

Cottonwood Lake

Site Description

Location

Water designation number (WDN)	57-0003-00
Legal description	T115N-R65W-Sec. 4,5,7,8,9,17,18
County (ies)	Spink
Location from nearest town	10.0 miles southwest of Redfield, SD

Survey Dates and Sampling Information

Survey dates	May 21-23, 2013 (FN,GN)
Frame net sets (n)	17
Gill net sets (n)	6

Morphometry (Figure 1)

Watershed area (acres)	29,102
Surface area (acres)	≈1500
Maximum depth (ft)	9
Mean depth (ft)	6.5

Ownership and Public Access

Cottonwood Lake is a non-meandered lake that covers both public and private property. The fishery is managed by SDGFP. Two public access sites, which are maintained by SDPFP, are located on the lake (southwest and east shore). Lands adjacent to the lake are owned by the State of South Dakota, U. S. Fish and Wildlife Service and private individuals.

Watershed and Land Use

The 29,102 acre Cottonwood Lake-Medicine Creek sub-watershed (HUC-12) encompasses Cottonwood Lake and is located within the larger Medicine Creek (HUC-10) watershed. Land use within the watershed is primarily agricultural including a mix of pasture or grassland, cropland and scattered shelterbelts.

Water Level Observations

No OHWM or outlet elevation was available for Cottonwood Lake. The elevation of Cottonwood Lake was 1316.7 fmsl on September 24, 2012, 1316.6 fmsl on May 13, 2013, and 1316.5 fmsl on October 7, 2013.

Fish Management Information

Primary species	Walleye, Yellow Perch
Other species	Black Bullhead, Black Crappie, Common Carp, Northern Pike
Lake-specific regulations	none
Management classification	warm-water marginal
Fish consumption advisories	none

