

Cottonwood Lake

Site Description

Location

Water designation number (WDN)	48-0003-00
Legal description	T126N-R55W-Sec. 9, 16
County (ies)	Marshall
Location from nearest town	one-half mile west of Lake City, SD

Survey Dates and Sampling Information

Survey dates	June 9-10, 2009 (FN, GN)
Frame net sets (n)	12
Gill net sets (n)	3

Morphometry (Figure 1)

Watershed area (acres)	6000
Surface area (acres)	350
Maximum depth (ft)	12
Mean depth (ft)	9

Ownership and Public Access

Cottonwood Lake is a meandered lake owned and managed by the SDGFP. Land ownership adjacent to Cottonwood Lake includes the State of South Dakota, the USFWS and private individuals. A public access (including boat ramp) is located on the southwest shore and is maintained by the SDGFP (Figure 2). Cabins are present along the south shore from the boat ramp east to the resort with much of the rest of the lake undeveloped (Figure 2).

Watershed and Land Use

The Cottonwood Lake watershed is dominated by agricultural lands with approximately 67% pasture or grassland and 33% cropland.

Water Level Observations

No Ordinary High Water Mark has been established by the South Dakota Water Management Board on Cottonwood Lake; however, an outlet structure is present with an elevation of 1827.2 fmsl. The elevation of Cottonwood Lake on April 28, 2009 was 1827.7 fmsl and indicated only a slight increase from the fall 2007 elevation of 1827.4 fmsl. By September 29, 2009 the water level had declined to an elevation of 1827.3 fmsl.

Aquatic Nuisance Species Monitoring

Plant Survey

Species identified included native milfoil, sago pondweed, clasping leaf pondweed and coontail. No aquatic nuisance plant species were identified during the 2009 survey.

Macro-Invertebrate/Mussel Survey

No aquatic nuisance macro-invertebrate or mussel species were sampled in 2009.

Fish Community Survey

No aquatic nuisance fish species were captured during the 2009 survey; however, common carp have been observed in Cottonwood Lake in the past.

Fish Management Information

Primary species	northern pike, yellow perch
Other species	black bullhead, black crappie, bluegill, common carp, green sunfish, largemouth bass, smallmouth bass, walleye, white sucker
Lake-Specific regulations	NE Panfish Management Area: 10 daily; 50 possession
Management classification	warm-water marginal
Fish consumption advisories	none



Figure 2. Map depicting location of Cottonwood Lake from Lake City, SD; including access site, and standardized net locations. CWFN= frame nets; CWGN= gill nets

Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length northern pike ≥ 3 , a PSD of 30-60, and a PSD-P of 5-10.
- 2) Maintain a mean gill net CPUE of stock-length yellow perch ≥ 30 , a PSD of 30-60, and a PSD-P of 5-10.
- 3) Maintain a mean frame net CPUE of stock-length bullhead ≤ 100 .

Results and Discussion

Cottonwood Lake is a shallow natural lake located northwest of Lake City, South Dakota. The lake receives surface water from Cottonwood Creek from the north and the local watershed. Water flowing from Cottonwood Lake runs south into Roy Lake.

Cottonwood Lake has a history of winter and summerkill events (most recently documented in winter of 1985-1986). Historically the fish community was primarily comprised of black bullhead, northern pike, and yellow perch (species believed to be more winterkill tolerant). However, anecdotal information suggests that walleye and largemouth bass have provided a sport fishery between winter and summerkill events. Currently, Cottonwood Lake is managed as a northern pike and yellow perch fishery.

Primary Species

Northern Pike: The 2009 mean gill net CPUE of stock-length northern pike was 4.3 (Table 1), and above the minimum objective (≥ 3 stock-length fish/net night). Based on the 2009 gill net catch, relative abundance of northern pike in Cottonwood Lake appears to be high (>3 stock-length northern pike/net night).

Northern pike sampled in gill nets during 2009 ranged in total length from 26 to 71 cm (10.2 to 28.0 in), had a PSD of 85, and a PSD-P of 8 (Figure 3). The PSD was above the objective range (30-60) and PSD-P was within the management objective range (5-10) indicating a population dominated by quality-length fish. Gill net sampled northern pike in 2009 had mean W_r values that ranged from 87 to 104 for all cm groups sampled. A slight decreasing trend in W_r was observed as total length increased. The mean W_r for stock-length northern pike was 91 (Table 1).

