

Clear Lake

Site Description

Location

Water designation number (WDN)	32-0005-00
Legal description	T115N-R53W-Sec.11, 14, 15, 16, 22
County (ies)	Hamlin
Location from nearest town	1 mile east of Thomas, SD

Survey Dates and Sampling Information

Survey dates	June 14-15, 2011 (GN)
Gill net sets (n)	6

Morphometry

Watershed area (acres)	23,306
Surface area (acres)	≈750
Maximum depth (ft)	≈13
Mean depth (ft)	unknown

Ownership and Public Access

Clear Lake is a meandered lake owned by the State of South Dakota and the fish community is managed by SDGFP. SDGFP leases land for a public access site which includes a boat ramp and landing dock on the north shore of Clear Lake (Figure 1). Lands adjacent to Clear Lake are under private ownership.

Watershed and Land Use

The 23,306 acre Clear Lake sub-watershed (HUC-12) is located within the larger Big Sioux River (HUC-10) watershed. Land use within the watershed is primarily agricultural with a mix of pasture or grassland, cropland, and small shelterbelts.

Water Level Observations

Clear Lake has no established Ordinary High Water Mark and an outlet elevation was not available. On May 11, 2011 the elevation of Clear Lake was 1706.4 fmsl and above the fall 2010 elevation of 1705.6 fmsl. By September 28, 2011 water levels had declined to 1705.2 fmsl.

Aquatic Nuisance Species Monitoring

Plant Survey

No aquatic nuisance plant survey was conducted in 2011.

Shoreline Survey

No aquatic nuisance species were identified in 2011.

Fish Community Survey

Common carp was the only aquatic nuisance fish species captured during the 2011 survey.

Fish Management Information

Primary species	walleye, yellow perch
Other species	common carp, northern pike, white crappie, white sucker
Lake-specific regulations	none
Management classification	warm-water marginal
Fish Consumption Advisories	none



Figure 1. Map depicting geographic location of several lakes in the Watertown, South Dakota area including Clear Lake (top). Also noted is the access site located on the north shore of Clear Lake (bottom). CHH= Clear Lake

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

Clear Lake is a shallow-natural lake located within the Big Sioux River drainage near the town of Thomas in Hamlin County, South Dakota. Fish community surveys conducted in the 1960-70's indicated that Clear Lake was susceptible to winterkill and the fish community was often dominated by black bullhead, northern pike, and yellow perch.

Above normal precipitation during the mid to late 1990's resulted in an increase in the water depth of Clear Lake which lessened the probability of winterkill. In 1997, walleye were introduced into Clear Lake and subsequently a popular sport fishery developed. However, during the winter of 2008-09 Clear Lake suffered a substantial winterkill limiting walleye and yellow perch populations. Gill nets set just after ice-out during 2009 captured only low numbers of yellow perch. Since the 2008-09 winterkill Clear Lake has been restocked to re-establish the fish community (Table 6). Currently, Clear Lake is managed as a walleye and yellow perch fishery.

Primary Species

Walleye: In 2011, walleye relative abundance was exceptionally high with a mean gill net CPUE of 76.7 (Table 1). The 2011 mean gill net CPUE was above the minimum objective (≥ 10 stock-length walleye/net night; Table 3) and the highest recorded in surveys conducted across northeast South Dakota lakes from 1999-2011.

Walleye captured in the 2011 gill net catch ranged in total length from 24 to 49 cm (9.4 to 19.3 in; Figure 2). Otoliths were collected from a sub-sample of gill net captured walleye in 2011 and age structure information suggested that re-stocking efforts were successful as year classes produced in 2009 and 2010 which coincided with fry stockings comprised 99% of walleye in the 2011 gill net catch (Table 4; Table 6; Figure 2). The majority of walleye from the 2009 and 2010 year classes were < quality length which resulted in low PSD and PSD-P values of 21 and 0 (Table 1; Table 3; Figure 2). As more walleye from the large 2009 year class, which ranged in total length from 31 to 42 cm (12.2 to 16.5 in) at the time of sampling, attain quality-length PSD values are expected to increase substantially (Table 4; Figure 2).

The 2009 walleye year class in Clear Lake has exhibited rapid growth with a weighted mean total length at capture of 370 mm (14.7 in) at age 2 (Table 5). Mean W_r values of walleye captured in the 2011 gill net catch exceeded 100 for all length

categories sampled with the mean W_r of stock-length walleye being 108 (Table 1). No length-related trends in walleye condition were apparent.

