Cattail/Kettle Lake

Site Description

Location

Water designation number (WDN)	48-0012-00
Legal description	T125N-R55W-Sec. 6,7,18,19 T125N-R56W-Sec. 1,2,10,11,12,13,14,23,24
County (ies)	Marshall
Location from nearest town	5 miles west and 3 miles north of Eden, South Dakota.

Survey Dates and Sampling Information

Dates of current survey	August 19-21, 2008 (FN, GN) September 19, 2008 (EF-WAE)
Date of most recent survey	August 21-23, 2007 (FN, GN)
Gill net sets (n)	6
Frame net sets (n)	18
Electrofishing-WAE (min)	61

Morphometry (Figure 1)

Watershed area (acres)	unknown
Surface area (acres)	≈2,800
Maximum depth (ft)	unknown
Mean depth (ft)	unknown

Ownership and Public Access

Cattail/Kettle Lake is a non-meandered lake; however, a significant amount of land previously managed as a Game Production Area (GPA) is now submerged. Water elevations have spilled over on private lands creating private ownership of much of the lakeshore. Both private and public land can be found beneath the water. A public access site is located on the west shore of Cattail/Kettle Lake and is maintained by the SDGFP (Figure 1).

Watershed and Land Use

Land use within the Cattail/Kettle watershed primarily is primarily agricultural including cropland, pasture and woodlands.

Water Level Observations

Cattail/Kettle Lake has no established Ordinary High Water Mark and an outlet elevation was not available. On May 6, 2008 the elevation of Cattail/Kettle Lake was 1793.1 fmsl and similar to the fall 2007 elevation of 1793.1 fmsl. On October 28, 2008 the elevation of Cattail/Kettle Lake had declined to 1792.4 fmsl.

Aquatic Vegetation and Exotics

The type and extent of aquatic vegetation has not been inventoried in Cattail/Kettle Lake; however, both emergent and submergent vegetation are common throughout the lake. Common carp has been the only exotic species reported in Cattail/Kettle Lake.

Fish Management Information

Primary species	walleye, yellow perch
Other species	black bullhead, black crappie, bluegill, common carp, largemouth bass, northern pike, smallmouth bass, white sucker
Lake-specific regulations	NE Panfish Management Area: 10 daily; 50 possession Walleye/Saugeye: minimum length 16”
Management classification	warm-water marginal
Fish Consumption Advisories	none

