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INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES
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Report of ICES Liaison Committee to NEAFC, 1965[1)2)]

A. ARCTIC FISHERIES (see Annex I)

A.1 At its 1964 meeting at The Hague the Commission, through the Liaison Committee, asked that ICES should renew the activity of the Arctic Fisheries Working Group for a further study of these stocks, considering all the foreseeable factors affecting the yield of these resources. The activity of the Group was formally renewed at the October meeting of ICES at Copenhagen, and had its first full working meeting at Hamburg from 18-23 January 1965. The report of this meeting is appended, Annex I.

A.2 In this report the Group emphasised that it is, to more than the usual extent, an interim report on a continuing programme of research. In particular, the time available at the Hamburg meeting did not allow for a full consideration of certain theoretical problems involved, and methods used, though it is expected that these will be discussed in detail at the next meeting of the Group, or at ICES in October 1965. Moreover, some essential data are still lacking. However, the Group did reach certain definite conclusions regarding the state of the stocks of cod and haddock and the effects of fishing on them, and made some general assessments of the effects of changes in the selectivity of the gear at present used, and in the total amount of fishing on the stock. These conclusions may be summarised as follows.

COD

Total catch (Annex I, Fig. 2)

A.3 Before the war this was increasing, reaching a peak of just under 900,000 tons in 1937. Since the war the total catch has remained remarkably constant except for two outstanding years (1955, 1,150,000 tons, and 1956, 1,340,000 tons); otherwise the catch has fluctuated between 640,000 and 900,000 tons, with no obvious trend. However, the proportion of the total catch taken in Region IIA (mainly the spawning fisheries at Lofoten) has declined from over 60% in 1930 to about 15% in 1962 despite continued high effort in that region (Annex I, Fig. 2).

Total effort (Annex I, Fig.3)

A.4 The total effort, as estimated from what was considered to be the most reliable measure of catch per unit effort, has increased more or less continuously since the war; the present effort is more than five times that in 1946. This increase in effort is in marked contrast to the lack of increase in total catch.

Catch per unit effort (Annex I, Fig.4)

A.5 Data from various national statistics were used, and though these gave some differences in detail, all the data agreed in showing a very considerable decrease in catch per unit effort since 1946. This decrease is most marked on the Norwegian Coast (Region IIa), where the catch per unit effort in the 1960s is about an eight of that in 1946, and least in the Barents Sea (Region I) where the estimate in the 1960s is a half to a quarter (depending on the data used) of that in 1946.

Sizes of fish (Annex I, Figs.5, 6 and 7)

A.6 During the whole period since 1930 there has been, except for a recovery during the war, a steady decline in the average size of fish

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1) Sections B5 -B48 have been omitted. They deal with the detailed examination of the Atlanto-Scandian and the North Sea herring stocks

2) Annexes I, II and III referred to in this report have been omitted. They are available for reference in the files of the ICNAF Secretariat

in the landings, particularly from the trawl fisheries in the feeding areas (Regions I and IIb). This has been due both to a very great decline in the abundance of the oldest fish, and also to a greater proportion of the small fish being kept on board and landed, rather than being discarded at sea.

The Group summarised the major changes since 1946 as follows:

1. Little change in total catch.
2. A great increase in the total effort.
3. A reduction in the proportion of fish taken in Region IIa.
4. A fall in the catch per unit effort in all regions.
5. A very big decrease in the catch of old and large fish.
6. An increase in the landings of small fish.

Conclusions

A.7 Although the variations in year-class strength and other factors independent of fishing do cause noticeable year-to-year fluctuations in catch (such as the high catches in 1955-56), the group found no suggestion that the failure of the catches since 1956 to increase above the 1946-54 average, despite the great increase in effort, was due to a lower average strength of year-classes. The dominant factor controlling the abundance of the stocks is the amount of fishing; fishing probably now accounts for two-thirds of the deaths among the immature fish, and rather more among mature fish.

Effort of mesh changes

A.8 Because of certain deficiencies and uncertainties in the data available to them the Group could not make quantitative assessments of the effects of any change in mesh size. The major uncertainties concern:

(a) the proportion of small fish that are caught and rejected at sea;
(b) the size composition of the catches of certain countries;
(c) the real selectivity of the gear in use, due to the effect of the chafing-gear (see also section D, paras. D1, 2 and 9).

