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

Fisheries Management
Waterways-Lac La Biche Area

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Abstract

A total of 131 fish representing five species were caught during the survey. The catch rate for walleye was 4.6 fish/100 m^2/24 hr (95% C.I. 3.3-6.0), which is considerably less than the Alberta mean of 18.1 walleye/100 m^2/24 hr. Walleye total lengths (n=46) ranged from 120 to 540 mm with fish over 500 mm representing only 9% of the catch. The walleye were spread out over the size range and were not concentrated in any size category. There were thirteen age-classes present (ages 0-9, 11, 12, & 14), with no age-classes close abundances higher than one fish/100 m^2/24 hr. Sixty-four percent of the walleye sampled were mature. Mean age-at-maturity was 4.5 years for males, and 8.8 years for females. The growth curve for males never reached 500 mm TL since L_{inf} was 464.8 mm TL. Females reached 500 mm TL at age 12 and L_{inf} was 635.1 mm TL. For Brutus Lake in 2010, three of the population metrics rate the walleye population as being collapsed and two metrics as vulnerable (Table 3). Given the very low abundance metric, this walleye population should be considered collapsed.

The catch rate for northern pike was 3.0 fish/100 m^2/24 hr (95% C.I. 2.2-3.8). Northern pike total lengths (n=29) ranged from 430 to 1010 mm with fish over 630 mm representing 62% 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 498899E 6426212N Zone 12) in the Richardson Backcountry known locally as Brutus Lake.

Methods

This FWIN survey was conducted from September 16-17, 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 12.2 to 12.3^{o}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 # 14752.

Results

A total of 131 fish representing five species were caught during the survey (Table 1). The catch rate for walleye was 4.6 fish/100 m^2/24 hr (95% C.I. 3.3-6.8) (Table 2), which is considerably less than the Alberta mean of 18.1 walleye/100 m^2/24 hr (Figure 1). Individual net catches were variable ranging from three to nine walleye (Table 1). Walleye total lengths (n=46) ranged from 120 to 540 mm (Figure 2) with fish over 500 mm representing only 9% of the catch. The walleye were spread out over the size range and were not concentrated in any size category (Figure 2). There were thirteen age-classes present (ages 0-9, 11, 12, & 14), with no age-classes close to having an abundance higher than one fish/100 m^2/24 hr (Figure 3). Sixty-four percent of the walleye sampled were mature. Mean age-at-maturity was 4.5 years for males, they were first mature at age-four and all were mature at age-five in the sample (Figure 4). Mean age-at-maturity was 8.8 years for females, they first mature at age-six and all were mature at age-eleven (Figure 4). However, the maturity sample sizes were small and there were several missing age-classes (Figure 4). The growth curve for males never reached 500 mm TL since L_{inf} was 464.8 mm TL (Figure 5). Females reached 500 mm TL at age 12 and L_{inf} was 635.1 mm TL (Figure 5).

The catch rate for northern pike was 3.0 fish/100 m^2/24 hr (95% C.I. 2.2-3.8) (Table 2). Northern pike total lengths (n=30) ranged from 430 to 1010 mm with fish over 630 mm representing 62% 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 eleven age-classes present (ages 2-9, 12, 13 & 15), 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).

Lake whitefish (n=40) were the second most abundant species after walleye caught in the FWIN nets and accounted for 31% of the catch (Table 1). The catch rate for lake whitefish was 4.0 fish/100 m^2/24 hr (95% C.I. 3.5-4.5) (Table 2). Lake whitefish total lengths ranged from 160 to 480 mm with a large grouping at 400 to 460 mm (Figure 8). There were twelve age-classes present (ages 2-7, 9-13 & 16), with age-class nine, then age-classes six and twelve 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).

Other species caught were white sucker (*Catostomus commersonii*) (n=14) and yellow perch (n=1) (Table 1).

Interpretation

For Brutus Lake in 2010, three of the population metrics rate the walleye population as being collapsed and two metrics as vulnerable (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.
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Table 1. Species catch summary by site, Brutus Lake, September 2010.

