

White Lake

Site Description

Location

Water designation number (WDN)	48-0031-00
Legal description	T128N-R57W-Sec.25,36
County (ies)	Marshall
Location from nearest town	6 miles east and 4 miles north of Britton, SD

Survey Dates and Netting Information

Dates of current survey	June 3-4, 2008 (FN,GN)
Dates of most recent survey	June 6-7, 2006 (FN,GN)
Gill net sets (n)	3
Frame net sets (n)	12

Morphometry (Figure 1)

Watershed area (acres)	21,184
Surface area (acres)	187
Maximum depth (ft)	20
Mean depth (ft)	8

Ownership and Public Access

White Lake is an impoundment created by The Works Progress Administration (WPA) in 1938 and is managed by the SDGFP. A public access site is located on the western shore off highway 27, just south of the dam and is maintained by the SDGFP (Figure 1; Figure 2). Lands adjacent to White Lake are generally under state and private ownership.

Watershed and Land Use

Land use within the White Lake watershed primarily is agricultural including pasture (70%), cropland (20%), and scattered shelterbelts (10%; Hanson et al. 2005).

Water Level Observations

No water level observations were made on White Lake during the 2008 survey.

Aquatic Vegetation and Exotics

Emergent vegetation in the form of bulrushes and cattails cover 95% of the shoreline. Submersed vegetation, primarily sago pondweed, is present in shallow portions of the lake. Common carp has been the only exotic species reported in White Lake.

Fish Management Information

Primary species	black crappie, walleye, yellow perch
Other species	black bullhead, common carp, northern pike, white sucker
Lake-specific regulations	NE Panfish Management Area: 10 daily; 50 possession walleye/saugeye: minimum length 14"
Management classification	warm-water permanent
Fish Consumption Advisories	none