Despite these uncertainties, which mainly concern the magnitude of any effect, it is clear that long-term gains will result from any moderate increase in mesh size. This is in agreement with findings by previous assessments on the Arctic cod, as reported to meetings of the Permanent Commission, though these earlier assessments only considered mesh sizes up to 150 mm, whose 50% release point is about 55 cm. The present Group considered the effect of releasing even larger fish, and considered that there would certainly be a benefit, probably increasing the total catch by more than 25% (some 200,000 tons under present conditions), from releasing fish up to 60 cm long, or even larger. This length is equivalent to the 50% selection point of a manila cod-end, without chafers, of 160 mm mesh.

A.9 No estimate could be made of how the benefit would be distributed among the different fleets fishing the Arctic cod stocks, as very much depends on possible redistribution of the fleets after the mesh change occurs. Clearly, though, the benefit to the line fisheries would be greater than that to the trawl fisheries, just as the most severe losses so far have been experienced by the line fisheries.

A.10 Quantitative estimates of immediate loss could not be made because of the absence of complete data on the sizes of fish now being caught, and of the effective mesh size. A first increase in mesh size from 120 mm to 130 mm would, as estimated in previous report, probably cause initial losses of 5-10%. These losses to the trawl fisheries would gradually disappear over a period of about two to three years, and further increase by steps of 10 mm would then cause similar short-term losses. The benefit to the fisheries as a whole would be complete about 5 to seven years after any increase in mesh size, but earlier in the trawl fisheries of Regions I and II

Changes in fishing effort (Annex I, Fig. 8)

A.11 The Group concluded from both the examination of the history of the fishery, and from theoretical considerations, that the stock of cod is now so heavily fished that (assuming the present mesh size) further increases in effort will, in the long term, result in a decrease in the average total catch. Again, assuming the present mesh size and growth rate of fish, and with the present pattern of fishing, the catch will increase with any decrease in effort until a maximum is reached about 10% above the catch that would be taken with the present effort, at only a little more than half the present effort. The catch per unit effort will also increase if the effort decreases, and at the level of maximum catch the catch per unit effort will be about double the present.

A.12 Though detailed assessments were not made of the effect of changes in both mesh size and fishing effort, the benefit in terms of increases in both catch and especially catch per unit effort from a substantial increase in mesh size and a moderate reduction in fishing effort would be greater than from either alone.

HADDOCK (Annex I, Fig. 9)

A.13 The Group did not consider the haddock fishery in as great detail as that for cod. However, they concluded that there would certainly be a long-term gain in total catch by releasing fish up to at least 55 cm long; this length corresponds to the 50% length of a manila cod-end, without chafers, of 160 mm. Any increase in fishing effort would not give much increase in catch and, in fact, an increased yield is more likely to be obtained by decreasing the effort by as much as a half; such a decrease in effort would roughly double the catch per unit effort.

OTHER SPECIES

A.14 Though the Working Group had insufficient time and data to consider the other species (mainly coalfish - see Section D, para D.14 - redfish and plaice), it should be pointed out that cod and haddock together account for rather more than 75% of the total demersal landings from the Arctic regions. Thus any measure, such as increasing the mesh size or reducing the amount of fishing, which will benefit both cod and haddock, is likely also to benefit the demersal catches taken as a whole, although the larger mesh suggested would cause, at least in the short term, substantial losses in redfish catches.

SUMMARY

A.15 In brief the report of the Arctic Fisheries Working Group shows that the cod and haddock stocks are very heavily fished. Consequently the fisheries would benefit by increasing the minimum mesh sizes in use, at least up to 160 mm (manila, without chafers) at the present level of fishing. Any benefit so obtained, however, would be lost rapidly if the intensity of fishing is further increased.

A.16 The stocks and fisheries would also benefit by decreasing the intensity of fishing. It is doubtful whether in practise sufficient control of fishing effort could be obtained by closed areas or closed seasons; ultimately control can only be effected by catch quotas or direct limitation of effort. Any of these courses, however, involves economic considerations which the Committee has not been able to consider properly (see para E.4).

