Fall Walleye Index Netting at Gleniffer Lake, Alberta, 2012

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Abstract

A total of 289 fish representing five species were caught during the Fall Walleye Index Netting (FWIN) survey. Walleye were the second most abundant species in the FWIN nets accounting for 37% of the catch. Individual net catches were variable ranging from 0 to 20 Walleye. The catch-per-unit effort (CPUE) for Walleye was 6.2 fish·100m^{-2}·24hrs^{-1} (95% C.I. 4.0–8.6), which is considerably less than the Alberta mean of 18.6 fish·100m^{-2}·24hrs^{-1}. Walleye total lengths (TL) (n=107) ranged from 118 to 695 mm and fish over 500 mm TL represented 11% of the catch. The majority of fish were in the 290 to 400 mm TL size category. There were 5 age-classes present (ages 0, 3, 5, 6 and 12) and 27% of the Walleye sampled were mature. Mean age-at-maturity was difficult to determine due to age-class gaps and low sample sizes, but females and males first matured by ages 6 and 5, 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 926.8 mm TL.

The CPUE for Brown Trout was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.2). Only one Brown Trout was captured and had a TL of 515 mm.

The CPUE for Mountain Whitefish was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.2). Mountain Whitefish TLs (n=2) ranged between 161 and 172 mm.

The CPUE for Northern Pike was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.3). Northern Pike TLs (n=2) ranged between 257 and 712 mm.

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. Although FWIN is not designed specifically for managing and estimating abundance of other sport fish species, FWIN surveys have been useful as a tool in assessing and monitoring those populations as well. 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 Gleniffer Lake

Methods

This FWIN survey was conducted from September 25 to 27, 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 16 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 14.2 and 15.8 °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 millimeter, and weighed in grams, with individual data recorded on a sample envelope for each fish. Walleye, Brown Trout (*Salmo trutta*), Burbot (*Lota lota*), Mountain Whitefish (*Prosopium willamsoni*) and Northern Pike (*Esox lucius*) were examined for gender and maturity, and a bony structure was removed for ageing. Otoliths were collected from Walleye, Brown Trout, Burbot and Mountain Whitefish and aged following the criteria outlined 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 1996, 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 # 16622.

Results

A total of 289 fish representing five species were caught during the 2012 FWIN survey (Table 1). Walleye were the second most abundant species in the FWIN nets accounting for 37% of the catch. Individual net catches were variable ranging from 0 to 20 Walleye. The CPUE for Walleye was 6.2 fish·$100m^{-2}$·$24hrs^{-1}$ (95% C.I. 4.0–8.6), which is 88% greater than the 3.3 fish·$100m^{-2}$·$24hrs^{-1}$ (95% C.I. 2.0–4.7) caught in 2011, but still considerably less than the Alberta mean of 18.6 fish·$100m^{-2}$·$24hrs^{-1}$ (Figure 1, Table 2). In 2012, Walleye TL (n=107) ranged from 118 to 695 mm, fish over 500 mm TL represented 11% of the catch and the majority of fish were in the 290 to 400 mm TL size category (Figure 2). In general, Walleye were more abundant in the 2012 survey, especially in the 340 to 390 mm TL size range, but drawing comparisons between years for TL is difficult due to the low sample size (n=33) encountered the previous year. In 2012, there were 5 age-classes present (ages 0, 3, 5, 6 and 12) and each were unstable; with only 1 age-class having a CPUE above 1 fish·$100m^{-2}$·$24hrs^{-1}$; the 5-year-olds. This is consistent with the 2011 data, where more age-classes existed (ages 2, 4 to 6 and 9 to 12), but none were stable (Figure 3). The most abundant age-classes were the 4-year olds in 2011 and the 5-year-olds in 2012, which represented 55% and 79% of the catch, respectively. In 2012, the mean Walleye age was 5.4 years and 27% of Walleye sampled were mature. The mean age-at-maturity is difficult to determine due to age-class gaps and low sample sizes, however based on the minimum ages-at-maturity present in the sample, female and male Walleye started maturing by ages 6 and 5, respectively (Figure 4). Walleye from the survey 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 926.8 mm TL, which is exaggerated due to age-class gaps (Figure 5).

