

SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
East 81 Lake, Brookings County
2102-F-21-R-47
2014

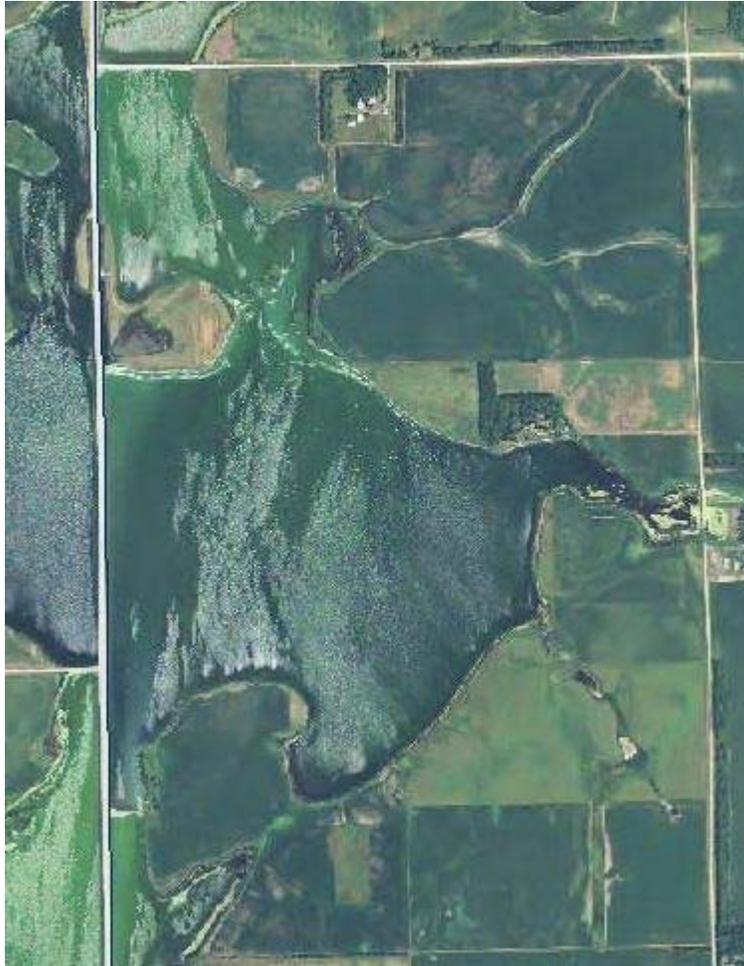


Figure 1. East 81 Lake, Brookings County

Legal Description: T109N-R52W-Sec. 7, 18

Location from nearest town: 4 miles south of Arlington, SD

Surface Area: 328 acres

Meandered (Y/N): yes

OHWM elevation: none set

Outlet elevation: none set

Max. depth at outlet elevation: 16.2 feet

Observed water level: full

Contour map available (Y/N): yes

Watershed area: no data

Shoreline length: no data

Date set: NA

Date set: NA

Mean depth at outlet elevation: 10.8 feet

Lake volume: 3,545 acre feet

Date mapped: 2011

DENR beneficial use classifications: no beneficial use classifications have been set for this water.

Introduction

General

East 81 Lake is located in Brookings County and is the northeast basin of what is legally known as Twin Lakes which is located on the west side of US Highway 81 in Kingsbury County. US Highway 81 separates this basin from the main lake, but it is believed that fish are able to travel through existing culverts under the highway.

Ownership of Lake and Adjacent Lakeshore Properties

Although East 81 Lake is a portion of the Twin Lakes complex, the South Dakota Department of Game, Fish, and Parks (GFP) manages it as a unique fishery. Most of the shoreline lies within a Waterfowl Production Area (WPA) managed by the United States Fish and Wildlife Service (USFWS). The remainder of the shoreline is privately owned.

Fishing Access

There is no boat ramp or other facilities on East 81 Lake. Small boats can be launched off a sandy shoreline on the northwest corner of the lake, but parking is limited. There is some shore fishing access within the WPA on the north shore and from the road right of way.

