SOUTH DAKOTA STATEWIDE FISHERIES SURVEY
Lake Herman, Lake County
2102-F-21-R-47
2014

Figure 1. Lake Herman, Lake County

Legal Description: T106N- R53W- Sec.10-11,14-15, 22-23
Location from nearest town: 2 miles west of Madison, SD

Surface Area: 1,287 acres
Meandered (Y/N): Yes
OHWM elevation: 1,669.0
Outlet elevation: 1,668.4
Max. depth at outlet elevation: 13 feet
Observed water level: Full
Contour map available (Y/N): Yes

Watershed area: 36,275 acres
Shoreline length: 9.5 miles
Date set: October, 1981
Date set: October, 1981
Mean depth at outlet elevation: 4.7 feet
Lake volume: 7,425 acre feet
Date mapped: 2002

DENR beneficial use classifications: (6) warmwater semipermanent fish propagation and irrigation (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation and stock watering.

Introduction

General

Lake Herman is a natural lake and the first in a chain of four lakes including Lake Madison, Round Lake and Brant Lake. It is believed that Herman Luce, an early settler in the area, named the lake for himself when he built his home in the timbered area on the east side of the lake in June, 1870. The log cabin Mr. Luce built is still standing and on display in Lake Herman State Park.

Ownership of Lake and Adjacent Lakeshore Properties

Lake Herman is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes. The South Dakota Department of Game, Fish, and Parks (GFP) owns and manages a State Park on the east side of the lake and a Lake Access Area on the west side. The remainder of the shoreline is privately owned and heavily developed.

Fishing Access

Lake Herman State Park East Access Area contains a double lane boat ramp, boat dock, picnic tables, comfort stations, and full service and primitive campgrounds. There are many areas suitable for shore fishing. The West Lake Access Area contains a single lane boat ramp, boat dock and a vault toilet. Shoreline access is limited at this area due to high banks. There is also considerable shoreline access available along the county road that runs around the north shore. In addition, there is a new concrete fishing platform on the outlet structure on the northeast corner of the lake.

Water Quality and Aquatic Vegetation

The watershed for Lake Herman extends northwest, west and southwest of the lake and is very large, encompassing 30,000-40,000 acres. Watershed topography is mostly rolling hills and the primary land use is row crop agriculture, pasture and urban development. Decades of sedimentation from the watershed have reduced mean water depth to 4.7 feet and as a result, the lake becomes very turbid during periods of high winds.

Water clarity was poor during the 2014 survey as indicated by a Secchi reading of only 53 cm (21 in, Table 1). Secchi depths under 100 cm (40 in) recorded during four of the last eight surveys were probably caused by high winds. No observations of vegetation were made.

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

Year	*Water Temp °C (°F)*	*Secchi Depth cm (in)*	*Observations/Comments (algae, aquatic vegetation, water quality, etc.)*
2014	-- (--)	53 (21)	No observations were recorded
2013	28 (82)	114 (45)	No observations were recorded
2012	28 (82)	30 (12)	No observations were recorded
2011	29 (84)	122 (48)	Sago pondweed
2010	27 (80)	51 (20)	Algae bloom, sago pondweed
2009	20 (68)	150 (59)	No vegetation
2007	24 (75)	61 (24)	Some cattails
2005	24 (75)	107 (42)	Some algae

Fish Community

Lake Herman has a diverse fish community consisting of many different species. Black bullhead, common carp, bigmouth buffalo, white sucker and white bass are the most abundant species found in the lake. The abundance of game fish species is generally low due to inadequate water depth, poor water quality, competition from rough fish species and the lack of abundant natural habitat.

Table 2. Fish species commonly found in Lake Herman, Lake County.

Game Species	*Other Species*
Walleye	Bigmouth Buffalo
Yellow Perch	Common Carp
White Bass	White Sucker
Black Crappie	
Northern Pike	
Bluegill	
Channel Catfish	
Smallmouth Bass	
Black Bullhead	
Green Sunfish	

Fish Management

Fish kills (summer or winter, Table 3) are relatively rare and not severe. The operation of an aeration system by the Lake Herman Development Association during the winter likely helps to prevent severe winter fish kills.