Site	Lift Date (2010)	Stratum	UTM Easting[a]	UTM Northing[a]	Set Duration (hours)	Number of fish caught					
						LKWH	NRPK	WALL	WHSC	YLPR	Total
BL01	Sept 17	shallow	498899	6426212	24.87	4	5	3	2	1	15
BL02	Sept 17	shallow	499198	6425525	25.75	5	3	5	2		15
BL03	Sept 17	deep	499472	6426680	25.93	6	3	9	1		19
BL04	Sept 17	deep	499647	6426345	26.63	4	2	9	2		17
BL05	Sept 17	shallow	498783	6425657	27.05	4	6	3	2		15
BL06	Sept 17	shallow	499161	6426439	27.53	5	4	7	4		20
BL07	Sept 17	shallow	499466	6427184	28.10	7	2	7	1		17
BL08	Sept 17	deep	499399	6425973	28.62	5	5	3			13
				Grand Total		40	30	46	14	1	131

[a] UTM 12U, NAD 83 map datum

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

Species	CPUE	95% CI
Lake whitefish	4.0	(3.5-4.5)
Northern pike	3.0	(2.2-3.8)
Walleye	4.6	(3.3-6.0)
White sucker	1.4	(0.8-2.0)
Yellow perch	0.1	(0.0-0.3)