Water Quality and Aquatic Vegetation

The water temperature during this year's lake survey was 22°C (72°F) and the water clarity was 218 cm (86 in) (Table 1). East 81 Lake will occasionally have a large abundance of submerged aquatic vegetation.

Table 1. Water temperature, Secchi depth and observations/comments on water quality and aquatic vegetation in East 81 Lake, Brookings County, 2005-2014.

| Year | Water Temp °C (°F) | Secchi Depth cm (in) | Observations/Comments (algae, aquatic vegetation, water quality, etc.) |
|-------------|-------------------------------|-------------------------------------|---|
| 2014 | 22 (72) | 218 (86) | Cattails |
| 2012 | 23 (73) | 119 (47) | Cattails, clasping leaf and sago pondweed |
| 2010 | 23 (74) | 56 (22) | Heavy northern water milfoil, sago, and clasping leaf |
| 2008 | 25 (77) | 100 (39) | Dense northern water milfoil, sago, and clasping leaf |
| 2006 | 27 (79) | 183 (72) | Northern water milfoil, sago, and clasping leaf pondweed |

Fish Community

East 81 Lake contains a fish community comprised of species typically found in large lakes in eastern South Dakota (Table 2). Yellow bullheads are only found in a few large lakes and common carp were first sampled in 2012 following a flood event that caused water to outflow to the Lake Sinai/Big Sioux River watershed.

Table 2. Fish species commonly found in East 81 Lake, Brookings County.

| Game Species | Other Species |
|---------------------|----------------------|
| Walleye | Common Carp |
| Yellow Perch | White Sucker |
| Northern Pike | |
| White Bass | |
| Black Bullhead | |
| Yellow Bullhead | |

Fish Management

East 81 Lake is managed as a walleye/yellow perch fishery, but fishing opportunities for northern pike, white bass, and large black and yellow bullheads also exist at times. The primary management strategy for walleye and yellow perch is stocking (Table 4). No fish kills have been documented on the lake since management activities were started.

Table 3. Fish kill history for East 81 Lake, Brookings County.

| Year | Severity | Comments |
|-------------|-----------------|--|
| | | No fish kills have been observed or recorded |

Table 4. Stocking history for East 81 Lake, Brookings County, 2005-2014.

| Year | Number | Species | Size |
|-------------|---------------|----------------|------------------|
| 2005 | 50,000 | Walleye | Small Fingerling |
| 2006 | 49,170 | Walleye | Small Fingerling |
| 2009 | 319,000 | Yellow Perch | Small Fingerling |
| 2011 | 50,560 | Walleye | Small Fingerling |
| 2013 | 49,000 | Walleye | Small Fingerling |
| 2014 | 487,000 | Walleye | Fry |

Methods

East 81 Lake was sampled on August 13-14, 2014 with three overnight gill nets. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh ($\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, and 2 in) monofilament netting.

Results and Discussion

Net Catch Results

Yellow perch was the most abundant species sampled in the gill nets followed by black bullhead, walleye, and white bass (Table 5). Common carp abundance rose slightly and no northern pike were caught (Table 7).

Table 5. Total catch from three overnight gill nets set in East 81 Lake, Brookings County, August 13-14, 2014.

| <i>Species</i> | <i>#</i> | <i>%</i> | <i>CPUE¹</i> | <i>80% C.I.</i> | <i>Mean CPUE*</i> | <i>PSD</i> | <i>RSD-P</i> | <i>Mean Wr</i> |
|-----------------|----------|----------|-------------------------|-----------------|-------------------|------------|--------------|----------------|
| Yellow Perch | 114 | 43.8 | 38.0 | <u>+9.4</u> | 63.6 | 23 | 6 | 96 |
| Black Bullhead | 104 | 40.0 | 34.7 | <u>+8.4</u> | 19.1 | 55 | 6 | -- |
| Walleye | 20 | 7.7 | 6.7 | <u>+3.0</u> | 23.4 | 80 | 40 | 89 |
| White Bass | 13 | 5.0 | 4.3 | <u>+4.3</u> | 8.4 | -- | -- | -- |
| Common Carp | 5 | 1.9 | 1.7 | <u>+1.5</u> | 0.5 | -- | -- | -- |
| Yellow Bullhead | 3 | 1.2 | 1.0 | <u>+1.3</u> | 0.8 | -- | -- | -- |
| White Sucker | 1 | 0.4 | 0.3 | <u>+0.4</u> | 0.2 | -- | -- | -- |

