Redfield Dam

Site Description

Location

Water designation number (WDN)	57-0004-00
Legal description	T116N-R64W-Sec. 9
County (ies)	Spink
Location from nearest town	Southwest edge of Redfield, SD.

Survey Dates and Sampling Information

Survey dates	June 9-10, 2015 (FN, GN)
Frame net sets (n)	12
Gill net sets (n)	3

Morphometry

Watershed area (acres)	29,667
Surface area (acres)	170
Maximum depth (ft)	12
Mean depth (ft)	unknown

Ownership and Public Access

The Redfield Dam fishery is managed by the SDGFP. A park owned and maintained by the city of Redfield is located on the east shore. The park provides good public access including shore fishing opportunities and a boat ramp (Figure 1). The remainder of property adjacent to the lake is under private ownership.

Watershed and Land Use

Redfield Dam lies within the 29,667 Outlet Turtle Creek sub-watershed (HUC-12), which is located within the larger Lower Turtle Creek (HUC-10) watershed. Land use within the watershed is primarily agricultural including rangeland and cropland.

Water Level Observations

No water level observations were made in 2015.

Fish Management Information

Fish species	bigmouth buffalo, black bullhead, black crappie, bluegill, channel catfish, common carp, green sunfish, largemouth bass, northern pike, orangespotted sunfish, rock bass, walleye, white sucker, yellow bullhead, yellow perch
Lake-specific regulations	none
Management classification	warm-water marginal
Fish Consumption Advisories	none

Figure 1. Map depicting geographic location of several lakes in the Redfield, South Dakota area including Redfield Dam (top). Also noted is the access area located within the city park and standardized net locations for Redfield Dam (bottom). RFFN= frame nets; RFGN= gill nets

Results and Discussion

Redfield Dam is located on the southwestern edge of Redfield, South Dakota. Redfield Dam was formed in the 1930's by the Works Progress Administration and has a long history of winter-kill and occasional summer-kill. In the mid 1990's, a renovation project took place within the Turtle Creek watershed; renovation included dredging Redfield Lake to remove sediment and increase the overall depth of the lake. In 2002, GFP crews ran transects and collected water depths to investigate benefits of the dredging operation. The water depth in Redfield Lake remained marginal for supporting fish life after the dredging operation. The majority of the lake remains shallow (<4ft), with the deepest water available in the original river channel (10-12ft)

Since the late 1960's, black bullheads have consistently dominated the fish population in Redfield Lake; while black crappie and northern pike have persisted, and at times have provided angling opportunities.

Species

Black Bullhead: Relative abundance of black bullheads tends to be high. In 2015, black bullheads were the most abundant fish species in the frame net catch (Table 1). The mean frame net CPUE for stock-length black bullhead of 378.8 (Table 1) represented an increase from CPUE's observed in 2007 and 2011, but was lower than the 2002 CPUE (Table 2).

Frame net captured black bullheads, which ranged in TL from 12 to 19 cm (4.7 to 7.5 in), were < quality-length (23 cm; 9 in) resulting in PSD and PSD-P values of 0 (Table 1; Figure 2). No age or growth information was collected. The mean Wr of stock-length individuals was 84 (Table 1).

Black crappie: The mean frame net CPUE of stock-length black crappies was 17.1 (Table 1). Since 2002, mean CPUE values have ranged from a low of 8.7 (2002) to a high of 146.2 (2007; Table 2). While the 2015 mean frame net CPUE was much lower than the 2007 CPUE of 146.2, relative abundance is still considered high.

Black crappies captured in the frame net catch ranged in TL from 15 to 30 cm (5.9 to 11.8 in), had a PSD of 83 and a PSD-P of 1 (Table 1; Figure 3). Age estimates based on otoliths collected from a sub-sample of frame net captured black crappies indicate the presence of five year classes (2009-2013; the 2011 year class was the most represented and comprised 75% of crappie in the frame net catch (Table 3).

Black crappies in Redfield Dam tend to exhibit slow to average growth. In 2015, the weighted mean TL at capture of age-3 and age-4 individuals was 219 and 216 mm (8.6 and 8.5 in), respectively (Table 4). A decreasing trend in black crappie condition was apparent as TL increased; however, mean Wr values exceeded 90 for nearly all 10-mm length groups represented.

Channel catfish: In surveys conducted from 2002-2015, relative abundance of channel catfish has remained low with mean frame net CPUE values for stock-length individuals < 1.0 (Table 1; Table 2). In 2015, only three stock-length catfish were

sampled, but several (i.e., n = 16) sub-stock individuals that ranged in TL from 16 to 21 cm (6.3 to 8.7 in) were encountered indicating recent reproduction.