The CPUE for Brown Trout was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.2). Only one Brown Trout was captured and had a TL of 515 mm. Brown Trout length frequency distribution cannot be compared as these species were not captured during the initial FWIN survey in 2011.

The CPUE for Mountain Whitefish was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.2). Mountain Whitefish TLs (n=2) ranged between 161 and 172 mm. Mountain Whitefish length frequency distribution cannot be compared as these species were not captured during the initial FWIN survey in 2011.

The CPUE for Northern Pike was 0.1 fish·100m^{-2}·24hrs^{-1} (95% C.I. 0.0–0.3). Northern Pike TLs (n=2) ranged between 257 and 712 mm. Northern Pike length frequency distribution between years cannot be compared due to the low sample size (n=2) in 2011 and 2012 (Figure 6).

Interpretation

Gleniffer Lake has remained within the bottom third of reported FWIN Walleye catch rates annually from across Alberta, but the catch rate has almost doubled since 2011. The population status classification for the Glennifer Lake Walleye fishery indicates a collapsed population, according to the criteria outlines in *Alberta's Walleye Management Recovery Plan* (Berry 1995). Of the 5 biological population metrics used as the criteria for classifying status of Walleye fisheries, modified for FWIN analysis from Sullivan (2003), all 5 population metrics (catch rate, age-class distribution, age-class stability, age at maturity and length at age) indicate a collapsed population (Table 3). This is consistent with the 2011 collapsed population status classification of the Walleye fishery in Gleniffer Lake (Wells 2012). Despite the collapse classification the increase catch rate, presence of young-of-the-year, and evidence of natural recruitment are all positive trends in showing signs of improvement for the population.

The low catch rate of Brown Trout and Mountain Whitefish suggest that these populations could be low in overall abundance within the reservoir. Alternately, given the FWIN survey occurs in late September mature Brown Trout and Mountain Whitefish that might normally reside within the reservoir may in fact have already started spawning migrations out of the reservoir to spawning locations upstream into the Red Deer River watershed. As such, the FWIN survey may not reflect the true presence and size class structure of these two species within Gleniffer Lake.

The catch rate of Northern Pike has remained relatively unchanged and low (<2 fish per net) over the past two years in Gleniffer Lake. The low abundance of Northern Pike suggests that this population is in a collapsed state.

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

Set Number	Lift Date (2012)	Stratum	UTM Easting	UTM Northing	Meridian	Soak Time (h)	Fish Count per Species								
							BNTR	BURB	LNSC	MNSC	MNWH	NRPK	WALL	WHSC	Set Total
GL1	27-Sep	Shallow	683448	5764564	-117 (Zone 11)	23.37	1		5		2		5	8	21
GL13	27-Sep	Deep	684912	5767327	-117 (Zone 11)	23.08			6				8	1	15
GL14	27-Sep	Deep	686235	5767814	-117 (Zone 11)	22.92			1				5	6	12
GL15	27-Sep	Deep	685931	5766097	-117 (Zone 11)	23.42			7				6	4	17
GL18	27-Sep	Deep	687761	5768157	-117 (Zone 11)	23.08		1	11			1	2		15
GL2	27-Sep	Shallow	684564	5764840	-117 (Zone 11)	23.00			12				20	4	36
GL20	27-Sep	Deep	688800	5769023	-117 (Zone 11)	22.75			10						10
GL6	27-Sep	Deep	687256	5768234	-117 (Zone 11)	23.08			9				3		12
L10	26-Sep	Deep	690488	5768995	-117 (Zone 11)	23.75			6				5		11
L14	26-Sep	Deep	690953	5768874	-117 (Zone 11)	23.47			4				6	6	16
L19	26-Sep	Shallow	688228	5769064	-117 (Zone 11)	23.00						1	4	8	13
LA1	26-Sep	Deep	689989	5769567	-117 (Zone 11)	25.00		1	11				13	1	26
LA12	26-Sep	Deep	688879	5768877	-117 (Zone 11)	23.75		1	29				7		37
LA3	26-Sep	Deep	688546	5768099	-117 (Zone 11)	22.47			18	1			12		31
LA7	27-Sep	Deep	686767	5766912	-117 (Zone 11)	22.83			1						1
LA8	26-Sep	Deep	685886	5766981	-117 (Zone 11)	22.75			5				11		16
Species Total							1	3	135	1	2	2	107	38	289

Table 2. Species catch rates from the 2011 and 2012 Gleniffer Lake FWIN surveys.

