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REPORT OF THE SECOND MEETING OF EXPERTS ON EFFORT LIMITATION,

Copenhagen, Denmark, 30-31 May, 5 June 1973

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1. The Report of the First Meeting of Experts on Effort Limitation in Woods Hole, Massachusetts in March (Summ.Doc. 73/5) was reviewed briefly. That meeting considered primarily the 10 questions posed by STACREM during the January 1973 Commission Meeting and also dealt with 4 questions posed by Captain Cardoso. The March meeting in Woods Hole resulted in the formulation of 9 recommendations including one that recommended the convening of another meeting at the Annual Meeting of the Commission.

2. The Group next considered the additional studies relevant to the problems which had been submitted as documentation to this Annual Meeting. In considering these contributions, it was felt that they could be related primarily to Recommendations 1, 3, 7 and 8 in Summ.Doc. 73/5.

3. Recommendation 1 dealt with three possible options for fisheries management. These were related to their advantages and disadvantages in managing a mixed fishery. These three options were:

   a) the current ICNAF regime of individual species quotas,

   b) total quota for all species,

   c) limitation of total effort,

   the latter two including optimization by setting individual species quotas within them. Documents pertinent to this recommendation were Summ.Doc. 73/1, Appendix 1, Res.Docs. 73/1, 6, 8, 9, 10, 15, and a contribution from NEAFC

ad hoc Study Group on Celtic Sea Herring Stocks. Summ.Doc. 73/1, Appendix I, and Res.Docs. 73/6, 8, 9, and 10 dealt primarily with aspects of assessments of the productivity of the total finfish biomass. These had been reviewed in detail by the Commission and were briefly referred to during the current meeting.

4. The general conclusions derived from these contributions were that

a) the finfish biomass in the Subarea 5 and Statistical Area 6 was being fished in 1971 at a point beyond the fishing mortality corresponding to its maximum sustained yield;

b) the difficulties of management in fisheries in this area were related to the mixture of species and the consequent by-catch problem;

c) the Assessments Subcommittee concluded that this problem could be alleviated by controlling the fishing mortality either by means of total catch quota or a total effort limitation and that the relative merits of the two approaches to regulation were difficult to decide on scientific grounds;

d) the total finfish catch quota must be less than the sum of the individual species quotas.

5. The choice between options 3(b) and 3(c) depended upon the resolution of a number of problems which had been referred to the present meeting. Information related to this aspect is contained in Res.Docs. 73/10 and 15, and in the contribution from the NEAFC ad hoc Study Group.

6. Res.Doc. 73/15 was reviewed. This document illustrates the possible general effects of removal of only the most inefficient vessels of a given category. It reviews the rate of technological change during the period of development of ICNAF and the consequence of using an effort quota as opposed to a catch quota in terms of the probable reactions of

the fleet manager. It also presents an evaluation of the practicability of control as related to the choice of units of fishing activity, i.e., days on ground, days fished.

7. Subsequent discussions dealt with the reactions to an international effort control which may result in an increase of fishing efficiency with or without technological improvements. Some of these reactions may be of a psychological nature and difficult to predict. Discussions provided further examples of how the relation between fishing mortality and fishing effort might change in response to an effort control regulation. It was not possible to evaluate the rate of change and the time involved but it was felt that once these changes in efficiency had been made, the system would stabilize again, presenting then an opportunity to re-evaluate and adjust for them.

If, on the other hand, it will be accepted that an improvement in fishing efficiency is inev itable as an immediate reaction to the introduction of fishing effort regulation, it would be desirable to set the effort quota at a lower level than apparently required.

8. The choice of units of effort for management, i.e., choice of days fished opposed to days absence or days on grounds, could allow for minimization of changes in fishing patterns but the choice must also be related to maximizing the efficiency of administration and management. Some felt, however, that effort limitation of this type would impose inequalities on some participants in the fishery (Summ.Doc. 73/5, paragraph 3 of Item 14 on page 11).