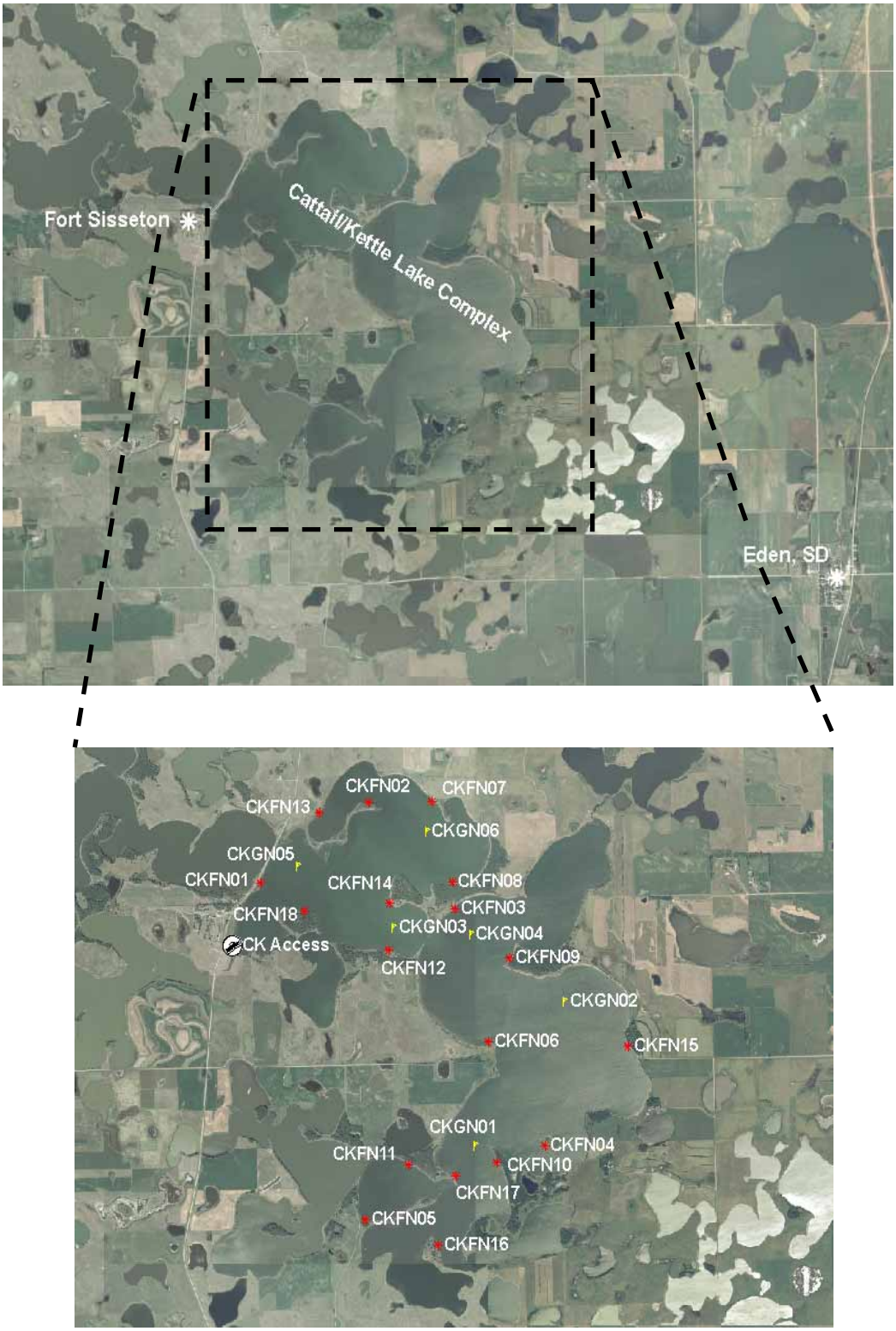

Figure 1. Map depicting location of the Cattail/Kettle Lake Complex from Eden, Marshall County, South Dakota. Also noted are standardized net locations and the access area which includes boat ramp, dock, and public toilet. CKFN = frame nets, CKGN= gill nets

Management Objectives

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

2) Maintain a mean gill net CPUE of stock-length yellow perch ≥ 25, a PSD of 30-60, and a PSD-P of 5-10.

3) Maintain a mean frame net CPUE of stock-length bullhead ≤ 100.

Results and Discussion

Cattail/Kettle Lake is a natural lake located in Marshall County of northeastern South Dakota. High water levels during the 1990's combined Cattail and Kettle lakes along with several smaller sloughs into one large water body that is now commonly referred to as Cattail/Kettle Lake. Water flows into Cattail/Kettle Lake from Lost Lake to the north and through a series of shallow lakes to the northwest. The outlet is located on the southwest corner of Cattail/Kettle Lake and flows toward Hickman Dam to the west. During high water events many area lakes become connected allowing fish to move among the various water basins and as a result many fish species have been introduced to Cattail/Kettle Lake via these waters.

Cattail/Kettle Lake was a popular winter fishery for large yellow perch and northern pike during the mid-1990's. The first walleyes were stocked into Cattail/Kettle Lake in 1997. Cattail/Kettle Lake is primarily managed as a walleye and yellow perch fishery. Overall, as many as 10 species of fish contribute to the fishery in Cattail/Kettle Lake.

Primary Species

Walleye: The mean gill net CPUE of stock-length walleye during 2008 was 5.3 and below the minimum objective (≥ 10 stock length fish/net night) for Cattail/Kettle Lake (Table 1; Table 3). Since 2001, relative abundance of walleye in the gill net catch has fluctuated from a low of 4.2 (2002) to a high of 20.7 (2005; Table 2). The 2008 gill net CPUE represented a decrease from the 15.0 observed in 2007, and indicated moderate relative abundance (4-11 stock-length walleye/net; Table 2).

Walleye recruitment in Cattail/Kettle Lake appears to be relatively consistent with the strongest year classes generally coinciding with stocked years (Table 6). The majority of walleye captured in the 2008 gill net catch were from the 2006 (42%) and 2008 (47%) year classes, which coincided with walleye fry stockings (Table 5; Table 6). The mean fall night electrofishing CPUE of age-0 walleye from Cattail/Kettle Lake in 2008 was 295.1/hour and indicative of a strong year-class (defined as > 75 age-0 walleye/hour electrofishing) however, recruitment is unknown at this time.

Walleye captured in gill nets during 2008 ranged in total length from 12 to 63 cm (4.7 to 24.8 in; Figure 2), had a PSD of 16 and a PSD-P of 9. The PSD of 16 was below the objective range of 30-60; while the PSD-P of 9 was within the objective range of 5-10 (Table 3). During the 2008 survey, the majority of walleye captured in the gill net catch were below the 406-mm (16-inch) minimum length restriction enforced on Cattail/Kettle Lake (Figure 2).

Walleye in Cattail/Kettle Lake typically reach the 406-mm (16-inch) minimum length restriction during their third growing season at age-2+ (Table 4). In 2008, walleye from the relatively-large 2006 year class had a mean total length at capture of 323 mm at age-2 which represented slower growth than other relatively large year classes produced in 2001 and 2003 (Table 4). The 2001 and 2003 year classes had weighted mean total length at capture values for age-2 walleye of 380 and 393 mm, respectively (Table 4). Walleyes in the 2008 gill net catch from Cattail/Kettle Lake had mean Wr values that ranged from 87 to 93 and no length-related trends were apparent. The mean Wr of stock-length walleye was 87 (Table 1).

