

Bullhead Lake

Site Description

Location

Water designation number (WDN)	48-0007-00
Legal description	T126N-R55W-Sec. 18,19
County (ies)	Marshall
Location from nearest town	4.0 miles west and 2.0 miles south of Lake City, SD

Survey Dates and Sampling Information

Survey dates	June 3-4, 2014 (FN, GN)
Frame net sets (n)	12
Gill net sets (n)	3

Morphometry (Figure 1)

Watershed area (acres)	34,744
Surface area (acres)	163
Maximum depth (ft)	15
Mean depth (ft)	7

Ownership and Public Access

The Bullhead Lake fishery is managed by the SDGFP. Lands adjacent to the lake are primarily owned by the State of South Dakota, but a small portion on the north shore is under private ownership. A public access (including boat ramp) is located on the southwest shore of the lake and is maintained by the SDGFP (Figure 2). Much of the shoreline of Bullhead Lake is undeveloped with only a few homes and/or cabins present along the northwest shore (Figure 2).

Watershed and Land Use

The 34,744 acre Roy Lake (HUC-12) sub-watershed encompasses Bullhead Lake and is located within the larger Northern Coteau Lakes-Upper James River (HUC-10) watershed. Land use within the watershed is primarily agricultural with a mix of pasture or grassland, cropland, and scattered shelterbelts.

Water Level Observations

No Ordinary High Water Mark has been established by the South Dakota Water Management Board on Bullhead Lake. The elevation of the lake on May 6, 2014 was 1798.8; 1.8 feet higher than the fall 2013 elevation of 1797.0 fmsl. The water level on October 29, 2014 was 1797.3 fmsl.

Fish Management Information

Primary species	northern pike, yellow perch
Other species	black bullhead, black crappie, bluegill, green sunfish, largemouth bass, smallmouth bass, walleye, white sucker
Lake-specific regulations	none
Management classification	warm-water semi-permanent
Fish consumption advisories	none

