

South Red Iron Lake

Site Description

Location

Water designation number (WDN)	48-0002-00
Legal description	T126N-R53W-Sec. 20,29,32
County (ies)	Marshall
Location from nearest town	8 miles southeast of Lake City, SD

Survey Dates and Sampling Information

Survey dates	June 19-21, 2012 (FN, GN)
Frame net sets (n)	18
Gill net sets (n)	6

Morphometry (Figure 1)

Watershed area (acres)	26,477
Surface area (acres)	610
Maximum depth (ft)	15
Mean depth (ft)	8

Ownership and Public Access

South Red Iron Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. A single public access site is located on the southwestern shoreline and is maintained by the SDGFP (Figure 2). South Red Iron Lake is owned by the State of South Dakota and lands adjacent to the lake are owned by the State of South Dakota, Bureau of Indian Affairs, and private individuals.

Watershed and Land Use

Land use in the South Red Iron Lake watershed is primarily agricultural grazing with some cropland (Hanson 2008).

Water Level Observations

No OHWM has been established by the South Dakota Water Management Board on South Red Iron Lake. The elevation of South Red Iron Lake on May 16, 2012 was 1826.7 fmsl and indicated a decrease from the fall 2011 elevation of 1829.8 fmsl. The water level had increased to an elevation of 1828.4 fmsl on September 26, 2012.

