

Swan Lake

Site Description

Location

Water designation number (WDN)	18-0017-00
Legal description	T119N-R56W-Sec.3,4,8,9,10,15,16,17
County (ies)	Clark
Location from nearest town	5 miles east and 2 miles north of Bradley, SD

Survey Dates and Sampling Information

Survey dates	May 30-31, 2012 (GN)
Gill net sets (n)	6

Morphometry

Watershed area (acres)	17,223
Surface area (acres)	2,000
Maximum depth (ft)	≈16
Mean depth (ft)	unknown

Ownership and Public Access

Swan Lake is a non-meandered lake and the fishery is managed by the SDGFP. A single public access site is located on the northeastern shoreline and is maintained by the SDGFP (Figure 1). Lands adjacent to Swan Lake are generally under state and private ownership.

Watershed and Land Use

The 17,223 acre Swan Lake sub-watershed (HUC-12) is located within the larger Grass, Dry, and Still Lakes (HUC-10) watershed. Land use within the watershed is primarily agricultural with a mix of pasture or grassland, cropland, and scattered shelterbelts.

Water Level Observations

Swan Lake has no established OHWM and an outlet elevation was not available. On May 8 and September 25, 2012 the elevation of Swan Lake was 1759.3 and 1757.7 fmsl, respectively.

Fish Management Information

Primary species	Walleye, Yellow Perch
Other species	Black Bullhead, Northern Pike
Lake-specific regulations	none
Management classification	none
Fish consumption advisories	none

