

Amsden Dam

Site Description

Location

Water designation number (WDN)	22-0001-00
Legal description	T122N-R59W-Sec.19-20, 29-30
County (ies)	Day
Location from nearest town	3.5 miles south and 3.0 miles west of Andover, SD

Survey Dates and Sampling Information

Survey dates	September 9-10, 2014 (FN, GN)
Frame net sets (n)	12
Gill net sets (n)	3

Morphometry

Watershed area (acres)	31,961
Surface area (acres)	235
Maximum depth (ft)	27
Mean depth (ft)	9

Ownership and Public Access

Amsden Dam is an impoundment managed by the SDGFP. A state park (including camp sites and boat ramp) is located centrally on the southern shoreline of Amsden Dam (Figure 1; Figure 2). Lands adjacent to the lake are under state and private ownership.

Watershed and Land Use

Land use within the Amsden Dam watershed is primarily agricultural including a mix of grassland (i.e., hay land, rangeland, and CRP), cropland, and scattered shelterbelts.

Water Level Observations

No water level observations were made in 2014.

Fish Management Information

Primary species	black crappie, bluegill, muskellunge, walleye
Other species	black bullhead, common carp, green sunfish, largemouth bass, northern pike, rock bass, smallmouth bass, white bass, white sucker, yellow perch
Lake-specific regulations	none
Management classification	warm-water permanent
Fish Consumption Advisories	none

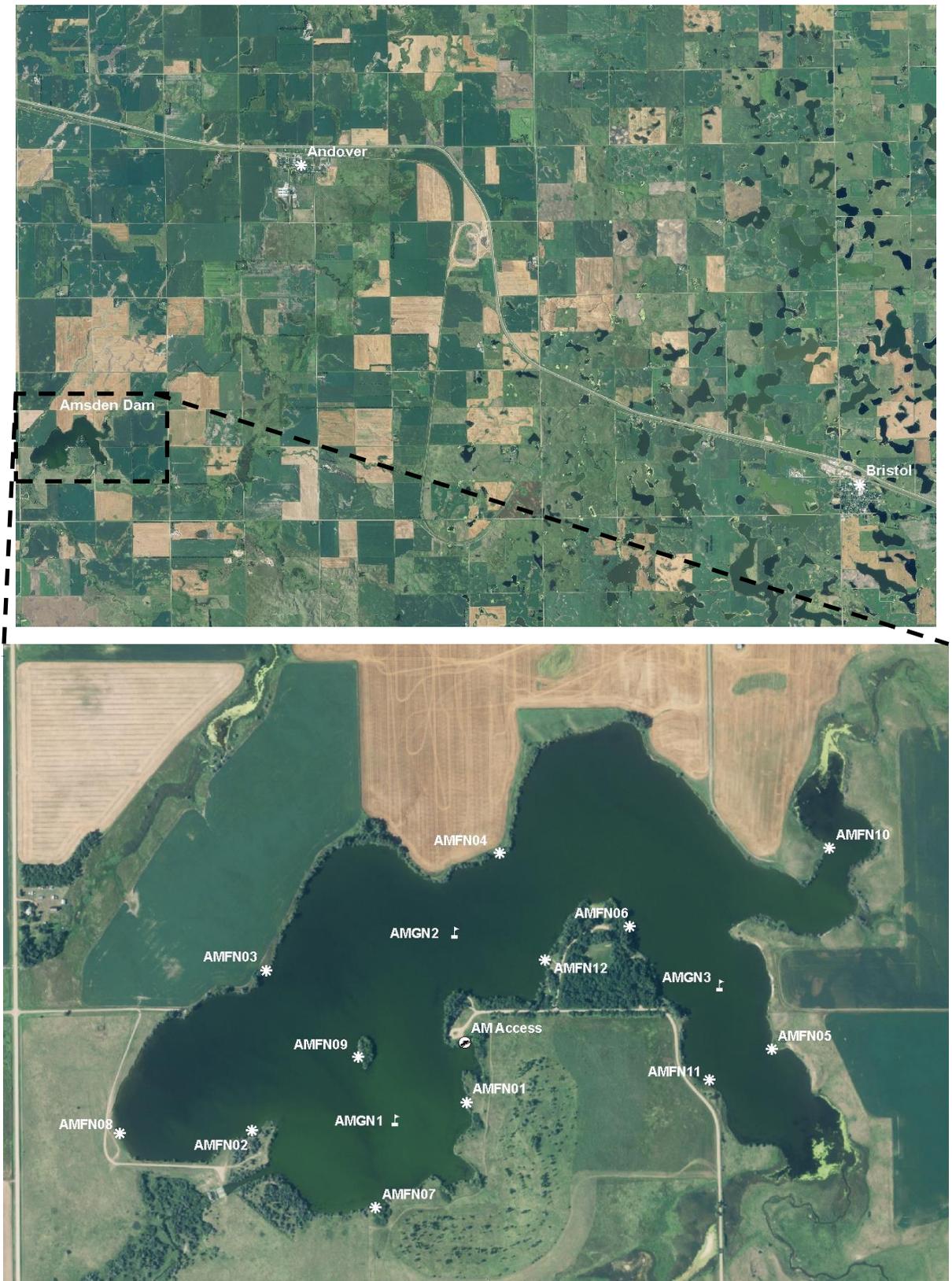


Figure 2. Map depicting geographic location of Amsden Dam from Andover, Day County, South Dakota (top). Also noted is the public access location and standardized net locations for Amsden Dam (bottom). AMFN= frame net; AMGN= gill net