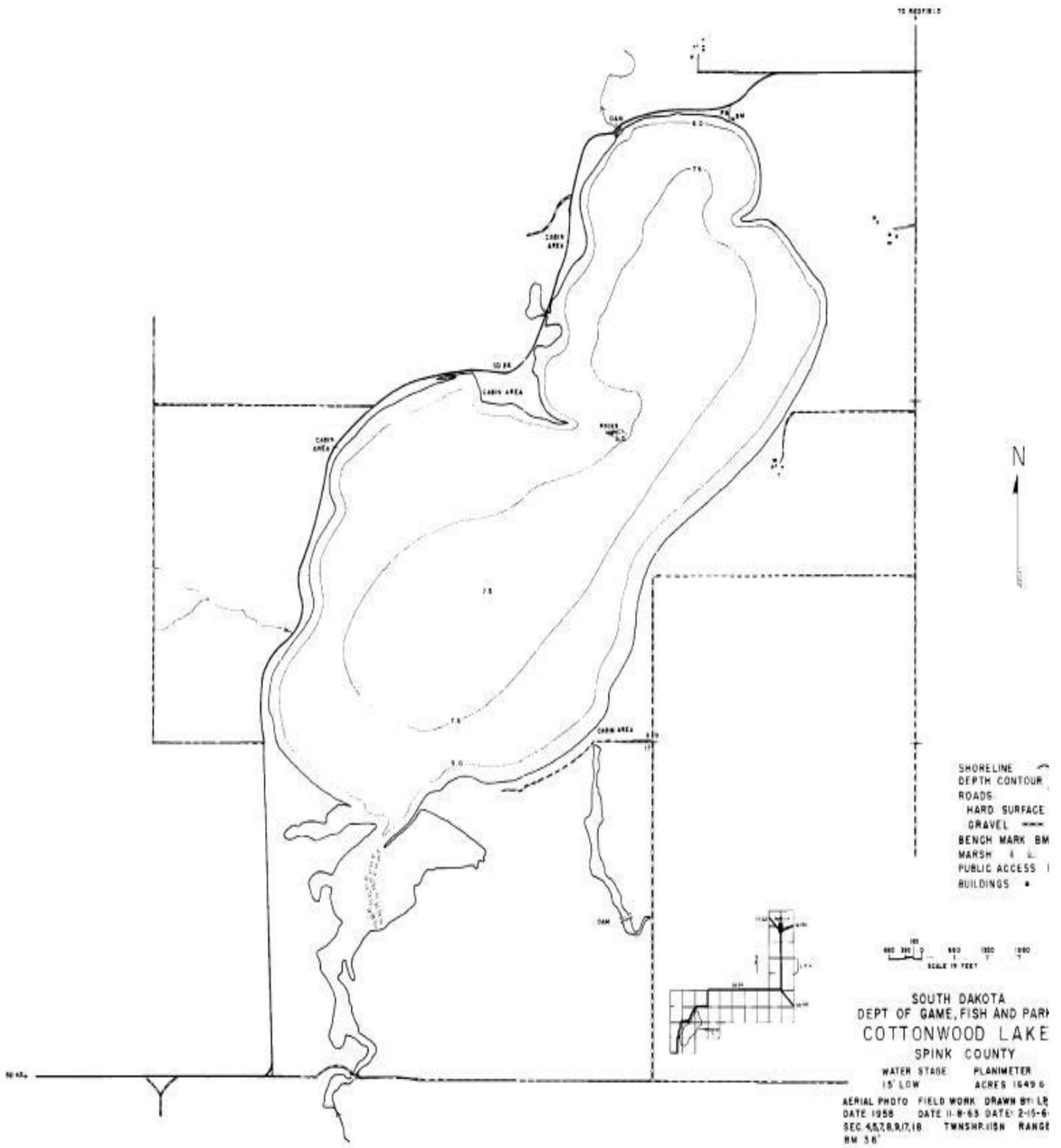


Figure 1. Map depicting depth contours of Cottonwood Lake, Spink County, South Dakota.

