COMMISSION OF THE EUROPEAN COMMUNITIES

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COMMISSION STAFF WORKING PAPER

REPORT OF
THE SCIENTIFIC, TECHNICAL AND ECONOMIC
COMMITTEE FOR FISHERIES

REVIEW OF SCIENTIFIC ADVICE FOR 2007

PART 2
ADVICE FOR FISH STOCKS OTHER THAN DEEPWATER RESOURCES AND
STOCKS IN THE BALTIC SEA

STECF opinion expressed during plenary meeting held in Ispra from 6-10
November 2006

This report does not necessarily reflect the view of the European Commission
and in no way anticipates the Commission’s future policy
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1 INTRODUCTION

A subgroup of the STECF met between 23 and 27 October 2006 to review scientific advice for 2007.

2 SUBGROUP ANALYSIS

The subgroup analysed all the 300 stocks of Community interest including those in third countries and international waters other than those from deep water or the Baltic already analysed in June 2006. The subgroup described each stock with a species name, a fishing area, a fleet segment (gear type, number of vessels), economic importance. It quantified the EU catch when this information were available. It then described the management system and the stock status. The subgroup then commented on the management assessments and advice provided by the management bodies concerned.

In general it found the management advice offered by the relevant bodies sound but had some reservations and concerns regarding suggestions to remove TACs on anglers in Vb VI, XII, XIV, non-enforcement of TACs on North east arctic cod, late closure of sandeel fishery, raising of F_{Pa} for North Sea plaice and lack of observed effort reductions for Western Channel plaice. It warned about the consistency of management measures of cod and haddock in Vb, Using the approach recommended in 2005 it provided indications of expected landings for those nephrops stocks assessed by underwater television.

It remarked on the need for a regional fisheries organisation in the South West Atlantic, underlined the need for close collaboration between Greece and Turkey for European anchovy in the Aegean. It emphasised the provision of better data to GFMC-SAC-SCSA for stocks such as sardines in the strait of Sicily and wondered whether management measures for red mullet in the Northern Alboran sea had been implemented. It shared concerns with ICCAT about the bluefin tuna stock, suggesting additional data collection and enforcement measures. It regretted the replacement of a moratorium for FADs for bigeye tuna by seasonal or area closures and EU TAC limits for Portuguese dogfish in the North east Atlantic being set above ICES recommendations.

The subgroup opinion is reproduced as an annex to this report.

3 STECF OPINION

STECF endorsed the report of the sub-group.
ANNEX ADVICE FOR FISH STOCKS OTHER THAN DEEPWATER RESOURCES AND STOCKS THE BALTIC SEA PREPARED BY STECF-SGRST BRUSSELS, 23-27 OCTOBER 2006
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STECF-SGRST BRUSSELS, 23-27 OCTOBER 2006

This report will be reviewed and evaluated by the Scientific, Technical and Economic Committee for Fisheries (STECF) in November 2006 Plenary Meeting

This report does not necessarily reflect the view of the STECF and the European Commission and in no way anticipates the Commission’s future policy in this area
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1. Introduction

1.1. Background

This review presents summary information on the state of stocks and management advice for stocks of Community interest throughout the world including those in Third Countries and international waters. In undertaking the review, STECF has consulted the most recent reports on stock assessments and advice from appropriate scientific advisory bodies or other readily available literature, and has attempted to summarise it in a common format. The review is partially incomplete, since in some cases, appropriate information was not readily available to the group. For some stocks the review remains unchanged from the Review of advice for 2005 (SEC(2004)372), since no new information on the status of or advice for such stocks was available at the time the review took place. This does not mean that no such information exists; merely that STECF did not have access to it. A comment to this effect is included in the relevant stock sections.

Nevertheless, the report provides summary assessment and management advice on about 300 stocks of interest to the Community.

STECF notes that the term ‘stock’ in some cases, may not reflect a likely biological unit, but rather a convenient management unit. In specific cases STECF has drawn attention to this fact.

STECF also is of the opinion that, as far as possible, management areas should coincide with stock assessment areas.

For each stock, a summary of the following information is provided:

STOCK: [Species name, scientific name], [management area]

FISHERIES: fleets prosecuting the stock, management body in charge, economic importance in relation to other fisheries, historical development of the fishery, potential of the stock in relation to reference points or historical catches, current catch (EU fleets’ total), any other pertinent information.

SOURCE OF MANAGEMENT ADVICE: reference to the management advisory body.

MANAGEMENT AGREEMENT: where these exist.

PRECAUTIONARY REFERENCE POINTS: where these have been proposed.

STOCK STATUS: Reference points, current stock status in relation to these. STECF has included precautionary reference point wherever these are available.

RELEVANT MANAGEMENT ADVICE: summary of advice.

STECF COMMENTS: Any comments STECF thinks worthy of mention, including errors, omissions or disagreement with assessments or advice.

STECF notes that following the introduction of mixed fishery advice in 2003, ICES began providing overviews of its advice for groups of stocks commencing in 2004. Such advice is summarised in section 16 of this report. In addition, the advice in relation to single species
exploitation boundaries and the associated terminology has also been modified. For most stocks, the single species advice on the state of the stock is formulated under two main headings:

- *Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects.*
- *Exploitation boundaries in relation to precautionary limits*

For those stocks for which management plans have been agreed, ICES has also provided advice under the heading

- *Exploitation boundaries in relation to existing management plans.*

The ICES advice also contains other information that may be important to the formulation of management proposals and agreements. However, in this report, STECF provides only a summary of the pertinent points in the ICES advice and suggests that the full ICES advice, together with any comments from STECF are taken into account before any management decisions are taken. Furthermore, brief overviews of the fisheries in some of the geographical regions where the Community has an interest are also included in the report.

A list of reports and publications consulted is given at the end of the document. STECF recognises that in future the format of the stock review publication may evolve, taking into account comments from users of the publication.

Note that for some stocks, the stock summaries have not been updated either because there was no new information available or the appropriate experts were unable to contribute to the report because of other commitments. In such cases, this is reflected in the comments from STECF on each stock. In particular, the sections dealing with stocks under the jurisdiction of CECAF (section 5), WECAF (section 6) and the Resources in the South-east Atlantic (section 7) and South-west Atlantic (section 13) remain unchanged from the STECF review of advice for 2004. Consequently, the text in these sections reflects the stock status as described in the review of advice for 2004.

The STECF review of scientific advice was drafted by the STECF Sub-group on Resource Status (SGRST, Chair, J. Casey) during its meeting with the Sub-group on Economic Assessment (SGECA) of 23 – 27 October 2006, and subsequently finalised and endorsed at the 21st STECF Plenary meeting (6 – 10 November 2006).

1.2. SGRST - stock review: participants

The following scientists attended the SGRST meeting held in Brussels from 23-27 October 2006. (participants affiliation and full address, also a list of experts that contributed by e-mail, can be found at the end of the document):

ARDIZZONE, Giandomenico
BAILEY Nick
CASEY John (Chair)
CHILARI Anna
CINGOLANI Nando
DI NATALE Antonio
DRANSFELD Leonie
2. Resources of the North-east Atlantic for which the EU fixes a TAC or shares a TAC fixed multilaterally

2.1. Anchovy (Engraulis encrasicolus) in Division VIII (Bay of Biscay)

**FISHERIES:** Fleets from France and Spain exploit Bay of Biscay Anchovy. Anchovy are mainly taken by pelagic trawlers and purse-seiners. The Spanish and French fleets fishing for anchovy in Subarea VIII are well separated geographically and in time. The Spanish fleet operates mainly in Division VIIIc and VIIIb in spring, while the French fleets operate in Division VIIIa in summer and autumn and in Division VIIIb in winter and summer. There is fishing for anchovy throughout the year. The fishery is mostly dependent on the year-class recruiting at age 1. The estimated total catch in 2005 was 1,128 t. and the estimated catch in 2006 up1st July was 1,430 t. This fishery has been managed by annual TACs, which has been set at a fixed level (in the range of 30,000 t to 33,000 t) independent of the advice (from 1979 to 2004). Since 2002, the total annual catches have been well below the fixed annual TAC indicating that when the recruitment is low, a management regime based on such annual TACs has not constrained the fishery.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment is based on stock biomass estimates from egg (1987–2006) and acoustic surveys (1989–2006) and catches from the French and Spanish fisheries.

**PRECAUTIONARY REFERENCE POINTS:** ICES considers that Blim is 21,000 t, the lowest observed biomass in the 2003 assessment, and proposed Bpa be set a 33,000 t. There is no biological basis for defining Flim, and Fpa be established between 1.0 and 1.2. A Bpa reference point is difficult to use in management for this short-lived stock and the advice given by ICES is therefore not linked to this reference point.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as suffering from reduced reproductive capacity. SSB is estimated to be about Blim. Low recruitment since 2001 and almost complete recruitment failure of the 2004 year-class are the primary causes of the stock collapse. This led to the closure of the fishery in July 2005 and July 2006. The 2005 year-class appears to be slightly stronger but is still amongst the lowest in the time-series.

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. The present closure of the fishery since July 2006 aims at protecting the remaining stock until a strong year-class recruits to the stock. ICES recommends that the fishery remains closed and should, at the earliest, be considered for re-opening if the acoustic and egg surveys in May-June 2007 demonstrate a strong 2006 year-class.

**STECF COMMENTS:** STECF agrees with the ICES’ advice and notes that reference points are difficult to use in management for this short-lived stock. STECF also notes that there are large inter-annual fluctuations in recruitment, which strongly depends on environmental factors. STECF also agrees with the recommendation of a revision of the current management regime to take into account the fluctuations in recruitment. This requires a reliable indicator of the latest
year-class strength, which can be obtained from the May surveys. For the time being the acoustic and egg surveys carried out in spring are the only ones able to provide an indicator of the strength of the incoming year-class.

### 2.2. Anchovy (*Engraulis encrasicolus*) in Sub-areas IX and X

#### 2.2.1. Anchovy (*Engraulis encrasicolus*) in Sub-area IX

This review relates to anchovy in Division IXa only.

**FISHERIES:** There is a regular fishery for anchovy in Division IXa South (Gulf of Cádiz). The fleets in the northern part of Division IXa occasionally target anchovy when abundant, as occurred in 1995. The anchovy in Subdivision IXa South has different biological characteristics and dynamics compared to anchovy in other parts of Division IXa. The anchovy population in Subdivision IXa South appears to be well established and relatively independent of populations in other parts of Division IXa. These other populations seem to be abundant only when suitable environmental conditions occur.

As consequence of regulations, in 2000, catches in Division IXa South decreased, probably as a result of a large reduction in the fishing effort by the Barbate single-purpose purse-seine fleet, one of the main fleets harvesting anchovy in the area. Most of these vessels accepted a tie-up scheme in 2000 and 2001 because the EU-Morocco Fishery Agreement was not renewed. Since 2002, these vessels have been fishing again in the Gulf of Cadiz. The effort exerted by the entire purse-seine fleet since 1997 has been high. In 2005, the possible combination of a new fishing closure in the fourth quarter and the reduction of the number of active vessels fishing anchovy led a marked decrease in fishing effort. The total landings of anchovy in 2005 were 4,515 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Analytical assessment of the stock is not possible at present.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been estimated for this stock.

**STOCK STATUS.** The information on this stock is inadequate to evaluate the spawning stock or fishing mortality relative to precautionary reference points, and the state of the stock is unknown.

**RECENT MANAGEMENT ADVICE:** ICES recommends that catches in 2007 should be restricted to 4,800 t (mean catches from the period 1988–2005 excluding 1995, 1998, 2001, and 2002). This level should be maintained until the response of the stock to the fishery is known.

**STCEF COMMENTS:** STECF agrees with the advice of ICES. STECF also considers that in-season management or alternative management measures (taking into account the data limitations) should be considered, due to fact that the stock experiences high natural mortality and is highly dependent upon recruitments.

#### 2.2.2. Anchovy (*Engraulis encrasicolus*) in Sub-area X

There is no information on Anchovy in Sub-area X.
2.3. Anglerfish (*Lophius piscatorius*) in IIa (EU zone), North Sea IV

**FISHERIES:** Anglerfish are taken as a by-catch by towed gears in the Northern North Sea and IIa, with an increasing directed trawl fishery in the deeper areas of the Northern North Sea (where 90% of the Area IV landings are taken). The fishery is dominated by the Scottish fleet, which takes around 70% to 90% of the total landings in this area. Working Group estimates of landings of anglerfish from the North Sea show a rapid increase in the late 1980s from about 10,000 t to about 18,000 t (1997) followed by a continuous decrease to between 8,000 t and 9,000 since 2003t. Provisional Official landings for 2005 are given as 9438 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The stock in the North Sea was formerly treated as a separate unit, but the assessment is now combined with that in Sub-Area VI – see Section 2.4.

The STECF response to a special request for this stock is given in Section 2.2.6 of the 19th report of the STECF.

2.4. Anglerfish (*Lophius piscatorius*) in Vb (EU zone), VI, XII, XIV

**FISHERIES:** The main fishery is in Sub-Area VI where anglerfish have become the subject of a directed trawl fishery. They are also taken as a by-catch in trawl fisheries targeting roundfish species and *Nephrops*. The main exploiters are the UK, France and Ireland, with smaller landings reported by other nations including Norway, Spain and Denmark. Vessels from EU Member States take most of the catch. ICES estimates of landings of anglerfish in Division VI show a similar trend to those in the North Sea – a rapid increase in the late 1980s (from about 6,000 t in 1989 to about 18,000 t in 1996) followed by a continuous decline since 1996 to 3296 t in 2004. Anglerfish are caught widely in VIa with the highest catch rates occurring along the shelf edge in deeper.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The assessment now includes anglerfish from Sub-area IV. The assessment is primarily base on commercial CPUE from a logbook and observer data study in Subarea IV and Division Via.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary fishing mortality reference point for this stock is $F_{pa} = 0.3$ be chosen as $F_{pa}$. This is based on spawner per recruit considerations, ie. the $F$ required to give 35% of virgin spawning stock biomass. There is currently no biological basis for defining $B_{lim}$ or $F_{lim}$. Therefore no precautionary biomass reference point has been proposed.

**STOCK STATUS:** There are major uncertainties about catch and effort data for anglerfish, as well as limited knowledge about population dynamics and distribution. The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk. Official landings have declined substantially since the mid-1990s. The development of commercial CPUE from a logbook and observer data study in Subarea IV and Division VIa have shown that the stock is not in decline in recent years. The mean size of landed anglerfish from trawl landings from Division VIa shows no trend over the last ten years, while a decrease in mean size was evident for the gillnet landings from Division IIa in the most recent years.

**MANAGEMENT OBJECTIVES:** There are no explicit management objectives for this stock but the European Community and Norway are in discussions regarding the joint management of this shared stock.
RECENT MANAGEMENT ADVICE: The available information is inadequate to evaluate spawning stock or fishing mortality relative to precautionary reference points. The effort in fisheries that catch anglerfish should not be allowed to increase and the fishery must be accompanied by mandatory programmes to collect catch and effort data on both target and bycatch fish.

In this situation the most productive way forward is to continue with the two stage approach ICES’ recommendation (ACFM 2004). The first stage is to substantially improve the quality and quantity of data collected on the fishery while maintaining exploitation at its current level (inasmuch as this can be determined). This is being achieved by a detailed and stringent monitoring programme, including the mandatory reporting of both catch and effort data in logbooks, and includes an industry collaboration trawl survey for anglerfish which began in 2005.

A key point in this recommendation was that the restrictive TAC in 2004 and previous years had led to extensive mis-reporting. Management aimed at maintaining effort at or below that of 2004, but without a specific TAC, would potentially have allowed the accurate reporting of catch and effort. In the event, a TAC based regime was retained, although at an increased level. To date it is not clear if this has improved the quality of the landings data. However, the TAC is still perceived as restrictive by the industry. The existing tally book scheme is continuing and observers have been placed on as many vessels as is feasible. The anglerfish survey took place in the autumn of 2005 and a second survey is due shortly. Ireland are now also undertaking an anglerfish survey.

This first stage of data collection is expected to take at least five years to establish useable time series of fisheries dependent and independent data. The second stage could then be launched to use these data to examine alternative management approaches and harvest control rules appropriate to this fishery in a similar fashion to that used elsewhere within this response; e.g. North Sea cod and plaice. Should evidence appear of a decline in the state of the stock during this period of data collection, the management of this stock should be revisited and appropriate management measures initiated.

Details of an evaluation of a special request for an STECF review of the TAC for this stock is given in the 2006 STECF subgroup report SGRST 06-03. The STECF plenary evaluation and response is included at the beginning of the report.

STECF COMMENTS: STECF broadly agrees with the ICES advice. STECF is pleased to see that the data requirements suggested by ICES have been strengthened to include survey data and a tally book scheme. It is hoped that provision of VMS data will also be possible. STECF comments that observer and tally book data examined by the STECF subgroup in 2006 showed there have been some increases in observed catch rates but that it is unclear whether this is due to increased abundance or changes in fishery targeting.

STECF has concerns regarding the practical implementation of the ICES advice and makes the following comments:

- Complete removal of the TAC might lead to attempts by fishers to substantially increase the fishery.
- This leads to a requirement to ensure there is no completely unrestricted fishery.
- If there is an increase in TAC there is the need to limit effort.
• There is a need to continue to collect detailed effort and catch data from the fishery.

These comments and the response to SGRST 06-03 lead to the following STECF recommendations:

• There is presently no basis to calculate an appropriate TAC. In 2004, STECF suggested somewhere between 10,200t and 30,200t. STECF recommends that catches and catch rates continue to be closely monitored to determine whether the agreed TAC for anglerfish for 2006 (15,000t) was in line with the permitted effort adequate to ensure accurate landings and effort data. Any observed overall change in catch rate during 2006 could then provide the basis for adaptive management measures for 2007.
• Effort should be limited to the present level.
• When a comprehensive and acceptable assessment of the stock status of anglerfish in ICES Sub-areas IV and VI becomes available, the management measures for fleets exploiting this stock be re-assessed.

2.5. Anglerfish in Div. VII

Anglerfish within the two management areas VII and VIII a,b,d,e are assessed together and comprise of two species (*Lophius piscatorius* & *Lophius budegassa*) which are not always separated for market purposes. The management area for this stock also includes the Irish Sea (VIIa) where catches since 1995 have been between about 400t and 1,300 t, (434 t in 2005). These catches are not included in the assessment.

**FISHERIES:** The trawl fishery for anglerfish in the Celtic Sea and Bay of Biscay developed in the 1970s. Anglerfish are also taken as a by-catch in other demersal fisheries in the area. Landings of both species have fluctuated over the last 20 years. In recent years, landings of *L. piscatorius* have declined from 22,100 t in 1996 to 14,900 t in 2000 and increased to 27,313 t in 2004. Landings in 2005 were slightly lower at 24,778 t. Landings of *L. budegassa* were 8,600t in 1998, declined to 5,700 in 2001 and increased again recently; in 2005 they were 7428t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES.

**PRECAUTIONARY REFERENCE POINTS:** For *L. piscatorius*, the proposed Fpa = 0.24 (Flim =0.33) and the proposed Bpa = 31,000t. For *L. budegassa*, the proposed Fpa = 0.23 and the proposed Bpa = 22,000t. For both the stocks Blim is not defined.

**STOCK STATUS:** Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock as having full reproductive capacity and being harvested sustainably. SSB of both stocks decreased from 1986 until 1993, then increased up to 1995–1996. SSB of *L. budegassa* is at present stable above Bpa. SSB for *L. piscatorius* has been above Bpa and increasing since the mid-90s. For both stocks, fishing mortality in most years has been above Fpa. In 2005 fishing mortality is estimated to be around Fpa for *L. budegassa* and below Fpa for *L. piscatorius*. For *L. piscatorius*, recent year-classes (1999–2002) are above average while for *L. budegassa* the 1999 and 2000 year-classes are below average, with 2000 being the lowest observed in the time-series

**RECENT MANAGEMENT ADVICE:** The ICES advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries in Section 16.1.
Exploitation boundaries in relation to high long term yield, low risk of depletion of production potential and considering ecosystem effects: For *L. piscatorius* the status quo fishing mortality is estimated at 0.21, which is above fishing mortalities that would lead to high long-term yields and low risk of stock depletion ($F_{0.1} = 0.05$ and $F_{\text{max}} = 0.09$). For *L. budegassa* the status quo fishing mortality is estimated at 0.23, which is above fishing mortalities that would lead to high long-term yields and low risk of stock depletion ($F_{0.1} = 0.09$ and $F_{\text{max}} = 0.15$). This indicates that long-term yield is expected to increase at fishing mortalities below the historic values.

Exploitation boundaries in relation to precautionary limits: In order to harvest the stock within precautionary limits fishing mortality should be kept below $F_{\text{pa}}$ and SSB should be above $B_{\text{pa}}$ for both species. Fishing at $F_{\text{pa}}$ for *L. budegassa* is equivalent to $F_{\text{sq}}$ and is expected to result in landings of 7600 t, leading to an SSB of 26 800 t in 2008. Given the link between the two species, this corresponds to a fishing mortality of 0.21 for *L. piscatorius*, corresponding to landings of at most 28 400 t in 2007. The predicted SSBs are well above $B_{\text{pa}}$ in all scenarios.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF reiterates the comments of ICES that ‘the majority of the anglerfish catch consists of young fish. An improvement of the selection pattern is expected to give a higher long term yield’. These young fish, have not yet reached maturity and the current exploitation pattern represents growth over-fishing.

The management area for this stock also includes the Irish Sea (VIIa) but the catches of the Irish Sea are not included in the assessment.

2.6. Anglerfish in Div’s VIIIa, b, d, e

Anglerfish within the two management areas VII and VIII abde are assessed together and comprise of two species (*L. piscatorius* and *L. budegassa*), which are not always separated for market purposes. Details of stock status and advice are given in Section 2.5.

2.7. Anglerfish (*Lophius sp.*) in VIIIc, IX, X

**FISHERIES:** Anglerfish in the Iberian region are caught as part of a mixed demersal fishery by vessels using trawls and fixed nets. Two species (*L. piscatorius* and *L. budegassa*) are caught and they are not always separated for market purposes so the advice is combined for the two stocks. Landings of (*L. piscatorius*) decreased from 6,900t in 1986 to about 790t in 2001. Landings have increased since and were 3644t in 2005. For *L. budegassa* landings decreased from 3,700t in 1988 to 770t in 2002 but have increased in the last couple of years. In 2005 they were 897 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. A surplus production model (ASPIC) was used to provide estimates of stock biomass and fishing mortality relative to their respective maximum sustainable yield (MSY) values. Two commercial CPUE series were used in the model.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points are proposed for this stock. $B_{\text{MSY}}$ and $F_{\text{MSY}}$ points can be used as a lower boundary for the biomass and an upper boundary for $F$. $B_{\text{MSY}}$ and $F_{\text{MSY}}$ are defined in the context of a production model and correspond to lower exploitation levels than adopted for stocks with similar population dynamics for which PA points are based on an analytical assessment.
STOCK STATUS: The assessment is only considered indicative of stock trends and cannot be used as an absolute measure of stock status. The stock size of the combined stocks (*Lophius piscatorius* and *L. budegassa*) is considered to be well below the level associated with harvesting at maximum sustainable yield. The fishing mortality is estimated to be well above $F_{\text{MSY}}$. The fishing mortality in 2004 was around 2.0 times $F_{\text{MSY}}$ and increased in 2005 to be 2.4 times higher than $F_{\text{MSY}}$.

RECENT MANAGEMENT ADVICE: The advice for the two stocks is similar to the advice given for 2006.

*Exploitation boundaries in relation to precautionary considerations:* The ICES advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries in Section 16.5.

Fishing mortality equal to zero in 2007 is required to bring SSB back to $B_{\text{MSY}}$ in the short term. If this is not possible then a recovery plan should be established that will ensure rapid and safe recovery of the SSB above $B_{\text{MSY}}$. Landings in 2001 and 2002 have apparently brought fishing mortality down to $F_{\text{MSY}}$. Catches in that order could be considered as a preliminary guidance for maximum landings in a recovery plan. The advice is essentially the same as last year.

STECF COMMENTS: STECF points out that, when using a surplus production model, sufficient contrast in the catch and catch per unit of effort data over a reasonable time period is needed in order to reliably estimate $B_{\text{MSY}}$ and $F_{\text{MSY}}$. It is also important to note that production models analyse trends of total biomass and do not account for any changes in the population structure that may have occurred recently.

STECF notes ICES comments that, ‘Combined landings increased since 2002 and overshot the TAC in 2005 by more than 100%. Measures should be taken to assure that the TAC is effectively restricting the fishery. STECF agrees with the ICES advice that the landings in 2001 and 2002 may provide guidance as to an appropriate level of catch in a recovery plan but notes the discrepancy in the ICES advice between the reported landings in Figure 7.4.3.2 and tables 7.4.3.1 and 7.4.3.2.

The two species are managed under a common TAC. The two species are usually landed together and they are recorded together in the landing statistics. Consequently, constraining fishing mortality on either species alone is impossible under a common TAC. STECF reviewed the ICES advice and notes that both species of anglerfish are caught in the mixed trawl (catching also hake and *Nephrops*) and artisanal fisheries (catching also hake in Portuguese waters), consequently the implementation of the recovery plan for southern hake and *Nephrops* in the Iberian region should reduce fishing mortality on anglerfish.

In the recovery plan for hake and *Nephrops*, SGMOS (2003) evaluated two effort reduction schemes: a 10% constant effort reduction relative to the previous year, and a lower effort reduction (5%) the beginning of the time series and then 10%. IPIMAR (2003) analysed the likely effect of these on the recovery of southern anglerfish stocks. Both schemes produced similar results, with a medium term recovery of the SSB and yield maintained below MSY. Considering the recovery plan as starting in 2004, the probability of anglerfish biomass being above $B_{\text{MSY}}$ in 2006 was estimated to be 50%, by 2010 the probability was estimated to rise to over 80%.

There is a limited scope for use of additional technical measures on anglerfish in the area. In addition to EU regulations in Region 3, national regulations include closed areas for hake (also
affecting bottom species like anglerfish) in Spanish and Portuguese waters and gear regulations. Little is know about nursery and spawning areas. Consequently, an appropriate closed area to protect juveniles cannot be identified. Improving selectivity through technical measures relating to gear design is currently a difficult objective, given the morphology of the species.

STECF notes that ICES advice of F equal to zero in 2007 is inconsistent with the mixed fisheries context. A separate recovery plan for anglerfish is not appropriate since the existing recovery plan for hake and Nephrops is likely to benefit the status of the anglerfish stocks, instead STECF recommends hake and Nephrops proposal should be amended specifically to include anglerfish.

The STECF response to a special request for this stock is given in Section 2.2.14 of the report of the 19th meeting of the STECF.

2.8. Blue whiting (Micromesistius poutassou L.) in Sub -areas I-IX, XII and XIV

Blue whiting is widely distributed in the eastern North Atlantic extending from the Strait of Gibraltar to the Barents Sea. It consists of several populations with genetic “leakage” between them, but it is treated as one stock since it has so far not been possible to define an unambiguous border between populations.

FISHERIES: Blue whiting is exploited mainly by fleets from Norway, Russia, the Faroe Islands, and Iceland but The Netherlands, Scotland, Denmark, Ireland, Sweden, Germany and Spain also take substantial catches. The fishery for blue whiting was fully established in 1977. The Northern blue whiting stock is fished in Subareas II, V, VI, and VII and most of the catches are taken in the directed pelagic trawl fishery in the spawning and post-spawning areas (Divisions Vb, Via,b and VIIb,c). Catches are also taken in the directed and mixed fishery in Subarea IV and Division IIIa, and in the pelagic trawl fishery in the Subareas I and II, in Divisions Va, and XIVa,b. The fisheries in the northern areas have taken 360,000 t to 2 300,000 t per year in the last decade with highest catch levels in 2003 and 2004. In 2005 catches were 2 000,000 t. In the southern areas (Subarea VIII, IX, Divisions VIIId,e and g-k) catches have been stable in the range of 25,000 to 34,000 t between 1987 and 2003, and increased to 85,000 t in 2004; in 2005 they were 27,000 t. In Division IXa blue whiting is mainly taken as bycatch in mixed trawl fisheries. Total landings in 2005 were 2.0 million t. Recent large landings are supported by the current high recruitments, and are much higher than in earlier years. Most of the catches are taken in the spawning and post-spawning areas along the continental edge, and in the Norwegian Sea. In the latter, the share of the total catch has increased from 5% in the mid-nineties to about 40% in 2003 and 2004. A larger proportion of the catch there consists of young fish. In 2005, the fishery in the Norwegian Sea was reduced to about half of the 2004 fishery. In 2002 to 2005, and in the absence of agreements on TACs and their allocation, the EU, Faroe Islands, Iceland, Norway, and the Russian Federation implemented unilateral measures to limit blue whiting catches. In December 2005 the EU, Faroe Islands, Iceland, Norway agreed to a management plan and sharing arrangement, and total catches of 2 million tonnes for 2006. Russia will be accommodated by transfers from some of the other countries and additional catches in the NEAFC area.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. For blue whiting five assessment models were used to explore the data for blue whiting. All models utilized catch-at-age data from commercial catches from 1981 onwards. Several survey time-series were available (1990–2005), but only one of the surveys covers almost the entire distribution area of the stock. Observations from two survey fleets are used in the assessment, namely the Norwegian acoustic survey on the spawning grounds 1991–2006 and the Norwegian
Sea International ecosystem survey 2000–2006. The final assessment was done using a stochastic multi-species model (SMS). It showed the most consistency in retrospective pattern and compared to the other models regarding the results from last year.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are \( F_{pa} = 0.32 \), \( B_{pa} = 2.25 \) million t.