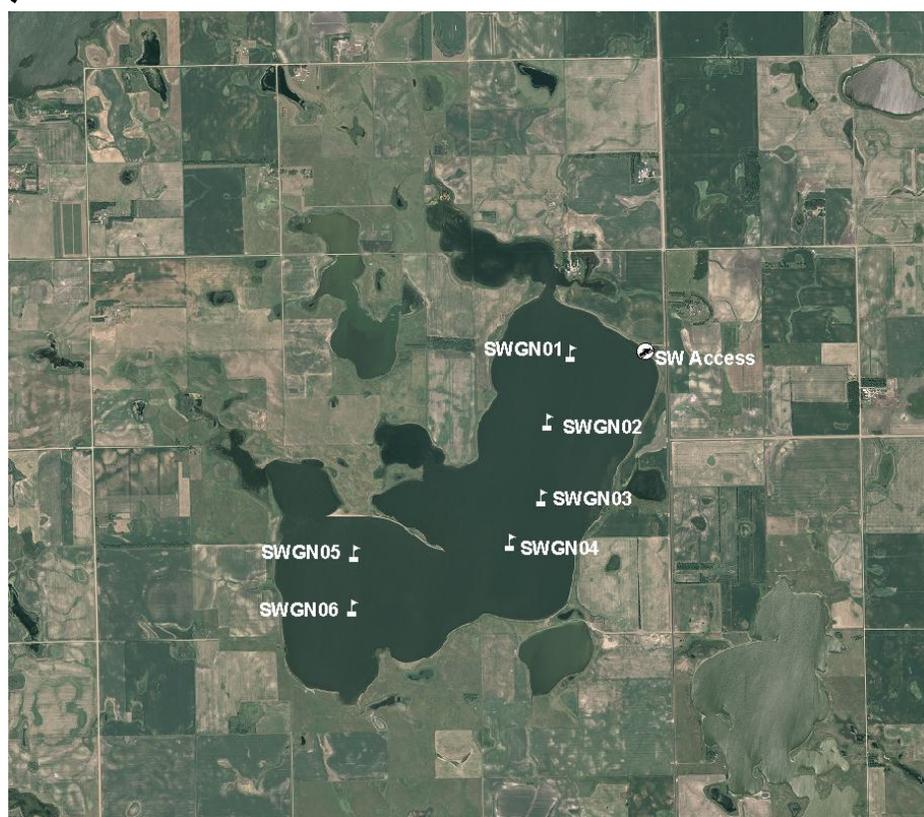
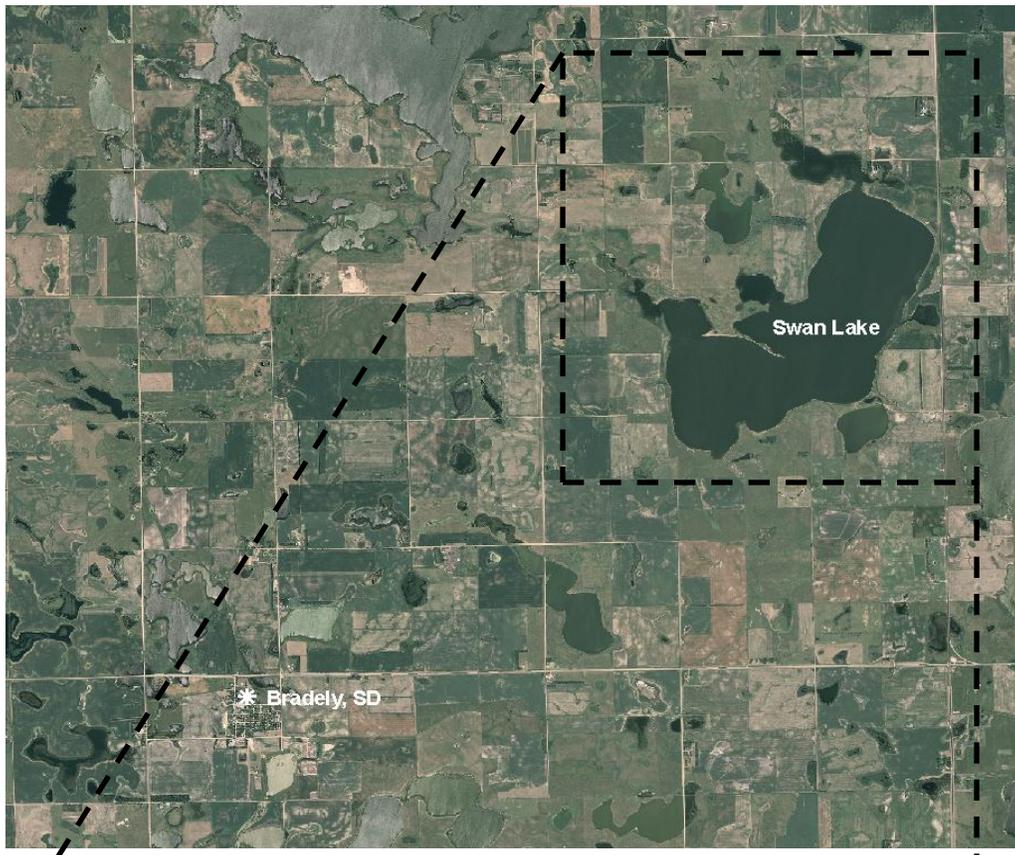


Figure 1. Map depicting geographic location Swan Lake from Bradely, South Dakota (top). Also noted is the public access point and standardized net locations for Swan Lake SWGN= g|| nets
Swan Lake

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 ≥ 30 , a PSD of 30-60, and a PSD-P of 5-10.

Results and Discussion

Prior to the 1990's Swan Lake was a shallow slough unable to support a sport fishery. During the mid-1990's above average precipitation and the resulting run-off provided an increase in surface area and depth making the lake capable of sustaining a sport fishery. Swan Lake is currently managed as a Walleye and Yellow Perch fishery.

Primary Species

Walleye: The mean gill net CPUE of stock-length Walleye during 2012 was 17.5 (Table 1) and was above the minimum objective (≥ 10 stock-length Walleye/net night; Table 3). The 2012 gill net CPUE is the highest observed since 2002 and relative abundance is considered high (Table 2).

