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Multi-annual plan Western Horse Mackerel



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 21.4.2009
SEC(2009) 524

COMMISSION STAFF WORKING DOCUMENT

Accompanying document to the

**Commission's proposal for a
COUNCIL REGULATION
establishing a long-term plan for the Western stock of Atlantic horse mackerel**

{COM(2009) 189}
{SEC(2009) 525}

IMPACT ASSESSMENT

Agenda planning : 2008/MARE/027

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PREFACE: CHANGES TO THE WORKING DOCUMENT FOLLOWING THE IA BOARD'S OPINION

This final version of the Impact Assessment report takes into account the opinion given by the Commission's Impact Assessment Board on October 13, 2008. In particular:

- the scientific background of the proposal and its repercussion on the problem definition and objectives has been redrafted;
- the reasons for choosing the western horse mackerel as the subject of a management plan despite there being only incomplete scientific advice have been better explained;
- the reasons for choosing an option have been better explained, the options and in particular sub-options of measures that can be developed within a management plan have been described in more detail;
- clarity has been added to the discussion of impacts, and uncertainties in the assessment have been highlighted;
- cross-references to the discards and the control policy have been pointed out;
- practical and administrative aspects of policy implementation have been addressed.

EXECUTIVE SUMMARY

The Impact Assessment concerns a draft proposal that would set long-term management objectives and implementing methods concerning the fisheries for the Western stock of the Atlantic horse mackerel. The scope of the proposal is of medium importance, covering about 60 million EUR per year in terms of catch value. Approximately 60 vessels, 600 at-sea jobs and some 140,000 tonnes of fish catch for human consumption would be affected by the proposal, which is intended to deliver stability and sustainability. The fleet segments involved in this fishery are dominated by medium to large pelagic trawlers. The Impact Assessment focuses on those fleet segments which have horse mackerel among their five most important species. These segments cover about 83% of the overall catch. The value of the horse mackerel catches comprises only a small to medium important part of similar catching opportunities available to the same fishing fleets (between 1 and 20% according to the fleet concerned).

The objective of the proposal is to:

- contribute to implementing the Common Fisheries Policy's overall objective (ensuring the sustainable exploitation of marine living resources in ecological, economic and social terms) for one concrete stock. This will be achieved by ensuring that the annual decision-making on fishing possibilities corresponds to biological indicators on the development of the stock which the most renowned scientific bodies have confirmed as being meaningful.
- As an ancillary objective, the proposal aims to establish, for the sector concerned, predictability for the annual legislative decisions on total allowable catch for the stock, and to provide stability to such decision-making.
- As another ancillary objective, the proposal aims at attracting scientific analysis to the stock and increase over time the database and stock assessment quality.

Scientific and Stakeholder Committees have been consulted. In fact, the proposal mirrors an initiative taken by the stakeholders organised in the Pelagic Species Regional Advisory Council (PeIRAC).

The proposal is supported by DG MARE as an additional element in steering decision-making under the Common Fisheries Policy (CFP) towards a long-term framework that is compatible

with international obligations and with the CFP objectives themselves. Indeed, this text represents the second case where a long-term management approach is proposed for stocks that are not outside safe biological limits, following the management plan for herring in the west of Scotland.¹ Furthermore, it stands out by applying a biological indicator other than stock biomass and fishing mortality, and relies on precedent work and an initiative undertaken within the sector.

The operational elements and options are:

- **Option 1:** no policy change; continue fixing the fishing possibilities as a yearly *ad hoc* exercise based on annual scientific advice and political considerations;
- **Option 2:** freezing or gradually reducing fishing pressure in view of the insufficient knowledge about the biological status of the stock;
- **Option 3:** management plan; sub-options relate to the different biological indicators and management tools available. In particular, management by technical measures or effort regulation is considered, and management by output-constraints. Management by output-constraints is being preferred, and here a harvest rule based on a share of the total spawning stock size is being discussed, as well as a harvest rule based on the trend in the egg abundance. The latter is retained as the preferred sub-option. To this sub-option, possible complementary elements relating to catch stability, stock decline and control are being presented.

The service has undertaken a basic simulation of the mid-term economic effects, at the aggregated fleet level, on the profit margins of the two options retained (option 1 and 3). It shows that the difference is marginal, and that option 3 might even have a slightly more beneficial effect in relative terms. The presented impact assessment compares the possible scenarios and comes to the conclusion that the most suitable is the one that consists of proposing a long-term management plan, which sets TACs stable for 3 years according to a harvest control rule based on a precautionary advice for the harvest level adjusted by a trend that reflects the tri-annual results of egg surveys.

Details of the consultation processes, options and impacts are provided.

¹ OJ L 344 of 20.12.2008, p. 6; proposal: COM (2008)240 final dated 6.5.2008.

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Organisation and Timing

This impact assessment concerns a proposal for a Council Regulation establishing a long-term plan for the Western stock of Atlantic horse mackerel (*trachurus trachurus*).

Its development is foreseen in Agenda Planning (MARE/2008/027) and in the 2008 Annual Management Plan of the Directorate-General of Maritime Affairs and Fisheries under the specific objective "Conservation, Management and exploitation of living aquatic resources". An adoption was originally planned for late 2008, and will now be carried over to early 2009.

The reform of the Common Fisheries Policy set the basis in 2002 for changing to long-term plans and away from annual decision-making. The stocks that were most problematic were addressed first. Long-term plans to provide for stock recovery for several stocks have been adopted since 2003. The Commission is now starting to propose long-term plans for species that are less problematic, but which can benefit greatly from regulations that would seek to prevent stocks from falling into critical situations. The first among this group of proposals has been the long-term plan for the management of Western Scotland herring, adopted end of 2008, and the plan concerning the Western stock of horse mackerel is following the suit.

The proposal builds on a concrete and scientifically underpinned initiative by the sector concerned, channelled through the Pelagic Stocks Regional Advisory Council in mid 2007, an initiative that the European Association of Producers Organisations had already taken some years before².

At the same time, the approach presented will enter uncharted waters, as it would be the first time that a management plan is agreed for a stock the status of which is only rudimentarily known, and therefore the Commission does not have at its disposal a full stock assessment.

DG MARE held a series of meetings to discuss this legislative initiative with DG ENV, as the associated service primarily concerned. Much progress has been achieved through these consultations, particularly during the summer months of 2008. The outcome of these discussions has provided the essential elements for the inter-service dialogue and steering work under the formal impact assessment procedure reported here.

1.2. Consultation and expertise

Advice has been sought from relevant scientific organisations since 2006. The impact assessment is prepared by DG MARE on the basis of scientific advice concerning long-term management and is complemented with economic analysis using available information. Consultation with stakeholders has taken place with the relevant representative body.

External expertise has been sought from the International Council for the Exploration of the Sea (ICES) concerning long-term management of fisheries resources of interest to the European Community. This organisation collates the expertise of fisheries scientists mostly working in the national fisheries laboratories of Member States and provides a systematic and standardised advice to the European Community and to Member States.

The spawning-stock biomass (SSB) of the Western horse mackerel stock has been dominated by an outstanding 1982 year class (~18 times the long-term average). The strong 1982 year class has been gradually fished down, whereas recruitment has remained low, resulting in a steady decline

² See 19th report of the STECF, SEC(2005) 369, page 111, <http://fishnet.jrc.it/web/stecf>

of SSB since its peak in 1988. The ongoing decline made it difficult to provide advice on sustainable management, so in response to a joint EU–Norway request to ICES to "advise on appropriate management systems including management strategies, objectives and ecosystem considerations" for the stock, several stock assessment approaches and management based on a simulation study were first evaluated in 2005³.

In 2006 ICES advised for the first time that harvest control rules based on the trend in the egg survey data appeared promising⁴. Simulations were undertaken within the Study Group on Management Strategies in 2006 and 2007, as requested by the EU jointly with Norway⁵. Based on this work and assisted by a separate group of scientists, the Pelagic RAC (PelRAC) presented to the Commission a management plan outline in July 2007⁶. The Commission asked ICES for a valuation of this plan. ICES in 2007 concluded that the plan was consistent with the precautionary approach in the short term, and advised to follow the plan for the period 2008 to 2010⁷. The Scientific, Technical and Economic Committee for Fisheries endorsed ICES' advice⁸.

A research project concerning the horse mackerel stock identity was also funded by the European Community⁹. It confirmed in 2004 previous assumptions about a stock distribution of the Western stock larger than previously held, in particular covering also the waters off the Northern coast of Spain (ICES division VIIIc). Following this evidence and preparing for a management of the stock, the Commission is working for a re-definition of the management areas defined for the setting of TACs, a topic discussed with RACs in the context of the "frontloading" of the TAC&Quota Regulation 2009. It is foreseen to achieve this rearrangement together with the entry into force of the management plan.

Stakeholders were consulted by means of verbal and written communication with the PelRAC. This body has been established¹⁰ for consultations with parties having an interest in the Common Fisheries Policy in respect of pelagic fish stocks. Its members come from the catching sector. Its members come from the catching sector (ship owners, small-scale fishermen, employed fishermen and producer organisations), from processors and traders, from environmental NGOs, from aquaculture producers, and from the recreational activity. Given that the initiative for a management plan for the Western horse mackerel came from the PelRAC itself, discussion took place upon the formal submission of the PelRAC's¹¹ proposal during 2007 and 2008, in the PelRAC's working group II (dedicated to blue whiting, sprat and horse mackerel) and the

³ Report of the *ad hoc* Group on Long Term Advice (AGLTA). (2005b) 126. 12–13 April 2005, ICES Headquarters. ICES Document CM 2005/ACFM: 25.

⁴ ICES, 2006. Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, 2006. ICES Advice, Book 9, p.70.

⁵ ICES SGMAS Report 2007. Report of the Study Group on Management Strategies (SGMAS), p. 28. ICES CM 2007/ACFM:04.

⁶ Based on the study "Towards a management plan for western horse mackerel", Ad hoc group of scientists in collaboration with members of the Pelagic RAC, Pelagic RAC et .al., 2007.

⁷ ICES, 2007. Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, 2007. ICES Advice, Book 9, p.13 and 55.

⁸ Report of the Scientific, Technical and Economic Committee for Fisheries. Review of scientific advice for 2007. Consolidated advice on stocks of interest to the European Community in the ICES areas, endorsed at the 26th STECF Plenary session November 2007, <http://www.ices.dk/products/icesadvice.asp>

⁹ HOMSIR project, A multidisciplinary approach using genetic markers and biological tags in horse mackerel (*trachurus trachurus*) stock structure analysis, QLK5-Ct1999-01438.

¹⁰ 2005/606/EC: Commission Decision of 5 August 2005 declaring operational the Regional Advisory Council for Pelagic stocks under the Common Fisheries Policy. OJ L 206, 09.08.2005, p. 21. <http://www.pelagic-rac.org>

¹¹ Based on the study "Towards a management plan for western horse mackerel", Ad hoc group of scientists in collaboration with members of the Pelagic RAC, Pelagic RAC et .al., 2007.

executive committee. The Commission welcomed the sector's initiative, discussed possible alternatives and impacts of such a plan with the stakeholders and used its legislative right of initiative for putting such a plan into practice. The key elements and recommendations retained to feed into the legislative process were as follows:

1. The TAC would be stable for a period of 3 years following the year of the most recent survey;
2. In the event of a survey result not being available, the TAC would in principle be based on annual scientific advice;
3. The introduction of special fishing permits would be considered;
4. The plan would be scientifically evaluated in intervals.
5. Criteria for the evaluation might be the following:
 - SSB has been maintained above SSB₁₉₈₂ (150,000t);
 - Knowledge about the stock increases due to cooperation with the sector;
 - The uncertainties and bias in the fishery and biological system remain within the bounds of those tested; and
 - The assumptions made in the simulation testing phase are still valid;
 - Catch levels have increased together with the biological indication of increased stock abundance, if any;
 - Discarding and misreporting do not increase in a period of increased stock abundance and could be taken into account in the TAC-setting process.
6. Control measures would include special fishing permits; harvest monitoring would benefit from increased observer coverage as programmed in national data collection programmes with the support from the harvesting sector;
7. The TAC would be set according to the following harvest control rule:
 - One half of the total TAC consists of 75.000 tonnes, being one half of the harvest level that for already some time has been considered as being precautionary with regard to a stock that does not produce large year classes;
 - One half of the total TAC consists of one half of the latest TAC set before the latest egg survey, multiplied by a factor which represents the slope in egg abundance confirmed by the latest three European egg surveys;
 - The total TAC will be reduced by discard or unreported landings where estimates exist, and
 - The total TAC will be increased by 7%, resulting from a simulation of the harvest control rule that produces less than 5% risk for a precautionary level of biomass.

The factor representing the slope would be calculated as shown in picture 1 which can be found in Annex 2.