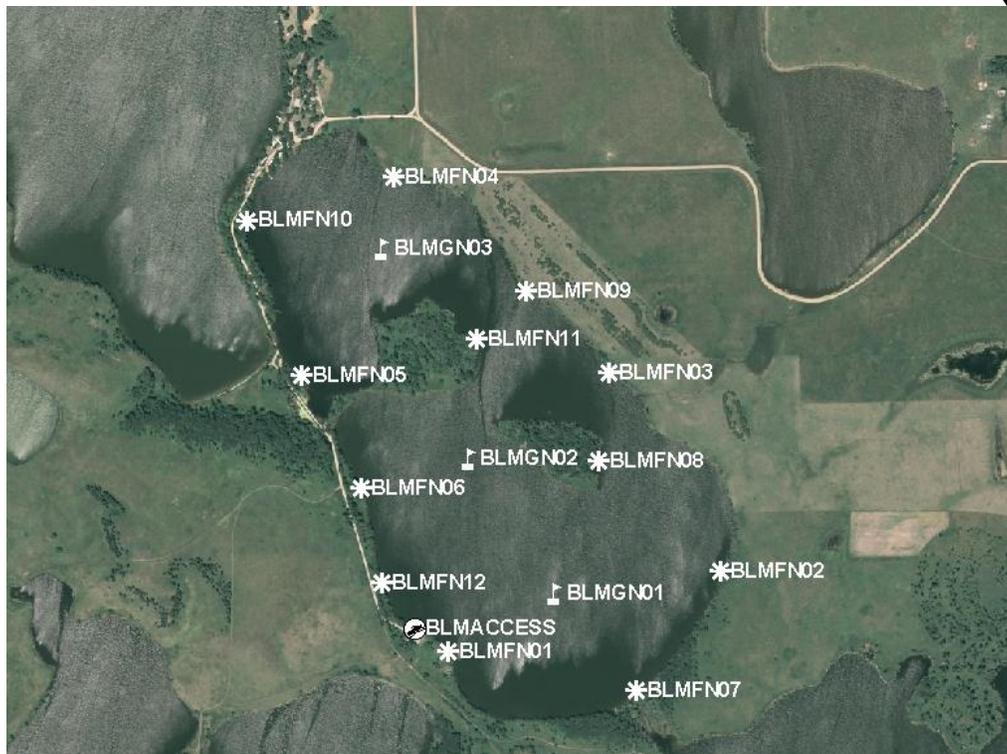
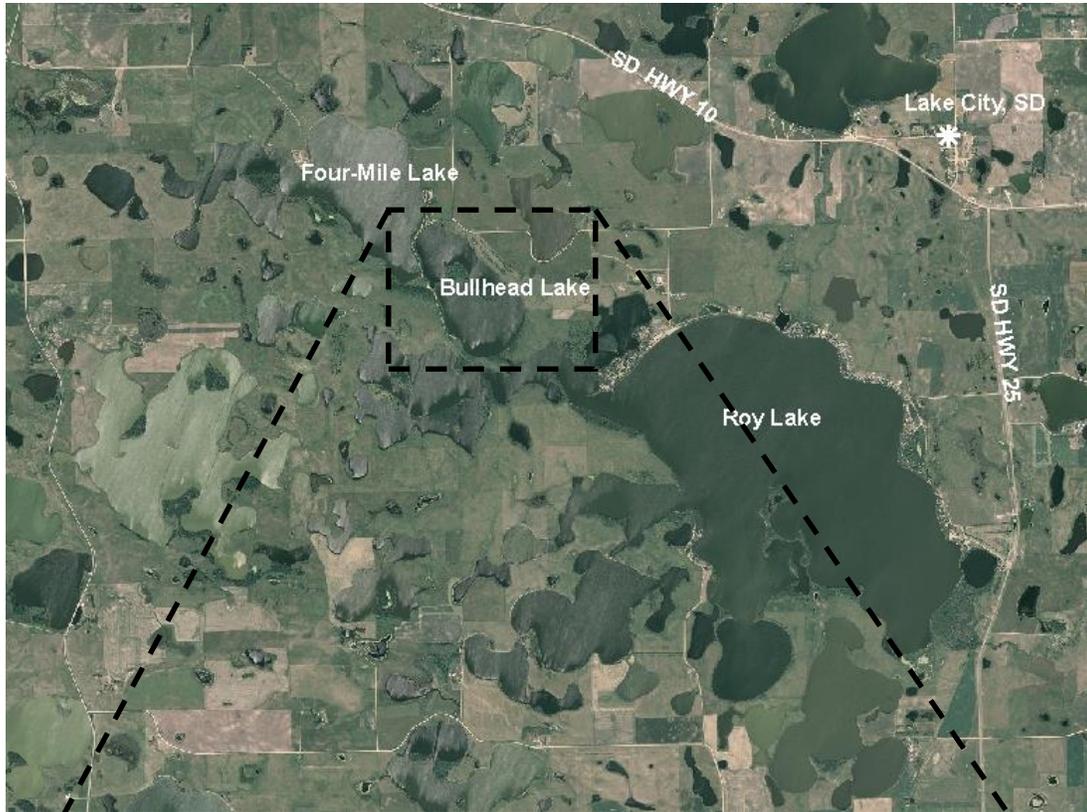


Figure 2. Map depicting geographic location of Bullhead Lake from Lake City, South Dakota (top). Also noted is the boat ramp and standardized net locations for Bullhead Lake (bottom). BLMFN= frame nets, BLMGN= gill nets

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 black bullhead ≤ 100 .

Results and Discussion

Bullhead Lake is a shallow natural lake located southwest of Lake City, South Dakota. The lake receives surface water from the local watershed and Four-Mile Lake to the northwest. During periods of high water, Bullhead Lake flows southeast into Roy Lake.