**STOCK STATUS:** Based on the most recent estimates of fishing mortality and SSB, ICES classifies the stock as having full reproductive capacity, but being harvested unsustainably. SSB increased to a historical high in 2003 but has decreased since 2004. Although the estimates of SSB and fishing mortality are uncertain, the estimate of SSB appears to be well above \( B_{pa} \). The estimated fishing mortality is well above \( F_{pa} \) and is estimated to have reached \( F_{lim} \) in 2004. Recruitment in the last decade appears to be at a much higher level than earlier, but indices from surveys indicate that the 2005 year-class is at the pre-1996 level.

**RECENT MANAGEMENT ADVICE:**

In December 2005, the coastal states (EU, Norway, Iceland, and Faroe Islands) agreed on a sharing arrangement for the blue whiting stock. This arrangement provides for catches in 2006 of 2 million tonnes, allocated as follows: EU 30.5%, Faroe Islands 26.125%, Norway 25.745%, and Iceland 17.63%. Russia will be accommodated by transfers from some of the coastal states and additional catches in the NEAFC regulatory area. Details of the arrangement are specified in Annex I and Annex II below:

**ANNEX I. MANAGEMENT OF THE BLUE WHITING STOCK IN THE NORTHEAST ATLANTIC**

1. A Delegation of the European Community, the Faroe Islands, Iceland and Norway met in Oslo on 15 and 16 December 2005 to consult on the management of the Blue Whiting stock in the North-East Atlantic.
2. The Delegations agreed to recommend to their respective authorities the arrangement for the regulation of the fisheries of Blue Whiting in 2006 and subsequent years set out in Annex I to this Agreed Record. They also agreed to recommend to their respective authorities the multi-annual management arrangement set out in Annex II.
3. The Delegations agreed to recommend that, in 2006, ICES be requested to evaluate, as soon as possible, whether the multi-annual management arrangement as set out in Annex II is in accordance with the precautionary approach and to make the results of this evaluation available to the Parties. The Delegations agreed to review the multi-annual management arrangement on the basis of evaluation by ICES.
4. This Agreed Record, including bilateral arrangements related to the implementation thereof, shall be applied provisionally from 1 January 2006 and enter into force when all Parties have notified each other of the completion of their necessary procedures.
5. For subsequent years, Delegations agreed to allocate allowable catches in the proportions that are set out in paragraph 1 of Annex I.
6. Unless one or more of the Parties notifies its withdrawal not later than by the end of June, the Agreed Record shall be renewed annually, including Annexes, in which years, maximum catch limit and quotas are updated.
7. The Delegations agreed to inform the NEAFC Secretariat about the regulatory measures they intend to take on the basis of this Agreed Record, for the fisheries of Blue Whiting in 2006 and in subsequent years.

ANNEX II. ARRANGEMENT FOR THE MULTI-ANNUAL MANAGEMENT OF THE BLUE WHITING STOCK

1. The Parties agree to implement a multi-annual management arrangement for the fisheries on the Blue Whiting stock which is consistent with the precautionary approach, aiming at constraining harvest within safe biological limits, protecting juveniles, and designed to provide for sustainable fisheries and a greater potential yield, in accordance with advice from ICES.

2. The management targets are to maintain the Spawning Stock Biomass (SSB) of the Blue Whiting stock at levels above 1.5 million tonnes (Blim) and the fishing mortality rates at levels of no more than 0.32 (Fpa) for appropriate age groups as defined by ICES.

3. For 2006, the Parties agree to limit their fisheries of Blue Whiting to a total allowable catch of no more than 2 million tonnes.

4. The Parties recognise that a total outtake by the Parties of 2 million tonnes in 2006 will result in a fishing mortality rate above the target level as defined in paragraph 2. Until the fishing mortality has reached a level of no more than 0.32, the Parties agree to reduce their total allowable catch of Blue Whiting by at least 100,000 tonnes annually.

5. When the target fishing mortality rate has been reached, the Parties shall limit their allowable catches to levels consistent with a fishing mortality rate of no more than 0.32 for appropriate age groups as defined by ICES.

6. Should the SSB fall below a reference point of 2.25 million tonnes (Bpa), either the fishing mortality rate referred to in paragraph 5 or the tonnage referred to in paragraph 4 shall be adapted in the light of scientific estimates of the conditions then prevailing. Such adaptation shall ensure a safe and rapid recovery of the SSB to a level in excess of 2.25 million tonnes.

7. This multi-annual management arrangement shall be reviewed by the Parties on the basis of ICES advice.

The maximum catch in 2007 corresponding to the existing management plan is 1.9 million tonnes, which is expected to leave the spawning stock biomass at 2.86 million t, i.e. above Bpa in 2008, but will lead to an F above Flim in 2007. The current fishing mortality, estimated at 0.48, is above the fishing mortalities that are expected to lead to high long-term yields and low risk of depletion of production potential (F0.1 = 0.20). This indicates that long-term yield is expected to increase at fishing mortalities well below the historic values. Fishing at such a lower mortality is expected to lead to higher SSB and would therefore lower the risk of the stock being outside precautionary limits. Fishing at Fpa implies catches of less than 980 thousand t in 2007. This will result in a spawning stock biomass in 2008 well above Bpa. The proposed management plan is not considered in accordance with the precautionary approach. ICES concludes that the exploitation boundaries for this stock should be based on the precautionary limits.

STECF COMMENTS: STECF agrees with the advice from ICES. STECF notes that in its evaluation of the management plan (ACFM 2006, ICES ADVICE Volume 9, Section 3.2.4), ICES has shown that for low recruitment scenarios the probability that the spawning stock biomass will remain above Blim is less than 95% and that the current management plan is not precautionary. STECF therefore recommends to follow the guidelines ICES provides, on how to
make the management plan consistent with the precautionary approach. Proposed adjustments include to
1. define in Paragraph 6 what actions will be taken to recover the stock when the SSB falls below $B_{pa}$,
2. to amend Paragraph 4 so as to secure a reduction in fishing mortality to or below $F_{pa}$ as soon as possible,
3. to ensure that the target fishing mortality is reduced to well below $F_{pa}$ (i.e. to about two-thirds of $F_{pa}$) to reduce the risk (less than 5%) of the SSB falling below $B_{lim}$, and/or
4. to use a trigger point for management action that is higher than $B_{pa}$.
A variety of solutions or combinations of items 1) to 4) are possible and the revised management plan should be re-evaluated in relation to the precautionary approach.

2.8.1. Blue whiting (Micromesistius poutassou L.) in Sub-areas Ila(1)-North Sea (1)
Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 2.8.

2.8.2. Blue whiting (Micromesistius poutassou L.) in Sub-areas Vb(1),VI,VI
Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 2.8.

2.8.3. Blue whiting (Micromesistius poutassou L.) in Sub-areas VIIIabd
Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 2.8.

2.8.4. Blue whiting (Micromesistius poutassou L.) in Sub-areas VIIIe
Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 2.8.

2.8.5. Blue whiting (Micromesistius poutassou L.) in Sub-areas VIIIc,IX,X
Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 2.8.

2.9. Brill (Scophthalmus rhombus) in the North East Atlantic

2.9.1. Brill (Scophthalmus rhombus) in the North Sea
No information is available on the status of this stock.
2.9.2. Brill (Scopthalmus rhombus) in the Baltic Sea Sub-divisions 22-32

**FISHERIES:** This species is caught in the mixed fishery, mainly in Subdivision 22. High landings declared in the period 1994-1996 may, in fact, be misreporting from the cod trawl fishery.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. Management was formerly under the jurisdiction if the International Baltic Sea Fisheries Commission (IBSFC) but management is now subject to EU – Russia negotiations.

**MANAGEMENT AGREEMENT:** No explicit objectives have been defined for this stock.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The state of the stock is unknown.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** No comments.

2.10. Capelin (Mallotus villosus) in Sub-areas I and II, excluding IIa west of 50W.

**FISHERIES:** Norway and Russia are the two main countries which exploit the capelin stocks in these areas. No fishery took place between autumn 1993 and spring 1999. The fishery was re-opened in the winter of 1999. Since 1979 the fishery has been regulated by a bilateral agreement between Norway and Russia (formerly USSR) and catches have been very close to the advice in all years, varying between 100 000 t and 650 000 t. In 2004 the fishery was again closed.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment and stock history is based on joint Russia-Norwegian acoustic surveys during September each year. A model incorporating predation from cod has been used for predicting SSB and for estimating the historical time series of SSB.

**MANAGEMENT AGREEMENT:** The fishery is managed according to a target escapement strategy, with a harvest control rule allowing (with 95% probability) the SSB to be above the proposed Blim, taking account of predation by cod. ICES considers the management plans to be consistent with the precautionary approach.

**PRECAUTIONARY REFERENCE POINTS:** The proposed limit reference point for biomass is $B_{\text{lim}} = 200,000$ t. No precautionary fishing mortality, or biomass reference points have been proposed.

**STOCK STATUS:** Based on the most recent estimates of SSB and recruitment, ICES classifies the stock as having reduced reproductive capacity. The SSB for April 2007 is predicted to be 189 000 t, i.e. below $B_{\text{lim}}$. The abundance at age 1 (2005 year-class) is estimated to be far below the long-term average, and this is the fifth weak year-class in a row. Observations during the international 0-group survey in August September 2006 indicated that the size of the 2006 year-class is twice as high as the long-term mean.

**MANAGEMENT OBJECTIVES:** The fishery is managed according to a target escapement strategy, with a harvest control rule allowing (with 95% probability) the SSB to be above the
proposed Blim, taking predation by cod into account. ICES considers the management plans to be consistent with the precautionary approach.

**RECENT MANAGEMENT ADVICE:** The spawning stock in 2007 is predicted from the acoustic survey in September 2006 by a model, which estimates maturity, growth, and mortality (including predation by cod). The model takes into account uncertainties both in the survey estimate and in other input data. Even with no catch in 2007, the probability of having an SSB below 200 000 t is above 50%. Only catches of mature fish have been considered.

**STECF COMMENTS:** STCEF agrees with the ICES advice.

### Section 2.11

#### 2.11. Cod (Gadus morhua) in area I and II (North East Arctic cod)

**FISHERIES:** Northeast arctic cod is exploited predominantly by Norway and Russia with smaller landings by countries including the UK, the Faeroe Islands, Spain and Germany. The fishery for North east Arctic cod is conducted both by an international trawler fleet operating in offshore waters and by vessels using gillnets, long-lines, hand-lines and Danish seine operating both offshore and in the coastal areas.

From a level of about 900,000 t in the mid-1970s, landings declined steadily to around 300,000 t in 1983-1985. Landings increased to above 500,000 t in 1987 before dropping to 212,000 t in 1990, the lowest level recorded in the post-war period. The catches increased rapidly from 1991 onwards, stabilised around 750,000 t in 1994-1997 but decreased to about 414,000 t in 2000. The catch in 2004 was 606,000 tonnes and provisional catches in 2005 were 641,000 t. The EU fleet landings were between 23 000 tons and 47 000 tons over the last 5 years.

Quotas were introduced in the trawl fishery in 1978 and for the fisheries with conventional gears in 1989. In addition to quotas, the fisheries are regulated by mesh size limitations (including sorting grids), a minimum catching size, a maximum by-catch of undersized fish, maximum by-catch of non-target species, closure of areas with high densities of juveniles, and by seasonal and area restrictions. Since January 1997 sorting grids have been mandatory for the trawl fisheries in most of the Barents Sea and Svalbard area. The fisheries are controlled by inspections of the trawler fleet at sea, by a requirement of reporting to catch control points when entering and leaving the EEZs, and by inspections for all fishing vessels when landing the fish. Keeping a detailed fishing log-book on board is mandatory for most vessels, and large parts of the fleet report to the authorities on a daily basis. There is some evidence that the present catch control and reporting systems are not sufficient to prevent under-reporting of catches.

**SOURCE OF MANAGEMENT ADVICE:** This stock is currently managed by a joint Norwegian and Russian scientific advisory body. The fisheries are regulated according to bilateral agreements between Russia and Norway. ICES has been approached for advice on biological assessment and management of this stock.

The advice is based on analysis of catch-at-age data, using one commercial CPUE series and three survey series. Estimates of cannibalism are included in the natural mortality. Alternative assessment methods (Fleksibest) are in development, and carried out for illustrative purposes.
PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for biomass and fishing mortality are $B_{pa} = 460,000$ t, $F_{pa} = 0.40$. The biological information on historic stock and recruitment sizes has been revised. These revisions have altered some of the historic values substantially, with two consequences. Spawning biomasses associated with some historic recruitment are now estimated to have been lower and current reference points may be revised. A dedicated Study Group on Biological Reference Points for Northeast Arctic cod [SGBRP] met for that purpose in January 2003. The impacts of both environmental and biological considerations to stock productivity were considered, including the issue of the age composition of the SBB, which may influence egg production.

MANAGEMENT AGREEMENTS: At the 33rd meeting of the Joint Russian-Norwegian Fisheries Commission (JRNC) in November 2004, the following decision was made:

“The Parties agreed that the management strategies for cod and haddock should take into account the following:
- conditions for high long-term yield from the stocks
- achievement of year-to-year stability in TACs
  - full utilization of all available information on stock development

On this basis, the Parties determined the following decision rules for setting the annual fishing quota (TAC) for Northeast Arctic cod (NEA cod):

- estimate the average TAC level for the coming 3 years based on $F_{pa}$. TAC for the next year will be set to this level as a starting value for the 3-year period.
- the year after, the TAC calculation for the next 3 years is repeated based on the updated information about the stock development, however the TAC should not be changed by more than +/- 10% compared with the previous year’s TAC.
- if the spawning stock falls below $B_{pa}$, the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from $F_{pa}$ at $B_{pa}$, to $F = 0$ at SSB equal to zero. At SSB-levels below $B_{pa}$ in any of the operational years (current year, a year before and 3 years of prediction) there should be no limitations on the year-to-year variations in TAC.
- The Parties agreed on similar decision rules for haddock, based on $F_{pa}$ and $B_{pa}$ for haddock, and with a fluctuation in TAC from year to year of no more than +/-25% (due to larger stock fluctuations)."

ICES has evaluated these decision rules for cod and a management plan based upon them is in accordance with the precautionary approach when the SSB is above Blim.

STOCK STATUS: Based on the most recent estimates of SSB, ICES classifies the stock as having full reproductive capacity. Based on the most recent estimates of fishing mortality, the stock is exploited with an unsustainable fishing mortality (at Flim), much higher than that intended under the management plan. The SSB has been above $B_{pa}$ since 2002. Fishing mortality was reduced significantly over the years 1999-2003 but has since then increased to a 2005 estimate equal to Flim. Surveys indicate that recent year-classes are at or below average.

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1 This quotation is taken from point 5.1, in the Protocol of the 33rd session of The Joint Norwegian-Russian Fishery Commission and translated from Norwegian to English. For an accurate interpretation, please consult the text in the official languages of the Commission (Norwegian and Russian).
RECENT MANAGEMENT ADVICE:

Exploitation boundaries in relation to existing management plans: The management plan implies a TAC of 366 000 t in 2007. This catch projection includes all catches and therefore the TAC must account for all misreported catches as well.

Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects: The current fishing mortality, estimated at 0.74, is above fishing mortalities that would lead to high long-term yields (indicated to be in the F range 0.25-0.5). This indicates that long-term yield will increase at fishing mortalities well below the historic values. Fishing at such a lower mortality would lead to higher SSB and therefore lower the risk of observing the stock outside precautionary limits.

Exploitation boundaries in relation to precautionary limits: The agreed management plan has been evaluated to be consistent with the precautionary approach when the SSB is above Blim and there is a low level of implementation error. However, the management plan is not fully enforced, resulting in non-reported landings and exploitation above what was intended in the management plan. Total catches in 2007 consistent with the Precautionary Approach reference points are below 309 000 t.

Conclusion on exploitation boundaries: Since the current management plan is not fully implemented ICES concludes that the exploitation boundaries for this stock should be based on the precautionary limits. Accordingly, total catches in 2007 should be below 309 000 t.

STECF COMMENTS: STECF agrees with the ICES advice in that it is prudent to fish at exploitation rates that do not exceed Fpa. STECF notes however that TACs in this fishery have not been enforced in the past and unless measures are take to do so, the realised fishing mortality is likely to exceed Fpa in 2007. STECF notes that the level of unreported catches has averaged 20% of total catches over the past four years and managers may wish to take this into account when setting the 2007 TAC.

2.12. Cod (Gadus morhua), in the North Sea (IIa, IIIa Skagerrak, IV and VIIId)

FISHERIES: North Sea cod are exploited by fleets from Belgium, Denmark, The Netherlands, Germany, France, Sweden, Norway, and UK. Small catches are also taken by fleets from Poland and The Faeroe Islands. Cod are taken mainly by otter trawls, gill nets, long-lines and beam trawl. The stock is managed by TAC through joint negotiation between the EU and Norway. Historically, landings peaked at about 350,000 t in the early 1970s, subsequently declining to around 200,000 t by 1988. Since 1989 landings have remained between about 100,000 t and 140,000 t. Landings in 1999 were 96,000 t, they strongly decreased to 71,300 t in 2000 and then to 49,600 t in 2001, 54,900 t in 2002, 32,500 t in 2003 and 27,200 t in 2004. The assessment area for this stock includes ICES Divisions IIIa (Skagerrak), VIIId and Sub-area IV, which are different management areas and for which separate TACs are set.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is based on an analysis of catch at age data calibrated with three survey indices. Discards and industrial bycatch were included in the assessment for the North Sea only.

PRECAUTIONARY REFERENCE POINTS: Precautionary reference points for fishing mortality and spawning stock biomass have been agreed as $F_{pa} = 0.65$, $B_{pa} = 150,000t$
MANAGEMENT AGREEMENT: In 2005 the EU and Norway have revised their initial agreement from 1999 and agreed to implement a long-term management plan for the cod stock, which is consistent with the precautionary approach and is intended to provide for sustainable fisheries and high yield.

Once the stock of cod has been measured for the current year and for the previous year as no longer being at risk of reduced reproductive capacity, the plan will come into operation on 1 January of the subsequent year.

The plan shall consist of the following elements:
1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 70,000 tonnes (Blim).
2. Where the SSB is estimated to be above 150,000 tonnes the parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate that maximises long term yield. The parties agreed to use F=0.4 on appropriate age groups.
3. Where the rule in paragraph 2 would lead to a TAC which deviates by more than 15% from the TAC for the preceding year, the Parties shall fix a TAC that is neither more than 15% greater nor 15% less than the TAC of the preceding year.
4. Should the SSB of cod fall below 150 000t (Bpa) the Parties shall decide on a TAC that is lower than that corresponding to the application of the rules in paragraphs 2 and 3.
5. The Parties may where considered appropriate reduce the TAC by more than 15% compared to the TAC of the preceding year.
6. This plan shall be subject to triennial review, the first of which will take place before 1 January 2009, including appropriate adaptations to the target mortality rate specified in paragraph 2.

The main changes between this and the plan of 1999 is the reduction of a target F to 0.4, and a limitation of the change of the TAC between years of 15%. ICES has not evaluated the consistency of the new management plan with the precautionary approach. The recovery plan adopted by the EU Council in 2004, is still to be fully implemented. Details of it are given in Council Regulation (EC) 423/2004:

Article 1. This Regulation establishes a recovery plan for the following cod stocks (hereinafter referred to as "depleted cod stocks"):
(a) cod in the Kattegat;
(b) cod in the North Sea, in the Skagerrak and the eastern Channel;
(c) cod to the west of Scotland;
(d) cod in the Irish Sea.

Article 2. Definitions of geographical areas
For the purposes of this Regulation, the following definitions of geographical areas shall apply:
(a) "Kattegat" means that part of division III a, as delineated by ICES, that is bounded on the north by a line drawn from the Skagen lighthouse to the Tistlarna lighthouse, and from this point to the nearest point on the Swedish coast, and on the south by a line drawn from Hasenore to Gnibens Spids, from Korshage to Spodsbjerg and from Gilbjerg Hoved to Kullen:
(b) "North Sea" means ICES subarea IV and that part of ICES division III a not covered by the Skagerrak and that part of ICES division II a which lies within waters under the sovereignty or jurisdiction of Member States;
(c) "Skagerrak" means that part of ICES division III a bounded on the west by a line drawn from the Hanstholm lighthouse to the Lindesnes lighthouse and on the south by a line drawn from the Skagen lighthouse to the Tistlarna lighthouse and from that point to the nearest point on the Swedish coast;
(d) "eastern Channel" means ICES division VII d;
(e) "Irish Sea" means ICES division VII a;
(f) "west of Scotland" means ICES division VI a and that part of ICES division V b which lies within waters under the sovereignty or jurisdiction of Member States.

Article 3. Purpose of the recovery plan: The recovery plan (...) shall aim to increase the quantities of mature fish to values equal to or greater than 150 000 t (Cod in the North Sea, Skagerrak and eastern Channel).

Article 4: Reaching of target levels. Where the Commission finds, on the basis of advice (...), that for two consecutive years the target level for any cod stock concerned has been reached, the Council shall decide by (...) to remove that stock from the scope of this Regulation (...).

Article 5: Setting of TACs. A TAC shall be set in accordance with Article 6 where the quantities of mature cod have been estimated by the STECF, in the light of the most recent report of ICES, to be equal to or above the minimum level of 70 000 t (Cod in the North Sea, Skagerrak and eastern Channel).

Article 6: Procedure for setting TACs. (1.) Each year, the Council shall decide (...) on a TAC for the following year for each of the depleted cod stocks. (2.) The TACs shall not exceed a level of catches which a scientific evaluation (...) has indicated will result in an increase of 30 % in the quantities of mature fish in the sea at the end of the year of their application, compared to the quantities estimated to have been in the sea at the start of that year. (3.) The Council shall not adopt a TAC whose capture is predicted (...) to generate in its year of application a fishing mortality rate greater than 0.65 (Cod in the North Sea, Skagerrak and eastern Channel). (4.) (...) (5.) Except for the first year of application of this Article: (a) where the rules provided for in paragraphs 2 or 4 would lead to a TAC which exceeds the TAC of the preceding year by more than 15 %, the Council shall adopt a TAC which shall not be more than 15 % greater than the TAC of that year; or (b) where the rules provided for in paragraphs 2 or 4 would lead to a TAC which is more than 15 % less than the TAC of the preceding year, the Council shall adopt a TAC which is not more than 15 % less than the TAC of that year.

Article 7: Setting TACs in exceptional circumstances. Where the quantities of mature fish of any of the cod stocks concerned have been estimated by the STECF, in the light of the most recent report of the ICES, to be less than the quantities set out in Article 5, the following rules shall apply: (a) Article 6 shall apply where its application is expected to result in an increase in the quantities of mature fish at the end of the year of application of the TAC to a quantity equal to or greater than the quantity indicated in Article 5; (b) where the application of Article 6 is not expected to result in an increase in the quantities of mature fish at the end of the year of application of the TAC to a quantity equal to or greater than the quantity indicated in Article 5, the Council shall decide (...) on a TAC for the following year that is lower than the TAC resulting from the application of the method described in Article 6.

Article 8. Fishing effort limitations and associated conditions. (1.) The TACs referred to in Chapter III shall be complemented by a system of fishing effort limitation based on the
geographical areas and groupings of fishing gear, and the associated conditions for the use of
these fishing opportunities specified in Annex V to Council Regulation (EC) No 2287/2003 of 19
December 2003 fixing for 2004 the fishing opportunities and associated conditions for certain
fish stocks and groups of fish stocks, applicable in Community waters and, for Community
vessels, in waters where catch limitations are required. (2.) Each year, the Council shall decide
by a qualified majority, on the basis of a proposal from the Commission, on adjustments to the
number of fishing days for vessels deploying gear of mesh size equal to or greater than 100 mm
in direct proportion to the annual adjustments in fishing mortality that are estimated by ICES
and STECF as being consistent with the application of the TACs established according to the
method described in Article 6.

ICES has previously concluded that a precautionary recovery plan must include an adaptive
element, implying that fisheries for cod remain closed until an initial recovery of the cod SSB has
been proven. Such an element is not included in the existing plan. ICES therefore considers the
recovery plan as not consistent with the precautionary approach.

STOCK STATUS: ICES classifies the stock as being harvested unsustainably and suffering
reduced reproductive capacity. SSB is well below the Blim of 70 000 t. Fishing mortality has
shown a decline since 2000 and is currently estimated to be around Flim. The 2001-2004 year-
classes are all estimated to have been well below average; the 2005 year-class is estimated from
surveys to be more abundant, but still below average.

RECENT MANAGEMENT ADVICE:

Exploitation boundaries in relation to existing management plans: Blim cannot be reached with a
30% increase in SSB. The management plan stipulates that in such cases a TAC should be set
allowing Blim to be reached within one year. Simulations indicate that this could be achieved
with 50% probability if F were reduced to 30% of the current F, corresponding to total removals
(landings, discards, and unaccounted removals) in 2007 of 35 000 t. ICES is unable to translate
this figure into a TAC with the required precision.

Exploitation boundaries in relation to precautionary limits: Given the low stock size and recent
poor recruitment, the stock cannot be rebuilt to Bpa in 2008 even with a zero catch. Simulations
indicate that with the recent poor recruitment, a zero catch would be required in 2007 and 2008 to
achieve the rebuilding of the stock to Bpa by 2009.

Conclusions regarding exploitation boundaries: Because the existing recovery plan does not
include the elements or measures necessary for rebuilding the stock at the current SSB (well
below Blim), ICES continues to advise on exploitation boundaries in relation to precautionary
limits and recommends that the fisheries for cod be closed until an initial recovery of the cod
SSB has been proven. Any catches that are taken in 2007 will prolong the recovery to Bpa.

STECF COMMENTS: STECF agrees with the ICES advice and notes that officially reported
landings of cod represent only 50% of estimated total removals. Hence predicted removals for a
given level of fishing mortality should not be directly translated into an equivalent catch
otherwise the desired level of fishing mortality will be exceeded.

2.13. Cod (*Gadus morhua*) in the Baltic Sea (Sub-div. 22-24)
Following the ICES advice on Baltic sea stocks issued in May 2006, STECF produced Part 1 of its review of advice for 2007. Following that review the assessment for Western Baltic cod was revised and ICES has issued revised advice for 2007 for this stock. The following text is based on that reviewed advice.

**FISHERIES:** Cod in Sub-divisions 22-24 is exploited predominantly by Denmark and Germany, with smaller catches taken by Sweden. The fishery is conducted by trawl and gillnets. Landings fluctuated between 15,000 and 54,000 t (1965-2004), falling in the late 1980s but increasing again in the 90’s because the fishery activities of Denmark and Germany shifted from the former traditional fishing grounds of the eastern cod stock to the area of the western cod stock due to the decline of the eastern cod stock and its fishing possibilities. Furthermore, quota transfers (up to 2001) of cod from the eastern Baltic stock to the western Baltic involving countries that normally exploit the eastern cod stock resulted in increased fishing pressure on the western cod stock. As a result, the average landings for 1996-99 amounted to 43,000 t. Landings in 2002 and 2003 declined to about 24,000 t. The fishery is largely based on recruiting year-classes (3 years and younger), and as a result of IBSFC regulations the discard rate is substantial. Technical measures including an increase in the minimum landing size and the mandatory use of 110 mm mesh BACOMA windows in trawls.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial as well as survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference point for spawning biomass is \( B_{pa} = 23,000 \text{ t} \). ICES considers that \( B_{lim} \), \( F_{pa} \) and \( F_{lim} \) are not yet defined. An establishment of \( F_{pa} \) is problematic because of the large exchange of cod from this stock to adjacent stocks.

**MANAGEMENT AGREEMENT:** There is no agreed management plan for this stock at the moment. The proposed long-term plan would imply landings of 22 700 t in 2007, assuming that this includes an annual 10% reduction in fishing effort from the 2005 level. The consistency of this plan with the Precautionary Approach has not been evaluated yet.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as being at risk of reduced reproductive capacity. In the absence of defined fishing mortality reference points, the state of the stock cannot be evaluated with regard to these. An analytical assessment demonstrates that the most recent (2005) estimated fishing mortality (1.09) and at this high exploitation rate the stock is highly dependent upon the strength of incoming year-classes.

**RECENT MANAGEMENT ADVICE:** Last year the advice was based on an agreed management plan which was considered to be consistent with the precautionary approach. In the absence of an agreed management plan this year, the advice is now based on precautionary limits. The combination of a low recruitment of the 2005 year-class and applying the precautionary limits implies a TAC of 24 500 t for 2007.

**STECF COMMENTS:** STECF agrees with the ICES advice. However, as long as this cod stock is managed in combination with the cod stock in Sub-divs. 25-32, implementation of the advice is unlikely to improve stock in Sub-divs. 22-24. STECF emphasizes that both stocks are overlapping in Sub-divs. 24/25 and the landings cannot be assigned to the separate stocks.
2.14. Cod (*Gadus morhua callarias*) in the Baltic Sea (Sub-div. 25-32)
The STECF Summary review and advice for cod in Sub-divisions 25-32 is given in Part 1 of the

2.15. Cod (*Gadus morhua*) in the Kattegat
The STECF Summary review and advice for cod in the Kattegat is given in Part 1 of the review
of advice for 2007.

