

Mud Lake

Site Description

Location

Water designation number (WDN)	57-0013-00
Legal description	T115N-R64W-Sec. 15
County (ies)	Spink
Location from nearest town	Six miles south of Redfield

Survey Dates and Netting Information

Dates of current survey	August 14 – 15, 2003
Date of most recent survey	none
Gill net effort	4
Frame net effort	10

Morphometry (Figure 1)

Watershed area (acres)	12,032
Surface area (acres)	400
Maximum depth (ft)	unknown
Mean depth (ft)	unknown

Ownership and Public Access

Mud Lake is not a meandered lake. SDGFP does not maintain any access sites on Mud Lake. A portion of Mud Lake is a game production area (GPA) managed by the SDGFP (Figure 1). Mud Lake has mixed ownership including the State of South Dakota and private parties.

Watershed and Land Use

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

Water Level Observations

Water levels were above the historic average, which has allowed sport fish survival and subsequently prompting this survey.

Aquatic Vegetation and Exotics

Not reported.

Fish Management Information

Primary species	black crappie, walleye, yellow perch
Other species	black bullhead, common carp, green sunfish, northern pike, largemouth bass
Management classification	warm-water seasonal
Fish consumption advisories	none

Figure 1. Mud Lake location map.



Management Objectives

- 1) Maintain a mean gill net CPUE of stock length walleye ≥ 10 , a PSD of 40 – 60, and an RSD-P of 5 – 10.
- 2) Maintain a mean gill net CPUE of stock length yellow perch ≥ 15 .
- 3) Maintain a mean frame net CPUE of stock length bullhead ≤ 100 and encourage commercial harvest during periods of high abundance.
- 4) Monitor water levels and winterkill events.

Results and Discussion

Primary Species

Walleye: Walleye CPUE was 0.2 and 4.8 for frame nets and gill nets, respectively (Table 1). No historical data was available from Mud Lake for comparison to determine historical trends; however, a gill net CPUE of below five would classify the Mud Lake walleye population as having moderate-low density when compared to other lakes in northeastern South Dakota.

Aging data from the 2003 survey indicated the presence of two year classes including 1999 and 2000 (Table 2; Table 4). Small fingerling walleye were stocked into Mud Lake in 2000 and 2004 (Table 3) and the 2000 year class comprised a large proportion of the walleye population (Table 2) at the time of this survey. The 1999 year class was likely attributed to high water during the late 1990's that joined Mud Lake and Twin Lakes allowing fish to move between the two water bodies. The success of the 2004 walleye stocking is unknown because no survey has been conducted on Mud Lake since 2003.

All walleye captured in gill nets during this survey were over quality length (380 mm) yielding a PSD of 100 and an RSD-P of 21 (Table 1; Figure 2). Growth of walleye in Mud Lake was exceptional with walleye reaching 466 mm total length by age-3. Similarly, the walleye condition in Mud Lake was good with W_r of walleye captured in frame nets and gill nets of 92 and 91, respectively. No length related change in W_r of walleye captured during this survey was apparent.

Black Crappie: Black crappie CPUE was 117.8 and 6.3 for frame nets and gill nets, respectively (Table 1). The abundance of stock length (130 mm) black crappie during this survey was relatively high. Black crappie ages were not assessed during this survey; however, based on the length frequency, black crappie captured during this survey were all likely from a single year-class (Figure 2). The statewide mean back-calculated length at age-1 and age-2 were reported as 83 and 147 mm, respectively (Willis et al. 2001). The mean length

at capture for black crappie in this survey was 129 so it appears that the black crappie in Mud Lake were from the 2002 year class and nearing the end of their second year of growth. Lengths of most black crappie captured in frame nets during this survey were below quality length (200 mm); thus, the PSD and RSD-P were each zero. Relative weight was 107 and 95 for black crappies captured in frame nets and gill nets, respectively (Table 1).

Yellow Perch: Yellow perch abundance in Mud Lake was relatively low during this survey with frame net and gill net mean CPUE of 7.2 and 2.3, respectively. Lengths of yellow perch captured by any gear during this survey ranged from 141 to 196 mm. All yellow perch captured in 2003 were less than quality length (200 mm); subsequently, the PSD and RSD-P of yellow perch in this survey were zero. Mean Wr of yellow perch captured in gill nets was 90 and no size related condition pattern was apparent.

Other Species

Black Bullhead: Black bullhead CPUE was 79.8 and 33.3 for frame nets and gill nets, respectively (Table 1). Black bullhead ranged in length from 122 to 145 mm with a frame net PSD of 6 and an RSD-P of 0 (Table 1; Figure 2). The Wr of black bullhead captured in frame nets was 78.