The Advisory Committee on Fisheries and Aquaculture (ACFA) was not consulted as that body advises on cross-cutting issues whereas this plan concerns a specific regional issue.

1.3. Dissemination of scientific advice and the results of consultations with stakeholders

The scientific advice from ICES and from STECF and the advice from the PelRAC are available on the websites of ICES, the PelRAC and the STECF, the latter being administered from the Joint Research Center¹².

2. PROBLEM DEFINITION

2.1. Current political background

The reform of the Common Fisheries Policy set the basis in 2002 for changing to long-term plans and reducing discretion of annual decision-making to ensure sustainable exploitation of fisheries resources. The stocks that were most problematic were addressed first. The Commission has started to propose long-term plans also for the less problematic species, with the objective of avoiding these stocks from falling into critical situations, and also aiming at the side-effect of increased scientific coverage. The Western horse mackerel belongs to this category of stocks.

It is a pelagic stock meaning it builds schools in the water column, not in permanent contact with the seabed. The commercially most relevant widely distributed pelagic fish stocks are already subject to international management instruments, which are agreed with neighbouring countries from the North, because those stocks are exploited also by those parties and agreement has been reached over the years on carrying out a joint management. This proves beneficial in bringing stability into the decisions on annual fishing opportunities both at the international and the Community level. The stocks concerned are Northeast Atlantic Mackerel, Blue Whiting, Atlanto-Scandian herring, and North Sea herring. The Western Scotland herring was thus the first of the pelagic stocks for which a management plan only at Community level could be developed, and the Western horse mackerel is the second one. The reasons for choosing the Western horse mackerel as the next candidate for introducing a Community management plan are the following:

- 1) Strong sector initiative;
- 2) Highest commercial importance among the pelagic stocks not jointly managed with neighbouring countries;
- 3) Exploitation by a large number of Member States;
- 4) Circumstances of the fishery conducive to improved effectiveness of management measures, given that discrepancy between lawful harvest limitations and actual harvest has considerably decreased in recent years (see point 2.3 below).

Based on the above, a new approach to managing the Western horse mackerel - based on long-term sustainability and improved assessment of the stock – is being proposed by the Commission.

2.2. Issue requiring action

The current management system as it applies in the EU does not serve the horse mackerel situation very well. The TAC is set every year following negotiations with Member States during which political pressure and short-term economic goals often take precedent over a long-term maximum sustainable yield (MSY) approach to fishery.

¹² Please refer to previous references for websites addresses

Moreover, the scientific advice for the stock is based on only a poor assessment. Generally, the stock assessment of mackerel and horse mackerel is difficult. For those assessments, scientists need standardised fishery-independent sources of information which they can use to "tune" the data they have received via commercial landings. Concerning acoustic surveys, mackerel and horse mackerel cannot easily be detected and differentiated acoustically because they lack a swim-bladder. As the most important fishery-independent source of information, international egg surveys for mackerel and horse-mackerel have been conducted every three years since 1977.

Using the information from the egg surveys and knowledge about how many eggs a female produces during spawning time, scientists estimate the spawning biomass of the stock. However, the models so far applied for estimating the size of the stock of Western horse mackerel cannot be considered robust, as the knowledge about the spawning behaviour has changed over time, rendering old models less reliable. The mortality caused by fishing is not well understood, due to the fact that the stock has long been dominated by only one "year-class" of recruits, due to insufficient catch data sampling in Member States, and due to the fact that the relevant band of year-classes to be examined has changed in more recent years, thus hampering the continuity in establishing longer time series. Therefore, a target mortality rate that would render MSY cannot be established at present.

It is by no means unusual that scientific advice for a stock cannot be based on a full stock assessment. This is indeed the rule rather than the exception, and reasons for the shortcomings of scientific advice are manifold, including for example reduced indicative strength of data coming from fisheries which are in decline. So far, the Commission has introduced management plans only to stocks which status is relatively well understood. In the case of horse mackerel, waiting for science to develop a full stock assessment before taking regulatory action is not the right direction. Knowledge on the stock has improved only recently, and the wide distribution of the stock, as well as the erratic recruitment that has been observed, make unpredictable the amount of time necessary to significantly improve the assessments. In the meantime, the egg survey data can indeed serve as biological indicator for the stock size. Therefore, basing a TAC-calculation on the development of the egg survey results every 3 years would be a possible solution to the problem of poor stock assessment. In view of the revision clauses built into the Commission's long-term plans, the plan could be adapted to more precise stock assessment once those are available.

Taking into account scientific advice on an *ad hoc* basis is hampered by the fact that the stock areas of scientific advice do not coincide with the areas for which total allowable catches are fixed. The problem of this area mismatch should be resolved no later as a long-term management will be implemented¹³.

The current system, with its annual approach to setting the TAC and the lack of predictive power in the assessment, means that the stock may not be optimally harvested. For example, in periods of elevated stock productivity, due to pulse recruitment, optimal catches cannot be advised for in the current management system. This is contrary to the overall objective of the Common Fisheries Policy, namely to provide for sustainable exploitation in ecological, economic and social terms.

¹³ For a detailed discussion see Annex 2. For the latest scientific contribution to the discussion on the stock boundaries see Abaunza et al., Stock identity of horse mackerel (*Trachurus trachurus*) in the Northeast Atlantic and Mediterranean Sea: Integrating the results from different stock identification approaches, Fisheries Research 89 (2008) 2, 196.

2.3. Underlying driving forces

The main long-term drivers of the fisheries system is the pursuit by the harvesting sector of a production increase, fuelled by growing demand and often not more than steady prices. The growing harvest potential of the fleet (production capacity) would allow for such increases, but the resource availability is limited by the resources' natural growth potential. Reducing the stock size to a low level (while maintaining high catches for a short period) lowers the productive potential of the stock in the longer term. This has happened with the vast majority of commercial fish stocks in the Community, partly sanctioned by the annual decision-making mechanism, partly due to illegal landings. In short-term perspective it can often be economic and social pressures which predominate in the dynamics of the system and lead to decisions on fishing opportunities that, cumulatively, can become unsustainable. In consequence, less or lower-quality fish is harvested despite an increase in effort and running costs.

Seen from the ecological perspective, fishing is the most important driving force of changes to the biodiversity. In fact, the pressure exerted on a stock by fishing can have a more important impact on the stock than all the biological conditions in which the stock develops.

In administrative and political terms, this means that economic and social pressure exist which have led to TACs being set higher than those recommended according to sustainability criteria, and many fish stocks being fished outside safe biological limits¹⁴.

In case of the Western horse mackerel, the discrepancy between scientific advice and TAC cannot be easily identified, as the areas concerned are not identical, so that three different TACs concern partly this stock, partly other stocks. However, as a general assessment, TACs were drastically higher than the advice up and until 2004. Likewise, landings of horse mackerel well exceeded the TACs set for this stock from 1988 for about a decade. In 1988 the stock's mass peaked with the exhaustion of growth potential of the 1982 class. Since 2004 - TACs being stable and the scientific advice indicating a trend towards possible higher catch rates - the discrepancies between advice, TACs and catches have levelled out. Indeed, the catches have even decreased in recent years, a fact that can be explained by the presence of better alternatives (in particular mackerel) for the fishing fleets involved, horse mackerel being often a "second choice" compared to more valuable pelagic fish.

Table 1: TAC horse mackerel for Western area, compared with landings as estimated by ICES

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
TAC (in thousand tonnes)	265	240	233	150	137	137	137	137	170
Landings (in thousand tonnes)	274	175	191	172	*	*	182	155	123

Source: ICES advice 2008, Book 9, page 91. In view of the discrepancy of TAC areas and stock area, the table is indicative only.

* Data for these years not comparable as they cover a larger region.

¹⁴ A detailed analysis is given in Commission Communication "Fishing Opportunities for 2009: Policy Statement from the European Commission", COM(2008)331final.

This situation can be seen as a unique opportunity that could be used for introducing a harvest control rules based on available biological information, thereby avoiding short-term negative economic effects that are a common determinant of long-term plans which aim at recovering depleted stocks, rather than keeping abundant stocks at a high level.

2.4. Effect on the sector

2.4.1. Identification of the sectors affected

The Western horse mackerel is one of three widely dispersed stocks of *Trachurus trachurus* in the Northeast Atlantic, extending from the Gulf of Cadiz to the Norwegian Sea (see Annex 1).

The principal sectors affected are the owners, operators and crews of pelagic fishing vessels operating in the distribution area of the Western stock of the Atlantic horse mackerel, that is the Northern North Sea, the Norwegian Sea, areas West of the British Islands, the Western English Channel, waters West of Brittany, the Bay of Biscay and North and Northwest Spain.

Today, several important fisheries for western horse mackerel can be distinguished: Dutch, German and French pelagic freezer trawlers operating in the Western English Channel and other parts of ICES sub-area VII, as well as in the Southern North Sea; an Irish pelagic seawater (fresh-fish) trawler fleet operating in ICES sub-areas VI and VII in coastal and shelf waters along the Northwest and West coast of Ireland; Danish trawlers operating in the Channel. Furthermore, a sporadic, occasionally very important and unregulated¹⁵ Norwegian purse seine fishery operates in the Northern North Sea in late autumn, the latter depending on the intensity of water influx from the Atlantic into that area¹⁶¹⁷. In addition, Spanish and Portuguese bottom trawlers and purse seiners operate along the Atlantic coast of the Iberian peninsular, partly in a targeted and partly in a mixed fishery. Finally, a part of the Lithuanian long-distance fleet catches horse mackerel in the regulatory area of NEAFC¹⁸.

The vessel owners and crews which will mostly be affected by the legislative initiative can be summarised as shown in the tables (see Table and 3) below. The figures are based on Member States' data and are regularly channelled into DG MARE's economic report¹⁹. The table also gives account of the employment involved and the relative importance of horse mackerel in the catches and revenues. Only those fleet segments are shown which carry horse mackerel among their five most important species (by weight or value). To be noted that the source does not distinguish between the different stocks of horse mackerel and might therefore particularly include horse mackerel from the North Sea stock or third country waters. However, the data is still meaningful given that the Western stock is by far the most important stock.

Table 2 - Basic data on fleet segments most concerned (2006)

¹⁵ Only subject to a by-catch limitation and a discard prohibition, see 2007 Report of the ICES working group on the assessment of Mackerel, Horse Mackerel, Sardine and Anchovy (WGMHSA), ICES doc. CM 2007/ACFM:31.

¹⁶ More in particular, Ireland, Denmark, Scotland, England and Wales, France, Germany and the Netherlands have a directed trawl fishery and Norway a directed purse seine fishery for horse mackerel. See footnote 2, page 228. Also ICES WGMHS report 2007, CM 2007/ACFM:31.

¹⁷ Towards a management plan for western horse mackerel, Pelagic RAC without year [2007], page 2. Iversen/Skogen/Svendsen, Availability of horse mackerel (*trachurus trachurus*) in the north-east North Sea, predicted by transport of Atlantic water, Fisheries Oceanography 11 (2004), page 245.

¹⁸ Report 2006 of the Republic of Lithuania on the achievement of a sustainable balance between fishing capacity and fishing opportunities.

¹⁹ Latest reference: Economic performance of selected EU fishing fleets, Summary document prepared by the economic unit of DG FISH, December 2007.

Member State	Segment	Length	Vessels	Capacity (GT)	Days at sea	Employment
NL	PTS ²⁰	>40m	14	70150	3450	465
IE	PTS	>40m	18	33460	1340	236
IE	PTS	24-40m	13	4500	1000	112
DE	PTS	>40m	13	24420	1940	65
UK	PTS	>40m	33	53220	3170	178
ES	PTS	12-24m	546	19580	n.a.	4997
Sum			637	205330		6053

Source: DG MARE based on STECF evaluations of MS data collected under fisheries data collection regulation.

Table 3 - Economic importance of horse mackerel for the fleet segments identified (2006; HOM=horse mackerel)

Member State	Segm.	Length	Total catch (t)	HOM catch (t)	Relative importance (%)	HOM catch (€m)	Income (€m)	Relative importance (%)
NL	PTS	>40m	356730	69970	20%	26,45	125,12	21%
IE	PTS	>40m	121850	18090	15%	4,52	44,55	10%
IE	PTS	24-40m	30550	5800	19%	1,45	30,97	5%
DE	PTS	>40m	153480	12120	8%	5,46	64,26	8%
UK	PTS	>40m	313680	12380	4%	4,45	178,04	2%
ES	PTS	12-24m	19730	1716	9%	1,53	123,6	1%
Sum			996020	120076		43,9	566,5	

Source: DG MARE based on STECF evaluations of MS data collected under fisheries data collection regulation.