Fish Management Information

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

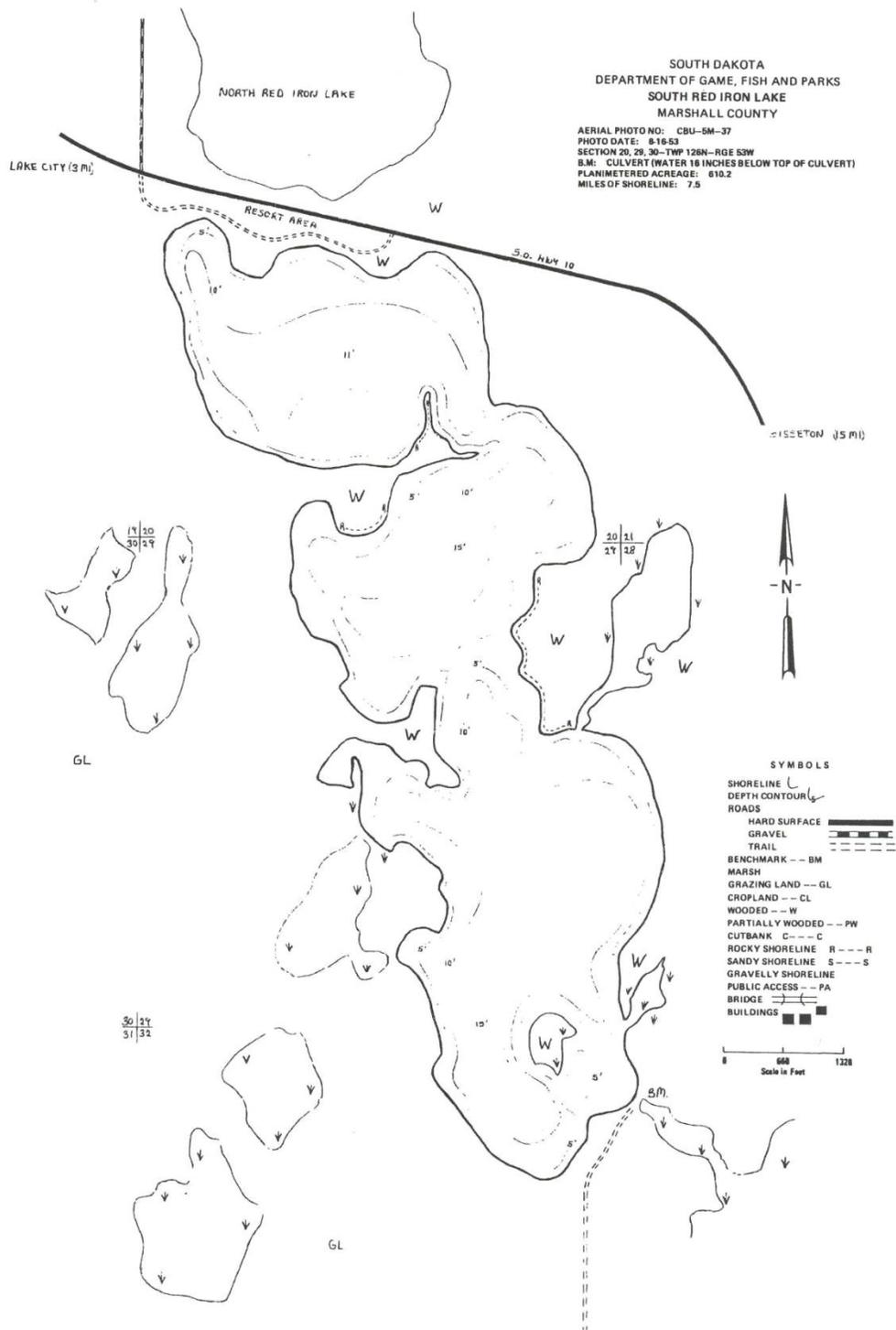


Figure 1. Map depicting depth contours of South Red Iron Lake, Marshall County, South Dakota.

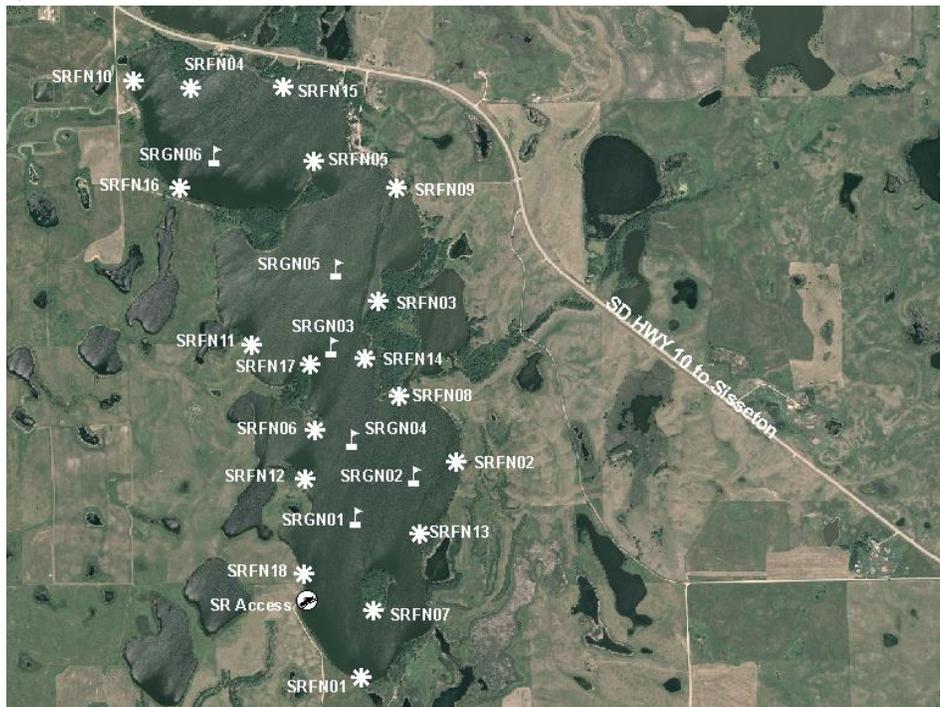


Figure 2. Map depicting geographic location of South Red Iron Lake from Lake City, South Dakota (top). Also noted is the boat ramp and standardized net locations for South Red Iron Lake (bottom). SRFN= frame nets, SRGN= gill nets

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 Walleye ≥ 10 , a PSD of 30-60, and a PSD-P of 5-10.
- 3) Maintain a mean gill net CPUE of stock-length Yellow Perch ≥ 30 , a PSD of 30-60, and a PSD-P of 5-10.
- 4) Maintain a mean frame net CPUE of stock-length Black Bullhead ≤ 100 .