Northern Pike: The mean gill net CPUE of stock-length northern pike was 3.0 (Table 1). The 2015 mean frame net CPUE represented a substantial decrease from the 2011 CPUE of 9.7 but still indicated high relative abundance. Northern pike depend on flooded vegetation for spawning and recruitment and tend to have improved recruitment during springs that have rising water levels.

Northern pike captured in the 2015 gill net catch ranged in TL from 53 to 82 cm (20.9 to 32.3 in; Figure 4) and were in good condition with mean Wr values $\geq$ 80 for all 10-mm length groups represented. Few inferences can made concerning other population parameters (e.g., size structure) due to low sample size.

Walleye: In 2015, few walleyes were captured in the frame net or gill net catch (Table 1). Walleye stockings have been largely unsuccessful in Redfield Lake (Table 2; Table 6); therefore future walleye stockings should only occur when extra fish are available and all other priority stockings have been completed.

Other: Bluegill, common carp, orangespotted sunfish, yellow bullhead, and yellow perch other fish species sampled during the 2015 survey (Table 1).

Management Recommendations

1) Conduct fish population assessment surveys utilizing gill nets and frame nets on an every fourth year basis (next survey scheduled in summer 2019) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

2) Stock walleye (≈500 fry/acre) provided water levels are favorable (i.e., lake is full), excess walleye are available, and other higher priority stockings have been completed.

3) Channel catfish should be stocked to supplement the existing population, and increase angling opportunities.

4) Monitor winter and summer kill events. In cases of substantial winter or summer kill stocking should be conducted to re-establish a fish community.

Table 1. Mean catch rate (CPUE; gill 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) of stock-length fish for various fish species captured in frame nets and experimental gill nets in Redfield Dam, 2015. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; COC= common carp; NOP= northern pike; OSF= orangespotted sunfish; WAE= walleye; YEB= yellow bullhead; YEP= yellow perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Frame nets								
BLB	378.8	149.2	0	---	0	---	84	1
BLC	17.1	6.3	83	4	1	1	99	1
BLG	0.1	0.1	0	---	0	---	109	---
CCF	0.3	0.2	100	0	0	---	87	14
COC	0.3	0.2	100	0	25	59	89	9
NOP	1.3	0.4	93	12	40	23	84	4
OSF[1]	0.5	0.4	---	---	---	---	---	---
WAE	0.1	0.1	100	---	100	---	88	---
YEB	4.0	0.8	54	12	25	11	88	1
Gill nets								
BLB	84.7	29.7	0	---	0	---	85	<1
BLC	0.3	0.6	0	---	0	---	114	---
COC	13.0	15.4	38	13	10	8	95	2
NOP	3.0	2.9	100	0	11	21	89	4
WAE	1.3	0.6	75	59	50	50	92	9
YEB	0.3	0.6	0	---	0	---	135	---
YEP	0.3	0.6	100	---	0	---	88	---

[1] All fish sizes

Table 2. Historic mean catch rate (CPUE; gill/frame nets = catch/net night) of stock-length fish for various fish species captured in frame nets and experimental gill nets from Redfield Dam, 2002-2015. BIB= bigmouth buffalo; BLB= black bullhead; BLC= black crappie; BLG= bluegill; CCF= channel catfish; COC= common carp; GSF= green sunfish; LMB= largemouth bass; NOP= northern pike; OSF= orangespotted sunfish; ROB= rock bass; WAE= walleye; WHS= white sucker; YEB= yellow bullhead; YEP= yellow perch

	CPUE			
Species	2002	2007[2]	2011	2015
Frame nets				
BIB	0.0	0.0	0.1	0.0
BLB	392.6	84.8	101.3	378.8
BLC	8.7	146.2	12.0	17.1
BLG	0.0	3.3	0.0	0.1
CCF	0.1	0.0	0.2	0.3
COC	0.3	9.6	1.8	0.3
GSF	0.0	0.5	0.0	0.0
LMB	0.0	0.2	0.0	0.0
NOP	0.5	1.0	2.7	1.3
OSF[1]	0.0	2.8	0.0	0.5
ROB	0.0	0.1	0.0	0.0
WAE	0.1	2.5	0.1	0.1
WHS	1.0	0.8	0.1	0.0
YEB	2.8	0.0	0.5	4.0
Gill nets				
BLB	91.0	16.7	8.0	84.7
BLC	0.0	1.0	0.0	0.3
CCF	0.0	0.0	0.0	0.0
COC	0.0	8.7	5.3	13.0
NOP	2.7	0.7	9.7	3.0
OSF[1]	0.0	0.3	0.0	0.0
WAE	0.3	1.3	0.0	1.3
WHS	0.3	0.0	0.0	0.0
YEB	0.3	0.0	0.0	0.3
YEP	0.0	0.0	1.0	0.3

[1] All fish sizes

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

Table 3. Year class distribution based on the expanded age/length summary for black crappie sampled in frame nets from Redfield Dam, 2011-2015.