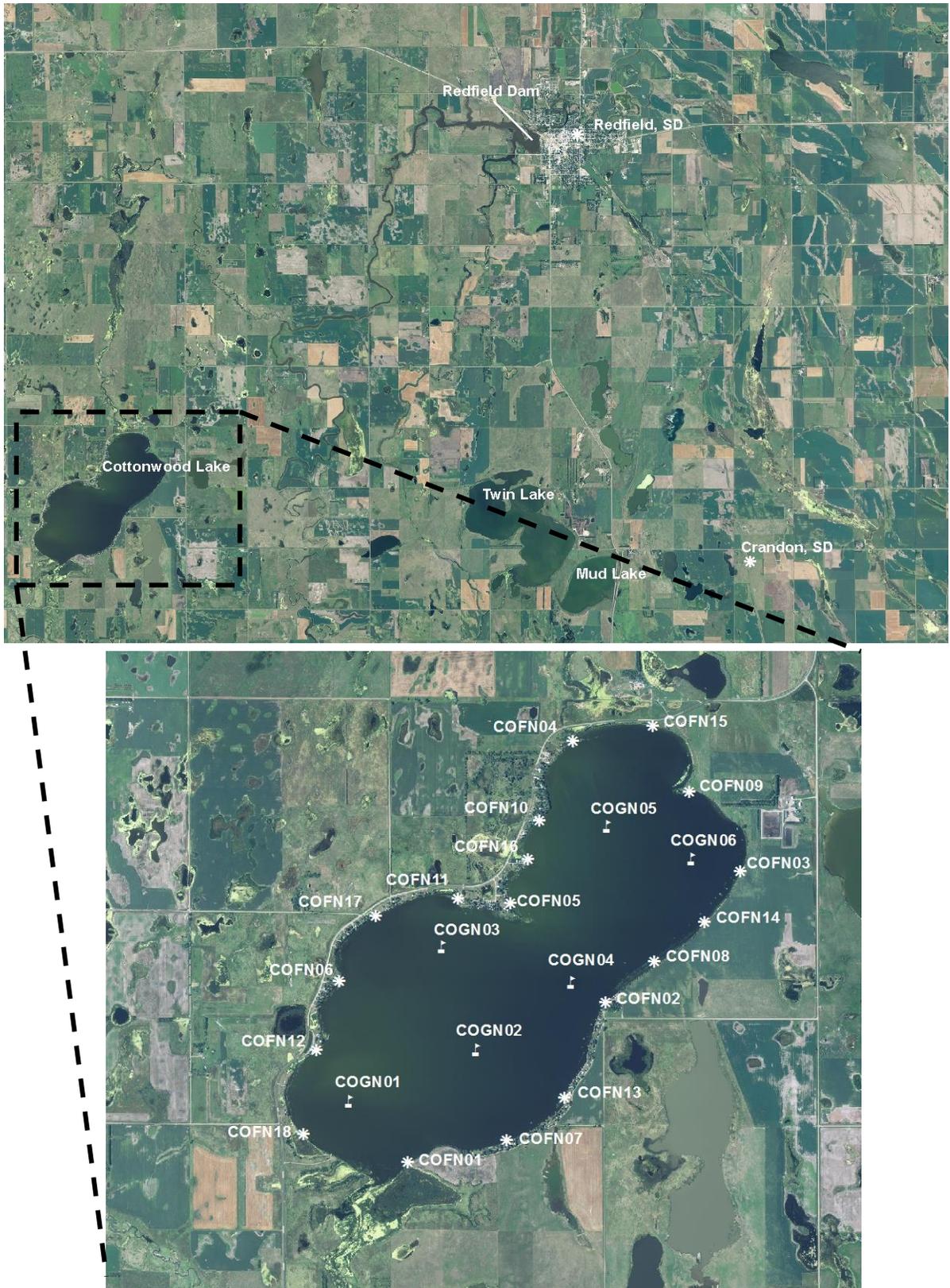


Figure 2. Map depicting geographic location of several lakes in the Redfield, South Dakota area including Cottonwood Lake (top). Also noted are standardized net locations for Cottonwood Lake (bottom). COFN= frame nets; COGN= gill nets

Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length Walleye ≥ 10 , a PSD of 30-60 and a PSD-P of 5-10.
- 2) Establish and 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 Black Bullhead ≤ 100 .

Results and Discussion

Cottonwood Lake is a shallow-natural lake located in Spink County southwest of Redfield, South Dakota. Reports dating back to the early 1960s indicated that at times Cottonwood Lake has provided quality angling opportunities for a variety fish species; most notably Northern Pike, Walleye and Yellow Perch. Unfortunately, the lake experiences occasional winter and summer kill events, which affect the quality of the fishery.

Throughout the early- and mid-2000s water levels were low (SDDENR 2014), the fishery was limited, and management activities (e.g., fish community surveys and fish stockings) were suspended. As water levels increased in the late-2000s, fish management activities resumed (Table 4). Currently, Cottonwood Lake is managed as a Walleye and Yellow Perch fishery.

Primary Species

Walleye: The mean gill net CPUE of stock-length Walleye was 16.2 (Table 1) and above the minimum objective (≥ 10 stock-length Walleye/net night). Based on the 2013 gill net CPUE, relative abundance is considered high.

Walleye captured in the 2013 gill net catch ranged in TL from 18 to 54 cm (7.1 to 21.3 in), had a PSD of 12 and a PSD-P of 4 (Table 1; Figure 3). Both the PSD and PSD-P were below management objectives of 30-60 and 5-10, indicating a population comprised of smaller (i.e., ≤ 38 cm; 15 in) individuals (Table 3; Figure 3).

Walleye were stocked for three consecutive years (2009-2011) to re-establish the population following an increase in water levels (Table 4). Based on ages estimated using otoliths, these stockings were successful (Table 2; Table 4). Year classes produced in 2009-2011 comprised nearly the entire sample (98%; Table 2). Although not abundant, the capture of two individuals from the 2012 cohort represented successful natural recruitment. In 2013, 825,000 fry were stocked into Cottonwood Lake; however, recruitment of this cohort is currently unknown and will be assessed in future surveys.

The weighted mean TL at capture of age-2, age-3, and age-4 Walleye was 261, 326, and 489 mm (10.3, 12.8, and 19.3 in), respectively (Table 3). Gill net captured Walleye in the stock-quality length category, which dominated the sample, had a mean Wr of 88.

Yellow Perch: No Yellow Perch were captured in the 2013 gill net catch; while only a single 320 mm (12.6 in) individual was sampled in the frame nets, which resulted in mean frame net CPUE for stock-length fish of 0.1 (Table 1). Currently, relative abundance is low. However, adult Yellow Perch are present and the potential exists for the population to expand.

Other Species

Black Bullhead: Black Bullheads were the most abundant species in the 2013 frame net catch (Table 1). The mean frame net CPUE of stock-length Black Bullhead was 690.5 (Table 1) and well above the management objective (≤ 100 stock-length Black Bullhead/net-night). Currently, relative abundance is considered high.

