

# SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-44

**Name:** North Island Lake                      **Counties:** Minnehaha, McCook  
**Legal Description:** T104N-R 52W-Sec. 19, T104-R 53-Sec 24-25  
**Location from nearest town:** 10 miles west of Colton, SD

**Dates of present survey:** July 12-14, 2011

**Dates of last survey:** July 13-15, 2009

Managed Species	Other Species
Walleye	Northern Pike
Yellow Perch	Black Crappie
Largemouth Bass	Green Sunfish
Muskellunge	Black Bullhead
Smallmouth Bass	Bluegill
	Common Carp

## PHYSICAL DATA

**Surface area:** 375 acres

**Maximum depth:** 17 feet

**Volume:** 4,922 acre-feet

**Contour map available:** Yes

**Lake elevation observed during the survey:** Full

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

**Watershed area:** Unknown acres

**Mean depth:** 13 feet

**Shoreline length:** 4.4 miles

**Date mapped:** 1997

### Introduction

Island Lake is a natural lake that lies on the McCook/Minnehaha County line. It was named for the numerous islands present during lower water years. County Highway 110 divides the lake into two sections that are managed separately and named North and South Island lakes. Culverts underneath the road used to allow fish passage between the lakes but we believe they were covered by rock when the road was raised in the mid-90's. Island Lake has a small, local watershed with no inlet or outlet streams.

### Ownership of Lake and Adjacent Lakeshore Properties

North Island Lake is not meandered public water. The South Dakota Department of Game, Fish and Parks (GFP) and the United States Fish and Wildlife Service (USFWS) share ownership of most of the lake basin and surrounding shoreline. The extreme northeast, southwest and northwest portions of the lake are privately owned.

## Fishing Access

The North Island Lake Access Area is currently in poor condition. High water levels have eroded much of the shoreline and the boat ramp is entirely under water. Small boats can still be launched but parking is limited. Shore fishermen frequently park along the county road to fish. Some shore fishing is available on the USFWS land on the north end of the lake. Plans are currently being drafted to make fishing access improvements within the next two years.

## Field Observations of Water Quality and Aquatic Vegetation

The water in North Island Lake was very clear during the survey with a Secchi depth measurement of 2.2 meters (86 in). There were large beds of sago pondweed (*Potamogeton pectinatus*) and clasping leaf pondweed (*Potamogeton richardsonii*) around the entire lake. There is some cattail (*Typha spp.*) and bulrush (*Scirpus spp.*) in the bays on the north end of the lake.

## BIOLOGICAL DATA

### Methods:

North Island Lake was sampled on July 12-14, 2011 with four overnight gill-net sets and 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. 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. Sampling locations are displayed in Figure 3.

### Results and Discussion:

## Gill Net Catch

Black bullhead, walleye and smallmouth bass were the only species sampled in the gill nets (Table 1).

**Table 1.** Total catch from four overnight gill net sets at North Island Lake, Minnehaha County, July 12-14, 2011.

Species	Number	Percent	CPUE <sup>1</sup>	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
<b>Black Bullhead</b>	551	94.2	137.8	<u>+75.7</u>	77.3	29	0	96
<b>Smallmouth Bass</b>	17	2.9	4.3	<u>+0.3</u>	0.6	0	0	98
<b>Walleye</b>	17	2.9	4.3	<u>+1.9</u>	5.0	44	0	89

\* 5 years (2001, 2003, 2005, 2007, 2009)

<sup>1</sup> See Appendix A for definitions of CPUE, PSD, and mean Wr.

**Table 2.** Catch per unit effort by length category for various fish species captured with gill nets in North Island Lake July 12-14, 2011.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
<b>Black Bullhead</b>	5.8	132.0	93.3	38.7	--	137.8	<u>+75.7</u>
<b>Walleye</b>	2.0	2.3	1.3	1.0	--	4.3	<u>+1.9</u>
<b>Smallmouth Bass</b>	2.8	1.5	1.5	--	--	4.3	<u>+0.3</u>

Length categories can be found in Appendix A.

