

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	14.0 miles east of Ipswich, SD

Survey Dates and Sampling Information

Survey dates	August 5-7, 2014 (FN, GN) September 11, 2014 (EF-WAE)
Frame net sets (n)	16
Gill net sets (n)	6
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. Two public access sites are located on Mina Lake, one within the state park and the other along the southeastern shore near the outlet structure (Figure 1). The shoreline has mixed ownership including the State of South Dakota and private individuals.

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

Water levels on Mina Lake are not monitored by SDDENR.

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, orangespotted 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

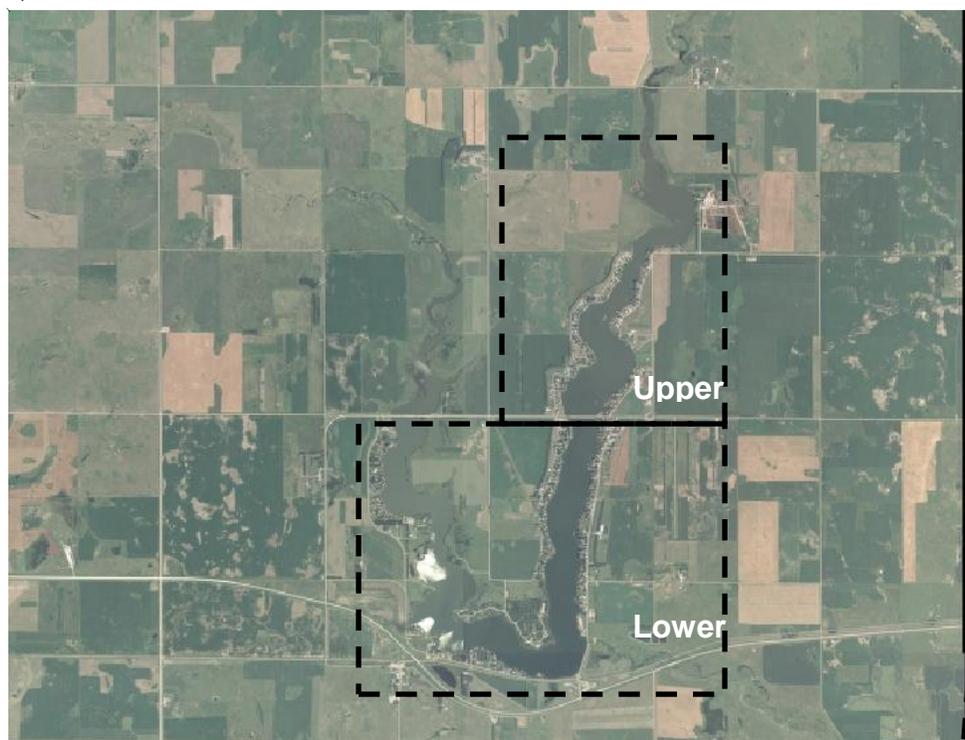
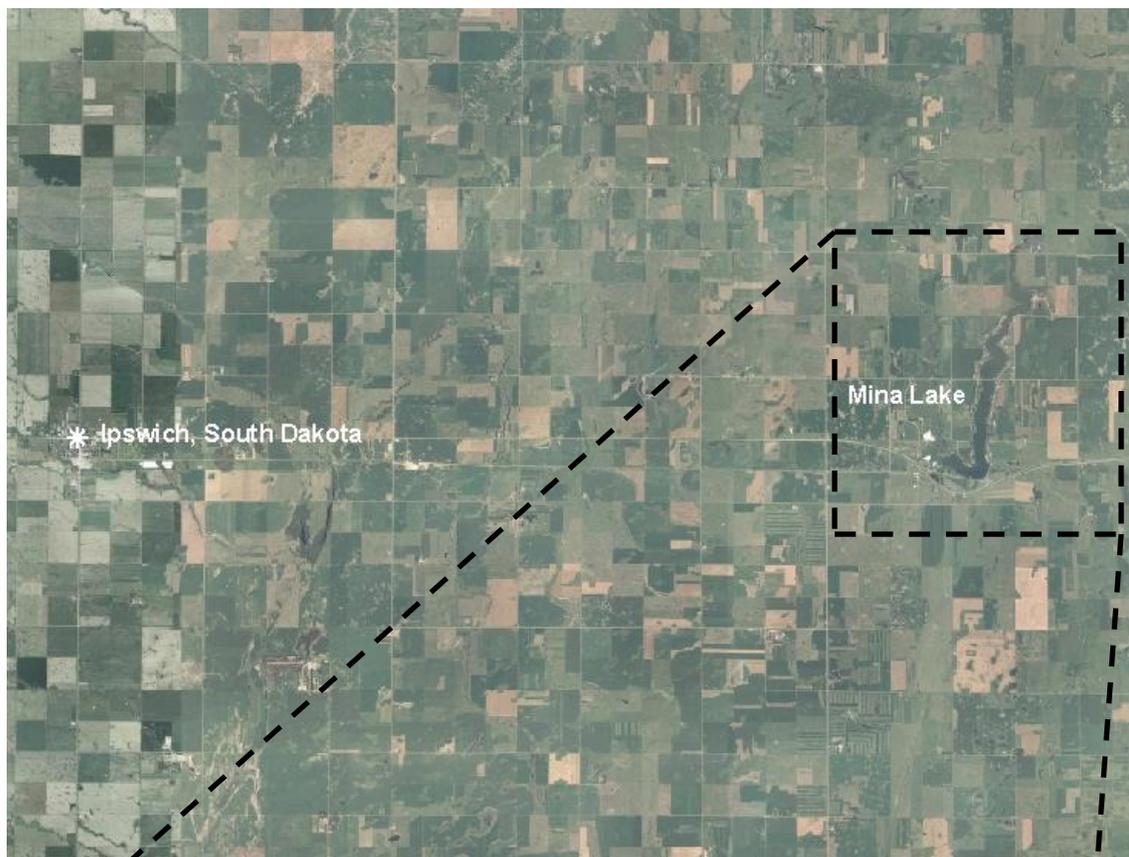


Figure 2. Map depicting geographic location of Mina Lake from Ipswich, Edmunds County, South Dakota (top). Also noted are upper and lower section designations (bottom).

