

Nine-Mile Lake

Site Description

Location

Water designation number (WDN)	48-0025-00
Legal description	T126N-R55W-Sec. 5 T127N-R55W-Sec. 31, 32
County (ies)	Marshall
Location from nearest town	3 north and 3.5 miles west of Lake City, SD.

Survey Dates and Sampling Information

Dates of current survey	May 30-31, 2007
Dates of previous survey	June 20-21, 1995
Gill net sets (n)	3
Frame net sets (n)	12

Morphometry (Figure 1)

Watershed area (acres)	2,592
Surface area (acres)	282
Maximum depth (ft)	10
Mean depth (ft)	7

Ownership and Public Access

Nine-Mile Lake is a meandered lake owned and managed by the SDGFP. Property adjacent to Nine-Mile Lake is primarily under State of South Dakota and private ownership. A public access (including boat ramp) is located on the northeast portion of Nine-Mile Lake and is maintained by the SDGFP (Figure 1). Several cabins are located along the north-northwestern shoreline of Nine-Mile Lake.

Watershed and Land Use

The Nine-Mile Lake watershed is comprised of approximately 50% cropland and 50% grassland.

Water Level Observations

The Water Management Board established Ordinary High Water Mark is 1825.5 fmsl (feet above mean sea level), and the established outlet elevation of Nine-Mile Lake is 1824.9 fmsl. On May 9, 2007, Nine-Mile Lake was near full with an elevation of 1824.6 fmsl (Lynn Beck, DENR, personal communication).

Aquatic Vegetation and Exotics

Emergent vegetation primarily horsetail and cattail covers approximately 80% of the shoreline of Nine-Mile Lake, and submergent vegetation is found throughout the lake (Stueven and Stewart 1996; Meester 1996). The type of submergent vegetation has not been documented. No exotic vegetation or wildlife was reported during this survey.

Fish Management Information

Primary species	northern pike, yellow perch
Other species	black bullhead, fathead minnow, Iowa darter, johnny darter, largemouth bass white sucker, walleye
Management classification	warm-water semi-permanent
Fish Consumption Advisories	none