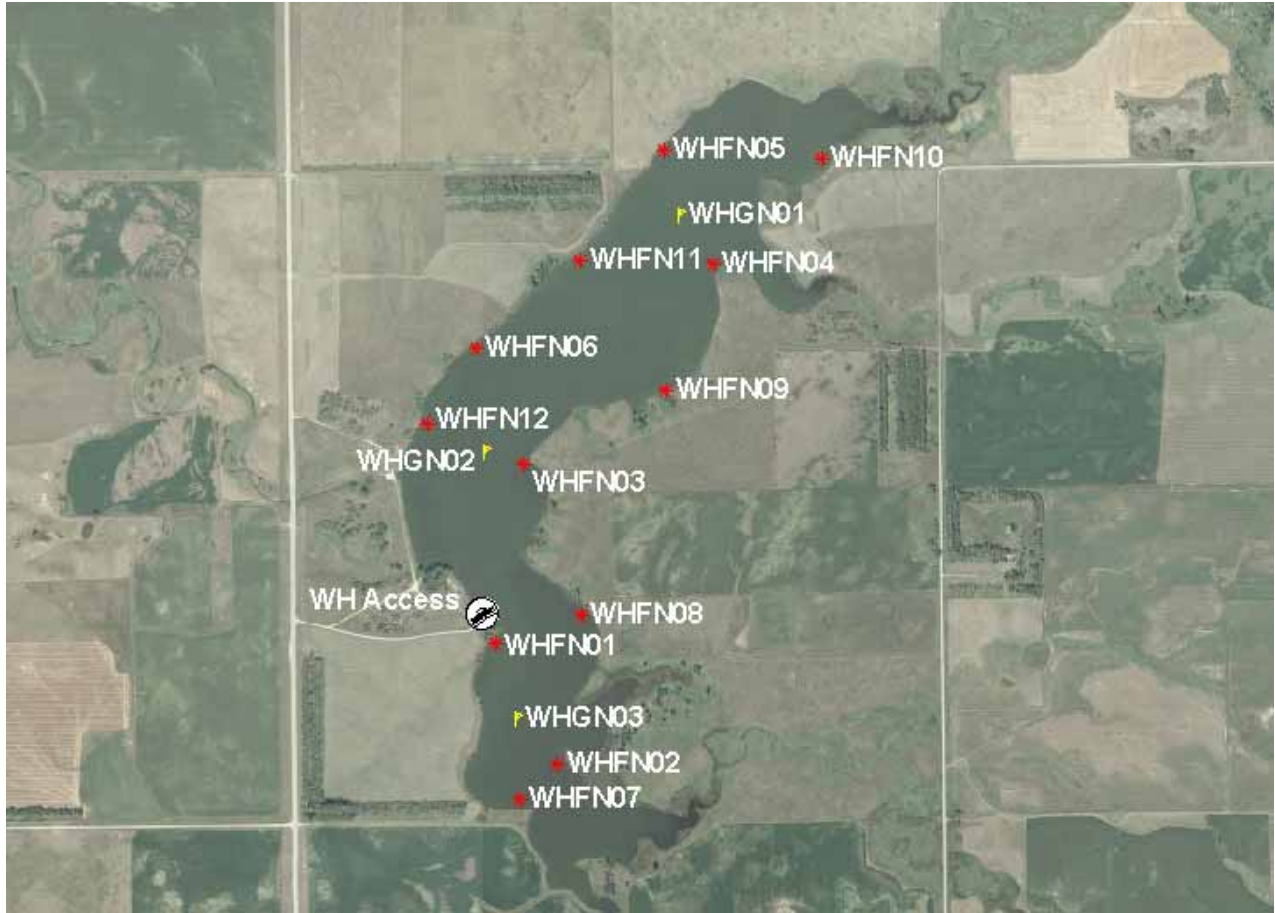


Figure 2. Map depicting access sites and standardized net locations for White Lake, Marshall County, South Dakota. WHFN= frame nets, WHGN= gill nets

Management Objectives

- 1) Maintain a mean frame net CPUE of stock-length black crappie ≥ 10 , a PSD of 30-60, and a PSD-P of 5-10.
- 2) Maintain a mean gill net CPUE of stock-length walleye ≥ 10 , a PSD of 30-60, and a PD-P of 5-10.
- 3) Maintain a mean gill net CPUE of stock-length yellow perch ≥ 25 , a PSD of 30-60, and a PSD-P of 5-10.
- 4) Maintain a mean frame net CPUE of stock-length bullhead ≤ 100 .

Results and Discussion

White Lake is an impoundment on the Wild Rice River in northeast South Dakota. The dam creating White Lake was constructed by the WPA in 1938 and was built to help control flooding on lower portions of the Wild Rice River. Water exiting White Lake enters the Wild Rice River which is a tributary of the Red River of the North. Currently, White Lake is managed as a black crappie, walleye, and yellow perch fishery.

Primary Species

Black crappie: Hubers and Blackwell (1999) reported that black crappies have provided a successful fishery in White Lake and this continues. The mean frame net CPUE of stock-length black crappie in 2008 was 47.3 (Table 1) and above the minimum objective (≥ 10 fish/ net night). Based on the 2008 mean frame net CPUE relative abundance is considered high.

Examination of age-structure and length-frequency information from frame net caught black crappies in 2008 suggests relatively consistent recruitment; however the annual level varies in magnitude (Tables 4-5; Figure 3). Age assignments made using otoliths revealed the presence of eight black crappie year-classes in the frame net catch during 2008 (Table 5). Age-0 and age-1 black crappies were not captured and likely were not recruited to our gear at time of sampling. Two year classes, 2004 and 2005, comprised approximately 80% of black crappies sampled in frame nets during 2008 (Table 5). The strong 2003 year class that comprised 82% of the 2006 survey represented less than 10% of the 2008 survey indicating high mortality (Table 5).

In 2008, black crappie captured in frame nets ranged in total length from 18 to 31 cm (7.1 to 12.2 inches; Figure 3). The PSD was 99 and the PSD-P was 18 (Tables 1, 3; Figure 3). The size structure of black crappie in White Lake was dominated by quality-length and larger fish.

