

# Piyas Lake

## Site Description

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### 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 .5 mile north of Eden (SDGFP access)

### Survey Dates and Sampling Information

Survey dates	July 7-8, 2009 (GN)
Gill net sets (n)	6

### Morphometry

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

### Ownership and Public Access

Piyas Lake is a meandered lake 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), neither have a formal boat ramp. A Sisseton-Wahpeton Oyate fishing license is required to use the Sisseton-Wahpeton Oyate access point (Figure 1). However, only a state fishing license is required to fish the lake if access is gained through non-tribal or public means. 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 Piyas Lake watershed is comprised of a mix of pasture or grassland, cropland, and woodland.

### Water Level Observations

No Ordinary High Water Mark has been established by the South Dakota Water Management Board on Piyas Lake. The elevation of Piyas Lake on May 6, 2009 was 1833.6 fmsl and indicated an increase from the fall 2008 elevation of 1832.4 fmsl. By September 29, 2009 the water level had declined to an elevation of 1833.2 fmsl.

### Aquatic Nuisance Species Monitoring

#### Plant Survey

No aquatic nuisance plant species were encountered. Sago pondweed was the only aquatic plant species identified during the survey.

#### Macro-Invertebrate/Mussel Survey

No aquatic nuisance macro-invertebrate or mussel species were sampled.

#### Fish Community Survey

No aquatic nuisance fish species have been captured in either of the past two surveys conducted in 2006 and 2009.

### Fish Management Information

Primary species	walleye, yellow perch
Other species	---
Lake-Specific regulations	NE Panfish Management Area: 10 daily; 50 possession
Management classification	warm-water marginal
Fish consumption advisories	none

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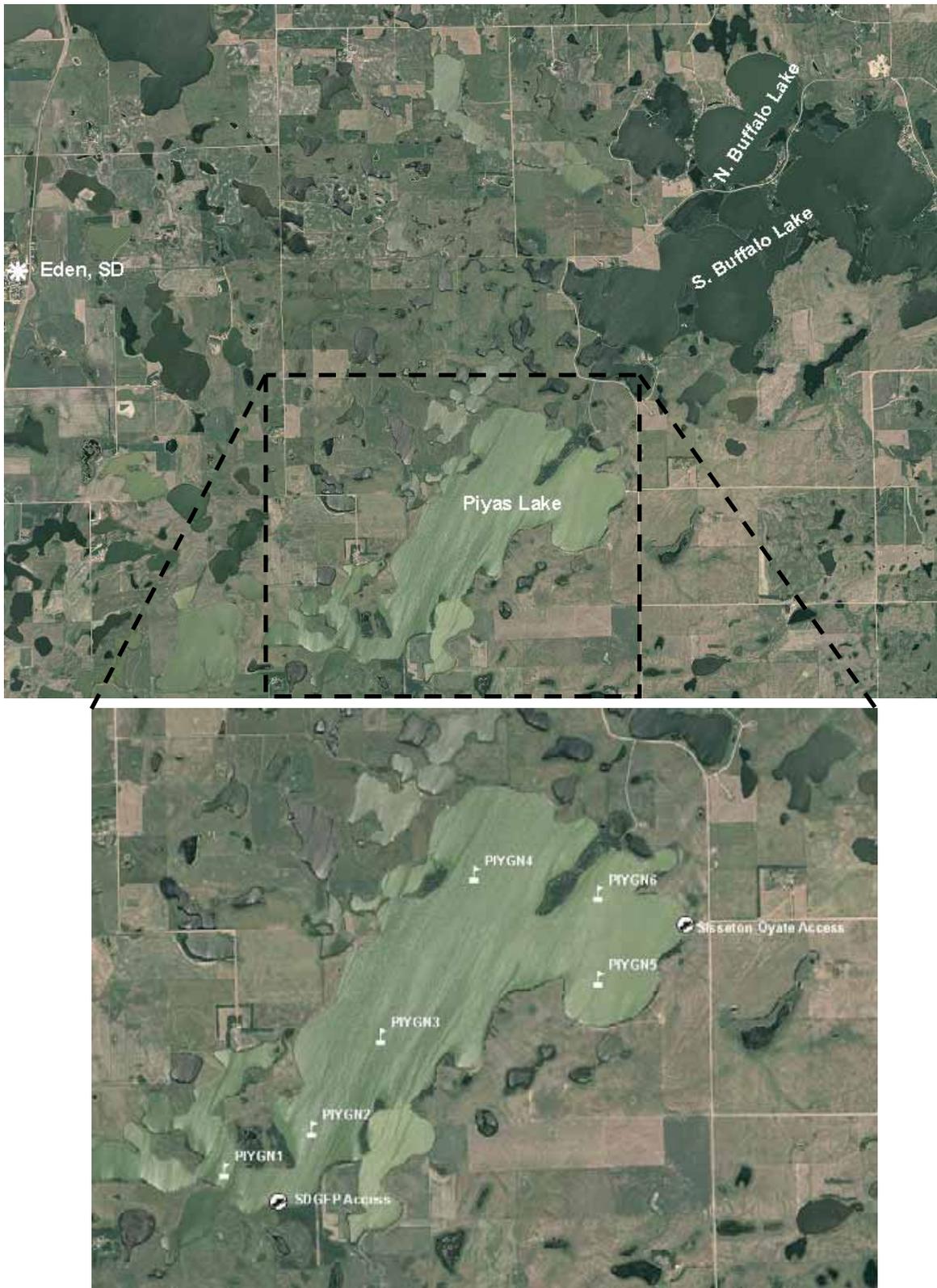


