Fall Walleye Index Netting at Pine Lake, Alberta, 2012

Fisheries Management
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Abstract

A total of 99 fish representing four species were caught during the Fall Walleye Index Netting (FWIN) survey. Walleye were the most abundant species in the FWIN nets accounting for 79% of the catch. Individual net catches were variable ranging from 0 to 34 Walleye. The catch-per-unit effort (CPUE) for Walleye was 11.6 fish·100m^{-2}·24hrs^{-1} (95% C.I. 3.9–20.1), which is 60% below the Alberta mean of 18.6 fish·100m^{-2}·24hrs^{-1}. Walleye total lengths (TL) (n=78) ranged from 107 to 573 mm and fish over 500 mm TL represented 13% of the catch. The majority of fish were in the 110 to 230 mm TL size category. There were 7 age-classes present (ages 0, 1, 4, 6 and 8 to 10) and 78% of the Walleye sampled were mature. Mean age-at-maturity is difficult to determine due to age-class gaps and low sample sizes, however females and males were mature by ages 4 and 6, respectively. Walleye reached a mean TL of 500 mm by age 6 and the growth curve suggests that the asymptotic average maximum body size (L_{inf}) was 607.3 mm TL.

The CPUE for Yellow Perch was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.4). Only one Yellow Perch was captured in 2012 and had a TL of 153 mm.

Northern Pike were the second most abundant species caught in the FWIN nets and accounted for 18% of the catch. The CPUE for Northern Pike was 2.7 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.5–6.0). Northern Pike TLs (n=18) ranged from 404 to 677 mm and fish over 500 mm TL represented 72% of the catch.

Although the results of this survey have been summarized, the authors caution that the reported 2012 FWIN catch rates may not reflect the actual and current population structure of Walleye and other captured fish species. Any comparisons made to previous survey years and to other provincial waterbodies should be treated with caution. It was suspected that anoxic conditions were present at the time of the survey, within the deep stratum of the lake, which resulted in reduced catch rates of those net sets. It is recommended that a FWIN survey be completed within the next couple of years so an unbiased sample can be used for current status and trend purposes.

Introduction

Alberta Environment and Sustainable Resource Development develops and implements strategies to sustainably manage fish populations and provide opportunities for harvest, when suitable. Monitoring is required to evaluate the effectiveness of these strategies and to develop alternate strategies where evidence supports change. During Fall Walleye Index Netting (FWIN) our objective is to estimate relative abundance, population structure and growth of Walleye (*Sander vitreus*), and also collect data on other species. These data are essential to provide sustainable harvest allocations for sport fish and provides insight into the current management strategies by comparing the results from previous FWIN surveys. This FWIN survey was conducted in September 2012 to determine abundance, structure, and reproduction (recruitment) of the Walleye population in Pine Lake.

Methods

This FWIN survey was conducted on September 24 and 25, 2012. A comprehensive description of equipment and methodology can be found in the Manual of Instructions Fall Walleye Index Netting (FWIN) (Morgan 2002). The FWIN nets consisted of eight panels, 7.62 m in length and 1.83 m in height with stretched mesh sizes of 25, 38, 51, 64, 76, 102, 127, and 152 mm. Nets were set at 6 sites randomly selected and weighted by depth stratum. Nets were set for 24 hrs (± 3 hours) before being cleared of fish and reset at new locations. Set and pull times were recorded. Nets were set perpendicular to depth contours, and minimum and maximum depths were recorded. Net location were recorded in Universal Transverse Mercator (UTM) projection coordinates using the North American Datum 1983 (NAD 83) on handheld GPS units. Surface water temperature was also recorded at all net locations, and ranged between 14.4 and 15.2°C.

