

**PLAICE AGE DETERMINATION EXCHANGE AND WORKSHOP
13-14 MAY 2003 OSTEND**

PRELIMINARY REPORT

1. AIMS OF EXCHANGE AND WORKSHOP

The overall aim was to improve ageing precision and the quality of age compositions provided to ICES Working groups. Further aims were:

- to find out the ageing agreement between countries and between the two methods of using whole otoliths and sections mounted in resin
- analyse and discuss the level of agreement between readers
- look at otoliths where there is disagreement and resolve any differences
- to re-read a selection of the exchange otoliths after discussing disagreements
- if time permits the workshop will also look at otoliths brought by participants
- to produce a reference collection of agreed ages for training etc

2. PARTICIPANTS IN EXCHANGE

		COUNTRY	PLAICE AGEING EXPERIENCE	NORMAL AGEING METHOD
READER 1	MICK EASEY	ENGLAND-UK	EXPERIENCED	Whole, burned and sections - transmitted and/or reflected light
READER 2	IAN HOLMES	ENGLAND-UK	EXPERIENCED	Whole and burned reflected light
READER 3	BRIAN HARLEY	ENGLAND-UK	EXPERIENCED	Whole, burned and sections - transmitted and/or reflected light
READER 4	GRANT COURSE	ENGLAND-UK	IN TRAINING	Whole, burned and sections - transmitted and/or reflected light
READER 5	MATTHEW PARKER-HUMPHRIES	ENGLAND-UK	TRAINED whole and burned	Whole, burned - reflected light Just started on sections
READER 6	PETER GROOT	NETHERLANDS	EXPERIENCED	Whole and sections – transmitted light
READER 7	MARCEL de VRIES	NETHERLANDS	IN TRAINING	Whole and sections – transmitted light
READER 8	KEES GROENEVELD	NETHERLANDS	IN TRAINING	Whole and sections – transmitted light
READER 9	MARIE-LAURE COCHARD	FRANCE	?	?

READER 10	MARIE-LINE MANTEN	FRANCE	EXPERIENCED	<35cm-whole >35cm-sections
READER 11	JEAN LOUIS DUFOUR	FRANCE	IN TRAINING	<35cm-whole >35cm-sections
READER 12	ILSE MAERTENS	BELGIUM	EXPERIENCED	Sections – microscope with monitor
READER 13	MARTINE MOERMAN	BELGIUM	IN TRAINING	Sections – microscope with monitor
READER 14	BART MAERTENS	BELGIUM	NONE	Doesn't normally age plaice
READER 15	HELLE RASMUSSEN	DENMARK	EXPERIENCED	Whole – reflected light
READER 16	AAGE THAARUP	DENMARK	IN TRAINING	Whole – reflected light
READER 17	UN	DENMARK	EXPERIENCED	Retired - Whole – reflected light
READER 18	GRAHAM JOHNSTON	IRELAND	IN TRAINING	Whole – reflected light
READER 19	MACDARA O CUAIG	IRELAND	IN TRAINING	Whole – reflected light

3. PARTICIPANTS IN WORKSHOP

MICK EASEY	ENGLAND-UK	ILSE MAERTENS	BELGIUM
IAN HOLMES	ENGLAND-UK	MARTINE MOERMAN	BELGIUM
PETER GROOT	NETHERLANDS	BART MAERTENS	BELGIUM
MARCEL de VRIES	NETHERLANDS	HELLE RASMUSSEN	DENMARK
KEES GROENEVELD	NETHERLANDS	AAGE THAARUP	DENMARK
MARIE-LINE MANTEN	FRANCE	GRAHAM JOHNSTON	IRELAND
JEAN LOUIS DUFOUR	FRANCE	MACDARA O CUAIG	IRELAND

4. SAMPLES

The exchange sample consisted of 245 otoliths from area VIId from the months of March, April, August, September, October, November and December 2001. These were from the normal CEFAS market samples and these months were the only ones where both otoliths were mostly available. One otolith had already been sectioned while the other one was whole although a few were missing, broken or crystalline.

5. EXCHANGE PROCEDURE

The slides and whole otoliths were circulated to each country. The aim was for each participant to age each method separately so as not to be biased by the ages of either method. The Belgian readers did not age the whole otoliths, as they were not familiar with this method. One of the French readers also did not age the whole otoliths.

6. WORKSHOP

Day 1

All the otoliths had been digitised at CEFAS using the sections and the whole otoliths before the meeting. A selection of these were projected and discussed. A series of images of four-year-old otoliths from each month throughout the year had also been prepared by CEFAS from the sections and whole otoliths illustrating the growth on the edge of the otolith. The readers were also shown these. Otolith samples from ICES areas VIIb, VIIj, IIIa and IVc brought by the Irish, Danish and Dutch participants were also observed. These all showed wide variations in growth rates and the growth on the edge.

Day 2

A sub-sample of 81 otoliths, which had been selected from the original sample prior to the meeting, was re-aged by both methods. The sub-sample was stratified by month and age (modal ages 1-6). Which otoliths were included in the re-read set was unknown to the workshop participants until re-reading commenced.