*10 years (2005-2014)

Table 6. CPUE by length category for selected species sampled with gill nets in East 81 Lake, Brookings County, August 13-14, 2014.

| <i>Species</i> | <i>Substock</i> | <i>Stock</i> | <i>S-Q</i> | <i>Q-P</i> | <i>P+</i> | <i>All sizes</i> | <i>80% C.I.</i> |
|-----------------|-----------------|--------------|------------|------------|-----------|------------------|-----------------|
| Yellow Perch | -- | 38.0 | 29.3 | 6.3 | 2.3 | 38.0 | <u>+9.4</u> |
| Black Bullhead | -- | 34.7 | 15.7 | 17.0 | 2.0 | 34.7 | <u>+8.4</u> |
| Walleye | 1.7 | 5.0 | 1.0 | 2.0 | 2.0 | 6.7 | <u>+3.0</u> |
| White Bass | 4.0 | 0.3 | -- | -- | 0.3 | 4.3 | <u>+4.3</u> |
| Common Carp | 0.7 | 1.0 | 0.3 | -- | 0.7 | 1.7 | <u>+1.5</u> |
| Yellow Bullhead | -- | 1.0 | -- | -- | 1.0 | 1.0 | <u>+1.3</u> |
| White Sucker | -- | 0.3 | -- | -- | 0.3 | 0.3 | <u>+0.4</u> |

Length categories can be found in Appendix A.

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

Table 7. Gill-net (GN) and trap-net (TN) CPUE for selected fish species sampled in East 81 Lake, Brookings County, 2005-2014.

| <i>Species</i> | <i>Gear</i> | <i>2005</i> | <i>2006</i> | <i>2007</i> | <i>2008</i> | <i>2009</i> | <i>2010</i> | <i>2011</i> | <i>2012</i> | <i>2013</i> | <i>2014</i> |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Black | GN | -- | | | 8.0 | | 4.0 | | 49.0 | | 34.7 |
| Bullhead | TN | | 57.8 | | 81.2 | | 4.7 | | 657.1 | | |
| Common | GN | -- | | | -- | | -- | | 1.0 | | 1.7 |
| Carp | TN | -- | | | -- | | -- | | 11.8 | | |
| Northern | GN | | 0.3 | | 0.3 | | -- | | 1.0 | | -- |
| Pike | TN | | 0.1 | | -- | | 0.3 | | -- | | |
| | GN | | 35.3 | | 22.0 | | 40.0 | | 13.0 | | 6.7 |
| Walleye | TN | | 2.3 | | 1.3 | | 1.5 | | 2.8 | | |
| White | GN | | 3.0 | | 13.3 | | 20.5 | | 1.0 | | 4.3 |
| Bass | TN | | -- | | 1.4 | | 68.9 | | 1.0 | | |
| White | GN | | 0.3 | | 0.3 | | -- | | -- | | 0.3 |
| Sucker | TN | | 0.3 | | -- | | 0.1 | | -- | | |
| Yellow | GN | | 1.0 | | 1.7 | | -- | | 0.5 | | 1.0 |
| Bullhead | TN | | 6.9 | | 6.8 | | 12.5 | | 12.5 | | |
| Yellow | GN | | 14.3 | | 17.7 | | 86.0 | | 162.0 | | 38.0 |
| Perch | TN | | -- | | 0.4 | | 2.4 | | 16.3 | | |

Walleye

Management Objective

- maintain a walleye population with a total gill-net CPUE of at least 20

Management Strategy

- stock small walleye fingerlings at the rate of 100/acre (32,800) as needed to achieve the management objective

Walleye abundance in East 81 continues to decline and is well below the management objective (Table 8). Two small fingerling stockings and one fry stocking over the last four years have failed to increase abundance. However, East 81 Lake still contains an excellent size distribution of walleyes (Figures 2, 3) and abundance is high enough to provide some angling opportunity.

