

Piyas Lake

Site Description

Location

Water designation number (WDN)	48-0038-00
Legal description	T124N-R55W-Sec.1,12 T125N-R53W-Sec.7,19,20,25,29,30,31
County (ies)	Day, Marshall
Location from nearest town	4.5 miles east and 2.0 miles south of Eden (Sisseton-Wahpeton Oyate access) 4.0 miles south, 4.0 miles east, and 0.5 mile north of Eden (SDGFP access)

Survey Dates and Sampling Information

Survey dates	June 30-July 1, 2015 (GN)
Gill net sets (n)	6

Morphometry

Watershed area (acres)	13,667
Surface area (acres)	≈1500
Maximum depth (ft)	≈14
Mean depth (ft)	unknown

Ownership and Public Access

Piyas Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. There are two public access points on Piyas Lake one on the southwest corner (SDGFP) and the other on the northeast corner (Sisseton-Wahpeton Oyate; Figure 1). The SDGFP site has no formal boat ramp; while the Sisseton-Oyate site contains a primitive boat ramp (i.e., constructed using over-sized rock and gravel) and landing dock. A Sisseton-Wahpeton Oyate fishing license is required to use the Sisseton-Wahpeton Oyate access point. However, only a state fishing license is required to fish the lake if access is gained through non-tribal lands. Lands adjacent to Piyas Lake are owned by the State of South Dakota, Bureau of Indian Affairs, and private individuals.

Watershed and Land Use

The 13,667 acre Piyas Lake sub-watershed (HUC-12) 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 woodland.

Water Level Observations

No OHWM has been established by the South Dakota Water Management Board on Piyas Lake. The elevation of Piyas Lake on April 28, 2015 was 1836.3 fmsl; 0.3 feet higher than the fall 2014 elevation of 1836.0 fmsl. The water level had declined to an elevation of 1835.2 fmsl on October 20, 2015.

Fish Management Information

Primary species	walleye, yellow perch
Other species	black bullhead, white sucker
Lake-specific regulations	none
Management classification	none
Fish consumption advisories	none

