Bailey Lake

Site Description

Location

Water designation number (WDN)	18-0004-00
Legal description	T118N-R58W Sec.
County (ies)	Clark
Location from nearest town	8.0 miles north, 1.0 mile west, and 0.8 mile south of Clark

Survey Dates and Sampling Information

Survey dates	May 27, 2015 (GN)
Gill net sets (n)	3

Morphometry

Watershed area (acres)	44,706
Surface area (acres)	200
Maximum depth (ft)	8
Mean depth (ft)	unknown

Ownership and Public Access

Bailey Lake is a meandered lake owned and managed by the SDGFP. A boat ramp located on the west shore is maintained by the SDGFP. In addition, shore fishing access is available near the boat ramp and along 423rd Avenue that runs along the east shore. Property adjacent to the lake is primarily under State of South Dakota and private ownership.

Watershed and Land Use

The 44,706 acre Reid Lake sub-watershed (HUC-12) encompasses Bailey Lake and is located within the larger Grass, Dry, and Still Lakes (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 Ordinary High Water Mark has been established by the South Dakota Water Management Board on Bailey Lake. On May 20, 2015 the elevation was 1790.6 fmsl; 1.0 ft below the Fall 2014 elevation of 1791.6 fmsl. On October 5, 2015 the water elevation of Bailey Lake was 1789.8 fmsl.

