Middle Lynn Lake

Site Description

Location

Water designation number (WDN)	22-0052-00
Legal description	T123N-R57W-Sec. 2,3,10,11,14,15
County (ies)	Day
Location from nearest town	6.5 miles west, 2.5 miles south, and 0.5 miles west of Roslyn

Survey Dates and Sampling Information

Survey dates	May 20-21, 2015 (GN)
Gill net sets (n)	6

Morphometry (Figure 1)

Watershed area (acres)	37,978
Surface area (acres)	≈1,050
Maximum depth (ft)	≈25
Mean depth (ft)	---

Ownership and Public Access

Middle Lynn Lake is a non-meandered lake that covers both public (e.g., Game Production Area) and private lands. The fishery is managed by the SDGFP. State-owned land on the south, west and north provide public access to the lake. A primitive (i.e., constructed using over-sized rock and gravel) boat launch can be accessed via an improved trail that runs along the south shore (Figure 1). Lands adjacent to the lake are owned by the State of South Dakota and private individuals.

Watershed and Land Use

The 37,978 acre Lynn Lake sub-watershed (HUC-12) encompasses Middle Lynn Lake and is located within the larger Pierpont Lake (HUC-10) watershed. Land use within the Pierpont Lake watershed is primarily agricultural with a mix of pasture or grassland, cropland, and scattered shelterbelts.

Water Level Observations

Water levels on Middle Lynn Lake are not monitored by SDDENR.

Fish Management Information

Primary species	muskellunge, walleye, yellow perch
Other species	black bullhead, black crappie, bluegill, northern pike
Lake-specific regulations	walleye: 2 daily; minimum length 15”
Management classification	none
Fish consumption advisories	Mercury: walleye (>18”). See the South Dakota Fishing Handbook for more details on meal and portion size recommendations. Also see Department of Health website: http://doh.sd.gov/food/Fish-Advisories.aspx for more information.