## Trap Net Catch

Black bullheads were the most common species sampled in the trap nets (Table 3). Bluegill, smallmouth bass, walleye, green sunfish, common carp, and yellow perch were also sampled. The dense band of vegetation surrounding the shoreline may be having a negative impact on trap net catches.

**Table 3.** Total catch from ten overnight trap net sets at North Island Lake, Minnehaha County, July 12-14, 2011.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
<b>Black Bullhead</b>	844	95.3	84.4	<u>+57.6</u>	268.8	36	0	94
<b>Bluegill</b>	18	2.0	1.8	<u>+0.8</u>	2.6	83	6	123
<b>Smallmouth Bass</b>	10	1.1	1.0	<u>+0.4</u>	0.6	11	0	93
<b>Walleye</b>	5	0.6	0.5	<u>+0.3</u>	1.0	--	--	--
<b>Green Sunfish</b>	5	0.6	0.5	<u>+0.3</u>	1.4	--	--	--
<b>Common Carp</b>	2	0.2	0.2	<u>+0.2</u>	0.2	--	--	--
<b>Yellow Perch</b>	2	0.2	0.2	<u>+0.2</u>	0.0	--	--	--

\* 5 years (2001, 2003, 2005, 2007, 2009)

**Table 4.** Catch per unit effort by length category for various fish species captured with trap nets in North Island Lake July 12-14, 2011.

Species	Substock	Stock	S-Q	Q-P	P+	All sizes	80% C.I.
<b>Black Bullhead</b>	3.4	81.0	51.6	29.4	--	84.4	<u>+57.6</u>
<b>Bluegill</b>	--	1.8	0.3	1.4	0.1	1.8	<u>+0.8</u>
<b>Smallmouth Bass</b>	0.1	0.9	0.8	0.1	--	1.0	<u>+0.4</u>
<b>Walleye</b>	0.2	0.3	0.2	0.1	--	0.5	<u>+0.3</u>
<b>Green Sunfish</b>	--	0.5	0.3	0.2	--	0.5	<u>+0.3</u>
<b>Common Carp</b>	--	0.2	--	0.2	--	0.2	<u>+0.2</u>
<b>Yellow Perch</b>	--	0.2	0.1	--	0.1	0.2	<u>+0.2</u>

Length categories can be found in Appendix A.

## Walleye

**Management objective:** Maintain a walleye fishery with a gill-net CPUE of at least 15.

Walleye gill-net CPUE remained far below the management objective (Table 5). The fish sampled ranged in length from 20 to 47 cm (7.9-18.5 in.) with an average length of 29.3 cm (11.5 in.). Based on angler reports and spring trap net catches during contaminant sampling in 2003, we believe that summer gill nets are ineffective at sampling walleyes in North Island Lake. Spring trap netting may be needed to more accurately assess the population. North Island walleyes grow quickly with fish exceeding 35.6 cm (14 inches) by age-3 (Table 6).

**Table 5.** Walleye gill-net CPUE, PSD, RSD-P, and mean Wr for North Island Lake, Minnehaha County, 2001-2011.

	2001	2002	2003	2004	2005	2007	2008	2009	2010	2011	Mean*
CPUE	8.0		1.0		3.8	5.8		6.3		4.3	5.0
PSD	70		--		53	0		16		44	35
RSD-P	15		--		40	0		4		0	15
Mean Wr	92		--		81	89		94		89	89

\*5 years (2001, 2003, 2005, 2007, 2009)

**Table 6.** Weighted mean length at capture (mm) for walleye captured in gill nets in North Island Lake Minnehaha County, 2005-2011. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends. Sample size in parentheses.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2011 (17)	222 (8)	270 (4)	376 (1)	426 (3)	472 (1)	--	--	--	--	--	--	--
2009 (25)	270 (5)	351 (17)	454 (2)	--	--	--	--	575 (1)	--	--	--	--
2007 (23)	245 (22)	330 (1)	--	--	--	--	--	--	--	--	--	--
2005 (15)	279 (5)	379 (3)	--	--	490 (1)	529 (1)	608 (1)	--	631 (4)	--	--	--