Results and Discussion

South Red Iron Lake is a shallow natural lake located southeast of Lake City, South Dakota. The lake receives surface water from South and North Buffalo Lakes which drain into Lake Almos. From Lake Almos water flows north through a series of small sloughs before it reaches the southeast end of South Red Iron Lake. Water from South Red Iron Lake flows north into North Red Iron which then flows into Clear Lake.

South Red Iron Lake has a history of occasional winter and summerkill events (most recently documented in winter of 1988-1989). Historically the fish community was primarily comprised of Black Bullhead, Northern Pike, and Yellow Perch. However, sport fish such as Walleye, black bass, and panfish have contributed to the sport fishery in recent years due to decreased frequency of winter/summerkill events. Currently, South Red Iron Lake is managed as a Northern Pike, Walleye and Yellow Perch fishery.

Primary Species

Northern Pike: The 2012 mean gill net CPUE of stock-length Northern Pike was 12.0 (Table 1), and above the minimum objective of (≥ 3 stock-length fish/net night). Based on the 2012 gill net catch, relative abundance of Northern Pike in South Red Iron Lake appeared to be high.

Northern Pike sampled in gill nets during 2012 ranged in TL from 28 to 73 cm (11.0 to 28.7 in), had a PSD of 49, and a PSD-P of 3 (Figure 3). The PSD was within the management objective range of 30-60; while the PSD-P was slightly below the management objective range of 5-10 (Table 3).

No age or growth information was collected from Northern Pike in 2012. Gill net captured Northern Pike had mean W_r values that ranged from 87 to 92 for all length categories (e.g., stock to quality) sampled, with the mean W_r for stock-length Northern Pike being 88 (Table 1). No length-related trends in condition were apparent.

Walleye: The mean gill net CPUE of stock-length Walleye was 5.5 (Table 1) and below the minimum objective (≥ 10 stock-length Walleye/net night). Since 2003 Walleye relative abundance has remained low to moderate with mean gill net CPUE values ranging from 1.8 (2006) to 5.5 (2012; Table 2).

Walleye captured in gill nets ranged in TL from 23 to 54 cm (9.1 to 21.3 in; Figure 4), had a PSD of 33, and PSD-P of 6 (Table 1). Both the PSD and PSD-P were within the management objectives (Table 3), indicating a balanced population (defined as PSD of 30-60 and PSD-P of 5-10).

Otoliths were collected from a sub-sample of Walleye in the gill net catch. Four consecutive year-classes were present (2008-2011; Table 4). The 2008 and 2010 year classes correspond with large fingerling stockings. Contribution of natural reproduction during stocked years is unknown since large fingerlings were not marked. The 2009 and 2011 year classes do not coincide with stocking events indicating natural reproduction. The weighted mean length at capture of age-3 Walleye was 460 mm (18.1 in; Table 5) indicating good growth. Condition of Walleye was good with mean Wr values ranging from 92 to 98 for all length categories. No length-related trend in Wr was observed.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 24.5 (Table 1), and below the minimum objective (≥ 30 stock-length Yellow Perch/net night). The mean gill net CPUE observed for Yellow Perch in 2012 was substantially higher than the 4.2 observed in 2009 but similar to those observed from 2003-2006 (Table 2). Based on the 2012 gill net catch, the relative abundance of stock-length Yellow Perch appears to be moderate.

Yellow Perch captured in the 2012 gill net catch ranged in TL from 8 to 25 cm (3.1 to 9.8 in), with the majority being $<$ quality-length (20 cm; 8 in; Figure 5). The PSD of 3 and PSD-P of 1 were well below the management objectives of 30-60 and 5-10, respectively (Table 1; Table 3).

Otoliths were collected from a sub-sample of gill net captured Yellow Perch in 2012. The weighted mean TL at capture for age-2 male Yellow Perch was 140 mm (5.5 in; Table 7). The weighted mean TL at capture for age-2 female Yellow Perch was 147 mm (5.8 in; Table 7). Mean Wr of gill net captured stock-length Yellow Perch in 2012 was 102 (Table 1) and a slight decreasing trend in Wr was observed as TL increased.