B. HERRING (see Annex II)

B. 1 Following the recommendation at the 1964 Commission Meeting the Liaison Committee appointed a Working Group to study the present state and the exploitation of herring stocks in the North Eastern Atlantic. The report of this Group is given at Annex II. It may be considered in three parts - 1, some general considerations, 2, the Atlanto-Scandian herring and 3, the North Sea herring.

1. GENERAL CONSIDERATIONS

B. 2 In the adult herring fisheries the range of sizes of fish is so small that there would be no gain in catch by attempting to protect the smaller adult fish, e.g. by mesh regulation. Such regulations would also often be impracticable, e.g. due to the meshing problem.

B. 3 In heavily fished adult herring stocks an increase in effort will result in little or no increase in total catch. However (in contrast to most demersal stocks) there is unlikely to be a decrease in total catch at extremely high levels of effort unless a reduction in adult stock reduces recruitment to the fisheries (see paras B.32, 36). Thus regulatory measures to restrict the total effort will generally not increase the total catch; they will, however, tend to increase the catch per unit effort (Annex II, fig. 1).

B. 4 Fisheries on immature herring are usually distinct from those on adults. Their effect is to reduce the recruitment to, and hence catch from, the adult fisheries. Whether or not this loss to the catch of adults is greater than the catch of immature fish depends on several factors, such as natural mortality, growth rate and the intensity of fishing on the adult stock.

(Sections B5 to B48 have been omitted. They deal with the detailed examination of the Atlanto-Scandian and North Sea stocks. The general conclusion is that in several of these stocks fishing intensity is so high that a further increase in fishing will give little or no increase in catch. There is also the possibility that for one stock of herring in the North Sea the reduction in adult stock due to fishing has resulted in a decline in recruitment. If this possibility is true then a reduction in fishing intensity on this stock could give an increase in catch).

C. ACTION BY OTHER COMMISSIONS

C. 1 At their 1964 meeting the International Commission for the North-west Atlantic Fisheries asked for a review from their scientists of possible conservation actions. By courtesy of ICNAF the Liaison Committee have seen this review (ICNAF document serial No. 1450). Though this review is directly concerned with conditions in the north-western Atlantic, it is also relevant to conditions on the east side. It concludes, as did the Arctic Working Group (para. A15), that mesh regulation (or any similar control of the capture of small fish) can by itself only go some of the way towards a proper conservation policy under which the fisheries could make the best use of the resources. Such a policy demands some form of control of the total amount of fishing. Several methods of control of fishing effort are possible, but the one that seemed to involve least problems in an international fishery is the allocation of quotas of total catch to each country.

C. 2 If ICNAF takes actions as a result of this review, and limits the amount of fishing in the north-west Atlantic, then some of the surplus effort will tend to be diverted to the north-east Altantic; as the Arctic Fisheries Working Group's report points out, the effort in at least some parts of the area is already much too high, and the risk of such diversion will intensify the need for corresponding limitation of effort in the eastern Atlantic. The disturbance to the fishery of any reduction, or stabilization of effort will be less if action is taken before such diversion is likely to occur. This emphasizes the need to take action towards reducing effort before the situation worsens still further.

D. REPORT OF CO-OPTED MEMBERS (see Annex III)

SELECTIVITY OF NETS IN USE

D.1 The Committee regrets to have to inform the Commission that at least in some areas the nets at present in use are, on the average, not releasing as large fish as would be expected from the size of mesh required by the regulations in force in those areas. Thus the objectives of the Commission in making these regulations are not being achieved. The scientific advice to the Commission is also affected; clearly assessments about the effect of changes in mesh size will be wrong if the assumption about the present effective mesh size is wrong.

D.2 There are various reasons for this failure; in the northern areas the replies to the Commission's inquiry (doc. No. NC 3/25) show that the use of chafers is extremely widespread and that in many cases the chafer approximates to a double cod-end. In general there are also difficulties in mesh measuring and enforcement. Nets which have been presumably passed as of legal size have been found when measured with the standard scientific gauge to be considerably smaller than the Convention size. In one country the average mesh size of thirty nets of single polyamide was 63 mm (legal mesh size 70 mm), in another the average of twenty nets of double polyamide measured in 1961 was 65 mm, and of thirty-five nets measured in 1964, 67 mm (legal mesh size 75 mm). In another country direct comparison between enforcement (wedge) and ICES gauges gave in some cases good agreement, but in other experiments the wedge gauge gave readings up to 7 mm greater, especially for the smaller mesh sizes (around 70 mm); thus meshes which on the scientific gauge would have been considered as undersized may appear as of legal size on the enforcement gauge. Nets on board vessels of a further country were measured with a wedge-type gauge and ranged from over 75 mm in one area to under 60 mm in another area; the Convention mesh in both areas is 75 mm.

