Alberta Conservation Association
2007/08 Project Summary Report

Project name: *Walleye Population Assessments (Fall Walleye Index Netting, FWIN) in Sturgeon, Gregoire, Hilda, and Ethel Lakes*

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Partnerships:

Alberta Tourism, Parks and Recreation and Culture (formerly Alberta Community Development), Gregoire Lake Provincial Park
Alberta Sustainable Resource Development

Key findings

- The four lakes had moderate to high density populations of walleye.
- All populations displayed unstable age-class distributions likely attributable to size-selective fishing mortality.
- Overall, walleye populations in these lakes exhibited relatively high growth rates, reaching 500 mm fork length by or before age-10.
- Information generated will allow ASRD to evaluate the effect of current sport fish regulations at these fisheries and will inform future management decisions on these lakes.

Introduction

Historically high harvest rates, coupled with slow growth rates and late maturity have resulted in the over-harvest of many of Alberta's walleye (*Sander vitreus*) populations (Sullivan 2003) and this trend is expected to continue given the increasing popularity of recreational fishing among Alberta residents. To protect and aid in the recovery of the walleye fishery, Alberta Sustainable Resource Development (ASRD) introduced *Alberta's Walleye Management and Recovery Plan* (AWMRP) in 1995, under which lakes were classified into one of four general categories, based on the fishery's level of exploitation (Berry 1995). The four categories included: collapsed, vulnerable, stable, and trophy. Using this classification each lake was assigned a corresponding sport fishing regulation (Sullivan 2003). In this report, we summarize results of gill net surveys we conducted during the summer of 2007, as part of the AWMRP, to obtain data on the abundance and population structure of walleye in four lakes (Sturgeon, Gregoire, Ethel, and Hilda lakes). The information collected in these surveys will allow ASRD to evaluate the effect

of current sport fish regulations on the fisheries at these lakes and will inform future management decisions.

Methods

We captured walleye using the Fall Walleye Index Netting (FWIN) survey methods developed by the Ontario Ministry of Natural Resources (Morgan 2000). Between 11 - 21 September 2007, we set nine to 20 multi-panel monofilament gill nets over a 21 - 27 h period in each lake. Each net measured 61 x 1.8 m and consisted of eight, 7.6 x 1.8 m panels of different mesh sizes (stretched mesh): 25, 38, 51, 64, 76, 102, 127, and 152 mm. We selected sampling sites in a stratified-random fashion, using depth zones (two strata: 2 - 5 m and 5 - 15 m) and surface area as strata.

For all captured fish, we identified it to species and measured fork length (FL, mm), total length (TL, mm), total weight (g), and mature female gonad weight (g). We determined sex and maturity following Duffy et al. (2000) and aged walleye using otoliths and the first three pelvic fin rays following Mackay et al. (1990). The location of the first annulus was identified by the process outlined in Watkins and Spencer (in preparation) Walleye that were less than 1 y (young-of-year, YOY) were recorded as age-0. All data were entered into Alberta Government's Fisheries Management Information System (FMIS) database.

We estimated mean catch rate of walleye (i.e., #fish/100 m^2/24 h) and associated 95% confidence intervals (95% CI) using the bootstrap technique (Haddon 2000). We used length- and age-class distributions, as well as length-at-age to examine population structure of walleye. We estimated growth rate using the von Bertalanffy growth function with the FAST software ver. 3.0 (Slipke and Maceina, 2006). Following the AWMRP, we used 500 mm FL as the provincial standard for assessing length-at-age distributions.

Results

Sturgeon Lake

A total of 20 nets were set in Sturgeon Lake between 11 - 13 September 2007 and resulted in the capture of 907 walleye with a catch rate of 41.5 fish/100 m^2/24 h (95% CI = 37.0 - 46.0). Other species captured include: 65 yellow perch (*Perca flavescens*), 76 northern pike (*Esox lucius*), 142 lake whitefish (*Coregonus clupeaformis*), 57 white sucker (*Catostomus commersoni*), 87 spottail shiners (*Notropis hudsonius*), and two trout perch (*Percopsis omiscomaycus*).

