# Ethel Lake Fall Walleye Index Netting, 2012

*Fisheries Management*
*Waterways/Lac La Biche, Cold Lake*

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## Abstract

A Fall Walleye Index Netting (FWIN) survey was conducted on Ethel Lake from September 26 to 28, 2012. A total of 305 fishes of 6 species were caught, including 108 walleye, 66 pike, 83 yellow perch, and 28 lake whitefish. The catch rate for walleye was 14.1 fish/$100m^2$/24 hours (95% confidence interval 9.7-18.9). Walleye total lengths ranged from 186 to 590 mm (n= 108), and walleye over 500 mm made up 24% of the sample. Only the 9-year-old age class had a catch rate of at least 3 fish/$100m^2$/24 hours. Ninety percent of captured walleye were mature, with maturity occurring at approximately 5 years for females and 4 years for males. Male walleye reached a mean total length of 500 mm by age 11 and females by age 8. Based on the results of the survey, this walleye population can be classified as collapsed.

## Introduction

Alberta Environment and Sustainable Resource Development implements strategies to sustainably manage fish populations and provide sustainable harvest allocations for sportfish. Monitoring is required to evaluate the effectiveness of these strategies. The Cold Lake area Fisheries Management team conducted a Fall Walleye Index Netting (FWIN) survey on Ethel Lake during the last week of September 2012. The purpose of this survey is to assess the relative abundance and population structure of the walleye (*Sander vitreus*) fishery. The survey also provides insight into the current management strategies by comparing these results to those from previous FWIN surveys, the most recent having been conducted on Ethel Lake in 2007. The current regulation regarding walleye in Ethel Lake is a 0 bag limit.

## Methods

This FWIN survey was conducted from September 26 to 28, 2012. A comprehensive description of equipment and methodology can be found in the Manual of Instructions Fall Walleye Index Netting (FWIN) (Morgan 2002). Fourteen sampling locations were used for this survey (Appendix 1). These sites were selected randomly and were weighted by depth stratum. The FWIN nets consisted of eight panels, 3.81 m in length and 1.83 m in height with stretched mesh sizes of 25, 38, 51, 64, 76, 102, 127, and 152 mm. The 8-panel FWIN nets used in this survey were half the length of standard FWIN nets. In order to report catch rates comparable to the full length standard, the area of the half net panels were factored against the area of the full net panels. The nets also included additional experimental panels of 12 and 19 mm separated from the standard gang by ten meter leads to collect data for an ongoing regional forage study. Nets were set for 24 hrs before being cleared of fish and reset at a new location. 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 for most net locations, and ranged between 13.4- 14.9 °C.

All fish species were kept for data collection. 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. Data was collected, including fork and total length (to the nearest millimetre) and weight (in grams) for all species, as well as sex and maturity from all sportfish. Bony aging structures were also collected from sport fish for age determination. Otoliths were collected from walleye and aged following criteria in Watkins and Spencer (2009). Cleithrum were collected from northern pike (*Esox lucius*) and aged following the criteria in Mackay et al. (1990).

For the analysis, only data from fish caught in the standard eight panel FWIN nets is presented in this report. The supplemental 12 and 19 mm mesh panels are not relevant to this FWIN survey. Relative abundance expressed as CPUE was calculated as number of fish caught/100 m$^2$/net/24 hours with 95% confidence intervals empirically determined by bootstrapping catches to 50,000 replications. Growth was described using the von Bertalanffy growth model in FAMS 1.0 (Slipke 2010).

The complete dataset from this survey, including the supplemental 12 and 19 mm mesh panels, is stored digitally in the Fish and Wildlife Management Information System (FWMIS) under Project ID # 16501.

## Results

A total of 305 fish of 6 species were caught during this FWIN (Appendix 1). The catch rate for walleye was 14.1 fish/100m$^2$/24 hours (95% confidence interval 9.7-18.9), which shows very little change from the 2007 FWIN survey catch rate of 14.0 fish/100m$^2$/24 hours (Table 1). This catch rate is on the threshold between collapsed and vulnerable status (Figure 1, Table 2). Walleye total lengths ranged from 186 to 590 mm (n= 108, Figure 2), and

walleye over 500 mm made up 24% of the sample. Only the 9-year-old age class had a catch rate of at least 3 fish/100m$^2$/24 hours (Figure 3), representing 25% of the population. Walleye sampled ranged in age from one to twenty-two years, with an average age of 8.5 years (n= 106). Ninety percent of walleye caught were mature. Average age-at-maturity is difficult to determine due to small sample sizes (Figure 4); however, based on the minimum ages-at-maturity present in the sample, male walleye started maturing by age 4 and females by age five. Male walleye from this survey reached a mean total length of 500 mm by age 11 and females by age 8 (Figure 5).

