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ACFM comments on stock assessment working group reports:
A supplement (for working groups) to the ACFM reports of
November 1986 and May 1987

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1. Introduction

This paper deals with assessment working group reports to the November 1986 and May 1987 meetings of ACFM. Thus, reports from Working Group meetings which have taken place after May 1987 are not commented upon since they have not yet been discussed by ACFM. Except for the report of the Working Group on Methods of Fish Stocks Assessments, those reports will be presented to the 1988 Statutory Meeting of ICES.

The report of the Working Group on Methods of Fish Stock Assessments, which met in June 1987, is tabled at this years Statutory Meeting in order to have it discussed and distributed before next years round of working group meetings. Any comments ACFM might have to the report will be conveyed to the Assessment Working Groups after ACFM having considered the report in November.

2. General comments

In November 1986, ACFM decided to try to standardize the report by giving for each stock a summary followed by the main text, and it was agreed to ask the Working Group chairmen to try to follow the proposed format when preparing the first draft for the ACFM report.

In May 1987, further discussions took place in ACFM on the form of the advice. It was agreed to go further along the lines suggested in

November by confining the report for each stock to a single page summary (See Appendix), and if further explanatory remarks were necessary, these should be confined to and labelled "Special comments" and placed on a subsequent page. By doing this it was avoided to have unnecessary duplication in the report by having text in the summary table and additional text following the table as was the case in some of the reports from the November 1986 meeting. A set of guidelines to be followed in completing the stock summary form will be distributed to all working groups.

3. Comments to assessment working group reports discussed at the November 1986 ACFM meeting.

3.1 Working Group on Multispecies Assessments of Baltic Fish

The work done by the Working Group was commended by ACFM, and it was decided to ask the group in 1987 to continue the multispecies VPA runs initiated at the 1986 meeting for Sub-divisions 25-29 and investigate the possibility of making multispecies VPA for the western Baltic (Sub-divisions 22-24).

3.2 Arctic Fisheries Working Group

During its meeting, the Working Group was only able to assess the saithe stock because there were no USSR participants or data at the meeting. The USSR data on cod, haddock and redfish had been mailed to the Working Group Chairman, but he did not receive them before leaving for the meeting in Copenhagen. Consequently, the assessments of these stocks were done by the Chairman after the meeting and submitted to ACFM in working papers. Comments below on these stocks refer to the assessments given in those working papers.

Concerning arctic cod, there was a confusing reduction in the mean F at ages 5-10 from 1984 to 1985 due to different exploitation patterns in the two years, and some concern was expressed about the assumed exploitation pattern in 1985. The Working Group should pay especial attention to the problem of estimating the exploitation pattern and to monitor changes in growth and maturity ogive.

The assessment of haddock was accepted, but concern was expressed as to the uncertainty of the survey estimates of year class strength. The

figures used in the assessment were much lower than the acoustic survey estimates. A more rigorous evaluation of stock size estimates and their variability from both acoustic and bottom trawl surveys seems warranted.

Concerning saithe, the Working Group was commended for the progress it has made in evaluating the effort data from trawler and purse seine fisheries and using them effectively in the assessment.

3.3 North-Western Working Group

Concern was expressed about the apparent incorrect use of the separable VPA. The chairman of the Working Group, in his written comments to ACFM, acknowledged the incorrect use but pointed out that, even with the correct use of the method (which he tried for two stocks), the final result would differ little.

Concern was also expressed relative to the use of the catch curve for estimating fishing mortality for some stocks. This method is only reliable if some major assumptions are fulfilled. Separable VPA may be used to explore alternative interpretation of the data under much less stringent assumptions. However, a choice among the alternative interpretations can only be made using external information (e.g. CPUE data). Further analysis of effort or CPUE data is necessary to develop measures more consistent with F or biomass estimates from VPA.

When calculating average levels of recruitment for use in forecasts, care should be taken to avoid the use of particularly long time periods during which biological conditions could have changed.

