Dry Lake

Site Description

Location

Water designation number (WDN)	05-0011-00
Legal description	T118N-R54W-Sec. 5,6,7,8,9,10,11,14,15,16
County (ies)	Codington
Location from nearest town	0.5 miles south of Florence, SD

Survey Dates and Sampling Information

Survey dates	May 29-30, 2013 (GN)
Gill net sets (n)	4

Morphometry (Figure 1)

Watershed area (acres)	12,035
Surface area (acres)	≈1,360
Maximum depth (ft)	≈15
Mean depth (ft)	unknown

Ownership and Public Access

Dry 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 east shore, west of State Highway 20 (Figure 1; Figure 2) and is maintained by the SDGFP. Lands adjacent to Dry Lake are owned by the State of South Dakota, U.S. Fish and Wildlife Service, and private individuals.

Watershed and Land Use

The 12,035 acre Dry Lake sub-watershed (HUC-12) is located within the larger Grass, Dry, and Still Lakes (HUC-10) watershed. Land use within the watershed is primarily agricultural with a mix of pasture or grassland, cropland, and scattered shelterbelts. Additionally, the city of Florence is located on the northern shore of Dry Lake.

Water Level Observations

No OHWM or outlet elevation was available for Dry Lake. The elevation on May 21, 2013 was 1746.4 fmsl, slightly higher than the fall 2012 elevation of 1745.8 fmsl. On October 9, 2013 the water level had declined to an elevation of 1745.7 fmsl.

