

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



Figure 1. West Oakwood Lake, Brookings County

Legal Description: T111N- R51W-Sec. 1, 3, 5-8, 12, 32, 36

Location from nearest town: 5 miles west of Bruce, SD.

Surface Area: 1,077 acres

Meandered (Y/N): yes

OHWM elevation: 1626.9

Outlet elevation: 1626.4

Max. depth at outlet elevation: 9.6 feet

Observed water level: 1 foot low

Contour map available (Y/N): yes

Watershed area: 43,363 acres

Shoreline length: no data

Date set: October, 1981

Date set: October, 1981

Mean depth at outlet elevation: 5.5 feet

Lake volume: 5,929 acre-feet

Date mapped: 2012

Beneficial use classifications: (5) warmwater semi-permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation and (9) fish and wildlife propagation and stock watering.

Introduction

General

The Oakwood Lakes complex derived its name from the numerous oak trees found in the area. East Oakwood Lake was originally named Oakwood Lake while West Oakwood was originally known as Lake Tetonkaha.

Ownership of Lake and Adjacent Lakeshore Property

West Oakwood is listed as a meandered lake in the State of South Dakota Listing of Meandered Lakes and the South Dakota Department of Game, Fish and Parks (GFP) manages the fishery. Much of the north and east shoreline is owned and managed by GFP as a Game Production Area and the Oakwood Lake State Recreation Area. The remainder of the shoreline is privately owned.

Fishing Access

Oakwood Lake State Recreation Area contains a two-lane boat ramp, boat dock, parking lot, public toilets, modern campground, and a handicapped-accessible fishing pier. Shore fishing sites are available throughout the area.

Water Quality and Aquatic Vegetation

Water clarity was poor with a Secchi depth of just 38 cm (15 in., Table 1). Scattered beds of sago pondweed (*Potamogeton pectinatus*) were observed throughout the lake.

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

Year	Water Temp °C (°F)	Secchi Depth cm (in)	Observations/Comments (algae, aquatic vegetation, water quality, etc.)
2014	24 (76)	38 (15)	Sago pondweed
2012	27 (80)	20 (8)	No vegetation
2010	26 (79)	50 (20)	Coontail and some sago pondweed
2008	24 (76)	71 (28)	Cattails and bulrushes, some algae
2006	26 (79)	10 (4)	Cattails

Fish Community

The fish community in West Oakwood Lake is consistent with that of a typical southeastern South Dakota lake. The main game fish species include walleye, yellow perch and northern pike (Table 2).

Table 2. Fish species commonly found in West Oakwood Lake, Brookings County.

<i>Game Species</i>	<i>Other Species</i>
Walleye Yellow Perch Black Bullhead Northern Pike Orange-spotted Sunfish Yellow Bullhead	Bigmouth Buffalo Common Carp White Sucker

Fish Management

GFP manages West Oakwood for walleye and yellow perch. A long history of fish kills presents a challenge to sustaining viable populations (Table 3). Walleye are stocked as needed to achieve objectives (Table 4). Yellow perch have not been stocked since 2001, and surveys indicate consistent natural reproduction and recruitment.

Table 3. Fish kill history for West Oakwood Lake, Brookings County.

<i>Year</i>	<i>Severity</i>	<i>Comments</i>
1978	Severe	Winterkill
1980		Aeration system installed by Oakwood Lakes Association
1982		Poor oxygen levels, but no dead fish were found
	Partial	1990-1994 winterkill occurred
1997	Severe	Winterkill
2001	Severe	Winterkill
2010	Severe	Winterkill (mostly common carp, buffalo and large walleyes)

Table 4. Stocking history for West Oakwood Lake, Brookings County, 2005-2014.

<i>Year</i>	<i>Number</i>	<i>Species</i>	<i>Size</i>
2006	1,201,589	Walleye	Fry
2010	1,200,000	Walleye	Fry
2012	1,350	Walleye	Juvenile
	450,000	Walleye	Fry
2014	600,000	Walleye	Fry

Methods

West Oakwood Lake was sampled on July 15-16, 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 were the most abundant species in the gill net catch (43.5%, Table 5), followed by black bullhead and walleye. Other species sampled include northern pike, white sucker, and bigmouth buffalo.

