South Buffalo Lake

Site Description

Location

Water designation number (WDN)	48-0034-00
Legal description	T125N-R53W-Sec.2,10,11,14, 15, 16,17
County (ies)	Marshall
Location from nearest town	6.0 miles east of Eden, SD

Survey Dates and Sampling Information

Survey dates	June 11-12, 2013 (FN,GN) June 18, 2013 (EF-LMB)
Spring electrofishing-LMB (min)	60
Frame net sets (n)	18
Gill net sets (n)	6

Morphometry (Figure 1)

Watershed area (acres)	16,000
Surface area (acres)	1,788
Maximum depth (ft)	14
Mean depth (ft)	8

Ownership and Public Access

South Buffalo Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. Two public access sites located on the northeast and southwest shorelines are present and both are maintained by the SDGFP (Figure 1; Figure 2). Lands adjacent to the lake have mixed ownership including State of South Dakota, Bureau of Indian Affairs, and private individuals.

Watershed and Land Use

The South Buffalo Lake watershed is primarily comprised of agricultural grazing land, with some cropland (Hanson 2007). The shoreline is heavily wooded with scattered lake cabins primarily along the northern shore.

Water Level Observations

The Water Management Board established Ordinary High Water Mark is 1835.4 fmsl and the outlet elevation of South Buffalo Lake is 1834.8 fmsl. On May 22, 2013 South Buffalo Lake was above the OHWM and outlet elevation at 1836.9 fmsl. On October 8, 2013 water levels had declined and the elevation was slightly below the OHWM, but remained above the outlet with an elevation of 1835.2 fmsl.

Fish Management Information

Primary species	Bluegill, Northern Pike, Walleye, Yellow Perch
Other species	Black Bullhead, Black Crappie, Common Carp, Emerald Shiner; Largemouth Bass, Golden Shiner, Orangespotted Sunfish, Smallmouth Bass, White Sucker
Lake-Specific regulations	none
Management classification	warm-water semi-permanent
Fish Consumption Advisories	none

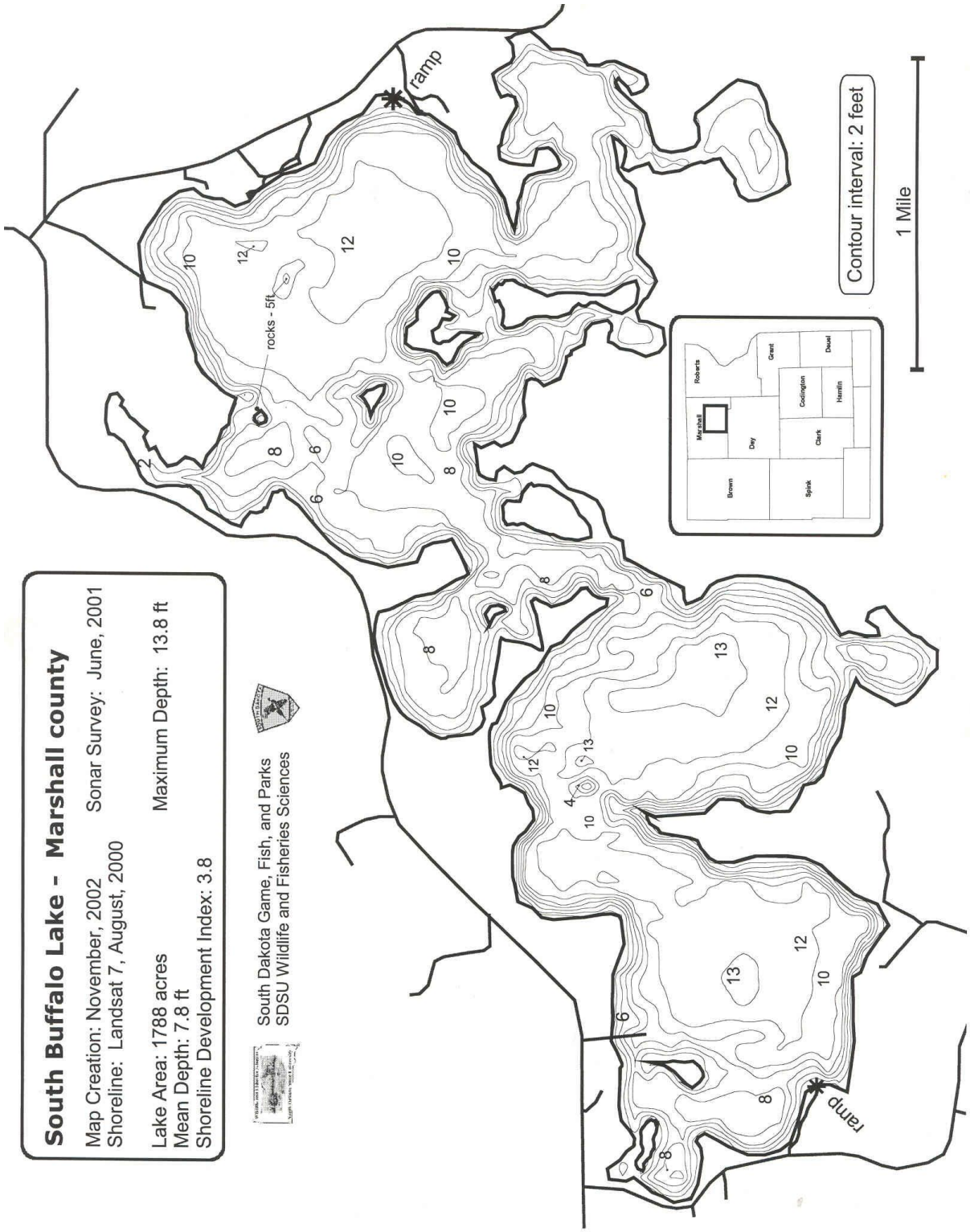

Figure 1. South Buffalo Lake depth contour map.