All fish species were kept for biological sampling. Catches were recorded by net location and mesh size. Net identification, date, mesh size, and count of each species of fish caught were recorded for each panel for catch-per-unit-effort (CPUE) calculations. All fish were measured for fork length (FL), and total length (TL) to the nearest millimetre, and weighed in grams, with individual data recorded on a sample envelope for each fish. Walleye, Northern Pike (*Esox lucius*) and Yellow Perch (*Perca flavescens*) were examined for gender and maturity, and a bony structure was removed for ageing. Otoliths were collected from Walleye and Yellow Perch and aged following criteria in Watkins and Spencer (2009). Cleithra were collected from Northern Pike and aged following the criteria in Mackay et al. (1990). Growth was described using the von Bertalanffy growth model in FAST 2.1 (Auburn University 2000-2001).

Relative abundance expressed as CPUE was calculated as number of fish caught·100m^{-2}·24hrs^{-1} with 95% confidence intervals empirically determined by bootstrapping catches to 50,000 replications (Haddon 2001).

Interpretations of the Walleye population status are based on criteria contained in the *Alberta's Walleye Management Recovery Plan* (Berry 1995, Sullivan 2003) modified for FWIN (Watters and Davis 2004).

The raw data is stored digitally in the Fish and Wildlife Management Information System (FWMIS), project # 16619.

Results

A total of 99 fish representing four species were caught during the 2012 FWIN survey (Table 1). Walleye were the most abundant species in the FWIN nets accounting for 79% of the catch. Individual net catches were highly variable ranging from 0 to 34 Walleye per net. The CPUE for Walleye was 11.6 fish·100m^{-2}·24hrs^{-1} (95% C.I. 3.9–20.1), which is a 67% decrease from the 2008 CPUE of 35.2 fish·100m^{-2}·24hrs^{-1} (95% C.I. 20.0–50.0) on Pine Lake, and 38% below the Alberta mean of 18.6 fish·100m^{-2}·24hrs^{-1} (Figure 1, Table 2). Walleye total lengths (TL) (n=78) ranged from 107 to 573 mm and fish over 500 mm TL represented 13% of the catch. In 2012, the majority of Walleye were in the 110 to 230 mm TL size category with a few larger individuals in the 440 to 580 size range. Walleye in the 240 to 430 mm TL size category were not present in the 2012 catch that were abundant in 2008 (Figure 2). In 2012, there were 7 age-classes present (ages 0, 1, 4, 6 and 8 to 10), but none were stable (> 3 fish·100m^{-2}·24hrs^{-1}). This is different from the 2008 data where 11 age-classes were represented, four of these being stable (ages 2, 3, 4 and 6). The most abundant age classes were the 6-year-olds in 2011 and 1-year-olds in 2012, which represented 22% and 63% of the catch, respectively (Figure 3). In 2012, the mean Walleye age was 2.2 years and 78% of the Walleye sampled were mature. Mean age-at-maturity is difficult to determine due to age-class gaps and low sample sizes, however females and males were mature by ages 4 and 6, respectively (Figure 4). Walleye reached a mean TL of 500 mm by age 6 and the growth curve suggests that the asymptotic average maximum body size (L_{inf}) was 607.3 mm TL (Figure 5).

The CPUE for Yellow Perch was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.4). Only one Yellow Perch was captured in 2012 and had a TL of 153 mm. Yellow Perch length frequency distribution between years cannot be compared due to the low sample size in 2012 (n=1) (Figure 6).

Northern Pike were the second most abundant species caught in the FWIN nets and accounted for 18% of the catch. The CPUE for Northern Pike was 2.7 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.5–6.0). Northern Pike TLs (n=18) ranged from 404 to 677 mm and fish over 500 mm TL represented 72% of the catch. Northern Pike length-frequency distribution between years is difficult to compare due to the low sample sizes in each TL size category in 2012 (Figure 7).