In 2008, black crappies aged using otoliths had a weighted mean length at capture of 214 and 234 mm for age-3 and age-4, respectively (Table 4). The condition of black crappie in White Lake during 2008 was good with a mean W_r value of 94 for stock-length black crappies. However, as length increased mean W_r values declined,

with values of 104, 94, 89, and 77 for stock to quality, quality to preferred, preferred to memorable, and memorable to trophy length groups, respectively. The observed decline in condition as total length increased may indicate high mortality of preferred-length or larger black crappie.

Walleye: Walleye abundance in White Lake remained low throughout the 1990's despite stockings of walleye and saugeye of various sizes since 1990 (Hubers and Blackwell 1999). Walleye relative abundance was classified as moderate-low during surveys conducted in 2003, 2004, and 2005 with mean gill net CPUE values of 5.0, 8.0, and 7.7, respectively (Tables 2-3). Recruitment of walleye in White Lake has been sporadic, with the large year classes produced in 2001 and 2005 (Table 8). During 2003-2005 the relatively strong naturally-produced 2001 year-class accounted for approximately 75% of all walleyes sampled (Table 8). In 2008, the mean walleye gill net CPUE of stock-length fish was 10.0 (Tables 1-3; Table 8). The gill net CPUE observed in 2008 met the minimum objective and indicates a moderate density walleye population. Stockings of large fingerlings in 2005 and small fingerlings in 2006 coincide with strong and moderate year-classes, respectively, which have resulted in increased walleye relative abundance observed in the 2008 survey (Table 8).

Walleye captured in gill nets during 2008 ranged in total length from 19 to 38 cm (7.5 to 15.0 inches; Figure 4). The PSD and PSD-P values during 2008 were 3 and 0, respectively, indicating low abundance of quality-length and larger walleye (Tables 1, 3; Figure 4). In 2008, approximately 28% of the gill net captured walleyes were above the minimum length restriction (356 mm) enforced on White Lake.

In 2008, mean length at capture of age-3 walleye was less mean length at capture of walleye in 2004 (Table 6). Condition of walleye in White Lake was good with the mean W_r for stock-length walleye being 88 (Tables 1; Figure 4). No length related trends in W_r were observed in the 2008 survey.

Yellow Perch: The mean gill net CPUE of stock-length yellow perch in 2008 was 18.0, and below the minimum objective (≥ 25 fish/net night; Tables 1-3). The length-frequency histogram of gill net captured yellow perch in 2006 and 2008 indicates sporadic recruitment in recent years (Figure 5).

During 2008, yellow perch ranged in total length from 11 to 25 cm (4.3 to 9.8 inches; Figure 5), had a PSD of 72, and a PSD-P of 2 (Tables 1, 3; Figure 5). No growth information was available. The condition of stock-length yellow perch in White Lake was good with a mean W_r of 102 (Tables 1, 3; Figure 5). No length related trends in W_r were observed in the 2008 survey.

Other Species

Black bullhead: The mean CPUE of stock-length black bullhead collected in frame nest during 2008 was 14.5 and within the objective (≤ 100 stock-length bullhead/net; Tables 1-3). Hubers and Blackwell (1999) reported a high density population of black bullheads in White Lake in 1998 and suggested that the population was stunted. Since 1998, surveys have found black bullhead relative abundance declining with CPUE values of 25.4 and 11.1 during the 2003 and 2006 surveys,

respectively (Tables 2-3). Reduced black bullhead density is likely a result of limited recruitment in recent years.

Black bullhead captured in frame nets during 2008 ranged in total length from 14 to 31 cm (5.5 to 12.2 inches; Figure 6). The PSD of black bullhead captured in frame nets during 2008 was 91 and the PSD-P was 6 (Tables 1, 3; Figure 6).

