Alberta Government

UNNAMED LAKE (NET LAKE - Richardson Backcountry) FALL WALLEYE INDEX NETTING SURVEY, 2010

Fisheries Management
Waterways-Lac La Biche Area

February 28, 2013

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Abstract

A total of 153 fish representing five species were caught during the survey. The catch rate for walleye was 8.1 fish/100 m^2/24 hr (95% C.I. 7.1-9.3), which is considerably less than the Alberta mean of 17.9 walleye/100 m^2/24 hr. Walleye total lengths (n=72) ranged from 110 to 560 mm with a large grouping from 370 to 460 mm and a smaller group from 480 to 510 mm. There were sixteen age-classes present (ages 0, 2-13, 15, 17 & 19), with age-class eight having an abundance higher than one fish/100 m^2/24 hr. Seventy percent of the walleye sampled were mature. Mean age-at-maturity was 6.6 years for males, and 8.8 years for females. Females first mature at age-seven and all were mature at age-twelve. Males reached 500 mm TL at age 22 and L_{inf} was 521.7 mm TL (Figure 5). Females reached 500 mm TL at age 13 and L_{inf} was 554.5 mm TL. For Net Lake in 2010, three of the population metrics rate the walleye population as being collapsed and two metrics as vulnerable. Given the very low abundance metric, this walleye population should be considered collapsed.

The catch rate for northern pike was 1.7 fish/100 m^2/24 hr (95% C.I. 0.9-2.8). Northern pike total lengths (n=15) ranged from 430 to 1010 mm with fish over 630 mm representing 60% of the catch.

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, and also collect data on other species. These data are essential to provide sustainable harvest allocations for sport fish. This FWIN survey was conducted in September 2010 to determine abundance, structure, and reproduction (recruitment) of the walleye (*Sander vitreus*) population in an Unnamed Lake (UTM 513929E 6443746N Zone 12) in the Richardson Backcountry known locally as Net Lake.

Methods

This FWIN survey was conducted from September 15-16, 2010. 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 eight 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. Surface water temperatures ranged from 12 to 13°C when nets were set. Set and pull times were recorded. Nets were set perpendicular to depth contours, and minimum and maximum depths were recorded. Net locations were recorded in Universal Transverse Mercator (UTM) projection coordinates using the North American Datum 1983 (NAD 83) on handheld GPS units.

All fish species were kept for biological sampling. Catches were recorded by net location and mesh size. A net ID, 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*), yellow perch (*Perca flavescens*), and lake whitefish (*Coregonus clupeaformis*) were examined for gender and maturity, and a bony structure was removed for ageing. Otoliths were collected from walleye and aged following criteria in Watkins and Spencer (2010). Cleithrum 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 FAMS 1.0 (Slipke 2010).

Relative abundance expressed as CPUE was calculated as number of fish caught/100 m^2 /24 hours with 95% confidence intervals empirically determined by bootstrapping catches to 10,000 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 # 14754.

Results

A total of 153 fish representing five species were caught during the survey (Table 1). The catch rate for walleye was 8.1 fish/100 m^2/24 hr (95% C.I. 7.1-9.3) (Table 2), which is considerably less than the Alberta mean of 17.9 walleye/100 m^2/24 hr (Figure 1). Walleye total lengths (n=72) ranged from 110 to 560 mm with a large grouping from 370 to 460 mm and a smaller group from 480 to 510 mm (Figure 2). There were sixteen age-classes present (ages 0, 2-13, 15, 17 & 19), with just age-class eight having an abundance higher than one fish/100 m^2/24 hr (Figure 3). Seventy percent of the walleye sampled were mature. Mean age-at-maturity was 6.6 years for males, they were first mature at age-four and all were mature at age-eight in the sample (Figure 4). Mean age-at-maturity was 8.8 years for females, they first mature at age-seven and all were mature at age-twelve (Figure 4). However, the maturity sample sizes were small and there were several missing age-classes (Figure 4). Males reached 500 mm TL at age 22 and L_{inf} was 521.7 mm TL (Figure 5). Females reached 500 mm TL at age 13 and L_{inf} was 554.5 mm TL (Figure 5).