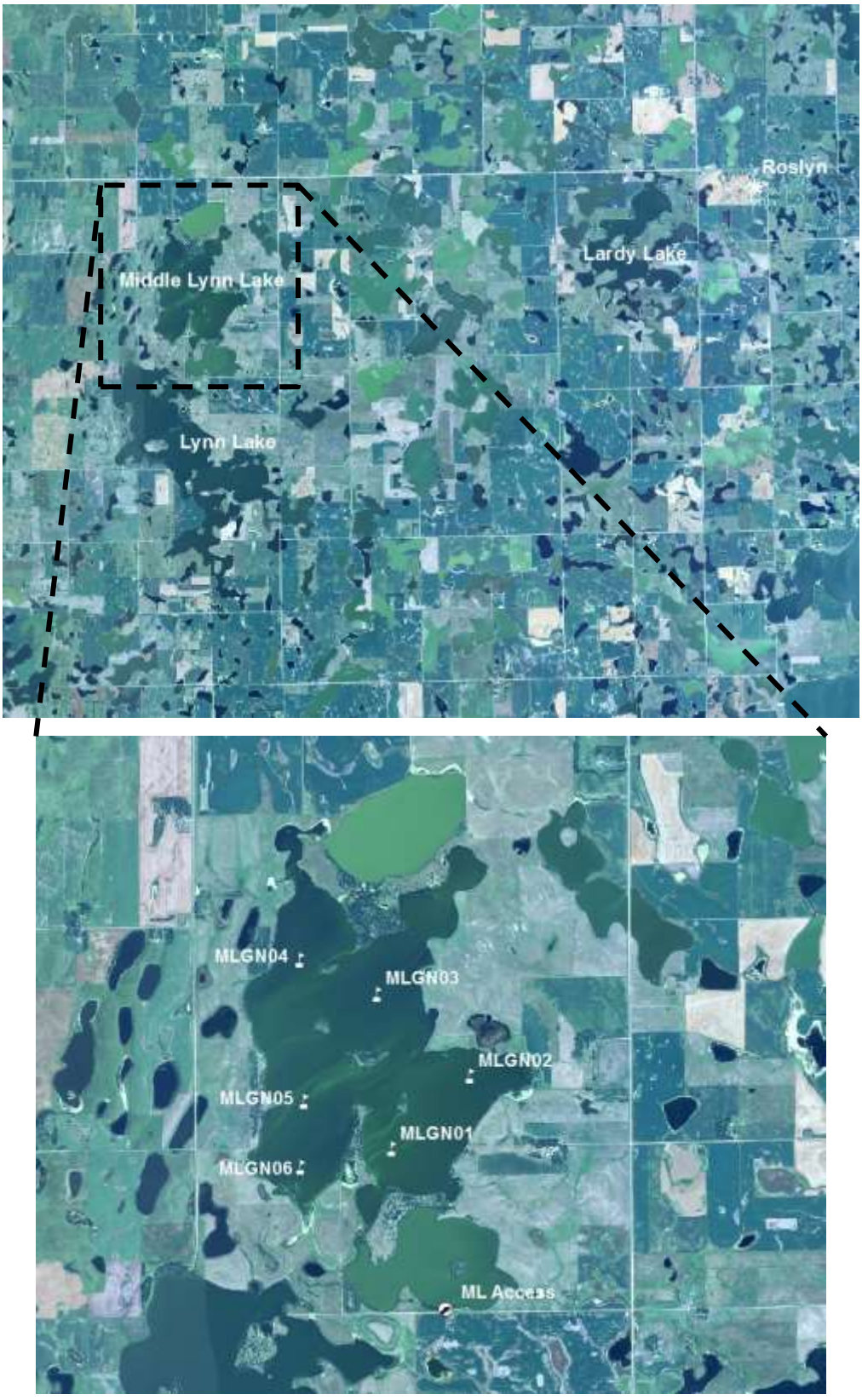

Figure 1. Map depicting geographic location of Lynn, Middle Lynn, and Lardy Lakes, Day County, from Roslyn, South Dakota (top). Also noted is the public access and standardized net locations for Middle Lynn Lake (bottom). MLGN= gill nets

Management Objectives

1) Maintain a low density muskellunge population (i.e., one 30-in fish/5 acres) to provide a unique angling opportunity in northeastern South Dakota.

2) Maintain a mean gill net CPUE of stock-length walleye ≥ 10, a PSD of 30-60, and a PSD-P of 5-10.

3) 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, Middle Lynn Lake was a shallow cattail slough. During the mid- to late-1990's, abundant precipitation and the resulting run-off increased both the surface area and depth of the lake, which created habitat capable of sustaining sport fish populations. Initial walleye stockings by SDGFP were made in 2002 and 2003 and several subsequent stockings have occurred (Table 6). From 2002-2014, walleye and yellow perch were the primary management species.

In 2015, SDGFP began managing the lake for muskellunge in addition to walleye and yellow perch. The decision was based, in large part, on the following reasons: 1) the lake contained sufficient habitat; 2) muskellunge were already present due to the connection with Lynn Lake during high water years; and 3) muskellunge stockings were having limited impact on the overall population in Amsden Dam and SDGFP biologists felt that those resources would be better allocated elsewhere. Going forward, Middle Lynn Lake will be managed as a muskellunge, walleye, and yellow perch fishery.

Primary Species

Walleye: The 2015 mean gill net CPUE for stock-length walleye was 5.7 (Table 1) and below the minimum objective (≥ 10 stock-length walleye/net night; Table 3). The mean gill net CPUE has decreased since 2006 and currently, relative abundance appears to be moderate.

Walleye ranged in TL from 13 to 45 cm (5.1 to 17.7 in; Figure 2), had a PSD of 3 and PSD-P of 0 (Table 1). Both the PSD and PSD-P were below management objectives (30-60 and 5-10, respectively) indicating a population dominated by stock-quality length individuals (< 38 cm, 15.0 in.; Table 3).

Otoliths were collected from a sub-sample of walleye in the gill net catch. Age structure information suggested the presence of three year classes (2011, 2013-2014; Table 4). The 2013 cohort, which coincided with a fry stocking, was the most represented and comprised 91% of walleye in the gill net catch (Table 4; Table 6).

Walleye exhibit satisfactory growth in Middle Lynn Lake with 2015 weighted mean TL at capture at age-2 of 296 mm (11.7 in; Table 5). Most walleye captured were in the stock-quality length category which had a mean Wr of 88.

Yellow Perch: The mean gill net CPUE of stock-length yellow perch was 11.8 (Table 1) and is substantially lower than the 2012 CPUE of 177.2 (Table 2). The 2015 mean gill net CPUE was below the minimum objective (≥ 30 stock-length perch/net night; Table 3) and indicated moderate relative abundance.

