

# Lardy Lake

## Site Description

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### **Location**

Water designation number (WDN)	22-0041-00
Legal description	T123N-R56W-Sec 2,3,10,11
County (ies)	Day
Location from nearest town	1.5 miles southwest of Roslyn, SD

### **Survey Dates and Sampling Information**

Survey dates	August 6-8, 2013 (FN,GN)
Frame net sets (n)	18
Gill net sets (n)	6

### **Morphometry (Figure 1)**

Watershed area (acres)	38,077
Surface area (acres)	≈825
Maximum depth (ft)	≈18
Mean depth (ft)	unknown

### **Ownership and Public Access**

Lardy Lake is a non-meandered lake that covers both public (e.g., Waterfowl Production Area) and private lands. The fishery is managed by the SDGFP. Public access to the lake is difficult. High water levels have flooded the road that provided access to a primitive boat ramp (i.e., constructed using over-sized rock and gravel) located on federally-owned lands along the west shore. Currently, public access is limited to foot traffic across federally-owned lands or flooded road rights-of-way. Lands adjacent to Lardy Lake are owned by the U. S. Fish and Wildlife Service and private individuals.

### **Watershed and Land Use**

The 38,077 acre Opitz Lake sub-watershed (HUC-12) encompasses Lardy Lake and is located within the larger Northern Coteau Lakes-Upper James River (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**

Water levels on Lardy Lake are not monitored by SDDENR.

### **Fish Management Information**

Primary species	Walleye, Yellow Perch
Other species	Bluegill, Northern Pike
Lake-specific regulations	none
Management classification	none
Fish consumption advisories	Mercury: Walleye ( $\geq$ 25 in). See the South Dakota Fishing Handbook for more details on meal and portion size recommendations. Also see Department of Health website: <a href="http://doh.sd.gov/Fish/Default.aspx">http://doh.sd.gov/Fish/Default.aspx</a> for more information.

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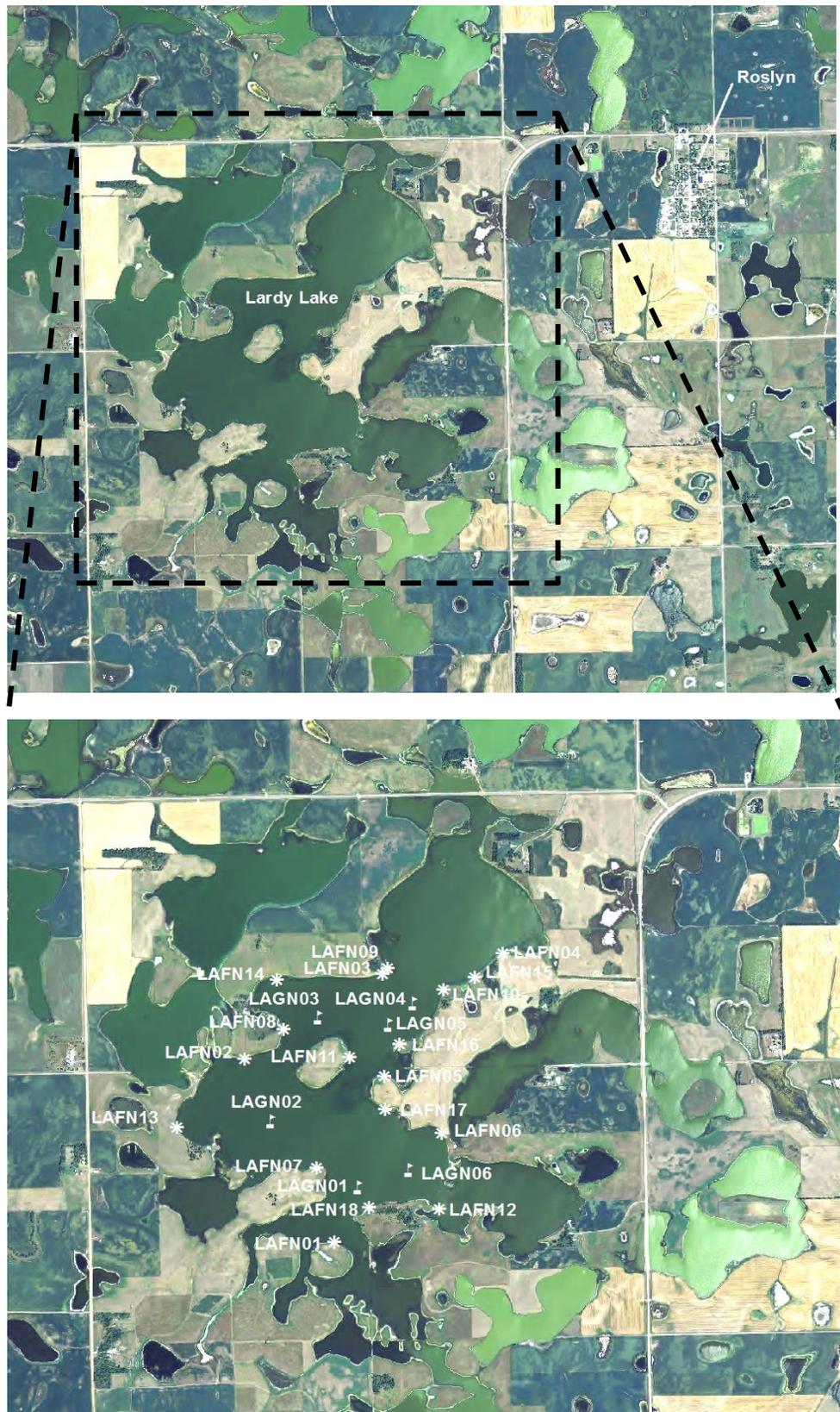


