Bullhead Lake

Site Description

Location

Water designation number (WDN)	23-0006-00
Legal description	T117N-R50W-Sec. 10, 11, 14, 15, 22, 23
County (ies)	Deuel
Location from nearest town	4.5 miles north and 2 miles east of Goodwin

Survey Dates and Sampling Information

Survey dates	July 3, 2012 (GN)
Gill net sets (n)	3

Morphometry (Figure 1)

Watershed area (acres)	3,374
Surface area (acres)	571
Maximum depth (ft)	11
Mean depth (ft)	7

Ownership and Public Access

Bullhead Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. A public access site which includes boat ramp and public toilet is located in the northwest corner of the lake (Figure 1). Lands adjacent to Bullhead Lake are owned by the State of South Dakota and private individuals.

Watershed and Land Use

The Bullhead Lake watershed is 3,374 acres and includes portions of Round and School lakes. The watershed is approximately 53% water, 25% grassland, 22% cropland, and 1% other. Upland areas within the watershed are characterized by rolling terrain which is predominately grass; while flatter areas have been tilled for cropland (SDDENR 2005).

Water Level Observations

The South Dakota Water Management Board established OHWM is 1,862.0 fmsl, and the outlet elevation of Bullhead Lake is 1,861.1 fmsl. On April 25, 2012, Bullhead Lake was slightly above the outlet elevation with an elevation of 1,861.4 fmsl. On October 2, 2012 the elevation was 1,859.6 fmsl.

Fish Management Information

Primary species	Walleye, Yellow Perch
Other species	Black Bullhead; Common Carp; Northern Pike; White Sucker
Lake-specific regulations	none
Management classification	warm-water semi-permanent
Fish consumption advisories	none