The fleets from Denmark, Portugal, France and Lithuania which recorded catches are excluded from the analysis since they have no fleets where horse mackerel is one of the top five target species in their catch composition, when assessed in catch value terms. For Denmark, it is noteworthy that despite holding a share of 9% of the horse mackerel's western TAC, industrial species of herring, mackerel, sprat, sandeel and blue whiting represent 95% of the total catch value of the PTS >40m segment. For France, the predominant pelagic catches in terms of value are tuna, herring, mackerel, blue whiting (92% for PTS >40m), and anchovy, pilchard, hake, seabass, albacore (78% for PTS 24-40m).

²⁰

Pelagic trawlers and seiners.

2.4.2. *Effect of the regulation*

Recent catches from this stock have been around 140,000t according to scientific estimates, with an average first-sale value of some €60 Million.

The fishing vessels in this sector are typically very mobile and have access to a number of fisheries resources, including North Sea herring, mackerel, blue whiting in the North-East Atlantic and also to some fisheries resources outside Community waters (e.g. sardinella off West Africa). Larger pelagic freezer trawlers are reported to target 14 and more different species²¹. It can be assumed that none of the vessels within the fleet segments concerned is targeting horse mackerel, including the one from the Western stock, exclusively. The relative importance of horse mackerel varies between 9 and 20% concerning the overall catch and between 1 and 21% concerning the value. The relative importance of the species for the sector is thus low or medium high.

As examples, the following species can be shown per fleet segment by importance in weight in descending order:

NL PTS > 40m: Herring, Horse Mackerel (not only Western stock), Mackerel, Blue Whiting.

DE PTS > 40m: Herring, Mackerel, Horse Mackerel (ditto), Blue Whiting.

UK PTS > 40m: Mackerel, Herring, Blue Whiting.

ES PTS 12-24m: Sardine, Horse Mackerel (ditto).

The stock represents a small part of the fishing opportunities available to Member States for the fleet sector concerned. Furthermore, the stock is not at an immediate risk of collapse and any adjustments in catches corresponding to the application of the plan should be moderate. The new management should maintain yields and fishing mortality rates at approximately the same level as has been taken from the stock in the recent past. Moreover, the simulations of the mid-term economic effects, at the aggregated fleet level, on the profit margins of the two options retained (option 1 and 3) showed that the difference was marginal, and that the preferred option might even have a slightly more positive effect in relative terms (Table 8).

On both accounts therefore the effect of changing the current regime on the relevant fisheries sectors is intended to help to ensure stability of a rather limited part of the sector's catches, and not to create important changes. However, as a consequence of applying the management plan over time, larger changes might occur with radical variations in the egg abundance, as identified in one of the future egg surveys. It cannot be predicted if and when such changes will occur, and applying the established rule would continue pursuing the objective of a sustainable fishing activity.

2.4.3. *Magnitude of the effect on the sectors*

It was only from the 1970's that horse mackerel gradually became upgraded from feed fish to human consumption. Nowadays, only very small quantities of horse mackerel are caught in industrial fisheries by Irish and UK vessels. The species also used to have some significance for

²¹ Norway cod, Greenland Halibut stocks, Norway haddock, Atlanto-Scandic herring, North Sea herring, Western Scotland herring, Western horse mackerel, North Sea mackerel, Northeast Atlantic mackerel, Norway saithe, Norway redfish, Greenland redfish stocks. See Annex to the report 2006 of the Federal Republic of Germany on the achievement of a sustainable balance between fishing capacity and fishing opportunities.

a traditional Danish feed fish fishery operating in the English Channel, which nowadays catches for human consumption²².

The targeted age groups are variable, as the fisheries exploit juvenile fish for the human consumption market, mid-aged fish mostly for the Japanese market, and older fish either for human consumption purposes (mostly for the African market) or for industrial purposes²³. According to the Commission's trade statistics, key export markets for horse mackerel for human consumption²⁴ are Tunisia, Japan, Nigeria, Ivory Coast and Ghana.

All vessels involved in the fisheries at stake must comply with a ceiling, established each year, of maximum allowable landings of horse mackerel harvested from defined areas. This may be achieved indirectly through the allocation of individual or collective quotas or through the closing of the fishery by the Member State once the overall quota allocated to that Member State has been consumed. This mechanism results from the annual TAC & Quotas Regulation. A regulation that sets harvest rules with a view to long-term management of the stocks would affect the sector again indirectly in the way that the discretion by which the annual TAC for this particular stock can be established would be restricted.

The intervention of the harvest control rule might entail an adjustment of the TAC for the next year that results in an increase or decrease of the TAC. Either way, the consequences for any given vessel are not an automatic and corresponding adjustment in individual fishing opportunities, since allocations to them depend on the system implemented by each Member State to administer its overall quota. Business opportunities and economic choices available to the vessel owner are also important in respect of the impact that TAC adjustments may have on individual operators. The intensity by which, for instance, a decrease in the TAC would have a restricting effect on the vessel owner's intention to catch Western horse mackerel would depend on, besides the Member States' management system, the level of quota exhaustion observed in the fishery concerned, and the economic importance of the fishing opportunity, in terms of absolute value and relative to alternative harvest opportunities.

The general importance of horse mackerel from the Western Atlantic stock can be described by looking at the available fishing opportunities in terms of total allowable catch. The TAC as well as the actual catches of Western horse mackerel are the most important among the TACs for horse mackerel. The following table, derived from the Commission's catch reporting system, illustrates this. It is to be noted that the statistics are based on a TAC area for the Western stock which is not fully in line with the distribution of the stock, but about 10% smaller in terms of fishing opportunities²⁵. The ongoing discussion of a reorganisation of TAC-areas is explained in Annex 2.

Table 4 - In 1000 tonnes rounded, TAC excluding share of non-EU members

²² European Parliament Working Paper FISH 113 EN 02-2004, The Fish Meal and Fish Oil Industry, its Role in the Common Fisheries Policy, page 8.

²³ ICES, 2004. Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, 2004, part 2, page 836.

²⁴ The Commission's trade statistics does not differentiate according to the different stocks.

²⁵ The existing Western TAC area is made up by ICES divisions VI, VII, VIIIab, VIIIde, Vb, XII, and XIV. The Commission considers a reallocation of division VIIIc (North and Northwest Spain) to the Western area, of division VIId (Eastern English Channel) to the Northern area and of divisions IIa as well as IVa to the Western area to be necessary. This will bring the TAC areas into line with scientific advice. The resulting TAC might result in an increase of about 10% in the Western area, which might be reflected by a similar increase in catches attributable to such area.

Horse mackerel	2005 TAC	2005 EU catches	2006 TAC	2006 EU catches	2007 TAC	2007 EU catches
Western TAC	133	123	135	120	136	109
Southern TAC	55	46	55	48	55	44
Northern TAC	41	38	41	32	41	27

Source: DG MARE catch reporting system

The fact of recently decreasing catches has been mentioned already in point 2.3. Based on an internal survey among members of the pelagic RAC, the market could absorb double of the 2007 catches. The industry has managed to develop over the years large markets in Africa and Asia, in addition to the existing traditional fresh-fish markets in Portugal and Spain. The relatively low and stable prices should also provide a buffer in economic downturns. The reason for a TAC not being exhausted might therefore be found in more attractive alternative fishing opportunities. Important factors affecting the catches are: highly volatile fuel prices; opportunities in mackerel, herring and blue whiting; size of the TAC portion that is traded with Norway and Faroes in exchange for other fishing opportunities.

The first-sale value of horse mackerel destined for human consumption has fluctuated around 0.47 EUR per kg in recent years (for comparison: Mackerel: 0,68 EUR, Herring: 0,24 EUR). Applying this to the catches registered only gives a very rough estimation, given the quality tiers and the fact that some parts of the catches will be utilised for industrial purposes, thus triggering a much lower income.

Table 5 - First-sale price in EUR of one kg horse mackerel per Member State which fleet segments have been assessed

Member State	2003	2004	2005	2006
NL	0,31	0,31	0,30	0,38
IE	0,13	0,18	0,25	0,25
DE		0,35	0,44	0,45
UK	0,19	0,18	0,28	0,36
ES	0,71	0,77	0,78	0,89
Average	0,34	0,36	0,41	0,47

Source: DG MARE based on STECF evaluations of MS data collected under fisheries data collection regulation.

Applying the first-sale value to the catches delivers the overall importance of the stock. For this exercise, the catches in division VIIIC (2004: 24.000t, 2005: 22.300t, 2006: 23.700t) have been added to the catches in the Western TAC area, for the reason that catches in this area belong to

the Western stock, as confirmed by scientific studies on the boundaries of the stock. Any long-term plan would apply to an area that comprises also area VIIIc²⁶.

Table 6 - Approximate first-sale value applying the average price to the catches

	2005	2006
Catch (including VIIIc) in Mio tonnes	145,3	143,7
Value in Mio EUR	59,6	67,5

Source: see tables 3 and 4.

For those Member States holding quotas on this stock, the proportion of the fishing opportunities for horse mackerel in the Western TAC area to the total of horse mackerel TACs is as follows²⁷. To be noted that after TAC area reorganisation the Western TAC area will increase by approximately 10%.

Table 7 - Horse mackerel quota in Western TAC area

Member State	Horse mackerel quota as % of all three TACs established for Atlantic horse mackerel	Combined TAC"as, all three areas in tonnes
NL	93	62191
IE	95	41109
ES	35	47700
FR	95	8480
PT	6	27898
DE	87	14079
DK	0	25208
UK	82	20191
BE	0	58
Sum	Not applicable	246914

Source: DG MARE based on the annual TAC"as Regulation

The table shows that dependency on this TAC, as compared to all horse mackerel TACs, is very significant among Member States, except for those which do not have a share in the Western

²⁶ This calculation is made for reason of simplification in line with ICES practice. The final TAC areas will incorporate further changes see Annex 2.

²⁷ Calculated from Council Regulation (EC) No 40/2008 of 16 January 2008 fixing for 2008 the fishing opportunities and associated conditions for certain fish stocks, applicable in Community waters and, for Community vessels, in waters where catch limitations are required. OJ L 19/1, page 86.

TAC (Denmark, Belgium) and those which have the majority share in the likewise important Southern TAC (Spain and Portugal).

2.4.4. Legal basis for Community action

Council Regulation (EC) No 2371/2002 of 20 December 2002 on the Conservation and Sustainable Exploitation of Fisheries Resources under the Common Fisheries Policy²⁸ provides for the establishment of management plans for fisheries exploiting stocks which are within safe biological limits (Article 6). In the case of the Western stock of Atlantic horse mackerel, the scientific advice available to the Commission qualifies the status of the stock as unknown. This means that fisheries scientists have not undertaken a full analytical stock assessment. However, the 2001 year class of this stock has been stronger than those observed in previous years, having led to increased catches since 2002. The spawning stock size is estimated to be well above the level of 1982, which produced an extraordinarily large amount of juveniles. In addition, the positive trend of the latest egg survey suggests that the spawning stock biomass has increased in recent years. The removal from the stock by fishing relative to the total mortality (fishing mortality) is considered to be relatively low, albeit not known. This suggests that the stock's reproduction is probably not being adversely affected by fishing activities at present. Therefore, Article 6 may still be applied. However, the plan should also work once the stock size will have decreased to levels that affect the reproductive capacity. In that case, Article 5 would be the provision on which to base the management plan. In view of this ambivalent nature of the plan, Article 37 of the Treaty establishing the European Community would form the general legal basis for the Community to act in this case.

2.4.5. Necessity and subsidiarity

Fisheries management is an exclusive Community competence; hence measures concerning fisheries of trans-national importance must be adopted at Community level and the principle of subsidiarity does not apply. In order to make explicit the rationale underlying this, it can be recalled that the initiative concerns the annual setting of a TAC for a fish stock that is shared between several Member States, currently the following ones: Denmark, Germany, Spain, France, Ireland, the Netherlands, Portugal and the United Kingdom. A Member State would not be able to regulate the TAC on its own, as it would have to anticipate parallel legislation by other Member States having an interest in the stock, and also the share of non-EU countries that traditionally harvest this stock following annual agreements with the Community. Neither would a Member State be able to effectively regulate the variation in TACs as a conservation measure, given that the stock can only be managed effectively as a common concern, so that Member States exploiting the stocks have to follow the same management rules at the same time. Therefore, it is necessary that the measure of setting TACs and formalising rules according to which this should happen be taken at the Community level.

3. OBJECTIVES

3.1. General objectives

The general policy objective of the long-term management plan is to ensure the exploitation of the stock consistently with a high sustainable yield.

Policy coherence concerning sustainability objectives should be maintained. The plan should conform to the objectives of the Common Fisheries Policy, as set out in Article 2 of Regulation

²⁸ OJ L 358, 21.12.2002, pp. 59-80.

