Fish Lake

Site Description

Location

Water designation number (WDN)	23-0001-00
Legal description	T113N-R47W-Sec. 8,9,16,17
County (ies)	Deuel
Location from nearest town	4 miles east and 3 miles north of Astoria, SD

Survey Dates and Sampling Information

Survey dates	September 4-5, 2013
Gill net sets (n)	6

Morphometry (Figure 1)

Watershed area (acres)	25,131
Surface area (acres)	800
Maximum depth (ft)	8
Mean depth (ft)	4

Ownership and Public Access

Fish Lake is a meandered lake owned by the State of South Dakota and the fish community is managed by the SDGFP. A public access site, which includes a metal slide-in boat ramp, is located on the southeast shore (Figure 1). Lands adjacent to Fish Lake are under private ownership.

Watershed and Land Use

Land-use within the Fish Lake watershed is primarily agricultural and includes both cropland and grassland (e.g., pasture).

Water Level Observations

The Water Management Board established OHWM is 1751.4 fmsl, and the outlet elevation of Fish Lake is 1750.8 fmsl. On October 3, 2012 Fish Lake was below the OHWM and outlet elevation at 1750.0 fmsl. On May 15, 2013 the elevation of Fish Lake had increased to 1751.8 fmsl. On October 7, 2013 the elevation was 1750.9 and near the outlet elevation.

Fish Management Information

Primary species	Northern Pike, Yellow Perch
Other species	Bigmouth Buffalo, Black Bullhead, Channel Catfish, Common Carp, Freshwater Drum, Walleye, White Sucker
Lake-specific regulations	none
Management classification	warm-water marginal
Fish consumption advisories	none