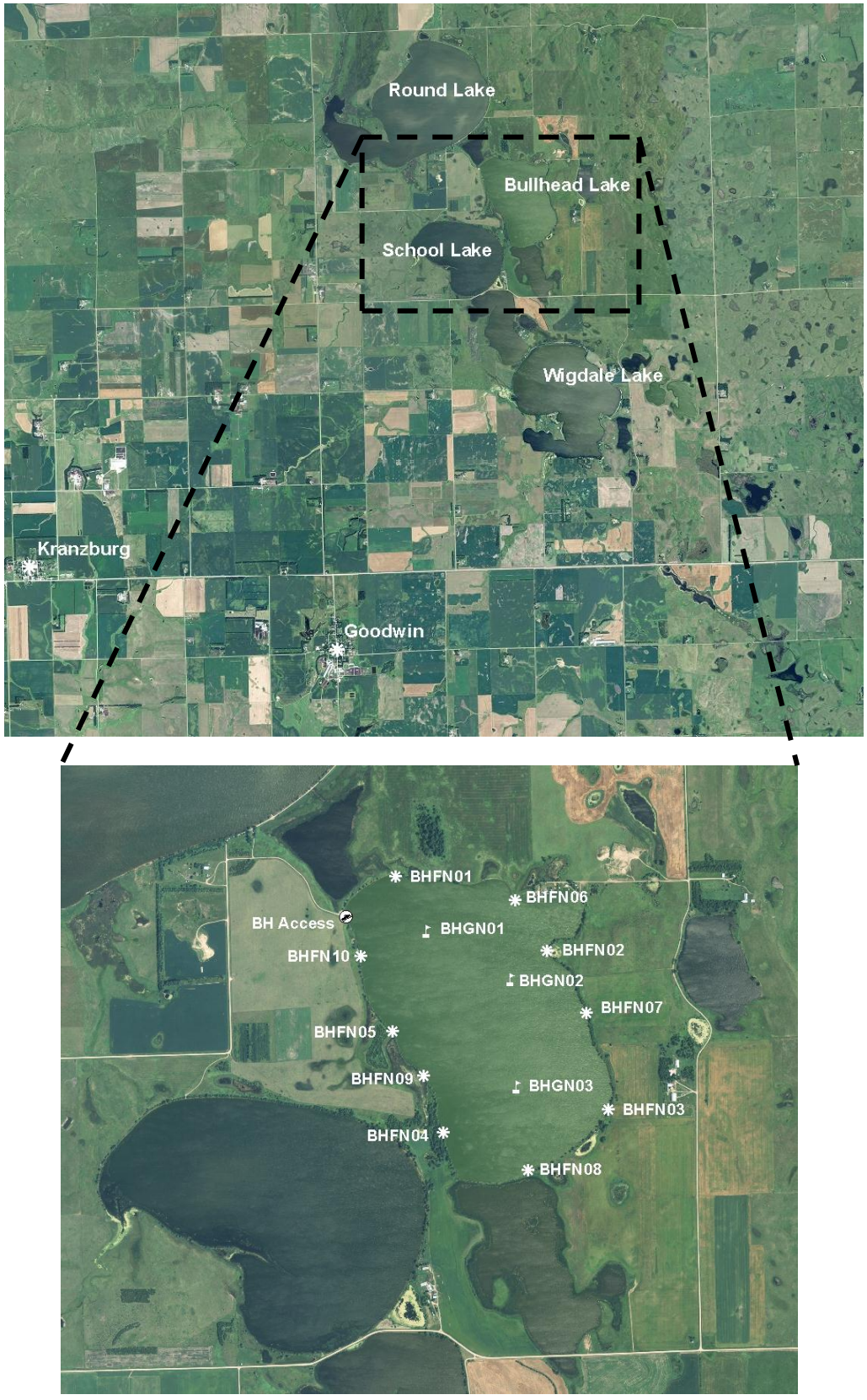

Figure 1. Map depicting geographic locations of Round, Bullhead, School and Wigdale Lakes from Goodwin, South Dakota (top). Also noted are standardized net locations and west access point which includes boat ramp, dock, and public toilet for Bullhead Lake (bottom). BHFN= frame net; BHGN= gill net

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) 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 with good public access. Large tracts of State owned Game Production Area's (GPA's) border the west and northeast shores of the lake. Bullhead Lake has no major surface water inlets or outlets; however, during high water periods water from Bullhead Lake flows into Round Lake to the northwest and then into Willow Creek before eventually reaching the Big Sioux River.

Although, susceptible to periodic winterkill Bullhead Lake has a history of providing a quality Walleye and Yellow Perch fishery within 25 miles of a major population center (Watertown) in northeast South Dakota. Currently, Bullhead Lake is managed as a Walleye and Yellow Perch fishery; however, Northern Pike are at times an important component of the fishery.

Note: Sampling was conducted approximately one month earlier (June 3-4) in 2008. Additionally, frame nets were not utilized as part of the fish community survey on Bullhead Lake. Therefore, the following results and discussion will focus on those fish species typically assessed using gill net (e.g., Northern Pike, Walleye, and Yellow Perch) data and noteworthy catches of other fish species.

Primary Species

Walleye: In 2012, Walleye relative abundance was moderate with a mean gill net CPUE of 7.7 (Table 1). The 2012 mean gill net CPUE was below the minimum objective (≥ 10 stock-length Walleye/net night; Table 3).

Walleye captured in the gill net catch ranged in TL from 28 to 64 cm (11.0 to 25.2 in; Figure 2). Otoliths were collected from a sub-sample of gill net captured Walleye in 2012. Four year-classes (2004, 2008-2010) were represented in gill net catch (Table 4). Only the 2010 year class coincides with a stocking event indicating natural reproduction is occurring (Table 4). The PSD and PSD-P values were 43 and 35, respectively (Table 1; Table 3; Figure 2). The 2012 PSD was within the management objective range (30-60); while the PSD-P was above the management objective range (5-10; Table 3). However, size structure indices should be interpreted with caution as sample size was low (i.e., 23 stock-length Walleye).

