THE ASSESSMENT OF IRISH SEA AND BRISTOL CHANNEL FISHERIES

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SUMMARY

Shortcomings in the present methods of assessing fish species in the Irish
Sea and Bristol Channel are discussed. These and the limitation on the number
of species currently being regulated suggest that the existing system of Working
Groups dealing with the area should be replaced by a single-area-based group.
Such a group could consider the particular problems raised by the kind of mixed
fishery which is characteristic of the Irish Sea and Bristol Channel.

INTRODUCTION

The regulation of fish stocks in the NE Atlantic has relied largely on
the results from single species analytical models, although there have been
attempts to carry out multispecies mesh assessments (e.g. Anon, 1974). Inter-
actions between species may be classified into (a) those resulting from
particular kinds of fishing activity and (b) those due to biological and
environmental factors. The first covers such things as mesh size, by-catch
and seasonal or long-term switching of fishing effort from one species to
another. The second includes all forms of competition (e.g. food limitation),
predation, commensalism etc. As long as the interactions between different
species are small, the single species approach will provide a valid basis for
management. In many areas of the world, where mixed catches of numerous species
are taken, this has never been the case and even in North European waters it
may be argued that single species regulation is no longer adequate on its own.
In the first place, with present fleet mobility and high levels of fishing effort
the rate of exploitation on individual species and stocks may be dependent on
the state of other species or of stocks in other areas (e.g. Clayden, 1972). In
the second place, the consequences on the total energy budget of dealing with
each species in terms of a constant parameter model need to be kept in mind
(Jones, 1976).

The Irish Sea and Bristol Channel (ICES Divisions VIIa and VIIf) are areas in
which single species management is likely to be particularly difficult and which
suffer because of the present structure of ICES Working Groups. The form in

which management advice is currently presented and the kinds of regulation which are implemented are inadequate to control the exploitation of fish stocks in these areas. The only demersal species for which TACs are currently set for VIIa and VIIf are plaice and sole and these account for only 14% of the total demersal catch, whereas in the North Sea (Sub-area IV) 77% of the total demersal catch is covered by TACs. The five main demersal species (whiting, cod, plaice, haddock and saithe) account for about 90% of the total demersal catch in Region IV, but only for 82% in Division VIIa (cod, whiting, plaice, skates and rays, saithe) and for 66% in VIIf (hake, whiting, cod, skates and rays, sole). (These figures and order of importance are derived from the 1974 Bulletin Statistique. In the case of VIIf the order of importance, particularly for hake, is suspect and may be due to inclusion of catches from other areas in the French data). The catches in VIIa and VIIf are characteristically more mixed than in the North Sea and the species composition shows large year to year fluctuations. Other major differences between the areas which affect fishing activity and hence fisheries management are:

1. The catch per unit area of fish and shellfish is about 55 Kg/ha in Sub-area IV compared with about 21 Kg/ha in Divisions VIIa and VIIf. The reason for this apparent difference in productivity is not known, but is reflected in generally lower catch rates. Because of these low catch rates, throughout most of the year much of the fishing activity in Division VIIa and VIIf is directed at particular seasonally abundant species and vessels which fish only in these areas need to be flexible in their working methods and fishing pattern.

2. Shellfish account for 7% of the total North Sea catch and for 13% of the Irish Sea and Bristol Channel catch. The bulk of the Irish Sea shellfish catch consists of high value species such as *Nephrops* and scallops. Many vessels fish seasonally for queen scallops and *Nephrops* and the latter fishery, carried out with small mesh nets, causes considerable loss of small whitefish.

3. Elasmobranchs account for 3% of the total North Sea catch and for 11% of the Irish Sea and Bristol Channel catch. The size of the elasmobranch catch in the latter areas, consisting mainly of skates and rays, poses a particularly acute management problem. These species appear to be suffering a gradual reduction in recruitment under the current fishing regime (Holden, 1977) and, since they are taken mainly as a by-catch, this means that it may not be possible to reduce the fishing mortality on them while maintaining that on other species.