Yellow Perch: The mean gill net CPUE of stock-length yellow perch in 2008 was 58.7, a decrease from the 72.5 observed in 2007 (Table 2). Since 2001, the mean gill net CPUE of stock-length yellow perch has fluctuated from a low of 21.5 (2006) to a high of 108.5 (2001) with the 2001-2008 average being 51.2 (Table 2). The 2008 gill net CPUE of 58.7 was above the minimum objective ($\geq$ 25 stock-length perch/net), and indicative of high relative abundance.

Yellow perch in Cattail/Kettle Lake currently exhibit consistent natural recruitment with what appears to be several year classes present in the 2008 gill net catch. Yellow perch captured in the 2008 gill net catch ranged in total length from 8 to 31 cm (3.1 to 12.2 in), had a PSD of 26, and a PSD-P of 2 (Figure 3). Both the 2008 PSD and PSD-P were below the management objectives of 30-60 and 5-10, respectively (Table 3).

No growth information was available. Mean Wr values for gill net captured yellow perch ranged from 99-107 for all length categories sampled with the mean Wr of stock-length yellow perch being 107 (Table 1).

Other Species

Black bullhead: The mean frame net CPUE of stock-length black bullhead during 2008 was 0.1 (Table 1) and within the objective ($\leq$ 100 stock-length fish/net-night) for black bullhead in Cattail/Kettle Lake (Table 3). Since 2002, the mean frame net CPUE of black bullhead has ranged from high of 548.7 (2003) to a low of 0.1 (2008) with the 2002-2008 average being 125.6 (Table 2).

In 2008, two black bullheads were captured in the frame nets. Poor recruitment of black bullheads in many northeastern South Dakota lakes has been common in recent years likely limiting their abundance.

Black crappie: During 2008, the mean frame net CPUE of stock-length black crappie was 2.5 (Table 1), a decrease from the 7.1 observed in 2007 (Table 2). Since 2002, the mean frame net CPUE of stock-length black crappie has fluctuated from a low of 0.6 (2004) to high of 10.3 (2006) with the 2002-2008 average being 3.9 (Table 2).

Based on the 2008 frame net catch, relative abundance was considered low (< 3 stock-length black crappie/net).

Length-frequency analysis and age-structure information of black crappie in the 2008 frame net catch indicates consistent black crappie recruitment of varying magnitude from 2004-2007 with black crappie from the 2005 year-class being the most represented (Table 8; Figure 5). Recruitment of the 2005 black crappie year class in Cattail/Kettle Lake resulted in an increase in relative abundance from low to moderate-high levels during surveys conducted in 2006 and 2007 (Table 2).

Black crappie captured in frame nets during 2008 ranged in total length from 8 to 32 cm (3.1 to 12.6 in), had a PSD of 78 and a PSD-P of 64 (Figure 5). Both PSD and PSD-P values for black crappie in the 2008 frame net catch were above the target management objectives of 30-60 and 5-10, respectively (Table 3). Black crappie from the 2005 year-class comprise the majority of stock-length (13 cm; 5 in) black crappie in the 2008 frame net catch and have reached preferred-length (30 cm; 10 in) resulting in the high size structure (Figure 5).

Otoliths were collected from a sub-sample of frame net captured black crappie in 2008. The weighted mean length at capture for age-2 and age-3 black crappie was 211 and 276 mm, respectively (Table 7). Mean Wr values of black crappie captured in the frame nets during 2008 ranged from 108 to 120 for all length categories sampled. The mean Wr of stock-length fish was 111 (Table 1).

Largemouth bass: Spring night electrofishing is the primary technique utilized to assess largemouth bass populations in northeastern South Dakota glacial lakes. Spring night electrofishing has not been conducted on Cattail/Kettle Lake. Largemouth bass have been observed in Cattail/Kettle Lake (Table 2) however densities are likely low, Blackwell et al. (2007) reported that largemouth bass were infrequent in the angler creel during the 2005 summer period (May-August). McKibbon (2002) found largemouth bass populations in eastern South Dakota glacial lakes to generally be of low density, high size structure, high condition, and have fast growth as a result of inconsistent recruitment patterns.

Northern Pike: Northern pike typically are not sampled effectively using standard lake survey methods; therefore reported values may not accurately represent the at-large population. Neumann and Willis (1995) reported the most reliable time to sample northern pike in eastern South Dakota natural lakes with gill nets was late spring following the spawn.

In 2008, eight northern pike ranging in total length from 56 to 65 cm (22.0 to 25.6 in) were captured resulting in a mean gill net CPUE of 1.3 (Table 1). Since 2001, northern pike relative abundance has varied from a low of 0.0 (2006) to a high of 4.8 (2002; Table 2).

All northern pike captured in the 2008 gill net catch were in the quality- to preferred-length category resulting in a PSD of 100 and a PSD-P of 0 (Table 1). No northern pike growth information was collected during 2008. The mean Wr of quality- to preferred-length northern pike sampled using gill nets during 2008 was 84.