The 2010 Walleye year class in Bullhead Lake has exhibited fair growth with a weighted mean TL at capture of 306 mm (12.0 in) at age 2 (Table 5). Mean Wr values of Walleye captured in the 2012 gill net catch ranged from 76 to 102 for all length categories sampled with the mean Wr of stock-length Walleye being 83 (Table 1). An increasing trend in Wr was observed as TL increased.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 30.3 (Table 1) and above the minimum objective (≥ 30 stock-length Yellow Perch/net night; Table 3). The 2012 gill net CPUE was substantially higher than the 7.0 observed in 2008 and indicated high relative abundance (Table 2).

Gill net captured Yellow Perch ranged in TL from 12 to 26 cm (4.7 to 10.2 in; Figure 3). Based on otolith age estimates, three consecutive year classes (2009-2011) were represented in the gill net catch (Table 7).

Yellow Perch growth appeared to be fair with a weighted mean TL at capture of 182 mm (7.2 in) for males and 196 mm for females (7.7 in) at age 2 (Table 8). Sampled Yellow Perch had mean Wr values ranging from 92 to 98 for all length categories sampled with the mean Wr of stock-length Yellow Perch being 96 (Table 1). No length-related trends in condition were apparent.

Other Species

Black Bullhead: Black Bullheads were the most abundant species in the 2012 gill net catch (Table 1). The mean gill net CPUE for stock-length Black Bullhead was 212.0 (Table 1). Based on the 2012 gill net catch, relative abundance of Black Bullhead appears to be very high.

Black Bullheads captured in the 2012 frame net catch ranged in TL from 15 to 26 cm (5.9 to 10.2 in), had a PSD of 38 and a PSD-P of 0 (Table 1). No growth information was collected in 2012. The mean Wr of stock-length Black Bullheads was 91 (Table 1).

Northern Pike: Northern Pike typically are not sampled effectively using standard mid-summer lake survey methods; therefore reported values may not accurately represent the at-large population. Neumann and Willis (1995) reported the most reliable time to sample Northern Pike with gill nets was late spring following the spawn.

In 2012, 4 stock-length Northern Pike ranging in TL from 48 to 74 cm (18.9 to 29.1 in.) were captured in the 2012 gill net catch resulting in a CPUE of 1.3 (Table 1). Few inferences can made concerning Northern Pike size structure and condition due to low sample size.

Other: Common Carp and White Sucker were captured during 2012. Relative abundance of both species appears to be low and their impact on the fishery is likely minimal.

Management Recommendations

1) Conduct fish community assessment surveys every fourth year (next scheduled for the summer of 2016) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

2) Stock Walleye biennially (≈500 fry/acre) to establish additional year-classes.

3) Collect otoliths from Walleye and Yellow Perch to assess age structure and growth rates of each population.

4) Monitor water levels and winterkill events. In cases of substantial winterkill re-stock with Walleye and Yellow Perch to 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 experimental gill nets from Bullhead Lake, 2012. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= Black Bullhead; COC= Common Carp; NOP= Northern Pike; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Gill Nets								
BLB	212.0	64.1	38	3	0	---	91	1
COC	1.7	1.7	100	-	60	52	89	4
NOP	1.3	1.3	75	59	25	59	80	4
WAE	7.7	0.6	43	18	35	17	83	3
WHS	2.3	1.7	100	0	100	0	100	5
YEP	30.3	8.2	53	9	1	2	96	1

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, 2007-2012. BLB= Black Bullhead; COC= Common Carp; NOP= Northern Pike; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

	CPUE		
Species	2007[1]	2008	2012
Frame Nets			
BLB	---	1.5	---
WAE	---	0.1	---
Gill Nets			
BLB	1.3	0.0	212.0
COC	3.3	0.0	1.7
NOP	0.3	0.0	1.3
WAE	5.0	5.0	7.7
WHS	0.7	1.3	2.3
YEP	10.7	7.0	30.3

[1] Monofilament gill net mesh size change (0.75”, 1.00”, 1.25”, 1.50”, 2.00” and 2.50”)

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 in experimental gill nets from Bullhead Lake, 2007-2012. WAE = Walleye; YEP = Yellow Perch

Species	2007[1]	2008	2012	Objective
Gill nets				
WAE				
CPUE	5	5	8	≥ 10
PSD	87	93	43	30-60
PSD-P	40	27	35	5-10
Wr	87	94	83	---
YEP				
CPUE	11	7	30	≥ 30
PSD	59	5	53	30-60
PSD-P	47	0	1	5-10
Wr	112	109	96	---

[1] Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 4. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (Number stocked x 1,000) from Bullhead Lake, 2007-2012.

