

Mina Lake

Site Description

Location

Water designation number (WDN)	26-0003-00
Legal description	T123N-R66W-Sec.12-14, 23-26
County (ies)	Brown; Edmunds
Location from nearest town	14 miles east of Ipswich, South Dakota

Survey Dates and Sampling Information

Survey dates	July 26-28, 2011 (FN, GN) September 26, 2011 (EF-WAE)
Gill net sets (n)	6
Frame net sets (n)	17
Fall electrofishing-WAE (min)	60

Morphometry (Figure 1)

Watershed area (acres)	195,000
Surface area (acres)	806
Maximum depth (ft)	27
Mean depth (ft)	9

Ownership and Public Access

Mina Lake is an impoundment owned by the State of South Dakota and the fishery is managed by the SDGFP. SDGFP manages two access sites, one within the state park and the other along the southeastern shore near the outlet structure (Figure 3). The shoreline has mixed ownership including the State of South Dakota and private parties.

Watershed and Land Use

Land use within the Mina Lake watershed is primarily agricultural with approximately 47% being cropland (cultivated and non-cultivated) and 40% being range/pastureland (Smith 2002). Housing and small shelterbelts/farmsteads comprise the remaining portions.

Water Level Observations

No water level observations were made in 2011.

Aquatic Nuisance Species Monitoring

Plant Survey

Areas of emergent vegetation, primarily bulrush and cattail, are limited to the upper arms and protected bays of the impoundment. In 2011, the only submersed aquatic plant species identified was sago pondweed. No aquatic nuisance plant species were encountered.

Shoreline Survey

No aquatic nuisance species were identified in 2011.

Fish Community Survey

Common carp was the only aquatic nuisance fish species captured during the 2011 survey; however, a single rudd was captured during the 2002 survey.

Fish Management Information

Primary species	black crappie, bluegill, channel catfish, walleye,
Other species	black bullhead, common carp, emerald shiner, freshwater drum, golden shiner, green sunfish, largemouth bass, northern pike, orange spotted sunfish, rock bass, rudd, shortnose gar, white bass, white sucker, yellow perch
Lake-Specific regulations	none
Management classification	warm-water permanent
Fish Consumption Advisories	none

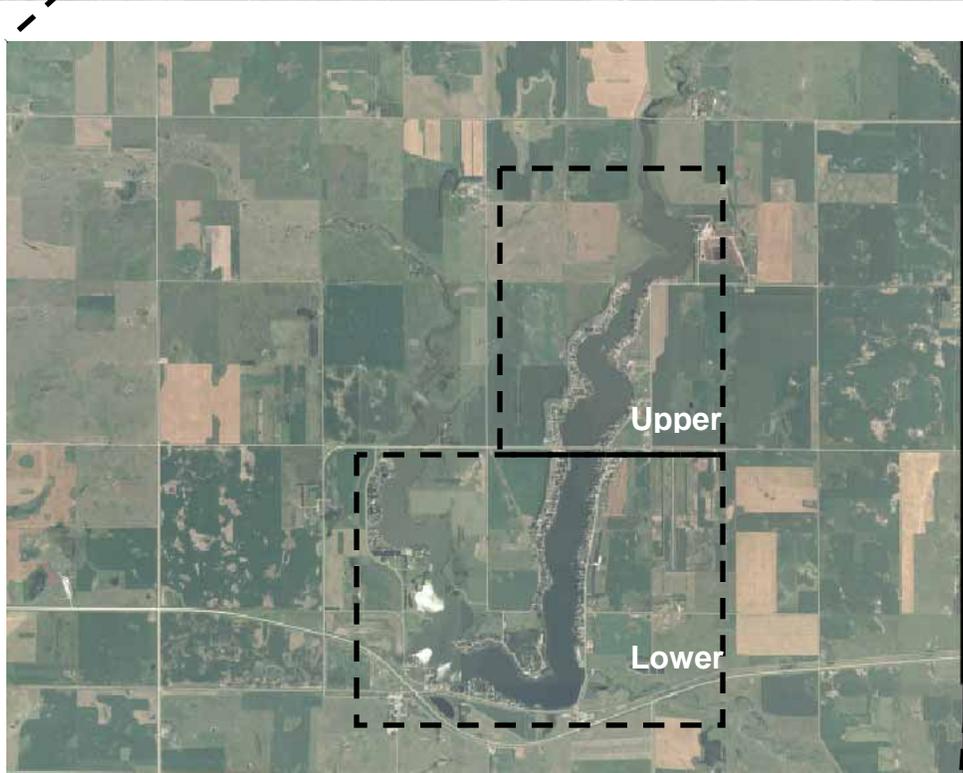
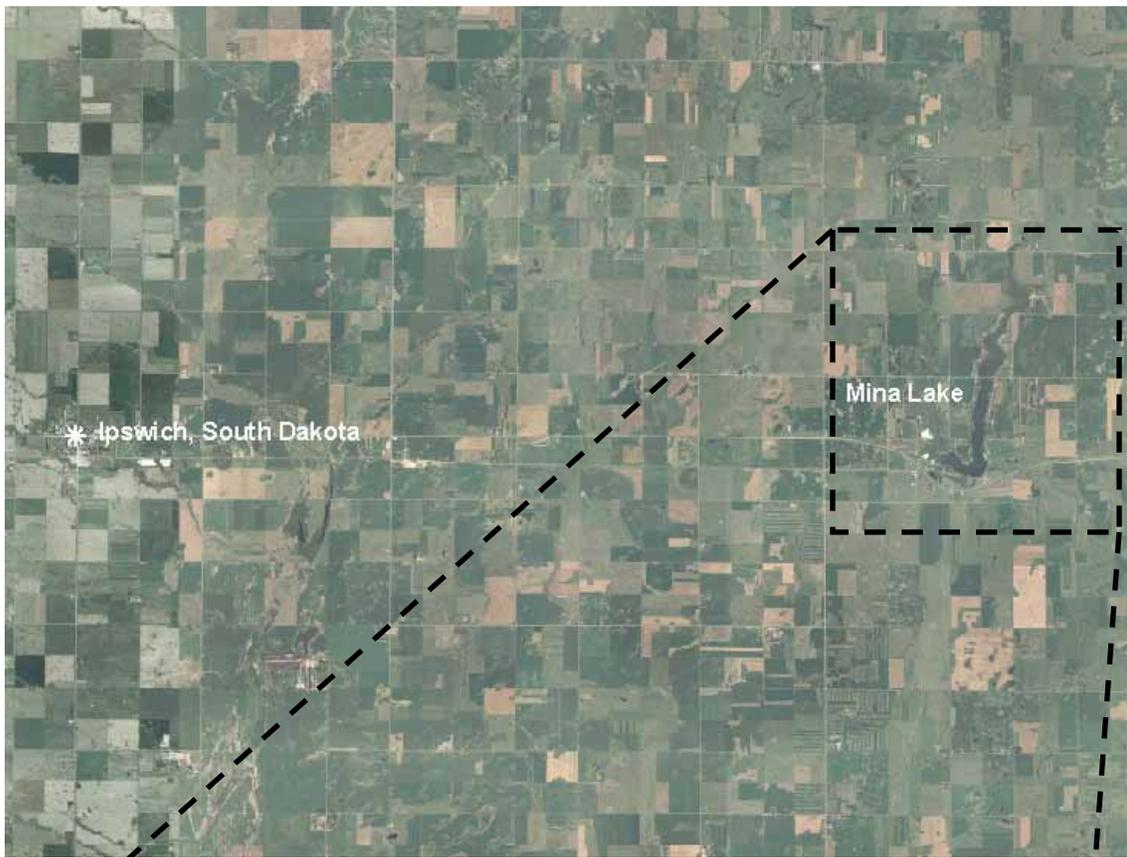