2.16. Cod (*Gadus morhua*) in the Skagerrak
**FISHERIES:** Landings of Skagerrak cod fluctuated between 7,000 and 20,000 t (1984-2002).
Landings since 2002 are estimated to be about 3,900 t. The assessment of the Skagerrak cod stock
is included in the North Sea cod assessment. For other information on this stock (see section
2.12, Cod - North Sea).

2.17. Cod (*Gadus morhua*) - Vb (EU zone), VI, XII, XIV

2.17.1. Cod in Vb1 (Faeroe Plateau cod)
**FISHERIES:** Faeroe plateau cod are taken in a mixed demersal fishery, which was initially
international. Following the declaration of EEZs in the 1970s, the fishery became largely Faeroese
and fishing mortality declined briefly but it has increased since to former high levels. Most of the
vessels involved are trawlers and longliners. Landings have fluctuated between 6,000 and 40,000 t
(1986-2005), almost entirely taken by non-EU fleets. The management area for this stock also
includes cod in VI, Vb2, XII and XIV.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The
advice is based on an analytical method using survey and catch-at-age data. The technique was
XSA calibrated by two research surveys.

**PRECAUTIONARY REFERENCE POINTS:** The proposed reference points for this stock are
\[ F_{pa} = 0.35 \] and \[ B_{pa} = 40,000 \text{t} \] and limit reference points of \[ F_{lim} = 0.68 \] and \[ B_{lim} = 21,000 \text{t} \].

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as
being at risk of reduced reproductive capacity. SSB in 2006 is at the same level as prior to the
collapse in 1990. Based on the most recent estimates of fishing mortality, ICES classifies the
stock as being at risk of being harvested unsustainably. The estimate of fishing mortality has been
above the proposed \( F_{pa} \) since 1996. Historically, the spawning stock biomass had been well above
\( B_{pa} \) for a number of the early years in the time-series, but has been below \( B_{pa} \) since 2004. The
recruitment after the 2000 year-class has been at or below average.

**MANAGEMENT OBJECTIVES:** The management objective is to achieve sustainable
fisheries. An effort management system was implemented in the Faroese demersal fisheries in
Division Vb in 1996. From the outset the aim of the effort management system was to harvest on
average 33% in numbers of the exploitable stock of cod. This translates into an average \( F \) of
approximately 0.45, above the \( F_{pa} \) of 0.35. ICES considers this to be inconsistent with the
Precautionary Approach.

**RECENT MANAGEMENT ADVICE:**
*Exploitation boundaries in relation to existing management plans:* The management objective
implied in the effort management scheme is to achieve an average exploitation rate equivalent to
a fishing mortality of 0.45, compared to the current estimate 0.46 in 2005. Assuming proportionality between effort and F and adherence to the management plan would imply no change in effort for 2007.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* The current fishing mortality estimated as 0.46 is above rates that would support optimal long-term yield and low risk of stock depletion (F0.1 and Fmax).

*Exploitation boundaries in relation to precautionary limits:* In the short term a reduction of 50% in fishing mortality in 2007 is required to rebuild this stock above Bpa (=40 000 t). The present management system has led to fishing mortalities that do not appear sustainable. ICES recommends a rebuilding plan including an adaptive approach on fishing effort and monitoring the development of the stock with reference to rebuilding to above Bpa. The reduction in fishing effort in 2007 should be in the order of 25% which corresponds to fishing at Fpa.

**STECF COMMENTS:** STECF agrees with the ICES advice.

### 2.17.2. Cod in area Vb2 (Faeroe Bank Cod)

**FISHERIES:** Faeroe Bank cod was exploited in an international fishery until the declaration of EEZs in the 1970s. Since then, the stock has largely been exploited by Faeroese vessels. The stock was the subject of a summer trawl fishery but trawling is now banned. The fishery is mainly carried out by longliners. Landings have increased sharply from 300t in 1992 to around 3,500 t in 1997 and 1998. Since 1999 (1,300 t), there has been an increase to a record high of the time series in 2003 at about 5,700 t. The 2004 landings are estimated at 3,400 t, almost entirely taken by non-EU fleets and in 2005 landings declined to an estimated 1,100 t. The management area for this stock also includes cod in VI, Vb1, XII and XIV.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on trends in commercial and survey CPUE.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** In the absence of defined reference points the state of the stock cannot be fully evaluated. The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk; however, the exploitation rate might not be sustainable.

**RECENT MANAGEMENT ADVICE:** ICES advises that fishing effort of the Faroe Bank should not exceed that exerted annually from 1996 to 2002 and that the current spawning closure introduced in 2005 be maintained.

**STECF COMMENTS:** STCEF agrees with the advice of ICES and notes that the ratio of landings to survey cpue index provides an exploitation ratio, which can be used as a proxy to relative changes in fishing mortality. The exploitation ratio has been higher than average in the last three years.
2.17.3. Cod in Division VIa (West of Scotland)

FISHERIES: West of Scotland cod is exploited predominantly by Scottish vessels using towed gears. A by-catch of cod is taken by French vessels targeting saithe. Since 1976, Scottish heavy trawl and seine effort has decreased, whilst that of light trawlers has generally increased, particularly in more offshore areas. Scottish Nephrops trawlers take a by-catch of cod. Catch restrictions in the first half of the 1990s led to considerable misreporting. Landings are predominantly taken by EU fleets and were sustained at about 21,000 t until the late 1980s. Landings have since declined markedly to a record low value of about 500 t in 2005. The management area for this stock also includes cod in VIb, Vb, XII and XIV.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on an age-based assessment using survey data only.

PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points are 

\[ F_{pa} = 0.6 \] and \[ B_{pa} = 22,000 \text{ t} \]

STOCK STATUS: The spawning stock biomass is at an all time low, but the rate of exploitation is uncertain and probably high. The survey SSB estimates indicate that the stock has been declining and is presently at an historical low. Recruitment estimates indicate a decline in recruitment in the last decade, correlated with a decline in the spawning stock to the lowest levels observed. Recruitment since 2003 has been the weakest in the time-series.

MANAGEMENT OBJECTIVES: The European Commission has enacted a Council Regulation (EC) No. 423/2004) which establishes measures for the recovery of cod stocks:

For stocks above \( B_{lim} \), the harvest control rule (HCR) requires:

1 ) setting a TAC that achieves a 30% increase in the SSB from one year to the next,
2 ) limiting annual changes in TAC to ± 15% (except in the first year of application), and,
3 ) a rate of fishing mortality that does not exceed \( F_{pa} \).

For stocks below \( B_{lim} \) the Regulation specifies that:

1 ) conditions 1-3 will apply when they are expected to result in an increase in SSB above \( B_{lim} \) in the year of application,
2 ) a TAC will be set lower than that calculated under conditions 1-3 when the application of conditions 1-3 is not expected to result in an increase in SSB above \( B_{lim} \) in the year of application.

ICES has previously concluded that a precautionary recovery plan must include an adaptive element implying that fisheries for cod remain closed until an initial recovery of the cod SSB has been proven. An initial 3-year closure would be required to increase SSB above \( B_{lim} \) with high probability. Such an element of zero catch is not included in the existing plan. ICES therefore considers the recovery plan not to be consistent with the precautionary approach.

RECENT MANAGEMENT ADVICE:

Exploitation boundaries in relation to existing management plans: Due to the uncertainty in the level of fishing mortality, ICES is not in a position to give quantitative forecasts. In addition the management plan is not explicit about the level of reduction in the catch when the stock is below \( B_{lim} \). Simulations show that fishing should be closed for 3 years in order to bring SSB above \( B_{lim} \).
Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects: There will be no gain in the long-term yield by having fishing mortalities above $F_{\text{max}}$ (0.19). Fishing at such lower mortalities would lead to higher SSB and, therefore, lower risks of fishing outside precautionary limits.

Exploitation boundaries in relation to precautionary limits: Given the very low SSB estimates, the high fishing mortalities and low recruitment in this stock, ICES advises zero catch of cod in 2007.

Conclusion on exploitation boundaries: As the recovery plan for this stock is considered to be consistent with the precautionary approach only when the fishery is closed for an initial period, and as this is congruent with the advice in relation to precautionary limits, ICES advises a zero catch of cod in 2007.

STECF COMMENTS: STECF agrees with the ICES advice.

2.17.4. Cod in Division VIb (Rockall)

The following text remains unchanged from the Review of Advice for 2006 because ICES has not undertaken any new assessments or provided any new advice since 2005.

FISHERIES: Rockall cod is exploited predominantly by Scottish, Irish and Norwegian vessels using towed gears. Landings have fluctuated between 700 t and 2,000 t (1984-1995) but have shown a steady decline since 1995 to a record low value of 68 t in 2004. The management area for this stock also includes cod in VIa, Vb, XII and XIV.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES but no explicit management advice is given for this stock.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points are defined for this stock.

STOCK STATUS: There is no information on the status of cod in Division VIb. Official catch data are incomplete. Due to the rapid decline in cod catches in Division VIa the official landings reported from this area now account for about 25% of the catch in Subarea VI.

RECENT MANAGEMENT ADVICE: Due to the rapid decline in cod catches in Division VIa the official landings reported from this area have in some of the most recent years accounted for about 25% of the catch in Subarea VI. TAC set for Division VIb cod should not jeopardise a rebuilding plan for cod in Division Via, nor management measures for haddock in this area.

STECF COMMENTS: STECF notes that because cod TACs are set to include all of Area VI, for management measures for VIb should be consistent with the management measures adopted for VIa cod, for which stringent management is advised. Because cod are taken in a mixed fishery with haddock, management measures adopted for VIb cod should also be consistent with the management measures adopted for VIb haddock, for which stringent management is also advised.

2.17.5. Cod in areas XII and XIV

FISHERIES: The management area for this stock also includes cod in VI and Vb (see sections 2.17.1 and 2.17.4.)
2.18. **Cod (Gadus morhua) in area VIIa (Irish Sea Cod)**

**FISHERIES:** The Irish Sea cod fishery has traditionally been carried out by otter trawlers targeting spawning cod in spring and juvenile cod in autumn and winter. Activities of these vessels have decreased, whilst a fishery for cod and haddock using large pelagic trawls increased substantially during the 1990s. In recent years the pelagic fishery has also targeted cod during the summer. Cod are also taken as a by-catch in fisheries for *Nephrops*, plaice, sole and rays.

Landings are taken entirely by EU fleets and were between 6,000 t and 15,000 t from 1968 to the late 1980s. There has since been a steep decline in landings to levels as low as 1,300 t in 2000. There has been a slight increase from this level in 2001 and 2002 (up to 2,700 t) but landings in 2003, 2004 and 2005 reached three consecutive record lows with 1,300 t, 1,000 t and 900 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for biomass and fishing mortality are $B_{pa}=10,000$ t, $F_{pa}=0.72$

**STOCK STATUS:**
Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having reduced reproductive capacity and as being harvested unsustainably. Fishing mortality had been around $F_{pa}$ until the mid-1980s. It has increased close to, or above $F_{lim}$ since the late 1980’s. SSB has been below $B_{lim}$ since the mid-1990s. Recruitment has been below average for the past sixteen years and the four most recent year-classes are amongst the smallest on record. At the average rate of exploitation estimated for recent years, SSB will remain at sizes where the risk of continued poor recruitment is high.

**RECENT MEASURES TO PROMOTE STOCK RECOVERY:** To rebuild the SSB of the stock, a spawning closure was introduced in 2000 for ten weeks from mid-February which was argued to maximize the reproductive output of the stock (EU Regulations 304/2000 and 549/2000). The measures were revised in 2001, 2002, 2003 and 2004, involving a continued, but smaller spawning ground closure, coupled with changes in net design to improve selectivity.

The European Commission has enacted a Council Regulation ((EC) No 423/2004) which establishes measures for the recovery of cod stocks i.e. cod in division VIIa:

For stocks above $B_{lim}$, the harvest control rule (HCR) requires:
1. setting a TAC that achieves a 30% increase in the SSB from one year to the next,
2. limiting annual changes in TAC to ± 15% (except in the first year of application), and,
3. a rate of fishing mortality that does not exceed $F_{pa}$.

For stocks below $B_{lim}$ the Regulation specifies that:
4. conditions 1-3 will apply when they are expected to result in an increase in SSB above $B_{lim}$ in the year of application,
5. a TAC will be set lower than that calculated under conditions 1-3 when the application of conditions 1-3 is not expected to result in an increase in SSB above $B_{lim}$ in the year of application.

The regulation is complemented by a system of fishing effort limitation.

ICES has previously concluded that a precautionary recovery plan must include an adaptive element implying that fisheries for cod remain closed until an initial recovery of the cod SSB has
been proven. Such an element of zero catch is not included in the existing plan. ICES therefore considers the recovery plan not to be consistent with the precautionary approach.

**RECENT MANAGEMENT ADVICE:**

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Fishing mortalities between $F_{0.1}$ and $F_{\text{max}}$ can be considered as candidate target reference points, which are consistent with taking high long-term yields and achieving a low risk of depleting the productive potential. The present fishing mortality is well above the candidate reference point.

*Exploitation boundaries in relation to existing management plans:* The most plausible forecast assumes a total removal in 2006 that is 55% greater than the agreed TAC. The forecast indicates that a zero catch in 2007 provides only 30% probability of rebuilding SSB to Blim in 2008. The simulations indicate that a 30% increase in SSB during 2007 could be achieved with a high probability, only with a reduction in fishing mortality to below 75% of the 2005 level.

*Exploitation boundaries in relation to precautionary limits:* Given the low stock size, recent poor recruitment, continued substantial catch well above the TAC, the uncertainty in the assessment, and the inability to reliably forecast catch, it is not possible to identify any non-zero catch which will be compatible to the precautionary approach.

**Conclusion on exploitation boundaries:** Because the existing recovery plan does not include the elements or measures necessary for rebuilding the stock at the current SSB (well below Blim), ICES continues to advise on exploitation boundaries in relation to precautionary limits and recommends that the fisheries for cod be closed until an initial recovery of the cod SSB has been proven. Any catches that are taken in 2007 will prolong the recovery to Bpa.

**STECF COMMENTS:**

STECF agrees with the ICES advice and notes the considerable problems with the assessment for this stock. STECF believes that the bias and uncertainty in the assessment are being exacerbated by the deterioration in availability and reliability of catch and effort data. However, STECF further notes the ICES comment that the continued decline in the stock indicates that the management measures taken up till now, have not proven sufficient to rebuild the stock to precautionary levels and detailed analysis of the impact of the regulations will not be possible until data of sufficient quality become available.

**2.19. Cod (Gadus morhua) - VIIb-k, VIII, IX, X**

**2.19.1. Cod (Gadus morhua) in area VIIId**

**FISHERIES:** Landings of cod from VIIId has declined from 15,100 t in 1986 to 1,900 t in 1991. Since then landings have risen to 8,600 t in 1998. Then sharply decreased to 1,600 t in 2001. In 2002, 3,100 t cod has been landed. In 2003 and 2004 consecutive record low values of 1,300 t and 800 t respectively were recorded. The 2005 landings (1000t) are the second lowest in the time-series. Cod from VIIId are included in the North Sea cod assessment. For other information on this stock (see section 2.12, Cod - North Sea).

**MANAGEMENT AGREEMENT:** In 2005 the EU and Norway have renewed their initial agreement from 1999 and agreed to implement a long-term management plan for the cod stock in the North Sea, which is consistent with the precautionary approach and is intended to provide for sustainable fisheries and high yield. (for details see section 2.12 Cod North Sea). The agreed
management plan for cod in IIIa and IV also applies to the component of the stock in Division VIIId.

**RECENT MANAGEMENT ADVICE:** As cod in VIIId are considered part of the North sea stock complex, the advice is given in section 2.12. The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4.

**STECF COMMENTS:** STECF agrees with the advice from ICES. See also section 2.12, Cod – North Sea.

### 2.19.2. Cod (Gadus morhua) in areas VIIe-k

**FISHERIES:** Cod in Divisions VIIe-k are taken as a component of mixed trawl fisheries. Landings are made mainly by French gadoid trawlers, which prior to 1980 were mainly fishing for hake in the Celtic Sea. Landings peaked in 1989 at 20,000 t and have since been maintained at between 6,000 and 13,000 t (1990-2003), all taken by EU fleets. Landings in the last two years have declined further to the lowest value in the time series in 2005 (3,100 t).

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial and survey data. The management area includes Divisions VIIe,f,g,h,j and k. The TAC covers the above Divisions, together with Sub-area VIII, IX and X and the CECAF area. Within this larger area there is no control over where the catches are taken. The TAC for Division VIIa is based on a separate assessment for that Division and has a separate TAC. The assessment of the stock in Division VIIId is combined with that of Sub-area IV and IIIa. If it is necessary to calculate a TAC for Sub-area VII - excluding Divisions VIIa and VIIId and including Sub-areas VIII, IX and X, then 1,000 t representing the average catches from the non-assessed areas should be added to the proposed TAC for Divisions VIIe–k.

**PRECAUTIONARY REFERENCE POINTS:** The proposed reference points for fishing mortality and biomass are $F_{pa} = 0.68$, $B_{pa} = 8,800$ t.

**STOCK STATUS:** The current assessment indicates that the stock was well below $B_{lim}$ since 2004 and is still declining. Fishing mortality has been very high since the mid-1980s, although it has declined slightly in recent years while remaining above $F_{pa}$. Recruitment since 2001 has been well below average.

**RECENT MANAGEMENT ADVICE:**

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Fishing mortalities close to $F_{max} = 0.33$ can be considered as candidate target reference points, which are consistent with taking high long-term yields and achieving a low risk of depleting the productive potential. The present fishing mortality (0.81) is above the candidate reference point.

*Exploitation boundaries in relation to precautionary limits:* Given the low stock size, high fishing mortalities and recent poor recruitment, it is not possible to identify any non-zero catch which will be compatible with the Precautionary Approach. The forecast indicates that a zero catch in 2007 allows SSB to achieve $B_{lim}$, but not $B_{pa}$ in 2008. Effort in the main fleet targeting cod has declined since 1999. There is some indication of recent reductions on fishing mortality, but not to sustainable levels. Further reductions of effective effort are needed to improve yields and reduce risks to the stock in the longer term.
The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that the observed 37% reduction in fishing effort that is attributed to the closure of rectangles 30E4, 31E4, and 32E3 during January–March 2005 and during February and March 2006 (Council Regulation (EC) No. 27/2005, Annex III, part A 12 (b) and Council Regulation (EC) No. 51/2006, Annex III, part A 4.2), does not appear to have resulted in an equivalent reduction in fishing mortality on cod in VII e-k.

### 2.20. Dab (*Limanda limanda*) in the northeast Atlantic

#### 2.20.1. Dab (*Limanda limanda*) IIa (EU zone), North Sea

There is no information on the status of this stock.

#### 2.20.2. Dab (*Limanda limanda*) Baltic sea Sub-divisions 22-32

**FISHERIES:** Total landings have decreased from 3106 t in 1994 to 715 t in 2002. Since 2002 the landings have increased to 1894 t in 2004. This species is discarded, mainly in the cod fishery. The level of discarding has not yet been evaluated.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Management was formerly under the jurisdiction of the International Baltic Sea Fisheries Commission (IBSFC) but is now the subject of EU-Russia negotiations.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for the dab stocks in the Baltic.

**MANAGEMENT AGREEMENT:** No explicit objectives have been defined for this stock.

**STOCK STATUS:** The state of the stock is unknown. No analytical assessment has been performed in the present or in previous years.

**RECENT MANAGEMENT ADVICE:** Data are insufficient for management advice and no advice is available from ICES.

**STECF COMMENTS:** STECF has no comment.

### 2.21. Flounder (*Platichthys flesus*) - IIa (EU zone), North Sea

There is no information on the status of this stock.

### 2.22. Flounder (*Platichthys flesus*) – IIIbcd (EU zone), Baltic Sea

The STECF Summary review and advice for flounder in the Baltic is given in Part 1 of the review of advice for 2007.

### 2.23. Greenland halibut (*Reinhartius hippoglossoides*) in area I and II

**FISHERIES:** The regulations enforced in 1992 reduced the total landings of Greenland halibut by trawlers from about 20,000 to 8,600 t. Since then annual trawler landings have varied between 9,000 and 20,000 t without any clear trend attributable to changes in allowable by-catch. Since 1992, the fisheries have been regulated by allowing a directed fishery only by small coastal longline and gillnet vessels. By-catches of Greenland halibut in the trawl fisheries have been...
limited by permissible by-catch per haul and an allowable by-catch retention limit on board the vessel

In recent years, EU Member State catches have been between 300 t and 500 t.

**SOURCE OF MANAGEMENT ADVICE:** This stock is currently managed by a joint Norwegian and Russian scientific advisory body. The fisheries are regulated according to bilateral agreements between Russia and Norway. ICES has been approached for advice on biological assessment and management of this stock. The analytical assessment is based on survey and commercial catch data. The assessment is considered uncertain due to age-reading problems and evidence of unreported landings that could not be taken into account.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points are defined for this stock.

**STOCK STATUS:** In the absence of defined reference points the status of the stock cannot be fully evaluated. The tentative assessment indicates that SSB has been low since the late 1980s, but a slight increase is indicated in recent years. There are indications of a decreasing trend in fishing mortality since the 1990s. Recruitment has been stable at a low level since the 1980s.

**RECENT MANAGEMENT ADVICE:** *Exploitation boundaries in relation to precautionary limits:* The stock has remained at a relatively low size in the last 25 years at catch levels of 15,000-25,000 t. In order to increase the SSB, catches should be kept well below that range. Catches for 2007 should be below 13,000 t as advised in 2005; this is the level below which SSB has increased in the past.

**STECF COMMENTS:** STECF agrees with the ICES advice.

**2.24. Greenland halibut (Reinhartius hippoglossoides) in area V, XII and XIV**

**FISHERIES:** Most of the fishery for Greenland halibut in Divisions Va, Vb and XIVb is a directed fishery, only minor catches in Va by Iceland, and in XIVb by Germany and the UK comes partly from a redfish fishery. During the period 1982–1986, landings were stable at about 31,000–34,000 t. In the years 1987–1989 landings increased to about 62,000 t. From 1990 to 1999 there was a decrease to around 20,000 t. In the last 4 years landings amounted to around 29,000 t. Catches not officially reported to ICES have been included in the assessment. Landings within Icelandic EEZ have traditionally been reported as caught in Division Va. Therefore, when referring to Division Va (or Icelandic waters) the area covers both Va and the Icelandic EEZ part of XIVb. Landings and fishery relates to the Greenland EEZ part of XIVb as well as international waters on the Reykjanes Ridge.

Catches in Icelandic waters have, due to quota regulations, decreased from 37,000 t in 1990 to 11,000 t in 1999. Since then landings have increased to above 20,000 t in recent years.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The analytical assessment is based on a number of indices of different quality and with different time span from the commercial fishery and surveys.

**REFERENCE POINTS:** The reference points used previously were linked to the specific assessment model used and this model is no longer applicable. Therefore, these reference points are no longer relevant.
STOCK STATUS: In the absence of defined reference points, the state of the stock cannot be fully evaluated. Survey and fishery indices, however, suggest that the present stock biomass is near a historic low in most areas.

RECENT MANAGEMENT ADVICE: Given the continued poor state of the stock, there is a need to reduce the exploitation of the stock considerably. ICES proposes to implement a management plan covering the whole stock area to ensure that effort in the future is kept within sustainable limits. It cannot be estimated what the sustainable effort or catches would be in the longer term. It is therefore proposed to implement an adaptive management plan with initial reductions in effort and catches and gradual adaptation of the outtake depending on the response of the stock. ICES has for several years recommended a total catch of less than 15 000 tonnes as a feasible initial step in an adaptive strategy. So far, catches have been well above that level. ICES maintains this advice since there is nothing to indicate that the stock responds favourably to the present level of catches.

STECF COMMENTS: STECF agrees with the ICES advice.

2.25. Haddock (*Melanogrammus aeglefinus*) in area I and II (North East Arctic haddock)

FISHERIES: The fishery is mainly a trawl fishery, in some periods only as by-catch in the fishery for cod. Occasionally there is also a directed trawl fishery for haddock. A large portion of the catches are taken as bycatch in a fishery directed at cod. Quotas restrict the fishery. The fishery is also regulated by a minimum catching size, a minimum mesh size in trawls and Danish seine, a maximum bycatch of undersized fish, closure of areas with high density of juveniles, and other area and seasonal restrictions. Since January 1997, sorting grids have been mandatory for the trawl fisheries in most of the Barents Sea and Svalbard area. There are recently no discrepancies between the officially reported landings and the landings used in the assessment. Haddock landings taken in Norwegian coastal areas south of 67 N are not included.

In recent years Norway and Russia have accounted for more than 90% of the landings. Before the introduction of national economic zones in 1977, UK (mainly England) landings made up 10–30% of the total. Since 1995, EU annual landings have decreased from 6,400 t to less than 3,000 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is now considered uncertain owing to a major revision of data and underreporting – it is only considered indicative of trends. based on catch-at-age data and 3 surveys, and it includes predation by NEA cod. The present catch control and reporting systems are not sufficient to prevent under-reporting of catches and discards, and there are indications that discarding and under-reporting is an increasing problem.

REFERENCES POINTS: The proposed precautionary reference points for biomass and fishing mortality are \( B_{pa} = 80,000 \) t, \( F_{pa} = 0.35 \).

STOCK STATUS: Based on the most recent estimates of SSB, ICES classifies the stock as having full reproductive capacity. However the assessment is uncertain and indicative of trends only.. Recent recruitment has been average with no large year-classes.

MANAGEMENT AGREEMENTS: At the 33rd meeting of the Joint Russian-Norwegian Fisheries Commission (JRNC) in November 2004, the following decision was made:

*The Parties agreed that the management strategies for cod and haddock should take into account the following:*
conditions for high long-term yield from the stocks
achievement of year-to-year stability in TACs
full utilization of all available information on stock development

On this basis, the Parties determined the following decision rules for setting the annual fishing quota (TAC) for Northeast Arctic cod (NEA cod):

- estimate the average TAC level for the coming 3 years based on Fpa. TAC for the next year will be set to this level as a starting value for the 3-year period.

- the year after, the TAC calculation for the next 3 years is repeated based on the updated information about the stock development, however the TAC should not be changed by more than +/- 10% compared with the previous years TAC.

- if the spawning stock falls below Bpa, the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from Fpa at Bpa, to F= 0 at SSB equal to zero. At SSB-levels below Bpa in any of the operational years (current year, a year before and 3 years of prediction) there should be no limitations on the year-to-year variations in TAC.

The Parties agreed on similar decision rules for haddock, based on Fpa and Bpa for haddock, and with a fluctuation in TAC from year to year of no more than +/-25% (due to larger stock fluctuations).

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2006 is presented in the context of mixed fisheries and is found in section 16.

The Joint Russian-Norwegian Fisheries Commission has agreed on a harvest control rule for NEA haddock. The catch rule is currently being evaluated by ICES. The ICES advice was based on catch in relation to perceived dynamics.

The recent increase in SSB (through the years 2001-2004) has been associated with catches less than 130 000 tonnes (including misreported catches). In the absence of a reliable assessment and since these catches appear to have led to an increase in the stock, ICES recommends keeping catches below this level in 2007. There were no analytical projections for NEA haddock for 2007.

STECF COMMENTS: STECF agrees with ICES’ advice. STECF notes that although the assessment is uncertain, ACFM considers fishing mortality to be too high and that reductions in F could increase SSB and reduce the risk of the stock going outside precautionary limits.

2.26. Haddock (Melanogrammus aeglefinus) in IIa (EU zone), in Sub-area IV (North Sea) and Division IIIa (Skagerrak- Kattegat)

FISHERIES: North Sea haddock is exploited predominantly by fleets from the UK (Scotland), Norway and Denmark. Most landings are for human consumption and are taken by towed gears, although there is a small by-catch in the small-mesh industrial fisheries. Substantial quantities are discarded in some years when new year-classes recruit to the fishery. Over 1963-2005, catches
have ranged from 58,000 t to 930,000 t. In recent years catches have decreased from 167,000 t in 2001 to 58,000 t in 2005, the most recent figure representing the historic low. A contributory factor to the lower catches in recent years has been the maintenance of low fishing mortality rate. EU technical regulations in force in 2003 and 2004 are contained in Council Regulation (EC) 850/98 and its amendments. The regulation prescribes the minimum target species composition for different mesh size ranges. In 2001, haddock in the whole of NEAFC region 2 were a legitimate target species for towed gears with a minimum codend mesh size of 100 mm. As part of the cod recovery measures, the EU and Norway introduced additional technical measures from 1 January 2002 (EC 2056/2001). The basic minimum mesh size for towed gears for cod from 2002 was 120 mm, although in a transitional arrangement running until 31 December 2002 vessels were allowed to exploit cod with 110 mm codends provided that the trawl was fitted with a 90 mm square mesh panel and the catch composition of cod retained on board was not greater than 30% by weight of the total catch. From 1 January 2003, the basic minimum mesh size for towed gears for cod was 120 mm. The minimum mesh size for vessels targeting haddock in Norwegian waters is also 120 mm. There is some indication of the effect of mesh size regulations in the sudden increase in weight-at-age in the human consumption component for age 2 haddock. However, a shift in exploitation pattern at the early ages has not been observed. Effort restrictions in the EC were introduced in 2003 (EC 2341/2002, Annex XVII, amended in EC 671/2003). Effort restriction measures were revised for 2004 (EC 2287/2003, Annex V) and 2005 (EC 27/2005, Annex IVa). Preliminary analysis of fishing effort trends in the major fleets exploiting North Sea cod indicates that fishing effort in those fleets has been decreasing since the mid-1990s due to a combination of decommissioning and days-at-sea regulations. A cod protection area has been implemented in 2004 (EC 2287/2003, amended in EC 867/2004) which defined the conditions under which certain stocks, including haddock, could be caught in Community waters. A maximum of 35% of the haddock TAC in 2004 could be taken from within the cod protection area. For UK a special permit was introduced that was needed to fish for haddock in the cod protection area. Although this management scheme was proposed to permit additional haddock to be caught in 2004, the uptake of the special permit has been relatively low. SOURCES OF MANAGEMENT ADVICE: The management advisory body is ICES. The advice is based on an age-based assessment using catch-at-age data from landings, discards and industrial by-catch, as well as survey data from IBTS. PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for fishing mortality and biomass are \( F_{pa} = 0.70 \), \( B_{pa} = 140,000 \) t. STOCK STATUS: Based on the most recent estimate of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and being harvested sustainably. SSB in 2005 is estimated at 256,000 t and is estimated to have decreased to around 231,000 t in 2006. SSB is well above the Bpa of 140,000 t. The 2001–2004 year-classes are all estimated to be well below average. Indications from surveys and industry are that the 2005 year-class is above the long-term geometric mean. This year-class will enter the fishery in 2007. Fishing mortality in 2005 is estimated at 0.32, which is well below \( F_{pa} = 0.7 \). MANAGEMENT AGREEMENT: In 1999 the EU and Norway have “agreed to implement a long-term management plan for the haddock stock, which is consistent with the precautionary approach and is intended to constrain harvesting within safe biological limits and designed to provide for sustainable fisheries and greater potential yield.”. The agreement was updated in November 2004:

“The plan shall consist of the following elements:
1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 100,000 tonnes (Blim).

