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RESULTS OF THE WORKSHOP ON COMPARATIVE AGE READING ON SPRAT FROM ICES DIV. IIIa.

by

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ABSTRACT

The paper presents results from comparative age reading on sprat otoliths from various areas within Div. IIIa. Readers from fishery laboratories in Denmark, Norway and Sweden participated in the workshop. The reproducibility of the readings between the laboratories was tested by coefficient of variation and index of precision. The results are presented by lenth groups and the ageing in each of the subareas Skagerrak and Kattegat. Low consistency in the ICES IBTS 1- and 2-group sprat, as demonstrated by the ICES Herring Assessment Working Group, may be explained by great variation in age determination.

INTRODUCTION

Calibration of otolith readings for age determination of sprat was identified by the ICES Industrial Working Group (Anon. 1992) as important for improving the assessments. Little consistency in the International Bottom Trawl Survey (IBTS) 1-and 2-group indices of sprat in ICES Div. IIIa has been demonstrated (Anon. 1993). During the meeting of the ICES Herring Assessment Working Group for the Area South of 62°N in March 1993, the members from Denmark, Norway and Sweden agreed to organise a workshop to be held as soon as possible.

The workshop was held at the Institute of Marine Rsearch, Lysekil, Sweden, May 10-12 1993, with the objective to compare age determinations between the laboratories involved. The workshop was arranged outside the ICES system.

The practical arrangement of the workshop was organized by The Institute of Marine Research, Lysekil, Sweden, and the Institute of Marine Research, Flødevigen Marine Research Station, Arendal, Norway, was asked to convene the workshop.

The participaiting laboratories were:

Denmark	Danmarks Fiskeri-og Havundersøgelser, Charlottenlund
Norway	Institute of Marine Research, Bergen
Norway	Institute of Marine Research, Flødevigen Research Station
Sweden	Institute of Marine Research, Lysekil

MATERIAL AND METHODS

Sprat otoliths (sagitta) from various locations and months were exchanged between the laboratories. A collection of 7 samples or 437 pairs of otoliths were examined (Table 1). The samples were taken from research vessel catches and from commercial landings, mainly in Div. IIIa.

The otoliths analysed were mounted in eukit or histokit on black plastic plates and examined in reflected light. The participants were only provided data on position and date of capture.

One of the laboratories provided otoliths stored dry in small plastic bags per length group. The dry stored otoliths are too opaque to be interpreted without previous cleaning in glycerol or water. This was found, however, to be too time-consuming within the available time-schedule and thus not included in the analysis.

The age in years was determined by counting the hyaline rings with January 1 used as the birthday.

RESULTS AND DISCUSSION

A total of 415 otoliths was used in the analysis. The overall agreement in age determination, presented as percentage of agreement, between the laboratories ranged from 76 to 86 % (Fig 1).

This common technique to assess the precision of fish age estimated by comparing the percentages of determination of ages which are agreed upon, has the disadvantage that it fails to take the range of

fish year classes available to the fishery into consideration. Thus, the present agreement seems poor since most commercial samples contain only a few year classes.
The reproducability of the readings between the laboratories was then tested by the coefficient of variation and the index of precision (Chang, 1982). The two indices, coefficient of variation and the index of precision, are incorporating the average year-class of fish and thus free from the disadvantage of the percent agreement technique. The coefficient of variation is the standard deviation as a fraction of the mean expressed as percentage. The index of precision is the percent error contributed by each observation to the average age-class. The results between the laboratories are given in Table 2, as overall and by length groups. The differences between the laboratories considering the ageing in each of the three subareas Kattegat, Skagerrak and the North Sea (Table 3), are remarkable.

The precision does not imply that the age estimates are accurately. It only refers to the consistency or the degree of reproducibility among determinations.

Disagreement on the ages stemmed mainly from interpretation of the growth at the edge of the otolith and the first ring when occuring near the nucleus. After each laboratory had presented their ageing, the results were discussed in plenary. The otoliths which produced difficulties were re-examined and discussed by presenting them on a monitor connected to a binocular. In most cases agreements were reached. This approach was found useful for settling differences in interpretation.

A metamorphic ring as described by Iles and Johnson (1962) was observed in some otolths. This ring occurred often in combination with a second ring. This double ring could be rather indistinct presenting difficulties in the interpretation. The workshop decided to consider the outer "ring" as an L_1 ring only when it occured as well defined. Indistinct checks or zones, variable in appearence, introduced various difficulties in the interpretation, even among the youngest sprat.

Any size dependent influence on the readings between the laboratories, was examined considering the two length groups smaller and larger than 10 cm (Table. 2 and 3). The great variation in age determination in sprat may explain the low consistency in the ICES IBTS 1-and 2-group sprat indices.

RECOMMENDATIONS

The workshop demonstrated very well the advantage of putting more effort into preparation and mounting of the otoliths and thereby improve the readability for age determination. Though time-

consuming, it was recommended to mount pairs of otoliths on black plastic plates. Only one otolith gives no possibility for comparison whenever doubts in the age determination appeared.

The collaboration and exchange of material between the laboratories should continue to reduce the discrepancies.

A new workshop should be held within 3 years, in order to minimise existing differences in interpretation and evaluate the different experiences.

The general impression among the participants was that shape and pattern of growth zones on the otoliths varied a lot. The workshop agreed to establish a photo collection of otoliths caracteristic for the various sub-areas within Div. IIIa. Each laboratory will provide photos or otoliths, and the collection will be organized by the present author.

Table 1. Sprat otoliths used for comparison of age.

Area	Subarea	Date	No. of otoliths
Kattegat	Anholt	16.8.1988	36
Skagerrak	Swedish W.Coast	7.1.1976	70
	" "	7.2.1989	20
	Skagen	17.2.1976	53
	Outer Oslofj.	28.5.1992	63
	Inner Oslofj.	14.3.1977	100
North Sea	37F2 (ICES)	7.1.1993	95

Table 2. The coefficient of variation (C.V) and the index of precision (D) between the laboratories, overall and by length groups. All in percentages.

	Overall		≤ 10 cm		> 10 cm	
	C.V	D	C.V	D	C.V	D
S-D	7.5	5.3	5.5	3.9	8.5	6.0
NB-S	6.3	4.4	2.6	1.8	8.0	5.7
NB-NF	10.8	7.6	5.9	4.2	13.2	9.3
DK-NF	10.0	7.1	4.3	3.0	12.7	9.0
DK-NB	8.5	6.0	5.6	3.9	9.8	7.0
S-NF	8.0	5.6	5.5	3.9	9.1	6.4

Table 3. The range of coefficient of variation (C.V) and the index of precision (D) from age determination in each subarea, overall and by length groups. All in percentages.

	Overall		≤ 10 cm		≥ 10 cm	
	C.V	D	C.V	D	C.V	D
Kattegat	12.0-34.1	8.5-24.1	0-17.7	0-12.5	13.6-38.8	9.6-22-4
Skagerrak*	6.2-12.8	4.4-9.1	2.6-7.7	1.8-5.5	6.5-13.6	4.6-9.6
North Sea	1.2-8.8	1.0-6.1	0-9.8	0-6.9	1.4-8.6	1.0-6.1

*except innter Oslofjord

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