Figure 2. Map depicting geographic location of Mina Lake from Ipswich, Edmunds County, South Dakota (top). Also noted are upper and lower section designations (bottom).

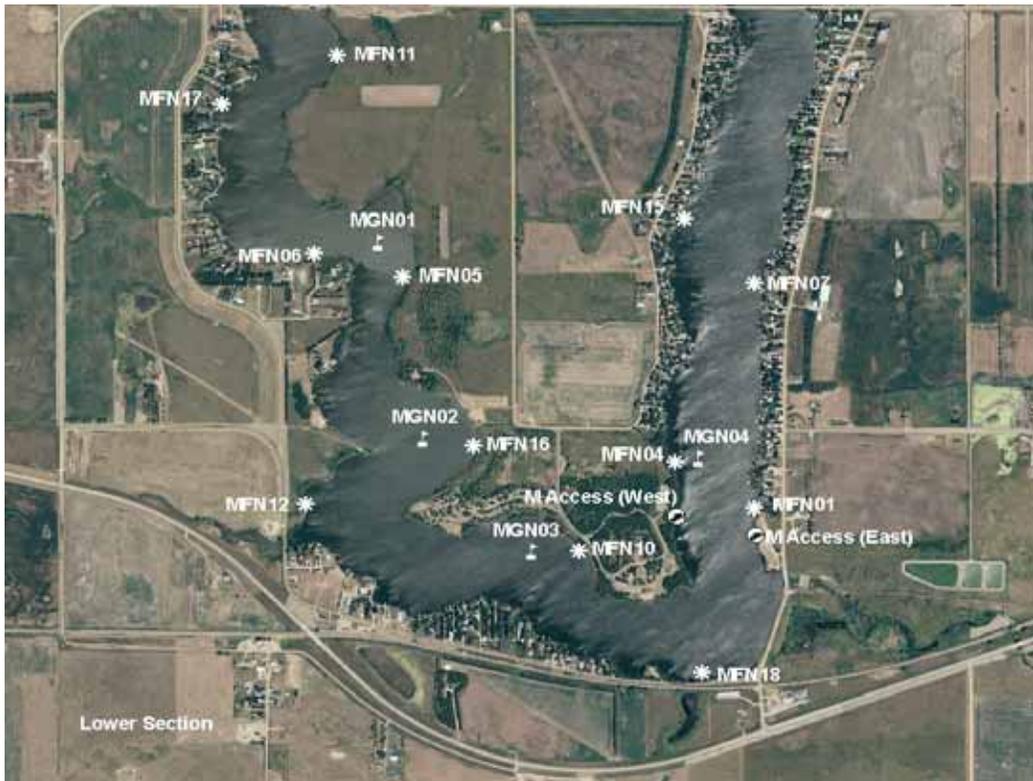


Figure 3. Map depicting access points and standardized net locations for upper and lower sections of Mina Lake, Edmunds County, South Dakota. MFN= frame nets, MGN= gill nets

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 frame net CPUE of stock-length bluegill ≥ 25 , a PSD of 30-60, and a PSD-P of 5-10.
- 3) Maintain a channel catfish population to diversify sport fishing opportunity in Mina Lake.
- 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 bullhead ≤ 100 .

Results and Discussion

Mina Lake is an impoundment constructed in the 1930's on Snake Creek approximately 12 miles west of Aberdeen, South Dakota. Snake Creek drains portions of McPherson, Edmunds, and Brown counties in South Dakota (Smith 2002). Mina Lake is primarily managed as a black crappie, bluegill, channel catfish and walleye fishery.

Primary Species

Black crappie: The mean frame net CPUE of stock-length black crappie was 16.7 (Table 1) and above the minimum objective (≥ 10 stock-length black crappie/net night; Table 3). Since 2003, mean frame net CPUE values have ranged from a low of 0.9 (2005) to a high of 25.9 (2006; Table 2). The 2011 frame net CPUE represented a substantial increase from the 1.1 observed in 2010 (Table 2) and indicated high relative abundance.

Frame net captured black crappie ranged in total length from 13 to 29 cm (5.1 to 11.4 in), had a PSD of 58 and PSD-P of 4 (Table 1; Table 3; Figure 4). The PSD was within the management objective range of 30-60; while the PSD-P was near the objective range of 5-10, indicating a relatively-balanced population (defined as PSD of 30-60 and a PSD-P of 5-10).

Since 2008, otoliths have been collected from a sub-sample of frame net captured black crappie. In 2011, four year classes (2007-2010) were present, with year classes produced in 2009 and 2010 being the most represented (Table 4). Collectively, year classes produced in 2009 (55%) and 2010 (41%) comprised 96% of black crappie in the frame net catch (Table 4).

Black crappie in Mina Lake exhibit average growth and typically attain quality-length (20 cm; 8 in) by age 2 (Table 5). Since 2008, the weighted mean total length at capture for age-2 black crappie has ranged from 204 to 231 mm (8.0 to 9.1 in); while the weighted mean total length at capture for age-3 crappie has ranged from 259 to 280 mm (10.2 to 11.0 in; Table 5). In 2011, the weighted mean total length at capture for age-2 and age-3 black crappie was 213 and 263 mm (8.4 and 10.4 in), respectively (Table 5). Frame net captured black crappie had high condition with mean W_r values that were ≥ 108 for all length categories (e.g., stock to quality) sampled. The mean W_r of stock-length crappie was 113 (Table 1) and no length-related trends in condition were apparent.

