

# Twin Lake

## Site Description

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### Location

Water designation number (WDN)	57-0002-00
Legal description	T115N-R64W-Sec.8-10,15,16
County (ies)	Spink
Location from nearest town	6.0 miles south of Redfield, SD

### Survey Dates and Sampling Information

Survey dates	September 9-10, 2015 (FN, GN)
Frame net sets (n)	18
Gill net sets (n)	6

### Morphometry

Watershed area (acres)	26,367
Surface area (acres)	1,235
Maximum depth (ft)	14
Mean depth (ft)	7

### Ownership and Public Access

Twin Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. Two public access sites exist on the lake, a low water ramp (north shore; inaccessible during high water years) and a high water ramp (east shore) that includes a boat ramp and landing dock (Figure 1; Figure 2). Lands adjacent to the lake are under mixed ownership including the State of South Dakota and private individuals.

### Watershed and Land Use

Twin Lake lies within the 26,367 Twin Lakes 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

The Water Management Board established OHWM and outlet elevation for Twin Lake is 1298.8 and 1299.6 fmsl, respectively. On April 19, 2015 the elevation of Twin Lake was 1298.9 fmsl; 0.6 ft below the fall 2014 elevation of 1299.5 fmsl. On October 5, 2015 water levels had declined to an elevation of 1298.3 fmsl.

### Fish Management Information

Primary species	black crappie, walleye,
Other species	black bullhead, bluegill, common carp, freshwater drum, northern pike, orangespotted sunfish, white sucker, yellow perch
Lake-Specific regulations	none
Management classification	warm-water semi-permanent
Fish consumption advisories	none

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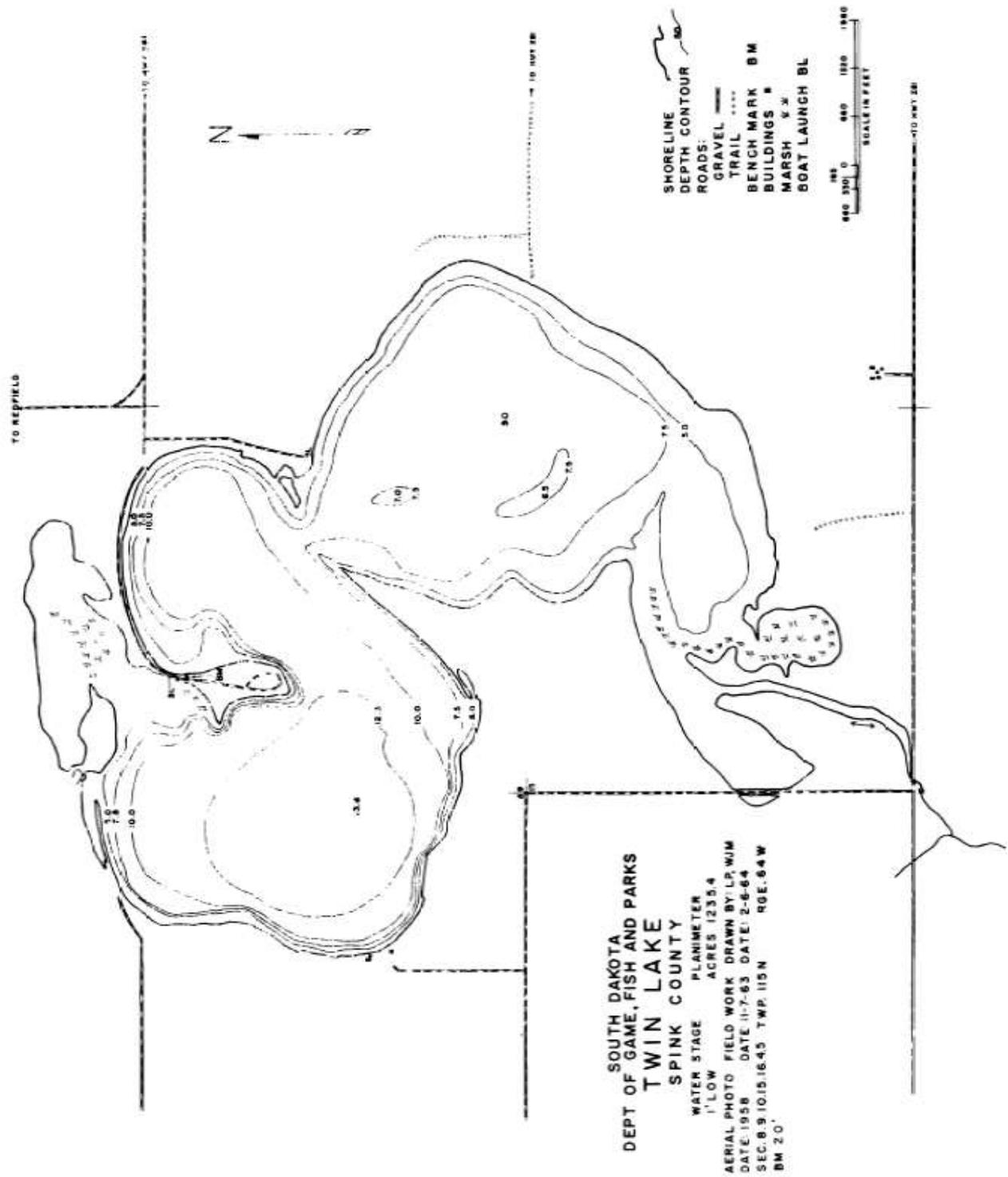




