

1 ICES ADVICE

1.1 The Form of ICES Advice

ICES recognises that “changes in fisheries systems are only slowly reversible, difficult to control, not well understood, and subject to change in the environment and human values” (FAO 1996). Therefore, ICES agrees that a precautionary approach should be applied to fishery management. Biological reference points, stated in terms of fishing mortality rates or biomass, are key concepts in implementing a precautionary approach. They are predefined benchmarks (limit reference points) that should be avoided to ensure that stocks and their exploitation remain within safe biological limits, and against which assessments should evaluate the status of the stock.

The concept of safe biological limits was introduced in ICES advice in 1981 and further developed in 1986 (Serchuk and Grainger, 1992). The aim of keeping stocks within ‘safe biological limits’ was described in the UN Agreement on Straddling Fish Stocks and Highly Migratory Stocks: a stock should be kept at a sustainable level by keeping it above a minimum biomass benchmark, and by keeping the fishing mortality below a maximum fishing rate benchmark. In 1998, ICES introduced precautionary biological reference points as the basis for its advice.

ICES provides advice on fishery management aimed at keeping the risk that the spawning biomass may fall below a minimum limit low. The minimum spawning stock biomass benchmark is described by the symbol B_{lim} (the biomass limit reference point). The value of B_{lim} is set on the basis of historical data, and chosen such that below it, there is a high risk that recruitment will ‘be impaired’ (seriously decline) and on average be significantly lower than at higher SSB. When information about the dependence of recruitment on SSB is absent or inconclusive, there will be a value of SSB, below which there is no historical record of recruitment. B_{lim} is then set close to this value to minimize the risk of the stock entering an area where stock dynamics is unknown.

Below B_{lim} there is a higher risk that the stock could ‘collapse’. The meaning of ‘collapse’ is that the stock has reached a level where it suffers from severely reduced productivity. ‘Collapse’ does not mean that a stock is at high risk of biological extinction, but does mean that recovery to improved status is likely to be slow, and dependent of effective conservation measures.

The fishing mortality rate should not be higher than an upper limit F_{lim} which is the fishing mortality that, if maintained, will drive the stock to the biomass limit.

Spawning biomass and fishing mortality can only be estimated with uncertainty. Therefore, operational reference points are required to take account of this. To

keep the true risk low that spawning biomass falls below B_{lim} , the estimated spawning biomass should in practice be kept above a higher level that allows for this uncertainty. Therefore, ICES applies a ‘buffer zone’ by setting a higher spawning biomass reference point B_{pa} (the biomass precautionary approach reference point). ICES advises that when the spawning biomass is estimated to be below B_{pa} , management action should be taken to increase the stock to above B_{pa} .

Similarly, to be certain that fishing mortality is below F_{lim} , fishing mortality should in practice be kept below a lower level F_{pa} that allows for uncertainty as well. ICES advises that when fishing mortality is estimated to be above F_{pa} , management action to reduce it to F_{pa} should be taken. Such advice is given even if the spawning biomass is above B_{pa} because fishing mortalities above F_{pa} are not sustainable.

ICES gives advice on many stocks for which there is no analytical assessment and accordingly no basis for setting reference points as described above. Also in these cases ICES uses a precautionary approach, but alternative models are applied, with reference points referring to properties of the stock or fishery that can be estimated, for example catch per unit of effort instead of biomass.

The ICES advice is primarily risk-averse, i.e. it aims at reducing the risk of something undesirable happening to the stocks. Biological target reference points are also part of the Precautionary Approach, but setting targets for fisheries management involves socio-economic considerations. Therefore, ICES does not propose values for Target Reference Points, and at least until now Management Agencies have not identified management targets based on socio-economic benefits. Hence Target Reference Points have not been directly used in the advice. This means that even if the ICES advice is followed and therefore the stock should be protected from impaired productivity, exploitation of most stocks is likely to be sub-optimal, i.e. the long-term yield is lower than it could be.

Managers are invited to develop management strategies. ICES will comment on these and consider if they are consistent with the precautionary approach. If they are, ICES will frame the advice to be consistent with the adopted management targets.

Framework for advice

When an assessment shows that the spawning biomass is below B_{pa} ICES regards the stock as being ‘outside safe biological limits’, regardless of the fishing mortality rate, and ICES will provide advice to increase spawning biomass above B_{pa} , which may involve

reducing fishing mortality to levels below F_{pa} possibly by a large amount cannot be achieved in the short-term, ICES will recommend the development of a rebuilding plan specifying measures to increase SSB above B_{pa} in an appropriate time scale depending on the biological characteristics of the stock and other relevant factors.

When an assessment shows that the stock is above B_{pa} but that the fishing mortality is above F_{pa} , the stock is 'harvested outside safe biological limits'. ICES will then recommend that the fishing mortality be reduced below F_{pa} in the short term.