No growth information was collected. The condition of black bullhead in White Lake during 2008 was good with a mean Wr of 96 for stock-length black bullheads (Tables 1).

Northern Pike: During 2008 the mean gill net CPUE of stock-length northern pike was 1.7 (Table 1). Hubers and Blackwell (1999) suggested that northern pike in White Lake experience variable and limited recruitment, therefore low densities likely preclude them as a target species.

Other: Common carp and white sucker were also captured during the 2008 survey; however, the abundance of these species is considered low and their impact on the fishery is likely minimal.

Management Recommendations

- 1) Conduct fish population assessment surveys on an every-four-year basis (next survey scheduled in summer 2012) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from black crappie, walleye, and yellow perch to assess age and growth information.
- 3) Stock walleye when available and survey data indicates a need.
- 4) Evaluate walleye population dynamics and implement regulations to benefit the population and comply with tool box options.
- 5) Monitor water levels and winter-/summer-kill events. In cases of complete winter- or summer-kill, stock northern pike and yellow perch to re-establish a new fish community.
- 6) Encourage commercial harvest of black bullhead to limit abundance if the abundance exceeds the management objective. At the time of this survey, the abundance of black bullhead in White Lake did not necessitate the need for commercial harvest.

Table 1. Mean catch rate (CPUE; catch/net night) 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 experimental gill nets and frame nets in White Lake, 2008. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). . BLB= black bullhead; BLC= black crappie; COC= common carp; NOP= northern pike; WAE= walleye; WHS= white sucker; YEP= yellow perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
<i>Frame nets</i>								
BLB	14.5	6	91	3	6	3	96	1
BLC	47.3	14.5	99	1	18	2	94	< 1
NOP	0.2	0.1	100	0	100	0	89	37
WAE	2.5	0.7	3	6	0	---	82	1
WHS	3.3	1.4	100	0	100	0	82	1
YEP	0.6	0.4	100	0	29	35	93	7
<i>Gill nets</i>								
BLB	25.0	17	81	8	3	3	101	1
BLC	3.7	3.8	100	0	27	26	97	3
COC	0.3	0.7	0	---	0	---	81	---
NOP	1.7	0.6	100	0	40	52	91	5
WAE	10.0	6.8	3	6	0	---	88	1
WHS	3.3	2.3	100	0	100	0	100	4
YEP	18.0	17.5	72	11	2	3	102	1

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured in experimental gill nets and frame nets in White Lake, 2003-2008. BLB= black bullhead; BLC= black crappie; COC= common carp; NOP= northern pike; WAE= walleye; WHS= white sucker; YEP= yellow perch

Species	2003	2004	2005	2006 ¹	2007 ¹	2008	Mean
<i>Frame nets</i>							
BLB	25.4	---	---	11.1	---	14.5	17.0
BLC	132.1	---	---	49.8	---	47.3	76.3
COC	0.0	---	---	0.3	---	0.0	0.1
NOP	0.3	---	---	0.1	---	0.2	0.2
WAE	0.0	---	---	0.3	---	2.5	0.9
WHS	1.1	---	---	8.1	---	3.3	4.2
YEP	4.3	---	---	18.9	---	0.6	7.9
<i>Gill nets</i>							
BLB	11.0	20.7	11.7	4.3	8.7	25.0	13.6
BLC	18.0	33.3	15.7	9.3	4.7	3.7	14.1
COC	0.0	2.0	3.0	4.0	4.3	0.3	2.3
NOP	1.7	2.0	2.7	0.7	0.3	1.7	1.5
WAE	5.0	8.0	7.7	4.3	1.3	10.0	6.1
WHS	3.7	1.3	0.7	2.7	3.0	3.3	2.5
YEP	81.0	76.7	26.0	47.0	7.7	18.0	42.7

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

Table 3. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and relative weight (Wr) for selected species captured in experimental gill nets and frame nets in White Lake, 2003-2008. BLB= black bullhead; BLC= black crappie; WAE= walleye; YEP= yellow perch