Fish Management Information

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

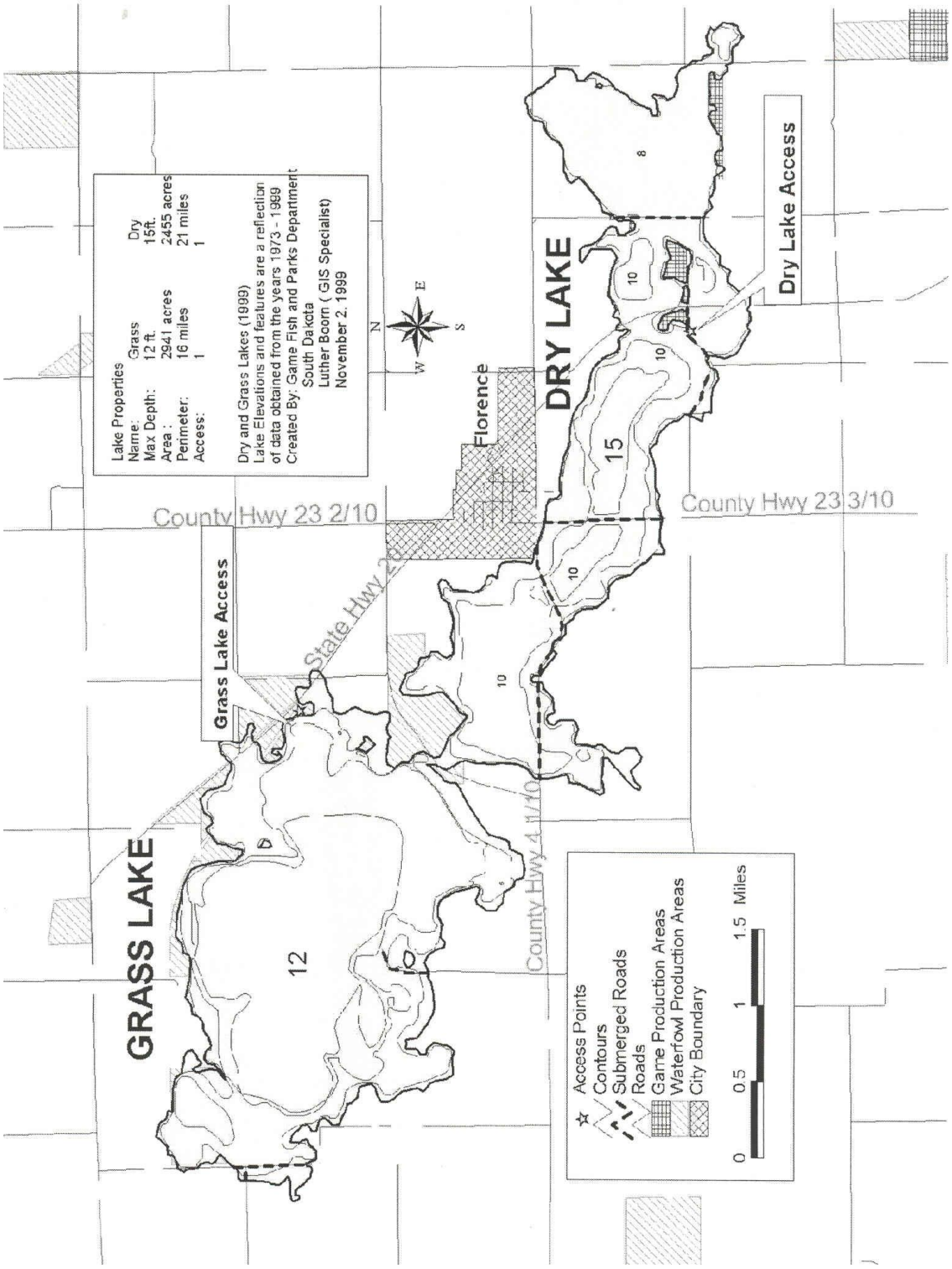

Figure 1. Map depicting depth contours of Dry and Grass Lakes, Codington County, South Dakota.

Figure 2. Map depicting public access and standardized net locations for Dry Lake, Codington County, South Dakota. DRGN= 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.

Results and Discussion

Prior to the 1990s, Dry Lake was a shallow slough with limited sport fishery potential. However, above normal precipitation during the mid to late 1990s increased the surface area and depth of the lake, which diminished the threat of winterkill and created habitat capable of sustaining a sport fishery.

An abundant walleye population developed in Dry Lake and the lake quickly became a popular destination for anglers. Unfortunately, fall water levels declined from 2001-2007 and remained low through 2009 (SDDENR 2014). Subsequently the lake suffered partial winter and summer fish kills that limited the sport fishery. In 2010 and 2011, water levels increased substantially and Walleye and Yellow Perch were stocked into Dry Lake (Table 6). Currently, Dry Lake is managed as a Walleye and Yellow Perch fishery.

Primary Species

Walleye: The mean gill net CPUE of stock-length Walleye was 20.0 (Table 1) and above the minimum objective (≥ 10 stock-length Walleye/net night). Since 2003, mean gill net CPUE values have ranged from a low of 14.2 (2003) to a high of 25.0 (2005; Table 2). Although each of the fish community surveys conducted since 2003 indicates an abundant Walleye population, partial winter and summer kill events severely limited the population between surveys conducted in 2005 and 2013 (see above). Currently, relative abundance is considered high.

Walleye captured in gill nets during 2013 ranged in TL from 18 to 44 cm (7.1 to 17.3 in; Figure 2). The PSD of 38 was within the objective range of 30-60; while the PSD-P was 0, as no preferred-length Walleye were sampled (Table 3; Figure 3).

Otoliths were collected from a sub-sample of gill net captured walleye. Three walleye year classes (2010-2012) were present (Table 4). Year classes produced in 2010 and 2011 were well represented and comprised 34% and 57%, respectively, of Walleye in the gill net catch (Table 4). The 2010 year class coincided with a fry stocking; while the strong 2011 cohort appears to be the result of natural reproduction (Table 4; Table 6). The contribution of stocked or naturally-produced walleye to the 2010 and 2012 year classes is unknown, as stocked walleye were unmarked making it difficult to differentiate stocked from naturally-produced walleye.

In 2013, weighted mean TL at capture of age-2 and age-3 walleye was 330 and 416 mm (13.0 and 16.4 in; Table 5). Mean Wr values of Walleye in the gill net catch ranged from 82 to 88 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length Walleye being 85 (Table 1). No length-related trends in condition were apparent.

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 7.3 (Table 1) and below the minimum objective (≥ 30 stock-length Yellow Perch/net night; Table 3). Based on the 2013 gill net catch, relative abundance appears to be low.

Gill net captured Yellow Perch ranged in TL from 10 to 28 cm (3.9 to 11.0 in; Figure 4). Age estimates made using otoliths revealed the presence of three consecutive year classes (2010-2012; Table 7). The 2011 (age-2) year class was the most abundant (25 of 31 individuals) comprising 71% of Yellow Perch in the gill net catch (Table 7).

In 2013, few male Yellow Perch were sampled (Table 8). The weighted mean TL at capture of age-2 females was 202 mm (8.0 in; Table 8). Although sample sizes were low, gill net captured Yellow Perch had acceptable condition, with mean Wr values that ranged from 89 to 94 for all length categories (e.g., stock to quality) sampled. The mean Wr of stock-length Yellow Perch was 93 (Table 1) and no length-related trends in condition were apparent.

