

Twin Lake

Site Description

Location

Water designation number (WDN)	57-0002-00
Legal description	T115N-R64W-Sec.8-10,15,16
County (ies)	Spink
Location from nearest town	six miles south of Redfield, SD

Survey Dates and Netting Information

Dates of current survey	August 7-8, 2007
Date of most recent survey	August 12-13, 2003
Gill net sets (n)	4
Frame net sets (n)	10

Morphometry (Figure 1)

Watershed area (acres)	768,640
Surface area (acres)	1,235
Maximum depth (ft)	14
Mean depth (ft)	7

Ownership and Public Access

Twin Lake is a meandered lake managed by the SDGFP. A single public access site is located on the northern shoreline and is maintained by the SDGFP (Figure 1). Twin Lake is owned by the State of South Dakota and lands adjacent to the lake are generally under state or private ownership.

Watershed and Land Use

The Twin Lake watershed is comprised of a mix of 60% pasture, 35% cropland and 5% woodlands.

Water Level Observations

The Water Management Board established the Ordinary High Water Mark at 1298.8 fmsl (feet above mean sea level), and the outlet elevation of Twin Lake is 1299.6 fmsl. Twin Lake has experienced a decrease in water elevation since 1998 when it was 1302.7 fmsl. In 2007 the elevation was 1294.1 on June 20, 2007 and had decreased to 1293.2 fmsl on October 22, 2007.

Aquatic Vegetation and Exotics

Emergent and submergent vegetation are abundant throughout Twin Lake. Common carp were the only exotic species encountered during this survey.

Fish Management Information

Primary species	black crappie, walleye
Other species	black bullhead, common carp, fathead minnow, northern pike, white sucker, yellow perch
Management classification	warm-water permanent
Fish Consumption Advisories	none

