Leola Dam

Site Description

Location

Water designation number (WDN)	47-0002-00
Legal description	T126N-R67W Sec. 17
County (ies)	McPherson
Location from nearest town	Northeast edge of Leola

Survey Dates and Sampling Information

Dates of current survey	September 18, 2007
Dates of most recent survey	May 26, 1994
Fall electrofishing (min)	41

Morphometry (Figure 1)

Watershed area (acres)	1,280
Surface area (acres)	23
Maximum depth (ft)	12
Mean depth (ft)	7

Ownership and Public Access

Leola Dam is a WPA Dam owned by South Dakota School and Public Lands. The fish community is managed by the SDGFP. The city of Leola maintains a ramp and park facilities on the northeast corner of the lake. Shore fishing opportunities are available along McPherson County 19, the city park area, and in the southwest corner of the lake (Figure 1). Lands adjacent to Leola Dam are owned by the City of Leola, State of South Dakota, and private individuals.

Watershed and Land Use

The Leola Dam watershed is dominated by agricultural lands, primarily pasture and cropland.

Water Level Observations

The water level of Leola Dam remains relatively constant due to an artesian well which flows year around.

Aquatic Vegetation and Exotics

Emergent and submergent vegetation are abundant in Leola Dam. Abundant vegetation impedes both shore fishing and boating. No exotic vegetation or wildlife was reported during this survey.

Fish Management Information

Primary species	bluegill, largemouth bass
Other species	black bullhead, black crappie, green sunfish, northern pike, yellow
Management classification	warm-water marginal fish life propagation
Fish Consumption Advisories	none

Figure 1. Map depicting location of Leola Dam including City Park and popular shore fishing areas.

Management Objectives

1) Maintain a mean fall electrofishing CPUE of stock-length largemouth bass ≥ 30, a PSD of 40-70, and an RSD-P of 10-20.

2) Maintain a mean fall electrofishing CPUE of stock-length bluegill ≥ 50, a PSD of 30-60, and an RSD-P of 5-10.

Results and Discussion

Leola Dam, constructed in 1936 by the Works Progress Administration, was named after the town of Leola. The dam was constructed on the upper end of a tributary to Foot Creek which flows south-easterly through McPherson and Brown Counties before emptying into the James River.

Surface water, coupled with artesian well inflows result in relatively-stable water levels in Leola Dam; however winterkill still occurs. Electrofishing in May 1994 resulted in no fish being sampled indicating a complete winterkill during the 1993-94 winter (Meester 1994). Currently, Leola Dam is managed as bluegill and largemouth bass fishery. Black bullhead, black crappie, northern pike, and yellow perch also contribute to the fishery.

Primary Species

Largemouth bass: The stock-length largemouth bass electrofishing CPUE was 23.6; while the electrofishing CPUE for all sizes was 131.2 (Table 1). The mean electrofishing CPUE of 23.6 was below the minimum objective (≥ 30 stock-length bass/hour) and indicative of low to moderate relative abundance; however, the relative abundance of sub-stock largemouth bass appears to be high and if survival is high should result in increased abundance of stock-length largemouth bass in future years.

Stock-length largemouth bass sampled by fall night electrofishing in 2007 ranged in total length from 300 mm to 530 mm, had a PSD of 100 and an RSD-P of 69 (Table 1; Figure 2). Both PSD and RSD-P values exceeded the objective ranges for management under the big bass option (Table 1; Table 3; Figure 2). The high PSD and RSD-P values are likely the result of limited recruitment as no largemouth bass in the stock- to quality-length category were captured (Figure 2). Natural reproduction appears to have been successful in 2007 as sub-stock largemouth bass ranging in total length from 60 to 100 mm were abundant during fall electrofishing; however, recruitment is unknown.

No growth information was collected in 2007. Mean Wr values of stock-length largemouth bass ranged from 108 to 118. The mean Wr of stock-length largemouth bass was 118, and no length-related trends were apparent (Table 1).

Bluegill: Relative abundance of bluegill in Leola Dam appears to be high, as the 2007 mean fall electrofishing CPUE was 634.2. The CPUE was well above the minimum objective (≥ 50 stock-length bluegill/hour; Table 1).

The total length of bluegill captured during fall night electrofishing in 2007 ranged from 90 to 220 mm (Figure 3). The majority of bluegills sampled were in the stock- to quality-length category resulting in a PSD of 8 and an RSD-P of 0, which was near the desired objective ranges for management under the big bass option (Table 1; Table 3; Figure 3). Electrofishing is known to underestimate the size structure of bluegill populations (Reynolds and Simpson 1978). However, given the small size of Leola Dam and the extremely high catch rates it is likely that the at-large bluegill population is comprised of small individuals as indicated by the low PSD.

No growth information was collected in 2007. Mean Wr values ranged from 106 to 115 and were indicative of good condition. The mean Wr of stock-length bluegill was 107, and a slight increasing trend in mean Wr values was observed as total length increased (Table 1).

Other Species

Yellow Perch: Yellow perch populations are generally not assessed using electrofishing in NE South Dakota; therefore few inferences will be made. In all 91 yellow perch were sampled by fall night electrofishing in Leola Dam during 2007; however the majority were sub-stock (< 130 mm). Six stock-length yellow perch that ranged in total length from 130 to 250 mm were captured during fall night electrofishing (Figure 4). No growth information was available.

Other: Black bullhead, black crappie, green sunfish, and northern pike were also captured in relatively low numbers during fall night electrofishing in 2007 (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys utilizing fall night 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) Collect otoliths from bluegill and scales from largemouth bass to assess age structure and growth rates of each population.

3) Monitor winterkill events; in cases of complete winterkill, stock largemouth bass and bluegill to re-establish a fish community.