Interpretation

As a result of potentially anoxic conditions at the time of the survey, the population status classification for the Pine Lake Walleye fishery cannot be accurately determined by the 2012 data. It was suspected that low dissolved oxygen concentrations were occurring within the deep stratum of the lake and subsequently resulted in reduced CPUE of deep net sets. The field crew onsite at the time of the survey encountered a foul smelling odor of sulphur when pulling some of the deep nets, which is consistent with the smell of anoxic water. The field crew did not have a dissolved oxygen meter onsite to confirm low oxygen levels were occurring at the individual net sets, but based on the odor and the low numbers of fish it was determined that conditions at Pine Lake were not optimal at the time of the survey. Ideally, field staff would have set additional nets and measured oxygen levels, but because of time and budget constraints another day of sampling was not possible. AESRD Fisheries Management Branch recommends that a FWIN be completed within 1 or 2 years so an unbiased sample can be used to assess the current fish stocks and for trend comparisons to previous sampling years.

Table 1. Species catch summary by site, Pine Lake, September 2012

Set Number	Lift Date (2012)	Stratum (Min - Max Depth (m))	UTM Easting	UTM Northing	Meridian	Soak Time (h)	Fish Count per Species				
							NRPK	WALL	WHSC	YLPR	Set Total
10C	25-Sep	Deep (6.2 - 9.2 m)	333742	5772273	-111 (Zone 12)	24.42	3	22	1		26
12A	25-Sep	Deep (5.2 - 11.5 m)	333389	5771899	-111 (Zone 12)	23.58		12			12
13A	25-Sep	Deep (6.6 - 8.1 m)	334219	5771775	-111 (Zone 12)	24.17	1				1
13C	25-Sep	Shallow (2.8 - 5.1 m)	334497	5771409	-111 (Zone 12)	24.42	12	34		1	47
3C	25-Sep	Deep (7.7 - 8.2 m)	331779	5775264	-111 (Zone 12)	23.75	2	7	1		10
9B	25-Sep	Deep (11.2 - 11.4 m)	332739	5772790	-111 (Zone 12)	23.75		3			3
Species Total							18	78	2	1	99

Table 2. Species catch rates from the 2006, 2007, 2008 and 2012 Pine Lake FWIN surveys.

Species	Year	CPUE	95% CI
NRPK	2006	6.1	(3.0 - 10.7)
	2007	5.6	(1.9 - 10.0)
	2008	4.4	(0.9 - 9.9)
	2012	2.7	(0.5 - 6.0)
WALL	2006	36.3	(22.3 - 54.8)
	2007	46.0	(33.7 - 70.0)
	2008	35.2	(20.0 - 50.0)
	2012	11.6	(3.9 - 20.1)
WHSC	2006	N/A	N/A
	2007	N/A	N/A
	2008	N/A	N/A
	2012	0.3	(0.0 - 0.6)
YLPR	2006	12.8	(5.9 - 19.9)
	2007	14.5	(13.6 - 15.5)
	2008	17.3	(18.1 - 31.7)
	2012	0.1	(0.0 - 0.4)