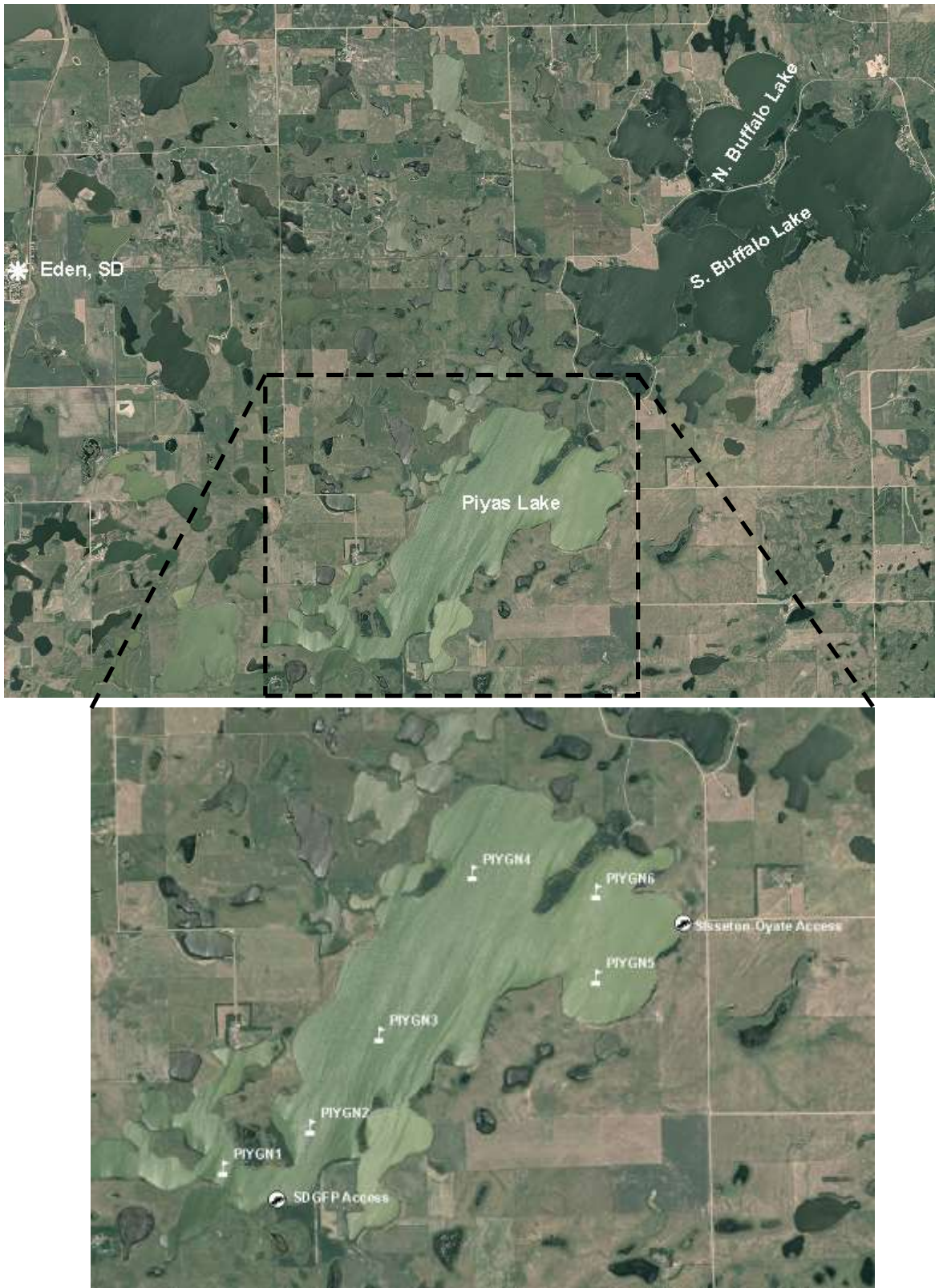


Figure 2. Map depicting geographic location of Piyas Lake from Eden, South Dakota (top). Also noted are access locations and standardized net locations for Piyas Lake (bottom). PIYGN= gill nets

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 1990's, Piyas Lake was a shallow slough unable to support a sport fishery. Above average precipitation during the mid-1990's provided an increase in surface area and depth creating habitat capable of sustaining sport fish populations. Currently, Piyas Lake is managed as a walleye and yellow perch fishery.

Primary Species

Walleye: The mean gill net CPUE of stock-length walleye was 11.2 (Table 1) and above the minimum objective (≥ 10 stock-length walleye/net night; Table 3). The 2015 gill net CPUE represented a substantial increase from the 2012 CPUE of 4.8 (Table 2) and indicated high relative abundance.

Walleye captured in gill nets ranged in TL from 17 to 60 cm (6.7 to 23.6 in), had a PSD of 73 and a PSD-P of 1 (Table 1; Figure 2). The PSD was above the management objective range of 30-60; while the PSD-P was below the objective range of 5-10 (Table 3). As walleye from the strong 2014 (age-1) cohort that currently range in TL from 17 to 24 cm (6.7 to 9.4 in) surpass stock-length (i.e., 25 cm; 10 in) the PSD is expected to decline.

Otoliths were collected from a sub-sample of gill net captured walleye; four year classes (2006, 2012-2014) comprised the entire sample (Table 4). While both natural reproduction and stocking contribute to the population, in recent years the strongest year classes (2012 and 2014) have coincided with stocking events (Table 4; Table 6). The contribution of stocked or naturally-produced walleye to year classes produced during stocked years is unknown, as stocked walleye were unmarked making it difficult to differentiate stocked from naturally-produced walleye.

Walleye growth rates appear to be relatively fast with weighted mean TL at capture values for age-3 fish of 431 and 418 mm (17.0 and 16.5 in) in 2009 and 2015, respectively (Table 5). Sample size of age-3 walleye was low in 2012. In 2015, mean Wr values ranged from 78 to 87 for all length categories (e.g., stock to quality) sampled. The mean Wr of stock-length walleye was 84 (Table 1) and no length-related trends in condition were apparent.

Yellow Perch: The mean gill net CPUE of stock-length yellow perch was 115.2 (Table 1) and above the minimum objective (≥ 30 stock-length perch/net night; Table 3). Since 2006, mean gill net CPUE values have fluctuated from a low of 16.7 (2009) to a high of 281.0 (2012; Table 2). Based on the 2015 gill net catch, relative abundance appears to be high.

