

**REPORT OF THE
STUDY GROUP ON EVALUATION OF CURRENT ASSESSMENT
PROCEDURES FOR NORTH SEA HERRING**

**By correspondance
February 2001**

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1 TERMS OF REFERENCE

The STGEHAP will be established and work by correspondence in 2001 to:

- a) propose and evaluate an assessment procedure that is less restrictive in the separability assumption than methods in current use (ICA);
- b) evaluate the usefulness of the so-called "split factor" in predicting abundance of the stock components in Division IIIa and in Sub-area IV;
- c) review the procedures used for generating fleet based selection patterns;
- d) based on the reviews done under b) and c) propose and evaluate a prediction procedure (both short and medium term) that meets management needs for an area based advice. Implement and verify a new prediction computer program;
- e) revisit the basis for the biological reference points implemented in the management plan for North Sea (autumn spawning) herring.

SGEHAP will make its report available to HAWG and will report by 30 April 2001 for the attention of ACFM.

The Study group met at the HAWG on 16 March to define a programme of work to address the TOR presented above. A programme of work was established with tasks aimed specifically at each item in the terms of reference.

2 PARTICIPANTS

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Contact details are attached in appendix 1

3 STUDY GROUP WORK PLAN

The work plan is presented in sections by term of reference

a) Evaluation of assessment procedures

Investigation of performance of ICA and AMCI (and possibly XSA) for assessment of North Sea herring.

Data sets will be provided including variability in:

Catch

- Catch at age from market sampling errors by bootstrap 1991-1998 (simulated errors for other years)
- Weights at age in the catch from market sampling errors by bootstrap 1991-1998 (simulated errors for other years)

Biological parameters

- Mean weights at age in the stock from acoustic surveys 1984-2000
- Fraction of stock mature at age 2 and 3 ring from acoustic surveys 1988-2000

Survey indices

- MIK 0-wr index. Available since 1977 as a recruitment index (errors by bootstrap)
- Acoustic 2-9+ wr index. Available since 1984, used since 1989 (errors by bootstrap)
- IBTS 1-5+ wr index. Available since 1971. Separated into a 1 wr index (used since 1979) and a 2-5+ wr index (used since 1983). Errors by bootstrap from 1977-1997 (simulated errors for other years)
- Multiplicative larvae abundance index (MLAI). Available since 1973, used since 1979 as an SSB index (section 2.5). (Error structure probably not resolved)

The assessment methods will be evaluated using data sets (with error) for precision in the assessment and retrospective patterns. Optimum use of the data series will also be investigated. A comparison of the different methods will be performed by examining uncertainty and sensitivity by means of automatic differentiation. Structural uncertainty for the models will be determined by examining the effect of model modifications and by computation of model selection criteria.

b) Evaluation of split factor

This will be done within the context of the short-term projections to be meaningful. One problem in evaluating the projections is that this cannot be done with regard to predicted and subsequently observed catches because the catches are driven by the TACs which are based on the projections in the first place.

An alternative way of evaluating the utility of the split factor for projections is to consider the population numbers at age, and the age structure in catches by fleet and to evaluate its utility as follows:

- 1) do n , (n may be 5-10 years, for example) retrospective assessments up to year y
- 2) start at year $y-n$ and do 2-year ahead population projections based on the results of year $y-n$ assessment with and without the split factor, starting from year $y-n$, $y-n+1$ etc. up to $y-2$
- 3) the fleet-specific total catch in weight including proportions of weight at age for NS and WBSS herring should be used, and appropriate F 's by age and fleet found to give the observed total catches. This would differ for the two methods:
 - partial F 's with no split factor;
 - LOCAL partial F 's (ages 0-1) based on split factor and partial F 's for older ages
- 4) compare how close the projections from the two methods are to the estimates from the most recent assessment (2001) taken as the true scenario, in terms of the numbers at age in the population, and the numbers at age in the catches by FLEET.

This evaluation might be done with the range of split factors, and attempts should be made to include years where split factors (observed and or predicted) are towards the ends of the range, rather than just for years where values are in the middle of the range. In addition the precision of the estimated numbers at age in the population, as estimated by ICA, and the observed inter-annual variability in the catches by fleet could be taken into account.

c) Review procedures for generating fleet based patterns

The current fleet definitions are:

North Sea

Fleet A: Directed herring fisheries with purse seiners and trawlers

Fleet B: All other vessels where herring is taken as by-catch

Division IIIa

Fleet C: Directed herring fisheries with purse seiners and trawlers

Fleet D: By-catches of herring caught in the small-mesh fisheries which combined earlier fleets D and E which are now managed together with a single quota.

The review will consider if the fleet separation still exists and how the fleet catch at age data are generated. A historic estimate of catch by fleet will be produced for use in testing assessments and projections.

d) based on the reviews done under b) and c) propose and evaluate a prediction procedure (both short and medium term) that meets management needs for an area based advice.

This task will be reviewed following completion of the studies above and the needs of work defined at this point. The feasibility and time required for implementation and verification of a new prediction computer program will be examined at this time

e) revisit the basis for the biological reference points implemented in the management plan for North Sea (autumn spawning) herring.

Following the review of assessment procedures and their accuracy and the evaluation of the current stock parameters (such as stock recruitment relationship) the studies will be reviewed and any new work and an associated timetable proposed.

The studies under TOR a-c will be carried out in the period 1 April 2001 to 17 August 2001. Data set preparation will be completed by 31 May to allow studies on model in June and July. The work of the study group was discussed in plenary of the HAWG and it was recommended that a meeting should be held in DIFRES Charlottenlund Denmark on 20-21 August 2001. This meeting will discuss the findings of the studies and draft a report for ACFM. Individual studies will be collated to provide a report for ACFM by 20 September 2001. A report detailing the results so far and any additional work required will be prepared for ACFM at this point. At the meeting in August the review of assessment procedures and their accuracy and the evaluation of the current stock parameters (such as stock recruitment relationship) the studies will be reviewed and any new work and an associated timetable proposed.

4 DIVISION OF RESPONSIBILITIES

Single fleet and survey indices data set preparation with error structure.		MLA Aberdeen UK
Multifleet data preparation		DIFRES Charlottenlund Denmark & IMR Lysekil Sweden
Evaluation of fleet definitions		DIFRES Charlottenlund Denmark & IMR Lysekil Sweden
Evaluation of Assessment Models	ICA	MLA Aberdeen UK
	AMCI	IMR Bergen Norway
	XSA	CEFAS Lowestoft UK
Evaluation of Split Factor		CEFAS Lowestoft UK

APPENDIX I

Study Group on the Evaluation of Current Assessment Procedures for North Sea Herring

SGEHAP

BFAFI Hamburg, 16 March 2001

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