Species	2003	2004	2005	2006 ¹	2007 ¹	2008	Average	Objective
<i>Frame nets</i>								
BLB								
CPUE	25	---	---	11	---	15	17	< 100
PSD	64	---	---	83	---	91	79	---
PSD-P	0	---	---	2	---	6	3	---
Wr	95	---	---	91	---	96	94	---
BLC								
CPUE	132	---	---	50	---	47	76	≥ 10
PSD	93	---	---	81	---	99	91	30-60
PSD-P	58	---	---	12	---	18	29	5-10
Wr	100	---	---	103	---	94	99	---
<i>Gill nets</i>								
WAE								
CPUE	5	8	8	4	1	10	6	≥ 10
PSD	7	100	96	46	50	3	50	30-60
PSD-P	7	13	9	23	25	0	13	5-10
Wr	92	96	92	90	84	88	90	---
YEP								
CPUE	81	77	26	47	8	18	43	≥ 25
PSD	10	57	40	33	43	72	43	30-60
PSD-P	0	2	0	0	4	2	1	5-10
Wr	99	80	91	108	94	102	96	---

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 black crappie captured in frame nets in White Lake, 2006-2008. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	N	Age											
		1	2	3	4	5	6	7	8	9	10	11	12
2008	565	---	---	214	234	261	271	284	---	254	304	---	295
2006	573	---	166	218	274	258	286	292	308	---	---	---	---

Table 5. Number of black crappies sampled (n), by year class using frame nets in White Lake, 2006-2008.

Survey Year	Year Class												
	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996
2008	---	---	---	194	264	56	27	2	---	17	6	---	2
2006	---	---	---	---	61	468	12	7	4	20	1	---	---

Table 6. Weighted mean length at capture (mm) for walleye captured in experimental gill nets in White Lake, 2003-2008. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	N	Age							
		1	2	3	4	5	6	7	8
2008 ¹	32	209	286	343	---	---	---	---	---
2007 ¹	3	---	322	330	---	498	---	---	---
2006 ¹	14	226	300	371	509	---	---	---	---
2005 ¹	24	---	255	---	460	---	---	---	664
2004	24	---	---	423	590	---	---	574	---
2003	15	---	332	---	---	---	555	---	---

¹ Fish aged using otoliths; scales used previous years.

Table 7. Stocking history including size and number for fishes stocked into White Lake, 1997-2008.

Year	Species	Size	Number
1998	SXW	juvenile	1,460
2005	WAE	large fingerling	(spring) 1,060
	WAE	large fingerling	(fall) 9,170
2006	WAE	small fingerling	19,000
2008	WAE	fry	250,000

Table 8. Numbers of walleye sampled (n) by year class and associated stocking history (Number stocked x 1,000) for walleye captured in White Lake, 2003-2008.

Survey Year	Year Class											
	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997
2008 ¹		2	7	23								
2007 ^{1,2}	---			1	1		1					
2006 ^{1,2}	---	---		2	5	2	5					
2005 ¹	---	---	---			1		21				1
2004	---	---	---	---				21	2			1
2003	---	---	---	---	---			14				1
Number stocked												
fry	250											
small fingerling			19									
large fingerling				10							1	

¹ Fish aged using otoliths; scales used previous years.