## Yellow Perch

**Management objective:** Maintain a yellow perch fishery with a gill-net CPUE of at least 25.

Yellow perch abundance has decreased steadily since 2001 (Table 7). No perch were sampled in North Island Lake in 2009 and 2011. The 2007 spring stocking of 3,420 juvenile perch (Table 10) did not increase gill net CPUE (Table 7). Yellow perch were stocked again in the fall of 2009 and 2011, again, with no measurable results.

**Table 7.** Yellow perch gill-net CPUE, PSD, and mean Wr for North Island Lake, Minnehaha County, 2001-2011.

	2001	2002	2003	2004	2005	2007	2008	2009	2010	2011	Mean*
CPUE	140.2		57.5		9.3	3.5		0.0		0.0	42.1
PSD	39		20		68	7		--		--	34
RSD-P	7		6		3	7		--		--	6
Mean Wr	108		106		109	112		--		--	109

\*5 years (2001, 2003, 2005, 2007, 2009)

## **Black Bullhead**

**Management objective:** Maintain a black bullhead population with a trap-net CPUE of 100 or less.

Black bullhead trap-net CPUE is the lowest since 1993 and is now within the management objective (Table 8). The sampled fish had an average length of 214 mm (8.4 in.) and the length-frequency histograms in Figure 2 illustrate the cyclic nature of the population.

**Table 8.** Black bullhead trap-net CPUE, PSD, and mean Wr for North Island Lake, Minnehaha County, 2001-2011.

	2001	2002	2003	2005	2007	2008	2009	2010	2011	Mean*
CPUE	345.9		214.4	256.0	388.5		139.0		84.4	268.8
PSD	53		32	48	18		12		36	33
RSD-P	7		12	3	3		0		0	5
Mean Wr	--		84	100	104		101		94	97

\*5 years (2001, 2003, 2005, 2007, 2009)

## All Species

Smallmouth bass abundance continues to increase since their introduction in 2007 (Table 9). CPUE for nearly all other species is lower than in 2009. Muskellunge were introduced in 2009 to create trophy angling opportunities. Additional muskies were stocked in 2011 (Table 10). Anglers reported catching muskellunge in 2011.

**Table 9.** Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in North Island Lake, Minnehaha County, 2003-2011.

<b>Species</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>COC (GN)</b>	--		--		--		--		--
<b>COC (TN)</b>	--		--		0.1		1.0		0.2
<b>WHS (GN)</b>	--		--		--		--		--
<b>WHS (TN)</b>	--		0.4		0.1		0.1		--
<b>BLB (GN)</b>	220.0		83.0		35.8		4.8		137.8
<b>BLB (TN)</b>	214.4		256.0		388.5		139.0		84.4
<b>NOP (GN)</b>	--		--		--		--		--
<b>NOP (TN)</b>	0.4		1.9		0.3		0.2		--
<b>GSF (GN)</b>	--		0.3		0.8		--		--
<b>GSF (TN)</b>	0.7		--		3.8		0.5		0.5
<b>HYB (GN)</b>	--		--		--		--		--
<b>HYB (TN)</b>	--		--		--		0.1		--
<b>BLG (GN)</b>	--		0.3		--		--		--
<b>BLG (TN)</b>	--		2.9		0.4		9.5		1.8
<b>SMB (GN)</b>	--		--		1.5		1.5		4.3
<b>SMB (TN)</b>	--		--		0.8		--		1.0
<b>LMB (GN)</b>	--		--		--		--		--
<b>LMB (TN)</b>	--		0.1		--		--		--
<b>BLC (GN)</b>	--		--		--		--		--
<b>BLC (TN)</b>	--		--		--		0.1		--
<b>YEP (GN)</b>	57.5		9.3		3.5		--		--
<b>YEP (TN)</b>	4.3		0.2		0.4		--		0.2
<b>WAE (GN)</b>	1.0		3.8		5.8		6.3		4.3
<b>WAE (TN)</b>	0.3		2.3		0.8		1.0		0.5

