Hazeldon Lake

Site Description

Location

Water designation number (WDN)	22-0019-00
Legal description	T124N-R55W-Sec. 20, 28, 29, 32, 33
County (ies)	Day
Location from nearest town	2.0 miles east and 0.5 miles north of Roslyn, SD

Survey Dates and Sampling Information

Survey dates	June 24-26, 2014 (FN, GN)
Frame net sets (n)	18
Gill net sets (n)	6

Morphometry (Figure 1)

Watershed area (acres)	38,077
Surface area (acres)	863
Maximum depth (ft)	20
Mean depth (ft)	12

Ownership and Public Access

Hazeldon 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 (including boat ramp and dock) is located on the southeast shore and is maintained by the SDGFP (Figure 1; Figure 2). Lands adjacent to the lake are owned by the State of South Dakota and private individuals.

Watershed and Land Use

The 38,077 acre Opitz Lake sub-watershed (HUC-12) encompasses Hazeldon Lake and is located within the larger Northern Coteau Lake-Upper James River (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

Water levels on Hazeldon Lake are not monitored by SDDENR.

Fish Management Information

Primary species	walleye, yellow perch
Other species	black bullhead, black crappie, common carp, green sunfish; northern pike, orangespotted sunfish; smallmouth bass, white sucker
Lake-specific regulations	none
Management classification	none
Fish consumption advisories	none