Smallmouth bass: Smallmouth bass are currently present at a low density in Cattail/Kettle Lake, based on mean frame net CPUE values observed since 2002 (Table 2). Smallmouth bass have not been assessed by electrofishing.

Other: Bluegill, common carp and white sucker were captured in low numbers during the 2008 survey (Table 1; Table 2).

Management Recommendations

1) Conduct fish community assessment surveys on an annual basis (next survey scheduled in summer 2009) to monitor fish relative abundance, size structure, growth and stocking success.

2) Conduct fall night electrofishing on an annual basis to monitor age-0 walleye relative abundance.

3) Collect otoliths from black crappie, walleye, and yellow perch; scales from largemouth and smallmouth bass to assess the age structure and growth rates of each population.

4) Stock walleye (≈1,000 fry/acre) to establish additional year classes if the fall night electrofishing CPUE of young-of-the-year walleye and gill netting results warrant (i.e., low gill net CPUE of < 250-mm (10 inch) walleye and/or fall night electrofishing CPUE of age-0 walleye < 75 fish/hour).

5) Evaluate walleye population dynamics and implement regulations to benefit the population and comply with tool box options.

Table 1. Mean catch rate (CPUE; gill/frame nets = 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 by experimental gill nets, frame nets, and electrofishing in Cattail/Kettle Lake, 2008. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB = black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; 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	0.1	0.2	100	0	100	0	85	62
BLC	2.5	1.0	78	10	64	13	111	1
BLG	1.8	1.7	0	---	0	---	89	3
COC	0.9	0.4	94	6	88	12	95	2
LMB	0.1	0.0	100	---	0	---	112	---
NOP	1.3	0.3	96	4	9	10	76	3
SMB	0.8	0.5	53	24	47	23	108	2
WAE	2.0	0.7	36	14	28	13	84	2
WHS	0.2	0.1	100	0	100	0	96	9
YEP	3.2	3.4	12	8	0	---	99	1
Gill nets								
BLC	0.3	0.3	50	50	50	50	111	43
COC	2.0	1.4	100	0	92	8	99	2
NOP	1.3	0.9	100	0	0	---	84	3
WAE	5.3	1.8	16	11	9	9	87	1
WHS	0.2	0.2	100	---	100	---	106	---
YEP	58.7	19.8	26	3	2	1	107	< 1
Electrofishing								
WAE[1](age-0)	295.1	---	---	---	---	---	---	---

[1] Fall Electrofishing-WAE.

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 experimental gill nets, frame nets, and electrofishing in Cattail/Kettle Lake, 2001-2008. BLB = black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; LMB= largemouth bass; NOP = northern pike; SMB = smallmouth bass; WAE = walleye; WHS = white sucker; YEP = yellow perch

	CPUE								
Species	2001	2002	2003	2004	2005	2006[1]	2007[1]	2008	Mean
Frame nets									
BLB	---	305.5	548.7	5.4	1.3	15.1	2.9	0.1	125.6
BLC	---	4.6	0.9	0.6	1.3	10.3	7.1	2.5	3.9
BLG		0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.3
COC	---	0.9	0.6	0.4	1.7	4.2	3.2	0.9	1.7
LMB	---	0.2	0.1	0.1	0.2	0.1	0.0	0.1	0.1
NOP	---	1.1	1.9	1.1	1.3	0.8	0.2	1.3	1.1
SMB	---	0.1	0.3	0.0	0.0	0.8	0.0	0.8	0.3
WAE	---	2.6	4.1	2.3	5.4	3.8	2.3	2.0	3.2
WHS	---	0.0	0.9	0.4	3.9	0.8	0.1	0.2	0.9
YEP	---	10.3	0.7	0.9	0.6	2.7	1.9	3.2	2.9
Gill nets									
BLB	45.2	51.7	42.2	6.2	1.3	38.0	2.8	0.0	23.4
BLC	0.2	0.0	0.8	0.5	0.8	9.7	4.7	0.3	2.1
COC	0.0	0.0	0.0	0.0	0.0	2.5	8.5	2.0	1.6
LMB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOP	2.5	4.8	0.7	1.5	0.5	0.0	1.7	1.3	1.6
WAE	10.3	4.2	15.5	15.0	20.7	10.8	15.0	5.3	12.1
WHS	0.8	1.2	1.3	0.5	0.0	0.2	0.2	0.2	0.6
YEP	108.5	39.7	42.3	42.5	23.5	21.5	72.5	58.7	51.2
Electrofishing									
WAE[2](age-0)	---	---	---	---	---	---	---	295.1	295.1

[1] Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5")
[2] Fall Electrofishing-WAE.