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

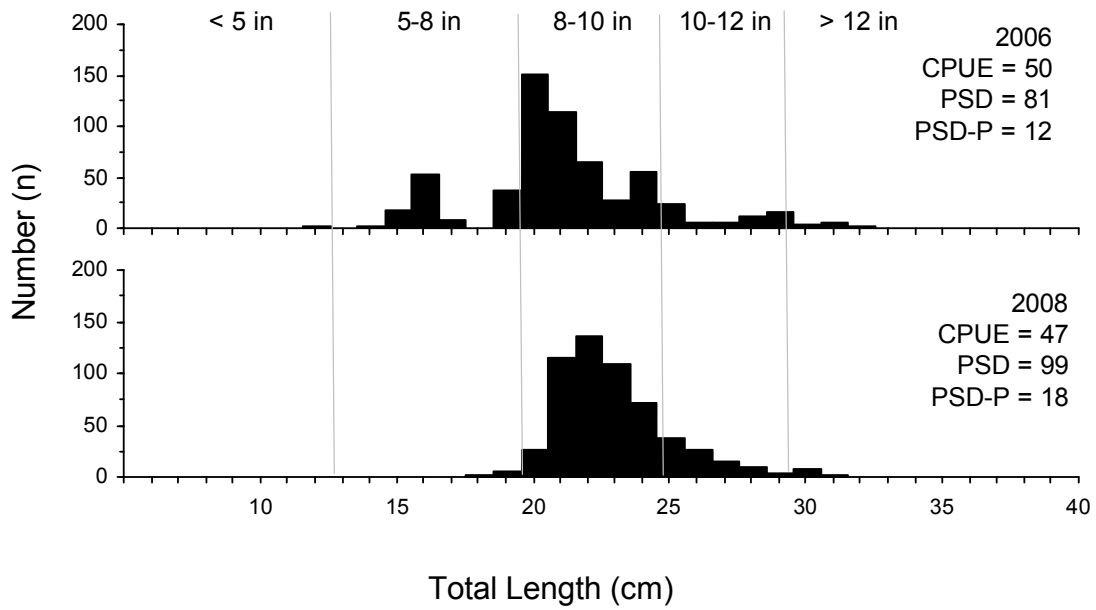


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using frame nets in White Lake, 2006 and 2008.