Management Objectives

- 1) Maintain a mean frame net CPUE of stock-length black crappie ≥ 10 , a PSD of 30-60, a PSD-P of 5-10.
- 2) Maintain a mean frame net CPUE of stock-length bluegill ≥ 25 , a PSD of 30-60, a PSD-P of 5-10.
- 3) Maintain a low-density muskellunge population (i.e., one 30-in fish/5 acres) that provides a unique angling opportunity in northeastern South Dakota.
- 4) Maintain a mean gill net CPUE of stock-length walleye ≥ 10 , 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

Amsden Dam is an impoundment created on Mud Creek in 1936, by the Work Progress Administration. There are two main water sources for Amsden Dam, Peckerel Creek in the northeast corner and Mud Creek in the southeast corner (Figure 1). The Mud Creek outlet is located on the western edge of the dam face and is the only outlet (Figure 1).

Prior to 2004, fisheries survey activities were designed around the existing muskellunge population. Survey gears were limited to spring and fall night electrofishing, and frame netting during cool water periods, in an effort to minimize the risk of killing muskellunge. This approach limited the ability to monitor the status of certain species commonly assessed utilizing gill nets (i.e., northern pike, walleye, and yellow perch). In the fall 2004, standard fish population assessments began utilizing gill nets, frame nets, and electrofishing. Currently, Amsden Dam is primarily managed as a panfish (i.e., black crappie and bluegill), muskellunge, and walleye fishery.

Primary Species

Black crappie: The mean frame net CPUE of stock-length black crappie in 2014 was 3.1 (Table 1) and below the minimum objective (≥ 10 stock-length black crappie/net night; Table 3). Since 2004, the mean frame net CPUE of black crappie has ranged from a low of 0.3 (2004) to a high of 13.3 (2011; Table 2).

Black crappie captured in the frame net catch ranged in TL from 7 to 27 cm (2.8 to 10.6 in; Figure 3). The PSD of 89 and the PSD-P of 86 were both above management objectives of 30-60 and 5-10, respectively, indicating a population comprised of larger individuals (Table 1; Table 3).

Otoliths were collected from a sub-sample of frame net captured black crappie in 2014. Age structure information indicated relatively consistent recruitment with five of the last six potential year classes being present (2009-2011, 2013-2014; Table 4). The 2010 year class comprised about 85% of stock-length black crappie in the frame net catch (Table 4; Table 5: Figure 3).

Black crappie from Amsden Dam exhibit relatively-fast growth. In 2014, weighted mean length at capture values were 268 mm (10.5 in) at age 3 and 293 mm (11.5 in) at age 4 (Table 5). A slight decreasing trend in black crappie condition was apparent as TL increased; however, mean Wr values exceeded 100 for all length categories sampled. The mean Wr of stock-length black crappie in the frame net catch was 108 (Table 1).

Bluegill: The 2014 mean frame net CPUE was 1.3 (Table 1) and well below the minimum objective for bluegill in Amsden Dam (≥ 25 stock-length bluegill/net night; Table 3). Since 2004, the mean frame net CPUE of bluegill has ranged from a low of 0.0 (2011) to a high of 16.2 (2006; Table 2). Currently, relative abundance is considered low.

Muskellunge: Amsden Dam is one of two lakes in northeastern South Dakota managed for muskellunge. Muskellunge fingerlings of various sizes, have been stocked into Amsden Dam since 1975. Biennial muskellunge stockings are scheduled to take place in conjunction with Lynn Lake, but the frequency of stockings depends upon availability. The goal is to maintain a low-density muskellunge population (one 30-inch fish/5 acres) that would provide anglers a diverse and unique opportunity in NE South Dakota.

Muskellunge have proven difficult to sample in Amsden Dam as only three adult muskellunge have been sampled during biennial fish community surveys conducted from 2004-2014. In 2014, a single muskellunge with a TL of 620 mm (24.4 in) and weight of 1534 g (3.4 lb) was captured by gill nets during the fish community survey (Table 1).

In recent years, both standard and large frame nets have been deployed shortly after ice-out to collect both walleye broodstock (for spawning) and muskellunge. In 2014, four muskellunge that ranged in TL from 79 to 99 cm (31.1 to 39.0 in) were captured; one of these fish was captured on three separate occasions. As a result, the muskellunge population in Amsden Dam was estimated at 13 fish (95% CI, 8-17) in 2014.

Walleye: The mean gill net CPUE of stock-length walleye was 14.3 (Table 1) and above the minimum objective (≥ 10 stock-length walleye/net night; Table 3). The 2014 gill net CPUE represented an increase from the 12.3 observed in 2011 (Table 2).

Walleye captured in gill nets ranged in TL from 15 to 67 cm (5.9 to 26.4 in), had a PSD of 72 and a PSD-P of 12 (Table 1). Both the PSD and PSD-P were above management objectives of 30-60 and 5-10 (Table 3).

Otoliths were collected from a sub-sample of gill net captured walleye. Eight year-classes (2004, 2008-2014) were present (Table 8). Year classes produced from 2011-2012 were the most represented and collectively comprised 55% of walleye in the

gill net catch (Table 8). The 2004, 2008, 2012 and 2014 year-classes correspond with stocking events; while the 2009, 2010, 2011 and 2013 year-classes were naturally produced (Table 8; Table 10). The contribution of stocked or naturally-produced walleye to year class strength during stocked years is unknown, as stocked walleye were unmarked making it difficult to differentiate stocked from naturally-produced walleye. The capture of three individuals from the 2014 (age-0) year class may indicate a potentially strong 2014 year-class as this cohort was not fully recruited to our gear at the time of sampling.