2. For 2005 and subsequent years the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than 0.30 for appropriate age groups.

3. Should the SSB fall below a reference point of 140,000 tonnes (Bpa), the fishing mortality rate referred to under paragraph 2, shall be adapted in the light of scientific estimates of the conditions then prevailing. Such adaptation shall ensure a safe and rapid recovery of SSB to a level in excess of 140,000 tonnes.

4. In order to reduce discarding and to enhance the spawning biomass of haddock, the Parties agreed that the exploitation pattern shall, while recalling that other demersal species are harvested in these fisheries, be improved in the light of new scientific advice from inter alia ICES.

5. A review of this arrangement shall take place no later than 31 December 2006.

6. This arrangement enters into force on 1 January 2005.

ICES considers that the agreed Precautionary Approach reference points in the management plan are consistent with the precautionary approach, provided they are used as lower boundaries on SSB, and not as targets. ICES is due to report on an evaluation of the management plan and candidate revisions of the plan in November 2006.

RECENT MANAGEMENT ADVICE: ICES’ advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries in the North Sea (section 16), which advises a minimal cod by-catch or discards.

Following the agreed management plan (F=0.3) would imply human consumption landings of 55,400 t in 2007, which is expected to lead to an increased SSB of 291,100 t in 2007. The increased catch and future SSB arises partly from the incoming 2005 year-class.

STECF COMMENTS: STECF agrees with ICES advice. Due to the incoming 2005 year-class, the ICES forecast suggests that discard quantities in 2007 will be high – ICES suggests that measures to reduce the capture of juveniles in the short term will lead to enhanced longer term catching opportunities.

Section 5.2.5 of the 21st Report of the STECF presents the STECF response to a special request from the Commission for advice on North Sea haddock.

2.27. Haddock (Melanogrammus aeglefinus) in areas Vb (EU zone), VI, XII & XIV

This management unit comprises three distinct haddock stocks (Vb, VIa and VIb), which are assessed separately.

2.27.1. Haddock in area Vb (Faroe)

FISHERIES: Faroe haddock are taken as part of a mixed demersal fishery, with most taken by trawls or longlines. Landings are predominantly Faroese, with only low EU landings (<50 t/a). Since 1988 total landings from Vb have increased from 4,000 t to 27,000 t in 2003 but have dropped back to 20,305 t in 2005. The management is by effort restrictions through individual transferable days introduced in 1996. The fishing law also prescribes fleet specific catch compositions of cod, haddock, saithe, and redfish.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. The advice is based on an age-based assessment using commercial landings and survey data.
PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for this stock are \( F_{pa} = 0.25 \) and \( B_{pa} = 55,000 \) t.

STOCK STATUS: Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and at risk of being harvested unsustainably. The 2005 estimate of fishing mortality is just above \( F_{pa} \). SSB increased to the highest in the observed series in 2004. This was the result of strong recruitment, including the record high 1999 year-class. Recent year-classes are estimated to be small and combined with low individual growth, and SSB is now declining.

RECENT MANAGEMENT ADVICE: ICES’ advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries in the North Sea (section 16). Taking into account the mixed fisheries interaction between cod and haddock, ICES recommends a reduction of the fishing effort directed at the Faroe Plateau cod and haddock in the neighbourhood of 50%. Based on the precautionary single species exploitation boundaries, the fishing effort should be reduced to correspond to a fishing mortality below \( F_{pa}= 0.25 \) which ensures SSB in 2008 stays above 55,000 t. A value of 0.2 is consistent with this requirement corresponding to an effort reduction of about 24% assuming linearity in the relationship between fishing effort and fishing mortality.

No formal management plan is available for this stock, but the management objectives are an exploitation rate equivalent to a fishing mortality of 0.45 on average. The current \( F \) estimate is uncertain and is at or below the management target.

STECF COMMENTS: STECF agrees with ICES’ advice. The advised reduction in effort corresponds to 16000 t landings in 2007.

2.27.2. Haddock in Division VIa (West of Scotland)

FISHERIES: Haddock to the West of Scotland are taken as part of a mixed demersal fishery, with most taken by UK (mainly Scottish) trawlers. Smaller proportions of the landings are taken by other nations including France, Ireland and Norway. From 1978 to 2004, catches were estimated to have varied between about 6903 t and 43,200 t, with the minimum in 2005. The large majority of the landings are made by EU-nations, with landings by non-EU fleets not exceeding 100 t over this period. Substantial quantities are often discarded when strong year-classes enter the fishery.

Emergency EU measures directed towards cod protection were established in the first half of 2001 and led to short-term area closures in the north of the Division VIa and, on a smaller scale, in the Clyde Sea area. The Clyde closure continued in 2002-2005 under national UK legislation.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. The advice is based on an age-based assessment using catch-at-age data from landings and discards, and survey data. Owing to uncertainties in landings quantity, catch data 1995-2005 were not used in the assessment.

PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for this stock are \( F_{pa} = 0.50 \) and \( B_{pa} = 30,000 \) t.

STOCK STATUS: Based on the most recent estimate of SSB and fishing mortality ICES classifies the stock as having full reproductive capacity but fishing mortality rate is uncertain. Fishing mortality appears to have been above \( F_{pa} \) between 1987 and 2002 but has fallen steadily from a peak in 1999 to values below or close to \( F_{pa} \) in the last few years. SSB varied around \( B_{pa} \) during the 1990s. The very strong 1999 year-class has caused SSB to increase from a level near
the historic low in 2000 to above $B_{pa}$ since 2001. More recent year-classes are close to average except the 2003 and 2004 year-classes, which are estimated to be low. The SSB is thus expected to decrease in the short-term.

**RECENT MANAGEMENT ADVICE:** ICES’ advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of the West of Scotland (section 16). Demersal fisheries in Subarea VI should in 2006 be managed without catch and discards of cod in Subarea VI.

The current estimated fishing mortality is 0.53. There will be no gain to the long-term yield by having fishing mortalities above $F_{max}$ (0.176). Fishing at such lower mortalities would lead to higher SSB and, therefore, lower risks of fishing outside precautionary limits. In order to maintain SSB above $B_{pa}$ in 2007, ICES recommends a reduction in fishing mortality to less than 0.44. This corresponds to landings less than 7200 t in 2007. Due to recent poor recruitments and in order to maintain SSB above $B_{pa}$ also after 2008, a TAC for 2007 well below 8,000 t should be considered.

**STECF COMMENTS:** STECF agrees with the single species exploitation boundary as presented by ICES. The implication of the management plan for cod (recovery plan) cannot be evaluated as the assessment is uncertain. STECF also notes that the more widespread use of 110-mm mesh nets in 2002 as well as the requirement to fit square mesh panels to certain towed gears since late 2000, may have improved the selection pattern for haddock.

Survey information continues to indicate an increase in unaccounted removal from this stock. Absolute biomass estimation may thus be biased, but it is not known to what extent.

### 2.27.3. Haddock in Division VIb (Rockall)

**FISHERIES:** The Rockall fishery had until recently taken place largely in the summer if fishing at Rockall was more profitable than in the North Sea or West of Scotland. A few Irish vessels exploit this stock on a more regular basis. There has been an increase in activity by non-EU fleets, notably Russian vessels, as part of the area now falls outside the EU EEZ. Scottish and Irish trawlers fish mainly for haddock, whilst Russian trawlers also fish for species such as gurnard. UK, Russian and Irish vessels account for the highest proportion of the landings, with smaller quantities taken by other nations including Iceland, France, Spain and Norway. Haddock are caught in a mixed fishery together with blue whiting and a number of non-assessed species such as grey gurnard. Between 1985 and 2002, reported landings have varied between 1,900 t and 9,800 t. Reported landings in 2003 and 2004 amount to 6,100 t and 6,400 t, respectively. Following the NEAFC agreement in March 2001, an area of the NEAFC zone around Rockall was closed to fishing using demersal trawls. It is necessary to know whether there is effective compliance with the closed area regulations, and that the closed area continues to encompass a sufficient proportion of the population of young fish. It is also necessary to establish that the selection pattern of the fishery has improved, or the overall effort has been reduced, and that improved survival of young fish has occurred as a result.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The advice is based on improved catch data and indices derived from one research survey 1988-2003, which only partly covers the known distributional area of haddock. In 2004-2005 new data on the biology and distribution of haddock were obtained, a trawl acoustic survey was carried out and the biomass of haddock from the Rockall Bank was estimated. The management body is NEAFC.
PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for this stock are \( F_{pa} = 0.40 \) and \( B_{pa} = 9,000 \) t.

STOCK STATUS: The state of the stock is more clear following the acquisition of improved data and a completed assessment. Spawning biomass levels have increased in recent years as a result of the 2000 and 2001 year-classes. SSB in 2005 is estimated to be above \( B_{pa} \). Fishing mortality has been high throughout the available time-series, but appears to have declined in 2005.

RECENT MANAGEMENT ADVICE: ICES’ advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of the West of Scotland (Section 16). The assessment indicating an improved stock status enabled forecasts to be made within the precautionary framework. Fishing at \( F_{pa} \) will give rise to landings of 7110 t in 2007.

STECF COMMENTS: STECF agrees with the advice from ICES and notes that the improvements in catch data and survey confirmation of year-class strength has led to the major change in stock status and advice for this stock. STECF emphasises that the continuation of the Rockall closure for demersal trawl fisheries is consistent with the protection of deep water coral reef habitats. Some concern continues that catches may be higher than landings due to mis-reporting, discarding and high-grading. STECF agrees that now that the stock has recovered to \( B_{pa} \), a management plan should be proposed and evaluated for this stock. Development of the plan should involve extensive collaboration between stakeholders, scientists, and management authorities in both the design and the monitoring of conservation measures. The survey only covers part of the distribution area of haddock and the results could be sensitive to other effects (migration).

2.28. Haddock (Melanogrammus aeglefinus) in VII, VIII, IX & X

This management unit comprises two distinct haddock stocks (VIIa and VIIb-k) that are assessed separately.

2.28.1. Haddock in Division VIIa (Irish Sea)

FISHERIES: The haddock stock is mainly confined to the western Irish Sea where important mixed-species fisheries for Nephrops, whiting and cod take place. A directed fishery has developed for haddock during the 1990s. Large catches of haddock are taken in the Nephrops fishery during periods of high haddock abundance. A directed fishery for mature haddock in spring, using pelagic trawls and whitefish otter trawls, has been curtailed since 2000 by the cod spawning closure. Fishing effort of these vessels has been redirected to surrounding regions, and some vessels switched to using Nephrops trawls to take advantage of the derogation for Nephrops fishing during the closure. The current directed fishery for haddock in the Irish Sea is likely to generate bycatches of cod in the same area. Between 1984 and 1995 landings ranged from about 400 t to 1,750 t and then increased to 3,000 t in the late nineties. Landings have since declined to about 761 t t in 2004. Official landing reports (530 t) were preliminary for 2005 and may substantially underestimate the true removal by the fishery.

Due to the bycatch of cod in the haddock fishery, the regulations affecting Division VIIa haddock remain linked to those implemented under the Irish Sea cod recovery plan. The extent to which fishing mortality may have been reduced in 2005 by management measures such as effort limitation and decommissioning of vessels in 2003 could not be reliably evaluated.
SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. Stock estimate are relatively uncertain due to lack of access to port sampling in 2003 and limited access in 2004. Consequently, in the absence of reliable landing data and catch-at-age data no analytical catch-based assessment could be performed. An assessment indicative of recent stock trends based on survey data only was carried out using the March survey data up to 2006.

PRECAUTIONARY REFERENCE POINTS: There are no biomass reference points defined for this stock. The proposed precautionary fishing mortality reference point is is \( F_{pa} = 0.50 \).

STOCK STATUS The assessment is indicative of trends in SSB and recruitment and is based on survey results. Recent trends in fishing mortality are uncertain although survey information indicates that fishing mortality remains at a high level relative to taking high long-term yields and that SSB has been sustained by recent high recruitment. The SSB increased since 2001 as a result of the stronger 1999 and 2001 year-classes. The 2003 and 2004 year-classes appear to be above average and should also result in increased SSB.

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2005 is presented in the context of mixed fisheries in Section 16.3. ICES recommends in order to harvest the stock within precautionary limits, effort and catches should be reduced considerably to approach \( F_{pa} \) of 0.5. Since current total mortality is in excess of 1.0, this suggests a substantial reduction in \( F \). Given the poor information on the actual catches, no quantified level of reduction is given by ICES. Due to the by-catch of cod in the haddock fishery, the regulations affecting Division VIIa haddock remain linked to those implemented under the Irish Sea cod recovery plan which implies that fisheries should be conducted without bycatch or discards of cod and minimal catch of whiting, without jeopardizing the recommended reduction in fishing mortality of haddock and plaice, and within the biological exploitation limits for all other stocks. Furthermore, unless ways can be found to harvest species caught in mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.

STECF COMMENTS: STECF agrees with the single species exploitation boundary given by ICES. The mixed fisheries advice by ICES implies a 0 catch of haddock in 2007. STECF notes that with the resumption of port sampling in 2005 data are likely to improve but that it will take some time for full assessments to resume. High rates of discarding have been observed and this should be reduced in order to improve medium to long term yield prospects.

2.28.2. Haddock in Division VIIb-k (Celtic Sea and West of Ireland)

FISHERIES: In this area, haddock is taken in mixed fisheries along with cod, whiting, plaice, Nephrops, sole and rays. Most catches come from otter trawlers, mainly from France and Ireland. The TAC has not been restrictive for haddock. Landings peaked at about 11,000 t in 1997 and have fluctuated between about 5,000 t and 8,000 t since then. In 2005, total ACFM estimated landings were landings were close to 6,600 t.

The TAC for haddock is set for all of Subareas VII, VIII, IX, and X. Quotas in recent years have been based on average landings and as the strong 2002 year-class recruited to the fishery underreporting, species misspecification of landings and high grading are know to have increased. Technical measures applied to this stock include a minimum landing size (\( \geq 30 \) cm) and the minimum mesh sizes applicable to the mixed demersal fisheries. Given the observed discarding rates in some towed gears there is a mismatch between minimum mesh sizes in these mixed demersal fisheries and the MLS. Within the large management area there is no control over where the catches will be taken. Current management measures for Divisions VIIb-k include haddock in Division VIIa. Whatever management measures are implemented, they must be
consistent with the assessment area. Council Regulation (EC) No. 1954/2003 established measures for the management of fishing effort in a ‘biologically sensitive area’ in Divisions VIIb, VIIj, VIIg. and VIIh. Effort exerted within the ‘biologically sensitive area’ by the vessels of each EU Member State may not exceed their average national annual effort (calculated over the period 1998–2002).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. An exploratory assessment was carried out, but the available data were not considered sufficient to provide a reliable indication of stock trends. A major shortcoming is the lack of a timeseries of discard data (work is underway to improve this and recent underreporting estimates. French survey information was available, but these data require closer examination before they can be used to assess the stock.

**PRECAUTIONARY REFERENCE POINTS:** No fishing mortality or biomass reference points are defined for this stock.

**STOCK STATUS:** The state of the stock is unknown in relation to precautionary reference points. Exploratory analysis shows indications of an increasing trend in SSB. Fishing mortality also appears to be relatively stable but at a high level. Recruitment is highly variable and there were strong 1995, 2001 and 2002 year-classes which probably led to the increased SSB.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries in Section 16.4. Future catches and SSB will be highly dependent on the strength of incoming year-classes and their discard mortality. In this context, the stock should be managed by ensuring that the effort is not allowed to increase, rather than by TAC management. Effort for much of the distributional area of this stock is currently capped at a recent average by Council Regulation (EC) No 1954/2003. Under mixed fisheries considerations ICES advises that fisheries in the Celtic Sea, Western Channel and Bay of Biscay should in 2006 be simultaneously managed without jeopardizing the recommended reduction in fishing mortality of cod, hake, megrim, plaice Celtic Sea, plaice Western Channel, sole Celtic Sea, sole Western Channel, and sole in Bay of Biscay and within the biological exploitation limits for all other stocks. Furthermore, unless ways can be found to harvest species caught in mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that discard quantities are high and that in order to reduce discards, increases in mesh size (or other technical measures) may be appropriate.

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**SECTIONS 2.29 to 2.33**

**2.29. Hake (Merluccius merluccius) in Skagerrak, Kattegat, IIIb, c, d (I) (Northern hake)**

Hake in the Skagerrak and Kattegat are assessed as part of the northern stock of hake (see section 2.31)

**2.30. Hake (Merluccius merluccius) in Division IIa, North Sea (EU zone) (Northern hake)**

Hake in the Division IIa and North Sea (EU zone), are assessed as part of the northern stock of hake (see section 2.31)
2.31. Hake (*Merluccius merluccius*) in Division Vb (I), VI and VII, and XII, XIV (Northern hake)
The management area covers Skagerrak, Kattegat, Ila, IIIb.c,d, IV, VI, VII, VIII, XII and XIV with separate TAC's for these Divisions.

**FISHERIES:** Hake is caught in nearly all fisheries in Subareas VII and VIII and also in some fisheries of Subareas IV and VI. The main part of the fishery (close to 80% of the total landings) was conducted in Subarea VII (Non-Nephrops trawling in medium to deep water, long-line in medium to deep water and gill nets in Sub-area VII), and in Sub-area VIII (gill nets in shallow to medium water and trawling in medium to deep water).

Landings were 46,400 t in 2005. The major fleets exploiting Northern hake have shown, in the longer term, a decrease in nominal fishing effort. Discards of juvenile hake can be substantial in some areas and fleets.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial CPUE series and survey data. Discards were not included in the assessment. Some discard data were available but it was not possible to incorporate these in a consistent way.

**MANAGEMENT AGREEMENT:** There are explicit management objectives for this stock under the EC Reg. No 811/2004 establishing measures for the recovery of the northern hake stock. It is aiming at increasing the quantities of mature fish to values equal or greater than 140,000 t. This is to be achieved by limiting fishing mortality to F=0.25 and by allowing a maximum change in TAC between years of 15%.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points were updated in 2003 following a revision of the assessment model and data in the recent years. The basis for setting reference points remained unchanged. The proposed reference points are: \( B_{\text{lim}}: 100,000 \ \text{t} \), \( B_{\text{pa}}: 140,000 \ \text{t} \), \( F_{\text{lim}}: 0.35 \), \( F_{\text{pa}}: 0.25 \).

**STOCK STATUS:** Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock as being at full reproductive capacity and being harvested sustainably. SSB appears to have been very close to \( B_{\text{pa}} \) over the last 3 years, and \( F \) has been around \( F_{\text{pa}} \) since 2001. As the age determination, growth rate, and productivity of northern hake stocks are uncertain, absolute estimates of SSB and \( F \) have to be considered with caution.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2005 is presented in the context of mixed fisheries and is found in 16.4. Following the agreed recovery plan, ICES indicates that a fishing mortality of \( F = 0.25 \) is expected to lead to an SSB of around 158,000 t in 2008 with estimated landings in 2007 of 53,800 t. ICES also indicates that the fishing mortality which is consistent with taking high long-term yield and achieving low risk of depleting the productive potential of the stock is 0.17, which would imply landings of less than 38,600 t in 2007.

**STECF COMMENTS:** STECF agrees with the ICES assessment of the state of the stock and notes that a recovery plan of this stock has been adopted in 2004 and implemented from that year onward. STECF notes that the ICES assessment indicates that the SSB is close to the rebuilding target and suggests that a management plan should be developed and agreed so that it can be implemented as soon as the rebuilding target is reached. STECF also notes the TAC has been overshot considerably since 2001 but the overshoot has been reduced in 2005. STECF also agrees that effective measures to reduce discarding are also needed, given the substantial discards of juvenile hake in some areas and fleets. STECF further notes ICES’
concerns over several sources of uncertainty in the assessment and forecast for this stock, mainly due to growth and discards estimation. This raises questions on the accuracy of ageing data and the calculation of historic catch-at-age data. STECF notes that an alternative assessment was explored assuming faster growth. The results indicate that the perception of trends in stock dynamics is similar, but the absolute levels are heavily dependent on the ageing criteria. If growth of hake is underestimated, the stock is likely to be smaller and fishing mortality higher. STECF agrees with ICES concerns and considers that special attention must be paid to improve the accuracy of age determination and discards estimation.

### 2.32. Hake (Merluccius merluccius) Divisions VIIIa,b,d,e.
Hake in the Divisions VIIIa,b,d,e are assessed as part of the Northern stock of hake (see section 2.31).

### 2.33. Hake (Merluccius merluccius) in Divisions VIIc, IX and X (Southern hake)

**FISHERIES:** This stock is exploited in a mixed fishery by Spanish and Portuguese trawlers and artisanal fleets. Landings fluctuated between 6,700 and 35,000 t (1972-2005) and in 2005 were 8,300 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial CPUE series and survey data. Qualitative information from the fishing industry has contributed to the assessment process. The assessment excludes the Gulf of Cadiz. Discards are not included in the assessment, but sampling shows that discards in numbers range between 45-70% and are mainly composed of the younger age classes.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points are $B_{pa}: 35,000$ t, $F_{pa}: 0.4$. Precautionary reference points for $B_{lim}$ and $F_{lim}$ are $25,000$ t and 0.55 respectively.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as having reduced reproductive capacity and being at risk of being harvested unsustainably. The assessment is indicative of stock trends. SSB appears to have decreased between 1982 and 1997 to a level likely well below $B_{lim}$, and has been stable or slightly increasing since. Fishing mortality has fluctuated without particular trend at a high level since the mid-1990s. There is no indication of a recent reduction in $F$. Recruitment was high in the mid-1980s and has been much lower since. There are indications of good recruitments in 2004 and 2005.

**MANAGEMENT OBJECTIVES:** There are explicit management objectives for southern hake and Nephrops under the EC Reg. No. 2166/2005 establishing measures for the recovery of the Southern hake and Norway lobster stocks in the Cantabrian Sea and Western Iberian peninsula by January 2006. The purpose is rebuilding the SBB to levels above $B_{lim}$ with a high probability within the next 10 years.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2005 is presented in the context of mixed fisheries and is found in Section 16.5. The preliminary evaluation of the recovery plan indicated that the proposed level of $F$ might be insufficient to rebuild the stock within 10 years and ICES recommends the development of a revised recovery plan with a stronger reduction in $F$, which gives a sufficient probability of stock recovery. ICES advises that there should be no fishing for southern hake in 2007.
STECF COMMENTS: STECF agrees with the ICES advice. STECF notes that the TAC has been overshot considerably in 2005. STECF agrees with ICES concerns over several sources of uncertainty in the assessment of this stock, including growth and age, stock identity, year-to-year variation in the performance of the surveys and discards estimation. In particular, this raises questions on the accuracy of aging data and the calculation of historic catch-at-age data.

2.34. Herring (Clupea harengus) in Div. I and II. (Norwegian Spring Spawners)
FISHERIES: Norwegian spring spawning herring is fished in Subareas I and II by Norway, Iceland, Russia, and the Faroe Islands; lesser catches are taken by the EU fleets of Denmark, Sweden, Germany, Ireland, Netherlands, and UK. Trawlers and purse seiners carry out the fishery. A large increase in fishing effort, new technology, and environmental changes contributed to the collapse of this stock around 1970. Recruitment failed in the second half of the 1960s when the SSB was reduced below 2.5 million t. Starting in 1989 a succession of above-average to very strong year-classes were produced, promoting full recovery of the SSB and allowing an expansion of the fishery. Since 1992 the coastal fishery has increased sharply. Until 1994, the fishery was almost entirely confined to Norwegian coastal waters. During the summer of 1994 there were also catches in the offshore areas of the Norwegian Sea for the first time in 26 years. The geographical extent of this fishery increased in 1995, with nine nations participating and the total catch exceeding 900 000 t. The fishery expanded further in 1996 and the annual level of the fishery was in the order of 1.2–1.5 million t in the period 1996–2000. After 2000 the fishery has dropped to a level between 700–1000 thousand tonnes. Total landings in 2005 amounted to just over 1 000,000 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on an analytical assessment, which takes into consideration catch data and eight surveys (acoustic surveys of adults and juveniles, and larval surveys). ICES investigated the use of a number of different models. When appropriately formulated, they all gave the same perception of the trajectory for stock size and fishing mortalities. On this basis, the SeaStar model was used, as in previous years.

PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for biomass and fishing mortality are $B_{pa} = 5$ million t, $F_{pa} = 0.15$.

STOCK STATUS: Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and being harvested sustainably. The estimate of the spawning stock biomass, although uncertain, is around 10.3 million t in 2006. Several good year-classes contribute to the present spawning biomass: the spawning stock is now dominated by the strong 2002 year-class, as well as by the 1998 and 1999 year-classes and surveys indicate that recruitment from the 2003 year-class is moderate, while the 2004 year-class is also strong (comparable to the 1998 year-class).

RECENT MANAGEMENT ADVICE: In 1999 EU, Iceland, Faroe Islands, Norway and Russia agreed on a long-term management plan from 2001. The aim is to maintain the stock size above 2.5 million t and to maintain a fishing mortality rate of 0.125, which is lower than the $F_{pa}$. These management measures shall be reviewed and revised on the basis of any new advice from ICES. Should SSB fall to below 5 million t ($B_{pa}$) the fishing mortality rate shall be adapted to ensure a
rapid recovery of SSB to the $B_{pa}$ level. This plan is is considered to be precautionary and with targets consistent with high-term yield and low risk of depletion production potential. In the ACFM report of 2006, ICES advises that this fishery should be managed according to the agreed management plan with a fishing mortality of no more than $F=0.125$, corresponding to landings in 2007 of less than 1 280,000 t. Catches of 1 280,000 t in 2007 are expected to lead to a spawning stock of 10.2 million tonnes in 2008. This is consistent with the current long-term management plan.

**STECF COMMENTS:** STECF agrees with the advice from ICES.

### 2.35. Herring (*Clupea harengus*) in Divisions IIIbcd, Baltic Sea

The STECF Summary review and advice for herring in Divisions IIIb,c,d Baltic Sea is given in Part 1 of the review of advice for 2007.

### 2.36. Herring (*Clupea harengus*) in the North Sea (Sub-area IV) including components of this stock in Divs. IIa, IIIa and VIIId

**FISHERIES:** The North Sea autumn spawning herring in this area is exploited by Denmark, France, Germany, Netherlands, Norway, Sweden, Russia and UK. Trawlers and purse seiners carry out the fishery. The fishing areas for this stock include ICES Sub-area IV and Divisions IIa, IIIa and VIIId. At present, the stock is managed by separate TACs in three different management areas (IIa, IVa-b and IVc+VIIId) through joint negotiations by EU and Norway. There is large scale misreporting of catches in several parts of the North Sea into adjacent management areas, and discard data are either incomplete or entirely missing. This stock complex also includes the Downs winter-spawning herring in Divisions IVc and VIIId. Recent catch estimate for 2005 by ICES amounts to 664,000 t and represents a TAC overshoot by 24%.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. The age-based assessment is based on landings from Subarea IV and Division VIIId and on surveys (Acoustic 1–9+ ring index, IBTS age 1–5+, 0-group and larvae SSB indices). Most reported catch data were official landings, but for some nations catch estimates were corrected for unallocated and misreported catch. The catch data was updated in 2004 according to reworking catch-at-age data for 1995-2001, splitting between North Sea Autumn Spawners (NSAS) and Western Baltic Summer Spawners (WBSS) based on new information on the distribution of Norwegian catches, and revisions in the Swedish catch data. ACFM catch includes unallocated and misreported landings, discards and slipping. Denmark and Norway provided information on by-catches of herring in the industrial fishery.

**PRECAUTIONARY REFERENCE POINTS:** The precautionary reference points for biomass and fishing mortality are $B_{pa}=1,300,000$ t, $F_{pa}=0.12$ for age groups 0-1 and $F_{pa}=0.25$ for age groups 2-6.