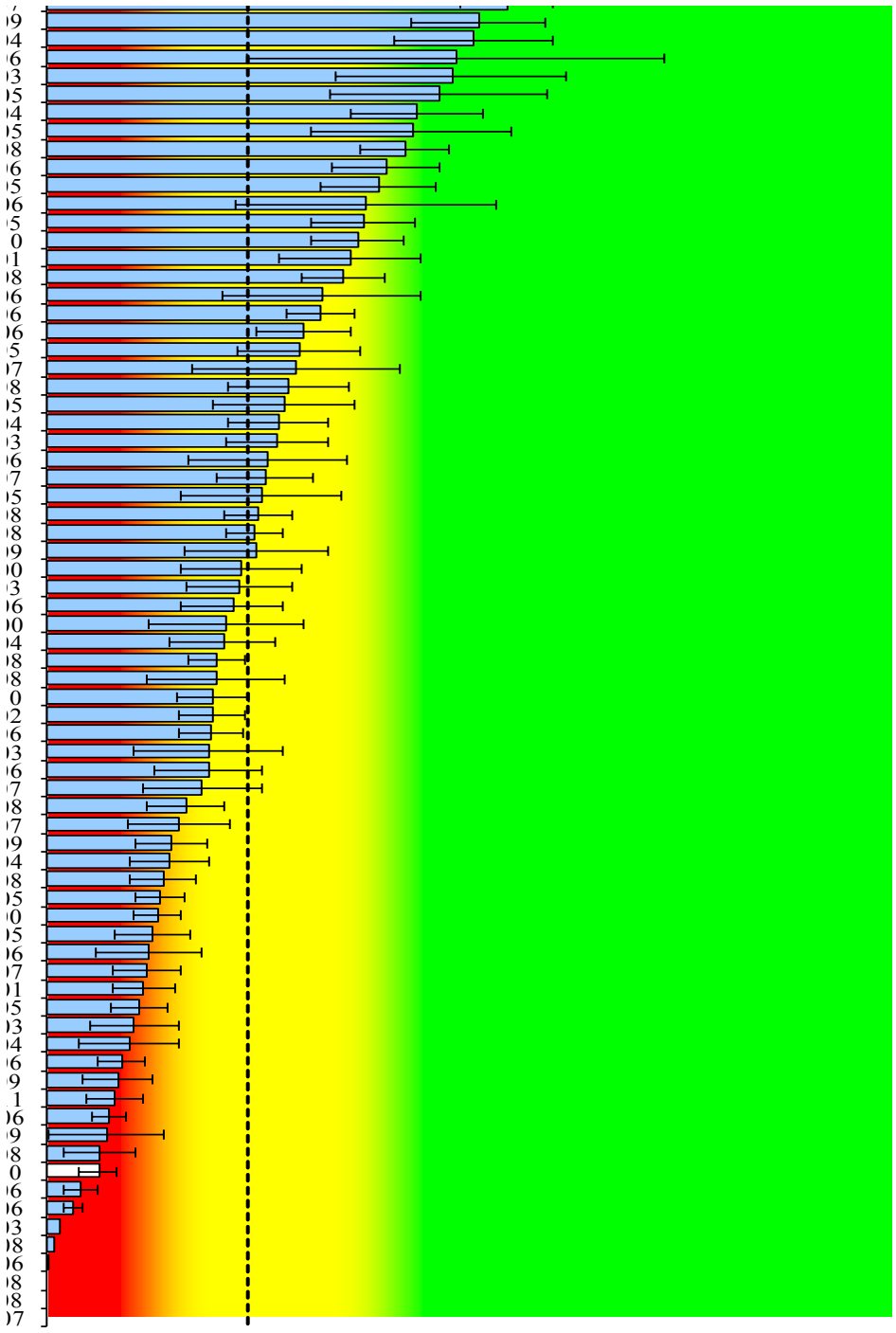

Figure 1. Mean walleye catch rates with 95% CI from a representative sample of FWIN surveys from across Alberta. The dashed line represents the mean provincial catch rate of 18.1 fish/100 m^2/24 hr. Collapsed, vulnerable, and stable catch rate ranges are indicated by red, yellow and green backgrounds. The walleye catch rate from the 2010 Brutus Lake FWIN survey is highlighted.

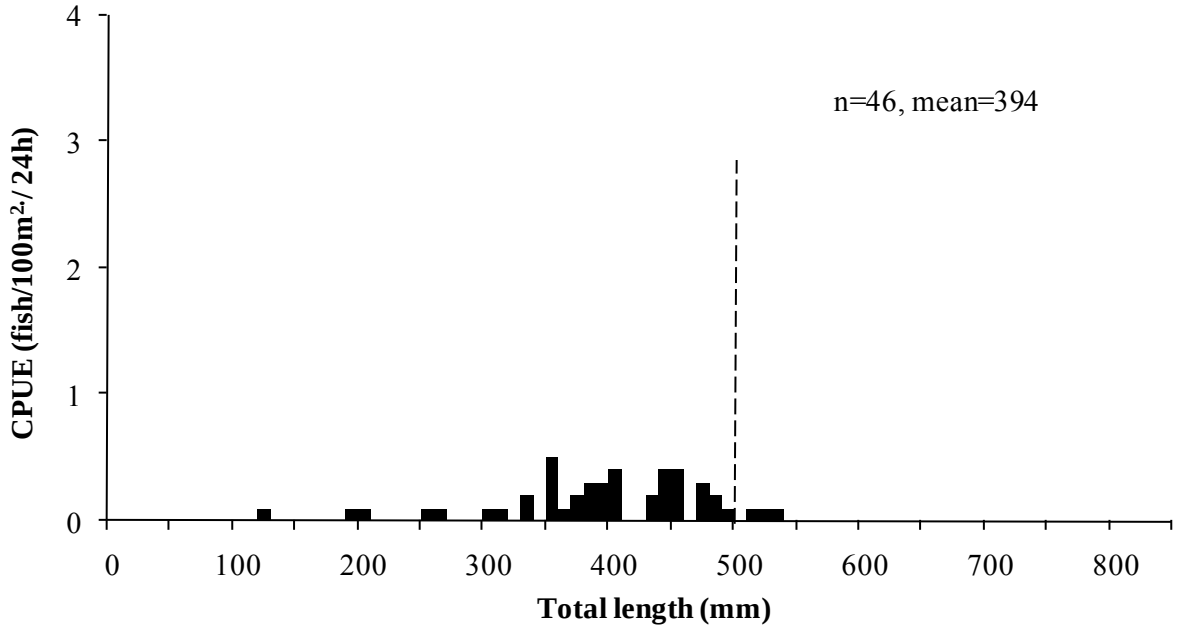

Figure 2. Walleye total length frequency distributions from the 2010 FWIN survey on Brutus Lake. Dashed line denotes the 50 cm TL minimum size limit.

