5 | 37.5 | 2.5 | 22.0 | 13.0 | 46.0 | +1.8 |

Table 9. Trap-net (TN) CPUE for selected fish species sampled in Lake Henry, Bon Homme County, 2005-2014.

| Species | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Black Bullhead | 210.2 | | 6.5 | | 2.3 | | 1.5 | | 0.7 | 0.3 |
| Black Crappie | 1.6 | | 28.2 | | 30.8 | | 20.4 | | 16.1 | 16.1 |
| Bluegill | 7.9 | | 28.8 | | 12.0 | | 54.4 | | 21.1 | 24.6 |
| Channel Catfish | 0.5 | | 0.1 | | -- | | -- | | -- | 0.9 |
| Common Carp | 1.4 | | 0.2 | | 0.2 | | 0.4 | | 0.4 | -- |
| Green Sunfish | 1.7 | | 0.4 | | 0.2 | | 0.1 | | -- | -- |
| Hybrid Sunfish | 0.5 | | 0.3 | | 0.2 | | -- | | -- | -- |
| Largemouth Bass | 0.2 | | 0.2 | | -- | | 0.3 | | 0.1 | -- |
| White Sucker | 4.5 | | 2.7 | | 6.1 | | 1.8 | | 3.5 | 2.0 |
| Yellow Perch | 8.3 | | 0.3 | | 0.2 | | 0.1 | | -- | 0.1 |

Largemouth Bass

Management Objective

- Maintain a largemouth bass fishery with an electrofishing CPUE of at least 20 and an RSD-P range of 20-40.

Management Strategy

- Stock large fingerling largemouth bass in the spring as needed to achieve the management objective.

Lake Henry has a high density bass population with excellent size structure and adequate natural recruitment (Table 10 and Figure 2). Largemouth bass have not been stocked since 2004.

Table 10. CPUE, PSD, RSD-P, and mean Wr for all largemouth bass sampled with electrofishing in Lake Henry, Bon Homme County, 2005-2014. Columns for stocked years are shaded.

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|----------------|------|------|-------|------|------|------|------|------|------|------|
| CPUE | 77.4 | | 118.5 | | 45.0 | | | | 36.7 | 46.0 |
| PSD | 35 | | 51 | | 28 | | | | 76 | 89 |
| RSD-P | 6 | | 8 | | 9 | | | | 41 | 25 |
| Mean Wr | 106 | | 92 | | 96 | | | | 97 | 88 |