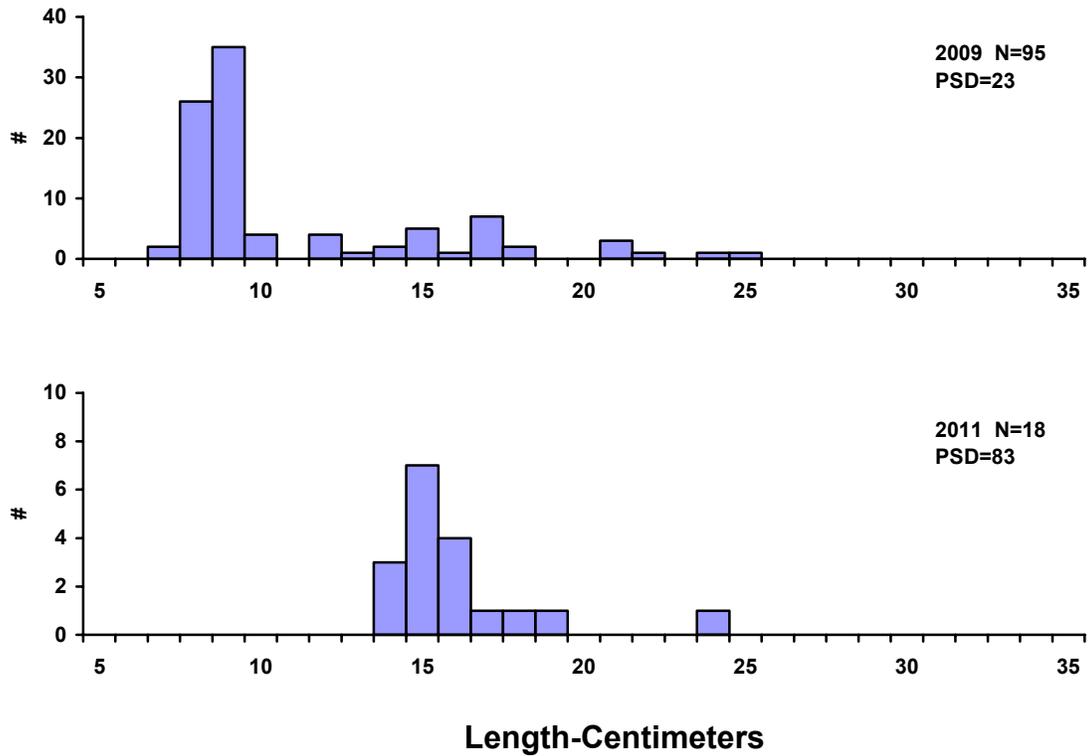
COC (Common Carp), WHS (White Sucker), BLB (Black Bullhead), NOP (Northern Pike), GSF (Green Sunfish), BLG (Bluegill), SMB (Smallmouth Bass), LMB (Largemouth Bass), BLC (Black Crappie), YEP (Yellow Perch), WAE (Walleye).