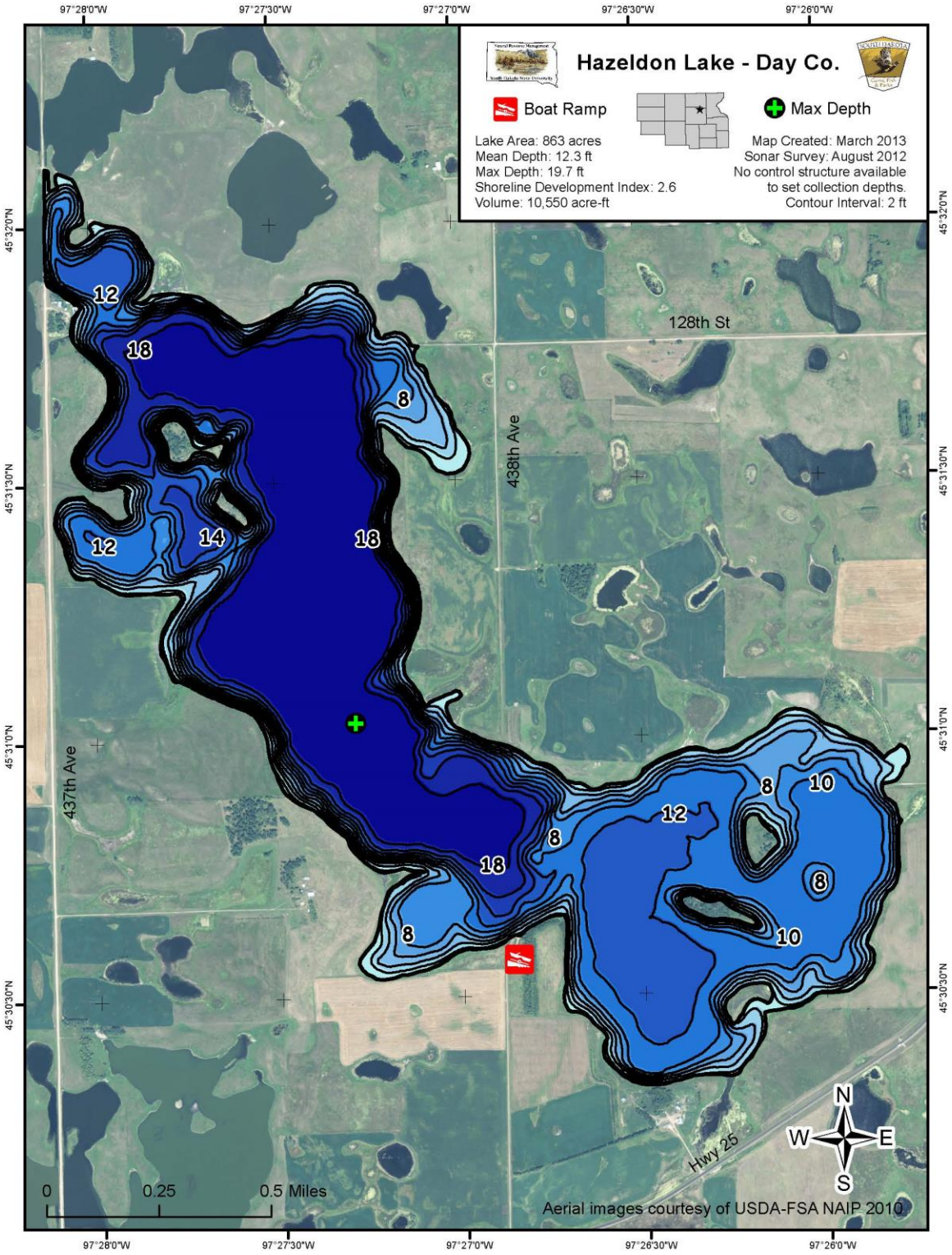

Figure 1. Map depicting depth contours of Hazeldon Lake.