D.3 Clearly there has been a general failure to achieve the minimum mesh required by the Convention (and this failure is almost certainly not confined to the countries concerned above), and there are also differences between countries. This emphasizes the need, mentioned in earlier reports to the Permanent Commission, for a standard mesh measuring device, free from operator bias, for checking what mesh is being used, though the Committee recognises the legal difficulties involved in the use of a pressure gauge as an enforcement instrument. The report of the co-opted members (Annex III) points out that the letter of the Convention - that no mesh should be less than the prescribed size - is considerably more rigorous than the objective - that the average mesh size is not less than the prescribed size; the standard used by the scientists in all their assessments and other work is of average mesh size. Because of the spread of mesh sizes in a net the smallest mesh is 5-10 mm less than the average, so that even using the present type of enforcement gauge, with its probable bias, it should be possible, with more or less rigorous applications of the letter of the law, to enforce the required average mesh (as measured with a standard gauge) (see also para. E.2).

SELECTIVITY DATA

D.4 Polypropylene: New data on the selectivity of polypropylene (ulstron) were consistent with statements in last year's report (NC 2/9) that the selectivity of polypropylene was probably greater than that of manila, and that the difference was probably less than 10%. The new data strengthen both these statements, particularly that the difference is less than 10%.

D.5 Polyamide: Data for the selection of haddock and whiting in the North Sea by a herring trawl using polyamide (perlon) cod-ends gave selection factors 5 to 10% greater than manila, in agreement with previous results.

D.6 Faroe haddock: A selection factor of 3.5 was found for haddock at Faroes using a polypropylene cod-end. This confirms the belief that the value of 2.8 from earlier experiments with manila, which is mush less than that found in other areas, was too low. There is no reason to alter the assessments previously made (using selection factors of 3.2 and 3.4).

D.7 Dab and plaice: Selection factors, for a trawl with a polyamide (perlon) cod-end, of 2.2 for dab and 2.1 for plaice in the North Sea are lower than previously reported. This difference may be due to the size of catch, and some revision of earlier figures may be possible by taking size of catch into account, but this revision is likely to be small.

D.8 Selection and meshing of herring: New experiments in the North Sea gave a selection factor of 4.0, within the range previously experienced. Meshing was again very common; it occurred to some extent among virtually all sizes of herring found in the catches. Among the sizes of fish for which meshing was most frequent rather more than 20% of the catch was meshed.

D.9 Top-side chafers: Further data on the effect of chafers were very variable, but showed that all types tested reduced the selectivity to some extent, and some by as much as 40%. Some of this variation is due to the general specification of the chafer, e.g. the present results confirm earlier information that the flap-type (i.e. chafers comprising several overlapping pieces of netting attached only at their forward ends) reduces selectivity much less than double cod-ends. The precise method of rigging, e.g. whether it is laced onto the cod-end only at the forward end, or also along the edges, may also be important, but it is difficult to observe or control the practice of commercial fishermen in rigging chafers. Further information on this subject is urgently required (see para E.3).

MATERIALS IN USE

D.10 A summary of the types of material in common use by the vessels of each country is given in Table 1 of Annex III. This shows that natural materials are becoming relatively rare, and only in two countries are they the most common material for cod-ends. The type of synthetic used varies considerably though polyamides are the most common. There is thus an increasing range of synthetic fibres in use, which increases the difficulties in providing advice on mesh differentials.

NEPHROPS AND WHITING IN THE IRISH SEA

D.11 One set of experiments suggested that, compared with present catches of Nephrops (using meshes of 40-50 mm), there would be little or no immediate loss in using meshes of 50-55 mm, but immediate losses would become considerable for meshes of 60 mm or upwards. No estimate of the long-term effect has been made.