**STOCK STATUS:** Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity but at risk of being harvested unsustainably. SSB in 2005 was estimated at 1.7 million t, and is expected to decrease to $B_{pa}$ (1.3 million t) in 2006. Both the 1998 and the 2000 year-classes were strong. However, all year-classes since 2001 are estimated to be among the weakest since the late 1970s. Due to the current circumstances of four poor recruiting year-classes of North Sea herring, it is particularly important that the decline of future spawning stock biomass be addressed with sufficient caution to ensure the safety of the spawning stock in the next few years.
MANAGEMENT AGREEMENTS: According to the EU-Norway agreement (November 2004): -

1. Every effort shall be made to maintain a level of Spawning Stock Biomass (SSB) greater than the 800,000 tonnes (Blim).

2. Where the SSB is estimated to be above 1.3 million tonnes the Parties agree to set quotas for the directed fishery and for by-catches in other fisheries, reflecting a fishing mortality rate of no more than 0.25 for 2 ringers and older and no more than 0.12 for 0-1 ringers.

3. Where the SSB is estimated to be below 1.3 million tonnes but above 800,000 tonnes, the Parties agree to set quotas for the direct fishery and for by-catches in other fisheries, reflecting a fishing mortality rate equal to:
   \[ 0.25 - (0.15 \times \frac{(1,300,000 - SSB)}{500,000}) \] for 2 ringers and older, and
   \[ 0.12 - (0.08 \times \frac{(1,300,000 - SSB)}{500,000}) \] for 0-1 ringers.

4. Where the SSB is estimated to be below 800,000 tonnes the Parties agree to set quotas for the directed fishery and for by-catches in other fisheries, reflecting a fishing mortality rate of less than 0.1 for 2 ringers and older and less than 0.04 for 0-1 ringers.

5. Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 15% from the TAC of the preceding year the Parties shall fix a TAC that is no more than 15% greater or 15% less than the TAC of the preceding year.

6. Notwithstanding paragraph 5 the Parties may, where considered appropriate, reduce the TAC by more than 15% compared to the TAC of the preceding year.

7. By-catches of herring may only be landed in ports where adequate sampling schemes to effectively monitor the landings have been set up. All catches landed shall be deducted from the respective quotas set, and the fisheries shall be stopped immediately in the event that the quotas are exhausted.

8. The allocation of TAC for the directed fishery for herring shall be 29% to Norway and 71% to the Community. The by-catch quota for herring shall be allocated to the Community.


ICES has examined the performance of this harvest control rule. ICES considers that the strict application of the TAC change limit of 15% (rule number 5) is not consistent with the Precautionary Approach in a situation like the present when four consecutive weak year-classes are recruiting to the population. The harvest control rule is in accordance with the Precautionary Approach if paragraph 6 is invoked sufficiently early to ensure that there is less than 5% chance of SSB falling below Blim in 10 years, even in the case of several consecutive weak year-classes. Assuming that paragraph 6 would be invoked when TAC constraints would lead to SSB falling below Bpa, it is considered that the revised HCR is in accordance with the Precautionary Approach.

RECENT MANAGEMENT ADVICE: Exploitation boundaries in relation to existing management plans: The 2004 management plan implies TACs and corresponding allocations among fleets as indicated in the catch options tables presented in the ICES report. Management of the autumn-spawning herring must be considered together with the western Baltic Herring. The management plan is not specific as to when paragraph 6 should be invoked and how much the TAC would be reduced beyond the 15% limitation. Due to the current circumstances of a sequence of four poor recruiting year-classes of North Sea herring, it is particularly important that the decline of future spawning stock biomass is addressed with sufficient caution to ensure the
safety of the spawning stock in the next few years. If the 15% constraint is applied, the SSB in 2007 will fall well below \( B_{pa} \) in 2007 and continue to fall in 2008. Accordingly, ICES recommends that paragraph 6 be invoked.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Appropriate reference points would be in the range of \( F_{0.1} \) and \( F_{\text{max}} \). The management plan suggests fishing mortality rates in this range.

*Exploitation boundaries in relation to precautionary limits* In order to comply with the Precautionary Approach, fishing mortality would have to be reduced on juveniles (to about 0.05) and on adults (to about 0.20) so as to bring SSB back to \( B_{pa} \) in 2008. Catches corresponding to such a reduction in fishing mortality would be of the order of 275 000 t from all fleets, implying a TAC of approximately 240 000 t for fleet A, and a bycatch of 5000-9000 tonnes for fleet B (see catch option table in the ICES report).

*Conclusion on exploitation boundaries* As the 2004 harvest rule has not been tested under the current circumstances of four consecutive weak year-classes, ICES advises that exploitation boundaries be set in relation to precautionary limits. Accordingly, ICES advises a total catch of 275 000 t for 2007, across all fleets, on herring autumn spawners in Subarea IV, Division VII d, and Division IIIa, corresponding to a reduction of fishing mortality on juveniles (to about 0.05) and on adults (to about 0.20). This would imply a TAC of approximately 240 000 t for fleet A and a bycatch of 5000-9000 tonnes for fleet B.

**STECF COMMENTS:** STECF agrees with the ICES advice for 2007 and agrees with the important considerations for the management of this stock that are highlighted in the ICES Report.

**2.37. Herring (Clupea harengus) in the Skagerrak, the Kattegat and in the Baltic Sea (Sub-div. 22-24).**
The STECF Summary review and advice for cod in the Kattegat is given in Part 1 of the review of advice for 2007.

**2.38. Herring (Clupea harengus) in Div. IVc and VIId.**

**FISHERIES:** See also Section 2.36 on herring in the North Sea and adjacent areas. The Downs herring fishery (herring in IVc and VIId) is concentrated on the winter-spawning aggregations in a restricted area, which makes this stock component particular vulnerable to excessive fishing pressure. This stock component is managed by a separate TAC.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Assessment has only been made on the combined North Sea stock based on analysis of catch at age data (ICA) calibrated with survey data. No separate assessment has recently been made for the Downs component of the stock.

**PRECAUTIONARY REFERENCE POINTS:** The precautionary reference points for biomass and fishing mortality are \( B_{pa} =1,300,000 \) t, \( F_{pa} = 0.12 \) for ages 0-1 and \( F_{pa} = .25 \) for ages 2-6 (c.f. Sect. 2.36).
STOCK STATUS: See the Section 2.36 on herring in the North Sea and adjacent areas. The stock complex in the North Sea also includes Downs herring, which has shown independent trends in exploitation rate and recruitment but is not assessed separately. Larval surveys suggest that SSB in 1995 reached its lowest level since 1980. Abundance indices from larvae and trawl surveys indicate uncertainty with regard to this complex. In general it has experienced good recruitment since the mid 1990s, although the most recent year-class is very weak.

RECENT MANAGEMENT ADVICE: See the Section 2.36 on herring in the North Sea and adjacent areas. Since 1989 the TAC for Downs herring has averaged 11% of the total TAC for herring in IV, VIIId and IIIa (range 5.8-16.2%), and this proportionality of TACs is thought to be an appropriate guide to distributing the harvesting among Downs herring and other stock components.

STECF COMMENTS: STECF agrees with the ICES advice.

2.39. Herring (Clupea harengus) - Vb (EU zone), VIaN, VIb

2.39.1. Herring (Clupea harengus) in Division Vb and VIb.

No assessment is made for these areas and no information was available to STECF from these areas.

2.39.2. Herring in Division VIa North

FISHERIES: Historically, catches have been taken from this area by three fisheries:

i) A Scottish domestic pair trawl fleet and the Northern Irish fleet operating in shallower, coastal areas, principally fishing in the Minches and around the Island of Barra in the south; younger herring are found in these areas. This fleet has reduced in recent years.

ii) The Scottish single-boat trawl and purse seine fleets, with refrigerated seawater tanks, targeting herring mostly in the northern North Sea, but also operating in the northern part of Division VIa (N). This fleet now operates mostly with trawls, but many vessels can deploy either gear.

iii) An international freezer-trawler fishery has historically operated in deeper water near the shelf edge where older fish are distributed. These vessels are mostly registered in the Netherlands, Germany, France, and England, but most are Dutch owned.

In recent years the composition of the catch of these last two fleets has become more similar and has been dominated by younger adults resulting from increased recruitment into the stock. In 2004, the Scottish trawl fleet fished both in areas similar to the freezer trawler fishery, and in the coastal areas in the southern part of Division VIa (N), unlike the previous year where the Scottish fleet tended to omit the coastal areas. Total estimated landings for this area have fluctuated between about 23,000 t and 90,000 t over the past 20 years. Misreporting of the catches has decreased in recent years. Catches in 2004 were estimated to 23,000 t while the TAC for 2004 was set at 30,000 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment in 2005, based on catch data and acoustic surveys, is less uncertain than in previous years reflecting the stability of the input data over the last years.

PRECAUTIONARY REFERENCE POINTS: Precautionary management references have only been set for spawning stock biomass (Blim has been set at 50,000 t, and the proposed
B_p=75,000 t) while there is yet no proposed fishing mortality reference points. Candidate reference points are under investigation.

**STOCK STATUS:** The state of the stock is uncertain. Exploratory assessments this year confirm earlier perceptions of a lightly exploited stock (F<=0.2), but the level of the current biomass is uncertain. There appears to be no recent strong year-classes since 2001.

**RECENT MANAGEMENT ADVICE:**
*Exploitation boundaries in relation to precautionary limits:* The recent level of fishing mortality is low and decreasing. The SSB, although uncertain is around Bpa. Given that the perception of the stock is the same as last year, the 2006 TAC should be applicable in 2007 also.

**STECF COMMENTS:** STECF notes that the 2006 assessment is consistent with the 2005 assessment and agrees with the ICES advice for 2007.

### 2.40. Herring (*Clupea harengus*) in the Clyde (Division VIa)

The following text remains unchanged from the Review of Advice for 2006 because ICES has not undertaken any new assessments or provided any new advice since 2005.

**FISHERIES:** There are two stock components present on the fishing grounds, resident spring-spawners and immigrant autumn-spawners. The UK exploits the small stock of herring in this area. TACs were set at 1,000 t since 1993. Since 1999, annual landings have varied among 500 t and in 2004 there was no fishery.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. No analytical assessment has been made in recent years and no independent survey data are available for recent years.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS** The available information is inadequate to evaluate stock trends, and the state of the stock is uncertain.

**RECENT MANAGEMENT ADVICE:** Until new evidence is obtained on the state of the stock, existing time and area restrictions on the fishery should be continued in 2006.

**STECF COMMENTS:** STECF agrees with the advice from ICES.

### 2.41. Herring (*Clupea harengus*) in Division VIa south and VIIbc

**FISHERIES:** In recent years only Ireland and the Netherlands have recorded catches from this area with over 91% of the catch taken by Ireland in 2005. Catches in 2005 amounted to 13,350 t which is a small increase to last year’s figure (12,300 t). The fishery exploits a mixture of autumn- and winter/spring-spawning fish. The winter/spring-spawning component is distributed in the northern part of the area. The main decline in the overall stock appears to have taken place on the autumn-spawning component.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The acoustic survey time-series was used for the first time this year in exploratory assessments. Exploratory runs showed similar trends in stock development over a range of assumptions.
PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for biomass and fishing mortality are $B_{pa} = 110,000$ t, $F_{pa} = 0.22$.

STOCK STATUS: The results of a tentative assessment suggest that the sharp decline in SSB may have stopped. The current level of SSB is uncertain, but likely to be below Blim. There is no evidence that large year-classes have recruited to the stock in recent years. Fishing mortality appears to have been reduced due to the reduction in catch; however, $F$ is likely to be above $F_{pa}$ and may even be above $F_{lim}$.

RECENT MANAGEMENT ADVICE: ICES advises that the current catch regime, which has been in place since 2000 does not appear to be rebuilding the stock. No fishing should be allowed unless a rebuilding plan is in place. This rebuilding plan should be analyzed scientifically. One element of such a recovery plan should consider further reductions in the catch.

STECF COMMENTS: The outline of a management plan to rebuild the stock will be proposed to the STECF plenary session.

2.42. Herring (Clupea harengus) in the Irish Sea (Division VIIa)

FISHERIES: This fishery is mainly exploited by the UK with Ireland taking a small proportion of the catches in some of the years. Since 1987 the landings have fluctuated between about 2,000 t and 10,000 t with an increase in catches in 2005 (4,400 t) compared to the previous three years (2,400 – 2,500 t).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The exploratory assessment of the stock is based on survey data and catch-at-age data. The assessment is not considered accurate with respect to recent $F$ and SSB, but it is indicative of trends and levels in the past.

PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference point for biomass is $B_{pa} = 9,500$ t. $F_{pa}$ is not defined.

STOCK STATUS: Based on the most recent estimates of SSB and fishing mortality ICES classifies the state of the stock as uncertain. It seems likely that the stock has been relatively stable for the last 10 years, and that the fishing mortality does not appear to be increasing above the recent average. There are no recruitment indices for this stock.

RECENT MANAGEMENT ADVICE: The SSB is uncertain but stable at around $B_{pa}$, while $F$ is uncertain but not increasing. Therefore the TAC of 4,800 t which has been implemented in recent years is not expected to be detrimental to the stock.

STECF COMMENTS: STECF agrees with the advice from ICES.

2.43. Herring (Clupea harengus) in Division VIIe,f

No assessment is made for herring in Divisions VIIe,f and no information on catches or stock status was available to STECF.

2.44. Herring (Clupea harengus) in the Celtic Sea (VIIg and VIIa South), and in VIIj

FISHERIES: France, Germany, Ireland, Netherlands and UK have participated in the herring fisheries in this area. However in recent years the fishery has mainly been exploited by Irish vessels and Ireland has been allocated nearly 90% of the overall quota. Until the late nineties, landings fluctuated between about 19,000 and 23,600 t. From 1998 to 2005, landings decreased from 20,300 to just below 8,500 t. The fishery exploits a stock, which is considered to consist of two spawning components (autumn and winter). The stock is exploited by two types of vessels,
larger boats with Refrigerated Sea Water (RSW) storage, and smaller dry hold vessels. The smaller vessels are confined to the spawning grounds (VIIaS and VIIg) during the winter period. The RSW vessels target the stock inshore in winter and offshore during the summer feeding phase (VIIg). The number of vessels participating in the fishery has decreased in recent years. However, efficiency has increased, especially in the RSW vessels. There has been little fishing in VIIj in recent seasons, and there is evidence that stock abundance in this area is currently low.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The current management regime has resulted in catch data which are thought reasonably reliable. There is an acoustic survey; however, the results are considered uncertain. There is no quantitative information on recruitment. There is no quantitative assessment in 2006. Hence, the levels of SSB and F in the most recent year are indicative of trends only. However, it is clear that there are low abundances of older fish both in the catches and the population. Also, it is clear that SSB has declined since the mid-1990s. In addition, the marked absence of 2-year-old fish is confirmed. In a fishery that is based on only a few age classes, this is a cause for concern as there may be a high risk to the reproductive capacity of the stock from such a series of events.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference point for biomass is $B_{pa} = 44,000$ t. No precautionary fishing mortality reference point has been defined.

**MANAGEMENT AGREEMENT:**

The Irish Celtic Sea Herring Management Advisory Committee was established to manage the Irish fishery for this herring stock. This Committee manages the Irish quota and implements measures in addition to the EU regulations. The committee has a series of objectives relating to the maintenance of high yield and a consideration to rebuild the stock if necessary to achieve this. The Committee has the following objectives:

- To build the stock to a level whereby it can sustain annual catches of around 20 000 t.
- In the event of the stock falling below the level at which these catches can be sustained the Committee will take appropriate rebuilding measures.
- To introduce measures to prevent landings of small and juvenile herring, including closed areas and/or appropriate time closures.
- To ensure that all landings of herring should contain at least 50% of individual fish above 23 cm.
- To maintain, and if necessary expand the spawning box closures in time and area.
- To ensure that adequate scientific resources are available to assess the state of the stock.
- To participate in the collection of data and to play an active part in the stock assessment procedure.

ICES considers that now implementing these objectives should be in the form of a rebuilding plan.

**STOCK STATUS:** The stock size continues to be uncertain, but SSB may be below Bpa, and may even be below Blim. The fishery is heavily dependent on incoming cohorts, and older ages are almost absent in the stock. Recent recruitment has been relatively low. Current fishing mortality is very uncertain but may be very high.

**RECENT MANAGEMENT ADVICE:** The current level of SSB is uncertain, but may be below Bpa and possibly even below Blim. There is no short-term forecast on which to base catch advice for 2007. However, given the risk to the stock indicated by weak recent recruitment, no fishing should be allowed until a rebuilding plan is in place. Such a plan should include closed areas to protect recruitment and further reductions in the catches.
STECF COMMENTS: A proposal of a management plan will be submitted to the STECF plenary session for review.

2.45. Horse mackerel (*Trachurus trachurus*) in the North Sea (Divisions IIIa eastern part, IVbc, VId).

**FISHERY:** Catches taken in Divisions IVb, c and VId are regarded as belonging to the North Sea horse mackerel and in some years also catches from Division IIIa - except the western part of Skagerrak. The total catch taken from this stock in 2003 is 29,000 tonnes. In previous years most of the catches from the North Sea stock were taken as a by-catch in the small mesh industrial fisheries in the fourth quarter carried out mainly in Divisions IVb and VId, but in recent years a large part of the catch was taken in a directed horse mackerel fishery for human consumption.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points are set for this stock as there is no sufficient information to estimate reference points.

**STOCK STATUS:** The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk, so the state of the stock is unknown. Catches increased rapidly in late 1990s and have remained high since.

**RECENT MANAGEMENT ADVICE:** Exploitation boundaries in relation to precautionary considerations: ICES reiterates the recommendation made in 2004 to limit the catches to below the 1982-1997 average of 18 000 t, in order to constrain the fishery until there is more information about the structure of horse mackerel stocks, and sufficient information to show that higher exploitation rates are sustainable.

North Sea horse mackerel migrate to areas where they mix with the western horse mackerel stock. The present agreed TAC is for the North Sea and Division IIa, and these areas do not correspond to the distribution area of the stock. The TAC should apply only to those areas where the North Sea horse mackerel are fished, i.e. Divisions IIIa, IVb, c and VId.

The allocation of catches to the different horse mackerel stocks is based on the temporal and spatial distribution of the fishery. It is therefore important that catches be reported by ICES rectangle and by quarter.

The points listed below should be taken into account when considering management options for the North Sea horse mackerel:

1) The stock units are incompatible with the management units.
2) Catches have increased during the last decade. The major part of the increased catches is taken in Division VId in quarters 1 and 4, which is adjacent to the boundary of the western stock. It is also adjacent to an area where juveniles of the western horse mackerel stock are found.
3) Recent catches are above the advised TACs of 18 000 t. The average annual catch in the period 1995-2004 was 31 000 t.
4) There is a bycatch of mackerel in the horse mackerel fishery.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF wishes to reiterate the comments by ICES that there has been a change in the age composition of the landings, which now have a higher proportion of younger age groups. A directed juvenile fishery occurs in all three mackerel stocks.

ICES recommends that the TAC should apply to all those areas where the North Sea horse mackerel are fished, i.e. Divisions III, IVb, c and VId. North Sea horse mackerel migrate out of
the North Sea to area where they mix with the western horse mackerel stock. The present agreed TAC is for the North Sea and Division IIIa and this area does not correspond to the distribution area of the stock. The TAC should apply to all those areas where the North Sea horse mackerel are fished. Therefore, as last year, STECF recommends that Division VIIId be transferred as soon as possible from the western horse mackerel management area to North Sea horse mackerel management area.

2.46. Horse mackerel (*Trachurus trachurus*) in the Western areas (Divisions IIa, IVa, Vb, VIa, VIIa-c, e-k, VIIIa-e)

**FISHERY:** Catches increased in the 1980s with the appearance of the extremely strong 1982-year-class. Changes in the migration pattern became evident at the end of the 1980s when the largest fish in the stock (mainly the 1982-year-class) migrated into Divisions IIa and IVa during the 3rd and 4th quarters. Since 1987 considerable catches have been taken by the Norwegian purse seine fleet in a fishery for reduction purposes, particularly in Division IVa in November, while most catches of other countries have been taken for human consumption purposes in Sub-areas VI, VII and Divisions VIIIa-e. The Norwegian catches have dropped considerably since 1996.

The total catch taken in 2004 was 157 600 t, 65,000 t lower than in 2003. Recently, fisheries in VIIe,f have taken large catches of mainly juvenile horse mackerel from the western stock. There has been a clear change in the age structure of the catches from older to younger fish since 1996.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment is based on an analysis of catch at age data calibrated with the results of the international triennial horse mackerel egg surveys. There are no explicit management objectives for this stock.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points are proposed for this stock.

**STOCK STATUS:** Based on recent research information on stock identity, the Western horse mackerel stock unit has been redefined and now includes Division VIIIic. In the absence of defined reference points and a full analytical assessment, the state of the stock is unknown. Data exploration indicates that the SSB shows a decrease since the late 1980s, as the outstanding 1982 year-class was depleted. Relative high catch rates of the 2001 year-class in 2002-2005 indicate that this year-class is stronger than those observed in recent years. Fishing mortality is also believed to be relatively low.

**RECENT MANAGEMENT ADVICE:** *Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:*

Exploitation boundaries in the past were based on F0.1. In view of the absence of a reliable selection profile, F0.1 cannot be estimated at the present time.

*Exploitation boundaries in relation to precautionary considerations:* ICES has advised that in the absence of a strong year-class sustainable yield is unlikely to be higher than 130 000 t for the traditional stock areas. This corresponds to catches less than 150 000 t in the revised stock area (i.e. 130 000 t for the traditional stock area, plus 20 000 t for the inclusion of Division VIIIic in the stock definition). Despite indications of a strong 2001 year-class and given the uncertainty in stock levels, ICES recommends that catches of horse mackerel in Divisions IIa, IIIa (western part), IVa, Vb, VIa, VIIa-c,e-k, and VIIIa-e be limited to less than 150 000 t.
STECF COMMENTS: STECF agrees with the ICES advice. In accordance with the recommendations for the North Sea stock (eastern component) of horse mackerel, STECF agrees with ICES that the TAC should apply to all areas where western horse mackerel are caught, i.e. Division IIa, IIIa (western part), IVa, Vb, VIIa-c, VIIe-k and VIIIa-e. A special request on a horse mackerel management plan development is given in section 2.2.17 of the Report of the 19th meeting of the STECF.

2.47. Horse mackerel (*Trachurus trachurus* L.) in IXa

FISHERY: Atlantic Horse mackerel in these Divisions are exploited by trawl and purse seine fleets from Spain and Portugal fishing along the Atlantic Iberian shelves, along the Gulf of Cadiz, the Portuguese and Galician shelves and along the south of the Bay of Biscay. This species is mainly caught by bottom trawlers and purse-seiners on the shelf and on a smaller scale on the shelf slope by hooks and gillnets. The landings from this stock are not well estimated prior to 1990 but the Portuguese catches alone prior to 1990 were in the range 60,000 t –80,000 t. Since 1991 landings from the combined Spanish and Portuguese fleets have declined to a low of about 20,000 t in 2003. The estimated catch in 2005 was about 23,100 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. Information from two surveys and catch-at-age is available for this stock. Only exploratory assessments were made. Accordingly, catch forecasts are not provided.

PRECAUTIONARY REFERENCE POINTS: No reference points have been proposed for this stock.

STOCK STATE: In absence of a reliable assessment and precautionary reference points, the state of the stock cannot be evaluated. Catches decreased from the early 1960s but have been relatively stable since the early 1990s. The age composition appears to be stable over the past 10 years, and there is no clear indication of recent strong year-classes. Exploratory analyses might indicate a lower spawning stock biomass at present than at the beginning of the relatively short time-series (early 1990s), but the fishing mortality appears to be rather stable and at a low level over the whole period.

RECENT MANAGEMENT ADVICE: Given the unknown state of the stock, fishing effort must not increase and catches in 2007 should not exceed the 2000-2004 average of around 25,000 t. The reference period of 2000-2004 excludes 2003 because of the reduced effort as an effect of the Prestige oil spill. The TAC for this stock should only apply to *Trachurus trachurus*.

STECF COMMENTS: STECF agrees with the advice from ICES and stresses that a TAC for *Trachurus trachurus* in IXa be set in accordance with ICES advice. STECF also notes that since 1987 catches from this stock have not been constrained by the agreed TACs.

2.48. Horse mackerel (*Trachurus spp.*) - CECAF (Madeira I.)

The ICES Working Group on Mackerel, Horse Mackerel, Sardine and Anchovy reported that catches of this species have been around 1500 tonnes from 1986 to 1990. Since then catches have declined to less than 700 t. STECF did not have access to any other stock assessment information on horse mackerel in this area.

2.49. Horse mackerel (*Trachurus spp.*) - CECAF (Canary I.)

STECF did not have access to any stock assessment information on horse mackerel in this area.
2.50. Horse mackerel (*Trachurus spp.*) - X (Azores I.)
The 2002 ICES Working Group on Mackerel, Horse Mackerel, Sardine and Anchovy reported that the catches of *Trachurus picturatus* have been around 3000 t between 1986 and 1990. Since 1999 catches have remained around 1500t. STECF did not have access to any new stock assessment information on horse mackerel in this area.

2.51. Lemon sole (*Microstomus kitt*) in the North Sea
STECF did not have access to any stock assessment information on Lemon sole in this area.

2.52. Mackerel (*Scomber scombrus*) - combined Southern, Western and North Sea spawning components) (2.52)

**STOCK components:** ICES currently uses the term *North East Atlantic Mackerel* to define the mackerel present in the area extending from ICES Division IXa in the south to Division IIa in the north, including mackerel in the North Sea and Division IIIa. The spawning areas of mackerel are widely spread, and only the area in the North Sea is sufficiently distinct to be clearly identified as a separate spawning component. Tagging experiments have demonstrated that after spawning, fish from Southern and Western areas migrate to feed in the Norwegian Sea and the North Sea during the second half of the year. Here they mix with the North Sea component in the North Sea. Since it is at present impossible to allocate catches to the stocks previously considered by ICES they are at present, for practical reasons, considered as one stock: the North East Atlantic Mackerel Stock. Catches cannot be allocated specifically to spawning area components on biological grounds, but catches from the Southern and Western components are separated according to the area where they are taken. In order to be able to keep track of the development of the spawning biomasses in the different spawning areas, the North East Atlantic mackerel stock is divided into three area components termed the Western Spawning Component, the North Sea Spawning Component and the Southern Spawning Component.

The Western Component is defined as mackerel spawning in the western area (ICES Divisions and Subareas VI, VII, VIII a,b,d,e). This component currently comprises 85% of the entire North East Atlantic Stock. Similarly, the Southern Component is defined as mackerel spawning in the southern area (ICES Divisions VIIIc and IXa). Although the North Sea component has been at an extremely low level since the early 1970s, ACFM regards the North Sea Component as still existing. This component spawns in the North Sea and Skagerrak (ICES Subarea IV and Division IIIa). Current knowledge of the state of the spawning components is summarised below:

**Western Component:** The catches of this component were low in the 1960s, but increased to more than 800 000 t in 1993. The main catches are taken in directed fisheries by purse seiners and mid-water trawlers. Large catches of the western component are taken in the northern North Sea and in the Norwegian Sea. The 1996 catch was reduced by about 200 000 t, compared with 1995, because of a reduction in the TAC. The catches since 1998 have been stable. The SSB of the Western Component declined in the 1970s from above 3.0 million t to 2.2 million t in 1994, but was estimated to have increased to 2.7 million t in 1999. A separate assessment for this stock component is no longer required, as a recent extension of the time-series of NEA mackerel data now allows the estimation of the mean recruitment from 1972 onwards. Estimates of the spawning stock biomass, derived from egg surveys, indicate a decrease of 14% between 1998 and 2001 and a 6% decrease from 2001 to the 2004 survey.

**North Sea Component:** Very large catches were taken in the 1960s in the purse seine fishery, reaching a maximum of about 1 million t in 1967. The component subsequently collapsed and
catches declined to less than 100 000 t in the late 1970s. Catches during the last five years have been assumed to be about 10 000 t. The 2002 and 2005 egg survey in the North Sea with limited spatial and temporal coverage both indicate a higher egg production in the North Sea area than in 1999. Though the North Sea spawning component has increased since 1999, it is still very small.

**Southern Component:** Mackerel is a target species for the hand line fleet during the spawning season in Division VIIIc, during which about one-third of the total catches are taken. It is taken as a bycatch in other fleets. The highest catches (87%) from the Southern Component are taken in the first half of the year, mainly from Division VIIIc, and consist of adult fish. In the second half of the year catches consist of juveniles and are mainly taken in Division IXa. Catches from the Southern Component increased from about 20 000 t in the early 1990s to 44 000 t in 1998, and were close to 50 000 t in 2002. Estimates of the spawning stock biomass, derived from egg surveys, indicate a decrease of about 50% between 1998 and 2001. However, the SSB estimated in 2001 is similar to the survey estimates in 1995. The SSB estimated in 2004 showed a decrease of 36% over the 2001 survey.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICES. This assessment is based on catch numbers-at-age for the period 1972-2005 and egg survey estimates of SSB from 1992, 1995, 1998, 2001, and 2004. Exploratory assessments using different assessment models gave comparable results. The estimate of total mortality in the past is in line with estimates from tag recapture studies. The results are sensitive to the way the surveys are used in the models. This year’s assessment is an update of last year’s assessment. For mackerel, fishery-independent data of the stock size becomes available only once every 3 years from egg surveys. Inclusion of a new independent data point may result in quite large revisions of the stock size, fishing mortality, and consequently catch predictions and TAC advice. Sampling for discards has been initiated in the EU in 2002 by legal regulations. Sampling of discards and slipping is problematic in pelagic fisheries due to high variability in discard and slipping practices. Better information on these practices is required in the future. Acoustic surveys are available for this stock but have not been used in the assessment because 1) they do not cover the entire geographic range, 2) there are difficulties with the estimation of fish density, and 3) there could be species identification issues in some areas.