Bluegill: The mean frame net CPUE of stock-length bluegill was 3.9 (Table 1) and below the minimum objective (≥ 25 stock-length bluegill/net night; Table 3). Since 2003, the mean frame net CPUE of bluegill has fluctuated from a low of 0.6 (2009) to a high of 10.8 (2007; Table 2). Based on the 2011 frame net CPUE, relative abundance is considered low.

Frame net captured bluegill ranged in total length from 10 to 23 cm (3.9 to 9.1 in; Figure 5). The majority of bluegill in the frame net catch were \geq quality-length which resulted in a PSD of 94 and PSD-P of 13 (Table 1; Figure 5). The PSD and PSD-P were both above management objectives of 30-60 and 5-10 (Table 3).

No age or growth information was collected from bluegill in 2011. Sampled bluegill had mean W_r values that ranged from 108 to 117 for all length categories (e.g., stock to quality) sampled, with the mean W_r of stock-length bluegill being 116 (Table 1) and no length-related trends in condition were apparent.

Channel catfish: From 2003-2006 relative abundance of channel catfish was low with mean frame net CPUE values commonly less than one stock-length channel catfish/net night (Table 2). In 2007, the mean frame net CPUE of stock-length channel catfish increased to 4.8 (Table 1) and the mean frame net CPUE of sub-stock channel catfish was 16.3. The increase in channel catfish relative abundance can likely be attributed to the 2006 stocking of 42,350 fingerlings (Table 8).

From 2007-2011, the relative abundance of channel catfish has remained relatively stable with mean frame net CPUE values ranging from 2.4 to 5.7 channel catfish/net night (Table 2). In 2011, frame net captured channel catfish ranged in total length from 31 to 53 cm (12.2 to 20.9 in; Figure 6). It appears that a high proportion of channel catfish, likely from the 2006 stocking, surpassed quality-length which resulted in the high PSD of 75 (Table 1; Figure 6). No preferred-length channel catfish were sampled (Figure 6).

No growth information was available. All frame net captured channel catfish were in the stock-quality and quality-preferred length categories which had mean W_r values of 94 and 98, respectively.

Walleye: Since 1998, recruitment of both naturally-produced and stocked walleye has been extremely poor in Mina Lake. The cause of the poor walleye recruitment is unknown, but is currently under investigation by a South Dakota State University graduate student.

Walleye of various sizes have been stocked annually from 2002-2011 with limited success (Table 6; Table 8). As a result mean gill net CPUE values for stock-length walleye have remained low (Table 2). In 2010, 43 walleye from the 2009 cohort, most of which were sub-stock length, were captured in the gill net catch (Table 6; Figure 7). Recruitment of walleye from the 2009 year class, which coincided with a small fingerling stocking (Table 6; Table 8) represented the first substantial walleye recruitment in Mina Lake since 1998.

In 2011, gill nets captured 11 stock-length walleye from the 2009 year class that ranged in total length from 27 to 37 cm (10.6 to 14.6 in), which resulted in a mean gill net CPUE of 1.8 (Table 1; Figure 7). Given the low sample size, few inferences can be made concerning the size structure, growth, and condition of walleye in Mina Lake.

Fall night electrofishing in 2011 resulted in a CPUE of 31.0 age-0 walleye/hour (Table 1). The 2011 year class coincides with a small fingerling stocking and represents only the third instance that age-0 walleye have been sampled by fall electrofishing from 2003-2011 (Table 2; Table 8). Recruitment of the 2011 year class is currently unknown and will be assessed in future surveys.

Other Species

Black bullhead: The mean frame net CPUE of stock-length black bullhead was 8.1 (Table 1). Since 2003, mean frame net CPUE values have ranged from 0.9 (2009) to 26.0 (2003) but remained within the objective range (≤ 100 stock-length black bullhead/net night; Table 3).

Frame net captured black bullhead ranged in total length from 11 to 30 cm (4.3 to 11.8 in; Figure 8). The majority of frame net captured black bullheads were in the quality-preferred length category which resulted in the high PSD of 69 (Table 1; Table 3; Figure 8). The PSD-P was 1, as only a single black bullhead \geq preferred-length was sampled (Table 1; Table 3; Figure 8).

No age or growth information was collected. Frame net captured black bullhead exhibited a slight increasing trend in condition as total length increased in 2011. Mean W_r values ranged from 79 to 86 for all length categories (e.g., stock to quality) sampled.

Freshwater Drum: The mean gill net CPUE of stock-length freshwater drum was 7.2 (Table 1) and represented a slight increase from the 6.0 observed in 2010 (Table 2). Since 2003, the mean gill net CPUE of freshwater drum has ranged from a low of 2.7 (2003) to a high of 30.2 (2007; Table 2).

Freshwater drum captured in the 2011 gill net catch ranged in total length from 29 to 40 cm (11.4 to 15.7 in), had a PSD of 95, and a PSD-P of 33 (Figure 9). No age or growth information was available in 2011. Mean W_r values for freshwater drum in the gill net catch ranged from 82 to 98 for all length categories (e.g., stock to quality) sampled. Freshwater drum exhibited a slight decreasing trend in condition as total length increased in Mina Lake.

Yellow Perch: Mina Lake has a low to moderate density yellow perch population that is likely inhibited by habitat characteristics similar to other large impoundments in Region IV (i.e., Richmond Lake and Elm Lake). In 2011, the mean gill net CPUE of stock-length yellow perch was 8.3 (Table 1). Since 2003, the mean gill net CPUE of stock-length yellow perch has fluctuated from 1.7 (2008) to 12.8 (2003; Table 2). Although relatively low abundance limits the yellow perch fishery in Mina Lake, yellow perch present can reach sizes attractive to anglers. Gill net captured yellow perch in 2011 ranged in total length from 14 to 28 cm (5.5 to 11.0 in).

Other: Common carp, northern pike, and white sucker were other fish species captured in low numbers during the 2011 survey (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys on an annual basis (next survey scheduled in summer 2012) to monitor fish relative abundance, fish population size structure, fish growth and stocking success.
- 2) Collect otoliths from black crappie, bluegill, and walleye to assess the age structure and growth rates of each population.
- 3) Stock channel catfish fingerlings (≈ 50 fingerlings/acre) every third year (when available) to bolster the channel catfish fishery in Mina Lake.
- 4) Stock walleye small fingerlings (≈ 100 fingerlings/acre) if gill netting results warrant (i.e., low gill net CPUE of < 250 mm (10 inch) walleye).
- 5) Continue research to explore poor walleye survival.