Walleye captured in gill nets during 2012 ranged in TL from 15 to 68 cm (5.9 to 26.8 in; Figure 2). The PSD of 57 was within the objective range of 30-60; while the PSD-P of 4 was slightly below the objective range of 5-10 (Table 1; Table 3). Age estimates made using otoliths indicated that eight year classes (2002, 2004, 2006-2011) were represented in the 2012 gill net catch (Table 4). Five year-classes (2004, 2006, 2007, 2009, and 2011) coincide with stocking events; while year classes produced in 2002, 2008, and 2010 were naturally produced (Table 4; Table 6). The contribution of natural reproduction to year classes coinciding with stocking events is unknown.

Growth rates appear to be good with the weighted mean TL at capture of age-2 and age-3 Walleye being 310 and 385 mm (12.2 and 15.2 in; Table 5). Walleye were in good condition with mean W_r values ranging from 86 to 102 for all length categories sampled. The mean W_r of stock-length Walleye in the 2012 gill net catch was 93 (Table 1) and a slight decreasing trend in W_r was observed as TL increased.

Yellow Perch: The 2012 mean gill net CPUE of stock-length Yellow Perch was 28.0 (Table 1) and was below the minimum objective (≥ 30 stock-length Yellow Perch/net night). The 2012 gill net CPUE represented an increase from the 2009 CPUE of 11.0 and is the highest observed since 2003 (Table 2). Relative abundance is considered moderate.

Yellow Perch captured in the gill nets ranged in TL from 9 to 33 cm (3.5 to 13.0 in; Figure 3). The PSD was 89 and PSD-P was 38 (Table 1). Both the PSD and PSD-P were above the management objective ranges of 30-60 and 5-10 (Table 3), respectively; indicating a population comprised of larger individuals.

Otoliths were collected from a sub-sample of gill net captured Yellow Perch. Age structure information revealed the presence of five year-classes (2007-2011; Table 7). The 2009 cohort was the most represented and comprised 42% of Yellow Perch in the gill net catch; while year classes produced in 2010 and 2011 accounted for 26% and 29% (Table 7).

Yellow Perch growth rates appear to be good with the weighted mean TL at capture for age-2 male and female Yellow Perch was 195 and 211 mm, respectively (7.7 and 8.3 in; Table 8). Yellow Perch were in good condition with mean Wr values ranging from 100 to 119 for all length categories sampled. The mean Wr of stock-length Yellow Perch was 116 (Table 1). No length-related trend in Wr was observed.

Other Species

Northern Pike: The 2012 mean gill net CPUE of stock-length Northern Pike was 4.2 (Table 1) and was the highest observed since 2004 (Table 2). Relative abundance appears to be high.

Northern Pike captured in the gill net sample ranged in TL from 43 to 97 cm (16.9 to 38.2 in; Figure 4). The condition of gill net captured Northern Pike was similar to that of Northern Pike captured from other northeast South Dakota glacial lakes with mean Wr values that ranged from 86 to 95 for all length categories (e.g., stock to quality) sampled. Stock-length Northern Pike had a mean Wr of 89 (Table 1) and no length-related trends in condition were apparent.

Management Recommendations

- 1) Conduct fish community surveys utilizing gill nets on an every third year basis (next survey scheduled in summer 2015) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Stock Walleye on a biennial basis (\approx 500 fry/acre) to establish additional year classes.
- 3) Collect otoliths from Walleye and Yellow Perch to assess age structure and growth rates of each population.
- 4) Monitor winter and summer kill events. In cases of substantial winter/summer kill the need to re-establish a fishery in Swan Lake should be evaluated. If water levels are sufficient, Walleye and Yellow Perch should be stocked to re-establish a fish community.