Table 3. Mean catch rate (CPUE; gill/frame nets = 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) for selected species captured by experimental gill nets, frame nets and electrofishing in Cattail/Kettle Lake, 2001-2008. BLB = black bullhead; BLC= black crappie; NOP = northern pike; WAE = walleye; YEP = yellow perch

Species	2001	2002	2003	2004	2005	2006[1]	2007[1]	2008	Average	Objective
Frame nets										
BLB										
CPUE	---	306	549	5	1	15	3	< 1	126	≤ 100
PSD	---	47	8	87	100	53	71	100	67	---
RSD-P	---	18	8	83	92	39	6	100	49	---
Wr	---	81	88	100	98	95	91	85	91	---
BLC										
CPUE	---	5	1	1	1	10	7	3	4	---
PSD	---	33	71	70	4	4	84	78	49	---
RSD-P	---	20	71	60	4	0	9	64	33	---
Wr	---	108	98	112	121	112	111	111	110	---
Gill nets										
NOP										
CPUE	3	5	1	2	1	0	2	1	2	---
PSD	100	79	100	100	100	---	90	100	95	---
RSD-P	0	3	50	11	33	---	20	0	19	---
Wr	82	82	78	85	92	---	88	84	85	---
WAE										
CPUE	10	4	16	15	21	11	15	5	12	≥ 10
PSD	61	68	88	51	71	95	53	16	63	30-60
RSD-P	16	12	23	12	15	18	27	9	17	5 – 10
Wr	92	91	90	94	97	97	89	87	92	---
YEP										
CPUE	109	40	42	43	24	22	73	59	43	≥ 25
PSD	10	13	16	19	11	72	24	26	26	30-60
RSD-P	1	0	0	7	3	17	6	2	5	5-10
Wr	97	92	106	99	101	98	103	107	101	---

[1] Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5")

Table 4. Weighted mean length at capture (mm) for walleye captured in experimental gill nets in Cattail/Kettle Lake, 2001-2008.
Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

		Age											
Year	N	0	1	2	3	4	5	6	7	8	9	10	11
2008[1]	61	124	257	323	---	---	473	---	---	---	635	---	566
2007[1]	110	---	256	403	444	479	570	499	553	558	---	590	
2006[1]	82	183	199	326	429	522	507	563	568	554	643	543	
2005[1]	123	---	305	393	463	482	490	507	---	537	---	---	
2004	100	136	290	408	434	459	494	531	559	---	---	---	
2003	152	145	302	380	439	473	494	545	---	---	---	---	
2002	27	---	254	356	459	470	501	---	---	---	---	---	
2001	123	128	250	363	---	487	---	---	---	---	---	---	

[1]Fish aged using otoliths; scales were used in previous years

Table 5. Stocking history including size (Size) and number (Number) for fishes stocked into Cattail/Kettle Lake, 1997-2008.

Year	Species	Size	Number
1997	WAE	fingerling	243,900
1999	WAE	fry	3,900,000
	WAE	fingerling	200,000
2000	WAE	fry	3,000,000
2001	WAE	fry	3,000,000
2003	WAE	fingerling	300,290
2006	WAE	fry	2,700,000
2008	WAE	fry	4,000,000

Table 6. Numbers of gill net sampled walleye (n), by year class and associated stocking history (Number stocked x 1,000) for walleye in Cattail/Kettle Lake, 2001-2008.

	Year Class											
Survey Year	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
2008[1,2]	29	2	26			1				1		2
2007[1,2]	---	0	62	10	7	5	1	2	3	7	0	13
2006[1,2]	---	---	15	2	3	49	1	1	1	4	4	1
2005[1]	---	---	---	0	25	52	13	3	8	4	0	18
2004	---	---	---	---	0	46	6	7	6	14	12	1
2003	---	---	---	---	---	0	3	16	7	26	25	16
2002	---	---	---	---	---	---	0	6	4	8	2	7
2001	---	---	---	---	---	---	---	55	12	22	0	34
Number stocked												
fry	4,000		2,700					3,000	3,000	3,900		
small fingerling						300				200		244
large fingerling												

[1]Fish aged using otoliths; scales were used in previous years
[2] Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5")

Table 7. Weighted mean length at capture (mm) for black crappie captured in frame nets in Cattail/Kettle Lake, 2008.

		Age						
Year	N	0	1	2	3	4	5	6
2008	47	81	136	211	276	306	---	325

Table 8. Numbers of frame net sampled black crappies (n) by year class in Cattail/Kettle Lake, 2001-2008.

	Year Class						
Survey Year	2008	2007	2006	2005	2004	2003	2002
2008	1	11	4	27	3		1