Yellow Perch captured in the 2015 gill net catch ranged in TL from 9 to 31 cm (3.5 to 12.2 in), had a PSD of 67, and a PSD-P of 37. The PSD was within the management objective of 30-60; while the PSD-P was above the objective range of 5-10 (Table 3).

Otoliths were collected from a sub-sample of gill net captured yellow perch. Age structure information indicated the presence of six year classes (2010-2015; Table 7). Cohorts produced from 2011-2014 were all well represented in the gill net catch (Table 7). Since 2009, weighted mean TL at capture values for age-2 yellow perch have ranged from 153 to 214 mm (6.0 to 8.4 in); while the weighted mean TL at capture for age-3 fish has ranged from 251 to 286 mm (9.9 to 11.3 in; Table 8). In 2015, the weighted mean TL at capture for age-2 and age-3 yellow perch was 177 and 251 mm (7.0 and 9.9 in), respectively (Table 8). Condition of gill net captured yellow perch was high with mean W_r values ≥ 97 for all length categories (e.g., stock to quality) sampled.

Other Species

Other: Black bullhead and white sucker were other fish species captured in low numbers during 2015 survey (Table 1).

Management Recommendations

- 1) Conduct fish population assessment surveys on an every third year basis (next survey scheduled in summer 2018) utilizing gill nets to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from walleye and yellow perch to assess age structure and growth rates of each population.
- 3) Stock walleye on a biennial basis (≈ 500 fry/acre) to establish additional year classes.
- 4) Monitor winter and summer kill events. In cases of substantial winter or summer kill the need to re-establish a fishery in Piyas 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 Piyas Lake, 2015. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= black bullhead; 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>Gill nets</i>								
BLB	0.7	0.7	75	59	75	59	101	10
WAE	11.2	1.8	73	9	1	2	84	1
WHS	9.3	3.5	100	0	100	0	97	1
YEP	115.2	23.8	67	3	37	3	109	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 Piyas Lake, 2006-2015. BLB= black bullhead; WAE = walleye; WHS= white sucker; YEP = yellow perch

Species	CPUE			
	2006 ¹	2009	2012	2015
<i>Gill nets</i>				
BLB	0.0	0.0	0.5	0.7
WAE	13.5	4.0	4.8	11.2
WHS	0.0	0.0	1.8	9.3
YEP	91.8	16.7	281.0	115.2

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

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 Piyas Lake, 2006-2015. WAE = walleye; YEP = yellow perch

Species	2006 ¹	2009	2012	2015	Objective
<i>Gill nets</i>					
WAE					
CPUE	14	4	5	11	≥ 10
PSD	98	67	45	73	30-60
PSD-P	14	0	10	1	5-10
Wr	98	98	97	84	---
YEP					
CPUE	92	17	281	115	≥ 30
PSD	5	10	46	67	30-60
PSD-P	2	4	2	37	5-10
Wr	107	110	107	109	---

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 (Number stocked x 1,000) from Piyas Lake, 2009-2015.

Survey Year	Year Class											
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
2015		56	16	50						1		
2012	---	---	---		6	19	1	1	1			
2009	---	---	---	---	---	---			9	15		
Number stocked												
fry		750		650		1300		1500		1300		
small fingerling												
large fingerling												

Table 5. Weighted mean length at capture (mm) for walleye captured in experimental gill nets (expanded sample size) from Piyas Lake, 2006-2015.

Year	Age				
	1	2	3	4	5
2015 ¹	197(56)	340(16)	418(50)	---	---
2012	285 (6)	380 (19)	515 (1)	537 (1)	516 (1)
2009	---	362 (9)	431 (15)	---	---
2006	---	306 (2)	---	484 (78)	---

¹Older walleye were sampled, but are not included in this table.

Table 6. Stocking history including size and number for fishes stocked into Piyas Lake, 2002-2015. WAE= walleye; YEP= yellow perch

Year	Species	Size	Number
2002	WAE	fry	1,300,000
2003	YEP	adult	2,356
2006	WAE	fry	1,300,000
2008	WAE	fry	1,500,000
2010	WAE	fry	1,300,000
2012	WAE	fry	650,000
2014	WAE	fry	750,000

Table 7. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from Piyas Lake, 2009-2015.