Although not well documented, Bullhead Lake has a history of partial winterkill events (most recent documented during the winter of 1992-93). Historically, the fish community has been primarily comprised of black bullhead, northern pike, and yellow perch (species believed to be more winterkill tolerant). However in recent surveys (2009 and 2014), as many as 10 fish species have been sampled from Bullhead Lake (Table 1; Table 2). Currently, Bullhead Lake is managed as a northern pike and yellow perch fishery.

Primary Species

Northern Pike: Northern pike typically are not sampled effectively during standardized mid-summer fish community surveys, but surveys conducted in the spring/early summer do a better job of documenting the at large population. The early June survey at Bullhead Lake in 2014 resulted in mean gill net CPUE of stock-length northern pike of 19.7 (Table 1) and was well above the minimum objective (≥ 3 stock-length northern pike/net; Table 3). Currently, relative abundance is high.

Gill net captured northern pike ranged in TL from 27 to 80 cm (10.6 to 31.5 in), had a PSD of 61, and a PSD-P of 7 (Table 1; Figure 3). Both the PSD and PSD-P were near management objectives indicating a well-balanced population (Table 3; Figure 3).

No northern pike age or growth information was collected. The condition of gill net captured northern pike was similar to that of pike captured from other northeast South Dakota lakes (e.g., Roy, South Buffalo, and Six-Mile Lakes) with mean W_r values that ranged from 85 to 88 for all length categories (e.g., stock to quality) sampled. Stock-length northern pike had a mean W_r of 87 (Table 1).

Yellow Perch: The mean gill net CPUE of stock-length yellow perch was 7.0 (Table 1) and below the minimum objective (≥ 30 stock-length yellow perch/net night). The 2014 mean gill net CPUE indicated low relative abundance.

Gill net captured yellow perch ranged in TL from 9 to 17 cm (3.5 to 6.7 in), with the majority being $<$ stock-length (13 cm; 5 in) as indicated by low PSD and PSD-P values of 10 and 0, respectively (Table 1; Table 3; Figure 4). Both the PSD and PSD-P were below management objectives of 30-60 and 5-10 (Table 3).

Otoliths were collected from a sub-sample of gill net captured yellow perch. Age structure information suggested the presence of four consecutive year classes (2009-2012; Table 4). The 2012 year class dominated the population and comprised 97% of yellow perch in the gill net catch (Table 4).

Yellow perch in Bullhead Lake tend to exhibit slow growth. In 2014, the weighted mean TL at capture of age-2 and age-3 perch was 103 and 141 mm (4.1 and 5.6 in; Table 5). The mean W_r of stock-length yellow perch was 88 (Table 1).

Other Species

Black Bullhead: Black bullheads were the most abundant species in the 2014 frame net catch (Table 1). The mean frame net CPUE of stock-length black bullhead was 18.7 (Table 1) and within the management objective (≤ 100 stock-length black bullhead/net-night). The 2014 mean frame net CPUE represented an increase from the 2009 mean CPUE of 0.1 (Table 2). Currently, relative abundance is considered low.

Frame net captured black bullheads ranged in TL from 10 to 36 cm (4.7 to 14.2 in), with the majority being $<$ quality-length (23cm; 9 in; Figure 5). The PSD was 18 and the PSD-P was 1 (Table 1). No age and growth information was collected. Mean W_r values of black bullheads captured in the 2014 frame net catch ranged from 77 to 101 for all 10-mm length groups sampled. The mean W_r of stock-length fish was 88 (Table 1) and no length-related trends in condition were apparent.

Bluegill: In 2014, bluegills that ranged in TL from 7 to 16 cm (2.8 to 6.3 in) were captured in frame nets (Figure 5). The mean frame net CPUE was 15.7 and represented a substantially increase for the 2008 CPUE of 2.8 (Table 1; Table 2).

No age or growth information was collected. The majority of bluegills in the 2014 frame net catch were in the stock-quality length category, which had a mean W_r of 131. Seasonal influences (i.e., spawning behavior) may have influenced W_r values.

