

**Alberta Conservation Association  
2008/09 Project Summary Report**

**Project name:** *Lentic Stock Assessment Program*

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**Partnerships:**

Alberta Tourism, Parks, Recreation and Culture  
Alberta Sustainable Resources Development

**Key findings**

- All four lakes (Elinor, Ironwood, Haig, and Wadlin) exhibited moderate densities of walleye, with estimated mean catch rates ranging from 10.5 – 21.8 fish/100m<sup>2</sup>/24h.
- Overall, size of walleye in the four lakes ranged from 80 to 675 mm FL but there were very few fish >500 mm FL in Elinor and Ironwood lakes.
- Populations in all four lakes displayed slow growth rates and early maturing fish.
- Walleye from Elinor, Ironwood, and Haig lakes showed wide and stable age-class distributions, while Wadlin Lake displayed a wide but unstable age-class distribution.

**Abstract**

As part of the Alberta Walleye Management and Recovery Plan (AWMRP), we conducted netting surveys at Elinor, Haig, Ironwood, and Wadlin Lakes to collect information on walleye population structure and growth. All lakes displayed moderate densities of walleye with catch rates (fish/100 m<sup>2</sup>/24 h) 10.4, 10.5, 18.7, and 21.8 for Ironwood, Wadlin, Elinor, Haig Lakes, respectively. Overall, size of walleye in the four lakes ranged from 80 to 675 mm FL but there were very few fish >500 mm FL (the standard size used in the AWMRP) in Elinor and Ironwood lakes. Walleye in all four lakes exhibited wide age-class (> 8 year-classes). Mean ( $\pm$ SE) ages were 6.5  $\pm$  0.2 y ( $n=217$ ) for Elinor, 6.7  $\pm$  0.4 y ( $n=126$ ) for Ironwood, 8.1  $\pm$  0.3 ( $n=188$ ) for Haig and 9.5  $\pm$  0.5 ( $n=194$ ) for Wadlin. However, older fish (>11 y) were poorly represented in Elinor Lake. Also, the Wadlin Lake population was represented primarily by six year-classes only; ages 3-7, 9-11, and 13-16 were poorly represented. Thus, under the AWMRP age-class

distribution is considered stable (6-9 age-classes present) for Elinor, Ironwood, and Haig lake populations while that at Wadlin lake is characterized as unstable. All populations displayed slow growth rates and early maturing fish; estimates indicate that fish from Haig and Wadlin lakes attained the 500-mm FL average size by age 10 while those from Elinor and Ironwood lakes were unlikely to reach this size (500 mm). Information generated in our study will help ASRD to determine the current status of these walleye fisheries and aid in future management decisions.

## **Introduction**

Walleye (*Sander vitreus*) populations in Alberta experience considerable fishing pressure, resulting from an imbalance of high angler population and limited fishing opportunities (Sullivan 2003). In 1995, Alberta Sustainable Resource Development (ASRD) implemented the Alberta Walleye Management and Recovery Plan (AWMRP) to facilitate the protection and recovery of exploited walleye fisheries (Berry 1995). Based on AWMRP criteria, Elinor and Ironwood lakes were classified as vulnerable and managed under a 3-walleye catch limit; Haig and Wadlin lakes were classified as collapsed and a managed under a catch-and-release regulation (Berry 1995). To evaluate the effectiveness of these management strategies, we conducted gill net surveys in the four lakes from 13 to 26 September 2008 to examine population structure and growth of walleye. The information collected in these surveys will help ASRD determine the current status of these walleye populations and revise sport fishing regulations accordingly.