Survey Year	Year Class										
	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
2015	3	193	267	162	240	17					
2012	---	---	---		749	949	16				
2009	---	---	---	---	---	---		17	93	7	1

Table 8. Weighted mean TL (mm) at capture for yellow perch captured in experimental gill nets (expanded sample size) from Piyas Lake, 2009-2015.

Year	Age					
	0	1	2	3	4	5
2015	97(3)	111(193)	177(267)	251(162)	259(240)	294(17)
2012	---	149 (749)	214 (949)	286 (16)	---	---
2009	---	114 (17)	153 (93)	253 (7)	319 (1)	---

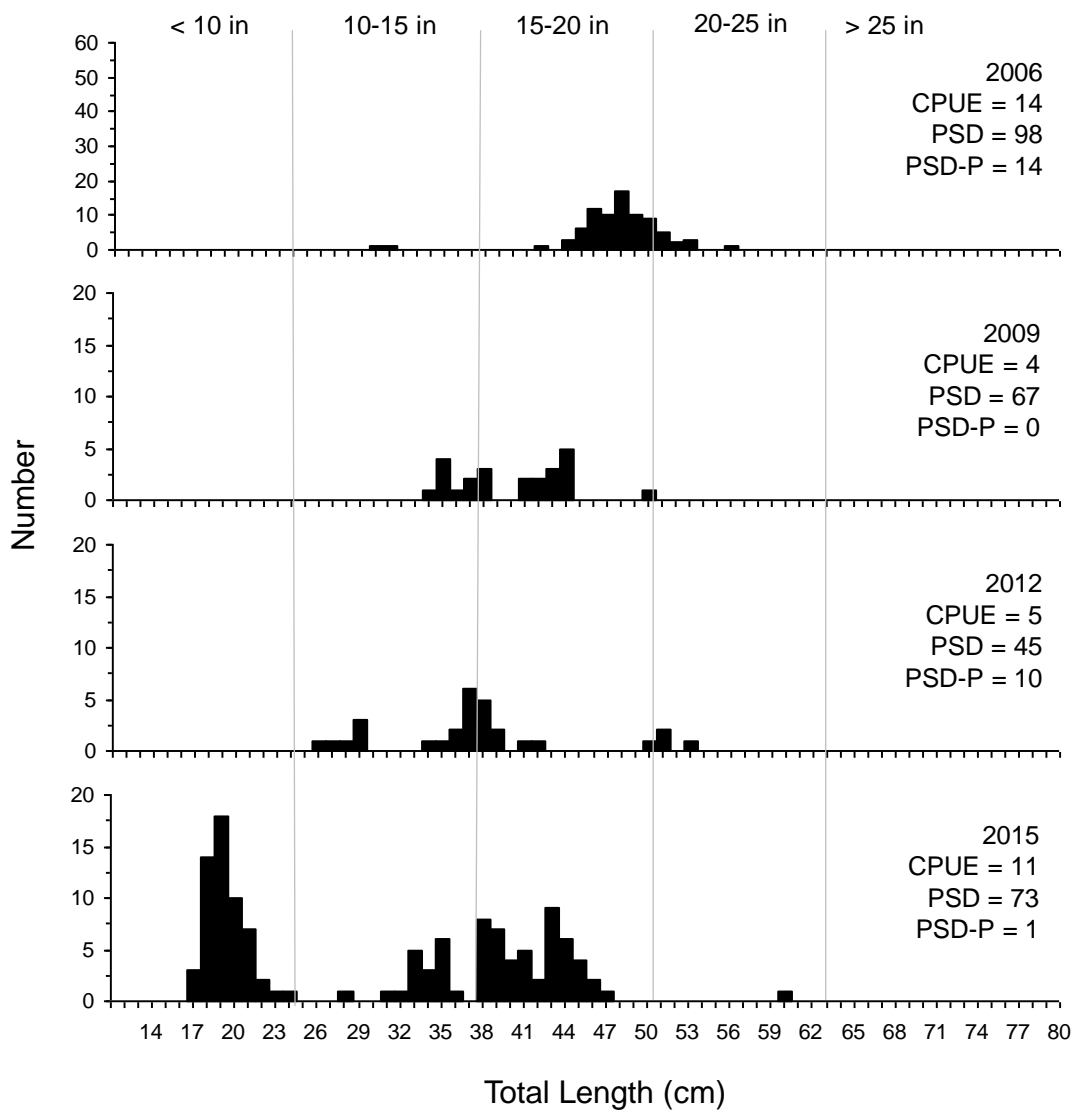


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Piyas Lake, 2006-2015.