Largemouth Bass: Few largemouth bass have been sampled in fish community surveys conducted from 2001-2014; however, sampling gears utilized (i.e., frame and gill nets) are not reliable at capturing largemouth bass. Spring night electrofishing is typically used to sample largemouth bass in northeast South Dakota. Anecdotal angler reports indicate that largemouth bass are present and at times contribute to the fishery.

Walleye: In 2014, the mean gill net CPUE of stock-length walleye was 7.3 (Table 1) and higher than the 2009 CPUE of 4.0 (Table 2). Gill net captured walleye ranged in TL from 19 to 67 cm (7.5 to 26.4 in), with six year classes being represented (2004 and 2008-2012; Table 6; Figure 6). Approximately 80% of gill net captured walleye were from year classes produced in 2011 and 2012 (Table 6). Sampled walleye were in good condition with mean W_r values that ranged from 80-101 for all 10-mm length groups represented. The mean W_r of stock-length individuals was 90 (Table 1).

Other: Green sunfish, black crappie and white sucker were other fish species captured in low numbers during the 2014 fish community survey (Table 1).

Management Recommendations

- 1) Conduct fish community assessment surveys utilizing gill nets and frame nets every five years (next survey scheduled for summer 2019) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) 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.
- 3) Collect otoliths from walleye and yellow perch to assess the age structure and growth rates of each population.
- 4) Continue to manage as a self-sustaining northern pike and yellow perch fishery.

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) of stock-length fish, for various fish species captured in frame nets and experimental gill nets from Bullhead Lake, 2014. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; GSF= green sunfish; HYB= sunfish hybrid; LMB= largemouth bass; NOP= 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	18.7	5.1	18	4	1	1	88	1
BLC	1.5	1.0	39	21	28	19	127	11
BLG	15.7	5.3	2	2	0	---	131	1
GSF	1.3	0.9	7	12	0	---	134	3
HYB ¹	0.8	0.5	---	---	---	---	---	---
NOP	2.2	0.5	77	14	8	9	84	3
WAE	0.2	0.2	0	---	0	---	85	<1
YEP	4.4	3.0	11	7	0	---	91	3
<i>Gill nets</i>								
BLB	7.3	5.4	27	17	0	---	94	2
BLC	0.7	1.3	0	---	0	---	111	9
LMB	0.3	0.6	0	---	0	---	116	---
NOP	19.7	3.1	61	11	7	6	87	1
WAE	7.3	10.3	50	19	18	14	90	2
YEP	7.0	6.5	10	11	0	---	94	5

¹ All fish sizes; *Lepomis* spp.

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured in frame nets and experimental gill nets from Bullhead Lake, 2009-2014. BLB= black bullhead; BLC= black crappie; BLG= bluegill; GSF= green sunfish; HYB= hybrid sunfish; LMB= largemouth bass; NOP = northern pike; WAE = walleye; WHS = white sucker; YEP = yellow perch

Species	CPUE					
	2009	2010	2011	2012	2013	2014
<i>Frame nets</i>						
BLB	0.1	---	---	---	---	18.7
BLC	0.1	---	---	---	---	1.5
BLG	2.8	---	---	---	---	15.7
GSF	0.0	---	---	---	---	1.3
HYB ¹	0.0	---	---	---	---	0.8
NOP	0.3	---	---	---	---	2.2
SMB	0.1	---	---	---	---	0.0
WAE	0.4	---	---	---	---	0.2
YEP	0.9	---	---	---	---	4.4
<i>Gill nets</i>						
BLB	0.0	---	---	---	---	7.3
BLC	0.0	---	---	---	---	0.7
LMB	0.0	---	---	---	---	0.3
NOP	5.7	---	---	---	---	19.7
WAE	4.0	---	---	---	---	7.3
WHS	0.3	---	---	---	---	0.0
YEP	1.7	---	---	---	---	7.0

¹ All fish sizes; *Lepomis* spp.