Table 5. Total catch from three overnight gill nets set in West Oakwood Lake, Brookings County, July 15-16, 2014.

Species	#	%	CPUE¹	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Yellow Perch	180	43.5	60.0	+8.3	103.2	29	5	102
Black Bullhead	134	32.4	44.7	+26.5	21.8	39	1	--
Walleye	53	12.8	17.7	+3.1	41.1	61	8	97
Northern Pike	18	4.3	6.0	+2.7	3.8	67	28	95
White Sucker	13	3.1	4.3	+2.6	8.7	67	25	--
Bigmouth Buffalo	6	1.4	2.0	+2.0	2.9	--	--	--
Common Carp	6	1.4	2.0	+0.7	6.3	--	--	--
O. S. Sunfish	3	0.7	1.0	+1.3	0.2	--	--	--
Yellow Bullhead	1	0.2	0.3	+0.4	0.1	--	--	--

*10 years (2005-2014)

Table 6. CPUE by length category for selected species sampled with gill nets in West Oakwood Lake, Brookings County, July 15-16, 2014.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
Yellow Perch	0.7	59.3	42.0	14.3	3.0	60.0	+8.3
Black Bullhead	1.0	43.7	26.7	16.7	0.3	44.7	+26.5
Walleye	1.3	16.3	6.3	8.7	1.3	17.7	+3.1
Northern Pike	--	6.0	2.0	2.3	1.7	6.0	+2.7
White Sucker	0.3	4.0	1.3	1.7	1.0	4.3	+2.6
Bigmouth Buffalo	0.3	1.7	0.3	1.0	0.3	2.0	+2.0
Common Carp	--	2.0	0.3	1.3	0.3	2.0	+0.7
O. S. Sunfish*	--	--	--	--	--	1.0	+1.3
Yellow Bullhead	--	0.3	--	--	0.3	0.3	+0.4

*No length categories established. 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 CPUE for all fish species sampled in West Oakwood Lake, Brookings County, 2005-2014.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
BM Buffalo		1.5		6.0		--		5.0		2.0
Black Bullhead		24.0		3.3		8.3		28.7		44.7
Common Carp		10.0		8.3		5.0		6.3		2.0
Green Sunfish		--		--		--		0.3		--
Northern Pike		2.5		0.7		--		10.0		6.0
OS Sunfish		--		--		--		--		1.0
Walleye		62.0		22.3		82.3		21.0		17.7
White Sucker		5.5		11.3		10.0		12.3		4.3
Yellow Bullhead		--		--		--		--		0.3
Yellow Perch		82.0		25.3		76.7		272.0		60.0

Walleye

Management Objective

- Maintain a walleye population with a total gill net CPUE of at least 15.

Management Strategy

- Stock walleye fry at the rate of 500/acre (538,500) as needed to achieve the management objective.

Although walleye gill-net CPUE decreased in 2014 to the lowest measured in the last 10 years (Table 8), it remains above the management objective. The population has a healthy size structure (Figures 2, 3) and the fish are typically in good to excellent condition (Table 8). Age-0 walleyes caught in small-mesh gill nets set in September and by anglers indicate that the fry stocking (Table 9) and/or natural reproduction produced a year class in 2014.

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

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CPUE		62.0		22.3		82.3		21.0		17.7
PSD		29		17		100		39		61
RSD-P		0		0		2		8		8
Mean Wr		95		90		98		95		97

Table 9. Walleye stocked into West Oakwood Lake, Brookings County, 2005-2014.