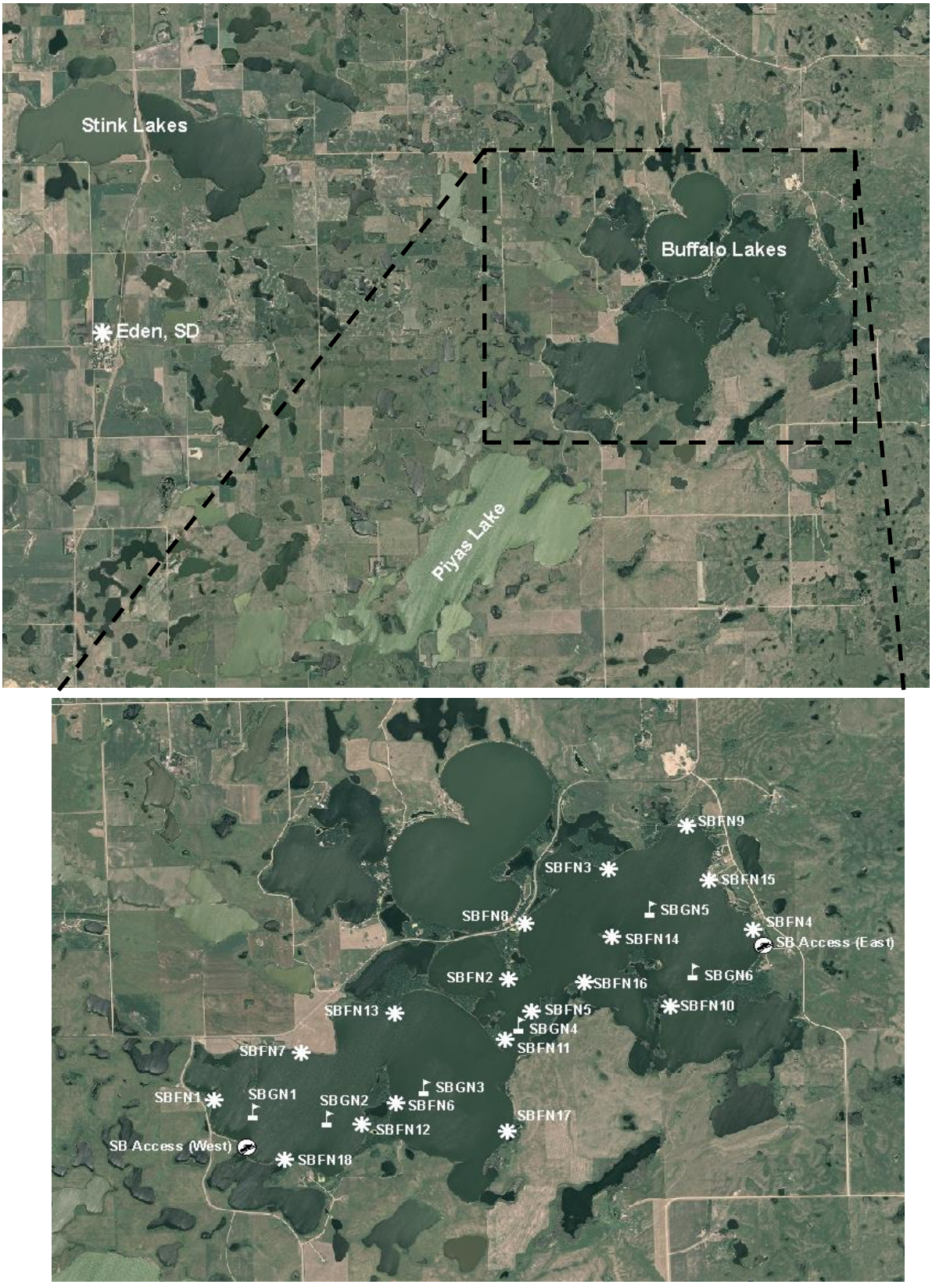

Figure 2. Map depicting geographic location of South Buffalo Lake from Eden, South Dakota (top). Also noted are access locations and standardized net locations for South Buffalo Lake (bottom). SBFN= frame nets, SBGN= gill nets

Management Objectives

1) Maintain a mean frame net CPUE of stock-length Bluegill ≥ 25, a PSD of 30-60, and a PSD-P of 5-10.

2) Maintain a mean gill net CPUE of stock-length Northern Pike ≥ 3, a PSD of 30-60, and a PSD-P of 5-10.

3) Maintain a mean gill net CPUE of stock-length Walleye ≥ 10, a PSD of 30-60, and a PSD-P of 5-10.

4) Maintain a mean gill net CPUE of stock-length Yellow Perch ≥ 30, a PSD of 30-60, and a PSD-P of 5-10.

5) Maintain a mean frame net CPUE of stock-length Black Bullhead ≤ 100.

Results and Discussion

South Buffalo Lake is a large, permanent, natural lake with complex morphometry (i.e., numerous basins, islands, and bays) located in Marshall County, South Dakota. The major inlet to South Buffalo Lake is located at the northeast corner of the lake. Other tributaries enter at the south and southeast. Water exiting South Buffalo Lake runs into North Buffalo and Almos Lakes, then through a chain of Coteau Lakes before eventually emptying into the James River.

Currently, South Buffalo Lake is primarily managed as a Bluegill, Northern Pike, Walleye and Yellow Perch fishery. Overall, as many as 13 species of fish have been sampled in South Buffalo Lake.

Primary Species

Bluegill: The mean frame net CPUE of stock-length Bluegill was 10.1 (Table 1) and below the minimum objective (≥ 25 stock-length Bluegill/net night; Table 3). Since 2001, mean frame net CPUE values have ranged from a low of 10.1 (2013) to a high of 255.6 (2007; Table 2). A substantial decrease in mean frame net CPUE has been observed since 2007 (Table 2). Currently, relative abundance is considered to be moderate.

Bluegill captured in frame nets ranged in TL from 14 to 27 cm (5.5 to 10.6 in; Figure 3). The PSD was 99 and the PSD-P was 64 (Table 1), both exceeded management objectives of 30-60 and 5-10 (Table 3) indicating a population comprised of larger (i.e., ≥15 cm; 6 in) individuals (Figure 3).

Based on age estimates made using otoliths, Bluegills in South Buffalo Lake tend to exhibit relatively-consistent recruitment of varying magnitude (Table 4). In 2013, seven consecutive year classes were represented in the frame net catch (Table 4).

Cohorts produced in 2007 and 2008 were the most abundant and collectively comprised 70% of Bluegill in the sample (Table 4).

Bluegills in South Buffalo Lake typically attain quality-length (15 cm; 6 in) by age 4 (Table 5). Since 2007, the weighted mean TL at capture of age-4 Bluegill has ranged from 153 to 181mm (6.0 to 7.1 in) with the highest values reported in the most recent surveys (i.e., 2011 and 2013; Table 5). Mean Wr values of Bluegill in the 2013 frame net catch exceeded 110 for all length categories (e.g., stock to quality) sampled. The mean Wr of stock-length fish was 117 (Table 1) and no length-related trends in condition were apparent. Mean Wr values were likely influenced by seasonal sampling bias (i.e., spawning behavior).

Northern Pike: The mean gill net CPUE of stock-length Northern Pike was 14.8 (Table 1) and above the minimum objective (≥ 3 stock-length Northern Pike/net; Table 3). Since 2001, mean gill net CPUE values have ranged from a low of 2.8 (2001) to a high of 14.8 (2013; Table 2). Currently, relative abundance is high.

Northern Pike sampled in gill nets ranged in TL from 30 to 86 cm (11.8 to 33.9 in; Figure 4). The PSD and PSD-P of 48 and 4 were within management objectives and indicated a relatively balanced population (defined as a PSD of 30-60 and a PSD-P of 5-10; Table 1; Table 3; Figure 4).

No age or growth information was collected. The condition of gill net captured Northern Pike was similar to that of Northern Pike captured from other northeast South Dakota glacial lakes (e.g., Cattail/Kettle and Roy Lakes). Northern Pike in the stock-quality and quality-preferred length categories, which dominated the sample, had mean Wr values of 84 and 83, respectively.

Walleye: The mean gill net CPUE of stock-length Walleye was 3.0 (Table 1) and below the minimum objective (≥ 10 stock-length Walleye/net night; Table 3). Since 2001, the mean gill net CPUE has fluctuated from a low of 0.8 (2009) to a high of 10.5 (2002; Table 2). Based on the 2013 gill net CPUE, relative abundance is considered low.

Gill nets captured 18 Walleye that ranged in TL from 26 to 67 cm (10.2 to 26.4 in; Figure 3). Age estimates made using otoliths revealed the presence of four consecutive year classes (2008-2011), each represented by few individuals (Table 6). Recruitment of both stocked and naturally-produced Walleye has been limited (Table 6; Table 8). Small fingerlings stocked in 2008, 2010, and 2012 were marked with Oxytetracycline (OTC) so that the contribution of stocked fish could be evaluated; each stocking produced a substantial year class (i.e., mean fall night electrofishing CPUE values for age-0 Walleye that ranged from 61.0 to 130.9; Table 6; Table 8). Unfortunately, as mentioned earlier, few individuals from these stocked cohorts have recruited to the population.