Yellow Perch: The mean gill net CPUE of stock-length yellow perch was 3.3 (Table 1) and below the minimum objective (≥ 30 stock-length yellow perch/net night). Based on the 2009 gill net catch the relative abundance of stock-length yellow perch appears to be low (<8 stock-length yellow perch/net night).

Yellow perch captured in the 2009 gill net catch ranged in total length from 8 to 18 cm (3.1 to 7.1 in; Figure 4). No quality- or preferred-length yellow perch were

captured resulting in a PSD and PSD-P of 0, well below the management objectives of 30-60 and 5-10.

Otoliths were collected from a sub-sample of gill net captured yellow perch in 2009. The weighted mean total length at capture for age-2 male yellow perch was 114 mm (4.5 in; Table 2). The weighted mean total length at capture for age-2 female yellow perch was 123 mm (4.8 in; Table 2). Mean W_r values of gill net captured yellow perch in 2009 ranged from 86 to 101 for all cm groups sampled and exhibited a slight decreasing trend in W_r as total length increased.

Other Species

Black Bullhead: The mean frame net CPUE of stock-length black bullhead during 2009 was 1.1 (Table 1) and within the management objective (≤ 100 stock-length fish/net-night). Black bullhead relative abundance was classified as low during 2009. Given the current low relative abundance, the impact of the black bullhead population on the sport fishery in Cottonwood Lake is likely minimal.

Bluegill: The mean frame net CPUE of stock-length bluegill during 2009 was 0.8 (Table 1). The low CPUE indicates low relative abundance. Condition of stock-length bluegill was good with a mean W_r of 112 (Table 1).

Largemouth Bass: No largemouth bass were sampled in the 2009 survey; however, the sampling gear utilized is unreliable at capturing largemouth bass. Spring electrofishing is the most effective method for capturing largemouth bass. Anecdotal angler reports indicate that largemouth bass are present in sufficient numbers to provide a sport fishery.

Walleye: No stock-length walleye were captured in the gill nets in 2009. Three sub-stock walleye from the 2008 year-class were captured indicating some survival of the 2008 large fingerling stocking (Table 6).

The shallow nature and susceptibility of Cottonwood Lake to winterkill exclude walleye from being a primary management species. However, the potential exists for occasional walleye year classes to develop and provide angling opportunities. Therefore, walleye stockings should continue provided water levels are favorable (i.e., lake is full), excess walleye are available, and higher priority stockings have been completed.

Other: White sucker were the only other species captured during the 2009 fish community survey and likely have a minimal impact on the fishery (Table 1).

Management Recommendations

- 1) Conduct fish community surveys utilizing gill nets and frame nets on an every fifth year basis (next survey scheduled in summer 2013) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Continue to manage as a self-sustaining northern pike and yellow perch fishery.
- 3) Stock walleye periodically when water levels are favorable (i.e., lake is full), extra walleye are available, and other higher priority stockings have been completed.
- 4) Collect otoliths from walleye and yellow perch to assess age structure and growth rates of each population.
- 5) Monitor winter and summerkill events. In cases of substantial winter/summerkill stock with northern pike and yellow perch to re-establish a fish community. If water conditions are acceptable (i.e., depth, oxygen) consider stocking bluegill and largemouth bass.
- 6) Conduct spring electrofishing during survey years (next in 2013) to monitor largemouth bass relative abundance, population size structure, and growth.

