INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

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Pelagic Fish Committee

RESULTS OF A COMPARATIVE AGE READING EXPERIMENT ON HERRING FROM THE NORTH SEA AND ADJACENT WATERS

by

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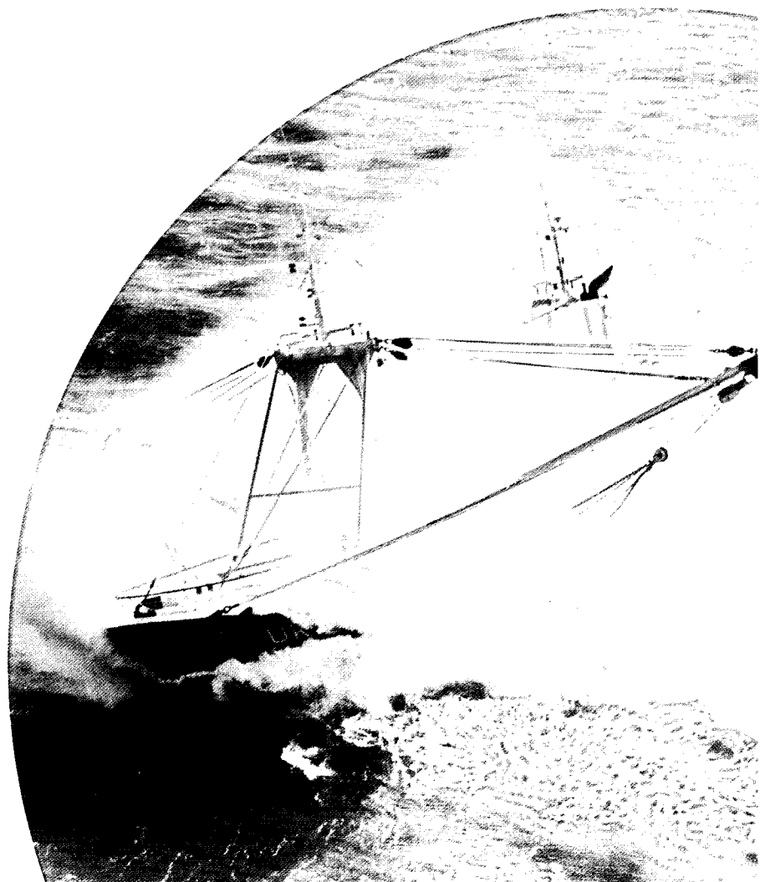

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Abstract

A collection of 10 samples, comprising a total of 250 herring otoliths, was read by otolith readers from 6 countries around the North Sea. Agreement between the readers varied from 70% to 90%. The results from this experiment indicate that even for a relatively "easy" species such as herring, a continuous quality control of age readings is necessary.

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	Holland	Norway	Germany	Scotland	Denmark
France	76.19% 0.26	77.62% 0.07	78.05% -0.21	77.14% 0.24	73.33% 0.25
Holland		79.52% -0.19	91.71% -0.08	95.24% -0.02	89.05% -0.01
Norway			80.98% -0.28	81.43% 0.17	77.62% 0.18
Germany				92.68% 0.11	88.73% 0.12
Scotland					89.05% 0.01

Table 2. Results from a comparison based on a selection of 210 good quality otoliths of autumn spawning herring.

Top figure: percentage agreement. Middle figure: mean deviation (calculated as in table 1).

1. INTRODUCTION

During the 1991 meeting of the Herring Assessment Working Group for the Area South of 62°N a recommendation was passed to organise a herring otolith exchange programme. The objective of this exchange was to check the uniformity in age determination between various laboratories. The RIVO institute in IJmuiden was asked to organize the exchange programme.

Data on age composition of catches, both from commercial vessels and from research vessels, are the corner stone of stock assessment. The ability to age fish correctly depends very much upon the experience of the otolith reader. Generally, the accuracy of age determination increases with the number of years the reader has been doing this job. When the person responsible for age reading in any of the laboratories is replaced, care should be taken to maintain the quality of age reading at the same level.