Species	Year	CPUE	95% CI
BNTR	2011	N/A	N/A
	2012	0.1	(0.0 - 0.2)
BURB	2011	0.1	(0.0 - 0.3)
	2012	0.2	(0.0 - 0.3)
LNSC	2011	7.5	(3.3 - 12.4)
	2012	7.8	(5.0 - 11.2)
MNSC	2011	N/A	N/A
	2012	0.1	(0.0 - 0.3)
MNWH	2011	N/A	N/A
	2012	0.1	(0.0 - 0.2)
NRPK	2011	0.2	(0.0 - 0.5)
	2012	0.1	(0.0 - 0.3)
WALL	2011	3.3	(2.0 - 4.7)
	2012	6.2	(4.0 - 8.6)
WHSC	2011	1.7	(0.7 - 4.4)
	2012	2.2	(0.9 - 3.6)

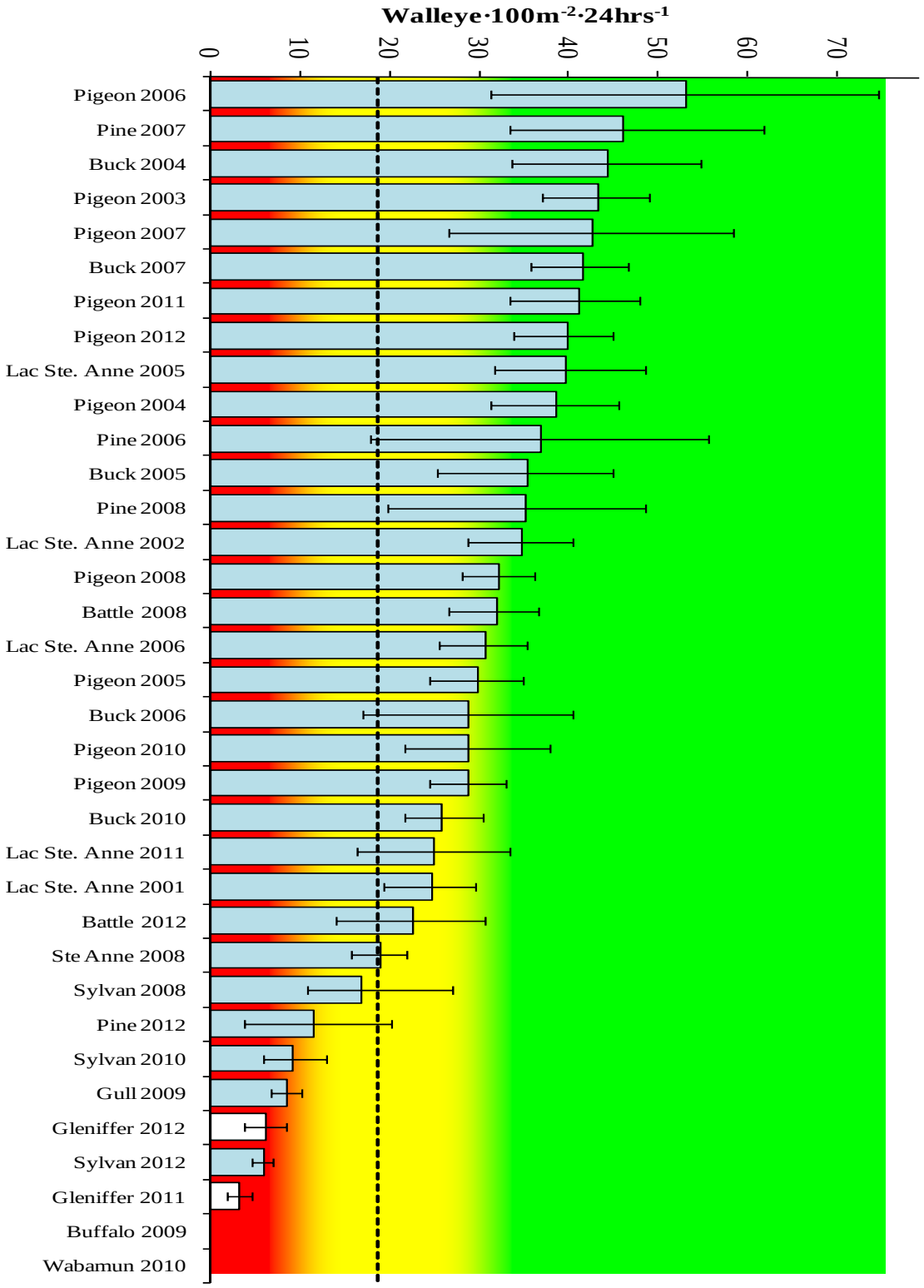