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length fish (PSD-P), and mean relative weight (Wr) of stock-length fish for various fish species captured in experimental gill nets from Swan Lake, 2012. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). NOP= Northern Pike; WAE= Walleye; YEP= Yellow Perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
<i>Gill nets</i>								
NOP	4.2	0.9	76	15	36	17	89	2
WAE	17.5	2.0	57	8	4	3	93	1
YEP	28.0	6.6	89	4	38	6	116	<1

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured in experimental gill nets from Swan Lake, 2002-2012. BLB = black bullhead; NOP = Northern Pike; WAE = Walleye; YEP = Yellow Perch

Species	CPUE							
	2002	2003	2004	2005	2006	2007	2009	2012
<i>Gill nets</i>								
BLB	33.0	1.0	0.3	0.0	0.0	0.0	0.0	0.0
NOP	1.5	2.2	4.3	1.8	0.5	1.3	1.0	4.2
WAE	22.3	15.7	9.7	4.2	9.0	2.7	1.8	17.5
YEP	126.7	36.0	14.3	13.0	8.7	2.0	11.0	28.0

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 mean relative weight (Wr) for selected species captured in experimental gill nets from Swan Lake, 2002-2012. WAE = Walleye; YEP = Yellow Perch

Species	2002	2003	2004	2005	2006	2007	2009	2012	Objective
<i>Gill nets</i>									
WAE									
CPUE	22	16	10	4	9	3	2	18	≥ 10
PSD	36	87	62	56	61	100	27	57	30-60
PSD-P	2	4	10	8	13	75	18	4	5-10
Wr	96	97	95	87	94	79	92	93	---
YEP									
CPUE	127	36	14	13	9	2	11	28	≥ 30
PSD	37	56	100	97	63	33	80	89	30-60
PSD-P	14	28	42	91	31	17	0	38	5-10
Wr	102	104	98	100	106	111	107	116	---

Table 4. 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 Swan Lake, 2009-2012.

Survey Year	Year Class											
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2012		1	9	89	2	1	2		1		1	
2009 ¹	---	---	---		5	8			1		1	
# stocked												
Fry		1000		750			1500		1500			
small fingerling						76						
large fingerling												

¹ Older Walleye were sampled, but are not reported in this table.

Table 5. Weighted mean length at capture (mm) for Walleye age-1 through age-10 captured in experimental gill nets (expanded sample size) from Swan Lake, 2005-2012. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age									
	1	2	3	4	5	6	7	8	9	10
2012	159 (1)	310 (9)	385 (89)	480 (2)	509 (1)	528 (2)	---	657 (1)	---	683 (1)
2009	213 (5)	302 (8)	---	---	494 (1)	---	649 (1)	---	---	655 (1)
2007	203 (3)	372 (3)	442 (1)	---	541 (1)	518 (1)	---	595 (2)	---	---
2006	238 (13)	314 (16)	351 (2)	433 (12)	---	494 (11)	502 (5)	602 (4)	---	---
2005	158 (2)	335 (11)	430 (9)	---	463 (2)	---	535 (2)	---	---	---

Table 6. Stocking history including size and number for fishes stocked into Swan Lake, 2001-2012.

Year	Species	Size	Number
2004	WAE	fry	1,500,000
2006	WAE	fry	1,500,000
2007	WAE	small fingerling	75,600
2009	WAE	fry	750,000
2011	WAE	fry	1,000,000

Table 7. Year class distribution based on the expanded age/length summary for Yellow Perch sampled in gill nets from Swan Lake, 2009-2012.

Survey Year	Year Class					
	2012	2011	2010	2009	2008	2007
2012		67	60	99	5	4
2009	---	---	---			66

Table 8. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Swan Lake, 2009-2012.