Few inferences can be made concerning size structure, growth, and condition of stock-length Walleye due to low sample size (Table 1; Table 5).

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 26.0 (Table 1) and below the minimum objective (≥ 30 stock-length Yellow Perch/net night). Since 2001, mean gill net CPUE values have ranged from 4.7 (2004) to 57.0 (2002; Table 2). Based on the 2013 gill net catch, relative abundance appears to be moderate.

Gill net captured Yellow Perch ranged in TL from 13 to 21 cm (5.1 to 8.3 in) had a PSD of 10 and PSD-P of 0 (Table 1; Figure 6). The PSD and PSD-P were below the management objectives of 30-60 and 5-10 (Table 3) and indicated a population comprised of smaller (i.e., < 20 cm; 8 in) individuals (Table 3; Figure 6).

Otoliths collected from a sub-sample of gill net captured Yellow Perch revealed the presence of five year classes (2005 and 2007-2010; Table 9). Year classes produced in 2008 and 2009 were the most abundant and comprised 96% of Yellow Perch sampled (Table 9). No fish from the 2011 cohort (age 2) were sampled, likely indicating a weak or missing year class (Table 9). In each of the two previous surveys, few Yellow Perch older than age 4 were captured (Table 10). In 2013, a high proportion (58%) exceeded age 4 as individuals from the relatively-strong 2008 cohort survived to age 5 (Table 10).

Yellow Perch in South Buffalo Lake exhibit slow growth. In 2013, the weighted mean TL at capture for age-4 and age-5 male Yellow Perch was 145 and 159 mm (5.7 and 6.3 in); while the weighted mean TL at capture of age-4 and age-5 females was 166 and 186 mm (6.5 and 7.3 in; Table 10). A slight decreasing trend in condition was apparent as TL increased; however, mean Wr values exceeded 90 for all cm-length groups (e.g., 13 cm) sampled.

Other Species

Black bullhead: From 2001-2011, Black Bullhead relative abundance was generally considered moderate to high, with mean frame net CPUE values that ranged from a low of 17.9 (2009) to a high of 121.9 (2004; Table 2). The 2013 mean frame net CPUE of stock-length Black Bullheads of 14.1(Table 1) was the lowest recorded since 2001(Table 2) and within the management objective (≤ 100 stock-length Black Bullhead/net night; Table 3).

Black Bullheads in the frame net catch ranged in TL from 15 to 35 cm (5.9 to 13.8 in), had a PSD of 92, and a PSD-P of 17 (Table 1; Figure 7). Length-frequency analysis indicates that recruitment has been limited in recent years as few individuals less than quality length (23 cm; 9 in) were present in the frame net catch (Figure 7). No growth information was collected during 2013. Mean Wr values ranged from 81 to 96 for all length categories (e.g., stock to quality) sampled. The mean Wr for stock-length Black Bullheads was 95 (Table 1).

Black Crappie: The mean frame net CPUE of stock-length Black Crappie was 5.2 (Table 1). The 2013 frame net CPUE represented an increase from the 2011 CPUE of 1.2 and was the second highest recorded since 2001 (Table 2). Although not abundant Black Crappie have consistently been sampled in South Buffalo Lake.

Black Crappie in the 2013 frame net catch ranged in TL from 19 to 34 cm (7.5 to 13.4 in), had a PSD of 99 and a PSD-P of 83 (Table 1; Figure 8). Length-frequency

analysis suggested inconsistent recruitment, which is common in eastern South Dakota natural lakes (Guy and Willis 1995), with few individuals < quality-length (20 cm; 8 in) being sampled (Figure 8).

No age or growth information was collected. Although sample sizes were low for some cm-length groups, a decreasing trend in Black Crappie condition was apparent as TL increased. Black Crappie in the preferred-memorable length category, which comprised a high proportion (74%) of the sample, had a mean Wr of 98.

Largemouth Bass: Largemouth bass populations are assessed using night electrofishing conducted during mid- to late-June when water temperatures are approximately 65°F in northeastern South Dakota. Largemouth Bass have been sampled on two occasions (2006 and 2013) at South Buffalo Lake. In 2013, the spring night electrofishing mean CPUE of stock-length Largemouth Bass was 33.0 (Table 1), which represented an increase from the 2006 CPUE of 18.9 (Table 2).

Largemouth Bass sampled by spring night electrofishing ranged in TL from 20 to 48 cm (7.9 to 18.9 in), had a PSD of 48, and a PSD-P of 24 (Table 1; Figure 9). Scales collected from Largemouth Bass captured during spring night electrofishing suggested relatively-consistent recruitment, with seven years classes (2003-2005, 2007, and 2009-2011) being represented (Table 11). The magnitude of individual year classes was low (Table 11). The 2010 and 2011 cohorts were the most abundant and comprised 70% of Largemouth Bass in the electrofishing catch (Table 11).

In 2013, the mean back-calculated length at age-3 was 312 mm (12.3 in) and exceeded region IV and statewide mean of means of 266 mm and 250 mm (10.5 and 9.8 in), respectively (Willis et al. 2001; Table 11). Condition of Largemouth Bass in the electrofishing catch was high with mean Wr values that exceeded 100 for all cm-length groups sampled. A slight increasing trend in condition was apparent as TL increased. Spawning activity may have influenced Wr values.

Other: Emerald Shiner, Smallmouth Bass, and White Sucker were other fish species captured in low numbers during the 2013 survey (Table 1).

Management Recommendations

1) Conduct fish population assessment surveys on a biennial basis (next survey scheduled in summer 2015) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

2) Conduct spring electrofishing biennially (2015) to monitor the Largemouth Bass population in South Buffalo Lake.

3) Collect otoliths from Bluegill, Walleye, And Yellow Perch; scales from Largemouth Bass to assess age structure and growth rates of the population.

4) Stock Walleye (≈100 small fingerlings/acre) on a biennial basis to establish additional year classes.

Table 1. Mean catch rate (CPUE; gill/frame net = catch/net night, electrofishing = catch/hour) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) of stock-length fish for various fish species captured in frame nets, experimental gill nets, and electrofishing in South Buffalo Lake, 2013. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; EMS= Emerald Shiner; LMB= Largemouth Bass; NOP= Northern Pike; SMB= Smallmouth Bass; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Frame nets								
BLB	14.1	4.4	92	3	17	4	95	<1
BLC	5.2	1.9	99	2	83	6	99	1
BLG	10.1	3.7	99	1	64	6	117	<1
NOP	0.2	0.1	50	50	0	---	79	10
SMB	0.1	0.1	100	---	100	---	105	---
WAE	0.2	0.2	0	---	0	---	86	10
YEP	0.9	0.7	25	20	0	---	90	<1
Gill nets								
BLB	41.0	10.1	53	5	7	3	88	<1
BLC	0.5	0.3	100	0	67	67	98	8
BLG	0.8	0.7	100	0	60	52	107	11
EMS[1]	0.2	0.2	---	---	---	---	---	---
NOP	14.8	2.0	48	9	4	4	84	1
WAE	3.0	0.5	17	16	6	10	88	3
WHS	4.8	1.7	100	0	97	6	107	2
YEP	26.0	6.2	10	4	0	---	101	<1
Electrofishing								
LMB	33.0	12.7	48	15	24	13	111	2

[1] All fish sizes.
[2] Spring Electrofishing-LMB.

