

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 miles south of Eden (Sisseton-Wahpeton Oyate access) 4 miles south, 4 miles east, and 0.5 mile north of Eden (SDGFP access)

Survey Dates and Sampling Information

Survey dates	July 3-6, 2012 (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 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 May 16, 2012 was 1836.0 fmsl and identical to the fall 2011 elevation. The water level had declined to an elevation of 1834.7 fmsl on September 26, 2012.

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 4.8 (Table 1) and below the minimum objective (≥ 10 stock-length Walleye/net night; Table 3). The 2012 gill net CPUE represented a slight increase from the 2009 CPUE of 4.0 (Table 2) and indicated moderate relative abundance.

Walleye captured in gill nets ranged in TL from 26 to 53 cm (10.2 to 20.9 in), had a PSD of 45 and a PSD-P of 10 (Table 1; Figure 2). Both the PSD and PSD-P were within the management objective ranges of 30-60 and 5-10 (Table 3). However, size structure indices should be interpreted with caution as sample size was low (i.e., 28 stock-length Walleye).

Otoliths were collected from a sub-sample of gill net captured Walleye. Age structure information indicated the presence of five year classes (2007-2011; Table 4). The 2010 and 2011 cohorts were the most represented and collectively comprised 89% of Walleye in the gill net catch (Table 4). The 2011 year class is the result of natural reproduction; while the 2010 year class coincided with a fry stocking (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. In 2012, approximately 650,000 Walleye fry were stocked into Piyas Lake (Table 6); however, recruitment of this cohort is currently unknown and will be assessed in future surveys.

Although sample sizes have been low, Walleye growth rates appear to be relatively fast with weighted mean TL at capture values for age-2 fish of 362 and 380 mm (14.3 and 15.0 in) in 2009 and 2012, respectively (Table 5). Mean Wr values ranged from 95 to 102 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length Walleye being 97 (Table 1). A slight increasing trend in Walleye condition was apparent as TL increased.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 281.0 (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 2012 gill net catch, relative abundance appears to be high.

Yellow Perch captured in the 2012 gill net catch ranged in TL from 10 to 29 cm (3.9 to 11.4 in), had a PSD of 46, and a PSD-P of 2. The PSD was within the management objective of 30-60; while the PSD-P was below 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 three year classes (2009-2011; Table 7). The majority (99%) of Yellow Perch in the gill net catch were from year classes produced in 2010 (55%) and 2011 (44%; Table 7). In 2012, the weighted mean TL at capture for age-1 and age-2 male Yellow Perch was 145 and 197 mm (5.7 and 7.8 in; Table 8). The weighted mean TL at capture for age-1, age-2, and age-3 female Yellow Perch was 152, 221, and 286 mm (6.0, 8.7 and 11.3 in), respectively (Table 8). Mean Wr values of gill net captured Yellow Perch ranged from 97 to 110 for all length categories sampled with the mean Wr of stock-length Yellow Perch being 107 (Table 1).

Other Species

Other: Black Bullhead and White Sucker were other fish species captured in low numbers during 2012 survey (Table 1).

Management Recommendations

- 1) Conduct fish population assessment surveys 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) 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/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, 2012. 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	0.5	0.7	0	---	0	---	103	13
WAE	4.8	3.1	45	16	10	10	97	1
WHS	1.8	2.4	18	22	0	---	95	4
YEP	281.0	82.9	46	2	2	1	107	<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, 2006-2012. BLB= Black Bullhead; WAE = Walleye; WHS= White Sucker; YEP = Yellow Perch

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

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, 2006-2012. WAE = Walleye; YEP = Yellow Perch

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

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, 2006-2012.

Survey Year	Year Class										
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
2012		6	19	1	1	1					
2009	---	---	---			9	15				
2006 ¹	---	---	---	---	---	---			2		78
Number stocked											
fry	650		1300		1500		1300				1300
small fingerling											
large fingerling											

¹ Monofilament gill net mesh size (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 Piyas Lake, 2006-2012.

Year	Age				
	1	2	3	4	5
2012	285 (6)	380 (19)	515 (1)	537 (1)	516 (1)
2009	---	362 (9)	431 (15)	---	---
2006	---	306 (2)	---	484 (78)	---

Table 6. Stocking history including size and number for fishes stocked into Piyas Lake, 2002-2012. 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

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

Survey Year	Year Class							
	2012	2011	2010	2009	2008	2007	2006	2005
2012		749	949	16				
2009	---	---	---		17	93	7	1

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

Year	Age			
	1	2	3	4
2012				
Male	145 (265)	197 (266)	---	---
Female	152 (450)	221 (683)	286 (16)	---
Combined	149 (749)	214 (949)	286 (16)	---
2009				
Male	107 (3)	142 (14)	242 (5)	---
Female	116 (12)	155 (78)	280 (2)	319 (1)
Combined	114 (17)	153 (93)	253 (7)	319 (1)