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length fish (PSD-P), and mean relative weight (Wr) of stock-length fish for various fish species captured in frame nets and experimental gill nets from Cottonwood Lake, 2009. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; NOP= northern pike; WAE= walleye; WHS= white sucker; YEP= yellow perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
<i>Frame nets</i>								
BLB	1.1	0.5	100	0	100	0	112	2
BLG	0.8	0.5	40	30	10	18	112	3
NOP	0.4	0.3	60	40	---	---	77	22
WAE	0.2	0.1	100	0	100	0	87	54
<i>Gill nets</i>								
NOP	4.3	1.3	85	15	8	13	91	2
WHS	2.0	1.1	100	0	17	33	105	4
YEP	3.3	1.3	0	---	0	---	96	2

Table 2. Historic mean catch rate (CPUE; gill/frame nets = catch/net night) of stock-length fish for various fish species captured by frame nets and experimental gill nets in Cottonwood Lake, 2002-2009. BLB = black bullhead; BLC= black crappie; BLG= bluegill; NOP = northern pike; WAE = walleye; WHS = white sucker; YEP = yellow perch

Species	CPUE								Mean
	2002	2003	2004	2005	2006	2007	2008	2009	
<i>Frame nets</i>									
BLB	---	---	---	35.6	---	---	---	1.1	18.4
BLG	---	---	---	5.0	---	---	---	0.8	2.9
GRS	---	---	---	0.1	---	---	---	0.0	0.1
NOP	---	---	---	0.2	---	---	---	0.4	0.3
WAE	---	---	---	0.3	---	---	---	0.2	0.3
YEP	---	---	---	1.4	---	---	---	0.0	0.7
<i>Gill nets</i>									
BLB	---	---	---	0.7	---	---	---	0.0	0.4
BLC	---	---	---	0.7	---	---	---	0.0	0.4
BLG	---	---	---	3.0	---	---	---	0.0	1.5
NOP	---	---	---	5.3	---	---	---	4.3	4.8
WAE	---	---	---	1.3	---	---	---	0.0	0.7
WHS	---	---	---	0.0	---	---	---	2.0	1.0
YEP	---	---	---	6.0	---	---	---	3.3	4.7

Table 3. Mean catch rate (CPUE; gill/frame nets = catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) for selected species captured by frame nets and experimental gill nets in Cottonwood Lake, 2002-2009. BLB = black bullhead; NOP = northern pike; WAE = walleye; YEP = yellow perch

Species	2002	2003	2004	2005	2006	2007	2008	2009	Average	Objective
<i>Frame nets</i>										
BLB										
CPUE	---	---	---	36	---	---	---	1	19	≤ 100
PSD	---	---	---	93	---	---	---	100	97	---
PSD-P	---	---	---	20	---	---	---	100	60	---
Wr	---	---	---	99	---	---	---	112	106	---
<i>Gill nets</i>										
NOP										
CPUE	---	---	---	5	---	---	---	4	5	≥ 3
PSD	---	---	---	56	---	---	---	85	71	30-60
PSD-P	---	---	---	0	---	---	---	8	4	5-10
Wr	---	---	---	92	---	---	---	91	92	---
YEP										
CPUE	---	---	---	6	---	---	---	3	5	≥ 30
PSD	---	---	---	6	---	---	---	0	3	30-60
PSD-P	---	---	---	0	---	---	---	0	0	5-10
Wr	---	---	---	99	---	---	---	96	98	---

Table 4. Weighted mean total length (mm) at capture by gender and age (sample size) for yellow perch captured in experimental gill nets in Cottonwood Lake, 2009.

Year	Age				
	1	2	3	4	5
2009					
Male		114 (6)			
Female	88 (2)	123 (14)	188 (1)		
Combined	88 (2)	120 (20)	188 (1)		

Table 5. Numbers of yellow perch sampled using gill nets by year class in Cottonwood Lake, 2009.

Survey Year	Year Class					
	2009	2008	2007	2006	2005	2004
2009		2	20	1		

Table 6. Stocking history including size and number for fishes stocked into Cottonwood Lake, 1999-2009.