Figure 2. Map depicting geographic location of Piyas Lake from Eden, South Dakota (top). Also noted are access locations and standardized net locations for Piyas Lake (bottom). PIYGN= gill nets

## Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length walleye  $\geq 10$ , 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

Prior to 1990's Piyas Lake was a shallow slough unable to support a sport fishery. During the mid 90's above average precipitation provided an increase in surface area and depth which made the lake capable of sustaining a sport fishery. Piyas Lake is currently managed as a walleye and yellow perch fishery.

### *Primary Species*

Walleye: The mean gill net CPUE of stock-length walleye during 2009 was 4.0 (Table 1) and below the minimum objective ( $\geq 10$  stock-length walleye/net night; Table 3). The 2009 gill net CPUE represents a substantial decrease from the 2006 CPUE of 13.5 (Table 2) and indicates moderate relative abundance.

Walleye captured in gill nets during 2009 ranged in total length from 34 to 50 cm (13.4 to 19.7 in; Figure 3). A relatively high proportion of walleye in the 2009 gill net catch exceeded quality length resulting in a PSD of 67, but no preferred-length walleye were captured (Table 3; Figure 3).

Otoliths were collected from a sub-sample of gill net captured walleye. Age structure information indicated that year classes produced in 2006 and 2007 comprised the entire sample. The 2006 year class was the most represented and coincided with a fry stocking (Table 7; Table 8); while the 2007 year class appears to be the result of natural reproduction (Table 8). Walleye fry were stocked in 2008 (Table 7); however, these fish may have been too small to sample during the 2009 survey.

Although sample size was relatively low, growth rates appear to be fast with the weighted mean total length at capture of age-3 walleye being 431 mm (17.0 in; Table 6). Walleye were in good condition with mean  $W_r$  values ranging from 94-105 for all length groups sampled. The mean  $W_r$  of stock-length walleye in the 2009 gill net catch was 98 (Table 1) and no length-related trends in condition were apparent.

Yellow Perch: Relative abundance of yellow perch in Piyas Lake was considered to be moderate in 2009 with the mean gill net CPUE of stock-length yellow perch being 16.7 (Table 1). The 2009 gill net CPUE represents a substantial decrease from the 2006 CPUE of 91.8 (Table 2) and was below the minimum objective ( $\geq 30$  stock-length perch/net night; Table 3).

Yellow perch captured in the 2009 gill net catch ranged in total length from 9 to 31 cm (3.5 to 12.2 in), had a PSD of 10, and a PSD-P of 4. Both the 2009 PSD and PSD-P were below the management objectives of 30-60 and 5-10, as the majority of yellow perch captured were less than quality length (Table 3; Figure 4).