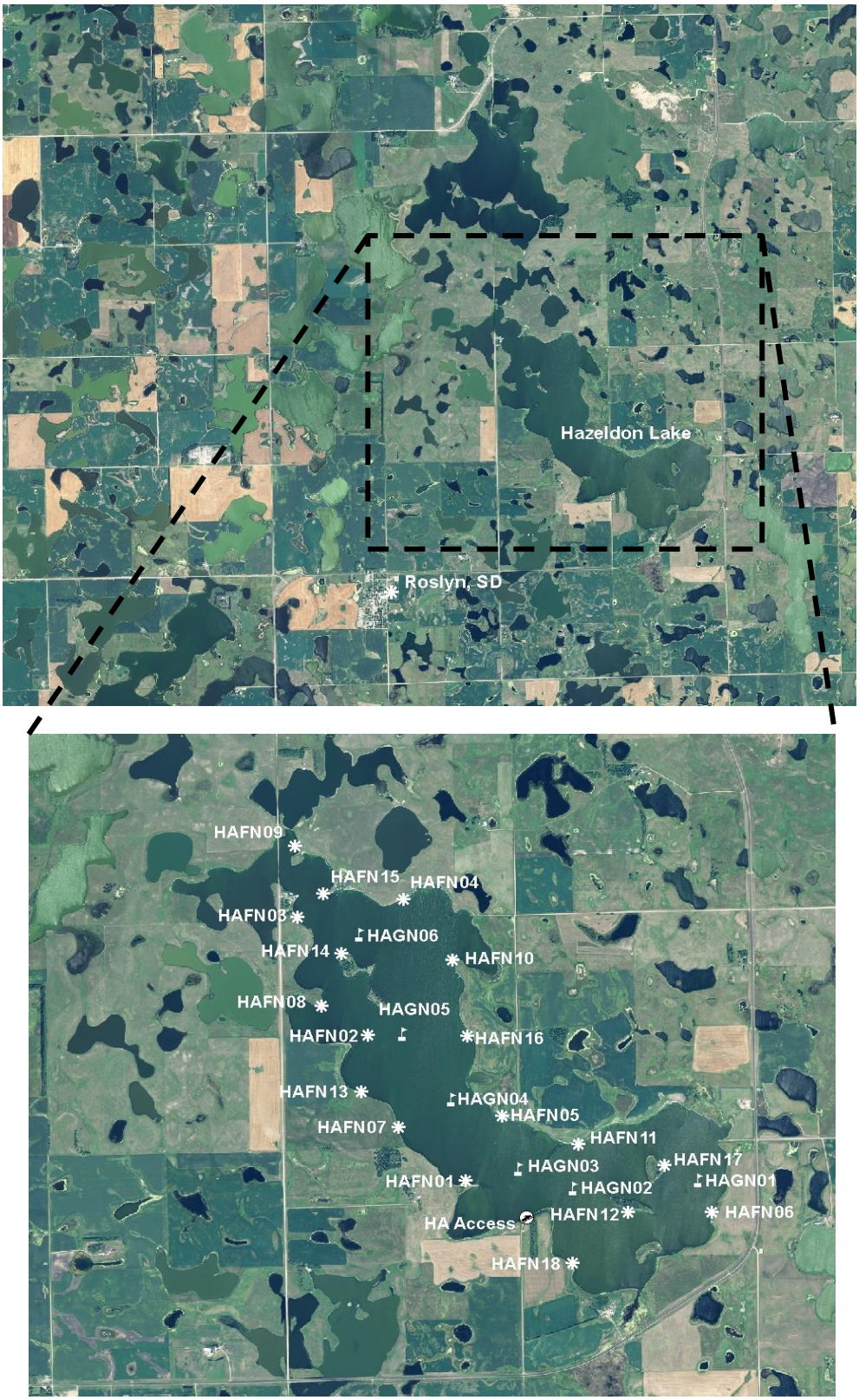

Figure 2. Map depicting geographic location of Hazeldon Lake (Day County) from Roslyn, South Dakota (top). Also noted is the public access location and standardized net locations for Hazeldon Lake (bottom). HAFN= frame net; HAGN= gill net

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 1990's, Hazeldon Lake was shallow and unable to support a sport fishery. However, above average precipitation during the mid to late 1990's provided an increase in surface area and depth of the lake creating habitat capable of supporting a sport fishery.

The first stocking of fish into Hazeldon Lake by SDGFP occurred in 1999 when walleye and black crappie were stocked. The initial walleye stocking was successful and a strong year class was established. In 2000, Hazeldon Lake was closed to fishing to protect the expanding Walleye population from angler harvest. Additional walleye stockings were completed in 2000 and 2001 and a high-density population developed. South Dakota Game, Fish and Parks planned to utilize the expanding walleye population as an additional egg source to help meet the state's stocking requirements; however, eggs collected during 2004 and 2005 had low hatch rates and the lake was opened to fishing in July 2006 (see Blackwell et al. 2013).

Currently, Hazeldon Lake is managed as a walleye and yellow perch fishery; however, other species such as black crappie, northern pike, and an occasional smallmouth bass may also contribute to the fishery. Overall, as many as 10 fish species have been collected from Hazeldon Lake (see above; Fish Management Information).

Primary Species

Walleye: The 2014 mean gill net CPUE for stock-length walleye of 2.0 was below the minimum objective (≥ 10 stock-length walleye/net) and the lowest recorded since 2005 (Table 1; Table 2; Table 3). Currently, relative abundance is low.

Gill net captured walleye ranged in TL from 16 to 68 cm (6.3 to 26.8 in), had a PSD of 33, and a PSD-P of 17 (Table 1; Figure 3). The PSD was within the management objective range of 30-60; while, the PSD-P was above the management objective range of 5-10 (Table 3).

Although the magnitude of year-class strength has been low in recent years, both naturally-produced and stocked walleye have contributed to the population (Table 4). In 2014, otoliths were collected from a sub-sample of gill net captured walleye; five year classes (2001, 2008, 2011-2013) were represented, each by a relatively-low number of individuals (Table 4).