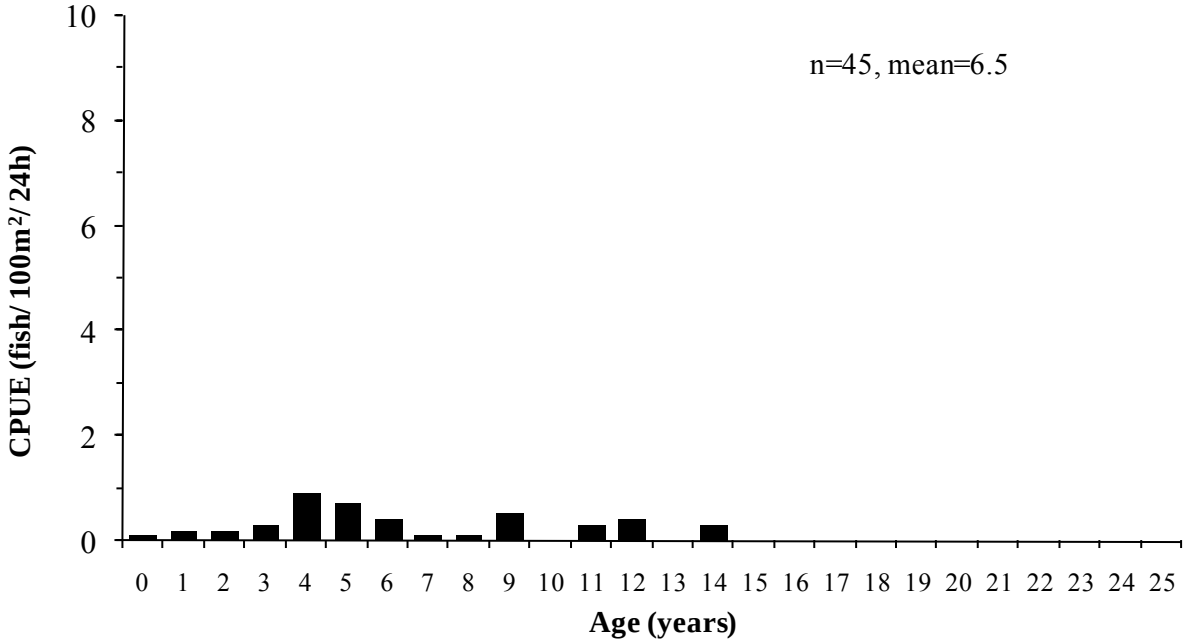

Figure 3. Walleye age frequency distributions from the 2010 FWIN survey on Brutus Lake.