Fish Management Information

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

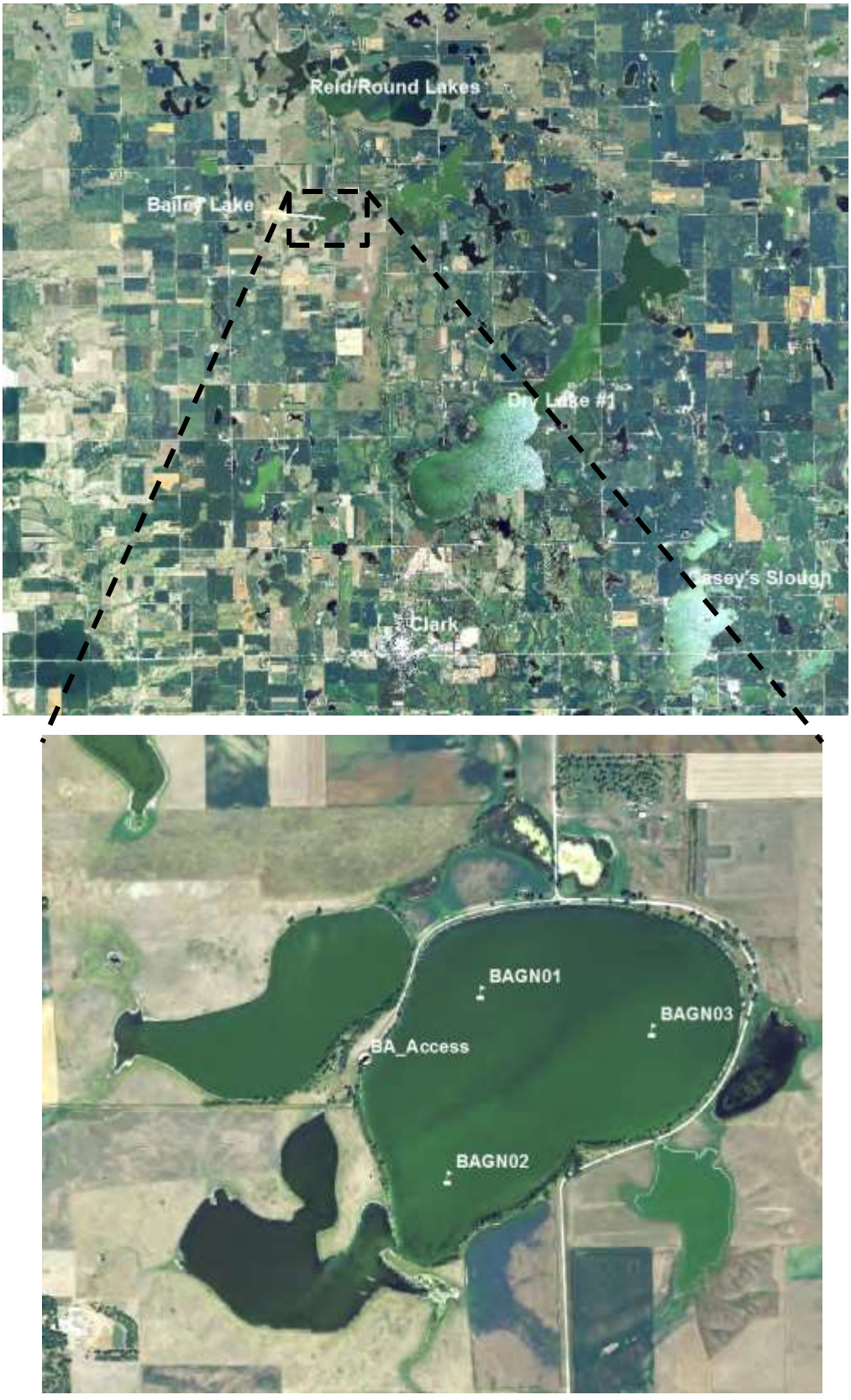

Figure 1. Map depicting geographic location of several Clark County lakes including Bailey Lake from Clark, South Dakota (top). Also noted is the public access and standardized net locations for Bailey Lake. BAGN= gill nets

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) Maintain a mean gill net CPUE of stock-length yellow perch ≥ 30, a PSD of 30-60, and a PSD-P of 5-10.

Results and Discussion

Bailey Lake is a shallow natural lake located north of Clark, South Dakota. The lake has good public access, but is susceptible to partial and complete winterkill events that affect the quality of the fishery. A substantial winterkill event occurred during the 2006-07 winter. Test netting shortly after ice-out in 2007 captured only two black bullheads. Subsequently, Bailey Lake was utilized as a natural walleye rearing pond (i.e., walleye fry are stocked in the spring and allowed to grow, then harvested as large fingerlings in the fall and stocked into other waters) in 2007. At times, Bailey Lake provides quality angling opportunities and is currently managed as a walleye and yellow perch fishery.

Primary Species

Walleye: The 2015 mean gill net CPUE for stock-length walleye was 28.0 (Table 1) and well above the minimum objective (≥ 10 stock-length walleye/net night; Table 3). Currently, relative abundance is high.

Walleye captured in gill nets during 2015 ranged in TL from 18 to 65 cm (7.1 to 25.6 in), had a PSD of 56 and a PSD-P of 7 (Table 1; Figure 2). Both the PSD and PSD-P were within the management objective ranges of 30-60 and 5-10, respectively (Table 3).

Otoliths were collected from a sub-sample of gill net captured walleye; six year classes were present (2007, 2009-2011 and 2013-2014) with four coinciding with fry stockings (Table 4). Walleye from the two natural produced year-classes (2010 and 2014) comprised only 6% of walleye in the gill net catch (Table 4).

Walleye growth appears to be adequate, as age-2 and age-4 walleye had weighted mean TL at capture values of 281 and 433 mm (11.1 and 17.0 in; Table 5). The mean Wr of stock-length walleye was 90 (Table 1).

Yellow Perch: The mean gill net CPUE of stock-length yellow perch in 2015 was 48.3 (Table 1) and above the minimum objective (≥ 30 stock-length yellow perch/net night; Table 3). The 2015 survey is the first survey since the winterkill event of 2006-07 in which yellow perch were captured. Based on the 2015 gill net catch, relative abundance appears to be high.

Yellow perch captured in the gill net catch ranged in TL from 8 to 30 cm (3.1 to 11.8 in; Figure 3). Both the PSD value of 10 and PSD-P value of 4 were below management objective ranges of 30-60 and 5-10 (Table 1; Table 3).