Figure 1. Map depicting geographic location of Lardy Lake from Roslyn, South Dakota (top). Also noted are standardized net locations for Lardy Lake (bottom). LAFN= frame nets; LAGN= gill nets

## Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length Walleye  $\geq 10$ , a PSD of 30-60, and a PSD-P of 5-10.
- 2) Maintain a mean gill net CPUE of stock-length Yellow Perch  $\geq 30$ , a PSD of 30-60, and a PSD-P of 5-10.

## Results and Discussion

The waterbody referred to as Lardy Lake is an 825 acre natural lake located near Roslyn, South Dakota (Figure 1). During the 1990s, abundant precipitation and the resulting run-off filled and/or expanded the lake. The increased water depth and surface area created habitat capable of sustaining sport fish populations. In 2002, Walleye were introduced into the lake and subsequent stockings of both Walleye and Yellow Perch have been conducted (Table 6). Currently, Lardy Lake is managed as a Walleye and Yellow Perch fishery.

### *Primary Species*

Walleye: The mean gill net CPUE of stock-length Walleye was 12.5 (Table 1) and above the minimum objective ( $\geq 10$  stock-length Walleye/net night; Table 3). Based on the 2013 gill net CPUE, relative abundance appears to be high.

Walleye in the gill net catch ranged in TL from 21 to 69 cm (8.3 to 27.2 in; Figure 2). A high proportion of Walleye  $\geq$  quality-length (38 cm; 15 in) were present in the sample (Figure 2). The PSD was 81 and the PSD-P was 32 (Table 1), both exceeded management objectives of 30-60 and 5-10, respectively (Table 3).

Otoliths were collected from a sub-sample of Walleye in the gill net catch. Age structure information suggested the presence of seven year classes (2004, 2006, 2008-2012; Table 4). Year classes that represented both stocked and non-stocked years were sampled. Year classes produced during fry stocked years (i.e., 2004, 2008-2010) collectively comprised 59% of Walleye in the gill net catch; while naturally produced cohorts (i.e., 2006, 2011-2012) accounted for the remaining 41% (Table 4; Table 6). The contribution of stocked or naturally-produced Walleye to year classes produced during stocked years is unknown, as stocked individuals were unmarked making it difficult to differentiate stocked from naturally-produced Walleye.