Year	Age				
	1	2	3	4	5
2012					
Male	101 (36)	195 (13)	235 (23)	260 (1)	---
Female	106 (31)	211 (50)	261 (75)	323 (2)	331 (4)
Combined	104 (67)	206 (60)	254 (99)	285 (5)	331 (4)
2009					
Male	---	184 (2)	---	---	---
Female	---	210 (64)	---	---	---
Combined	---	209 (66)	---	---	---

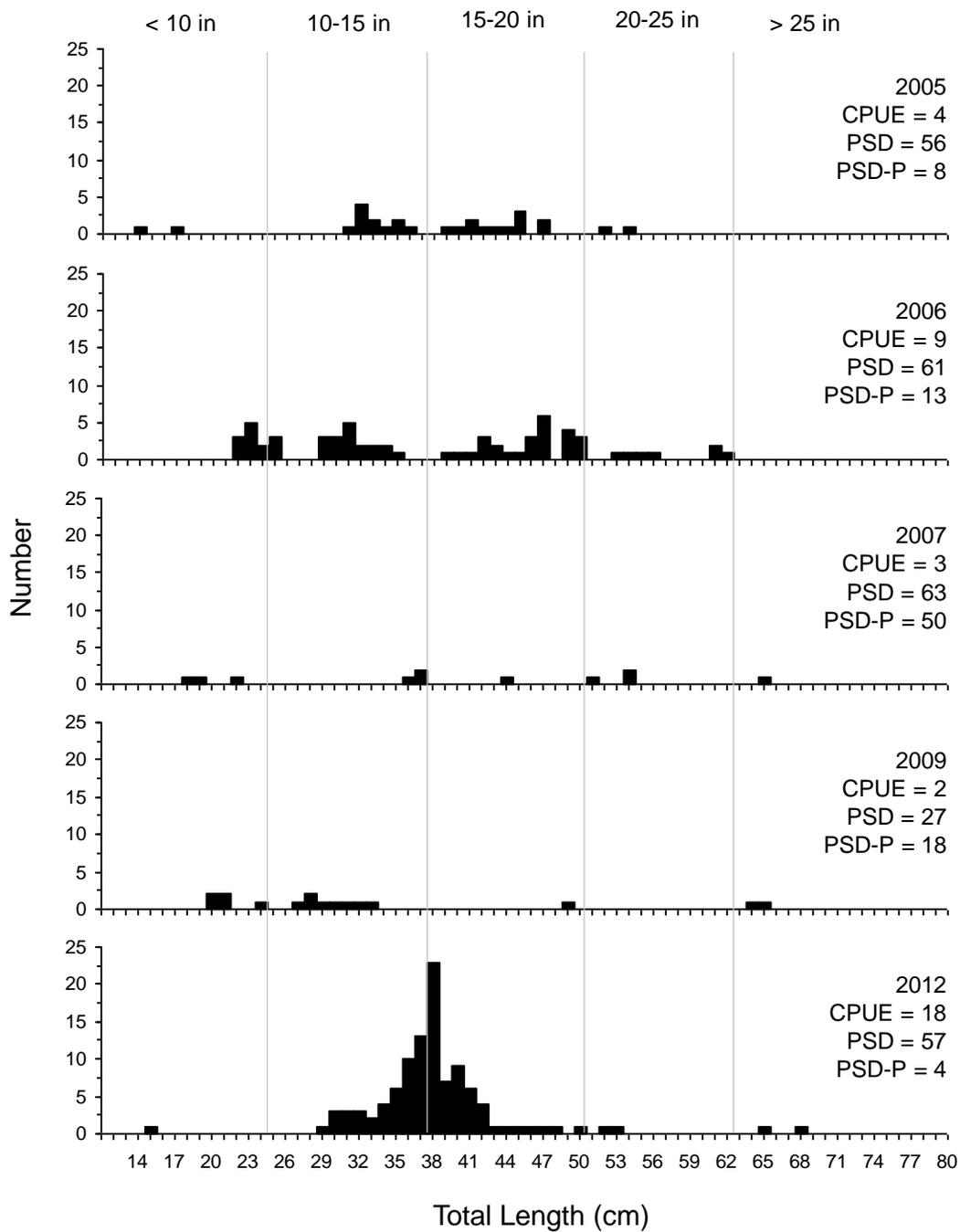


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Swan Lake, 2005-2012.