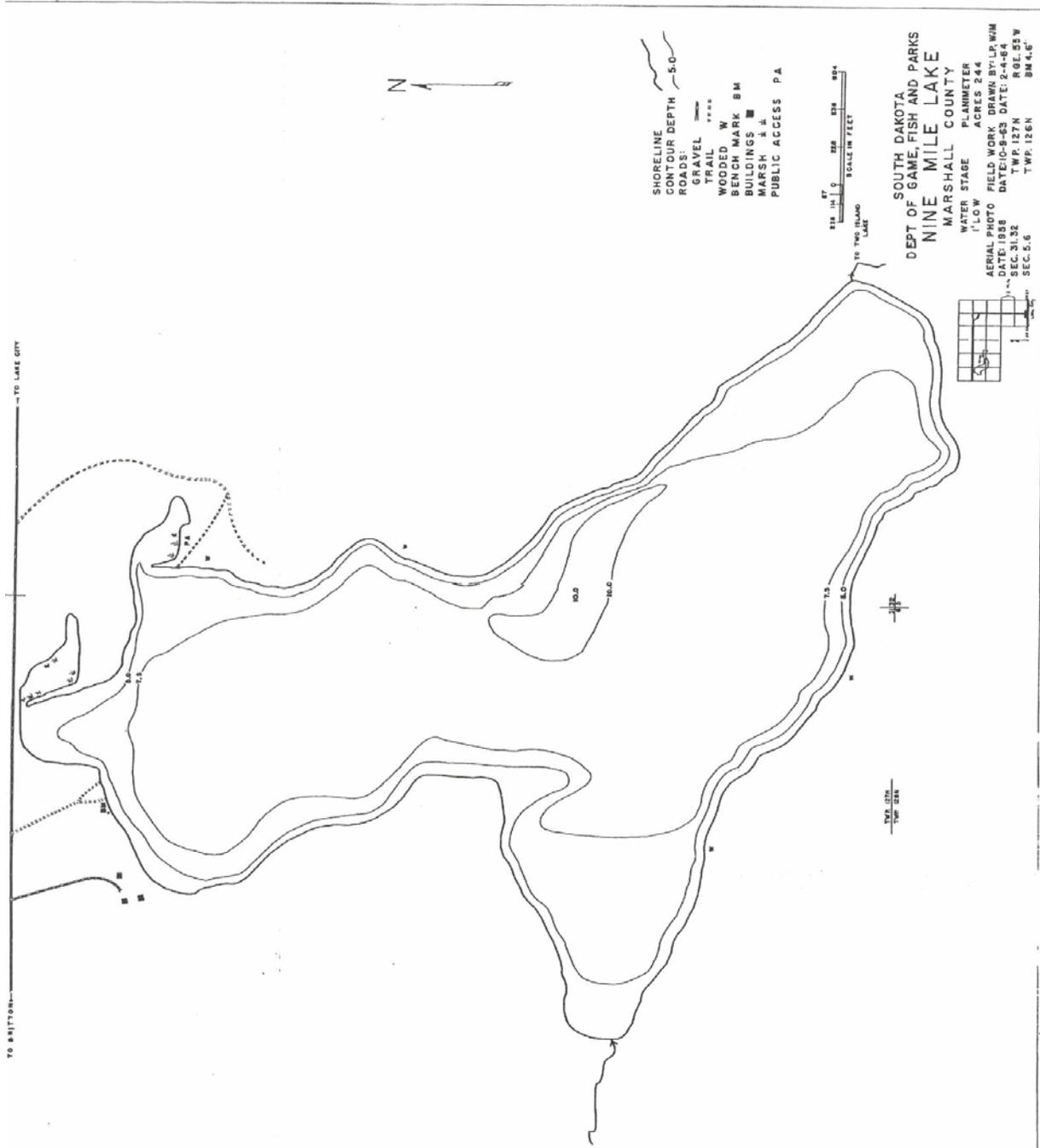


Figure 1. Nine-Mile Lake contour map.

Management Objectives

Table 6. Maintain a mean gill net CPUE of stock-length northern pike ≥ 3 , a PSD of 30 – 60, and an RSD-P of 5 – 10.

- 2) Maintain a mean gill net CPUE of stock-length yellow perch ≥ 25 and 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

Nine-Mile Lake is a shallow natural lake, with abundant submerged vegetation. Dating back to the late-1960's the fish community has been comprised mainly of more winterkill tolerant species such as black bullhead, northern pike, and yellow perch; however, occasional short-lived intervals of relatively-high walleye abundance have occurred between winterkill events. Currently, Nine-Mile Lake is managed primarily as a northern pike and yellow perch fishery.

Primary Species

Northern Pike: The mean gill net CPUE of stock-length northern pike in Nine-Mile Lake during 2007 was 10.0, and above the minimum objective of (≥ 3 stock-length fish/net-night; Tables 1-3). Although, northern pike are typically not sampled effectively using standard lake survey methods, sampling of Nine-Mile Lake coincided with the most reliable time to assess northern pike populations using gill nets in eastern South Dakota natural lakes, which is late spring following the spawn (Neumann and Willis 1995). Based on the 2007 gill net catch, relative abundance of northern pike in Nine-Mile Lake is high (Table 1; Table 3).

Sampled northern pike ranged in total length from 280 to 690 mm, had a PSD of 43, and an RSD-P of 0 (Table 1; Table 3; Figure 2). No growth information was collected. Condition was good for sampled pike, with the mean W_r of stock-length fish being 100 (Table 1). No length-related trends in W_r were apparent during 2007.

Yellow Perch: The mean gill net CPUE of stock-length yellow perch in 2007 was 18.0, and below the minimum objective (≥ 25 stock-length fish/net-night; Tables 1-3). Based on the 2007 gill net catch, relative abundance of yellow perch in Nine-Mile Lake is considered low to moderate. However, seasonal and/or habitat characteristics may have influenced gill net catch rates as our assessment was conducted in late-May, and it appears yellow perch may have been near shore as the mean frame net CPUE of stock-length yellow perch was 40.0 (Table 1). Length distributions of both frame net and gill net captured yellow perch were similar in 2007.

Length-frequency analysis of gill net captured yellow perch in 2007 indicates consistent recruitment in recent years, with what appears to be two year-classes present (Figure 3). Gill net captured yellow perch ranged in total length from 130 to 190 mm, with no quality- or preferred-length fish being captured (Table 1; Table 3; Figure 3).

No growth information was available for 2007. The condition of yellow perch in Nine-Mile Lake was good with the mean W_r of stock-length fish being 97 (Table 1). No length-related trends in W_r were apparent.

Other Species

Largemouth bass: In 2005, largemouth bass were stocked into Nine-Mile Lake in an attempt to take advantage of the abundant submerged aquatic vegetation present. It is unknown how largemouth bass will perform in Nine-Mile Lake; however, largemouth bass relative abundance was found to be positively correlated with the percent coverage of submergent vegetation in some eastern South Dakota glacial lakes and large impoundments (McKibbin 2002). Guy and Willis (1991) found that aquatic vegetation coverage and Secchi depth were important indicators of an environment capable of producing high density largemouth bass populations in South Dakota small ponds.