Frame net captured Black Bullheads ranged in TL from 13 to 35 cm (5.1 to 12.2 in), had a PSD of 58, and a PSD-P of 5 (Table 1, Figure 4). No age and growth information was collected. Mean Wr values for Black Bullheads in the frame net catch ranged from 87 to 93 for all length categories (e.g., stock to quality) sampled. The mean Wr of stock-length individuals was 92 (Table 1) and no length-related trends in condition were apparent.

Northern Pike: Relative abundance of Northern pike was high, with the mean gill net CPUE of stock-length Northern Pike being 5.5 (Table 1). The high relative abundance can be attributed to increased recruitment related to substantial rises in spring water levels that took place from 2008-2010 (SDDENR 2014). Northern Pike depend heavily on flooded vegetation for spawning and recruitment, and tend to have improved recruitment during springs that have rising water levels.

Gill net captured Northern Pike ranged in TL from 49 to 82 cm (19.3 to 32.3 in), had a PSD of 91 and a PSD-P of 30 (Table 1; Figure 5). No growth information was collected for northern pike in 2013. Although sample size was relatively low, an increasing trend in Northern Pike condition was apparent as total length increased. Mean Wr values ranged from 72 to 97 for all length categories (e.g., stock to quality) sampled. A high proportion (61%) of gill net captured Northern Pike were in the quality-preferred length category, which had a mean Wr of 80. Sampling took place during late-May; therefore, mean Wr values were likely influenced by recent spawning activity and at a seasonal low. Neumann and Willis (1995) reported that Wr values were lowest during spring following the spawn and remained low throughout the summer in Lake Thompson, South Dakota.

Other: Black crappie and common carp were other fish species captured in low numbers during the 2013 fish community survey (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys on an every fifth year basis (next survey scheduled in summer 2018) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from Walleye and Yellow Perch to assess age structure and growth rates of each population.
- 3) Stock Walleye (≈ 500 fry/acre) on a biennial basis to establish additional year classes provided water levels are sufficient.
- 4) If available, pre-spawn adult Yellow Perch should be stocked to supplement the current population.
- 5) Monitor winter and summer kill events. In cases of substantial winter/summer kill the need to re-establish a fishery in Cottonwood Lake should be evaluated. If water levels are sufficient, Walleye and Yellow Perch should be stocked to re-establish a fish community.

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, 2013. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= Black Bullhead; BLC= Black Crappie; COC= Common Carp; Northern Pike; WAE= Walleye; 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	690.5	288.4	58	1	5	0	92	2
BLC	2.3	1.2	95	6	62	13	116	2
COC	0.2	0.2	100	0	100	0	95	11
NOP	1.9	0.5	88	10	21	12	78	4
WAE	6.5	2.0	24	7	2	2	85	1
YEP	0.1	0.1	100	---	100	---	90	---
<i>Gill nets</i>								
BLB	23.0	10.5	63	7	7	3	93	<1
COC	0.3	0.5	100	0	100	0	112	23
NOP	5.5	1.2	91	9	30	14	85	3
WAE	16.2	8.3	12	6	4	3	89	1

Table 2. Year class distribution based on the expanded age/length summary for walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Cottonwood Lake, 2013.

Survey Year	Year Class				
	2013	2012	2011	2010	2009
2013		2	57	41	11
# stocked					
fry	825		800	1,650	
sm. fingerling					133
lg. fingerling					

Table 3. Weighted mean total length at capture (mm) for walleye sampled in experimental gill nets (expanded sample size) from Cottonwood Lake, 2013.

Survey Year	Age			
	1	2	3	4
2013	200(2)	261(57)	326(41)	489(11)

Table 4. Stocking history including size and number for fishes stocked into Cottonwood Lake, 2009-2013. WAE= walleye; YEP= Yellow Perch

Year	Species	Size	Number
2009	WAE	small fingerling	132,850
2010	WAE	fry	1,650,000
	YEP	juvenile	3,200
2011	WAE	fry	800,000
2013	WAE	fry	825,000