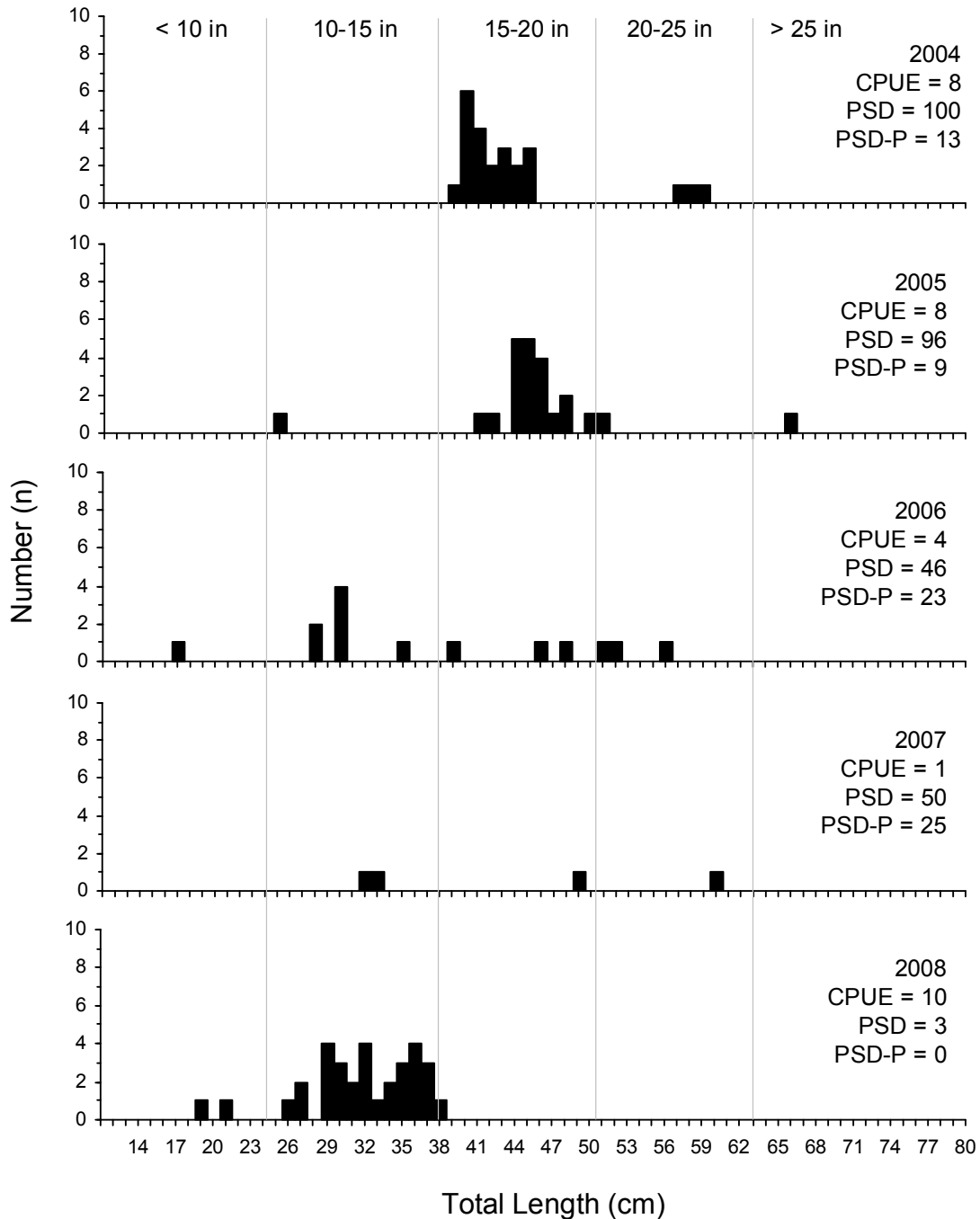


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in White Lake, 2004-2008.

