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COMMUNICATION FROM THE COMMISSION
IMPLEMENTATION OF TECHNICAL MEASURES
IN THE COMMON FISHERIES POLICY

1. INTRODUCTION

The purpose of this document is to provide a summary of the effectiveness of the current package of technical measures, an indication of associated problems and an indication of probable future action.

2. PURPOSE, SCOPE AND CONSEQUENCES OF TECHNICAL MEASURES¹

2.1. Protection of juveniles

By far the major reason for imposing technical measures is to create conditions such that the capture of juvenile fish is minimised. In this context, the major tools comprise the definition of various means to improve the selectivity of fishing gear and the definition of areas to be closed to fishing either permanently or seasonally to prevent capture of juvenile fish which inhabit these areas. In more scientific terminology, technical measures are intended to minimise the fishing mortality rate of juveniles. It must be remembered that fishing for juveniles contributes to reducing the potential biomass of the stock and the number of individuals reaching maturity and reproducing. All other factors being constant, fishing for juveniles reduces biomass, potential yield and may affect recruitment of a stock.

Conditions related to the selectivity of fishing gear are predominantly applied to gears intended for the capture of demersal fish species.

The regulations related to the selectivity of fishing gears are supplemented by regulations stipulating the minimum landing size of various species of fish.

Technical measures also exist for the protection of some species of fish, particularly herring, in areas in which they habitually concentrate in high densities to spawn and where fishing on such spawning aggregations would lead to extremely high mortality rates.

Yet other technical measures prohibit the implementation of undesirable fishing methods such as the use of explosives and, in some areas, harpoon guns and/or fishing with electrified fishing gear and the encirclement of marine mammals by various types of fishing gear.

In some cases, such as that of Arctic cod in the Barents Sea, the application of technical measures (minimum mesh size, discard ban) together with catch limitations and favourable environmental conditions have allowed a considerable recovery of the stock, as demonstrated by the increase of total stock biomass to the highest level since 1978.

¹ A detailed presentation of the types of technical measure will be found in Annex 5.

2.2. Other aspects of technical measures

As well as ensuring better use of fish stocks, the introduction of technical measures also impinges on discussion of interaction between fishing and the environment, especially the problem of discards.

Interaction between the fishing industry and the environment was recently studied by a working group on the Commission's initiative (SEC(94) 1453 final). Certain types of towed gear (bottom trawls, particularly beam trawls, and dredgers, particularly hydraulic dredgers) have a direct impact on the environment. Rules governing the use of this gear necessarily have ecological implications. But the attention of public opinion has so far been drawn more especially to two other issues:

- by-catch of protected species,
- discards.

In general, there is no doubt that the environmental lobby will play an ever-increasing role in discussions. The scope of concern about by-catch of protected species is steadily widening. Anxiety used to be felt only about the survival of a few species of mammals and seabirds; it has now spread in two directions:

- even when the species caught is not in danger of extinction, by-catches are criticized because of the suffering of the animals killed, or because of indirect ecological consequences on the food chain;
- new species are constantly being added to the list of those regarded as endangered.

The problem of discards is also attracting growing attention, in particular in terms of environmental concern as analysed in an earlier Commission communication; the matter is not as simple as it looks at first sight. There are many reasons for discards, whether they are due to economic considerations or to the regulations; the ecological consequences of discards are also varied, and while they are adverse for some species, they may well be favourable for others. As Annex 3 shows in detail, relations with technical measures are also very complex. But just because this is a complex question is no reason to abandon attempts to find a way forward, since progress is vital given the dimensions of the problem, as the recent FAO review demonstrates.²

Discussion of specific problems has highlighted the dearth of available scientific information and analysis. It is urgent to fill this gap, especially as certain types of fishing could be very seriously restricted if the shortage of relevant data led to an over-cautious approach. That is the reason for the high priority the Commission has given to collecting information and developing scientific expertise. As several earlier reports have stressed, however, progress will not be possible unless the Member States too develop the necessary initiatives.

² FAO Fisheries Technical paper No 339 "A global assessment of fisheries by-catch and discards"
Rome 1994

3. HISTORICAL BACKGROUND TO TECHNICAL CONSERVATION MEASURES

3.1. General history

The first Regulation introducing technical measures was Regulation (EEC) No 2527/80, adopted in September 1980. Regulation (EEC) No 171/83³ further developed conservation measures, on the basis of recommendations by the North-East Atlantic Fisheries Commission (NEAFC). Regulation 171/83, which covers fishing grounds from the Kattegat to the Bay of Biscay, has been amended six times.

In 1986, Regulation 171/83 was replaced by a new instrument, Regulation (EEC) No 3094/86.⁴ This Regulation extends the scope of the rules to the Atlantic fishing grounds opposite the Iberian Peninsula, following the accession of Spain and Portugal, and introduces substantial vital amendments, in particular the concept of defining certain fishing grounds. The golden opportunity offered by this change in the rules to clear away a large number of out-of-date provisions and to simplify the new rules was not taken. Various Commission proposals (such as increasing certain mesh sizes or applying the "one-net rule") were not adopted by the Council, although it was recognized that the one-net rule could ensure effective control of mesh sizes.

Regulation 3094/86 has changed considerably since it was first adopted in October 1986. It had been amended eighteen times by October 1995, and a nineteenth amendment, regarding passive gear, is under discussion at the Council. In fact, very few of the amendments concern matters of substance: most of them (twelve) relate to minor changes or changes of form; others were made in response to requests from Member States for more flexibility in certain conservation rules. Most of the amendments were adopted under item A; only two (the second and the eleventh) involve changes with a major impact on resource conservation. A consolidated version of the Regulation is being prepared, but it could not be completed earlier, since further amendments were adopted on several occasions during the course of the work.

³ OJ L 24, 27.1.1983, p.14.

⁴ OJ L 288, 11.10.1986

3.2. 11th amendment to Regulation (EEC) No 3094/86

The background to what was to become the 11th amendment began when the scientific community highlighted the deterioration of North Sea roundfish resources (November 1989 report by the ACFM and the ICES). The Commission drew the attention of the official departments responsible for fisheries in the Member States to these findings. When the Council met to discuss fisheries in December 1989, Council and Commission issued a statement⁵ expressing serious concern about the situation of certain stocks, in particular cod and haddock in the North Sea. The High-Level Working Party was instructed to intensify work on amending existing rules, mainly in terms of minimum mesh sizes, minimum size on landing and reduction in discards into the sea. In the light of the conclusions of the High-Level Working Party (Fisheries Directors-General), the Commission was to bring appropriate proposals before the Council by 31 July 1990 at the latest.

The conclusions of the High-Level Working Party were made public on 17 May 1990.⁶ On the basis of those conclusions, the Commission sent the Council a proposal in July 1990 amending the Regulation for the tenth time, concentrating on increased mesh sizes, net geometry and the application of the one-net rule. These proposals were thought very tough, and led to deadlock in the Council. The Commission also sent another proposal to the Council in 1990, that for an 11th amendment, on driftnets and an increase in mesh size in region 3 (from 65mm to 80mm). This proposal led to further deadlock in the Council, due to rejection of the Commission's proposals and to differences of opinion among the Member States. In 1991, the Commission presented its 12th proposal to the Council, essentially concerning updating and clarification of the large number of conservation standards, several of which had been in Regulation 3094/86 since its adoption, and had subsequently lapsed, without being removed. The presentation of this proposal set discussions in train once again. After a number of Council meetings failed to produce any results, a policy agreement was eventually reached in October 1991 on a package grouping the three proposals into a single instrument amending Regulation 3094/86 for the 11th time.⁷ (A minor proposal had meanwhile been adopted as the tenth amendment.)

A compromise was found for driftnets, by authorizing driftnets up to 5 km in length for two years (1992 and 1993) for certain netters (France). The technical measures in the body of the instrument had been considerably simplified, and the increase in mesh size was smaller than originally proposed. In northern waters (region 2, north of the 48th parallel in the North Sea), the standard mesh size was increased slightly (from 90 mm to 100 mm), while no immediate increase was decided for the southern part, the major argument against an increase being that existing rules should first be applied properly (standard mesh size of 65 mm) before increasing the size to 80 mm. The Commission's suggestion of accepting the one-net rule, which it took from the conclusions of the High-Level Working Party, was not adopted by the Council.

⁵ Council doc. 11089/89 PV/CONS 87 PECHE 386.

⁶ Council doc. 6574/90 PECHE 173, 30 May 1990

⁷ Regulation (EEC) No 345/92 of 27 January 1992

In return, the Commission obtained an undertaking from the Council that it would adopt further increases in mesh size in 1994 if resources did not improve in the meantime.⁸ From 1991 to 1994, stocks did not recover. In the North Sea, the increase in mesh size to 100 mm did not affect catches of juveniles as it was hoped. In region 3, compliance with legal mesh sizes was no better than before. Meanwhile the work schedule had been upset by the prospect of new accessions (1994), and then by the consequences of changes in the arrangements for Spain and Portugal. The adoption of these increases was therefore postponed.

The December 1994 Council meeting, which adopted the principle of management of fishing efforts in the western region absorbing the former arrangements for Spain and Portugal also asked the Commission to present proposals to improve the selectivity of fishing for the fishing grounds concerned. The results of the Commission's consultations of experts (SEC(95)1599) showed that the basic structure of the proposals rejected or postponed by the Council in 1990/91 should be maintained. It is therefore vital for the Commission to return in 1996 with a new overall proposal. The need arises because of the Council's conclusions not only in October 1991, but also in December 1994. But whatever the proposals are, the discussions will certainly be arduous.

3.3. Passive gear

Community rules on technical measures have concentrated on towed gear (trawls, Danish seines and the like), while the legislation on static gear was solely a matter for the Member States. The recent development of fishing with gillnets and trammel nets has led to a sense of injustice between fishermen using towed gear and those using static gear. In 1992, the Commission was specifically requested to draft a proposal. This request was considered especially suitable when the discussion of the Multi-annual Guidance Programmes in 1992 showed that it did not seem appropriate in the immediate future to reduce the tonnage and/or kW of the fleets using passive gear. The Commission sent the Council a communication on the general problem of passive fishing gear in relation to the CFP (COM(94) 235). It has also presented a proposal defining the rules on mesh sizes for set nets and trammels (COM(95) 212). The discussions, which have not been confrontational on the whole, are still going on in the Council. There is agreement on the need for new standards for static gear, but each Member State concerned would like to bring the new rules, which hinge on mesh sizes, as close as possible to its own existing rules. Like Regulation 3094/86, the new rules will not cover fishing in the Baltic or the Mediterranean, which is governed by specific rules.

3.4. The Baltic (Regulation (EEC) No 1866/86) and the Mediterranean (Regulation (EC) No 1626/94)

Technical measures in the Baltic Sea are covered by specific regulations. They are closely linked to decisions taken by the International Baltic Sea Fishery Commission. When the Commission made a stricter proposal for the length of driftnets than the technical rules of the IBSFC, the Member States concerned opposed it, arguing for the existing rules adopted by the IBSFC, which were the only ones that could be invoked against the other Member States. The technical measures applied in the Baltic Sea are on the whole less elaborate than those applied under Regulation 3094/86 from the Kattegat to the Atlantic. But there was a major

⁸ Council doc. 9217/91 PV/CONS91 PECHE 250

development at the 1994 meeting of the IBSFC: a set of decisions which led, at Community level, to the fifth amendment to the Regulation on technical measures in the Baltic Sea (Regulation (EC) No 2250/95) in 1995. This even went so far as to include a one-net rule. At technical level, the Regulation on measures in the Baltic Sea would be enhanced by improved precision, e.g. clarification of the arrangements for panels to help small cod to escape, or precise definitions of fishing directed at flatfish associated with smaller mesh sizes. Such improvements are sure to be encouraged by enlargement of the EU to Finland and Sweden. Swedish accession should also facilitate the development of specific technical measure in the Skagerrak/Kattegat, which is essentially bound in with the Baltic Sea question.

Discussion of technical measures has also extended to the Mediterranean Sea. A proposal was made in 1992, at the request of the Council. Here again, lengthy discussions led to a complicated final result, weakened by a whole series of derogations. Yet there is an explicit demand for further derogations to authorize catches of small juveniles. Although Regulation (EC) No 1626/94 is imperfect, and in need of amendment, it is a first step towards a policy of resource management and conservation in the Mediterranean. In a few years, it will be possible to assess its impact.

3.5. Derogations and simplifications

The rules in the arsenal of the CFP have often been accused of excessive complexity, and the strongest criticism has been aimed at the technical measures. The complexity is partly due to combination in a single instrument of provisions applying to a wide variety of regions (Regulation 3094/86 applies from the Kattegat to the Straits of Gibraltar), but this does not in practice affect the fishermen operating over a limited area. Nevertheless, the Commission has tried to reduce geographical disparities. Some progress was made with the 11th amendment, and more is foreseeable. In general, however, the major complication is the number of derogations to the general rules. Beyond the complexity of the texts themselves, the derogations make it much more difficult to monitor compliance, particularly as long as provisions like the one-net rule cannot be adopted. Derogations should therefore be limited to the necessary minimum. Discussions prior to the 11th amendment of Regulation 3094/86 showed that what might appear to be a policy requirement for one Member State when a technical measures package was adopted did not always correspond later on to actual use. This means that any substantive revision of the technical measures regulations must be used as an opportunity to eliminate out-of-date or unnecessary derogations. In preparation for these discussions, each Member State should be asked to specify which derogations it regards as essential, and to establish how these derogations are actually used and monitored.