	Year Class										
Survey Year	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
2015			23	14	153	6	9				
2011	---	---	---	---		31	21	56	26		28

Table 4. Weighted mean total length (mm) at capture for black crappie captured in frame nets (expanded sample size) from Redfield Dam, 2011-2015.

	Age					
Year	1	2	3	4	5	6
2015	---	169(23)	219(14)	216(153)	257(6)	227(9)
2011	105(31)	185(21)	204(56)	225(26)	---	241(28)

Table 5. Stocking history including size and number for fishes stocked into Redfield Dam, 2000-2015. BLG= bluegill; CCF= channel catfish; LMB= largemouth bass; NOP= northern pike; SMB= smallmouth bass; WAE= walleye

Year	Species	Size	Number
2000	WAE	small fingerling	33,750
2004	NOP	adult	200
2004	BLG	adult	550
2005	SMB	fingerling	8,160
2005	LMB	fingerling	15,000
2005	WAE	fingerling	6,400
2006	CCF	fingerling	20,020
2008	WAE	small fingerling	20,720
2010	WAE	fry	200,000
2012	WAE	fry	104,710
2014	WAE	fry	100,000

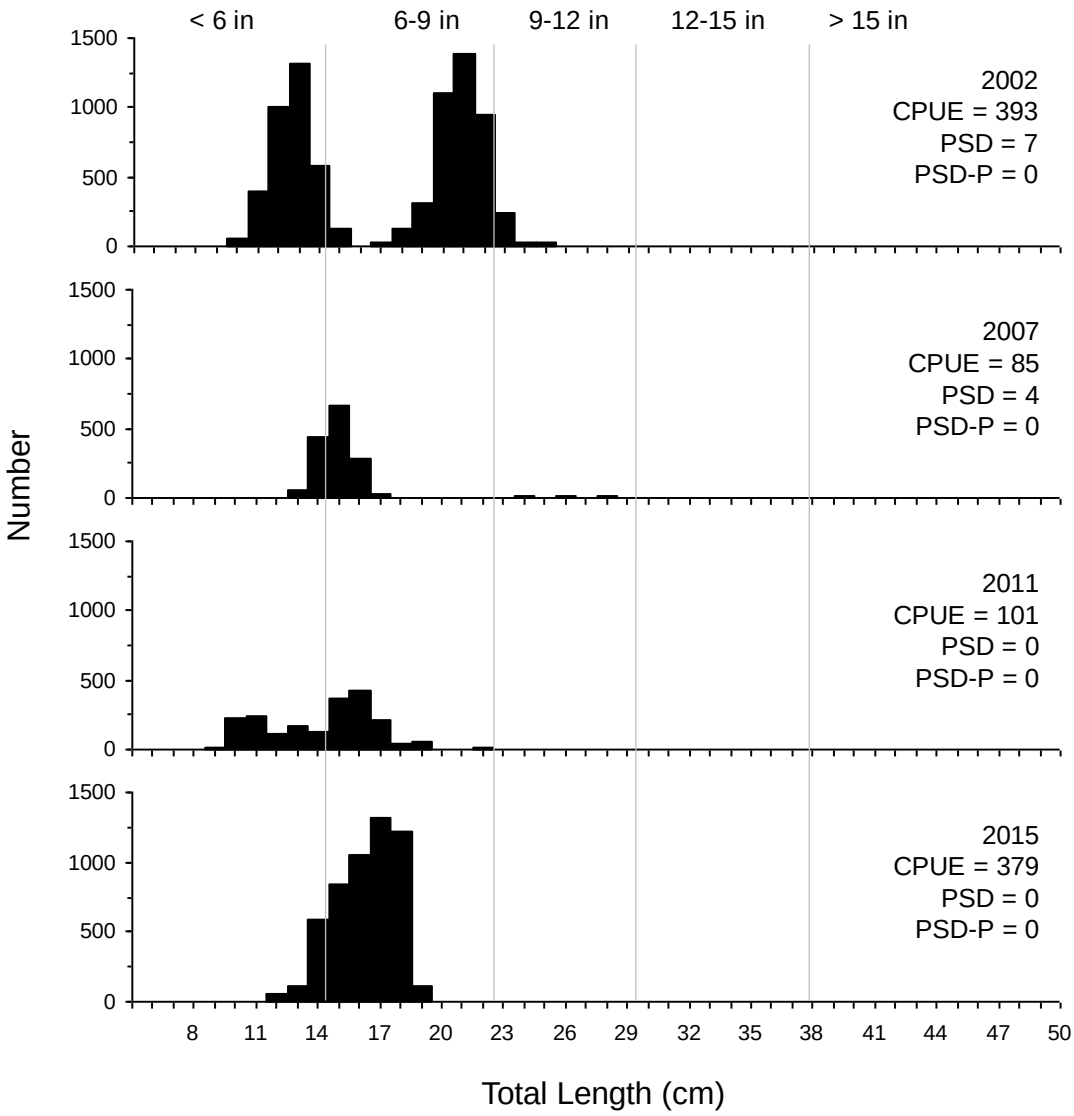

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black bullhead captured using frame nets in Redfield Dam, 2002-2015.

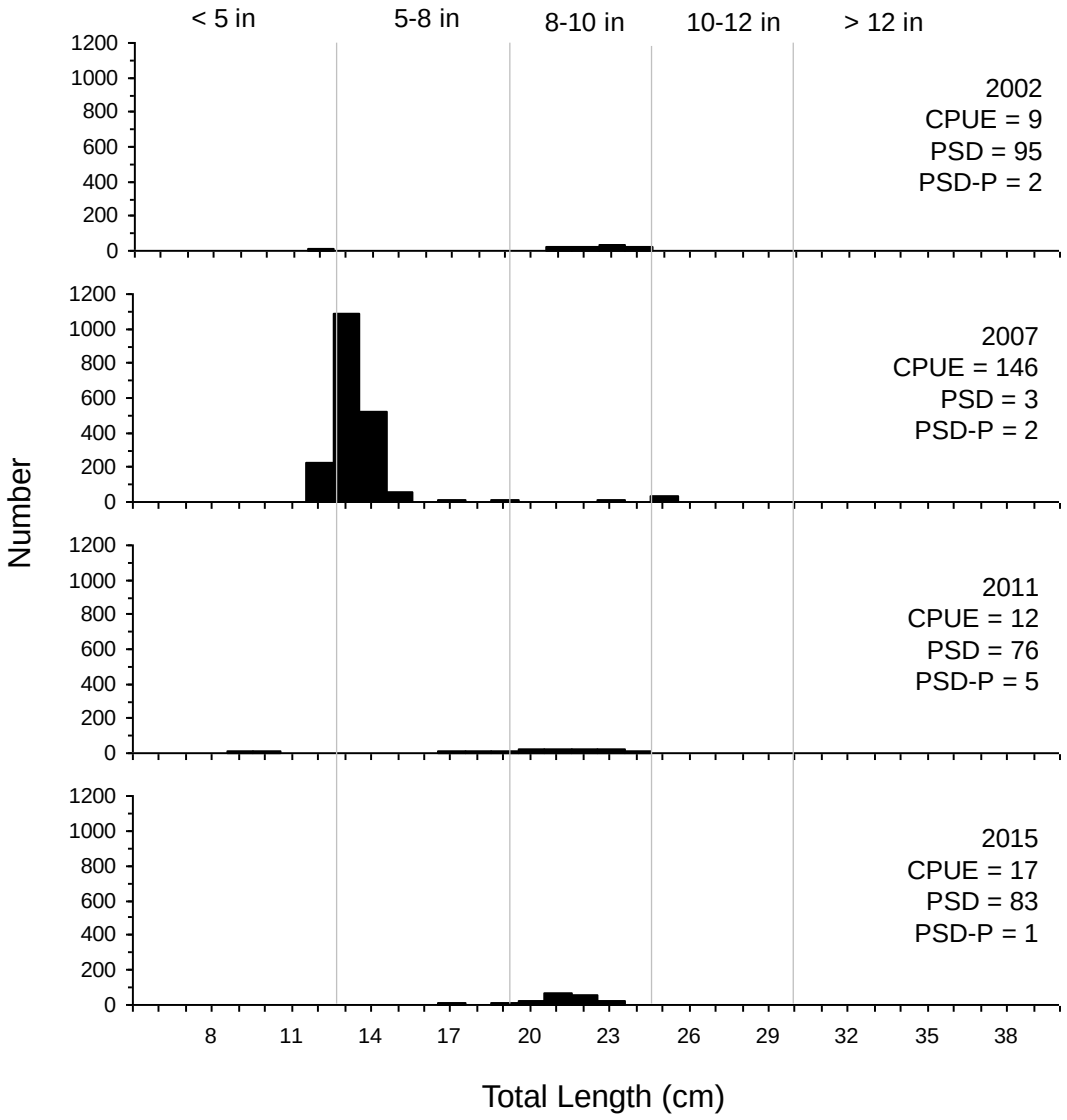

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using frame nets in Redfield Dam, 2002-2015.