Figure 2. Map depicting geographic location of several lakes in the Redfield, South Dakota area including Mud and Twin Lakes (top). Also noted are access locations (Mud and Twin Lakes) and standardized net locations for Twin Lake (bottom). TWINFN= frame nets; TWINGN= gill nets

## Management Objectives

- 1) Maintain a mean frame net CPUE of stock-length black crappie  $\geq 10$ , a PSD of 30-60, and an RSD-P of 5-10.
- 2) Maintain a mean gill net CPUE of stock length walleye  $\geq 10$ , a PSD of 30-60, and an RSD-P of 5-10.

## Results and Discussion

Twin Lake is a shallow-natural lake located in Spink County near Redfield, South Dakota. The lake is managed primarily as a black crappie and walleye fishery and at times it provides quality angling opportunities for several species including black crappie, northern pike, walleye, and yellow perch. Unfortunately, during dry years the lake becomes relatively-shallow and susceptible to winterkill. A partial winterkill was reported following the 2006-07 winter at Twin Lake; however, gill nets set as part of the 2007 fish community survey conducted August 7-8 indicated that several walleye year classes were present (Kaufman et al. 2008), but water levels remained low through 2009 before rising during the spring of 2010 (SDDENR 2015). Based on the 2011 netting results, it appeared that the lake suffered an apparent winterkill during this time period, as nearly all walleye captured during the 2011 fish community survey were from the 2010 (age-1) cohort (Table 6).

### *Primary Species*

Black Crappie: Black crappies were the most abundant fish species in the frame net catch. The mean frame net CPUE for stock-length black crappie was 29.1 (Table 1) and above the minimum objective ( $\geq 10$  stock-length crappie/net night; Table 3). The 2015 mean frame net CPUE represented a substantial increase from the 2011 CPUE of 1.1 (Table 2).

Black crappie in the frame net catch ranged in TL from 7 to 32 cm (2.8 to 12.6 in), had a PSD of 97 and PSD-P of 92 (Table 1; Figure 3). Both the PSD and PSD-P were above management objective ranges of 30-60 and 5-10, respectively (Table 3). The increase in relative abundance and high size structure can be attributed to relatively abundant 2010 and 2011 cohorts that currently exceed preferred length (i.e., 25 cm; 10 in) in the frame net catch. Size structure is expected to decline, as individuals from the strong 2014 (age-1) year class, which ranged in TL from 7 to 10 cm (2.8 to 3.9 in), surpass stock-length (i.e., 13 cm; 5 in; Table 4; Figure 3).

Based on the 2015 sample, black crappie in Twin Lake appear to grow quickly attaining preferred length (i.e., 30 cm; 12 in) at approximately age 4 or 5 (Table 5). A slight decreasing trend in condition was apparent as TL increased but mean  $W_r$  values were  $\geq 110$  for all length categories (i.e., stock to quality) represented. The mean  $W_r$  of stock-length individuals was 114 (Table 1).

Walleye: Walleye were the most abundant fish species in the 2015 gill net catch. The mean gill net CPUE of stock-length walleye was 45.2 (Table 1) and well above the minimum objective ( $\geq 10$  stock-length walleye/net night; Table 3). Since 2003, mean gill net CPUE values have ranged from a low of 2.8 (2003) to a high of 45.2 (2015; Table 2). Currently, relative abundance is high.