Year	Species	Size	Number
2002	WAE	large fingerling	2,249
2003	WAE	small fingerling	37,380
2004	WAE	fry	350,000
2005	WAE	large fingerling	8,114
2008	WAE	large fingerling	5,015

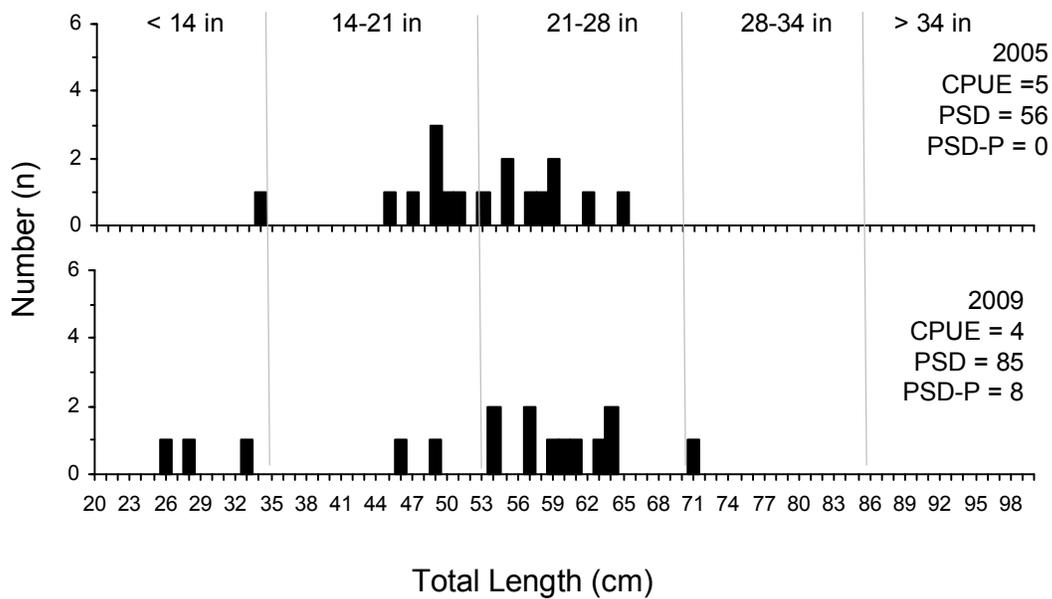


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for northern pike captured by gill nets in Cottonwood Lake, 2005 and 2009.

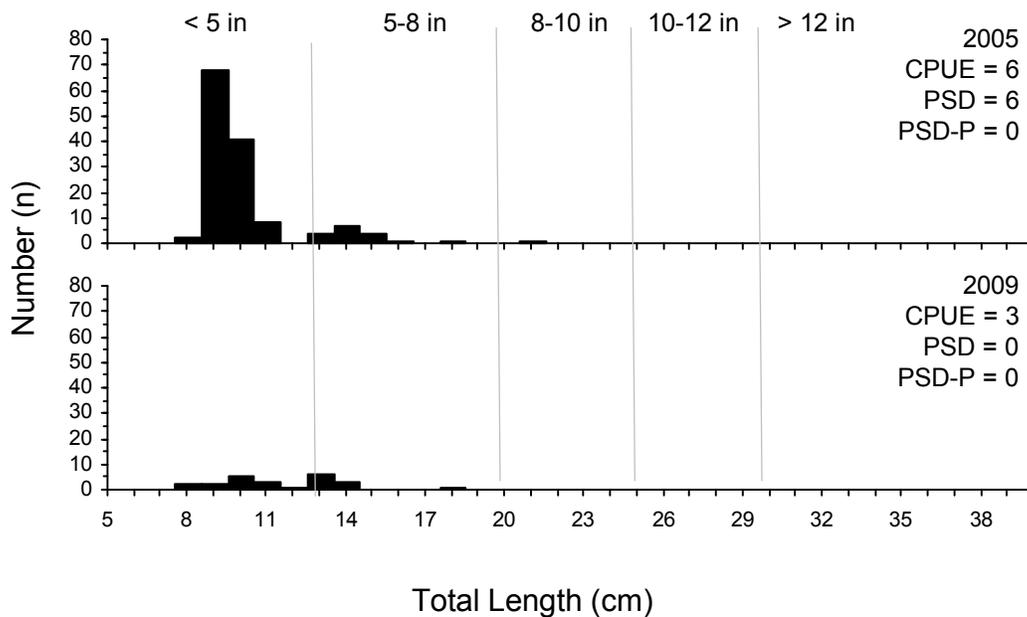


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured in gill nets in Cottonwood Lake, 2005 and 2009.