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 in gill nets, frame nets, and electrofishing in Mina Lake, 2011. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; COC= common carp; FRD= freshwater drum; 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	8.1	5.0	69	7	1	1	83	1
BLC	16.7	5.8	58	5	4	2	113	<1
BLG	3.9	1.8	94	5	13	7	116	1
CCF	5.7	2.6	75	7	0	---	97	1
COC	1.1	0.4	47	20	32	19	91	6
FRD	1.0	0.4	65	21	18	17	94	4
NOP	1.1	0.5	84	15	5	9	77	3
WAE	0.5	0.2	0	---	0	---	89	2
WHS	0.1	<0.1	100	---	100	---	93	---
YEP	1.4	0.6	67	17	4	7	94	<1
<i>Gill nets</i>								
BLB	7.5	3.1	73	11	0	---	93	1
BLC	1.5	1.2	11	21	0	---	118	3
CCF	1.7	2.1	90	18	0	---	100	4
COC	0.2	0.2	100	---	100	---	90	---
FRD	7.2	4.2	95	5	33	12	91	2
NOP	0.3	0.3	50	50	0	---	76	38
WAE	1.8	1.4	0	---	0	---	89	3
WHS	0.2	0.2	100	---	100	---	102	---
YEP	8.3	5.9	40	12	14	8	100	2
<i>Electrofishing</i>								
WAE ¹	31.0	---	---	---	---	---	---	---

¹ Fall electrofishing-WAE; catch rate (CPUE) represents age-0 walleye/hour

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 in frame nets, experimental gill nets, and by electrofishing from Mina Lake, 2003-2011. BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; COC= common carp; COS= common shiner; FRD= freshwater drum; GSF= green sunfish; HYB= hybrid sunfish; NOP= northern pike; OSF= orangespotted sunfish; ROB= rock bass; SHG= shortnose gar; WAE= walleye; WHB= white bass; WHS= white sucker; YEP= yellow perch

Species	CPUE									
	2003	2004	2005	2006 ³	2007 ³	2008	2009	2010	2011	
<i>Frame nets</i>										
BLB	26.0	15.8	11.6	6.0	16.2	5.8	0.9	8.9	8.1	
BLC	11.0	1.3	0.9	25.9	9.0	2.5	3.2	1.1	16.7	
BLG	9.1	6.8	6.4	5.9	10.8	1.8	0.6	1.8	3.9	
CCF	0.0	0.2	0.4	0.6	4.8	2.4	3.6	4.2	5.7	
COC	0.1	1.0	2.4	1.7	6.0	1.9	2.1	1.0	1.1	
FRD	0.4	0.7	1.2	2.3	3.7	2.3	2.1	1.1	1.0	
GSF	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	
HYB ¹	0.0	0.0	0.0	2.0	0.3	0.0	0.2	0.0	0.0	
NOP	1.4	0.8	0.6	0.3	0.2	3.2	2.2	2.4	1.1	
OSF ¹	0.0	0.0	0.0	0.4	11.9	0.0	0.0	0.1	0.0	
ROB	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	
SHG ¹	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	
WAE	0.3	0.1	0.3	0.5	0.2	0.3	0.3	0.3	0.5	
WHB	0.2	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	
WHS	0.2	0.2	0.1	0.7	1.2	0.3	0.3	0.3	0.1	
YEP	0.6	3.1	1.4	2.3	1.1	1.7	1.9	1.0	1.4	
<i>Gill nets</i>										
BLB	7.5	5.5	1.0	6.0	10.3	8.2	12.2	10.7	7.5	
BLC	0.5	0.0	0.0	0.7	0.0	0.0	0.0	0.5	1.5	
CCF	0.3	0.0	0.0	0.7	1.0	1.7	1.8	0.8	1.7	
COC	2.5	2.3	0.8	5.2	15.5	8.7	1.2	0.2	0.2	
FRD	2.7	4.0	8.2	17.0	30.2	19.0	12.8	6.0	7.2	
NOP	0.2	0.5	0.5	0.0	0.0	3.5	1.5	3.3	0.3	
OSF ¹	0.0	0.2	0.0	0.0	0.0	0.5	0.5	0.0	0.0	
WAE	1.3	1.3	0.3	0.5	0.3	1.0	0.2	0.7	1.8	
WHS	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	
YEP	12.8	5.3	9.3	9.2	4.2	1.7	4.3	6.0	8.3	
<i>Electrofishing</i>										
WAE ²	0.0	0.0	0.0	0.0	0.0	0.0	54.9	10.8	31.0	

¹ All fish sizes

² Fall electrofishing-WAE; catch rate (CPUE) represents age-0 walleye/hour

³ Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

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 mean relative weight (Wr) of stock-length fish for selected species captured by frame nets and gill nets in Mina Lake, 2003-2010. BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; FRD= freshwater drum; WAE= walleye

Species	2003	2004	2005	2006 ¹	2007 ¹	2008	2009	2010	2011	Objective
<i>Frame nets</i>										
BLB										
CPUE	26	16	12	6	16	6	1	9	8	≤ 100
PSD	96	99	100	90	23	45	56	74	69	---
PSD-P	4	12	25	47	6	1	0	0	1	---
Wr	84	87	89	87	87	89	88	87	83	---
BLC										
CPUE	11	1	1	26	9	3	3	1	17	≥ 10
PSD	92	100	59	6	100	58	100	20	58	30-60
PSD-P	17	74	59	5	21	44	26	15	4	5-10
Wr	106	103	117	122	113	118	117	118	113	---
BLG										
CPUE	9	7	6	6	11	2	1	2	4	≥ 25
PSD	88	38	71	72	41	94	40	66	94	30-60
PSD-P	31	20	10	7	9	3	30	19	13	5-10
Wr	122	114	119	124	122	124	124	122	116	---
CCF										
CPUE	0	<1	<1	1	5	2	4	4	6	---
PSD	---	100	100	73	0	0	5	29	75	---
PSD-P	---	0	25	36	0	0	0	0	0	---
Wr	---	119	120	109	92	88	101	97	97	---
<i>Gill nets</i>										
FRD										
CPUE	3	4	8	17	30	19	13	6	7	---
PSD	88	100	100	46	12	18	61	86	95	---
PSD-P	19	8	4	27	5	7	17	17	33	---
Wr	89	92	96	101	97	98	96	92	91	---
WAE										
CPUE	1	1	<1	1	<1	1	<1	1	2	≥ 10
PSD	63	100	100	67	100	83	100	0	0	30-60
PSD-P	25	13	50	67	50	33	0	0	0	5-10
Wr	89	96	105	105	100	107	115	82	89	---

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

Table 4. Year class distribution based on the expanded age/length summary for black crappie sampled in frame nets from Mina Lake, 2008-2011.