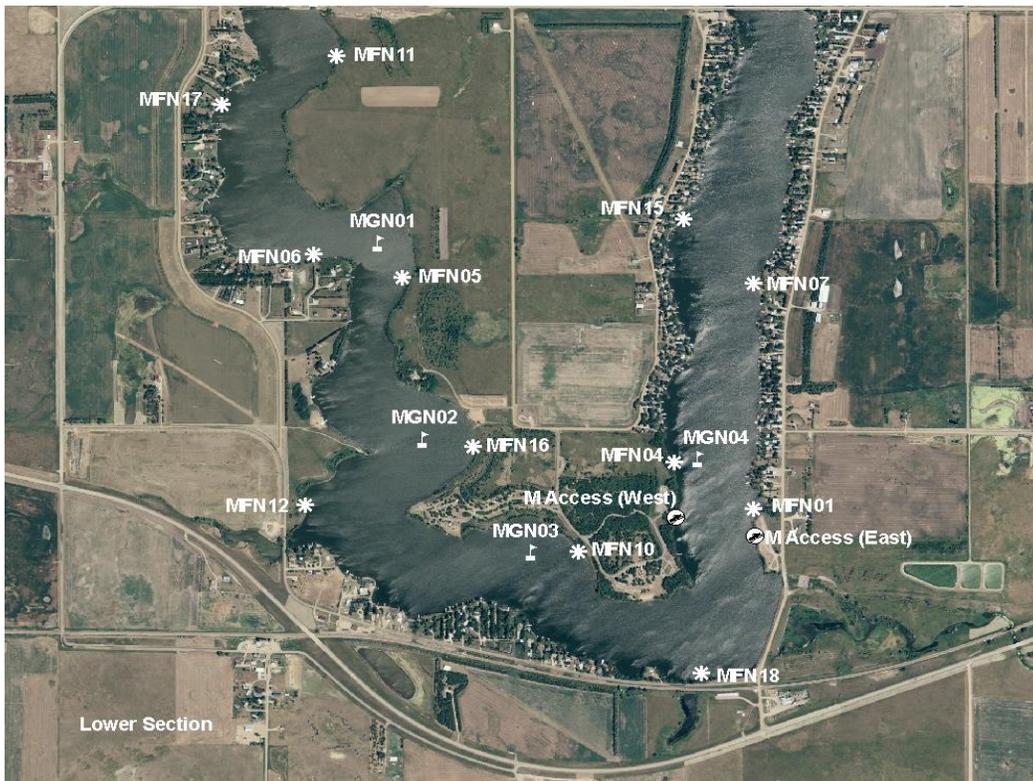


Figure 3. Map depicting access points and standardized net locations for upper and lower sections of Mina Lake, Edmunds County, South Dakota. MFN= frame nets, MGN= gill nets

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 black 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: In 2014, frame nets captured only two stock-length black crappie with TL values of 26 and 30 cm (10.2 and 11.8 in; Figure 4). The mean frame net CPUE of stock-length black crappie was 0.1 (Table 1) and below the minimum objective (≥ 10 stock-length black crappie/net night; Table 3). Both the 2013 and 2014 frame net CPUE's have represented a substantial decrease from the 2012 CPUE of 31.3 (Table 2) and indicated low relative abundance. The cause of the decrease in relative abundance is unknown.

Low sample size precludes analysis of condition, size and age structure of the black crappie population.

Bluegill: The mean frame net CPUE of stock-length bluegill was 16.7 (Table 1) and below the minimum objective (≥ 25 stock-length bluegill/net night; Table 3). Since 2005, the mean frame net CPUE of bluegill has fluctuated from a low of 0.6 (2009) to a high of 16.7 (2014; Table 2). Based on the 2014 frame net CPUE, relative abundance is considered moderate.

Frame net captured bluegill ranged in TL from 9 to 23 cm (3.5 to 9.1 in), with most being quality-preferred (15-20 cm; 6-8 in) length (Figure 5). The PSD of 92 was

above the management objective range (30-60); while, the PSD-P of 2 was below the management objective (5-10; Table 3).

No age or growth information was collected from bluegill in 2014. Sampled bluegill had mean W_r values > 100 for all 10-mm length groups represented; an increasing trend in mean W_r was observed as TL increased.

Channel Catfish: Since 2005, the relative abundance of channel catfish has remained low; mean frame net CPUE's have ranged from a low of 0.4 to a high of 5.7 (Table 2). In 2014, frame nets captured 27 individuals ranging in TL from 31 to 67 cm (12.2 to 26.4 in; Figure 6). The mean frame net CPUE of stock-length channel catfish was 1.4 (Table 1).

No growth information was available. Although sample size was low, frame net captured channel catfish appeared to be in good condition with mean W_r values that ranged from 82-108 for all 10-mm length groups sampled; the mean W_r of stock-length channel catfish was 96.

Walleye: Since 1998, recruitment of both naturally-produced and stocked walleye has been extremely poor in Mina Lake. Walleye of various sizes have been stocked annually since 2002 with limited success (Table 4; Table 6; Ermer et al. 2006). 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, were captured in the gill net catch (Table 5; 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 2014, gill nets captured 4 stock-length walleye that ranged in TL from 41 to 55 cm (16.1 to 21.7 in) and represented two cohorts (2009 and 2010; Table 4; Figure 7). The mean gill net CPUE of stock-length walleye was 0.7 (Table 1). Few inferences can be made concerning size structure, growth, or condition due to the low sample size.

It appears that recruitment of the 2014 cohort will also be limited; despite, the stocking of 79,906 small fingerlings, as fall night electrofishing resulted in the capture of only seven age-0 walleye (Table 1).

Other Species

Black Bullhead: The mean frame net CPUE of stock-length black bullhead was 31.1 (Table 1) and within the objective range (≤ 100 stock-length black bullhead/net night; Table 3). Since 2005, mean frame net CPUE values have varied from a low 0.9 (2009) to a high of 85.5 (2012; Table 2). The 2014 mean frame net CPUE represented a slight decrease from the 2013 CPUE of 35.2, but relative abundance is still considered high.

Frame net captured black bullhead ranged in TL from 12 to 32 cm (4.7 to 12.6 in; Figure 8). The 2014 frame net PSD was 75 and the PSD-P was 41 (Table 1).

No age or growth information was collected. Mean W_r values ranged from 80 to 97 for all 10-mm length groups sampled. The mean W_r of stock-length individuals was 86 (Table 1) and no length-related trends in condition were observed.