Walleye captured in gill nets ranged in TL from 21 to 48 cm (8.3 to 18.9 in) with the majority being stock to quality length (i.e., 25-38 cm; 10-15 in; Figure 4). The PSD was 28 and slightly below the management objective range of 30-60; no preferred-length (i.e., 51 cm; 20 in) walleye were captured (Table 1; Figure 4).

Age estimates made using otoliths indicated the presence of three year classes (2010, 2012, and 2014), all of which, coincided with stocking events (Table 6; Table 8). The 2012 and 2014 cohorts were the most abundant and comprised 98% of walleye in the gill net catch. The contribution of natural reproduction to year classes coinciding with stocking events is unknown, as stocked walleye were unmarked not allowing for differentiation of stocked from naturally-produced walleye.

Growth rates appear to be fast with weighted mean TL at capture values for age-3 Walleye that approached or exceeded quality length (i.e., 38 cm; 15 in) in surveys conducted in 2007 and 2015 (Table 8). In 2015, walleye were in good condition with mean Wr values  $>90$  for all length categories (i.e., stock to quality) sampled. The mean Wr of stock-length walleye was 94 (Table 1) and no length-related trends in condition were apparent.

### *Other Species*

Black Bullhead: Few black bullheads were captured in the 2015 frame net catch. The mean frame net CPUE of stock-length black bullhead was 0.1 and the lowest recorded since 2003 (Table 1; Table 2). Currently, relative abundance is low and their impact on the sport fishery is likely minimal.

Yellow Perch: No yellow perch were captured in surveys conducted in 2007 or 2011 (Table 2). As a result of their absence, adult yellow perch were stocked in the spring of 2015 (Table 8). While the stocking contribution is unknown, yellow perch were sampled in the 2015 gill net catch; the mean gill net CPUE of stock-length individuals was 2.8 (Table 1) and indicated low relative abundance. Given that sampled yellow perch may not have originated in Twin Lake and sample size was low no inferences will be made concerning other population parameters (e.g., growth).

Other: Bluegill, common carp, freshwater drum, northern pike, and orangespotted sunfish were other fish species captured in low numbers 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 structure, fish growth, and stocking success.
- 2) Collect otoliths from black crappie and walleye to assess age structure and growth rates of each population.
- 3) Stock walleye ( $\approx 500$  fry/acre) on a biennial basis (even years) to supplement the walleye population.
- 1) Monitor winter and summer kill events. In cases of substantial winter or summer kill the need to re-establish a fishery in Twin Lake should be evaluated. If water levels are sufficient, walleye and black crappie 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 frame nets experimental gill nets from Twin Lake, 2015. 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; FRD= freshwater drum; NOP= northern pike; OSF= orangespotted sunfish; 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	0.1	0.1	100	---	100	---	91	---
BLC	29.1	9.4	97	1	92	2	114	1
BLG	0.2	0.2	100	0	100	0	151	<1
COC	0.7	0.5	100	0	92	14	92	4
NOP	0.1	0.1	100	0	100	0	76	18
OSF <sup>1</sup>	0.2	0.1	---	---	---	---	---	---
WAE	4.5	1.0	52	9	0	---	93	1
YEP	0.2	0.2	0	---	0	---	105	9
<i>Gill Nets</i>								
BLB	0.2	0.2	100	---	100	---	89	---
BLC	1.7	0.8	100	0	100	0	113	3
COC	2.0	1.1	100	0	92	15	95	3
FRD	0.2	0.2	0	---	0	---	105	---
NOP	0.3	0.3	100	0	50	50	92	24
WAE	45.2	2.6	28	5	0	---	94	1
YEP	2.8	1.5	24	19	6	10	106	2

<sup>1</sup> All fish sizes.

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 Twin Lake, 2003-2015. BLB= black bullhead; BLC= black crappie; BLG= bluegill; COC= common carp; FRD= freshwater drum; NOP= northern pike; OSF= orangespotted sunfish; WAE= walleye; WHS= white sucker; YEP= yellow perch

Species	CPUE			
	2003	2007 <sup>2</sup>	2011	2015
<i>Frame nets</i>				
BLB	166.1	1.6	53.4	0.1
BLC	39.9	9.4	1.1	29.1
BLG	0.0	0.0	0.2	0.2
COC	7.4	0.2	9.4	0.7
NOP	2.1	0.1	0.2	0.1
OSF <sup>1</sup>	0.0	0.0	0.0	0.2
WAE	3.7	6.7	6.3	4.5
WHS	0.2	0.0	0.0	0.0
YEP	1.2	0.0	0.0	0.2
<i>Gill nets</i>				
BLB	18.0	0.5	19.0	0.2
BLC	2.3	0.0	1.0	1.7
COC	27.8	8.8	17.5	2.0
FRD	0.0	0.0	0.0	0.2
NOP	1.0	0.0	0.3	0.3
WAE	2.8	8.0	33.0	45.2
YEP	3.8	0.0	0.0	2.8