	Year Class											
Survey Year	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2012			13	1	8				1			
2008	---	---	---	---			1	8	1		3	2
2007[1]	---	---	---	---	---		1	8			5	1
# stocked												
fry	170		350				340					
sm. fingerling							34					
lg. fingerling												

[1] Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")

Table 5. Weighted mean length at capture (mm) for Walleye captured in experimental gill nets (expanded sample size) from Bullhead Lake, 2007-2012. Note: Sampling was conducted approximately one month earlier in 2008.

	Age							
Year	1	2	3	4	5	6	7	8
2012	---	306 (13)	421 (1)	521 (8)	---	---	---	641 (1)
2008	---	340 (1)	442 (8)	480 (1)	---	518 (3)	528 (2)	---
2007	247 (1)	382 (8)	---	---	524 (5)	608 (1)	---	---

Table 6. Stocking history including size and number for fishes stocked into Bullhead Lake, 2001-2012. WAE= Walleye; YEP= Yellow Perch

Year	Species	Size	Number
2005	YEP	fingerling	1,000
2006	WAE	fry	340,000
		small fingerling	34,000
2010	WAE	fry	350,000
2012	WAE	fry	170,000

Table 7. Year class distribution based on the expanded age/length summary for Yellow Perch sampled in gill nets from Bullhead Lake, 2012.

	Year Class			
Survey Year	2012	2011	2010	2009
2012		1	60	31

Table 8. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Bullhead Lake, 2012.

	Age		
Year	1	2	3
2012			
Male	125 (1)	182 (16)	213 (5)
Female	---	196 (44)	232 (24)
Combined	125 (1)	193 (60)	226 (31)