Figure 1. Mean Walleye catch rates with 95% CI from a representative sample of FWIN surveys from Across Central Alberta. The dashed line represents the mean provincial catch rate of 18.6 fish·100m^{-2}·24hrs^{-1}. Collapsed, vulnerable, and stable catch rate ranges are indicated by red, yellow and green backgrounds. The Walleye catch rates from the 2011 and 2012 Gleniffer Lake FWIN surveys are highlighted.

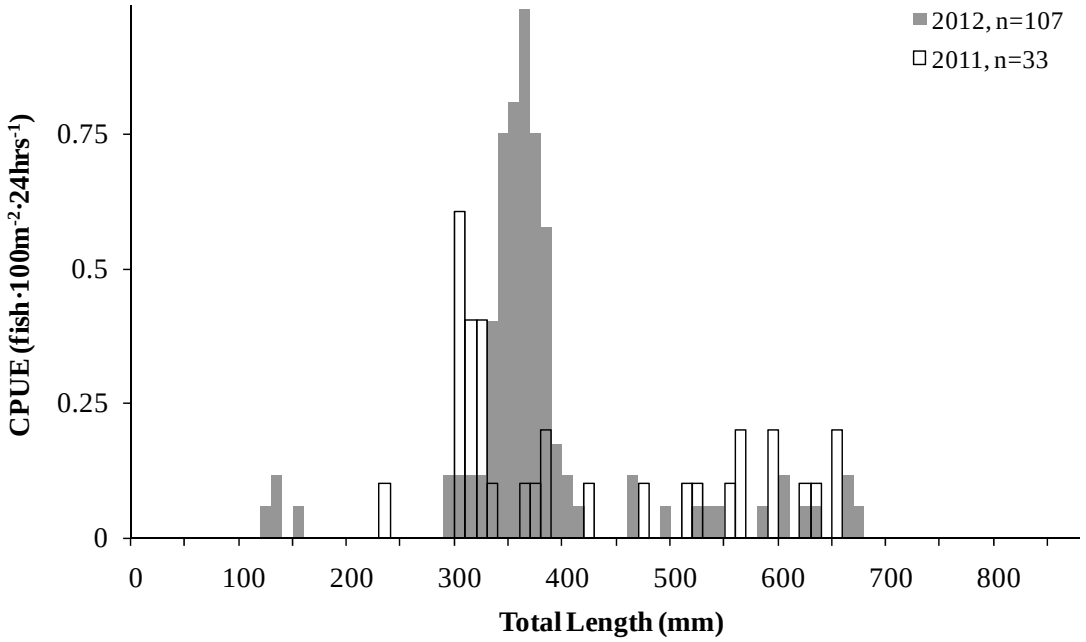

Figure 2. Walleye total length frequency distributions from the 2011 and 2012 FWIN surveys on Gleniffer Lake.