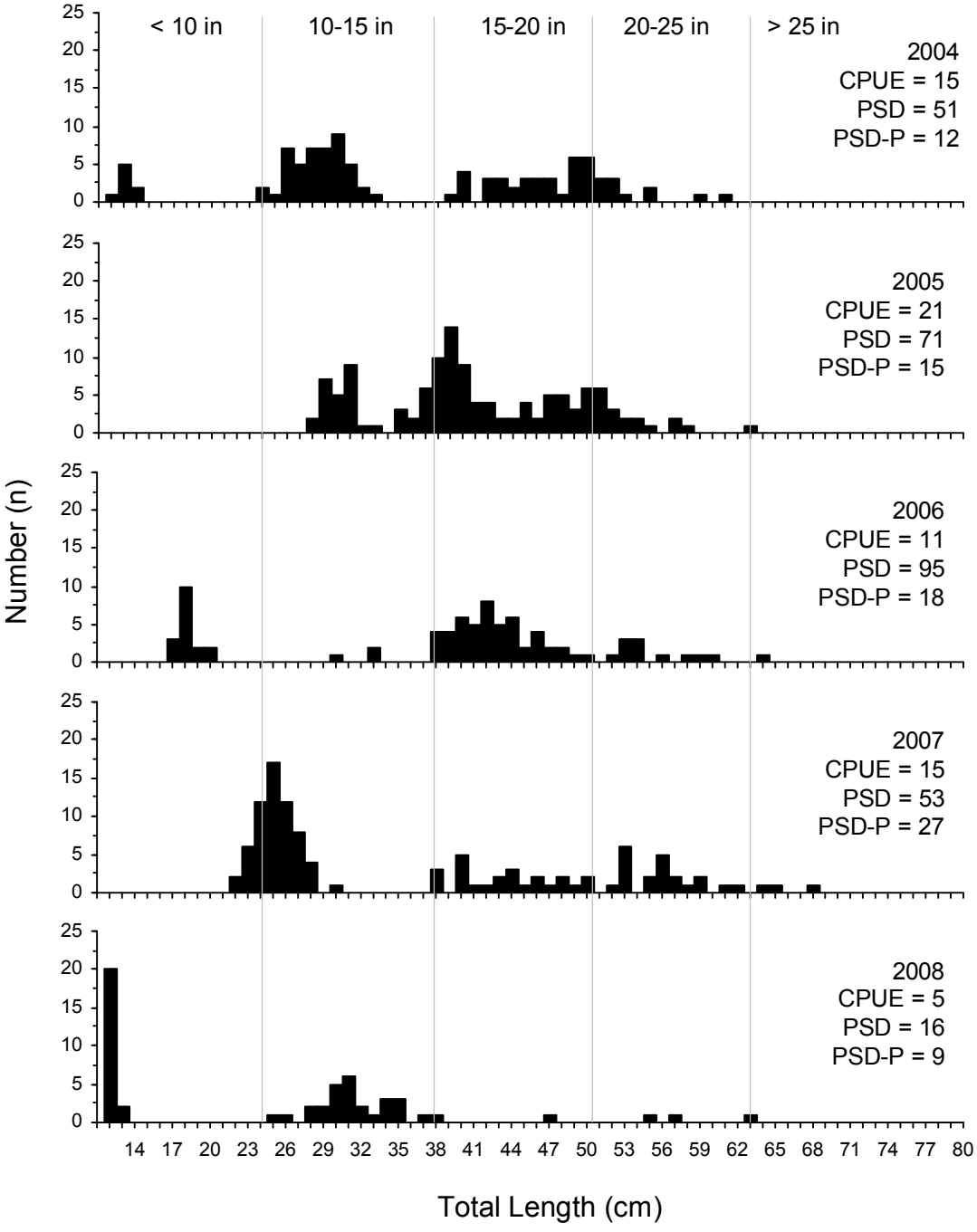

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Cattail/Kettle Lake, 2004-2008.