Otoliths were collected from a sub-sample of gill net captured yellow perch. Age structure information indicated that year classes produced in 2005-2008 comprised the entire sample, with the 2007 year class being the most represented (Table 5). The weighted mean total length at capture for age-2 and age-3 male yellow perch was 142 and 242 mm (5.6 and 9.5 in; Table 4) and the weighted mean total length at capture for age-2 and age-3 female yellow perch was 155 and 280 mm (6.1 and 11.0 in; Table 4). Mean  $W_r$  values of gill net captured yellow perch in 2009 ranged from 107 to 111 for all length categories sampled with the mean  $W_r$  of stock-length yellow perch being 110 (Table 1).

### **Management Recommendations**

- 1) Conduct fish population assessment surveys on a every third year basis (next survey scheduled in summer 2012) 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 (1,000 fry/acre) to establish additional year classes.
- 4) Establish a public boat ramp on Piyas Lake, either through an agreement with the Sisseton-Wahpeton Oyate or development of state lands located on the southwest corner of the lake.
- 5) Monitor water levels and winter/summerkill events. In case of a substantial winterkill event, without boat access the need to re-establish a fishery in Piyas Lake should be evaluated.

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, 2009. Confidence intervals include 80 percent ( $\pm$  CI-80) or 90 percent ( $\pm$  CI-90). 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>								
WAE	4.0	1.7	67	17	0	---	98	2
YEP	16.7	8.7	10	5	4	3	110	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, 2002-2009. WAE = walleye; YEP = yellow perch

Species	CPUE								
	2002	2003	2004	2005	2006 <sup>1</sup>	2007	2008	2009	Mean
<i>Gill nets</i>									
WAE	---	---	---	---	13.5	---	---	4.0	8.8
YEP	---	---	---	---	91.8	---	---	16.7	54.3

<sup>1</sup> Monofilament gill net mesh size (.75", 1", 1.25", 1.5", 2" and 2.5")

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, 2002-2009. WAE = walleye; YEP = yellow perch

Species	2002	2003	2004	2005	2006 <sup>1</sup>	2007	2008	2009	Average	Objective
<i>Gill nets</i>										
WAE										
CPUE	---	---	---	---	14	---	---	4	9	$\geq 10$
PSD	---	---	---	---	98	---	---	67	83	30-60
PSD-P	---	---	---	---	14	---	---	0	7	5-10
Wr	---	---	---	---	98	---	---	98	98	---
YEP										
CPUE	---	---	---	---	92	---	---	17	55	$\geq 30$
PSD	---	---	---	---	5	---	---	10	8	30-60
PSD-P	---	---	---	---	2	---	---	4	3	5-10
Wr	---	---	---	---	107	---	---	110	109	---

<sup>1</sup> Monofilament gill net mesh size (.75", 1", 1.25", 1.5", 2" and 2.5")

Table 4. Weighted mean total length (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Piyas Lake, 2009.

Year	Age				
	1	2	3	4	5
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)	---

Table 5. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from Piyas Lake, 2009.

Survey Year	Year Class					
	2009	2008	2007	2006	2005	2004
2009		17	93	7	1	

Table 6. Weighted mean length at capture (mm) for walleye captured in experimental gill nets (expanded sample size) from Piyas Lake, 2006-2009.

Year	Age				
	1	2	3	4	5
2009		362 (9)	431 (15)		
2006		306 (2)		484 (78)	

Table 7. Stocking history including size and number for fishes stocked into Piyas Lake, 2002-2009.

Year	Species	Size	Number
2002	WAE	fry	1,300,000
2006	WAE	fry	1,300,000
2008	WAE	fry	1,500,000

Table 8. 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, 2006-2009.