Walleye in Lardy Lake exhibit fast growth (Table 5). In 2013, the weighted mean TL at capture of age-2 and age-3 Walleye was 381 and 469 mm (15.0 and 18.5 in; Table 5). Mean  $W_r$  values ranged from 85 to 93 for all length categories (e.g., stock to quality) sampled in the gill net catch. The mean  $W_r$  of stock-length individuals was 92 (Table 1) and no length-related trends in condition were apparent.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 86.2 (Table 1) and above the minimum objective ( $\geq 30$  stock-length Yellow Perch/net night; Table 3). Currently, relative abundance is high.

Gill net captured Yellow Perch ranged in TL from 9 to 30 cm (3.5 to 11.8 in), had a PSD of 24, and a PSD-P of 5 (Table 1; Figure 3). The PSD was below the management objective of 30-60; while the PSD-P was within the management objective of 5-10 (Table 3).

Otoliths collected from a sub-sample of gill net captured Yellow Perch indicated that four year classes (2008, and 2010-2012) were represented. The 2012 year class was the most represented and comprised 77% of Yellow Perch in the gill net catch; while cohorts produced in 2010 and 2011 collectively comprised an additional 23% (Table 7).

The weighted mean TL at capture for age-1 and age-2 male Yellow Perch was 126 and 188 mm (5.0 and 7.4 in; Table 8). Few males older than age 2 were captured (Table 8). The weighted mean TL at capture for age-1, age-2, and age-3 females was 135, 212, and 267 mm (5.3, 8.3 and 10.5 in), respectively (Table 8). Gill net captured Yellow Perch had high condition, with mean Wr values that exceeded 100 for all length categories (e.g., stock to quality) sampled. The mean Wr of stock-length individuals was 108 (Table 1) and no length-related trends in condition were apparent.

#### *Other Species*

Northern Pike: Northern Pike typically are not sampled effectively during standardized mid-summer fish community surveys. As a result, mean gill net CPUE values are often low. In 2013, the mean gill net CPUE was 2.5 (Table 1) and relative abundance was considered moderate.

Gill nets captured 15 Northern Pike that ranged in TL from 53 to 92 cm (20.9 to 36.2 in), had a PSD of 100 and PSD-P of 27 (Table 1). Although sample size was low, Northern Pike condition appeared to be similar to that of Northern Pike captured from other northeast South Dakota glacial lakes (e.g., Waubay and Lynn Lakes) with mean Wr values that ranged from 75 to 96 for all 10-mm length groups represented. A slight decreasing trend in condition was apparent as TL increased.

Other: Bluegill was the only other fish species captured during the 2013 fish community survey (Table 1).

## **Management Recommendations**

- 1) Conduct fish community assessment surveys on an every third year basis (next surveyed scheduled for summer 2016) 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) Establish a public boat ramp and parking area.
- 5) Monitor winter and summer kill events. In cases of substantial winter/summer kill the need to re-establish a fishery in Lardy 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 frame nets and experimental gill nets from Lardy Lake, 2013. Confidence intervals include 80 percent ( $\pm$  CI-80) or 90 percent ( $\pm$  CI-90). BLG= Bluegill; 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>Frame Nets</i>								
BLG	1.2	0.9	14	13	0	---	117	3
NOP	0.7	0.2	100	0	42	27	89	2
WAE	2.6	0.9	98	4	77	10	91	1
YEP	6.6	2.1	2	2	0	---	95	<1
<i>Gill Nets</i>								
NOP	2.5	0.6	100	0	27	21	89	2
WAE	12.5	4.7	81	8	32	9	92	1
YEP	86.2	12.0	24	3	5	2	108	<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 Lardy Lake, 2004-2013. BLG= Bluegill; NOP= Northern Pike; WAE= Walleye; YEP= Yellow Perch