Freshwater Drum: The mean gill net CPUE of stock-length freshwater drum was 5.5 (Table 1). Since 2005, the mean gill net CPUE of freshwater drum has ranged from a low of 3.3 (2012) to a high of 30.2 (2007; Table 2).

Freshwater drum captured in the 2014 gill net catch ranged in TL from 33 to 40 cm (13.0 to 15.7 in), had a PSD of 100 and PSD-P of 12 (Table 1; Figure 9). No age or growth information was collected. The majority of freshwater drum captured were in the quality-preferred length category, which had a mean Wr of 94.

Yellow Perch: Mina Lake often contains 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 2014, the mean gill net CPUE of stock-length yellow perch was 27.2 (Table 1) and the highest recorded since 2005 (Table 1; Table 2).

Gill net captured yellow perch ranged in TL from 14 to 29 cm (5.5 to 11.4 in), had a PSD of 43 and a PSD-P of 20 (Table 1; Figure 10). Five consecutive year classes (2009-2013) were represented. The 2013 cohort was the most abundant and comprised 55% of yellow perch in the gill net catch; year classes produced in 2011 and 2012 accounted for an additional 23% and 12%, respectively (Table 7).

In recent years, yellow perch in Mina Lake attained quality length (20 cm; 8 in) during their third growing season at age 2 (Table 8). In 2014, the weighted mean TL at capture of age-2 individuals was 225 mm (8.9 in; Table 8). As with most populations, males tend to be smaller at a given age than females, particularly at older ages (Table 8). Yellow perch in the gill net catch had mean Wr values > 95 for all length categories (e.g., stock to quality) sampled; stock-length individuals had a mean Wr of 103 (Table 1).

Northern Pike: The 2014 mean gill net CPUE for northern pike was 0.5 (Table 1). Since 2005, mean gill net CPUE values have ranged from 0.0 (2006, 2007) to 3.5 (2008; Table 2). Gill net captured northern pike ranged in TL from 19 to 75 cm (7.5 to 29.5 in).

Other: Common carp and white sucker were other fish species captured in low numbers during the 2014 survey (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys on an annual basis (next survey scheduled in summer 2015) 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) Consider re-introduction of saugeye into the population, as walleye recruitment has been poor. Stock saugeye (≈ 100 small fingerlings/acre) to establish additional year-classes if gill netting and/or fall night electrofishing CPUE of age-0 saugeye/walleye results warrant [i.e., low gill net CPUE of sub-stock (< 25 cm; 10 in) saugeye/walleye and/or fall night electrofishing CPUE of < 75 age-0 fish/hour].
- 5) Conduct fall night electrofishing on an annual basis to monitor age-0 saugeye/walleye relative abundance.

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, 2014. 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	31.1	7.3	75	3	41	4	86	1
BLC	0.1	0.1	100	0	100	0	116	34
BLG	16.5	6.5	92	3	2	2	126	1
CCF	1.4	1.4	48	18	9	10	96	3
COC	0.6	0.4	20	24	10	18	98	12
FRD	0.3	0.2	100	0	40	52	101	14
NOP	0.8	0.4	67	26	25	23	86	3
WAE	0.3	0.2	80	43	40	52	102	10
WHS	0.3	0.2	100	0	100	0	90	2
YEP	9.6	7.3	13	5	8	4	97	1
<i>Gill nets</i>								
BLB	24.5	14.8	53	7	7	4	94	<1
BLG	0.2	0.2	---	---	---	---	141	<1
CCF	1.0	0.4	100	0	67	43	119	13
COC	0.5	0.5	---	---	--	---	105	9
FRD	5.5	2.5	100	0	12	10	94	1
NOP	0.5	0.3	100	0	33	67	89	10
WAE	0.7	0.6	100	0	25	59	104	8
WHS	0.2	0.2	100	---	100	---	94	<1
YEP	27.2	7.5	43	6	20	6	103	<1
<i>Electrofishing</i>								
WAE ¹	7.0	---	---	---	---	---	---	---

¹ Fall night 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, 2005-2014. BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; COC= common carp; FRD= freshwater drum; GSF= green sunfish; HYB= hybrid sunfish; LMB= largemouth bass; 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									
	2005	2006 ³	2007 ³	2008	2009	2010	2011	2012	2013	2014
<i>Frame nets</i>										
BLB	11.6	6.0	16.2	5.8	0.9	8.9	8.1	85.5	35.2	31.1
BLC	0.9	25.9	9.0	2.5	3.2	1.1	16.7	31.3	0.2	0.1
BLG	6.4	5.9	10.8	1.8	0.6	1.8	3.9	5.6	6.7	16.5
CCF	0.4	0.6	4.8	2.4	3.6	4.2	5.7	1.2	0.6	1.4
COC	2.4	1.7	6.0	1.9	2.1	1.0	1.1	0.5	0.2	0.6
FRD	1.2	2.3	3.7	2.3	2.1	1.1	1.0	0.0	0.4	0.3
GSF	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HYB ¹	0.0	2.0	0.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0
NOP	0.6	0.3	0.2	3.2	2.2	2.4	1.1	2.0	0.9	0.8
OSF ¹	0.0	0.4	11.9	0.0	0.0	0.1	0.0	0.0	0.0	0.0
ROB	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
SHG ¹	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
WAE	0.3	0.5	0.2	0.3	0.3	0.3	0.5	0.7	0.1	0.3
WHB	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
WHS	0.1	0.7	1.2	0.3	0.3	0.3	0.1	0.1	0.5	0.3
YEP	1.4	2.3	1.1	1.7	1.9	1.0	1.4	2.1	1.2	9.6
<i>Gill nets</i>										
BLB	1.0	6.0	10.3	8.2	12.2	10.7	7.5	44.7	17.0	24.5
BLC	0.0	0.7	0.0	0.0	0.0	0.5	1.5	1.0	0.0	0.0
BLG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2
CCF	0.0	0.7	1.0	1.7	1.8	0.8	1.7	1.0	3.2	1.0
COC	0.8	5.2	15.5	8.7	1.2	0.2	0.2	1.2	0.2	0.5
FRD	8.2	17.0	30.2	19.0	12.8	6.0	7.2	3.3	7.3	5.5
LMB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
NOP	0.5	0.0	0.0	3.5	1.5	3.3	0.3	1.3	0.7	0.5
OSF ¹	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0
WAE	0.3	0.5	0.3	1.0	0.2	0.7	1.8	1.2	3.5	0.7
WHS	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.2
YEP	9.3	9.2	4.2	1.7	4.3	6.0	8.3	14.8	8.7	27.2
<i>Electrofishing</i>										
WAE ²	0.0	0.0	0.0	0.0	54.9	10.8	31.0	---	0.0	7.0