4. APPARENT EFFECTS OF THE IMPLEMENTATION OF TECHNICAL MEASURES

4.1 Historical trends in fishing mortality rates on young fish.

As indicated in Section 2 of this report, the main intention of the implementation of technical measures is to reduce the fishing mortality rate on juvenile fish.

For many of the most important fish stocks exploited by Community vessels, scientists have evaluated the fishing mortality rate for each age group of fish landed or caught, depending on the availability of data on quantities of fish discarded. If technical measures had been

effective it would be expected that the fishing mortality rate on the younger age groups of fish would have declined compared to historical levels. However, the figures of Annex 2.a indicate that for the majority of the main fish stocks no such decline is evident.

Simultaneously, the TAC levels have failed to reduce exploitation rates. This has resulted in the key stocks either not recovering from decline, or declining even further, as illustrated by figures in Annex 2.b.

The basic picture, therefore, is that, despite increases in mesh size and application of closed areas and closed seasons the intended effects of technical measures do not appear to have been realised. At best, it may be believed that the situation would have been worse if the current technical measures had not been applied. Nevertheless, catches of young, small fish continue to be taken. These are usually discarded since they are predominantly of lengths less than the corresponding minimum landing sizes.

4.2 Why are technical measures less effective than anticipated?

Results of experiments in controlled conditions, either on research vessels or on commercial vessels, indicate that application of appropriately formulated technical measures relating to mesh size and/or structure of fishing gears should result in improved selectivity of fish and should, thereby, reduce the mortality rate of young fish.

4.2.1 Response of fishermen

However, the price to be paid following the application of such technical measures is a short-term reduction in catches and, probably, landings to levels less than these would otherwise be the case. It is the fishermen who must pay this price. Understandably, therefore, fishermen, who are subject to immediate considerations such as repayment of loans etc., react adversely to proposals for technical measures intended to improve selectivity.

Fishermen often persuade their national administrations that conditions proposed to improve selectivity are too extreme and that the potential loss in landings will be economically unsupportable. Negotiations on this topic often result in dilution of the original proposal. Requests are also made for derogation from proposals intended to improve selectivity on the grounds that, if the proposal is implemented without derogation, it will be impossible to conduct fisheries economically for a number of target species. Similar requests for derogations are also made with respect to closed areas and/or closed seasons. Derogations are often agreed even though it is recognised that by-catches will be made of species other than those for which the derogation is requested and for which the derogation is inappropriate.

It has also become increasingly clear in recent years that specification only of minimum mesh size for towed gear is insufficient to guarantee appropriate selectivity. Adjustment of other attributes of such gear can and are made such that for any defined minimum mesh size, selectivity is poorer than that expected on the basis of results of controlled experimentation. Such adjustments are often not in contravention of existing regulations. They include, for example, the use of:

- cod-ends of legal minimum mesh size but made of very thick and inflexible netting materials, often incorporating double-twine netting,

- increasing the number of meshes around the diameter of the cod-end,
- increasing the length of various parts of the net immediately anterior to the cod-end,
- the use of hexagonal-mesh netting in the cod-end such that the meshes are almost closed under conventional fishing conditions

It is also clear that illegal activities also take place. These include :

- use of an extra cod end surrounding the conventional cod-end so arranged that the outer cod end can be detached if inspection appears imminent.
- deliberate insertion into the cod-end of heavy items such as tyres or mattresses to increase the hydrodynamic drag and thereby close the cod-end meshes.

More detailed reference is made to such illegal activities in the Commission Staff Working paper on control on conservation policy.

4.2.2 Absence of a "one-net" rule

The difficulties of enforcement of current regulations intended to ensure appropriate selectivity in the absence of a "one-net" rule or some effective alternative effective have been debated extensively.

The Community's technical measures regulation contains numerous references to mesh sizes which may be used in derogation to the general "reference" mesh size for defined geographical areas. Each derogation mesh size is accompanied by conditions defining the minimum percentage of the catch which must be comprised of the "target" species for which use of the mesh size is allowed and a maximum percentage of "protected" species. On inspection, the legality or otherwise of a catch is assessed in relation to the mesh size used to take the catch and the associated percentage composition of the catch.

At present, the presence on board Community fishing vessels of nets of different minimum mesh size is permitted. This allows the possibility that fish may be deliberately or otherwise caught with a mesh size smaller than that which should be used according to the regulations. On inspection, the claim is made that any quantities of fish on board which are in contravention of the rules for a permitted derogatory mesh size were caught with a net of appropriate mesh size, one or more of which is carried by the vessel. In principle, all mesh size and associated by-catch regulations can be avoided simply by always carrying on board a net of the general reference mesh size for the geographical area in which the vessel is fishing.

Widespread use of such tactics will lead to the capture and hence death of perhaps large quantities of small fish which would not otherwise have been caught and killed. In technical terminology, such procedures are contrary to the establishment of a more satisfactory exploitation pattern than that evident at present.

The Commission is of the opinion that prohibition of the carriage on board of nets of more than one minimum mesh size is an obvious means of implementing effective control leading to enhanced conservation benefits.

However, it has been pointed out to the Commission that it is difficult to anticipate the reaction of fishermen to the "one-net rule". It may be the case that discarding would increase. If, for example a fisherman uses a derogatory mesh size but few of the target species were available he may continue to fish with the derogatory mesh rather than return to port to change gear. To remain within existing legislation, fish would be discarded (or, perhaps, transshipped) to ensure that the percentage composition of the catch on board is legally acceptable if inspected.

Another possibility is that imposition of the one-net rule might further encourage legal or illegal steps to be taken to reduce the selectivity of gears as indicated in Section 4.2.1 of this report.

A further possibility is that fishing effort might be redirected with respect to species so that some resources (probably the more valuable ones) may become subject to increased exploitation rates. Augmentation of fishing effort may also occur in an attempt to recover perceived loss of fishing opportunities.

Furthermore, the Commission has also been made aware of a number of perceived technical and socio-economic problems.

These can be classified into two major categories:

(i) *Interzonal problems*

A considerable number of boundary lines are defined in Community regulations separating geographical areas or boxes in which mesh-size regulations change from those in adjacent areas. Fishermen wish to be able to change gear "instantaneously" to allow them to fish legally as they cross boundaries. To allow "instantaneous" changes from one mesh size to another, gear of more than one mesh size must be simultaneously carried on board. Under the one-net rule, return to port, with consequent loss of potential fishing time, is seen as the only practical way of changing gear.

(ii) *Intrazonal problems*

Even if fishermen do not require or intend to cross boundaries during a fishing trip, it is claimed that they require multiple minimum mesh sizes on board to allow opportunistic exploitation of some species which might become available to them in the course of a trip. (For example, mackerel/herring becoming available (32mm net) during a trip primarily intended to catch demersal species (100 or 80 or 65mm net depending on geographical area).

5. TECHNICAL MEASURES APPLIED OUTSIDE COMMUNITY WATERS

5.1 North Atlantic

Technical measures applied outside Community waters in the North Atlantic are, for the most part, very similar in nature to those applied within Community waters and consist of the usual

package of minimum mesh sizes, closed areas and/or seasons, minimum landing sizes, etc. Given the generally poor or very poor state of the stocks, especially the demersal stocks, throughout this area it appears that the contribution of technical measures to the conservation of the stocks has not been that expected from theoretical considerations.

Norway and Iceland apply some technical measures of a different nature to those defined in the Community regulations. North of 62° 00' N, Norwegian vessels fishing for shrimps are obliged to instal a sorting grid into their trawls. The grid is a rigid structure made of metal or, more recently, plastic which provides an escape route for small individuals of various species which would otherwise be retained as by-catch. A similar measure has also been introduced in the NAFO shrimp fishery, in order to avoid the by-catch of juvenile redfish. This measure seems to have already produced positive effects on the redfish stock.

Norway and Iceland also operate a system of real-time closure of fishing in areas and at times when catches of small fish are high. The closures are initiated either on the advice of inspection services or, on some occasions, on the advice of the fishermen themselves.

The table in Annex 6 compares mesh sizes for bottom trawls and other technical measures in different areas of the North Atlantic and the Mediterranean.

5.2 International fora

It should also be recalled that major orientations regarding technical measures are discussed within a number of international fora. The fourth International Conference for the Protection of the North Sea produced a ministerial declaration in which, with regard to fisheries, emphasises the requirement to establish exploitation rates within safe biological limits, to promote the rebuilding of depleted stocks and to minimise by-catches and discarding.

The United Nations Conference on straddling stocks and highly migratory fish stocks, which conclude in August 1995, indicates specific provisions for the reinforcement of conservation and management measures and the improvement of the selectivity of fishing methods.

The Code of Conduct for responsible fishing currently being developed within the framework of an FAO sponsored conference also indicates similar provisions. The meeting on the conservation of cetaceans in the Mediterranean and Black Sea held in Monaco in September 1995 adopted a resolution for more stringent technical measures to minimise by-catches of cetaceans.

These fora do not go as far as specifying in detail the required technical measures for each stock and/or area and the stocks and/or areas dealt with are sometimes different to those to which this document is strictly relevant. Nevertheless, the requirement for the application of effective technical measures to improve selectivity is clearly indicated.

6. RECENT PROPOSALS ON TECHNICAL MEASURES

6.1 Technical measures as a substitute for effort regulation.

6.1.1 Proposals from Member States to the Commission

In recent years Member States have suggested to the Commission that technical measures may be implemented as a substitute for regulation of fishing effort.

In 1991 and 1992 the respective TAC and quota regulations contained conditions whereby vessels targeting cod and haddock in the North Sea, the Skagerrak and Kattegat and to the west of Scotland were subject to limitations on days at sea. However, partial or total exemption was provided to vessels of some Member States if they used towed gear with mesh sizes greater than the reference mesh size then in force. The basis for the exemption was that use of larger mesh size would provide conditions such that the spawning stock biomass at the end of the year would be the same as that expected by the application of effort restrictions.

In practice, the intended effects of the exemption conditions were evaded by at least some fishermen who used gear in compliance with the exemption conditions but whose technical characteristics were such that their selectivity was no better and was probably worse than the gears which they replaced.

Some Member States also suggested the adoption of technical measures as a contribution towards the targets of the current Multi-annual Guidance Programme (MAGP). In general, the Commission, being aware of factors such as those indicated in Section 2.4.1 of this report and also because the MAGP is fundamentally concerned with reducing overall fleet capacity rather than controlling fishing mortality rate on juvenile fish, did not accept these suggestions. However the Commission accepted the mandatory use under national regulations of square-mesh panels in Nephrops trawls by United Kingdom and of beam trawls of restricted beam length by Netherlands.

6.1.2 Proposals from professional fishermen to Member States

In February 1992, the United Kingdom government announced a package of measures intended to provide legal means to control fishing effort of their fishermen. The United Kingdom fishermen reacted to this package by offering proposals on technical measures as a substitute to control of fishing effort. It was made clear that the proposed technical measures should be considered as a strict alternative and should not be considered as additional to effort control.

These proposals included the mandatory use of square-mesh panels, the imposition of additional closed areas and seasons (weekends), definition of maximum twine diameters, use of separator trawls and revision of mesh sizes for some diamond-mesh gears. The Commission is aware that UK authorities are discussing these proposals with appropriate fishermen's representatives.

6.2 Other proposals

In a letter of July 1995 to the Commission, the Irish South and West Fishermen's Organisation provided a summary of the technical measures which they consider acceptable. These included increased mesh sizes in diamond-mesh gear, use of square-mesh panel in *Nephrops* trawls, acceptance of the one-net rule, characteristics of netting materials, boxes for protection of hake, increases in minimum landing sizes, amendment to regulations on by-catches and conditions relating to static gear.

Danish authorities have often indicated that economic incentives might be offered to induce fishermen to accept either appropriate application of existing technical measures or application of new and/or additional technical measures. At present, the nature of the economic incentives are largely undefined but the Commission would welcome further discussion of this topic with Danish authorities and/or with any other Member State(s).

The Commission has on a number of occasions indicated to its Consultative Committee that proposals from them on possible alternative and/or additional technical measures would be welcome. There has been no response to this suggestion.

6.3 Summary of the proposals

The Member States' proposals to the Commission in 1991 and 1992 entailed the use of mesh sizes in towed gear greater than the reference mesh size defined in appropriate regulations. Reference was also made to the possibility of defining a maximum diameter of the twine employed to construct nets but such considerations were, ultimately, not included in the conditions leading to exemption from effort regulation.