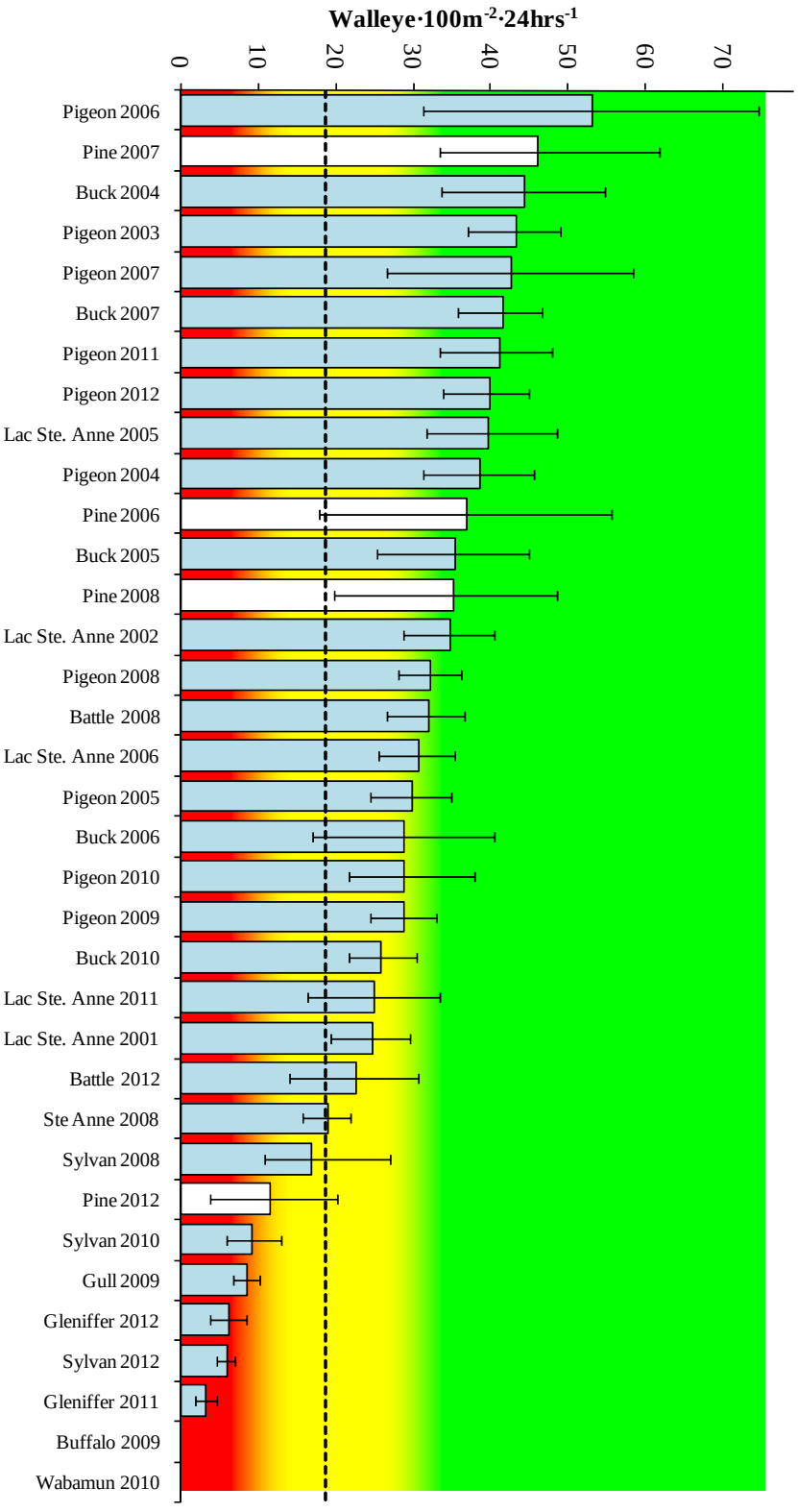

Figure 1. Mean Walleye catch rates with 95% CI from a representative sample of FWIN surveys from Across Central Alberta. The dashed line represents the mean provincial catch rate of 18.6 fish·100m^{-2}·24hrs^{-1}. Collapsed, vulnerable, and stable catch rate ranges are indicated by red, yellow and green backgrounds. The Walleye catch rates from the 2006 to 2012 Pine Lake FWIN surveys are highlighted.