In order to provide a scientific basis on which to consider possible forms
of management for the area, changes are needed in the present ICES Working Group
structure. Since the interaction between fisheries for different species clearly
does need to be taken into account, it would seem sensible to have one group
covering all species in the area. The reasons for suggesting such a group apply
not only to the institutional aspects but also to objectives and methodology.
Aside from economic considerations, the proximate objective of maximum sustainable
yield on each species will not work when applied to a variety of species caught
in a mixed fishery. Instead it may be necessary to specify a "minimum spawning
stock" for each species, which is sufficiently large to ensure steady recruitment.
Above this stock level the decision about what mix of species shall be taken can
be guided, but not decided, by consideration of the interaction between different
forms of fishing. For example estimates have been made of the effect of the
Nephrops fishery on recruitment of whiting (Watson and Parsons, 1974).

Initially the assessments can follow guidelines of the kind laid down by
the *ad hoc* Meeting on the Provision of Advice on the Biological Basis for Fisheries
Management (Anon, 1977). These are summarised in Figure 1. This approach does
not take account of the reservations about constant parameter models (Jones,
op. cit.) or of the general criticisms of Pope (1976).

An attempt has been made (Brander 1977) to summarise a number of single
species assessments for the Irish Sea and Bristol Channel using the scheme in
Figure 1 and to compare the conclusions with those from a multispecies assess-
ment. The results of the single species assessments are shown in Table 1 under
the same numbered headings as in Figure 1 and the broad conclusion is that
reductions in fishing mortality of up to 75% are required in order to achieve
the conditional maximum yield per recruit for most species. A crude production
model of the total demersal yield over the past twenty years (Brander, *op. cit.*)
does not support this conclusion, but suggests that fishing mortality was
close to that needed for MSY in 1970 and, from the evidence of past trends,
may now be only 20% too high. Part, but not all of the difference between the
two models may be ascribed to the effect of increases in recruitment, which
have taken place for reasons not yet understood.

The difference between the results of the single species assessments and
the multispecies production model clearly has a great effect on the management
advice offered for the area. The multispecies approach used is a crude one,
but it may allow for some of the interactions between species and is perhaps
best regarded at present as a check on the overall, long-term conclusions
from the single species models. An area based working group could consider

the problems raised by this kind of multispecies approach and could begin to assemble the data required for critical examination of the processes of production and recruitment. The present structure of ICES Working Groups makes it difficult to take a wide overview of this kind and may therefore be inadequate to provide advice on the particular problems of managing Irish Sea and Bristol Channel fisheries.

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Table 1   Summary of single species assessments for the Irish Sea and Bristol Channel

Species	Action required on				
	1	2	3	4 Conditional MYR	
	Spawning stock size	Exploitation pattern	Catch rate	Reduction in F	Increase in Y/R
Cod	No	Yes	No	60%	20%
Whiting	No	Yes	No	60%	4%
Sole	No	Yes	Yes	None	
Plaice	Possibly in Bristol Channel	Yes	No	50%	3%
Skates and rays	Yes	Yes	No	?	
Herring	Possibly on Mourne stock	Yes	No	Slight	?
Nephrops	No	Yes	?	75%	50%

START

1. Will the stock be reduced to a level at which recruitment declines or becomes highly uncertain ? — YES → Allow stock to recover. Drastic measures may be needed immediately

NO

2. Can the pattern of exploitation and age of first capture be brought closer to that needed for max. yield per recruit or MSY? — YES → Consider change in mesh and minimum landing size; closed, areas, closed seasons

NO

3. Will the stock be large enough to produce an acceptable catch rate ? — NO → Take steps to reduce fishing mortality unless a large year-class is about to recruit

YES

4. Will the fishing mortality be at or close to that needed for conditional MYR or other current objective ? — NO → Adjust fishing mortality by TAC or effort regulation or both