Walleye in Amsden Dam generally attain quality-length (38 cm; 15 in) between age-2 and age-4 (Table 8). Since 2006, the weighted mean TL at capture for age-2 walleye has ranged from 296 to 381 mm (11.7 to 15.0 in); while the weighted mean TL at capture for age-3 walleye has ranged from 345 to 433 mm (13.6 to 17.0 in). Walleye captured in the 2014 gill net catch had mean Wr values that ranged from 82 to 104 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length walleye being 91 (Table 1). No length-related trends in condition were apparent.

Other Species

Black bullhead: The mean frame net CPUE of stock-length black bullhead was 42.8 (Table 1) and within the management objective (≤ 100 stock-length black bullhead/net night; Table 3). Based on the 2014 frame net CPUE, relative abundance is considered high.

Black bullhead sampled in the frame net catch ranged in TL from 10 to 33 cm (3.9 to 13.0 in), had a PSD of 76 and a PSD-P of 43 (Table 1; Figure 6). No age or growth information was collected. Frame net captured black bullheads were in good condition with mean Wr's > 90 for all length categories (e.g., stock-quality) sampled. The mean Wr of stock-length individuals was 93 and no length-related trends in condition were apparent.

Rock Bass: The mean frame net CPUE of stock-length rock bass was 5.3 (Table 1). Since 2004, the mean frame net CPUE has ranged from 2.9 (2004) to 29.7 (2011). Currently, relative abundance is considered moderate.

Length-frequency analysis of rock bass in the 2014 frame net catch indicated consistent recruitment, with nearly all 1-cm length groups from 9 and 24 cm represented. No age and growth information was collected in 2014. Rock bass in the 2014 frame net catch had high condition with mean Wr values that exceeded 99 for all length categories (e.g., stock-quality) sampled. A slight increasing trend in condition was apparent as TL increased.

Yellow Perch: The mean gill net CPUE of stock-length yellow perch increased from 19.0 in 2011 to 49.3 in 2014 (Table 1; Table 2). Gill net captured yellow perch ranged in TL from 11 to 29 cm (4.3 to 11.4 in), had a PSD of 11 and PSD-P of 4 (Table 1; Figure 8). Individuals from the 2013 cohort that ranged in TL from 11 to 19 cm (4.3 to 7.5 in) comprised a high proportion (89%) of all yellow perch in the gill net catch (Table 11; Figure 8).

Other: Common carp, northern pike, smallmouth bass and white sucker were also captured during the 2011 survey (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys using standard frame nets and experimental gill nets on an every third year basis (next survey scheduled in summer 2017) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from black crappie, bluegill, walleye, and yellow perch to assess the age structure and growth rates of each population.
- 3) Conduct annual spring trap netting using large frame nets to monitor muskellunge population parameters (e.g., abundance, size structure, etc).
- 4) Stock 500 (\approx 12-inch) muskellunge fingerlings on a biennial basis, to maintain a low density population which provides a unique angling opportunity in northeastern South Dakota. However, if stocking success does not improve muskellunge management in Amsden Dam should be re-considered.
- 5) Maintain statewide 1,016-mm (40-inch) minimum length restriction on muskellunge in an effort to develop a unique trophy fishery.
- 6) Stock walleye (\approx 100 small fingerling/acre) on a biennial basis to establish additional year classes.

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 frame nets and experimental gill nets from Amsden Dam, 2014. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; MUE= muskellunge; NOP= northern pike; ROB= rock bass; SMB= smallmouth bass; 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	42.8	20.6	76	4	43	4	93	2
BLC	3.1	1.4	89	9	86	10	108	1
BLG	1.3	0.7	31	21	19	18	110	3
COC	0.1	0.1	100	---	100	---	---	---
NOP	0.6	0.3	86	28	43	39	90	3
ROB	5.3	2.3	41	11	6	5	105	<1
SMB	2.3	1.5	22	14	19	13	110	1
WAE	0.5	0.4	100	0	17	33	92	5
WHS	0.8	0.6	89	21	89	21	101	12
YEP	0.9	0.6	64	34	36	34	87	2
<i>Gill nets</i>								
BLB	28.7	24.6	71	8	20	7	96	1
BLC	14.7	12.2	52	13	52	13	117	2
BLG	0.3	0.6	100	---	100	---	118	---
COC	0.3	0.6	0	---	0	---	105	---
MUE	0.3	0.6	0	---	0	---	93	---
NOP	1.3	1.3	50	50	0	---	83	3
ROB	3.0	2.9	67	31	22	28	106	4
SMB	3.7	3.3	0	---	0	---	115	3
WAE	14.3	2.7	72	12	12	9	91	1
WHS	9.0	8.5	89	11	78	14	101	2
YEP	49.3	11.2	11	4	4	3	98	1

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured in frame nets and experimental gill nets from Amsden Dam, 2004-2014. BLB= black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; MUE= muskellunge; NOP= northern pike; ROB= rock bass; SMB= smallmouth bass; WAE= walleye; WHS= white sucker; YEP= yellow perch