Table 8. CPUE, PSD, RSD-P, and mean Wr for all walleyes sampled with gill nets in East 81 Lake, Brookings County, 2005-2014. Stocked years are shaded.

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|----------------|------|------|------|------|------|------|------|------|------|------|
| CPUE | | 35.3 | | 22.0 | | 40.0 | | 13.0 | | 6.7 |
| PSD | | 5 | | 65 | | 23 | | 85 | | 80 |
| RSD-P | | 0 | | 0 | | 5 | | 15 | | 40 |
| Mean Wr | | 87 | | 96 | | 97 | | 93 | | 89 |

Table 9. Walleyes stocked into East 81 Lake, Brookings County, 2005-2014.

| Year | Number | Size |
|------|---------|------------------|
| 2005 | 50,000 | Small Fingerling |
| 2006 | 49,170 | Small Fingerling |
| 2011 | 50,560 | Small Fingerling |
| 2013 | 49,000 | Small Fingerling |
| 2014 | 487,000 | Fry |

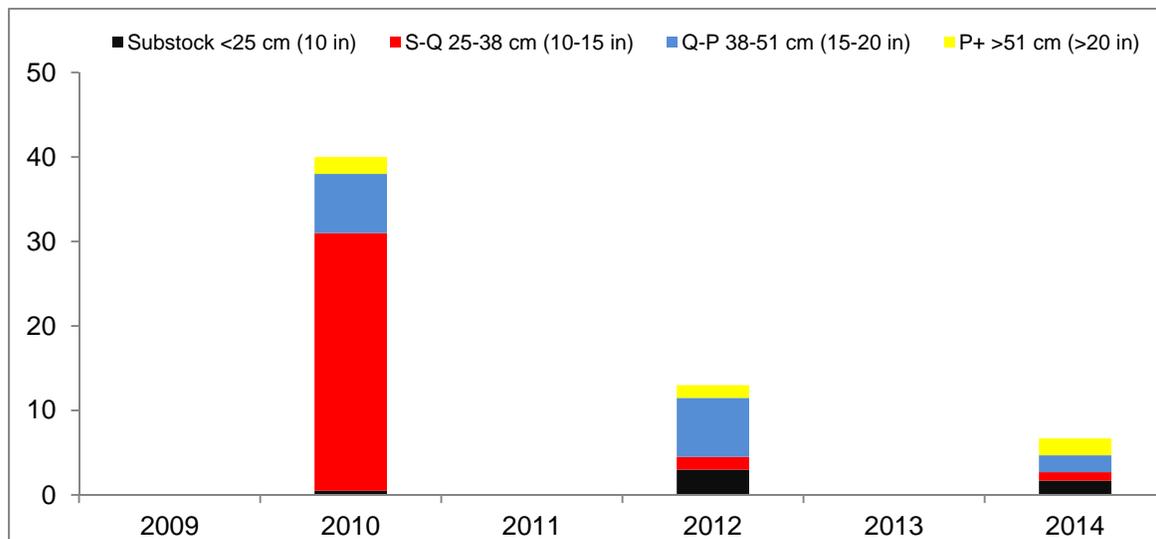


Figure 2. CPUE by length category for walleye sampled with gill nets in East 81 Lake, Brookings County, 2009-2014.