Walleye and yellow perch stocking efforts (Table 4) have been generally unsuccessful at producing high-yield fisheries similar to others in the area but they have produced enough fish to sustain some seasonal opportunity, especially for shore anglers. In years when white bass produce large age-0 year classes, the competition for forage likely slows the growth of age-0 walleyes and reduces their chance of surviving the winter.

Table 3. Fish kill history for Lake Herman, Lake County.

Year	*Severity*	*Notes*
2003	Light	9/3/03 – 1,000s FHM, 1 WAE, 1 WHS
1999	Light	July – minor carp kill in Dirk's Bay
1995	Moderate	Partial winterkill of larger WAE and COC

Table 4. Stocking history for Lake Herman, Lake County, 2005-2014.

Year	*Number*	*Species*	*Size*
2005	2,000,000	Walleye	Fry
2007	1,400,000	Walleye	Fry
2008	1,400,000	Walleye	Fry
2009	7,539,000	Yellow Perch	Fry
2010	1,312	Walleye	Large Fingerling
2011	135,790	Walleye	Fingerling
2012	130,130	Walleye	Fingerling
2013	135,200	Walleye	Fingerling
2014	95,920	Walleye	Fingerling

Methods

Lake Herman was sampled on July 23-24, 2014 with three overnight gill-net sets. 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 (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting.

Results and Discussion

Net Catch Results

The gill-net catch was dominated by black bullheads and non-game species (Table 5). Walleye, white bass and yellow perch were the most abundant game fish sampled. Overall abundance of fish was similar to 2013 and down from past years (Table 7).

Table 5. Total catch from three overnight gill net sets at Lake Herman, Lake County July 23-24, 2014.

Species	***#***	***%***	***CPUE[1]***	***80% C.I.***	***Mean CPUE****	***PSD***	***RSD-P***	***Mean Wr***
Black Bullhead	105	51.7	35.0	±19.2	15.1	18	2	--
Bigmouth Buffalo	26	12.8	8.7	±4.7	2.3	--	--	--
White Sucker	20	9.9	6.7	±3.7	10.4	80	80	--
Walleye	18	8.9	6.0	±2.7	7.4	67	17	94
White Bass	13	6.4	4.3	±2.6	5.8	--	--	--
Yellow Perch	12	5.9	4.0	±1.5	15.9	100	0	99
Common Carp	4	2.0	1.3	±0.4	2.2	--	--	--
Northern Pike	4	2.0	1.3	±0.4	1.1	--	--	--
Channel Catfish	1	0.5	0.3	±0.4	0.4	--	--	--

*10 years (2005-2014)

Table 6. Catch per unit effort by length category for various fish species captured with gill nets in Lake Herman July 23-24, 2014.

Species	***Substock***	***Stock***	***S-Q***	***Q-P***	***P+***	***All sizes***	***80% C.I.***
Black Bullhead	--	35.0	28.7	5.7	0.7	35.0	±19.2
Bigmouth Buffalo	8.3	0.3	--	0.3	--	8.7	±4.7
White Sucker	--	6.7	1.3	--	5.3	6.7	±3.7
Walleye	2.0	4.0	1.3	2.0	0.7	6.0	±2.7
White Bass	4.0	0.3	--	--	0.3	4.3	±2.6
Yellow Perch	--	4.0	--	4.0	--	4.0	±1.5
Common Carp	--	1.3	--	--	1.3	1.3	±0.4
Northern Pike	0.7	0.7	0.3	--	0.3	1.3	±0.4
Channel Catfish	--	0.3	--	--	0.3	0.3	±0.4

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 all fish species sampled in Lake Herman, Lake County, 2005-2014.