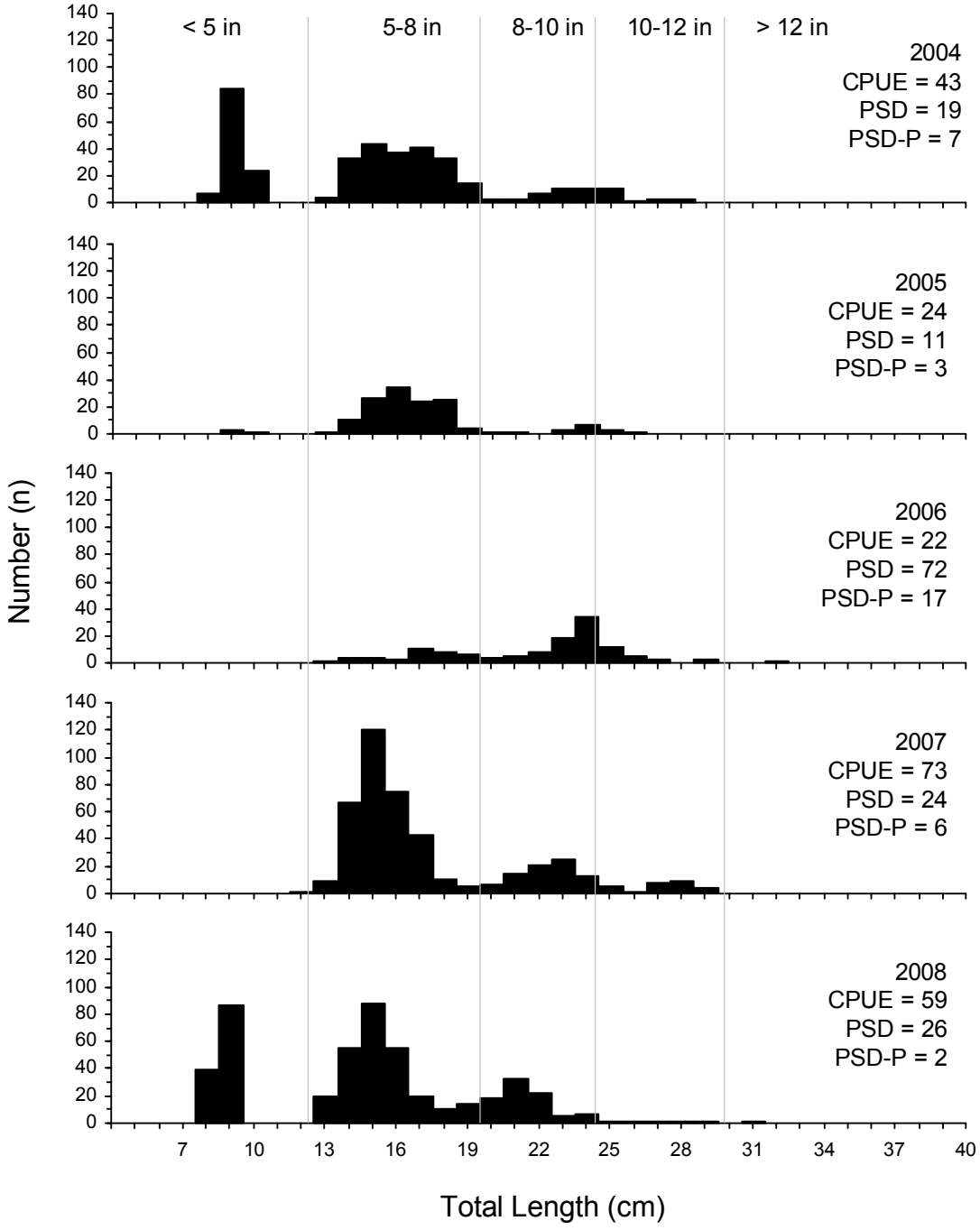

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Cattail-Kettle Lake, 2004-2008.