Species	CPUE				
	2004	2005	2006 <sup>1</sup>	2007 <sup>1</sup>	2013
<i>Frame Nets</i>					
BLG	---	---	---	---	1.2
NOP	---	---	---	---	0.7
WAE	---	---	---	---	2.6
YEP					6.6
<i>Gill Nets</i>					
BLG	0.0	0.7	0.0	0.0	0.0
NOP	0.0	0.0	0.0	0.0	2.5
WAE	1.0	10.3	39.3	6.3	12.5
YEP	42.3	13.7	88.3	113.3	86.2

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

Note: From 2007-2010, the fish community in Lardy Lake was monitored as part of research being conducted through South Dakota State University examining the influence of Gizzard Shad introductions into northeastern South Dakota glacial lakes (i.e., East Krause, Lardy and Mid-Lynn; VanDeHey 2011).

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 Lardy Lake, 2004-2013. WAE = Walleye; YEP = Yellow Perch

Species	2004	2005	2006 <sup>1</sup>	2007 <sup>1</sup>	2013	Objective
<i>Gill nets</i>						
WAE						
CPUE	1	10	39	6	13	≥ 10
PSD	67	10	74	32	81	30-60
PSD-P	0	0	5	0	32	5-10
Wr	98	98	101	100	92	---
YEP						
CPUE	42	14	88	113	86	≥ 30
PSD	3	41	34	24	24	30-60
PSD-P	1	20	14	6	5	5-10
Wr	101	115	107	102	108	---

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

Note: From 2007-2010, the fish community in Lardy Lake was monitored as part of research being conducted through South Dakota State University examining the influence of Gizzard Shad introductions into northeastern South Dakota glacial lakes (i.e., East Krause, Lardy and Mid-Lynn; VanDeHey 2011).

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 Lardy Lake, 2005-2013.

Survey Year	Year Class											
	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
2013		10	19	16	7	21		2		1		
2007 <sup>1</sup>	---	---	---	---	---	---		13		6		
2006 <sup>1</sup>	---	---	---	---	---	---	---	4	22	91	3	2
2005	---	---	---	---	---	---	---	---	1	29	2	1
# stocked												
fry	300			650	650	650				1,000		600
sm. fingerling											60	
lg. fingerling												

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

Table 5. Weighted mean length at capture (mm) for Walleye captured in experimental gill nets (expanded sample size) from Lardy Lake, 2005-2013. 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
2013	---	269(10)	381(19)	469(16)	512(7)	527(21)	---	602(2)	---	696(1)
2007	---	347(13)	---	487(6)	---	---	---	---	---	---
2006	172(4)	338(22)	422(91)	519(3)	538(2)	---	---	---	---	---
2005	131(1)	308(29)	456(2)	465(1)	---	---	---	---	---	---

Table 6. Stocking history including size and number for fishes stocked into Lardy Lake, 2002-2013. WAE= Walleye; YEP= Yellow Perch

Year	Species	Size	Number
2002	WAE	fry	600,000
2003	WAE	small fingerling	59,550
2004	WAE	fry	1,000,000
2008	WAE	fry	650,000
	YEP	fry	650,000
2009	WAE	fry	650,000
	YEP	fry	644,000
2010	WAE	fry	650,000
2013	WAE	fry	300,000

Table 7. Year class distribution based on the expanded age/length summary for Yellow Perch sampled in gill nets from Lardy Lake, 2013.

Survey Year	Year Class					
	2013	2012	2011	2010	2009	2008
2013		619	146	37		1

Table 8. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Lardy Lake, 2013.