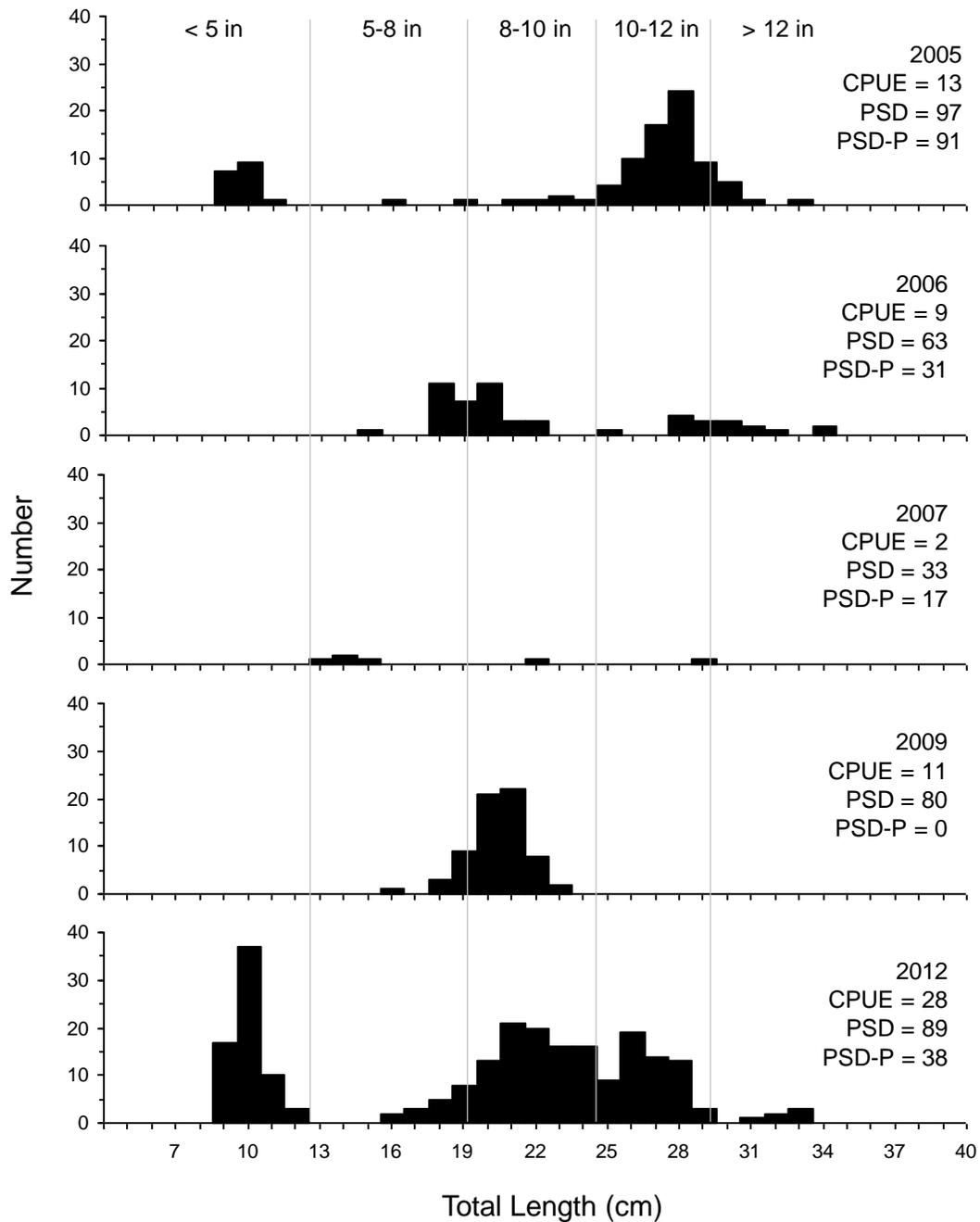


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in Swan Lake, 2005-2012.