Year	Number	Size
2006	1,201,589	Fry
2010	1,200,000	Fry
2012	1,350	Juvenile
	450,000	Fry
2014	600,000	Fry

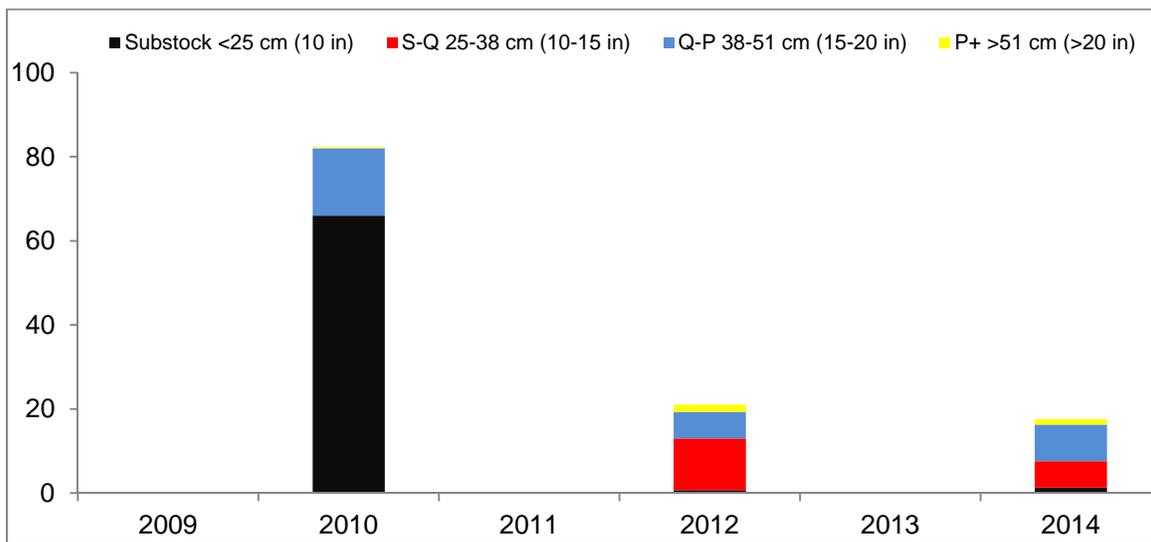


Figure 2. CPUE by length category for walleye sampled with gill nets in West Oakwood Lake, Brookings County, 2009-2014.

