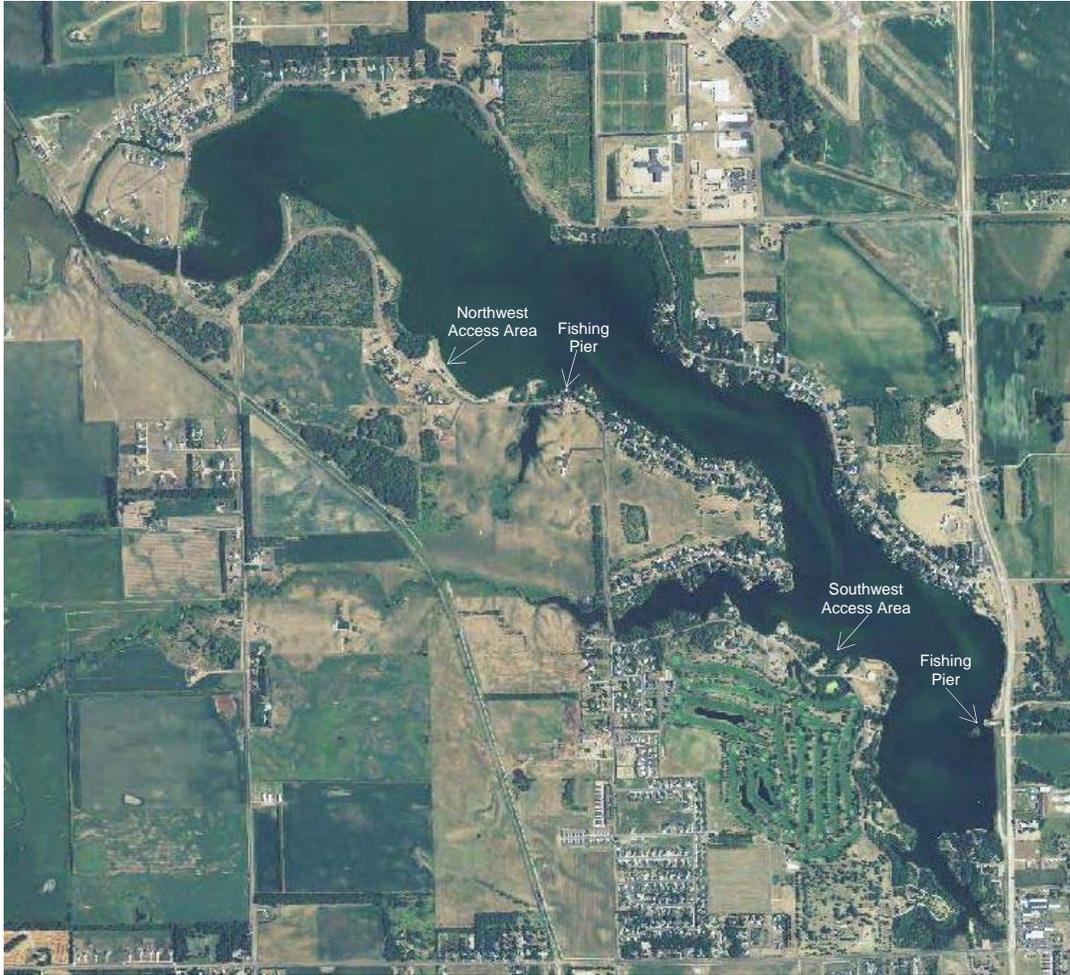


**SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**  
**Lake Mitchell, Davison County**  
**2102-F-21-R-46**  
**2013**



**Figure 1.** Lake Mitchell, Davison County

**Legal Description:** T103W- R60N-Sec 4-6, 9; T104N- R60W-Sec 31-32

**Location from nearest town:** Northwest side of Mitchell, SD

**Surface Area:** 670 acres

**Meandered (Y/N):** No

**OHWM elevation:** --

**Outlet elevation:** --

**Max. depth at outlet elevation:** 29 feet

**Observed water level:** Full

**Contour map available:** Yes

**Watershed area:** 229,911 acres

**Shoreline length:** 10 miles

**Date set:** --

**Date set:** --

**Mean depth at outlet elevation:** 12.2 feet

**Lake volume:** 8,212 acre feet

**Date mapped:** 1970

**DENR beneficial use classifications:** (1) domestic water supply, (4) warm water permanent fish life propagation, (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation and stock watering

## **Introduction**

### **General**

Lake Mitchell was constructed in 1928 by the City of Mitchell to serve as a domestic water supply and a regional recreation center. The primary source of water is Firesteel Creek, which has two main branches and drains a watershed that extends 50 miles above the lake.

### **Ownership of Lake and Adjacent Lakeshore Properties**

Lake Mitchell is owned by the City of Mitchell but the fishery is managed by the South Dakota Department of Game, Fish, and Parks (GFP). The City owns and maintains several public access areas and parks around the lake. The remainder of the lakeshore is privately owned and heavily developed.

### **Fishing Access**

The Northwest Access Area has a double lane boat ramp, boat dock, parking lot, and public toilets (Figure 1). The Southwest Access Area has a single lane boat ramp, dock, and parking lot. Numerous access areas and parks around the lake provide ample shore fishing opportunities. One handicapped-accessible fishing pier is located on the south side of the lake toward the west end and another is located in Kibbe Park on the northeast corner of the lake.

