Policy to deal with destructive testing, stating what should be preserved and what can be destroyed (condition “rare structure”) –

Stephen sent a document to that effect –

should be vetted by someone with intricate knowledge of the procedures that will be used on ageing structures

• Institutional

1. Emulate the Pacific Ocean’s Community of Age Reading Experts (CARE) for the Atlantic and Arctic

Oceans

2. Foster a community of DFO scientists whose mandated tasks include sampling

of ageing structures, age estimation using ageing structures or analysis of age

estimates data

3. Creation of a DFO working group that meets regularly to ensure that age estimations

practices in different labs follow shared best practices

4. Provide support for inter-regional ageing structure exchanges and secondary reader testing

5. Canadian representation on appropriate ICES working groups related to age

estimation (WGBIOP or WGSMART)

Recognise the fact that the skills required to obtain unbiased age estimates are unique and take a long time to acquire

• Otolith cataloguing, storage and inventory

1. Ageing structures removed from an individual should be uniquely identified
2. Clearly label ageing structures so they can be traced back to their collection, good bookkeeping
3. Ageing structures should be stored in an environment that minimizes degradation and that maintains readability
4. An electronic inventory of the physical ageing structures available should be documented and updated regularly
5. A subset of ageing structures should be preserved in their unaltered state for future unforeseen usage (i.e. not in resin)

Develop and publish Standard Operating Procedures for each lab

Favour age estimation in a “blind” setting, where no prior knowledge is used when interpreting patterns in ageing structures

Establish a quality-control process to identify mistakes made during data entry (e.g. a typo)

Develop standardized protocols to validate age estimates (add to your regional SOP)

Document the uncertainty associated with age estimates

Assessment methods would ideally incorporate ageing errors into the assessment framework

Generate an age-error matrices as part of your standard procedures

Have at least 2 age readers, for redundancy

Strive for obtaining unbiased age estimates

Establish a process so that “cheat sheets” and guides used for training agers, aging process are updated regularly

Don’t let outside information influence your ageing

• Preparing for changes associated with a warming climate

1. Regularly revisit the pattern recognition used for estimating ages
2. Rate of growths are likely to change so …
3. Continued inter-regional communication and events that promote collaborations
4. Northward migration of species …

Research and development

1. Pursue further studies in sclerochronology that will support the identification of changes in patterns used in estimating ages

• Reference collection

1. Actively curate reference collections so that old otoliths that have lost their readability are replaced by new otoliths, this includes renewing ageing structures
2. Strive to have a validation study to ascertain the periodicity of ageing patterns
3. Ensure that the age structures in the reference collection are representative of what will be available (spatial variation, temporal variation, …)

Training

Develop a document that details the steps to train new agers, and/or add it to your regional SOP

Establish procedures that integrate current practices (e.g. labels that have been used for many year) into improved practices

• Digital imaging of ageing structures

1. Scale bar in the image so that the image scale in pixels per mm can be determined
2. the file naming convention to use when taking images of otoliths should uniquely
3. identify each ageing structure, a recommended nomenclature would be as follows:
4. When practical, promote the capture of digital images of ageing structure

How much more work is it to take images and annotate them vs. just ageing to an age-length pair?

• Annotation of digital images

1.

• Analysis of age estimates

1. The sampling design used in the collection of data should be accounted for in all

subsequent analyses of age estimates

2. Analyses that compute catch-at-age matrices from length samples and age estimates

should strive to be fully documented and reproducible

3. Contemporary procedures that reduce bias in age structure estimates should be used