## **Methods**

We captured walleye using gill nets following the Fall Walleye Index Netting (FWIN) protocol by Morgan (2000). Each net consisted of eight 7.6 x 1.8 m panels of different mesh sizes (ranging 25-152 mm stretched mesh) and was set for 21 to 27 h. We used a stratified-random sampling design based on surface area and depth (shallow: 2 – 5 m and deep: 5 – 15 m) to determine the number and location of sampling sites. We set 11 nets (5 shallow, 6 deep) at Elinor Lake, 8 (6 shallow, 2 deep) at Haig Lake, 11 (3 shallow, 8 deep) at Ironwood Lake, and 18 (5 shallow, 13 deep) at Wadlin. We recorded species, fork length (FL, mm), total length (TL, mm), total weight (g), sex, and state of maturity from each captured fish. We also collected otoliths for aging walleye.

We used a “bootstrap” technique to estimate mean catch rate (fish/100 m<sup>2</sup>/24 h) and associated 95% confidence intervals (CI) following Haddon (2001). We examined growth rate with the von Bertalanffy growth model. We interpreted population descriptors (age-class distribution, age-class stability, and length-at-age) using the AWMRP criteria developed using the 500 mm FL fish as standard size. Age at maturity was described as when 50% of the walleye are mature.

## Results

We captured 227 walleye from Elinor Lake, 197 from Wadling Lake, 192 from Haig Lake, and 127 from Ironwood Lake. Corresponding estimated mean catch rates were 18.7 fish/100 m<sup>2</sup>/24 h (95% CI = 16.3 – 21.1) for Elinor, 10.5 fish/100 m<sup>2</sup>/24 h (95% CI = 7.6 - 13.5) for Wadlin Lake, 21.8 fish/100 m<sup>2</sup>/24 h (95% CI = 17.7 – 27.5) for Haig Lake, and 10.4 fish/100 m<sup>2</sup>/24 h (95% CI = 7.2 – 14.3) for Ironwood Lake.

Overall, size range of walleye in the four lakes ranged from 80 mm (in Ironwood) to 675 mm (in Haig). However, there were few walleye >500 mm FL in Elinor and Ironwood lakes (Figure 1). The population in Elinor Lake exhibited a unimodal distribution with a dominant peak in the 304-370 mm range. In contrast, populations of the other three lakes exhibited multi-modal distributions. For Ironwood, strong peaks include the 250 and 400-500 mm size ranges. For Haig Lake, strong peaks occurred within the 400-500 mm size ranges. The population in Wadlin Lake exhibited three distinct size ranges with peaks around the 180, 280, and 520 mm size ranges (Figure 1).