Other species caught included 66 northern pike *(Esox lucius)*, 83 yellow perch (*Perca flavescens*), and 28 lake whitefish (*Coregonus clupeaformis*). Figures for these fish were not included in the report due to the low sample size encountered. The total length of northern pike ranged from 324 to 679 mm, and averaged 517 mm. Pike ages ranged between 1 and 7 years, with an average of 4 years. The total lengths of lake whitefish ranged between 474 and 637 mm, averaging to 582 mm. Whitefish were an average of 14 years old, and ages ranged from 5 to 23 years. The total lengths of yellow perch ranged from 95 to 304 mm, and averaged 131 mm.

## Interpretation

Of the five population metrics used to classify walleye populations including catch rate, maturity, age and size distribution (Table 2), one can be classified as "vulnerable" while the remainder fall under the "collapsed" category. The Ethel Lake walleye population can therefore be classified as collapsed, based on the balance of the evidence.

Table 1. Species catch rates from the 2012 and 2007 Ethel Lake FWIN surveys.

| Species | Year | CUE | 95% C.I. |
|---------|------|-----|----------|
| WALL | 2012 | 14.1 | 9.7- 18.9 |
| | 2007 | 14.0 | 9.0- 19.1 |
| NRPK | 2012 | 8.6 | 5.7- 11.6 |
| | 2007 | 13.9 | 10.8- 17.2 |
| YLPR | 2012 | 10.8 | 6.5- 15.3 |
| | 2007 | 10.7 | 7.5- 13.6 |
| LKWH | 2012 | 3.7 | 2.2- 5.2 |
| | 2007 | 1.2 | 0.3- 2.3 |