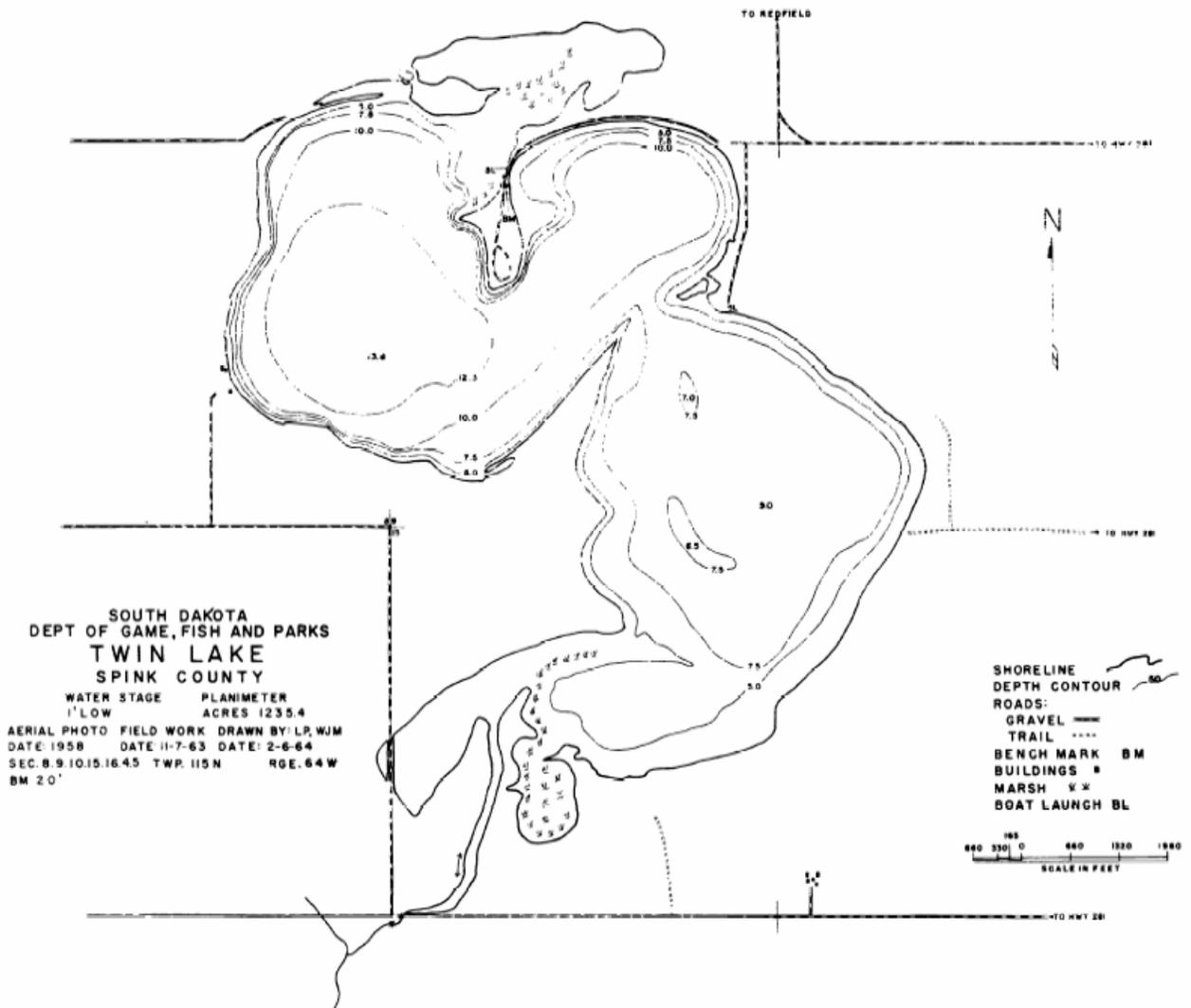


Figure 1. Twin Lake contour map.

Management Objectives

- 1) Maintain a mean gill net CPUE of stock length walleye ≥ 10 , a PSD of 30-60, and an RSD-P of 5-10.
- 2) Maintain a mean frame net CPUE of stock-length black crappie ≥ 15 , a PSD of 30-60, and an RSD-P of 5-10.
- 3) Maintain a mean frame net CPUE of stock length bullhead ≤ 100 .

Results and Discussion

Twin Lake is a meandered body of water and the trophic state is classified as eutrophic. Early settlers named it Twin Lake because of its configuration. Along with the construction of a dam in the 1930's on Turtle Creek, a diversion canal was dug to Twin Lake in an effort to stabilize water levels. Over time, the canal has become constrained with sediment, cattail growth and debris. At one time it was believed that the canal was not working properly because of a lack of maintenance. However it appears that the gradient is not correct for proper water flow through the canal. Twin Lake water levels have decreased since the high water levels observed in the late 1990's. Past survey information dating back to the 1960's indicates that Twin lake is susceptible to partial and complete winterkills resulting in a fish community often dominated by rough fish (i.e., black bullheads and common carp). Fisheries management in Twin Lake will be dependent upon water levels and frequency of winterkill events. Currently Twin Lake is managed as a black crappie and walleye fishery. Black bullhead, northern pike, and yellow perch also contribute to the fishery.

Primary species

Black Crappie: Black crappie frame net CPUE during the 2007 survey was 9.4 and below the minimum objective (≥ 15 stock-length black crappie/net night; Table 3). The 2007 frame net CPUE decreased from 40.0 in 2003 (Table 2). Length-frequency analysis indicates that recruitment is erratic, similar to many eastern South Dakota natural lakes (Figure 2). Black crappie ranged in total length from 255 mm to 305 mm, with a PSD of 100 and RSD-P of 100, which indicates a population comprised of mostly memorable-length fish (Figure 2; Table 1). No growth information was taken in 2007.

Walleye: The mean gill net CPUE of stock-length walleye during the 2007 survey was 8.0, and was below the management objective of (≥ 10 stock length fish/ net night) for walleye in Twin Lake (Table 1). Mean gill net CPUE increased from the 2003 mean gill net CPUE of 2.8 (Table 2). The mean gill net CPUE in 2007 represents moderate relative abundance.