Species	CPUE				
	2004	2006 [†]	2008	2011	2014
<i>Frame nets</i>					
BLB	3.6	0.1	15.6	117.8	42.8
BLC	0.3	10.3	5.0	13.3	3.1
BLG	0.7	16.2	9.9	0.0	1.3
COC	0.1	0.2	0.1	0.6	0.1
NOP	0.2	0.9	0.5	0.9	0.6
ROB	2.9	17.1	7.7	29.7	5.3
SMB	1.9	4.4	0.8	3.0	2.3
WAE	1.5	0.5	1.0	1.0	0.5
WHS	0.6	0.3	0.4	0.5	0.8
YEP	1.1	11.7	1.0	2.8	0.9
<i>Gill nets</i>					
BLB	0.3	0.0	44.0	120.0	28.7
BLC	0.7	0.3	1.0	1.3	14.7
BLG	0.0	0.0	0.3	1.0	0.3
COC	0.0	0.0	0.0	0.3	0.3
MUE	0.7	0.0	0.0	0.0	0.3
NOP	0.0	0.0	0.3	0.0	1.3
ROB	1.7	4.0	3.7	7.3	3.0
SMB	0.0	0.3	0.0	0.3	3.7
WAE	6.0	8.7	16.3	12.3	14.3
WHS	0.0	0.7	3.0	11.3	9.0
YEP	3.3	5.7	5.7	19.0	49.3

[†] Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 6. Year class distribution based on the expanded age/length summary for bluegill sampled in frame nets from Amsden Dam, 2008 and 2014.

Survey Year	Year Class											
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	
2014		11		4								
2008	---	---	---	---	---	---	6	38	50	1	4	

Table 7. Weighted mean total length (mm) at capture for bluegill captured in frame nets (expanded sample size) from Amsden Dam, 2008 and 2014.

Year	Age				
	0	1	2	3	4
2014	---	118(11)	---	202(4)	---
2008	96(6)	107(38)	133(50)	200(1)	214(4)

Table 8. Year class distribution based on the expanded age/length summary for walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Amsden Dam, 2006-2014.

Survey Year	Year Class													
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2014	3	4	12	16	5	3	2				1			
2011	---	---	---	4	11	12	10	1	2					1
2008	---	---	---	---	---	---	25	3	30	3	11	2		1
2006 ¹	---	---	---	---	---	---	---	---	5	1	11	8	3	3
# stocked														
fry	120													
sm. fingerling			23				25					26		36
lg. fingerling											22			

¹ Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 9. Weighted mean length at capture (mm) for walleye age-0 through age-10 captured in experimental gill nets (expanded sample size) from Amsden Dam, 2006-2014. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age										
	0	1	2	3	4	5	6	7	8	9	10
2014	175(3)	312(4)	366(12)	430(16)	453(5)	503(3)	540(2)	---	---	---	671(1)
2011	143(4)	295(11)	381(12)	433(10)	532(1)	517(2)	---	---	---	---	573(1)
2008	144(25)	310(3)	375(30)	412(3)	425(11)	446(2)	---	580(1)	---	---	---
2006	187(5)	166(1)	296(11)	345(8)	400(3)	493(3)	---	---	---	---	---

Table 10. Stocking history including size (Size) and number (Number) for fishes stocked into Amsden Dam, 2001-2014. MUE= muskellunge; WAE = walleye

Year	Species	Size	Number
2001	MUE	fingerling	250
	WAE	small fingerling	36,400
2003	WAE	small fingerling	26,000
2004	MUE	fingerling	470
	WAE	large fingerling	21,600
2005	MUE	fingerling	208
2006	MUE	fingerling	250
2008	WAE	small fingerling	24,840
2010	MUE	fingerling	500
2012	MUE	large fingerling	509
	WAE	small fingerling	23,370
2014	MUE	large fingerling	505
	WAE	fry	120,000

Table 11. Year class distribution based on expanded age/length summary for yellow perch sampled in gill nets from Amsden Dam, 2011 and 2014.

Survey Year	Year Class							
	2014	2013	2012	2011	2010	2009	2008	2007
2014	1	136	7	6	3			
2011	---	---	----	4	56			1

Table 12. Weighted mean total length (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Amsden Dam, 2011 and 2014.

Year	Age				
	0	1	2	3	4
2014					
Male	116(1)	144(42)	213(3)	250(1)	---
Female	---	156(94)	225(4)	242(5)	273(3)
Combined	116(1)	152(136)	220(7)	243(6)	273(3)
2011					
Male	93(1)	177(19)	---	---	---
Female	100(3)	182(37)	---	---	321(1)
Combined	98(4)	180(56)	---	---	321(1)