The United Kingdom fishermen's proposals refer to possibilities such as mandatory use of square-mesh panels, increase in minimum mesh size in towed gear, definition of maximum twine diameter, use of separator trawls, additional closed areas (including real-time) closures. In addition, the UK proposals also refer to possible technical measures for passive gear and to possible conditions applicable to fisheries for molluscs and crustaceans. The Irish proposals are similar in nature.

6.4 Conclusions

The Commission does not consider that technical measures should be accepted in future as a substitute for effort control. It appears that it is relatively easy to modify gears in such a way that it complies with all legal requirements but does not exhibit the expected improvement in selectivity.

In this context it is important to recall that there are, fundamentally, two underlying principles for the conservation of fish stocks:

- (i) Do not catch young fish
- and
- (ii) Do not catch too many fish

Technical measures, TACs and control of fishing effort should be used in conjunction with each other and should not be perceived as mutually exclusive alternatives. It is for this reason that the Commission is attempting to establish a global package incorporating :

- (i) Technical measures, primarily to protect juvenile fish
- (ii) Combined measures to limit exploitation rates, such as input limitations (reduction of capacities through Multi-annual Guidance Programmes, effort control) and output limitations (Tacs and quotas). Definition of mid-term objectives and associated strategies incorporating effort control, TAC's and quotas, measures in a manner consistent with the MAGP, for the achievement of the objectives.

There is no possible substitution between effort reduction and the protection of juveniles : they must be applied simultaneously in an integrated manner.

The figure in annex 7 shows the different elements of this integrated package.

7. THE FUTURE

The Commission considers the following elements worthy of consideration for the future.

7.1 Improved enforcement of existing or improved regulations.

Irrespective of the details of the technical measures package, increased attention must be paid to enforcement. In this context, the Commission will return to the question of the one-net rule to discuss the ways in which this idea can be applied. One possibility is that only a limited number of combinations of mesh sizes may be permitted. In particular, carriage of gear of a number of mesh sizes appropriate for catching a range of demersal species might be prohibited or limited. However, carriage of a gear of a specified minimum mesh size appropriate for catching pelagic fish and a gear of a specified minimum mesh size appropriate for catching demersal species might be permitted.

The Commission also has the intention of discussing with Member States apparent cases of misuse of various derogations such that directed fisheries have been conducted for some species under totally inappropriate technical conditions.

7.2 Extension of geographical area to which certain conditions apply

In principle, it appears desirable to extend conditions relating to minimum mesh sizes similar to those pertaining in the North Sea to all waters off the coasts of the British Isles and Ireland and perhaps also to the Bay of Biscay. In more southerly waters, higher mesh sizes are absolutely necessary for the exploitation of most demersal finfish such as hake, anglers and megrim.

Consideration must also be given to extending to the Skagerrak and Kattegat conditions more similar to those prevailing in the North Sea.

For the Baltic, in parallel to conditions pertaining in other Community waters, consideration will be given to defining for each gear operated under derogation, a minimum percentage of target species and a maximum percentage of by-catch species.

7.3 Removal or modification of apparently redundant or unnecessary aspects of the regulations

Certain aspects of current regulations may be redundant. Examples include conditions for fishing in the Skagerrak and Kattegat for certain species to be used as bait, conditions in the same area for fishing for greater weevers, conditions for fishing for eel in the North Sea. In addition, thought might be given to reducing the number of permitted mesh sizes within certain areas while maintaining the possibility to pursue viable fisheries. In this context it may be appropriate to propose the closure to the use of certain gear of areas uninhabited by the species which are the target for such gear. For example, the Commission considers that it should not be permitted to deploy gear designed for catching Nephrops in areas where Nephrops do not exist.

7.4 Inclusion in regulations of various additional technical conditions

Consideration will be given to establishing conditions stipulating the mandatory use of square-mesh, probably as panels, within appropriate towed gear. The requirement to employ separator trawls, to instal rigid grids in towed gear and to define maximum twine diameter will also be considered.

New or augmented conditions relating to closed areas for the protection of juvenile fish, especially hake, may also be considered.

7.5 Other possibilities

Consideration will be given to possibilities for establishing a system whereby real-time closures of fisheries or parts of fisheries can be enacted.

Consideration will also be given to establishing conditions which permit, under constraints such as quotas and penalty coefficients, the capture by specified fisheries of species or size-groups of species whose capture is theoretically undesirable but is unavoidable and/or economically highly desirable.

7.6 Environmental considerations

In accordance with the Ministerial Declaration of the North Sea Environmental Conference of 1995, the Commission will make a proposal to establish in the North Sea an undisturbed area in which scientific investigation of the recovery of the environment will take place.

In addition, the Commission may consider, for the protection and conservation of species other than fish, the requirement to establish areas to be closed seasonally to various types of fishing.

7.7 Towards the development of a positive approach to technical measures

If large numbers of fishermen are not to feel that the technical measures introduced are designed to hamper them, discussions between the scientific community, government departments and the fishing industry must be as practical as possible, foresee how problems will develop, and take action.

Work on developing incentive measures should continue. To a large extent, it involves initiatives that can be taken by the Member States, so that the share-out of the overall fishing rights recognized at national level is favourable to those using the most selective techniques. This does not preclude the Community from providing stimulus, or even coordination.

8. CONCLUSIONS

The introduction of technical measures did not have the hoped-for effects in protecting juveniles and the species affected by by-catches. By-catches and discards continue to raise considerable problems.

The problems of translating factual information into effective decisions are illustrated in Annexes 1(a) and 1(b), in the cases of hake and haddock respectively. There has, however, been a change of attitude on the part of the fishermen's representatives, at least in certain Member States. For various reasons (greater awareness, hope of avoiding other types of restriction, especially restriction of fishing effort, concern about real or imagined catches of juveniles by fishermen from other Member States), calls are now being heard for the introduction and reinforcement of technical measures. In the United Kingdom, the trade has given a great deal of thought to the matter, which has led to a set of proposals for technical measures. It was not possible to meet the UK fishermen's request that these proposals should be taken into account as an alternative to limitations on fishing efforts. But the approach shows a constructive spirit, and will contribute to the Commission's forthcoming proposals.

The problem of technical measures goes beyond the framework of fishing alone. For the sake of reducing the impact of fishing on ecosystems, the environmental lobby attaches increasing importance to the definition of more selective fishing. This is, in the first instance, to prevent or limit catches of sensitive species (marine mammals, birds, etc.). But requests are covering a steadily widening range: they must be taken into account wherever they are justified, and if possible anticipated. There is even a risk, if measures to achieve good fisheries management have not been taken in time, that more radical demands will lead to action for the sake of environmental conservation.

Inadequacies in the instruments go some way to explaining their shortcomings; but their effects are relatively minor compared to those of two important causes:

- overcapacity leading to very intensive exploitation;
- inadequate monitoring.

The first factor means fewer large fish, which makes fishermen economically dependent on continuing to catch small fish. It makes monitoring even more difficult, especially in the absence of firm determination.

It is clear from a look at the arrangements adopted outside the Community that there is no easy answer the CFP might have overlooked. Continuity is needed. The existing measures have to be improved, and the Commission will see to this through the presentation of appropriate proposals. These proposals cannot but take account of concurrence among scientists that mesh sizes should be further increased. They must also take full account of the proposals from the trade, and aim at being innovative. But technical measures will be effective only if they are integrated into an overall policy. Rates of exploitation must be cut, which means a direct reduction in capacity and in fishing effort. Monitoring arrangements must be made much more efficient.

From this point of view, 1996 will be crucial: decisions are to be taken on the Fourth Multi-Annual Guidance Programme, which will oblige the Council to decide on the follow-up to earlier commitments relating to technical measures.

ANNEX 1.a

Specific measures for contributing to the conservation of hake in the Atlantic

Hake is one of the stocks for which scientific advice is most alarming. The Atlantic hake fishery has consequently been the subject of a number of Commission initiatives.

On 27 July 1988, when adopting the 5th amendment¹ to Regulation (EEC) No 3094/86, the Conseil underlined the need to reduce catches of small-sized hake taken in close association with *Nephrops* in region 3. On 14 to 16 December 1987, as a result of a proposal from the Commission based on a report on scientific experiments carried out in the fishery, the Council gave an undertaking to adopt by 30 June 1989 minimum mesh size rules to apply from 1 April 1990 to trawling for *Nephrops* in region 3. The Commission's proposal to increase the mesh size was postponed, however, at the request of the French delegation. A Council Decision (on the introduction of a mesh size of 55mm and the possibility of using selective trawls in the *Nephrops* fishery in region 3) was only reached with the adoption of the 9th amendment² and applied from 1 April 1990.

The protection of juvenile hake was the aim also of the introduction by the 11th amendment³ of seasonal boxes in the waters opposite the Iberian Peninsula (Spain and Portugal). The Council Decision did not cover the whole of the closed period proposed by the Commission.

The Commission proposal for an 11th amendment included an increase in the standard mesh size in region 3 from 65mm to 80mm, which was deemed to be the most appropriate size for hake according to scientific advice given on a number of occasions. The Council rejected the proposal at its meeting on 28 October 1991 but gave an undertaking "to decide, on a proposal from the Commission, on the introduction of 80mm diamond mesh in region 3, while standardizing *Nephrops* mesh at 70mm, with effect from 1 January 1995 at the latest ...". As explained in the main Council text, the matter is to be dealt with again in 1996.

At the Council meeting in December 1994, the Council and the Commission expressed serious concern at the state of health of the southern hake stock (in ICES Divisions VIIIc and IXa)⁴. On the setting up of the southern hake task force, both agreed on the need to establish ways of achieving a very substantial reduction in the rate of exploitation of the stock, especially of juveniles.

The Commission held a meeting of the relevant experts. Their report has been sent to the Member States. On this matter too, decisions have still to be taken.

¹ Regulation (EEC) No 2024/88 of 23 June 1988.
² Regulation (EEC) No 4056/89 of 19 December 1989.
³ Regulation (EEC) No 345/92 of 27 January 1992.
⁴ Council document 11486/93 of 18 March 1994.

ANNEX 1.b

Technical measures related to the management of the mixed fishery for cod, haddock and whiting in the North Sea.

In the North Sea, cod, haddock and whiting are caught predominantly with bottom trawls and seines. The vast proportion of the catches taken in each operation of these types of gear contains some mixture of the three species in question along with numerous other demersal species in lower quantities.

The major approach to prevention of capture of the juveniles of these species has been to implement regulations stipulating the minimum mesh size of the gear predominantly used in their capture. In this context, a difficulty is immediately encountered. For any stipulated mesh size, and assuming constancy of all other relevant factors, whiting will be retained by the gear less easily than haddock which will be retained less easily than cod. The choice of mesh size for application within this fishery is, therefore, a compromise. Perfection for whiting will be sub-optimal for cod and vice versa.

Nevertheless, successive increases in the legal minimum mesh size for application in this fishery have been implemented. In the 1960's, prior to the adoption of the CFP, the minimum mesh size was 65mm whereas it is now 100mm.

Almost every proposal for increase was opposed by fishermen from at least some Member States, and hence by their administrations, on the grounds that the higher mesh size would not permit the retention of whiting. In fact, it appears that no such effect is evident and that, despite the increases, whiting of small size and low age are still caught by gear of the 100mm minimum mesh size and are often discarded in large quantities.

