Long Lake

Site Description

Location

Water designation number (WDN)	47-0008-00
Legal description	T127N-R70W Sec. 2, 3, 10 T128N-R70W Sec. 35
County (ies)	McPherson
Location from nearest town	3 miles West of Long Lake, McPherson County, SD.

Survey Dates and Sampling Information

Dates of current survey	September 19, 2007
Dates of most recent survey	1978
Gill net sets (n)	3

Morphometry (Figure 1)

Watershed area (acres)	unknown
Surface area (acres)	~400
Maximum depth (ft)	~8-10
Mean depth (ft)	unknown

Ownership and Public Access

Long Lake is a meandered lake owned by the State of South Dakota. The fish community is managed by the SDGFP. A 3.5 acre lake access area located on the northern shore provides public access; however, no boat ramp exists (Figure 1). Boat anglers typically launch from the lake access area, or the road ditch on the NE corner of the lake (personal communication Joe Galbraith). Lands adjacent to Long Lake are owned by US Fish and Wildlife Service, State of South Dakota, and private parties

Watershed and Land Use

The Long Lake watershed is primarily comprised of agricultural lands with much of the landscape being pasture and/or grassland.

Water Level Observations

Heavy precipitation during the mid to late 1990's increased the water depth of Long Lake allowing a sport fishery to be developed; however, in recent years water depth has declined. During the 2007 fish community assessment survey, maximum water depth was approximately 8-10 feet.

Aquatic Vegetation and Exotics

Emergent and submergent vegetation are present in Long Lake; however, no aquatic vegetation survey has been conducted. Past fisheries survey reports from the mid to late 1970's indicate the presence of cattail (*Typha spp*.), bulrush (*Scirpus spp*.), coontail (*Ceratophyllum demersum*), and sago pondweed (*Potamogeton pectinatus*). No exotic vegetation or wildlife was reported during this survey.

Fish Management Information

Primary species	walleye, yellow perch
Other species	none encountered
Management classification	warm-water marginal
Fish Consumption Advisories	none

Figure 1. Aerial photograph that depicts location of Long Lake including public access area from the city of Long Lake, McPherson County, South Dakota.

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 gill net CPUE of stock-length yellow perch ≥ 25, a PSD of 30-60, and an RSD-P of 5-10.

Results and Discussion

Long Lake is a shallow-natural lake located near the City of Long Lake in McPherson County, South Dakota. Past surveys conducted in the 1970's indicated that Long Lake was highly susceptible to winterkill and primary management activities were limited to stockings of black bullheads, northern pike, and yellow perch (species believed to be more winterkill tolerant).

Heavy precipitation in the mid to late 1990's increased water depth and diminished the threat of winterkill. In 2000, walleye and yellow perch were stocked into Long Lake and a sport fishery has developed. However, the water level has declined in recent years increasing the potential for winterkill. Currently, Long Lake is managed as a walleye and yellow perch fishery.

Primary Species

Walleye: The mean gill net CPUE of stock-length walleye during 2007 was 16.3, and above the minimum objective (≥ 10 stock-length fish/net night; Table 1). Based on the 2007 walleye gill net catch, walleye relative abundance is considered high in Long Lake.

Both length-frequency analysis and age structure information of gill net captured walleye during 2007 indicate the presence of four year-classes (2000, 2005-2007; Table 2; Table 4). The 2000 and 2005 walleye year-classes were the most represented and coincided with stockings (Table 3; Table 4). Year-classes produced in 2006 and 2007 were the result of natural reproduction (Table 4). The 2006 year-class appears to be weak; while the capture of 14 age-0 walleye in gill nets during 2007 may indicate a potentially strong 2007 year-class as this cohort was likely not fully recruited to our gear at time of sampling.

Walleye captured in gill nets during 2007 ranged in total length from 170 to 620 mm, had a PSD of 80 and an RSD-P 35 (Table 1; Figure 2). High PSD and RSD-P values indicate a population primarily comprised of larger walleye. Both PSD and RSD-P values for gill net captured walleye in 2007 exceeded the management objectives of 30-60 and 5-10, respectively (Table 1; Figure 2).

Walleye in Long Lake exhibit relatively fast growth with the weighted mean length at capture for age-2 walleyes being 391 mm during the 2007 survey (Table 2). No

comparisons can be made to other years as walleye from Long Lake have not previously been aged. Mean Wr values ranged from 89-97 for all length categories sampled and were indicative of good condition. The mean Wr of stock-length walleye was 92 and no length-related trends in mean Wr values was apparent in 2007 (Table 1).

Yellow Perch: The mean gill net CPUE of stock-length (130 mm) yellow perch in 2007 was 64.0, and above the minimum objective (≥ 25 fish/net night; Table 1). Yellow perch relative abundance is quantified as high based on the 2007 gill net catch.