Gill net captured yellow perch ranged in TL from 13 to 30 cm (5.1 to 11.8 in; Figure 3), had a PSD of 87, and a PSD-P of 80. The PSD and PSD-P values were above management objectives (defined as PSD of 30-60 and a PSD-P of 5-10; Table 3) indicating a population dominated by quality and preferred-length yellow perch (>20 cm, 7.9 in.; Figure 3).

Otoliths were collected from a sub-sample of gill net captured yellow perch. Age structure information indicated the presence of five year classes (2010-2014; Table 7). The majority (63%) of yellow perch in the gill net catch were from the 2011 year class (Table 7).

In 2015, the weighted mean TL at capture for age-2 and age-4 yellow perch was 163 and 269 mm, respectively (6.4 and 10.6 in; Table 8). Mean Wr values of gill net captured yellow perch ranged from 90 to 100 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length yellow perch being 94 (Table 1).

Other Species

Other: Black bullhead and northern pike were captured in low numbers during the 2015 survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys utilizing gill nets on an every third year basis (next survey scheduled for summer 2018) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

2) Conduct annual spring trap netting using large frame nets to monitor muskellunge population parameters (e.g., abundance, size structure, etc).

3) Stock muskellunge (≈one fingerling/acre) on a biennial basis, in an effort to maintain a low density population that provides a unique angling opportunity in northeastern South Dakota.

4) Maintain statewide 1,016-mm (40-in) minimum length restriction on muskellunge in an effort to develop a unique trophy fishery.

5) Stock walleye (≈500 fry/acre) on a biennial basis to establish additional year classes.

6) Collect otoliths from walleye and yellow perch to assess age structure and growth rates of each population.

7) Maintain the 381-mm (15-in) minimum length limit and reduced daily limit on walleye; the regulation is designed to protect smaller fish from harvest, increase average fish size, and provide a more equitable distribution of the walleye harvest (Lucchesi and Blackwell 2009).

8) Improve access via enhancements (e.g., installation of landing dock) to the primitive boat launch and parking area.

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 Middle Lynn Lake, 2015. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= black bullhead; NOP= northern pike; WAE= walleye; YEP= yellow perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Gill Nets								
BLB	1.5	1.4	33	31	22	27	109	4
NOP	0.3	0.3	100	0	50	50	83	15
WAE	5.7	1.9	3	5	0	---	88	2
YEP	11.8	6.6	87	7	80	8	94	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 Middle Lynn Lake, 2004-2015. BLB= black bullhead; NOP= northern pike; WAE= walleye; YEP= yellow perch

	CPUE					
Species	2004	2005	2006	2007	2012	2015
Gill Nets						
BLB	1.0	0.7	0.0	0.0	0.7	1.5
NOP	0.0	0.0	0.0	0.0	0.0	0.3
WAE	16.3	15.7	12.3	1.7	1.8	5.7
YEP	27.0	24.0	118.7	35.0	177.2	11.8

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 Middle Lynn Lake, 2004-2015. WAE = walleye; YEP = yellow perch

Species	2004	2005	2006	2007	2012	2015	Objective
Gill nets							
WAE							
CPUE	16	16	12	2	2	6	≥ 10
PSD	94	100	97	40	55	3	30-60
PSD-P	0	2	68	40	0	0	5-10
Wr	107	109	91	100	95	88	---
YEP							
CPUE	27	24	119	35	177	12	≥ 30
PSD	73	86	29	38	31	87	30-60
PSD-P	20	38	14	14	10	80	5-10
Wr	100	100	112	121	98	94	---

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 Middle Lynn Lake, 2007-2015.

	Year Class												
Survey Year	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
2015		2	32		1								
2012	---	---	---		44	13	2						
2007[1]	---	---	---	---	---	---	---	---		3	1		2
# stocked													
fry	370		375			700	700	700			700		700
sm. fingerling													
lg. fingerling													

[1] 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 Middle Lynn Lake, 2005-2015. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

	Age				
Year	1	2	3	4	5
2015	140(2)	296(32)	---	458(1)	---
2012	200(44)	340(13)	379(2)	---	---
2007	258(3)	253(1)	---	531(2)	---
2006	208(46)	---	---	---	517(36)
2005	---	---	---	471(47)	---

Table 6. Stocking history including size and number for fishes stocked into Middle Lynn Lake, 2003-2015. GIZ= gizzard shad; MUE= muskellunge; WAE= walleye; YEP= yellow perch

Year	Species	Size	Number
2003	WAE	fry	700,000
2005	WAE	fry	700,000
2008	GIZ	adult	117
	WAE	fry	700,00
	YEP	fry	701,000
2009	GIZ	adult	125
	WAE	fry	700,000
	YEP	fry	703,000
2010	WAE	fry	700,000
2013	WAE	fry	375,000
2015	MUE	large fingerling	1,054
	WAE	fry	370,000

Table 7. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from Middle Lynn Lake, 2012-2015.