**PRECAUTIONARY REFERENCE POINTS:** The precautionary reference points for biomass and fishing mortality proposed by ICES are $B_{pa} = 2.3$ million t, and $F_{pa} = 0.17$. This F is considered to provide approximately 95% probability of avoiding $F_{lim}$, taking into account the uncertainty in the assessments. $F_{lim}$ is 0.26, the fishing mortality estimated to lead to potential stock collapse. Agreements in force between the EU, Norway and the Faroes specify a long-term management arrangement with a target fishing mortality between 0.15 and 0.2 and a minimum biomass of 2.3 million t.

**STOCK STATUS:** Based on the most recent estimates of fishing mortality, ICES classifies the stock as being harvested unsustainably. Fishing mortality in 2005 is estimated to be at Flim (0.26). Because of the unknown levels of underreporting in the catch, SSB in recent years relative to $B_{pa}$ cannot be accurately estimated, but indications are that SSB has increased over the last 3 years and is now around $B_{pa}$. The stock has been showing much more variable recruitment over the recent four years compared to the past. The 2000 and 2003 year-classes are estimated to be poor, while both the 2001 and the 2002 year-classes are above average. The 2002 year-class is estimated to be the highest in the time-series. There is insufficient information on the size of the 2004 and 2005 year-classes.
MANAGEMENT AGREEMENTS: The agreed record of negotiations between Norway, Faroe Islands, and EU in 1999, states:

“For 2000 and subsequent years, the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality in the range of 0.15 - 0.20 for appropriate age groups as defined by ICES, unless future scientific advice requires modification of the fishing mortality rate.”

“Should the SSB fall below a reference point of 2 300 000 tonnes (Bpa), the fishing mortality rate, referred to under paragraph 1, shall be adapted in the light of scientific estimates of the conditions prevailing. Such adaptation shall ensure a safe and rapid recovery of the SSB to a level in excess of 2 300 000 tonnes.”

“The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES.”

ICES considers the agreement to be consistent with the precautionary approach, if F on average is kept below 0.17. The rationale for ICES proposing Fpa = 0.17 is to have a high probability of avoiding exploiting the stock above Flim. In addition, projections indicate that F = 0.17 will optimize long-term yield and at the same time result in a low risk of the stock decreasing below Bpa. However, the management plan does not specify measures that would apply under poor stock conditions that preclude further evaluation. Furthermore, the management plan assumes that catch information is unbiased so that absolute estimates of SSB can be produced. This condition has not been met for a number of years.

RECENT MANAGEMENT ADVICE: ICES advises that any agreed TAC should cover all areas where Northeast Atlantic mackerel are fished. The agreed management plan (F between 0.15 and 0.20) would imply catches between 390 000 t and 509 000 t in 2007. The exploitation boundaries in relation to the management plan given above is based on ICES interpretation that fishing mortality (F) should always be within an upper bound of 0.20. However, the management plan does not explicitly prioritise the F-based over the biomass-based decision rule, or vice versa. ICES’ evaluation of the decision rule as being in accordance with the PA is based on the assumption that F should have an upper bound of 0.20.

ICES advises that the existing measures to protect the North Sea spawning component remain in place. These are:
- There should be no fishing for mackerel in Divisions IIIa and IVb,c at any time of the year.
- There should be no fishing for mackerel in Division IVa during the period 15 February 31 July.
- The 30-cm minimum landing size at present in force in Subarea IV should be maintained.

STECF COMMENTS: STECF agrees with ICES.
Furthermore STECF notes that the advice, as derived from the present assessments, does reflect the level of reported catches. There is a broad perception that there are substantial undeclared landings in this fishery. As the assessment is strongly dependent on the catch information, both recently and in the past and the estimates of abundance, predicted catches for the future, are scaled to the reported catches. Hence managers are encouraged to obtain reliable catch information.

2.53. Megrim (Lepidorhombus whiffiagonis.) in IIa (EU zone), North Sea FISHERIES: Megrim are mainly caught as a by-catch in trawl fisheries targeting anglerfish in Division IIa and Sub-area IV.
2.54. Megrim (Lepidorhombus whiffiagonis) in Vb (EU zone), VI, XII & XIV

**FISHERIES**: The main fishery is in Sub-Area VI where megrim are a secondary target for vessels fishing for anglerfish. They are also taken as a by-catch in trawl fisheries targeting roundfish species and Nephrops. The main exploiters are the UK, France Spain and Ireland. From 1983 to 2004, reported landings have ranged from 1785 t to 5,300 t with lowest catches being recorded in 2004. Final catch figures for 2005 were not available. The true level of recent landings is thought to be obscured by serious area misreporting and underreporting. In the past, management of the megrim stock has been linked to that for anglerfish on the assumption that landings were correlated in the fishery. This may no longer be true due to recent changes in the fishing pattern in the Scottish and Irish fleets, and the dynamics of the species are probably not linked.

**SOURCE OF MANAGEMENT ADVICE**: The management advisory body is ICES.

**PRECAUTIONARY REFERENCE POINTS**: No precautionary reference points have been proposed for this stock.

**STOCK STATUS**: The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk, so the state of the stock is unknown. The stock was evaluated using information on landings and catch composition. There is still no survey series adequately covering the stock.

**RECENT MANAGEMENT ADVICE**: The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.2. ICES recommended that catches in 2007 should be no more than the recent (2002-2004) landings from Divisions VIa and Vb and unallocated landings from the North Sea (Sub-area IV) of about 2 100 t.

**STECF COMMENTS**: STECF agrees with the advice from ICES.

2.55. Megrim (Lepidorhombus whiffiagonis) in VII

Megrim in management areas VII and VIIIabde are assessed as a single stock.

**FISHERIES**: Megrim to the west of Ireland and Britain and in the Bay of Biscay are caught predominantly by Spanish and French vessels, which together have reported more than 60% of the total international landings, and by Irish and UK demersal trawlers. Megrim is mostly taken in mixed fisheries for hake, anglerfish, Nephrops, cod, and whiting. Over the period 1984 to 2003, ICES Working Group catches have ranged from 15517t to 21,815t. In 2005, catches were 14542t.

**SOURCE OF MANAGEMENT ADVICE**: The management advisory body is ICES.

**PRECAUTIONARY REFERENCE POINTS**: The proposed precautionary reference points for fishing mortality and biomass are Fpa = 0.30, Bpa = 55,000t.
STOCK STATUS: An age-based assessment was carried out using landings and discards data, calibrated by two commercial CPUE series and two surveys. However, the assessment was not considered to be robust. It has not been possible to fully quantify SSB, fishing mortality and recruitment for this stock. However, indications are that landings and SSB have been reasonably stable over the time-series. There are no indications of reduced recruitment.

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4. Owing to the lack of a robust assessment that could not be used for a short-term forecast, the basis of the October 2006 ICES advice has changed to recent average catches. The current stock status is uncertain, but all indicators point to the stock and catches being stable. Therefore ICES recommends that the landings of L. whiffiagonis in 2007 should not exceed the average landings of 2003–2005. This corresponds to 14 200 tonnes.

STECF COMMENTS: STECF notes that the basis of ICES advice for 2007 is again revised from previous years. The reasons for the changed view of the assessment quality are related to the following data issues

- Limited discard data are available in the time-series and filling in of the missing years is problematic because discarding practices in the fisheries are very variable over time;
- Conflicting trends in commercial tuning data;
- Limited survey information, particularly on the strength of the incoming year-classes.

Since the results of the ICES assessment are so uncertain and appear to have changed several times in recent years, STECF agrees with the ICES advice on the grounds that there are no objective criteria on which to base an alternative level of exploitation.

2.56. Megrim (Lepidorhombus whiffiagonis) in VIIIa,b,d,e.

Megrim in Divisions VIIIa,b,d,e are assessed together with megrim in Sub area VII (see section 2.55).

2.57. Megrim (Lepidorhombus whiffiagonis & Lepidorhombus boscii) in VIIIc, IX & X

FISHERIES: Megrim in the Iberian region are caught as a bycatch in the mixed bottom trawl fisheries by Portuguese and Spanish vessels and also in small quantities by the Portuguese artisanal fleet. Two species (Lepidorhombus whiffiagonis & L. boscii) are caught and they are not usually separated for market purposes so the advice is combined for the two stocks. A change in fishing technology with increase in VHVO trawl to target horse mackerel and increasing use of pair trawlers (targeting blue whiting) has reduced the effort on megrim in recent years. Landings of L. whiffiagonis have declined from over 900 t in 1990 to 147 t in 2005. Landings of L. boscii have declined from about 2,600 t in 1998 to 720 t in 2002. In 2005 landings were about 983 t and revised Portuguese landings for 2004 caused a small upturn in that year to 1006.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES.

STOCK STATUS: In the absence of defined reference points, the state of the two stocks cannot be evaluated with regard to biological reference points. There has been a decrease in landings since the late 1980s. SSB of both species decreased since the late 1980s and then stabilised close to the historic low. Fishing mortality has declined in recent years. For L. whiffiagonis, recent recruitments have been lower than in the second half of the 1980s. For L. boscii, recruitment appears to be rather stable over the whole time period.
RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2007 is presented in the context of mixed and is found in Section 16.5. Even at the recent low levels of fishing mortality for both species (L. whiffiagonis 0.15 and L. boscii 0.27), SSB has been stable showing no strong signs of increase. Fishing mortality should therefore not be allowed to increase. This level of exploitation corresponding to Fsq gives predicted landings in 2007 of around 190 t for L. whiffiagonis and around 1240 t for L. boscii. The combined landings at the current exploitation level would be around 1440 t.

STECF COMMENTS: STECF agrees with the ICES view that exploitation on these stocks should not increase but notes that the landings predicted by the forecast give rise to increases to levels not seen since 2000 and 1995 in the cases of L. whiffiagonis and L. boscii respectively.

**2.58. Norway lobster (Nephrops norvegicus) in Skagerrak, Kattegat, IIIa.**

FISHERIES: There are two Functional Units in this Management Area: a) Skagerrak (FU 3) and b) Kattegat (FU 4). The majority of landings are made by Denmark and Sweden, with Norway contributing small landings from the Skagerrak. During the last 15 years, landings from the Skagerrak varied between 1900 and 3,250 t, while landings from the Kattegat varied between about 900 and 1,800 t (with the lowest landings recorded in 1994-1995). In 2005 total estimated landings amounted to 4032 t, somewhat lower than the 1998 peak of 5044 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES and the data available include fishery data such as LPUE and biological sampling data such as length compositions from which mean sizes can be derived.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: All indications are that the stocks in this management area are exploited at sustainable levels. However, the available information is inadequate to evaluate spawning stock or fishing mortality relative to risk, so strictly speaking the state of the stock is unknown. Indices from commercial fishery suggest that the stocks in this Management Area are exploited at sustainable levels. Large amount of discards in 1999 and 2000 may indicate strong recruitment in those years.

RECENT MANAGEMENT ADVICE: Given the apparent stability of the stocks, current levels of exploitation appear to be sustainable. Due to uncertainty in the available data ICES is not able to reliably forecast catch. Therefore ICES recommends that fishing effort for fleets targeting Nephrops should not be allowed to increase.

Advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries in Section 16.1.

STECF COMMENTS: STECF agrees with the advice from ICES that effort should not be allowed to increase in this fishery. STECF notes that the mismatch between minimum landing size (40 mm CL in Division IIIa) and the selectivity of the 70-mm diamond mesh cod-ends results in large quantities of Nephrops being discarded, there are also important considerations concerning the bycatch of gadoids and the need to reduce these through appropriate selectivity measures in this fishery. STECF also notes that the use of two different minimum landing sizes for Nephrops in Divisions IIIa and IV potentially causes an enforcement and policy problem in countries where Nephrops from the two areas are being landed.

**2.59. Norway lobster (Nephrops norvegicus) - IIa (EU zone), North Sea (EU zone)**
Norway lobster is assessed in a number of different Functional Units (FUs), see below. A series of Management Areas (MA), each containing one or more FU’s is defined for TAC management purposes.

A number of the FUs are assessed using underwater television surveys which ACFM considers to give a good indication of stock status. STECF (2005) advised on a sustainable harvest rate approach (based on yield per recruit principles and $F_{0.1}$) which could be applied to TV abundance data to estimate catch. The 2006 ICES WGNSSK applied this approach for FUs assessed by TV but ACFM proposed an alternative based on the ratio of historic landings/stock biomass from TV. STECF considers this to be inappropriate where, inter alia: a) uncertainty in landings is known to exist in earlier years; b) the early part of the landings data series reflects the period of initial fishery development; c) the TV series is short and covers a period when landings data are known to be uncertain. STECF also notes that in making the historic ratio calculation, i) biomasses based on incorrect individual weights were used and ii) the upper 95% estimate of the TV biomass was used and was applied to the mean biomass of recent years to estimate landings. STECF considers this to be inconsistent and believes that a ratio based on the mean TV biomass estimate would have been more appropriate. STECF considers that for most stocks assessed by underwater TV its 2005 advice provides a basis for sustainable harvesting of Nephrops.

**2.59.1. Norway lobster (Nephrops norvegicus) in Division IVa (rectangles 44–48 E6–E7 and 44 E8)**

**FISHERIES:** There are two Functional Units in this Management Area (MA): a) Moray Firth and b) Noup.

Landings from this fishery are predominantly reported from Scotland, with very small contributions from England in the mid-1990s, but not recently. About three quarters of the landings are made by single-rig trawlers, a high proportion of which use a 70-mm mesh. In 1999, twin-rig vessels predominantly used a 100 mm mesh, with 90% of the twin-rig landings made using this mesh size. Legislative changes in 2000 permitted the use of an 80 mm mesh. Total estimated landings in 2005 were 1,770 t.

Discarding of undersize and unwanted *Nephrops* occurs in the fishery of Moray Firth. Discarding rates averaged over the period 2003 to 2005 for this stock were about 21% by number, or 11% by weight. This represents a marked reduction in discarding rate compared to the average for the period 2002 to 2004 (30% by number and 14 % by weight).

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The TV underwater survey biomass estimates are used to estimate landings associated with various harvest rates due to uncertainty in the recent fishery data. The available fishery information is inadequate to use analytical methods to evaluate spawning stock or fishing mortality relative to precautionary reference points.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been determined for this stock.
STOCK STATUS: Moray Firth: The TV survey estimate of abundance for Nephrops in the Moray Firth suggests that the population increased by around 40% in 2002, probably due to good recruitment in that year. Based on the surveys the stock has been relatively stable since 2002, while length compositions in the catch have been relatively stable for 10 years.

Noup: The TV survey estimate of abundance for Nephrops in the Noup suggests that the population declined between the two surveys in 1994 and 1999, but unfortunately no recent data are available.

RECENT MANAGEMENT ADVICE: No management objectives have been set for this fishery. ICES advices that the effort in this fishery should not be allowed to increase relative to the past three years and in addition that the harvest ratio in this stock should be no more than 15%, until such time that more reliable catch information becomes available. This corresponds to landings of less than 2,400 t for the Moray Firth stock. The fishery in Noup stock should be less than 240 t, the average of the last three years.

STECF COMMENTS: STECF agrees with ACFM on its evaluation of the state of the stocks in this MA. STECF also agrees that effort should not increase relative to the last three years. STECF notes, however, that in giving its advice on catches for the Moray Firth, ACFM has not adopted the sustainable approach proposed by STECF (2005) and employed by ICES WGNSSK which suggests applying an $F_{0.1}$ based harvest rate to the available TV data.

STECF notes that ICES ACFM used an historic harvest rate approach based on the upper 95% confidence interval of the biomass. STECF does not consider this appropriate and recommends that the method suggested by STECF in 2005 should be employed. The estimated landings for 2007 when applying the STECF approach to The Moray Firth amount to 3119 tonnes. STECF agrees with the ACFM advice for the Noup.

2.59.2. Norway lobster (Nephrops norvegicus) in Division IVa (other than Moray Firth and Noup)

FISHERIES: There is only one Functional Unit in this Management Area (MA): Fladen Ground. Small quantities of landings are made outside the main Fladen Ground Functional Unit.

The fleet fishing the Fladen Ground for Nephrops comprises approximately 215 trawlers, which are predominantly Scottish (> 97%), based along the Scottish NE coast, with very few landings made in the UK by foreign vessels. The overall trend in landings from the Fladen Ground is upward, with the highest figure (provisional) recorded in 2005 (10,700 t). Nearly 40% of the Nephrops landings are reported as bycatch, where fish are the main target species. Approximately two-thirds of the landings are made by single-rig vessels and one-third by twin-rig vessels. In both units, two-thirds of the catches are taken with 100-mm meshes, the remainder with 70- to 80-mm meshes.

Discarding rates averaged over the period 2003 to 2005 for this stock were 11% by number, or 7% by weight.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on the annual TV underwater survey, which are used to indicate landings associated with various harvest rates. This survey provides a fishery-independent estimate of
Nephrops abundance. The available fishery information is inadequate to use analytical methods to evaluate spawning stock or fishing mortality in relation to the precautionary approach. **PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been determined for this stock of Nephrops.

**STOCK STATUS:** TV surveys suggest that the stock in this Management Area is probably exploited at a sustainable level. The TV survey estimates of abundance for Nephrops in the Fladen Ground indicate that the stock has fluctuated around twofold since 1992. In the last four years it has declined by 40% and is currently of a size similar to that observed in the late 1990s.

**RECENT MANAGEMENT ADVICE:** There are no management objectives set for this fishery. ICES advice that the effort in this fishery should not be allowed to increase relative to the past three years and in addition that the harvest ratio in this stock should be no more than 7.5%, until such time that more reliable catch information becomes available. This corresponds to landings of less than 10,882 t for the Fladen stock. The fishery in adjacent squares should be limited to 105 t, the average of the last three years.

**STECF COMMENTS:** STECF agrees with ACFM on its evaluation of the state of the stocks in this MA. STECF also agrees that effort should not increase relative to the last three years. STECF notes, however, that in giving its advice on catches for the Fladen ground, ACFM has not adopted the approach employed by ICES WGNSSK.

STECF notes that ICES ACFM used an historic harvest ratio approach although the basis of the selection of 7.5% is not clear. STECF considers the harvest rate approach to be inappropriate for the Fladen Ground since in the early years of the time series, the fishery was developing spatially. Harvest rates based on a fishery operating on only a fraction of the ground surveyed will be underestimates. The ACFM ratio predicts landings about the same as currently reported – these are known, however to be under-reported.

STECF considers that the (F0.1) based harvest rate (around 18% predicted for this stock) would be likely to lead to increases in effort and recommends a more cautious approach is required owing to the following features of this stock:

- The stock exhibits a comparatively low density (number m⁻²). The very large stock size arises from its widespread distribution over a large area.
- There is more limited biological data available for this stock on which to base the yield curve calculations
- The fishery is a comparatively recent one (developed mainly in the 1990s) and recruitment dynamics are less well known. The use of the STECF target based on Y/R principles assumes that recruitment is fairly constant, but this is not known and it is considered prudent to move steadily towards the longer term target.

STECF suggests that the rate of 10% proposed by WGNSSK should be applied and suggests that this harvest rate could be reviewed regularly and adjusted adaptively in the light of new data and greater understanding of the stock dynamics and potential. The estimated landings for 2007 that correspond to the recommendation for the Fladen Ground Functional Unit is 14392.
2.59.3. Norway lobster (Nephrops norvegicus) in Divisions IVa, East of 2° E + rectangles 43 F5-F7.

**FISHERIES:** There is only one Functional Unit in this Management Area: Norwegian Deep. Landings from this area in 2005 were 1,117 t. The majority of the landings from this FU are made by Denmark (80%) and Norway. During the last five years, landings have fluctuated between 750 t and 1,216 t, with the highest figures recorded in 2002. As a consequence of regulations, there was a switch to increasing Danish effort targeting Nephrops since 2002. Norwegian shrimp trawlers have started fishing more specifically for Nephrops in the most recent years, due to the landings restrictions for Pandalus.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Information on this stock is inadequate to provide advice based on precautionary limits. The perception of the stock status is based on Danish LPUE data.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been determined for this stock.

**STOCK STATUS:** Spawning stock or fishing mortality relative to risk were not evaluated. LPUEs from the Danish fishery have been rather stable over the last 10 years with increasing trend during the most recent 2 years. A slight decrease in mean size in the catches and landings in 2004 could indicate a high exploitation pressure in recent years, and that this Nephrops stock is fully exploited. However, the trends in Danish LPUE figures do not indicate any decline in stock abundance.

**RECENT MANAGEMENT ADVICE:** There are no management objectives set for this fishery. The inadequate information prevent any advice on this fishery.

**STECF COMMENTS:** ICES indicates an increasing trend of the LPUE in the last two years. STECF notes however that this may not be an indication of an increase in Nephrops abundance since the observed increase is based on the Danish LPUE series which may be affected by changes in selectivity and/or increases in gear efficiency. On the other hand, it may be that only part of the stock is exploited at present, considering that the sediment maps indicate that there may be scope for the fishery to expand into new grounds.

2.59.4. Norway lobster (Nephrops norvegicus) in Divisions IVb,c east of 1°E (excluding rectangles 43 F5-F7)

**FISHERIES:** There are two Functional Units in this Management Area: a) Botney Gut-Silver Pit and b) Off Horn Reef.

Landings from Botney Gut were 1,015 t in 2005. Up to 1995, the Belgian fleet used to take over 75% of the international landings from this stock, but since then, its share has dropped to less than 25%. Over 60% of the total international landings being taken by Dutch trawlers for first sale in the Netherlands or in Belgium. Long-term effort of the Belgian Nephrops fleet has shown an almost continuous decrease since the all-time high in the early 1990s.

Denmark accounts for most of the Nephrops landings from Off Horn Reef. Landings from this area doubled from 2000 to 2004 (from 600 to 1227 t). Landings and fishing effort decreased in 2005, but LPUE increased.
**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Information on these stocks is considered inadequate to provide advice based on precautionary limits. The perception of the stocks is based on LPUE and length distribution in the catches. **PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been determined for this stock. **STOCK STATUS:** 
Botney Gut: Indications from landing per unit effort do not indicate a decline in stock density. The mean sizes of males in the landings show evidence of an overall long term downward trend, while mean sizes of females seem to have stabilised, albeit at a level that is lower than in the early 1990s. 
Off Horn Reef: The upward trend in LPUE is noted for recent years. A precautionary interpretation of this increase suggests that the stock level remains relatively stable. However, the marked shift in the size distribution for 2005 compared to previous years could be a sign of a too high exploitation level in recent years. However, as LPUE was at a high level in 2005, the decrease in mean size in the catch could merely be a sign of large recruitment. **RECENT MANAGEMENT ADVICE:** There are no management objectives for this fishery. ICES recommends that the level of exploitation, i.e. effort on these stocks should not be increased. **STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that in the North Sea TAC (which comprises eight Nephrops stocks), the present aggregated management approach runs the risk of unbalanced effort distribution. Adoption of management initiatives to ensure that effort can be appropriately controlled in smaller areas within the overall TAC area is recommended.

**1.1.5 Norway lobster (Nephrops norvegicus) in Divisions IVb,c west of 1°E**

**FISHERIES:** There are two Functional Units in this Management Area (MA): a) Farn Deeps and b) Firth of Forth. Some landings are made outside the Functional Units, but inside the MA. Total landings were 5,619 t in 2005.
The UK fleet has accounted for virtually all landings from the Farn Deeps. Landings from the Firth of Forth fishery are predominantly reported from Scotland, with very small contributions from England. Effort currently appears to be at its lowest level since 1984, while LPUE appears to be at its highest in the series. Estimated discarding during this period has fluctuated around 40% by weight of the catch in the Farn Deeps and 24 % in the Firth of Forth, similar to levels recorded since the beginning of the data series in 1985. **SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Information on these stocks is considered inadequate to provide advice based on precautionary limits. The TV underwater survey biomass estimates are used to indicate landings associated with various harvest rates. **PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock. **STOCK STATUS:** The stocks in this Management Area appear to be exploited at a sustainable level. 
Farn Deeps: The TV fall survey estimates of abundance for *Nephrops* indicate that the population has increased from 2002 to 2005. Effort currently appears to be at its lowest level since 1984 and LPUE appears to be at its highest in the series. Mean size of the smaller length
groups for males and females has increased in recent years, but the LPUE for these length groups has remained fairly static.

Firth of Forth: The TV survey estimate of abundance for *Nephrops* in the Firth of Forth suggests that the population declined between 1993 and 1998, but has increased since then and has been at a relatively high level in the last four years. The increases in abundance in the late 1990s and most recent years have been reflected in CPUE and mean size data, in that they suggest an increase in recruitment in 1998 and 2003.

**RECENT MANAGEMENT ADVICE:** ICES advises that the effort in this fishery should not be allowed to increase and in addition the harvest ratio in these stocks should be no more than 15% until more reliable catch information becomes available. This corresponds to landings of less than 3,500 t for the Farn Deeps stock and 1,500 t for Firth of Forth stock. The fishery in other statistical squares in this area should be less than 600 t, the average of the last three years.

**STECF COMMENTS:** STECF agrees with ACFM on its evaluation of the state of the stocks in this MA. STECF also agrees that effort should not increase relative to the last three years. STECF notes, however, that in giving its advice on catches for this MA, ACFM has not adopted the sustainable approach proposed by STECF (2005) and employed by WGNSSK which suggests applying an $F_{0.1}$ based harvest rate to the available TV data.

For the Farn Deeps, STECF notes that ICES ACFM used an historic harvest ratio approach although the basis of the selection of 15% is not clear. STECF considers the harvest rate approach to be inappropriate for the Farn Deeps since the TV survey series coincides with the recent period when there has been underreporting. STECF recommends that the method suggested by STECF in 2005 should be employed. The estimated landings for 2007 when applying this approach to the Farn Deeps amount to 4301 tonnes.

For the Firth of Forth, STECF notes that ICES ACFM used an historic harvest rate of 15% approach based on the upper 95% confidence interval of the biomass. STECF does not consider this appropriate and recommends that the method suggested by STECF in 2005 should be employed. The estimated landings for 2007 when applying the STECF approach to the Firth of Forth amount to 2019 tonnes.

**2.60. Norway lobster (Nephrops norvegicus) in Vb and VI**

Norway lobster is assessed in a number of different Functional Units (FUs), see below. The Management Area (MA), contains 3 FU’s. The FUs are assessed using underwater television surveys which ACFM considers to give a good indication of stock status. STECF (2005) advised on a sustainable harvest rate approach (based on yield per recruit principles and $F_{0.1}$) which could be applied to TV abundance data to estimate catch. The 2006 ICES WGNSDS applied this approach for FUs assessed by TV but ACFM proposed an alternative based on the ratio of historic landings/stock biomass from TV. STECF considers this to be inappropriate where, inter alia: a) uncertainty in landings is known to exist in earlier years; b) the early part of the landings data series reflects the period of initial fishery development; c) the TV series is short and covers a period when landings data are known to be uncertain. STECF also notes that in making the historic ratio calculation, i) biomasses based on incorrect individual weights were used and ii) the upper 95% estimate of the TV biomass was
used and was applied to the mean biomass of recent years to estimate landings. STECF considers this to be inconsistent and believes that a ratio based on the mean TV biomass estimate would have been more appropriate. STECF considers that for most stocks assessed by underwater TV its 2005 advice provides a basis for sustainable harvesting of Nephrops.

2.60.1. Norway lobster (Nephrops norvegicus) in Divisions Vb and Vlb

There are no reported landings of Nephrops from this area.

2.60.2. Norway lobster (Nephrops norvegicus) in Division Vla

**FISHERIES:** There are three Functional Units in this Management Area (MA): a) North Minch, b) South Minch and c) Clyde. Nephrops are also caught outside these areas. TV surveys in deep water suggest widespread distribution at low density, and surveys at Stanton Bank and in sea lochs (where important creel fisheries occur), suggest widespread distribution there also.

The quality of fishery information, particularly landings, is uncertain. Available information indicates that landings in recent years are most likely an underestimate of actual landings. The landings reported in the 1990s are considered to be more accurate.

Total Nephrops landings in 2005 (provisional) were estimated to be 10,500 t. The Nephrops trawl fisheries take bycatches of other species, especially haddock and whiting but also cod, megrim, and anglerfish.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on the TV underwater survey biomass estimates and on trends in mean size.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been determined for this stock.

**STOCK STATUS:** TV surveys and trends in mean size suggest that the stocks comprising the Division Vla appear to be exploited at a sustainable level.

North Minch: The TV survey estimate of abundance for Nephrops suggests that the population remained relatively stable between 1994 and 2001, but has increased sharply between 2001 and 2003. The higher level of abundance observed in 2003 is maintained in 2005. The increase in abundance observed between 2001 and 2003 coincides with the increases in CPUE observed in the catch data, particularly for the smaller size category, interpreted as increase in recruitment. The mean size of larger Nephrops (>35 mm carapace length) in the landings has been stable throughout the time-series.