The Sturgeon Lake walleye displayed broad length- and age-class distributions, consisting of fish ranging in length from 110 - 590 mm (Figure 1) and ages ranging from 0 to 24 y with a mean age of 4.9 ± 3.7 y (Figure 2). The von Bertalanffy growth curve indicated both male and female walleye reached 500 mm FL by age-6. Older fish (≥ age-13) were poorly represented in the catch suggesting a moderately unstable age-class distribution; recruitment to the fishery seems strong but there is heavy mortality of legal-size fish.

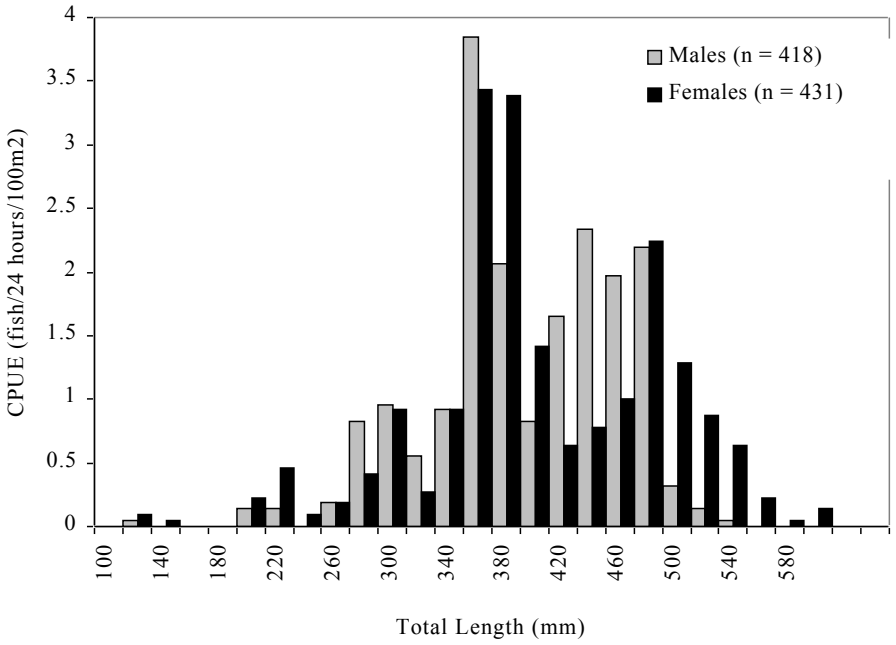

Figure 1. Length-class distribution of walleye from Sturgeon Lake in 2007.

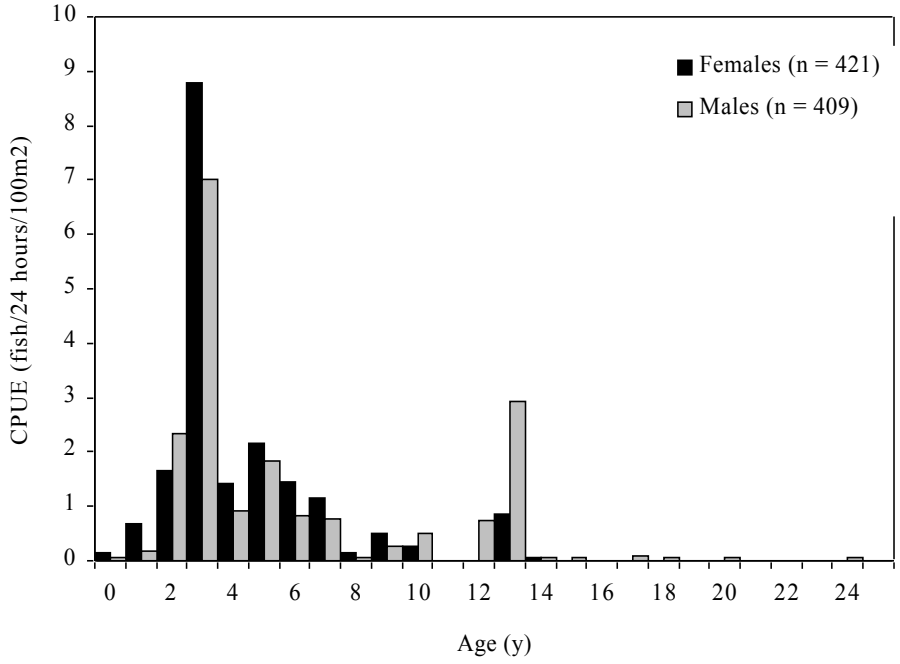

Figure 2. Age-class distribution of walleye from Sturgeon Lake in 2007.