Table 3. Mean catch rate (CPUE; 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 Bullhead Lake, 2009-2014. BLG= bluegill; NOP = northern pike; WAE= walleye; YEP = yellow perch

Species	2009	2010	2011	2012	2013	2014	Objective
<i>Frame nets</i>							
BLG							
CPUE	3	---	---	---	---	16	---
PSD	5	---	---	---	---	2	---
PSD-P	0	---	---	---	---	0	---
Wr	104	---	---	---	---	131	---
<i>Gill nets</i>							
NOP							
CPUE	6	---	---	---	---	20	≥ 3
PSD	76	---	---	---	---	61	30-60
PSD-P	12	---	---	---	---	7	5-10
Wr	91	---	---	---	---	87	---
WAE							
CPUE	4	---	---	---	---	7	---
PSD	67	---	---	---	---	50	---
PSD-P	25	---	---	---	---	18	---
Wr	85	---	---	---	---	90	---
YEP							
CPUE	2	---	---	---	---	7	≥ 30
PSD	0	---	---	---	---	10	30-60
PSD-P	0	---	---	---	---	0	5-10
Wr	97	---	---	---	---	88	---

Table 4. Year class distribution based on expanded age/length summary for yellow perch sampled in gill nets from Bullhead Lake, 2009-2014.

Survey Year	Year Class								
	2014	2013	2012	2011	2010	2009	2008	2007	2006
2014			569	5	11	4			
2009	---	---	---	---	---			154	2

Table 5. Weighted mean total length (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Bullhead Lake, 2009-2014.

Year	Age					
	0	1	2	3	4	5
2014						
Male	---	---	103 (263)	139 (2)	158 (6)	159 (2)
Female	---	---	103 (305)	143 (3)	169 (5)	218 (2)
Combined	---	---	103 (569)	141 (5)	163 (11)	188 (4)
2009						
Male	---	---	101 (27)	143 (1)	---	---
Female	---	---	103 (127)	151 (1)	---	---
Combined	---	---	103 (154)	147 (2)	---	---

Table 6. 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 Bullhead Lake, 2009-2014.

Survey Year	Year Class													
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2014 ¹			7	10	2	1	1				1			
2009 ¹	---	---	---	---	---		3	2	3	3				1
# stocked														
fry	85		80		164						160			
sm. fingerling												19.6		
lg. fingerling										1.52				

¹ Older walleye were sampled, but are not reported in this table

Table 7. Weighted mean TL at capture (mm) for Walleye age-1 through age-10 sampled in experimental gill nets (expanded sample size) from Bullhead Lake, 2009-2014. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

Year	Age									
	1	2	3	4	5	6	7	8	9	10
2014 ¹	---	258 (7)	373 (10)	449 (2)	514 (1)	535 (1)	---	---	---	593 (1)
2009 ¹	194 (3)	352 (2)	369 (3)	420 (3)	---	---	---	650 (1)	---	---

¹ Older Walleye were sampled, but are not reported in this table.

Table 8. Stocking history including size and number for fishes stocked into Bullhead Lake, 2001-2014. WAE= walleye

Year	Species	Size	Number
2003	WAE	small fingerling	19,580
2004	WAE	fry	160,000
2005	WAE	large fingerling	1,515
2010	WAE	fry	164,000
2012	WAE	fry	80,000
2014	WAE	fry	85,000