(EC) No 2371/2002. In addition, such plans should contribute to the aims of the Implementation Plan agreed by the World Summit on Sustainable Development at Johannesburg in 2002, especially in respect of exploiting stocks compatibly with maximum sustainable yield²⁹. This political objective has been the subject of a separate Commission Communication (Implementing sustainability in EU fisheries through maximum sustainable yield (COM (2006) final) and accompanying working document (SEC(2006) 868)³⁰. However, this objective is only operational in a small number of cases, namely where the scientific knowledge about the stock allows drawing conclusions on what the biomass and fishing levels would be that ensure the maximum sustainable yield (MSY) in the long term. The case of the Western horse mackerel is a typical example of a stock where the MSY approach is not operational in the foreseeable future³¹, so that subsidiary objectives must be defined that would contribute to the overall objective but for which the precise relation between attaining the subsidiary objective and attaining the overall objective is not known.

3.2. Operational objectives

Contributing to the general objective will be achieved by ensuring that the decision-making on fishing opportunities corresponds to biological indicators on the development of the stock which the most renowned scientific bodies have confirmed as being meaningful.

As an ancillary objective, the proposal aims to establish, for the sector concerned, predictability for the annual legislative decisions on total allowable catch for the stock, and to provide stability to such decision-making. This ancillary objective is linked to the general objective of economic and social sustainability.

Another ancillary objective is to attract fisheries managers', the sector's, and scientists' interest towards better understanding of this stock, so that the data base and analysis for both management and scientific advice are steadily improved.

Attaining these operational objectives will represent steps towards attaining the general objective.

The operational objectives are consistent with the PelRACs initiative outlined above, and are considered realistic. As the sub-objectives meet current harvesting conditions, timely implementation of the initiative in practice will be feasible without the need to resort to transitory measures.

4. POLICY OPTIONS

The Commission has considered the following options:

Option 1 implies that the current system of managing the stock by setting annual Total Allowable Catch (TAC) according to available scientific information on the stock and ad hoc political considerations remains unchanged.

Under current regime, the stock is managed by means of a precautionary TAC that in recent years has been set at around 150,000t, according to historical data. This TAC is not based on recent analytical assessment or long-term forecast.

²⁹ www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIToc.htm

³⁰ www.cc.cec/home/dgserv/sg/sgvista/i/sgv

³¹ See Roel/Oliveira, Harvest control rules for the Western horse mackerel (*Trachurus trachurus*) stock given paucity of fishery-independent data, ICES Journal of Marine Science, 661, 667.

Option 2 is based on the consideration that, given the absence of conclusive information on the status of the stock, freezing or gradually reducing the directed fishery on Western horse mackerel might be a good way to protect the stock against decline. This could be achieved by either a yearly TAC-setting following a specific understanding of precautionary approach or by introducing a legal instrument for the stock (management plan).

Option 3 is about proposing a legal management instrument for the stock, according to available conservation reference points and longer-term sustainability considerations. Several sub-options of a management plan relating to different biological indicators and other implementation elements were evaluated.

4.1. Description of the options

4.1.1. Option 1 - No policy change

Under present conditions, there is no quantitative legal basis establishing guidelines or restrictions on the annual setting of fishing opportunities concerning the stock of Western horse mackerel.

Currently, the Total Allowable Catch (TAC) for a species is adjusted every year according to analytical scientific assessment based on traditionally used conservation reference points, like stock spawning biomass (SSB) levels and fishing mortality (F). The Western horse mackerel stock is one of the best studied horse mackerel stocks in the world, yet, due to the nature of the stock, there are large gaps in the information base. Because SSB, recruitment and F cannot be assessed so far, a reliable analytical assessment for the stock is not available. Because of that, a precautionary approach based on historical data rather than recent scientific evidence has been applied.

Retaining this process would mean that annual TAC decisions are taken on the basis of incomplete stock information and *ad-hoc* considerations of economic and social factors at the political level. Experience has shown that these circumstances often lead to stock overfishing and ineffectual or late harvest restrictions. The case of the Atlantic horse mackerel shows this pattern in rather drastic form up until the last couple of years (see chapter 2.3 on driving forces).

In the last decision taken on this species, in December 2008, the only solution that could be found to the different TAC-areas of horse mackerel was a "roll-over" of the previous TAC-levels, without showing due regard to the scientific advice. However, Member States and Commission declared that they were seeking to agree on TAC areas in line with scientific advice on the stock boundaries, and then develop the TAC according to the management plan that Commission has committed to present.

4.1.2. Option 2 - Freezing or gradually reducing the directed fishery

Traditionally, a scientific assessment has been based on the conservation reference points for biomass and fishing mortality rate. In the absence of a reference point for fishing mortality rate, no analytical assessment is available for the Western horse mackerel, and scientists consider the state of the stock as unknown.

Given the absence of conclusive information on the state of the stock, one option might be to freeze or gradually reduce the directed fishery of Western horse mackerel. However, traditionally used reference points are not the only way to evaluate the state of the stock. Regulation 2371/2002 (Article 3 (k)) describes 'conservation reference points' according to which current scientific assessment is made as "values of fish stock population parameters (such as biomass or fishing mortality rate) used in fisheries management, for example with respect to an acceptable level of biological risk or a desired level of yield." In case of the horse mackerel,

the egg surveys have been carried out for decades, and the results of such surveys produce useful and reliable information about the stock. Among other things they are useful for estimating spawning stock biomass and trends over time and therefore can be used to assess one important biological parameter for the stock.

The Commission follows the policy line that where there are biological indicators available that hint on the stock development, a management measure should take this into account, and provide, if circumstances as a whole are conducive, for adequate catch adjustments. These would be possible catch increases in times of positive trends and catch decreases in times of negative trends. Such a path is more closely linked to sustainable use of resources than freezing or decreasing the fishing pressure while waiting for a stock assessment. In other words, the mere fact of data poor situations should not prevent the Commission from presenting a management plan that qualifies as serving a more sustainable stock exploitation, based on information that feeds into stock assessment but was not suitable so far to provide a reliable and conclusive assessment based on standard reference points.

In light of the above, freezing or gradually reducing the directed fishery on Western horse mackerel as a precautionary approach in the absence of analytical assessment based on F and SSB and without taking into account other available sources of information about the stock, would result not only in lowering the TACs without clear gain for the state of the stock but also in purposely limiting our knowledge about the stock.

Due to the lack of predictive power in current assessment, it is necessary to seek and apply alternative ways to effectively manage the stock. This is why option 2 has been rejected by DG MARE and will not be further pursued.

4.1.3. Option 3 – Management plan

The multi-annual approach to fisheries management is one of the key pillars of the current CFP, as it supports sustainable exploitation³². For the stock of Western horse mackerel, the sector representatives have argued for such an approach, given that biological indicators are available and given the economic importance of this stock. Therefore, the lack of a full stock assessment should not prevent the Community from taking action to ensure the sustainable exploitation of horse mackerel.

4.1.3.1. Sub-option 1- Effort Regulation

One possible management tool would be effort administration, which is the limitation of the activity (production "input") of the vessels concerned by the fishery. Effort regulation has its strength in mixed and seasonally stretched fisheries, where the management by output regulation (TAC&Quota) cannot prevent high discards or black landings. In addition, effort reduction is used in order to promote capacity reduction over time, being a tool that can lead to spare capacity. The characteristics of the horse mackerel fishery are such that effort management is not the preferable instrument: The fishery is clean in the sense that schools of the one species are being detected and targeted. This does not mean that there are no discards, but those are mostly due to highgrading rather than giving away unwanted or undersized parts of the catch composition (see below). Large parts of the fishery are controlled by very big vessels, which are extremely versatile during the year and during the fishing trip and do not have technical restrictions in their range of operation. Trying to restrict the activity of those vessels with a view to influence on a minor component of their landings' profile, would produce major practical problems, and might not be effective at all. In addition, landings' control targeting the discharge

³² Council Regulation 2371/2002 recital 6.

of these large vessels is more efficient than landings control in a mixed fishery characterised by a multitude of small vessels (see control part below). Furthermore, the small pelagic fish sector has so far not been among the sectors that show particularly worrying shortcomings in terms of coping with overcapacity. Finally, the sector itself, represented in the pelagic RAC, does not favour effort restrictions.

Therefore, effort regulation is not considered the right tool for long term management.

4.1.3.2. Sub-option 2 – Regulation by technical measures

Fishing for horse mackerel is technically regulated by Regulation 850/98. A minimum landing size is set at 15 cm. Grading equipment on board is only allowed under specific processing circumstances. These technical provisions have been maintained in the Commission's proposal for a successor regulation.³³ A specific question has arisen in recent years whether the increasing fishery on juvenile fish (years 1 to 3) should be restricted, e.g. by prohibited areas. Since 2005, however, the portion of juvenile fish from the total fish caught has decreased to former levels. In view of this stabilisation, no specific measures seem necessary at the start of long-term management. Such measures might however be added to the long-term management once the fishing patterns change.

4.1.3.3. Sub-option 3 – Regulation by assigning a proportion of the Spawning stock to harvest

One strategy for setting TACs could consist in earmarking a proportion of the estimated spawning stock size as annual fishing opportunity. Such an approach has been developed as one harvest strategy among the scientific options presented to the pelagic RAC³⁴. The major shortcoming of this approach is the poor estimation of the size of the spawning stock. In case that larger variation would occur to this estimate, due to an increased provision or improved analysis of data, the implicit aim of this strategy - having a rather constant development of fishing opportunities - would be adversely affected.

4.1.3.4. Sub-option 4 - Regulation by fixing the fishing opportunities following the result trend of egg surveys

The main fishery-independent biological information on the Western horse mackerel is the egg abundance according to the triennial international egg survey on mackerel and horse mackerel. Egg survey results are used by scientists for estimating the size of spawning stocks. This is particularly the case for mackerel, but also for example for anchovy in the Bay of Biscay and for some stocks of cod and plaice. Like in the case of anchovy, there exists for horse mackerel no direct calculation link between the seasonal egg production per female and the perceived total egg production. However, models based on daily egg production have been developed in order to provide and estimate of the spawning size in such cases, and in any case the trend in the egg abundance serves as an indicator of the development of the stock size, assuming that a larger stock would on average produce more eggs than a smaller stock. Therefore, scientific advice suggests that the biological information from egg surveys can be used, in the absence of a full stock assessment, as biological indicator for the stock health and serve thus as a reference for stock management.

The surveys from the last twenty years provided the following results (index egg production):

1983: 513,1;

³³ Art. 4 and 11 of the Commission proposal for a Council Regulation for the conservation of fisheries resources through technical measures, COM/2008/324 final.

³⁴ Roel/Oliveira., op.cit., 664

1989: 1762,1;
1992: 1712,1;
1995: 1264,5;
1998: 1135,7;
2001: 820,8;
2004: 889;
2007: 1427.

The approach is, in summary, innovative in the sense that management rules would be based on a biological indicator short of a full stock assessment, while it would be a classical approach in the sense that it tries to steer away decision on fishing opportunities from ad hoc considerations to a science-based planning. The long-term management will be based on the grounds of a specific biological parameter, egg abundance, which becomes a conservation reference point for the stock.

Using this approach, attaining the objectives discussed before can be ensured by the following orientations:

- (a) In the absence of positive biomass trends indicated by increased egg production, the overall catch limit should be kept within a limit that used to be defined as the maximum in the absence of strong recruitment to the stock. This level has been scientifically established by the scientific agencies by a yield per recruit analysis that excluded the extraordinary strong year class of the year 1982³⁵;
- (b) If there are positive biomass trends indicated by increased egg production, the overall catch limit should be increased in function of this indicator;
- (c) Such increase in the overall catch limit should be capped in order to cater for the uncertainty of the indicator, in particular for the fact that the underlying scientific surveys are only undertaken every three years, and for the fact that the relation between increased egg production and increased recruitment is not well known.

The following themes were identified, during the science/stakeholder consultations, as potential points for the effective management plan:

- TAC to encompass the entire spatial distribution of the stock;
- Consideration of measures to regulate fishing mortality separately for juveniles and adults;
- Optimal harvesting of most profitable size grades or other product types;
- Ability to adjust management to take advantage of periods of elevated productivity;
- Stability in TAC vs. large increases/decreases;
- Ability to carryover unused quota to the following year.

Initially, three alternative strategies for managing the Western horse mackerel stock with a TAC with the objective of long-term stable yields, and with a low risk to driving the SSB below the level estimated for the stock in 1982 were evaluated by STECF (2006). Final simulations

³⁵ ICES. Report of the working group on the assessment of mackerel, horse mackerel, sardine and anchovy, CM 2007/ACFM:31, p. 23.

included only two HCR scenarios, which were then further evaluated with 1000 iterations over a range of test values. Summary statistics on size and variability of yield and risk were calculated for each simulation before the informed decision on the most viable option was made. ICES has endorsed the approach originating from scientific advice to the PelRAC.