Survey Year	Year Class							
	2011	2010	2009	2008	2007	2006	2005	2004
2011		116	156	7	5			
2010	---		16	1	2	1		
2009	---	---			44		12	
2008	---	---	---		18	1	24	1

Table 5. Weighted mean total length (mm) at capture for black crappie sampled in frame nets (expanded sample size) from Mina Lake, 2008-2011.

Year	Age			
	1	2	3	4
2011	161 (116)	213 (156)	263 (7)	287 (5)
2010	145(16)	215(1)	280(2)	280(1)
2009	---	231(44)	---	294(12)
2008	167 (18)	204 (1)	259 (24)	295 (1)

Table 6. Year class distribution based on the expanded age/length summary for walleye sampled in gill nets and associated stocking history (Number stocked x 1,000) from Mina Lake, 2007-2011.

Survey Year	Year Class											
	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
2011			11									
2010	---		43									
2009	---	---	1				1					
2008	---	---	---			1				2	2	1
2007 ¹	---	---	---	---	1			1			1	
# stocked												
fry						800		1,500				
sm. fingerling	80	80	80	80	81							
lg. fingerling						23	33	58	43	8		

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

Table 7. Weighted mean total length at capture (mm) for walleye sampled in experimental gill nets (expanded sample size) from Mina Lake, 2005-2011. 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
2011	---	---	303(11)	---	---	---	---	---	---
2010	---	224(43)	---	---	---	---	---	---	---
2009	122(1)	---	---	---	489 (1)	---	---	---	---
2008	---	---	364 (1)	---	---	---	501 (2)	493 (2)	551 (1)
2007	---	---	---	429 (1)	---	---	514 (1)	---	---
2006	---	330 (1)	---	---	---	520 (1)	520 (1)	---	---
2005	---	---	---	---	---	---	510 (2)	---	---

Table 8. Stocking history including size and number for fishes stocked into Mina Lake, 2000-2011.

Year	Species	Size	Number
2000	CCF	fingerling	16,569
	CCF	juvenile	144
2002	WAE	fingerling	8,246
2003	WAE	large fingerling	42,812
2004	WAE	fry	1,500,000
	WAE	large fingerling	57,703
2005	WAE	large fingerling	33,310
2006	WAE	fry	800,000
	WAE	large fingerling	23,110
	CCF	fingerling	42,350
2007	WAE	small fingerling	80,780
2008	WAE	small fingerling	80,000
2009	WAE	small fingerling	80,115
2010	WAE	small fingerling	80,300
2011	WAE	small fingerling	79,980

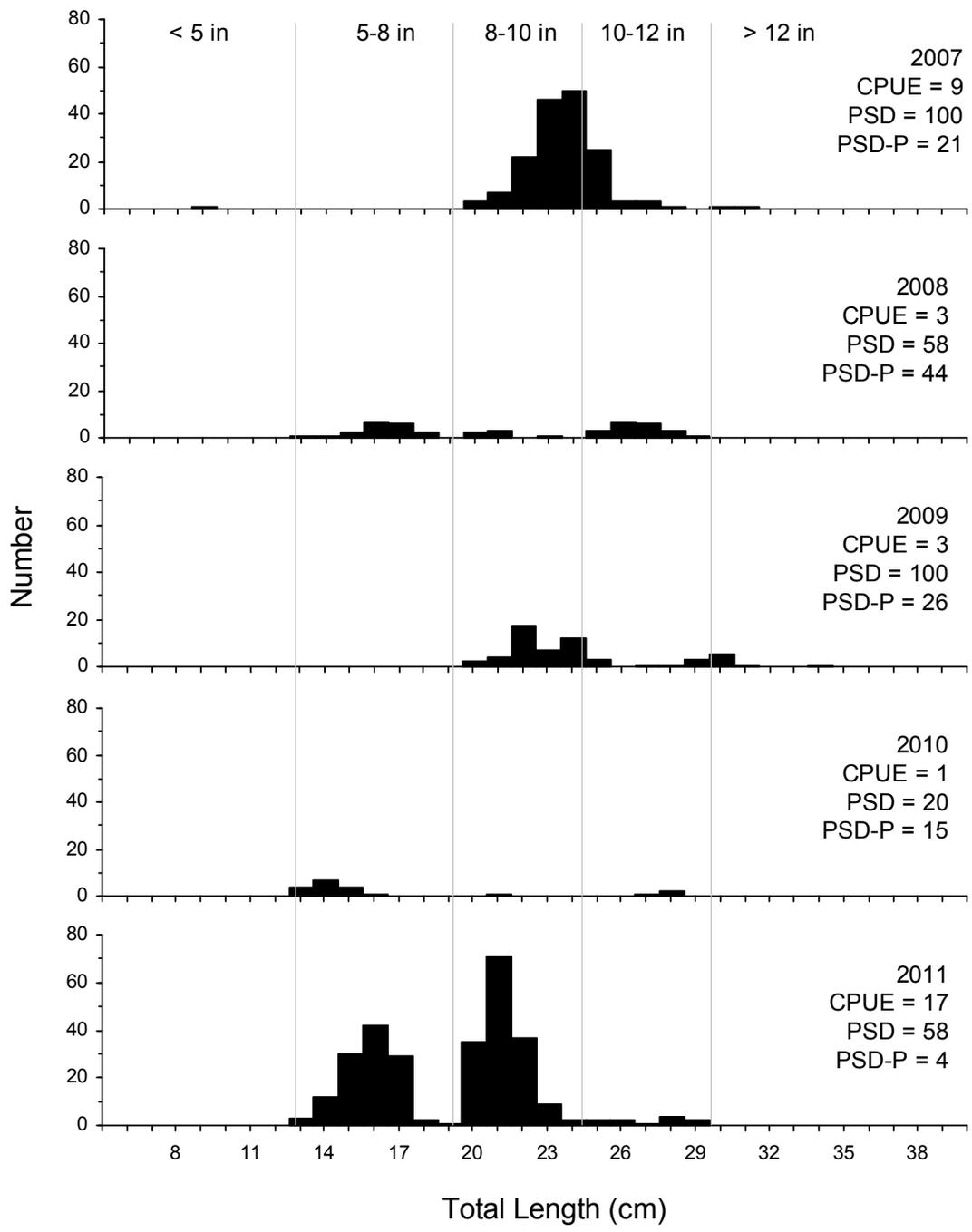


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using frame nets in Mina Lake, 2007-2011.