Species	*Gear*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*
Bigmouth	GN	5.8		0.3		--	0.8	0.3	0.8	1.3	8.7
Buffalo	TN	99.4		5.8		10.1	9.6	4.6	4.5	6.4	
Black	GN	0.5		1.7		6.0	14.0	18.0	33.5	12.3	35.0
Bullhead	TN	21.3		32.2		134.4	73.2	348.4	265.6	16.0	
Black	GN	--		--		--	--	--	--	--	--
Crappie	TN	0.2		5.9		0.1	0.6	1.5	0.8	0.2	
	GN	--		--		--	--	--	--	--	--
Bluegill	TN	--		0.5		0.8	0.2	0.1	1.0	0.2	
Channel	GN	--		--		1.0	0.3	0.3	1.0	--	0.3
Catfish	TN	0.1		--		2.1	2.5	0.4	2.7	--	
Common	GN	0.5		0.3		--	--	12.0	1.8	1.3	1.3
Carp	TN	0.4		0.6		--	0.7	8.8	2.2	0.7	
Green	GN	--		--		--	--	--	0.3	--	--
Sunfish	TN	--		--		--	0.1	--	0.2	--	
Northern	GN	--		0.7		1.3	1.3	2.3	1.8	--	1.3
Pike	TN	0.2		1.0		0.3	1.5	3.1	0.3	2.3	
Smallmouth	GN	--		--		--	--	0.3	--	--	--
Bass	TN	0.1		--		--	0.3	--	0.1	--	
	GN	11.5		12.0		2.7	5.0	6.0	13.3	2.3	6.0
Walleye	TN	--		5.0		2.1	1.2	0.4	0.3	1.1	
White	GN	--		2.7		3.3	1.5	1.3	32.8	0.7	4.3
Bass	TN	--		0.6		1.9	1.7	3.4	7.3	3.7	
White	GN	13.8		15.3		15.0	13.0	10.0	4.5	5.0	6.7
Sucker	TN	1.2		12.4		11.1	31.0	11.9	3.0	4.5	
Yellow	GN	13.0		4.3		14.7	31.0	26.3	33.3	0.7	4.0
Perch	TN	--		0.6		0.6	0.8	0.1	8.9	0.1	

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 (643,500) as needed to achieve the management objective

Walleye CPUE (Table 8) remains below the management objective despite five consecutive years of fingerling stocking (Table 9). Fish from multiple year classes were sampled, but no year class was particularly abundant (Figures 2 and 3).

Table 8. Gill-net CPUE, PSD, RSD-P, and mean Wr for all walleyes sampled in Lake Herman, Lake County, 2005-2014.

	2005	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***
CPUE	11.5		12.0		2.7	5.0	6.0	13.3	2.3	6.0
PSD	5		8		--	28	56	58	--	67
RSD-P	3		3		--	0	11	8	--	17
Mean Wr	87		86		--	84	86	92	--	94

Table 9. Walleye stocked into Lake Herman, Lake County, 2005-2014.

Year	***Number***	***Size***
2014	95,920	Small Fingerling
2013	135,200	Small Fingerling
2012	130,130	Small Fingerling
2011	135,790	Small Fingerling
2010	1,312	Large Fingerling
2008	1,400,000	Fry
2007	1,400,000	Fry
2005	2,000,000	Fry

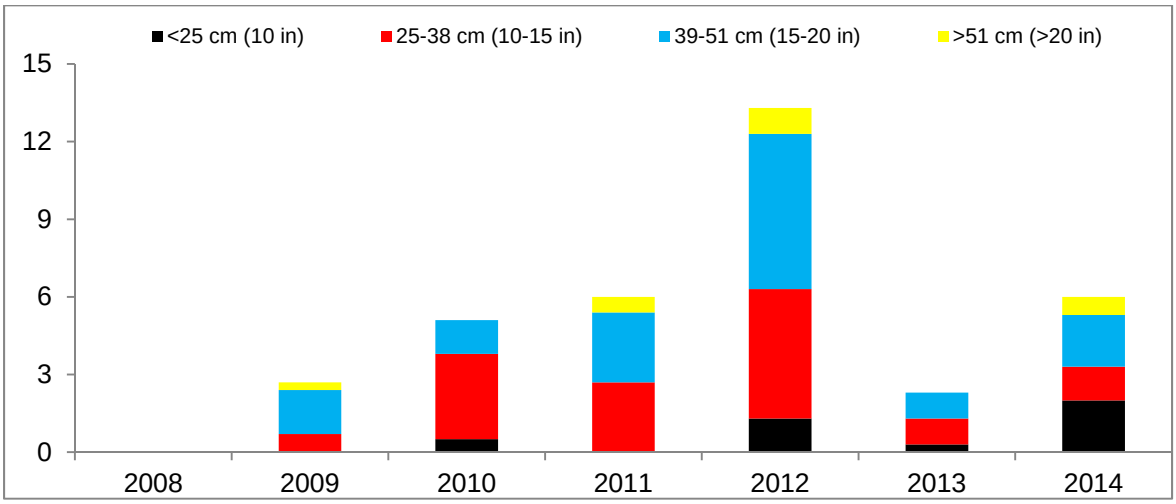

Figure 2. CPUE by length category for walleye sampled with gill nets in Lake Herman, Lake County, 2008-2014.

