2018 Anchovy Otolith Exchange

Executive summary

During the last anchovy workshop (WKARA2) held in 2016 a great effort of standardization of procedures among different labs and groups for age determination was carried out. These efforts produced a general agreement on anchovy growth patterns among areas (both Mediterranean and Atlantic waters) and common reading criteria were adopted. According to all these new insights, along the meeting it was proposed to test if the mentioned efforts finally produced an increase of agreement among readers and labs compared to the previous exchange. Therefore it was recommended the realization of a small exchange to be carried out in 2018 and this was adopted by WGBIOP 2017. Preliminary results were delivered to WGBIOP in 2018, but not finished due difficulties in managing results by stock with SmartDots. This complete report will be presented at WGBIOP 2019.

The Objectives of the present exchange were: 1) Evaluate if the updated Age reading protocol in WKARA2 have been adopted by all readers (at least the participants in WKARA2). 2) Evaluate if the accuracy and precision in otolith age reading of anchovy among readers of fishery and surveys samples throughout the year has improved. 3) Report results to the WGBIOP that will take place in October 2018.

To that purpose an exchange program of anchovy otoliths was organized by IEO, AZTI and IAMC-CNR between April and September 2018, before WGBIOP 2018. A set of altogether 160 images of anchovy otoliths were selected and uploaded for analysis using the SmartDots application, distributed in the Bay of Biscay and the Strait of Sicily. These areas have been chosen for the following reasons: 1) The Atlantic and Mediterranean areas are represented with these two stocks; 2) They have differences in the complexity of otolith interpretation: easier otoliths of the Bay of Biscay than those of the Strait of Sicily; 3) different conventional birth date are used: 1st of January in the Bay of Biscay and 1st of July in the Strait of Sicily and 4) by practical logistical reasons, more simple and quick to obtain the images for the exchange since the coordinators are involved in these areas. A protocol for the exchange of age readings was provided to all participants (including WKARA2 age reading protocol).

Twenty-five readers from fourteen institutes and nine countries (Germany, England, France, Spain, Portugal, Tunisia, Italy, Croatia and Greece) participated. From all readers fourteen readers have a long time experience reading anchovy otoliths (experts); seven was intermediate and four trainees. Thirteen of the 25 readers also took part in the last anchovy workshop (WKARA2 2016), representing the 52% of the total readers of this Exchange, and twelve readers attended the exchange directly without participating in the WKARA2 (48%). Seventeen of the participants to this Exchange (13 experts, 3 medium and 1 trainee readers) are readers providing input to the assessment of anchovy (71%). Participants' coverage in the Exchange was very good, it is the first time that readers from all the main areas of the European anchovy distribution participate in this kind of exchanges.

Overall agreement between all readers and areas is very low, 63.6%. CV= 49.5%, very similar (slightly lower) than in 2014 (PA=65.5;CV=58.2%). By stock, the agreement with the modal age

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of all readers was low (between 56 and 71%) and CV was high (between 47 and 59%). In the case of the advanced and expert group, agreements and CVs are variable, depending on the stock, showing the highest agreement in the ane.27.8 stock (which results in 76% and 83% of agreement and CVs of 38% and 26%). The results of the stock readers group are much better than the other groups of readers (including advanced and expert group), for Bay of Biscay readers and Strait of Sicily readers (91% & 96% of agreement; CV of 9% & 9%, respectively, although in the latter area only two readers of the same institute participate on this stock).

Comparing the results of Exchange 2018 with that of 2014 for all readers, there has been a small decrease of the overall level of agreement and a decrease of CV in those areas that were analyzed in the two exchanges. For the Bay of Biscay stock readers there is no variation from one exchange to another with a high PA and low CV in the two exchanges. For the anchovy of the Strait of Sicily there is no improvement for the expert's readers. Restricting the comparison to those who participated in the 2014 exchange (and in WKARA) no improvement is seen either (similar PA for the case of the Bay of Biscay and some decline of agreement in GSA16), with a bit greater variability --CVs -- in the two areas. This leads to conclude that no improvement can be noticed in general in agreement and precision, nor for the all readers neither for the WKARA readers.

In spite of not having met the quality standards for age determination agreed in WKARA2, and of not having noticed any improvement *vs* the 2014 exchange, it seems that many readers and mainly those who attended the WKARA2 tend to follow the same growth pattern in the otoliths of the two areas when interpreting the winter marks. This is supported by the rather high consistency achieved in the analysis of distance of winter marks from the core of otolith in both areas. For the future the most problematic issue which requires to be improved is the application of the age determination rule, although there are still some readers who need improving as well the discrimination between actual winter marks and checks and to understand the correct annual growth pattern.

In view of the current results and that there are new readers a new workshop might be considered for 2021. Meanwhile, we recommend the readers to review and read the WKARA2 report (where there are many examples) and to review the collection of otoliths of reference that is in the Age Forum Reader.