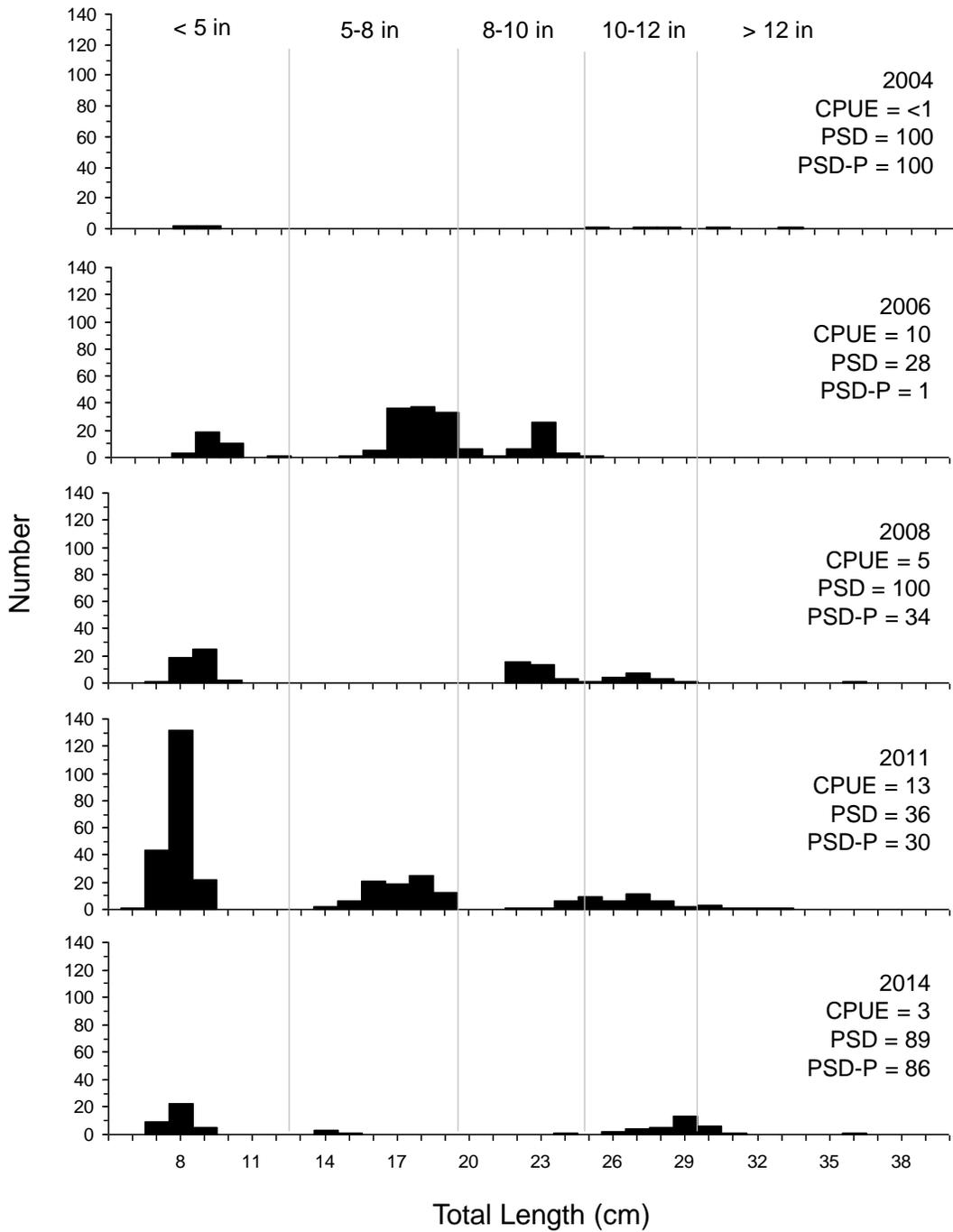


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using frame nets in Amsden Dam, 2004-2014.

