



# Marine Scotland Science

## Fish Age Determination Procedures: Herring

G Henderson



FISH AGE DETERMINATION PROCEDURES  
4: HERRING

Gordon Henderson\*

Marine Scotland Science, Marine Laboratory, 375 Victoria Road, Torry, Aberdeen, AB11 9DB

Gordon.Henderson@gov.scot  
0131 244 2965



This manual is intended to be used in conjunction with training at the microscope

In order to undertake stock assessments for use in fisheries management, a knowledge of fish age/stage is required. Although there is a general relationship in most species between age and size, It is difficult to determine the age of a species by simple measurements of body length or weight. Fisheries scientists, therefore, are required to determine fish age using alternate measures. The most common method is observing the growth rings in hard, bony structures of the fish the ear bones (otolith), scales, spines etc .

This manual describes the procedures employed by Marine Scotland Science for the aging of Herring (*Clupea harengus*)

### Collecting herring otoliths

Samples may be collected at fish processors, and on research vessel cruises. Otoliths are removed from herring by making a single lateral cut into the back of the head at the posterior end of the skull, with a sharp, short bladed knife. This exposes the otoliths within the auditory capsule. Both otoliths are carefully removed, using fine, straight tipped, watch makers' forceps to ensure the otoliths remain undamaged.

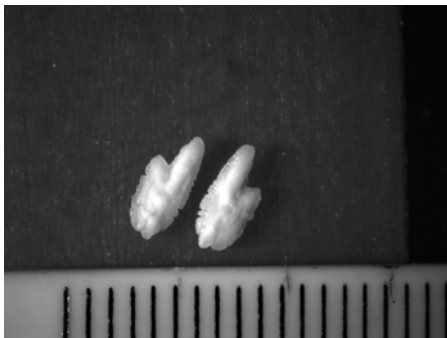


Figure 1. Herring otoliths in September; scale in millimetres.

Each pair of otoliths (Fig 1) is washed in clean water to remove dirt or blood then placed in a single well in a moulded, black plastic, tray (Fig 2). Details of species, market, vessel, gear used, area fished and date are recorded on labels (which are adhered to the plastic tray), and the accompanying biological and length recording sheets. Sheets are then completed according to the Market Sampling Instructions. The otolith trays are covered with a lid and secured with masking tape. Samples and sheets are returned to the laboratory.



Figure 2. Photograph of tray used for collection, storage and reading of Herring and Mackerel otoliths.

### Preparing herring otoliths

Herring otoliths are placed in bespoke plastic trays at the time of collection, and delivered to the reader in this form (Fig 3). The trays containing the otoliths are opened and left for a minimum of 24 hours to allow the otolith to dry in preparation for analysis. When the otoliths have dried out, the wells are filled with 96% ethanol using a pipette in a ventilated laboratory environment.



Figure 3. Otoliths are aligned with the sulcus side down and the rostrum at the upper end of the well using watchmaker forceps.

### Herring

The bespoke plastic tray is placed under a stereo microscope, and the light source adjusted to provide the best lighting conditions for the sample. The otoliths are read under reflected light, against the black background of the collection and storage tray.

Otoliths are read in order, starting at well 1 in the top left corner in each tray, ensuring a match with the associated biological data sheet for the sample.

Otoliths are read by counting the number of successive translucent zones, which are indicative of winter growth, starting at the nucleus and counting outwards towards the otolith edge (Figure 4. ). Care is taken to ascertain that each ring is genuine, as some rings may be split or merged and so not indicative of a true year of growth. The otolith rostrum and post-rostrum are used as the first points of reference; other areas of the otolith where translucent bands are clearly visible are also used to confirm the estimation of age, especially in older fish (approximately +6 years)

The age estimation for each otolith is noted on the associated biological sheet. Any level of uncertainty the reader may have of a given age can be noted on the biological sheet also.

Once a sample has been completed, the tray is removed from below the microscope and any excess ethanol is removed with a pipette. The tray is then placed in a well-ventilated environment to allow the remaining ethanol to evaporate. Once a tray is completely dry it is closed and the sample area and number of otoliths noted, in preparation for the archiving of the tray into long term storage.

Otoliths are archived monthly, by Marine Scotland Science herring sampling area, for a given year. An electronic record is kept of each sample's location within the storage facility.



© Crown copyright 2019

You may re-use this information (excluding logos and images) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence, visit <http://www.nationalarchives.gov.uk/doc/open-government-licence/> or e-mail: [psi@nationalarchives.gov.uk](mailto:psi@nationalarchives.gov.uk).

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

The Scottish Government  
St Andrew's House  
Edinburgh  
EH1 3DG

Published by the Scottish Government, August 2019