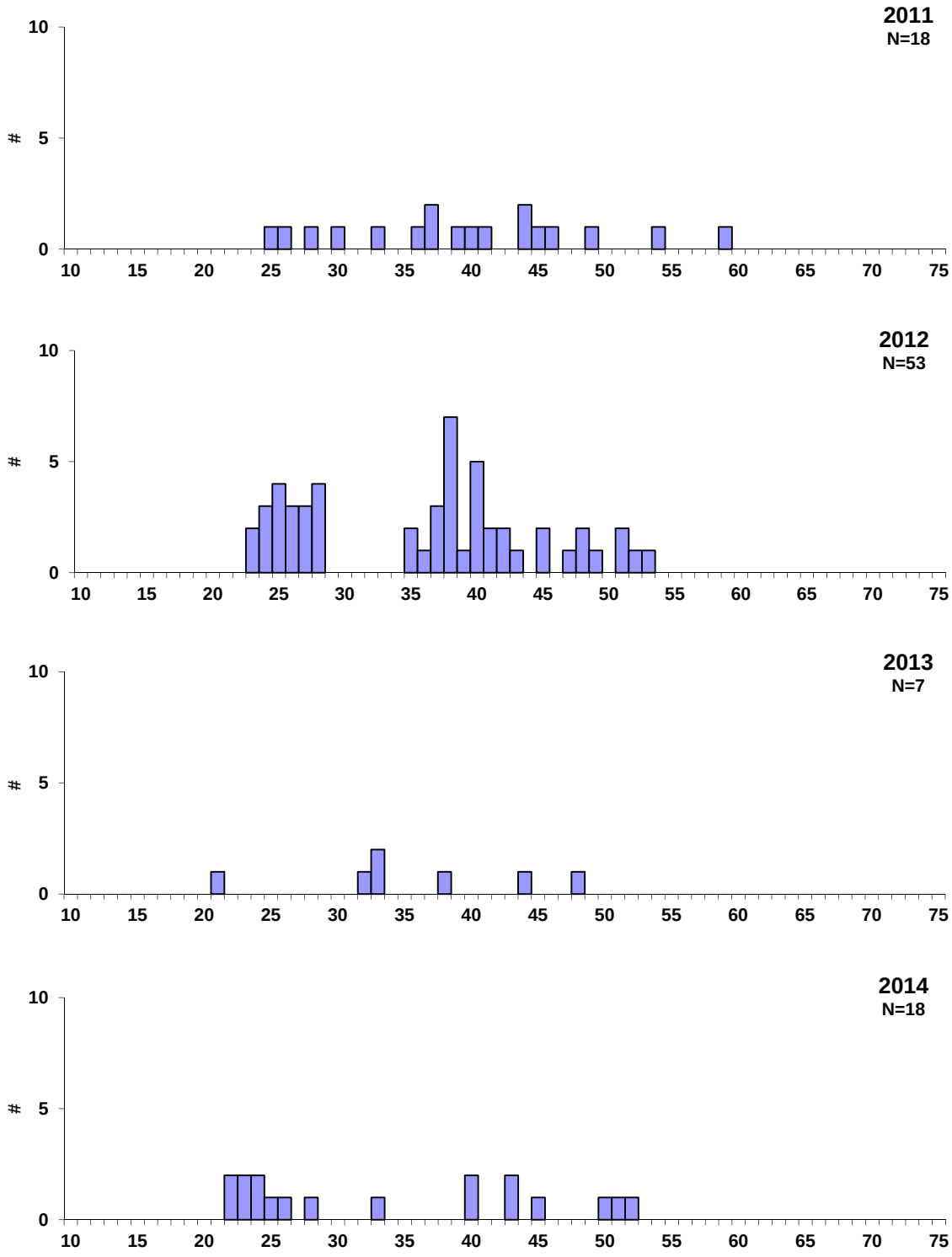

Figure 3. Length frequency histograms for walleye sampled with gill nets in Lake Herman, Lake County, 2011, 2012, 2013, 2014.

