Age validation, ager calibration and age verification

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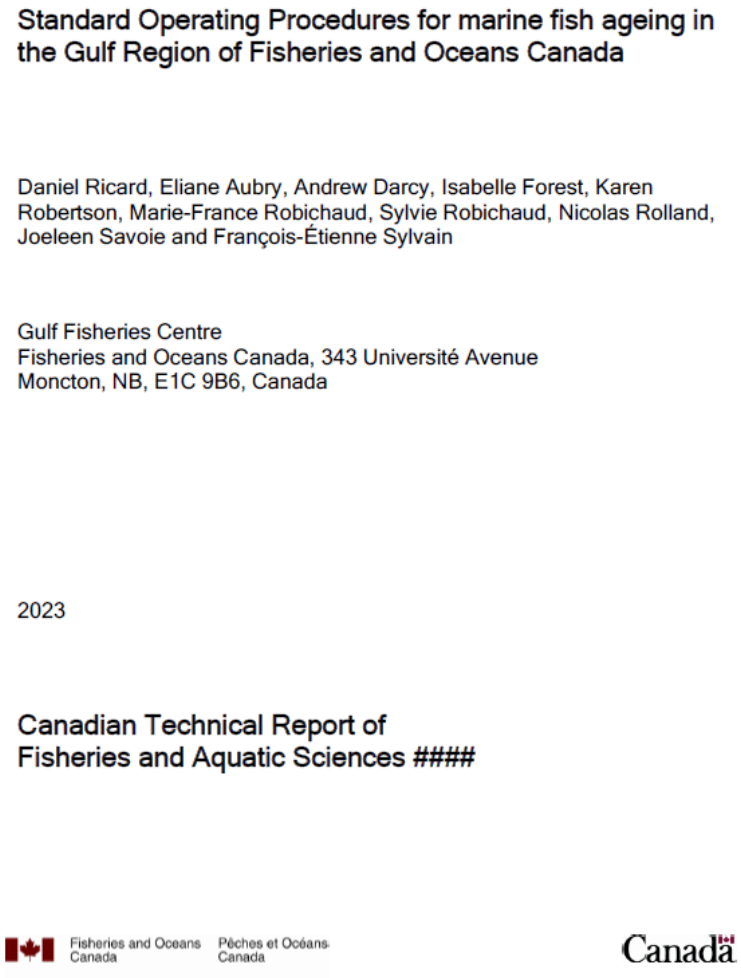
Standard Operating Procedures document

Our regional attempt at rescuing and formalising the available information about ageing procedures



Standard Operating Procedures for marine fish ageing in the Gulf Region of Fisheries and Oceans Canada

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Age validation

- The review by Campana (2001) is a must-read for anyone involved in age determination activities
- A necessary step to establish the existence and the frequency of opaque and translucent zones

Age validation - 4T American Plaice

A validation study often involves a bomb radiocarbon assay

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ARTICLE

Bomb Radiocarbon Validates Age and Long-Term Growth Declines in American Plaice in the Southern Gulf of St. Lawrence

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Abstract

The growth rate and size composition of American Plaice *Hippoglossoides platessoides* in the southern Gulf of St. Lawrence has changed markedly over the past 40 years. The size at age recorded in commercial fisheries and research survey data has declined, particularly through the mid-1980s. Females of the 1969 cohort grew to an estimated maximum length of 59 cm (males, 42 cm); the 1994 cohort grew to a much smaller maximum of 37 cm (29 cm for males). There is no indication of any reverse trend in growth or size at age in the 2000s, despite reduced harvests and warmer water temperatures. Incorrect aging methods are not the reason for the observed growth trends. Ages were determined by counting the growth increments visible on the surface of whole otoliths, and there is no bias in ages determined by this method (as opposed to those from thin-sectioned otoliths). The accuracy of ages determined by reading whole otoliths was validated to at least 27 years (±2 years) by bomb radiocarbon assays of 39 otoliths collected between 1971 and 1986. While commercial fishing may have contributed to past declines in plaice growth, ongoing natural mortality may be keeping size at age and the growth rate low despite the recent increases expected from low fishing mortality and higher water temperatures.

Otolith reference collection

- Series of otoliths of known ages used to determine whether an ager provides accurate and unbiased ages
- Physical collection
- Digital images of physical collection
- An important step to allow for ager calibration

Ager calibration

- American Plaice and White Hake examples
  - R Markdown document that performs a calibration run, where the assigned ages are compared to the "true" ages in the reference collection
- Otolith exchange with other labs

Age verification

- Recent example for American Plaice and Winter Flounder
- R Markdown document that provides the information required to verify and validate the assigned ages
- Outliers are identified and flagged
  - What constitutes an outlier?
- The first step is for the ager to go and re-age these otoliths
- The second step is to ascertain that the identified outliers are aged with certainty
- The ages are now ready to be included in the production database, in our case in the bio cards

ICES data quality assurance repository

DATA QUALITY ASSURANCE REPOSITORY

References

Campana, S.E. 2001. Accuracy, precision and quality control in age determination, including a review of the use and abuse of age validation methods. Journal of Fish Biology 59: 197--242.