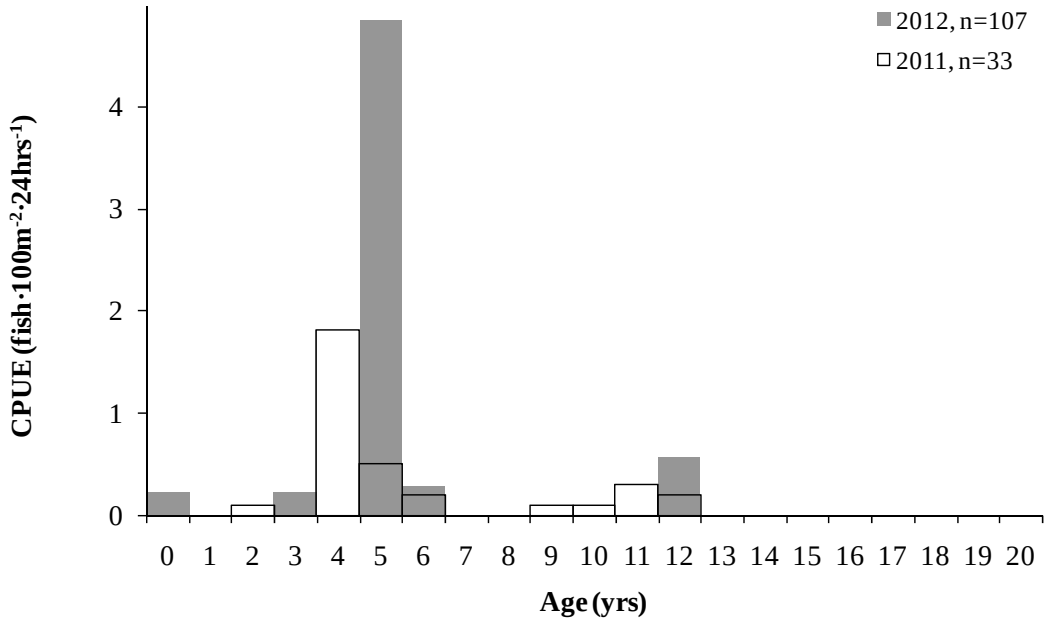

Figure 3. Walleye age frequency distributions from the 2011 and 2012 FWIN surveys on Gleniffer Lake. Mean ages were 5.7 and 5.4 years, respectively.

