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Spawning season, maturity and fecundity: Southern horse mackerel, *Trachurus trachurus*, Life-history: Reproduction

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It was decided during the last benchmark assessment (WKBENCH, 2011) of the southern stock of horse mackerel (HOM) in ICES division IXa (correspondent to the new area code 27.9.a) the maturity ogive for the estimation of spawning stock biomass (SSB) be obtained with histological data, to better understand if a particular fish has already achieved maturity. Consequently, the (fixed) microscopic maturity ogive currently (since 2012) used is based on the percentage of mature individuals obtained by Murta *et al.*, 2011, from data obtained in the triennial AEPM/DEPM surveys (2004, 2007 and 2010). ALKs obtained from catches (the 1st quarter of the same year) were applied to the proportion of mature females at length in these surveys (obtained from histology), a logistic model was fitted to the resulting proportions of mature females at age from these 3 years of data, and an average stock ogive at age is estimated, predicted by the model.

The ogive could not be updated with the 2013 DEPM survey since, due to logistic problems, the adult samples were obtained by the commercial fleet, the smaller/younger fish (likely corresponding to the immature/maturing individuals) could not be collected, and thus data from mature fish only were available. Moreover, while re-analysing for this assessment benchmark the data of the historical series of AEPM/DEPM surveys, it was recognized that caution must be taken in regard to the sampling coverage of smaller fish (corresponding to the ages of first maturation), as in earlier EPM surveys, only females with macro stage 2 and above were collected for histology, thus undersampling the immature (macro stage 1) fraction of the population. Sampling strategy during future DEPM surveys is recommended to be adapted with the purpose of allowing for accurate estimation of maturity ogives.

Additionally, during the last Workshop on Data Evaluation for Southern Horse Mackerel (WKSHOM), held in Lisbon last November 2016, information on the Southern horse mackerel reproductive biology was compiled and analysed. based on data from regular

sampling of the commercial fleet, from AEPM/DEPM surveys, and from an annual cycle ad hoc monthly sampling undertaken in 2014. The results obtained from both macro and microscopical information indicate that the population spawning peak occurs during the first semester (max March-May), though HOM individuals can be observed reproductively active all year around. The macroscopic assignation of gonads to maturity stages is subjected to errors, in particular between stages 1 (immature) and 2 (mature), possibly disturbing the proportion of maturity, which strenghtens the requirement of using microscopical maturity information. Length at first maturity (L_{50}) estimates (from catches and DEPM surveys) for females during the main spawning season shows some inter-annual variability, but it is needed to evaluate its impact on the maturity at age (applying ALKs from the 1st quarter catches), actually used in the assessment.

In conclusion, maturity estimates should be obtained from DEPM surveys, for the DEPM years, and the historical mean of DEPM years, for the other years. In any case histology must be applied to the samples, the ages of all fish must be obtained, and the sampling cover the lengths corresponding to first maturation.

References:

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- Murta A.G., Costa A.M., Gonçalves P. 2011. Variability in the maturity ogives of horse mackerel estimated with microscopic criteria. WD to be presented to ICES Working Group on Anchovy and Sardine (WGANSA), 24-28 June 2011, Vigo, Spain, 6 pp.