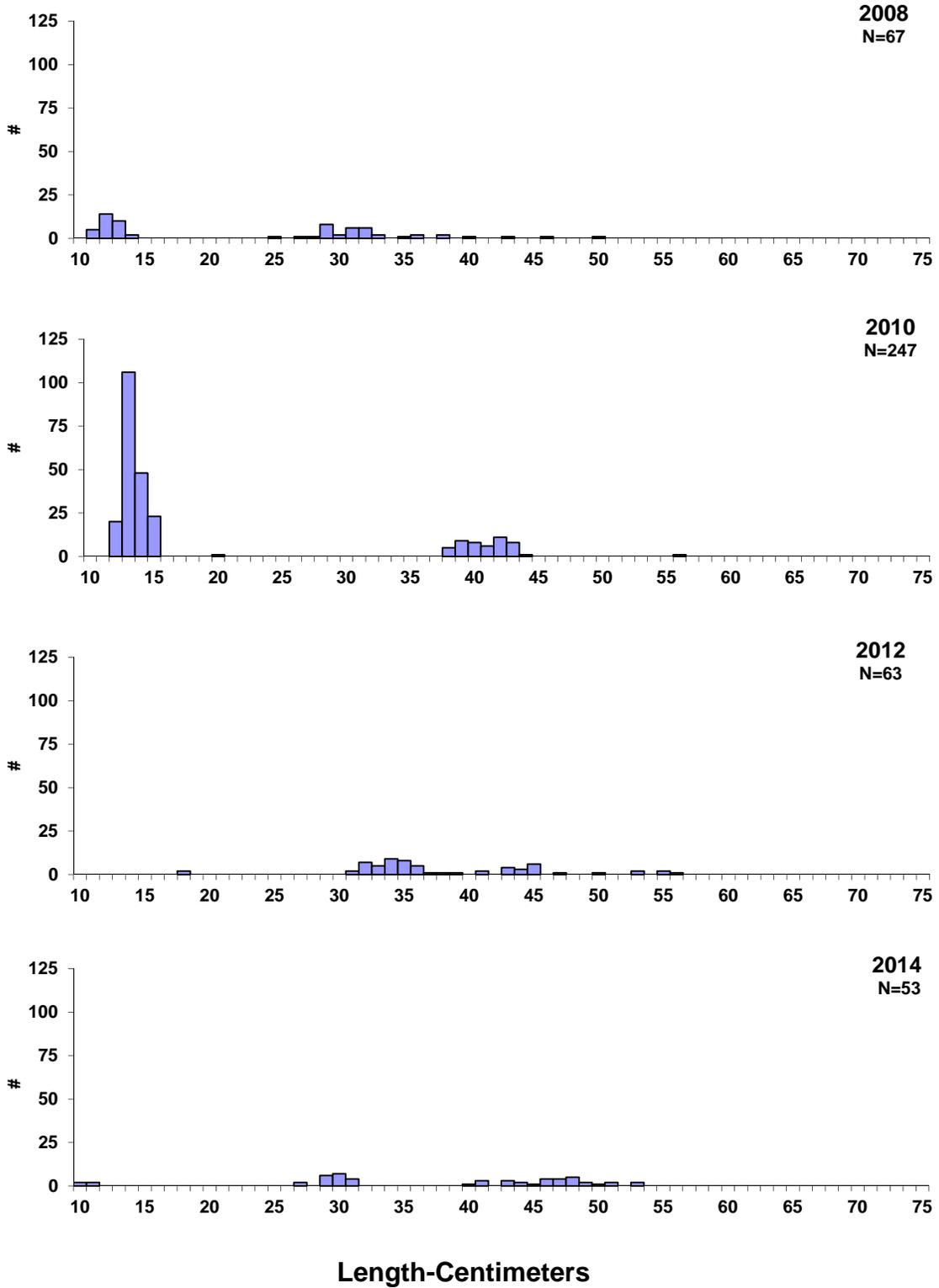


Figure 3. Length frequency histograms for walleyes sampled with gill nets in West Oakwood Lake, Brookings County, 2008, 2010, 2012 and 2014.

Yellow Perch

Management Objective

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

Management Strategy

- Stock small fingerling yellow perch at the rate of 500/acre (538,500) as needed to achieve the management objective.

Yellow perch gill-net CPUE decreased in 2014 (Table 10), but remains well above the management objective. The majority of fish sampled were stock-quality length (5-8 in., Figure 4), but the abundance of older fish was very good as well. Age-0 yellow perch were abundant in fall seine hauls indicating good natural reproduction in 2014.

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

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
CPUE		82.0		25.3		76.7		272.0		60.0
PSD		45		57		26		57		29
RSD-P		3		9		6		8		5
Mean Wr		97		104		102		94		102