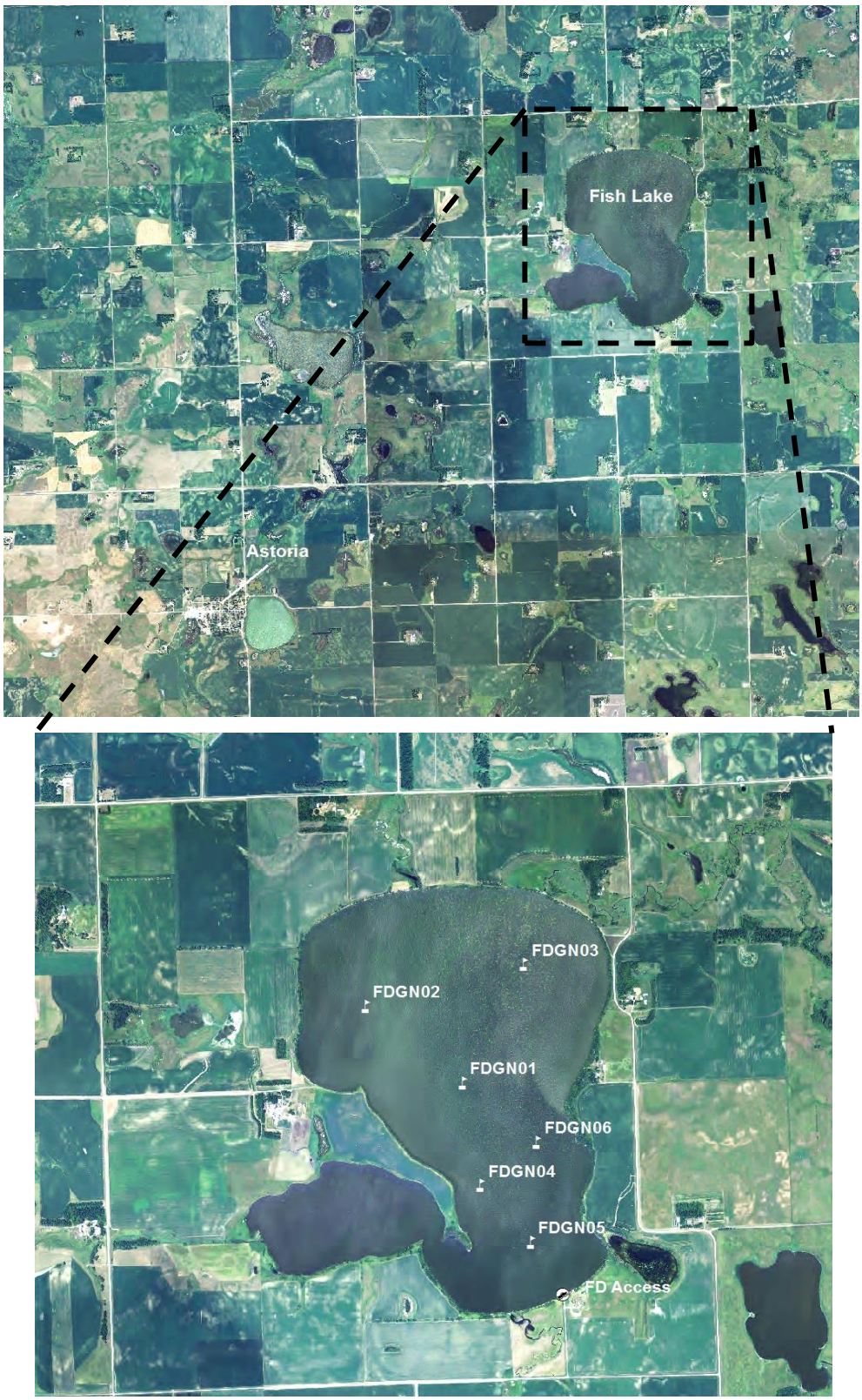


Figure 1. Map depicting geographic location of Fish Lake from Astoria, South Dakota (top). Also noted is the access location and standardized net locations for Fish Lake (bottom). FDGN= gill nets

Management Objectives

1) Maintain a mean gill net CPUE of stock-length Northern Pike ≥ 3, 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

Fish Lake is an 800-acre natural lake located on the eastern edge of the Coteau des Prairie. Fish Lake has no major aquifer connections and receives recharge primarily from surface water input via its 25,131 acre watershed and water discharged from Oak Lake in Brookings County (SDDENR 1983b). Water exiting Fish Lake flows over the outlet structure located on the northeast shore and then flows northeast into Minnesota's Lac qui Parle River (SDDENR 1983b).

At times, Fish Lake provides quality angling opportunities for northern pike and yellow perch. However, the lake is shallow and susceptible to partial and complete winterkill events which affect the quality of the fishery. Fish Lake is managed as a self-sustaining northern pike and yellow perch fishery.

Primary 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. The 2013 mean gill net CPUE of 2.0 represented a substantial decrease from the 2009 CPUE of 8.0 and was below the minimum objective (≥ 3 stock-length Northern Pike/net night; Tables 1-3). Currently, relative abundance appears to be moderate.

Gill nets captured 12 Northern Pike that ranged in TL from 47 to 74 cm (18.5 to 29.1 in; Figure 2). Few inferences can be made concerning size structure due to the low sample size. 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., Punished Woman and Pelican Lakes) with mean Wr values that ranged from 77 to 96 for all 10-mm length groups represented. A slight decreasing trend in condition was apparent as TL increased.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 3.7 (Table 1) and below the minimum objective (≥ 30 stock-length Yellow Perch/net night; Table 3). The 2013 gill net CPUE was lower than the 2009 CPUE of 23.0 (Table 2) and indicated low relative abundance.

Gill net captured Yellow Perch ranged in TL from 8 to 28 cm (3.1 to 11.0 in; Figure 3). Age estimates made using otoliths revealed the presence of four consecutive year classes (2010-2013), each represented by relatively few individuals (Table 4). The

2011 and 2012 cohorts were the most abundant and collectively comprised 77% of Yellow Perch in the gill net catch (Table 4). Although sample sizes were low, gill net captured Yellow Perch had weighted mean TL at captures values of 153 and 188 mm (6.0 and 7.4 in) at ages 1 and 2, respectively (Table 5). Few inferences can be made concerning size structure and condition due to the low sample size

Other Species

Black Bullhead: Black Bullhead populations are typically assessed using frame net data from northeast South Dakota lakes; however, frame nets were not utilized during the 2013 fish community survey at Fish Lake. Black Bullheads were the most abundant species in the gill net catch with a mean gill net CPUE for stock-length individuals of 70.7, which represented an increase from the 2009 CPUE of 35.3 (Table 2).