Yellow Perch: The mean gill net CPUE of stock-length yellow perch in 2011 was 4.5 (Table 1) and below the minimum objective (≥ 30 stock-length yellow perch/net night; Table 3). The 2011 gill net CPUE was similar to the 5.2 observed in 2008, prior to the 2008-09 winterkill (Table 2) and indicated low relative abundance.

In 2011, gill nets captured 30 yellow perch that ranged in total length from 12 to 31 cm (4.7 to 12.2 in; Figure 3). Based on otolith age estimates, three year classes (2007, 2009, and 2010) each of low magnitude comprised the entire sample (Table 7).

Although sample size was low, yellow perch growth appeared to be fast with a weighted mean total length at capture of 242 mm (9.5 in) at age 2 (Table 8). Sampled yellow perch had mean W_r values that were ≥ 100 for all length categories sampled with the mean W_r of stock-length yellow perch being 103 (Table 1). No length-related trends in condition were apparent.

Other Species

Other: Black bullhead, common carp, northern pike, white crappie, and white sucker were other fish species captured in low numbers during the 2011 survey (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys utilizing experimental gill nets every third year (next survey scheduled in summer 2014) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from walleye and yellow perch to assess the age structure and growth rates of each population.
- 3) Stock walleye (≈ 500 fry/acre) on a biennial basis (odd years) to establish additional year classes.
- 4) Monitor winter and summerkill events. In cases of substantial winter/summerkill stock with walleye and yellow perch 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 using experimental gill nets from Clear Lake, 2011. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). COC= common carp; NOP = northern pike; WAE = walleye; WHC= white crappie; 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>								
COC	0.5	0.5	67	67	67	67	126	28
NOP	0.3	0.5	50	50	0	---	99	6
WAE	76.7	4.9	21	3	0	---	108	<1
WHC	0.2	0.2	0	---	0	---	124	---
WHS	0.5	0.5	67	67	33	67	98	9
YEP	4.5	0.6	44	17	19	13	103	1

Table 2. Historic mean catch rate (CPUE; frame/gill nets= catch/net night) of stock-length fish for various fish species captured by experimental gill nets from Clear Lake, 2004-2011. BLB = black bullhead; COC= common carp; NOP = northern pike; WAE = walleye; WHC= white crappie; WHS = white sucker; YEP = yellow perch

Species	CPUE					
	2004	2005	2006 ¹	2007 ¹	2008	2011
<i>Gill nets</i>						
BLB	0.3	0.0	0.0	0.0	0.0	0.0
COC	1.0	2.3	0.0	2.7	1.0	0.5
NOP	0.3	0.0	0.3	0.0	0.2	0.3
WAE	25.8	17.3	14.0	16.3	14.8	76.7
WHC	0.0	0.0	0.0	0.0	0.3	0.2
WHS	2.0	1.0	1.0	1.0	0.0	0.5
YEP	58.8	13.0	28.7	18.3	5.2	4.5

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 frame nets and experimental gill nets from Cattail/Kettle Lake, 2003-2011. WAE = walleye; YEP = yellow perch

Species	2004	2005	2006 ¹	2007 ¹	2008	2011	Objective
<i>Gill nets</i>							
WAE							
CPUE	26	17	14	16	15	77	≥ 10
PSD	55	67	36	96	100	21	30-60
RSD-P	1	4	5	4	20	0	5 - 10
Wr	95	86	90	96	95	108	---
YEP							
CPUE	59	13	29	18	5	5	≥ 30
PSD	69	56	83	27	29	44	30-60
RSD-P	33	0	7	22	23	19	5-10
Wr	107	110	115	110	102	103	---

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 Clear Lake, 2005-2011.

Survey Year	Year Class											
	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
2011		72	389	1	2							
2008	---	---	---		12	10	5	35	6	14	14	5
2007 ¹	---	---	---	---		2	2	37	1	3	3	1
2006 ^{1,2}	---	---	---	---	---			27	4	5	5	
2005 ²	---	---	---	---	---	---		8	14	13	23	
# stocked												
fry	300	600	300		600			1000				750
small fingerling												
large fingerling												

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

² Walleye from the 2007 year class were sampled in low numbers, but are not reported in this table

Table 5. Weighted mean length at capture (mm) for walleye age-1 through age-9 captured in experimental gill nets (expanded sample size) from Clear Lake, 2005-2011. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age								
	1	2	3	4	5	6	7	8	9
2011	263(72)	370(389)	463(1)	485(2)	---	---	---	---	---
2008	163(12)	394(10)	444(5)	463(35)	521(6)	501(14)	505(14)	528(5)	---
2007	288(2)	395(2)	426(37)	441(1)	492(3)	498(3)	472(1)	---	---
2006	---	325(27)	413(4)	447(5)	473(5)	---	---	---	646(1)
2005	173(8)	353(14)	402(13)	424(23)	---	---	---	586(2)	---

Table 6. Stocking history including size and number for fishes stocked into Clear Lake, 2000-2011.