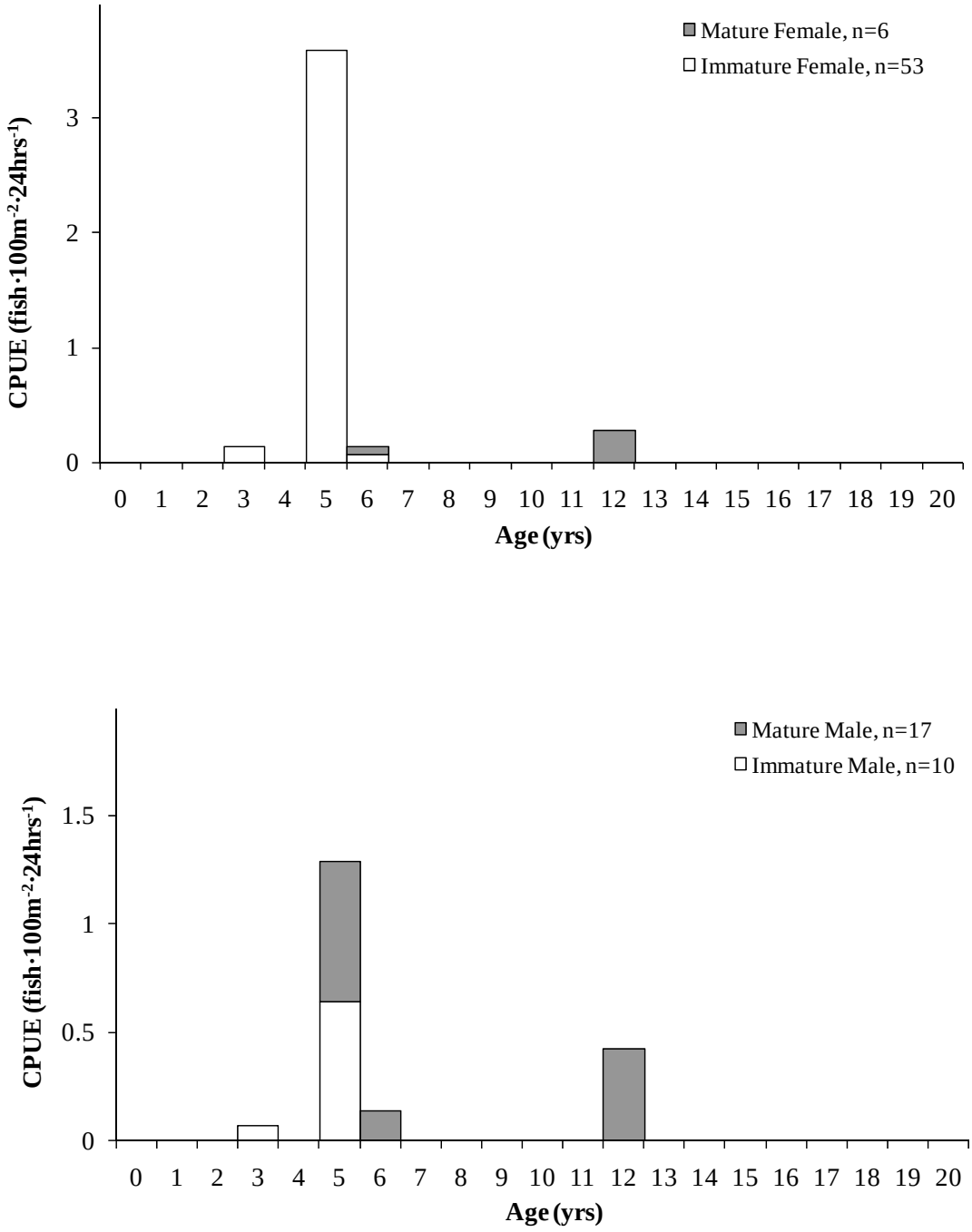

Figure 4. Age-at-maturity distributions for female and male Walleye from the 2012 FWIN survey on Gleniffer Lake.

Table 3. Walleye stock classification for Gleniffer Lake based on the 2012 FWIN survey results.

POPULATION METRIC	POPULATION STATUS CLASSIFICATION			
	TROPHY	STABLE	VULNERABLE	COLLAPSED
CATCH RATE (FWIN)	High - >30 walleye•100m^{-2}•24h^{-1}	High - >30 walleye•100m^{-2}•24h^{-1}	Moderate: 15-30 walleye•100m^{-2}•24h^{-1}	Low: <15 walleye•100m^{-2}•24h^{-1}
				CPUE =6.2
AGE CLASS DISTRIBUTION	Wide: 8 or more age classes (n=200); mean age >9 years.	Wide: 8 or more age classes (n=200); mean age 6 to 9 years.	Narrow: 1 to 3 age classes; mean age 4 to 6 years; few old (>10 years).	Can be wide or narrow; mean age 6 to 10 years.
				Wide age class distribution - 5 age-classes (n=107 mean age = 5.4 years; few old fish.
AGE CLASS STABILITY	Very stable: 1 to 2 "measureable" (> 3 walleye•100m^{-2}•24h^{-1}) age classes out of a smooth catch curve.	Relatively stable: 2 to 3 "measureable" age classes out of a smooth catch curve.	Unstable: 1 to 3 "measureable" age classes, with gaps in age classes.	Stable or unstable: 1 or fewer "measurable" age classes.
				1 measurable age class (> 3 walleye•100m^{-2}•24h^{-1}) of 5 -year old fish; gaps in age classes.
AGE AT MATURITY	Females: 10-20 years Males: 10-16 years	Females: 8-10 years Males: 7-9 years	Females: 7-8 years Males: 5-7 years	Females: 4-7 years Males:3-6 years
				Females fully recruited at age 6; males fully recruited at age 5.
LENGTH AT AGE	Very Slow 50 cm in 12-15 years	Slow 50 cm in 9-12 years	Moderate 50 cm in 7-9 years	Fast 50 cm in 4-7 years
				500mm TL reached at 6 years