Table 2. Historic mean catch rate (CPUE; gill/frame nets= catch/net night, electrofishing= catch/hour) of stock-length fish for various fish species captured by frame nets, experimental gill nets and electrofishing in South Buffalo Lake, 2001-2013. BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; COC= Common Carp; EMS= Emerald Shiner; GOS= Golden Shiner; LMB= Largemouth Bass; NOP= Northern Pike; OSF= Orangespotted Sunfish; SMB= Smallmouth Bass; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

	CPUE									
Species	2001	2002	2003	2004	2005	2006[1]	2007[1]	2009	2011	2013
Frame nets										
BLB	103.4	112.9	18.4	121.9	45.7	---	21.2	17.9	22.0	14.1
BLC	2.0	1.7	2.4	2.4	0.5	---	6.1	0.5	1.2	5.2
BLG	19.1	40.9	47.5	44.0	19.3	---	255.6	73.7	14.9	10.1
COC	0.0	0.2	0.2	0.2	0.2	---	0.1	0.1	0.1	0.0
LMB	0.0	0.0	0.1	0.0	0.0	---	0.1	0.0	0.0	0.0
NOP	0.7	0.2	2.2	0.8	0.4	---	0.9	0.4	0.4	0.2
OSF[2]	0.0	0.0	0.0	0.0	0.0	---	0.0	0.1	0.0	0.0
SMB	0.0	0.0	0.2	0.0	0.0	---	0.2	0.2	0.1	0.1
WAE	0.3	0.3	0.4	0.4	0.1	---	0.1	0.1	0.1	0.2
WHS	0.1	0.1	0.6	0.3	0.1	---	0.2	0.6	0.0	0.0
YEP	1.4	8.1	0.4	0.1	0.2	---	16.7	8.4	8.7	0.9
Gill nets										
BLB	97.5	61.3	39.8	126.7	0.7	0.8	7.8	0.7	9.2	41.0
BLC	0.3	0.5	2.8	1.0	0.5	0.7	6.7	0.0	0.7	0.5
BLG	0.2	0.2	0.2	0.2	0.0	3.7	2.8	0.0	1.0	0.8
EMS[2]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
GOS[2]	0.0	0.0	0.5	0.0	0.0	0.0	0.2	0.0	1.3	0.0
LMB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
NOP	2.8	8.7	12.8	3.5	3.0	8.5	14.2	3.5	9.7	14.8
SMB	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WAE	6.2	10.5	7.2	7.2	1.2	3.5	4.5	0.8	2.2	3.0
WHS	7.8	9.7	5.2	6.8	5.2	4.7	4.3	4.0	5.5	4.8
YEP	28.7	57.0	18.3	4.7	13.3	47.7	47.3	40.3	44.7	26.0
Electrofishing										
LMB[3]	---	---	---	---	---	18.9	---	---	---	33.0

[1]Monofilament gill net mesh size (0.75”, 1.00”, 1.25”, 1.50”, 2.00” and 2.50”)
[2] All fish sizes.
[3] Spring night electrofishing.

Table 3. Mean catch rate (CPUE; gill/frame nets= catch/net night), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and relative weight (Wr) for selected species captured in frame nets and experimental gill nets from South Buffalo Lake, 2001-2013. BLB= Black Bullhead; BLG= Bluegill; LMB= Largemouth Bass; NOP= Northern Pike; WAE= Walleye; YEP= Yellow Perch

Species	2001	2002	2003	2004	2005	2006[1]	2007[1]	2009	2011	2013	Objective
Frame nets											
BLB											
CPUE	103	113	18	122	46	---	21	18	22	14	≤ 100
PSD	87	76	63	64	36	---	52	95	85	92	---
PSD-P	2	17	7	11	14	---	15	31	63	17	---
Wr	94	81	81	80	84	---	98	83	88	95	---
BLG											
CPUE	19	41	48	44	19	---	256	74	15	10	≥ 25
PSD	76	78	86	82	14	---	40	28	71	99	30-60
PSD-P	43	13	19	42	9	---	6	11	6	64	5-10
Wr	116	113	110	123	112	---	119	104	116	117	---
Gill nets											
NOP											
CPUE	3	9	13	4	3	9	14	4	10	15	≥ 3
PSD	29	56	29	43	22	53	48	81	69	48	30-60
PSD-P	12	0	3	5	0	2	7	10	14	4	5-10
Wr	84	86	84	81	85	94	92	88	91	84	---
WAE											
CPUE	6	11	7	7	1	4	5	1	2	3	≥ 10
PSD	14	35	53	63	43	90	59	100	54	17	30-60
PSD-P	3	3	9	21	0	33	30	0	23	6	5 – 10
Wr	91	93	90	90	98	98	100	99	92	88	---
YEP											
CPUE	29	57	18	5	13	48	47	40	45	26	≥ 30
PSD	7	14	6	18	5	2	2	0	2	10	30-60
PSD-P	0	0	1	0	0	0	0	0	0	0	5-10
Wr	101	93	92	104	104	108	101	95	93	101	---

[1] Monofilament gill net mesh size (0.75”, 1.00”, 1.25”, 1.50”, 2.00” and 2.50”)

Table 4. Year class distribution based on expanded age/length summary for Bluegill sampled in frame nets from South Buffalo Lake, 2007-2013.

	Year Class														
Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
2013				25	20	79	49	1	2	6					
2011[1]	---	---				80	130	42	7	5		1		1	1
2009	---	---	---	---		31	174	650	295	84	29		48	38	7
2007[1]	---	---	---	---	---	---			71	2223	1748	338	16	48	110

[1] Older bluegill were sampled, but are not reported in this table.

Table 5. Weighted mean total length (mm) at capture for age-2 through age-10 Bluegill captured in frame nets (expanded sample size) from South Buffalo Lake, 2007-2013.

	Age								
Year	2	3	4	5	6	7	8	9	10
2013	---	166(25)	181(20)	203(79)	216(49)	230(1)	257(2)	233(6)	---
2011[1]	---	133(80)	169(130)	181(42)	180(7)	213(5)	---	259(1)	---
2009	92(174)	119(650)	153(295)	182(84)	223(29)	---	250(48)	257(38)	260(7)
2007[1]	84(71)	117(2223)	153(1748)	179(338)	223(16)	227(48)	240(110)	257(67)	248(36)

[1] Older bluegill were sampled, but are not reported in this table.

Table 6. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1000) from South Buffalo Lake, 2009-2013.

	Year Class												
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2013[1]			5	10	1	1							
2011[1]		---	---		7	5			4				
2009		---	---	---		2			2	1			2
# stocked													
fry								2200					
sm. fingerling		214[2]		220[3]		221[4]			437		220		
lg. fingerling													

[1] Older walleye were sampled, but are not reported in this table.

[2] 29% of stocked Walleye were OTC marked; 10 of 40 otoliths (20%) collected from fall electrofished age-0 Walleye (mean catch/hour = 61.0) exhibited marks. Chi-Square analysis indicated no significant difference in the proportion observed verses the proportion stocked (p-value=0.161); concluded that 2012 year class was largely produced by stocking.