Table 2. Walleye Stock Classification for Ethel 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= 14.1** |
| 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. |
| | | | | **1 age class (n=106); mean age = 8.5** |
| AGE CLASS STABILITY | Very stable: 1 to 2 "measureable" (> 3 walleye•100m$^{-}$•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. |
| | | | | **One measureable age classes; low abundance of remaining 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 mature at age 5; males mature at age 4.** |
| 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 |
| | | **Males reach 50cm by 11 years, females by 8 years old** | | |
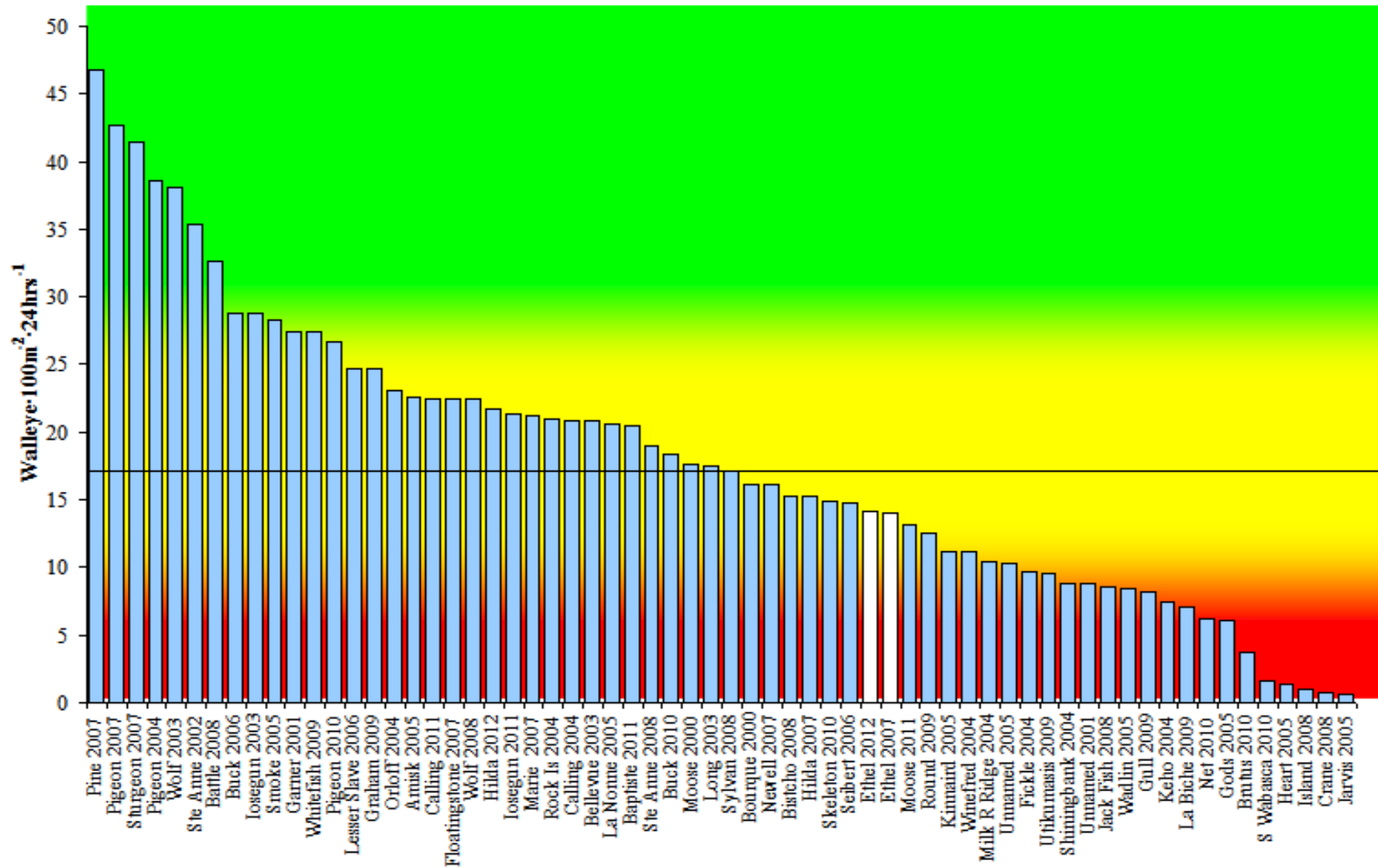
Figure 1. Mean walleye catch rates from a representative sample of FWIN surveys from across Alberta. The black line represents the mean provincial catch rate of 17.1 fish/100m$^2$/24 hours. Collapsed, vulnerable, and stable catch rate ranges are indicated by red, yellow and green backgrounds. The walleye catch rates from the 2007 and 2012 Ethel Lake FWIN surveys are highlighted.
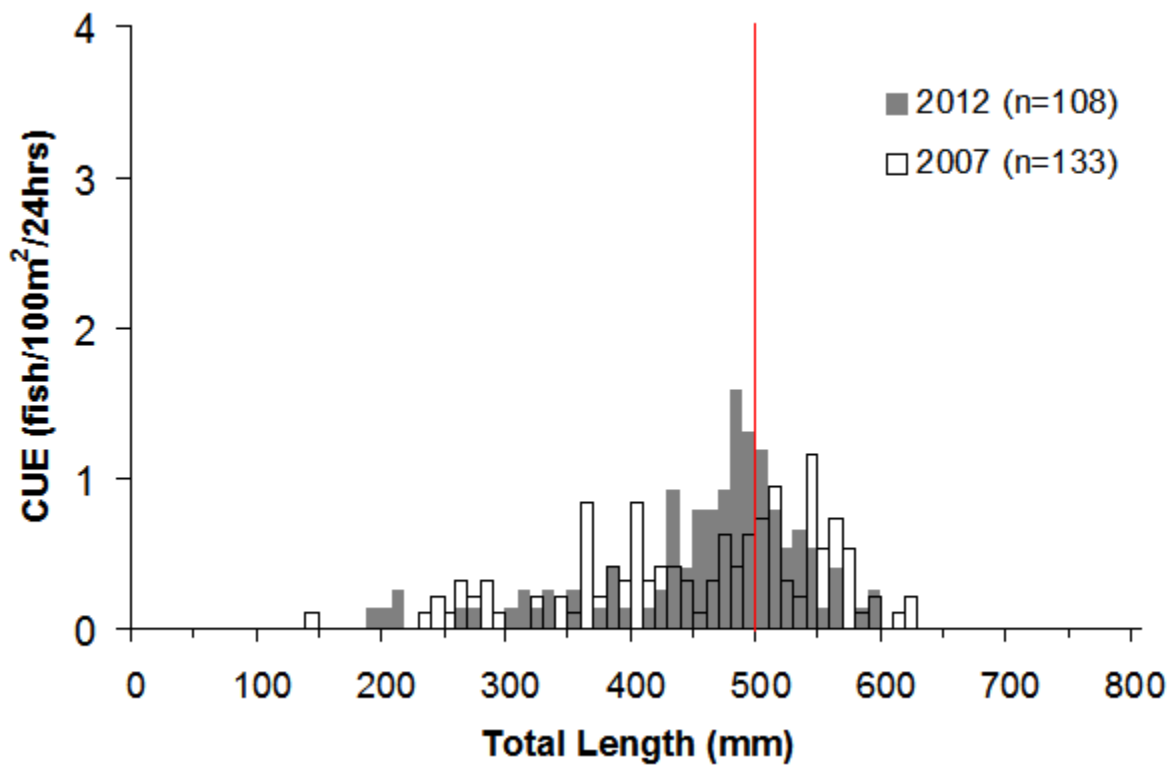
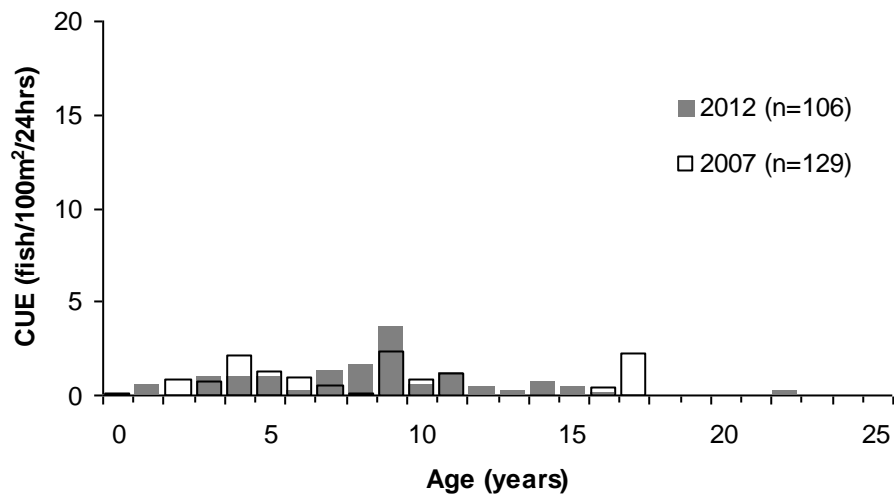Figure 2. Walleye total length-frequency distributions from the 2007 and 2012 FWIN surveys on Ethel Lake.