Other Species

Black Bullhead: The mean frame net CPUE of stock-length Black Bullhead during 2012 was 15.9 (Table 1) and within the management objective (≤ 100 stock-length fish/net-night). Black Bullhead relative abundance was classified as moderate in South Red Iron Lake during 2012.

Black Crappie: The mean frame net CPUE of stock-length Black Crappie during 2012 was 1.3, indicating low relative abundance (Table 1). Condition of stock-length Black Crappie in South Red Iron Lake was good with a mean Wr of 97 (Table 1).

Bluegill: The mean frame net CPUE of stock-length Bluegill during 2012 was 3.6 (Table 1). The low CPUE indicates low relative abundance. Condition of stock-length Bluegill was good with a mean W_r of 120 (Table 1).

Largemouth Bass: No Largemouth Bass were sampled in the 2012 survey; however, the sampling gear utilized is not effective at capturing Largemouth Bass. Spring electrofishing is the most effective method for capturing Largemouth Bass. Anecdotal reports from anglers indicate that Largemouth Bass are present in sufficient numbers to provide a sport fishery.

Smallmouth Bass: The mean frame net CPUE of stock-length Smallmouth Bass in 2012 was 0.7 (Table 1); however, the sampling gear utilized is not effective at capturing Smallmouth Bass. Spring electrofishing is the most effective method for capturing Smallmouth Bass. Anecdotal reports from anglers indicate that Smallmouth Bass are present in sufficient numbers to provide a sport fishery.

Other: White Sucker and Common Carp were the only other species captured during the 2012 fish community survey and likely have a minimal impact on the fishery (Table 1).

Management Recommendations

- 1) Conduct fish community surveys utilizing gill nets and frame nets on an every third year basis (next survey scheduled in summer 2015) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Continue to manage as a self-sustaining Northern Pike and Yellow Perch fishery.
- 3) Stock Walleye on a biennial basis (≈ 25 large fingerling/acre) to establish additional year classes.
- 4) Collect otoliths from Walleye and Yellow Perch to assess age structure and growth rates of each population.
- 5) Monitor winter and summer kill events. In cases of substantial winter/summer kill stock with Northern Pike, Walleye, and Yellow Perch 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 South Red Iron Lake, 2012. Confidence intervals include 80 percent (\pm CI-80) or 90 percent (\pm CI-90). BLB= Black Bullhead; BLC= Black Crappie; BLG= Bluegill; COC= Common Carp; NOP= Northern Pike; SMB= Smallmouth Bass; WAE= Walleye; WHS= White Sucker; 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	15.9	2.3	72	4	15	4	96	<1
BLC	1.3	0.5	58	18	25	15	97	4
BLG	3.6	1.0	34	10	9	6	120	1
COC	0.1	0.1	100	---	100	---	91	---
NOP	1.3	0.4	21	15	0	---	84	2
SMB	0.7	0.3	31	24	15	19	103	4
WAE	0.1	0.1	0	---	0	---	92	<1
WHS	0.1	0.1	100	0	100	0	102	14
YEP	1.6	0.7	50	16	11	10	91	1
<i>Gill nets</i>								
BLB	26.5	8.6	13	4	0	---	103	<1
BLC	1.2	0.7	29	36	0	---	115	2
NOP	12.0	2.0	49	10	3	3	88	<1
SMB	1.5	1.0	33	31	0	---	108	4
WAE	5.5	1.7	33	14	6	7	94	1
WHS	6.8	1.7	98	4	59	13	110	2
YEP	24.5	3.1	3	2	1	1	102	<1

Table 2. Historic mean catch rate (CPUE; gill/frame nets = catch/net night) of stock-length fish for various fish species captured by frame nets and experimental gill nets in South Red Iron Lake, 2002-2012. BLB = Black Bullhead; BLC= Black Crappie; BLG= Bluegill; COC= Common Carp; LMB=Largemouth Bass; NOP = Northern Pike; SMB= Smallmouth Bass; WAE = Walleye; WHS = White Sucker; YEP = Yellow Perch