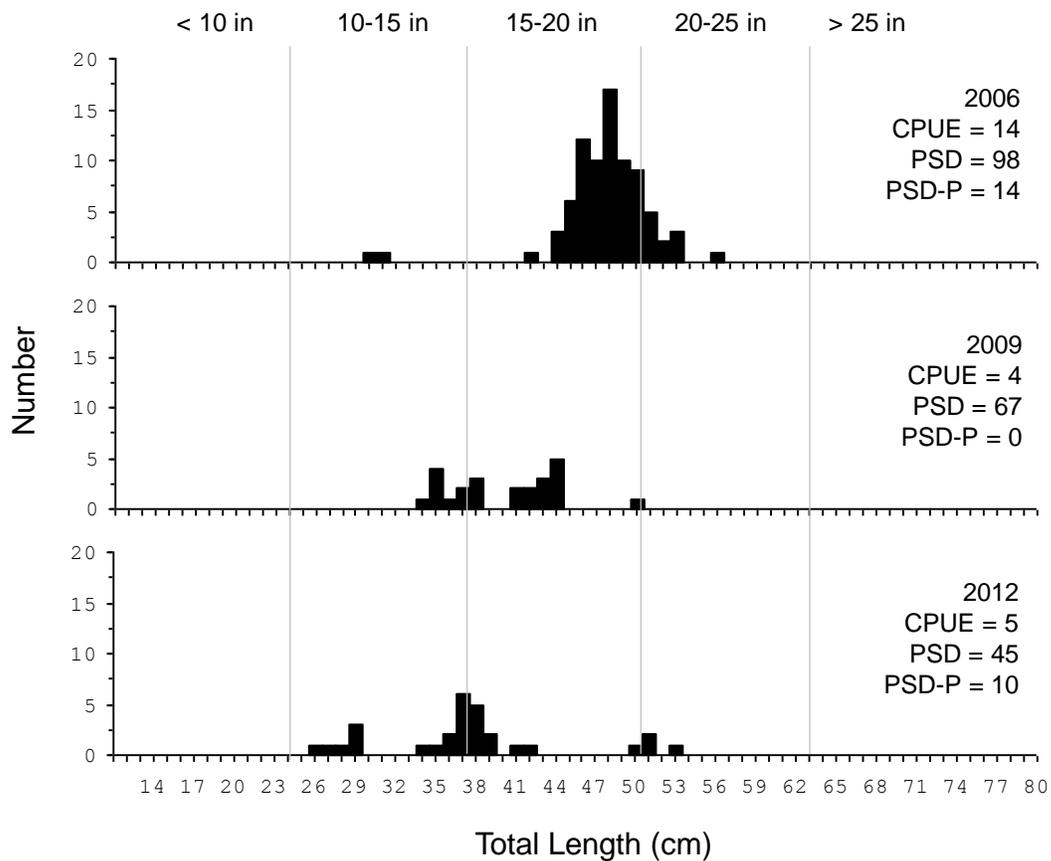


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Piyas Lake, 2006-2012.

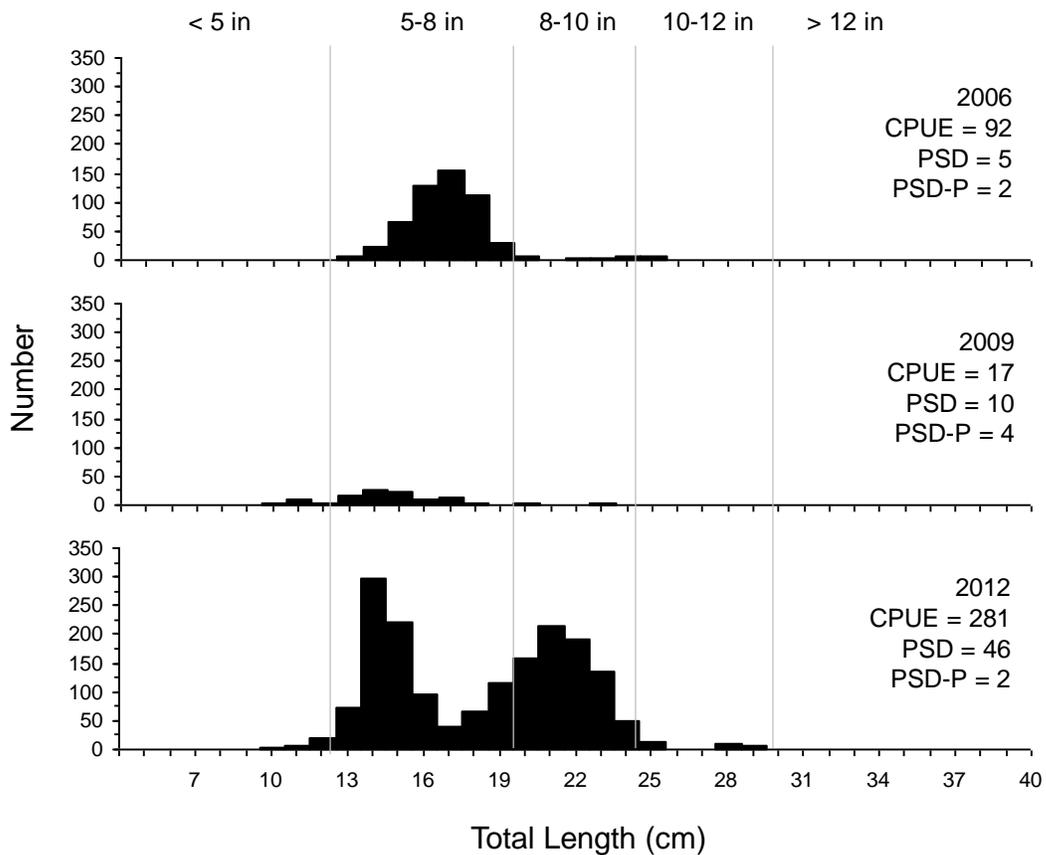


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