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, 2005-2014. BLB= black bullhead; BLC= black crappie; BLG= bluegill; WAE= walleye

Species	2005	2006 ¹	2007 ¹	2008	2009	2010	2011	2012	2013	2014	Objective
<i>Frame nets</i>											
BLB											
CPUE	12	6	16	6	1	9	8	86	35	31	≤ 100
PSD	100	90	23	45	56	74	69	93	96	75	---
PSD-P	25	47	6	1	0	0	1	6	25	41	---
Wr	89	87	87	89	88	87	83	94	90	86	---
BLC											
CPUE	1	26	9	3	3	1	17	31	<1	<1	≥ 10
PSD	59	6	100	58	100	20	58	90	100	100	30-60
PSD-P	59	5	21	44	26	15	4	15	100	100	5-10
Wr	117	122	113	118	117	118	113	112	---	116	---
BLG											
CPUE	6	6	11	2	1	2	4	6	7	17	≥ 25
PSD	71	72	41	94	40	66	94	55	31	92	30-60
PSD-P	10	7	9	3	30	19	13	21	13	2	5-10
Wr	119	124	122	124	124	122	116	123	112	126	---
<i>Gill nets</i>											
WAE											
CPUE	<1	1	<1	1	<1	1	2	1	4	1	≥ 10
PSD	100	67	100	83	100	0	0	29	62	100	30-60
PSD-P	50	67	50	33	0	0	0	0	5	25	5-10
Wr	105	105	100	107	115	82	89	84	91	104	---

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 the expanded age/length summary for walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Mina Lake, 2010-2014.

Survey Year	Year Class									
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
2014					1	3				
2013				5	4	11		1		
2012						7				
2011						11				
2010						43				
fry									800	
sm. fingerling	80	49	81	80	80	80	80	81		
lg. fingerling			7						23	33

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

Table 5. Weighted mean TL at capture (mm) for walleye sampled in experimental gill nets (expanded sample size) from Mina Lake, 2005-2014. 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
2014	---	---	---	---	431(1)	472(3)	---	---	---
2013	---	---	317 (5)	390 (4)	411 (11)	---	513 (1)	---	---
2012	---	---	---	357 (7)	---	---	---	---	---
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 6. Stocking history including size and number for fishes stocked into Mina Lake, 2005-2014. CCF= channel catfish; WAE= walleye

Year	Species	Size	Number
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
2012	CCF	fingerling	17,075
	WAE	small fingerling	80,850
	WAE	large fingerling	7,485
2013	WAE	small fingerling	48,900
2014	WAE	small fingerling	79,906

Table 7. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from Mina Lake, 2012-2014.

Survey Year	Year Class							
	2014	2013	2012	2011	2010	2009	2008	2007
2014		91	19	37	5	12		
2013	---		5	30	7	10		
2012	---	---		8	17	55	2	7

Table 8. Weighted mean TL (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Mina Lake, 2012-2014.

Year	Age				
	1	2	3	4	5
2014					
Male	158(42)	209(5)	233(16)	245(2)	253(4)
Female	170(45)	231(14)	258(23)	277(1)	278(6)
Combined	164(91)	225(19)	247(37)	259(5)	267(12)
2013					
Male	---	205 (8)	212 (5)	224 (4)	---
Female	159 (5)	216 (22)	237 (2)	263 (6)	---
Combined	159 (5)	213 (30)	219 (7)	248 (10)	---
2012					
Male	150 (5)	188 (5)	218 (10)	254 (1)	229 (2)
Female	155 (3)	211 (12)	230 (43)	274 (1)	265 (3)
Combined	152 (8)	203 (17)	227 (55)	264 (2)	244 (7)