YES →

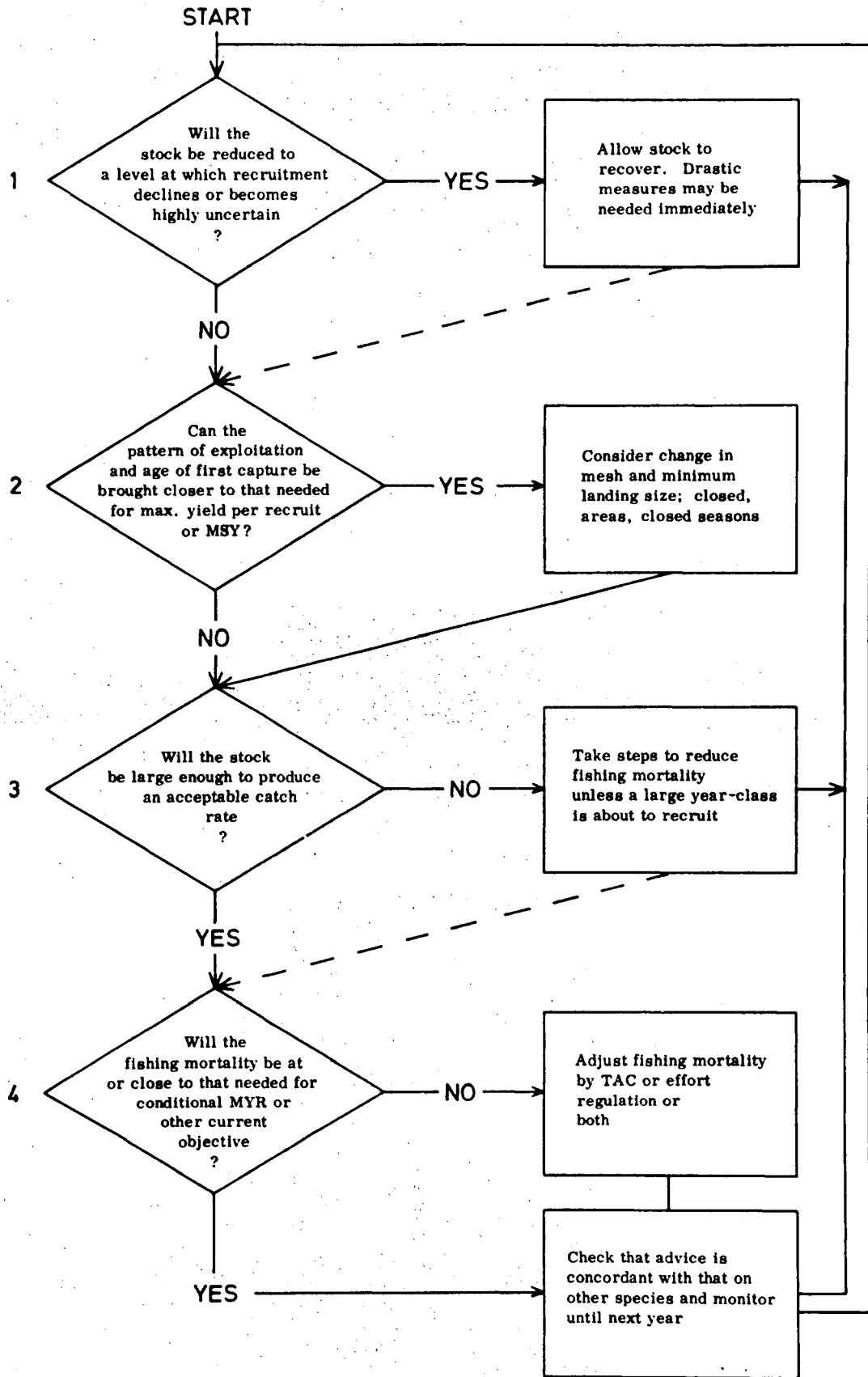Check that advice is concordant with that on other species and monitor until next year

FIGURE 1 Flow chart for single species assessments