[3] Stocked Walleye were OTC marked; 50 of 50 otoliths collected from fall electrofished age-0 Walleye (mean catch/hour = 130.9) exhibited marks for an estimated stocking contribution of 100%

[4] 77% of stocked Walleye were OTC marked; 34 of 50 otoliths (68%) collected from fall electrofished age-0 Walleye (mean catch/hour = 81.3) exhibited marks. Chi-Square analysis indicated no significant difference in the proportion observed verses the proportion stocked (p-value=0.130); concluded that 2008 year class was largely produced by stocking.

Table 7. Weighted mean total length at capture (mm) for Walleye age-1 through age-10 captured in experimental gill net sets (expanded sample size) from South Buffalo Lake, 2005-2013. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

	Age									
Year	1	2	3	4	5	6	7	8	9	10
2013[1]	---	276(5)	313(10)	461(1)	451(1)	---	---	---	---	---
2011[1]	---	254(7)	377(5)	---	---	521(4)	---	---	---	---
2009	161 (2)	---	---	407 (2)	458 (1)	---	---	499 (2)	---	---
2007[1]	---	256 (22)	380 (1)	489 (2)	---	488 (6)	478 (1)	545 (1)	545 (3)	675 (1)
2006[1]	181 (3)	---	390 (5)	---	452 (6)	517 (5)	---	---	593 (4)	---
2005	---	238 (1)	---	372 (3)	---	---	---	---	---	---

[1] Older walleye were sampled, but are not reported in this table.

Table 8. Stocking history including size and number for fishes stocked into South Buffalo Lake, 2001-2013. (WAE= Walleye; LMB= Largemouth Bass)

Year	Species	Size	Number
2003	WAE	small fingerling	220,430
2005	WAE	small fingerling	437,300
2006	WAE	fry	2,200,000
2006	LMB	fingerlings	100,320
2008	WAE	small fingerling	220,560
2010	WAE	small fingerling	220,060
2012	WAE	small fingerling	213,730

Table 9. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from South Buffalo Lake, 2009-2013.

	Year Class									
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
2013				2	64	87	3		1	
2011	---	---			239	264	82	2	2	
2009	---	---	---	---		244	608	98	17	6

Table 10. Weighted mean total length (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from South Buffalo Lake, 2009-2013.

	Age							
Year	1	2	3	4	5	6	7	8
2013								
Male	---	---	---	145 (21)	159 (28)	---	---	---
Female	---	---	154 (2)	166 (42)	186 (59)	194 (4)	---	209 (1)
Combined	---	---	154 (2)	159 (64)	178 (87)	194 (3)	---	209 (1)
2011								
Male	---	99 (64)	121 (71)	148 (13)	---	---	---	---
Female	---	101 (179)	142 (210)	162 (36)	188 (2)	201 (2)	---	---
Combined	---	101 (239)	134 (264)	154 (82)	188 (2)	201 (2)	---	---
2009								
Male	92 (68)	113 (227)	146 (14)	152 (2)	---	---	---	---
Female	91 (168)	119 (367)	148 (94)	163 (16)	140 (10)	---	---	---
Combined	92 (244)	117 (608)	148 (98)	162 (17)	140 (6)	---	---	---

Table 11. Mean back-calculated length (mm) at age and standard error (SE) for Largemouth Bass captured during spring night electrofishing in South Buffalo Lake, 2013.

			Age									
Year	Age	N	1	2	3	4	5	6	7	8	9	10
2011	2	16	122	239								
2010	3	7	117	237	320							
2009	4	2	105	236	306	356						
2008	5	0										
2007	6	3	123	221	308	362	392	415				
2006	7	0										
2005	8	1	127	254	313	372	411	433	442	451		
2004	9	3	97	202	311	365	396	426	447	460	474	
2003	10	1	77	98	312	351	388	412	440	456	468	478
Mean		33	110	227	312	361	397	421	443	456	471	478
SE			7	8	2	4	5	5	2	3	3	---
Mean Comparison [1]												
Small lakes/impoundments			99	183	246	299	332	---	---	---	---	---
Large lakes/impoundments			89	178	256	316	359	---	---	---	---	---
Region IV			80	180	266	325	356	---	---	---	---	---
Statewide			96	182	250	305	342	---	---	---	---	---

[1] Willis et al. 2001.

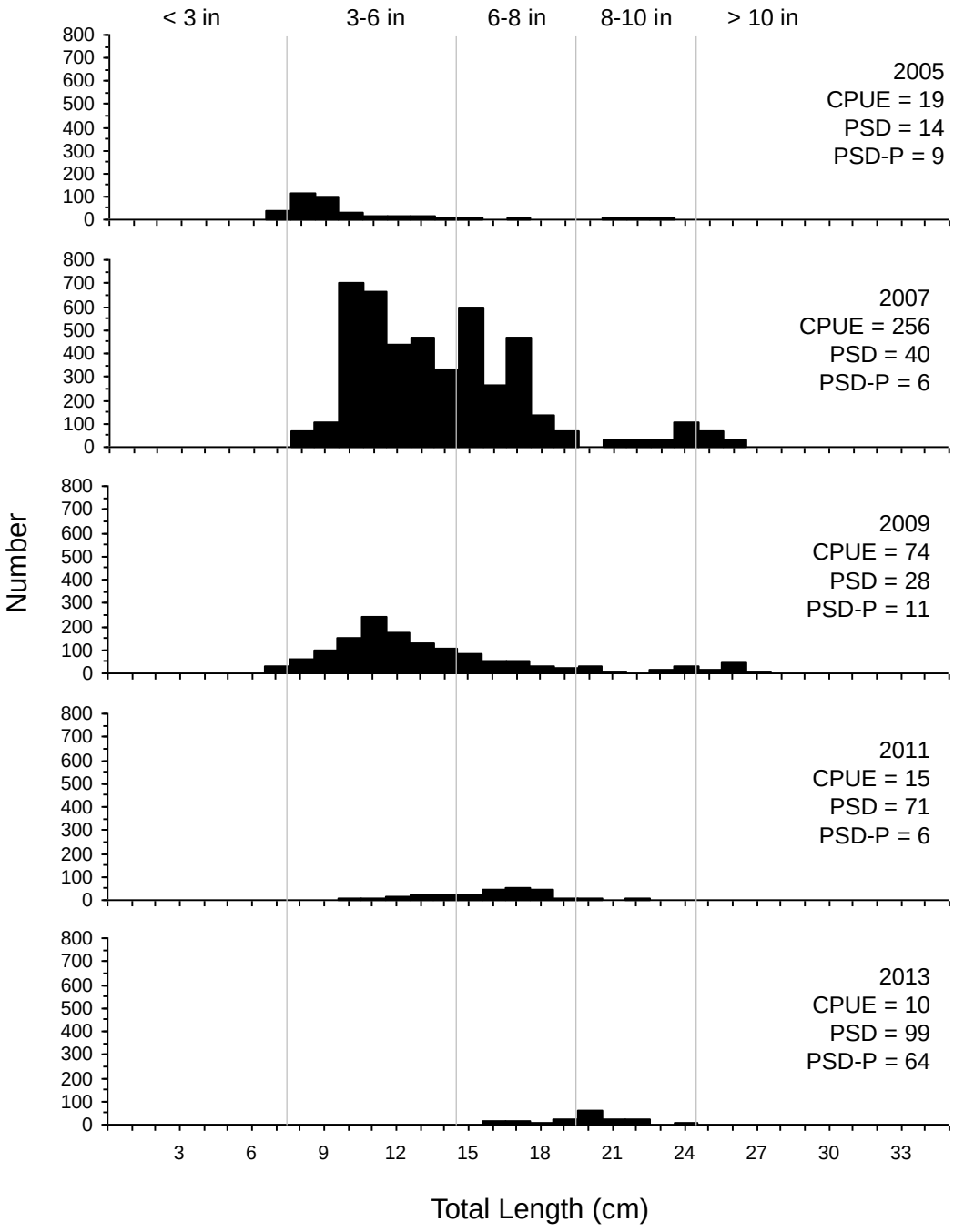

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Bluegill captured using frame nets in South Buffalo Lake, 2005-2013.