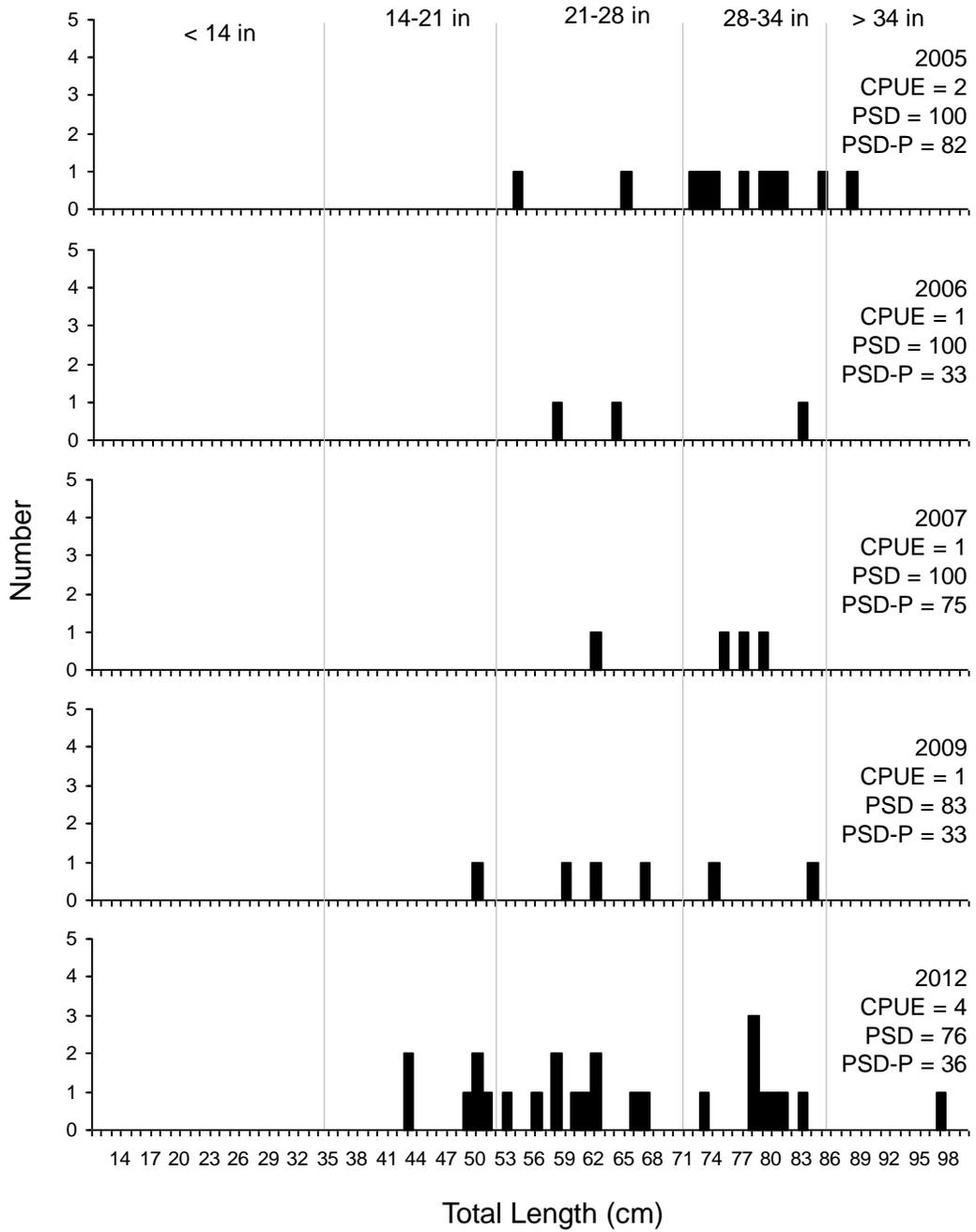


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Northern Pike captured using experimental gill nets in Swan Lake, 2005-2012.