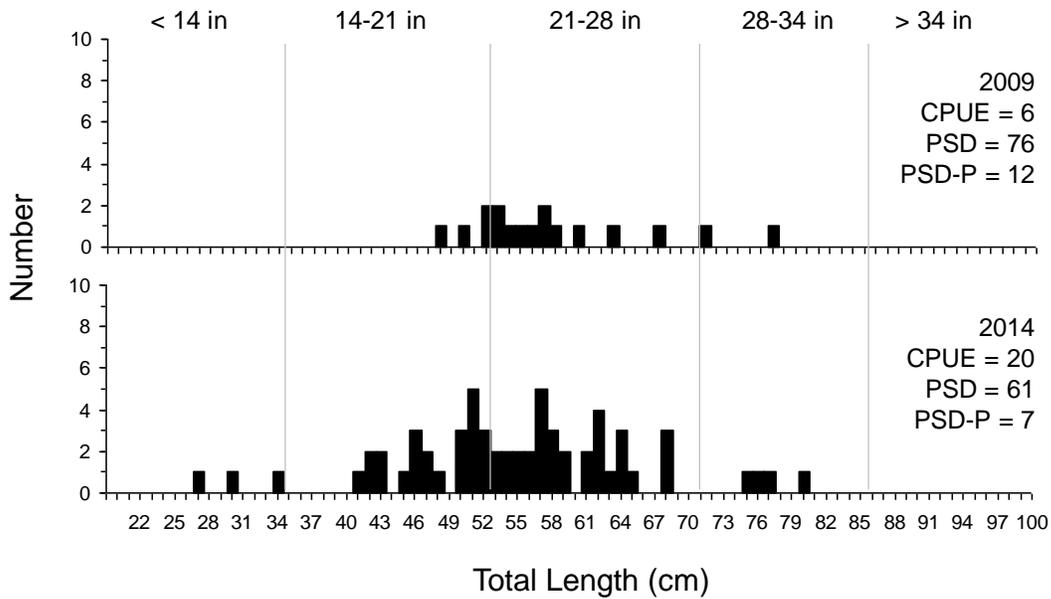


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for northern pike captured using experimental gill nets in Bullhead Lake, 2009-2014.

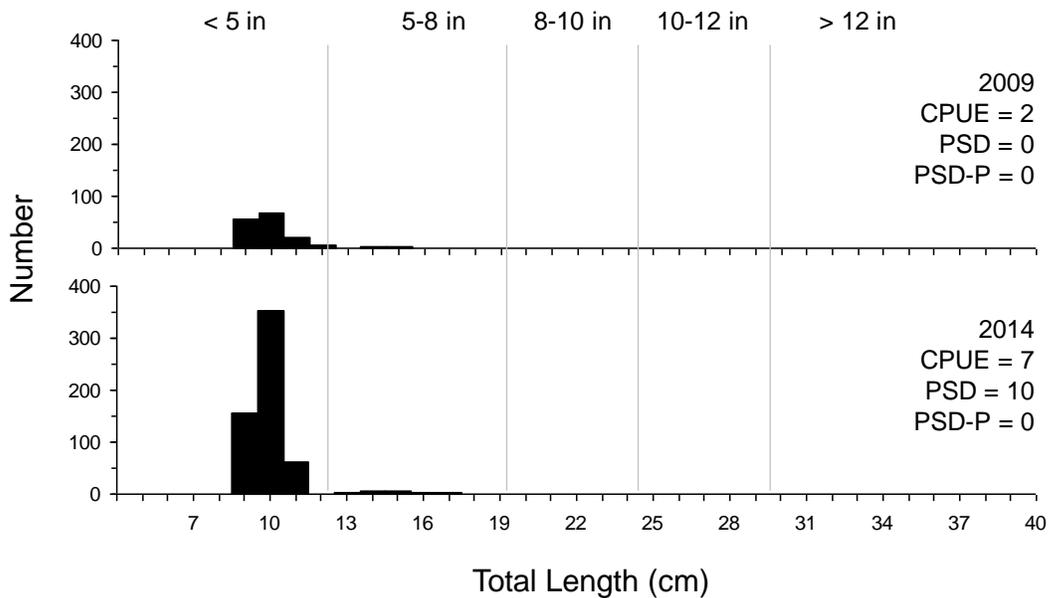


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Bullhead Lake, 2009-2014.