## MANAGEMENT RECOMMENDATIONS

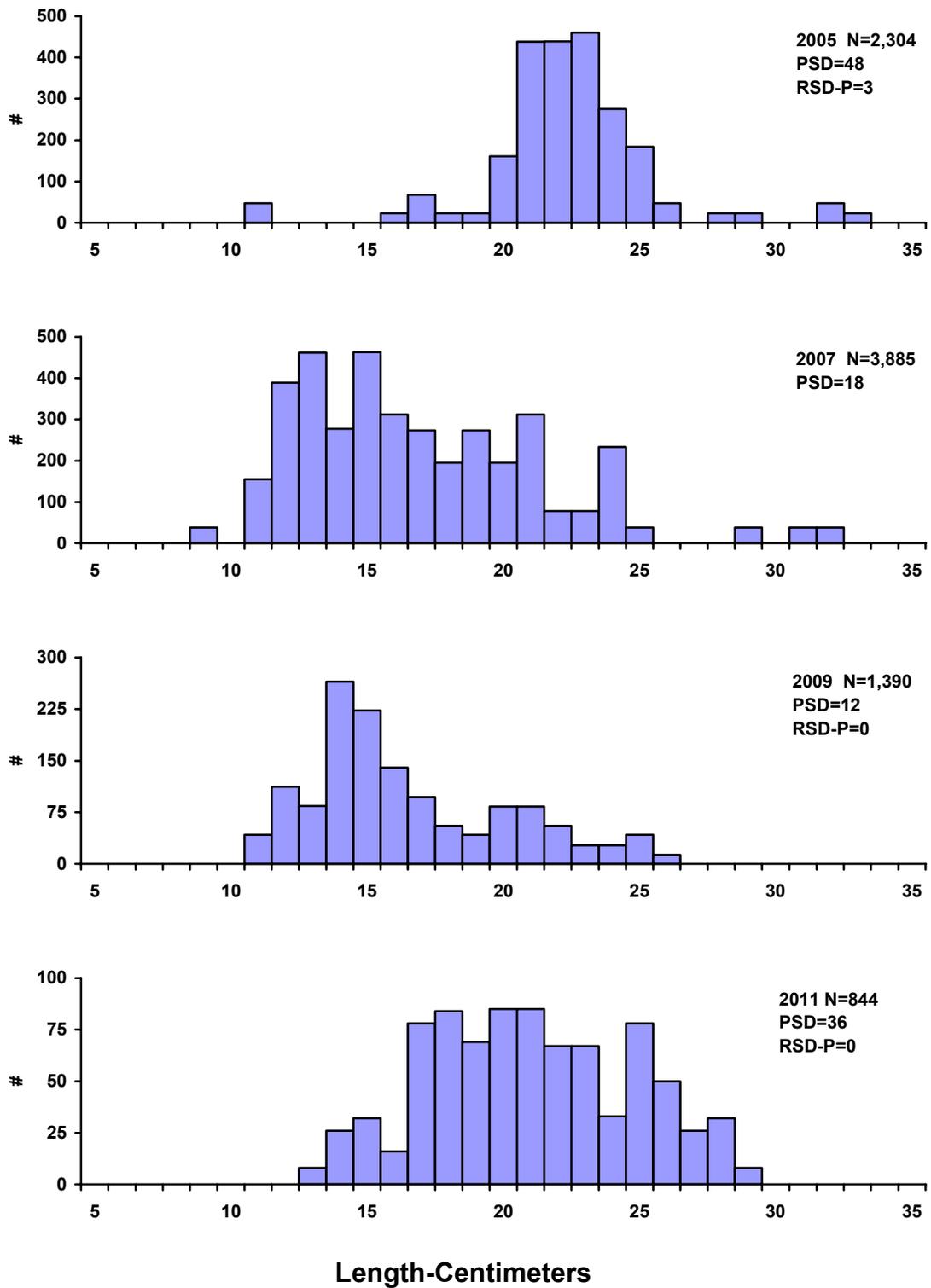
1. Continue to conduct biennial lake surveys to monitor the fishery. Attempt a spring trap netting survey to sample the walleye population and compare the results with summer gill nets samples. Recommend a walleye sampling strategy based on the results of the comparison.
2. Manage black bullhead density by maintaining predator abundance and using intensive netting removals if needed.
3. Investigate the possibility of improving the access area.
4. Monitor the muskellunge population with trap nets or short term gill net sets in late April.