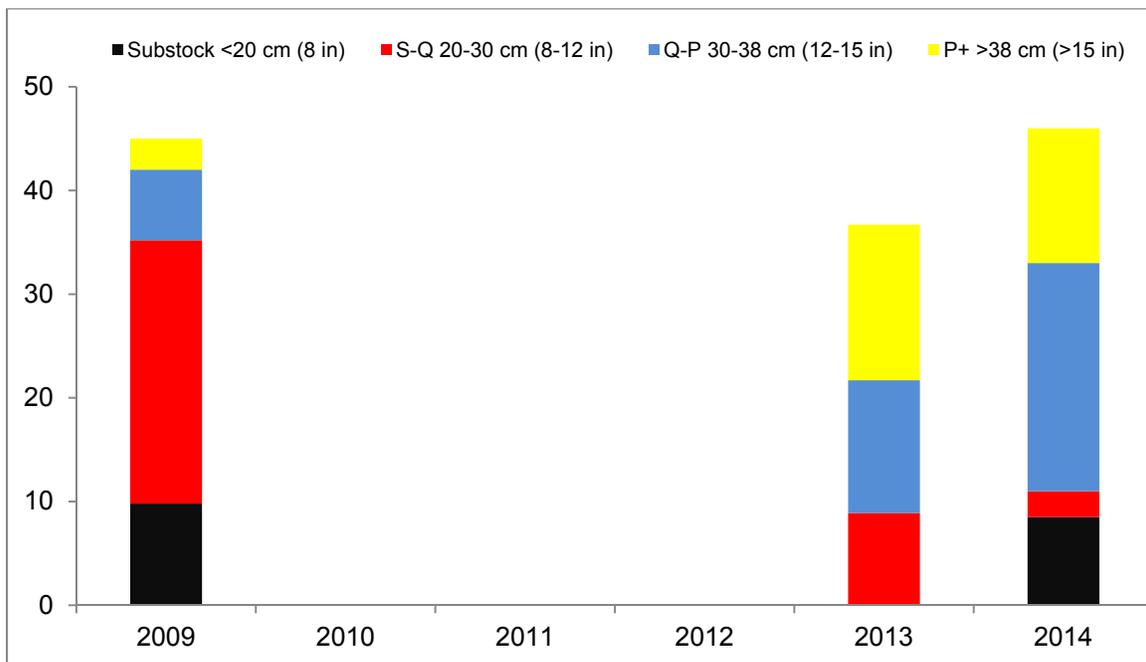


Figure 2. CPUE by length category for largemouth bass sampled by electrofishing in Lake Henry, Bon Homme, County, 2009-2014.

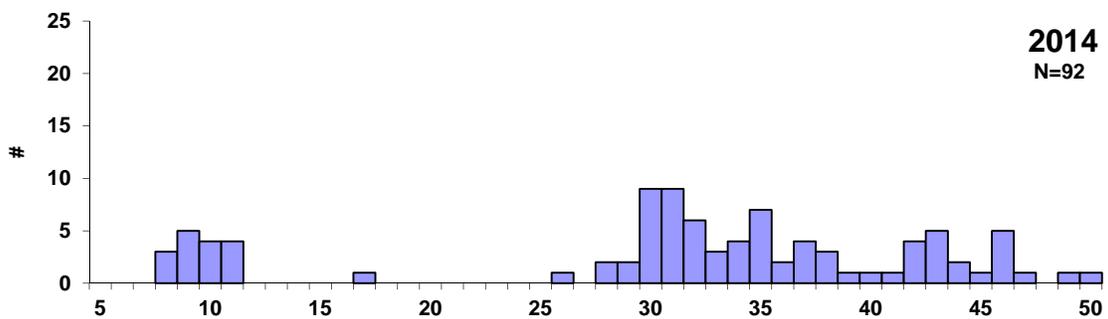
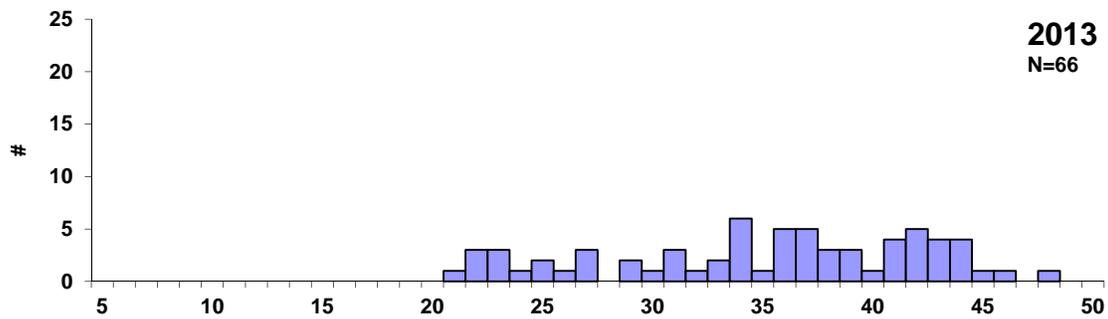
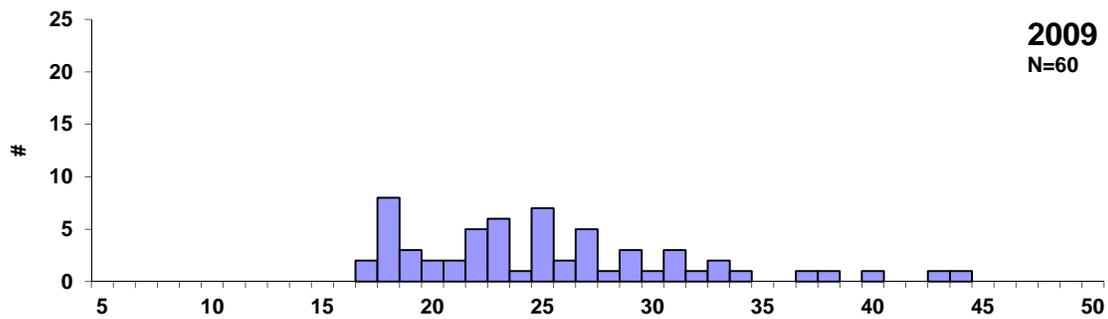
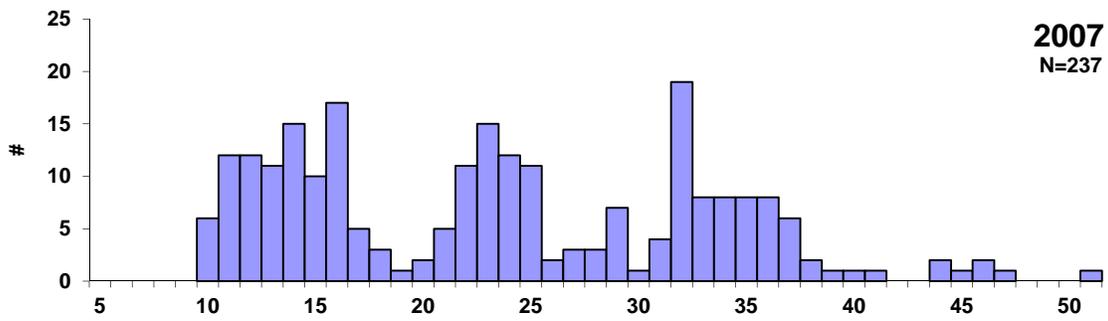