Species	CPUE				
	2003	2004	2006 [†]	2009	2012
<i>Frame nets</i>					
BLB	127.8	38.6	8.9	0.4	15.9
BLC	0.9	0.5	0.9	1.0	1.3
BLG	1.6	1.6	23.4	2.4	3.6
COC	0.0	0.0	0.0	0.1	0.1
LMB	0.0	0.0	0.1	0.0	0.0
NOP	0.3	0.2	1.2	0.4	1.3
SMB	0.2	0.6	0.4	0.4	0.7
WAE	0.2	0.1	0.1	0.1	0.1
WHS	0.3	0.1	0.2	0.2	0.1
YEP	0.7	0.3	11.6	0.0	1.6
<i>Gill nets</i>					
BLB	44.2	2.3	1.5	0.0	26.5
BLC	1.8	0.8	0.7	0.5	1.2
BLG	0.5	0.2	0.2	0.0	0.0
COC	0.0	0.0	0.5	0.0	0.0
NOP	9.7	6.2	9.2	6.0	12.0
SMB	0.2	0.7	0.3	0.2	1.5
WAE	3.7	4.3	1.8	3.8	5.5
WHS	10.8	6.2	7.3	4.8	6.8
YEP	34.2	24.2	24.7	4.2	24.5

[†] 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; gill/frame 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) for selected species captured by frame nets and experimental gill nets in South Red Iron Lake, 2002-2012. BLB = Black Bullhead; NOP = Northern Pike; WAE = Walleye; YEP = Yellow Perch

Species	2003	2004	2006 ¹	2009	2012	Objective
<i>Frame nets</i>						
BLB						
CPUE	128	39	9	<1	16	≤ 100
PSD	44	86	83	100	72	---
PSD-P	4	51	77	25	15	---
Wr	89	91	93	90	96	---
<i>Gill nets</i>						
NOP						
CPUE	10	6	9	6	12	≥ 3
PSD	43	57	49	53	49	30-60
PSD-P	5	8	7	8	3	5-10
Wr	84	86	90	90	88	---
WAE						
CPUE	4	4	2	4	6	≥ 10
PSD	32	50	73	100	33	30-60
PSD-P	18	0	36	35	6	5-10
Wr	92	93	93	86	94	---
YEP						
CPUE	34	24	25	4	25	≥ 30
PSD	5	58	7	0	3	30-60
PSD-P	0	1	1	0	1	5-10
Wr	104	100	107	102	102	---

¹ Monofilament gill net mesh size (0.75", 1.0", 1.25", 1.5", 2.0" and 2.5").

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 South Red Iron Lake, 2009-2012.

Survey Year	Year Class											
	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	
2012		2	22	7	3							
2009 ¹	---	---	---		11		8	6			5	
Number stocked												
fry												
small fingerling							61	79			61	
large fingerling	7		17		13							

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

Table 5. Weighted mean TL at capture (mm) for Walleye age-1 through age-10 sampled in experimental gill nets (expanded sample size) from South Red Iron Lake, 2005-2012. 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
2012	245(2)	343(22)	460(7)	521(3)	---	---	---	---	---	---
2009 ¹	196(11)	---	408(8)	462(6)	---	552(5)	---	559(2)	---	---
2007 ¹	---	288(6)	---	478(2)	552(1)	---	---	---	---	---
2006	184(1)	320(1)	425(1)	334(1)	424(3)	---	439(1)	565(1)	498(1)	563(1)
2005	186(1)	297(4)	374(4)	427(5)	---	---	532(2)	---	641(1)	---

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

Table 6. Stocking history including size and number for fishes stocked into South Red Iron Lake, 2002-2012. WAE= Walleye

Year	Species	Size	Number
2003	WAE	small fingerling	60,840
2005	WAE	small fingerling	79,300
2006	WAE	small fingerling	60,800
2008	WAE	large fingerling	12,638
2010	WAE	large fingerling	16,687
2012	WAE	large fingerling	7,380

Table 7. Year class distribution based on the age/length summary for Yellow Perch sampled in gill nets from South Red Iron Lake, 2009-2012.

Survey Year	Year Class					
	2012	2011	2010	2009	2008	2007
2012		3	107	41	6	
2009	---	---	---	---	6	27

Table 8. Weighted mean TL (mm) at capture by gender and age (sample size) for Yellow Perch captured in experimental gill nets (expanded sample size) in South Red Iron Lake, 2009-2012.