### **Water Quality and Aquatic Vegetation**

The water in Lake Mitchell was fairly clear during this survey with a Secchi depth measurement of 1.27 m (50 in). Beds of sago pondweed (*Potamogeton pectinatus*), common cattail (*Typha spp.*), and duckweed (*Lemna spp.*) were common in the bays and creek arms. Large stands of common cattail were found in Kippes Bay and in the west end of the lake where it had been absent for several years. Curlyleaf pondweed (*Potamogeton crispus*), an invasive species, was discovered for the first time in 2012 and observed again in 2013.

### **Fishery**

Lake Mitchell contains a very diverse fish community and at least nine game species of interest to anglers (Table 1). All fish populations in the lake are self-sustaining by natural reproduction and only walleyes have been stocked in recent years in an attempt to increase their abundance (Table 3). The summer 2007 fish kill (Table 2) had a significant, but temporary, impact on black crappie abundance.

**Table 1.** Fish species commonly found in Lake Mitchell, Davison County.

<b>Game Species</b>	<b>Other Species</b>
Bluegill	Common Carp
Black Crappie	Bigmouth Buffalo
White Crappie	Freshwater Drum
Largemouth Bass	Shorthead Redhorse
Smallmouth Bass	White Sucker
Channel Catfish	
Flathead Catfish	
Walleye	
Northern Pike	

**Table 2.** Fish kill history for Lake Mitchell, Davison County.

<b>Year</b>	<b>Severity</b>	<b>Species Killed</b>	<b>Notes</b>
2012	Severe	CCF, BLC, BLG, FHM	7/3/12 – West end canal – algae bloom
2007	Moderate	BLC	July – post-spawn stress, environmental
2006	Light	FWD, BLC	Late March – far west end

**Table 3.** Stocking history for Lake Mitchell, Davison County, 2004-2013.

<b>Year</b>	<b>Number</b>	<b>Species</b>	<b>Size</b>
2006	67,760	Walleye	Small Fingerling
2007	5,192	Walleye	Large Fingerling
2009	67,500	Walleye	Small Fingerling
2012	67,340	Walleye	Small Fingerling
2013	67,720	Walleye	Small Fingerling

## Methods

Lake Mitchell was sampled on July 8-10, 2013 with five overnight gill net sets and twelve overnight trap 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 ( $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ , and 2 in) monofilament netting. 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. Two hours of nighttime electrofishing was done on September 16, 2013 to monitor walleye recruitment.

## Results and Discussion

### Net Catch Results

In general, the overall number of fish sampled with gill nets and trap nets in 2013 was less than previous years (Table 6). Channel catfish continues to be one of the most abundant species sampled. A bigmouth buffalo was caught for the first time since 2010 while no white crappies have been sampled in 2012 or 2013.

**Table 4.** Total catch from five overnight gill nets set in Lake Mitchell, Davison County, July 8-10, 2013.

<i>Species</i>	<i>Number</i>	<i>%</i>	<i>CPUE</i> <sup>1</sup>	<i>80% C.I.</i>	<i>Mean CPUE*</i>	<i>PSD</i>	<i>RSD-P</i>	<i>Mean Wr</i>
Channel Catfish	63	57.8	12.6	+5.3	7.3	61	16	89
Walleye	12	11.0	2.4	+1.6	3.0	42	8	87
Freshwater Drum	7	6.4	1.4	+1.0	6.8	--	--	--
Bigmouth Buffalo	5	4.6	1.0	+1.0	0.1	--	--	--
Common Carp	5	4.6	1.0	+0.8	0.8	--	--	--
Northern Pike	4	3.7	0.8	+0.5	0.9	--	--	--
Black Crappie	3	2.8	0.6	+0.5	1.3	--	--	--
Shorthead Redhorse	3	2.8	0.6	+0.5	4.8	--	--	--
Bluegill	3	2.8	0.6	+0.3	0.4	--	--	--
White Sucker	2	1.8	0.4	+0.3	1.4	--	--	--
Largemouth Bass	1	0.9	0.2	+0.3	0.0	--	--	--
Smallmouth Bass	1	0.9	0.2	+0.3	0.1	--	--	--

\*10 years (2003-2012)

**Table 5.** Total catch from twelve overnight trap nets set in Lake Mitchell, Davison County, July 8-10, 2013.

<i>Species</i>	<i>Number</i>	<i>%</i>	<i>CPUE</i>	<i>80% C.I.</i>	<i>Mean CPUE*</i>	<i>PSD</i>	<i>RSD-P</i>	<i>Mean Wr</i>
Channel Catfish	33	24.3	2.8	+1.7	6.4	39	19	80
Common Carp	28	20.6	2.3	+1.6	3.1	100	50	90
Bluegill	27	19.9	2.3	+0.9	22.2	96	67	97
Black Crappie	17	12.5	1.4	+0.9	10.7	65	41	106
Freshwater Drum	6	4.4	0.5	+0.3	0.6	--	--	--
Smallmouth Bass	6	4.4	0.5	+0.3	0.5	--	--	--
White Sucker	6	4.4	0.5	+0.3	0.4	--	--	--
Shorthead Redhorse	5	3.7	0.4	+0.2	3.7	--	--	--
Flathead Catfish	3	2.2	0.3	+0.2	0.1	--	--	--
Northern Pike	3	2.2	0.3	+0.2	0.2	--	--	--
Bigmouth Buffalo	1	0.7	0.1	+0.1	0.0	--	--	--
Walleye	1	0.7	0.1	+0.1	0.4	--	--	--

\*10 years (2003-2012)

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

**Table 6.** Gill-net (GN) and trap-net (TN) CPUE for selected fish species sampled in Lake Mitchell, Lake County, 2004-2013.