More specific comments to the assessment of the different stocks are given in the minutes of the ACFM meeting.

The Working Group was commended for the good review in the report of the fisheries and available literature for blue ling, ling and tusk. Age-structured assessments are not likely in the near future, and ACFM noted that the status quo estimates of catch given for tusk and ling in Division Vb may be the type of approach to take.

3.4 Atlanto-Scandian Herring and Capelin Working Group

Concerns were raised with the assessment of the Norwegian Spring-spawning herring. The further development of the stock will largely depend on the abundance of the 1983 year class. The estimate of the Barents Sea component of this year class was based on an acoustic survey in January 1986 and an assumed high M in 1986 to compensate for expected predation mortality before the year class left the Barents Sea. However, no estimates to check its subsequent abundance were available, and ACFM decided that no reliable stock forecast and catch predictions for 1987 could be given.

The Working Group should consider to provide less detail in the text of its report and a better description of the general situation with this stock.

3.5 Blue Whiting Working Group

The assessment of the northern stock was accepted, recognizing the uncertainty in the precise estimate of the current F and the exploitation pattern. Concerning the exploitation pattern, an alternative to the flat-topped pattern should be considered (separable VPA approach perhaps).

It was suggested that CPUE data should be further analyzed by the Working Group as a basis for tuning the VPA because there is considerable variability in the absolute acoustic estimates.

3.6 North Sea Flatfish Working Group

An assessment of the North Sea sole and plaice stocks was not done by the Working Group when it first met in March 1986 because the 1985 catch and age compositions were not known. An extra meeting of the Working Group was therefore held in October 1986. At that meeting age compositions were provided as well as minimum and maximum estimate of the unreported catch.

The Working Group was commended for trying innovative assessment approaches given its poor data in recent years. In the minutes of the

ACFM meeting are given some comments on the SHOT calculation of spawning stock biomass for North Sea flatfish which were considered relevant to the Working Group.

The Working Group should look into the consequences for the North Sea sole stock of a fishery closure during the spawning season and consider alternatives or additional regulatory measures to TACs.

3.7 Hake Working Group

In the comments to the assessment of the northern hake stock, it was noted that widely different results can be obtained with different growth parameters when using length cohort analysis. It is regrettable that, after so many years, an adequate growth equation is not available.

The Working Group should look at any alternative assessment approaches which avoid the steady-state assumption. A considerable amount of data is available on which to base alternative approaches.

Equilibrium analyses related to the relative benefits of different exploitation patterns were well done. Estimates of F from length cohort analyses, however, appear to be rather low and suggest that perhaps a closer examination of input F and analytical assumptions for use of length based techniques is desirable.

The Working Group should provide data in support of its suggested use of separator trawls for the Nephros fishery.

ACFM could not accept the assessment of the southern stock, given the uncertainties in the terminal F and the inconsistencies between CPUE and recruitment estimates from Spain and Portugal.

Yield-per-recruit evaluations of various exploitation patterns were well done and informative.

The deletion of discards and catches of young fish in the Working Group report to ensure consistency in the time series should not imply that the collection of such data for its future inclusion in the data base will not continue.

The Working Group should consider all sources of information (qualitative and quantitative) in evaluating stock trends.

3.8 Working Group on Fisheries Units in Sub-areas VII and VIII

ACFM felt that the Group should be commended for an outstanding job in making significant advance in assessment methodology.

It was noted that it is not actually true that length-based techniques are only applicable to equilibrium conditions. The model should be developed further to get away from the steady-state situation so that data could be analyzed to provide trends in stock size.

4. Comments to assessment working group reports discussed at the May 1987 ACFM meeting

4.1 Ad hoc Multispecies Assessment Working Group

ACFM noted with approval the continued effort of the Multispecies Working Group to refine its estimates of M , and the progress made towards evaluating the management consequences of its work. ACFM suggests that the Working Group takes note of the conclusions and recommendations of the EC Workshop on Technical Interactions in Mixed Fisheries (Nantes, March-April 1987) which refer, in part, to its work. ACFM also suggests that the Working Group consider a more detailed representation of the fisheries in the North Sea now that the methods to handle a larger number of fisheries are available.