Since 2005, weighted mean TL at capture values have ranged from 240 to 401 mm (9.4 to 15.8 in) and 346 to 468 mm (13.6 to 18.4 in) at ages 2 and 3, respectively (Table 5). However, due to low sample sizes weighted mean TL at capture values may at times represent a single walleye. In 2014, weighted mean TL at capture values for age-2 and age-3 walleye were 240 and 346 mm (9.4 and 13.6 in), the lowest reported since 2005 (Table 5). Gill net captured walleye were in good condition with mean Wr values ranging from 84 to 107 for all 10-mm length groups sampled. The mean Wr of stock-length walleye was 89 (Table 1) and no length-related trends in condition were apparent.

Yellow Perch: In 2014, the mean gill net CPUE was 40 and is above the minimum objective (≥ 30 stock-length yellow perch/net night; Table 3). The 2014 mean gill net CPUE represents an increase from the 2008-2011 average of 17.5. Currently, relative abundance is considered high.

Gill net captured yellow perch ranged in TL from 9 to 29 cm (3.5 to 11.4 in), had a PSD of 40 and PSD-P of 3 (Table 1; Table 3; Figure 3). The PSD value was within the management objective range of 30-60 and the PSD-P was below the management objective range of 5-10 (Table 3; Figure 3). Based on age estimates from otoliths, four year classes (2010-2013) were represented in the gill net catch (Table 7). The 2011-2012 year classes comprised 87% of yellow perch in the gill net catch (Table 7).

The weighted mean TL at capture for age-2 male yellow perch was 161 mm (6.3 in); while the weighted mean TL at capture for age-2 female yellow perch was 176 mm (6.9 in; Table 8). Gill net captured yellow perch were of high condition, with mean Wr values of 92-110 for all length categories (e.g., stock to quality) sampled. A decreasing trend in condition was apparent as TL increased.

Other Species

Black Bullhead: In surveys conducted from 2005-2014, black bullhead relative abundance has remained low, with mean frame net CPUE values not exceeding four stock-length black bullhead/net night (Table 2). In 2014, the mean frame net CPUE for black bullhead was 0.9 (Table 1).

Black Crappie: Black crappie relative abundance has remained low from 2005-2014 with mean frame net CPUE values of stock-length black crappie ≤ 1.7 (Table 2). Poor recruitment has resulted in the current low abundance; however, adult black crappies are present and the potential exists for the population abundance to increase.

Northern Pike: Northern pike relative abundance has remained low to moderate from 2005-2014 with mean gill net CPUE values of stock-length northern pike ≤ 2.0 (Table 2).

Common Carp: Common carp have not historically been sampled in Hazeldon Lake (Table 2). However, during the 2014 survey common carp were the most represented species in the frame nets (Table 1). The mean frame net CPUE value was 9.8 (Table 1). The impact of the observed increase in relative abundance on the sport fishery is unknown and will be monitored.

Other: Green sunfish and orangespotted sunfish were the only other fish species captured during the 2012 survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys utilizing gill nets and frame nets biennially (next survey scheduled in summer 2016) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

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

3) Stock walleye (≈500 fry/acre) biennially to establish additional year classes if gill netting results warrant (i.e., low gill net CPUE of < 25 cm (10 in) walleye).

Table 1. 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) of stock-length fish for various fish species captured in frame nets and experimental gill nets from Hazeldon Lake, 2014. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= black bullhead; BLC= black crappie; COC= common carp; GSF= green sunfish; NOP= northern pike; OSF= Orangespotted sunfish; WAE= walleye; 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	0.9	0.4	19	18	6	11	91	4
BLC	0.1	0.1	50	50	50	50	115	33
COC	9.8	2.9	100	0	86	4	95	<1
GSF	0.2	0.1	67	67	0	---	111	17
NOP	0.4	0.3	86	28	0	---	81	5
OSF[1]	0.1	0.1	---	---	---	---	---	---
WAE	0.8	0.3	50	25	29	22	87	3
YEP	0.5	0.3	11	21	0	---	99	6
Gill nets								
COC	0.5	0.5	100	0	100	0	106	5
NOP	2.0	0.9	100	0	42	27	85	3
WAE	2.0	1.7	33	26	17	20	89	3
YEP	40	9.2	40	5	3	2	106	1