Gregoire Lake

A total of 18 nets were set in Gregoire Lake between 11 - 13 September 2007 and resulted in the capture of 234 walleye with a catch rate of 11.8 fish/100 m²/24 h (95% CI = 8.7 - 16.6). Other species captured include: 83 yellow perch, 114 northern pike, 55 lake whitefish, 62 cisco (*Coregonus artedi*), 34 white suckers, eight spottail shiners, and 1 trout perch.

Walleye from Gregoire Lake displayed a broad age-class distribution with ages ranging from 0 to 20 y (Figure 3). Strong age-classes include ages-1, 3, 10, and 13.

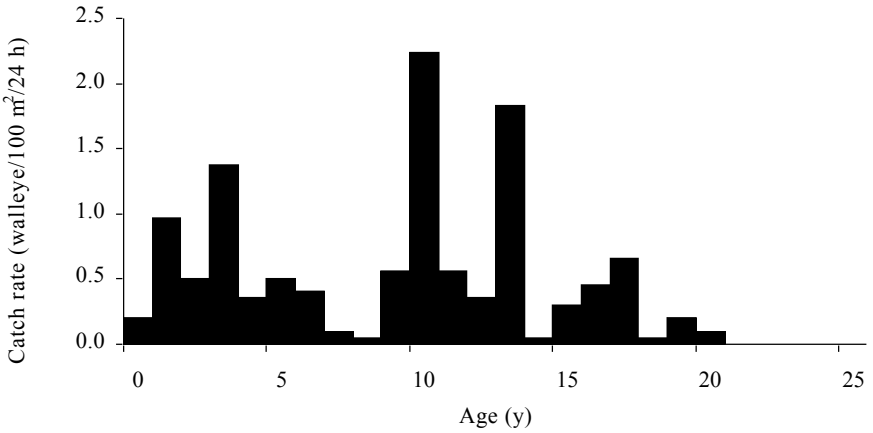

Figure 3. Age-class distribution of walleye from Gregoire Lake in 2007.

The von Bertalanffy growth plot indicated that, on average, walleye in Gregoire Lake reached 500 mm FL at age-14. The low slope of this length-at-age relationship may indicate either a slow rate of growth or an altered population caused by the excessive mortality of larger fish from size selective fishing or related hooking mortality.

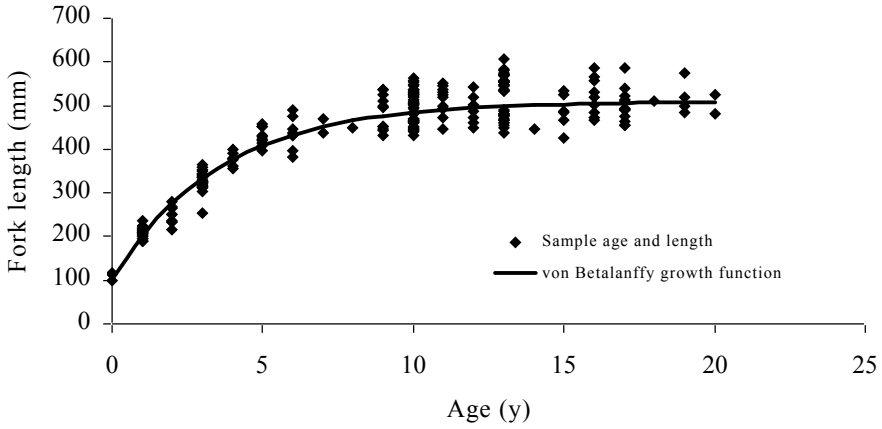

Figure 4. Length-at-age relationship for walleye from Gregoire Lake in 2007.