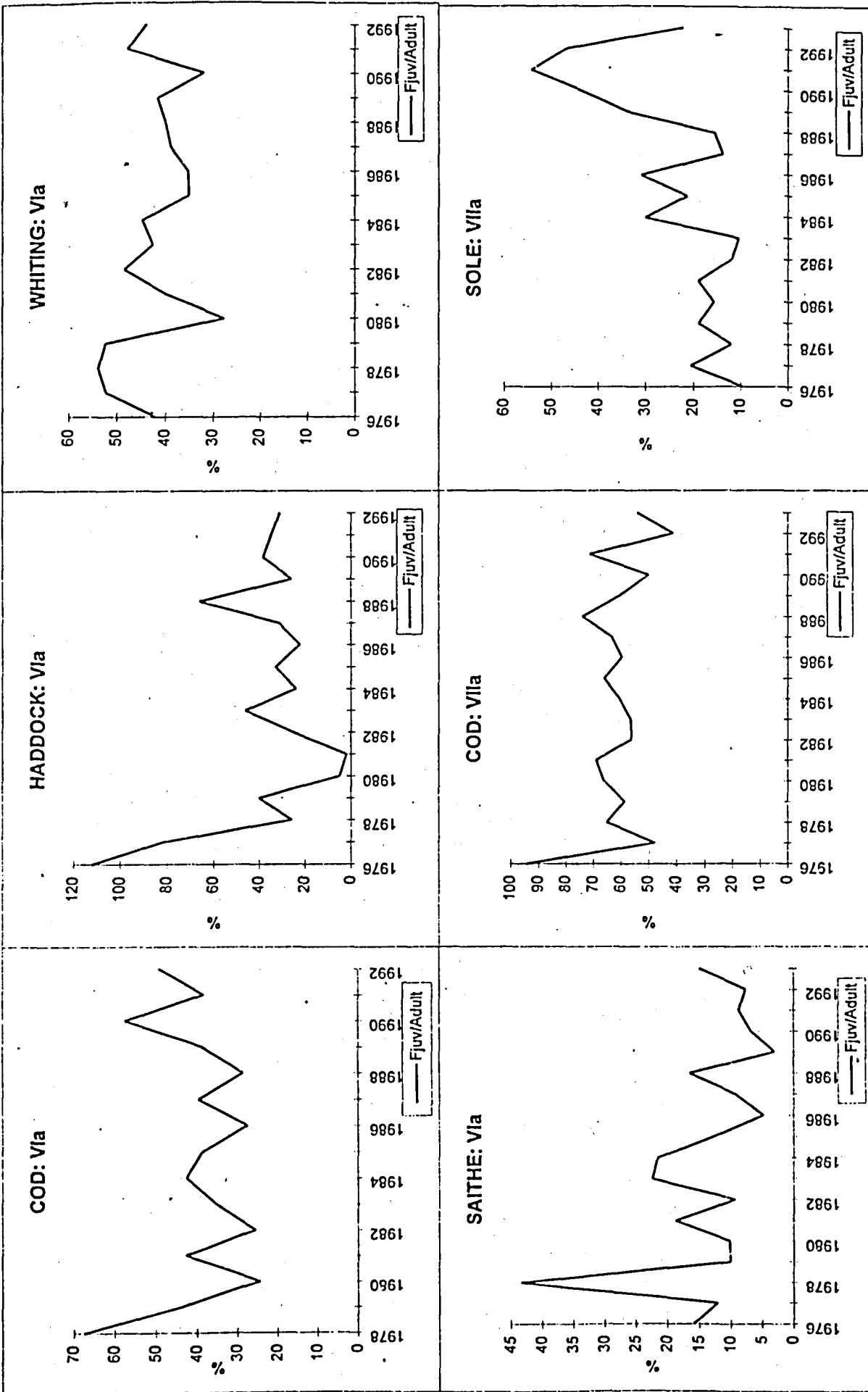
A specific derogation for fishing for whiting also exists which permits the use of 90mm mesh size with associated conditions on minimum percentage of target species, maximum percentage of by-catch and other conditions relating to the structure of the gear. The Commission is not aware of widespread use of this derogation despite the considerable effort made by certain Member States to obtain it and despite the fact that the agreed conditions were accepted by Council as an A-point.

Various other derogations intended to permit the conduct of other fisheries also run counter to the adequate management of cod, haddock and whiting. Minimum mesh size of 80mm is permitted to facilitate the sole fishery and 70mm is permitted for conduct of fisheries for *Nephrops*. Regrettably these fisheries also catch cod and, depending on their geographical location, may also catch haddock and whiting.

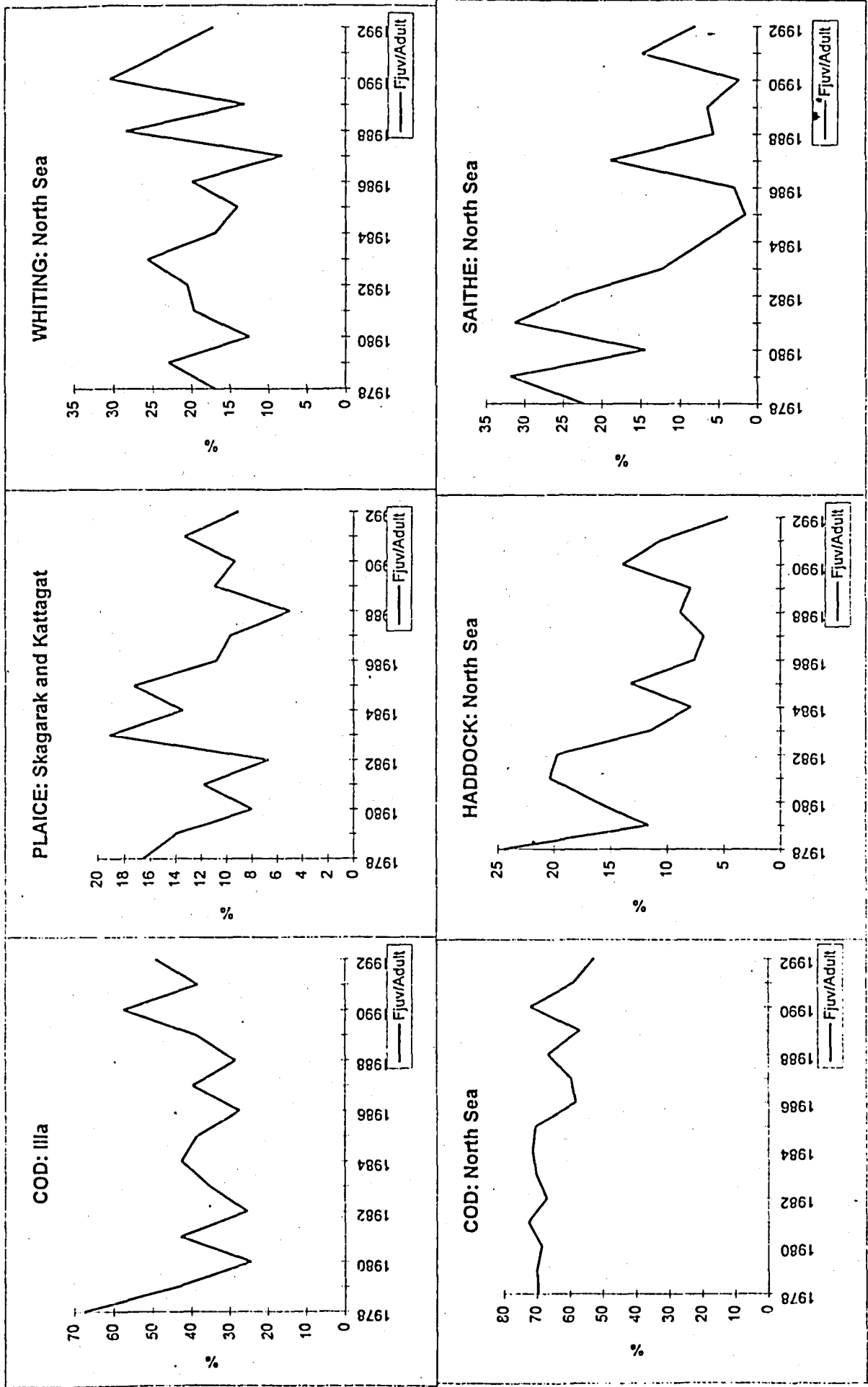
Nets of minimum mesh size 32mm are also permitted for the capture of Norway pout. These fisheries take large by-catches of juvenile whiting (xxx tonnes in 1994) and haddock (xxx tonnes in 1994). Attempts have been made to reduce the effects of these fisheries on whiting and haddock by implementing the "Norway pout box" in whose geographical area juvenile haddock and whiting co-exist with Norway pout and where fishing with nets of 32mm minimum mesh size is prohibited. Nevertheless, the large catches of haddock and whiting persist.

Overall, therefore, the expected effects of regulations intended to minimise catches of juvenile roundfish have not been as successful as expected. It is, however, probable that exploitation of young roundfish would have been greater in the absence of the existing regulations but the present situation is far from satisfactory and greater efforts must be made to achieve significant improvements.

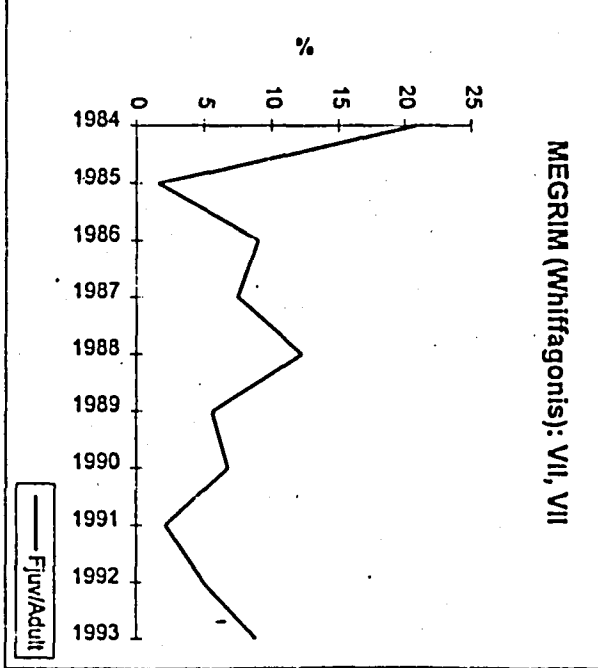
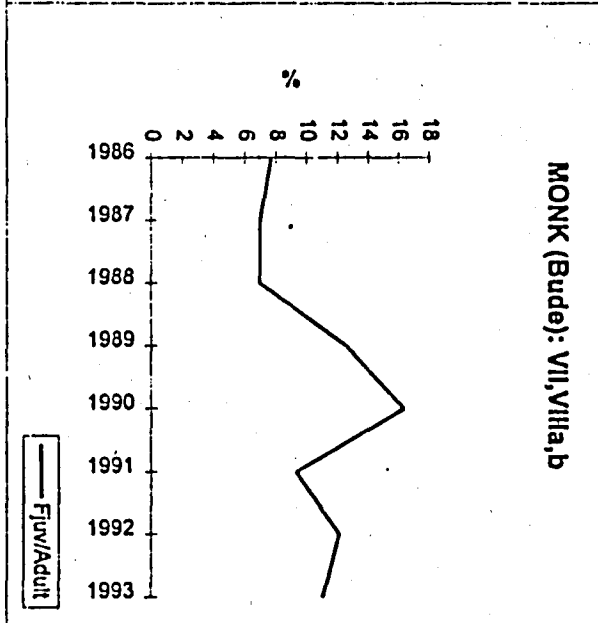
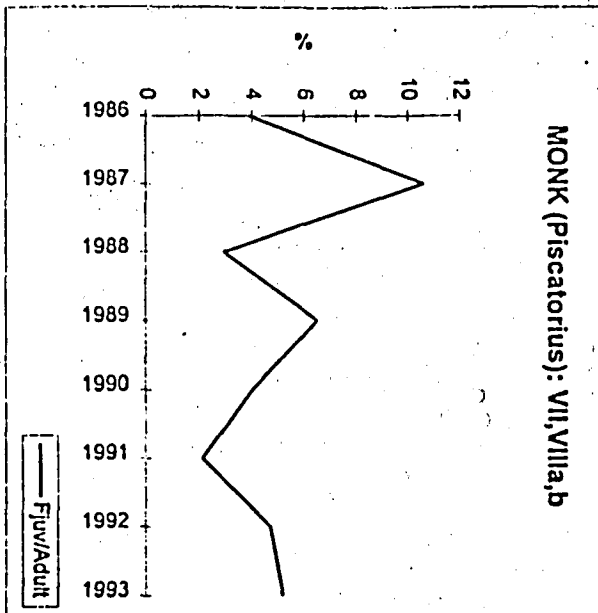
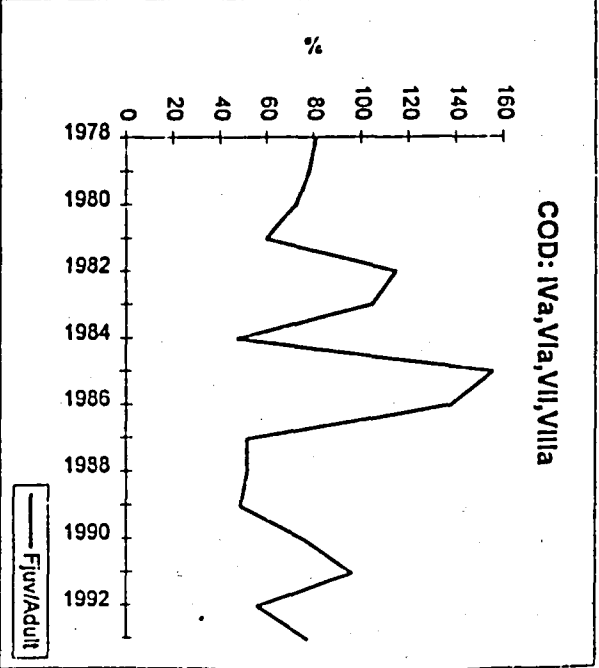
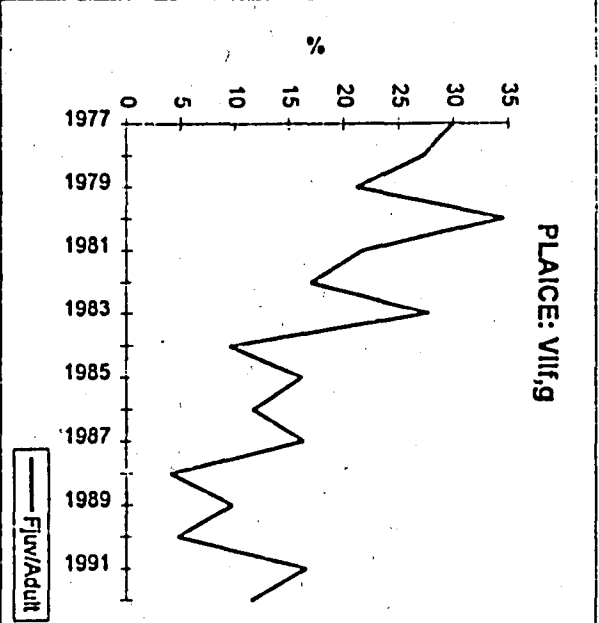
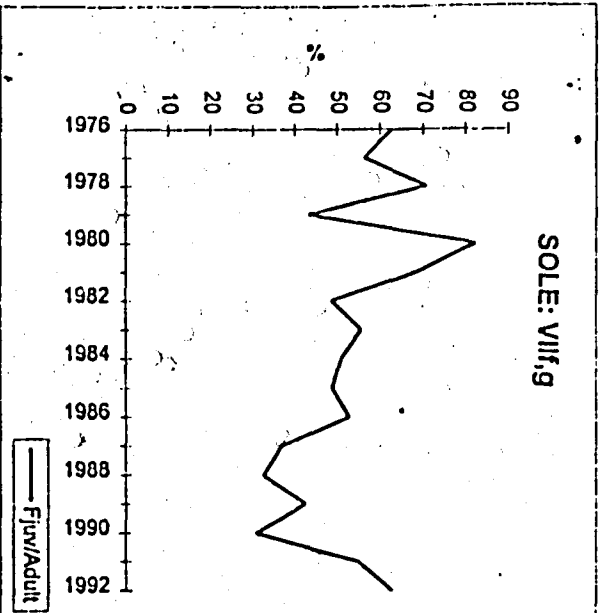
Fishing mortality of non-mature fish expressed as a % of the fishing mortality on adult fish.