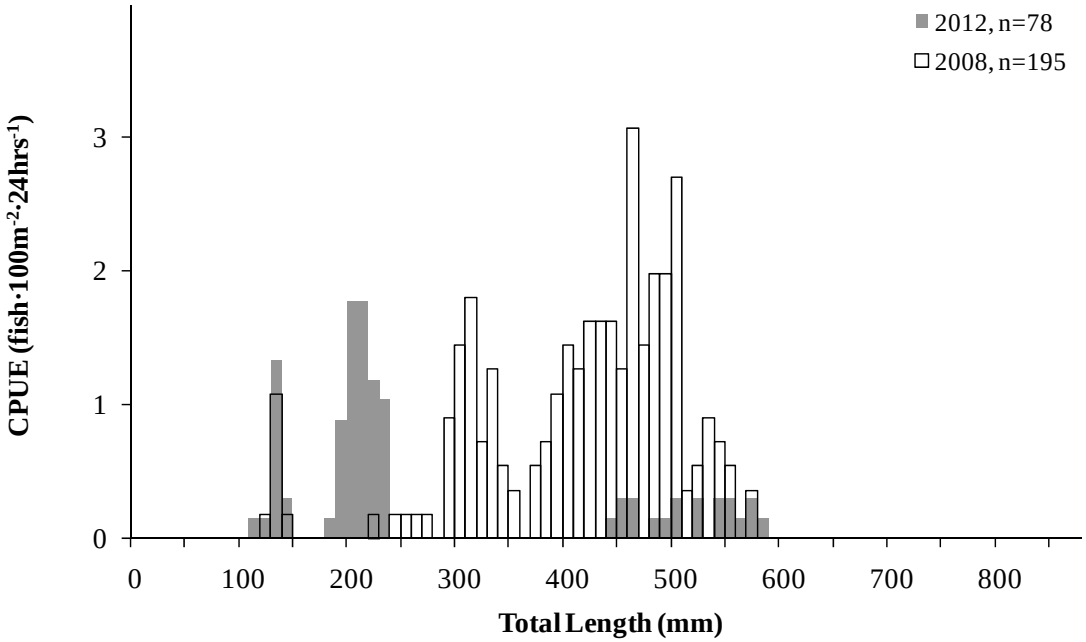

Figure 2. Walleye total length frequency distributions from the 2008 and 2012 FWIN surveys on Pine Lake.

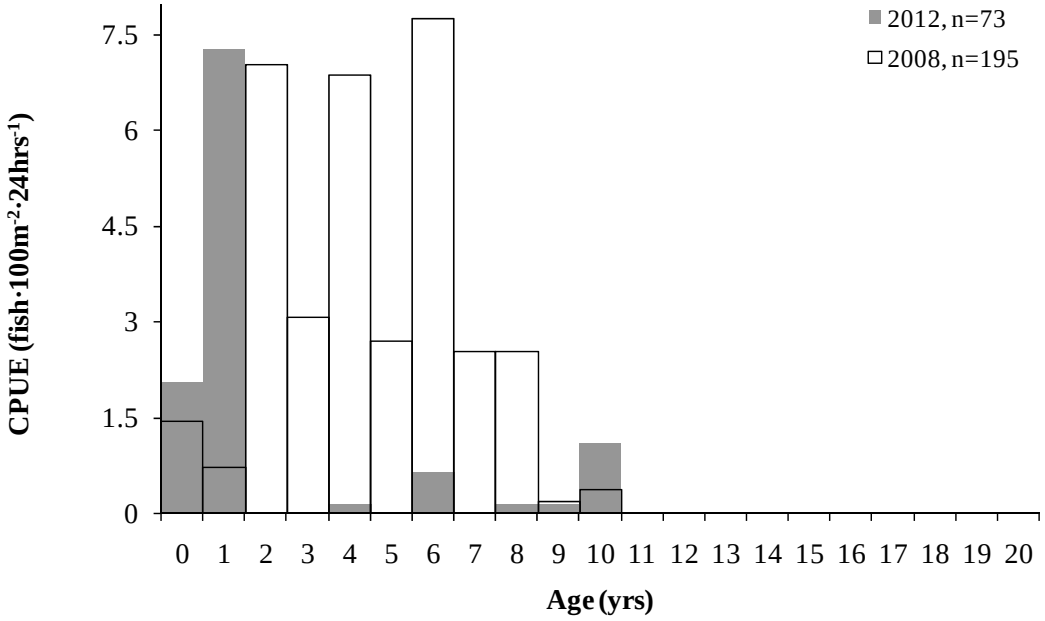

Figure 3. Walleye age frequency distributions from the 2008 and 2012 FWIN surveys on Pine Lake. Mean ages were 4.4 and 2.2 years, respectively.