ACFM found it difficult to understand the procedure by which the M_1 values had been calculated, in particular the "smoothing" by eye. The Working Group is asked to review its methods for this analysis.

ACFM also noted the discussion by the Herring South of 62° N Working Group on the applicability of North Sea values of M to other areas. Whilst the precise values obtained in the North Sea would not be expected to be valid elsewhere, the conventional constant values do look unfashionably small. Recognizing that there may be no great need to revise M values elsewhere, ACFM, nevertheless, asks the Working Group to consider if a simple generalization of its results could be derived for provisional application elsewhere, when required.

ACFM noted that most of the discrepancy between the different methods of long-term assessment may be due to non-comparable assumptions about recruitment. The peculiar herring/ haddock sensitivity of the MSVPA-based method obviously requires further investigation.

In responding to the Working Group's request for more specific guidance on the questions relating to long-term management to which answers would be of interest, ACFM proposed a list of prototype questions, which is given in the minutes of the meeting.

4.2 North Sea Roundfish

ACFM recognizes the heavy workload of the Working Group and commends and encourages its diligent attempts to improve its assessments. ACFM also commended the continued efforts by the Working Group to establish standard working procedures, particularly in relation to the utilization of CPUE and recruit index data. ACFM is, however, not satisfied that the present procedures are yet fully satisfactory and requests that the Working Group continue to explore the use of other available methods. ACFM also noted that the material provided in the Working Group report is not fully sufficient to enable the reader to appreciate the quality of the data and its interpretation. ACFM recognizes the difficulty in summarizing the voluminous data and analyses in question, but would appreciate seeing plots of catchability for each fleet, as these are very useful, and having a report that was a bit less cryptic. ACFM thanks the Working Group for making its programs and data available on the ICES microcomputer, but considers that the long-term solution is to integrate the methods used with the main ICES system and data base (preferably in a portable form). ACFM requests the Working Group, therefore, to collaborate with the ICES staff and other scientists to that end, particularly since other working groups also need procedures to handle multiple fleets, by-catches, and discards. In particular, ACFM requests the Working Group to consider whether the VPA tuning procedures now available at ICES might not be combined with the IFREMER programs for catch forecasting as a basis for their work.

In addition, ACFM notes that:

- 1) Because of the high levels of F , the assessments are very dependent on the precision of recruitment forecasts. The various indices

provide estimates of variable quality which often conflict with each other and with expectations based on catch and average F , with no general rule as to which estimates should be preferred.

The Working Group is commended for its attempts to make more efficient use of the recruit indices this year and is encouraged to pursue this work. It is requested to further develop the utilization of recruit indices, taking account of the historic precision of the various estimates and making allowance for possible curvature of the index/VPA relationship.

- 2) The terminal F s determined by VPA tuning seem to be rather unstable, perhaps because they are sensitive to sampling errors in the catch-at-age data. The tuning method used doesn't explicitly take account of the precision of estimates from various fleets, and prevents indices from groundfish/ recruit surveys from being incorporated in the analysis. The Working Group should investigate the use of alternative tuning methods which take account of the precision of the various estimates and permit survey data to be incorporated.
- 3) The Working Group should investigate further the use of methods of analysis which allow for changing catchability in both commercial and research vessel data by simply down-weighting old data rather than by fitting trends (cf. Cook's method).

ACFM also noted that "tuning" a VPA by using average F s will inevitably underestimate the current F if an increasing trend is present and will also transmit any errors in catch at age in the final year directly into the estimated populations. For these reasons, it is probably not a very satisfactory procedure, even (or perhaps especially) for data sets of poor quality.

The Working Group should consider whether, in some cases, simpler methods might not be more appropriate for forecasting. In the worst cases a SHOT forecast may be as good as anything else. Elsewhere, the technique adopted by the Irish Sea and Bristol Channel Working Group (use of separable VPA guided by the results of catchability tuning) may be more robust than the use of raw tuned or averaged terminal F s.