Ethel Lake

A total of nine nets were set in Ethel Lake between 19 - 21 September 2007 and resulted in the capture of 134 walleye with a catch rate of 14.0 fish/100 m²/24 h (95% CI = 9.0 - 19.0). Other species captured include: 101 yellow perch, 134 northern pike, 12 lake whitefish, 26 cisco, and 29 white suckers.

Walleye in Ethel Lake displayed broad and multimodal age-class distributions with ages ranging from 0 to 17 y and peaks (modes) at ages-4, 9, and 17 (Figure 5). The von Bertalanffy plot indicated that, on average, walleye from Ethel Lake reached 500 mm FL by age-10 (Figure 6). The variable catches of walleye may indicate recurring recruitment issues and increased mortality likely related to size-selective fishing and/or related hooking mortality.

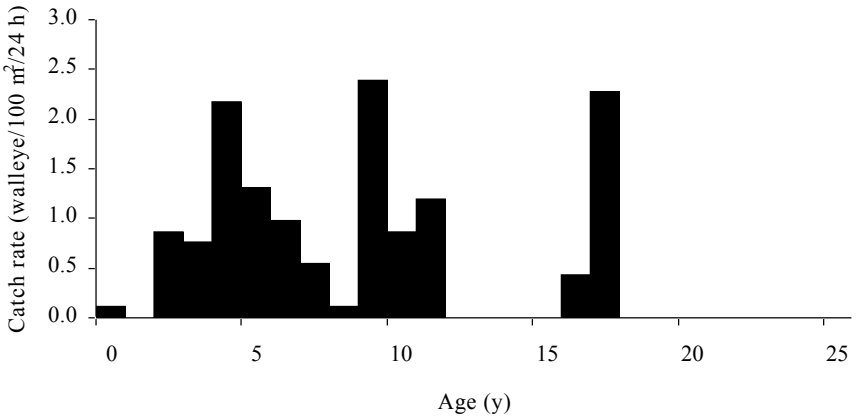

Figure 5. Age-class distribution of walleye from Ethel Lake in 2007.

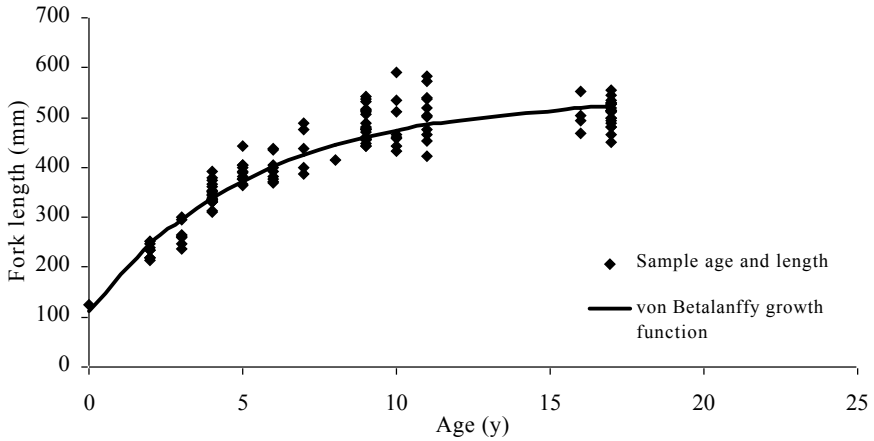

Figure 6. Length-at-age relationship for walleye from Ethel Lake in 2007.

Hilda Lake

A total of 9 nets were set in Hilda Lake between 19 - 21 September 2007 and resulted in the capture of 149 walleye with a catch rate of 15.1 fish/100 m²/24 h (95% CI = 10.1 - 19.8). Other species captured include: 139 yellow perch, 48 northern pike, 42 cisco, and 19 white suckers.

The walleye sampled from Hilda Lake displayed a narrow and unstable age-class distribution with ages-7, 8, and 9 fish dominating the catch; older fish (≥ age-8) were poorly represented (Figure 7). The lack of older fish may be caused by excessive mortality from size-selective fishing or related hooking mortality. The youngest walleye sampled from Hilda Lake to reach 500 mm FL was age-9 (Figure 8). The growth curve indicates a lack of larger, older fish supporting the notion of excessive mortality on these fish.

