ELSEVIER

Fisheries Research 46 (2000) 51–52

FISHERIES RESEARCH

www.elsevier.com/locate/fishres

Editorial

Section 2: Estimation of fish age and growth

The topic of estimation of fish age and growth was well represented at this symposium with 20 oral presentations and nearly 60 poster presentations, which illustrates very clearly the importance of age and growth studies in fisheries research and stock assessment. Presentations covered work on all life stages from early larval stages to late adult stages, and included reports from scientists from all continents working in most of the major oceanic systems.

Estimation of fish age by otolith increment analysis is still a labour-intensive methodology, and several attempts have been made to simplify procedures without major loss of information. Several presentations deal with the possibility of using otolith morphology as a proxy for fish age. An explicit comparison with alternative methods is often not reported, and the benefit of otolith size methods over fish length (or weight or head size) based methods should be documented (Fig. 1). The application of the less accurate and less labour-intensive methods is expected to be strongly influenced by environmental settings and spawning discreteness.

Several contributions focus on methodological aspects and the need for calibration and validation of techniques. The validation of daily increment formation is as important as ever, and new examples of apparent non-daily increment formation are presented. The validation of annual structures using otolith microstructure also relies on an understanding of the temporal meaning of the microstructures and considerable progress has been made on the details of otolith microstructure and the underlying physiological basis of micro-increment formation.

The question of accuracy in age estimation is of paramount concern in any study, and calibrations are critical for estimating ageing precision. The use of several other biochemical condition and growth indices in addition to otolith information has several advantages, and can help validate the daily increment technique as well as provide additional insights for ecological studies.

There has been progress in several aspects of age and growth studies since the last otolith symposium (Secor et al., 1995). The importance of using appropriate statistical methods to comply with the inherent autocorrelative nature of longitudinal otolith increment data (Chambers and Miller, 1995) has been recognised and applied in several studies. Radiometric dating has emerged as a promising method to validate age determination methods of long-lived species. Improvements in sensitivity of these techniques hold the promise of radiometric age determination of individual fish.

A continued effort has been made to utilise computational power for 2D and 3D image analysis of otolith morphology and incremental structure. High energy X-ray technology and artificial neural network methodology have also been attempted to reveal 2D and 3D structures of otoliths, and the next few years will tell if these methods will be viable avenues of data acquisition. Still more work is needed before they can be routinely applied, and while these methods have great promise, difficult or unusual patterns present a major stumbling block. The gains of using standardised procedures are evident, but the detection of unusual patterns or structures representing anomalous environmental and/or feeding conditions may be missed. Papers in this section, however, show that increased computational power has facilitated interesting and powerful simulation studies on various aspects relating to parameter estimation and sensitivity analysis.

0165-7836/00/$ – see front matter
PII: S0165-7836(00)00132-6

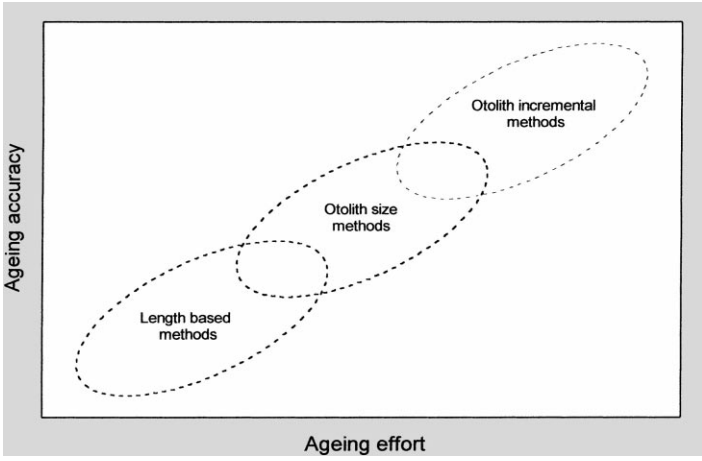

Fig. 1. Conceptual diagram of the relation between ageing effort and ageing accuracy.

On the preparation front of otolith microstructure analysis, a new and interesting method to prepare otoliths for SEM analysis has been proposed by using Proteinase K. Marking otoliths with alizarin compounds as a relatively recent methodology when presented in the previous symposium (Tsukamoto, 1995), but it has now become a standard method to validate age in larval and juvenile fish. Marking experiments on released specimens injected with oxytetracycline have confirmed the longevity and slow growth in sablefish, and more examples of age and growth determination of otolith marked specimens in other species are expected in the years to come.

References

Chambers, R.C., Miller, T.J., 1995. Evaluating fish growth by means of otolith increment analysis: special properties of individual-level longitudinal data. In: Secor, D.H., Dean, J.M., Campana, S.E. (Eds.), Recent Developments in Fish Otolith Research. University of South Carolina Press, Columbia, South Carolina, pp. 155–174.

Secor, D.H., Dean, J.M., Campana, S.E., 1995. Recent Developments in Fish Otolith Research. University of South Carolina Press, Columbia, South Carolina, 764 pp.

Tsukamoto, K., 1995. Use of otolith-tagging in a stock enhancement program for masu salmon (*Oncorhyncus masou*) in the Kaji River, Japan. In: Secor, D.H., Dean, J.M., Campana, S.E. (Eds.), Recent Developments in Fish Otolith Research. University of South Carolina Press, Columbia, South Carolina, pp. 403–422.

John L. Butler[a], Arild Folkvord[*]
[a]*National Marine Fisheries Service*
Southwest Fisheries Science Center
La Jolla, CA 92038, USA
[b]*University of Bergen*
Department of Fisheries and Marine Biology
5020 Bergen, Norway
[*]Corresponding author. Tel.: +47-5558-4456;
fax: +47-5558-4450.
E-mail address: arild.folkvord@ifm.uib.no
(A. Folkvord)