South Minch: The TV survey estimate of abundance for Nephrops in the South Minch suggests that the population fluctuated without trend between 1995 and 2000, but remained more stable and at a slightly higher level from 2001 to 2003. A further increase in abundance in 2004 has been maintained in the latest (2005) survey. The increase to the more stable level of abundance observed after 2001 coincides with the increase in CPUE and reduction in mean size observed in the catch data, particularly for the smaller size category, interpreted as an increase in the recruitment. The mean size in larger Nephrops (>35 mm carapace length) in the landings has been stable throughout the time-series.

Clyde: Two TV surveys are conducted in the area. The TV survey estimate of abundance for Nephrops in the Firth of Clyde suggests that the population has increased steadily since 1999. Reductions in the mean size in catches coincident with increases in CPUE. The increase to the more stable level of abundance observed after 2001 coincides with the increase in CPUE, suggesting strong recruitments in 1995, 1998 and 2003. A series of good recruitments would be
consistent with the increase in abundance observed from the TV surveys. The higher levels of discarding observed in recent years are associated with the increase in CPUE of smaller individuals. The TV survey estimate of abundance for *Nephrops* in the Sound of Jura suggests that the population has been fairly stable over the last 5 years. The mean size in larger *Nephrops* (>35 mm carapace length) in the landings has declined very slightly throughout the time-series.

**RECENT MANAGEMENT ADVICE:** ICES advises that the effort in this fishery should not be allowed to increase relative to the past three years. In addition ICES advises that the exploitation ratio in this stock should be no more than 15%, until such time that more reliable catch information becomes available. This corresponds to landings of less than 3,200 t for North Minch, 7,200 t for the South Minch, and 3,800 t for the Clyde stock. Landings from other areas in Division VIa should be below the average of 2003-2005, corresponding to landings of 2,100 t.

**STECF COMMENTS:** STECF agrees with ACFM on its evaluation of the state of the stocks in this MA. STECF also agrees that effort should not increase relative to the last three years. STECF notes, however, that in giving its advice on catches for this MA, ACFM has not adopted the sustainable approach proposed by STECF (2005) and employed by WGNSDS which suggests applying an $F_{0.1}$ based harvest rate to the available TV data.

For the North Minch, South Minch and Firth of Clyde, STECF notes that ICES ACFM used an historic harvest rate of 15% approach based on the upper 95% confidence interval of the biomass. STECF does not consider this appropriate and recommends that the method suggested by STECF in 2005 should be employed. The estimated landings for 2007 when applying the STECF approach to the Functional Units in this Management Area are as follows:

- North Minch: 4498 tonnes
- South Minch: 10116 tonnes
- Firth of Clyde: 5271 tonnes

**2.61. Norway lobster (*Nephrops norvegicus*) – VII**

Norway lobster in Division VII is split up into four components: VIIa, VIIbcjk, VIIde and VIIfgh.

Two FUs in ICES Area VII are assessed using underwater television surveys (Irish Sea West and Arran Ground (the latter used to indicate trends at the present time). ACFM considers such surveys give a good indication of stock status. STECF (2005) advised on a sustainable harvest rate approach (based on yield per recruit principles and $F_{0.1}$) which could be applied to TV abundance data to estimate catch. The 2006 ICES WGNSDS applied this approach for FUs assessed by TV but ACFM proposed an alternative based on the ratio of historic landings/stock biomass from TV. STECF considers this to be inappropriate where, *inter alia:* a) uncertainty in landings is known to exist in earlier years; b) the early part of the landings data series reflects the period of initial fishery development; c) the TV series is short and covers a period when landings data are known to be uncertain. STECF also notes that in making the historic ratio calculation, i) biomasses based on incorrect individual weights were used and ii) the upper 95% estimate of the
TV biomass was used and was applied to the mean biomass of recent years to estimate landings. STECF considers this to be inconsistent and believes that a ratio based on the mean TV biomass estimate would have been more appropriate. STECF considers that for most stocks assessed by underwater TV its 2005 advice provides a basis for sustainable harvesting of Nephrops.

2.61.1. Norway lobster (Nephrops norvegicus) in Division VIIa (excluding rectangles 33E2-E5)

**FISHERIES:** There are two Functional Units in this area: Irish Sea East and Irish Sea West. The fishery information, particularly landings, is uncertain. Estimates of landings in 2005 were 567 t from the Irish Sea East and 6,603 t from the Irish Sea West. Most of the landings are taken by the UK and the Republic of Ireland. The *Nephrops* trawl fisheries take bycatches of other species such as cod and particularly juvenile whiting.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on fishing effort data.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been determined for *Nephrops* in these stocks.

**STOCK STATUS:** TV surveys and trends in biological characteristics suggest that the stocks in Division VIIa are exploited at a sustainable level.

**Irish Sea East:** Annual LPUEs have been fluctuating, but were generally lower in the 1990s and 2000s than in the late 1970s and early 1980s. Landings have been fairly stable since the mid-1980s.

**Irish Sea West:** TV survey estimates of abundance for *Nephrops* in Irish Sea West are available only since 2003. They show that the stock has declined in 2004 and 2005 from the 2003 level. Indices of abundance from the August trawl survey are available for a longer period. They show the stock to have reached its highest abundance in 2003 and also indicate a decline from this level in 2004 and 2005. The 2005 trawl survey index of abundance is close to the long-term (1994-2004) mean abundance estimates. Mean size in the catches and in trawl surveys has been stable over time.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of these stocks in 2005 is presented in the context of mixed fisheries and is found in Section 16.3. The stocks have sustained current levels of effort for many years. ICES advises that the effort in this fishery should not be allowed to increase compared to 2003-2005 levels.

**STECF COMMENTS:** STECF agrees with ACFM on its evaluation of the state of the stocks in this Management Area (MA). STECF also agrees that effort should not increase relative to the last three years. STECF notes, however, that in giving advice for this MA, ACFM has not adopted the sustainable approach proposed by STECF (2005) and employed by WGNSDS which suggests applying an F₀.1 based harvest rate to the available TV data.

ACFM stated that given the uncertainty in landings, it was not possible to give catch advice but that exploiting the stock at the average effort of the last three years was probably sustainable. An average figure of 4.4 million KW days effort was cited and the suggestion made that if effort was controlled, a TAC would not be needed. STECF points out that this effort figure excludes vessels under 10m in length.

STECF notes the ICES ACFM suggestion that if the true landings can be established the harvest ratio based on the TV surveys could be adjusted over time in the fishery to ensure that the stock
is exploited at a sustainable rate in the long term. STECF considers the harvest rate approach to be inappropriate for the Irish Sea west since the TV survey series coincides with the recent period when there has been underreporting. STECF recommends that the method suggested by STECF in 2005 should be employed. The estimated landings for 2007 when applying this approach to the Irish Sea West amount to 16748 tonnes.

2.62. Norway lobster (Nephrops norvegicus) in Divisions VIIIa, b

FISHERIES: There are two Functional Units in this Management Area: a) Bay of Biscay North and b) Bay of Biscay South, together called Bay of Biscay. Nearly all landings are taken by French trawlers. Landings have fluctuated between 3,500 and 6,000 t during the time-series. These fluctuations may be explained by variability in recruitment. Despite a decommissioning programme for French vessels, it is likely that effective effort has stabilised since 1994 or even increased due to increased gear efficiency.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on an age-based assessment. Catch-at-age data generated by slicing of sampling length distributions were combined for males and females.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been defined for this stock.

STOCK STATUS: Landings declined until 2000, but they have stabilised in recent years with a slightly increasing trend. Recruitment showed a declining trend up to 1998, but seems to have improved since then. The recruitment 2004 appears to be the strongest of the whole time-series 1987-2004, but its actual strength is still not confirmed. Spawning biomass appears to have been stable over the whole time-series with a slight increase since 2000. The fishing mortality is well above the Fmax of 0.20.

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock for 2007 is presented in the context of mixed fisheries and is found in Section 16.4. No management objectives have been set for this fishery. ICES recommends not to increase catches in 2007 over the recent level of 3,600 t (2003-2005) until the strengths of the recent year-classes have been confirmed.

STECF COMMENTS: STECF agrees with the advice from ICES. STECF notes that Landings in 2005 exceeded the agreed TAC for VIIIab. STECF also notes that the exploitation pattern implies a high mortality of small Nephrops in spite of the mesh regulation implemented by the EC in 2000. Any improvement in exploitation pattern should be complemented with effort control in order to reduce discarding and overall fishing mortality rates.

2.63. Norway lobster (Nephrops norvegicus) in Division VIIIc

FISHERIES: There are two Functional Units in this Management Area: a) North Galicia and b) Cantabrian Sea. All catches from these FUs are taken by Spain. Nephrops are a small component of landings taken by bottom trawlers. Landings and effort in both functional units have declined and landings are now at extremely low levels compared to earlier years (<100 t in 2005 compared to landings of about 500 t in the early 1990s).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. Fishery statistics for both FUs and age-based assessment for North Galicia used as indicative of
stock trends. Catch-at-age data generated by slicing of sampling length distributions were combined for males and females.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points are defined for this stock.

**STOCK STATUS:** Both stocks are currently experiencing recruitment failure.

**North Galicia:** Recruitment has declined over the time series, and is now extremely low. Landings and LPUE have fluctuated along a marked downward trend. Landings are currently very low. There is a sharp decline in stock biomass and recruitment. The fishing mortality may have been reduced in recent years.

**Cantabrian Sea:** Landings are currently at the lowest levels on record. Fishing effort is declining. LPUEs are currently at low levels.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock for 2007 is presented in the context of mixed fisheries and is found in Section 16.5. There are explicit management objectives for southern hake and *Nephrops* under the EC Reg. No. 2166/2005 establishing measures for the recovery of the Southern hake and Norway lobster stocks in the Cantabrian Sea and Western Iberian peninsula by January 2006. The aim of the recovery plan is to rebuild the stocks within 10 years, with a reduction of 10% in F relatively to the previous year and the TAC set accordingly. However, given the very low state of the stock, ICES advices a zero TAC for both FUs in this Management Area.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF also agrees with ICES remark that stronger measures than those established by the EC recovery plan are required to rebuild the stocks. STECF notes that the TAC has not been restrictive. STECF also notes that due to the mixed nature of the demersal fisheries in this Management Area, management measures for the target finfish species will also have influenced the exploitation rate of *Nephrops*.

**2.64. Norway lobster (*Nephrops norvegicus*) in Divisions VIIIId, e**

**FISHERIES:** There are no reported landings of *Nephrops* from this area.

**RECENT MANAGEMENT ADVICE:** ICES suggested that a zero TAC be set for this area to prevent misreporting.

**STECF COMMENTS:** STECF notes that the most recent information for this stock relates to the year 2002. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2004. STECF agrees with the advice from ICES.

**2.65. Norway lobster (*Nephrops norvegicus*) in Division IX and X.**

**FISHERIES:** There are five Functional Units (FU) in Division IXa: a) West Galicia, b) North Portugal, c) Southwest Portugal, d) South Portugal, and e) Gulf of Cadiz. There are no reported landings of *Nephrops* from Division IXb and Subarea X. *Nephrops* represents a small but valuable bycatch in these fisheries targeting mainly demersal fish species. In the Southwest and South SW and S Portugal there is a crustacean trawl fishery, targeting mainly deepwater crustaceans. The fishery in West Galicia, North Portugal and Gulf of Cádiz is mainly conducted by Spanish vessels, and that in Southwest and South Portugal by Portuguese vessels, on deep water grounds (200-750 m). The Portuguese fleet comprises two components: demersal fish trawlers and crustacean trawlers. Total landings in IXa were 690 t in 2005.
SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. The stocks in FUs of West Galicia and North Portugal, and Southwest and South Portugal were assessed on an age-basis using catch-at-age data generated by slicing of sampled length distributions. Fishery statistics and the stock assessments are used only as indicative of stock trends.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been defined for these stocks.

STOCK STATUS: West Galicia and North Portugal: Landings have gradually declined since the 1980s, and are now very low. Recruitment appears to have failed in recent years and the stock size is considered to be extremely low. The fishing mortality has been declining since 1999.

SW and S Portugal: Landings declined sharply from 1992 to 1996, but have increased since then to levels slightly below those of the mid-1980s. Recruitment and SSB were sharply reduced in the early 1990s. Recruitment was stable at a low level in the period 1996-2002, but has increased again in the last three years. After the lowest value in 1996, SSB has shown an increasing trend. Fishing mortality has shown the same decline to the mid-1990s and subsequent increase for the males, but appears to be stable for the females.

Gulf of Cadiz: Landings have shown an increasing trend since 1996 to levels observed in the 1980s. The state of the stock is uncertain. The survey and LPUE information indicate that at present the stock is at about half of its level at the beginning of the time-series.

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2005 is presented in the context of mixed fisheries and is found in Section 16.5. A recovery plan for southern hake and Iberian *Nephrops* stocks has been in force since the end of January 2006 (EC Reg. No. 2166/2005). The aim of the recovery plan is to rebuild the stocks within 10 years, with a reduction of 10% in F relatively to the previous year and the TAC set accordingly. In order to reduce F on *Nephrops* stocks in this Management Area even further, a seasonal ban was introduced in the trawl and creel fishery in two boxes, located in West Galicia and Southwest Portugal, in the peak of the *Nephrops* fishing season.

For West Galicia and North Portugal ICES advises that there should be no fishing on *Nephrops* until the recruitment improves considerably. For SW and S Portugal ICES advises that landings in 2007 should not exceed 200 t. For Gulf of Cadiz ICES recommended not to increase the catches in 2007 above the lowest recent landings of 50 t.

STECF COMMENTS: STECF agrees with the advice of ICES. STECF notes, however, that for the Gulf of Cadiz, the recent lowest limit of 50 t is from a decade ago (1996) while landings since 2000 have been greater than 120 t. The advice therefore implies that catches should be reduced by more than 50% of the levels observed since 2000. STECF agrees with ICES that for FUs West Galicia and North Portugal stronger measures than those in the agreed recovery plan are required to prevent a collapse of the stock. STECF also notes that because of the difference in stock status between FUs of West Galicia and North Portugal (severely depleted) and the better situation for the more southerly components, a subdivision of the TAC by Functional Unit should be considered.
2.66. Northern shrimp (*Pandalus borealis*) in Division IIIa and Division IVa East (Skagerrak and Norwegian Deeps)

**FISHERIES:** *Pandalus borealis* is fished by bottom trawls at 150–400 m depth throughout the year by Danish, Norwegian and Swedish fleets. Total catches have varied between 11 000 and 17 000 t in the period 1985–2005. In 2005 total landings were around 13 700 t, while estimated catches (including discards) were around 15 200 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The perception of the state of the stock in 2005 is based on trends in Danish and Norwegian commercial LPUEs and biomass indices from Norwegian surveys up to 2006. In recent years several assessment models, including both cohort based and stock production models, have been applied for this stock. A major problem has been (and still is) to obtain realistic data for the predation mortality on this stock, which is believed to have stronger influence the stock fluctuations than the fishery.

**PRECAUTIONARY REFERENCE POINTS:** Limit reference points are not defined due to the (assumed) large influence of predation (natural mortality).

**STOCK STATUS:** The current state of the stock appears to be stable and at a rather high level. The perception of the state of the stock in 2005 is based on trends in Danish and Norwegian commercial LPUEs and biomass indices from Norwegian surveys up to 2006. The stock seems to have increased since 1988 to an all time high in 2004 and thereafter declined thereafter but is still on above the average level.

**RECENT MANAGEMENT ADVICE:** ICES advice on the exploitation of this stock is now presented in the context of the mixed fisheries in the North Sea (Section 16.1). Based on the assessment it is recommended that the total landings from IIIa and IVa East in the 2007 are not increased above the recent average (2003-2005) of 14,000 t. However, it is likely that the stock may even sustain a higher exploitation.

**STECF COMMENTS:** STECF agrees with the ICES advice

2.67. Northern shrimp (*Pandalus borealis*) on Fladen Ground (Division IVa)

**FISHERIES:** In the EU zone of the North Sea, *Pandalus* on the Fladen Grounds (Div. IVa) is the main shrimp stock exploited. This stock is mainly exploited by Danish and UK trawlers with the majority of landings taken by the Danish fleet. The fishery targets *Pandalus borealis*, with low by-catches of other species. Historically, large fluctuations in this fishery have been frequent, for instance between 1990 and 2000 annual landings ranged between 500 t and 6000 t. However since 2000 a continuous declining trend is evident, and in 2004 and 2005 recorded landings dropped to below 25 t. Information from the fishing industry in 2004 gives the explanation, that this decline is caused by low shrimp abundance, low prices on small shrimp characteristic for the Fladen Ground and high fuel prices.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. No assessment of this stock has been made since 1992, due to insufficient assessment data.

**PRECAUTIONARY REFERENCE POINTS:** There is no basis for defining precautionary reference points for this stock.

**STOCK STATUS:** There is a total lack of separate, fishery independent data. The most recent analytical assessment of this stock was presented in the 1992 ACFM Report (ICES, 1992). Landings have declined since 2000, but in 2004 and 2005 nearly no catches were recorded. Part
of the explanation for this development is the low price for shrimp combined with the rather high fuel costs. No monitoring of this stock has taken place, and recent years’ drop in landings is at least partly due to a decline demand for these shrimp. However, it cannot be ruled out that the drop also reflects a decline in the stock.

**RECENT MANAGEMENT ADVICE:** ICES advice on the exploitation of this stock is now presented in the context of the mixed fisheries in the North Sea (Section 16.1). No stock specific management advice is given by ICES. In the absence of information on stock development, ICES recommends that when/if the fishery on this stock begins, the effort should not increase to levels above the average for the years prior to the present absence of fishing activities and that the fishery must be accompanied by mandatory programmes to collect catch and effort data on both target and by-catch fish.

**STECF COMMENTS:** STECF agrees with the ICES advice.

### 2.68. Northern Shrimp (*Pandalus borealis*) in Sub-areas I (Barents Sea) and & IIb (Svalbard Waters)

**FISHERIES:** The fisheries for Northern shrimp in Sub-areas I & II (Barents Sea & Svalbard area) are among the largest shrimp fisheries in the North east Atlantic. Norway and Russia take the majority of the landings. In the early 1980s total landings were above 100,000 t, but have since declined. Reported landings for all countries increased between 1995 (25,000 t) and 2000 (83,000 t), but have decreased slightly in 2001 (55,000 t) and 2002 (60,000 t). In 2005 landings were around 41,000 tons.

**SOURCE OF MANAGEMENT ADVICE:** This stock is currently managed by a joint Norwegian and Russian scientific advisory body, and ICES has been approached for biological advice for management of this stock. The ICES advice for 2007 is based on an assessment using a surplus stock production model.

**PRECAUTIONARY REFERENCE POINTS:** Following a NAFO recommendation for stocks assessed by stock production models, a limit reference values (Blim) defined as 30% of Bmsy is proposed.

**STOCK STATUS:** In 2006 this stock was assessed by a stochastic (Bayesian) surplus production model, using a) total catch and b) 3 different sets of indices of stock biomass as input. This model provides estimates of biomass relative to Bmsy. According to this model the biomass has fluctuated above Bmsy for most of the years in the period covered by the model. Correspondingly Fmsy has been below Fmsy. However, the effect of predation by the Barents Sea cod stock has not yet been included in the model. Following the ICES/NAFO recommendation of defining limit reference values (Blim) as 30% of Bmsy for stocks assessed by stock production models, this stock is well above Blim.

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. Based on a catch option table with associated risks of B falling below Blim. ICES recommends a TAC of 50,000 t for 2007. According to the model output such catch level would imply a low risk (probability), that the biomass falls below Blim and F being above Flim. Shrimp is an important prey for several fish species, especially cod, and consumption by cod probably influences shrimp population dynamics significantly and should be taken into account in management. Cod consumption estimates are on average much higher than shrimp landings.

**STECF COMMENTS:** STECF agrees with the ICES advice.
2.69. Norway pout (Trisopterus esmarki) in IIa, IIIa and the North Sea

**FISHERIES:** The fishery is mainly prosecuted by Danish and Norwegian vessels using small mesh trawls in the northern North Sea at Fladen Ground and along the edge of the Norwegian Trench. The fishery is mainly by Danish and Norwegian vessels using smallmesh trawls in the northern North Sea. Main fishing seasons are 1st, 3rd, and 4th quarters of the year. The fishery targets both Norway pout and blue whiting. The stock is managed by TACs. Landings fluctuated between 110,000 and 735,000 t in the period 1971-1997, and apart from 2000 (184,000 t) decreased substantially in the following years with much smaller, variables landings (around 80,000 t). Total landings in 2003 and 2004 dropped to record low of the time series with 27,100 t and 13,500 t respectively and the fishery was closed in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment is analytical using catch-at-age analysis based on quarterly catch and cpue data.

**PRECAUTIONARY REFERENCE POINTS:** No Fpa is set for this stock, the proposed Bpa = 150,000t.

**STOCK STATUS:** Based on the most recent estimate of SSB, ICES classifies the stock as suffering from reduced reproductive capacity. SSB at the beginning of 2006 was near Blim. Fishing mortality in 2005 and the first half of 2006 was close to zero due to a closure of the fishery. Recruitment was below average in the period 2000–2004, with a record low in 2003–2004. The recruitment in 2005 has been estimated to be at the long-term average, while survey estimates of recruitment for 2006 indicates recruitment below the long-term average.

**RECENT MANAGEMENT ADVICE:** The fishery should be closed until information, which assures that the stock will be above Bpa at the beginning of 2008 is available. Current information indicates that SSB in 2008 will be below Bpa even with zero catch in 2007.

**STECF COMMENTS:** STECF agrees with the advice from ICES.

2.70. Plaice (Pleuronectes platessa) in Subarea IV (North Sea)

**FISHERIES:** North Sea plaice is taken mainly in a mixed flatfish fishery by beam trawlers in the southern and southeastern North Sea. Directed fisheries are also carried out with seine and gill net, and by beam trawlers in the central North Sea. Fleets involved in this fishery are the Netherlands, UK, Belgium, Denmark, France, Germany and Norway. Landings fluctuated between 70,000 and 170,000 t (1987-2002) and are predominantly taken by EU fleets. The 2003, 2004 and 2005 landings of 66,500t, 61,400t and 55,700t respectively were three consecutive record lowest since 1957.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The assessment for North Sea plaice has been fundamentally changed with the inclusion of discards in the assessment since 2004. Accordingly, the reference points were re-estimated. Blim is set as Bloss, the lowest observed biomass in 1997 as assessed in 2004. Bpa is based on 1.4*Blim and set at 230,000t. Fpa is based on Flim (=Floss) and set at 0.6 which is the 5th percentile of Floss and gives a 50% probability that SSB is around Bpa in the medium term.

**MANAGEMENT AGREEMENTS:** The management agreement (1999), previous agreed between the EU and Norway was not renewed for 2005 and is no longer in force. A new management plan for North Sea plaice is under development.

**STOCK STATUS:** Based on the most recent estimate of SSB and fishing mortality, ICES classifies the stock as being at risk of reduced reproductive capacity and as being harvested
sustainably. SSB in 2005 is estimated at around 193 000 t and is estimated at a similar level (194 000 t) in 2006. SSB for 2007 is expected to be below the Bpa of 230 000 t. Fishing mortality in 2005 is estimated as below Fpa. Recruitment since 2003 has been below the time-series average.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.1.

*Exploitation boundaries in relation to existing management plans:* The management agreement has not been renewed for 2005. Therefore, advice is only presented in the context of precautionary boundaries.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* The current total fishing mortality (including discards) is estimated at 0.52, which is well above the rate expected to lead to high long-term yields (F0.1 = 0.17).

*Exploitation boundaries in relation to precautionary limits:* The exploitation boundaries in relation to precautionary limits imply human consumption landings of less than 32 000 t in 2007, which is expected to rebuild SSB to the Bpa (=230 000 t) in 2008.

**STECF COMMENTS:** TEXT BELOW IS FROM FROM 2005 review OF ADVICE FOR 2006 – IT THEREFORE IS STILL TOBE DISCUSSED AT THE PLENARY STECF agrees with the ICES advice. STECF notes that the forecast is based on a final year estimate of F, which is very poorly estimated and shows a retrospective pattern of underestimation. Given the uncertainty in the final year estimate and the retrospective bias, STECF is of the opinion that a more appropriate approach would be to use a value of F that represents the average exploitation rate over recent years.

STECF agrees with ICES that the current minimum landing size results in high discard rates in the mixed flatfish fishery with beam trawls using 80mm mesh size. STECF suggests that technical measures to reduce discarding in addition to an overall reduction in F should be considered.

STECF notes that as plaice are caught in a mixed fishery, the management measures for plaice should take into account management measures adopted for other species, especially North Sea cod for which stringent management is advised. Fishing for plaice has recently been restricted because of days-at-sea regulations which were introduced in the light of the cod recovery plan. This restriction induces a more coastal fishing pattern in the southern North Sea, which is in the area where smaller plaice are abundant and this could lead to increased discarding.

The technical basis for the determination of the reference points has changed (now discards are included and the method used has changed). STECF is not in position to determine if the new reference points are appropriate but is concerned at the magnitude of the increase (Fpa changed from 0.3 to 0.6).

**2.71. Plaice (Pleuronectes platessa) in the Baltic Sea (Div. IIIb,c,d)**

The STECF Summary review and advice for plaice in the Baltic is given in Part 1 of the review of advice for 2007.
2.72. Plaice (*Pleuronectes platessa*) in Kattegat and Skagerrak (Div.IIIa)

**FISHERIES:** The plaice catches in this area are taken in fisheries using seine, trawl and gill nets targeting mixed species for human consumption. Plaice is an important by-catch in a mixed cod-plaice fishery. Denmark and Sweden account for the majority of the landings while only minor landings are taken the German, Norwegian and, occasionally, vessels from Belgium and Netherlands. Landings fluctuated between 7,700 and 16,500 t. (1980-1999). Landings in 1998 and 1999 were amongst the lowest around 8,500 t. The landings increased to 11560 t in 2001 but subsequently decreased and amounted to 6905 in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial fishery and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_p = 0.73$, $B_p = 24,000t$. ICES states that $F_{lim}$ and $B_{lim}$ cannot be accurately defined. No target fishing mortality reference point ($F_Y$) is defined for this stock.

**STOCK STATUS:** The assessment is indicative of trends only. In the absence of a reliable assessment, the state of the stock cannot be evaluated in relation to the Precautionary Approach. All survey indices indicate that abundance and recruitment of plaice in Skagerrak and Kattegat has been substantially higher in the last 6–7 years, compared with measurements in the 1990s.

**RECENT MANAGEMENT ADVICE:** The ICES advice on the exploitation of this stock in 2005 is presented in the context of mixed fisheries and is found in Section 16.1.

- *Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects.* No information was provided by ICES
- *Exploitation boundaries in relation to precautionary limits.* The assessment is very uncertain and is characterized by large annual revisions in population estimates, hence no short-term forecasts were performed. There is no analytical assessment, but indications from the surveys are that biomass has increased. The advice is to maintain the current TAC of 9600 t for 2007.

Plaice is taken both in a directed fishery and as an important bycatch in a mixed cod-*Nephrops*-plaice fishery. The stock area for North Sea cod includes the Skagerrak (Division IIIaN). Both North Sea cod and Kattegat (Division IIIa South) cod are well below $B_{lim}$. Thus, monitoring of bycatches and discards of cod should be continued.

**STECF COMMENTS:** STECF agrees with the advice from ICES.
STECF notes that fisheries for plaice in Division IIIa are linked to those exploiting sole and that this linkage should be taken into account when implementing management rules for either stock.

2.73. Plaice (*Pleuronectes platessa*) - Vb (EU zone), VI, XII, XIV

STECF did not have access to any stock assessment information on plaice in these areas.

2.74. Plaice (*Pleuronectes platessa*) in Division VIIa (Irish Sea)

**FISHERIES:** Plaice are taken mainly in long-established UK and Irish otter trawl fisheries for demersal fish. They are also taken as a by-catch in the beam trawl fishery for sole. The main fishery is concentrated in the northeast Irish Sea. Catches are predominantly taken by the UK, Belgium and Ireland, with smaller catches by France and at the end of the 1990s by The Netherlands. Landings were sustained between 2,900 t and 5,100 t from 1964-1986. Landings have since declined from the 1987 peak of 6,200 t to historical lows of around 1,500 t in the last 6
years, well below the agreed TAC. The 2005 landings are 1,200 t which is the second lowest value in the time series.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.45$, $B_{pa} = 3,100$ t.

**STOCK STATUS:**
Based on the most recent estimate of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and being harvested sustainably. The SSB in 2005 was above $B_{pa}$ and average fishing mortality in the last three years has been below $F_{pa}$. Fishing mortality on this stock has been maintained above $F_{pa}$ for much of the time-series, but declined through the 1990s. SSB has been above $B_{pa}$ throughout the period of assessment.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.3.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Fishing mortality is estimated to be below $F_{max}$ (0.36) and to be close to $F_{0.1}$ (0.13). There will be little gain to the longterm yield by increasing fishing mortalities above current levels. Fishing at $F_{0.1}$ is expected to lead to landings of 2100 t in 2007.

*Exploitation boundaries in relation to precautionary limits:* In order to harvest the stock within precautionary limits, fishing mortality should be kept below $F_{pa}$ (0.45). This corresponds to catches of less than 6500 t in 2007 and will lead to a reduction in SSB to 11 900 t in 2008 which is well above $B_{pa}$ (3 100 t).