Otoliths were collected from a sub-sample of gill net captured yellow perch. Four year classes (2011-2014) were represented with the 2013 year class accounting for 79% of captured yellow perch (Table 7).

The weighted mean TL at capture for age-1 and age-2 yellow perch was 93 and 168 mm (3.7 and 6.6 in; Table 8), respectively. The mean Wr of stock-length yellow perch was 96 (Table 1) and a decreasing trend in Wr was observed as TL increased.

Black Bullhead: The mean gill net CPUE for stock-length black bullheads of 55.3 (Table 1) represented a substantial increase from the 2010 CPUE of 8.7 (Table 2) and indicated high relative abundance. Gill net captured black bullheads ranged in TL from 16 to 37 cm (6.3 to 14.6 in.), had a PSD of 47 and PSD-P of 7 (Table 1; Figure 4). The mean Wr of stock-length black bullheads was 105 (Table 1).

Other: Species diversity has increased since the 2010 survey with five new species captured in 2015 including bluegill, green sunfish, largemouth bass, white sucker and yellow perch.

Management Recommendations

1) Conduct fish community assessment surveys utilizing gill nets every fifth year (next scheduled for summer 2020) to monitor fish relative abundance, fish population size structure, fish growth, and stocking success.

2) Stock walleye (≈500 fry/ acre) on a biennial basis to establish additional year classes, provided water levels remain sufficient.

3) Collect otoliths from walleye and yellow perch to assess age structure and growth rates of each population.

4) Monitor winter and summer kill events. In cases of substantial winter or summer kill the need to re-establish a walleye fishery in Bailey 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 experimental gill nets from Bailey Lake, 2015. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= black bullhead; BLG= bluegill; GSF= green sunfish; LMB= largemouth bass; 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	55.3	30.5	47	6	7	3	105	<1
BLG	3.0	2.2	11	21	0	---	112	6
GSF	0.3	0.6	0	---	0	---	114	---
LMB	0.7	0.6	0	---	0	---	114	35
WAE	28.0	5.7	56	9	7	5	90	1
WHS	1.3	0.6	100	0	25	59	109	6
YEP	48.3	21.5	10	4	4	3	96	<1

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured experimental gill nets from Bailey Lake, 2010-2015. BLB= black bullhead; BLG= bluegill; GSF= green sunfish; LMB= largemouth bass; WAE= walleye; WHS= white sucker; YEP= yellow perch

	CPUE					
Species	2010	2011	2012	2013	2014	2015
Gill nets						
BLB	8.7	---	---	---	---	55.3
BLG	0.0	---	---	---	---	3.0
GSF	0.0	---	---	---	---	0.3
LMB	0.0	---	---	---	---	0.7
WAE	33.0	---	---	---	---	28.0
WHS	0.0	---	---	---	---	1.3
YEP	0.0	---	---	---	---	48.3

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 Bailey Lake, 2010-2015. WAE= walleye; YEP = yellow perch

Species	2010	2011	2012	2013	2014	2015	Objective
Gill nets							
WAE							
CPUE	33	---	---	---	---	28	≥ 10
PSD	62	---	---	---	---	56	30-60
PSD-P	0	---	---	---	---	7	5-10
Wr	96	---	---	---	---	90	---
YEP							
CPUE	0	---	---	---	---	48	≥ 30
PSD	---	---	---	---	---	10	30-60
PSD-P	---	---	---	---	---	4	5-10
Wr	---	---	---	---	---	96	---

Table 4. 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 Bailey Lake, 2010-2015.

	Year Class								
Survey Year	2015	2014	2013	2012	2011	2010	2009	2008	2007
2015		2	39		36	3	7		2
2010	---	---	---	---	---		156		59
# stocked									
fry	86		86		85		100		750
sm. fingerling									
lg. fingerling									

Table 5. Weighted mean TL at capture (mm) for walleye captured in experimental gill nets (expanded sample size) from Bailey Lake, 2010-2015.