	Year Class								
Survey Year	2015	2014	2013	2012	2011	2010	2009	2008	2007
2015		1	8	3	44	14			
2012	---	---	---		727	839	163	42	10

Table 8. Weighted mean TL (mm) at capture for yellow perch captured in experimental gill nets (expanded sample size) from Middle Lynn Lake, 2012-2015.

	Age				
Year	1	2	3	4	5
2015	138(1)	163(8)	276(3)	269(44)	280(14)
2012	101(727)	176(839)	238(163)	271(42)	270(10)

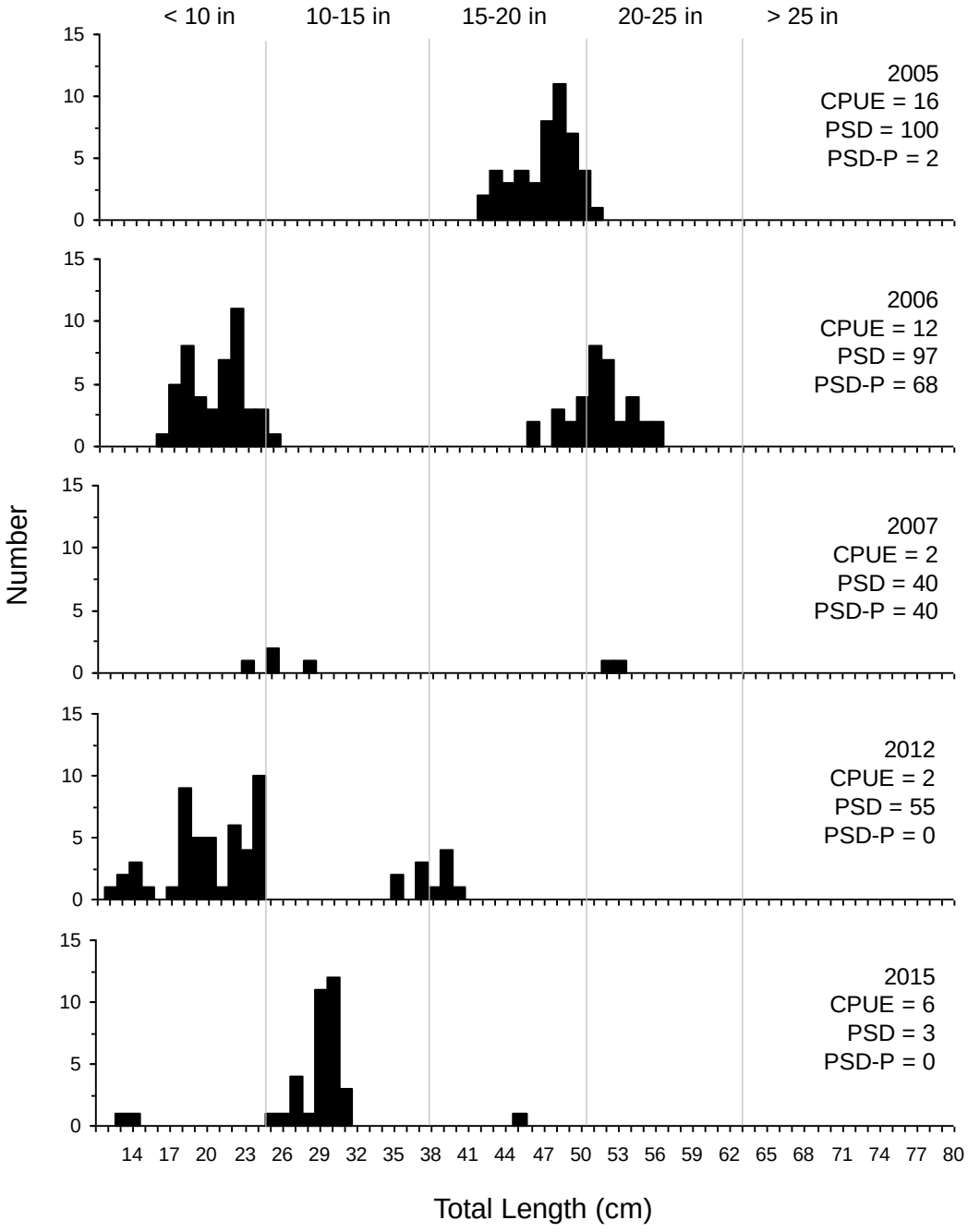

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Middle Lynn Lake, 2005-2015.