Year	Age			
	1	2	3	4
2012				
Male	92 (3)	140 (39)	164 (6)	161 (1)
Female	---	147 (70)	183 (30)	210 (5)
Combined	92 (3)	144 (107)	176 (41)	202 (6)
2009				
Male		136 (2)	---	---
Female	94 (6)	142 (25)	---	---
Combined	94 (6)	142 (27)	---	---

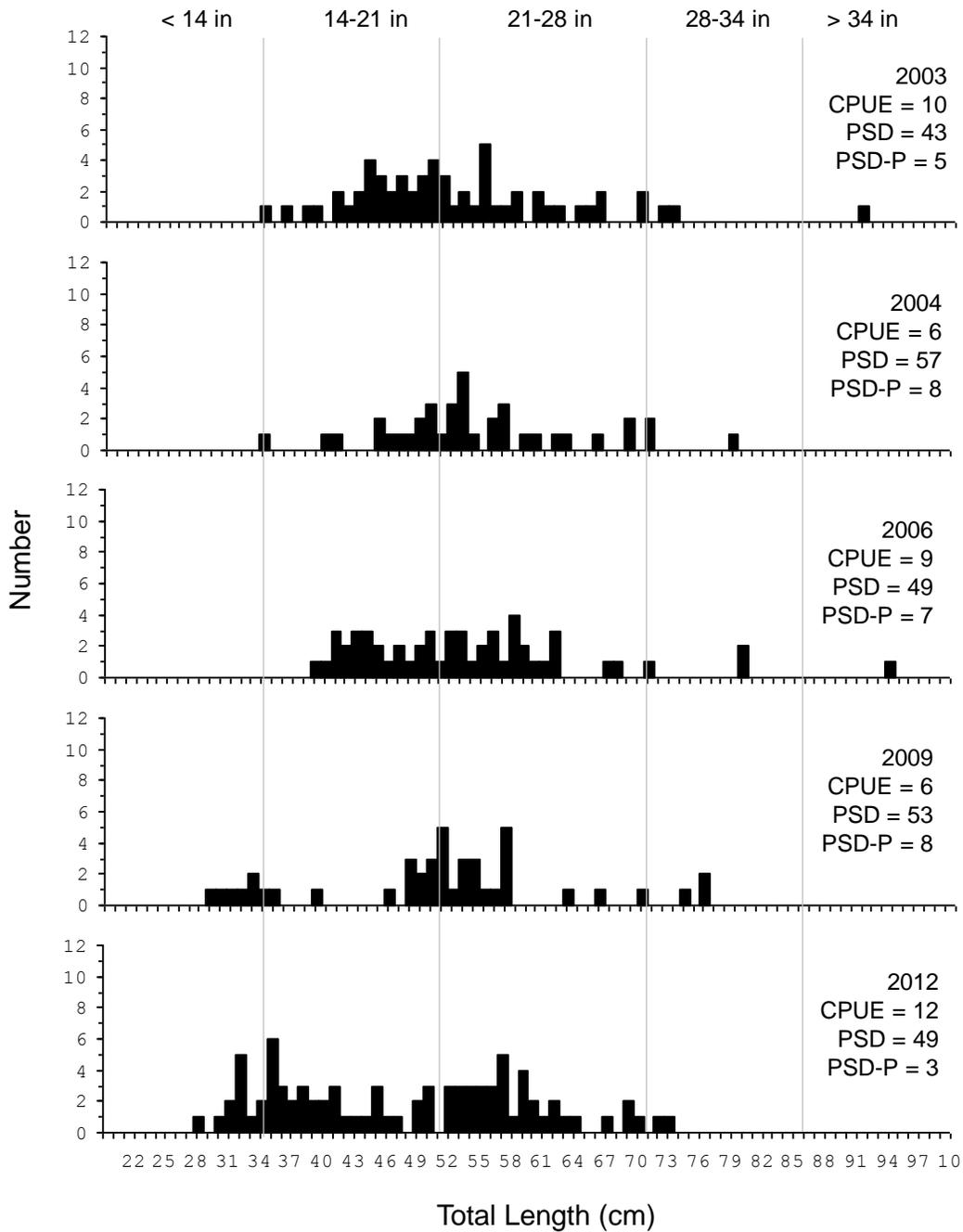


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Northern Pike captured using experimental gill nets in South Red Iron Lake, 2003-2012.