2. MATERIAL AND METHODS

A collection of 10 samples, each containing 25 pairs of otoliths, was circulated among the participating laboratories. The samples were taken from commercial landings and from research vessel catches. Seven samples originated from the North Sea, two from west of the British Isles, and one from the English Channel.

The otoliths were mounted in epoxy resin, and they could be examined both with direct light and with translucent light.

The following laboratories participated in the experiment:

France	IFREMER, Boulogne
Denmark	DIFMAR, Charlottenlund
Norway	Institute of Marine Research, Bergen
Germany	Institut für Seefischerei, Hamburg
UK	Marine Laboratory, Aberdeen
Netherlands	RIVO, IJmuiden

The participants were provided data sheets that contained all particulars of the samples, such as catch date and position, and the length, weight and maturity stage of the individual fish. They were asked to assign a year of birth to each fish. This required not only a correct reading of the number of winter rings, but also a correct classification of the fish into spring- and autumn spawners.

3. RESULTS

The results of comparing the readings on all otoliths are given in Table 1. This table shows the percentage of agreement between each combination of countries, and also the mean deviation (sum of differences divided by number of observations). The latter figure shows whether the differences between two countries were consistently in one direction.

The German institute had to read the samples two times. After the first reading, there was a consistent difference of 1 year with the other countries. It appeared that an extra ring had been counted in all samples from the 2nd, 3rd and 4th quarter. When this

systematic error was corrected, the results were comparable to those from other countries.

Overall agreement between results from different countries ranged from 71% to 90%. However, the agreement varied considerably from one sample to another. It appeared that some samples were very easy to read, whereas other samples presented considerable problems. The most difficult case was a sample from the southern North Sea, containing a mixture of autumn spawners and coastal spring spawners. Most readers had problems in classifying herring as either spring or autumn spawners, and hence came up with different estimates for the year of birth.

A second comparison was made after removing "difficult" otoliths. Some of the samples had been slightly damaged in the course of the exercise, and this presented a handicap for the last readers. Other otoliths were difficult to read from the start, and these would normally have been discarded by most otolith readers. Therefore, after the last country had read the samples, the Dutch reader (without having seen the results of his colleagues) identified a number of low quality otoliths that were removed in a second comparison. In this second comparison, also the sample containing coastal spring spawners was excluded. These fish are typical for the southern North Sea, and otolith readers in other laboratories are not familiar with this type. The results for the remaining 210 good otoliths are presented in table 2. Agreement between the various institutes now increased to 73%-95%

4. DISCUSSION

The results of the present exercise show a reasonable agreement in age-reading of herring between the laboratories around the North Sea. The comparison based on "good" otoliths is probably more realistic that the comparison that includes all otoliths. The latter exercise included otoliths that were slightly damaged, or that were difficult to read initially. During routine age reading, most readers will only use good otoliths, that are mounted in a way they are familiar with. Moreover, they will mainly read otoliths from areas they are specialised in.

However, differences in the order of 25% between some laboratories are clearly unacceptable, and efforts should be made to reduce these discrepancies. It is therefore suggested that workshops for otolith readers should be organised at regular intervals, say every 5 years, in order to maintain a sufficiently high quality of international age readings.

	Holland	Norway	Germany	Scotland	Denmark
France	73.39% 0.26	76.21% 0.10	76.45% -0.23	73.79% 0.30	70.97% 0.29
Holland		77.02% -0.17	86.78% -0.03	87.50% 0.04	84.27% 0.03
Norway			78.01% -0.18	76.21% 0.20	73.79% 0.20
Germany				90.46% -0.02	87.97% -0.01
Scotland					87.50% 0.00

Table 1. Results from a comparison including all 248 pairs of otoliths.

Top figure: percentage agreement; bottom figure: mean deviation (sum of all differences divided by number of observations). The mean deviation has been calculated by deducting the age reading by the country in the left hand column from the age reading by the country in the top row. A positive deviation thus means that the country in the top row on average reads a higher age for a given fish than the country in the left hand column.