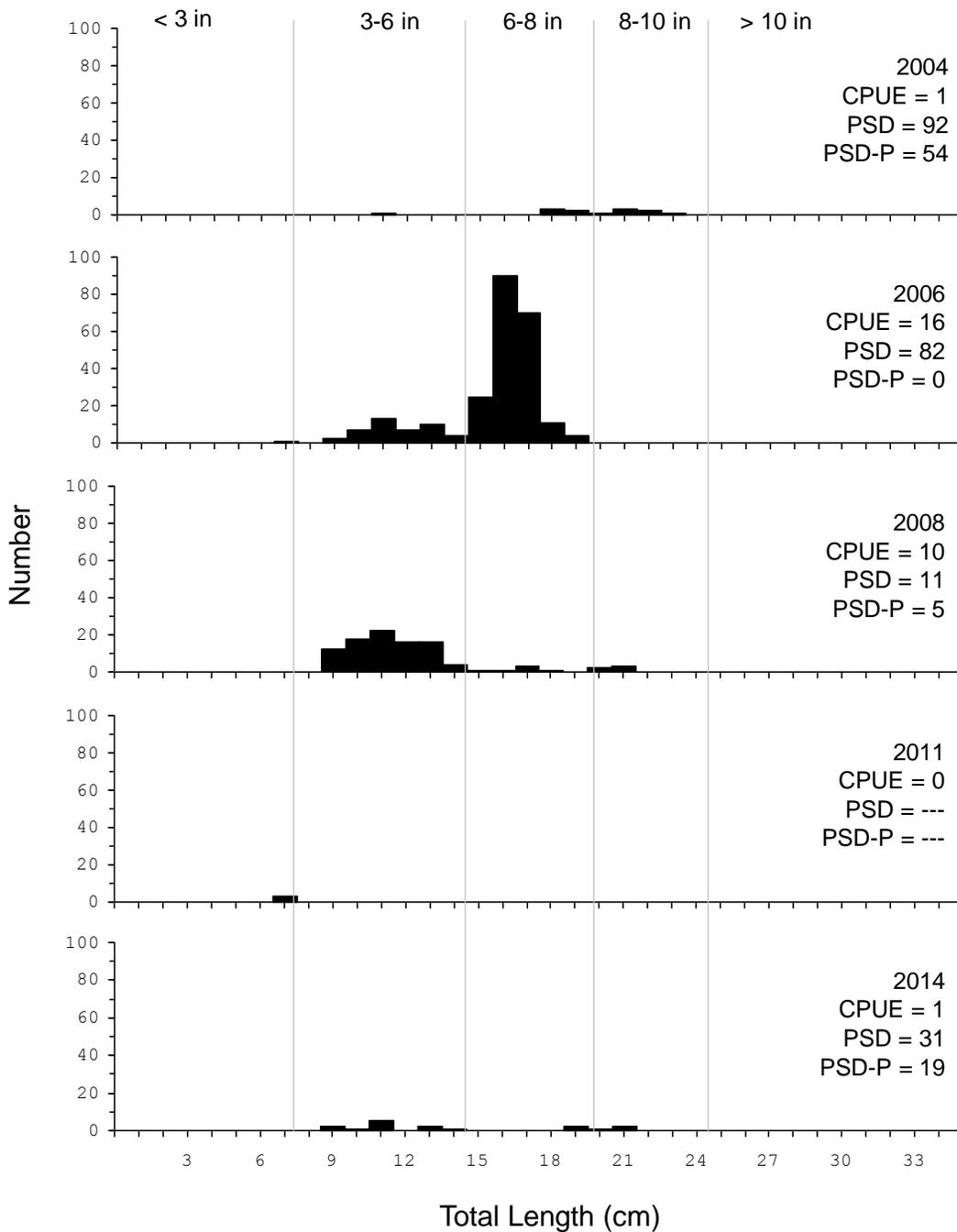


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for bluegill captured using frame nets in Amsden Dam, 2004-2014.

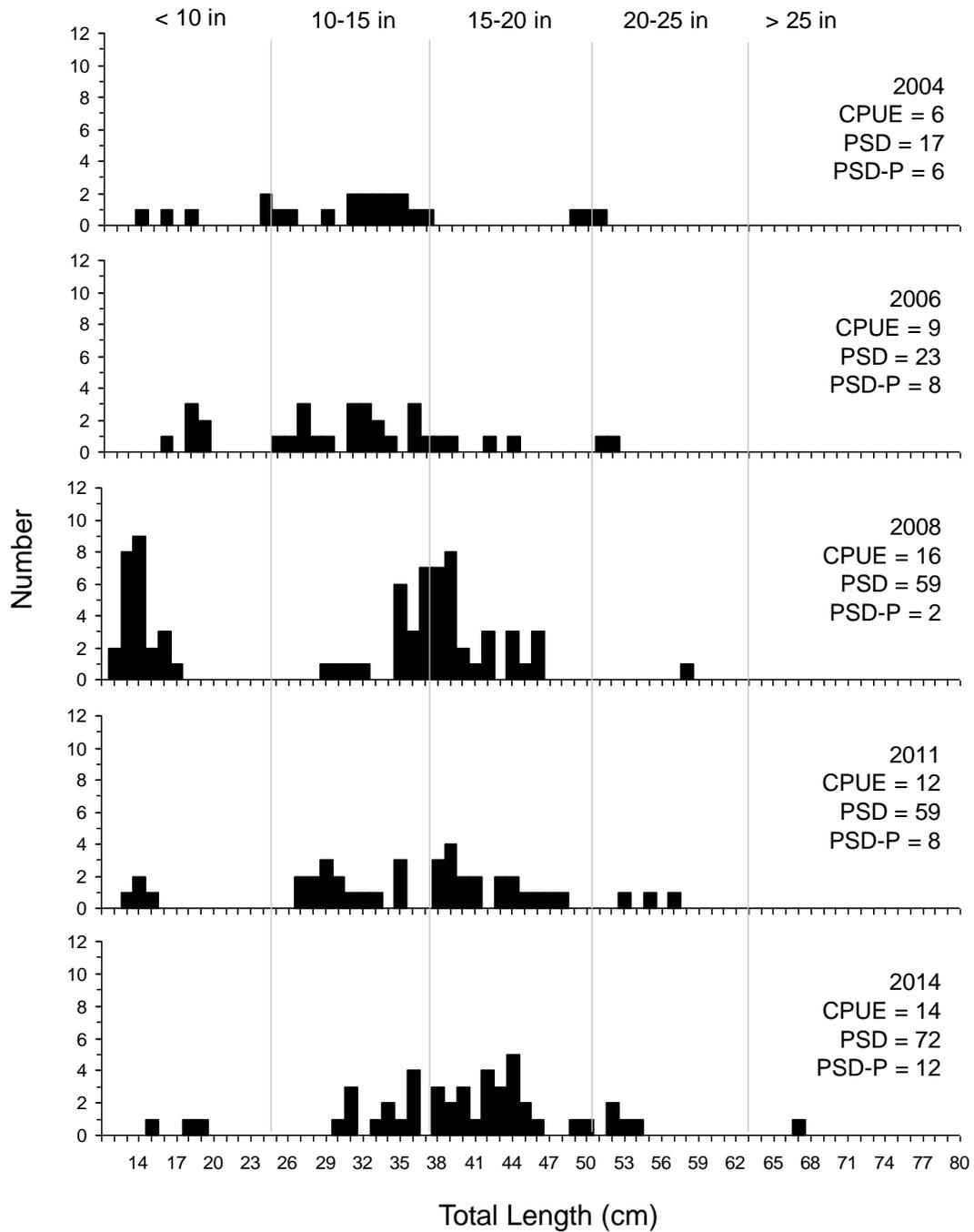


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Amsden Dam, 2004-2014.