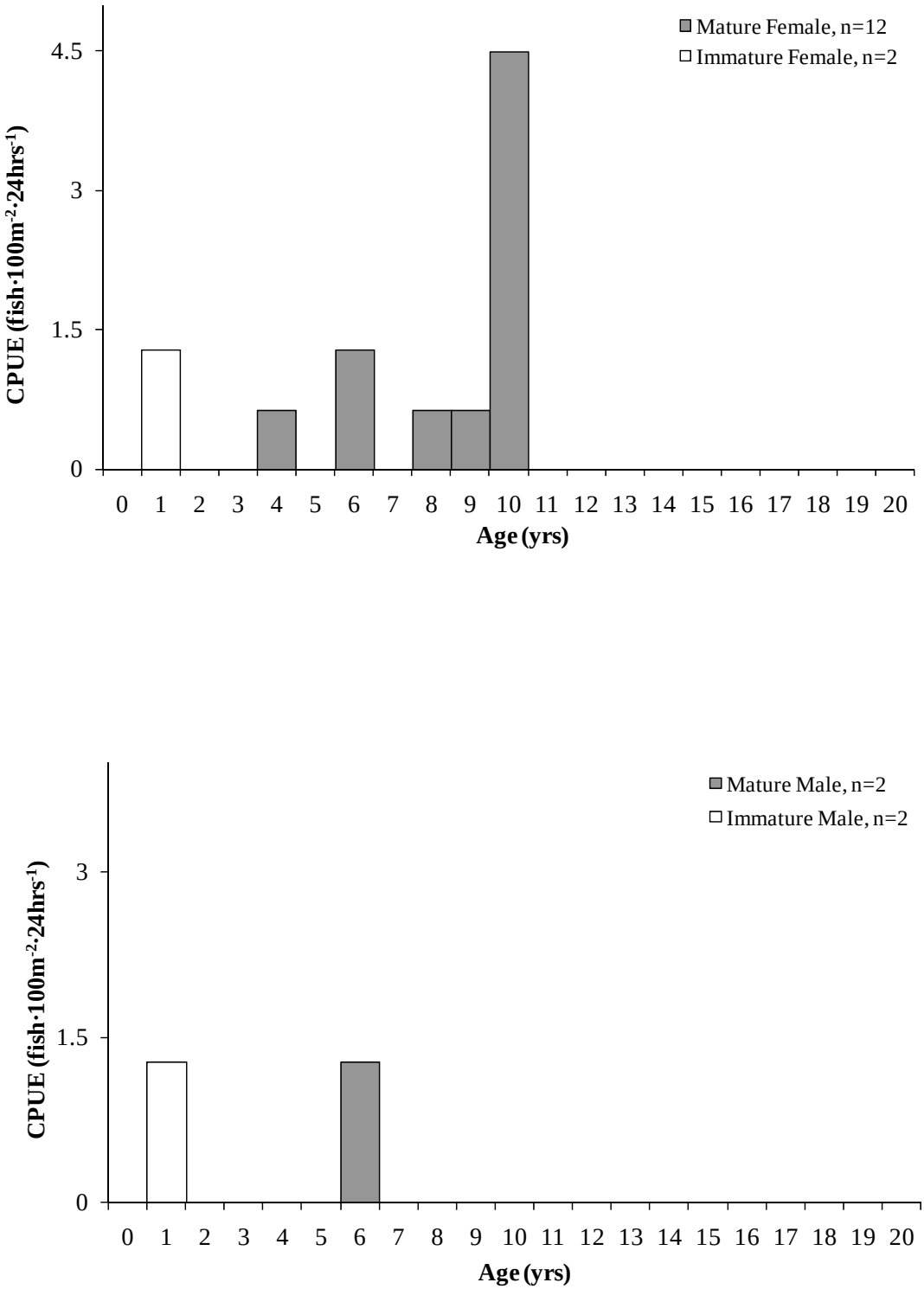

Figure 4. Age-at-maturity distributions for female and male Walleye from the 2012 FWIN survey on Pine Lake.