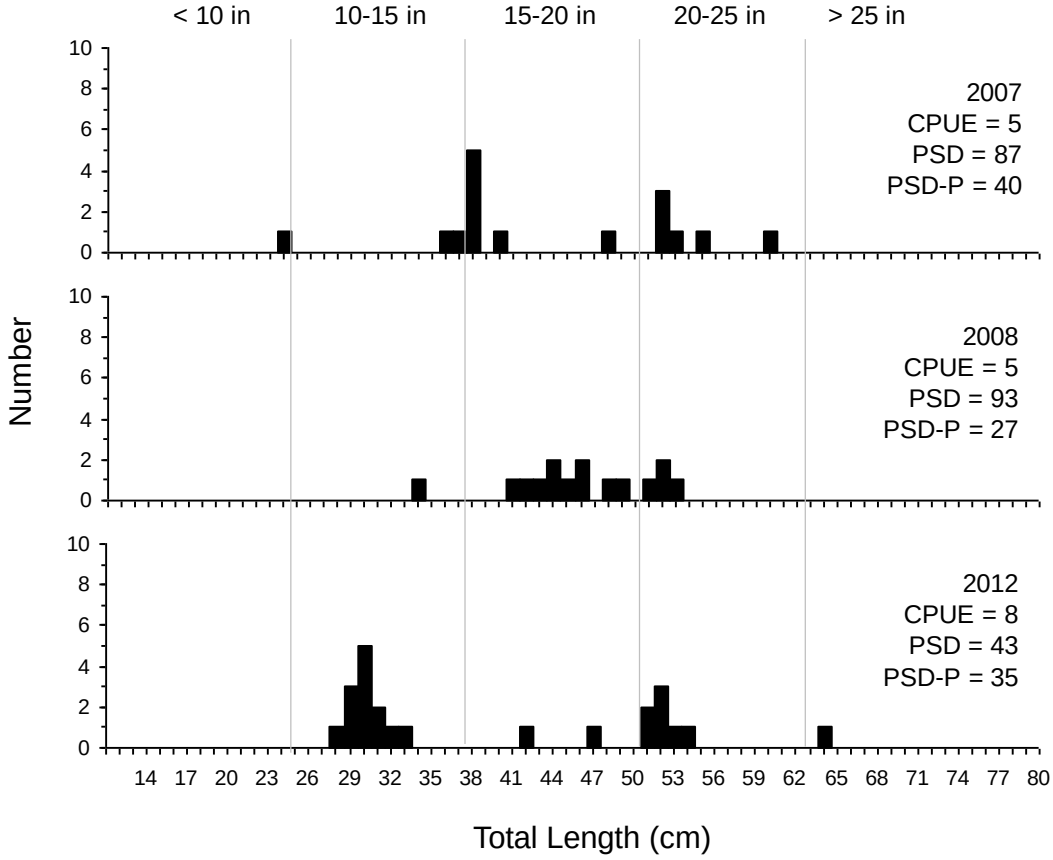

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Bullhead Lake, 2007-2012. Note sampling was conducted approximately one month earlier in 2008.

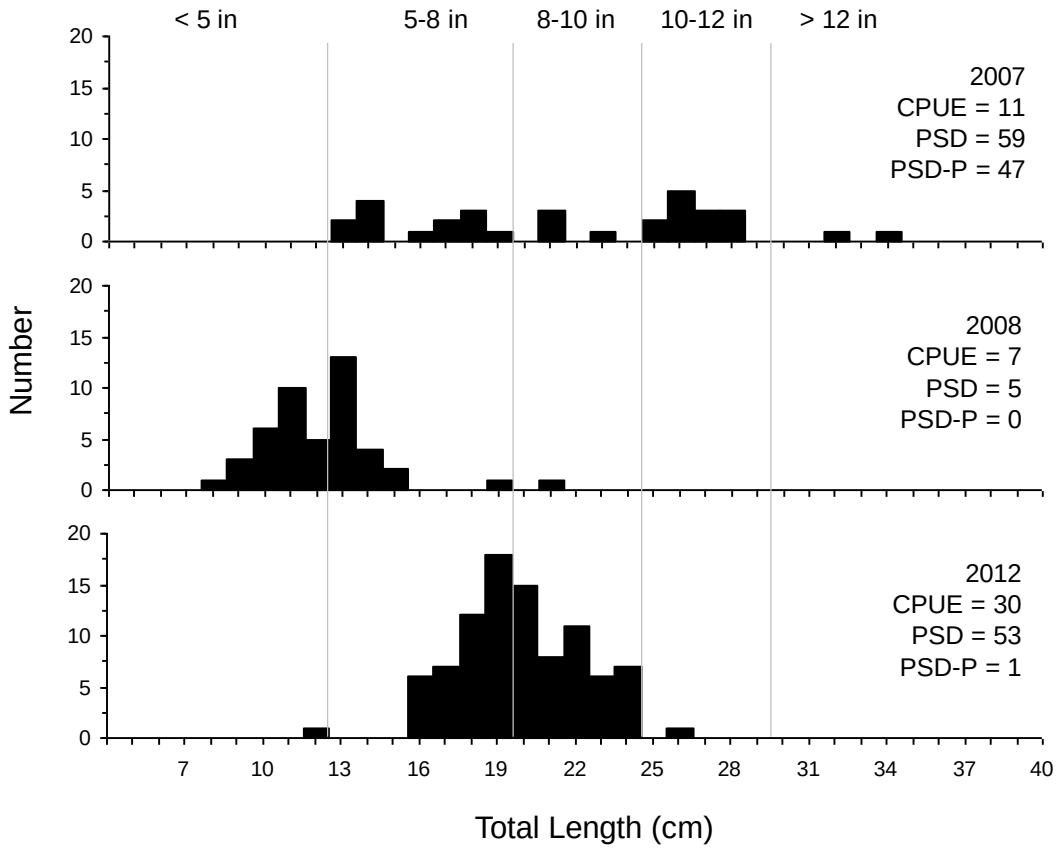

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in Bullhead Lake, 2007-2012. Note: sampling was conducted approximately one month earlier in 2008.