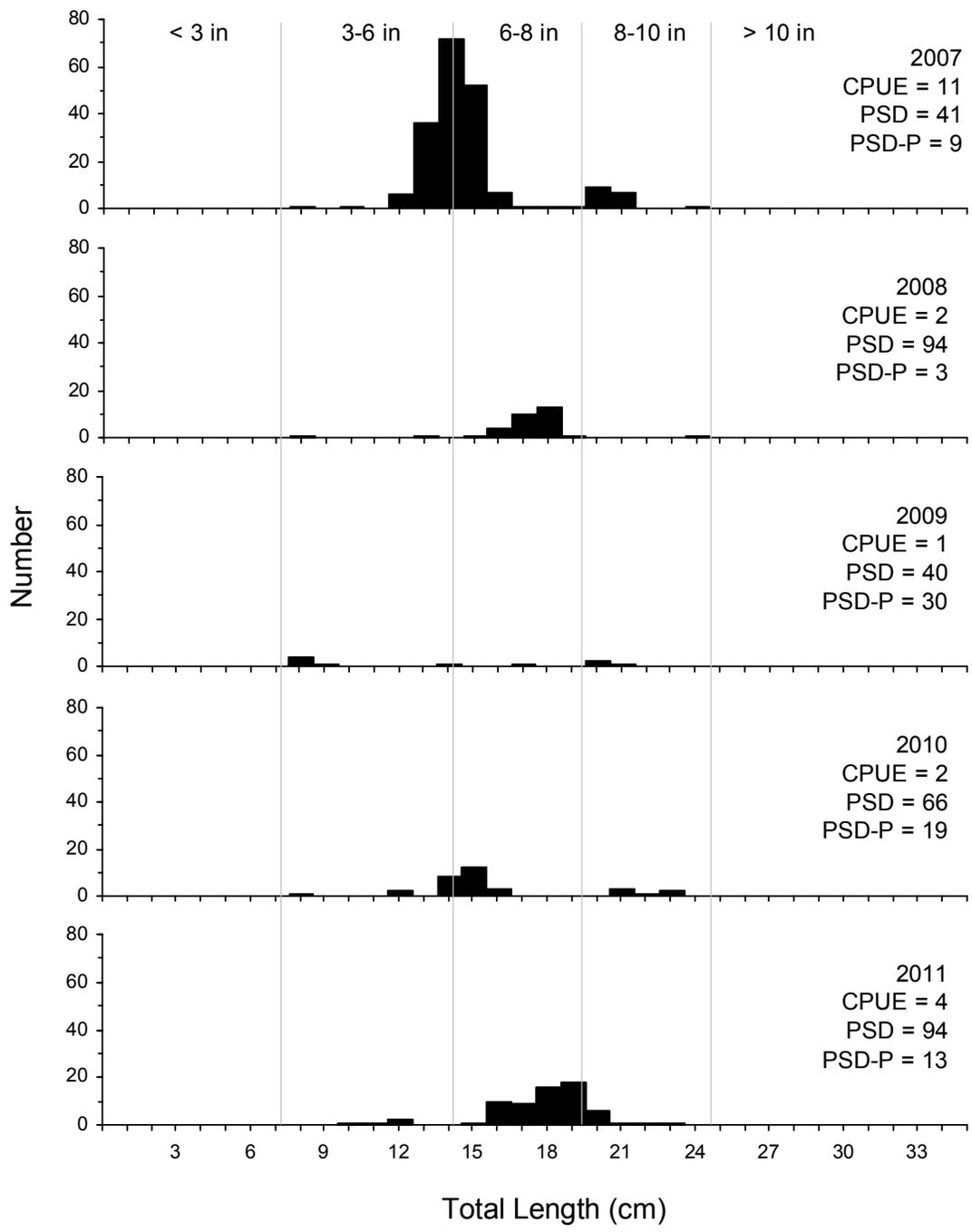


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for bluegill captured using frame nets in Mina Lake, 2007-2011.