Figure 3. Length frequency histograms for largemouth bass from Lake Henry, Bon Homme County, 2007, 2009, 2013 and 2014.

Bluegill

Management Objective

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

Management Strategy

- Monitor the bluegill population during annual lake surveys and report the results.

Bluegill management objectives were met for the first time since Lake Henry was rebuilt (Table 11). Interestingly, very few Henry bluegills grow past 20 cm (8 in) or live past age-5 (Table 12). Slow growth rates and the absence of larger fish are likely related to high abundance.

Table 11. CPUE, PSD, RSD-P, and mean Wr for all bluegill sampled with trap nets in Lake Henry, Bon Homme County, 2005-2014. Columns for stocked years are shaded.

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|----------------|------|------|------|------|------|------|------|------|------|------|
| CPUE | 7.9 | | 28.8 | | 12.0 | | 54.4 | | 21.1 | 24.6 |
| PSD | 18 | | 80 | | 88 | | 18 | | 100 | 90 |
| RSD-18 | 3 | | 10 | | 53 | | 2 | | 10 | 41 |
| RSD-P | 1 | | 0 | | 3 | | 0 | | 0 | 0 |
| Mean Wr | 114 | | 97 | | 88 | | 93 | | 83 | 90 |

Table 12. Weighted mean length at capture (mm) for bluegill sampled with trap nets in Lake Henry, Bon Homme County, 2005-2014. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size is in parentheses.

| Year | Age-1 | Age-2 | Age-3 | Age-4 | Age-5 | Age-6 | Age-7 | Age-8 | Age-9 | Age-10 |
|---------------|-------------|--------------|--------------|--------------|-------------|-------------|-------|-------|-------|--------|
| 2014 (246) | 108 (20) | 145 (4) | 163 (9) | 176 (199) | 180 (14) | -- | -- | -- | -- | -- |
| 2013 (211) | -- | -- | 169 (179) | 180 (32) | -- | -- | -- | -- | -- | -- |
| 2011 (543) | 97 (164) | 133 (242) | 146 (125) | 191 (5) | 173 (7) | -- | -- | -- | -- | -- |
| 2009 (117) | -- | 128 (8) | 176 (52) | 182 (43) | 194 (14) | -- | -- | -- | -- | -- |
| 2007 (288) | 127 (6) | 141 (41) | 154 (37) | 167 (53) | 176 (78) | 176 (73) | -- | -- | -- | -- |