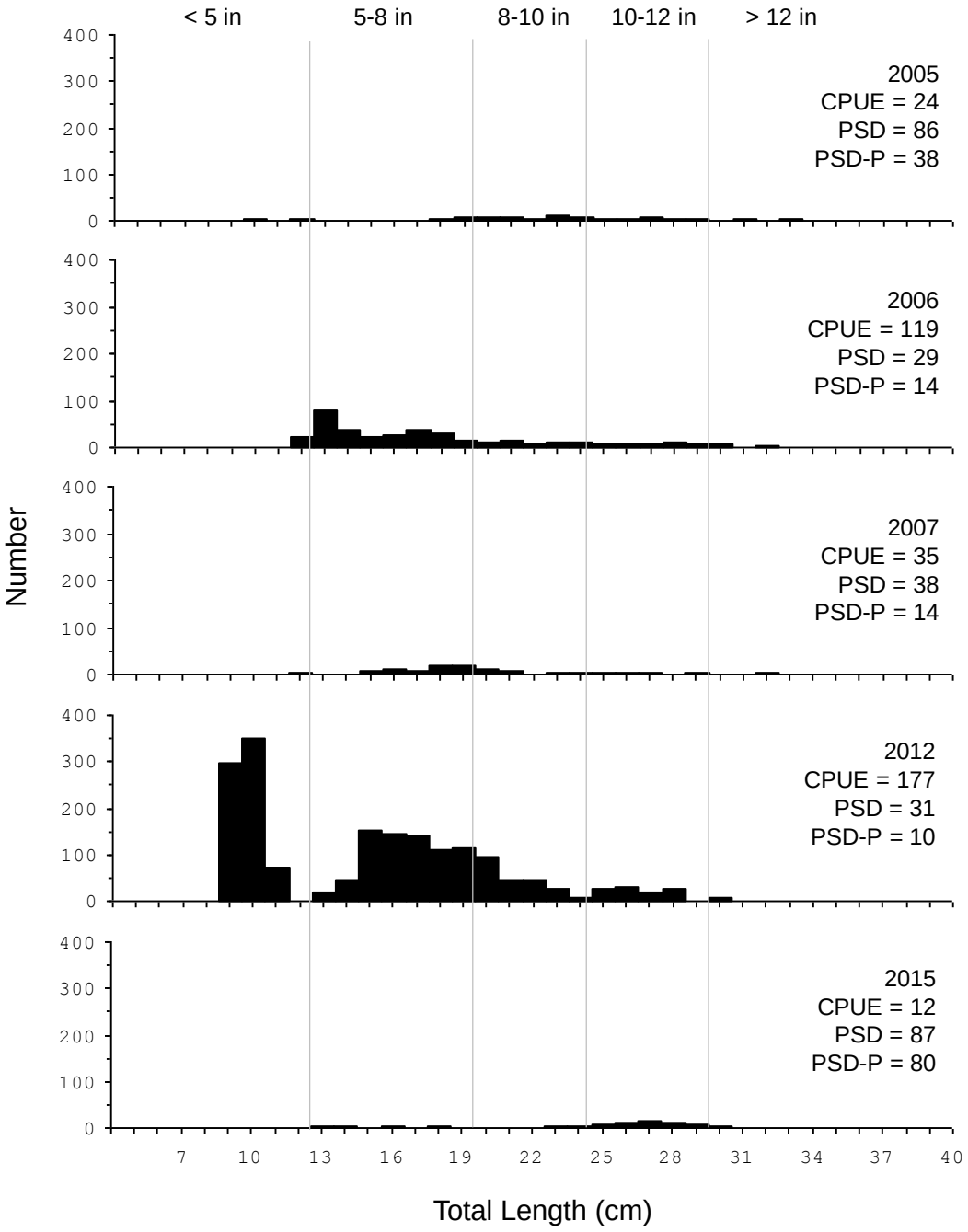

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Middle Lynn Lake, 2005-2015.