D.12 In the last year's report it was shown that in the County Down whiting fishery, which covers approximately the same area as the Nephrops fishery, the use of a 70 mm mesh would cause an immediate loss of about 30%. The long-term effect, with a 25 cm minimum landing size of whiting, would be between a 10% gain and a 10% loss. No other protected species would benefit from the use of 70 mm meshes.

DOGFISH

D.13 The Committee cannot at present add substantially to the report given in last year's report (NC 2/9). This report showed that because of its biology the dogfish is more likely to suffer from the effects of too heavy fishing than other species. The stock of picked dogfish in the region of the north of Scotland and west of Norway is now heavily fished, and possibly quite severe conservation measures are likely to be necessary if the dogfish fisheries are to

be preserved. Like other predatory fish, the dogfish may cause loss in catch to any fisheries on the species of fish on which it feeds, and it is theoretically possible that this loss could be greater than the value of the dogfish fisheries. It is hoped that information on this and other aspects of the dogfish, as well as a joint report by Norwegian and English scientists on the state of the dogfish stocks, will be presented at the next ICES meeting.

COALFISH

D.14 The coalfish Working Group presented its report. The yield of the coalfish fisheries is very much affected by changes in availability and recruitment. Only in the Icelandic area could the effect of fishing be directly demonstrated, but because of the other sources of variation this is not the same as being able to state that there is no effect of fishing in the other areas.

ARTICLE 6 FISHERIES

D.15 Though national reports on Article 6 fishing are not complete, the available information suggests that the main developments in 1964 were a further increase in herring fishing in the north-eastern North Sea, and a decrease in the industrial fishery for sand-eels and Norway pout. This decrease was particularly marked in the Danish North Sea landings of Norway pout, which were 122,000 tons in 1962, and only 10,000 tons in 1964.

D.16 Information on the by-catches of Annex II species showed little change except for an increase in haddock due to the strong 1962 year-class. Dutch data confirmed the presence of very high numbers of small flatfish in shrimp trawl catches, but suggested that the introduction of a new type of trawl would substantially reduce these by-catches.

D.17 Except in the Nephrops fishery the by-catches of Annex II species rarely exceeded 10%, and then by only a small amount.

DANISH ANNEX IV WHITING FISHERY

D.18 While the catches of this fishery increased somewhat, the percentage of Annex II species other than whiting did not exceed 4%.

STATISTICAL NEWSLETTERS

D.19 In Annex III the co-opted members draw the attention of all interested administrators and scientists to the work that ICES is doing to improve the availability of the statistical and other material on which much of the scientific advice to the Commission is based.

E. RECOMMENDATIONS

The Committee wish to make the following recommendations arising from its work, and that of the Working Groups.

E. 1 Arctic fisheries. Countries fishing for cod and other species in the North-east Arctic should be asked to provide more data on

a) the rate of discards made by the trawlers, together with fish used for meal;
b) length measurements of the landings of commercial trawlers;
c) the effective selectivity of the gear in use, with or without chafers.

E. 2 Mesh sizes in use. All countries should be asked to provide regular information on the actual mesh sizes in use, as measured with the standard scientific gauge (ICES guage).

E. 3 Chafers. While the evidence already available is sufficient to show that chafers are widely used, and greatly reduce selectivity, and hence that action is urgently needed to achieve the required 120 mm minimum mesh in northern waters, the Committee still require more detailed information on both the use of chafers, and the precise effect of chafers on selectivity to enable it to make its assessments more precise.

E. 4 Effort regulation. In the present report the possibility or advisability of regulating fishing effort is mentioned several times. Such regulation raises problems of economics and enforcement, as well as purely scientific problems, and these problems interact. The Committee would therefore welcome any opportunity for experts in these various fields to meet and discuss these different aspects of effort regulation.

E. 5 Regular reviews of Article 6 and other fisheries. As in earlier years the present report contains a review of the Article 6 fisheries during the previous vear, but the Committee questions whether the Commission requires such an up-to-date review annually. It suggests that it might be adequate to make such a review at intervals of, say, three years. It further suggests that such a review might usefully be expanded to cover, at least briefly, all the major fisheries in the Commission's area. This would be most easy in practice if the fisheries of one Region were reviewed each year, perhaps beginning with Region II.