The catch rate for northern pike was 1.7 fish/100 m^2/24 hr (95% C.I. 0.9-2.8) (Table 2). Northern pike total lengths (n=15) ranged from 430 to 1010 mm with fish over 630 mm representing 60% of the catch (Figure 6). The northern pike were spread out over the size range and were not concentrated in any size category. There were nine age-classes present (ages 2-5 & 7-11), with age-class five being the most abundant (Figure 7). The abundance of all year classes was low and less than one fish/100 m^2/24 hr (Figure 7).

Cisco (*Coregonus artedi*) (n=40) were the second most abundant species after walleye in the FWIN nets and accounted for 28% of the catch (Table 1). The catch rate for cisco was 4.9 fish/100 m^2/24 hr (95% C.I. 2.2-7.6) (Table 2). Cisco total lengths ranged from 100 to 360 mm (Figure 8). They had a tri-modal distribution with a large grouping at 280 to 320 mm TL, and smaller groupings at 190 to 220 mm TL and 100to 120 mm TL (Figure 8).

Other species caught were lake whitefish (n=19) and white sucker (*Catostomus commersonii*) (n=4) (Table 1).

Interpretation

For Net Lake in 2010, three of the population metrics rate the walleye population as being collapsed and two metrics as trophy (Table 3). Given the very low abundance metric, this walleye population should be considered collapsed.

The northern pike population is probably also collapsed given their low abundance.

These very small lakes lakes in this area are generally oligitrophic (have very low nutrients) and have naturally low productivities. These populations are on the northern edge of the walleye's natural distribution.

Table 1. Species catch summary by site, Net Lake, September 2010.

Site	Lift Date (2010)	Stratum	UTM Easting[a]	UTM Northing[a]	Set Duration (hours)	Number of fish caught					
						CISC	LKWH	NRPK	WALL	WHSC	Total
N01	Sept 15	shallow	513929	6443746	23.00	11	2	1	7	1	22
N02	Sept 15	deep	513228	6443120	22.22	8	1	3	7		19
N03	Sept 15	shallow	513449	6443795	23.18	1		2	8	1	12
N04	Sept 15	shallow	514111	6443416	23.20		3	5	11		19
N05	Sept 15	shallow	514295	6443982	24.08	1	7	2	10	2	22
N07	Sept 15	deep	512521	6442663	25.13	3			7		10
N08	Sept 15	shallow	513571	6442780	24.77	9	4	1	12		26
N20	Sept 15	deep	513614	6443062	24.30	10	2	1	10		23
					Grand Total	43	19	15	72	4	153

[a] UTM 12U, NAD 83 map datum

Table 2.   Species catch rates from the 2010 Net Lake FWIN survey.