	Age							
Year	1	2	3	4	5	6	7	8
2015	188(2)	281(39)	---	433(36)	500(3)	524(7)	---	637(2)
2010	243(156)	---	428(59)	---	---			

Table 6. Stocking history including size and number for fishes stocked into Bailey Lake, 2007-2015.

Year	Species	Size	Number
2007	WAE	fry	750,000
2009	WAE	fry	100,000
2011	WAE	fry	85,000
2013	WAE	fry	86,000
2015	WAE	fry	86,000

Table 7. Year class distribution based on expanded age/length summary for yellow perch sampled in gill nets from Bailey Lake, 2015.

	Year Class				
Survey Year	2015	2014	2013	2012	2011
2015		13	125	19	1

Table 8. Weighted mean total length (mm) at capture for yellow perch captured in experimental gill nets (expanded sample size) from Bailey Lake, 2015.

	Age			
Year	1	2	3	4
2015	93(13)	168(125)	212(19)	307(1)

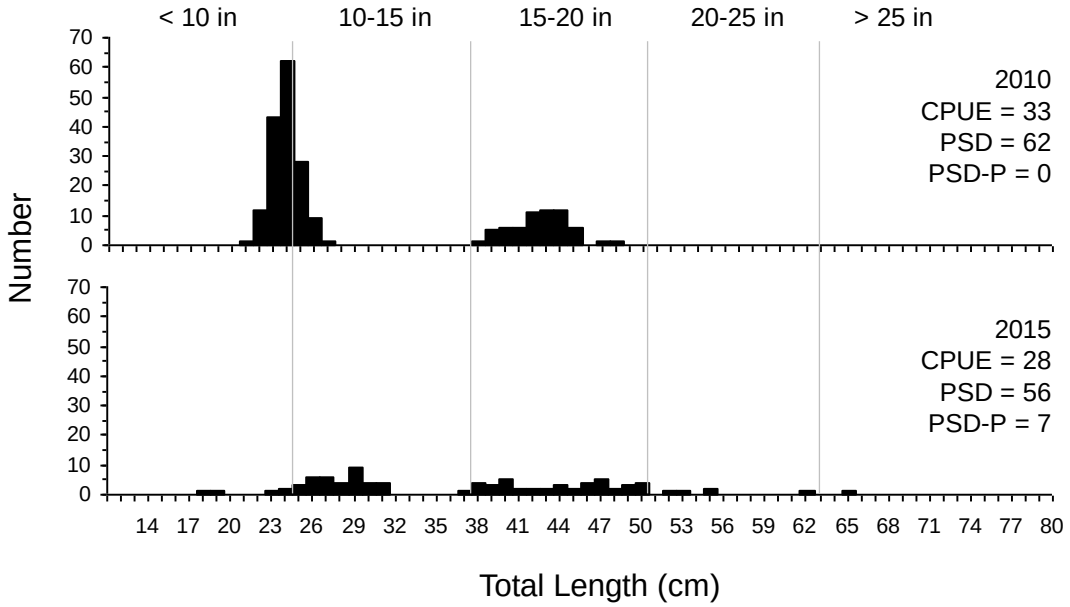

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Bailey Lake, 2010-2015.