Year	Age				
	1	2	3	4	5
2012					
Male	126 (252)	188 (47)	240 (6)	---	---
Female	135 (342)	212 (99)	267 (27)	---	307 (1)
Combined	131 (619)	203 (146)	259 (37)	---	307 (1)

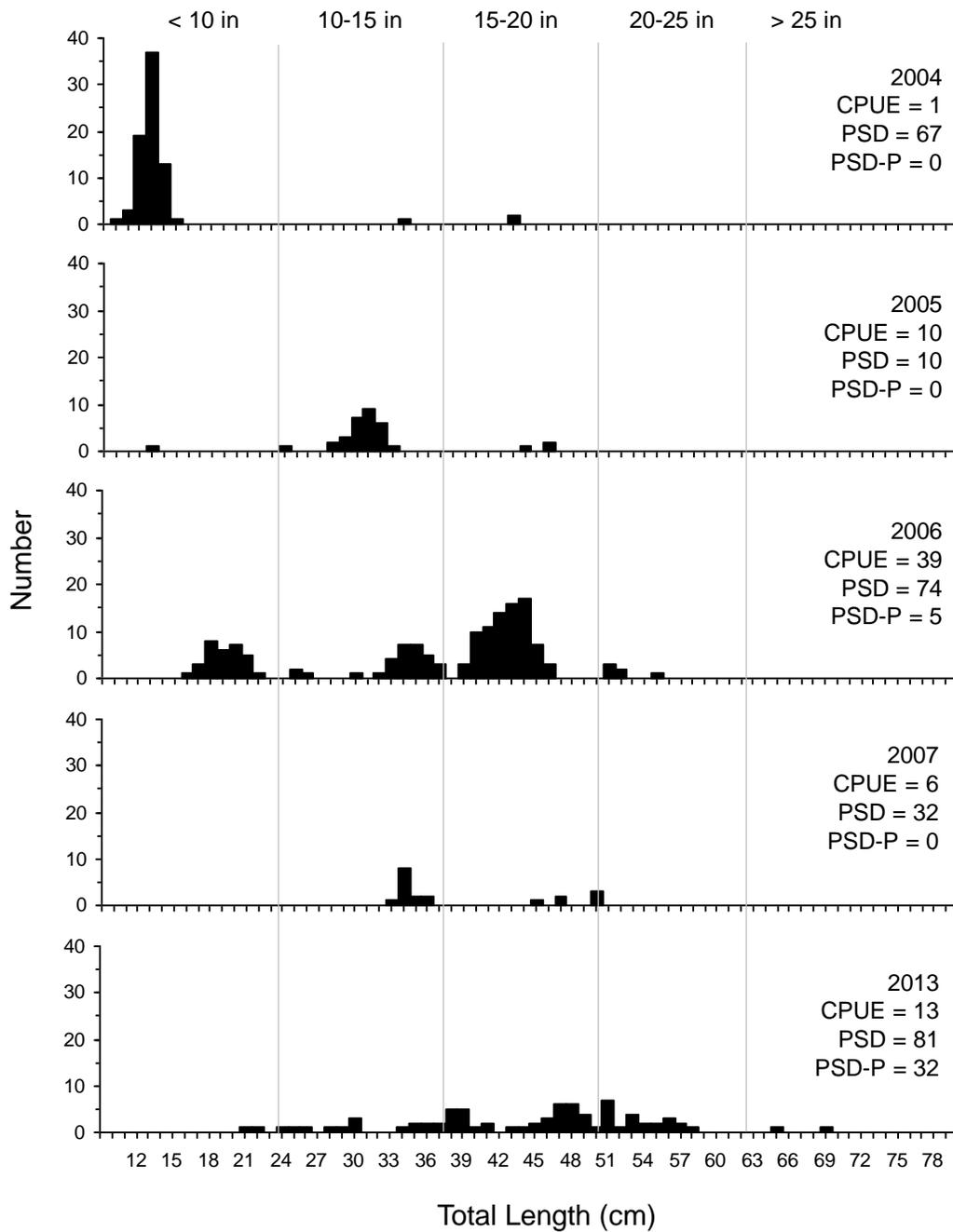


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Lardy Lake, 2004-2013.