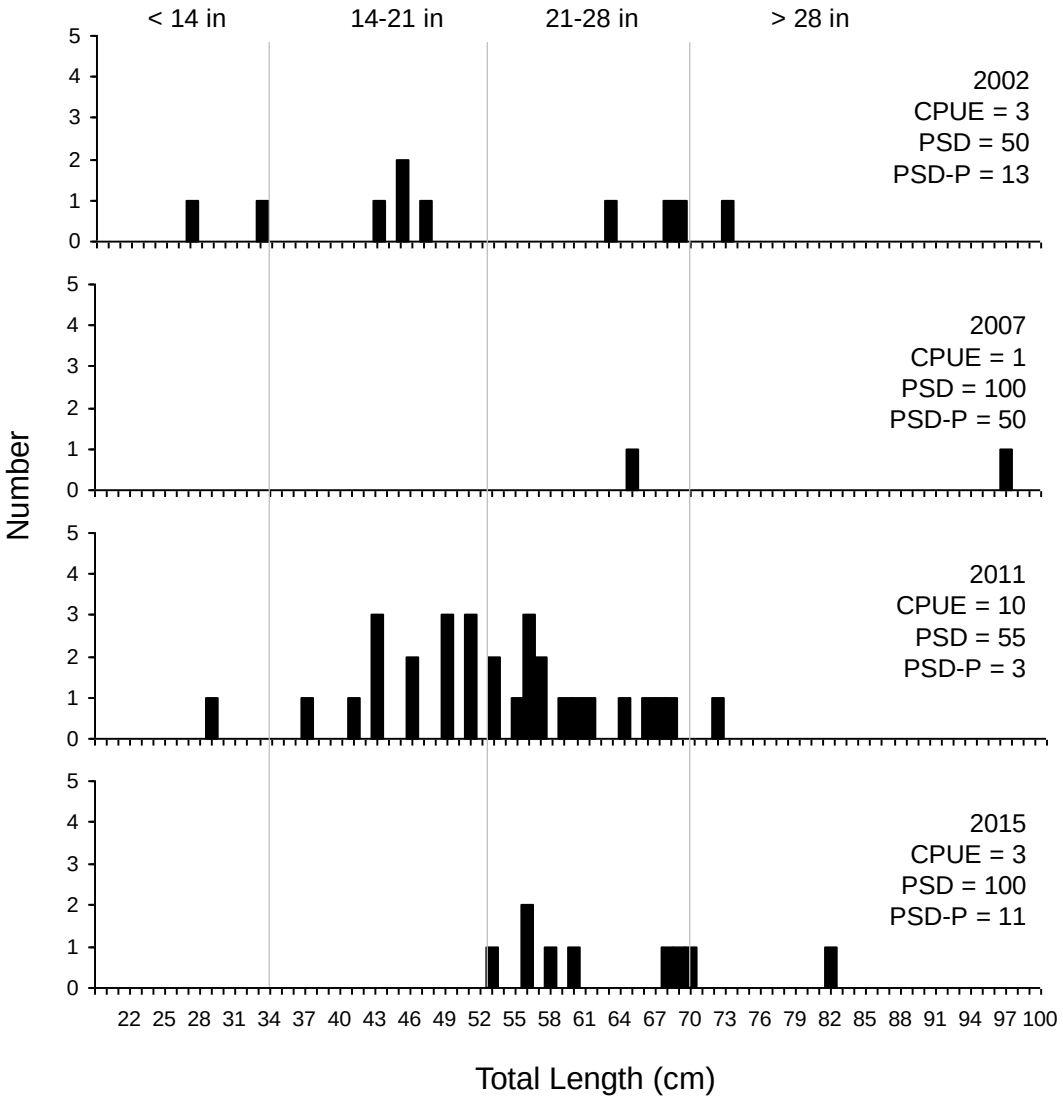

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for northern pike captured using experimental gill nets in Redfield Dam, 2002-2015.