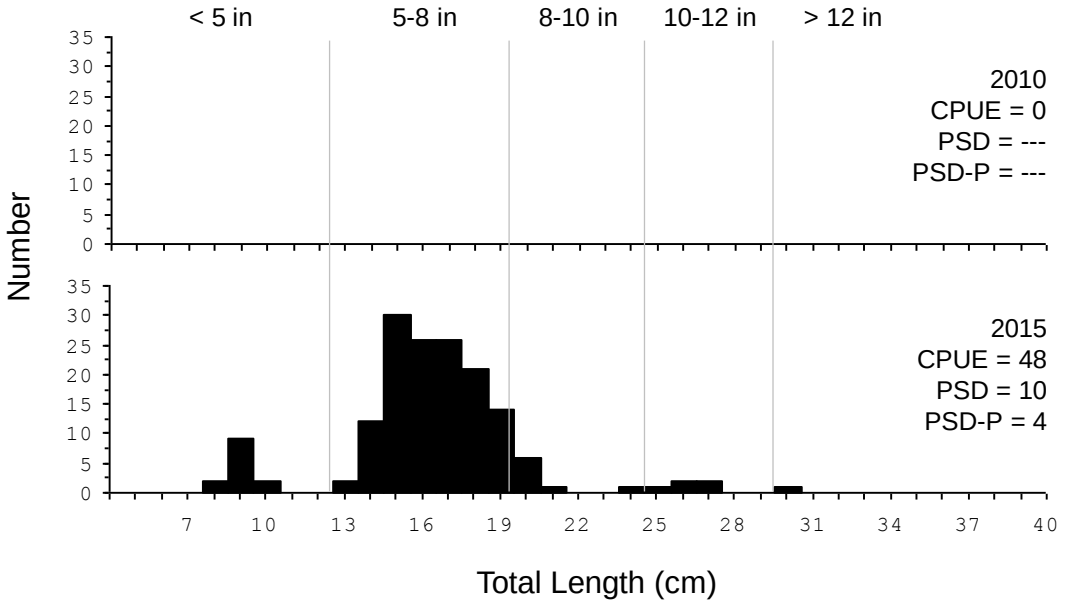

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Bailey Lake, 2010-2015.

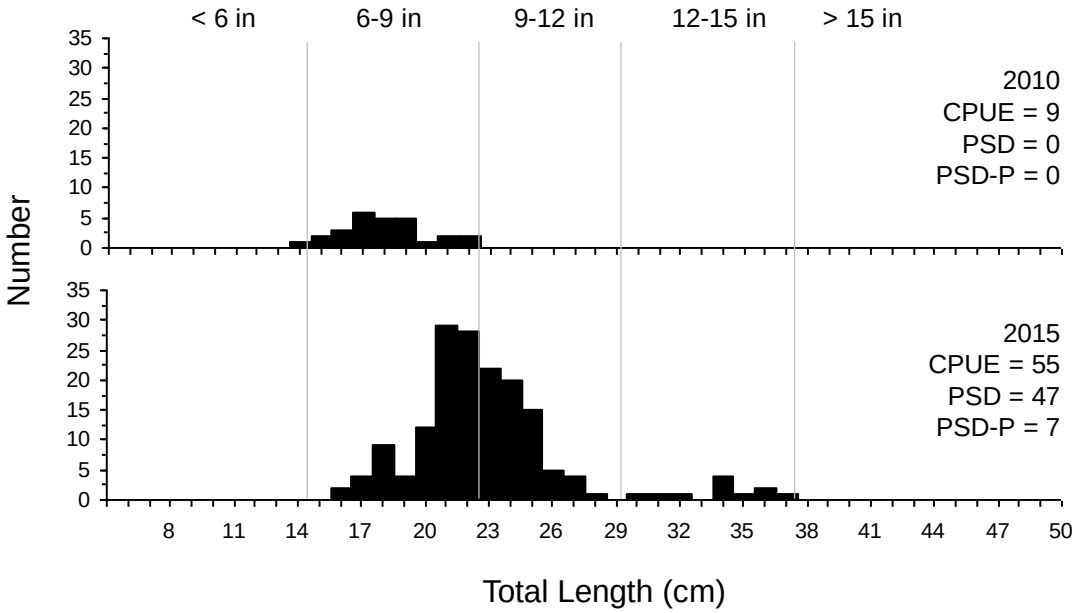

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using experimental gill nets in Bailey Lake, 2010-2015.