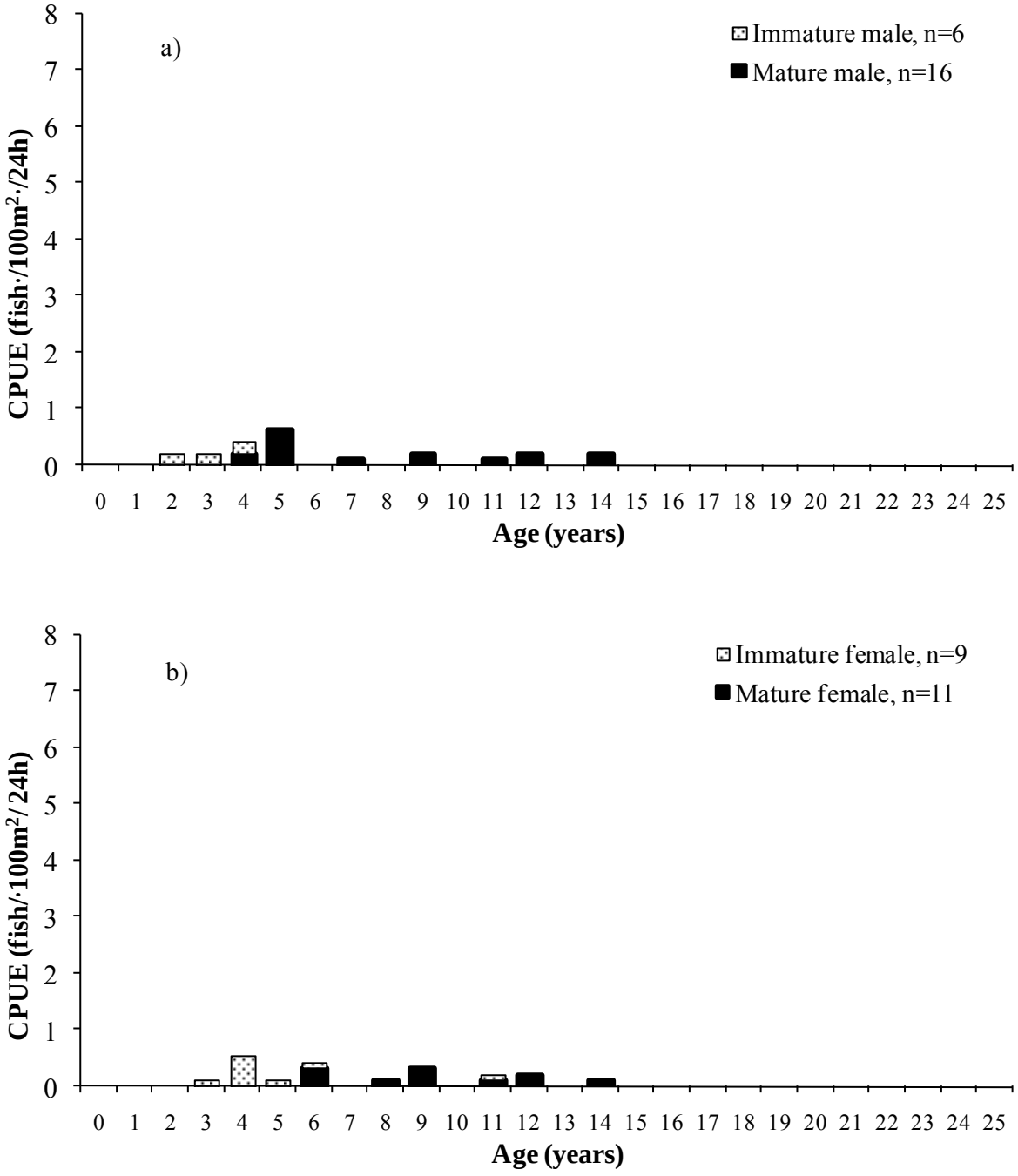

Figure 4. Age-at-maturity distributions for a) male and b) female walleye from the 2010 FWIN survey on Brutus Lake.