7. RESULTS

The data from the exchange and the workshop were analysed by RIVO (Loes Bolle) and CEFAS (Mick Easey) using the Excel workbook "AGE COMPARISONS.XLS" (Eltink et al., 2000). The results are summarised below. The results will be used to prepare a Working Document for the next meeting of ICES PGCCDBS and may also be used to prepare a CEFAS Technical Report. The full analysis is available if required.

- Broken (only a small piece), and crystalline otoliths were excluded from the analysis for both methods.
- All estimates are obtained by comparing individual readings to the modal age.

7.1 Exchange sample analysis

Comparison of all age readings (both methods, all countries and all readers)

Method	Reader	% AGREEMENT	CV	RELATIVE BIAS
Slide	READER 1(UK)	94.4%	3.7%	-0.07
Slide	READER 3(UK)	93.5%	3.9%	-0.08
Slide	READER 2(UK)	92.6%	5.5%	-0.05
Slide	READER 4(UK)	89.8%	9.5%	-0.08
Slide	READER 17(DK)	89.8%	7.2%	-0.09
Slide	READER 10(Fr)	85.6%	10.6%	0.00
Slide	READER 11(Fr)	84.7%	12.5%	-0.01
Slide	READER 6(NL)	83.7%	16.5%	0.13
Slide	READER 5(UK)	80.5%	11.7%	-0.15
Slide	READER 8(NL)	77.7%	16.5%	-0.01
Slide	READER 9(Fr)	73.5%	17.6%	-0.01
Slide	READER 7(NL)	62.8%	20.2%	0.25
Slide	READER 14(Be)	50.2%	17.1%	0.51
Slide	READER 15(DK)	45.6%	15.9%	0.53
Slide	READER 12(Be)	36.3%	16.7%	0.59
Slide	READER 18(Ir)	34.9%	24.0%	0.93
Slide	READER 16(DK)	30.2%	16.7%	0.94
Slide	READER 19(Ir)	30.2%	19.2%	0.73
Slide	READER 13(Be)	10.7%	19.2%	1.44
Whole	READER 2(UK)	91.6%	6.0%	-0.13
Whole	READER 3(UK)	89.7%	6.1%	-0.11
Whole	READER 5(UK)	88.7%	8.6%	-0.13
Whole	READER 1(UK)	87.9%	6.5%	-0.07
Whole	READER 17(DK)	84.9%	10.1%	-0.20
Whole	READER 11(Fr)	82.5%	11.5%	-0.16
Whole	READER 6(NL)	82.3%	14.8%	-0.01
Whole	READER 10(Fr)	81.0%	10.3%	-0.18
Whole	READER 7(NL)	78.1%	17.5%	-0.23
Whole	READER 8(NL)	74.0%	17.2%	-0.19
Whole	READER 16(DK)	49.1%	18.8%	0.38
Whole	READER 18(Ir)	47.7%	20.5%	0.38
Whole	READER 15(DK)	44.7%	16.2%	0.46
Whole	READER 19(Ir)	39.3%	22.4%	0.50
	All readers	68.7%	20.7%	0.23

The overall agreement between all the participants on the original exchange sample was only 68.7% (range 10.7 – 94.4). There appears to be four main reasons for this:

- **Unfamiliarity by some countries with the growth patterns of the exchange sample.** It became apparent at the workshop, especially when looking at some 107j plaice otoliths brought by the Irish participants that some of the low agreement was due to misidentification of the edge caused by unfamiliarity with the 107d stock. The

107j otoliths caught in December only showed a small hyaline edge whereas the 107d fish had a similar growth pattern in August with the hyaline completed in December.

- **The gap in the samples between April and August.** This contributed to some people miscounting the edge. The gap in the samples was completely unintentional. The samples picked were the only ones where the second otolith was available. Any future exchanges should not have a gap in samples that could cause unnecessary mistakes to be made.
- **Some participants had only just started learning to read plaice otoliths.**
- **Interpretation of true and false rings.** See the discussion (section 8).

7.2 Re-read sample analysis (day 2 of workshop)

After observing and discussing the digitised images and edge growth pictures the re-reading of the 81 otoliths showed a substantial improvement in the percentage agreement, CV and bias figures (1st reading compared with 2nd reading in table below).

Method	Reading	Bias range	Overall CV	Agreement range	Overall agreement
Slide	1 st	-0.07 – +1.41	0.23	7.4 – 92.6%	61.6%
	2 nd	-0.12 – +0.68	0.12	43.2 – 97.5%	86.8%
Whole	1 st	-0.05 – +0.62	0.19	43.2 – 96.3%	74.1%
	2 nd	-0.14 – +0.09	0.08	65.4 – 92.6%	86.0%

NB. Please be aware that the precision of the methods cannot be compared based on the above table, because all workshop participants are included in the slide readings whereas 3 participants, 2 of which are inexperienced age readers, did not read the whole otoliths.