Four year-classes (2000, 2001, 2004, and 2006) were present in the 2007 gill net sample (Table 4; Table 6). Year-classes produced in 2004 and 2006 comprised approximately 85% of all walleye sampled in the 2007 gill net catch and coincided with walleye stockings; while the relatively-small 2001 year-class appears to be naturally-produced (Table 5; Table 6).

Walleye caught in gill nets ranged in total length from 225 mm to 605 mm, with the majority of fish in the quality- to preferred-length group (Figure 3). The Twin Lake walleye population sample had a PSD of 75 and a RSD-P of 16 (Table 1). Both PSD and RSD-P values were above their objective ranges of 30-60 and 5-10, respectively (Table 3). Condition of walleye in Twin Lake is good, with the mean W_r of stock-length walleye collected in gill nets being 88 (Table 1). No length-related trend in mean W_r values was apparent during 2007.

Other Species

Black Bullhead: The 2007 mean CPUE of stock-length black bullhead was 1.6 and 0.5 for frame nets and gill nets, respectively (Table 1). In 2003, the mean black bullhead CPUE was 166.1 and 18.0 for frame nets and gill nets, respectively (Table 2). Black bullhead relative abundance has decreased since 2003. Black bullhead in 2007 ranged in length from 305 mm to 315 mm with a frame net PSD of 100 and an RSD-P of 56 (Table 1; Figure 4). Mean W_r of black bullhead captured in frame nets was 89, indicating good condition.

Common Carp: Common carp are likely not effectively sampled during our standard fish community assessment surveys. However, common carp were the most abundant fish species in the 2007 gill net catch with the mean CPUE being 8.8 (Table 1). The 2007 gill net CPUE represents a decrease from the 27.8 observed in 2003.

Gill net captured common carp in 2007 ranged in total length from 400 to 680 mm, had a PSD of 97 and an RSD-P of 86. Gill net sampled common carp had mean W_r values that ranged from 90-94 with the mean W_r of stock-length fish being 92 (Table 1).

Other: Northern pike and hybrid sunfish were also collected during the 2007 survey. Their abundance appears to be low and likely contributes little to the fishery at this time (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys on an every-four-year basis (next survey scheduled in summer 2011) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from walleye and black crappie to assess age structure and growth rates of each population.
- 3) Stock walleye on a biennial basis (1,000 fry/acre) to add additional year classes.
- 4) Monitor water levels and winterkill events to assess stocking strategies. Stock northern pike and yellow perch in cases of complete winterkill events to establish fish populations.

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, mean relative weight (Wr) of stock-length fish, proportional stock density (PSD) and relative stock density of preferred-length fish (RSD-P) of various fish species captured in experimental gill nets and frame nets in Twin Lake, 2007. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB = black bullhead; BLC= black crappie; COC= common carp; NOP = northern pike; sunfish hybrid= HYB; WAE = walleye

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	RSD-P	CI-90	Wr	CI-90
<i>Frame nets</i>								
BLB	1.6	0.7	100	0	56	23	89	3
BLC	9.4	6.0	100	0	100	0	98	< 1
COC	0.2	0.2	100	0	100	0	---	---
NOP	0.1	0.1	100	---	0	---	76	---
HYB ¹	0.1	0.1	---	---	---	---	---	---
WAE	6.7	2.7	33	9	12	7	90	1
<i>Gill nets</i>								
BLB	0.5	0.5	100	0	0	---	91	5
COC	8.8	2.3	97	3	86	10	92	1
WAE	8.0	5.0	75	13	16	11	88	2

¹ all sizes

Table 2. Historic mean catch rate (CPUE; Catch/net night) of stock-length fish for various fish species captured in experimental gill nets and frame nets in Twin Lake, 2000-2007. BLB = black bullhead; BLC= black crappie; COC= common carp; NOP = northern pike; HYB= sunfish hybrid; WAE = walleye; WHS = white sucker; YEP= yellow perch