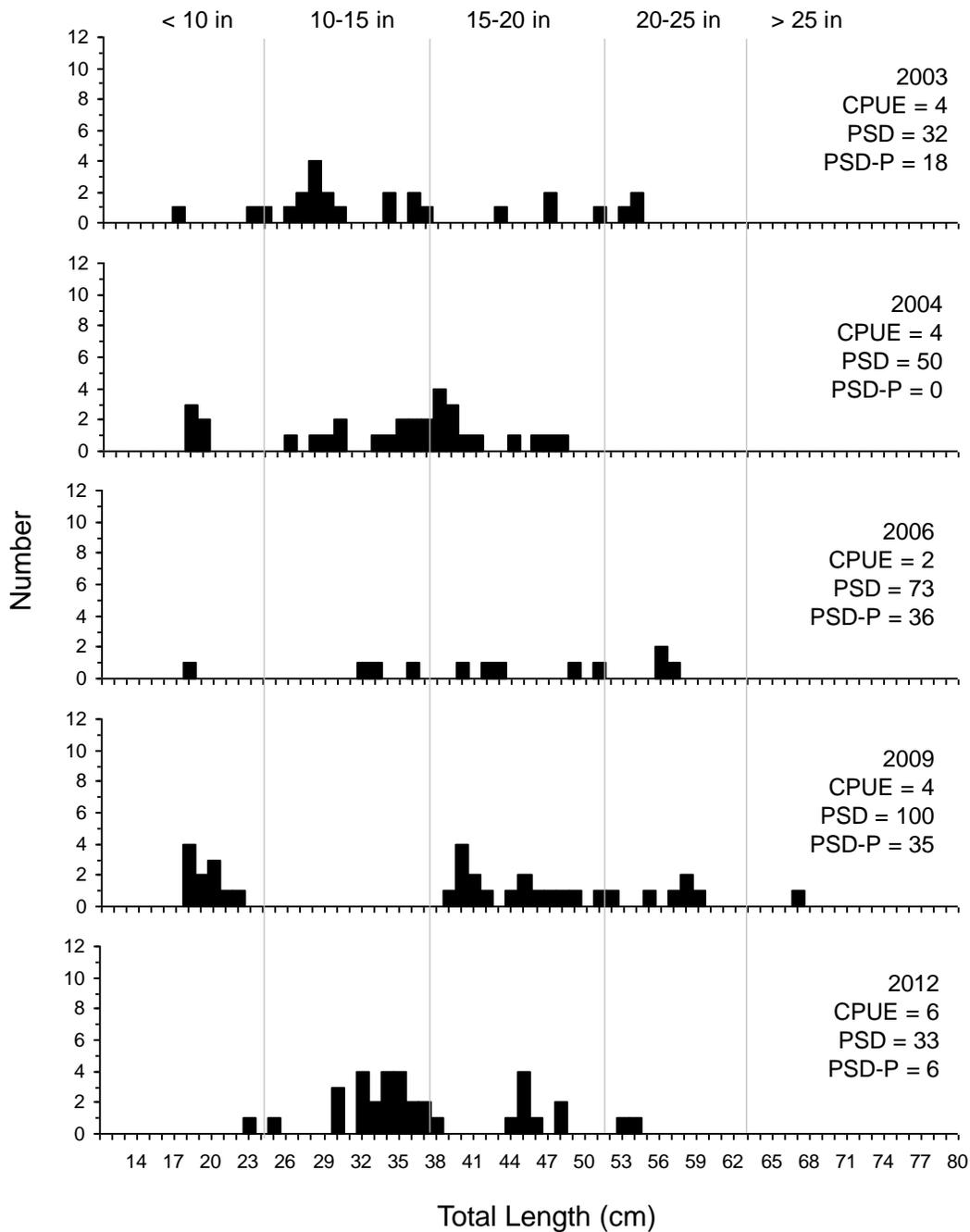


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in South Red Iron Lake, 2003-2012.