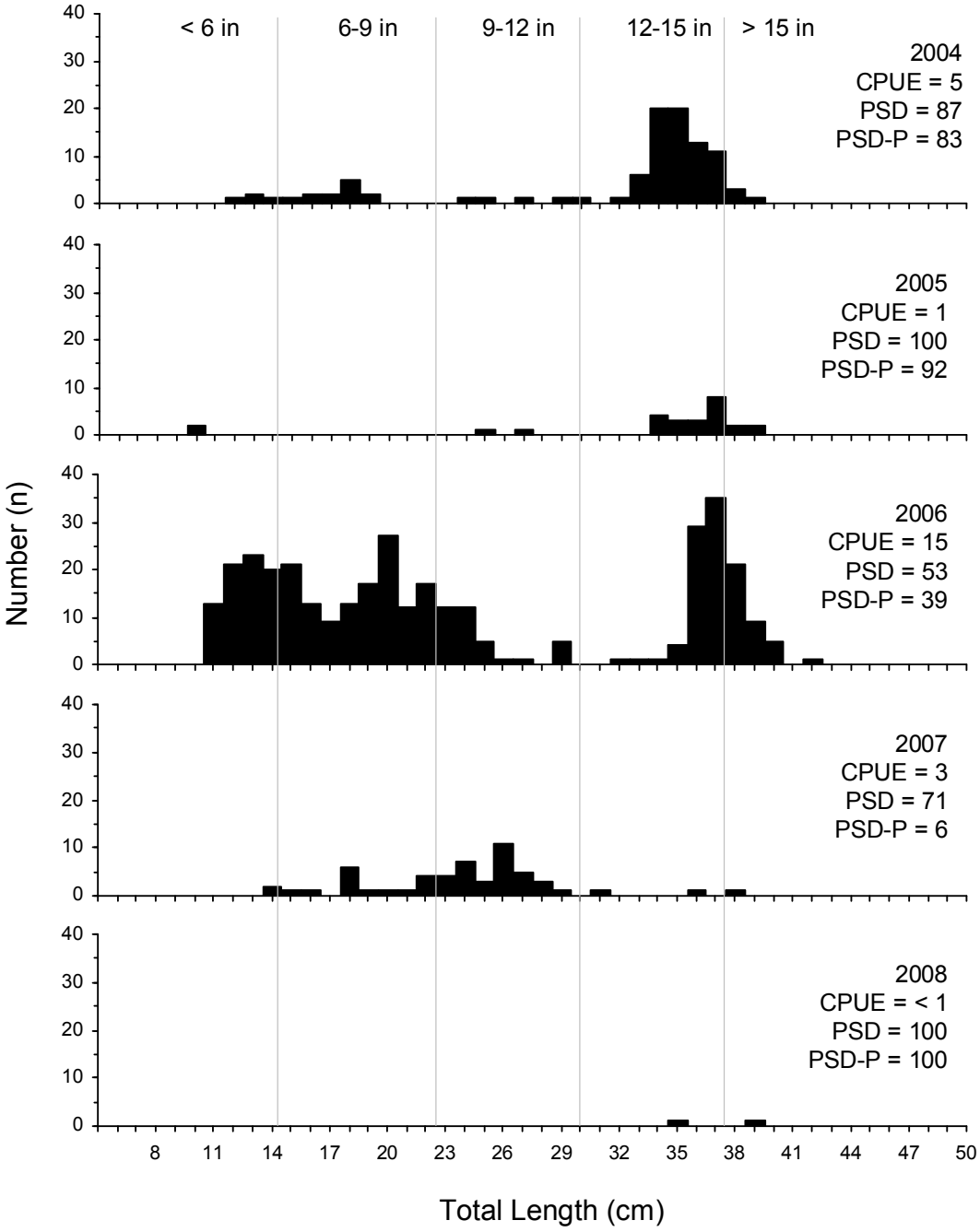

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using experimental gill nets in Cattail-Kettle Lake, 2004-2008.

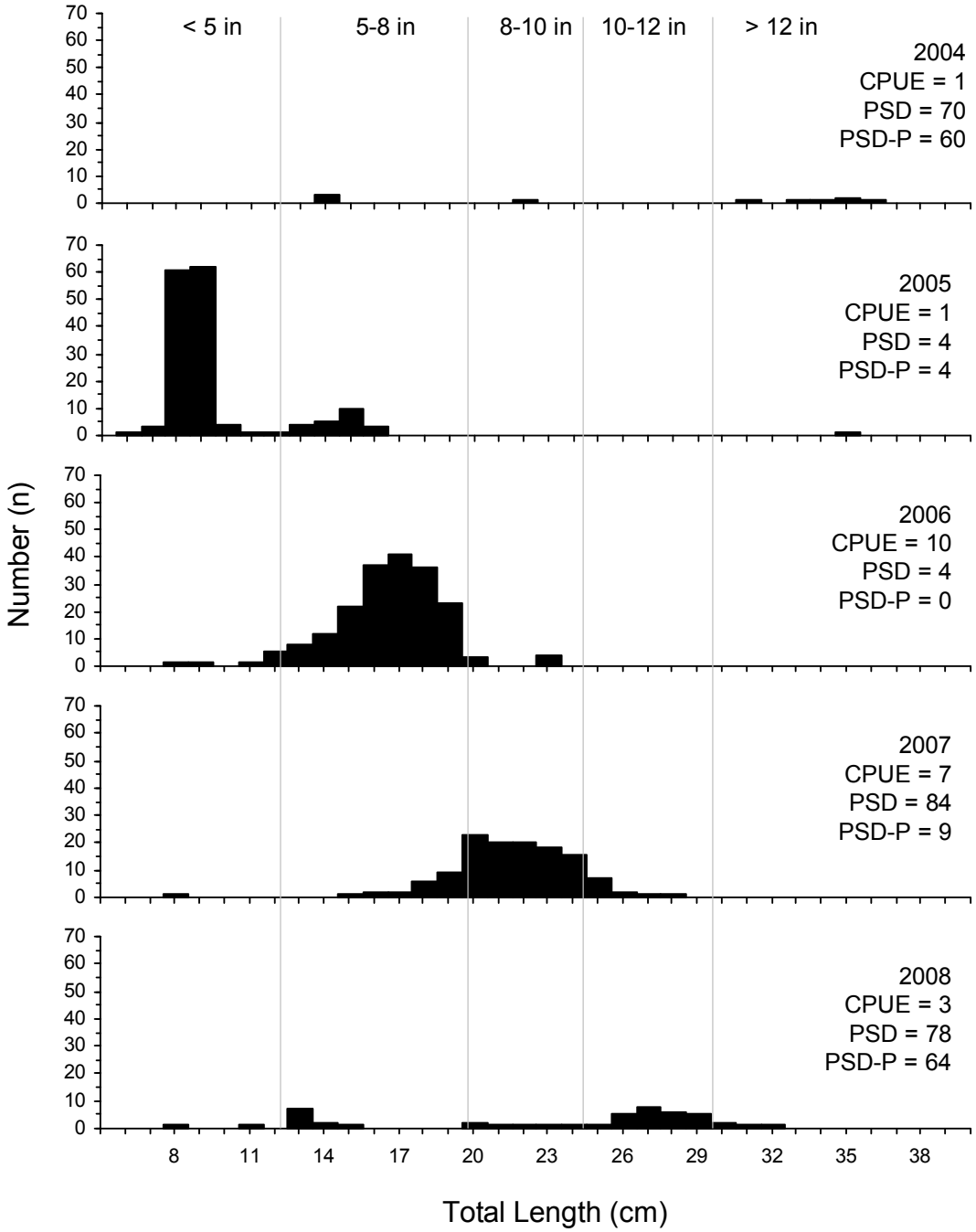

Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using experimental gill nets in Cattail-Kettle Lake, 2004-2008.