Species	CPUE								Mean
	2000	2001	2002	2003	2004	2005	2006 ¹	2007 ¹	
<i>Frame nets</i>									
BLB	---	---	---	166.1	---	---	---	1.6	83.9
BLC	---	---	---	39.9	---	---	---	9.4	24.7
COC	---	---	---	7.4	---	---	---	0.2	3.8
NOP	---	---	---	2.1	---	---	---	0.1	1.1
HYB ²	---	---	---	0.0	---	---	---	0.1	0.1
WAE	---	---	---	3.7	---	---	---	6.7	5.2
WHS	---	---	---	0.2	---	---	---	0.0	0.1
YEP	---	---	---	1.2	---	---	---	0.0	0.6
<i>Gill nets</i>									
BLB	---	---	---	18.0	---	---	---	0.5	9.3
BLC	---	---	---	2.3	---	---	---	0.0	1.2
COC	---	---	---	27.8	---	---	---	8.8	18.3
NOP	---	---	---	1.0	---	---	---	0.0	0.5
WAE	---	---	---	2.8	---	---	---	8.0	5.4
YEP	---	---	---	3.8	---	---	---	0.0	1.9

¹ Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5"), previous years (.5", .75", 1", 1.25", 1.5" and 2").

² all sizes

Table 3. Mean catch rate of stock-length fish (CPUE; catch/net night), proportional stock density (PSD), relative stock density of preferred-length fish (RSD-P), and relative weight (Wr) for selected species captured using gill nets and frame nets in Twin Lake, 2000 - 2007. BLB= black bullhead; BLC= black crappie; WAE= walleye

Species	2000	2001	2002	2003	2004	2005	2006 ¹	2007 ¹	Average	Objective
<i>Frame nets</i>										
BLB										
CPUE	---	---	---	166	---	---	---	2	84	≤ 100
PSD	---	---	---	12	---	---	---	100	56	---
RSD-P	---	---	---	4	---	---	---	56	30	---
Wr	---	---	---	78	---	---	---	89	84	---
BLC										
CPUE	---	---	---	40	---	---	---	9	25	≥ 15
PSD	---	---	---	15	---	---	---	100	58	30-60
RSD-P	---	---	---	14	---	---	---	100	57	5-10
Wr	---	---	---	112	---	---	---	98	105	---
<i>Gill nets</i>										
WAE										
CPUE	---	---	---	3	---	---	---	8	6	≥ 10
PSD	---	---	---	100	---	---	---	75	88	30-60
RSD-P	---	---	---	24	---	---	---	16	20	5-10
Wr	---	---	---	92	---	---	---	88	90	---

¹ Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5"), previous years (.5", .75", 1", 1.25", 1.5" and 2").

Table 4. Weighted mean length at capture (mm) for walleye captured in experimental gill nets in Twin Lake, 2003 and 2007. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	N	Age									
		1	2	3	4	5	6	7	8	9	10
2007 ¹	35	258	---	408	---	---	604	565	---	---	---
2003	11	---	406	453	---	495	---	---	---	---	---

¹ Age assignments made using otoliths; scales were used in previous years

Table 5. Stocking history including size and number for fishes stocked into Twin Lake, 1996 - 2007.

Year	Species	Size	Number
1996	BLC	adult	830
	NOP	fry	1,200,000
	YEP	juvenile	47,625
1998	WAE	fingerling	196,500
1999	WAE	fingerling	303,400
2000	WAE	fingerling	250,700
2004	WAE	fingerling	123,500
2006	WAE	Fry	1,200,000

Table 6. Numbers of walleye captured using gill nets (n) by year class and associated stocking history (Number stocked x 1,000) in Twin Lake, 2003 and 2007.