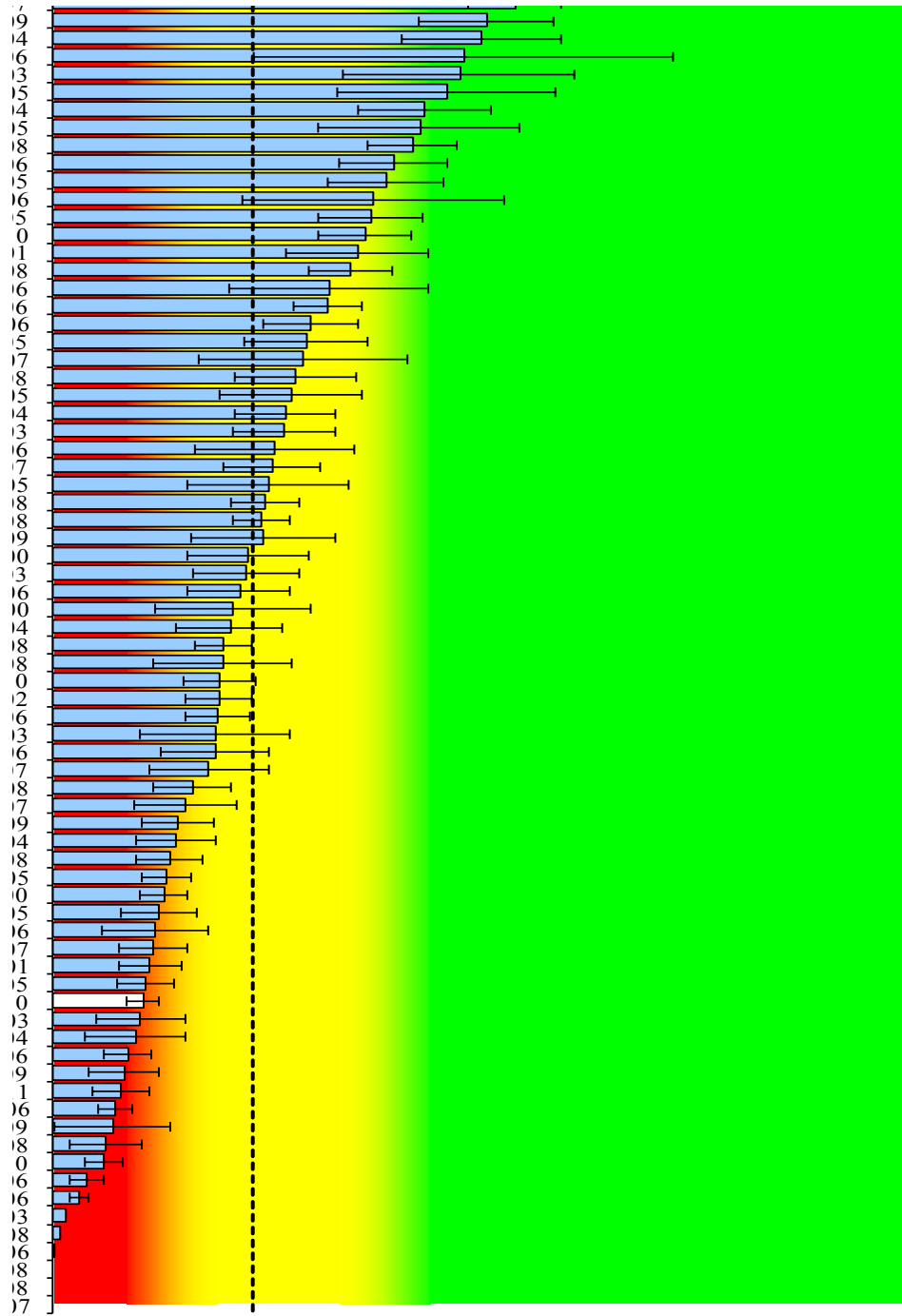| Species	CPUE	95% CI
Cisco	4.9	(2.2-7.6)
Lake whitefish	2.1	(0.9-3.6)
Northern pike	1.7	(0.9-2.8)
Walleye	8.1	(7.1-9.3)
White sucker	0.5	(0.1-0.9)