The standard phrases are:

- When the SSB estimate is below B_{pa} : 'Based on the most recent estimate of the biomass ICES classifies the stock as being outside safe biological limits'
- When the B_{pa} estimate is above B_{pa} but the F estimate is above F_{pa} : 'Based on the most recent estimates of fishing mortality and SSB ICES classifies the stock as being harvested outside safe biological limits'
- When neither of the above applies: 'Based on the most recent estimate of SSB and fishing mortality ICES classifies the stock as being inside safe biological limits'

The ICES reference points in current use were set in 1998 using the stock and fishery data then available, as a provisional step in the implementation of the precautionary approach. In some cases, it has been necessary to change these reference point values as a result of changes in the data or the productivity of the stock,

ICES 1997. Report of the Precautionary Approach to Fisheries Management. Copenhagen, 5–11 February 1997. ICES CM 1997/Assess:7.

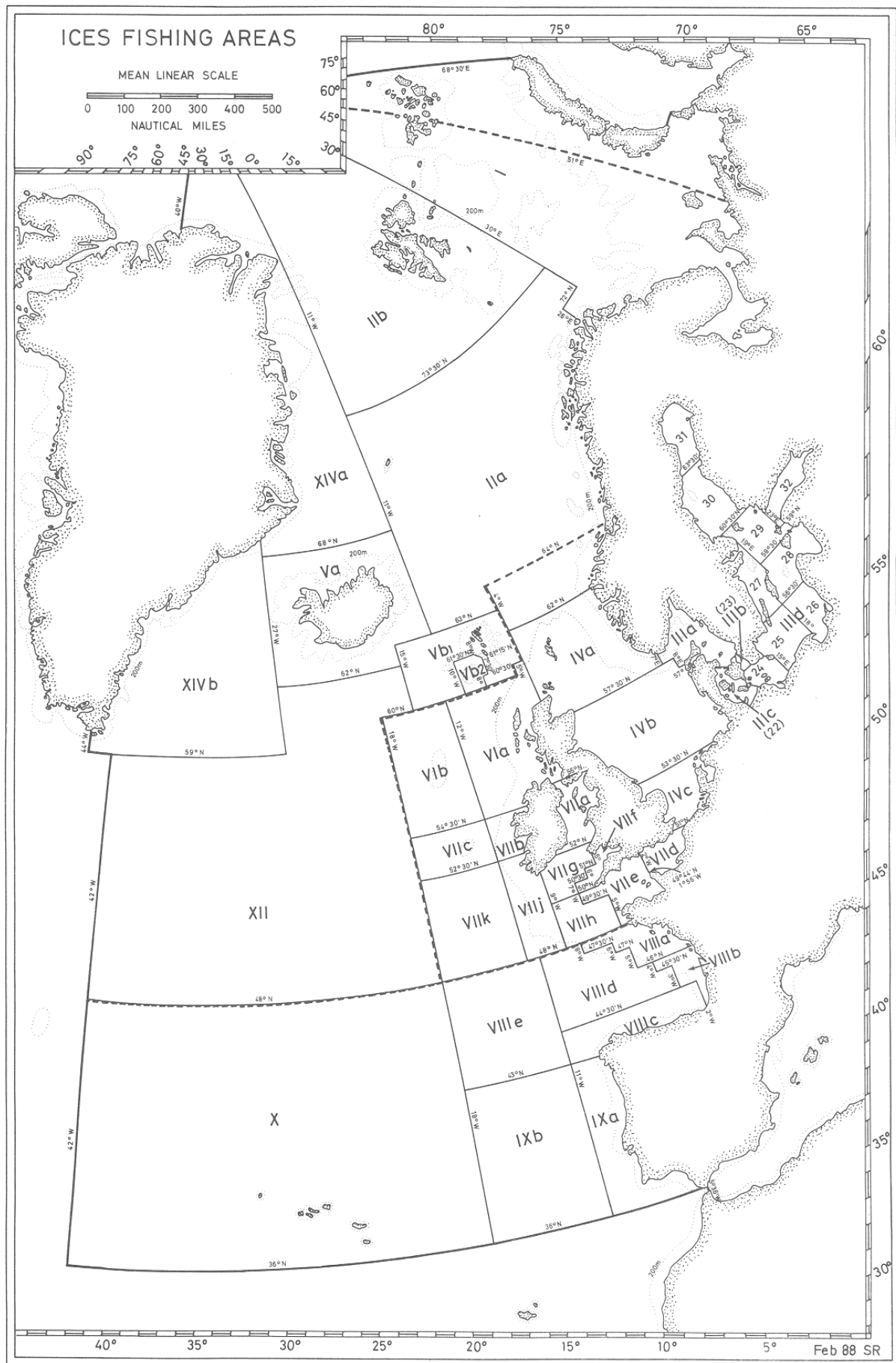
ICES 1998. Report of the Precautionary Approach to Fisheries Management. Copenhagen, 3–6 February 1998. ICES CM 1998/ACFM:10.