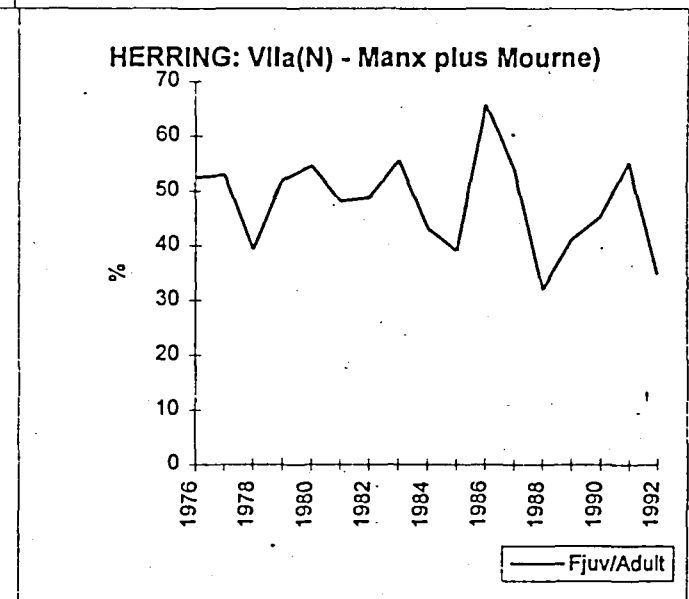
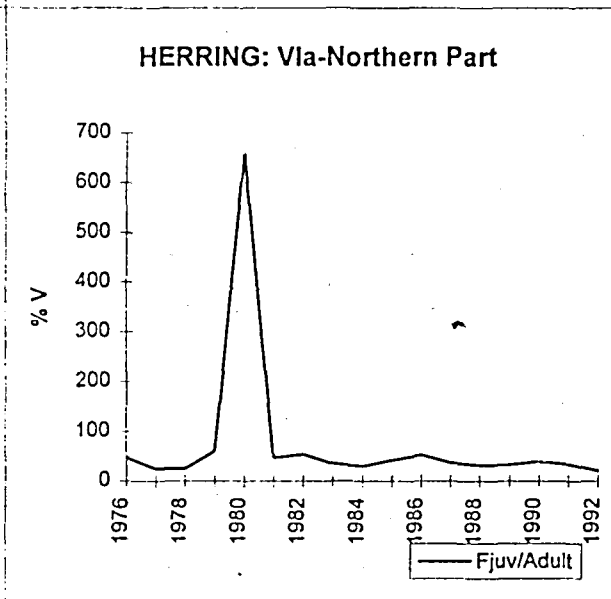
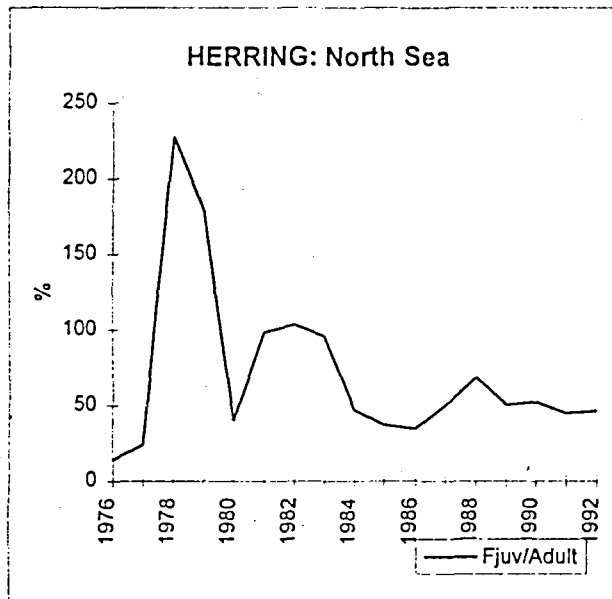
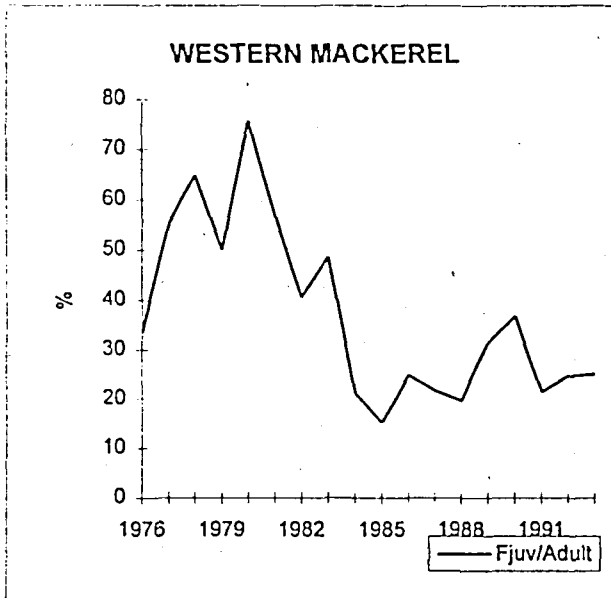
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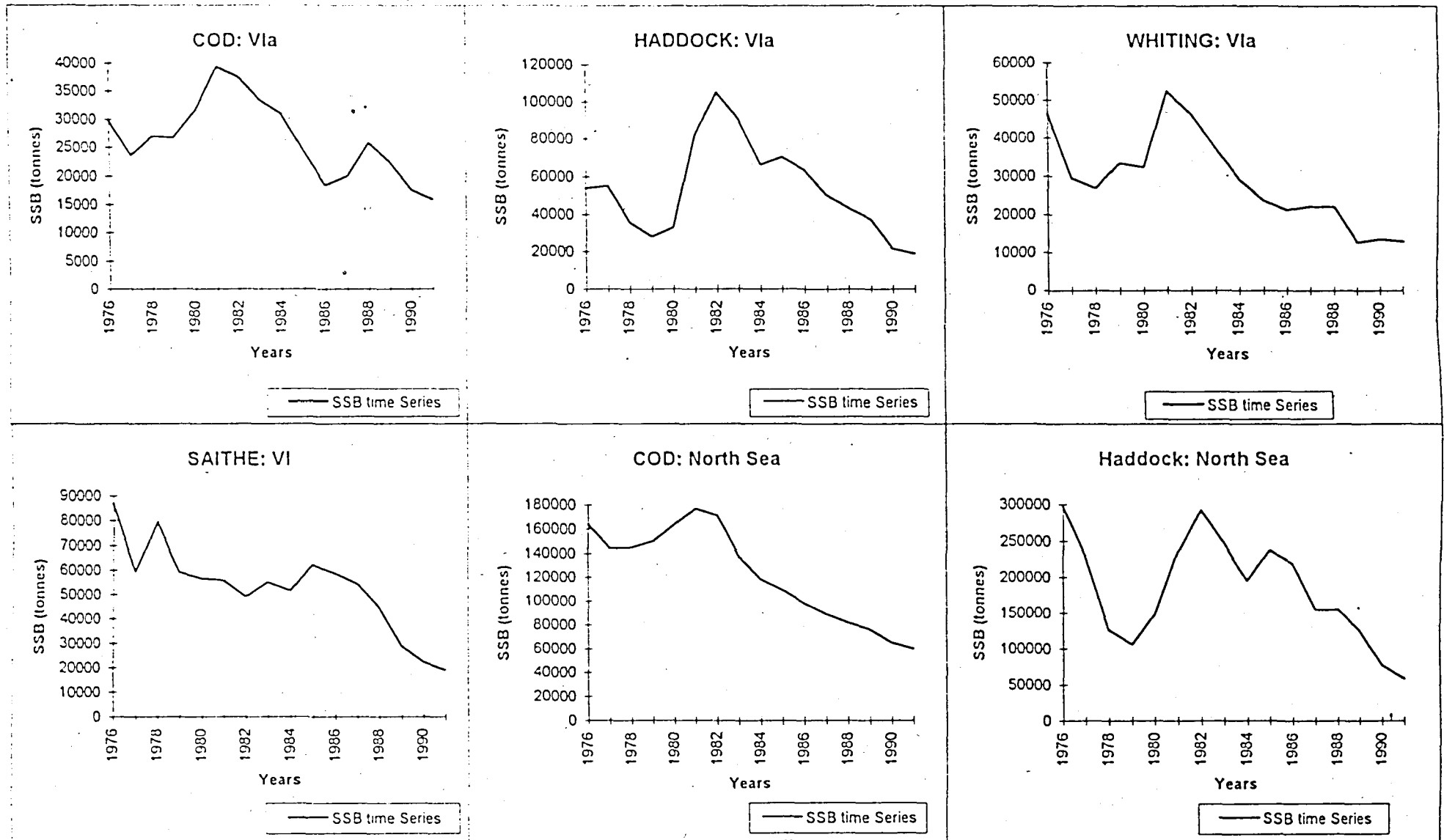
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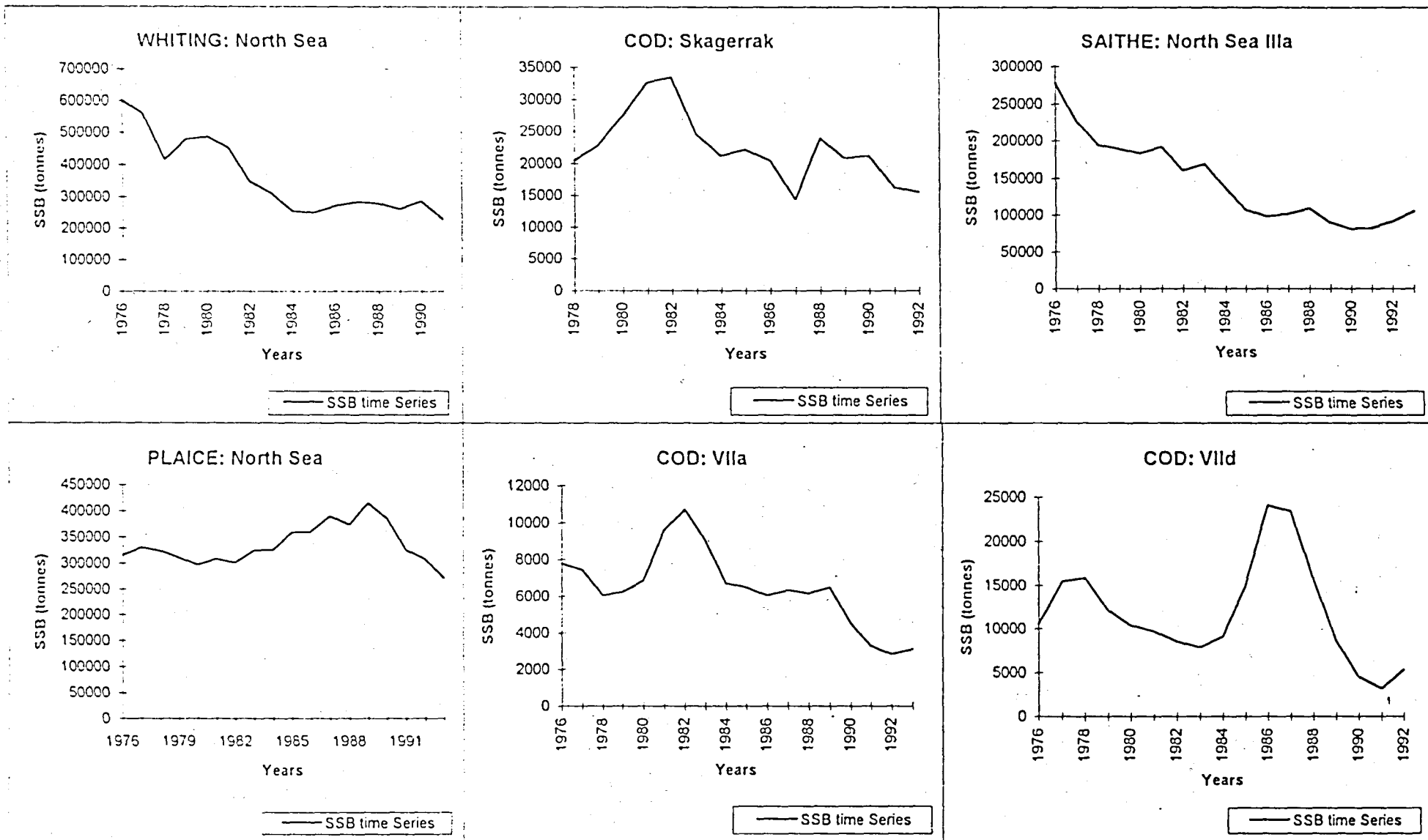
Fishing mortality of non-mature fish expressed as a % of the fishing mortality on adult fish.