Gill net captured Black Bullheads ranged in TL from 11 to 31 cm (4.3 to 12.2 in) with the majority being ≤ quality-length (23 cm; 9 in). The PSD was 11 and the PSD-P was 0 (Table 1). No age and growth information was collected. Mean Wr values ranged from 91 to 96 for all length categories (e.g., stock to quality) sampled in the gill net catch. The mean Wr of stock-length Black Bullheads was 91 (Table 1) and no length-related trends in condition were apparent.

Walleye: The shallow nature and susceptibility of Fish Lake to winterkill exclude Walleye from being a primary management species. However, the potential exists for occasional strong year classes to develop and provide angling opportunities. Therefore, periodic stockings should continue provided water levels are favorable (i.e., lake is full), excess Walleye are available, and higher priority stockings have been completed.

In 2013, the mean gill net CPUE of stock-length Walleye was 10.3 (Table 1) and higher than the 2009 CPUE of 0.0 (Table 2) when only a single Walleye was captured. The increase in relative abundance can be attributed in large part to recruitment of the strong 2010 year class, which coincided with a fry stocking (Table 6; Table 8).

Gill net captured Walleye ranged in TL from 17 to 51 cm (6.7 to 20.1 in) , with the majority (86%) being from the strong 2010 year class that ranged in TL from 42 to 51 cm (16.5 to 20.1 in; Table 6; Figure 4). The PSD was 87 and the PSD-P was 6 (Table 1; Figure 4). The 2010 year class has exhibited fast growth with a weighted mean TL at capture of 476 mm (18.7 in) at age 3 (Table 7). The mean Wr of age-3 (2010 year class) Walleye was 91.

Other: Channel catfish, common shiner, common carp, and white sucker were other fish species captured in low numbers during the 2013 fish community survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys utilizing gill nets and frame nets every four years (next survey scheduled for summer 2017) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

2) Continue to manage as a self-sustaining northern pike and yellow perch fishery.

3) Stock walleye periodically when water levels are favorable (i.e., lake is full), extra walleye are available, and other higher priority stockings have been completed.

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

5) Monitor winter and summerkill events. In cases of substantial winter/summerkill the need to re-establish a fishery in Fish Lake should be evaluated. If so desired, northern pike 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 (PSD-P) fish, and mean relative weight (Wr) of stock-length fish, for various fish species captured in experimental gill nets from Fish Lake, 2013. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= Black Bullhead; CCF= Channel Catfish; CNS= Common Shiner; COC= Common Carp; NOP= Northern Pike; WAE= Walleye; WHS= White Sucker; 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	70.7	8.1	11	3	0	---	91	1
CCF	0.5	0.3	67	67	0	---	103	9
CNS	0.3	0.3	---	---	---	---	---	---
COC	0.5	0.3	100	0	100	0	97	3
NOP	2.0	0.9	83	20	8	15	85	3
WAE	10.3	2.9	87	7	6	5	92	1
WHS	1.8	1.0	100	0	100	0	100	3
YEP	3.7	1.2	23	16	5	8	91	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 Fish Lake, 2009-2013. BIB= Bigmouth Buffalo; BLB = Black Bullhead; CCF= Channel Catfish; CNS= Common Shiner; COC= Common Carp; NOP = Northern Pike; WAE = Walleye; WHS = White Sucker; YEP = Yellow Perch

	CPUE				
Species	2009	2010	2011	2012	2013
Frame nets					
BLB	56.3	---	---	---	---
COC	1.5	---	---	---	---
NOP	1.2	---	---	---	---
WAE	0.2	---	---	---	---
WHS	5.0	---	---	---	---
YEP	8.5	---	---	---	---
Gill nets					
BIB	1.0	---	---	---	0.0
BLB	35.3	---	---	---	70.7
CCF	0.3	---	---	---	0.5
CNS	0.0	---	---	---	0.3
COC	5.3	---	---	---	0.5
NOP	8.0	---	---	---	2.0
WAE	0.0	---	---	---	10.3
WHS	0.3	---	---	---	1.8
YEP	23.0	---	---	---	3.7

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 by experimental gill nets in Fish Lake, 2009-2013. NOP = Northern Pike; WAE= Walleye; YEP = Yellow Perch

Species	2009	2010	2011	2012	2013	Objective
Gill nets						
NOP						
CPUE	8	---	---	---	2	≥ 3
PSD	79	---	---	---	83	30-60
PSD-P	8	---	---	---	8	5-10
Wr	90	---	---	---	85	---
YEP						
CPUE	23	---	---	---	4	≥ 30
PSD	70	---	---	---	23	30-60
PSD-P	20	---	---	---	5	5-10
Wr	102	---	---	---	91	---

Table 4. Year class distribution based on expanded age/length summary for yellow perch sampled in gill nets from Fish Lake, 2009-2013.