Other Species

Northern Pike: Relative abundance of Northern Pike was high, with the mean gill net CPUE of stock-length Northern Pike being 7.5 (Table 1). The high relative abundance can be attributed to increased recruitment related to substantial rises in spring water levels that took place in recent years (SDDENR 2014). Northern Pike depend heavily on flooded vegetation for spawning and recruitment, and tend to have improved recruitment during springs that have rising water levels.

Gill net captured Northern Pike ranged in TL from 50 to 85 cm (19.7 to 33.5 in), had a PSD of 93 and a PSD-P of 33 (Table 1; Figure 5). Size structure indices should be interpreted with caution as sample size was low (i.e., 30 stock-length Northern Pike).

The condition of gill net captured Northern Pike was similar to that of Northern Pike captured from other northeast South Dakota glacial lakes (e.g., Grass and Pelican Lakes), with mean Wr values that ranged from 80 to 88 for all length categories (e.g., stock to quality) sampled. Stock-length Northern Pike had a mean Wr of 83 (Table 1) and no length-related trends in condition were apparent.

Other: Black Bullhead and White Sucker were other fish species captured in low numbers during the 2013 survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys on an every fifth year basis (next survey scheduled in summer 2018) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

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

3) Stock Walleye (≈500 fry/acre) on a biennial basis to establish additional year classes, provided water levels are sufficient.

4) Monitor winter and summer kill events. In cases of substantial winter/summer kill the need to re-establish a fishery in Dry 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 Dry Lake, 2013. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= Black Bullhead; 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	2.5	1.1	40	30	0	---	98	3
NOP	7.5	1.1	93	8	33	15	83	2
WAE	20.0	7.0	38	9	0	---	85	1
WHS	0.8	0.8	100	---	100	---	118	16
YEP	7.3	2.8	69	15	10	10	93	1

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured experimental gill nets from Dry Lake, 2003-2013. BLB= Black Bullhead; COC= Common Carp; NOP= Northern Pike; OSF= Orangespotted Sunfish; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

	CPUE		
Species	2003[1]	2005	2013
Gill nets			
BLB	4.5	1.5	2.5
COC	0.2	0.0	0.0
NOP	5.3	1.7	7.5
OSF[1]	0.7	5.5	0.0
WAE	14.2	25.0	20.0
WHS	1.7	2.0	0.8
YEP	4.2	8.8	7.3

[1] Sampling conducted approximately one month later (i.e., early July) than other years

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 Dry Lake, 2003-2013. NOP= Northern Pike; WAE = Walleye; YEP = Yellow Perch

Species	2003[1]	2005	2013	Objective
Gill nets				
NOP				
CPUE	5	2	8	---
PSD	97	100	93	---
PSD-P	6	50	33	---
Wr	100	98	83	---
WAE				
CPUE	14	25	20	≥ 10
PSD	38	100	38	30-60
PSD-P	0	15	0	5-10
Wr	101	102	85	---
YEP				
CPUE	4	9	7	≥ 30
PSD	64	80	69	30-60
PSD-P	4	20	10	5-10
Wr	105	91	93	---

[1] Sampling conducted approximately one month later (i.e., early July) than other years

Table 4. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1000) from Dry Lake, 2005-2013.

	Year Class													
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
2013		8	50	30										
2005	---	---	---	---	---	---	---	---			1	49	48	2
# stocked														
fry		1000		2000			2000		1400				3000	
sm. fingerling														
lg. fingerling														

Table 5. Weighted mean TL at capture (mm) for Walleye sampled in experimental gill nets (expanded sample size) from Dry Lake, 2005-2013. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

	Age				
Year	1	2	3	4	5
2013	193 (8)	330 (50)	416 (30)	---	---
2005	---	380 (1)	463 (49)	493 (48)	554 (2)

Table 6. Stocking history including size and number for fishes stocked into Dry Lake, 2000-2013. WAE= Walleye; YEP= Yellow Perch

Year	Species	Size	Number
2001	WAE	fry	3,000,000
	YEP	fingerling	22,570
2005	WAE	fry	1,400,000
2007	WAE	fry	2,000,000
2010	WAE	fry	2,000,000
	YEP	fingerlings	3,375
2011	YEP	adult	3,145
2012	WAE	fry	1,000,000

Table 7. Year class distribution based on the expanded age/length summary for Yellow Perch sampled in gill nets from Dry Lake, 2013.

	Year Class			
Survey Year	2013	2012	2011	2010
2013		6	25	4

Table 8. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from Dry Lake, 2013.

