BIOP Guidelines for Workshops on Maturity Staging Calibration

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Version history

Version	Author	Date	Changes
Version 3	ICES PGCCDBS	March 2010	**Changes based on WKMSSPDF. Topics to consider when preparing a Worksho**p f) modified and i) added. **Topics to consider during the Workshop** e) added. b)ii) modified Guidelines for collecting maturity data and histological analyses for maturity workshops 8) modified
Version 4	ICES PGCCDBS	February 2012	**Changes based on WKMSSPDF2012:** recommendation to create European Fish Maturity Stagers Forum added
Version 5	ICES PGCCDBS	February 2014	**Changes based on WKMATCH recommendations**
Version 6	ICES WGBIOP	September 2015	**Text improvement** **3 k) Added after discussion**

1 Introduction

The main objectives of a maturity staging workshop are: i) to agree on a common maturity scale for the species/stock of concern across laboratories, based on a comparison of existing scales and standardization of maturity determination criteria; ii) to establish correspondence between old and new scales so that time-series of previous data can be converted; iii) to reduce sources of error in maturity determination by validating macroscopic staging, and iv) to propose an optimal sampling strategy to estimate accurate maturity ogives.

A **Fish Maturity Stagers Forum** (MSF), similar to the Age Readers Forum, has been created in tandem with the **WebGR** tool (http://webgr.wiki.azti.es/doku.php) to streamline the preparation and the implementation of maturity staging exercises and workshops.

WKMATCH recommends the establishment of regular training courses on maturity staging targeting observers normally collecting biological data and the laboratory responsible of this data collection.

2 Topics to consider when preparing a Workshop

a) Identify sources of data that, at present, are used to collect maturity data and their current sampling protocols.

b) Identify the metadata that are needed to accompany samples collected for analyses and specify it in the sampling protocols (see guidelines below).

c) Gather published/grey literature information on the reproductive biology and ecology of the species / stock of concern with emphasis on the timing of the different stages of the reproductive cycle, particularly spawning time, delimitating clearly its duration.

d) Studies are required on spawning synchronicity among individuals within a stock, as low synchronicity will mean there is temporal overlap of different stages (developing, spawning, spent and/or resting).

e) The organization for the collection of the samples and the methods for histological analysis need to be decided among the experts but guidance can be found below (Guidelines for collecting maturity data).

f) Maintain contact with participating countries to ensure adequate sample coverage is obtained prior to the workshop's analyses of samples. In this sense the following should be ensured:

- Laboratories participating in stock assessment or data collection of the stock of concern may participate even if they do not collect routinely maturity data.
- Experts on histology, maturation process and the reproductive biology/ ecology as well as those in charge in collecting process of the species of concern or at least a related species should participate in the workshop.

g) Ideally, fresh samples should be provided during the workshops. This needs to be taken into account when setting the timing of the meeting according to the species reproductive biology.

h) Provide detailed protocols on collecting images of the gonads sampled, including at least a precise description of the quality of images (set up of camera and format) and image calibration. Additionally, in case of histologically images, agree on the histological protocol and microscope set up (see guidelines for histological process below).

i) Use histological slides and images as a tool for calibration prior to a workshop. This is especially important because results from the calibration exchange will point out possible discrepancies between labs. They should be address during the workshop.

j) Gather information on how the data are, or could be used, in the assessment process.

k) Put in place arrangements for histological analyses of collected material taking into account that all participants may not have facilities or resources to meet this requirement. Arranging for centrally located analyses has proved effective in the past and has ensured that adequate samples are validated. Consider bi-lateral agreements to cover the cost of such work.

l) Each laboratory should carry out investigations into potential discrepancies in maturity staging between scientists within the laboratory. Accuracy may be estimated by means of whole-mounts (see guidelines for whole-mounts analysis protocol in WKMATCH 2012 report). They should also consider, if available, microscopic staging. If possible provide statistical analysis of precision and accuracy within the laboratory. Potential causes for lack of precision and accuracy should also be analysed.

m) Prepare a full set of reference material covering both the spatial and temporal aspects of the species/stock of concern. These consist of pictures of all maturity stages together with their histology report.

n) Illustrated and validated manuals will be developed in order to enhance accuracy in maturity staging among laboratories.

3 Topics to consider during the Workshop

a) **Provide information on participating laboratory procedures, including sampling** procedures, macroscopic maturity determination process, maturity scale definitions and if applicable gonad preservation and histological methods, and protocols used to determine microscopic maturity.

b) **Provide a statistical report of exchange comparing observed maturity stages with** validated histological stage for the workshop participants to consider. Differences in staging between laboratories should be statistically analysed in terms of precision and accuracy; sources of discrepancies should also be analysed.

c) **Resolve interpretation differences between readers and laboratories both** at macroscopic and microscopic scales. Differences may arise from:

- Using different maturity scales
- Different interpretation of the same macroscopic stages (terminology and precise definition of stages are critical issues)
- Different sampling protocols, e.g. timing and/or gear selectivity or availability, see guidelines for collecting maturity data below.
- Different interpretation of gonad structures and gamete development in histological slides. This should not be an issue, so experts on gametogenesis should be involved in workshops.

d) **Agree and create a single maturity scale. Consider the following aspects:**

- Follow the general maturity scale proposed by WKMATCH.
- If subdivision of scale is needed, keep the scale as simple and efficient as possible. Not everything can be extracted from a maturity scale and a complex maturity scale may introduce more errors than relevant information (See WKMAT report)
- Describe the stages precisely avoiding ambiguity and overly subjective description (like colour descriptions), for example, give measurements instead of saying "bigger".

  If two stages are hard to distinguish macroscopically, they should both be indicated. This often occurs with resting and/or mature inactive stages that are confused with immature or developing (at early stages). In these cases, histology must be used to confirm the maturity stage.

  As a calibration exercise, each participant should classify the workshop sample collection using the agreed maturity scale. This will provide a test of the new scale and any discrepancies in interpretation should be identified and resolved.

e) Based on the experiences e.g. of the WKMSSPDF (22-26.02.2010) it is recommended to set the maximum fish to stage in one session to 120. However, the total numbers to stage should also take into account the species and any sample size requirements for statistical comparisons. This applies to fresh samples as well as pictures.

f) Participants should indicate the level of experience on the determination of the maturity staging. This will help the on the analysis of the results calibration exercise.

g) The results from the calibration exercise should be recorded to provide data for statistical analysis.

h) Improvements in agreement due to the workshop should be analysed. Ideally a different set of samples should be used, not the ones already staged earlier in the workshop. Discrepancies of maturity staging between participants should be statistically analysed in terms of precision and accuracy.

i) Try to use standard terminology from the WKMATCH 2012.

j) When a new agreed maturity scale is proposed the impact on maturity historical series should be evaluated.

k) The participants are highly encouraged to keep in touch after the workshop (perhaps for one year) in order to share and solve contingent problems in applying the common scale faced in each laboratory

l) Produce an agreed reference collection of preserved gonads, histological slides and images that should be stored in a reference lab (defined by the Workshop) and always available for the scientific community. Copies of histological slides can be made and distributed with referenced images of these slides.

m) The minimum output from species-specific workshops should be an illustrated manual.

n) Provide recommendations to stock assessment Working Groups and Benchmarks on relevant issues derived from maturity stage studies, such as timing of sampling, changes on maturity time-series, spatial differences on maturity, differential sex maturation, etc.