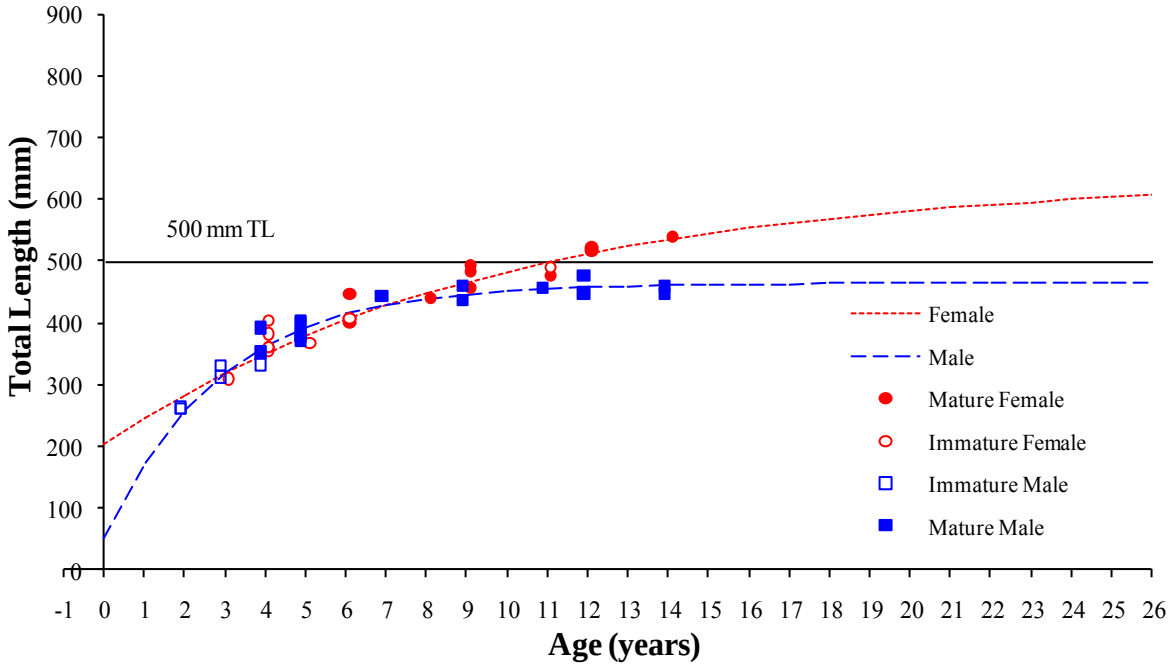

Figure 5. Von Bertalanffy growth curves for female (L_{inf} = 635.1, K = 0.105, t_o = -3.66, R^2 = 0.97, Prob < 0.0001) and male (L_{inf} = 464.8, K = 0.35, t_o = -0.333, R^2 = 0.99, Prob < 0.0001) walleye from the Brutus Lake FWIN survey, 2010.

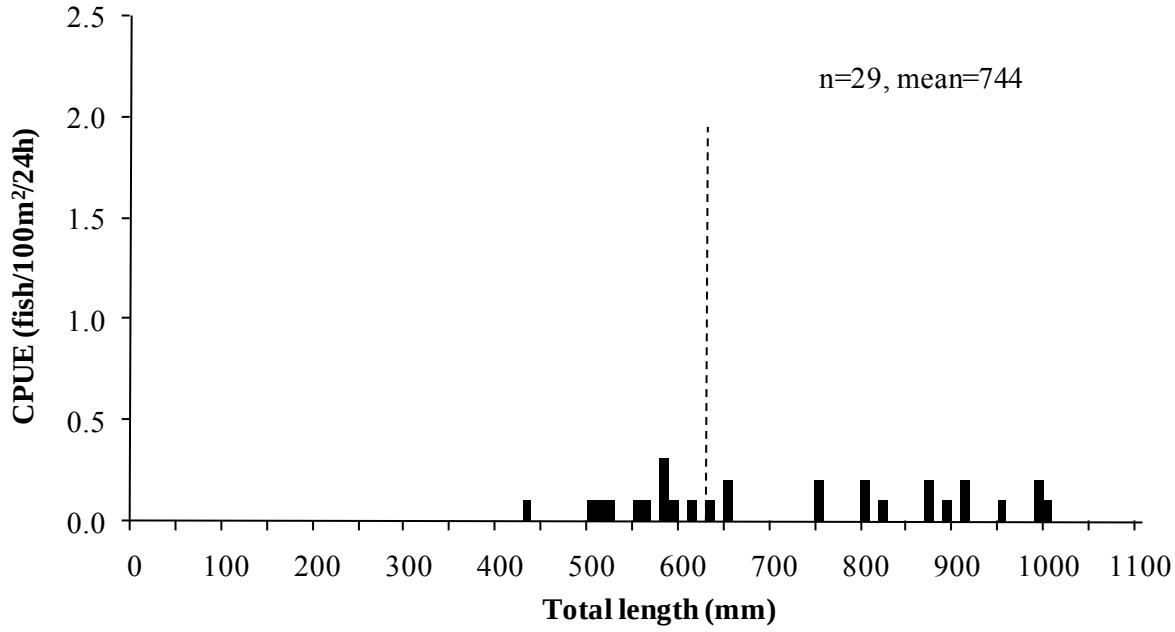

Figure 6. Northern pike total length frequency distributions from the 2010 FWIN survey on Brutus Lake. Dashed line denotes the 63 cm TL minimum size limit

Table 3. Walleye stock classification for Brutus 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 = 4.6
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.
				13 age-classes; mean age =6.5
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 11; males fully recruited at age 5. 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 9; males never reach 50 cm; pooled reach 50 cm at age 19.	

