Hilda Lake Fall Walleye Index Netting, 2012

Fisheries Management
Waterways/Lac La Biche, Cold Lake

January 22, 2013

Senior Fisheries Biologist(s): Jordan Walker, Fisheries Management Cold Lake

Data Summary and Report by: Rebecca Heron, Fisheries Technician, Cold Lake

Disclaimer
This is a summary report prepared for public distribution by Alberta Environment and Sustainable Resource Development, Fisheries Management Branch. This report has been peer reviewed, but may be subject to revision pending further data analysis.

Abstract

A Fall Walleye Index Netting (FWIN) survey was conducted on Hilda Lake from October 1 to 3, 2012. A total of 176 fish of 5 species were caught, including 96 walleye, 23 pike, and 39 yellow perch. The catch rate for walleye was 21.7 fish/100m2/24 hours (95% confidence interval 15.1-28.8). Walleye total lengths ranged from 128 to 534 mm (n= 96), and walleye over 500 mm made up only 5% of the sample. The 4, 5, and 7 year olds had catch rates of at least 3 fish/100m^2/24 hours. Sixty-six percent of captured walleye were mature, with maturity occurring at approximately 4-5 years for females and 4 years for males. Male and female walleye growth was slow and neither reached 500 mm by age 15. Based on the results of the survey, this walleye population can be classified as vulnerable.

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 Hilda Lake during the first week of October 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 (walleye limit of 0) by comparing these results to those from previous FWIN surveys. The most recent survey was conducted on Hilda Lake in 2007. Since the last FWIN survey, Hilda Lake walleye regulations changed from 1 fish over 50cm to a 0 bag limit (in 2010).

Methods

This FWIN survey was conducted from October 1 to 3, 2012. A comprehensive description of equipment and methodology can be found in the Manual of Instructions Fall Walleye Index Netting (FWIN) (Morgan 2002). Eight 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. Two additional panels of 12 and 19 mm stretched mesh were attached but separated with a 15 m section of rope. 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. 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 11.7- 13.7 °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 the main body of the 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 raw data from this FWIN survey, including the 12 and 19 mm panel data, is stored digitally in the Fish and Wildlife Management Information System (FWMIS) under Project ID # 16496.

Results

A total of 176 fishes of 5 species were caught during this FWIN (Appendix 1). The catch rate for walleye was 21.7 fish/100m^2/24 hours (95% confidence interval 15.1-28.8), which is 44% higher than the 2007 FWIN survey catch rate of 15.1 fish/100m^2/24 hours (Table 1). This catch rate is similar to other populations in Alberta with vulnerable status (Figure 1). Walleye total lengths (n= 96) ranged from 128 to 534 mm (Figure 2), and walleye over 500 mm made up 5% of the sample. Three age classes had catch rates of at least 3 fish/100m^2/24 hours: ages 4, 5, and 7 years (Figure 3). Respectively, these classes represent 18%, 14%, and 18% of the walleye population.

Walleye sampled ranged in age from zero to fifteen years, with an average age of 6.8 years (n= 93). Sixty-six 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 four or five. The current growth of walleye appears to be moderate to slow; however, there were few fish greater than 500 mm in our survey (Figure 5).

Other species caught included 23 northern pike *(Esox lucius)* and 39 yellow perch (*Perca flavescens*). 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 386 to 822 mm, and averaged 504 mm. Ages ranged between 2 and 14 years, averaging four years with the two and three year-olds being the most abundant. The length of yellow perch ranged from 99 to 317 mm, and averaged 135 mm.

Interpretation

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

Table 1. Species catch rates (fish/100m^2/24hrs) from the 2012 and 2007 Hilda Lake FWIN surveys.