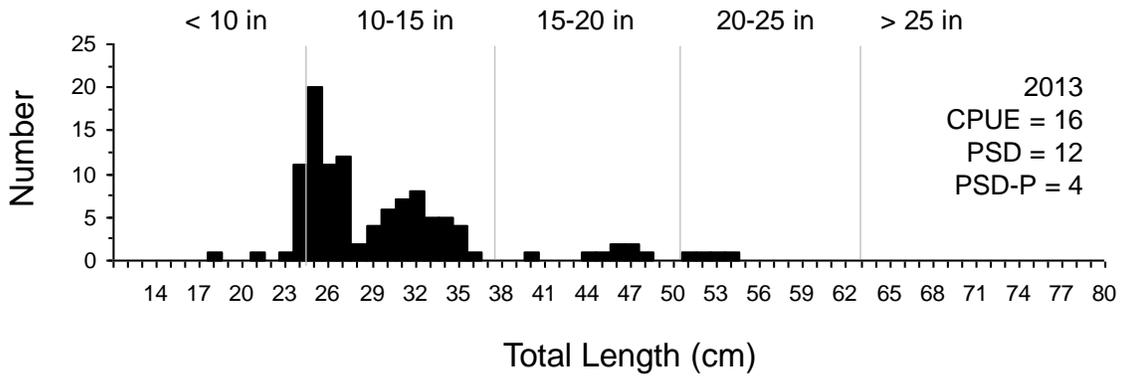


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Cottonwood Lake, 2013.

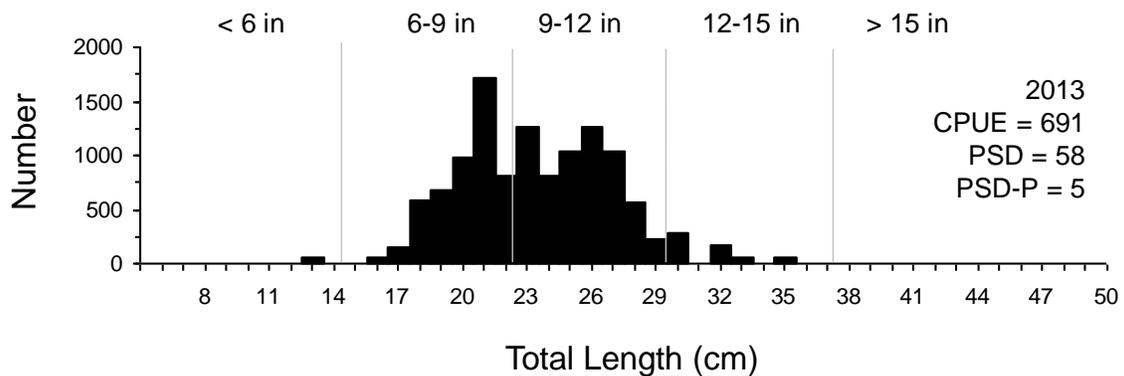


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Black Bullhead captured using frame nets in Cottonwood Lake, 2013.

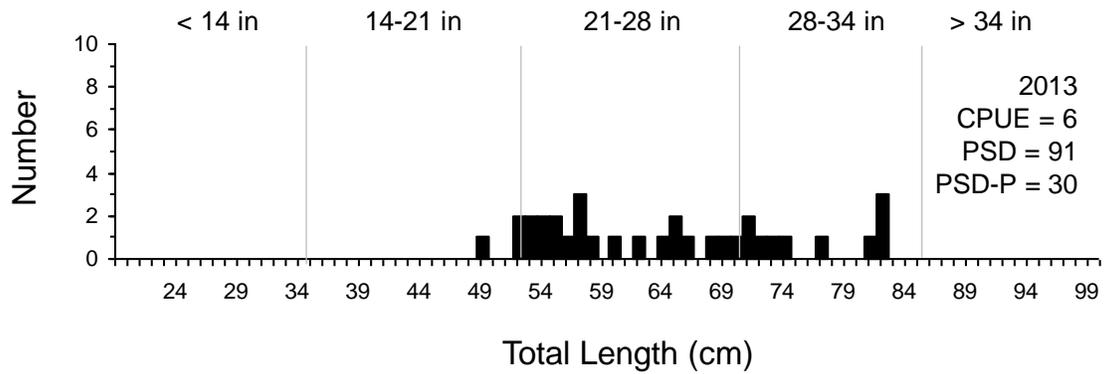


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Northern Pike captured using experimental gill nets in Cottonwood Lake, 2013.