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REVIEW OF THE HANDLING OF PREDATION DATA AND DATA ON EVENTUAL
CHANGES IN WEIGHT AT AGE AND AGE AT FIRST MATURITY BY DIFFERENT
ASSESSMENT WORKING GROUPS

by

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1. Predation data

For the 1984 round of working group meetings the groups assessing the fish stocks the North Sea were asked to "take into account the levels of predation mortality implied by the results of the stomach sampling project".

During the ACFM meeting in May 1984, a review was undertaken of the handling of this item in the working group reports dealt with at that meeting.

The North Sea stomach sampling program included the following predators: Cod, haddock, whiting, saith, mackerel. The working groups had in 1984 available estimates of consumption of different species as reported by Daan (1983) Gislason (1983), Hislop et al (1983) and Mehl and Westgård (1983), and also some updated estimates communicated to the working groups by Daan.

Since the results of the program showed only small numbers of saith and mackerel in the stomachs, the working groups dealing with those species concluded that no new estimate of natural mortality could be made. Saith and mackerel's importance was as predators, not as prey.

The North Sea Roundfish Working Group gave the estimated numbers at each age of cod, haddock and whiting eaten by the predators examined in 1981. The working group did not try to estimate new values of M for the different age groups since the estimated numbers consumed are dependent on predator stock biomass, and the latter has itself to be estimated in a multispecies model. It was pointed out, however, that when predation data are taken into account, they are likely to produce higher values of M on the youngest age groups than the value used at present ($M = 0.2$). The implications of this for stock assessment were briefly discussed.

The Industrial Fisheries Working Group examined the reported estimated number of Norway pout, sprat and sandeel taken by the predators. For Norway pout and sprat the working group concluded that the data agreed well with the natural mortality used earlier for these species, although for Norway pout M should probably be somewhat higher for the youngest age groups and somewhat lower for the older ones. For sandeel, the working group concluded that the M used earlier was too low for 0- and I-group. It had, however, no opportunity to examine this in detail since a large number of sandeel eaten by whiting had not been allocated to age. Further, one would have to divide the 0-group into those eaten in the first and second half of the year.

The Herring Assessment Working Group for the Area south of 62°N gave the most detailed examination of the predation data, and amended the reported numbers of 0- and I-group herring eaten by whiting in 1981 since the authors had used a wrong age-length key for juvenile herring. Based on the amended figures the working group calculated predation mortality on 0- and I-group herring in 1981, and decided to adopt as a first approximation a value of $M = 1.0$ for 0-group and $M = 0.8$ for I-group herring. These values were used for calculating yields from the North Sea herring stock for various levels of juvenile fishery, applying $M = 0.1$ for 2-group and older herring. It was pointed out in the report that the natural mortality inflicted by whiting and other predator stocks upon the herring can be expected to vary rather widely from one year to another, and the calculated values should be treated with some caution, more as an indication of the order of magnitude than as accurate point estimates.

During the ACFM's discussion of the reports the following further problems/requirements were identified:

1. There is need for a detailed breakdown by time and prey size of 0-group consumed in order to distinguish between the predation mortality in the pre-recruit phase and the predation mortality occurring after 0-group has started to recruit to the fishable stock.

The latter mortality would be relevant in for example Y/R studies, while the former could be of importance for a better understanding of the factors determining recruitment.

2. A stomach sampling program should be repeated to take account of changes in for example feeding habits. How will changes in the (relative) size of the different prey and predator stocks affect the predation mortalities, i.e. what is the appropriate "feeding model"?
3. To attempt annual estimates of predation by stomach analysis would be prohibitively expensive. Can we narrow it down to certain species, areas and time periods?
4. Better data on distribution of stocks by areas at different times of years is important for improving estimates of consumption.
5. Apparent sharp change from month to month in whiting predation needs to be checked in repeated programme. Could it be sampling errors?

2. Data on mean weight at age and age at first maturity

In 1984 all assessment working groups were asked to "analyse the effect of changes in the data sets of weight at age and age at first maturity on the time series of stock and spawning stock biomass". As shown below the different working group reports dealt with by ACFM at the May meeting treated this to a very variable extent and also in a variable way.

Industrial Fisheries Working Group and Working Group on Redfish and Greenland Halibut in Region 1 did not deal with this item at all.

The Mackerel Working Group reported that no data were available to the group to indicated changes.

To the Herring Assessment Working Group for the Area south of 62°N several working documents were presented discussing the possibility of density - dependent growth on Manx, Celtic Sea, central and southern North Sea stocks, and Icelandic summer spawning herring. Detailed reports will be presented to the theme session on density - dependent relationships at the 1984 Statutory Meeting. It was pointed out in the report that from the Icelandic data it was clear that failure to take account of change in these population parameters can seriously bias the estimates of the spawning stock.

For most of the stocks dealt with by the Saithe (Coalfish) Working Group constant weights at age in the stock have been used up to the late 1970's, and only in recent years were these weights estimated according to the values observed each year in the catches. It is possible that weight at age could be estimated annually for the earlier years. The working group could not anticipate the magnitude or direction of resulting changes in estimates of stock biomass.

A better description of maturity at age using an ogive instead of the usual knife-edge array is not possible at present; past values would still be more difficult to revise.

The working group also states that the appropriateness of mean weight in the catch as an estimate of weight in the stock on 1st January is questionable.

For most of the stocks dealt with by the North Sea Roundfish Working Group weight at age data have been determined separately for each year. The majority of the data were revised at the special Data base meeting of the group in 1981.

The working group used this year maturity ogives instead of knife-edged age at first maturity, and the effects of this on spawning stock estimates were shown. The maturity ogives were however based on data from only 1981 and 1982 (North Sea) or 1983 (West of Scotland), and during the discussion in ACFM it was questioned how representative these would be for the earlier years.

The Working Group on Assessment of Demersal Stocks in the Baltic tested at its meeting in 1983 if there was a density dependence of growth in the cod stock in Sub-divisions 25 to 32. The analysis gave a somewhat surprising result:

"The higher density, the larger cod".

During the 1984 meeting, new data on growth for the period 1970 - 83 were made available by the German Democratic Republic for Sub-division 22. It was not shown any correlation between these new data and abundance values of the cod stock in Sub-divisions 22 and 24. Furthermore, data for the proportion of mature fish at age were also provided for the same period, and no relationship to the abundance of the cod stock could be established.

The new data were used in the assessment of the cod stock in Sub-divisions 22 and 24.

The Working Group on Assessment of Pelagic Stocks in the Baltic only demonstrated the effect on estimated spawning stock size of sprat in assessment units 27, 29 - 32, making two different assumptions on maturity ogive. It was however not stated what these assumptions were based upon.

During the discussion of the reports the following points were raised: To analyse differences between years and trend over time it is necessary to have disaggregated data. It is necessary to know where and when, sampling was done. Many working groups do not have stock mean weights, only catch mean weights. There is need for standardised maturity stages.

Finally, it was realized that it is difficult for a working group, at a meeting, to go into details of data base on mean weight etc.. Working group members should be given tasks to bring documentation to the meeting in the form of for example working documents (the procedure used by the Herring Assessment Working Group).

References:

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