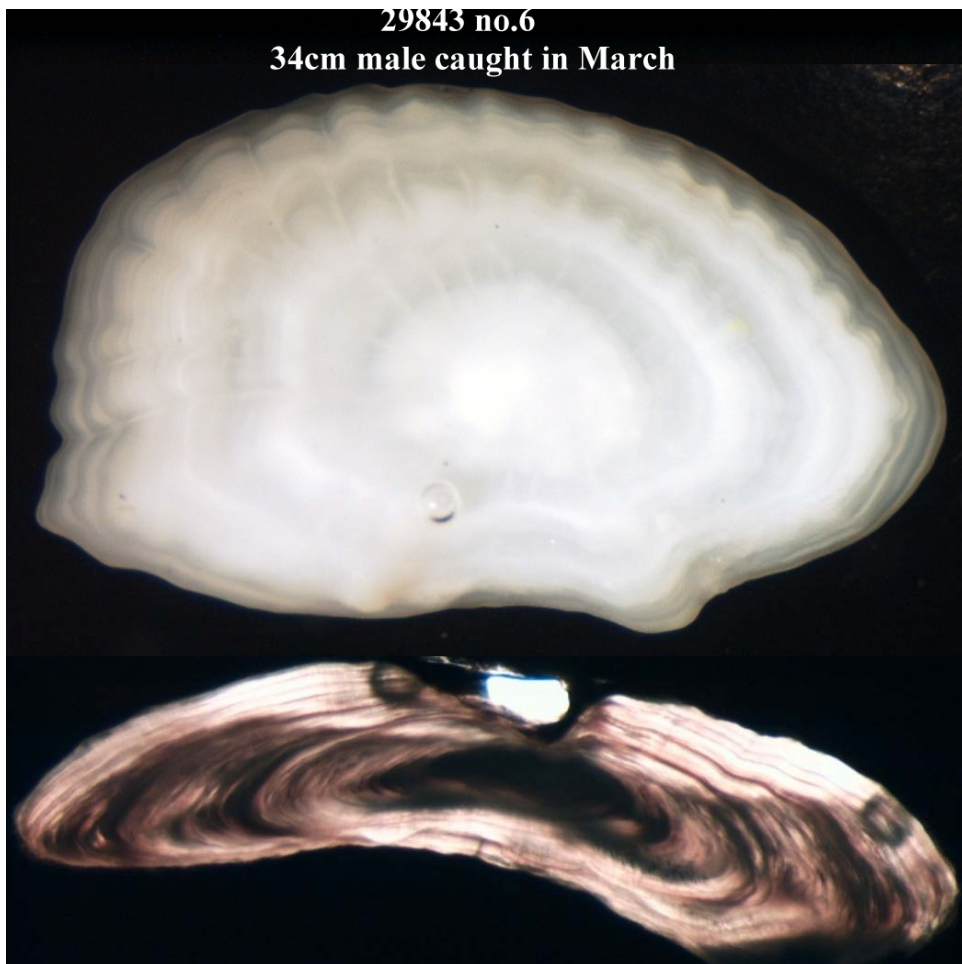
8. DISCUSSION

8.1 Over estimation of age

There is a tendency to over estimate the age of **younger fish** (ages 1-6) either by counting false rings or misidentification of the edge growth. This is mainly with the inexperienced readers, but also readers with some experience can also make this mistake. This bias was evident in the present exchange and in a previous exchange using otoliths from the central and northern North Sea. As the younger age groups comprise a large proportion of the North Sea plaice stock this bias **may severely affect the quality of the age compositions provided to ICES working groups.**

8.2 Under estimation of age

There are considerable differences of plaice ageing methods between countries. CEFAS staff use a mixture of whole, burned and sections to obtain the age but some countries only use whole otoliths and this could lead to under ageing older fish especially from the northern North Sea. The burning and sectioning methods both show the annual zones on **older fish** much clearer than can be seen on the whole otolith. The re-read sample of younger age groups (modal age 1-6) showed very good agreement between the whole otoliths and the sections. However, one of the disagreements is illustrated below and shows the under-ageing mistakes that can be made using whole otoliths, even on younger fish. This is fish number 6 from sample 29843, a 34 cm male caught in March. For the second reading, the whole otolith modal age is 3 (range 3 and 5). The section modal age is 6 (range 4, 6 and 7). Most of the experienced readers made the whole otolith 5 and the section 6. The inexperienced readers classed the small rings near the edge on the whole otolith as splits.



8.3 Accuracy

Plaice otoliths vary considerably in their ease/difficulty of ageing from the waters around the British Isles. Growth rates, nucleus size, splits and timing of the edge growth vary considerably making some areas relatively easy to age and others extremely difficult. Also, the various methods used for ageing each have their problems with regard to the ease or difficulty of identifying the annual rings correctly in certain parts of the otolith. To become proficient in age determination takes several years ageing several thousand otoliths and there will always be some fish where agreement cannot be achieved. A good training programme and frequent calibration exercises are required to obtain experience in recognising true and false rings. It is difficult to resolve disagreements at a single workshop especially without structures of known age and to maintain and improve agreement between countries further exchanges should take place on a regular basis.

Acknowledgements

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References

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