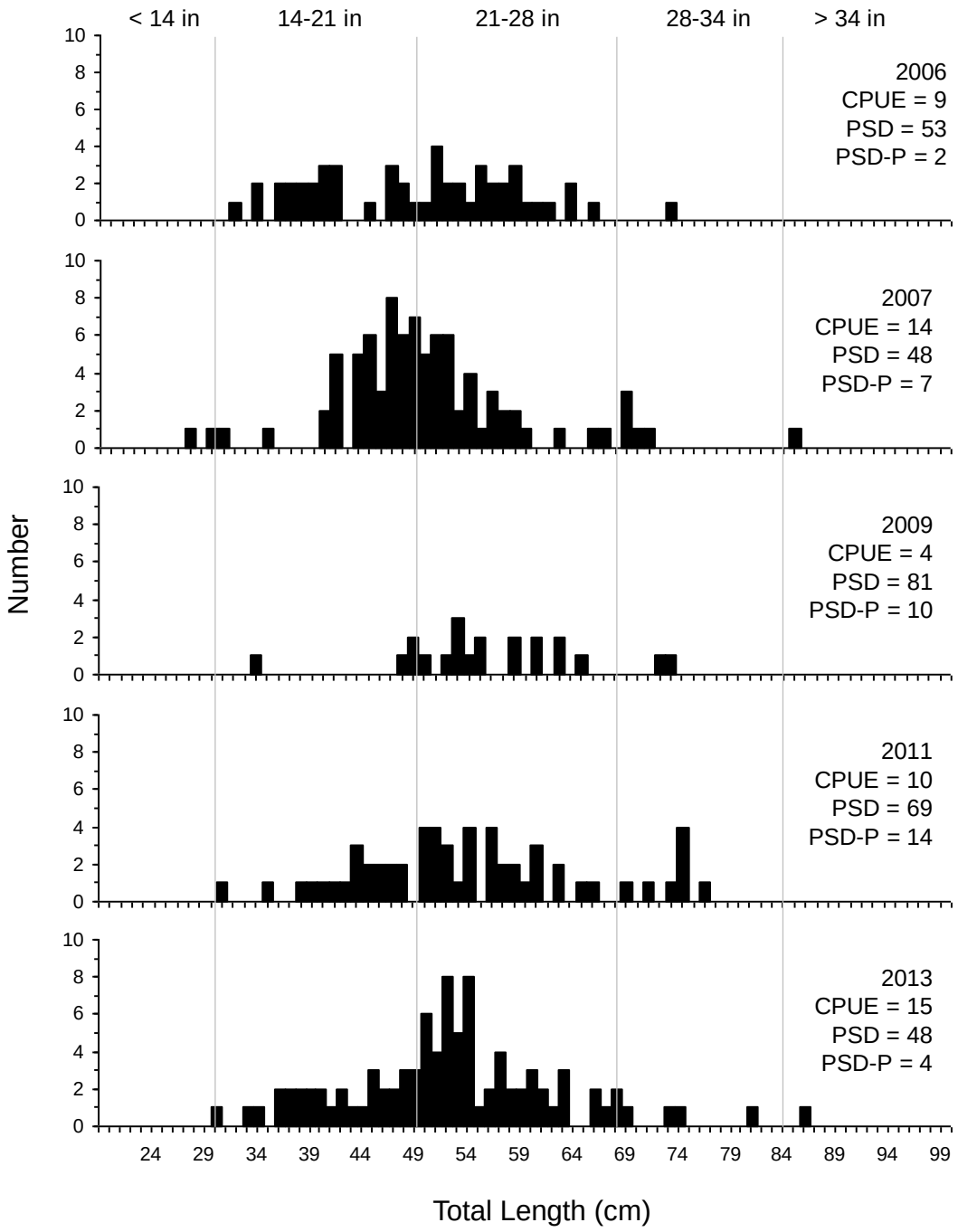

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Northern Pike captured using gill nets in South Buffalo Lake, 2006-2013.

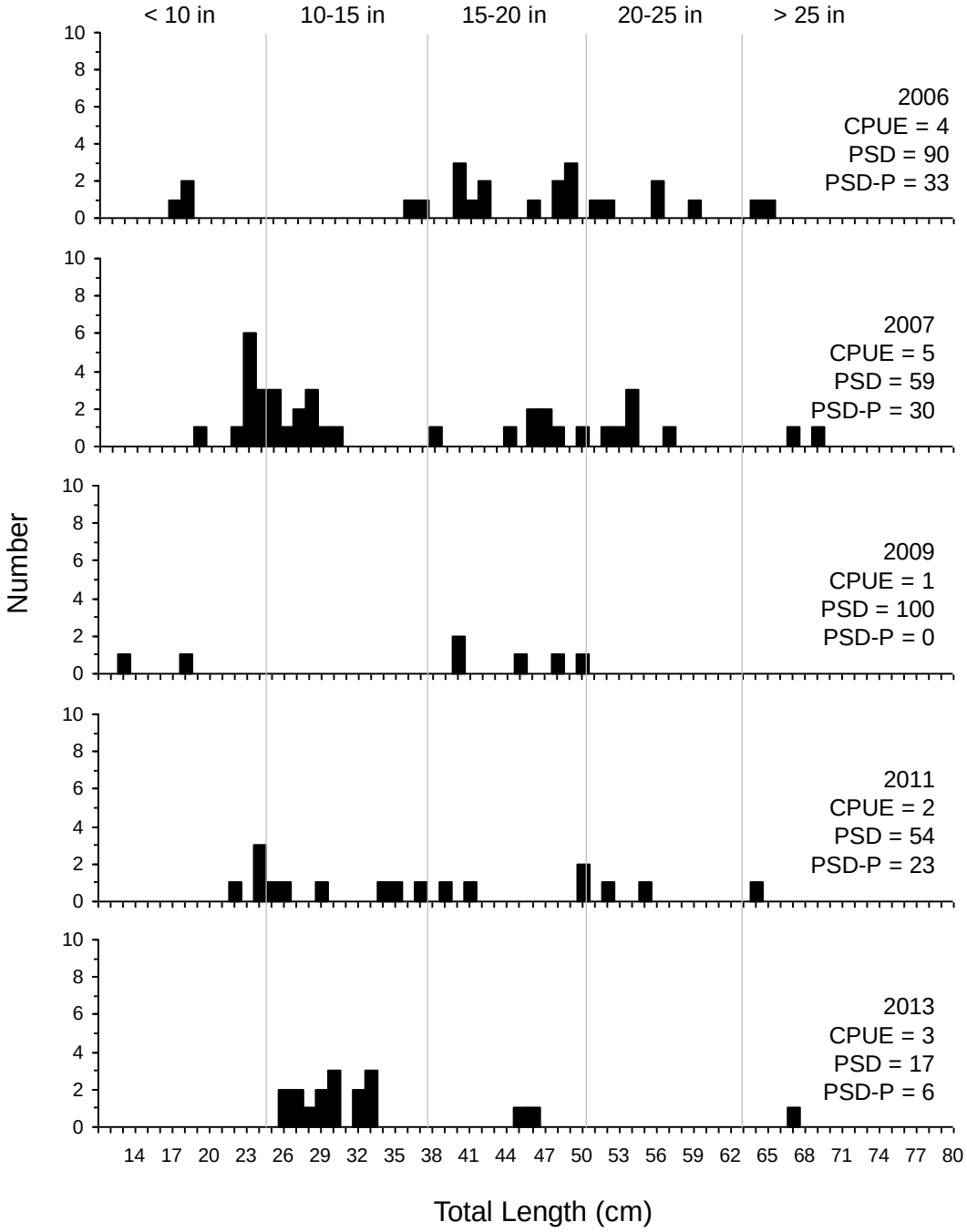

Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using gill nets in South Buffalo Lake, 2006-2013.