<i>Species</i>	<i>2004</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>
BIB (GN)	--	--	--	--	--	0.2	--	--	--	1.0
BIB (TN)	--	0.1	--	0.2	--	--	0.1	--	--	0.1
BLB (GN)	0.3	--	--	0.3	1.5	0.2	4.3	2.8	3.0	--
BLB (TN)	--	0.2	0.7	--	--	0.3	0.2	--	0.7	--
BLC (GN)	0.3	0.5	5.2	0.4	0.3	0.5	0.2	--	2.7	0.6
BLC (TN)	5.4	3.8	49.5	9.3	1.6	2.3	10.5	8.6	3.8	1.4
BLG (GN)	0.8	0.9	0.8	--	--	0.2	0.3	0.2	0.5	0.6
BLG (TN)	6.4	19.8	53.4	39.2	17.2	4.3	24.2	7.6	18.7	2.3
CCF (GN)	3.3	5.3	4.3	6.0	2.7	4.2	5.7	1.2	25.3	12.6
CCF (TN)	3.9	3.2	1.5	1.2	24.4	6.0	1.8	3.1	1.9	2.8
COC (GN)	0.3	1.9	1.2	1.0	0.5	0.7	0.5	0.6	1.0	1.0
COC (TN)	2.6	4.8	2.4	1.7	2.6	6.3	2.6	2.7	3.6	2.3
FCF (GN)	--	--	--	--	--	--	0.2	--	--	--
FCF (TN)	--	--	--	0.1	0.1	0.1	0.1	0.3	--	0.3
FRD (GN)	6.7	10.0	7.0	9.9	3.5	2.2	5.2	5.0	12.0	1.4
FRD (TN)	1.2	0.2	0.5	0.5	0.7	0.1	0.3	0.2	1.6	0.5
NOP (GN)	0.5	0.6	0.5	0.3	1.2	1.8	0.5	3.0	0.7	0.8
NOP (TN)	0.5	0.2	0.4	0.1	0.2	0.3	0.2	0.1	0.1	0.3
SHR (GN)	9.3	6.0	7.7	0.3	0.2	0.8	0.3	1.4	1.8	0.6
SHR (TN)	6.8	10.2	3.3	2.9	1.7	1.1	2.4	2.1	1.0	0.4
SMB (GN)	--	--	--	--	--	--	--	0.8	0.2	0.2
SMB (TN)	0.1	0.3	0.3	--	0.5	0.4	1.6	1.1	0.5	0.5
WAE (GN)	1.8	1.1	2.0	1.0	2.7	2.0	3.3	9.2	3.3	2.4
WAE (TN)	0.4	0.4	--	0.4	0.6	0.3	0.3	--	--	0.1
WHC(GN)	0.2	--	--	--	--	--	--	--	--	--
WHC (TN)	0.1	--	0.2	0.3	--	--	0.2	0.1	--	--
WHS (GN)	0.8	0.8	1.2	0.3	0.5	0.8	2.5	6.8	0.2	0.4
WHS (TN)	0.1	0.6	0.1	0.3	0.1	0.3	0.9	0.9	0.3	0.3

BIB (Bignmouth Buffalo), BLB (Black Bullhead), BLC (Black Crappie), BLG (Bluegill), CCH (Channel Catfish), COC (Common Carp), FCF (Flathead Catfish), FRD (Freshwater Drum), NOP (Northern Pike), SHR (Shorthead Redhorse), SMB (Smallmouth Bass), WAE (Walleye), WHC (White Crappie), WHS (White Sucker)

## Walleye

**Management objective:** To maintain a walleye population with a gill net CPUE of at least 5 stock-length (25 cm, 10 in) or longer fish.

Total gill-net CPUE for walleyes in Lake Mitchell continued to decline in 2013 (Table 8) and stock-length CPUE was slightly less than 50% of the management objective (Table 7). Despite consistently low abundance, the population usually contains larger fish that provide some angling opportunity (Table 7, Figure 2).

Gill-net CPUE objectives for traditional walleye fisheries in eastern South Dakota generally range from 10-15 fish per net. We may consider reducing the stock-length CPUE objective for Lake Mitchell from 5 to 3 because mean total CPUE over the last 20 years is only 2.9 fish per net and has only exceeded 5 three times (Tables 8-9).

Natural reproduction for walleyes in Lake Mitchell is fairly consistent and produces a significant portion of the fishing opportunity in the lake. Moderate to moderately-strong year classes of age-0 fish were documented by fall electrofishing in six of eight years (Table 11). Of those six years, only three were stocked (2009, 2012, and 2013). Although moderately-strong year classes were produced in 2009 and 2013, OTC marking showed that 41% of these year classes were naturally produced.

Further analysis going back 20 years shows that the stocked periods of 1994-1999 and 2006-2013 coincided with mean gill net CPUEs of 3.2. However, from 2000-2005, when no stocking was done, mean CPUE declined slightly to 2.1. This is a very small and statistically insignificant difference but it may indicate a slight stocking benefit and provide some justification for future stocking if gill net CPUEs drop to 2.0 or less and fall electrofishing indicates poor age-0 production (natural or stocked) that year.