<sup>1</sup> All fish sizes

<sup>2</sup> Monofilament gill net mesh size (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")



Table 7. Weighted mean TL at capture (mm) for walleye sampled in experimental gill nets (expanded sample size) from Twin Lake, 2007-2015. 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
2015	291(121)	---	380(147)	---	465(5)	---	---
2011	268(160)	---	---	---	453(1)	---	---
2007	258(10)	---	408(20)	---	---	604(1)	565(4)

Table 8. Stocking history including size and number for fishes stocked into Twin Lake, 2006-2015.

Year	Species	Size	Number
2006	WAE	fry	1,200,000
2008	WAE	fry	1,200,000
2010	WAE	fry	1,250,000
2012	WAE	fry	604,448
2014	WAE	fry	620,000
2015	YEP	adult	4,950

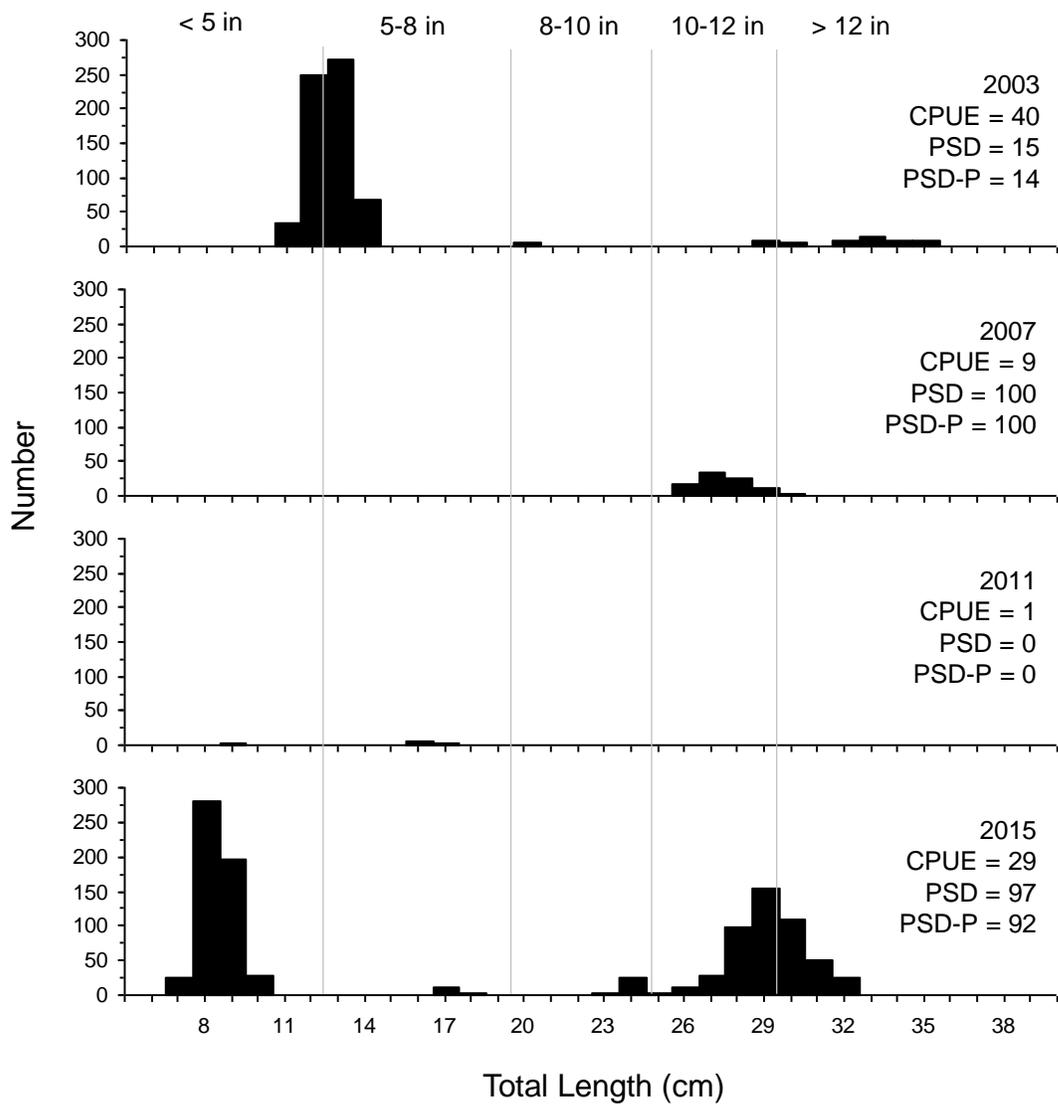


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for black crappie captured using frame nets in Twin Lake, 2003-2015.