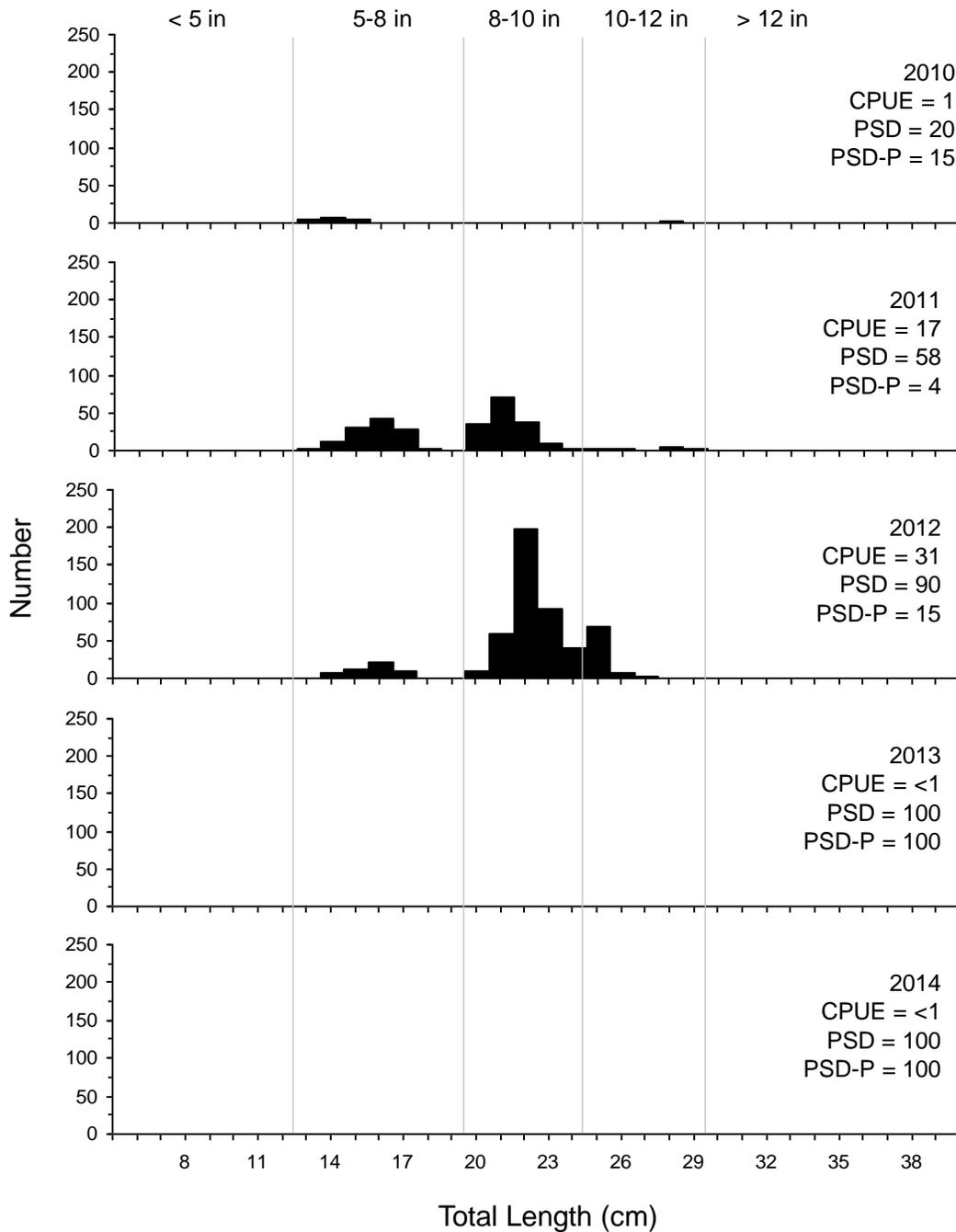


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using frame nets in Mina Lake, 2010-2014.

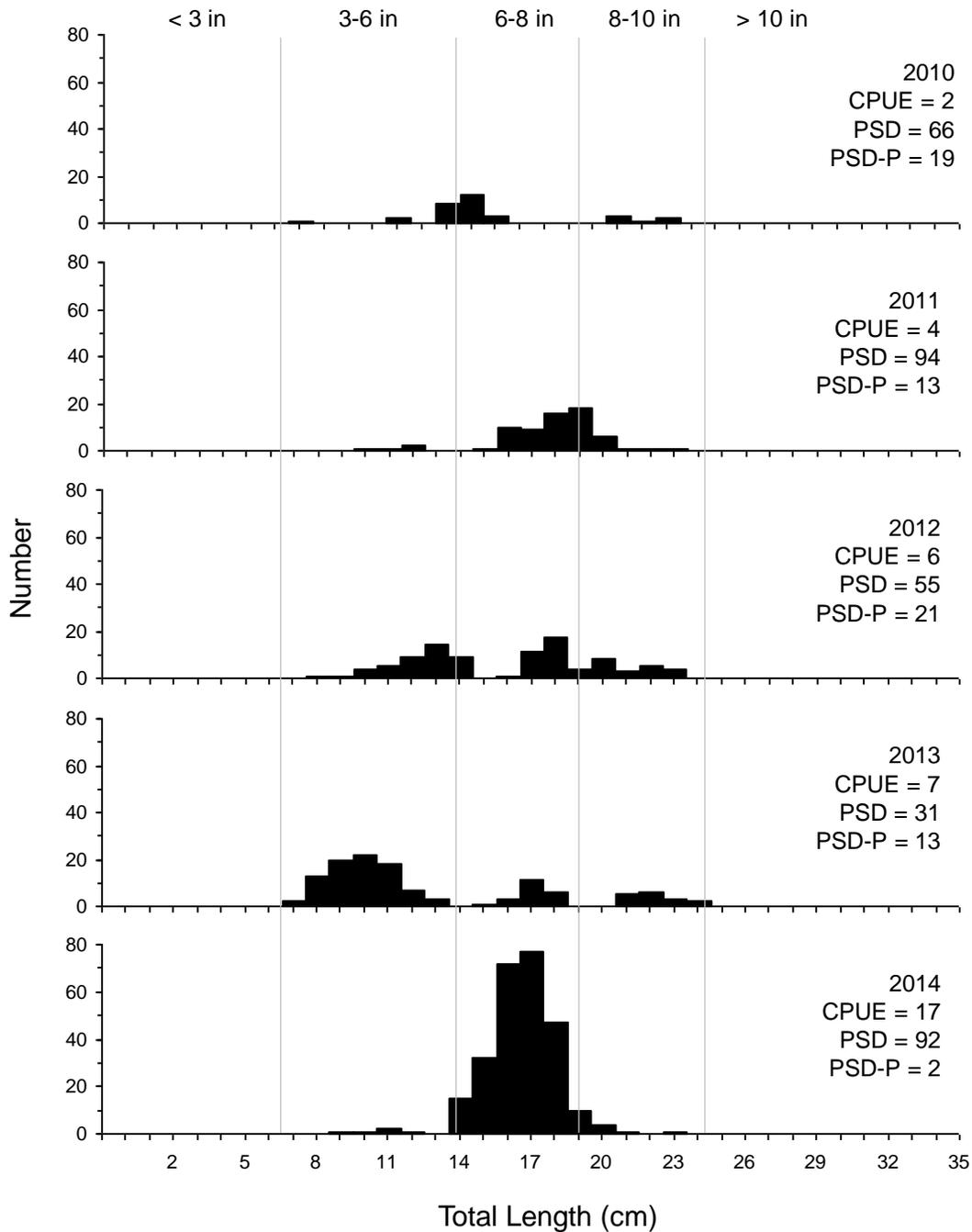


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for bluegill captured using frame nets in Mina Lake, 2010-2014.