	Year Class									
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
2013	3	10	10	3						
2009	---	---	---	---	16	10	43	11	2	1

Table 5. Weighted mean total length (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Fish Lake, 2009-2013.

	Age					
Year	0	1	2	3	4	5
2013						
Male	96 (1)	---	164 (2)	---	---	---
Female	96 (2)	153 (10)	194 (8)	257 (3)	---	---
Combined	96 (3)	153 (10)	188 (10)	257 (3)	---	---
2009						
Male	101 (13)	170 (1)	191 (12)	252 (1)	---	---
Female	99 (3)	177 (11)	223 (30)	275 (10)	301 (2)	336 (1)
Combined	100 (16)	174 (10)	214 (43)	273 (11)	301 (2)	336 (1)

Table 6. 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 Fish Lake, 2013.

	Year Class			
Survey Year	2013	2012	2011	2010
2013	1	8		54
# stocked				
fry		800		400
sm. fingerling				
lg. fingerling				

Table 7. Weighted mean TL at capture (mm) for Walleye sampled in experimental gill nets (expanded sample size) from Fish Lake, 2013.

	Age			
Year	0	1	2	3
2013	178 (1)	273 (8)		476 (54)

Table 8. Stocking history including size and number for fishes stocked into Fish Lake, 2000-2013.

Year	Species	Size	Number
2001	NOP	fry	400,000
2003	YEP	adult	550
2004	YEP	adult	3,000
2005	YEP	fingerling	1,000
2010	WAE	fry	800,000
2012	WAE	fry	400,000

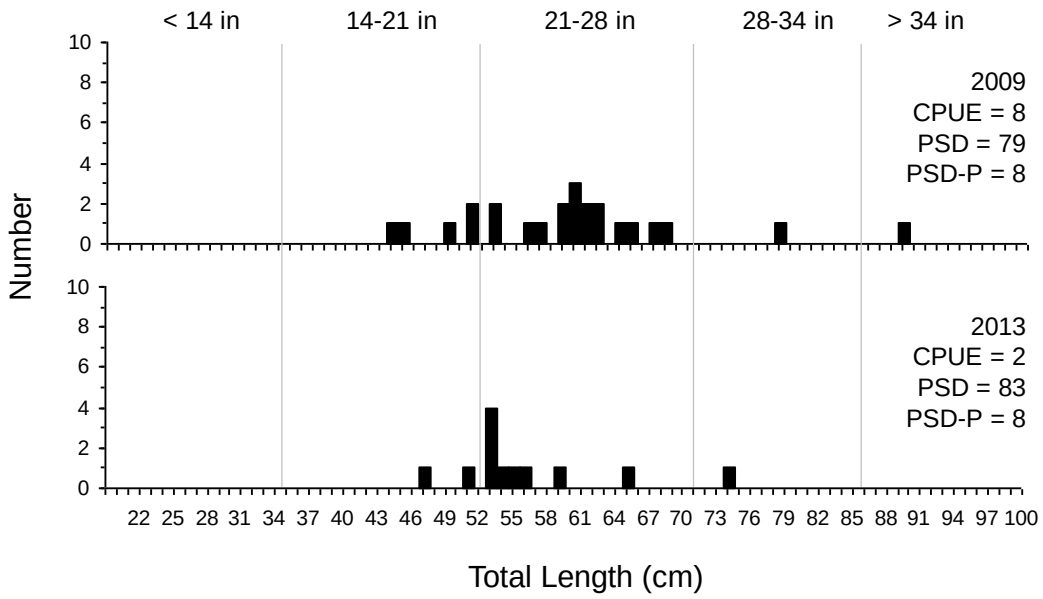
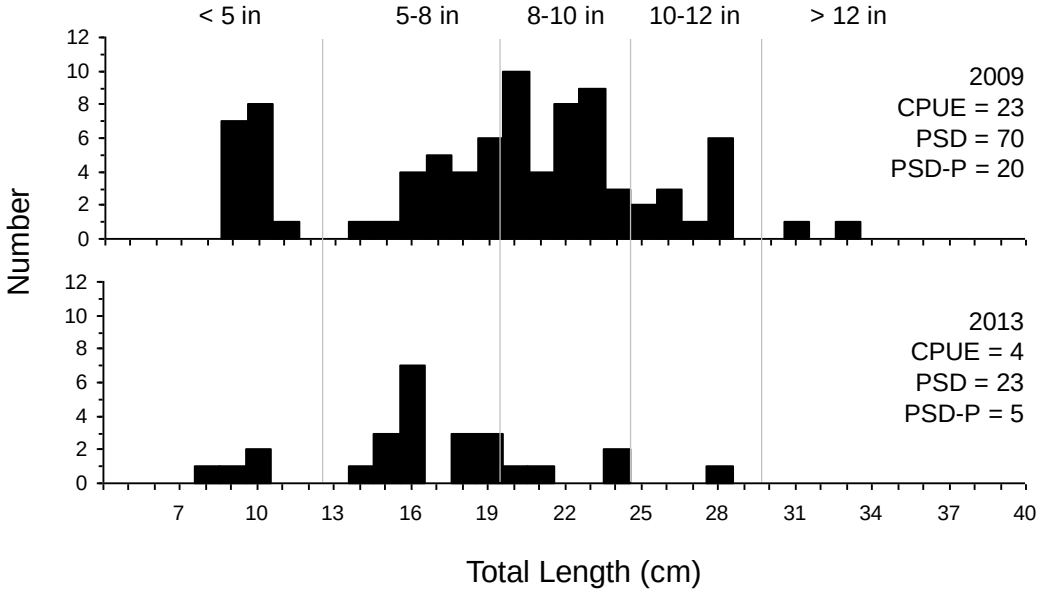