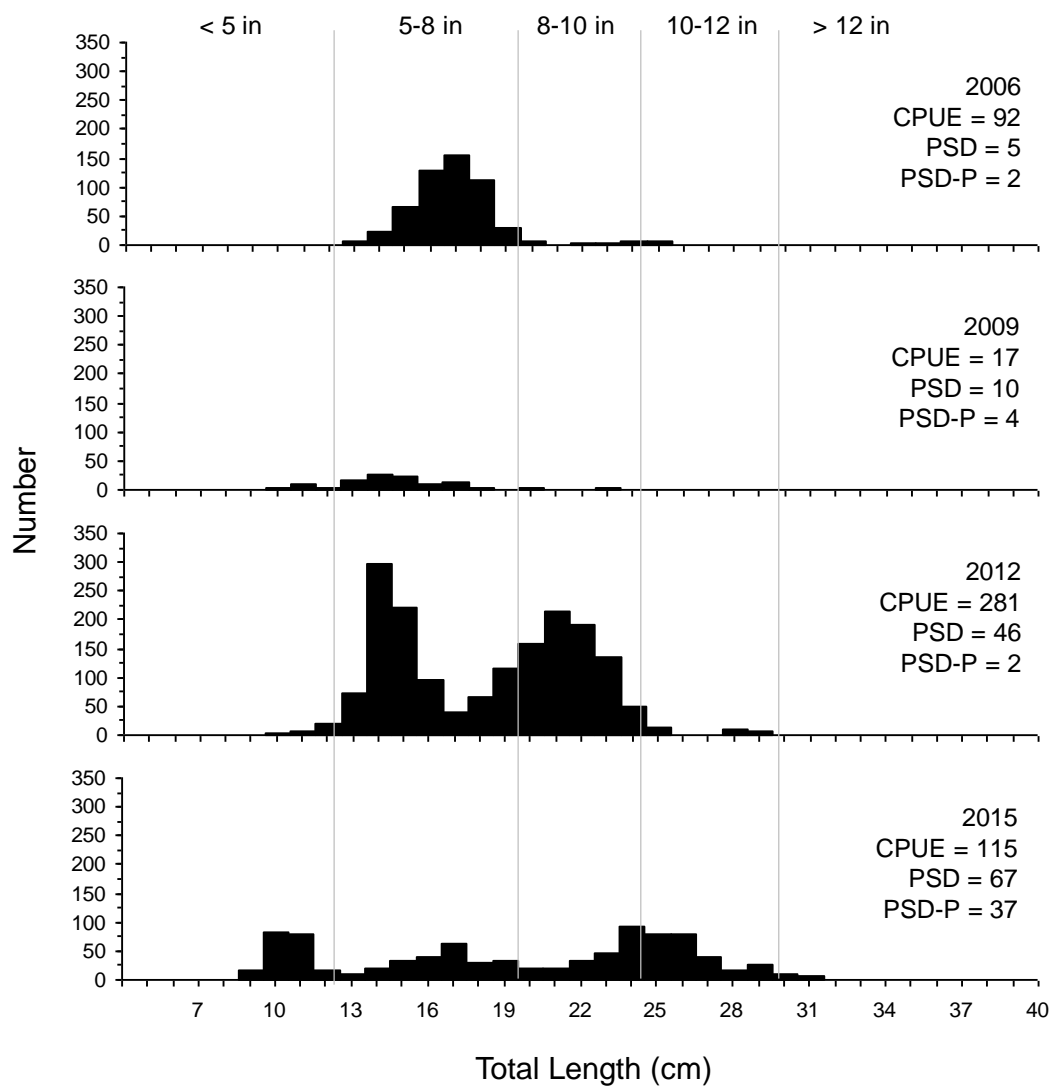


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Piyas Lake, 2006-2015.