An effort limitation would fix the upper level to which the effort would tend as opposed to a catch quota which in face of a possible decrease in

catch per unit effort might, if not promptly and adequately adjusted, generate more and more effort in an attempt to reach the quota.

9. With regard to Recommendation 3, Member Countries should consider the magnitude of the errors associated with factors involved in setting fishing effort regulations. Res.Docs. 73/18, 110, 114 and 118 were considered.

10. Res.Doc. 73/18 contained an analysis of various factors involving year, species, area, country, vessel, gear-tonnage classes and months. It showed that the vessel gear-tonnage class factor was the most critical accounting for the major portion of variability. The next most important factor was country, and the others were of lesser importance. The 1970-71 year-gear interaction was not significant suggesting no change in gear during this period. The ensuing discussion brought out the fact that this analysis may not be applicable to future changes and that the factors incorporated in the model failed to account for a substantial part of the variation.

11. Res.Doc. 73/110 considered relative error in fishing mortality by catch or effort quotas. The model employed was similar to that used in the March meeting. Data from several North Atlantic cod and Georges Bank herring fisheries were considered. Catchability coefficients were noted as changing with biomass although these tended to be asymptotic, and some time trends were observed but over long periods of time. The general conclusions from the analysis were that catch quotas are by their nature theoretically more subject to error than effort quotas, based on the best measures of effort available, e.g., days fished especially if recruitment is highly variable. It was suggested that catch quotas may give, in some cases, more accurate results than effort regulation using an easily observable but less precise unit of effort, e.g., days on grounds, especially in multi-species fisheries with a large variety of fishing methods.

12. Res.Doc. 73/118 dealt with the development of fishing effort measures based on the concept of the volume of water fished per unit time. The document defined the basic derivation of the method and illustrated its application to fisheries of the USSR of the Northwest Atlantic. The accuracy of the method was evaluated on the basis of a correlation between catch per hour fished and gross tonnage, vessel length, engine capacity, and fishing capacity (volume of water swept). These correlations ranged from 0.80-0.97. Discussion of the paper indicated that the definitions of certain terms differ from those commonly adopted in the consideration of fishing effort. This approach was considered of value if, in fact, the factors involved in the ev aluation of what is now usually designated as "fishing power" of vessels and their gear will be pant of what is in this method defined as "fishing efficiency". This would take care of catchability of the gear as well as behavioural and distributional characteristics of fish.

It was noted that ICES Working Group on Research and Engineering Aspects of Fishing Gear, Vessels and Equipment, IJmuiden, 3-5 May 1973, recognized this method as a fundamental approach to the solution of the problem of fishing effort evaluation and recommended to ICES member countries a study of the feasibility of its application to their fisheries.

13. Res.Doc. 73/99 outlined the magnitude of the by-catch problem in Subarea 5 and Statistical Area 6 and its effects on regulation by individual species catch quotas. The analysis indicated that, even when the catch of a species from different fisheries was accounted for, the fishing pattern of directed fisheries would have to be significantly altered but even then some species quotas would be exceeded and some not achieved. If the coastal directed

fisheries were to be maintained, some other directed fisheries would have to be substantially limited and the total catch would be considerably reduced.

14. General conclusions

The report of the March meeting and the contributions discussed at this meeting provide some measure of the probable effects of changes in the fishing pattern on the regulation of fishing mortality by direct effort limitation. It is obvious, however, from the research documents, the report of the March meeting, and discussions that there is not as yet adequate information to permit full evaluation of the proposed effort limitation scheme. The studies do indicate, however, that in Subarea 5 and Statistical Area 6, the setting of individual species catch quotas based on independent species assessments is not satisfactory in terms of the current ICNAF management regime in achieving the objectives of maximum sustainable yield in this mixed species fishery.