	Age		
Year	1	2	3
2013			
Male	109 (4)	200 (4)	247 (1)
Female	104 (2)	202 (21)	274 (3)
Combined	107 (6)	202 (25)	267 (4)

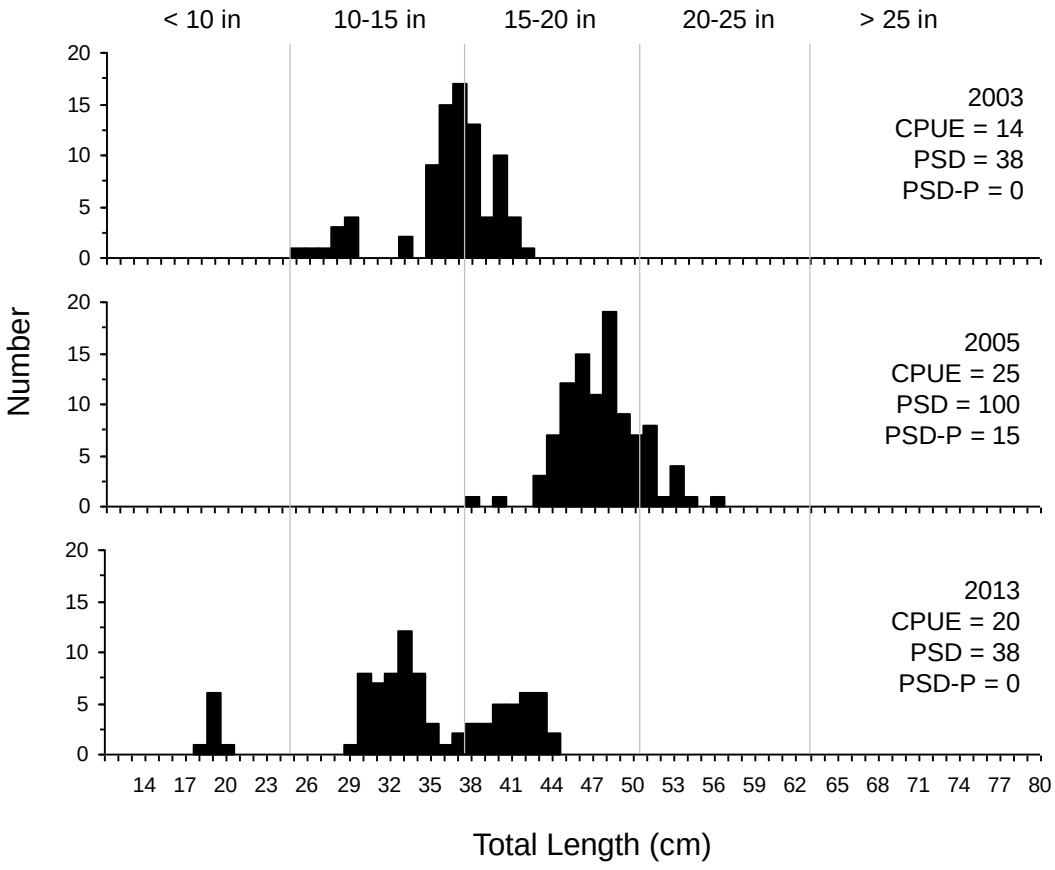

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Dry Lake, 2003-2013.