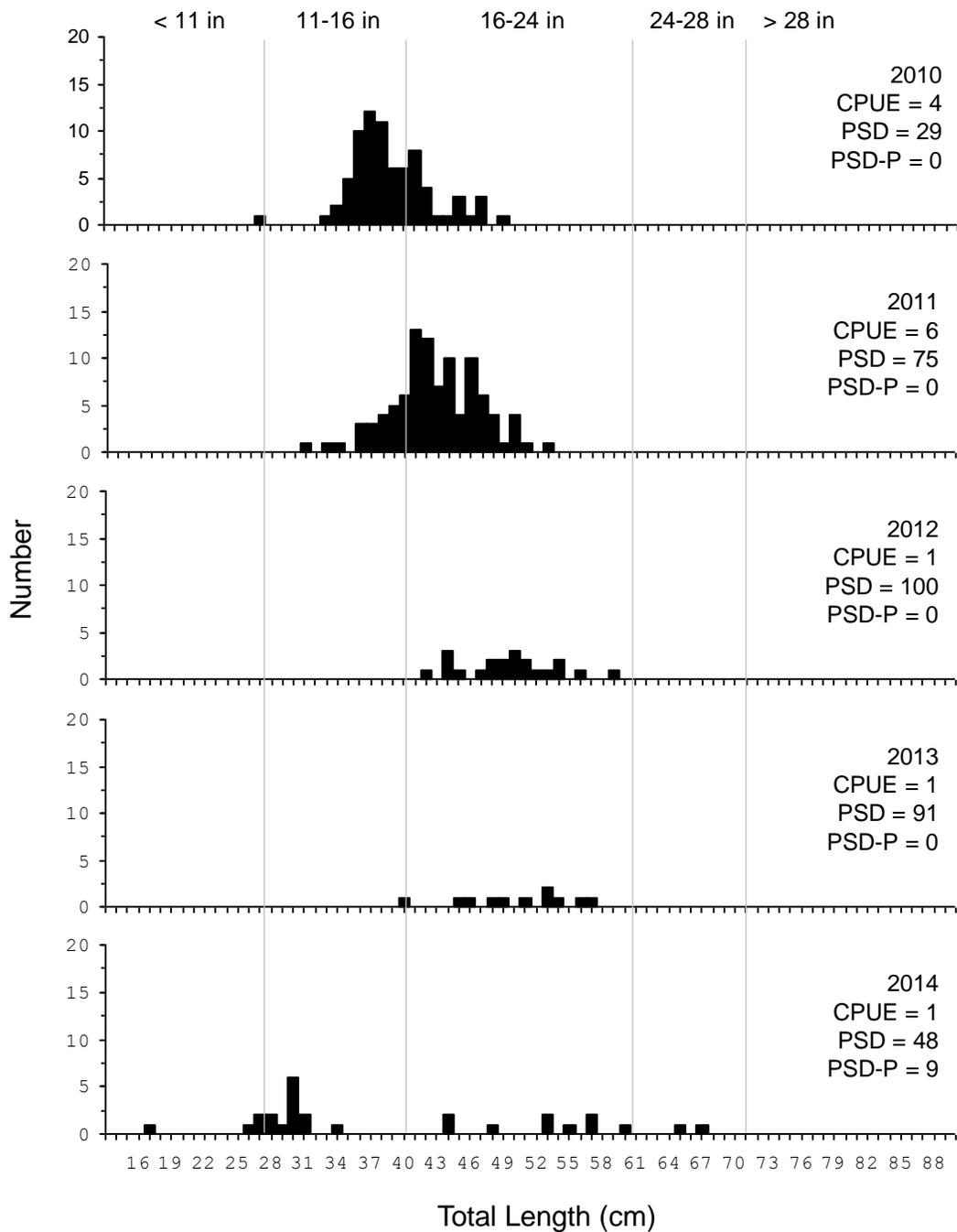


Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for channel catfish captured using frame nets in Mina Lake, 2010-2014.

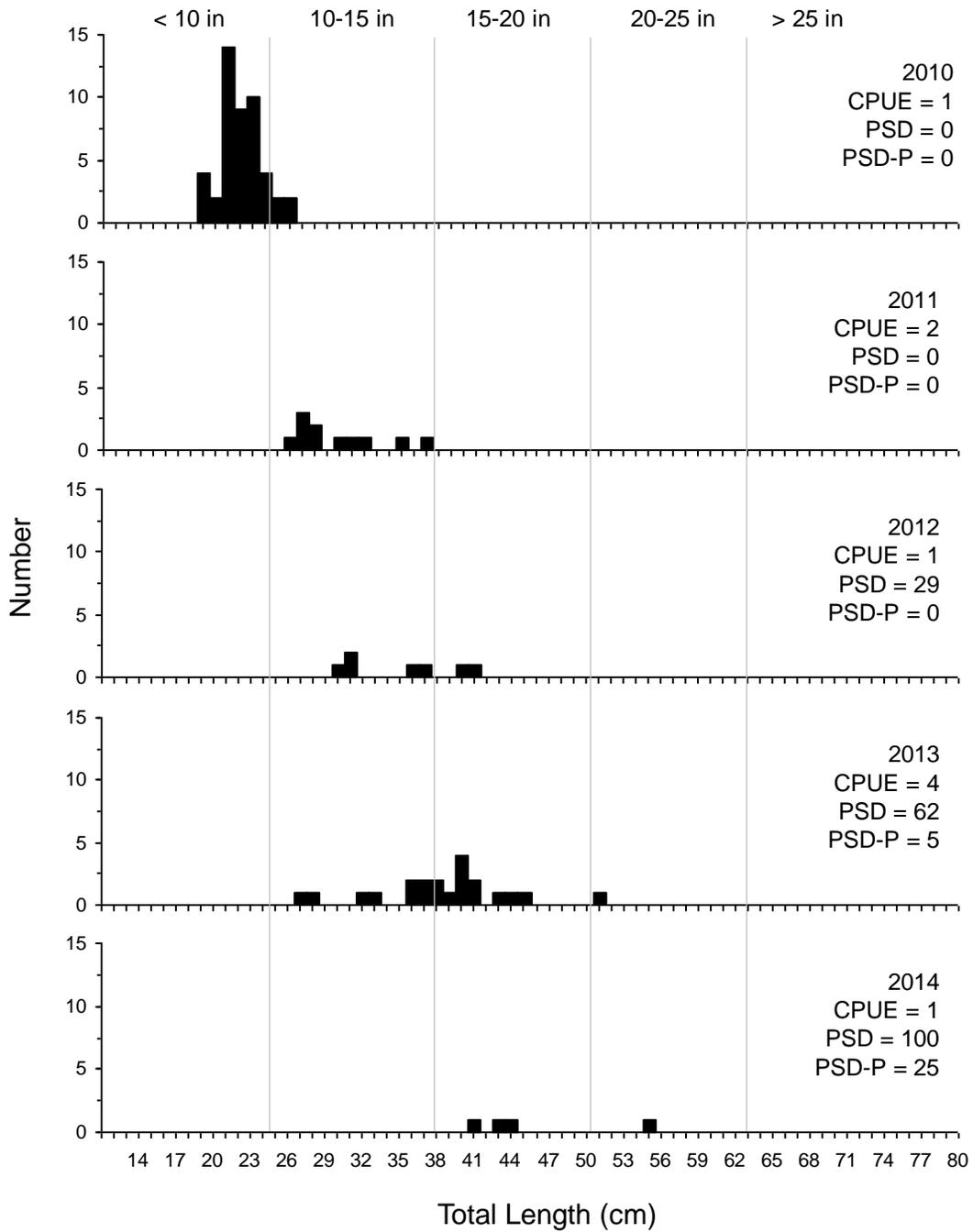


Figure 7. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using gill nets in Mina Lake, 2010-2014.