This year's meeting of the Methods Working Group may be expected to provide further guidance on some of these points.

ACFM thanks the Working Group for including stock-recruit plots and calculations of biomass per recruit in its report. They were most useful in calculating the biological reference points F_{med} and F_{high} and ACFM suggests that the Working Group might find it useful to try these calculations at its next meeting.

More specific comments to the assessment of the different stocks are given in the minutes of the ACFM meeting.

4.3 Mackerel Working Group

It was agreed that the Working Group did the best that it could with respect to the stock mixing/ migration problem. ACFM would appreciate seeing a table in the Working Group report containing catch at age in number and tonnes by division for each stock. The Working Group is encouraged to continue to maintain and include in future reports (at least for information purposes) separate data bases and VPAs for the two stocks, although it recognizes the difficulty associated with splitting the catches.

Some concerns were expressed that the 1984 and especially the 1985 year class may not be as strong as assumed in the Western stock. Further, the Working Group's rather low estimate of the size of the 1986 year class could not be supported. ACFM encourages improved coordination of the various recruitment surveys in view of the importance of getting better recruitment estimates for the mackerel stocks.

Concerning mesh regulations, ACFM encourages further experimentation with the use of square-mesh trawls for mackerel.

4.4 Industrial Fisheries Working Group

The Working Group was commended for the valuable task it accomplishes and should continue to meet on an annual basis. Although catch predictions can not be offered, it was felt that the assessments are equally as important since there is a lot of interest in the

industrial fisheries. Further, although by-catch data are presented to other working groups, it was stressed the usefulness of having these data presented and analyzed in a single report.

4.5 Flatfish Working Group

The Working Group had an ad hoc meeting in February to provide advice on measures to improve the exploitation pattern of North Sea plaice.

Two main approaches were considered:

- 1) increase in mesh size
- 2) protected areas

The first option was considered by the Working Group to be unrealistic because of its expected effect on the sole fishery. However, ACFM was of the opinion that it should be given further consideration and the Working Group is requested to consider more fully mesh size regulations when it meets in October.

Concerning closed areas, ACFM acknowledged the good job done by the Working Group in its analysis but noted that the results were limited by using data on effort pattern and discard rates from earlier years which may not necessarily reflect the current situation.

4.6 Herring Assessment Working Group for the Area south of 62⁰ N

New and slightly higher M values for all stocks except the Icelandic summer-spawning stock were adopted from the Multispecies Working Group. ACFM discussed this point and wondered if predation of herring had been examined in other areas besides Iceland and North Sea. It was suggested that the Multispecies Working Group should look at the generalities in the predation mortality data and see what could be extrapolated to other areas (see Section 4.1). It was felt that extrapolation of North Sea data to other areas was not necessarily correct in all cases.

Some specific comments to the assessments of more technical nature are given in the minutes.

4.7 Working Group on Assessment of Pandalus Stocks

The Working Group was commended for the big improvements in the assessments of the Pandalus stocks.

4.8 Division IIIa Demersal Stocks Working Group

It was noted that the procedure used by the Working Group to estimate exploitable biomass (i.e. multiplying the biomass-at-age array by the average selection pattern) could lead to errors if the selection pattern changed over the time period used for calibrating the VPA. Therefore, it would be better to estimate the biomass in each year using the selection pattern for that year.

The Working Group is to be commended for the advances it has made in the assessment.

4.9 Irish Sea and Bristol Channel Working Group

The Working Group is to be commended for having done a very good job. ACFM would have appreciated having SEs for the various regressions for recruitment listed in the respective tables. In the various tables showing nominal landings, differences between official and Working Group totals for a given year should be shown in a row titled "Unallocated" (this was done for some stocks, but not for others). For Celtic Sea cod, a sampling program needs to be developed to obtain cod age compositions from the Nephrops trawlers. The Working Group should describe the areas of distribution of the stocks it assesses as well as the areas of the various fisheries in the area to see if the present stock unit definitions are appropriate for assessment and management purposes (and also to provide information to evaluate possible misreporting of catches). ACFM was advised that discarding occurs in the Celtic Sea plaice fishery, and requests the Working Group to try to provide such data in the future.