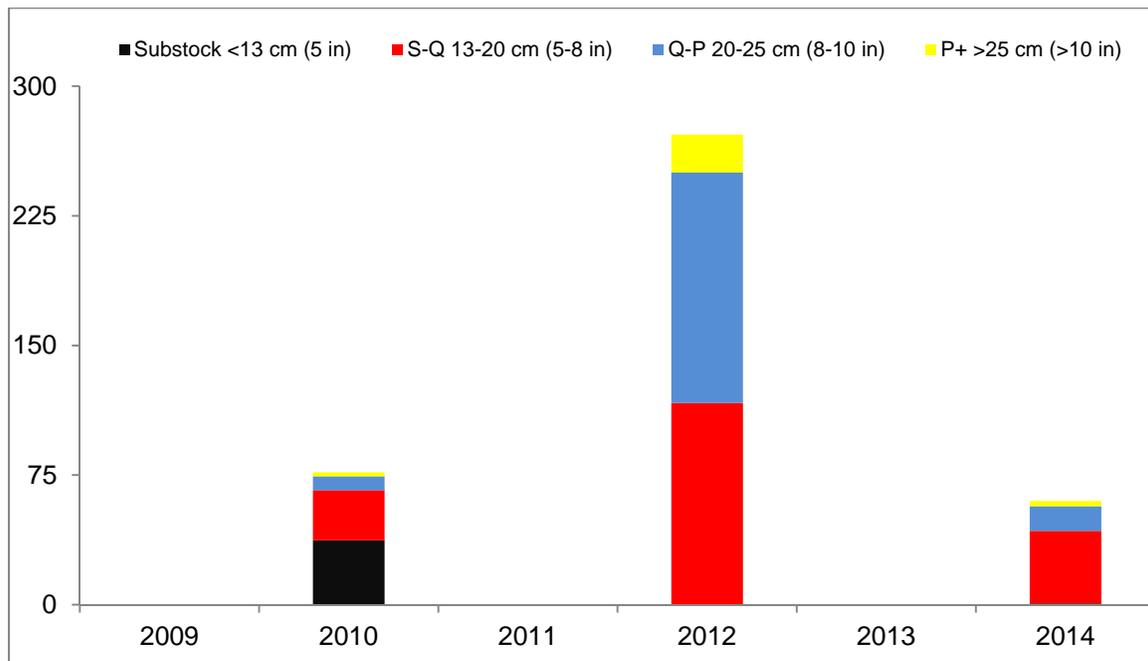


Figure 4. CPUE by length category for yellow perch, sampled with gill nets in West Oakwood Lake, Brookings County, 2009-2014.