[1] All fish sizes

Table 2. Historic mean catch rate (CPUE; gill nets = catch/net night, electrofishing = catch/hour) of stock-length fish for various fish species captured in frame nets, experimental gill nets and electrofishing from Hazeldon Lake, 2005-2014. BLB= black bullhead; BLC= black crappie; COC= common carp; GSF= green sunfish; NOP= northern pike; OSF= Orangespotted sunfish; SMB= smallmouth bass; WAE= walleye; WHS= white sucker; YEP= yellow perch

	CPUE								
Species	2005	2006[1]	2007[1]	2008	2009	2010	2011	2012	2014
Frame nets									
BLB	0.2	0.1	0.6	1.8	3.8	1.9	---	0.7	0.9
BLC	1.0	1.7	1.6	0.3	1.0	0.1	---	0.1	0.1
COC	0.0	0.0	0.0	0.0	0.0	0.0	---	40.7	9.8
GSF	0.1	2.1	5.2	4.7	5.3	5.9	---	2.1	0.2
NOP	0.3	0.1	0.1	0.2	0.0	0.0	---	0.3	0.4
OSF[2]	0.0	0.0	0.0	0.0	0.0	0.0	---	0.0	0.1
SMB	0.0	0.0	0.0	0.0	0.1	0.0	---	0.0	0.0
WAE	4.3	2.0	1.6	0.3	0.8	1.7	---	1.2	0.8
WHS	0.0	0.0	0.1	0.1	0.1	0.1	---	0.0	0.0
YEP	0.6	5.6	3.1	1.7	1.4	1.0	---	8.4	0.5
Gill nets									
BLB	0.0	0.0	0.2	0.3	0.3	0.2	0.2	0.0	0.0
BLC	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0
COC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	0.5
NOP	0.5	0.8	0.2	1.2	1.0	0.2	0.5	0.0	2.0
WAE	22.3	29.2	7.2	5.0	4.2	8.7	5.3	7.5	2.0
WHS	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
YEP	16.3	51.5	49.7	19.5	16.0	19.3	15.0	44.8	40.0
Electrofishing									
WAE[3]	---	---	---	243.6	96.8	4.0	330.0	---	---

[1] Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")
[2] All fish sizes
[3] Fall night electrofishing-WAE; catch rate (CPUE) represents age-0 walleye not stock length

Table 3. Mean catch rate (CPUE; gill/frame nets = catch/net night), 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 Hazeldon Lake, 2005-2014. WAE= walleye; YEP= yellow perch

Species	2005	2006[1]	2007[1]	2008	2009	2010	2011	2012	2014	Objective
Gill nets										
WAE										
CPUE	22	29	7	5	4	9	5	8	2	≥ 10
PSD	74	81	79	87	96	52	97	38	33	30-60
PSD-P	6	11	5	13	48	23	50	16	17	5-10
Wr	92	93	96	105	99	100	103	95	89	---
YEP										
CPUE	16	52	50	20	16	19	15	45	40	≥ 30
PSD	34	47	36	38	42	22	8	9	40	30-60
PSD-P	9	17	8	6	8	3	0	2	3	5-10
Wr	111	109	112	112	99	110	101	105	106	---

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

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 Hazeldon Lake, 2009-2014.