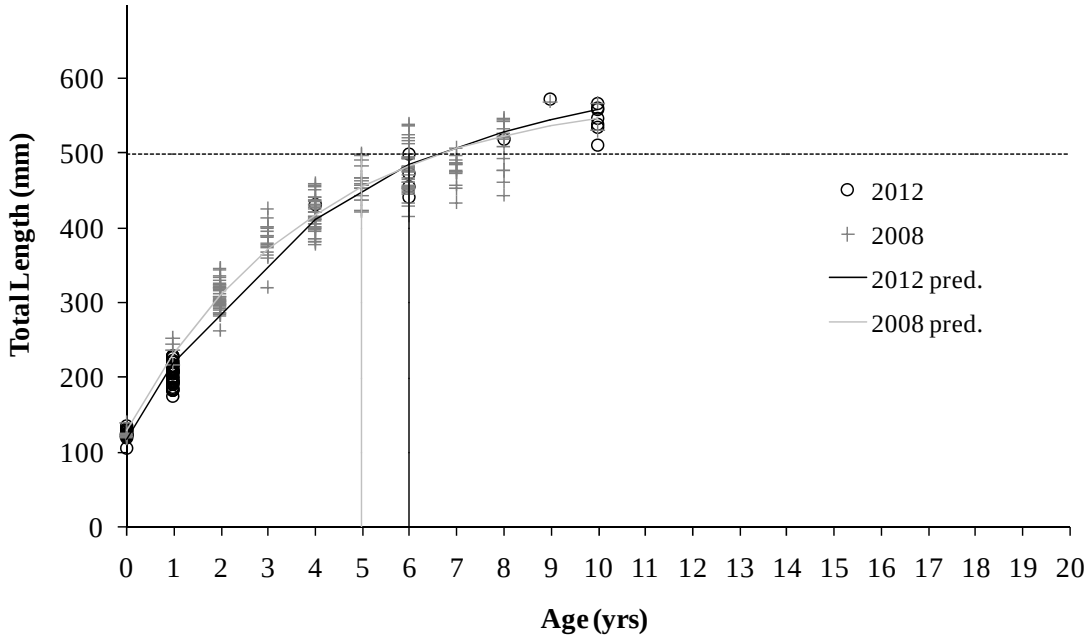

Figure 5. Total length-at-age for Pine Lake Walleye from the 2008 (L_{inf} = 583.9, K = 0.253, t_o = -1.003, R^2 = 0.99, Prob > 0.0001), and 2012 (L_{inf} = 607.3, K = 0.231, t_o = -0.931, R^2 = 0.99, Prob > 0.0001) FWIN surveys.