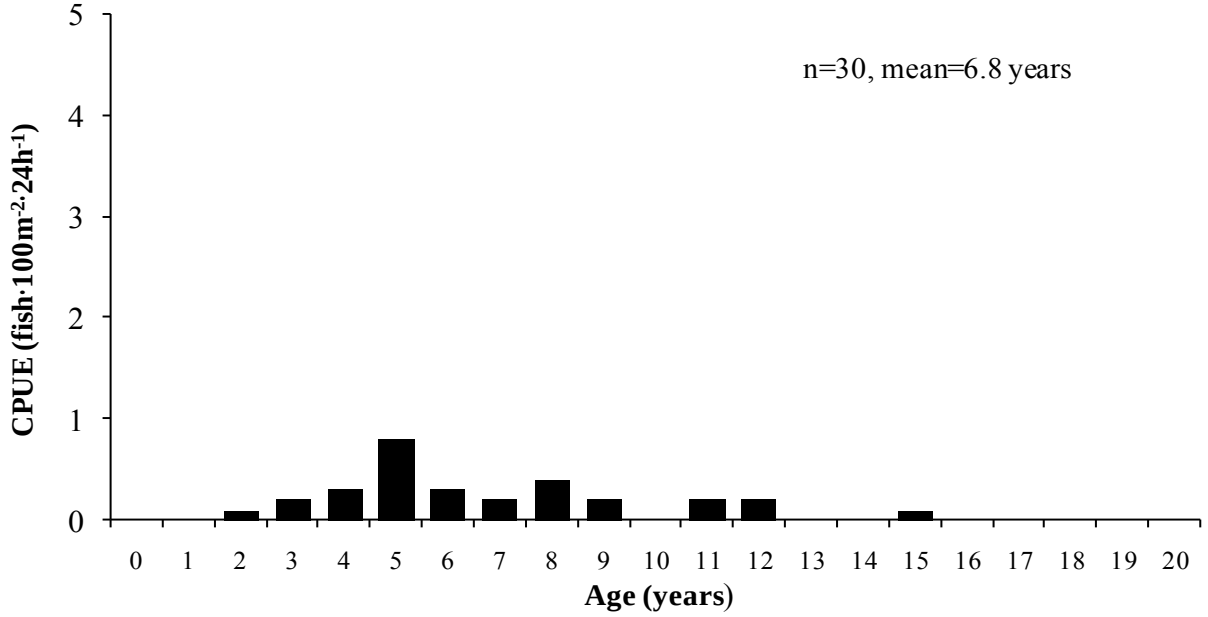

Figure 7. Northern pike age frequency distributions from the 2003 and 2010 FWIN surveys on Brutus Lake.