	Year Class													
Survey Year	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001
2014		7	12	4			1							1
2012	---	---		67	1	6	5		1				1	3
2011[1]	---	---	---		1	4	10	2	2	6				4
2010[1]	---	---	---	---		22	21		6	2				5
2009[1]	---	---	---	---	---		9	1	7	4	1	1		7
# stocked														
fry		600		600[2]										1000
sm. fingerling							80[3]		125					
lg. fingerling														

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

[2] Stocked walleye were OTC marked; 16 of 25 otoliths collected from fall electrofished age-0 walleye exhibited marks for an estimated stocking contribution of 64%

[3] 70% of stocked walleye were OTC marked; 39 of 50 otoliths collected from fall electrofished age-0 walleye exhibited marks for an estimated stocking contribution of ≈100%

Table 5. Weighted mean TL at capture (mm) for walleye sampled in experimental gill nets (expanded sample size) from Hazeldon Lake, 2005-2014. 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	6	7	8	9	10
2014[1]	180 (7)	240 (12)	346 (4)	---	---	606 (1)	---	---	---	---
2012[1]	244 (67)	401 (1)	468 (6)	500 (5)	---	631 (1)	---	---	---	665 (1)
2011[1]	240 (1)	389 (4)	454 (10)	527 (2)	512 (2)	544 (6)	---	---	---	595 (4)
2010[1]	256 (22)	379 (21)	---	515 (6)	537 (2)	---	---	---	530 (5)	---
2009	211 (9)	376 (1)	446 (7)	524 (4)	517 (1)	594 (1)	---	516 (7)	586 (1)	593 (3)
2008	245 (5)	377 (4)	458 (8)	463 (5)	494 (1)	---	512 (8)	548 (2)	---	---
2007	258 (6)	382 (9)	432 (6)	472 (1)	---	475 (20)	471 (2)	---	---	---
2006	260 (17)	349 (17)	409 (31)	---	444 (71)	482 (5)	509 (35)	---	---	---
2005	220 (10)	331 (11)	---	393 (45)	438 (8)	487 (25)	---	---	---	---

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

Table 6. Stocking history including size and number for fishes stocked into Hazeldon Lake, 1999-2014. BLC= black crappie; WAE= walleye;

Year	Species	Size	Number
1999	BLC	fingerling	113,646
	WAE	small fingerling	201,800
2000	WAE	fry	100,000
2001	WAE	fry	1,000,000
2006	WAE	small fingerling	125,220
2008	WAE	small fingerling	80,040
2011	WAE	fry	600,000
2013	WAE	fry	600,000

Table 7. Year class distribution based on the expanded age/length summary for yellow perch sampled in gill nets from Hazeldon Lake, 2009-2014.

	Year Class											
Survey Year	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
2014		33	122	116	2							
2012	---	---		744	61	31						
2011	---	---	---		156	87	2					
2010	---	---	---	---		486	56	9				
2009	---	---	---	---	---		77	75	11	1		1

Table 8. Weighted mean TL (mm) at capture by gender for yellow perch captured in experimental gill nets (expanded sample size) from Hazeldon Lake, 2009-2014.

	Age					
Year	1	2	3	4	5	6
2014						
Male	105 (15)	161 (20)	189 (10)	---	---	---
Female	108 (18)	176 (117)	224 (86)	294 (2)	---	---
Combined	107 (33)	173 (122)	216 (116)	294 (2)	---	---
2012						
Male	112 (280)	165(16)	164 (11)	---	---	---
Female	119 (450)	190 (41)	242 (13)	---	---	---
Combined	116 (744)	180 (61)	196 (31)	---	---	---
2011						
Male	100 (39)	155 (18)	207 (1)	---	---	---
Female	103 (116)	178 (69)	241 (1)	---	---	---
Combined	102 (156)	173 (87)	224 (2)	---	---	---
2010						
Male	106 (199)	174 (15)	239 (3)	---	---	---
Female	111 (265)	195 (41)	256 (5)	---	---	---
Combined	109 (486)	187 (56)	247 (9)	---	---	---
2009						
Male	106 (31)	184 (12)	222 (3)	---	---	---
Female	107 (45)	196 (64)	254 (7)	286 (1)	---	344 (1)
Combined	107 (77)	194 (75)	242 (11)	286 (1)	---	344 (1)