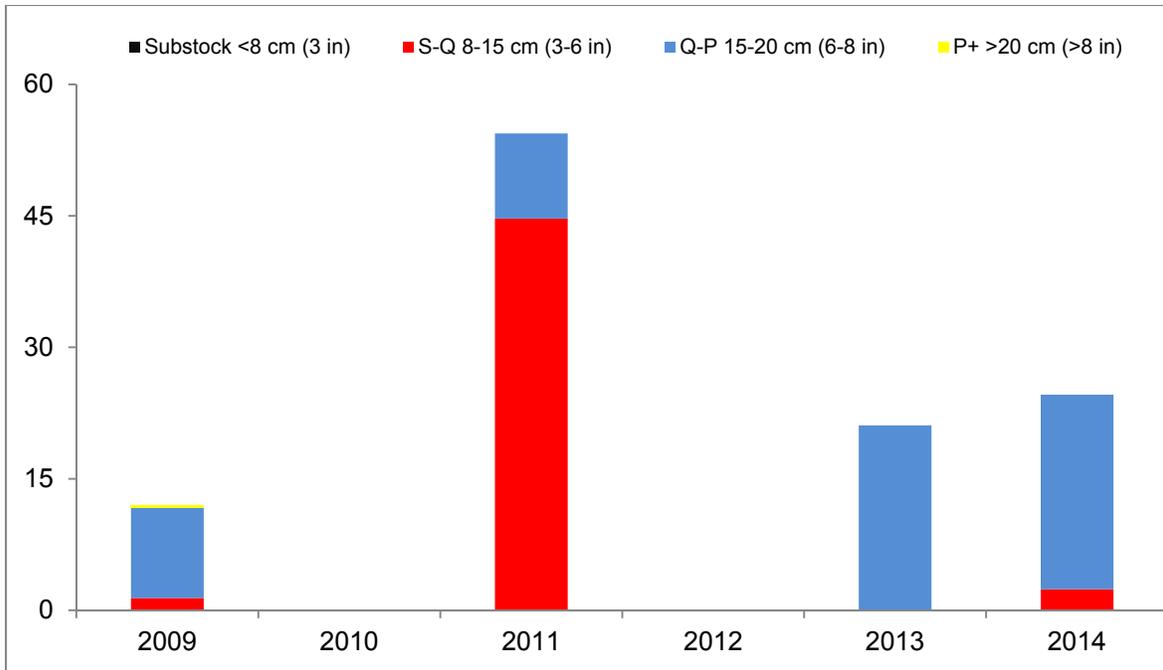
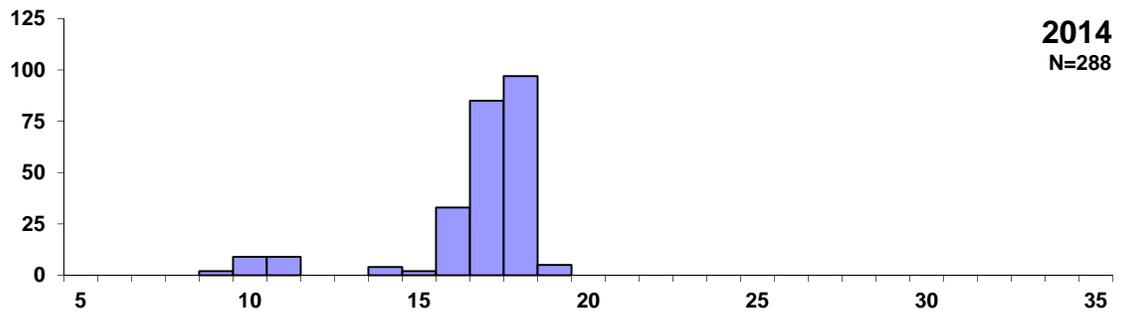
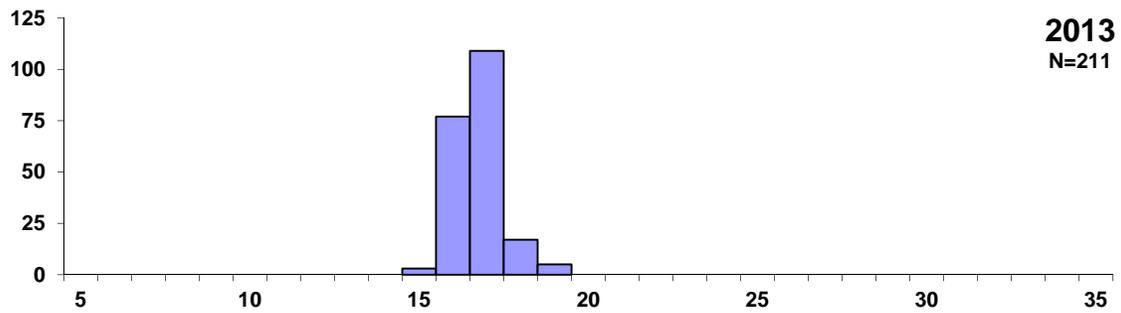
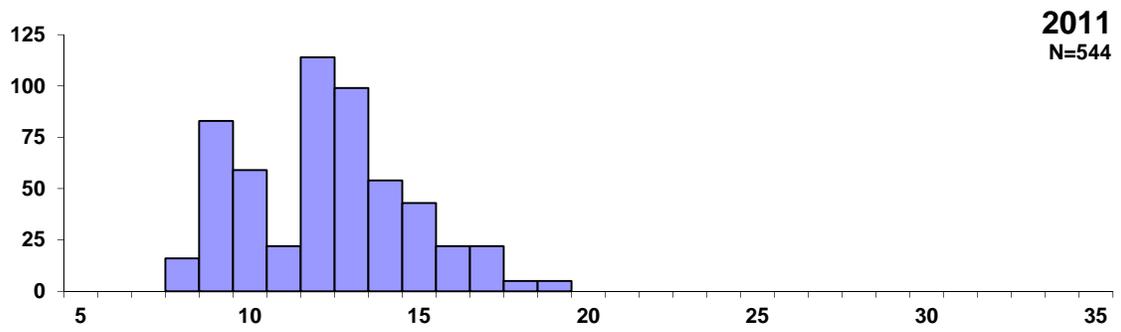
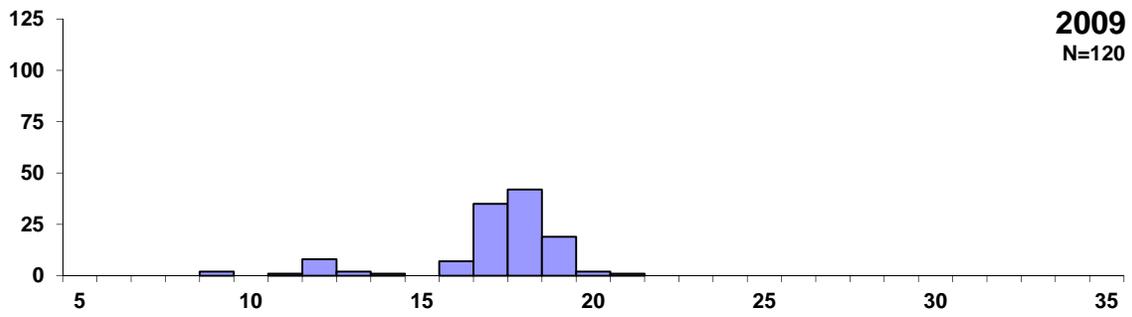