4.1.3.5. What provision should be made if the stock falls below the minimum level

Scientific advice indicates a risk to reproduction of the stock if the spawning stock size should fall below the size estimated for 1982. This size no longer is a formal reference point B_{lim} used by ICES or STECF, due to the method used at the time being based on false assumptions on the spawning behaviour³⁶, but can be considered as a proxy, and has led to ICES recalculating in 2008 the series of SSB based on more recent knowledge³⁷.

The long-term plan should not aspire to offer a mathematically exact solution for this risk, because the evolution of the biomass is not known with full certainty³⁸. Three mechanisms are being considered appropriate to deal with this risk:

- First, the very low risk, as shown by scientific modelling, of this case happening during the first three-year term of the plan, and beyond.
- Then, the obligation to seek a scientific evaluation of the plan's effectiveness after six years of application³⁹.
- Finally, the recurrent legislative option of adapting the biological reference point to improved scientific knowledge indicating that following the method no longer provides for sustainable exploitation.

4.1.3.6. Additional provisions concerning control and discard accounting

Recurrent problems of long-term management are the knowledge about and significance of discards of fish, and the enforcement of the harvest rules established.

4.1.3.6.1 Discards

While it has been scientifically confirmed that discards of younger fish has decreased over time due to the sector having developed a market for young fish, discards of horse mackerel might still be high from time to time, particularly in view of its low value compared to other species.

³⁶ See ICES, WGMHSA 2007, loc.cit., p. 283.

³⁷ See Roel/Oliveira, loc.cit., p. 664. The 1982 stock size has always been difficult to establish, but an approximation has been made. The stock is characterised by infrequent, extremely large recruitments. As only a short time series of data are available, it is not possible to quantify stock-recruit relationships, but one may make the precautionary assumption that the likelihood of a strong year class appearing would decline if stock size were to fall lower than the stock size at which the only such event has been observed. The basis for the level of B_{pa} is the stock size in 1983 (as estimated by an egg survey and an assessment), which is used as a proxy for the stock size present in 1982; that which produced the strong 1982 year class. The egg survey biomass estimate was 530,000 t, another model estimated an SSB in 1982 of 930,000t, and a model retained estimated 500,000t. The most recent scientific advice estimates 1,4 million tonnes as SSB 1982.

³⁸ See the different estimates according to different models ranging from 1,9 to 3,4 million tonnes for 2007. ICES, WGMHSA 2007, loc.cit., p. 281.

³⁹ ICES' assessment assumes an unacceptable risk after 40 years, based on the scientific model presented by an expert group that advised the pelagic RAC.

Scientific survey data confirms, for example, that horse mackerel is on place three of the most discarded species in the Dutch pelagic freezer trawler fleet⁴⁰.

In the context of yearly agreements with Northern coastal states, an international working group of control experts for international pelagic fisheries has discussed avenues of discard reduction since 2005. Understanding was reached that any regulatory attempt would need to entail a large amount of observer coverage in order to be meaningful. A voluntary arrangement with the industry has not come to light, while some evidence suggests that large pelagic vessels having observers on board fish less days and land more fish than those without observers.

The Commission has proposed a general monitoring obligation concerning discards with its new proposal for a Control Regulation (Articles 41 and 42 of the proposal, COM(2008)721 final). With regard to specific fisheries, the Commission decided not to pursue the monitoring and reduction of discards with a regulatory fishery-by-fishery approach, but rather to come up with a general policy on this issue. For this reason, a focussed discard-prevention policy covering horse mackerel would not be an appropriate legislative measure at this stage.

Nevertheless, the harvest rule to be applied to the Western horse mackerel should cover all catches from the fishery, including discards. Scientists have warned that their models on calculating risk probabilities for stock decline are based on all catches being accounted for. In order to cater for this, as was the case in the recent Commission proposal for amending the cod recovery plan⁴¹, the TAC resulting from the method as established in the long-term plan should be reduced by the fishing mortality estimated to be attributable to discarding.

4.1.3.6.2 Control

Unaccounted TAC overshooting has been considered substantial during the presence of the very large year class 1982. Since its disappearance, the problem is less important, but still a threat to the good functioning of any management plan.

The major landings of pelagic species coming from international fisheries, including horse mackerel, are the subject of regular controls and expert discussion with neighbouring states. Indeed, yearly agreements with the Coastal states (e.g. Annex XII of the Agreed Record of Conclusions of Fisheries Consultations between Norway and the European Community for 2009) contain standards for fish weighing and landings' inspection, concerning any landing of more than 10 tonnes. Yearly progress reports give account of inspection experience, the number of infringements detected, avenues for better regulation etc.

Estimates of Inspection costs have been made through a study commissioned by the European Commission at the occasion of assessing the impact of a general reform of the control legislation. Average data from 2004 to 2006 suggest that an inspection on land in the Atlantic region might cost about 515 EUR, while an inspection at sea 8.976 EUR⁴².

With a view to translate the agreements found with Coastal States into Community legislation, Regulation (EC) No. 1542/2007⁴³ establishes procedures for weighing and labelling procedures for herring, mackerel and horse mackerel, and sets inspection benchmarks for landings

⁴⁰ See *Borges et.al.*, What do pelagic freezer-trawlers discard?, ICES Journal of Marine Science (65), page 605.

⁴¹ COM(2008)162 final of April 4, 2008.

⁴² MRAG et.al., study for the Impact Assessment of a proposal to reform and modernise the control system applicable to the Common Fisheries Policy; related tender FISH/2006/09.

⁴³ This Commission Regulation was preceded by similar technical regulations in the annual TAC&Quota Regulation, see Council Regulation (EC) No 13/2005.

exceeding 10 tonnes, notably an obligation to cover 10% of landing and 15% of fish quantity with extensive inspections.

With the envisaged management plan, the Commission would want to build on the tighter control framework achieved with this Regulation concerning the monitoring of landings. More rigorous control benchmarks or landing rules should not be introduced before results of this control framework have been confirmed and analysed covering some years of experience. However, this specific control framework should be expanded in spatial scope so that all areas where Atlantic horse mackerel is caught would be covered.

As an easily accessible complementary control instrument, special fishing permits are being considered in order to ensure the plan's working in practice.

With regard to the compliance commitment, the sector has proposed to participate in observer schemes and wants the TAC to take account of overshooting. An indirect incentive for good observer coverage would be a harvest rule that integrates the occurrence of discards even when an estimation of discards could not be made by scientist, e.g. due to insufficient fleet sampling.

4.1.3.7. Possible limits on TAC variations

For reasons of business planning in the context of supply and demand, the catching industry has a strong interest in predictability and stability in the determination of their annual fishing possibilities. Accordingly, it was analysed whether a constraint of +/-15% on annual TAC fluctuation should apply.

5. ANALYSIS OF IMPACTS

5.1. Economic and social impact

It is not possible to forecast economic impacts in absolute terms. Market prices for horse mackerel can fluctuate widely in response to variations in demand. However, the plan should, by contributing to the stability of horse mackerel supplies, also contribute to the stability of the horse mackerel fishing industry and its markets.

Most of the catches of Western horse mackerel are taken by vessels engaging in a variety of fishing activities on various stocks and whose dependence on this stock is limited. Therefore the direct impact of improved long-term management of this stock will cover only a part of the economic activity of these vessels.

One significant impact of option 3 would be the absolute stability in expectations concerning fishing opportunities. Predictability of fishing opportunities is a key demand of the sector. With a TAC-setting that applies a method to the identical data for three consecutive years (period from one egg survey to the next), the TAC can be expected to be stable during that period.

A basic simulation of the economic impact of options 1 and 3 has been calculated by DG MARE as follows, based on economic data provided regularly by Member States. The simulation concerns the profit of the fleet segments identified above.

The assumptions for option 1 (*status quo* scenario) are built on continuous TACs at 167,920t, as is currently the case. The assumptions for option 3 are built on a TAC increase in 2009 towards 179,730t, afterwards stable, based on a simple calculation following the management plan's harvest control rules and including catch area VIIIC. The assumptions for the Spanish fleets here are kept steady, given that they mostly catch in area VIIIC and would thus not experience a major effect from the reorganisation of TAC areas.

The following qualifications are to be made concerning the use of this table:

- Economic impacts were assessed using a bio-economic model approved and used by the STECF to assess TAC/quota proposals (annual) and long term management plans. The model builds on a historic baseline of economic and catch data and makes predictions of economic performance based on future catch opportunities and subsequent changes in costs and earnings of fleet segments;
- While the baseline for comparison is the year 2006, it should be noted that years prior to 2006 have been taken into account in the simulation of the options, thus resulting in lower values for the coming years, as compared to the well-performing year 2006;
- profits will likely have declined during the first half of 2008 due to the extraordinary rise in fuel price not built into the calculation model;
- The profits for the German fleet appear high compared to figures extracted for similar fleets in other Member States. A verification of data correctness for the purpose of this Impact Assessment is not possible, because the Commission does not have continuous access to the data pool that serves as bases for running economic analysis. However, while the absolute figures might be misleading, the calculation might still be useful in relative terms, that means comparing the outcomes of options 1 and 3.

Table 8 - Simulation of effects on the profit for selected fleet segments

		Baseline	OPTION 1	OPTION 3
	€ million	Profit 2006	Average (2007-09)	Average (2007-09)
NL >40m	Profit	6.42	7.61	7.77
IRE >40m	Profit	3.66	1.55	1.69
IRE 24-40m	Profit	4.1	9.17	9.23
GER >40m	Profit	57.76	53.59	53.72
UK >40m	Profit	44.34	31.98	31.98
ESP	Profit	1.5	1.10	1.10

Source: EC/STECF

In overall terms, the options compared do not show significantly different impacts. The lower future performance compared to 2006 is due to 2006 being a high-performing year in the data series. Option 3 (management plan) shows a very modest profit increase for some fleet segments, compared to option 1 (baseline scenario).

Given the data available, social effects of options 1 and 3 cannot be decoupled from their economic impacts and are likely to go in line with them, showing that impacts in both cases do not differ significantly.

Since the management plan would not introduce new procedures, no significant impact on administrative burden would take place either (see for the control special chapter below). Moreover, adoption of a long-term plan with clear sustainability criteria may allow the fishery to qualify for certification under independent "eco-label" criteria. This could be helpful in product marketing terms, and in improving the perception of the sector as a responsible industry.

5.2. Environmental impacts

It is not normally possible to predict long-term trends in fisheries productivity. Changes in oceanic climate including global warming, and currently unexplained medium-term changes in recruitment can lead to significant trends in productivity. However, it is known that keeping fisheries impacts at levels no higher than those needed to take high yields improves the stability of the stock and improves the robustness of the fishery to adverse environmental effects. In fact, there is no possibility to achieve good status of marine waters unless commercial stocks are in

good shape. The conservation of commercial stocks therefore is also an environmental concern. Avoiding that stocks become overfished is relevant for the goals of the Marine Strategy Framework Directive 2008/56/EC which entered into force in summer 2008.

However, the current management system as it applies in the EU is not adequate to the horse mackerel stock. The lack of an analytical assessment or forecast precludes the implementation of the implicit EU management strategy, which is to set TAC one year ahead, based on forecasted population size in an intermediate year, from an assessment from the same year. Given that egg surveys for horse mackerel are carried out every third year, setting TACs should reflect that and also happen in 3-yearly intervals. Implementing a plan which will lead to catch limitations according to biological indicators on the stock abundance based on thorough scientific assessment will improve the state of the stock and ensure sustainability of the fishery.

The main arguments against the current regime (Option 1) are as follows:

- no full scientific assessment being available for the stock;
- TACs set annually based on *ad-hoc* considerations of economic and social factors at the political level rather than environmental indicators and parameters;
- Risk of stock overfishing and even collapse.

Moreover, retaining current management of the stock means that:

- conditions for sustainable long term yield for the stock are not provided for;
- TAC is being limited every year without any gain or long-term sustainable benefit for the stock;
- possible additional catches to those covered by the TAC are taking place;
- target fisheries will not proceed with minimum ecological impact (with the industry being against the current regime for not reflecting the actual state of the stock).

The main arguments in favour of multi-annual management based on egg survey results (Option 3) are as follows:

- tuning data are restricted to one point estimate of SSB every third year;
- noise (error) in the SSB data carried over to the assessments made between survey years is reduced; and
- low recruitment variability (besides the infrequent occurrence of exceptionally large year classes) and the absence of clear indication of changes in weight and/or maturity over time.

Moreover, such long-term management of the stock would include the provisions to ensure that:

- conditions for sustainable long term yield for the stock are provided for;
- acceptable year to year stability in the TAC is achieved; unified management regime across all areas where the stock is distributed is achieved;
- there are not additional catches to those covered by the TAC, achieved by control programmes having to focus on long-term management plans;
- target fisheries will proceed with minimum ecological impact (with the industry agreeing to partake in studies to demonstrate that there are no additional catches above the level of the TAC as well as in studies to quantify the levels of non-target by-catch).