Yellow perch captured in gill nets during 2007 ranged in total length from 130 to 330 mm. All 10-mm length groups from 130 to 260 mm were represented in the yellow perch gill net catch, indicating consistent recruitment in recent years (Figure 3). High relative abundance of stock-quality length yellow perch in the 2007 gill net catch resulted in a PSD of 26 and an RSD-P of 4 (Figure 3). Both PSD and RSD-P values for gill net captured yellow perch were below the desired objective ranges of 30-60 and 5-10.

The mean Wr of stock-length yellow perch was 88 (Table 1). Mean Wr values ranged from 88-93 for all length categories sampled and no length-related trends mean Wr values were apparent.

Other Species

Other: No other species were captured during the 2007 fish community assessment survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys utilizing gill nets 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; unless the water level recedes and a viable fishery no longer exists.

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

3) Stock walleye (≈1000 fry/acre) biennially to establish additional year-classes unless water levels recede and a viable fishery no longer exists.

4) Monitor water level and winter/summer kill events. In cases of complete winter/summerkill evaluate the need to establish a sport fishery in Long Lake.

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 in Long Lake, 2007. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). WAE= walleye; YEP= yellow perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	RSD-P	CI-90	Wr	CI-90
Gill nets								
WAE	16.3	8.5	80	9	35	11	92	<1
YEP	64.0	10.5	26	5	4	3	88	<1

Table 2. Weighted mean length at capture (mm) for walleye captured in experimental gill nets in Long Lake, 2007.

		Age										
Year	N	0	1	2	3	4	5	6	7	8	9	10
2007	61	199	327	391	---	---	---	---	569	---	---	---

Table 3. Stocking history including size and number for fishes stocked into Long Lake, 2000-2007. WAE= walleye; YEP= yellow perch

Year	Species	Size	Number
2000	WAE	small fingerling	80,600
	YEP	adult	2,150
2005	WAE	fry	400,000

Table 4. Numbers of walleye sampled (n) by year class and recent associated stocking history (Number stocked x 1,000) for walleye captured in Long Lake, 2007.

Survey Year	2007	2006	2005	2004	2003	2002	2001	2000
2007	14	3	28					16
Number stocked								
fry			400					
small fingerling								81
large fingerling								

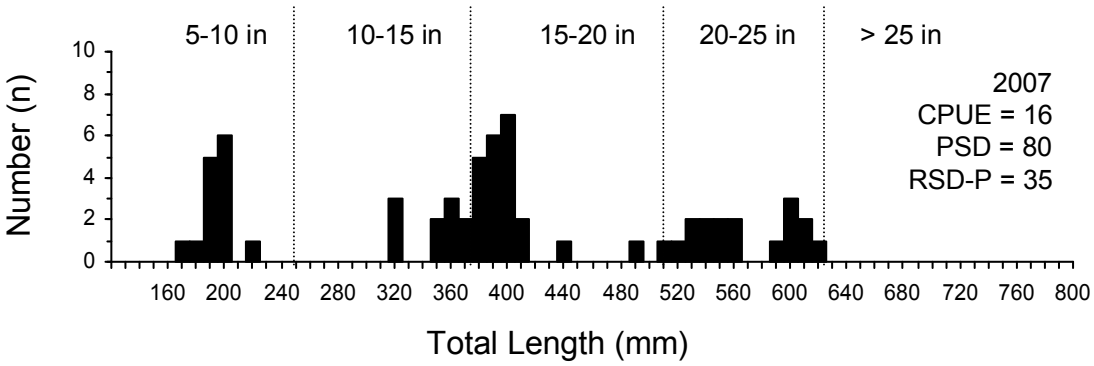

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for walleye captured in gill nets in Long Lake, 2007.

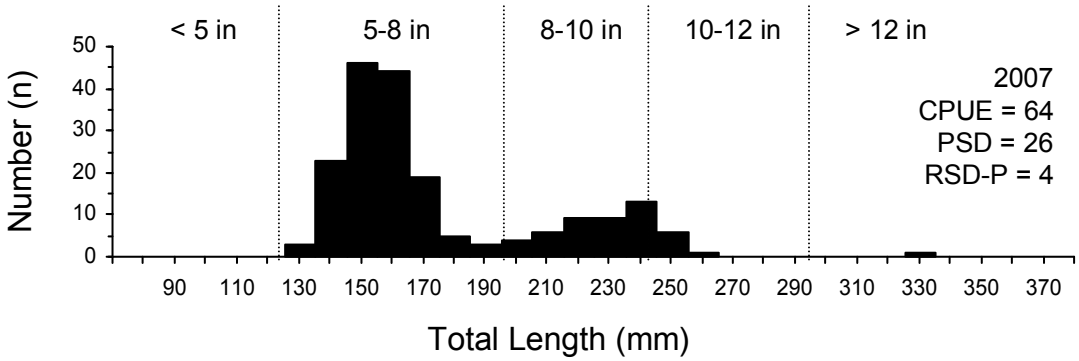

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for yellow perch captured in gill nets in Long Lake, 2007.