Figure 4. CPUE by length category for bluegill sampled with trap nets in Lake Henry, Bon Homme County, 2009-2014.



Length-Centimeters

Figure 5. Length frequency histograms of bluegills from Lake Henry, Bon Homme County, 2007, 2009, 2011 and 2013.

Black Crappie

Management Objective

- Maintain a black crappie population with a trap-net CPUE of at least 20 and PSD of at least 40.

Management Strategy

- Monitor the black crappie during annual lake surveys and report the results.

Black crappie CPUE was unchanged in 2014 and remains below management objective (Table 13). The fish sampled ranged in length from 12 to 24 cm (4.7-9.4 in) with an average length of 219 mm (8.6 in) (Figures 6 and 7). Growth continues to be better than many of our small impoundments (Table 14). Like bluegill and largemouth bass, black crappies have not been stocked since 2004.

Table 13. CPUE, PSD, RSD-P, and mean Wr for all black crappie sampled with trap nets in Lake Henry, Bon Homme County, 2005-2014. Stocked years are shaded.

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|----------------|------|------|------|------|------|------|------|------|------|------|
| CPUE | 1.6 | | 28.2 | | 30.8 | | 20.4 | | 16.1 | 16.1 |
| PSD | 56 | | 27 | | 67 | | 6 | | 94 | 96 |
| RSD-23 | 56 | | 8 | | 38 | | 3 | | 1 | 17 |
| RSD-P | 31 | | 4 | | 2 | | 0 | | 0 | 0 |
| Mean Wr | 103 | | 100 | | 96 | | 96 | | 85 | 90 |

Table 14. Weighted mean length at capture (mm) for black crappie sampled with trap nets in Lake Henry, Bon Homme County, 2005-2014. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size is in parentheses.