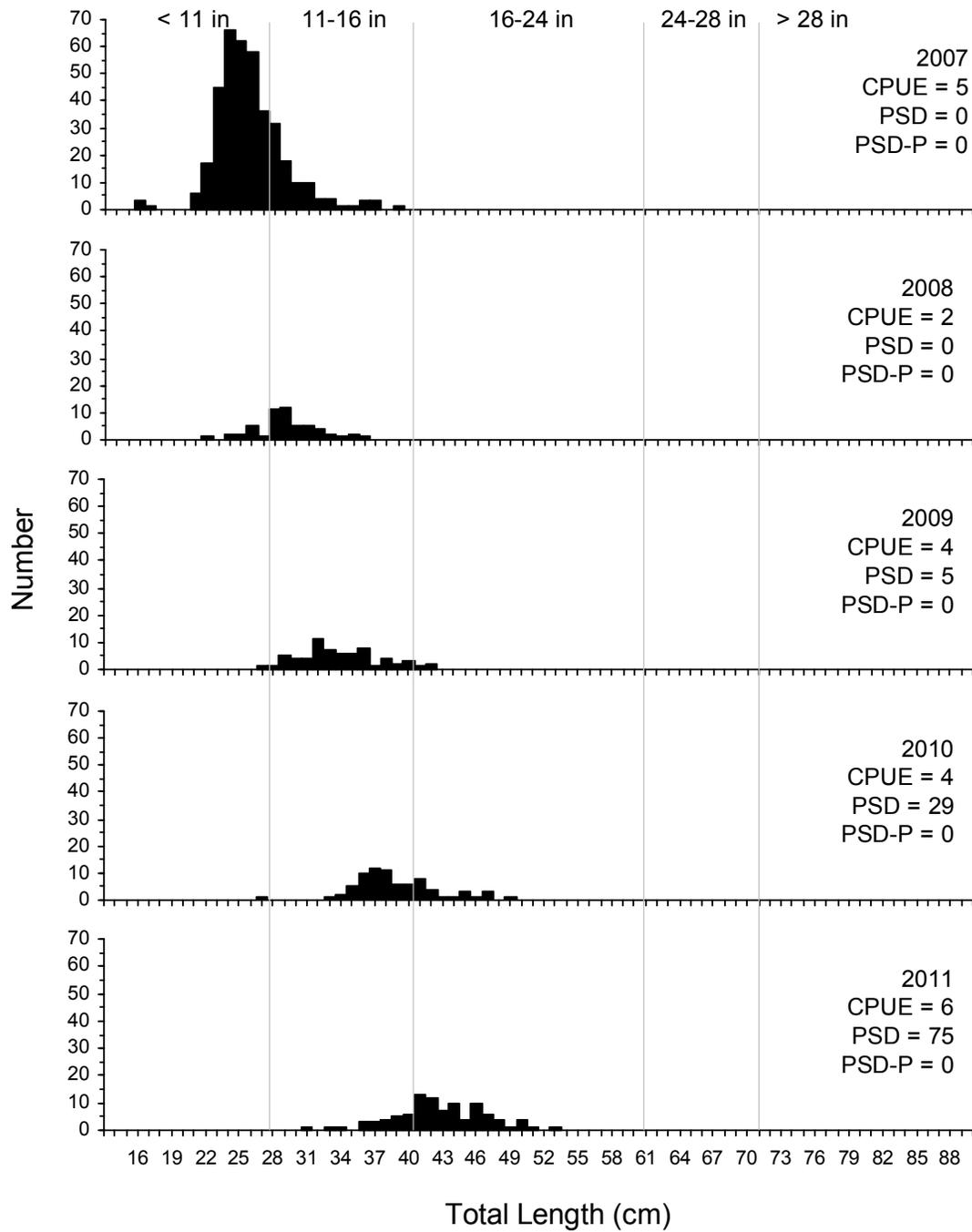


Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for channel catfish captured using frame nets in Mina Lake, 2007-2011.

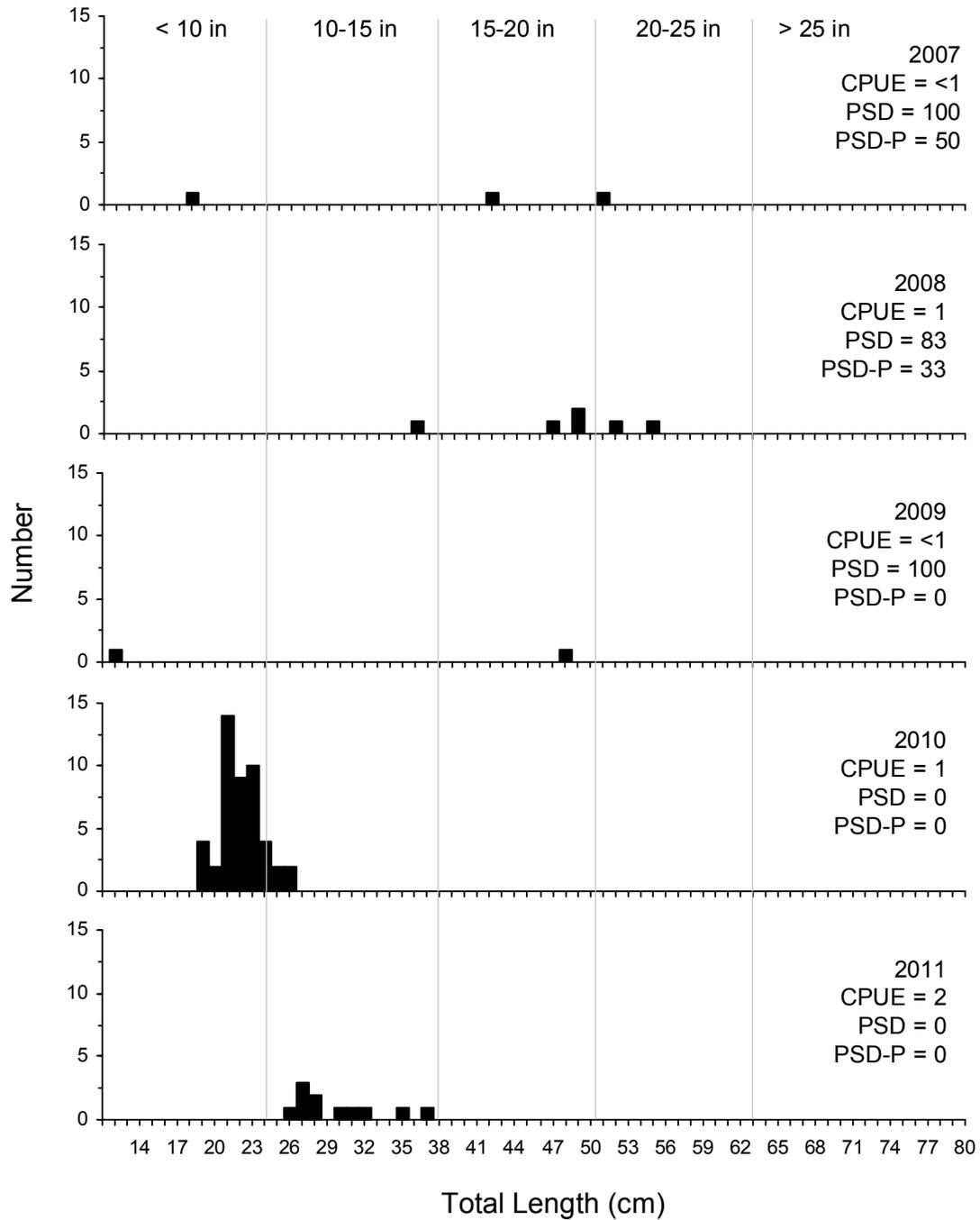


Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using gill nets in Mina Lake, 2007-2011.