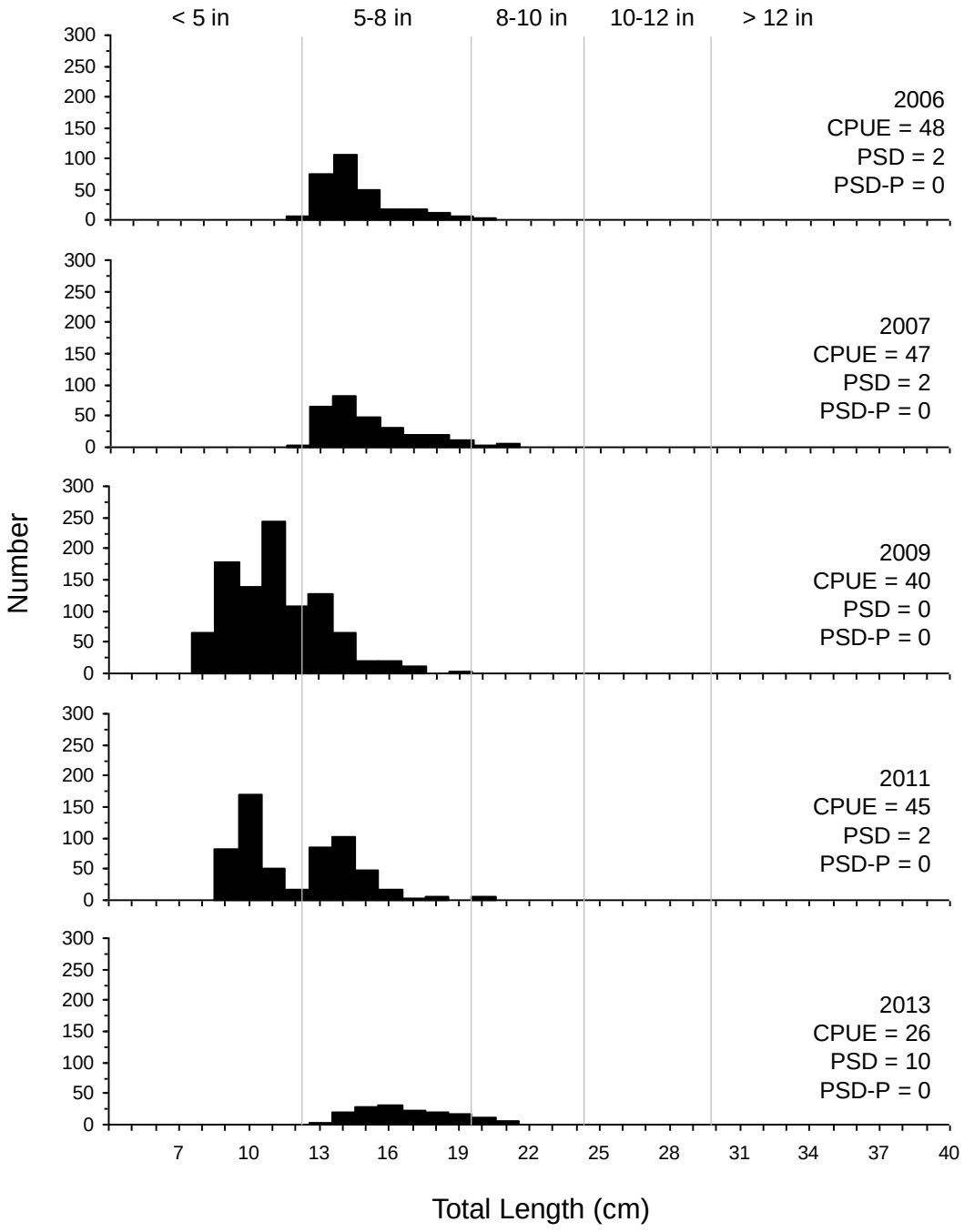

Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using gill nets in South Buffalo Lake, 2006-2013.