Year	Species	Size	Number
2000	WAE	fry	750,000
2004	WAE	fry	1,000,000
2007	WAE	fry	600,000
2009	WAE	fry	300,000
2010	BLC	fingerling	29,920
	BLC	adult	66
2011	WAE	fry	600,000
	WAE	fry	300,000

Table 7. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from Clear Lake, 2011.

Survey Year	Year Class				
	2011	2010	2009	2008	2007
2011		18	8		4

Table 8. Weighted mean total length (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Clear Lake, 2011.

Year	Age			
	1	2	3	4
2011				
Male	143(5)	238(1)	---	256(1)
Female	140(13)	242(7)	---	307(3)
Combined	140(18)	242(8)	---	295(4)

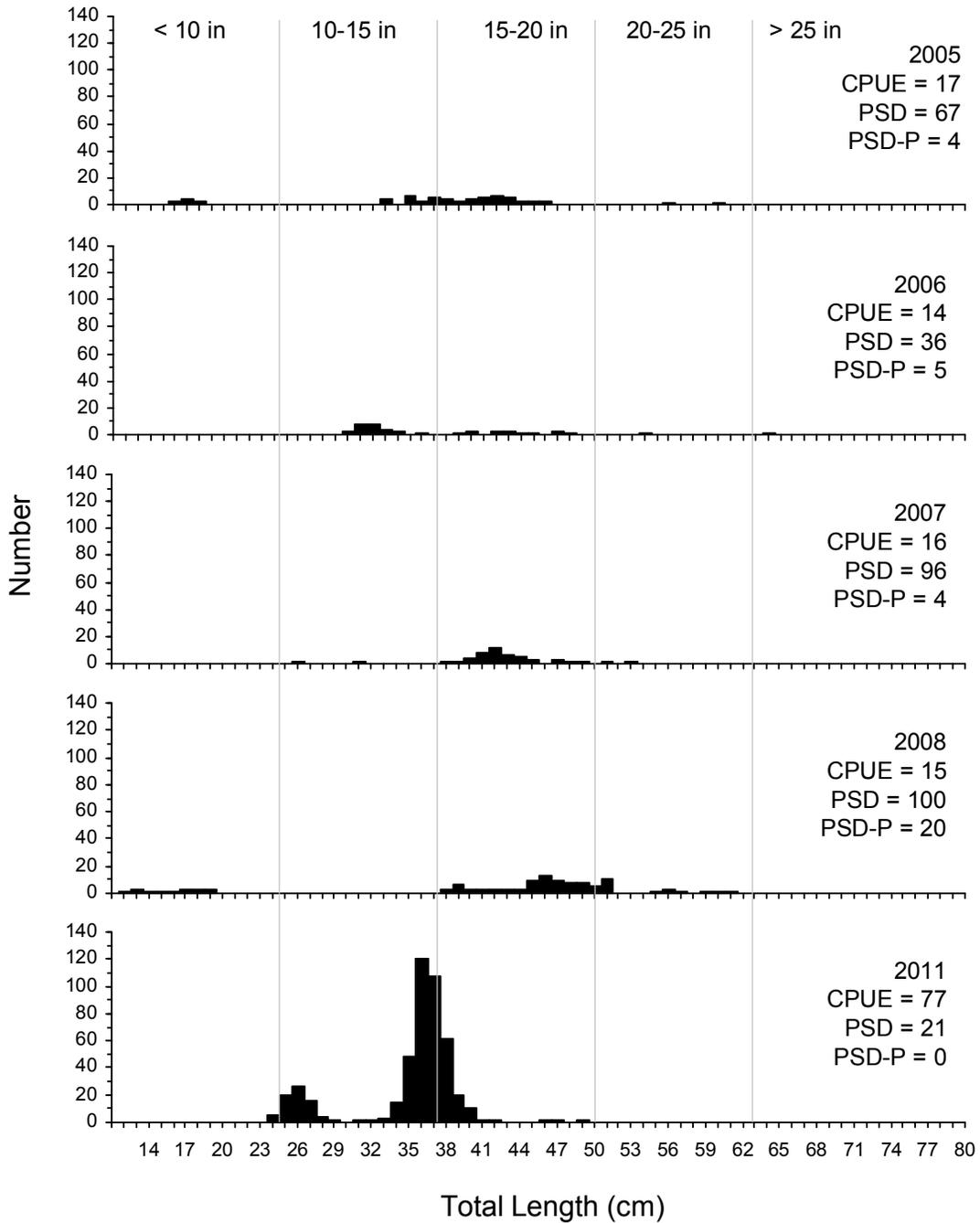


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Clear, 2005-2011.