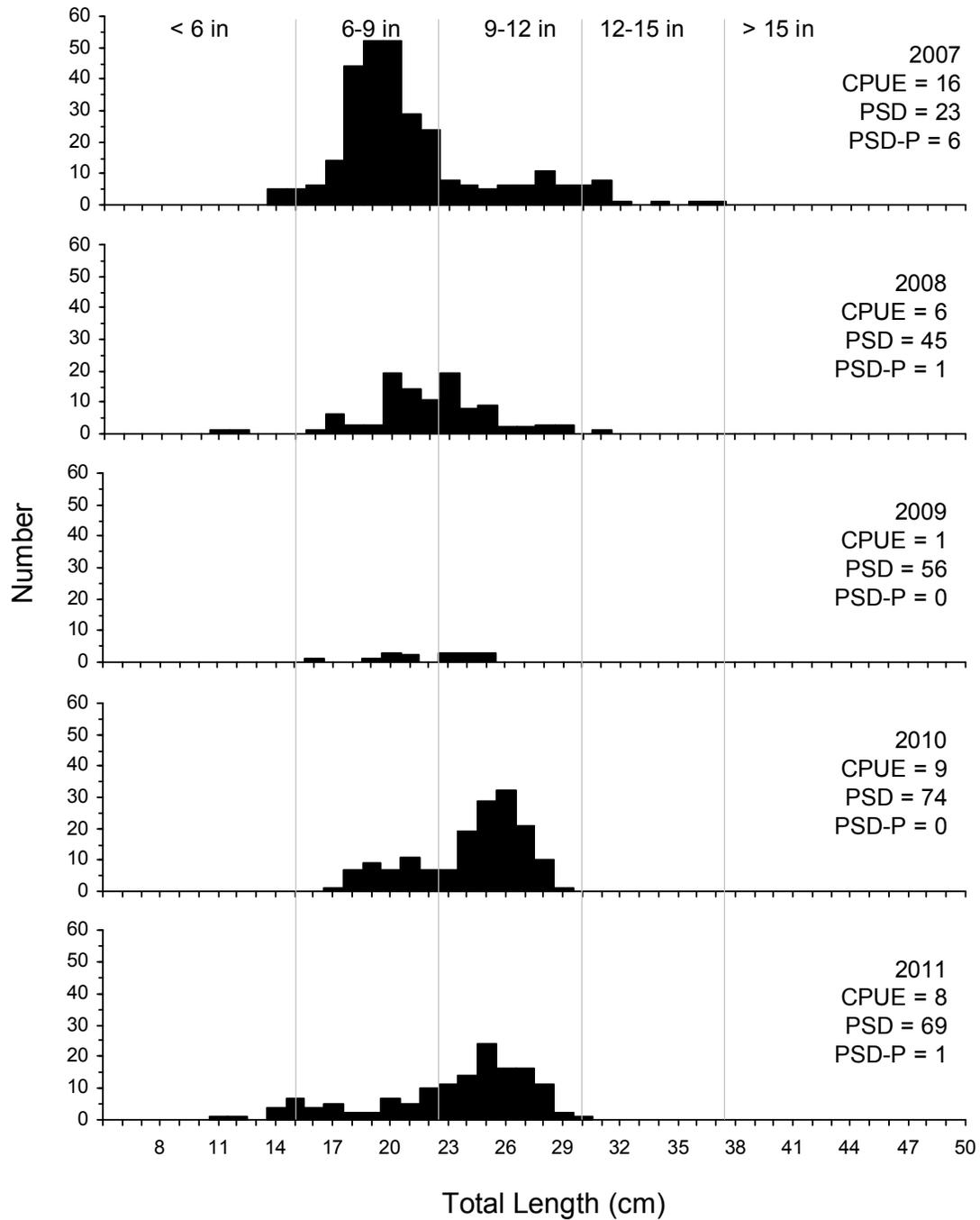


Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using frame nets in Mina Lake, 2007-2011.

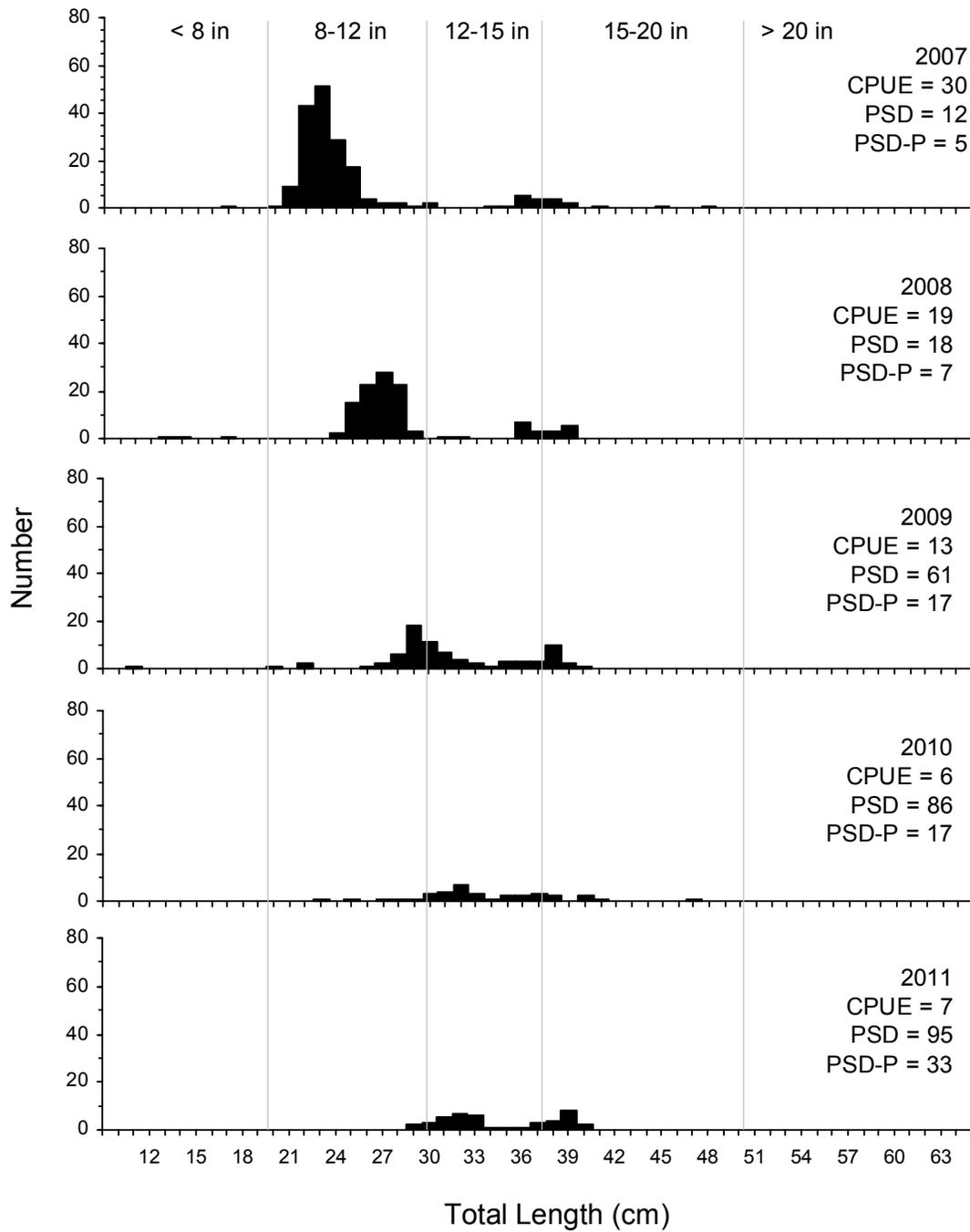


Figure 9. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for freshwater drum captured using gill nets in Mina Lake, 2007-2011.