It was suggested that the JFREMERE multiple fleet prediction program be installed on the ICES computer for use by this Working Group in the future.

4.10 Working Group on Pelagic Stocks in Divisions VIIIC and IXa and Horse Mackerel

The Working Groups is to be commended for the significant progress it has made in assessing horse mackerel. ACFM acknowledges the hard work done by only a few people and stresses the need for more people to participate in the Working Group and for more research to be done on this wide ranging species which is becoming very important.

ACFM discussed the stock units defined by the Working Group and felt that, for the present time, they were useful, but that the highly migratory nature of horse mackerel would make it difficult to allocate catches to such stocks.

The interaction between horse mackerel and mackerel should be examined. In view of the ageing problems with this species, conventional assessment methods may not be appropriate, and other approaches should be considered (e.g., further use of the egg survey estimates, yield/biomass ratios to estimate catches, and so on). The Working Group should look into measures to reduce the large catches of juvenile horse mackerel by purse seines. ACFM may ask the Working Group to assess the stock of anchovy found in the Bay of Biscay.

4.11 Working Group of Pelagic Stocks in the Baltic

The Working Group should look closely at the question of separate stocks of herring in Sub-divisions 29 NE and 30 E.

The Working Group should consider using separable VPA to evaluate the exploitation pattern in the terminal year for the various stocks.

4.12 Working Group on Demersal Stocks in the Baltic

The Working Group needs to look closely at the F pattern in the terminal year for the cod stock in Sub-divisions 25-32. The Group should also reevaluate the estimate of $M = 0.3$ for this stock, in light of the fact that an M of 0.2 is assumed for the stock in Sub-divisions 22 and 24 and the age compositions for the two are about the same. ACFM would also like the Working Group to look into the question of whether the same or different mesh sizes and corresponding landing sizes are appropriate for the two Baltic cod stocks.

4.13 Baltic Salmon and Trout Working Group

ACFM raised a number of concerns with figures and calculations given in the Working Group report. Although there is no doubt that F and catches should be reduced in the Main Basin and Gulf of Bothnia, the uncertainties in the calculations and assumptions, and especially the inconsistencies between yield per artificial smolt unit (ASU) predicted by the recalibrated assessment model and the yield observed

in 1984-1986, made it difficult to quantify the reduction in catch or effort which should be aimed for. The Working Group should have a further look at these problems at its next meeting.

4.14 Working Group on North Atlantic Salmon

ACFM recognizes the very heavy workload of the Working Group and would like to commend it for an outstanding job. ACFM would appreciate having the Canadian and Greenland catches of Maine-origin fish shown in a single table in future Working Group reports. The Group is to be commended for its analysis on the abundance of salmon at West Greenland (e.g. Tables 24-25). It would be useful to have a more complete table showing the tags that have been applied.

Appendix 1. Standard format of ACEM report as agreed in May 1987.

x.xx.xx (Stock name)

Source of information:

Year	1980	1981	1982	1983	1984	1985	1986	1987	Max ²	Min ²	Mean ²
Recomm. TAC											
Agreed TAC											
Actual landings								1			
Sp. stock biomass									1		
Recruitment (age)									1		
Mean F(- ,)									1		

¹ Predicted or assumed. ² Over period 19 -19 . Weights in t, recruitment in

Catches:Data and assessment:Fishing mortality:Recruitment:State of stock:Forecast for 1988:

Assuming F(87) = , Catch(87) = , SSB(88) =

Option	Basis	F(88)	Predicted catch(88) ('000 t)	Predicted SSB(89) ('000 t)	Consequences/implications

Continued fishing at current levels of fishing mortality will lead to

Recommendation:

Special comments: (put on next page or pages)