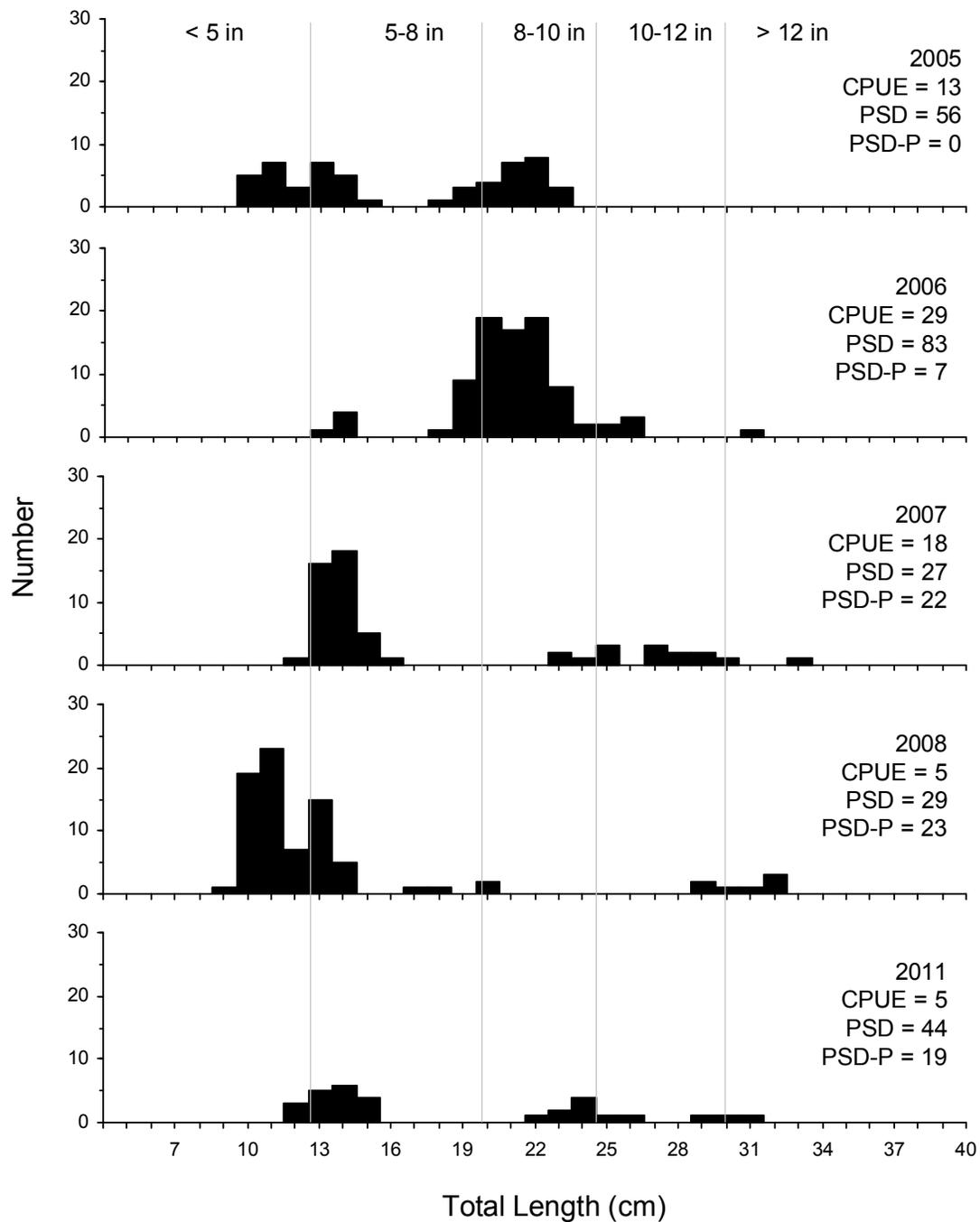


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Clear Lake, 2005-2011.