Survey Year	Year Class									
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
2007 ^{1,2}		10		20			1	4		
2003	---	---	---	---		0	3	7	0	1
Number stocked										
fry	---	1,200	---	---	---	---	---	---	---	---
small fingerling	---	---	---	124	---	---	---	251	303	197
large fingerling	---	---	---	---	---	---	---	---	---	---

¹ Age assignments made using otoliths; scales were used in previous years

² Monofilament gill net mesh size change (.75", 1", 1.25", 1.5", 2" and 2.5"), previous years (.5", .75", 1", 1.25", 1.5" and 2").

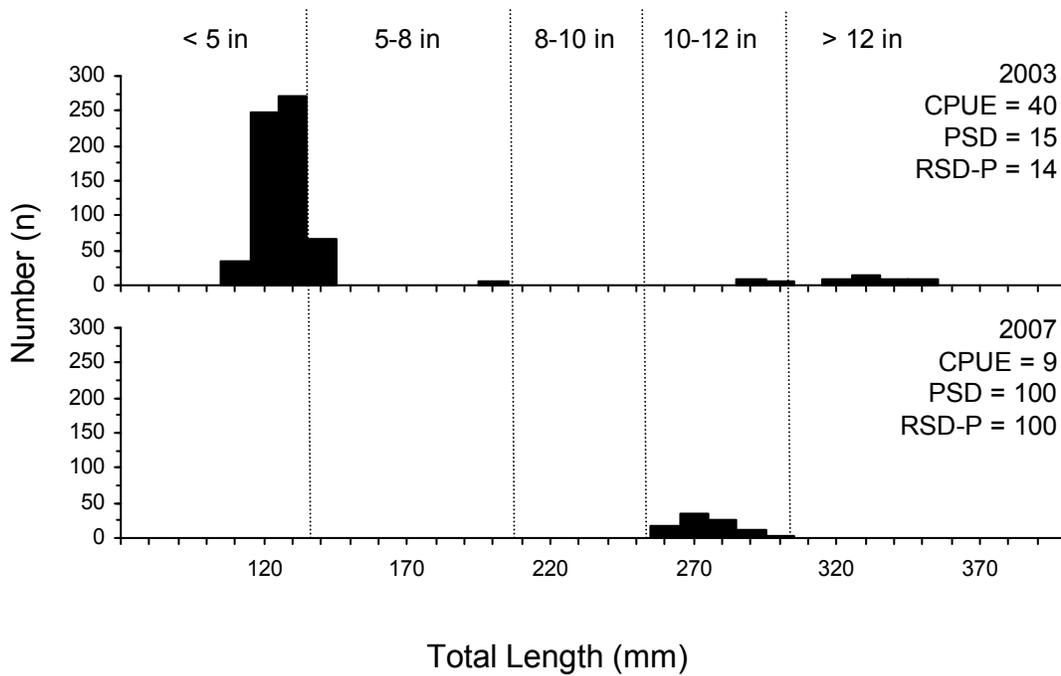


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for black crappie captured using frame nets in Twin Lake, 2003 and 2007.