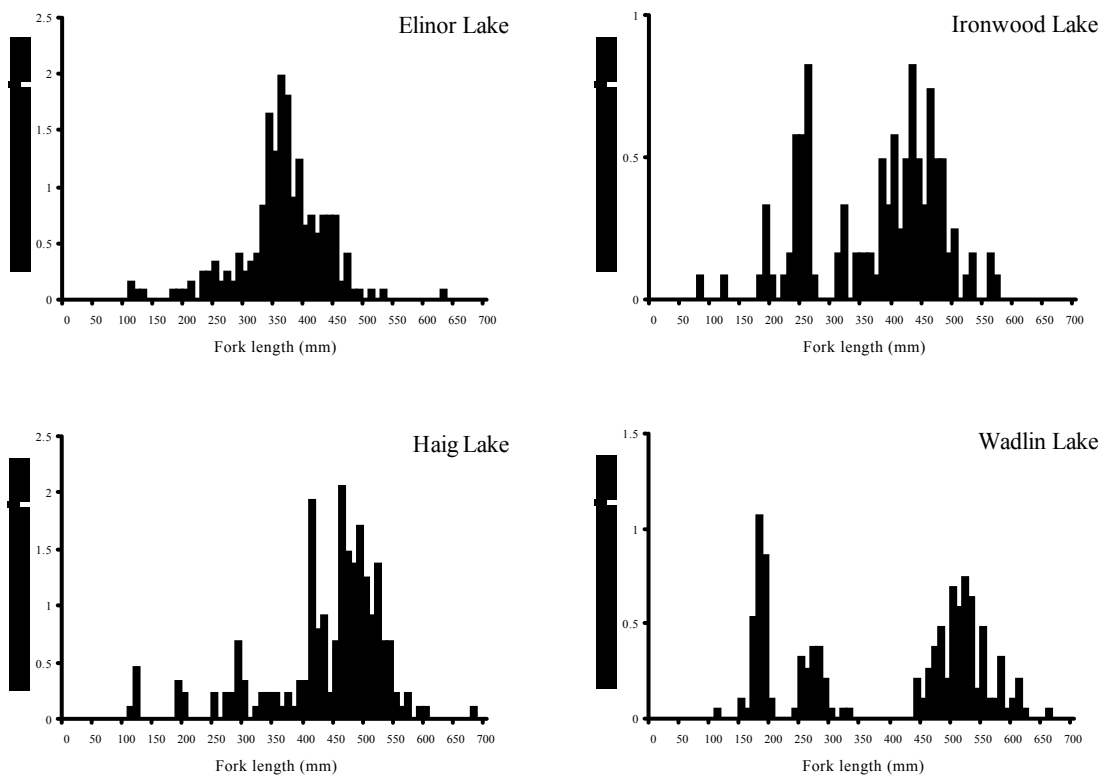


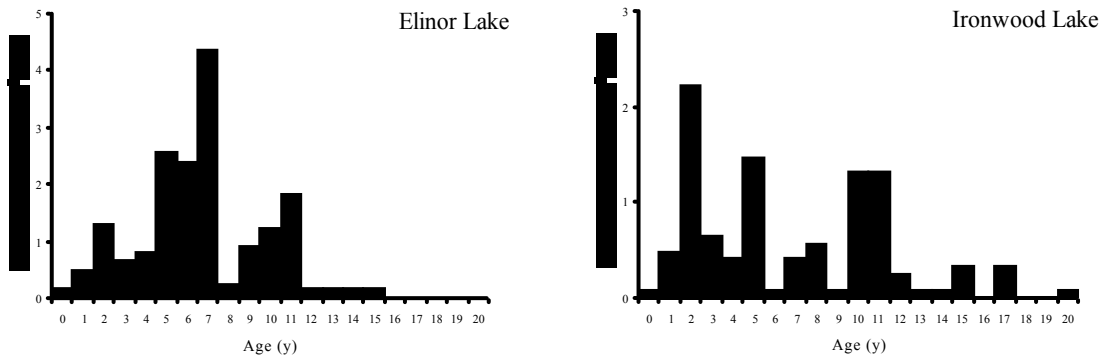
Figure 1. Length-frequency distributions of walleye from Elinor, Ironwood, Haig, and Wadlin lakes, Alberta during the 2008 gill netting survey.

Based on AWMRP criteria, walleye populations in all lakes exhibited wide age-class (> 8 year-classes) distributions (Figure 2). Age ranges were 0 – 15 y for Elinor Lake, 0 – 20 y for

Ironwood, and 0 – 18 y each for Haig and Wadlin lakes (Figure 2). Corresponding mean ( $\pm$ SE) ages were  $6.5 \pm 0.2$  y ( $n=217$ ) for Elinor,  $6.7 \pm 0.4$  y ( $n=126$ ) for Ironwood,  $8.1 \pm 0.3$  ( $n=188$ ) for Haig and  $9.5 \pm 0.5$  ( $n=194$ ) for Wadlin. However, older fish ( $>11$  y) were poorly represented in Elinor Lake. Also, the Wadlin Lake population consisted primarily of six year-classes only; ages 3-7, 9-11, and 13-16 were poorly represented. Thus, under the AWMRP age-class distribution is considered stable (6-9 age-classes present) for Elinor, Ironwood, and Haig lake populations but unstable for Wadlin Lake.

Walleye from Haig and Wadlin lakes showed slow growth rates with fish reaching 500 mm FL by age-10. In contrast, although a few individuals  $>500$  mm FL were captured in both lakes, estimated average maximum sizes were 456 mm for the Elinor and 477 for Ironwood lake suggesting that fish in these two lakes are unlikely to attain the 500 mm FL standard size.