Other: Frame net CPUE of common carp, green sunfish, largemouth bass, and northern pike were 1.1, 0.2, 0.1, and 1.5, respectively (Table 1). Common carp and northern pike were also captured in gill nets with CPUE of 13.8 and 0.3, respectively. No historic information was available to determine trends; however, it is likely that common carp, green sunfish, largemouth bass, and northern pike remain in relatively low abundance in Mud Lake. Few northern pike were captured but the pike that were captured were larger than quality length (530 mm). Northern pike frame net PSD was 100 and the RSD-P was 53. Conversely, largemouth bass captured during this survey were less than quality length (300 mm) and the PSD was zero. The Wr of common carp, green sunfish, largemouth bass, and northern pike captured in frame nets ranged from 89 to 97 and indicated that these fish species were of acceptable condition in Mud Lake.

Summary

Mud Lake has historically been considered a slough that occasionally filled with water. During the late 1990's high precipitation increased water levels above the historic average and provided habitat suitable to provide a temporary sport fishery. High water levels connected nearby Twin Lake to Mud Lake and likely allowed fish to move from Twin Lake into Mud Lake. The SDGFP stocked walleye small fingerlings into Mud Lake in 2000 and 2004 in attempts to establish a walleye fishery in the lake. At the time of this survey in 2003 the 2000 stocking appeared successful and dominated the walleye population in Mud Lake.

Since initial filling the water levels in Mud Lake have declined steadily and are well below the maximum depth obtained during the flooding of the late 1990's. Given the low water levels angler accessibility has been reduced and winterkill events are likely. Future fisheries management in Mud Lake will likely be dictated by water levels and especially the likelihood of winterkill events. No lake survey has been conducted on Mud Lake since 2003 so the current status of the fishery is unknown.

Management Recommendations

- 1) Conduct fish population assessment surveys on an every-four-year basis (next survey scheduled in summer 2007) to monitor fish abundance, fish population size structures, fish growth, and stocking success.
- 2) Stock walleye at 1,000 fry/acre every-other-year to establish consistent year classes. Stock northern pike and yellow perch in cases of complete winterkill events to establish a fish population. Monitor water levels and winterkill events to assess stocking strategies.
- 3) Encourage commercial harvest of black bullhead to limit bullhead abundance when necessary.

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 net sets, frame net sets, or night electrofishing in Mud Lake, 2003. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90).

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	RSD-P	CI-90	Wr	CI-90
<i>Gill nets</i>								
BLB	33.3	9.4	11	4	0	---	82	1
BLC	6.3	3.2	4	7	4	7	95	1
COC	13.8	5.7	24	9	24	9	84	2
NOP	0.3	0.4	100	---	100	---	92	---
WAE	4.8	1.8	100	0	21	17	92	2
YEP	2.3	2.7	0	---	0	---	90	5
<i>Frame nets</i>								
BLB	79.8	37.0	6	1	0	---	78	2
BLC	117.8	24.9	0	---	0	---	107	3
COC	1.1	0.8	27	26	18	22	89	5
GSF	0.2	0.2	0	---	0	---	107	44
LMB	0.1	0.1	0	---	0	---	97	---
NOP	1.5	0.6	100	0	53	24	92	2
WAE	0.2	0.3	100	0	50	50	91	8
YEP	7.2	2.6	0	---	0	---	85	1

Table 2. Mean back-calculated length (mm) at age and standard error (SE) for walleye captured in experimental gill net sets in Mud Lake, 2003.

Year	Age	N	Age			
			1	2	3	4
2000	3	16	135	322	424	---
1999	4	1	227	421	507	563
Mean	---	17	181	371	466	563
SE	---	---	46	49	41	0
<i>Mean Comparison</i> ¹						
Small lakes/impoundments			176	271	384	431
Large lakes/impoundments			169	280	358	425
Region IV			161	281	367	433
Statewide			168	279	360	425

¹ Willis et al. 2001.

Table 3. Stocking history (10-year) including size and number for fishes stocked into Mud Lake, 1996 - 2005.

Year	Species	Size	Number
2000	WAE	small fingerling	83,790
2004	WAE	small fingerling	45,000

Table 4. Numbers of walleye sampled (n) by year class and associated stocking history (Number stocked x 1,000) for walleye captured in Mud Lake, 2003.

Survey Year	Year Class									
	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993
2003	0	0	16	1	0	0	0	0	0	0
Number stocked										
fry	---	---	---	---	---	---	---	---	---	---
small fingerling	---	---	84	---	---	---	---	---	---	---
large fingerling	---	---	---	---	---	---	---	---	---	---

Figure 2. Length frequency, catch rate of stock length fish (CPUE), proportional stock density (PSD), relative stock density of preferred length fish (RSD-P), and relative weight (Wr) of stock length fish for various fish species captured in frame net sets (BLB and BLC) or experimental gill net sets (WAE and YEP) in Mud Lake, 2003.

