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A comparison of otolith and scale ages for western Labrador lake whitefish, *Coregonus clupeaformis*

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Synopsis

Scale ages underestimate otolith ages of western Labrador lake whitefish. Discrepancies occur from age 4 or 5 and can be considerable.

Introduction

Coregonids have traditionally been aged using scale circuli patterns (van Oosten 1923, Hogman 1968 and others). Until recently there were few criticisms of this procedure which is reliable for young, rapidly growing fish from exploited populations. Jessop (1972) showed scales underestimated otolith ages by 1 to 2 years for unexploited round whitefish, *Prosopium cylindraceum,* from northern Quebec. Power (1978) reported otolith ages could be more than double scale ages for unexploited lake whitefish, *Coregonus clupeaformis,* from the same area.

In a study involving lake whitefish samples from 15 widely scattered Canadian lakes, Mills & Beamish (1980) found that for slow growing, lightly fished stocks scale ages underestimated fin-ray ages and that these differences in ages could seriously affect estimates of growth and mortality. Morin (1980) compared scale and otolith ages from exploited anadromous stocks of lake whitefish, cisco, *Coregonus artedii,* and round whitefish in the James Bay and Hudson Bay estuaries. He found that most fish were young enough that there were few differences between methods, but beyond scale age 8, otolith ages may be underestimated by as much as 16 years. The question of accuracy of scale ages in northern whitefish is crucial for understanding their biology, especially if large numbers of older and slower growing fish are involved. The purpose of this study is to compare scale ages and otolith ages of lake whitefish from western Labrador.

Materials and methods

A total of 495 lake whitefish, taken from the area of the Churchill Falls hydro-electric development, were used for the comparisons. Locations, dates and sample sizes were as follows: Lobstick control structure, 1978, 191; Lobstick control structure, 1979, 156; Smallwood Reservoir, 1979, 60; Ten Mile Lake, 1979, 60; Jacopie Lake, 1979, 21; Lake Michikamau, 1979, 7. Fish were collected from May 1 - September 30 during both years.

Fish were captured with a 15 m beach seine at the Lobstick control structure; all others were gillnetted. All sample sites except Ten Mile Lake are flooded areas. For reasons not central to this paper, only females were sampled from all sites ex-

cept Lobstick control structure in 1978 when both sexes were sampled.

Scales were removed from above the lateral line, just posterior to the dorsal fin, on the left side of the fish. Scale ages were read on a Nikon profile projector at 20 or 50X magnification. Otoliths were broken, burned and read as described by Power (1978). All fish were aged three times using each method before final ages were assigned.

Results and discussion

Scale and otolith samples from these fish are generally well suited for ageing studies. Scale circuli were continuous and annuli were compressed at the edges only in older fish. This compression of annuli was not prominent in corresponding otoliths. Growth did not appear regular for either method, some years growth appeared better than others.

Differences between scale and otolith ages were consistent in fish from all areas. Comparisons of otolith and scale ages are summarized in Figure 1 for all sampling locations. Otolith ages were greater than scale ages for 71% of the fish sampled. Major differences occured at scale age 4, and the magnitude of differences between methods increased with increasing scale age.

The Labrador fish correspond to the group characterized by Mills & Beamish (1980) as showing poor agreement between ageing methods. Such populations typically have many specimens where fin-ray (or other structure) ages are more than 1 year greater than scale ages. Of particular interest is that discrepancies appear early in life, at age 4 or 5 for Labrador fish, at age 2 or 3 for the Dezadesh Lake (N.W.T.) fish examined by Mills & Beamish. Interestingly, Bruce (1975) observed that lake whitefish over age 5 were ripening during the summer of 1974 in the Smallwood Reservoir, however the significance of this is not known.

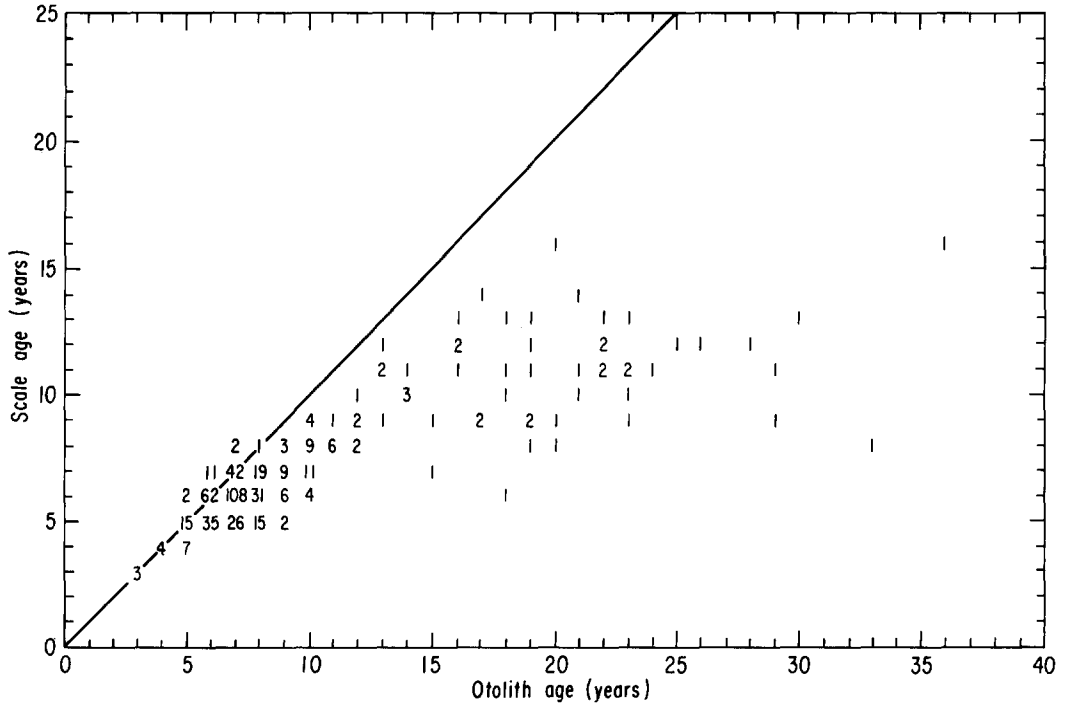

Fig. 1. Scale age, otolith age readings for lake whitefish from western Labrador. The numerals indicate the number of fish falling within each cell of the matrix. The diagonal marks the line of agreement between scale and otolith readings; to the right of this line otolith ages exceed scale ages.

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