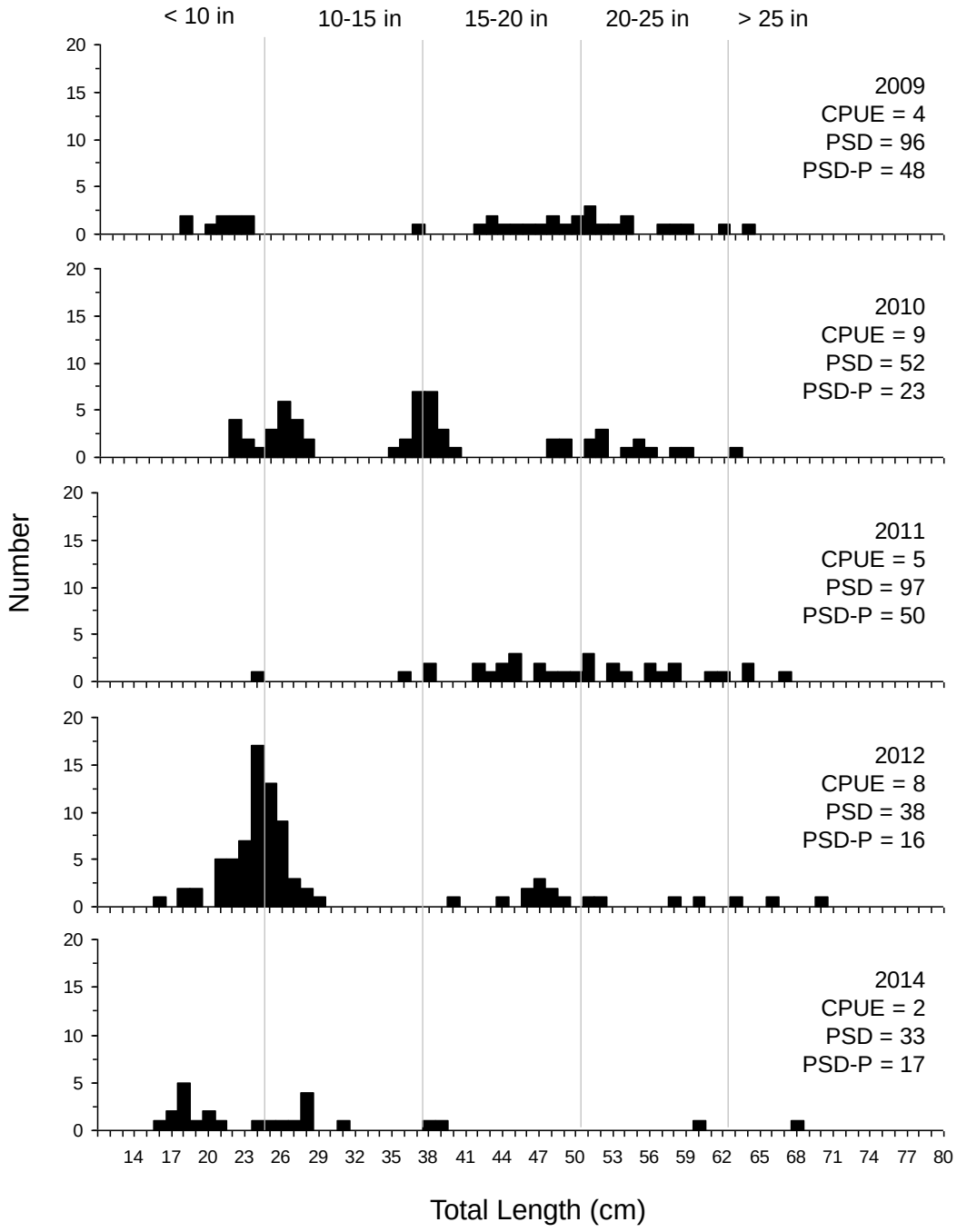

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for walleye captured using experimental gill nets in Hazeldon Lake, 2009-2014.