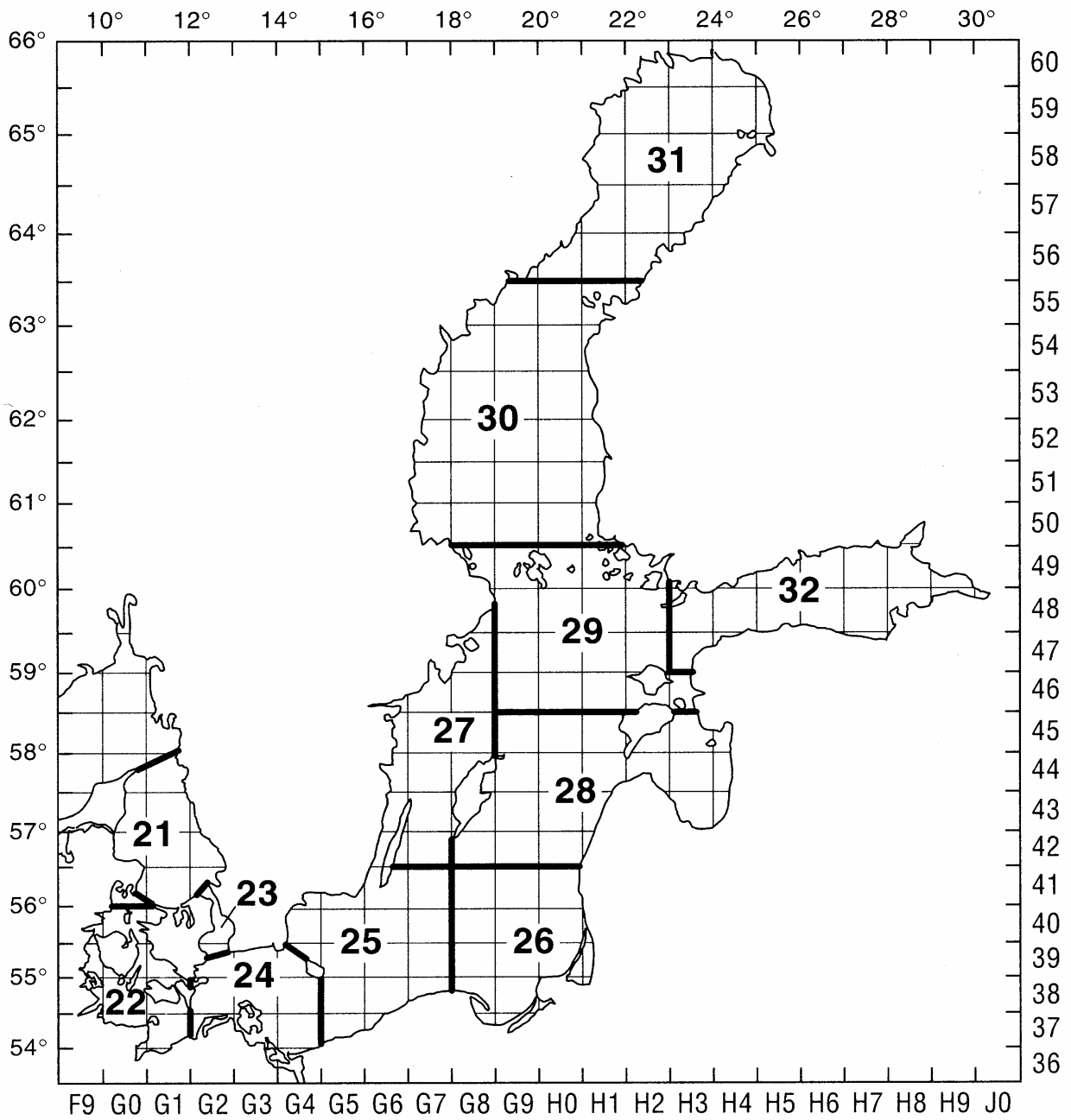
ICES 2002. Report of the Study Group on the Further Development of the Precautionary Approach to Fisheries Management. Lisbon, 4–8 March 2002. ICES CM 2002/ACFM:10

Serchuk, F M. and Grainger, J. R. 1992. Development of the basis and form of ICES Fisheries Management Advice; Historical background (1976–1990) and the new form of ACFM Advice (1991 - ?). ICES CM 1992/Assess:20.

Report of the 11th Dialogue Meeting Nantes January 1999, ICES Coop. Res. Rep. 228 (1999).

Report of the Follow-up meeting of the 11th Dialogue Meeting, February 2000.





2.5 Precautionary Reference Points

In order to improve consistency with the framework described above, and take advantage of new biological and fisheries information acquired on many stocks, ICES is in the middle of a process to review the precautionary reference points that are used in formulating the advice. The considerations were completed for the Northeast Arctic cod for which revised reference points are introduced. There has been done very thorough investigations of the applicability of limit reference points but the step from the limit reference point to precautionary reference points requires an evaluation of the accuracy of the assessments. ICES is undertaking this review at present.