5.3. Impacts on international relations

The stock is distributed almost wholly within EC waters and is not subject to unregulated exploitation by third-country vessels. Catches and fish stock management will not be affected by such third-country activities.

The Faroese and Norway participate in the exploitation of this stock by exchanging fishing opportunities with the Union within the yearly TAC. A better management of the TAC will possibly be taken up in the negotiations with Norway, which has an interest in the stock in its own waters, with a view to manage the stock jointly according to criteria that support sustainable exploitation.

In addition, in the recent past, some transfers of quota have been made from the EC-managed TAC to the Faroe Islands as part of the annual bilateral exchange of fishing possibilities. Setting the TAC in a multi-annual framework will allow more predictability in the fishing opportunities available for exchange with third countries. In general, it can be assumed that the importance of this stock increases when the importance of other stocks which are used to carry out exchanges of fishing opportunities with Northern States decreases, like it is currently the case with blue whiting.

5.4. Impact summary

	Option 1: continue current management	Option 3: implement management plan
Positive impacts	No change, current rules allow fishing at unchanged levels.	Management of stock based on improved scientific assessment, stock long-term sustainability achieved as objective. Possible short-term increase or decrease in TAC.
Negative impacts	Management of stock keeps being based on poor scientific assessment and <i>ad hoc</i> decisions leading to long-term sustainability not assured as an objective.	Rules are changed leading to possible short-term reduction in direct Western horse mackerel fishing.
Direct impacts	Management plan based on current poor assessment and <i>ad hoc</i> decisions not efficient enough to achieve long-term stock sustainability. A risk of stock going back to unsafe levels.	Improved assessment and well informed decisions likely to result in a sustainable and stable fishery in the long term.
Indirect impacts	Negative economic, social and environmental impacts due to the possible stock reduction to unsafe levels and greatly reduced fishing opportunities in the long-term.	Positive economic, social and environmental impacts due to improved efficiency of management plan leading to long-term sustainability of the stock and improved fishing opportunities.
Economic	<u>Short-term:</u> No change in catches	<u>Short-term:</u> Possible small increase or

impacts	and profits due to lack of assessment. <u>Long-term:</u> Possible negative impacts due to increased risk of fishing above safe levels. This would result in loss of profitability of the fishing industry.	decrease in catches resulting in small changes in sector's profitability. <u>Long-term:</u> Positive impacts due to achieving long-term stock stability based on better scientific assessment. Improved profitability of the industry.
Social impacts	<u>Short-term:</u> No change. <u>Long-term:</u> Possible stock collapse following TAC allocations based on inadequate stock assessment resulting in possible decline of employment in the sector.	<u>Short-term:</u> No negative impact on employment. <u>Long-term:</u> Improved scientific assessment of the stock leads to better management of resources, a stable stock and maintained employment in the sector.
Environmental impacts	<u>Short-term:</u> Possible negative impact on the conservation of species due to insufficient scientific assessment and applying <i>ad hoc</i> decisions leading to fishing at unsafe levels. <u>Long-term:</u> Greater risk of possible decrease in stock biomass to unsafe levels, thus adverse effect on biodiversity.	<u>Short-term:</u> Gradual improvement in stock management reducing risk of fishing above safe levels. <u>Long-term:</u> Improvement in the stock assessment leading to better management of stocks resulting in less negative impact of fishing on the biodiversity.

6. COMPARING THE OPTIONS

6.1. Should a long-term plan be implemented?

Various options have been considered internally by scientific agencies. The resulting scientific advice, previous experience with the mackerel stocks, and stakeholder contributions agree that introducing a long-term management to the stock of Western horse mackerel, based on TAC set every 3 years according to results of egg survey is appropriate and beneficial. DG MARE services agree, and further consider that this is consistent with the objectives of the Common Fisheries Policy and the Johannesburg World Summit on Sustainable Development. The proposal includes provision to revise fishing mortality rates if scientific advice indicates that this is needed, and at intervals of no less than three years.

The choice to implement such a plan can be compared with continuing under present conditions.

Option 1 : <i>Annual ad-hoc</i> decision making		
	Qualitative description	Quantitative description
Economic impact		
Short-term costs to relevant enterprises	Unknown, not predictable. Likely pressure to set fishing opportunities above sustainable	<i>Ad hoc</i> decisions affecting entire catches from the stock.

	levels.	
Long-term costs to relevant enterprises	Unknown, not predictable. Likely that pressure to set fishing opportunities above sustainable levels can result in stock depletion below maximum sustainable yield levels.	<i>Ad hoc</i> decisions affecting long-term productivity of the whole stock, i.e. up to ca. 60M€/yr.
Social impact		
	Unknown, not predictable. Flexibility is retained at a decision-making level.	
Environmental impact		
	Unknown, not predictable. Pressures to increase catches in the short term tend to lead to stock depletions.	TAC decisions under the CFP have been taken on average at about 40% above sustainable levels.

Option 3 : Implementation of long-term plan		
	Qualitative description	Quantitative description
Economic impact		
Short-term costs to relevant enterprises	Short-term impacts can be mitigated by a limit on changes to TACs so long as stock levels remain good.	Not quantified, but should be low.
Long-term costs to relevant enterprises	Long-term costs should be kept at a low level by maintaining stocks and catches at high and stable levels.	By exploiting the stock at maximum sustainable yield, costs should be low and the economic resource rent kept at a high level, close to or higher than current values.
Social impact		
	The long-term plan should minimise short-term disruptions and ensure high and stable incomes and employment for the long-term.	Maintenance of employment and incomes at close to current levels (in proportion to Western stock).
Environmental impact		
	The plan should lead to safe and near-optimal exploitation of the stock, with a small risk of stock collapse and including precautionary elements.	Exploitation of the stock in conformity with the precautionary approach and MSY objectives in the Johannesburg Implementation Plan.

DG MARE considers that retaining an annual decision-making system unconstrained by considerations of sustainability would be a high-risk approach for the sector in the longer term. While the stock has not yet been depleted in the absence of a long-term plan, conditions may change rapidly (in this fish stock, or in others nearby) and it is consistent with the precautionary approach to implement a sound management practice in advance. Moreover, the short-term economic impact of both options (1 and 3) is marginal according to the simulation. Option 3 (long-term plan) might even have a slightly more positive effect on the sector. Given that the sector concerned is favouring a long-term approach, DG MARE considers the stock to be an ideal candidate for implementation of a management plan.

6.2. Alternatives concerning the biological indicators to be retained

Two sets of biological data are available for the stock: catch-at-age data supplied by some Member States and the results of the egg surveys carried out every three years. Taking the results of the egg surveys as a biological indicator that guides on harvest rules has been considered useful with regard to sustainable stock management. Catch at age data alone do not easily translate into management rules without a stock assessment. The estimates of SSB are very unsecure and have been subject to considerable change in the last ten years. The scientific bodies which follow the stock should use both, catch at age data and the results of the egg survey in order to better understand the dynamics of the stock. Once a full stock assessment will be available, the management plan could easily step up to this higher level of scientific assurance.

An alternative to including the new biological indicator would be to perpetuate the current system to use just historical data as biological indicator for the stock. The TAC would be kept stable at a level that according to that data can be considered safe for the stock. This would not, however, be in line with the objective of establishing a management approach consistent with MSY, since the latter requires the regime to be flexible and the adjustments being made as the status or trends of the stock indicate being appropriate. Retaining this option would mean ignoring the possibility of a substantial increase of the stock thanks to a particularly strong year-class, as seen in 1982.

DG MARE favours the idea of incorporating the egg survey data into the stock assessment on the basis that this is the option most likely to help improve assessment of the stock and introduce management most appropriate to its optimal productive levels according to MSY and therefore is most effective in environmental and long-term economic terms, for as long as more precise scientific assessments are not available.

6.3. What provision should be made if the stock should fall below the minimum level?

As outlined in the descriptive part on option 3, the long-term plan involves a very low risk of the stock falling below the proxy used to represent a minimum stock size. The very fact that the management will be based on indicators rather than full stock knowledge brings with it the increased amount of uncertainty as to the reliability of this method and the future developments. As the risk analysis is based on a large number of unknown or estimated factors, a timely revision of the impact of the plan is foreseen, already after the second adaptation of the three-year TAC.

6.4. What additional provisions should be included concerning control measures?

The control environment and general direction on control policy has been described in chapter 4.1.3.6.2. Four elements of an enhanced control are being considered for legislative action in connection with the horse mackerel:

- The specific control Regulation mentioned before does not cover the stocks off the Iberian Peninsula. However, the management plan would cover the full Western stock's distribution,

including the area North of Spain. With a view to have the same control standards applying to all landing sites of Western horse mackerel, and to maintain a level playing field in competitive terms, the Commission considers extending the scope of that Regulation towards the areas around the Iberian Peninsula. The control standards are already established in the Netherlands, Denmark, Sweden, Germany, the United Kingdom, France and Ireland, and the benchmarks are partly being already met. For Spain and Portugal, the extension of the control provisions would probably entail additional expenses. Those cannot be estimated, as it is not known how big an effort would be necessary in order to arrive at the agreed control benchmarks. In particular, a large amount of landings in these Member States will be below the threshold of 10 tonnes;

- Special fishing permits, aiming at reducing area misreporting concerning the different stocks;
- Fixing a minimum amount of fish that would be deducted from the TAC in order to account for discards in case where the information base is not sufficient for scientists to estimate the discards in the fishery. Placed within the harvest rule, such a provision would present an incentive for better observer coverage and catch reporting to scientific bodies, so that the amount of real discards can be deducted;
- A provision that translates into the horse mackerel fishery and accentuates the existing Member State obligations to carry out data cross-checks, without introducing new inspection benchmarks, as those are covered by the specific control regulation mentioned before.

Detected overshooting of the TAC and subsequent remedial action would be subject to the general provisions applicable in this case, including deductions from next year's TAC as now proposed by the new Control Regulation (Chapter III, document COM(2008)721 final). The proposal would interlink with these provisions of the new Control Regulation.

6.5. Should a limit be imposed on variations in TACs between years?

The Commission is committed to deliver TACs that correspond to scientific advice but at the same time these TACs should aim at stability (not too large a **variation** from year to year) in order to ensure stability in fisheries. Scientific advice allows for the possibility of limiting TAC variations between years when the stock biomass is above Precautionary Levels (Bpa). This limitation can be applied in an *ad-hoc* way, but its application could be formalised if the stock requires it. The question therefore arises whether a TAC limitation constraint should be built into option 3 on developing a long-term management plan. The characteristics of such a constraint can be summarised as follows:

Alternative (i) : Unlimited TAC variations		
	Qualitative description	Quantitative description
Economic impact		
	Unforeseen variations in survey efficiency can lead to large variations in scientific assessments and so to large variations in TAC. This leads to market instability.	In the absence of constraints, unnecessary variations in TAC of up to 40% could be expected.
Social impact		

	Large variations in TACs can cause large variations in earnings and hence in social instability and disruption. Stakeholders have strongly requested a constraint on TAC changes.	Not quantified.
Environmental impact		
	Large changes in TACs can be necessary if stocks are depleted to minimum levels or are at risk of approaching them. However, if stocks are in good state such changes are not necessary for effective stock management.	Scientific assessment indicates that large TAC changes are not needed when spawning stock size is above Bpa.

Alternative (ii) : +/- 15% limit on TAC variations at high stock levels		
	Qualitative description	Quantitative description
Economic impact		
	Constraining TAC changes to small values can help stabilise markets and assist in the forward planning of enterprises catching and marketing fish. This leads to lower costs. The extent of cost reduction cannot be quantified.	Scientific simulation studies have indicated that TAC changes can be limited to +/-15% so long as stocks are at a healthy level. However, a TAC variation constraint of +/- 15% generally reduces the long-term yield from the stock, as shown in scientific model calculations.
Social impact		
	Reduced variations in TACs can stabilise earnings and employment and hence avoid social instability and disruption. Stakeholders have strongly requested a constraint on TAC changes.	Not quantified.
Environmental impact		
	Reduced changes in TACs can be consistent with good fish stock management so long as the possibility to make large changes if the stock falls below a warning level is retained. In such cases the stocks can still be exploited with	Scientific assessment indicates that large TAC changes are not needed when spawning stock size is above Bpa.

	high and stable yields.	
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As regards the management plan proposed by DG MARE, firstly, the harvest rule would provide a TAC which is constant during a three-year-period, thus providing highest possible stability within this period. Secondly, when egg survey data are available every three years, the variation in the TAC would be limited by two factors: Firstly, half of the TAC would be established by the baseline TAC of 150,000 tonnes considered as being sustainable in the short term by scientific agencies since several years. Secondly, the increase and decrease in the TAC coming from a variation of the other half of the TAC calculation formula, being based on the last recorded TAC, in function of the variation of the egg abundance would be limited as well in two ways: For the egg abundance indicator, the trend would be taken from the three latest egg surveys, thus covering a trend period of six years. And, the indicator would not fluctuate freely, but between the values 0 and 1.4, thus allowing the second half of the TAC calculation formula to fluctuate between 0 and 140% of the last recorded TAC. For instance, if the slope in the egg surveys is neither increasing nor decreasing, the factor to be applied will be 1, thus resulting in the second half of the TAC calculation being equal to the latest TAC reference.