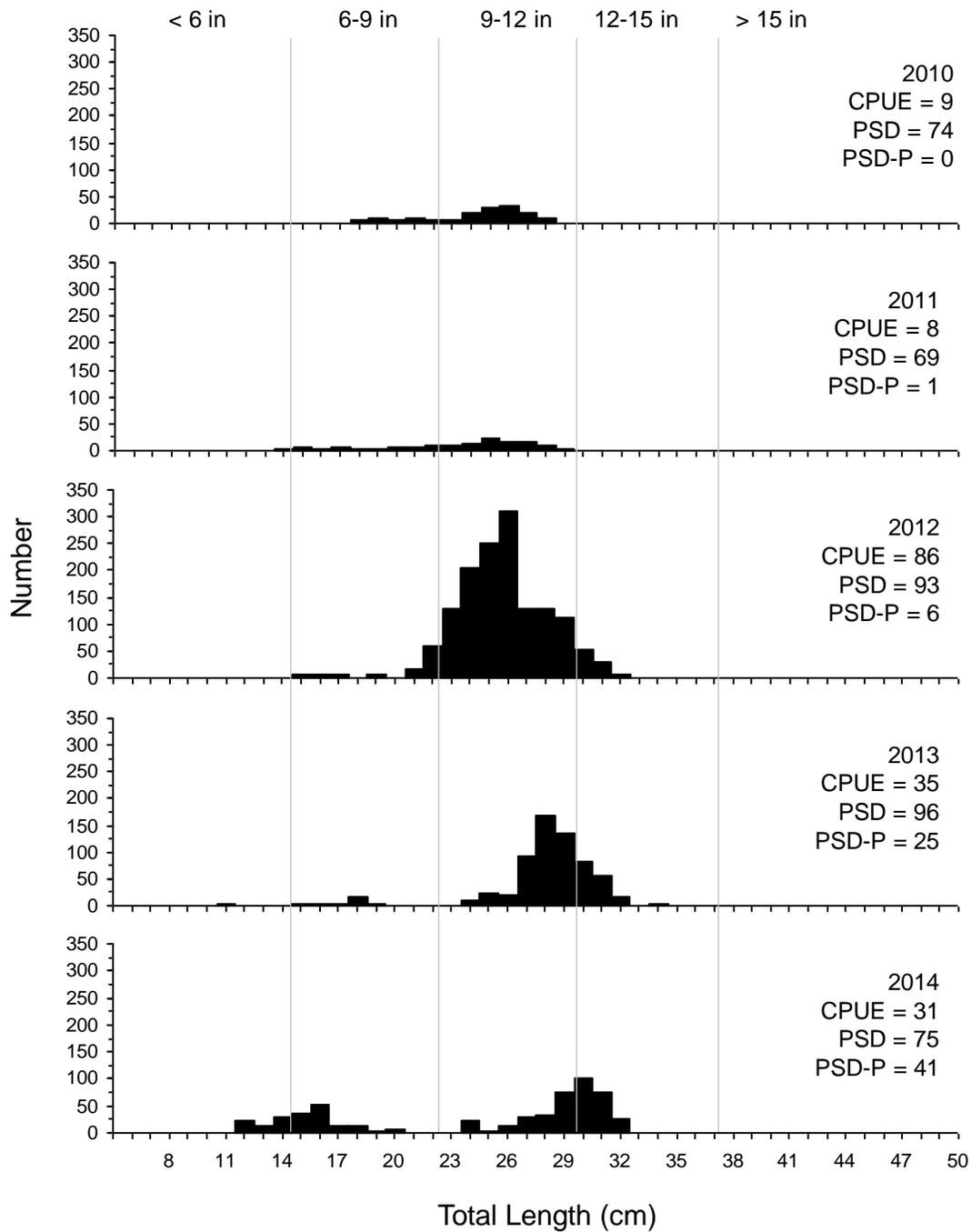


Figure 8. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using frame nets in Mina Lake, 2010-2014.