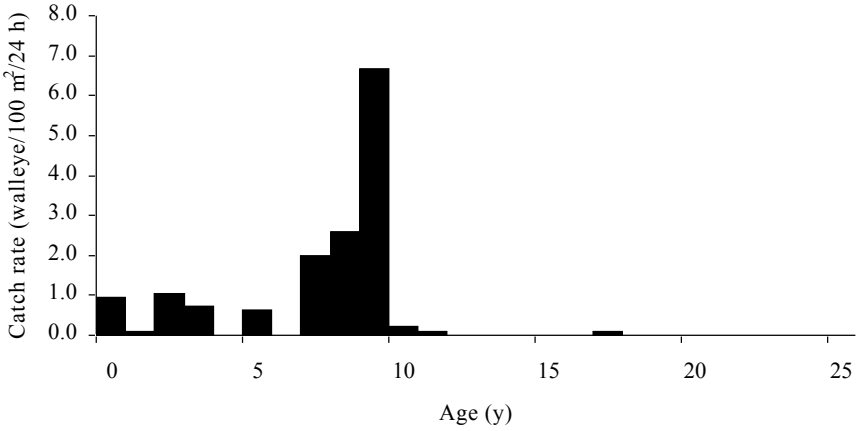

Figure 7. Age-class distribution of walleye from Hilda Lake in 2007.

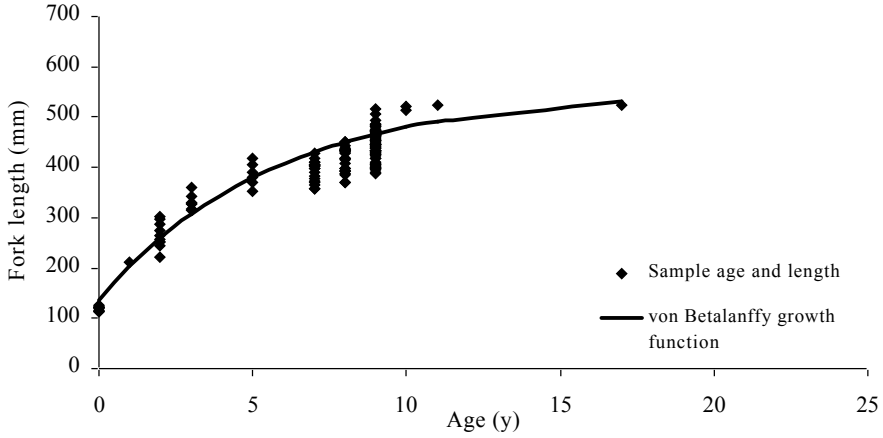

Figure 8. Length-at-age for walleye from Hilda Lake in 2007.

Conclusion

The data collected during the population assessments of these walleye fisheries indicate varying levels of exploitation. Gregoire, Ethel and Hilda lakes have moderate densities of walleye with the density of walleye at Sturgeon Lake being relatively high. All populations displayed unstable age-class distributions likely attributable to size-selective fishing and hooking mortality. These fisheries also generally displayed increased growth rates, reaching 500 mm FL by or before age-10 (except for Gregoire Lake). This information will allow ASRD to evaluate the effect of current sport fish regulations at these fisheries and will inform future management decisions.

Communications

- ACA data reports prepared to summarize results.
- Collaboration and discussion with ASRD regarding sampling effort, logistics, interpretation of data, and future efforts.

Literature cited

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Staff heading to pull nets at Sturgeon Lake. Left to right: Jason Leathem, Chad Lyttle and Nathan Carruthers. (Photo: Tyler Johns)

Chad Lyttle sampling biological information from a walleye caught from Sturgeon Lake. (Photo: Jason Leathem)

Campsite at Cold Lake ASRD warehouse for work at Ethel and Hilda lakes. (Photo: Bill Patterson)

Locating net location using depth sounder and Global Positioning System (GPS) at Ethel Lake. (Photo: Roy Schmelzeisen)

Sampling fish from Hilda and Ethel lakes in Cold Lake ASRDs warehouse. Left to right: Shane Wood, Troy Furukawa, and Roy Schmelzeisen. (Photo: Bill Patterson)