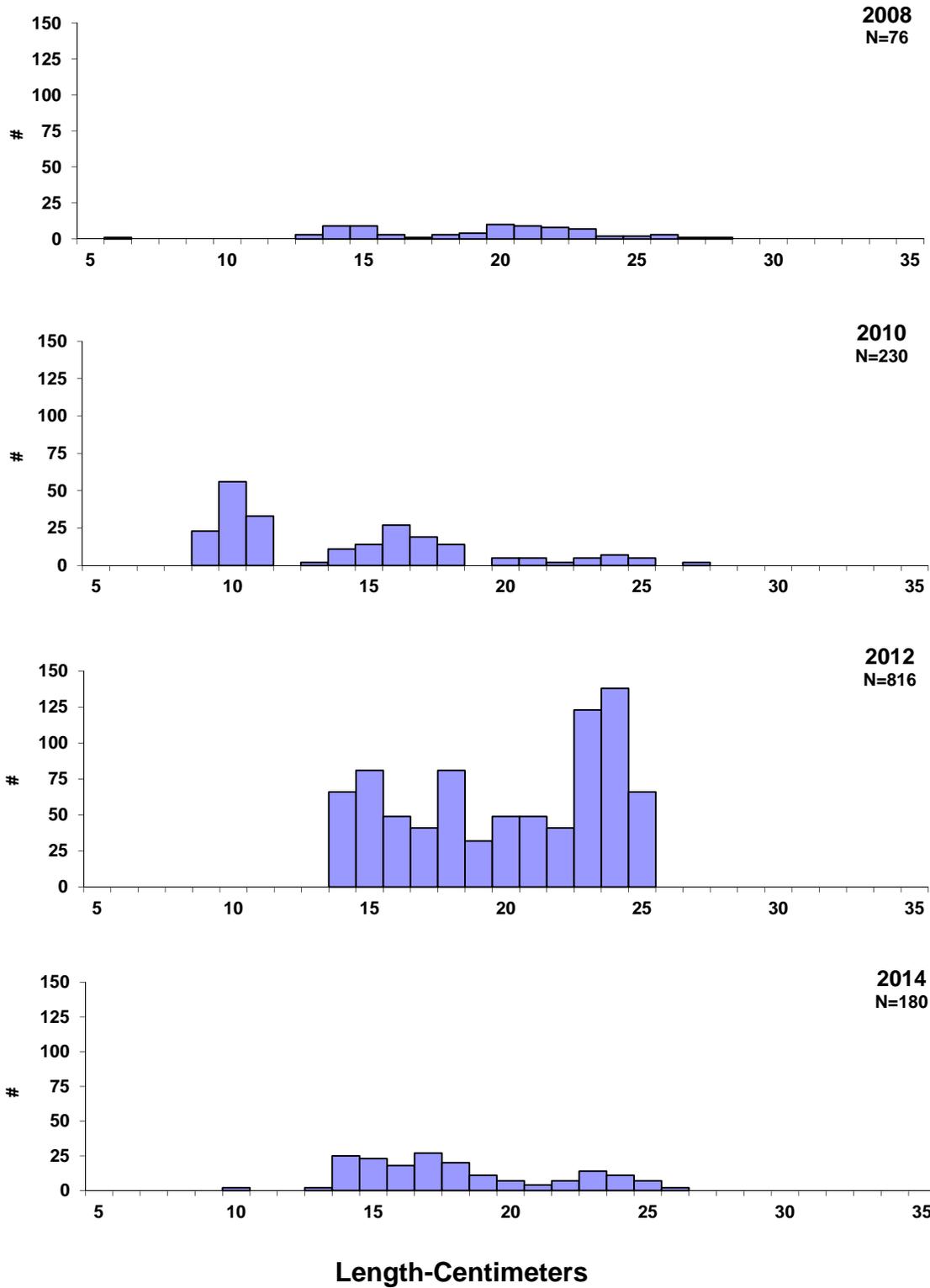


Figure 5. Length frequency histograms for yellow perch sampled with gill nets in West Oakwood Lake, Brookings County, 2008, 2010, 2012 and 2014.

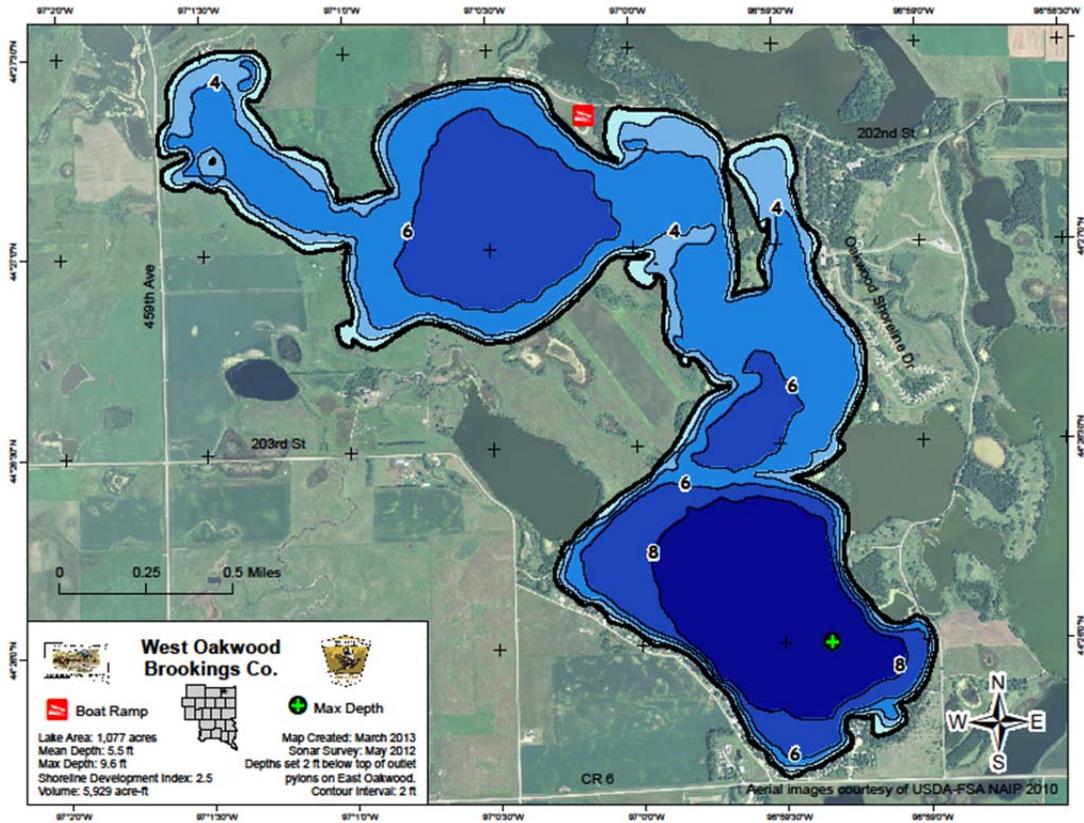


Figure 6. Contour map of West Oakwood Lake, Brookings County.

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.