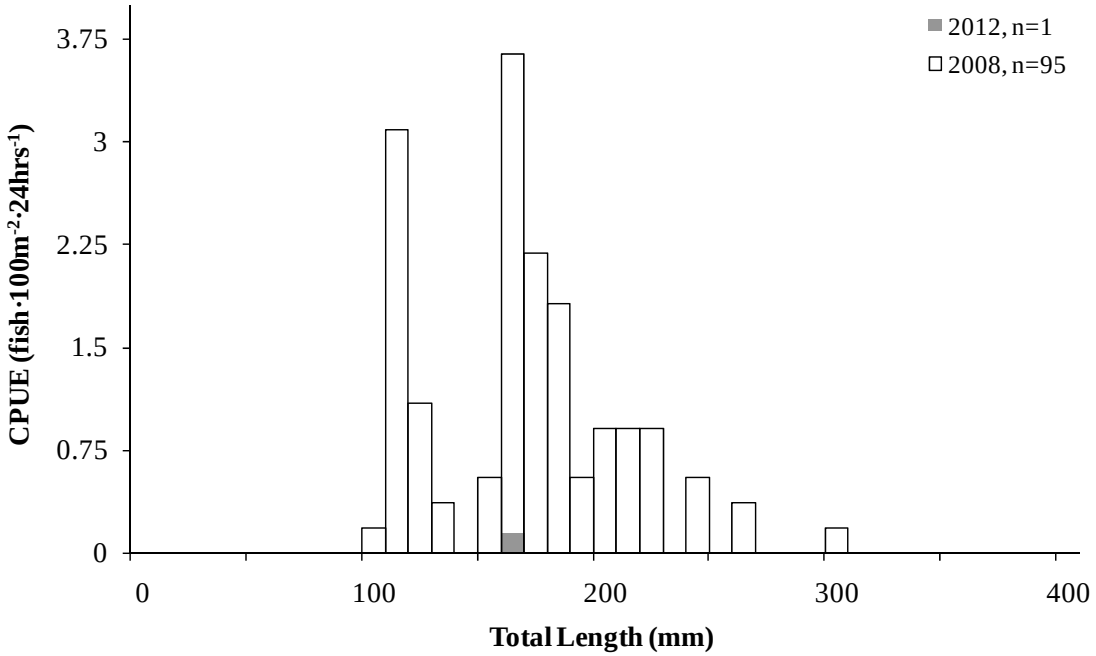

Figure 6. Yellow Perch total length-frequency distributions from the 2008 and 2012 FWIN surveys on Pine Lake.

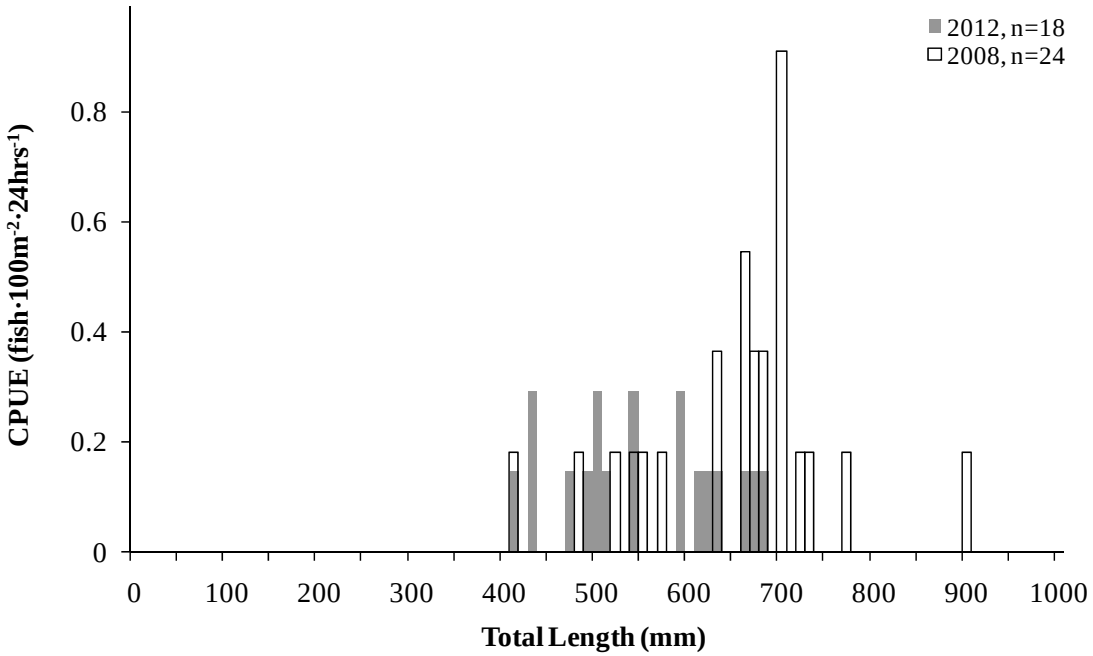

Figure 7. Northern Pike total length-frequency distributions from the 2008 and 2012 FWIN surveys on Pine Lake.

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