In view of these safeguards ensuring stability, the sector has not asked for a maximum annual TAC fluctuation of 15%. Neither has it been retained within option 3.

7. MONITORING AND EVALUATION

The indicators of successful operation of this plan are that:

1. biologically
 - approximate spawning stock biomass has been maintained above its 1982 level and above a precautionary biomass level (about 130% of the 1982 spawning stock size).
2. socio-economically
 - catch levels have increased together with the biological indication of increased stock abundance, and vice versa;
 - discarding and misreporting do not increase in a period of increased stock abundance and could be taken into account in the TAC-setting process.
3. Further evaluation criteria are that:
 - knowledge about the stock increases due to cooperation with the sector;
 - uncertainties and bias in the fishery and biological system remain within the bounds of those tested; and
 - assumptions made in the simulation testing phase are still valid.

A harvest control rule designed in such a way and applied rigorously should safeguard against stock depletion. However, as simulations are based on past stock dynamics, and cannot guarantee future developments, it is a normal condition of most management plans with HCRs, that such HCRs be re-evaluated on a regular basis.

The plan will be reviewed and re-evaluated on six yearly intervals to ensure that:

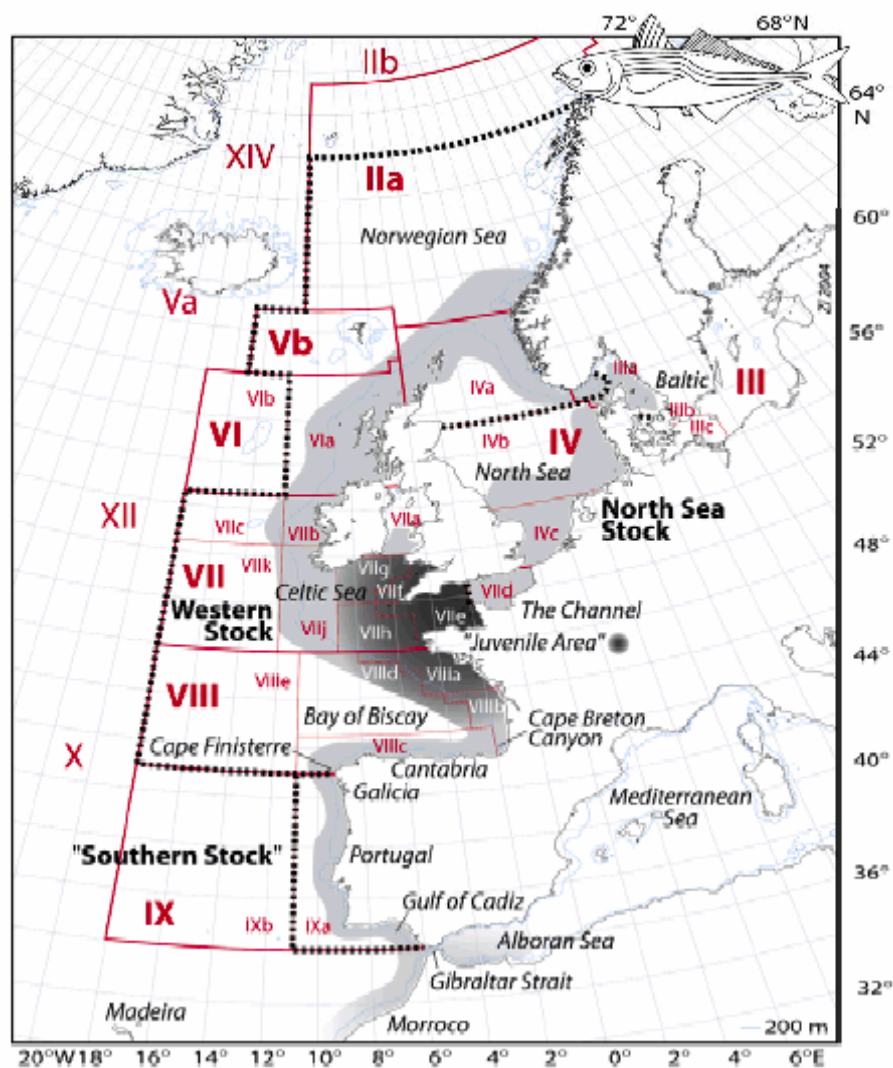
1. SSB has been maintained above SSB1982 and above a precautionary biomass level (about 130% of the 1982 spawning stock size);

2. assumptions made in the simulation testing phase are still valid, and the impact of the rule will be tested again using a model that takes account of all factors known and relevant at the time of evaluation.

Should advice from STECF and ICES indicate that the plan is not reaching its objectives, a review process will be initiated by DG MARE.

Concerning specific control issues, cross-national coordination of inspection activities is to be established by the new CFC agency. Additionally, the inspectors of DG MARE will follow-up and review the implementation of fisheries control measures by Member States which obligatorily need to have a focus on the implementation of long-term plans.

ANNEX 1: DISTRIBUTION OF HORSE MACKEREL IN THE NORTHEAST-ATLANTIC.



Stock definitions as used by the 2004 ICES WGMHSA (Anon., 2004). Note that the “Juvenile Area” is currently only defined for the Western Stock distribution area – juveniles do also occur in other areas (like in Div. VIId). Map source: GEBCO, polar projection, 200 m depth contour drawn.

ANNEX 2: DRAFT LONG-TERM PLAN FOR THE WESTERN STOCK OF ATLANTIC HORSE MACKEREL – CALCULATING A SLOPE FOR YEARS 1, 2 AND 3.

The proposed Regulation would govern the setting of total allowable catches (TAC) according to a harvest control rule (HCR) that would allow high and stable catches over the long term.

The TAC would be set according to the following rules:

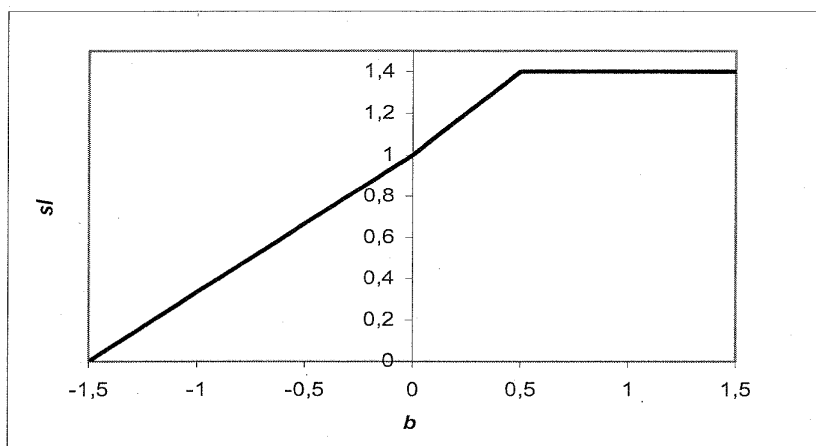
1. The TAC would be set for 3 years following the year of the most recent survey;
2. The TAC would be fixed at the set level for a period of 3 years;
3. In the event of the TAC being overshoot in any year in the fixed period, the overshoot (as estimated by ICES) would be subtracted from the following years TAC (this needs to be tested by simulation);
4. In the event of a survey result not being available, ICES would be asked to advise on the state of the stock and on exploitation boundaries consistent with the Precautionary Approach.
5. The TAC will be set according to the following rule:

$$TAC_{y-y+2} = 1.07 \left[\frac{TAC_{ref}}{2} + \frac{TAC_{y-3}sl}{2} \right]$$

Where $TAC_{ref}=150,000$ t and sl is a function of the slope of the most recent egg abundance estimates from surveys

The factor representing the slope (sl) would be calculated as shown in the following picture:

- 1) Divide the last three egg estimates from the triennial survey by 10^{15} ;
- 2) Compute the slope (b) for years 1, 2 and 3;
- 3) If
 - $b \leq -1.5 \Rightarrow sl = 0$
 - $-1.5 < b < 0 \Rightarrow sl = 1 - (1 / -1.5 * b)$
 - $0 \leq b \leq 0.5 \Rightarrow sl = 1 + (0.4 / 0.5 * b)$
 - $b > 0.5 \Rightarrow sl = 1.4$



ANNEX 3: REORGANISATION OF TAC AREAS AS A CONDITION PRECEDENT TO A LONG-TERM PLAN FOR THE WESTERN STOCK OF ATLANTIC HORSE MACKEREL.

Existing management areas for TAC-setting

Horse mackerel is being caught in coastal EU waters under three different annual TAC-rules⁴⁴ (three further TACs concern the Spanish and Portuguese Atlantic Islands):

- the EC-waters of the Norwegian Sea (division IIa) and the North Sea (sub-area IV): Northern area,
- the EC-waters West of Scotland and Ireland (VI and VIIbc), the Irish Sea (VIIa), the Celtic Sea (VIIIf-k), the English Channel (VIIId), the Biscay (VIIIab and VIIIId), and international waters of the North Atlantic up to Greenland (Vb, XII and XIV): Western area, and
- Atlantic waters off Portugal and Spain (divisions IXa and VIIIfc): Southern area.

The TACs and catches are highest in the Western area, followed by the Southern area.

The need for a review of the TAC-areas

Advice areas do not coincide with TAC-areas: ICES advice is given for the biological stocks, which are the discrete sub-populations of the species concerned that show a degree of reproductive isolation from each other in space or time or both. The distribution of biological stock is being described using ICES sub-areas and divisions. These areas do not coincide with the current TAC-areas (see Table below).

The biological basis for the new stock areas has been developed from various biological examinations undertaken in the last decades⁴⁵, in particular by a large EC-funded project in 2003⁴⁶. The mismatch of areas can be summarised as shown in table 1:

⁴⁴ Total Allowable Catch in weight is being decided by the Council on a yearly basis. See for the latest decisions the Council Regulation (EC) No 41/2008 of December 21, 2007.

⁴⁵ For an overview, see: ICES report 2002 of the study group on stock identity of mackerel and horse mackerel, CM/H:4; ICES WGMHSA report 2003, CM 2003/ACFM:07; ICES WGMHSA report 2004, CM 2004/ACFM:08; ICES WGMHSA report 2007, CM 2007/ACFM:31; Zimmermann, Biologie des Stöckers in Nordsee und Nordostatlantik, Inf. Fischwirtsch. Fischereiforsch. 46(4), 1999. Abaunza et al., Horse mackerel: Identification of stocks, Fisheries Research 89(2008) 2, 101; idem et al, Stock identity of horse mackerel (*Trachurus trachurus*) in the Northeast Atlantic and Mediterranean Sea: Integrating the results from different stock identification approaches, Fisheries Research 89 (2008) 2, 196.

⁴⁶ HOMSIR project 2000-2003, A multidisciplinary approach using genetic markers and biological tags in horse mackerel (*trachurus trachurus*) stock structure analysis, project no° QLK5-Ct1999-01438.

Table 1

ICES-division concerned	Allocation to existing TAC-area	Biological observation as reviewed by ICES and ICES working groups	Allocation in the ICES-advice
VIIIc North and Northwest Spain	Southern area (VIIIc, IXa)	Inhabited by the Western stock, exchange between stocks not specified	Western stock (IIa, IVa, Vb, VI, VIIa-c, VIIe-k, VIIa-e)
VIIId Eastern English Channel	Western area (VI, VII, VIIlab, VIIIde, Vb, XII, XIV)	Inhabited by the Northern stock for overwintering, overlap with the Western stock possible	Northern stock (IIIa Eastern part, IVbc, VIIId)
IIa Norwegian Sea and IVa Northern North Sea	Northern area (IIa, IV)	Inhabited by the Western stock in autumn, in first and second quarter presence of Northern stock possible	Western stock (IIa, IVa, Vb, VIa, VIIa-c, VIIe-k, VIIa-e)
IIIa Skagerrak and Kattegat	none	Presence of the Western stock in autumn; catches in winter/ spring in the Western part and catches in the Eastern part likely attributable to the Northern stock	Eastern part to the Northern stock, Western part to the Western stock

The problem of a mismatch between TAC-area and advice-area

The inconvenience caused by the area mismatch has several facets:

The TAC-setting shall be science-based. If scientific advice is given for a stock area that is covered by various TAC-areas, the TAC-setting as a management tool is not able to correlate directly with the scientific advice.