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Northern Pike captured using experimental gill nets in Fish Lake, 2009-2013.



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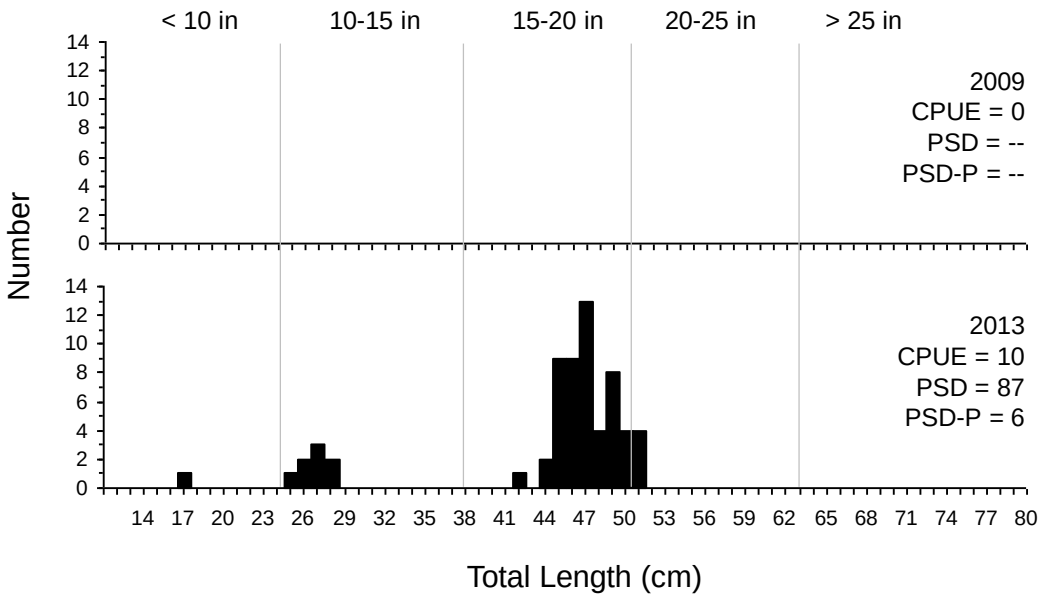

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