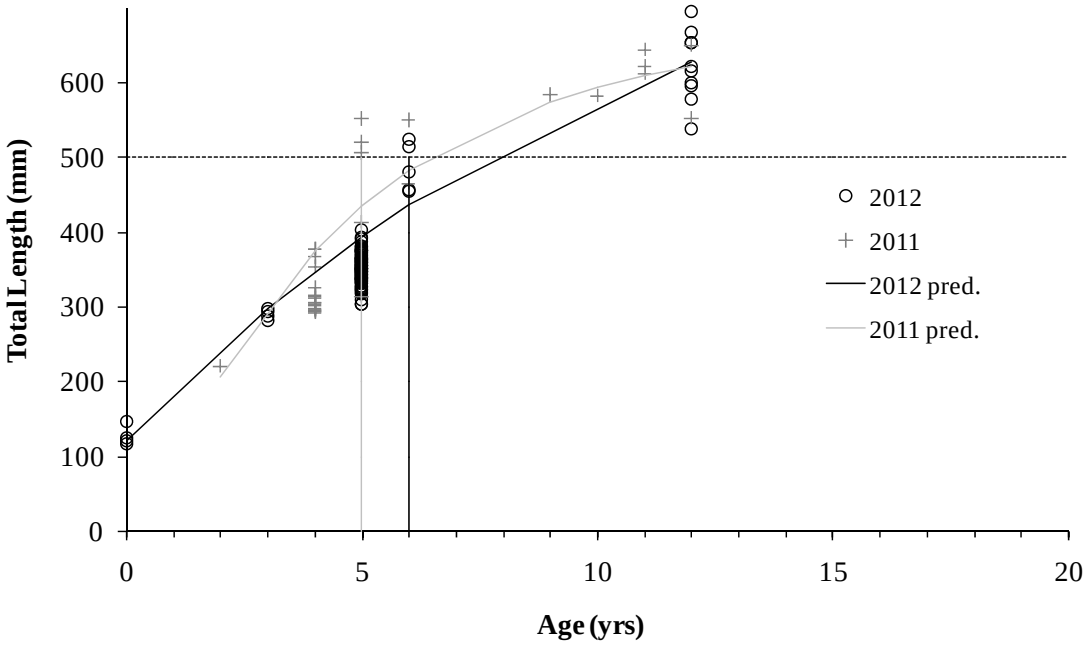

Figure 5. Total length-at-age for Gleniffer Lake Walleye from the 2011 (L_{inf} = 667.8, K = 0.23, t_o = 0.387, R^2 = 0.96, Prob > 0.0001), and 2012 (L_{inf} = 926.8, K = 0.083, t_o = -1.713, R^2 = 0.97, Prob > 0.0025) FWIN surveys.

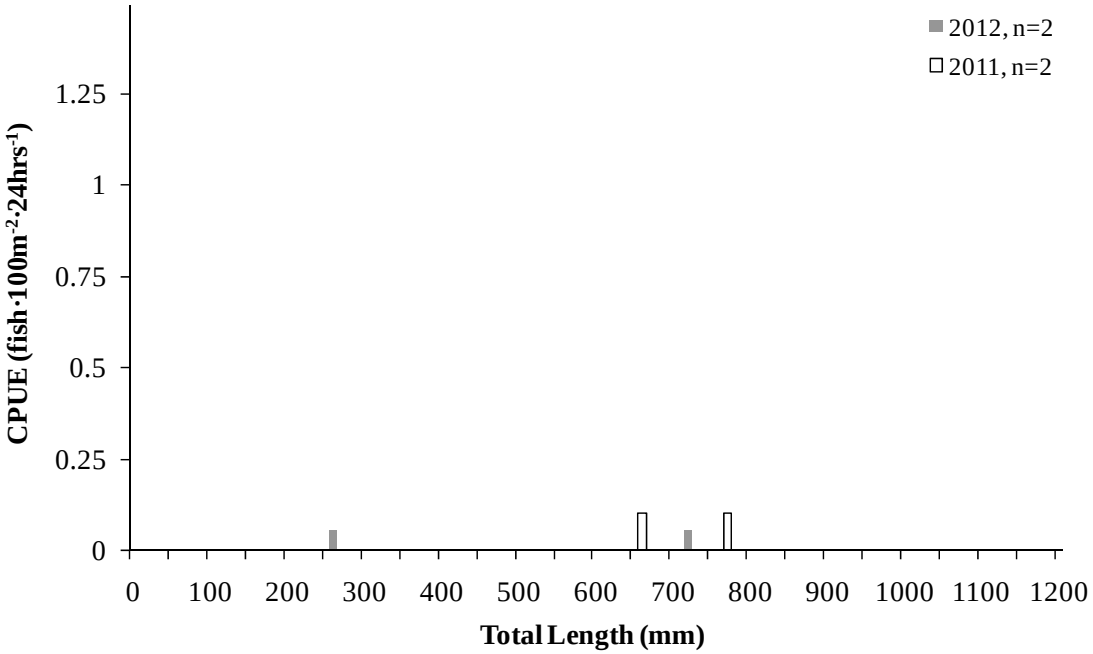

Figure 6. Northern Pike total length-frequency distributions from the 2011 and 2012 FWIN surveys on Gleniffer Lake.

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