Electrofishing which is typically used to sample black bass populations in northeastern South Dakota has not been conducted in Nine-Mile Lake. During the next fish community assessment survey (summer 2012), electrofishing should be conducted to evaluate the largemouth bass population.

Walleye: The mean CPUE of stock-length walleye was 0.3 and 0.7 for gill nets and frame nets, respectively (Table 1; Table 2). Mean CPUE values for both frame nets and gill nets denote low relative abundance, despite frequent stockings of small fingerlings and fry (Table 5; Table 6).

In surveys conducted since 1985 (1988, 1995, 2000, and 2007), walleye relative abundance has remained low. Despite annual stockings from 1985-1991 (except 1988), walleye abundance was classified as low during the 1995 fish community survey, with a mean gill net CPUE of 3.3 (Meester 1996). Lucchessi and Scubelek (2001) found that four consecutive years of stocking small fingerlings from 1996-1999 into Nine-Mile Lake resulted in a mean gill net CPUE of 2.8 during 2000, and failed to produce a quality walleye fishery. Walleye small fingerling and fry stockings made in 2003 and 2004, respectively, appear to have been unsuccessful at increasing the relative abundance of walleye in Nine-Mile Lake.

It appears that past walleye stockings of fry and small fingerlings have been largely unsuccessful at establishing an acceptable walleye fishery in Nine-Mile Lake; therefore, if future attempts are made at increasing walleye abundance, large fingerlings should be stocked. However, given the high potential for winterkill in Nine-Mile Lake walleye should only be stocked when extra fish are available and all higher priority stockings have been completed.

Black Bullhead: The mean frame net CPUE of stock-length black bullhead during 2007 was 10.4, and within the management objective (≤ 100 stock-length fish/net-night; Tables 1-3). Black bullhead relative abundance was classified as low in Nine-Mile Lake during 2007. Given the low relative abundance, the impact of the black bullhead population on the sport fishery in Nine-Mile Lake is likely minimal.

Other Species

A single bluegill was the only other species sampled in the 2007 netting survey.

Management Recommendations

1. Conduct fish community assessment surveys utilizing gill/frame nets and electrofishing on an every fifth year basis (next survey scheduled in summer 2012) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
2. Stock walleye (≈ 25 large fingerlings/acre) when extra are available and all higher priority stockings have been fulfilled.
3. Collect scales from largemouth bass; otoliths from walleye and yellow perch to assess age structure and growth rates of each population
4. Monitor water levels and winter/summer kill events. In cases of complete winterkill, utilize as a natural rearing pond for walleye then re-stock northern pike and yellow perch to establish a fish community.

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 Nine-Mile Lake, 2007. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB = black bullhead; BLG= bluegill; NOP = northern pike; WAE = walleye; YEP = yellow perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	RSD-P	CI-90	Wr	CI-90
<i>Frame nets</i>								
BLB	10.4	3.5	97	2	3	3	107	1
BLG	0.1	0.1	100	---	100	---	145	---
NOP	0.3	0.2	25	59	0	---	87	6
WAE	0.7	0.3	50	36	38	34	95	4
YEP	40.0	10.3	2	1	0	1	89	2
<i>Gill nets</i>								
BLB	3.7	0.6	91	9	36	28	119	5
NOP	10.0	1.1	43	16	0	---	100	2
WAE	0.3	0.7	100	---	100	---	93	---
YEP	18.0	12.4	0	---	0	---	97	1

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 Nine-Mile Lake, 2000-2007. BLB = black bullhead; BLG= bluegill; NOP = northern pike; WAE = walleye; YEP = yellow perch

Species	CPUE								Mean
	2000	2001	2002	2003	2004	2005	2006 ¹	2007 ¹	
<i>Frame nets</i>									
BLB	---	---	---	---	---	---	---	10.4	10.4
BLG	---	---	---	---	---	---	---	0.1	0.1
NOP	---	---	---	---	---	---	---	0.3	0.3
WAE	---	---	---	---	---	---	---	0.7	0.7
YEP	---	---	---	---	---	---	---	40.0	40.0
<i>Gill nets</i>									
BLB	---	---	---	---	---	---	---	3.7	3.7
NOP	---	---	---	---	---	---	---	10.0	10.0
WAE	---	---	---	---	---	---	---	0.3	0.3
YEP	---	---	---	---	---	---	---	18.0	18.0

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 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 in experimental gill nets and frame nets in Nine-Mile Lake, 2000-2007. BLB= black bullhead; NOP= northern pike; YEP= yellow perch

