

Executive summary

The workshop on age reading of Norwegian Spring Spawning herring (WKNSSAGE), chaired by Jane Aanestad Godiksen, met 9–10 November 2015 in Charlottenlund, Denmark. The meeting was attended by 12 experts from four countries. WKNSSAGE was a request from WGWIDE to WGBIOP to review any technical problems regarding age-reading of Norwegian spring spawning herring between Norway, Denmark, Iceland and the Faroe Islands. In 2015 Norway sampled the same areas as the three other countries during the IESNS-survey, and during the post-cruise meeting the differences between the age distributions from trawl samples taken in the same area and period became apparent. For example, from one stratum the Norwegian samples were dominated by three age groups, while the age distribution from Denmark looked much more uni-modal. Also comparison of samples taken by Norway, the Faroe Islands and Iceland show age distributions, which are not comparable, and thus, ageing or sampling issues are likely to exist among all of the participating nations. As a result, WGWIDE approached WGBIOP with a request for a fast-track workshop between age readers to address any potential issues related to the age determination of NSS herring.

Denmark and the Faroe Islands are ageing NSS herring by reading their otoliths, while Norway and Iceland use scales. To establish a common understanding of how both structures appear and are interpreted the workshop was initiated by examining some pre-annotated scales and otoliths. Concerns over the interpretation of the edge were addressed and there appeared to be very little disagreement in the interpretation of the growth zones in either structure. Thereafter an exercise containing otoliths and scales from the same fish was prepared in WebGR, the actual structures were also available to the readers. The results showed a low level of agreement (52%) between age readings and a general trend appeared where the scales were estimated to be one year older than the otoliths. This led to an apparent loss of the strong year class of 2004. After reviewing the structures in plenary, it was clear that it was most often the first winter ring in the scale which was not clearly visible in the otolith. In order to review the problem in more detail a numerical analysis was attempted utilizing the measurements extracted from WebGR. A number of shortcomings were noticed when using this approach to identify potential problem areas in the age interpretation. The problems could be associated with mixing of subpopulations and/or stocks.

WKNSSAGE concluded that the different ages obtained from scale and otolith readings could be due to a number of issues relating to identification of the first winter ring and age interpretation of older fish, confounded by stock mixing issues. Final conclusions cannot be reached based on the samples from this workshop. We believe the sampling and stock mixing issues should be addressed separately by WGWIDE.

Overall, WKNSSAGE recommend that the Workshop on Age estimation of Norwegian Spring Spawning Herring (*Clupea harengus*) (WKARNSSH) 2017 consider the shortcomings of the present workshop and develops an ageing protocol that contain robust procedures for a quality check. The above mentioned ageing issues should be addressed in full based on a larger sample set of good quality scales and otoliths and defined instructions for annotation. Prior to WKARNSSH within country disagreements need to be resolved. Also, stock mixing issues need to be addressed (potentially by genetics combined with otolith shape analysis) and sampling protocols need to ensure that both otoliths and scales are sampled from the same fish (at least subsamples).