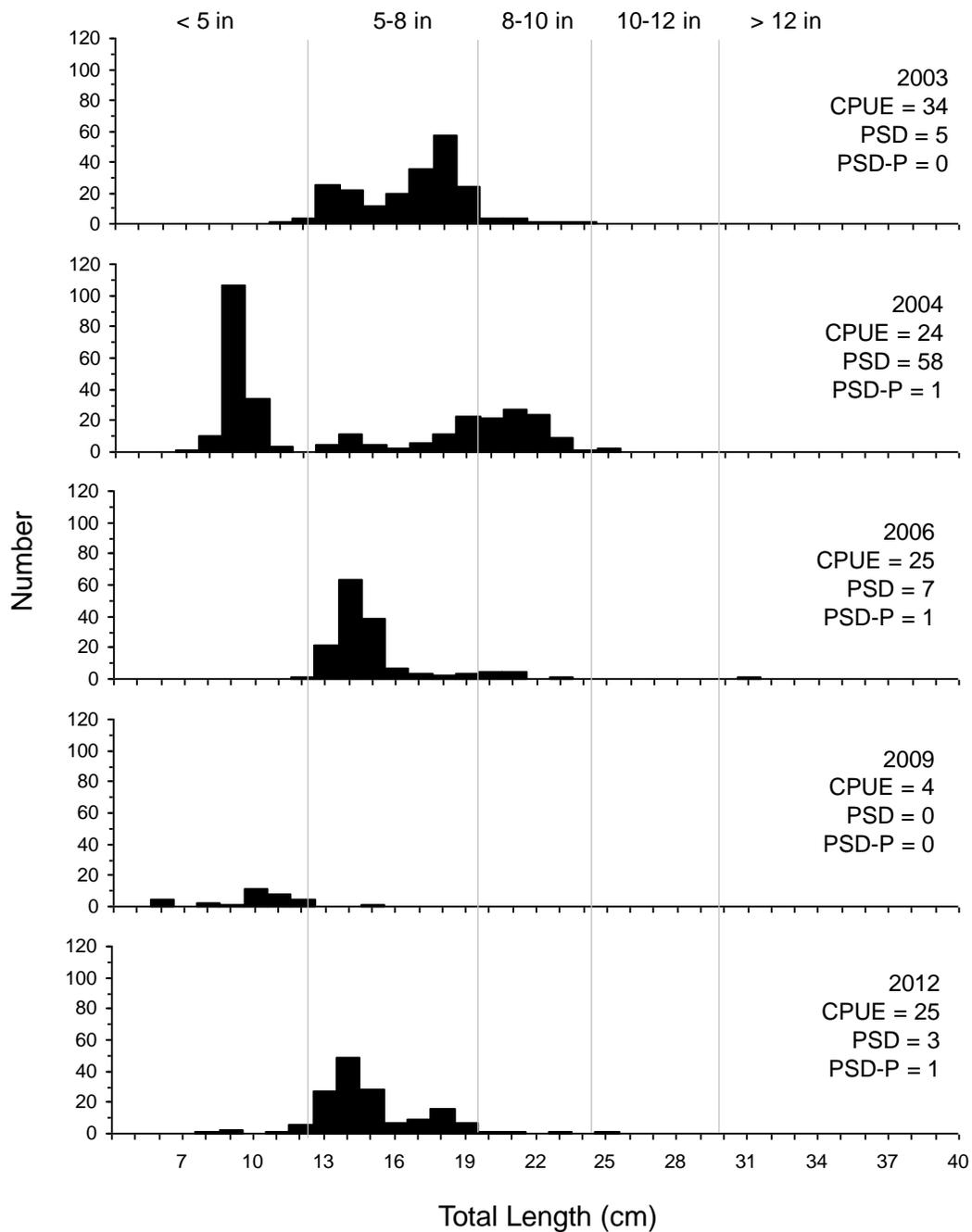


Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in South Red Iron Lake, 2003-2012.