Yellow Perch

Management Objective

- none at this time

Management Strategies

- monitor the yellow perch population during annual lake surveys and report the results
- yellow perch fry or fingerling stocking is currently being evaluated and may be a potential future strategy to supplement natural reproduction

Yellow perch CPUE increased from 2013, but was still well below the CPUEs measured in 2009 through 2012 (Table 10). All yellow perch sampled in 2014 were stock length or longer (Table 10) and appear to be from a single year class (Figures 4 and 5).

Table 10. Yellow perch gill-net CPUE, PSD, RSD-P, and mean Wr for Lake Herman, Lake County, 2005-2014.

	2005	***2006***	***2007***	***2008***	***2009***	***2010***	***2011***	***2012***	***2013***	***2014***
CPUE	13.0		4.3		14.7	31.0	26.3	33.3	0.7	4.0
PSD	86		100		88	51	41	71	--	100
RSD-P	74		69		0	45	0	3	--	0
Mean Wr	101		100		106	106	102	90	--	99

Table 11. Yellow perch stocked into Lake Herman, Lake County, 2005-2014.

Year	***Number***	***Size***
2009	7,539,000	Fry

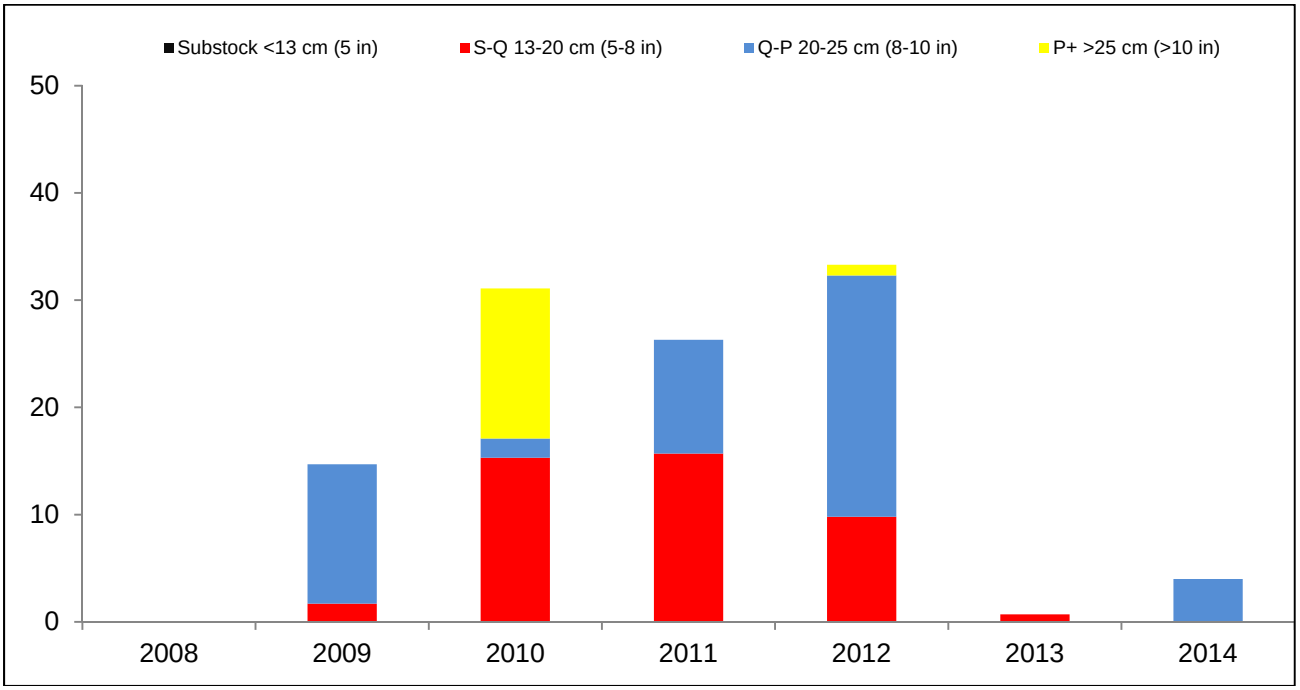

Figure 4. CPUE by length category for yellow perch sampled with gill nets in Lake Herman, Lake County, 2008-2014.