| Year | Age-1 | Age-2 | Age-3 | Age-4 | Age-5 | Age-6 | Age-7 | Age-8 | Age-9 | Age-10 |
|---------------|--------------|--------------|--------------|--------------|-------|------------|-------|-------|-------|--------|
| 2014 (161) | 138 (8) | -- | 230 (10) | 221 (143) | -- | -- | -- | -- | -- | -- |
| 2013 (161) | -- | -- | 204 (56) | 214 (105) | -- | -- | -- | -- | -- | -- |
| 2011 (204) | 146 (193) | 226 (9) | 245 (2) | -- | -- | -- | -- | -- | -- | -- |
| 2009 (308) | 149 (89) | 195 (73) | 236 (126) | 239 (20) | -- | -- | -- | -- | -- | -- |
| 2007 (279) | 151 (120) | 180 (112) | 225 (38) | 254 (7) | -- | 285 (2) | -- | -- | -- | -- |

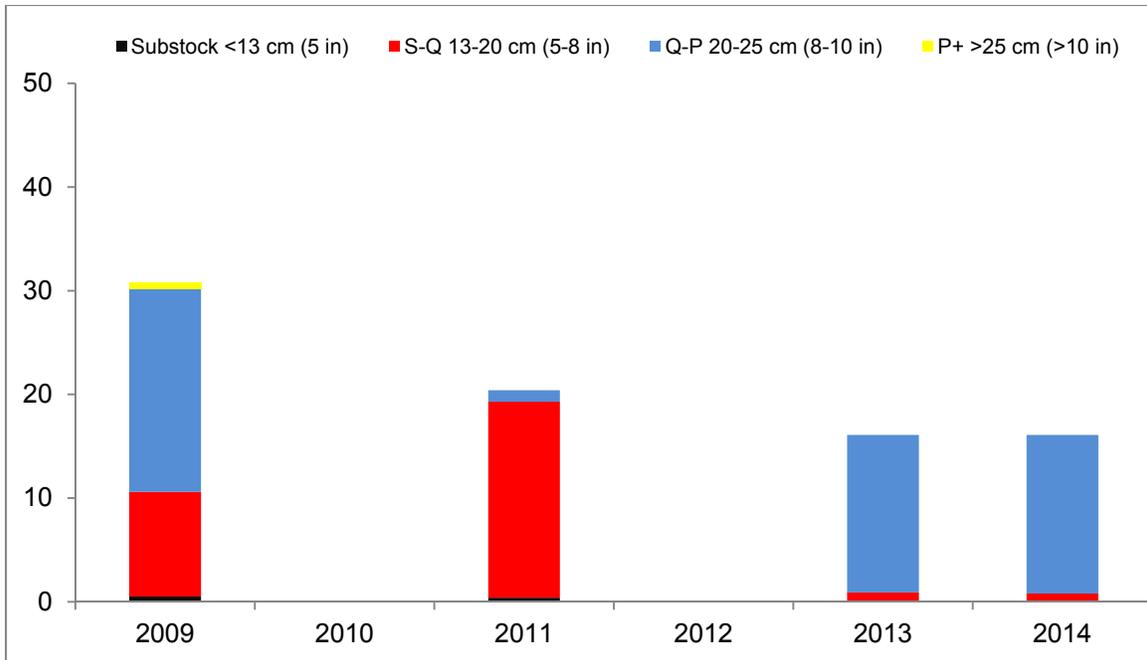
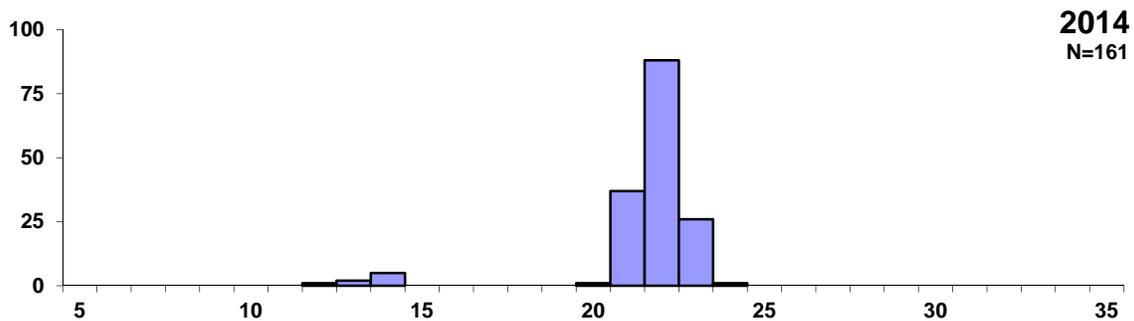
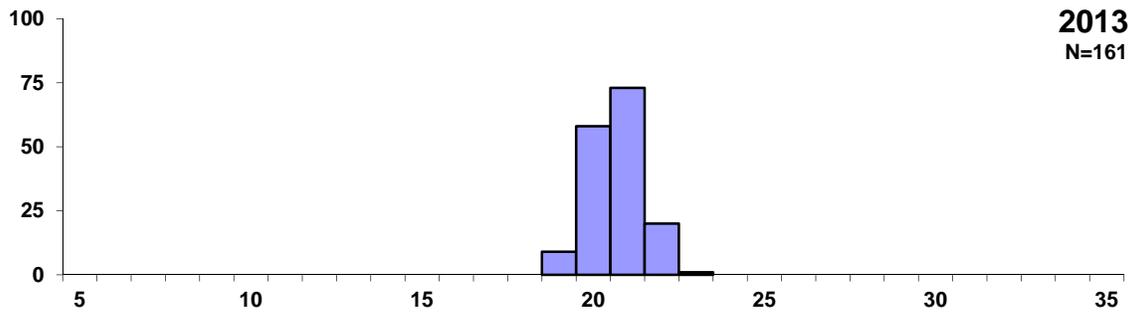
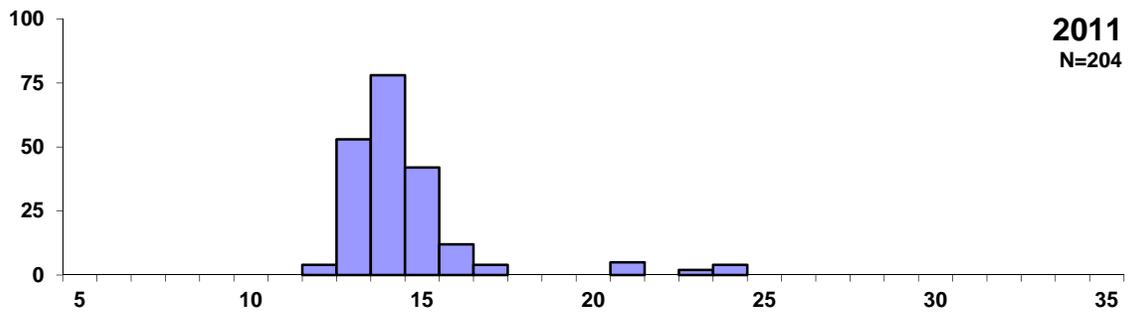
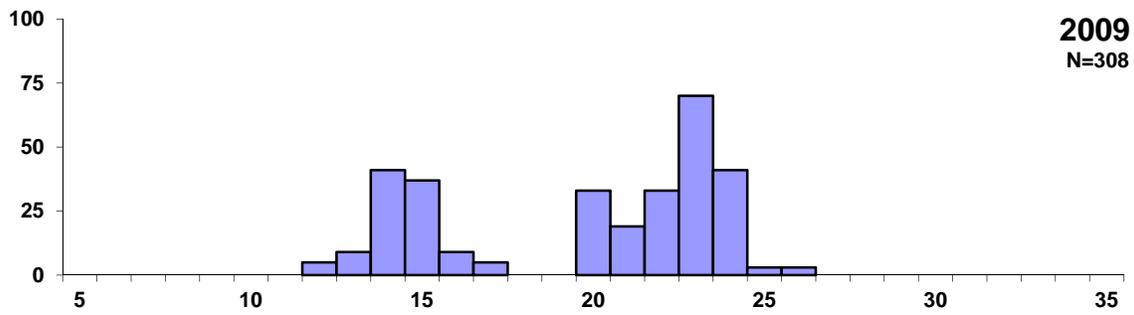


Figure 6. CPUE by length category for black crappie, sampled with trap nets in Lake Henry, Bon Homme County, 2009-2014.



Length-Centimeters

Figure 7. Length frequency histograms of black crappies from Lake Henry, Bon Homme County, 2009, 2011, 2013 and 2014.

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.