Walleye from Elinor, Ironwood, and Haig lakes appear to mature at a young age, with both males and females maturing before age 8. Males matured at age 4 from Elinor, Ironwood, and Haig lakes, while females matured at age 7, age 5, and age 6, respectfully. We could not accurately determine the age-at-maturity of walleye from Wadlin Lake because no ages 4-7 fish were caught, however both sexes had reached sexual maturity by age 8.



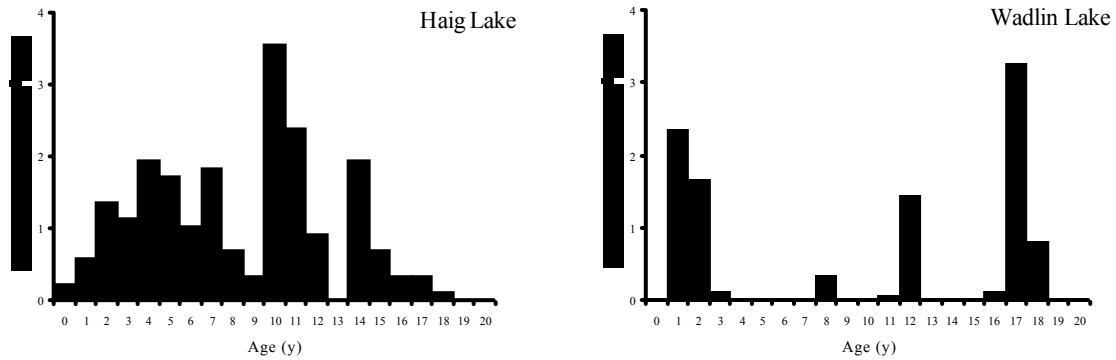


Figure 2. Age-class distributions of walleye from Elinor, Ironwood, Haig, and Wadlin lakes, Alberta during the 2008 gill netting survey.

## Conclusion

Elinor, Haig, Ironwood, and Wadlin lakes displayed a range of moderate densities of walleye with estimated mean catch rates between 10.4 – 21.8 fish/100m<sup>2</sup>/24h. Overall, size range of walleye in the four lakes ranged 80 - 675 mm. However, there were few walleye >500 mm FL in Elinor and Ironwood lakes. Walleye populations in Elinor, Haig and Ironwood lakes displayed wide and stable age-class distributions, while that of Wadlin Lake showed a wide but unstable age-class distribution. Populations in all four lakes displayed slow growth rates and early maturing fish.

## Communications

- ACA data reports prepared to summarize results.

## Literature cited

- Berry, D. 1995. Alberta's walleye management and recovery plan. Alberta Fish and Wildlife Division, Edmonton, Alberta, Canada. 32 pp.
- Haddon, M. 2001. Modeling and quantitative methods in fisheries. Chapman and Hall/CRC, Boca Raton, Florida, USA. 406 pp.
- Morgan, G.E. 2000. Manual of instructions, fall walleye index netting (FWIN). Ontario Ministry of Natural Resources, Fish and Wildlife Branch, Peterborough, Ontario, Canada. 37 pp.

Sullivan, M.G. 2003. Active management of walleye fisheries in Alberta: dilemmas of managing recovering fisheries. *North America Journal of Fisheries Management* 23: 1343-1358.



Photo 1. Staff removing a northern pike from gill net at Elinor Lake. Left: Roy Schmelzeisen, right: Stefanie Van Huystee. (Photo: Troy Furukawa)



Photo 2. Staff inspecting a gill net at Ironwood Lake. (Photo: Bill Patterson)



Photo 3. Calm day at Elinor Lake. (Photo: Troy Furukawa).



Photo 4. Morning mist at Ironwood Lake. (Photo: Bill Patterson).