Species	Year	CUE	95% C.I.
WALL	2012	21.7	15.1-28.8
	2007	15.1	10.1–19.8
NRPK	2012	5.3	1.8-9.3
	2007	4.9	2.7-7.2
YLPR	2012	10.9	4.8-17.5
	2007	14.3	6.5-24.2

Table 2. Walleye Stock Classification for Hilda Lake based on the 2012 FWIN survey results

POPULATION METRIC	POPULATION STATUS CLASSIFICATION			
	TROPHY	STABLE	VULNERABLE	COLLAPSED
CATCH RATE	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 = 21.7 (15.1-28.8)	
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.
			3 age classes (n=93); mean age = 6.8	
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.
			Few measureable age classes; irregular recruitment of several 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 4-5; 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
				***Very slow growth. Similar to "hockey-stick"- age-at-length. Males and females do not reach 50 cm until after 15 years of age.**

*In a few populations in Alberta, walleye growth is very slow as fish approach maturity (Spencer, 2010). This growth rate is not indicative of a "Trophy" population.

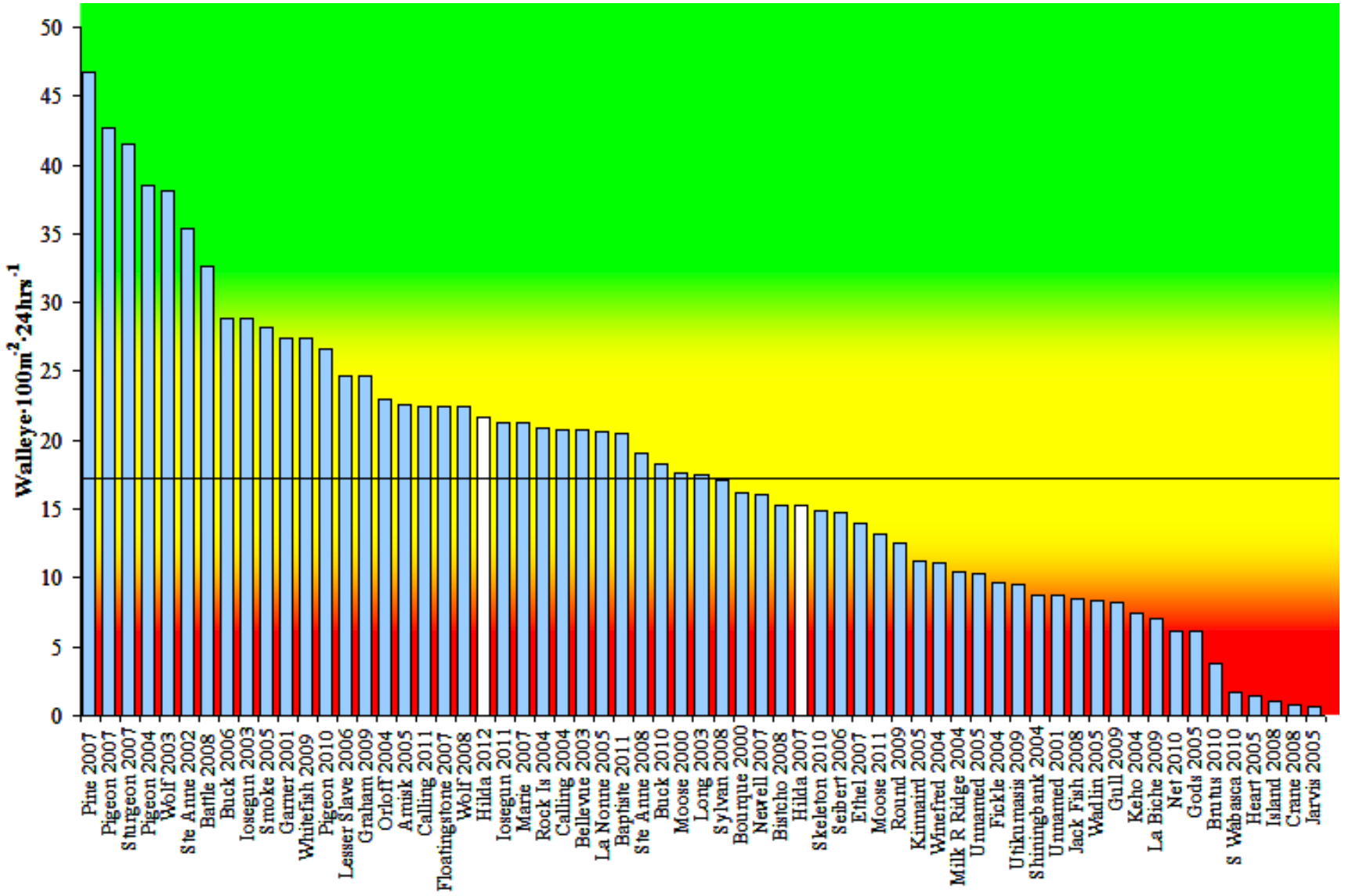

Figure 1. Mean walleye catch rates from a representative sample of FWIN surveys from across Alberta. The black line represents the mean provincial catch rate of 17.1 fish/100m^2/24 hours. Collapsed, vulnerable, and stable catch rate ranges are indicated by red, yellow and green backgrounds. The walleye catch rates from the 2007 and 2012 Hilda Lake FWIN surveys are highlighted.

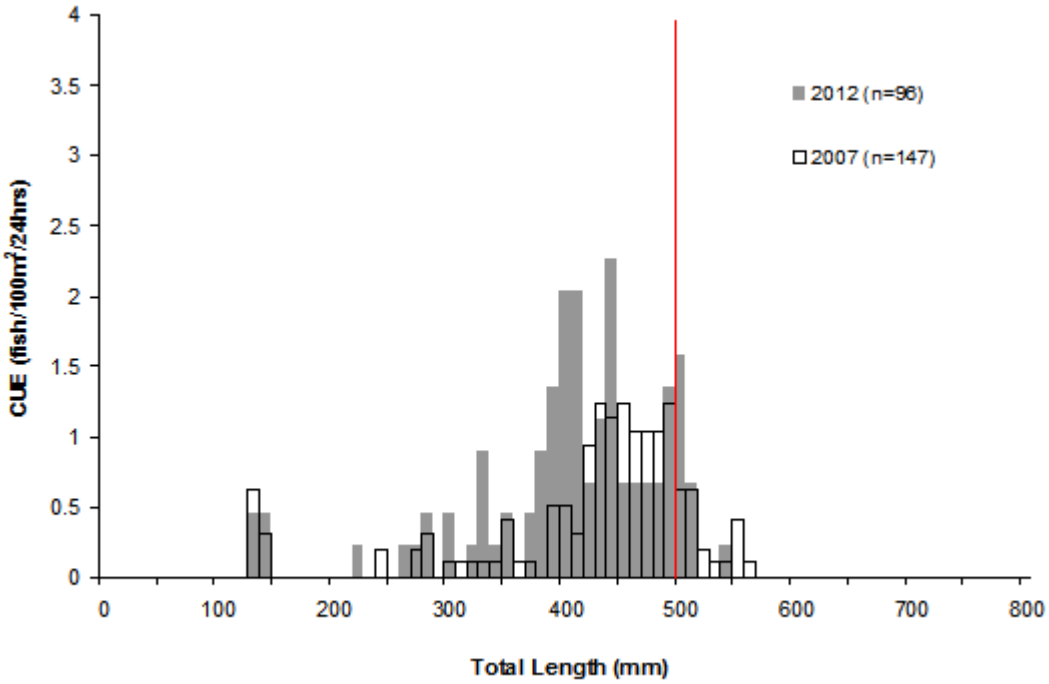

Figure 2. Walleye total length-frequency distributions from the 2007 and 2012 FWIN surveys on Hilda Lake. The red line represents the previous minimum size limit of 500mm, which was changed to a catch-and-release regulation in 2010.