Figure 3. Walleye age-frequency distributions from the 2007 and 2012 FWIN surveys on Ethel Lake. Mean age was 8.5 for both surveys.
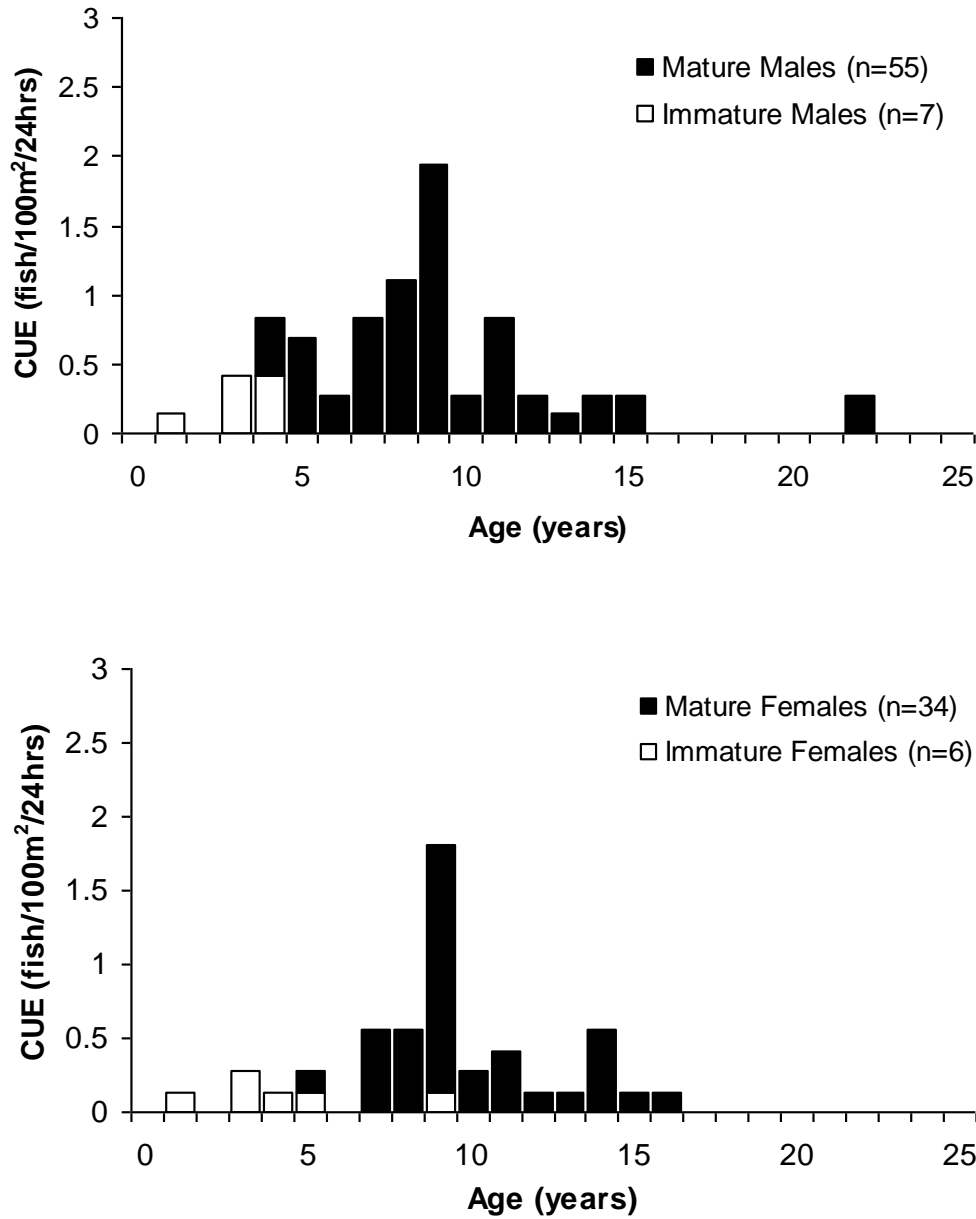
Figure 4. Age-at-maturity distributions for male and female walleye from the 2012 FWIN survey on Ethel Lake (stacked bar graph).
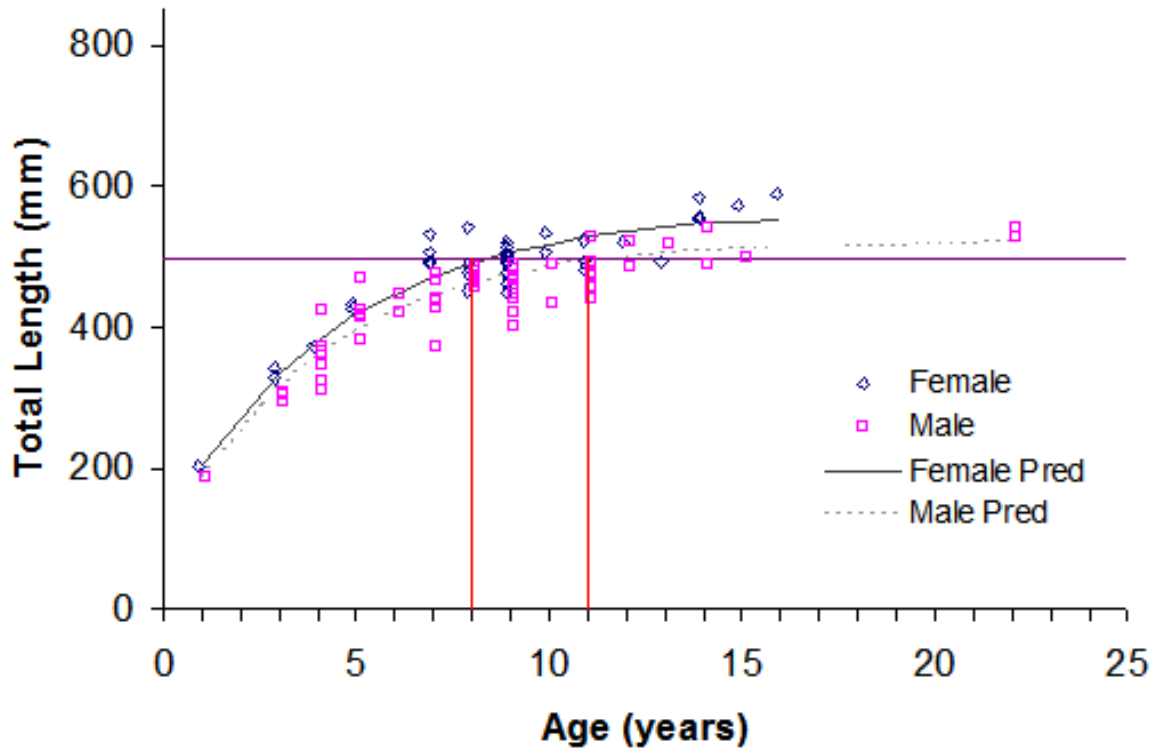
Figure 5. Total length-at-age for Ethel Lake walleye from the 2012 Ethel Lake FWIN survey (Females: $L_{inf}$ = 568.156, K = 0.221, $t_o$ = -1.021, $R^2$ = 0.95, Prob > F= 0.0001; Males: $L_{inf}$ = 522.56, K = 0.243, $t_o$ = -0.807, $R^2$ = 0.98, Prob > F= 0.0001).