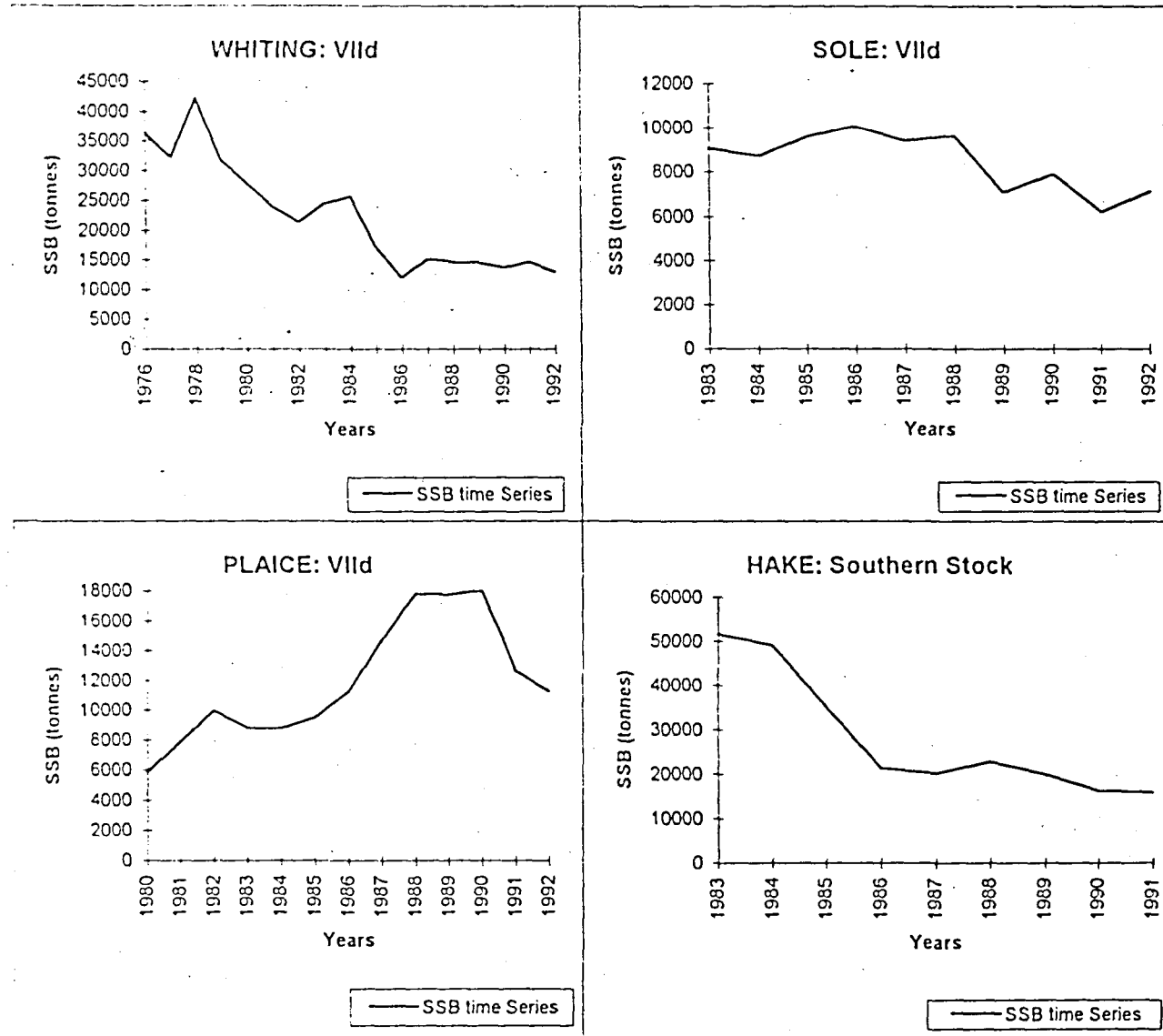
Time series of spawning stock biomass (SSB) estimates for different stocks exploited by fishermen of the Union.



Time series of spawning stock biomass (SSB) estimates for different stocks exploited by fishermen of the Union.



Time series of spawning stock biomass (SSB) estimates for different stocks exploited by fishermen of the Union.



ANNEXE 3

TECHNICAL MEASURES AND DISCARDS

The seriousness of the problem of discards within the CFP has been underlined and examined by the Commission at an earlier date (SEC(92)423). More recently an FAO report¹ has given an update on the situation at world level.

Technical measures are neither the main cause, nor an easy answer to the problem of discards. As the Commission indicates in detail in the Communication on the subject, discards have many causes, which vary according to the fishery involved. The links between technical measures and discards vary too, depending on the type of measure.

- The introduction of permanent or temporary boxes in waters where by-catches of species that are not marketed, or are even protected, or the proportion of very small fish are excessive, can only reduce the quantity of discards while providing other direct benefits.

- The limiting or banning of non-selective fisheries and measures to increase mesh sizes in the same way together provide direct protection for juveniles and certain species and the retention of discards.

- The matter becomes more sensitive when the question of minimum sizes is broached. It is technically possible to reduce the selectivity of fishing gear, particularly trawls, in such a way that an increase in mesh sizes does not result in the desired reduction in catches of small fish. To achieve a dissuasive effect, therefore, it has to be arranged that fishermen taking this approach do not gain a commercial advantage from such practices. That is why there are frequently rules banning the marketing of very small fish, so that they have no commercial value. To reduce the scope for fraud, the simplest solution is to prohibit fishermen from keeping such fish on board, otherwise if they do keep them the risk of fraudulent marketing is great.

Fixing minimum mesh sizes has one drawback therefore: the fish caught cannot be sold commercially and often have to be thrown into the sea although most of them are dead. This drawback is regularly cited as an illustration of the "absurdity" of the rules. Certainly it is true that it is a drawback: which has become tolerated, but to avoid another more serious one: the continued taking of large amounts of small fish. The need to arrive at a relative weighting for the two drawbacks shows that the choice can only result from a compromise. Even in a single-species fishery the selectivity of particular fishing gear is necessarily imperfect: the retention rate develops progressively with the size of the fish and not according to a simple threshold effect. Therefore, the problem of discards cannot be avoided. To reduce it as much as possible it would be necessary to choose a very low legal minimum size so that very few fish which are too small can be caught by gear being operated according to the rules. But in that case it would not be possible to achieve the desired dissuasive effect and it would be economically attractive for fishermen to continue to direct their activities towards small fish whose size is just above the legal minimum. On the other hand, if the minimum size was very large, equivalent to a length where three-quarters of all fish are retained by the trawl, for example, the number of discards would be large. The minimum size should be defined

¹ FAO fisheries technical paper No 339 "A global assessment of fisheries by-catch and discards" Rome 1994.

according to the specific characteristics of each fishery. Thus, when small fish are fished in areas different from those where fish "normally" retained by a legal trawl are found, a higher minimum size is more justified than where there is no geographical segregation, allowing fishermen who wish to do so to avoid catching fry. However, taking account of specific characteristics has its own drawback: the need for simple rules. It is very difficult to ensure that minimum sizes for a species are complied with when they vary according to fishery. The final compromise is made even more difficult by the fact that most fisheries are multi-species.

The problem of discards cannot be resolved overall without an across-the-board improvement in the management of fisheries. Overfishing, improper fishing and discards are inseparable.

The existence of overcapacity leads to a high rate of exploitation meaning fewer large fish, making it economically impossible for fishermen to avoid taking large quantities of small fish. Mesh sizes cannot be regulated therefore unless additional measures are taken to fix minimum sizes, which lead to discards.

The vicious circle cannot be broken simply by putting in place technical measures. It is necessary to go back to the source of the problems, meaning excess effort and overcapacity

ANNEX 4

UNDERTAKINGS BY THE COUNCIL REGARDING TECHNICAL MEASURES

On a number of occasions the Council has considered that while immediate decisions were not necessarily relevant, improvement in the selectivity of fishing techniques required a timetable of specific decisions. Precise undertakings to that effect have been given, consisting of the statements below.

Doc. 11089/89 PV/CONS 87 PECHE 386

"The Council and the Commission agree that the disturbing situation of certain demersal stocks, particularly in the North Sea, requires conservation measures appropriate to the circumstances. They consider that amendments to existing rules should be implemented in a global context, in particular as regards minimum mesh size, minimum size on landing and discards. In this connection they hereby instruct the High Level Working Party to intensify the detailed discussions already started in this area and to report back before 1 June 1990."

Doc. 9217/91 PV/CONS91 PECHE 250Decision on :1. minimum mesh size in region 3 :

"The Council undertakes to decide, on a proposal from the Commission, on the introduction of 80mm diamond mesh in region 3, while standardizing Nephrops mesh at 70mm, with effect from 1 January 1995 at the latest, provided that scientific analysis recognized by the ICES and STCF confirms that the measures in force at the time have not resulted in the restoration of stocks."

2. minimum mesh size in region 2 : :

"The Council undertakes to decide, on a proposal from the Commission, on the introduction of 110mm diamond mesh, with optional panels of 100mm square mesh, in region 2 (the whole of the North Sea and the West of Scotland, north of latitude 56) as from 1 January 1995 at the latest, provided that scientific analysis recognized by the ICES and STCF confirms that the measures in force at the time have not resulted in the restoration of stocks."

Doc. 11486/93 PV/CONS93 PECHE 544Hake in ICES divisions VIIIc and IXa

"The Commission and the Council agree on the need to establish, before September 1994, a task force to further investigate the state of the spawning stock of hake in ICES divisions VIIIc and IXa and, if required, to define means by which a rapid and large reduction in the exploitation rate of this stock, particularly of juveniles, can be achieved."

North Sea cod

"The Commission and the Council note that the North Sea cod task force of 1993 was unable to recommend conservation measures specific to the North Sea stock of cod. Therefore, and in the light of the particularly serious situation of the stock of cod in the North Sea and in the context of its responsibilities with respect to control, the Commission will assign priority to the respecting of quotas and technical measures associated with this stock.

The Commission declares that in collaboration with the Member States concerned and by application of the new control regulation, it will propose the establishment of a specific programme of control in the immediate future."

Doc. 12404/94 PV/CONS93 PECHE 488

V. Amendments to be made to the Regulation laying down certain technical conservation measures:

- (b) The Commission will make proposals by 30 June 1995 to improve technical conservation measures (in particular in respect of the selectivity of fishing gear) in western waters. The Council will decide on these proposals before 31 December 1995.

ANNEXE 5

TECHNICAL MEASURES AND PROTECTION OF JUVENILES

1 The various technical measures

1.1 Selectivity of trawls and minimum mesh sizes

The most important fishing technique by far is trawling. It is also the most efficient technique for catching juveniles as small mesh sizes are authorized.

The selectivity of a trawl depends firstly on the width of the mesh used in the terminal part, i.e. cod-end and bow cod-end. It is also linked to other factors, such as the number of meshes appearing on the circumference of this terminal part. It is therefore possible by increasing this number to reduce the selectivity and to cancel out the benefits expected from an increase in mesh sizes. The method of rigging can also play an essential role. Traditional rigging involves the mesh being not in the intended form of squares, but as diamonds with varying degrees of taper (cf. figure 3). This reduces the possibility of fish escaping because they have to slip through a sometimes excessively narrow diamond. The so-called "square mesh" method of rigging is more reliable in this respect. A more regular performance can be expected of it, thus increasing the chances of survival of the fish which escape, reducing "selectivity failures" which result in a trawl catching fish which, because of their small size, should have been allowed to escape (cf. figure 4). Scientific experiments, then numerous tests carried out by members of the industry have shown the advantage of this type of rigging. At the same time it has been revealed that a problem regularly cited (fragility of the rig) could be resolved by using panels. Even if some initial enthusiasm now seems exaggerated, and even if in certain cases (flatfish) one cannot hope for much improvement, the square mesh rig opens the way to definite progress.