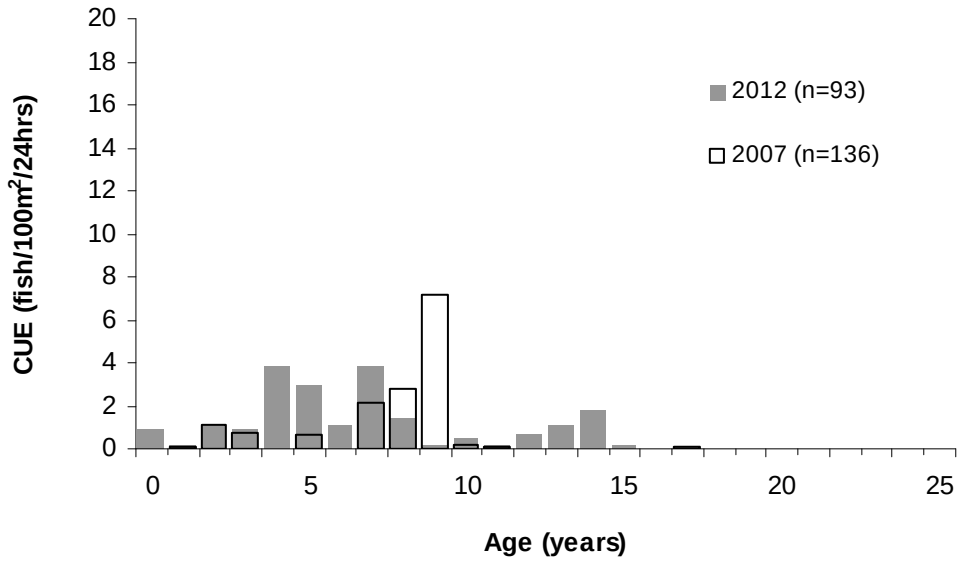

Figure 3. Walleye age-frequency distributions from the 2007 and 2012 FWIN surveys on Hilda Lake. Mean ages were 7.1 and 6.7 years, respectively.