Fall electrofishing CPH values of 50 or more on natural lakes generally produce significantly higher age-1 CPH and stock-length gill-net CPUE than documented on Lake Mitchell and other large impoundments like Richmond and Mina. Potential explanations include poorly understood productivity differences, differences in species composition and interactions and movement of fish over spillways during high water events.

**Table 7.** Catch per unit effort by length category for walleye sampled with gill nets in Lake Mitchell, Davison County, July 8-10, 2013.

<b>Substock</b> <i>&lt;25cm, 10 in</i>	<b>Stock</b> <i>25 cm, 10 in</i>	<b>S-Q</b> <i>25-38 cm, 10-15 in</i>	<b>Q-P</b> <i>38-51 cm, 15-20 in</i>	<b>P+</b> <i>&gt;51 cm, 20 in</i>	<b>All Lengths</b>	<b>80% C.I.</b>
--	2.4	1.4	0.8	0.2	2.4	$\pm 1.6$

**Table 8.** CPUE, PSD, RSD-P, and mean Wr for all walleye sampled with gill nets in Lake Mitchell, Davison County, 1994-2003. Stocked years are shaded.

	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
<b>CPUE</b>	5.8	1.0	6.0	2.0	3.0	1.7	2.0	1.7	3.0	3.3
<b>PSD</b>	6	--	--	--	21	--	--	--	45	10
<b>RSD-P</b>	0	--	--	--	0	--	--	--	18	0
<b>Mean Wr</b>	92	--	86	--	82	--	90	--	90	85

**Table 9.** CPUE, PSD, RSD-P, and mean Wr for all walleye sampled with gill nets in Lake Mitchell, Davison County, 2004-2013. Stocked years are shaded.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>CPUE</b>	1.8	1.1	2.0	1.0	2.7	2.0	3.3	9.2	3.3	2.4
<b>PSD</b>	45	--	92	--	33	58	55	5	30	42
<b>RSD-P</b>	0	--	8	--	0	8	0	0	0	8
<b>Mean Wr</b>	85	--	89	--	85	86	83	82	86	87

**Table 10.** Walleyes stocked into Lake Mitchell, Davison County, 2004-2013.

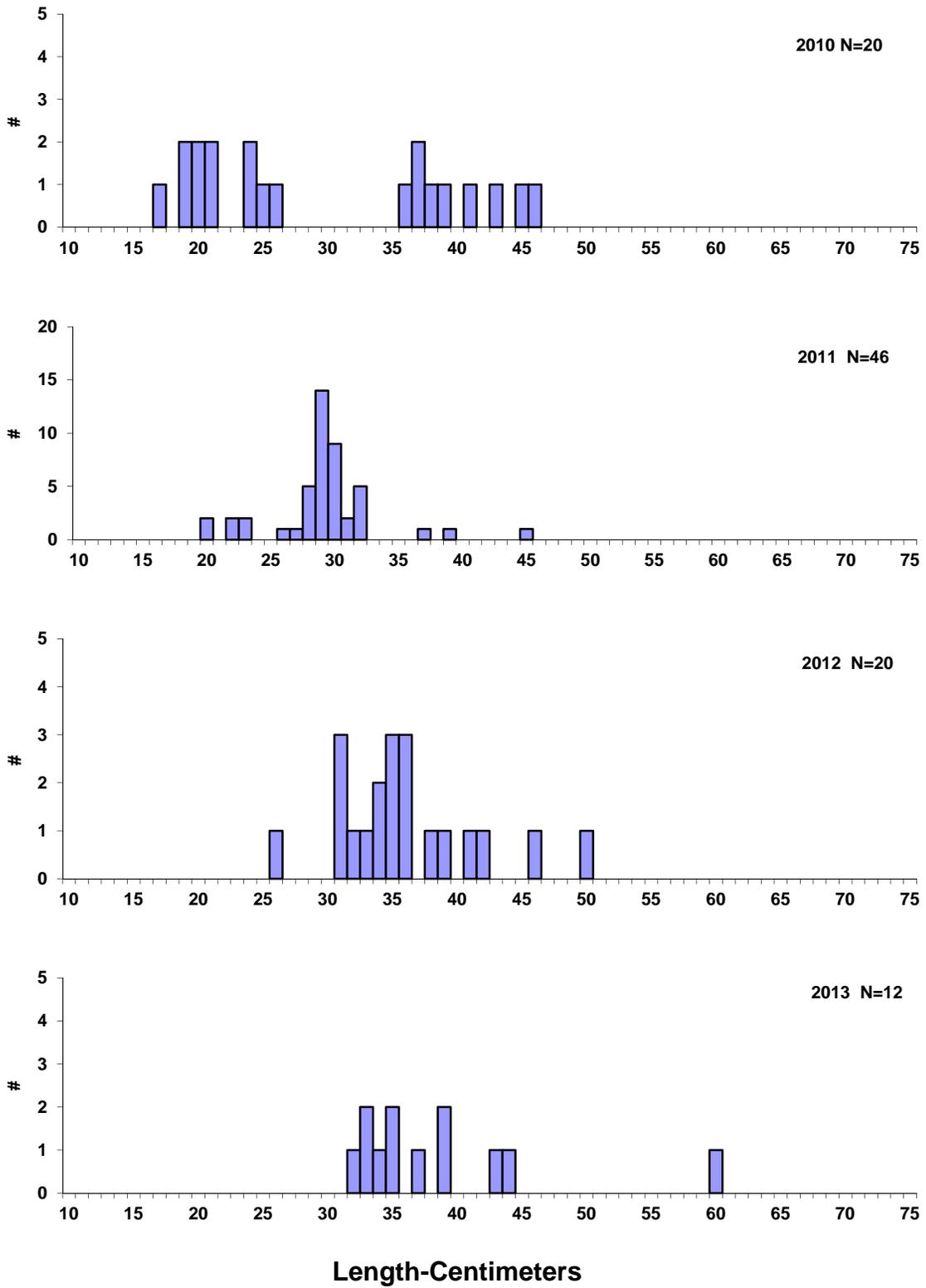
<b>Year</b>	<b>Number</b>	<b>Size</b>
1995	67,000	Small Fingerling
1997	134,000	Small Fingerling
1999	73,700	Small Fingerling
	13,850	Large Fingerling
2006	67,760	Small Fingerling
2007	5,192	Large Fingerling
2009	67,500	Small Fingerling
2012	67,340	Small Fingerling
2013	67,720	Small Fingerling