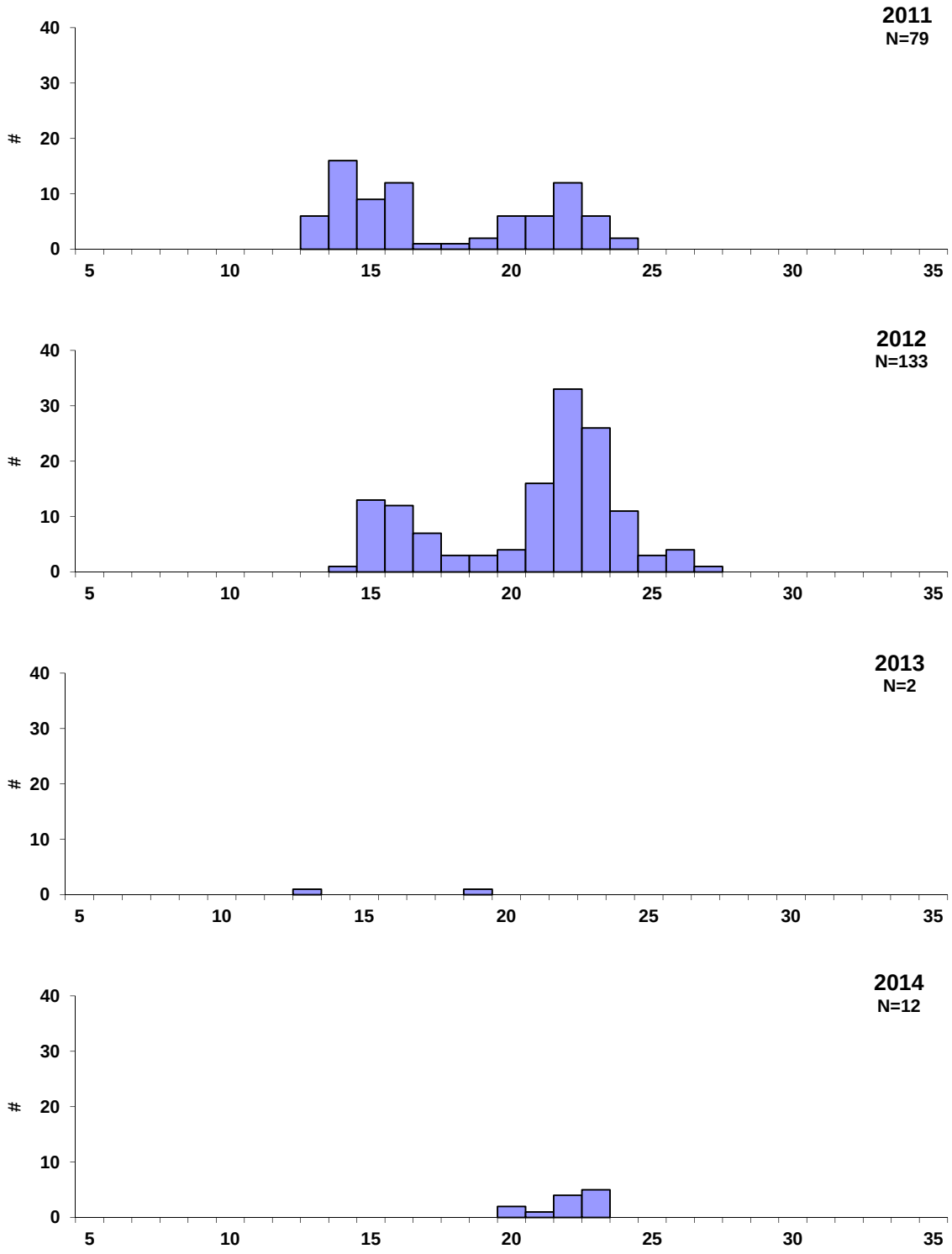

Figure 5. Length frequency histograms for yellow perch sampled with gill nets in Lake Herman, Lake County, 2011, 2012, 2013, 2014.