1.2 Fixing minimum mesh sizes

It is technically quite possible to so reduce the selectivity of fishing gear, especially trawls, that an increase in mesh sizes does not bring about the desired reduction in catches of small-sized fish. To achieve a dissuasive effect, therefore, it has to be arranged that fishermen taking this approach do not gain a commercial advantage from such practices. This is why there are frequently rules banning the marketing of very small fish, so that they have no commercial value. To reduce the scope for fraud, the simplest solution is to prohibit fishermen from keeping such fish on board, otherwise if they do keep them the risk of fraudulent marketing is great.

Fixing minimum mesh sizes has one drawback: the fish caught cannot be sold commercially and often have to be thrown into the sea although most of them are dead. This drawback is regularly cited as an illustration of the "absurdity" of the rules. Certainly it is true that it is a drawback which has become tolerated, but to avoid another more serious one: the continued taking of large amounts of small fish.

The need to arrive at a relative weighting for the two drawbacks shows that the choice can only result from an imperfect compromise. Even in a single-species fishery the selectivity of particular fishing gear is necessarily imperfect (see Figure 3): the retention rate develops progressively with the size of the fish and not according to a simple threshold effect. Therefore, the problem of discards cannot be avoided. To reduce it as much as possible it would be necessary to choose a very low legal minimum size so that very few fish which are

too small can be caught by gear being operated according to the rules. But in that case it would not be possible to achieve the desired dissuasive effect and it would be economically attractive for fishermen to continue to direct their activities towards small fish whose size is just above the legal minimum. On the other hand, if the minimum size was very large, equivalent to a length where three-quarters of all fish are retained by the trawl, for example, the number of discards would be large. The minimum size should be defined according to the specific characteristics of each fishery; Thus, when small fish are fished in areas different from those where fish "normally" retained by a legal trawl are found, a higher minimum size is more justified than where there is no geographical segregation, allowing fishermen who wish to do so to avoid catching fry. However, taking account of specific characteristics has its own drawback: the need for simple rules. It is very difficult to ensure that minimum sizes for a species are complied with when they vary according to fishery. The final compromise is made even more difficult by the fact that most fisheries are multi-species.

1.3 Boxes

The idea of protecting certain zones linked to particular stages in the life-cycle of fish is a very widespread one. Among laypersons it often leads to confusion, between spawning ground and nursery, for instance. For most species fished, the locations where broodstock congregate for fertilisation and spawning (spawning grounds) are generally different from the locations where the smallest fish come together (nurseries). The hake case illustrated in Figure 5 is, generally speaking, a classic one, the spawning grounds being far out to sea by comparison with the nurseries.

Contrary to what beginners in matters of resource conservation tend to believe, the principal measure for guaranteeing the correct exploitation and sustainability of resources is, very generally, protection of the nurseries.

It is difficult to ascribe stable geographical boundaries to certain species. Thus, small juvenile North Sea cod extend over vast areas and concentrations are not in the same place each year. On the other hand, it is easier to delimit the nurseries for other species. Community legislation includes a set of boxes, in particular in the North Sea for flat fish and off the Iberian Peninsula for hake.

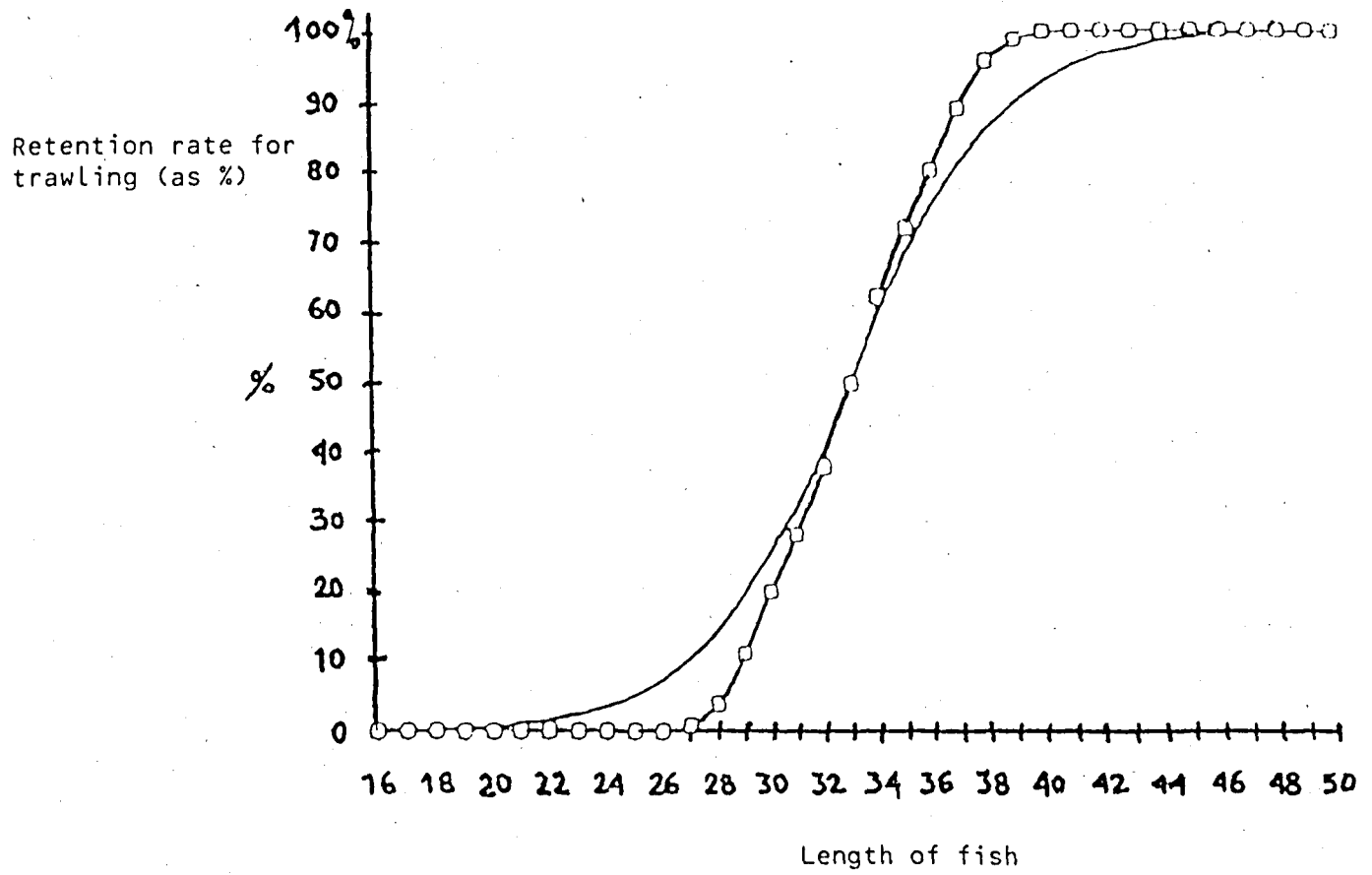
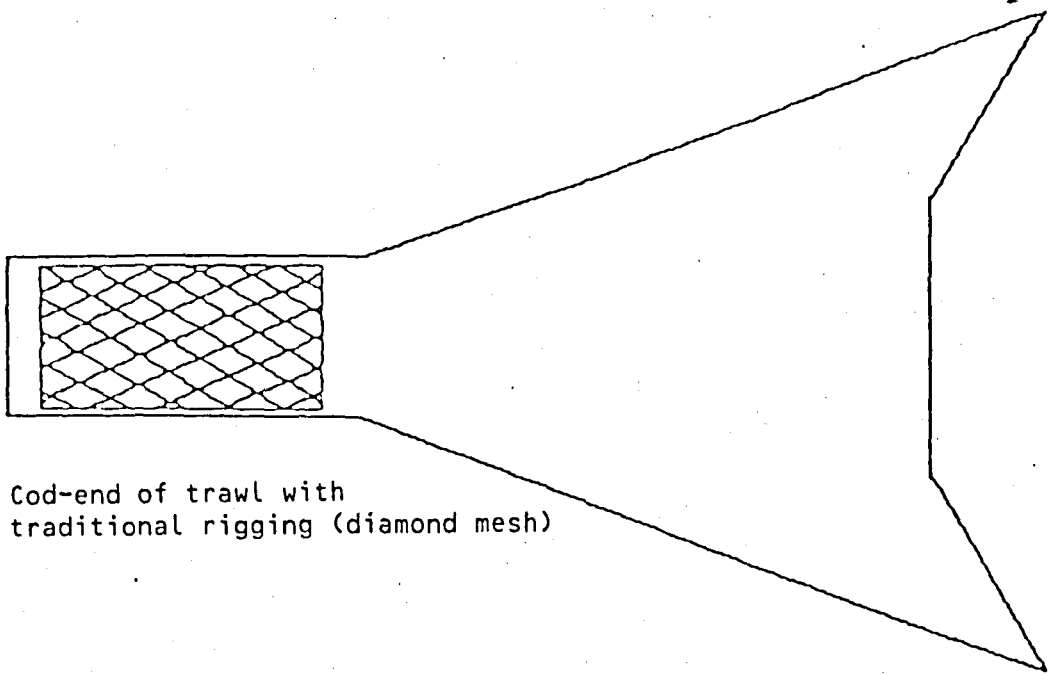
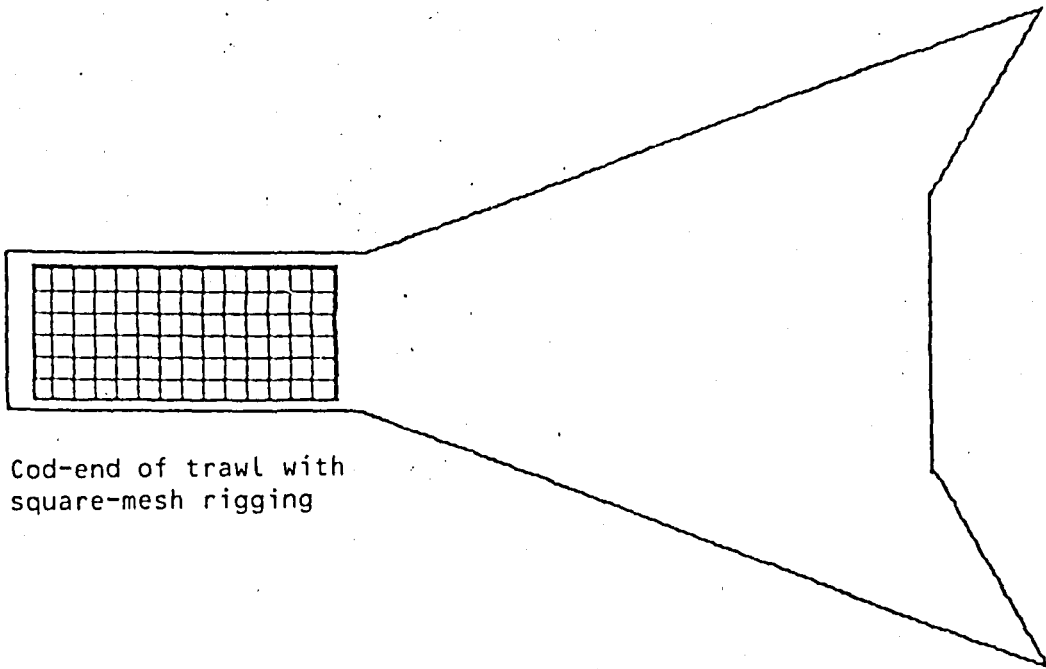


Fig. 1 : Rate of retention of fish in cod-end of trawl as a function of the length of the fish

-□-□- = improved selectivity



Cod-end of trawl with traditional rigging (diamond mesh)



Cod-end of trawl with square-mesh rigging

Figure 2 : mesh shapes of cod-end of trawl with traditional and square-mesh rigging

2 Biological consequences of technical measures

2.1. Single-species arguments

General problems

Technical measures are designed to protect young individuals. The result of this is an immediate loss of earnings potential, corresponding to the commercial value of the fish which are not taken.