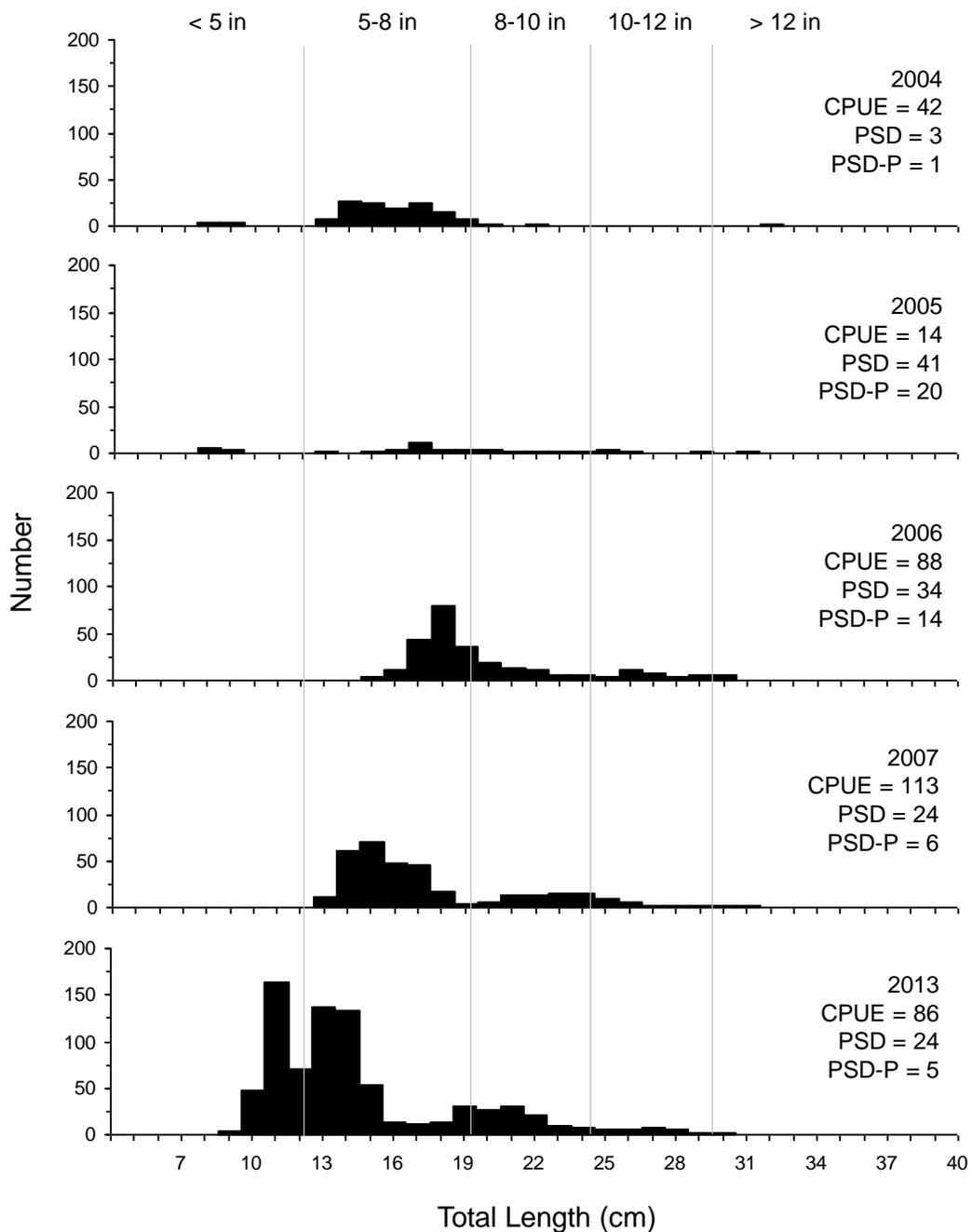


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in Lardy Lake, 2004-2013.