The Group was of the opinion that a major problem is the solution of the by-catch problem but that, unfortunately, not enough work has yet been applied to its solution. It recognized that the definition of by-catch and the deficiencies in the collection of statistics in mixed fisheries are components of this problem.

It was agreed that firstly it should be determined in which fisheries and for which countries this problem is important and that then an evaluation should be made of its true magnitude in Subarea 5 and Statistical Area 6, utilizing all sources of information available from the Member Countries concerned, including season and area distribution of species and catches, and the type, mode, operation and selectivity of the fishing gears used. The Group noted that, on the basis of the statistical data currently published by ICNAF, the herring and mackerel fisheries do not seem to contribute significantly to the by-catch problem, whereas this problem appears to be of major significance

in the silver hake fishery as shown in the attached table prepared from Table 4 of the 1971 ICNAF Statistical Bulletin.

The Group

recommends

that a Working Group be established to undertake a detailed study of all available data on the by-catch problem in Subarea 5 and Statistical Area 6, and to prepare plans which might form the basis of an international experiment to study mesh selectivity and the use of specialized fishing gear in relation to the by-catch problem.

It was also suggested that all exemption rules in force should be reviewed so that their contribution to the by-catch problem can be evaluated.

Breakdown of catches by species and types of fishery in Subarea 5 and Statistical Area 6 in 1971 (ICNAF Statistical Bulletin Vol. 21 for 1971, Table 4) for the purpose of studying the problem of by-catch associated with the silver hake fishery.

Div.	Fishery	Days Fished	Cod	Had	Red	S.H.	Flo	OG	Her	OP	OF	SF	Total
5Y	Groundfish	3,470	3,020	332	3,673	3,257	1,964	3,073	270	18	31	3,313	18,964
	Silver H	13				82	1	12				9	104
	Pelagic (USA)	1,749	604	118	610	4,969	626	1,194	12,497	93	20	377	21,109
	NK (USA)		22	3	5	7	55	1			3,130	711	3,934
5Ze	Groundfish	3,220	2,070	1,230	1,900	3,017	5,457	1,811	1,334	12	11	556	17,398
	All sp	2,274	657	283	65	42,771	1,810	5,617	5,276	12,226	9,562	2,966	81,266
	Pelagic	9,122	442	12	3,105	11,202	859	3,585	50,908	29,892	8,510	1,262	109,777
5Zw	Groundfish	2,476	577	4		1,909	5,026	6,538	767	516	686	441	16,464
	All sp	2,173	25	53		10,681	1,834	14,112	2,930	5,068	14,189	483	49,375
	Pelagic	899	2			566	667	313	1,163	8,605	1,756		13,072
		284	1		6	89	34	248	1,987	3,009	659	9	6,042
5NK	All sp	1,572	152	29	180	18,126	4,432	11,089	4,823	11,277	3,691	1,781	55,580
6A	Groundfish	733	102	1		542	2,990	1,915	61	133	122	67	5,933
	All sp	916				2,379	312	7,875	17	90	1,021	191	11,885
	Pelagic	4,551	8		3	2,924	873	2,376	10,078	46,199	4,635	114	67,120
6BC	Groundfish	-	-	-	-	-	-	-	-	-	-	-	-
	All sp	-	-	-	-	-	-	-	-	-	-	-	-
	Pelagic	1,407	-	-	-	2,445	33	958	3,594	22,892	3,312	116	33,350
6NK			258	7	-	2,447	7,964	3,524	1,160	233,552	26,386	429,345	704,643
ALL	Groundfish		5,769	1,567	5,573	8,725	15,437	13,337	2,432	679	850	4,377	58,759
	All sp		834	365	245	74,039	8,389	38,705	13,046	28,661	28,463	5,430	198,210
	Pelagic		1,057	130	3,724	22,195	3,092	8,674	80,227	110,690	18,892	1,878	250,470
	NK		280	10	5	2,453	8,019	3,525	1,160	233,552	29,516	430,056	708,577
	Total												