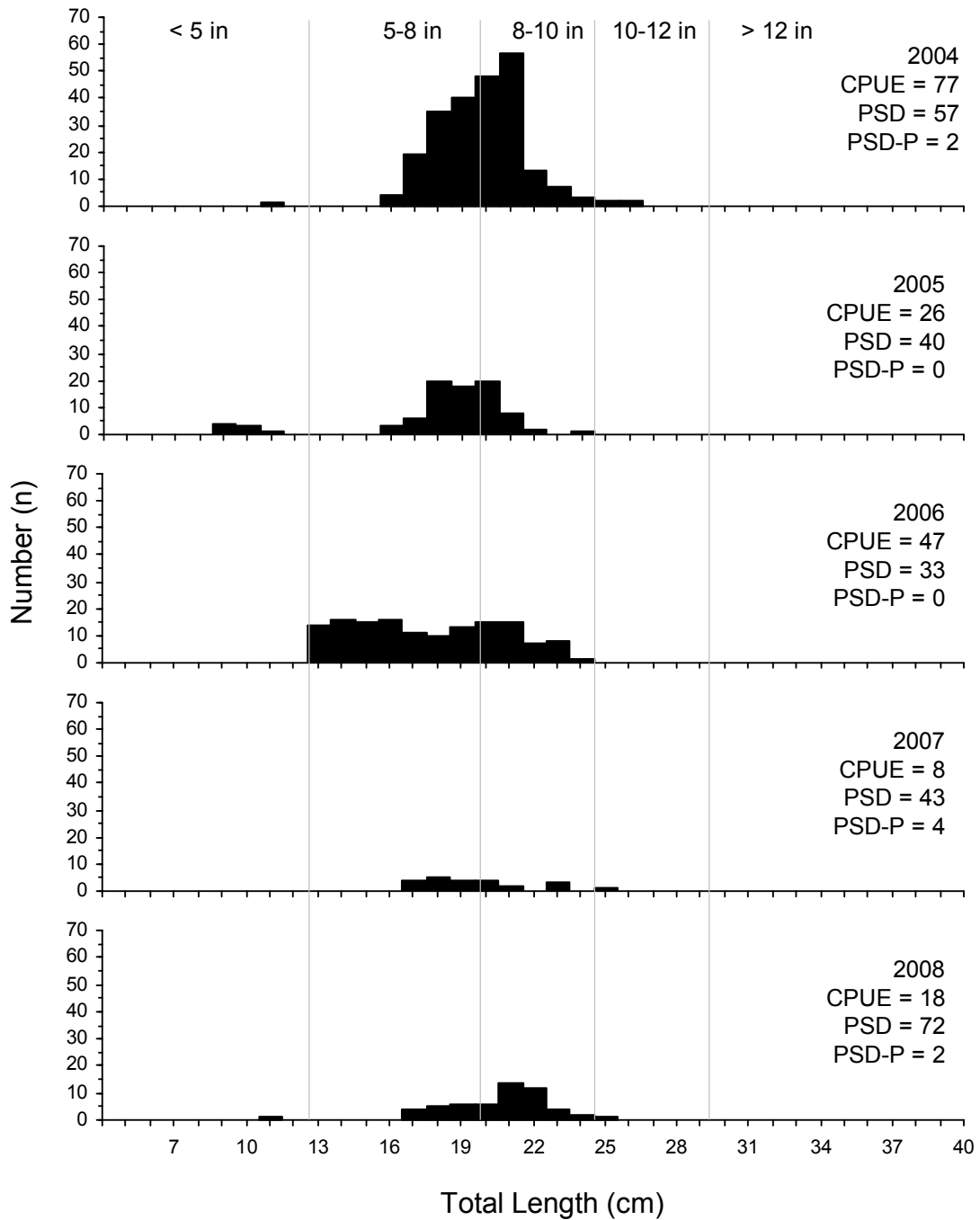


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in White Lake, 2004-2008.

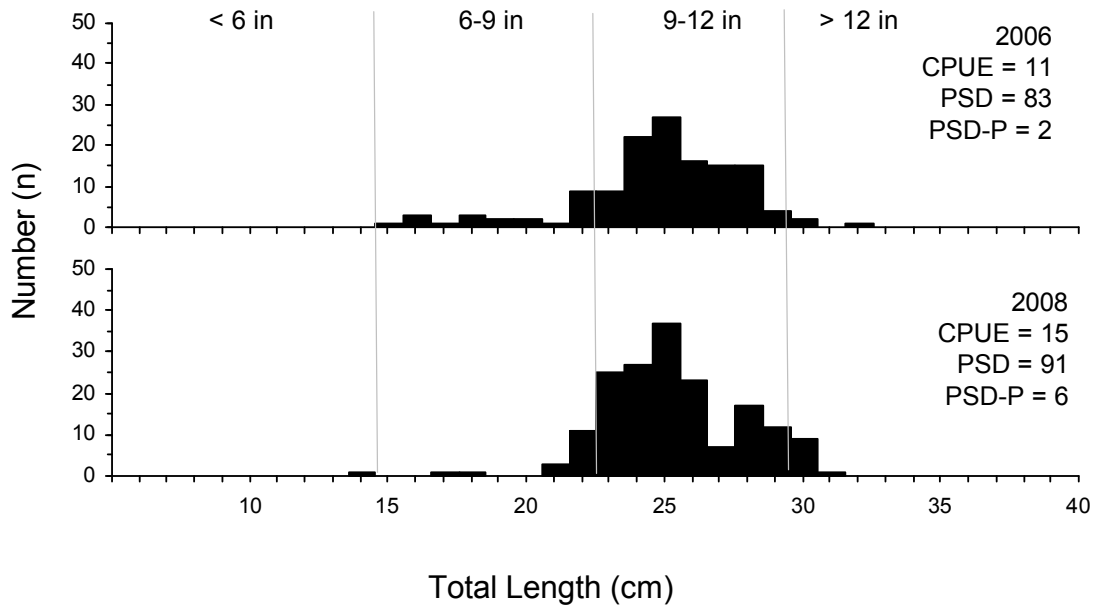


Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using frame nets in White Lake, 2006 and 2008.