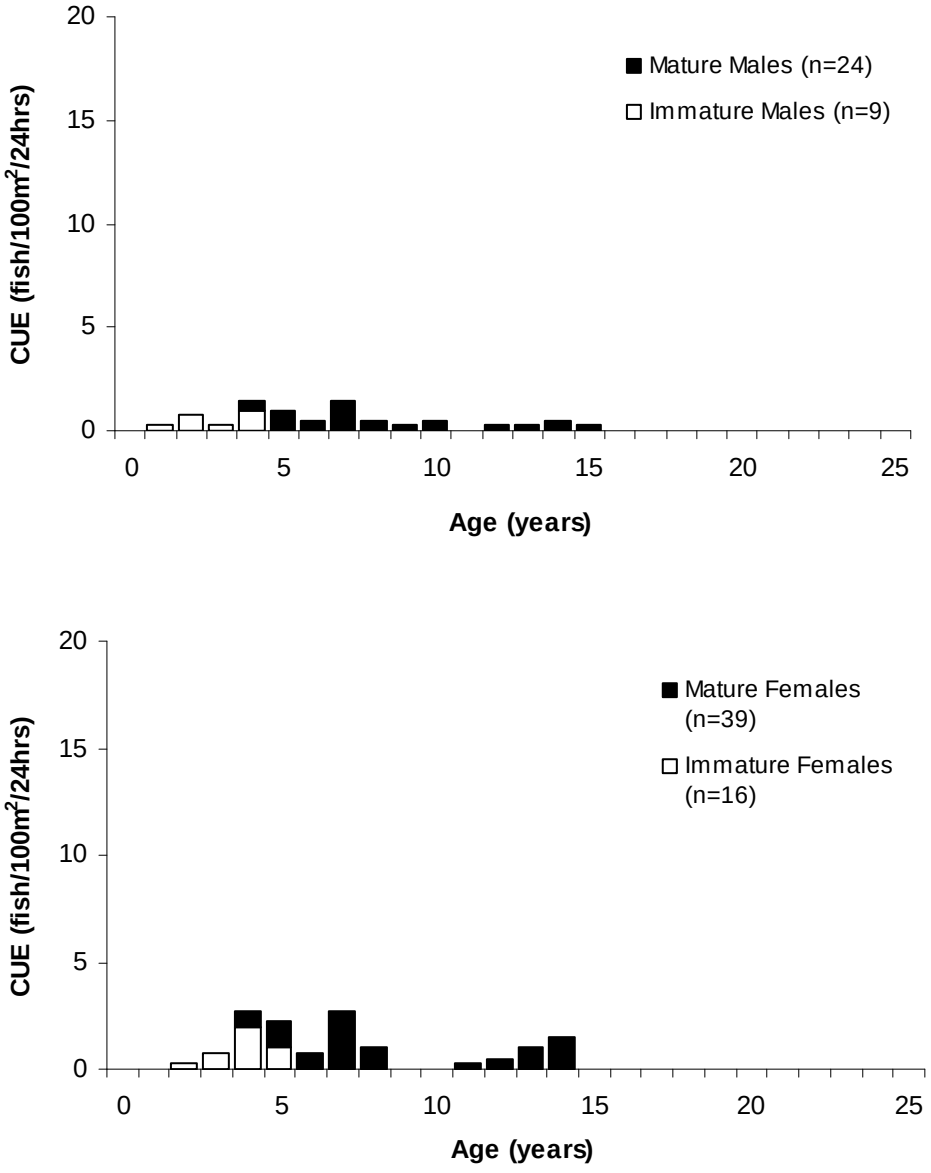

Figure 4. Age-at-maturity distributions for male and female walleye from the 2012 FWIN survey on Hilda Lake (stacked bar graph).

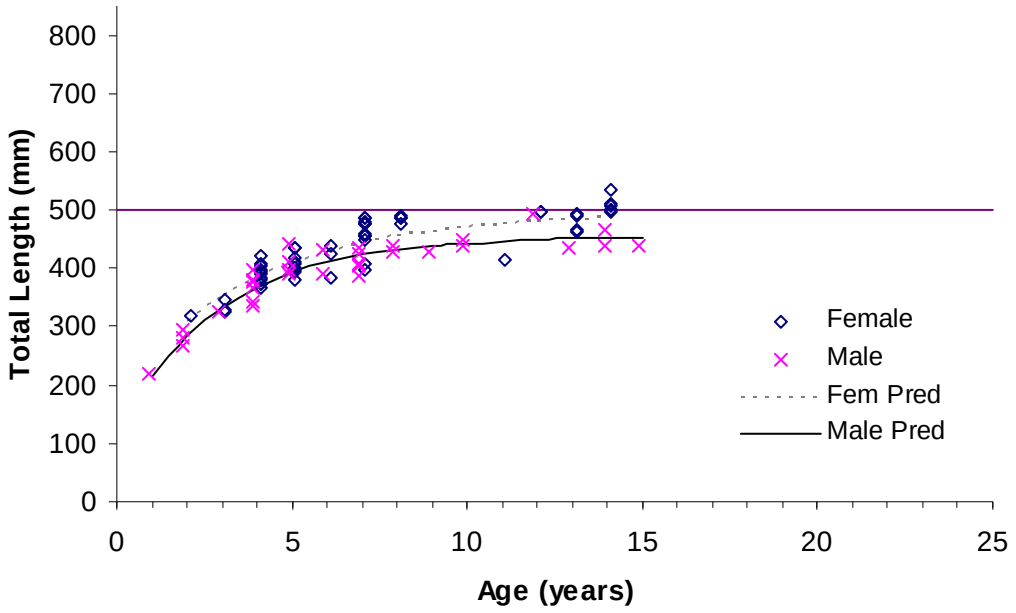

Figure 5. Total length-at-age for Hilda Lake walleye from the 2012 Hilda Lake FWIN survey (Females: L_{inf} = 494.567, K = 0.258, t_o = -1.812, R^2 = 0.82, Prob > F= 0.0001; Males: L_{inf} = 455.185, K = 0.337, t_o = -0.898, R^2 = 0.95, Prob > F= 0.0001).

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).

Spencer, S.C. 2010. Active Adaptive Management to Address a Small Fish Problem. Doctoral Thesis, Department of Renewable Resources, University of Alberta. 146 p.

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 Hilda Lake FWIN October 1 to 3, 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	CISC	WHSC	Total
HL11	537721	6043154	3-Oct-12	22.47	10	0	2	2	0	14
HL12	537224	6042264	2-Oct-12	23.6	11	8	15	0	0	34
HL14	535937	6040423	3-Oct-12	23.25	10	8	1	0	0	19
HL3	537486	6041620	3-Oct-12	23.23	11	2	3	0	1	17
HL5	537021	6041184	3-Oct-12	22.63	14	2	11	3	1	31
HL7	536228	6040597	2-Oct-12	24.13	2	1	0	0	0	3
HL8	536965	6040880	2-Oct-12	25.42	14	2	7	2	0	25
HL9	536310	6041716	2-Oct-12	24.8	24	0	9	0	0	33
				Total	96	23	48	7	2	176