Figure 1. Mean walleye catch rates with 95% CI from a representative sample of FWIN surveys from across Alberta. The dashed line represents the mean provincial catch rate of 17.9 fish/100 m^2/24 hr. Collapsed, vulnerable, and stable catch rate ranges are indicated by red, yellow and green backgrounds. The walleye catch rate from the 2010 Net Lake FWIN survey is highlighted.
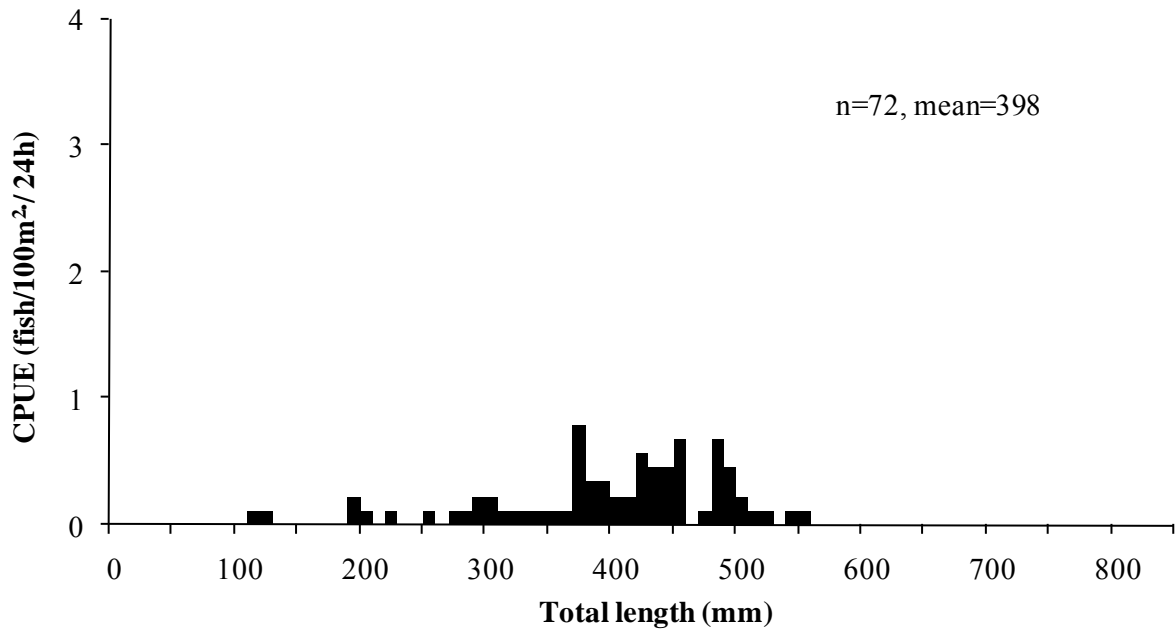
Figure 2. Walleye total length frequency distributions from the 2010 FWIN survey on Net Lake. Dashed line denotes the 50 cm TL minimum size limit.
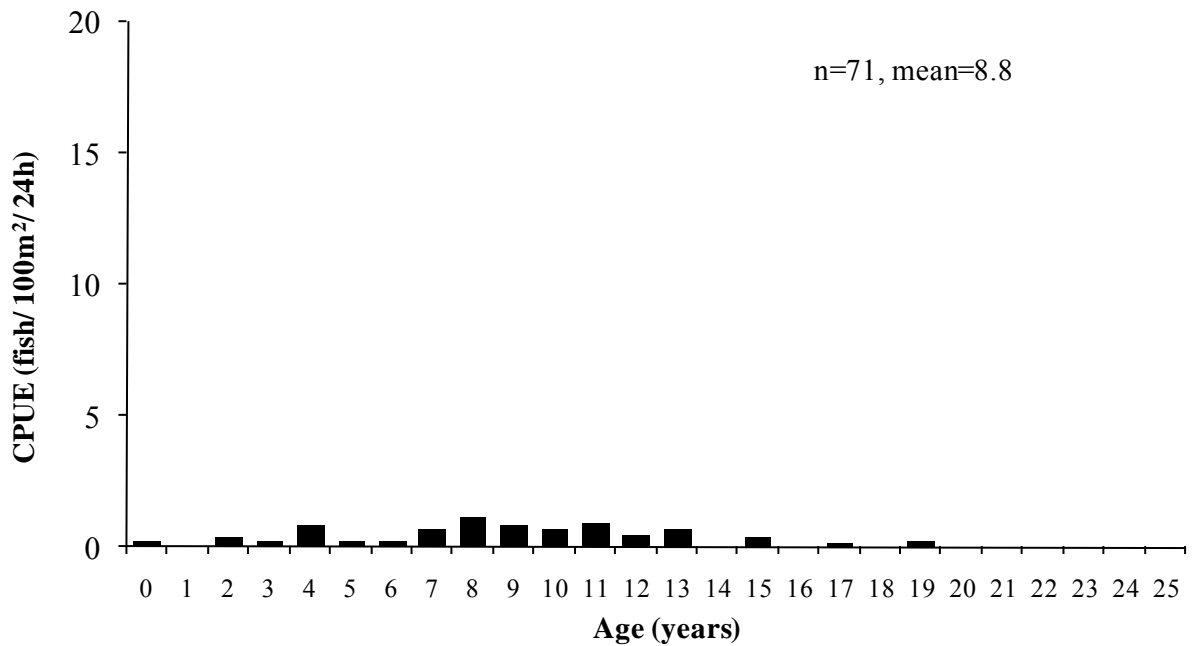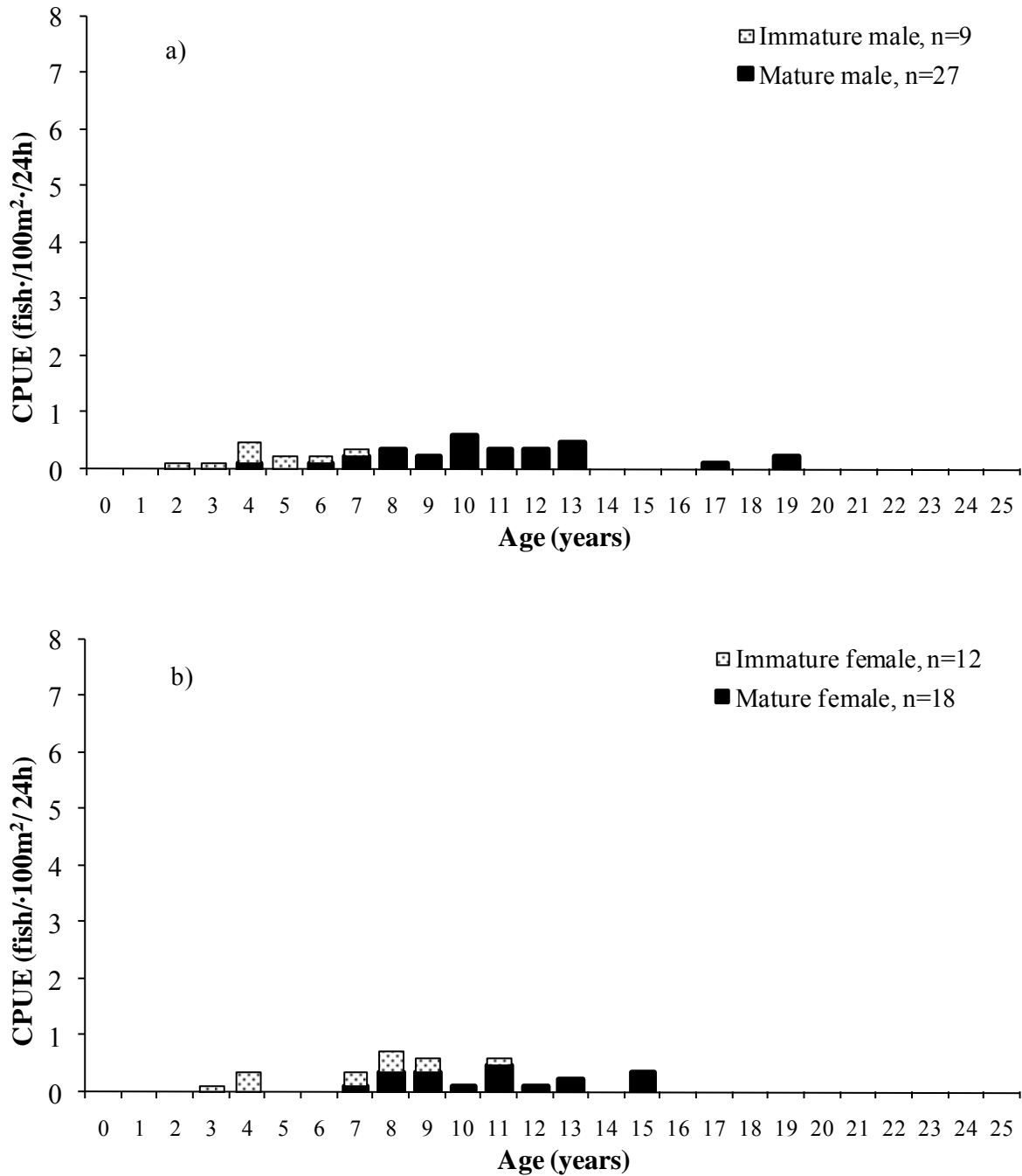