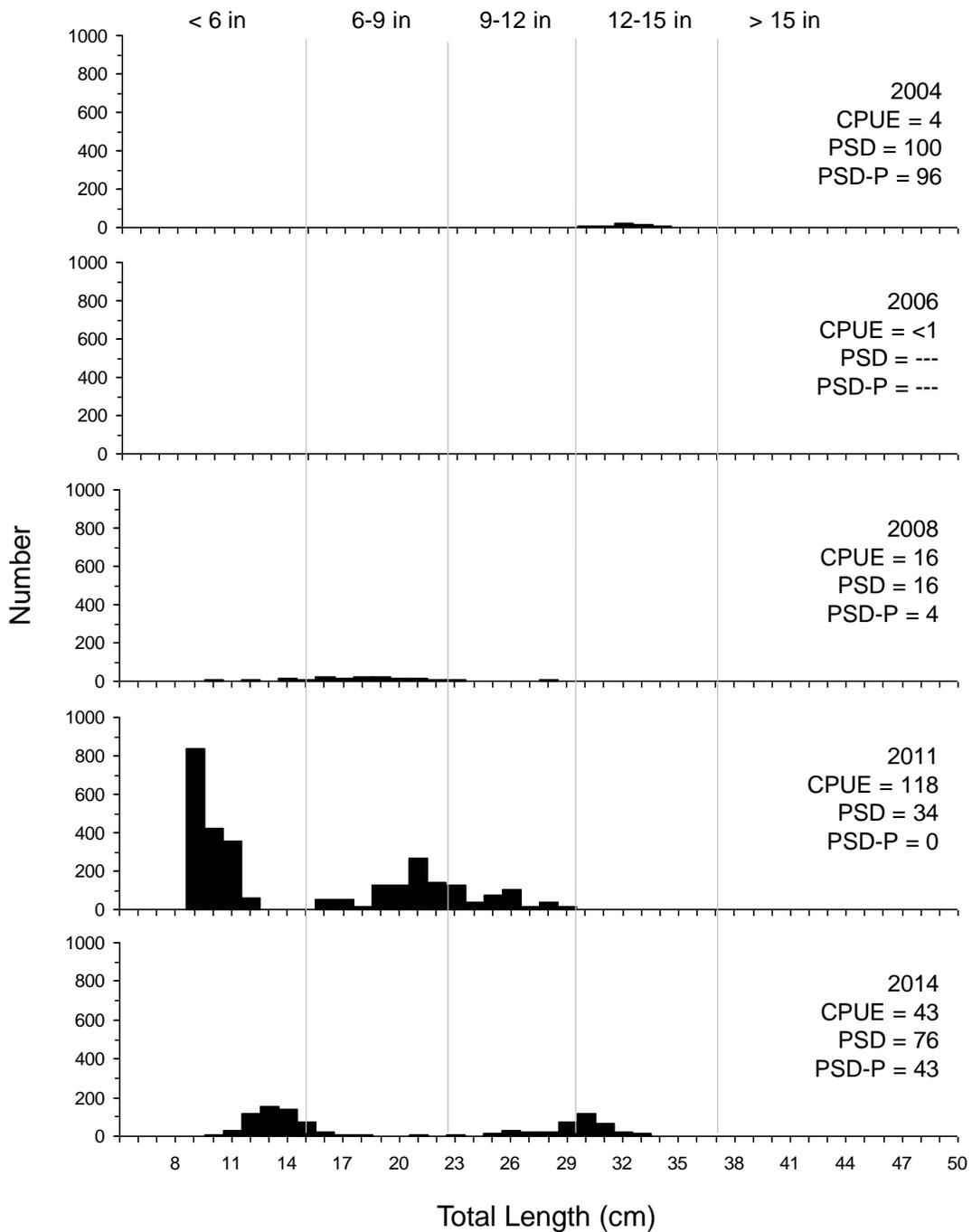


Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using frame nets in Amsden Dam, 2004-2014.