**Table 11.** Age-0 and age-1 walleyes sampled during 2 hours of nighttime electrofishing on Lake Mitchell, Davison County, 2000-2013.

<b>Year</b>	<b>Stocking</b>	<b>Age-0 CPH</b>	<b>% stocked</b>	<b>Mean length (range; mm)</b>	<b>Wr</b>	<b>Age-1 CPH</b>	<b>Mean length (range; mm)</b>	<b>Wr</b>
2013	fingerling	121	59	184 (158-213)	84	0		
2012	fingerling	1	100	186 (180-192)	93	2	280	91
2011	none	25		167 (141-210)	98	24	267 (239-310)	86
2010	none	50		185 (160-210)	83	18	283 (260-325)	84
2009	fingerling	37	59	183 (156-226)	91	1	250	91
2008	none	8		180 (156-211)	89	2	301 (287-305)	88
2001	none	73		187 (145-218)		2	267 (255-273)	
2000	none	21		173 (141-203)		23	230 (207-270)	

### Management Recommendation

- stock small walleye fingerlings the year after gill net CPUE of stock-length or longer fish falls to 2.0 or less and fall electrofishing indicates poor production of age-0 fish



**Figure 4.** Length frequency histograms for walleye sampled with gill nets in Lake Mitchell, Davison County, 2010-2013.

## **Black Crappie**

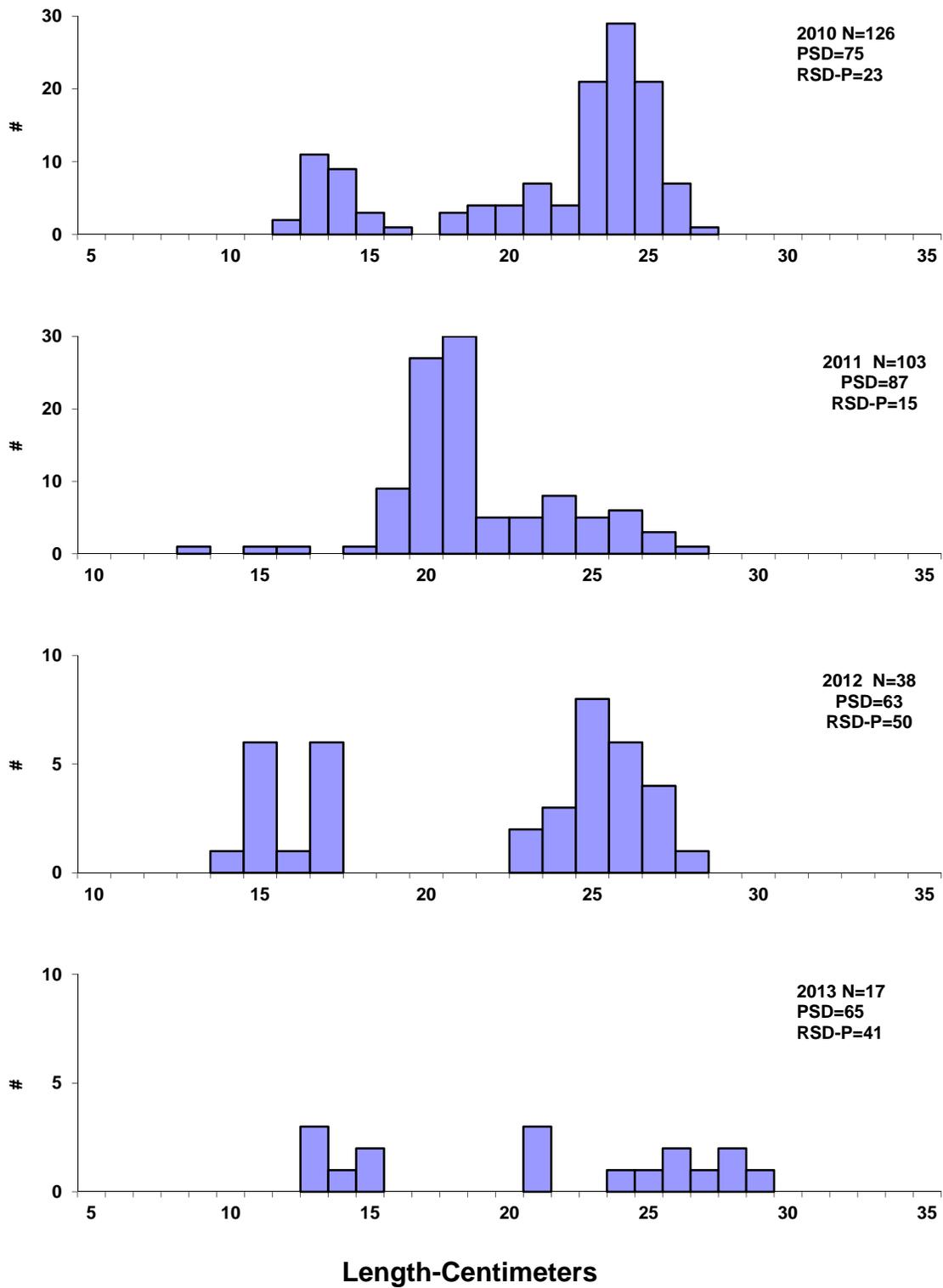
Although black crappie trap-net CPUE has been declining since 2010 (Table 12), the population contains 2-3 year classes and larger fish ranging in length from 24-29 cm (9.4-11.4 in) (Figure 3).