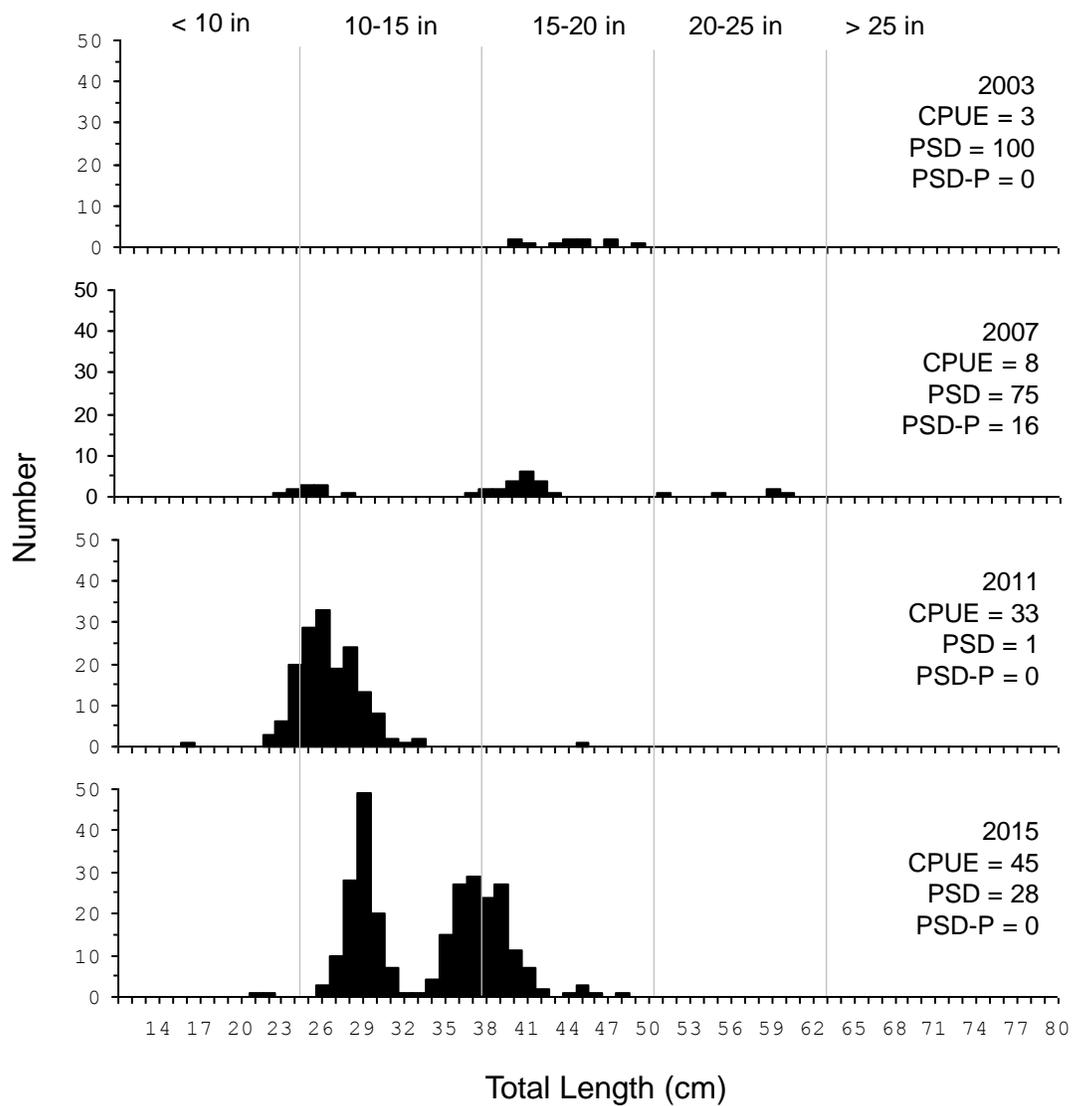


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Twin Lake, 2003-2015.