Survey Year	Year Class								
	2009	2008	2007	2006	2005	2004	2003	2002	2001
2009			9	15					
2006 <sup>1</sup>						2		78	
Number stocked									
fry		1,500		1,300				1,300	
small fingerling									
large fingerling									

<sup>1</sup> Monofilament gill net mesh size (.75", 1", 1.25", 1.5", 2" and 2.5")

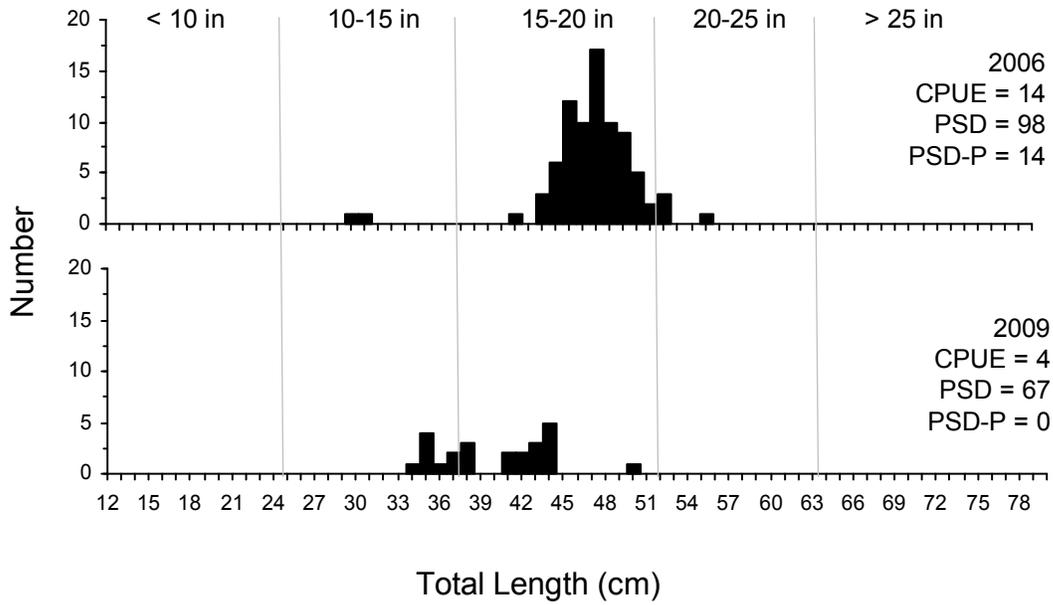


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured by gill nets in Piyas Lake, 2006 and 2009.

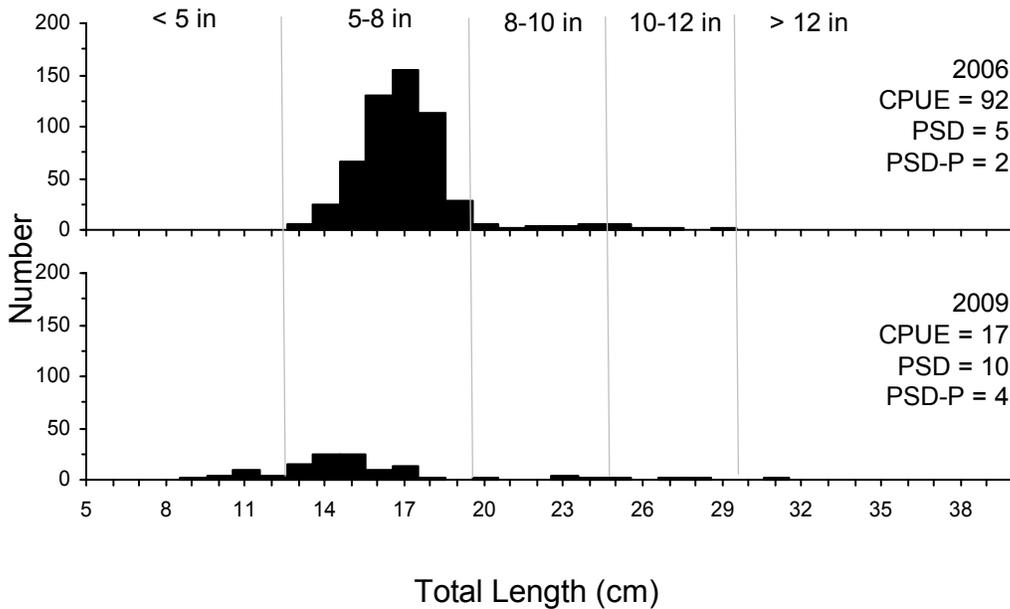


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured by gill nets in Piyas Lake, 2006 and 2009.