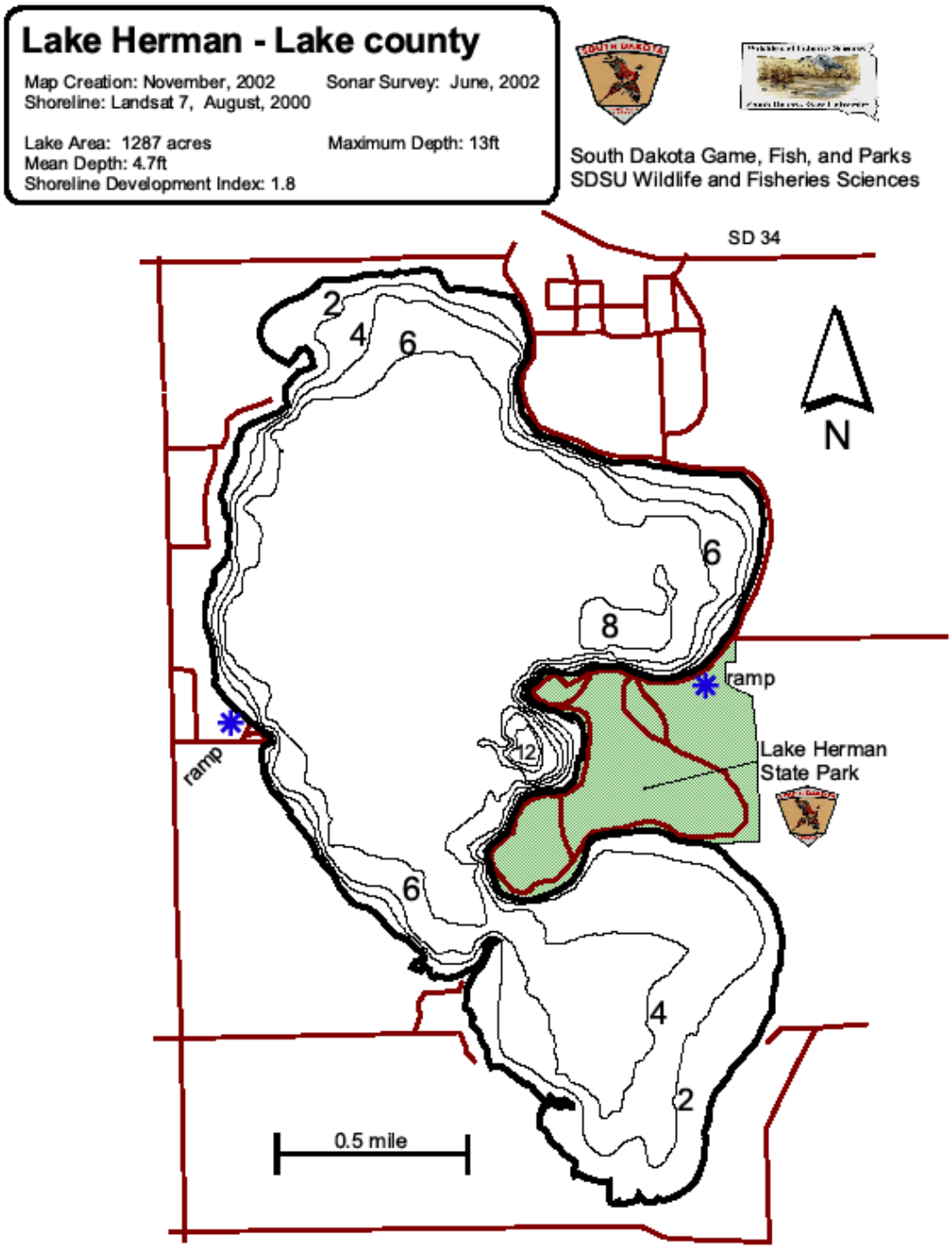

Figure 6. Contour map of Lake Herman, Lake County.

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:

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

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

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

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.