**Table 10.** Stocking record for North Island Lake, Minnehaha County, 1995-2011.

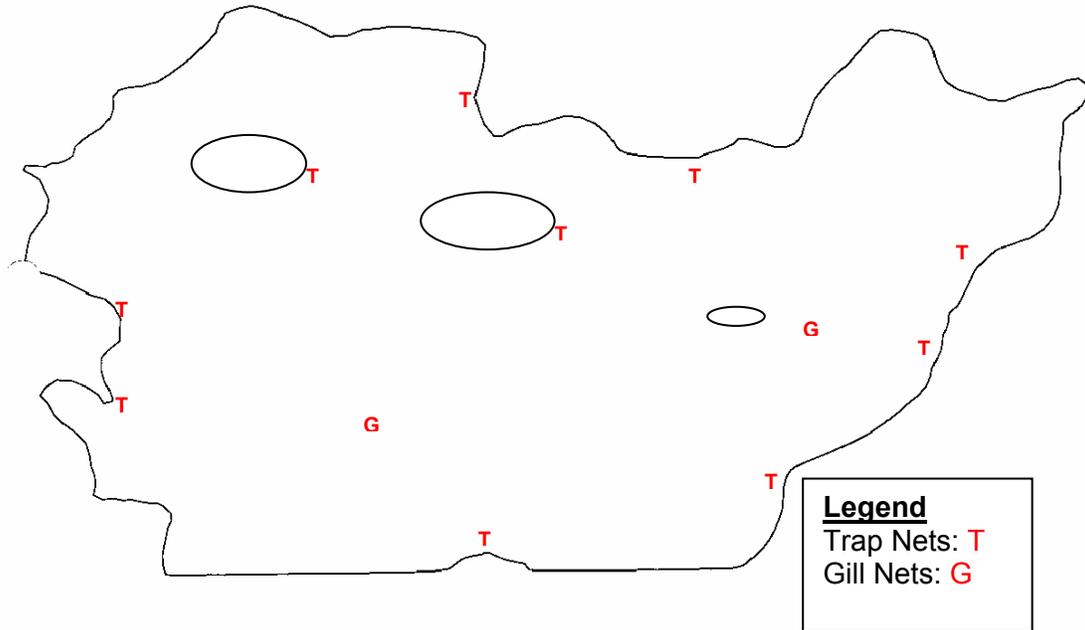
<b>Year</b>	<b>Number</b>	<b>Species</b>	<b>Size</b>
1995	25,780	Yellow Perch	Fingerling
1996	27,000	Walleye	Fingerling
1997	28,800	Walleye	Fingerling
	2,690	Yellow Perch	Fingerling
1998	25,000	Walleye	Fingerling
	1,243	Yellow Perch	Adult
	18,590	Yellow Perch	Fingerling
1999	25,000	Walleye	Fingerling
	1,065	Yellow Perch	Adult
	2,522	Yellow Perch	Juvenile
2000	13,380	Yellow Perch	Juvenile
2003	26,650	Bluegill	Fingerling
	44,010	Largemouth Bass	Fingerling
2004	1,248	Bluegill	Adult
	25,010	Largemouth Bass	Fingerling
	294	Northern Pike	Adult
	410	Walleye	Juvenile
2005	45,100	Walleye	Fingerling
	25,317	Yellow Perch	Fingerling
	77	Yellow Perch	Adult
2007	164	Smallmouth Bass	Adult
	3,224	Walleye	Large Fingerling
	3,420	Yellow Perch	Juvenile
2008	164	Smallmouth Bass	Adult
	28	Smallmouth Bass	Juvenile
2009	8,748	Walleye	Large Fingerling
	620	Yellow Perch	Fingerling
	310	Yellow Perch	Adult
	145	Muskellunge	Juvenile
2011	272	Muskellunge	Large Fingerling
	10,058	Yellow Perch	Large Fingerling



**Figure 1.** Length frequency histogram for bluegill sampled with trap nets in North Island Lake, Minnehaha County, 2009 and 2011.



**Figure 2.** Length frequency histograms for black bullheads sampled with trap nets in North Island Lake, Minnehaha County, 2005, 2007, 2009, and 2011.



**Figure 3.** Sampling locations on North Island Lake, Minnehaha County, 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).

<b>Species</b>	<b>Stock</b>	<b>Quality</b>	<b>Preferred</b>	<b>Memorable</b>	<b>Trophy</b>
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.