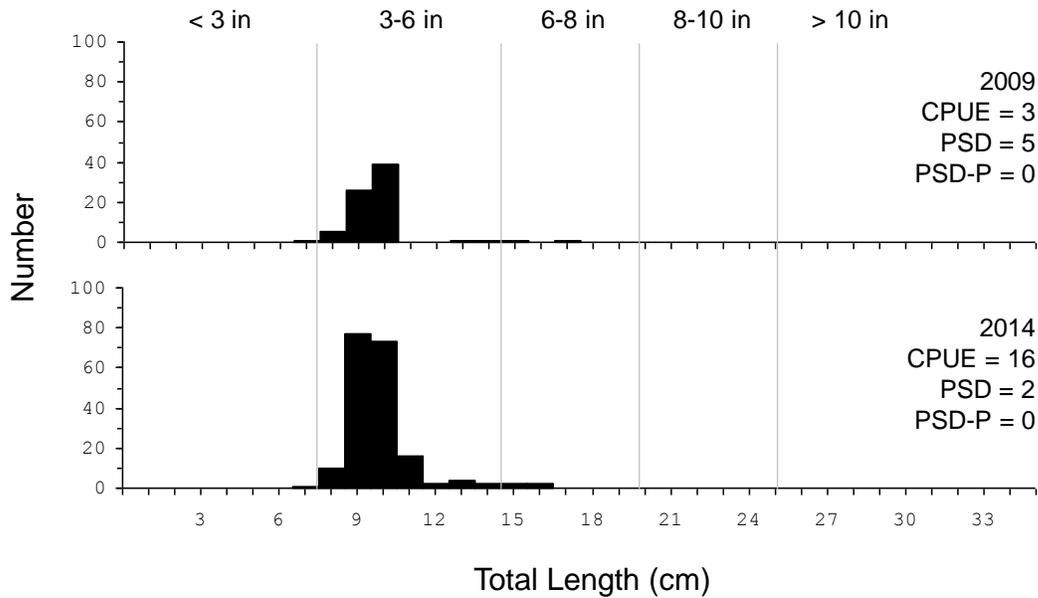


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for bluegill captured using frame nets in Bullhead Lake, 2009-2014.

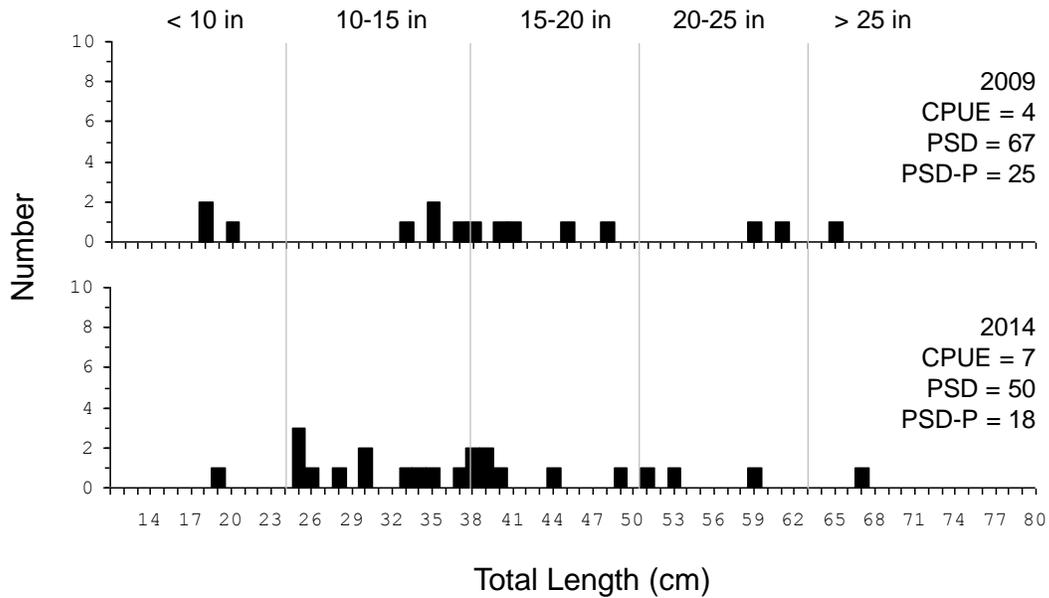


Figure 6. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Bullhead Lake, 2009-2014.