## Literature Cited

Mackay, W.C., G.R. Ash, and H.J. Norris (eds.). 1990. Fish ageing methods for Alberta. R.L.& L. Environmental Services Ltd. in assoc. with Alberta Fish and Wildl. Div. and Univ. of Alberta, Edmonton. 113 p.

Morgan, G.E. 2002. Manual of Instructions – Fall Walleye Index Netting (FWIN).  Percid Community Synthesis, Diagnostics and Sampling Standards Working Group. Ontario Ministry of Natural Resources. 34 p.

Slipke, J. W. 2010. Fishery Analyses and Modeling Simulator (FAMS 1.0).

Watkins, Owen B. and Stephen C. Spencer 2009. Collection, preparation and ageing of walleye otoliths. Fish and Wildlife Division, Alberta Sustainable Resource Development. 14pp.

## APPENDICES

Appendix 1. Catch summaries from the Ethel Lake FWIN September 26 to 28, 2012.  Set coordinates are Universal Transverse Mercator Zone 12, North American Datum 83.

| Set Number | UTM Easting | UTM Northing | Lift Date | Set Duration (hours) | Number of fish caught | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WALL | NRPK | YLPR | LKWH | WHSC | CISC | Total |
| EL1 | 542665 | 6042320 | 27-Sep-12 | 23.17 | 7 | 6 | 7 | 5 | 1 | 0 | 26 |
| EL12 | 542843 | 6043022 | 27-Sep-12 | 24.28 | 8 | 8 | 7 | 2 | 1 | 0 | 26 |
| EL13 | 541503 | 6043017 | 27-Sep-12 | 24.35 | 5 | 12 | 7 | 1 | 3 | 0 | 28 |
| EL14 | 542608 | 6044229 | 27-Sep-12 | 23.42 | 3 | 8 | 13 | 2 | 2 | 2 | 30 |
| EL15 | 541538 | 6043404 | 27-Sep-12 | 23.77 | 9 | 7 | 14 | 4 | 0 | 0 | 34 |
| EL17 | 542998 | 6043854 | 28-Sep-12 | 23.47 | 8 | 4 | 7 | 2 | 0 | 7 | 28 |
| EL18 | 541238 | 6042404 | 27-Sep-12 | 22.97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EL3 | 541234 | 6041962 | 27-Sep-12 | 23.03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EL31 | 541049 | 6041831 | 28-Sep-12 | 23.43 | 10 | 4 | 4 | 4 | 0 | 1 | 23 |
| EL4 | 541491 | 6042664 | 28-Sep-12 | 23.07 | 11 | 3 | 2 | 0 | 0 | 1 | 17 |
| EL5 | 542259 | 6043385 | 28-Sep-12 | 23.50 | 11 | 4 | 12 | 3 | 0 | 0 | 30 |
| EL6 | 541588 | 6041813 | 28-Sep-12 | 23.83 | 10 | 4 | 2 | 1 | 0 | 0 | 17 |
| EL7 | 542476 | 6043061 | 28-Sep-12 | 23.20 | 7 | 4 | 8 | 3 | 0 | 0 | 22 |
| EL8 | 542100 | 6042419 | 27-Sep-12 | 22.98 | 19 | 2 | 0 | 1 | 0 | 2 | 24 |
| | | | | Total | 108 | 66 | 83 | 28 | 7 | 13 | 305 |