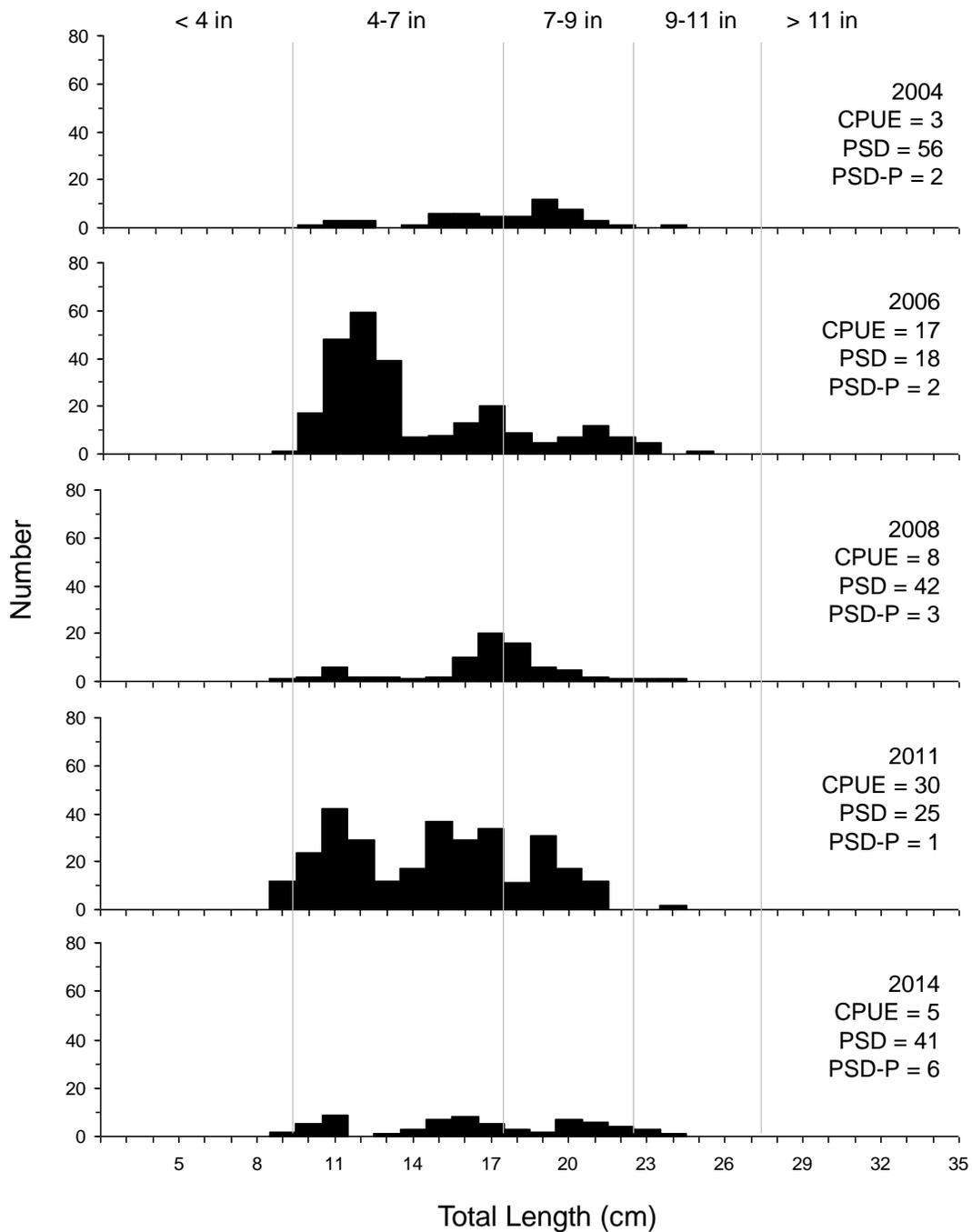


Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for rock bass captured using frame nets in Amsden Dam, 2004-2014.

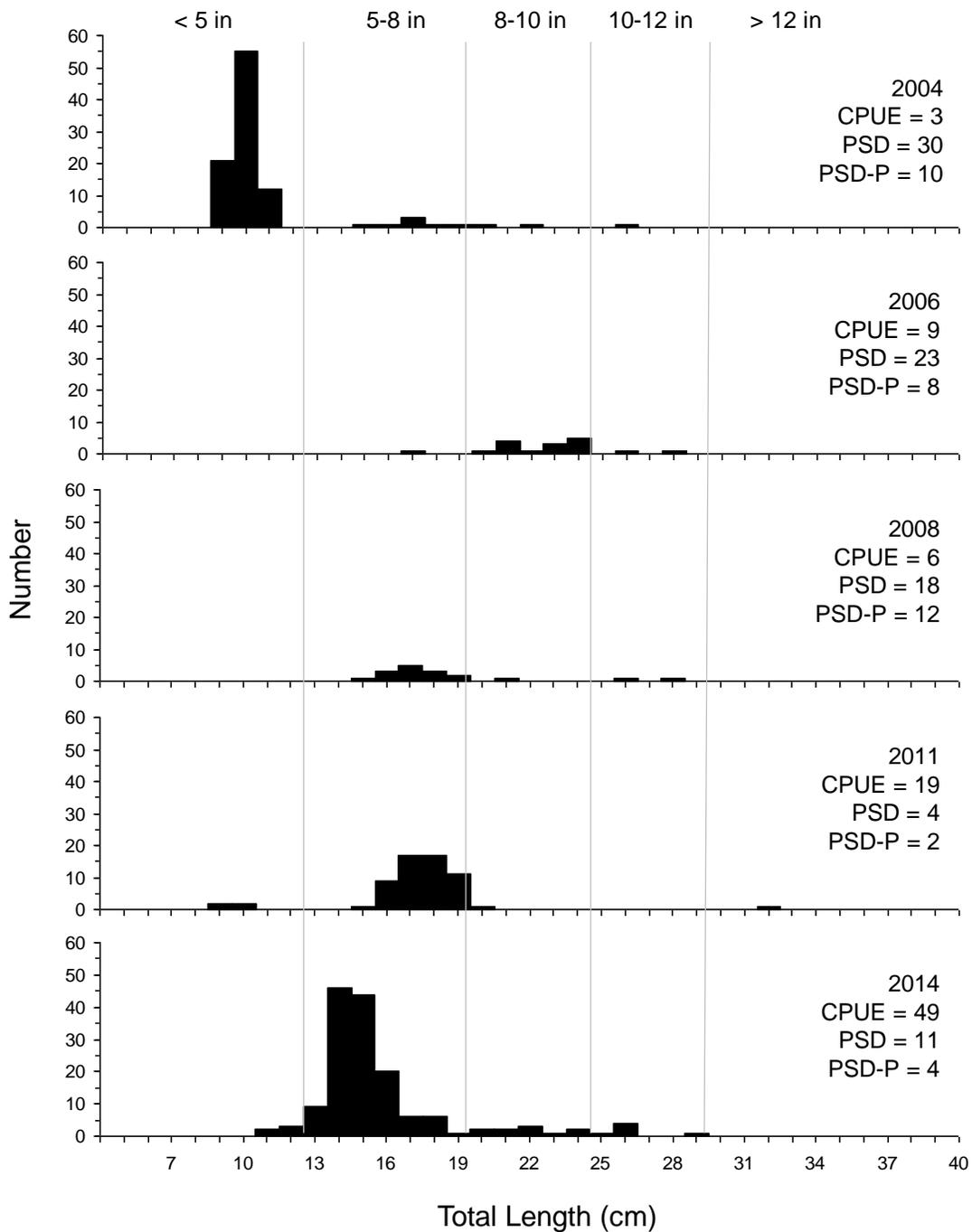


Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Amsden Dam, 2004-2014.