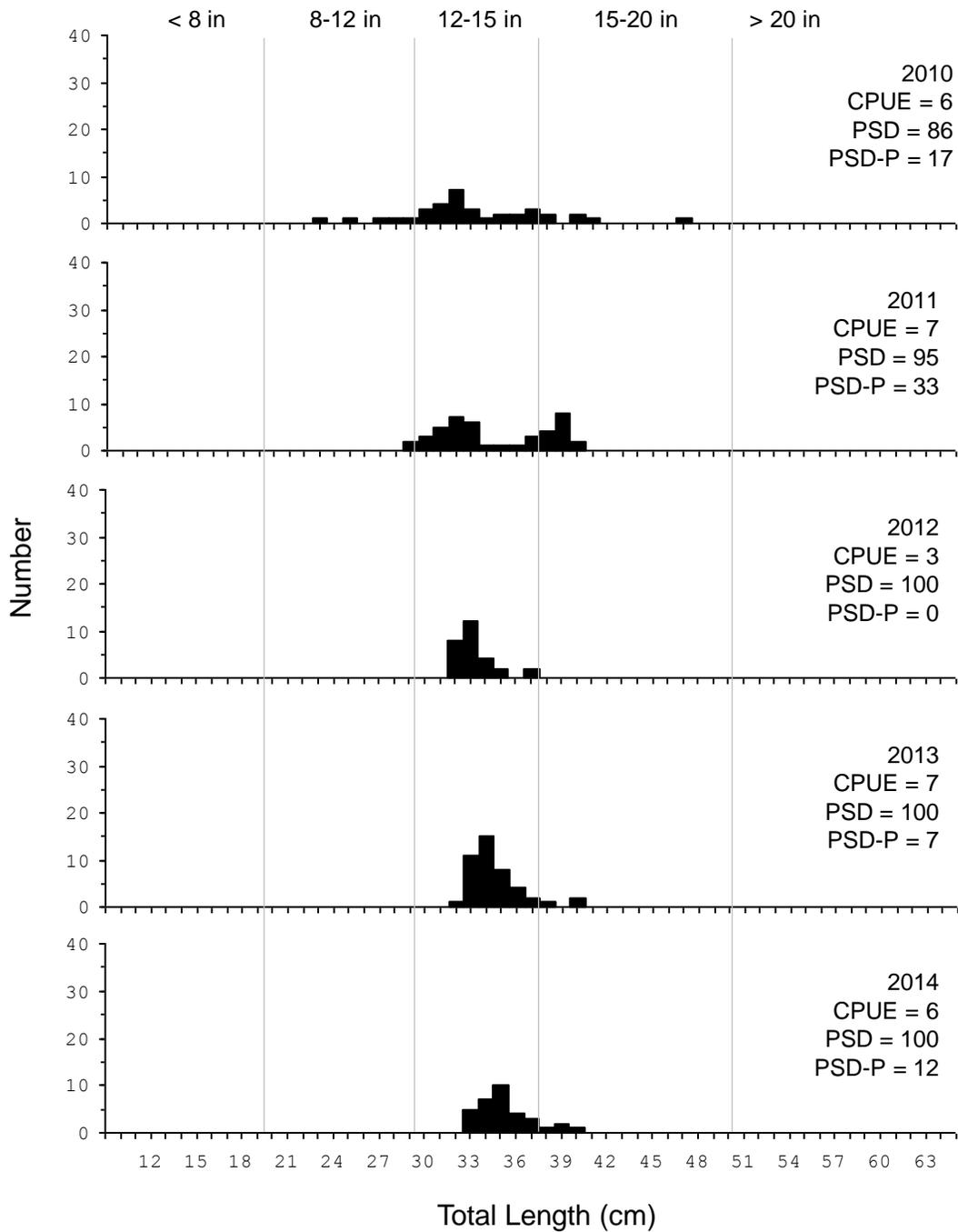


Figure 9. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for freshwater drum captured using gill nets in Mina Lake, 2010-2014.

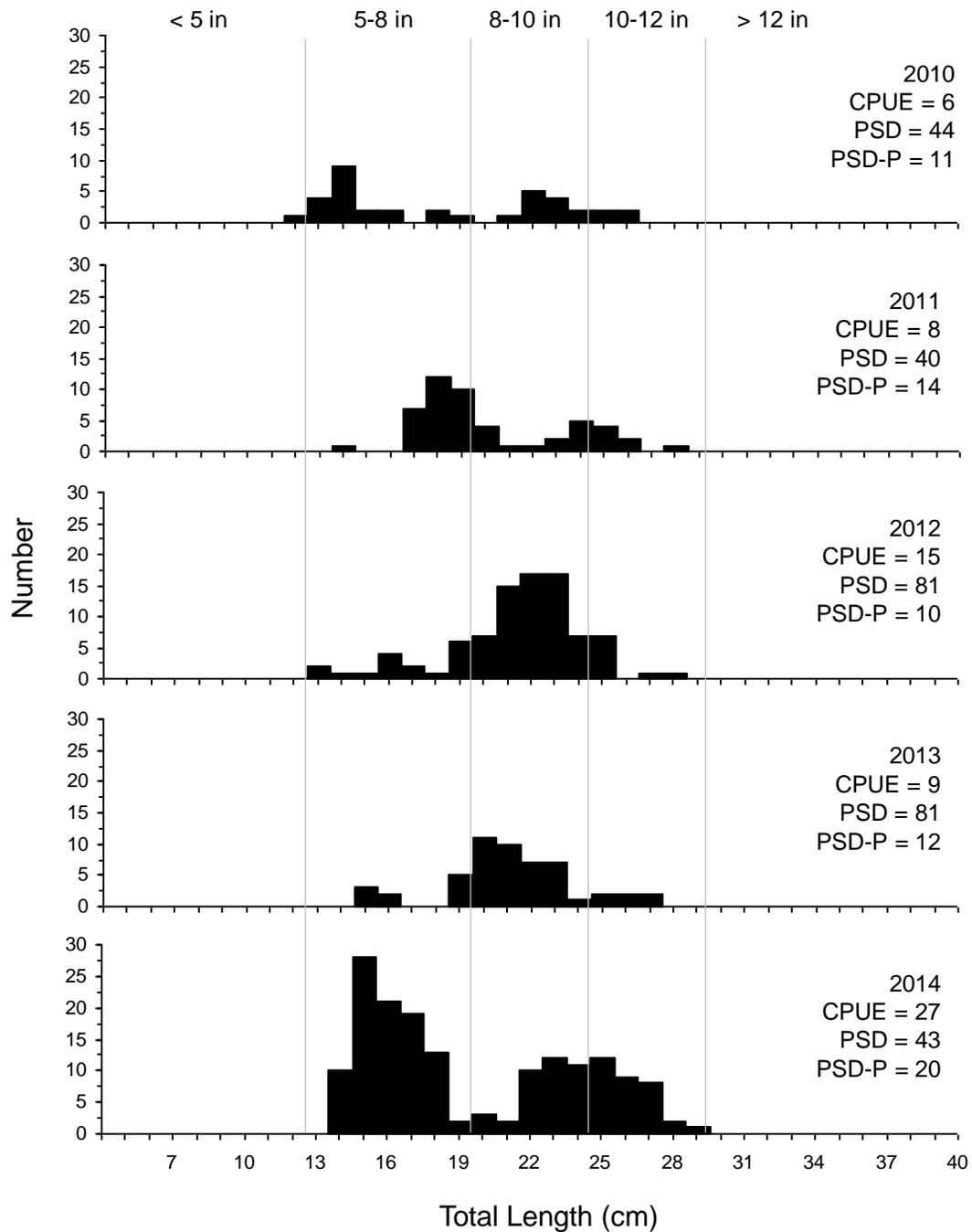


Figure 10. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Mina Lake, 2010-2014.