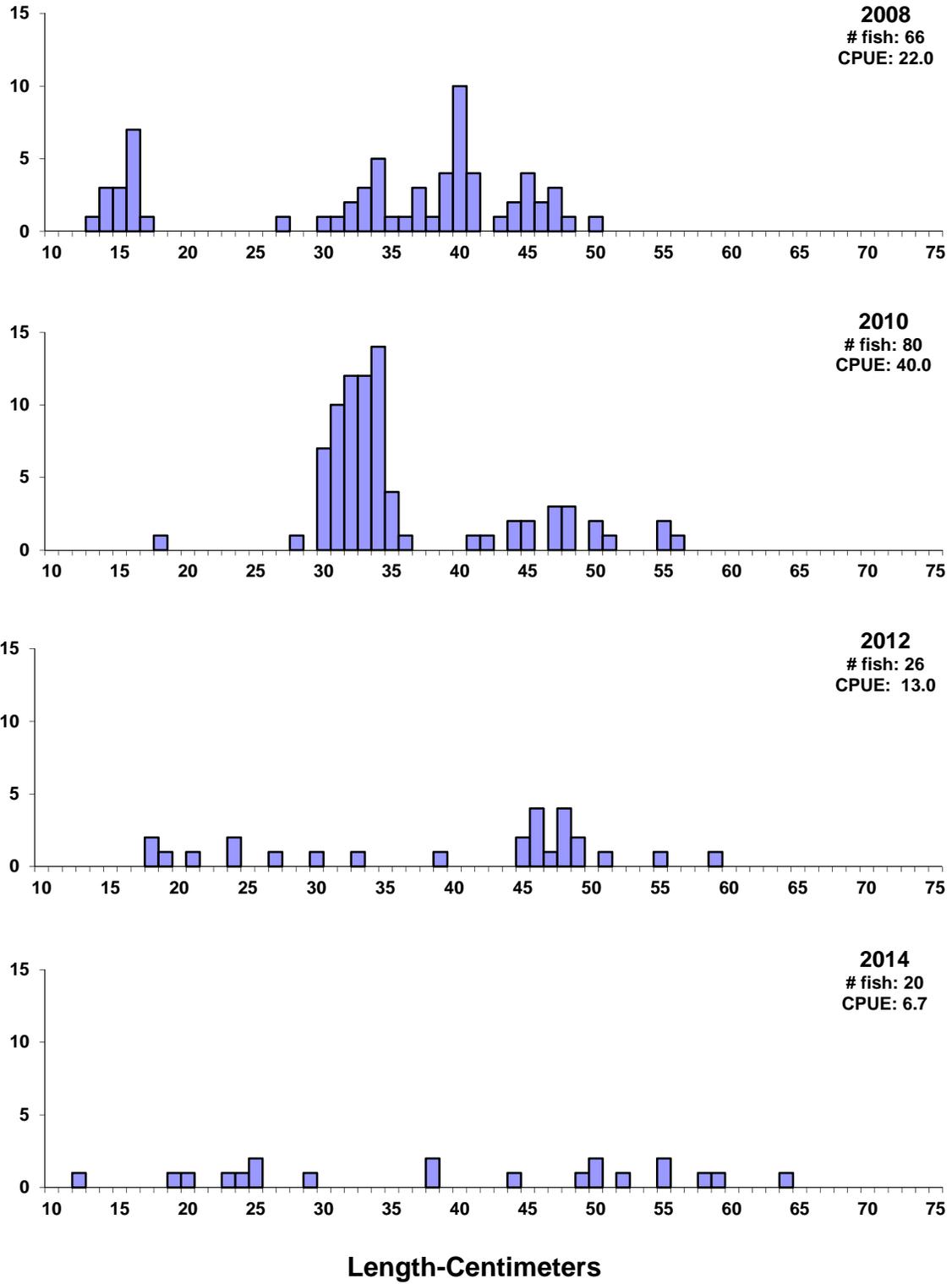


Figure 3. Length frequency histograms for walleye sampled with gill nets in East 81 Lake, Brookings County, 2008, 2010, 2012 and 2014.

Yellow Perch

Management Objective

- maintain a yellow perch population with a total gill-net CPUE of at least 25

Management Strategy

- stock yellow perch fingerlings at the rate of 500/acre (164,000) as needed to achieve the management objective

Yellow perch gill-net CPUE has declined significantly since 2012 (Table 10) and the majority of the current population consists of fish that are 13-20 cm (5-8 in) long (Figures 4, 5). It's also interesting to note that few yellow perch in East 81 Lake ever grow larger than 25 cm (10 in).