**Table 12.** CPUE, PSD, RSD-P, and mean *Wr* for all black crappie sampled with trap nets in Lake Mitchell, Davison County, 2004-2013.

	<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>2012</b>	<b>2013</b>
<b>CPUE</b>	5.4	3.8	49.5	9.3	1.6	2.2	10.5	8.6	3.8	1.4
<b>PSD</b>	95	77	3	50	59	86	75	87	63	65
<b>RSD-P</b>	27	60	0	2	3	7	23	15	50	41
<b>Mean <i>Wr</i></b>	102	110	113	109	105	110	99	104	105	106

**Table 13.** Catch per unit effort by length category for black crappie sampled with trap nets in Lake Mitchell, Davison County, July 8-10, 2013.

<b>Substock</b> <i>&lt;13cm, 5 in</i>	<b>Stock</b> <i>13 cm, 5 in</i>	<b>S-Q</b> <i>13-20 cm, 5-8 in</i>	<b>Q-P</b> <i>20-25 cm, 8-10 in</i>	<b>P+</b> <i>&gt;25 cm, 10 in</i>	<b>All Lengths</b>	<b>80% C.I.</b>
--	1.4	0.5	0.3	0.6	1.4	<u>±0.9</u>



**Figure 3.** Length frequency histograms for black crappie sampled with trap nets in Lake Mitchell, Davison County, 2010-2013.

## **Bluegill**

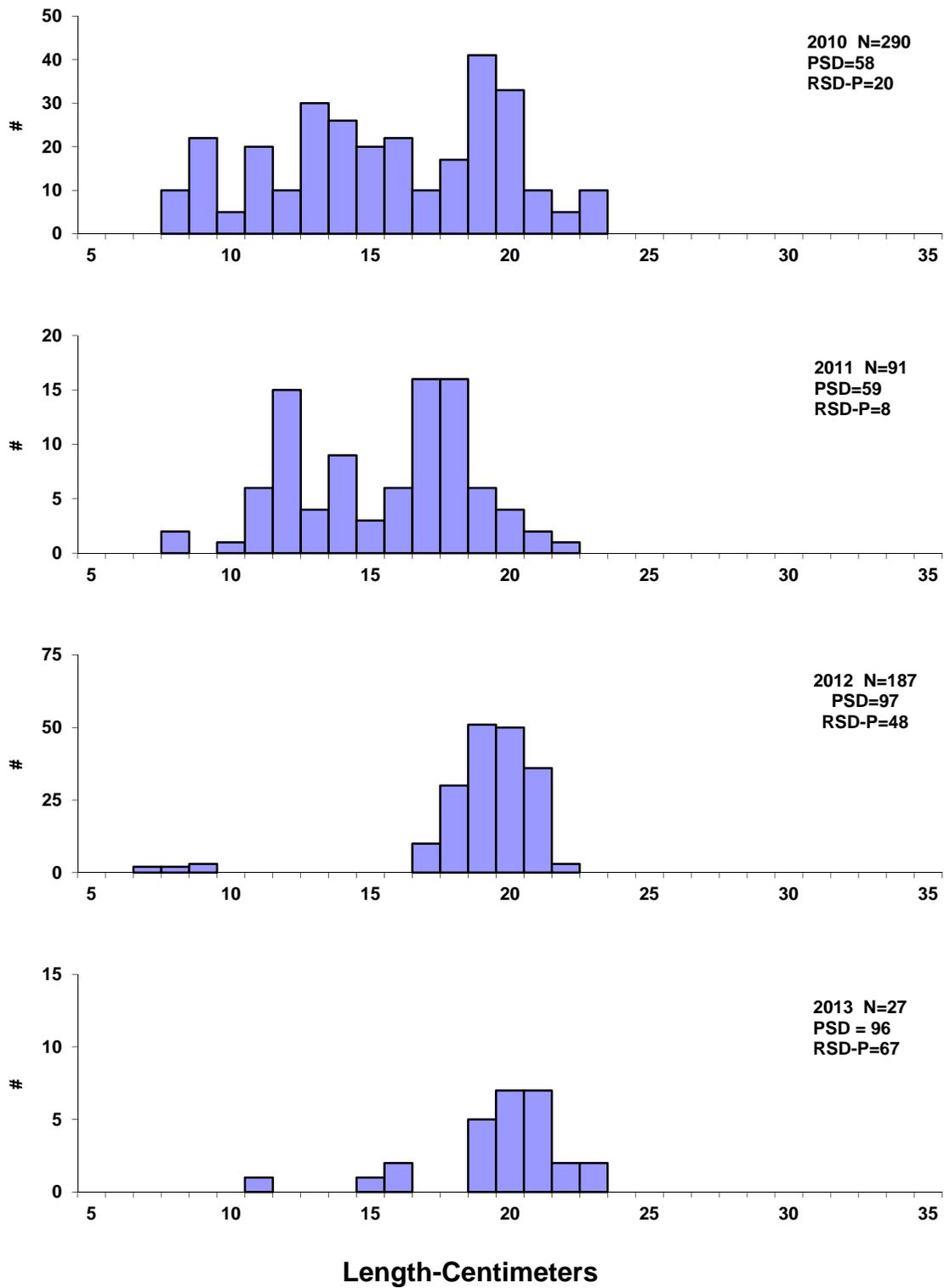
After a brief increase in 2012, bluegill trap-net CPUE fell again in 2013 (Table 14). The population contains several year classes with the largest fish ranging in length from 19-23 cm (7.5-9 in). Despite the low trap-net CPUE, anglers reported good bluegill fishing in 2013.