Figure 3. Walleye age frequency distributions from the 2010 FWIN survey on Net Lake.

Figure 4. Age-at-maturity distributions for a) male and b) female walleye from the 2010 FWIN survey on Net Lake.

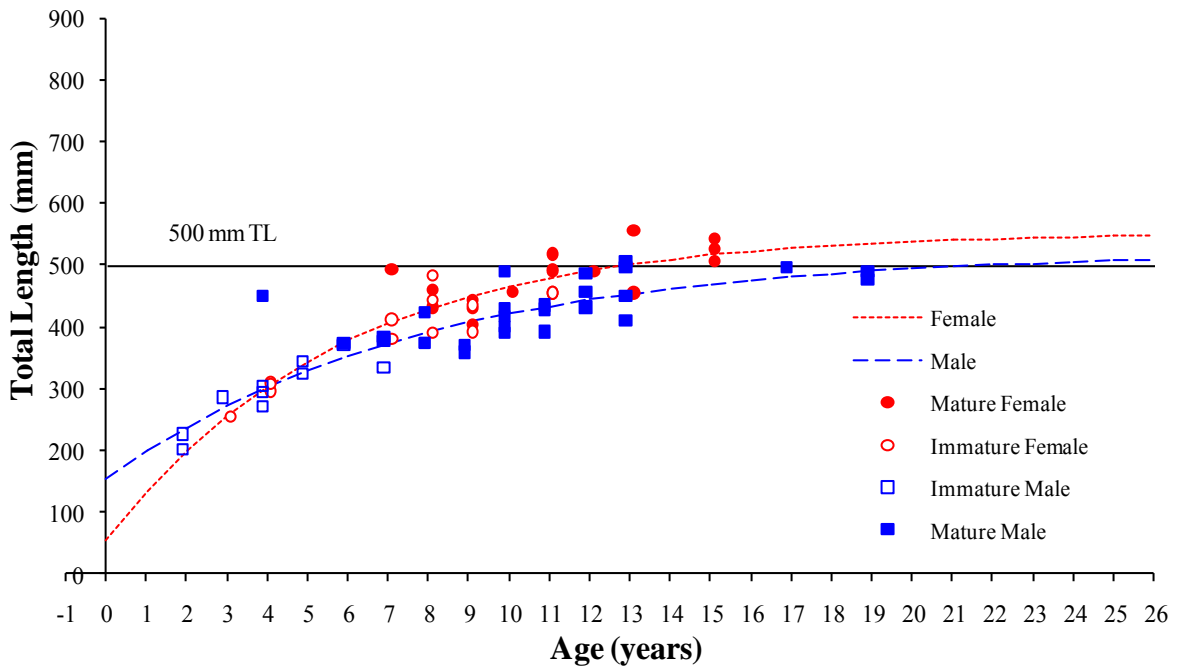Figure 5.   Von Bertalanffy growth curves for female (L_{inf} = 554.5, K = 0.173, t_o = -0.607, R^2 = 0.98, Prob < 0.0001) and male (L_{inf} = 521.7, K = 0.13, t_o = -2.692, R^2 = 0.94, Prob < 0.0001) walleye from the Net Lake FWIN survey, 2010.
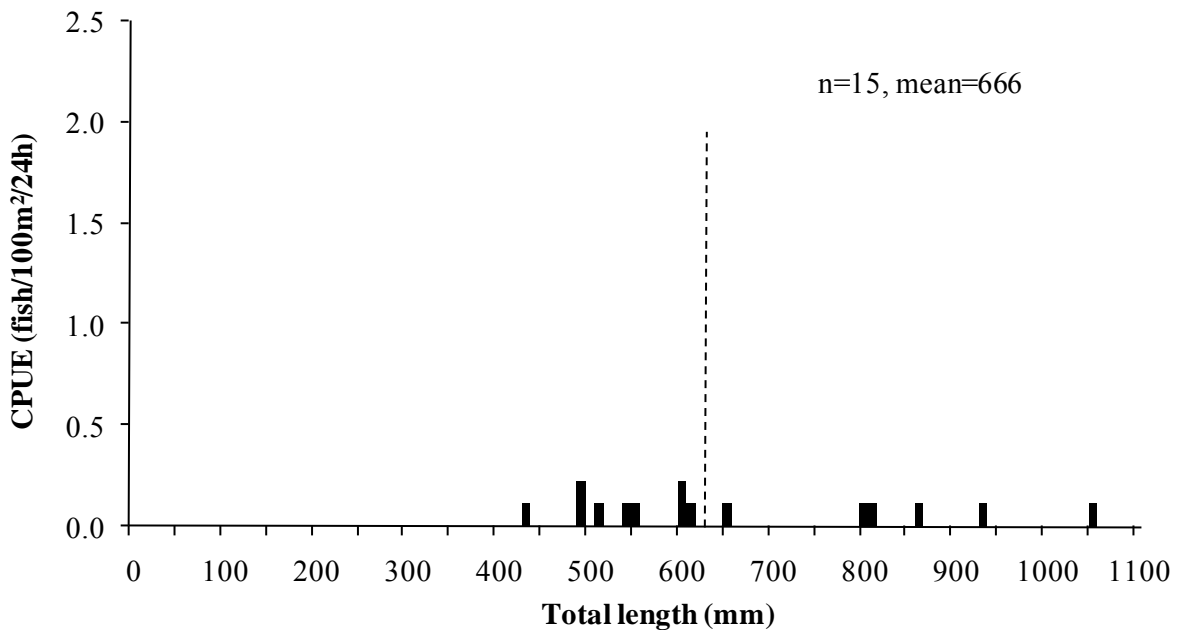