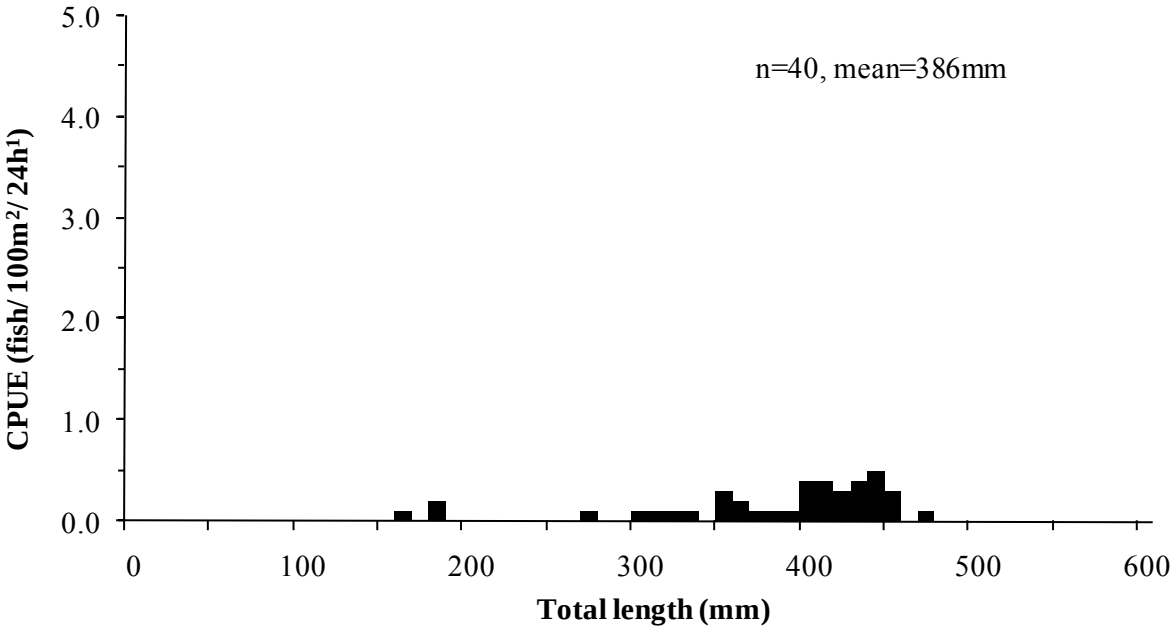

Figure 8. Lake whitefish total length frequency distribution from the 2010 FWIN surveys on Brutus Lake.

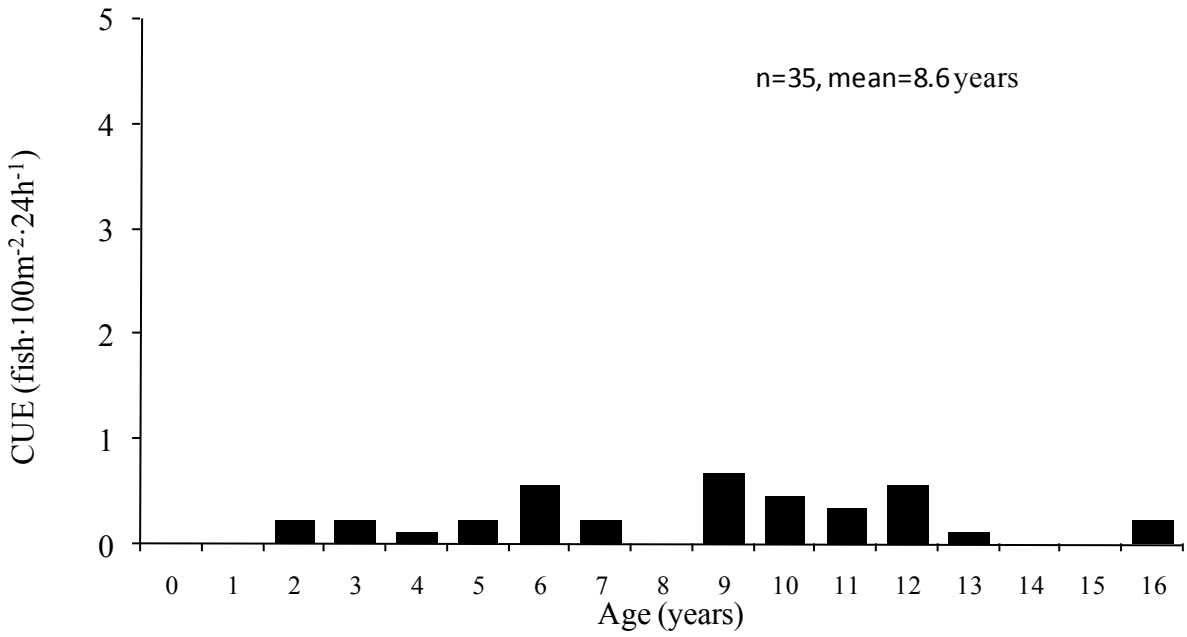

Figure 9. Lake whitefish age frequency distributions from the 2010 FWIN survey on Brutus Lake.

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