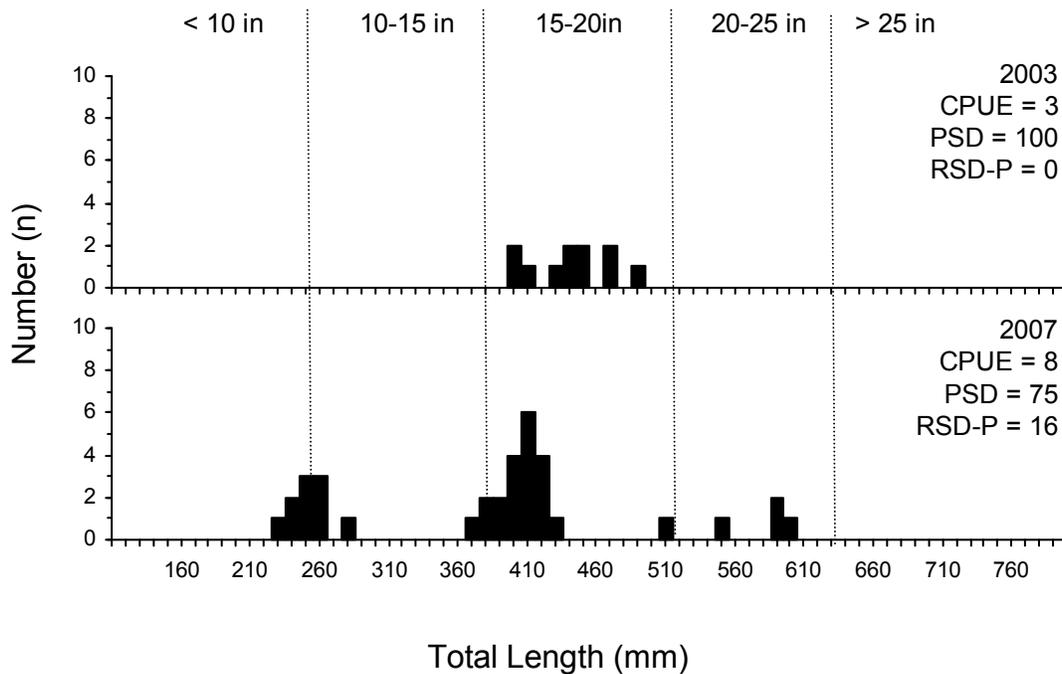


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for walleye captured using gill nets in Twin Lake, 2003 and 2007.

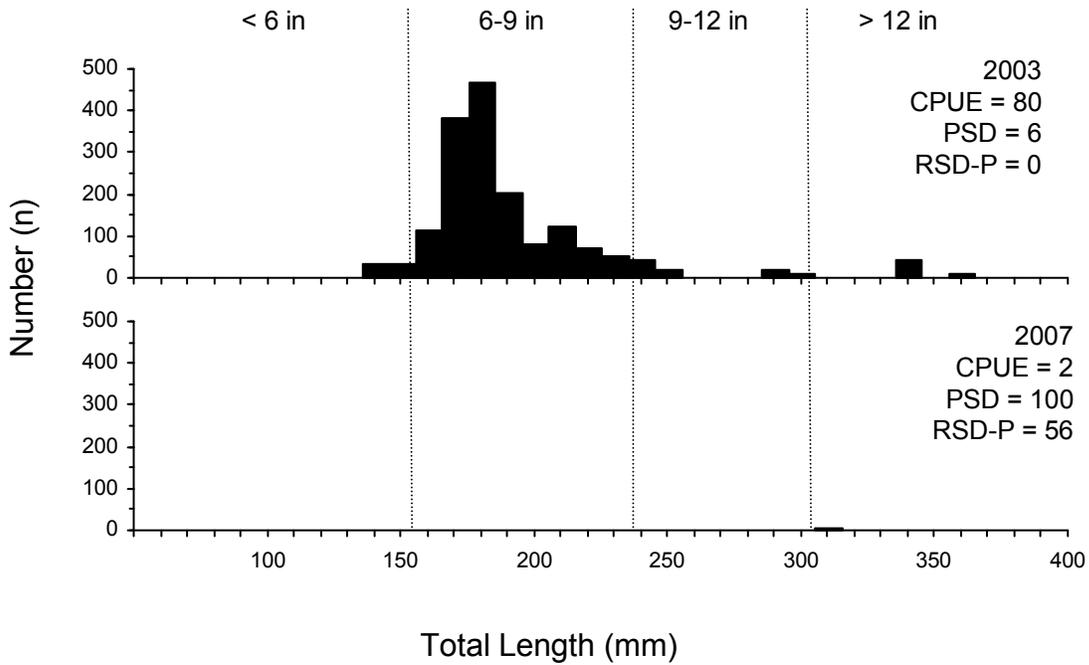


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for black bullhead captured using trap nets in Twin Lake, 2003 and 2007.