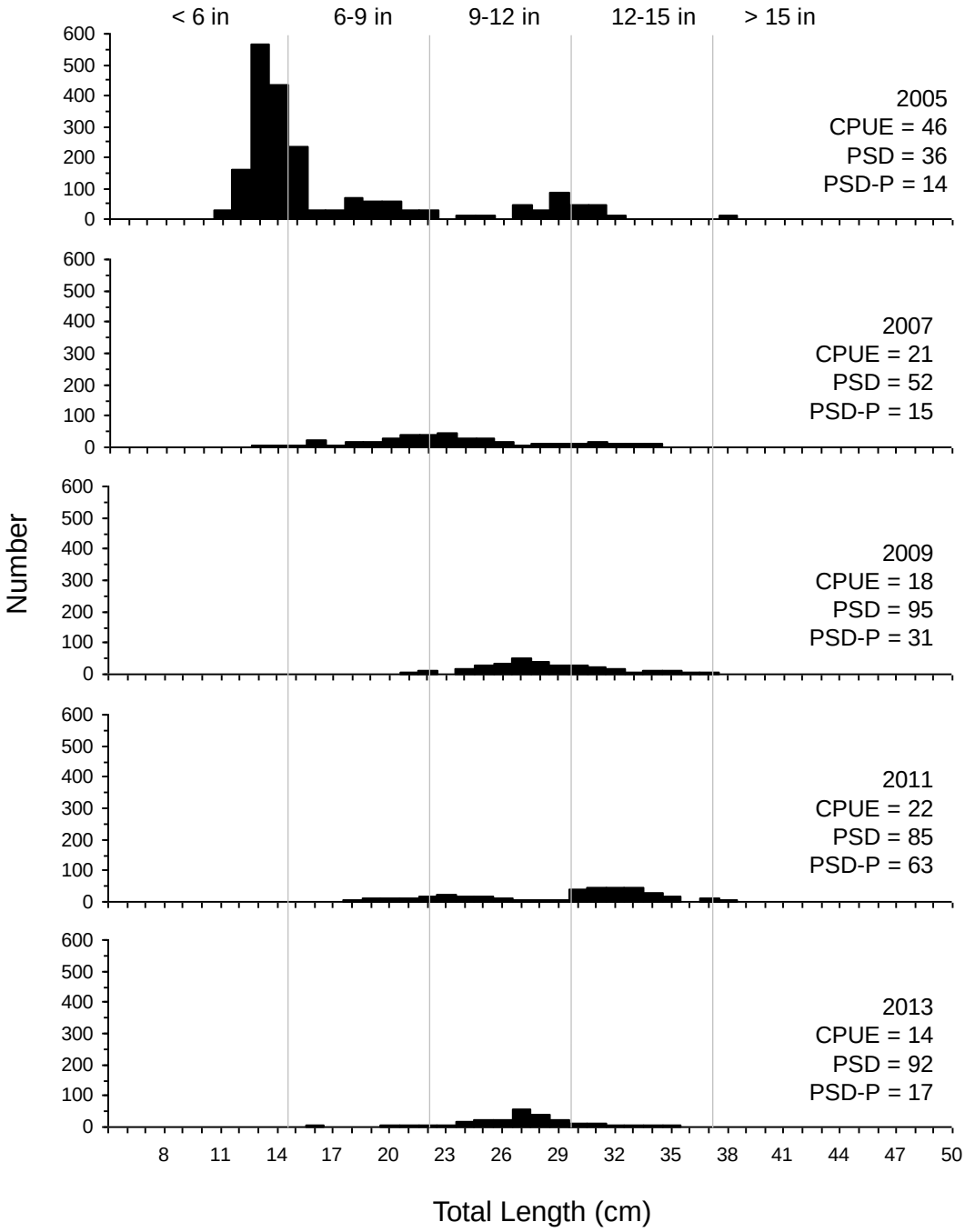

Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Bullheads captured using frame nets in South Buffalo Lake, 2005-2013.

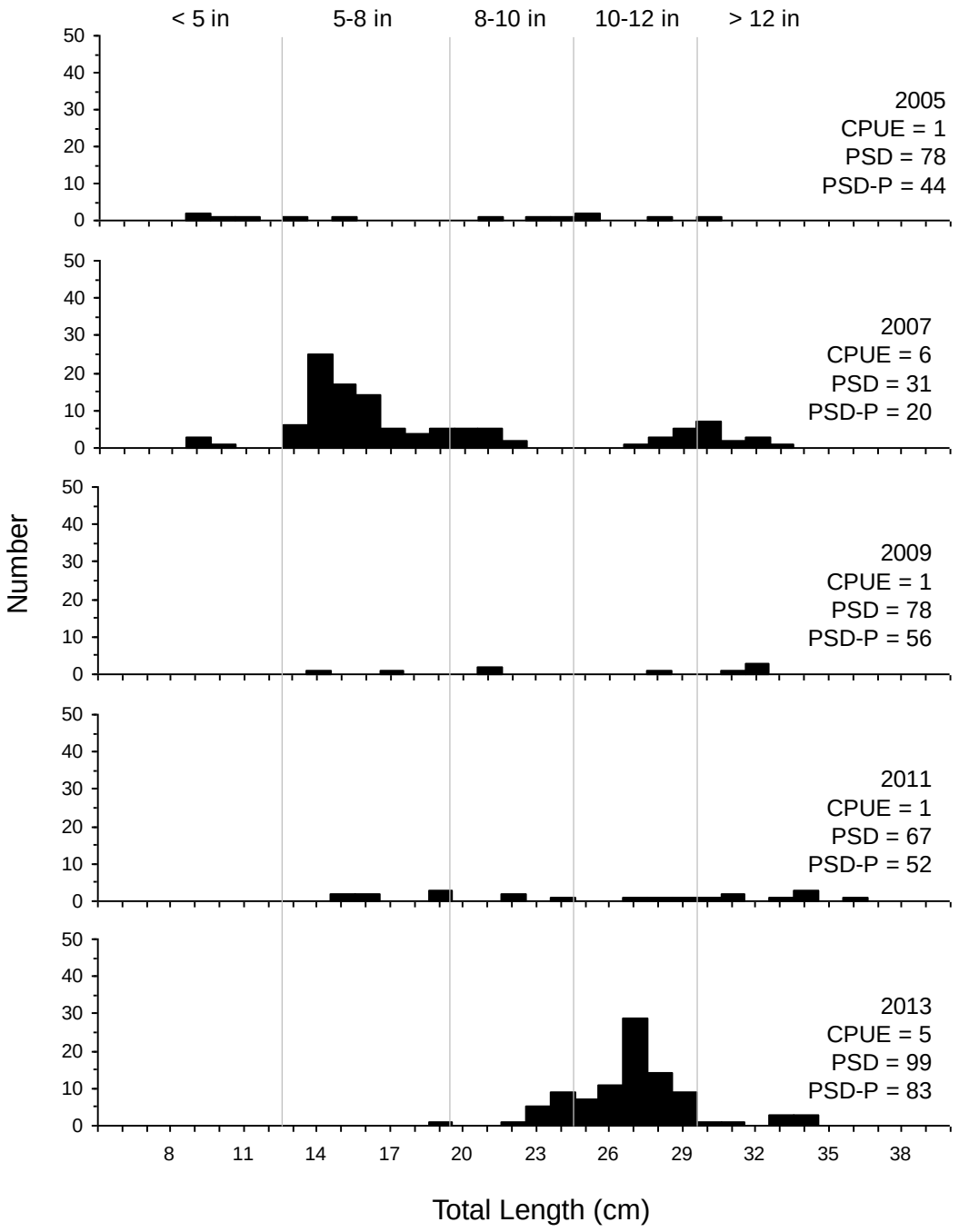

Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Crappie captured using frame nets in South Buffalo Lake, 2005-2013.

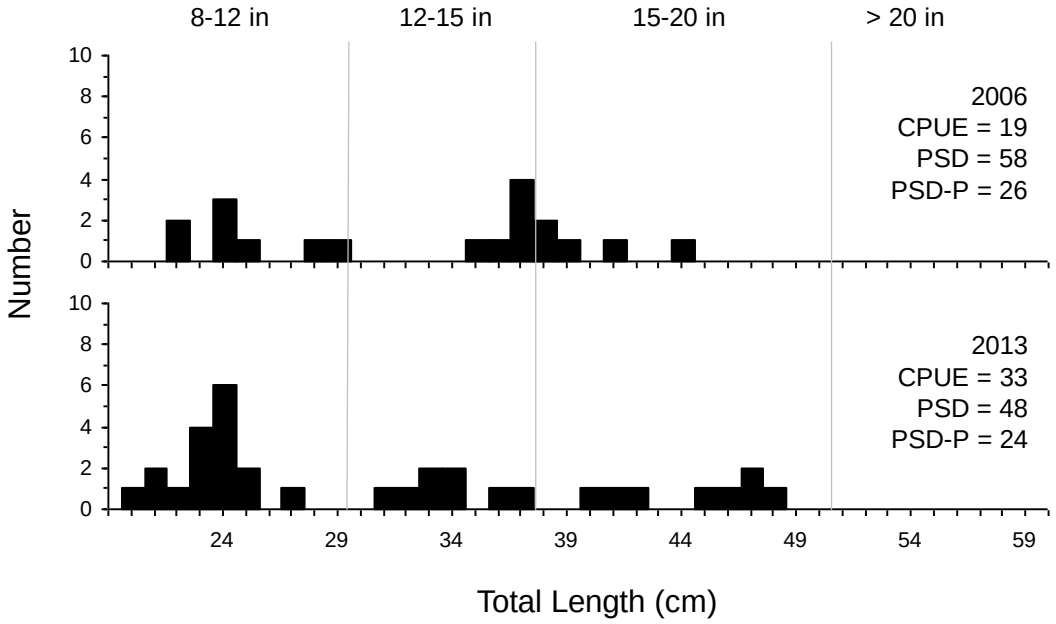

Figure 9. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Largemouth Bass captured during spring night electrofishing in South Buffalo Lake, 2006 and 2013.