Medium- and long-term benefits can be offset against this loss:

- The clearest benefit corresponds to the subsequent catching of spared animals. Only part will be taken by fishermen, the rest dying naturally, but growth in size will, by way of compensation, increase the individual weights. The weight balance will be positive as long as the growth potentials are increased, and the re-catch rates are sufficient, i.e. mortality due to fishing is high *vis-à-vis* natural mortality.
- Sparing the young individuals also eventually increases the abundance of the breeding stock. Scientific analyses even show that this is often the most effective measure in this respect, even more so than others that one may consider more spontaneously (stoppage of fishing during the breeding season). The increase in breeding stock constitutes the sole guarantee against the risks of biological collapse which arise when the renewal of the generations is not ensured (see also 1.1.3).
- Avoiding catching fish as soon as they are available for fishing also provides fishery managers with time for reaction: it becomes possible to assess the abundance of an age group before it enters *en masse* into catches. This is an approach to determining TACs which is regaining credibility.
- The problem of discards constitutes in itself an argument for increases in mesh sizes and protection of nurseries. An important part of the fish spared by increasing mesh sizes are fish which have not reached the minimum size, which are normally discarded. An ICES working group indicates a band of 40 to 130 million individuals for the annual discards of Atlantic hake. It is usual in the North Sea for the number of discarded haddock to exceed in one haul the number of fish which will be sold.

The situation of roundfish stocks

The state of Community resources varies according to species and zone. If some stocks are "in good health" (mackerel of the so-called western stock, various stocks of herring), the other extreme corresponds to large size roundfish, which have an essential position in the economy of demersal fish. In the North Sea, in western Scotland, cod occupies first place accompanied by haddock and saithe. Cod is found in the Irish Sea, the Celtic Sea and the eastern English Channel, and has a crucial place due to not being preponderant. More to the south, it is hake which forms the backbone of a lot of fisheries, combined with cod in the Celtic Sea. It is precisely for these stocks that the scientific analyses are the most alarming.

For certain stocks the scientific assessments are more precise than for others. It would be wrong to think therefore that, in the second case, the dangers are less. A close examination of the studies shows that, on the contrary, while in the Irish Sea or along the Iberian Peninsula certain information is lacking, all the accessible data converges to indicate a very serious situation.

Decisions are urgently required. For cod and haddock, and for hake, stocks are in serious danger of collapsing. For cod, many of the stocks have recently experienced a catastrophic development starting with those in the north-western Atlantic. Haddock, in the Ban Georges (north-western Atlantic) has been reduced to the state of residual stock without economic interest due to overfishing in the 1970s.

2.2. Multispecies aspects

These are of two types. Technical interactions are talked about to designate the fact that fisheries target not one but several species. Biological interactions correspond especially to predation relationships existing between the various fish.

Technical interactions

Where it is not possible to prevent the simultaneous catching of species presenting very different growth potentials, compromises must be accepted with the resulting mesh size being too large for "small" species and too small for large species.

It would be conceivable to envisage mesh sizes a good deal larger than those proposed to optimize the exploitation of cod, saithe or hake. There are in fact very large fish, such as ling or anglerfish, halibut, turbot or skate and rays, which would justify very large mesh sizes.

Where there is a very small size species, and where it is possible to catch this species without taking fish *en masse* belonging to larger species, the most straightforward solution is to provide for a derogation, linked to a target species, or to a group of target species. In essence it is the pelagic or semi-pelagic species (herring, mackerel, horse mackerel, anchovy, sardine, blue whiting) and the crustaceans (Norway lobster, shrimps and prawns) which pose a problem. But any derogation, even where it corresponds to a real technical possibility, introduces a risk. The species targeted by fishing subject to a derogation can become just an excuse. The risks must therefore be measured, the mesh size subject to a derogation adapted to the target species, by avoiding any laxness, and the fishing activity subject to a derogation subjected to conditions which limit the dangers therein. It must also be ensured that these conditions are controllable. All this, unfortunately, leads to complex regulations.

Biological interactions

Natural mortality negatively affects the consequences of increases in mesh size. This can be complicated where the species protected exerts in return a predatory role on other stocks. The phenomenon is difficult to quantify, but is qualitatively unquestionable. It depends, among other things, on the relative distribution of the predators and prey, for ranges of precise sizes. It can therefore vary for the same species from one sea to another. The case of North Sea whiting has been much studied and discussed.

3. The economic and social consequences

3.1. General comments

Whatever the information gaps may be, nothing justifies bringing economics into conflict with biology in terms of technical measures. These measures have consequences, and reasons for being, which are both economic and social, and biological. A deep-rooted tradition means that restrictions, such as technical measures and fishing effort restrictions, would no longer be justified when the analysis is extended from the biological field to the economic domain. In

reality, where bio-economic studies have been carried out, they have very generally led to stricter conclusions than those arising from biological points of view. It is not therefore reasonable to postpone increases in mesh size while awaiting additional economic studies which one hopes would allow the conclusions to be reversed.

To clarify the debate, the increase in mesh size must be considered, in any case, as one possible decision, the other being the continuance of the rules currently in force. Each of these has its socio-economic advantages and disadvantages, whose assessment is marred by uncertainties. The essential debate must revolve around the distinction between the long term, where the increases in mesh size will bring biological, economic and social gains, and the short term, where difficulties may exist. It is important, in the same way, to analyse the proportion of profits and losses.

3.2. Evaluation in the medium and long term

To increase the mesh sizes would allow production to be increased for a lot of stocks. Not only can taking into account the economic phenomena not contradict these conclusions, but the integration of price variations according to the size of the fish can increase the gains. If between two and six years, the weight of a hake is multiplied by more than six, the price per kilogram is, at the same time, multiplied by nearly two for the trawlers in the Atlantic. If the same six-year-old hake is taken by a lining vessel, its price will again be multiplied by two. The same fish can therefore see its selling price multiplied by practically twenty-five depending on whether it is taken by a trawler with a small mesh size or by some longlining vessels. Even if a flexibility of price can intervene to complicate the estimates, there are no results which suggest that it can cancel out the benefit of the weight increase of catches. In the North Sea, the estimated flexibilities indicate at most a reduction of 20% in the long-term gains caused by increases in mesh size. Furthermore, these flexibilities would imply not an economic cancellation of the benefit of the increase in production, but would allow consumers to benefit by a reduction in prices through better use of resources.

At the social level, it is more difficult to forecast the benefits to be expected from increases in mesh size. But it is certainly not by wasting potential income through misuse of resources that one creates viable jobs. This is indeed one of the clearest results of the scientific research which shows that the more one is imprudent by exposing very young fish to being caught, the more it is necessary to be prudent in terms of fishing intensity.

3.3. Short-term losses

An increase in mesh size is an investment whose dividends can only be reaped after the fish have grown sufficiently. The necessary delay corresponds in the practical context of Community waters to a transitory period of several months to two or three years as appropriate.

The losses can, moreover, be limited for two reasons:

- the flexibility of prices mentioned can absorb the consequences of a decrease in supply;
- the estimates are made "all things being equal", i.e. without integrating the ability of fishermen to adapt their practices and tactics, to give up fishing methods which would be more directly affected by increases in mesh size. The clearest example of this is given by the distribution of fishing effort. With small mesh sizes, it is economically attractive to concentrate effort in areas which are rich in juveniles. As soon as the increases in mesh

size enter into effect, interest increases in those sectors where the largest fish are to be found.

The flexibilities mentioned are not purely theoretical. Various increases in mesh size have already occurred. Short-term losses had, for example, been announced in the Celtic Sea, which have never been noticed, the prices and the fishermen having developed. Vessels having opted for a mesh size of 110 mm in region 2 have immediately adapted their practices to this new rule. This experience can also be seen in other fisheries and it can even be said that, to date, the increases in mesh size which have occurred in the Community have never caused real economic difficulties, even temporary ones, to appear. It is true that these increases were of a moderate extent. But when organizing the phases it is always possible to reduce the immediate losses at each step. A rapid increase will allow the full benefits of rational mesh sizes to be reaped quickly, but will increase the difficulties of adaptation.

3.4. Sharing of benefits and sacrifices

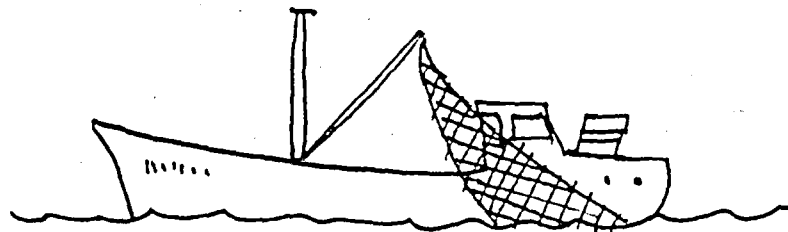
The diversity of fisheries creates disparities in connection with technical measures. Those which catch large fish have everything to gain and will not even suffer a notable short-term loss. This is the case with vessels which already use large mesh sizes or different flotillas of lining vessels. Conversely, the short-term losses affect more particularly the flotillas dedicated to fishing with small mesh sizes. This is the case with various specialized fishing activities subject to a derogation. Even if the flotillas concerned often have a limited number of crew, the problem is real. But, in a context of limitation of resources, even of biological risk for stocks, dangerous practices cannot be perpetuated. Furthermore, the statutory *status quo* also implies arbitration between methods. It leads to the priority disappearance of flotillas fishing for the largest fish. The intensification of fishing for juveniles has, furthermore, already led to the disappearance of certain fisheries, such as those fishing for adult hake in the Bay of Biscay.

Whatever the decision may be, it implies a heterogeneity in the distribution of profits and losses, in the short and long term. It is not the easy solution which lets the juvenile fisheries wear down the others which is necessarily the most fair. The only fairness in the matter corresponds to the risk of collapse of stocks which would make everyone a loser.

ANNEX 6**Technical measures in force in different areas of the North Atlantic and the Mediterranean**

Zone	Minimum mesh size of bottom trawl	Discard ban	One-net rule	Real-time stoppage of fishing
Baltic	70 -105 mm	no	no	no
Norway	135 mm	yes	no	yes
EU - Regions 1 & 2	80 -100 mm	no	no	no
EU - Skagerrat/Katt.	90 mm	no	no	no
EU - Region 3	65 mm	no	no	no
EU - Region 5	65 mm	no	no	no
EU - Region 6	100 mm	no	no	no
EU - Mediterranean	40 mm	no	no	no
EU - Gulf of Cadiz	40 mm	no	no	no
Iceland	155 mm	yes	no	yes
NAFO	130 mm	no	yes	no
Canada	? -160 mm	yes	no	no

FLEET



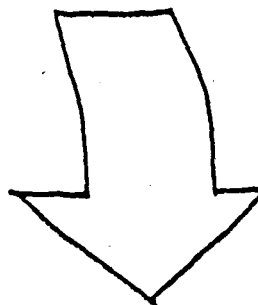
MULTI ANNUAL GUIDANCE PROGRAMME

Adaptation of the size of the fleets

EFFORT CONTROL

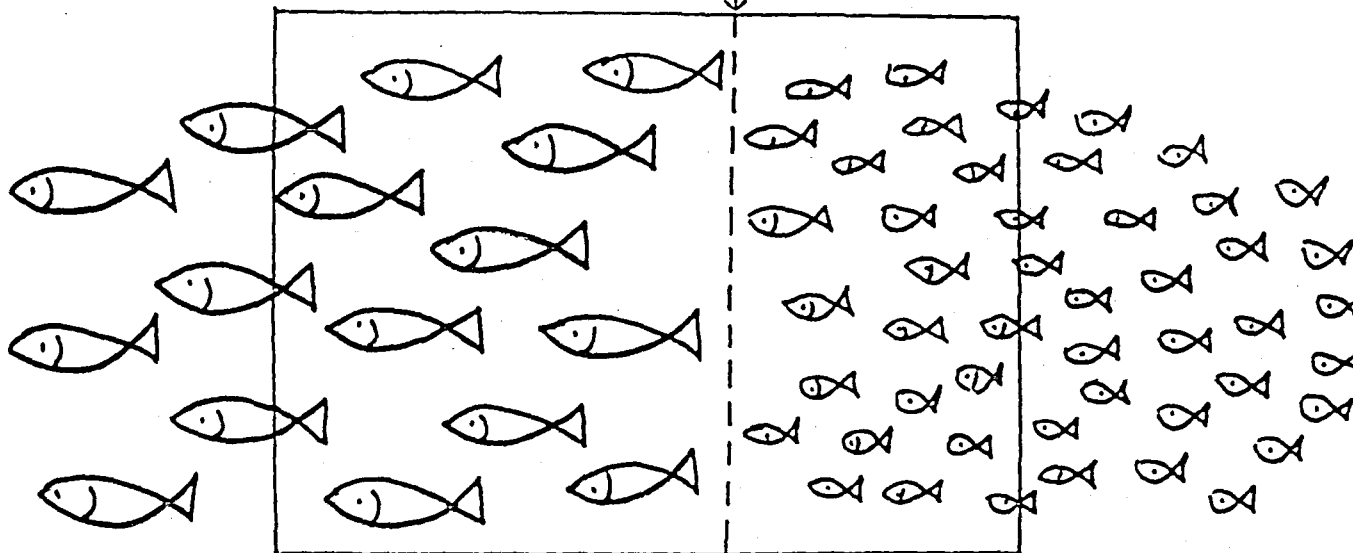
Direct limitation of the fishing activity.

FISHING ACTIVITY



TECHNICAL MEASURES : to avoid the catch of juvenile.

FISH STOCK



TACS & QUOTAS : Limitation of the amount of resource removed.

ANNEXE 7