Table 10. CPUE, PSD, RSD-P, and mean Wr for all yellow perch sampled with gill nets in East 81 Lake, Brookings County, 2005-2014. Stocked years are shaded.

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|----------------|------|------|------|------|------|------|------|-------|------|------|
| CPUE | | 14.3 | | 17.7 | | 86.0 | | 162.0 | | 38.0 |
| PSD | | 84 | | 42 | | 41 | | 40 | | 23 |
| RSD-P | | 30 | | 2 | | 0 | | 7 | | 6 |
| Mean Wr | | 116 | | 111 | | 101 | | 92 | | 96 |

Table 11. Yellow perch stocked into East 81 Lake, Brookings County, 2005-2014.

| Year | Number | Size |
|-------------|---------------|------------------|
| 2009 | 319,000 | Small Fingerling |

Table 12. Weighted mean length at capture (mm) for yellow perch captured in gill nets in East 81 Lake, Brookings County, 2010-2012. Sample size is in parentheses.

| Year | Age-1 | Age-2 | Age-3 | Age-4 | Age-5 | Age-6 | Age-7 | Age-8 |
|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 2014 (114) | 165 (89) | 233 (12) | 245 (12) | 265 (1) | -- | -- | -- | -- |
| 2012 (324) | 166 (200) | 231 (121) | 286 (3) | -- | -- | -- | -- | -- |
| 2010 (156) | 191 (135) | 218 (21) | -- | -- | -- | -- | -- | -- |

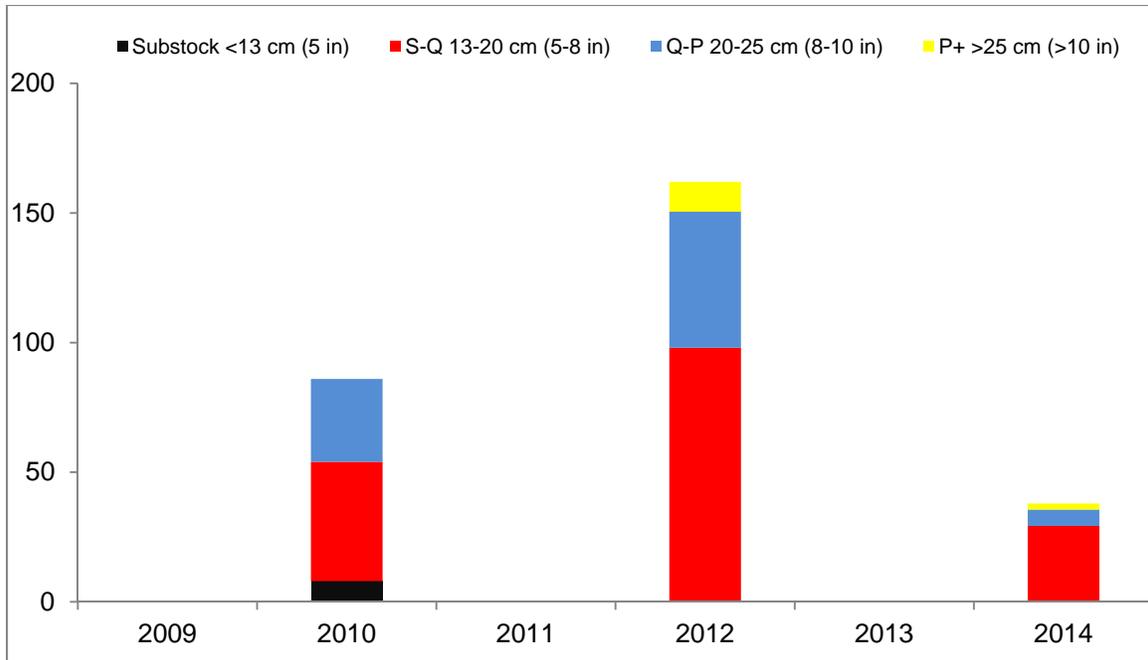


Figure 4. CPUE by length category for yellow perch sampled with gill nets in East 81 Lake, Brookings County, 2009-2014.