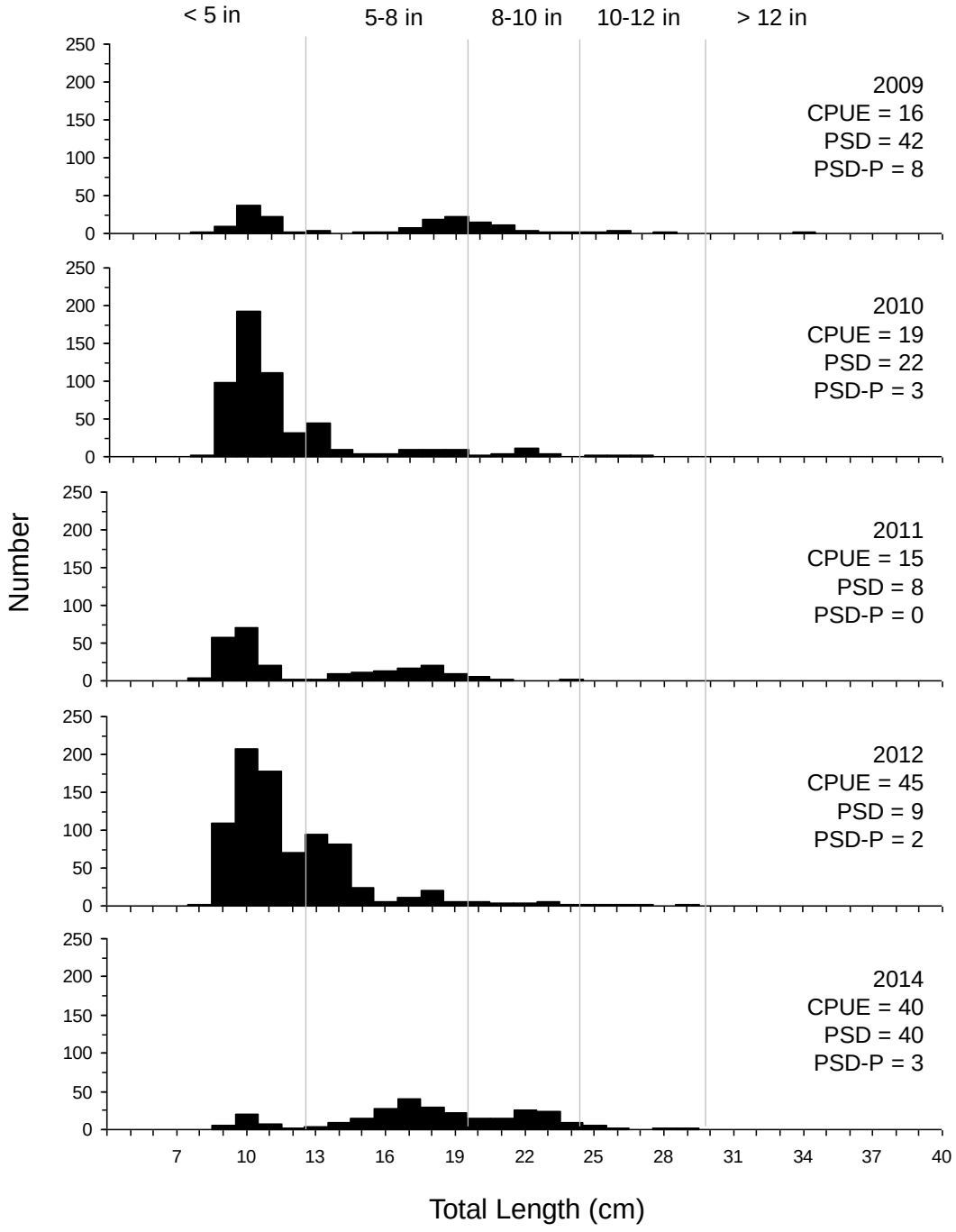

Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for yellow perch captured using experimental gill nets in Hazeldon Lake, 2009-2014.