Table 1. Mean catch rate (CPUE; catch/hour) 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 during fall night electrofishing in Leola Dam, 2007. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; GSF= green sunfish; LMB= largemouth bass; NOP= northern pike; YEP= yellow perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	RSD-P	CI-90	Wr	CI-90
Electrofishing								
BLB	1.5	2.3	100	---	100	---	91	---
BLC	3.0	4.8	100	0	0	---	110	<1
BLG	634.2	120.1	8	3	<1	1	107	1
GSF	25.4	24.8	0	---	0	---	105	2
LMB	23.6	9.0	100	0	69	21	118	2
NOP	11.8	8.8	75	25	13	23	88	7
YEP	8.7	9.1	50	45	17	33	84	5

Table 2. Stocking history including size and number for fishes stocked into Leola Lake, 1994-2007. BLG= bluegill; LMB= largemouth bass

Year	Species	Size	Number
1994	BLG	adult	250
	LMB	fingerling	2,200
1995	LMB	fingerling	2,200
1996	LMB	fingerling	3,200

Table 3. Stock density index objective ranges for largemouth bass and bluegill under three different management strategies (from Willis et al. 1993).

	Largemouth Bass		Bluegill	
Option	PSD	RSD-P	PSD	RSD-P
Panfish	20-40	0-10	50-80	10-30
Balance	40-70	10-40	20-60	5-20
Big Bass	50-80	30-60	10-50	0-10

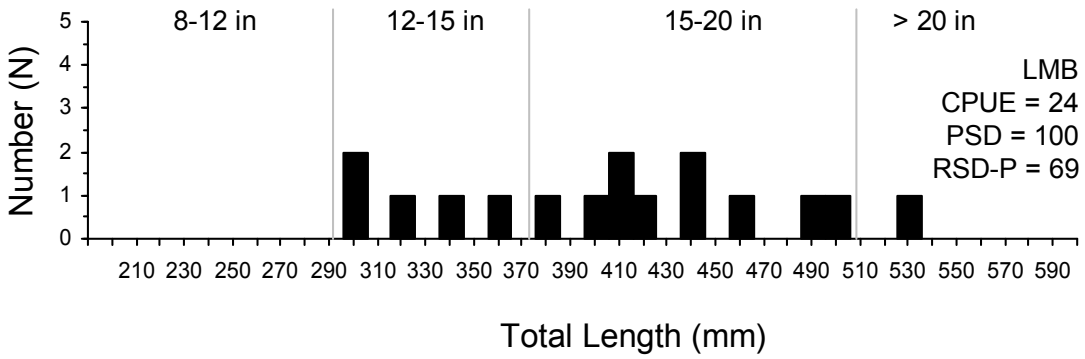

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for largemouth bass captured during fall night electrofishing in Leola Dam, 2007.

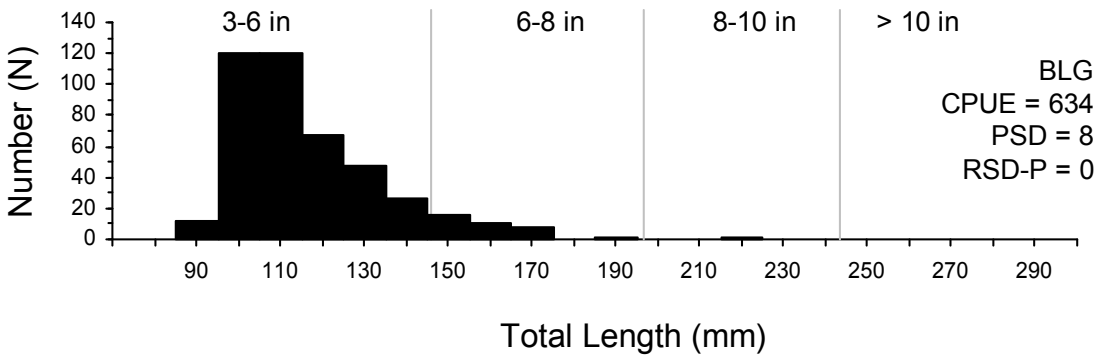

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for bluegill captured during fall night electrofishing in Leola Dam, 2007.

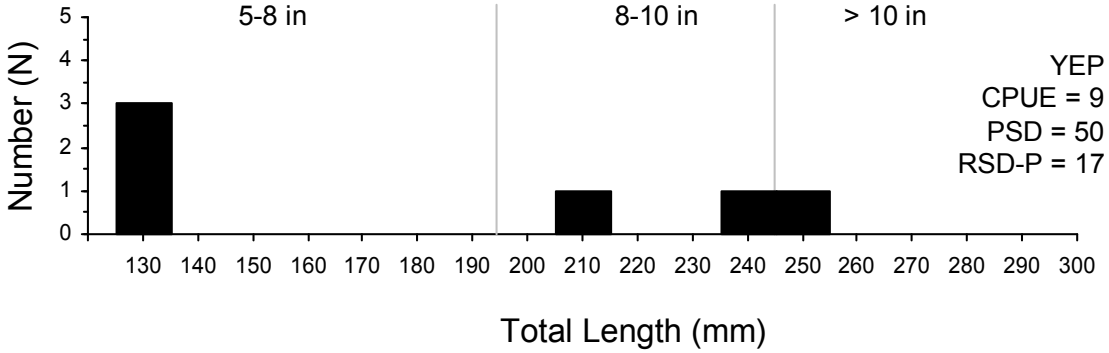

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional stock density (PSD), and relative stock density of preferred-length fish (RSD-P) for yellow perch captured during fall night electrofishing in Leola Dam, 2007.