Figure 6.   Northern pike total length frequency distributions from the 2010 FWIN survey on Net Lake. Dashed line denotes the 63 cm TL minimum size limit

Table 3.   Walleye stock classification for Net Lake based on the 2010 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 = 8.1
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.
				16 age-classes; mean age =8.8
AGE CLASS STABILITY	Very stable: 1 to 2 "measureable" (> 3 Walleye/•$100m^{2}$/ 24h) 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.
				no measureable 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 12; males fully recruited at age 8. However, several missing age-classes.	
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
			Females reach 50 cm at age 13; males at age 22; pooled reach 50 cm at age 18.	

n=15, mean=6.5 years
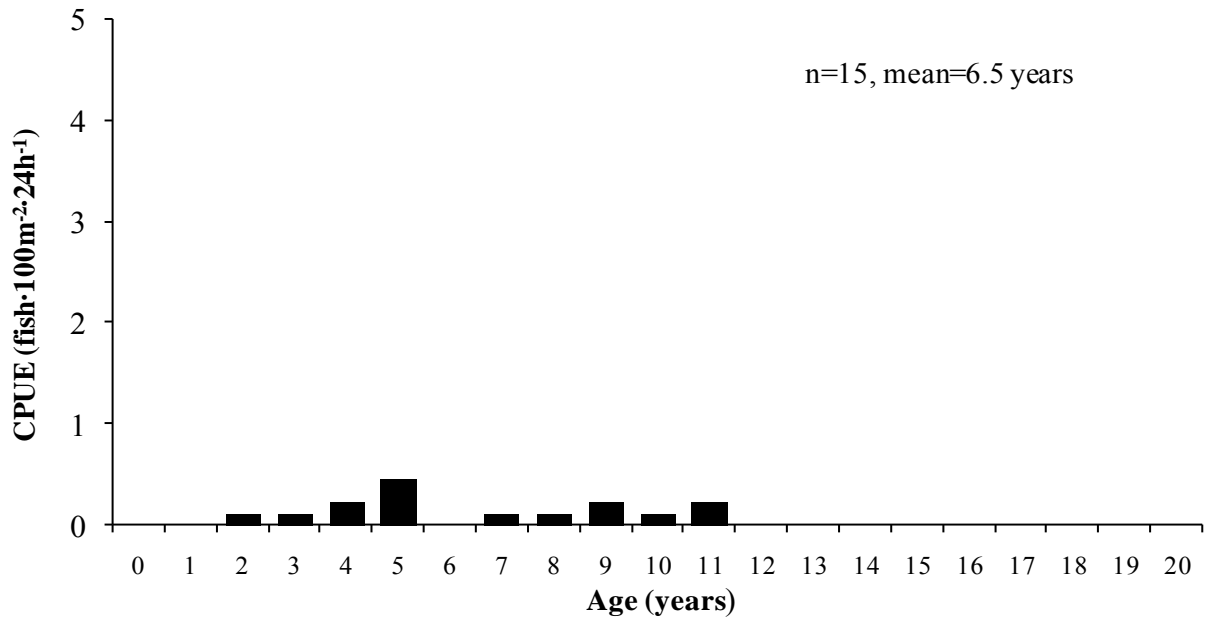
Figure 7. Northern pike age frequency distributions from the 2003 and 2010 FWIN surveys on Net Lake.

n=40, mean=229mm
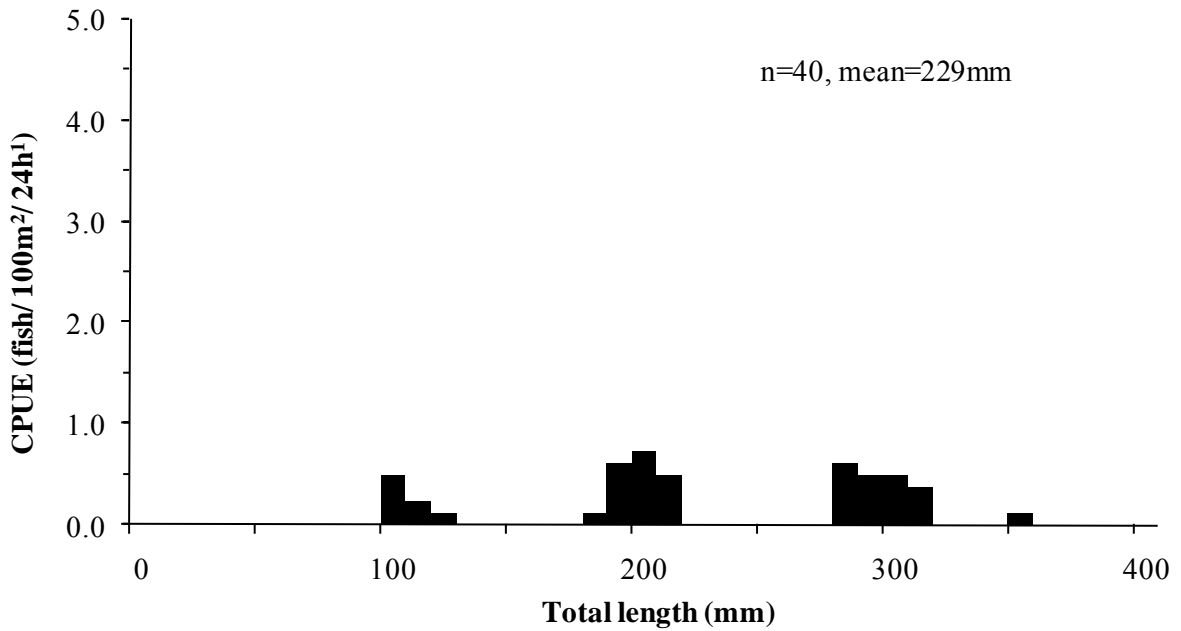
Figure 8. Cisco total length frequency distribution from the 2010 FWIN surveys on Net Lake.

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