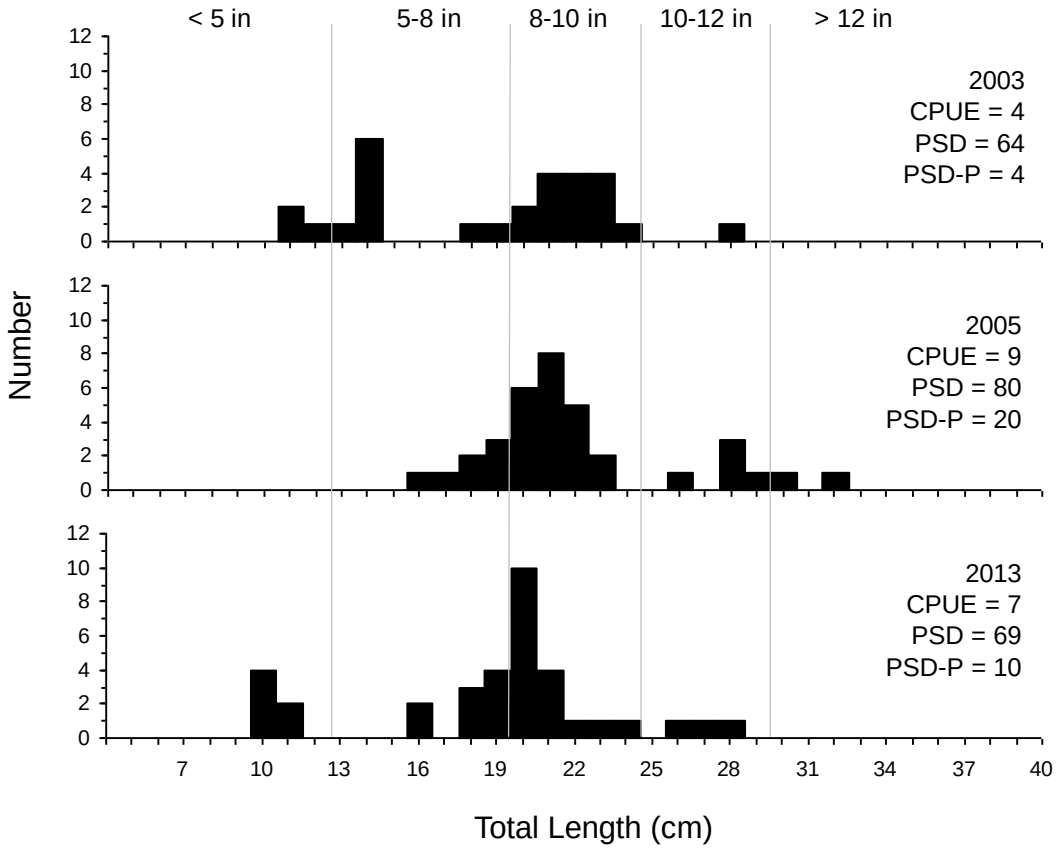

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in Dry Lake, 2003-2013.

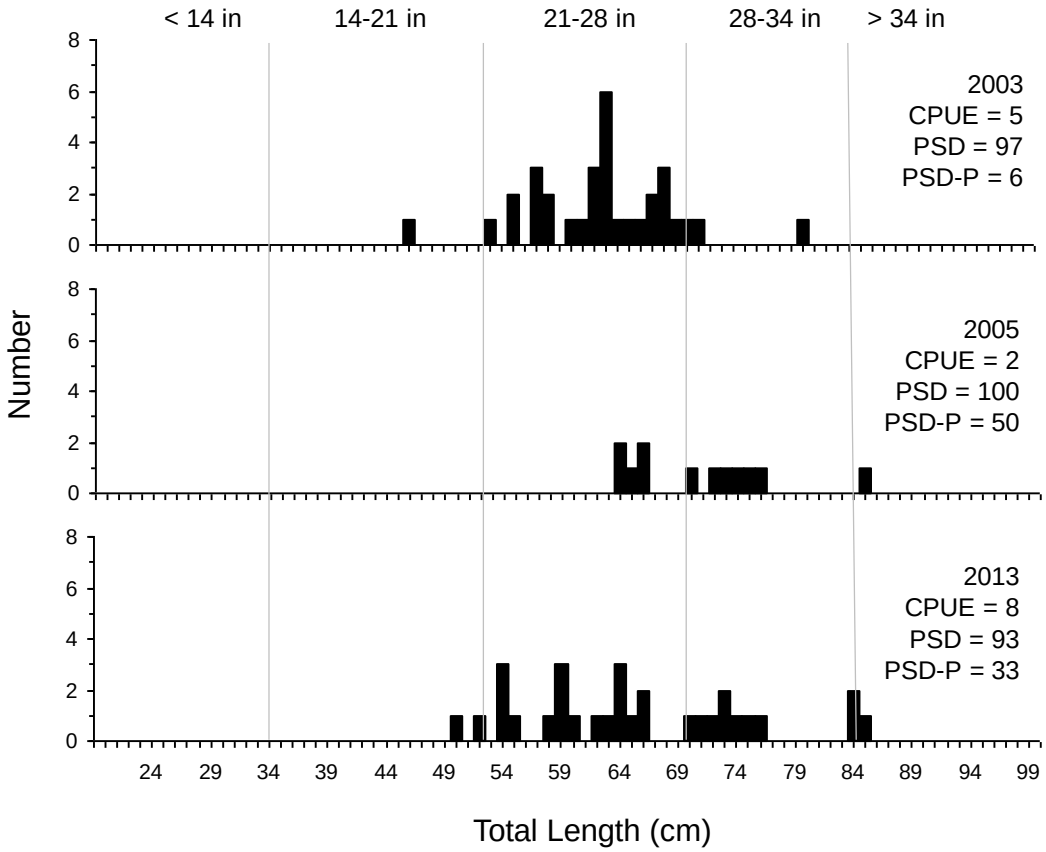

Figure 5. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Northern Pike captured using experimental gill nets in Dry Lake, 2003-2013.