**Table 14.** CPUE, PSD, RSD-P, and mean Wr for all bluegill sampled with trap nets in Lake Mitchell, Davison County, 2004-2013.

	<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>2012</b>	<b>2013</b>
<b>CPUE</b>	6.4	19.8	53.4	39.2	17.2	4.3	24.2	7.6	18.7	2.3
<b>PSD</b>	76	52	56	87	86	84	58	59	97	96
<b>RSD-P</b>	66	39	9	29	61	71	40	32	91	85
<b>Mean Wr</b>	63	30	5	3	13	53	20	8	48	67

**Table 14.** Catch per unit effort by length category for bluegill sampled with trap nets in Lake Mitchell, Davison County, July 8-10, 2013.

<b>Substock</b> <i>&lt;8cm, 3 in</i>	<b>Stock</b> <i>8 cm, 3 in</i>	<b>S-Q</b> <i>8-15 cm, 3-6 in</i>	<b>Q-P</b> <i>15-20 cm, 6-8 in</i>	<b>P+</b> <i>&gt;20 cm, 8 in</i>	<b>All Lengths</b>	<b>80% C.I.</b>
--	2.3	0.1	0.7	1.5	2.3	+0.9



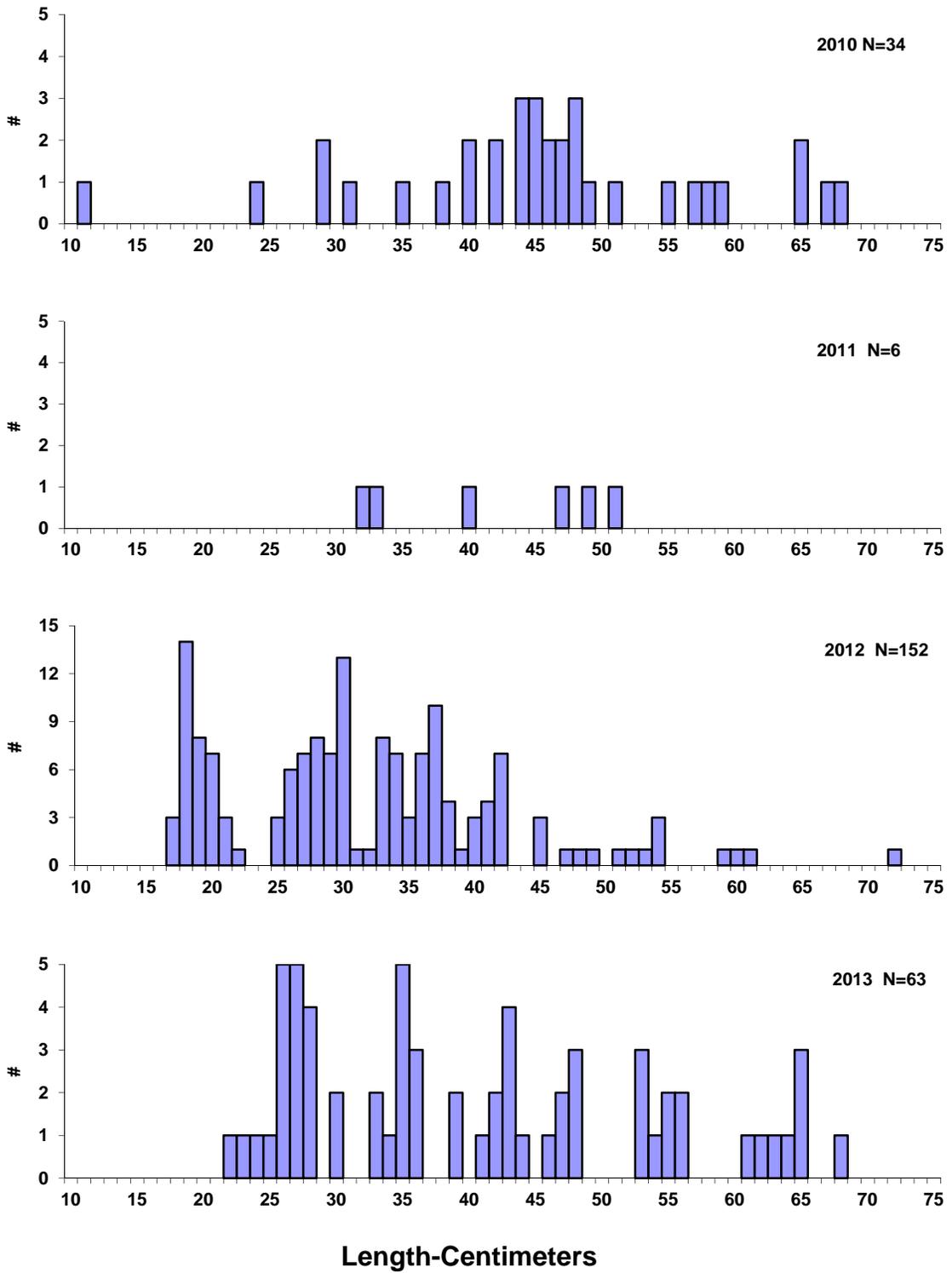
**Figure 4.** Length frequency histograms for bluegill sampled with trap nets in Lake Mitchell, Davison County, 2010-2013.