Species	2000	2001	2002	2003	2004	2005	2006 [†]	2007 [†]	Average	Objective
<i>Frame nets</i>										
BLB										
CPUE	---	---	---	---	---	---	---	10	10	≤ 100
PSD	---	---	---	---	---	---	---	97	97	---
RSD-P	---	---	---	---	---	---	---	3	3	---
Wr	---	---	---	---	---	---	---	107	107	---
<i>Gill nets</i>										
NOP										
CPUE	---	---	---	---	---	---	---	10	10	≥ 3
PSD	---	---	---	---	---	---	---	43	43	30-60
RSD-P	---	---	---	---	---	---	---	0	0	5-10
Wr	---	---	---	---	---	---	---	100	100	---
YEP										
CPUE	---	---	---	---	---	---	---	18	18	≥ 25
PSD	---	---	---	---	---	---	---	0	0	30-60
RSD-P	---	---	---	---	---	---	---	0	0	5-10
Wr	---	---	---	---	---	---	---	97	97	---

[†] 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 net sets in Nine-Mile Lake, 2007.

Year	N	Age								
		1	2	3	4	5	6	7	8	9
2007	1	---	---	---	---	---	540	---	---	---

Table 5. Stocking history including size and number for fishes stocked into Nine-Mile Lake, 1998 – 2007. LMB= largemouth bass; WAE= walleye

Year	Species	Size	Number
1998	WAE	small fingerling	25,000
1999	WAE	small fingerling	25,000
2003	WAE	small fingerling	26,700
2004	WAE	fry	260,000
2005	LMB	fingerling	25,600

Table 6. Numbers of walleye sampled (n) by year class and associated stocking history (Number stocked x 1,000) for walleye captured in Nine-Mile Lake, 2007.

Survey Year	Year Class									
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
2007							1			
Number stocked										
fry				260						
small fingerling					26.7				25	25
large fingerling										

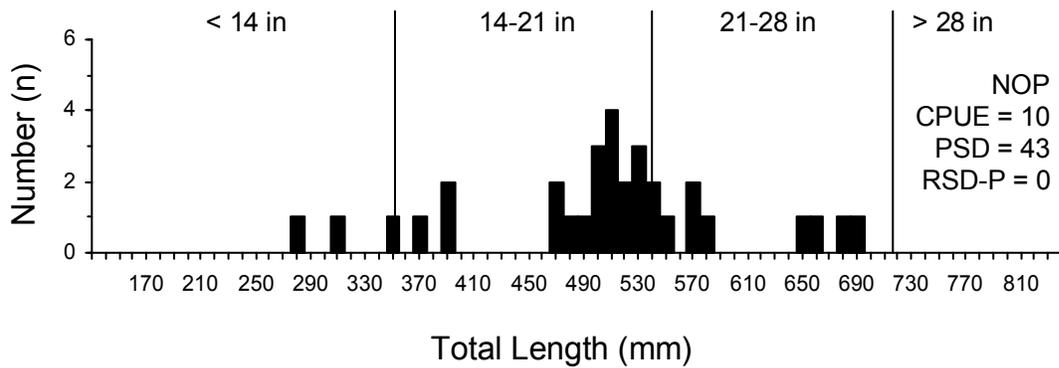


Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for northern pike captured in gill nets in Nine-Mile Lake, 2007.

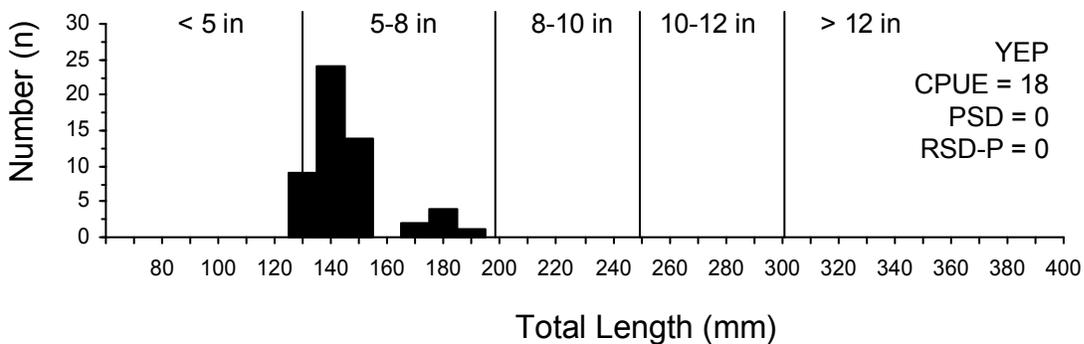


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for yellow perch captured in gill nets in Nine-Mile Lake, 2007.