This fact is of particular importance in the context of management plans that set harvest control rules based on a scientific method. Such a management plan is envisaged for the Western stock of horse mackerel, and it cannot be implemented without an alignment of the TAC-areas.

Proposed modifications to the TAC-areas

The Commission considers a reallocation of division VIIIc (North and Northwest Spain) to the Western area, of division VIIId (Eastern English Channel) to the Northern area and of divisions IIa as well as IVa to the Western area to be necessary. This will bring the TAC areas into line with scientific advice and allow the implementation of a long-term plan for the Western Stock.

Division IIIa would not be included in this reallocation exercise at this stage, but will be subject to future work especially in the context of EC-Norway bilateral relations.

Neither does the Commission at this stage intend to extend this exercise to Norwegian waters in general. Further work will be needed before harvest rules can be established that cover the whole area of stock distribution.

The following table illustrates the reorganisation of the TAC areas based on a method that is being discussion with Member States in the context of frontloading the 2009 TAC&Quota

Regulation. It contains averages TACs from the last ten years and a simulation based on the 2008 TAC figures.

Table 2

Modified average TACs and projected TACs under the new system (based on 2008 TAC), in tons:

In tonnes	Old average	New average	2008 fishing possibilities as currently applied (excluding countries not participating in the quota key)	Simulated 2008 fishing possibilities for new areas (excluding countries not participating in the quota key)
Western TAC	204900	233546	167920	185247
Northern TAC	52599	44467	36480	35271
Southern TAC	73000	52486	57750	41632
Sum	330499	330499	262150	262150

GLOSSARY

B

biomass – the total weight of living matter, either by species or all species combined. Also referred to as the standing stock.

Blim – see limit reference points.

Bmsy – the spawning stock biomass (SSB) necessary to support a fishery that would produce the maximum sustainable yield (MSY).

Bottom trawling - trawling (towing a trawl, which is a fishing net) along the sea floor.

Bpa – see limit reference points.

by-catch – the catch of non-target species and undersized fish of the target species. By-catch of commercial species may be retained or discarded along with non-commercial by-catch.

C

catch (C) – the total quantity of fish that is retained by fishing gear and brought onto the deck or fishing station, ie landings plus discards.

CFP – the Common Fisheries Policy of the European Union (as revised in: Council Regulation 3760/92). It provides the framework for the management of the EU fishery sector, including all marine fisheries within 200 miles of member states' baselines.

collapsed stock – the decline in spawning stock biomass (SSB), through sustained fishing pressure or natural causes, to the point where it no longer generates sufficient recruits to support a fishery.

D

demersal – species of fish that live on, or in close proximity to, the seabed, eg flatfish, cod, haddock. The term also applies to fishing gear that is worked on the seabed.

depleted stock – the decline in spawning stock biomass (SSB) to a level that is approaching, or is below, the lowest historic record but has not necessarily reached the point of collapse. (See also limit reference points and safe biological limits.)

discards – any fish, or other living matter caught when fishing, that is not retained but returned to the sea – alive or dead.

effort (f) – the total quantity of fishing gear in use for a specific period of time (Ricker 1975). Effort can be expressed in a multitude of ways: days away from port, hours trawling, length of drift net, number of hooks used, and so on. At its most basic, it is the total number of boats engaged in a fishery and/or the number of days they were fishing.

environmentally sustainable fisheries – fisheries that safeguard the requirements of all animals and plants within an ecosystem or habitat and do not cause irreversible or other significant, long-term change to the environment or the communities of species that live within that environment.

exploitation pattern - the distribution of fishing mortality over the age composition of the fish population, determined by the type of fishing gear, area and seasonal distribution of fishing, and the growth and migration of the fish. The pattern can be changed by modifications to fishing

gear, for example, increasing mesh or hook size, or by changing the ratio of harvest by gears exploiting the fish (e.g., gill net, trawl, hook and line, etc.).

F

F – formally, the instantaneous rate of fishing mortality (the natural logarithm of the change in abundance due to fishing per unit of time), but more simply, the proportion of the population killed each year by fishing.

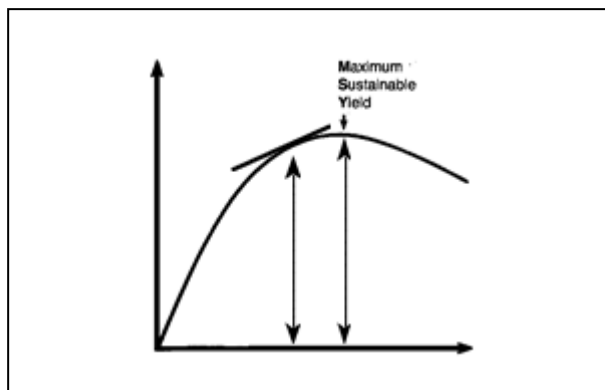


Figure 8: A generalised yield-per-recruit (YPR) curve showing the point at which the fishing mortality rate (F) is equivalent to the maximum sustainable yield (F_{msy}) and the point at which the slope of the curve is approximately 10% the slope of $F=0$, ie $F 0.1$.

fish stock – scientifically, a population of a species of fish that is isolated from other stocks of the same species and does not interbreed with them and can, therefore, be managed independently of other stocks (cf gene pool).

However, in EU legislation the term ‘stock’ is used to mean a species of fish living in a defined sea area, the two are not always synonymous (Holden 1994).

fishery conservation – the conservation and sustainable use of exploited fish stocks. It is the principal objective of UK and EU fisheries legislation; fishery management is the primary method through which the objective is pursued.

fishing effort – see effort.

fishing mortality rate – see F .

Flim – see limit reference points.

F_{MSY} – the level of fishing mortality (F) that corresponds to the peak value on a dome-shaped yield-per-recruit curve and the value that will produce the maximum sustainable yield (MSY) from a fish stock (Fig. 8 & 10).

F_{pa} – see limit reference points.

I

ICES – the International Council for encourages research into commercial the Exploration of the Sea, an fish stocks, their biology and all factors independent scientific advisory body (natural and man made) that may founded in 1902. It is funded by 19 affect their abundance. It does not member states’ governments from undertake research in its own right but around the North Atlantic (including has a secretariat (in Copenhagen) to Canada and the USA) and Baltic Sea. It facilitate and co-ordinate collaboration, including fishery stockassessments, between member states. Work is carried out through numerous working groups convened under the remit of one or more standing committees:

Advisory Committee of Fisheries Management (ACFM), Advisory Committee for the Marine Environment (ACME), Baltic Committee, Fisheries Technology Committee, Living Resources Committee, Mariculture Committee, Marine Habitat Committee, Oceanography Committee, Resource Management Committee.

J

juvenile – an immature fish, ie one that has not reached sexual maturity (but could still be larger than the minimum landing size – MLS).

L

landings – that part of the catch which is put ashore. Frequently, landings provide the only record of total catch; ie the landings plus discards.

limit reference points – are biological or fishery management indicators that define the point at which precautionary action must be taken to safeguard a fish stock. In order for stocks and fisheries exploiting them to be within safe biological limits, there should be a high probability that: 1 – the spawning stock biomass ($SSB = B$) is above the threshold where recruitment is impaired; 2 - the fishing mortality (F) is below that which will drive the spawning stock to the biomass threshold, a condition that must be avoided. Thus: B_{lim} = minimum acceptable biomass F_{lim} = maximum acceptable fishing mortality (lim stands for ‘limit’). The certainty with which these points can be identified varies with the quality of assessment data available. Therefore, ICES has also identified precautionary reference points that identify higher biomass thresholds than B_{lim} and lower fishing mortality thresholds than F_{lim} :

B_{pa} = precautionary minimum biomass

F_{pa} = precautionary maximum fishing mortality (pa stands for precautionary approach).

In many instances, the value for B_{pa} will be the same as the value previously identified as the minimum biologically acceptable limit – MBAL (ICES 1998a and ICES Current). In circumstances where the relationship between the exploited stock and the spawning stock is not clear, as is the case with some of the deep-water species of fish, limit reference points may be expressed with respect to the ‘unexploited stock’:

M

MSY - Maximum Sustainable Yield: the largest average catch that can be taken continuously from a stock under existing environmental conditions (Fig. 8). (For species with fluctuating recruitment, the maximum might be obtained by taking fewer fish in some years than in others). Also known as maximum equilibrium catch (Ricker 1975). (see also Figure 8).

misreporting – the inaccurate recording of catches in EU fishing log books or comparable reporting systems. Among the more common practices are under-reporting the quantity of fish caught or reporting the catch as being taken in a different area from the one in which it was actually made. The latter example is most widespread when the quota for a species in one ICES Division has been taken but quota is still available in an adjacent Division. (See also under-reporting and black-fish.)

mixed fishery – a fishery that takes multi-species catches. Pelagic fisheries tend to take relatively ‘clean’ single species catches whereas multi-species catches are more frequent in demersal fisheries.

monitoring – the regular and systematic collection of environmental and biological data by agreed methods and to agreed standards. Monitoring provides information on current status, trends and compliance with respect to declared standards and objectives. (See also surveillance.)

mortality – the death of organisms through natural causes (M), eg predation, or fishing (F) etc. It is usually expressed as an instantaneous rate: the natural logarithm (with sign changed) of the ratio of number of animals surviving to the end of the year and the number at the start of the year (Ricker 1975).

O

over-fishing – any fishery where the total fishing effort is greater than is required to meet or match a specific management objective, eg maximum sustainable yield (MSY). (See also growth overfishing and recruitment overfishing.)

P

pelagic fish - fish that live in the pelagic zone, i.e. a layer in the sea/ocean close to surface. Pelagic stocks can be contrasted with demersal fish, which is a fish that feeds on or near the bottom of the ocean or a deep lake in the demersal zone.

precautionary approach – a decision to take avoiding action based on the possibility of significant environmental damage, even before there is conclusive evidence that damage will occur (DOE 1992). This approach requires fishery managers to pay due regard to the uncertainties of stock assessment and management. They must implement the appropriate precautionary action if limit reference points are reached.

purse seine – a common type of seine, named such because along the bottom are a number of rings. A rope passes through all the rings, and when pulled, draws the rings close to one another, preventing the fish from "sounding", or swimming down to escape the net. This operation is similar to a traditional style purse, which has a drawstring. It is a preferred technique for capturing fish species which school, or aggregate, close to the surface: such as sardines, mackerel, anchovies, herring, certain species of tuna (schooling); and salmon soon before they swim up rivers and streams to spawn (aggregation). Boats equipped with purse seines are called purse seiners.

seine - a large fishing net that hangs vertically in the water by attaching weights along the bottom edge and floats along the top. Boats equipped for seine fishing are called seiners. Seine nets are usually long flat nets like a fence that are used to encircle a school of fish, with the boat driving around the fish in a circle. There are two main types of seine nets: *purse seines* and *Danish seines*.

precautionary approach – a decision to take avoiding action based on the possibility of significant environmental damage, even before there is conclusive evidence that damage will occur (DOE 1992). This approach requires fishery managers to pay due regard to the uncertainties of stock assessment and management. They must implement the appropriate precautionary action if limit reference points are reached.

S

Spawning Stock Biomass – see SSB.

SSB– spawning stock biomass: the total weight of all sexually mature fish in a population or stock. It is the sexually mature part of an exploited population upon which the future survival of the stock, and its fishery, depends.

STECF – the Scientific, Technical and Economic Committee on Fisheries of the EC, DG Fisheries (Fig. 2). Unlike ICES working groups and ACFM (Fig. 3) which only consider stock assessments and management from a scientific perspective, the STEFC is expected to consider the socio- economic implications of modifying or varying scientific, including ICES' advice.

stock biomass – the total weight of all fish of all ages in a given population or stock.

sustainability – meeting the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987 – the Brundtland Report).

sustainable fisheries – fisheries with an annual catch, including discards, that does not exceed the surplus production of the stock (ie annual growth plus recruitment less the annual natural mortality – M). Fisheries can be sustainable at levels of stock significantly below the stock that would support MSY or MEY but only if managers pay full regard to limit reference points. (See also environmentally sustainable fisheries .)

T

TAC – total allowable catch, the quantity of fish that can be taken from each stock each year. The figure is agreed by the Fisheries Council of Ministers each December for the following year. EU member states are allocated a fixed proportion of the TAC as their national quota. (See also relative stability and track record.)

target species – the primary species of fish that a fishing vessel aims to catch during a given fishing operation. In pelagic fisheries this can be a single species, eg herring or mackerel, but it is usually a group of species in demersal fisheries, eg cod and whiting or plaice and sole.

U

under-reporting – failure to meet the legal requirement under the CFP to report fully and accurately all the fish that have been caught and landed. (MLS). It is an offence for anyone to (See also misreporting) retain or offer for sale undersize fish.