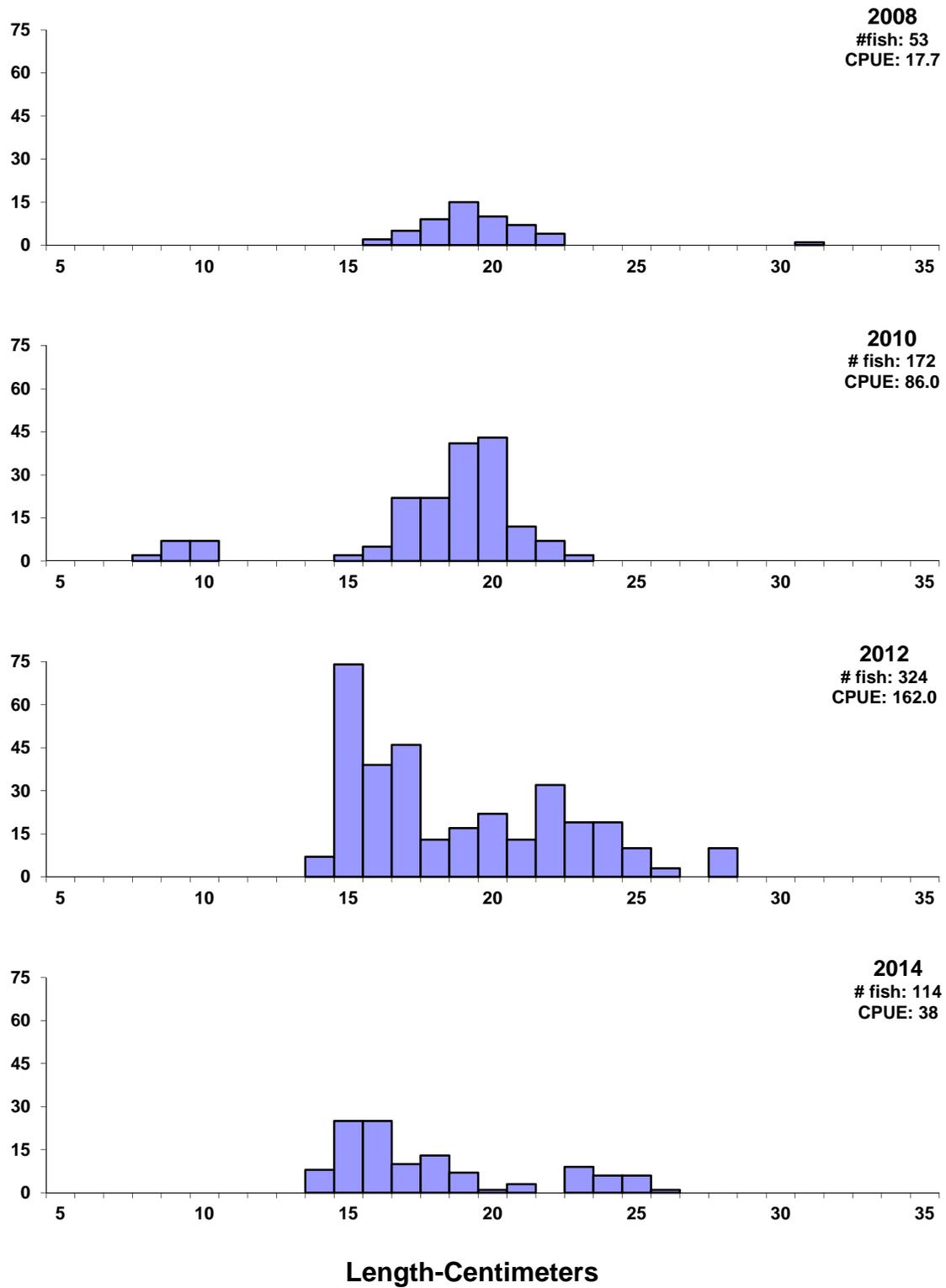


Figure 5. Length frequency histograms for yellow perch sampled with gill nets in East 81 Lake, Brookings County, 2008, 2010, 2012 and 2014.

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.