## **Channel Catfish**

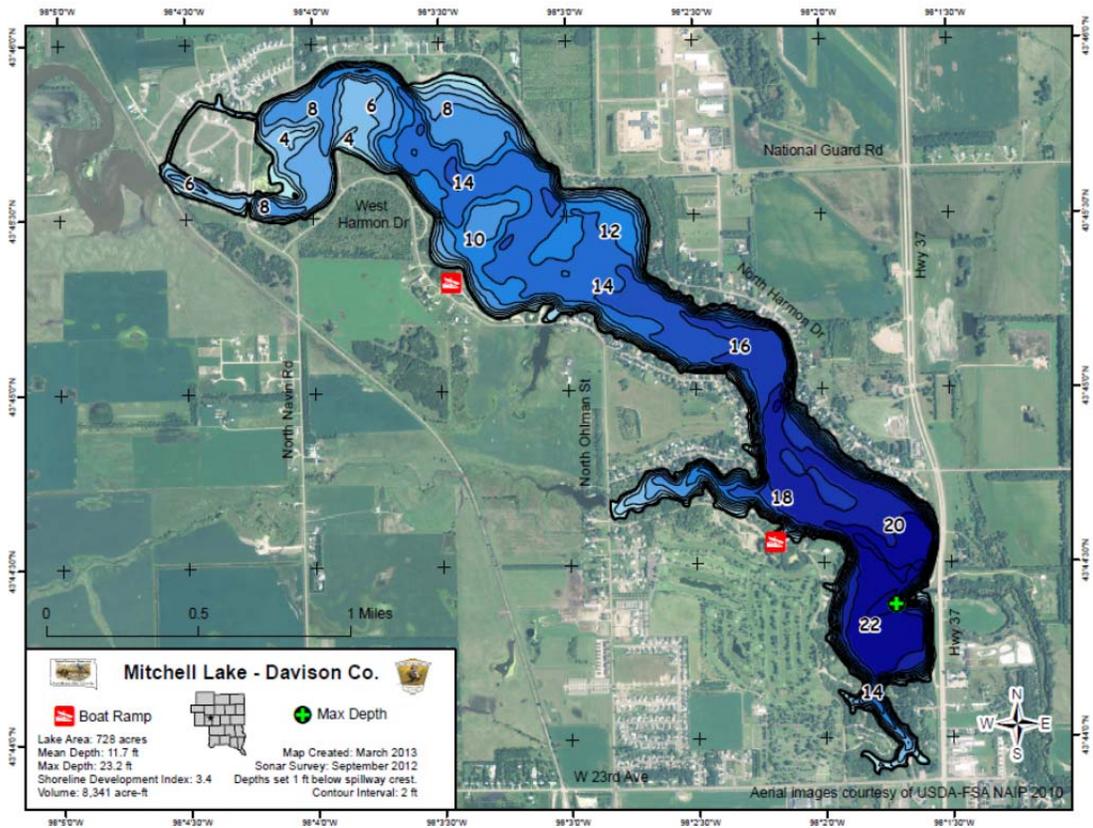
Lake Mitchell supports a fantastic catfish population containing multiple year classes of fish ranging in length from 22-68 cm (8.7-26.8 in) (Figure 5). This population is sustained entirely by natural reproduction and abundance has significantly increased the last two years (Table 16).

**Table 16.** Channel catfish gill-net CPUE, PSD, RSD-P, and mean *Wr* for Lake Mitchell, Davison County, 2004-2013.

	<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>2012</b>	<b>2013</b>
<b>CPUE</b>	3.3	5.3	4.3	6.0	2.7	4.2	5.7	1.2	25.3	12.6
<b>PSD</b>	80	86	85	93	73	64	78	--	27	61
<b>RSD-P</b>	5	2	8	0	20	12	13	--	2	16
<b>Mean <i>Wr</i></b>	94	90	102	89	87	103	91	--	97	89



**Figure 5.** Length frequency histograms for channel catfish sampled with gill nets in Lake Mitchell, Davison County, 2010-2013.



**Figure 6.** Contour map of Lake Mitchell, Davison 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).

<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.