**STECF COMMENTS:** STECF agrees with the advice for VIIa plaice. STECF notes that the assessment is based on catch-at-age analysis with CPUE series from both commercial fleets and surveys, but no discard information is included.

### 2.75. Plaice (*Pleuronectes platessa*) in Division VIIbc

**FISHERIES:** Ireland is the major participant in this fishery with around 90% of the international landings between 1993-2003. Plaice are normally caught in mixed species otter trawl fisheries in Division VIIb. These vessels mainly target other demersal fish species and *Nephrops*.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES.

**PRECAUTIONARY REFERENCE POINTS:** No fishing mortality or biomass reference points are defined for this stock.

**STOCK STATUS:** The state of the stock is unknown but landings show a declining trend in recent years. No assessment was performed, due to the short series of data and lack of reliable tuning indices.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4.

For the stock specific advice, ICES recommends that catches in 2007 should be no more than the recent average (2003–2005) of around 55 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment.

**STECF COMMENTS:** STECF agrees with the advice from ICES. The exploitation of this stock should be conducted in the context of mixed fisheries protecting stocks outside safe biological...
limits. STECF notes that the proposed TAC is unlikely to constrain the fishery as the landings over the last years are below the proposed landings advices and TAC’s.

2.76. Plaice (Pleuronectes platessa) – VIIde
Plaice in Divisions VII d and e are assessed separately but the TAC is set for both divisions combined.

2.76.1. Plaice (Pleuronectes platessa) in Division VIIId (Eastern English Channel)

FISHERIES: The stock is exploited predominantly in a mixed flatfish fishery by otter and beam trawlers. French offshore otter trawlers have a directed fishery in winter. Countries involved in this fishery are Belgium, France and the UK. Landings fluctuated between 2,000 and 10,000 t (1976-2005). Landings fluctuated hardly in the last decennia but declined slightly in the last 4 years from 5,700 t to 3,500 t in 2005.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on an age-based assessment using commercial and survey data.

PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.45$, $B_{pa} = 8,000t$.

STOCK STATUS: The state of the stock cannot be assessed due to discrepancies in the available data. The assessment is indicative of trends only. In the absence of a reliable assessment, the state of the stock cannot be evaluated in relation to the Precautionary Approach. Analysis of survey indices show that SSB has remained stable since 1998.

Possible stock identification problems may contribute to divergence between catch and survey data. Historical tagging information indicate that there may be significant migration of plaice between ICES divisions VIIId, e and IVc.

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.1.

In the absence of short-term forecasts, ICES recommends to maintain landings in 2007 at 4000 t which is the average of landings from the last three years (2003–2005).

STECF COMMENTS: STECF agrees with the advice for VIIId plaice. STECF notes that due to the minimum mesh size (80 mm) in the mixed beam trawl fishery, a large number of undersized plaice are discarded. Discard estimates are not included in the assessment. The 80-mm mesh size is not matched to the minimum landing size of plaice (27 cm). Measures taken specifically directed at sole fisheries will also impact the plaice fisheries.

STECF further notes that the impact of effort limitations enforced since 2004 as part of the cod recovery measures have not been formally evaluated by ICES for plaice in Subarea VIIId.

2.76.2. Plaice (Pleuronectes platessa) in Division VIIe (Western English Channel)

FISHERIES:
The fisheries taking plaice in the Western Channel mainly involve vessels from the bordering countries: the total landings (2005) are split among UK vessels (80%), France (16%), and Belgium (4%). Landings of plaice in the Western Channel were low and stable between 1950 and the mid-1970s, and increased rapidly during 1976 to 1988 as beam trawls began to replace otter trawls, although plaice are taken mainly as a bycatch in beam-trawling directed at sole and anglerfish. Estimated landings have been fairly stable since 1994. The main fishery is south and west of Start Point. Although plaice are taken throughout the year, the larger landings are made during February, March, October, and November.

The TAC for plaice in the English Channel is set for Divisions VIId,e combined.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are \( F_{pa} = 0.45, B_{pa} = 2,500t \).

**STOCK STATUS:**
The stock estimates are uncertain, but the assessment is indicative of trends. There are, however, strong indications that fishing mortality has been above \( F_{pa} \) and SSB has been below \( B_{pa} \) since the early 1990s. Recent recruitments seem to be weak.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** Fishing: mortalities between \( F_{0.1} = 0.10 \) and \( F_{max} = 0.23 \) can be considered as candidate target reference points, which are consistent with taking high long-term yields and achieving a low risk of depleting the productive potential. The recent fishing mortality is clearly well above these potential fishing mortality targets.

**Exploitation boundaries in relation to precautionary limits:** Given the low stock size, recent poor recruitment, high fishing mortality, the uncertainty in the assessment, and the inability to reliably forecast catch, ICES recommends a substantial reduction in catch until the estimate of SSB is above \( B_{pa} \) or other strong evidence of rebuilding is observed.

As the TAC for plaice in the Channel is set for Divisions VIId,e combined, the results from this assessment need to be considered along with those for the much larger Division VIId stock. Given that the Division VIId component dominates the TAC, a catch control does not guarantee that fishing mortality in Division VIIe is constrained. Management measures should be put in place to minimize fishing mortality on the VIId stock.

Apart from technical measures including mesh size and MLS (22 cm) for this species, the following effort restrictions have been implemented in area VIIe.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that although effort restrictions have been inforced since 2005 (Council Regulation (EC) No. 27/2005 and Council Regulation (EC) No 51/2006) no obvious reduction in nominal effort in 2005 compared to 2004 for the main fleets were encountered and the fishing mortality is increasing.
2.77. Plaice (*Pleuronectes platessa*) in the Celtic Sea (Divisions VIIIf and g)

**FISHERIES:** The fishery for Celtic Sea plaice involves vessels from France, Belgium, England and Wales and Ireland. In the 1970s, the VIIIf,g plaice fishery was mainly carried out by Belgian beam trawlers and Belgian and UK otter trawlers. Effort in the UK and Belgian beam-trawl fleets increased in the late 1980s but has since declined. Recently, many otter trawlers have been replaced by beam trawlers, which target sole. Landings increased in the late eighties to its record high (2100t) and have declined since. Lowest catch levels of 308 t have been recorded in 2005. All landings are reported by EU fleets. Plaice in the Bristol Channel and Celtic Sea (ICES Divisions VIIIf and VIIg) are managed by TAC and technical measures. Misreporting is known to occur as quotas become more restrictive.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The analytical age-based assessment (XSA) is based on landings, one survey index, and two commercial CPUE series. There is a strong retrospective bias of overestimation of SSB and underestimation of fishing mortality. Recent forecasts for this stock have been overly optimistic, probably due to this bias problem.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} =$ not defined, $B_{pa} = 1,800$ t.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as being at risk of suffering reduced reproductive capacity. SSB peaked in 1988-1990, following a series of good year-classes, then declined rapidly and has since 2000 remained around Blim. No F reference points have been defined. F has fluctuated around an average level (0.60) for the entire time-series. Recruitment was relatively high in most years in the 1980s, but has been lower since then. Some very weak classes have occurred since the late 1990s.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Target reference points have not been agreed for this stock. A candidate for a target reference point which is consistent with taking high long-term yields and achieving a low risk of depleting the productive potential of the stock may be identified in the range of $F_{0.1}$ (0.15) and $F_{\text{max}}$ (0.31). There is no gain in yield to have a target above this level. Current F is estimated to be 0.35.

*Exploitation boundaries in relation to precautionary considerations:* A 50% reduction in F is needed to increase SSB to around $B_{pa}$ in 2008. This corresponds to landings of less than 380 t in 2007. If such a large reduction in F is not achievable in the short term, ICES recommends that a recovery plan be developed.

This plan should include a sustained reduction of fishing mortality to rebuild the stock above $B_{pa}$ in the medium term. Catch and effort reductions are required to promote such a reduction in fishing mortality

**STECF COMMENTS:** STECF agrees with the advice from ICES.

Furthermore, STECF notes that:

Simulations with long-term target Fs below 0.65 were explored for this stock. These indicate that when a HCR is developed for this stock, target fishing mortalities within the range of $F_{0.1}$ (0.15) and $F_{\text{max}}$ (0.31) are predicted to result in the highest long-term yields, whilst posing little risk of being below Blim in the long term. When such a HCR is developed interactions between the
Celtic Sea plaice and sole stock should be considered. (see also section 2.99 sole in Divisions VIIfg – Celtic Sea)

- Discard rates are believed to be high for this stock and their non-inclusion in the analysis may represent a major deficiency in the assessment, particularly if there have been changes in discarding practices over time.
- The high level of discarding indicated in this mixed fishery would suggest a mis-match between the mesh size employed and the size of the fish landed. Increases in the mesh size of the gear should result in fewer discards and, ultimately, in increased yield from the fishery. The use of larger mesh gear should be encouraged in this fishery in instances where mixed fishery issues allow for it.

- Council Regulation (EC) No. 27/2005, Annex III, part A 12 (b) prohibited fishing in ICES rectangles 30E4, 31E4, and 32E3 during January March 2005 with the intention of reducing fishing mortality on cod. This restriction did not apply to beam trawlers during March 2005. Beam trawlers account for the vast majority of plaice landed by vessels in Divisions VIIfg. The proportion of plaice taken from the closed area about the same in 2005 as in previous years, but declined markedly in February and March 2006. Proportions taken in January and April, immediately before and after the closure, are higher than in previous years. Observed LPUE of plaice in February and March 2006 is not dramatically reduced, which may indicate that catch rates can be maintained outside of the closed area. The closure probably had little impact on the fishing mortality on plaice. A similar conclusion can be drawn for sole in VIIfg, but the outcome with respect to cod in this area may be different (see Section 2.19.2).

2.78. Plaice (*Pleuronectes platessa*) in VIIhjk

**FISHERIES:** Ireland, UK, and France are the major participants in this fishery. Plaice are predominantly caught within mixed species otter trawl fisheries in Division VIIj. Increasingly the Irish vessels target mainly hake, anglerfish, and megrim and not the more traditional inshore species (plaice, sole, whiting, and cod). Otter trawlers accounted for the majority, with beam trawlers and seiners taking smaller catches of plaice. Landings have decreased every year since 1997 from 640 tonnes to a record low of 164 tonnes in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment for this stock in 2002 was preliminary. In 2006 the data were screened and updated but no new analytical assessment was carried out.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The state of the stock is unknown. Landings are substantially below the TAC and have been declining. The 2003, 2004 and 2005 landings are the lowest observed in the time-series.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2006 is presented in the context of mixed fisheries and is found in Section 16.4 of this report. Within the single boundary exploitation, ICES in 2006 advised that catches in 2007 should be no more than the recent average (2003–2005) of around 196 tonnes, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment.

**STECF COMMENTS:** STECF agrees with the ICES advice.
Furthermore, STECF notes that the decline in landings may be due to a decline in plaice availability or due to restrictions imposed on the fleets that exploit plaice in this area e.g. Irish vessels have been subject to vessel quotas for hake, cod and anglerfish and this may have influenced the amount of deployed fishing effort. Similarly, the introduction of effort restrictions under Council Regulation (EC) No. 1954/2003, may also have affected the deployed fishing effort.

**2.79. Plaice (Pleuronectes platessa) in VIII, IX and X.**

No information is available to STECF on these stock(s).

**2.80. Pollack (Pollachius pollachius) in all areas.**

STECF notes that there is no advice on management for pollack and the precautionary TACs have not been restrictive. Little information was available to STECF on the status and/or exploitation of Pollack in any area. In all cases the only management advice has originated from STECF and has taken the form of precautionary TACs based on the recent level of landings. The agreed TACs and landings data for 1989 to 1999 can be summarised as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Agreed TAC (kt)</th>
<th>Min. Landing (kt)</th>
<th>Max. Landing (kt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vb(EC),VI,XII,XIV</td>
<td>1.10</td>
<td>0.22</td>
<td>0.50</td>
</tr>
<tr>
<td>VII</td>
<td>17.00</td>
<td>3.81</td>
<td>6.08</td>
</tr>
<tr>
<td>VIIIab</td>
<td>2.60</td>
<td>1.00</td>
<td>1.95</td>
</tr>
<tr>
<td>VIIc</td>
<td>0.80</td>
<td>0.05</td>
<td>0.11</td>
</tr>
<tr>
<td>IX</td>
<td>0.45</td>
<td>0.03</td>
<td>0.08</td>
</tr>
</tbody>
</table>

The TACs for 2006 were agreed as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Agreed TAC (kt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vb(EC),VI,XII,XIV</td>
<td>0.45</td>
</tr>
<tr>
<td>VII</td>
<td>15.3</td>
</tr>
<tr>
<td>VIIIab</td>
<td>1.68</td>
</tr>
<tr>
<td>VIIc</td>
<td>0.262</td>
</tr>
<tr>
<td>IX</td>
<td>0.288</td>
</tr>
</tbody>
</table>

**2.81. Redfish (Sebastes mentella) in Sub-areas I and II**

**FISHERIES:** The only directed fisheries for *Sebastes mentella* (deep-sea redfish) are trawl fisheries. By-catches are taken in the cod fishery and as juveniles in the shrimp trawl fisheries. Traditionally, the fishery for *S. mentella* was conducted by Russia and other East European countries on grounds located south of Bear Island towards Spitsbergen. Since 1 January 2003 all directed fisheries for *S. mentella* have been forbidden in the Norwegian EEZ zone north of 62°N and in the Svalbard area. Additional protection for adult *S. mentella* comprises area closures. Since January 1st, 2005, the bycatch percentage has been reduced to 15% (both species together). ICES considers this value to be appropriate only if it reflects the lowest rate of unavoidable redfish bycatch. Bycatches are taken in gadoid and shrimp-trawl fisheries. After the introduction of sorting grids in 1993, discarding in the shrimp fishery was reduced. Small redfish less than 18-
20 cm are, however, not sorted out by the grid, and criteria for the maximum number of redfish per kilogram shrimp are enforced (from 2006 onwards, i.e. 3 juvenile redfish per 10 kg shrimp). For 2004 and 2005, landings of S. mentella taken in the pelagic Russian fishery for herring and blue whiting in the Norwegian Sea were reported to ICES. Of a total Russian catch of 2879 tonnes in 2004 and 5023 tonnes in 2005, 1510 tonnes (52%) and 3299 tonnes (66%), respectively, were reported taken as bycatch in these pelagic fisheries (maximum 49% in each haul). Germany has also annually reported 2 40 tonnes S. mentella caught in their pelagic fisheries. The working group believes that similar bycatches of S. mentella may have been taken by other national fleets, but then either discarded or put together with the other species into meal production. Better statistics on this bycatch, and regulations to prevent this continuing, are needed.

**SOURCE OF MANAGEMENT ADVICE:** This stock is currently managed by a joint Norwegian and Russian scientific advisory body. The fisheries are regulated according to bilateral agreements between Russia and Norway. ICES note that it was not possible to conduct an analytical assessment of this stock in 2005. Information, therefore, is based on Norwegian and Russian research vessel surveys carried out since 1980. These surveys provide information on both recruitment and spawning stock biomass.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** In the absence of defined reference points the state of the stock cannot be fully evaluated. The only year-classes that can contribute to the spawning stock are those prior to 1991 as the following 15 year-classes are extremely poor. Surveys indicate that the stock, at present, is near a historical low. The 1991-2005 year-classes are indicated to be well below those of the 1980s.

**RECENT MANAGEMENT ADVICE:** For Sebasted mentella in Area I and II, ICES advises that the measures introduced in 2003 should be continued, i.e. there should be no directed trawl fishery on this stock and the area closures and low bycatch limits should be retained until a significant increase in the spawning stock biomass (and a subsequent increase in the number of juveniles) has been detected in the surveys. In addition, measures to prevent high bycatches in the pelagic trawl fisheries for blue whiting, herring, and mackerel in the Norwegian Sea seem necessary. An important contribution to rebuild the stock is also the agreement to reduce the maximum bycatch of redfish in the shrimp fishery from 10 to 3 specimens per 10 kilograms of shrimp from 2006 onwards.

**STECF COMMENTS:** STECF agrees with the advice from ICES.

### 2.82. Redfish (Sebastes marinus) in Sub-areas I and II

**FISHERIES:** The fishery is mainly conducted by Norway, accounting for 80–90% of the historical total catch. The fish are caught mainly by trawl (at present only as bycatch) and gillnet, and to a lesser extent by long line, Danish seine, and handline, in that order. Some of the catches are taken in mixed fisheries together with saithe and cod. Important fishing grounds are the More area (Svinøy), Halten Bank, outside Lofoten and Vesterålen, and at Sleppen outside Finnmark. Traditionally, S.marinus has been the most popular and highest priced redfish species. In the period 1984–90 landings of S. marinus were at a level of 23,000–30,000 t. In the period 1991–1999 the landings were around 17,000 t but since then they have decreased and in 2005 landings were only around 7,700 t. EU landings reached 245 t in 2005.
SOURCE OF MANAGEMENT ADVICE: No explicit management objectives have been established for this stock. It is currently managed by a joint Norwegian and Russian scientific advisory body and regulated according to bilateral agreements between Russia and Norway. Information is based on Norwegian and Russian research vessel surveys carried out since 1986 as well as from CPUE (kg per trawl hour) from Norwegian trawlers since 1992. An exploratory assessment was conducted using a simulation model covering the period 1986-2005. Input data to the model were two fishing fleets (gillnet and other gears) with catch in tonnes, by length and age on a quarterly basis, and the annual Barents Sea joint bottom trawl survey with catch in numbers by length and age. Work on that model is continuing.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been established for this stock.

STOCK STATUS: In the absence of defined reference points the state of the stock cannot be fully evaluated. Surveys and commercial CPUE show a substantial reduction in abundance and indicate that the stock at present is historically low. The year-classes in the last decade have been very low and declining. Presently, this stock is in a very poor condition. Given the low productivity of this species, this situation is expected to remain for a considerable period.

RECENT MANAGEMENT ADVICE: ICES advises that there should be no directed fishery and any bycatch in other fisheries should be kept as low as possible. ICES considers that the area closures should remain.

STECF COMMENTS: STECF agrees with the advice from ICES.

2.83. Redfish in Sub-areas V, VI, XII and XIV

In ICES sub-areas V, VI, XII and XIV there are at least 3 species of redfish: S. marinus, S. mentella and S. viviparus. The latter, S. viviparus, for which there is a small fishery in Va, has only been of minor commercial value.

One stock of S. marinus exists in the area of East Greenland - Iceland -Faroes. Large redfish, S. marinus (type named “Giant”), have been recorded and fished in different areas of. Within the entire S. marinus distribution area including the Reykijanes Ridge, there may be a genetically distinct component, “giant” S. marinus, with a different depth distribution than the typical S. marinus.

The stock structure of S. mentella is complex and uncertain, but there are indications that there may be at least “oceanic”, “pelagic deep-sea”, and “deep-sea” stocks or stock components. Both the “oceanic” and “pelagic deep-sea” forms in the Irminger Sea are sometimes referred to as pelagic redfish, to differentiate them from the redfish associated with the slope and shelf areas. Thus the redfish fisheries in Subareas V, XII, and XIV may operate on several stocks. ICES decided to maintain the current advisory units until a synthetic review of stock identification information is available:

- a demersal unit on the continental shelf in ICES Divisions Va, Vb, and XIV (advice in Section 4.2.5c) and a pelagic unit in the Irminger Sea and adjacent areas (V, VI, XII, and XIV) This latter unit also includes pelagic redfish in the NAFO Convention Area.

(advice in Section 4.2.5d). There is a change in the nomenclature used previously: the pelagic unit now includes what was formerly known as pelagic deep-sea and oceanic S. mentella. The demersal unit is the deep-sea S. mentella occurring on the continental shelf and on the slope. STECF agrees with ICES’ conclusion about inadequate evidence to revise advisory units.
2.83.1. Redfish (Sebastes marinus) in Sub-areas V, VI, XII and XIV

**FISHERIES:** *S. marinus* are mainly taken by trawlers in depths down to 500 m. In Division Va, the catch is mainly taken by Icelandic trawlers while in Division Vb, Faroese trawlers predominate. In Sub-area XIV, the catches are mainly a by-catch in shrimp fisheries. Total catches decreased almost continuously from 1983-1996 but have increased slightly since then. The decline occurred in all sub-areas. In order to reduce the catches of *S. marinus* in Division Va, an area closure was imposed in 1994 and the quotas have been reduced in recent years. The total catch of *S. marinus* in Divisions Va and Vb and in the Sub-areas VI and XIV has decreased from about 130,000 t in 1982 to about 37,000 t in 2001. In 2005 total landings amounted to 45,000 t. In recent years more than 90% of total catches are taken in Sub-area Va.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The state of the stock is classified according to results of the Icelandic spring groundfish survey. The quantitative advice is derived from analysis with an age-length based model (BORMICON). The spring survey data in Division Va and the data from the commercial catch in Va are used in the BORMICON model, which is used for assessment of the past and current state of the stock in Division Va as well as for the medium-term projection.

**PRECAUTIONARY REFERENCE POINTS:** ICES suggest that the relative state of the stock can be assessed through survey CPUE index series (U), which imply a maximum, *U*<sub>max</sub>, as well as the present state. Given these data, the following reference points are proposed. *U*<sub>lim</sub> = 20% of highest observed survey index. *U*<sub>pa</sub> be set at 60% of highest observed survey index.

**STOCK STATUS:** Based on the most recent indicator of SSB ICES classifies the stock as having full reproductive capacity. In recent years the survey index has been above the *U*<sub>pa</sub> value with approximately 50% probability, and above *U*<sub>lim</sub> with high (>95%) probability. Survey information indicates that the adult stock in the Greenland area is depleted. In Subarea XIV the German groundfish survey showed an almost continuous decrease in biomass indices by more than 90% in the period 1986 - 2001, but signs of increasing biomass have been observed since 2001. This survey mainly reflects pre-recruit fish that will migrate out of the area when they reach fishable size. In Division Vb the Faroese groundfish survey (covering 1994 - 2006) indicates that the abundance has been stable since 2001. Catches have declined since 1985 to a low level in recent years, and this decline is also reflected in the Faroes summer survey.

**RECENT MANAGEMENT ADVICE:** Catches in ICES Divisions Va in 2007 should be less than 35 000 t. Maintaining catches below 35 000 t is expected to keep the stock above *U*<sub>pa</sub> in the medium term. A small component in Division Vb should be accounted for and the total advised TAC for Divisions Va and Vb is therefore 37 000 t. There should be no directed fishery for *S. marinus* in Subarea XIV as the fishable stock of *S. marinus* in Subarea XIV is depleted and the adult stock is non-migrating.

**STECF COMMENTS:** STECF agrees with the advice of ICES.
2.83.2. Deep-sea Redfish (Sebastes mentella) on the continental shelf in Sub-areas V, VI and XIV

**FISHERIES:** Division Va, demersal *S. mentella* are taken mainly by Icelandic trawlers at depths greater than 500 m. In Division Vb, the fishery is carried out mainly by Faroese trawlers, though some bycatch is taken by other countries fishing demersal species. In Subarea XIV, the catch is mainly taken as bycatch by German freezer trawlers targeting Greenland halibut. The total annual catches almost doubled in the early 1990s, but have since then decreased to the level of the 1980s. The increase was mainly caused by an increased catch in Division Va, both in the demersal and in a temporarily developed pelagic fishery, and by an increase in Subarea XIV in 1993-1994. The increased catch of *S. marinus* in Va in 2002 and decreased catch of *S. mentella* in 2001 and 2002 is due to a joint quota for *S. marinus* and *S. mentella* on the shelf, and the fishing fleet has increased the proportion taken from *S. marinus* in most recent years. Analysis of logbook information from 1991-2005 shows that the pelagic fishery east of the redfish line occur in the same area as the bottom trawl fisheries, the fisheries often coinciding seasonally and occurring within the same depth range. Analysis based on the same source indicates that annual catch with pelagic gear east of the redfish line has been decreasing over the period. The average annual pelagic catch was around 13 thousand tonnes in the period 1991-1998 (4-25 thousand ton interannual range), but in more recent years the average annual catch has been less than 3 thousand tonnes (0.8 thousand ton interannual range).

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Survey data is used from the German groundfish survey in Subarea XIV (1985-2005), and from the Icelandic groundfish survey in Va (2000-2003). Cpes data was used from Icelandic trawlers in Division Va (1986-2005) and from the Faroese fishery in Division Vb (1991-2005).

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points are established.

**STOCK STATUS** In the absence of reference points the state of the stock cannot be fully evaluated. Commercial cpue indicates a general decrease in stock biomass from the late 1980s to the early 1990s; after this it has been relatively stable. Survey biomass indices suggest another decrease after 2001.

**RECENT MANAGEMENT ADVICE:** There is no basis to change the advice from last year. Therefore, catches in 2007 should not exceed 22 000 t, and there should be no direct fishery for *S. mentella* in Subarea XIV.

**STECF COMMENTS:** STECF agrees with the advice of ICES.

2.83.3. Oceanic redfish (Sebastes mentella) in area Va, XII and XIV

**FISHERIES** The pelagic fishery in the Irminger Sea only exploits the mature part (approximately 95% mature) of the stock. The fishery started in 1982 in the upper 500 m and expanded from 1991 onwards into deep waters where the majority of the catch is now taken. Catches in the southwestern area (almost exclusively shallower than 500 m) have remained relatively stable, but low since 1997, with a slight decline in the last 2 years. In the northeastern area (deeper than 500 m) catches increased until 1997 and then fluctuated without a clear trend until 2004. In 2005, the catches from this area dropped to about half the previous level. This was associated with a strong
The main feature of the fishery in recent years is a clear distinction between two widely separated grounds fished at different seasons and different depths. Since 2000, the southwestern fishing ground extended also into the NAFO Convention Area. The parameters analysed so far do suggest, however, that the aggregations in the NAFO Convention Area do not form a separate stock. Some biological features distinguish the fisheries in the two areas. The length distributions of the catches differ between the described two main fishing ground/seasons. The fisheries in the northeastern area (2nd quarter) mainly target larger and post-spawning fish.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES, the stock is managed by NEAFC in cooperation with NAFO. Cpus series, catch, and length information is available from the commercial fishery. Acoustic surveys conducted since 1991 in the Irminger Sea are available for estimation of the stock biomass above the deep-scattering layer. Trawl information from below this layer is available from 1999. Data on maturity-at-length and maturity at-weight and some age-reading experiments were available from both fishery and survey. In recent years, data from most fishing nations have been compiled, and this enabled production of detailed charts showing the area and depth distribution of the fisheries.

**PRECAUTIONARY REFERENCE POINTS:** There are no precautionary reference points for pelagic redfish in Va, XII and XIV.

**STOCK STATUS:** In the absence of reference points and an analytical assessment, the state of the stock cannot be fully evaluated. Even though the stock status is uncertain, trends in survey indices, the decline in cpue in 2004 and 2005, and the rapid decrease in catches from 2004 suggest that the stock is in a state of rapid depletion.

**RECENT MANAGEMENT ADVICE:** Even though the stock status is uncertain, trends in survey indices, cpue data, and the development of the fishery suggest that the stock is in a state of rapid depletion. Therefore, ICES recommends that no fishing takes place. The stock should continue to be monitored, and the fishery should not be reopened unless there are clear indications of recovery.

**STECF COMMENTS:** STECF agrees with ICES.

**2.84. Saithe (Pollachius virens) in Div’s IIa (EU zone), IIIa, Sub-areas IV (North Sea) and VI (West of Scotland).**

**FISHERIES:** In the various areas over which this stock is distributed, saithe are primarily taken in a directed shelf-edge trawl fishery, and are also taken as part of the mixed roundfish fishery. The stock is exploited by nations including Norway, France, Germany, the UK, Ireland, Spain and Denmark. Between 1967-2004, ICES Working Group reported landings have varied between 88326t and 343967t and have been relatively stable over the last 18 years (mostly just over 100,000 t). In 2005 landings were 116343 t. The stock is managed by TAC. Separate TACs are set for Saithe in IIa (EU zone), IIIa, North Sea combined (Sub-area IV) and Sub-area VI.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial data. Survey data are not considered reliable for saithe and the assessments are more limited than for other gadoids.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.40$, $B_{pa} = 200,000t$.

**STOCK STATUS:** Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and being harvested sustainably. Fishing mortality has declined since 1986, and is estimated below $F_{pa}$ since 1997. SSB was mostly below
B_{pa} between 1984 and 1997, (and was below B_{lim} from 1990–1993) but increased in the late 1990s and is estimated to be above B_{pa} since 1997

**RECENT MANAGEMENT ADVICE:** The ICES advice on the exploitation of this stock is presented in the context of mixed fisheries and is found in Section 16.1.

In 2004 EU and Norway “agreed to implement a long-term plan for the saithe stock in the Skagerrak, the North Sea and west of Scotland, which is consistent with a precautionary approach and designed to provide for sustainable fisheries and high yields. The plan shall consist of the following elements:

1. Every effort shall be made to maintain a minimum level of Spawning biomass (SSB) greater than 106 000 tonnes (B_{lim}).
2. Where the SSB is estimated to be above 200 000 tonnes the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than 0.30 for appropriate age groups.
3. Where the SSB is estimated to be below 200 000 tonnes but above 106 000 tonnes the TAC shall not exceed a level which, on the basis of a scientific evaluation by ICES, will result in a fishing mortality rate equal to 0.30-0.20*(200 000-SSB)/94 000.
4. Where the SSB is estimated by the ICES to be below the minimum level of SSB of 106 000 tonnes the TAC shall be set at a level corresponding to a fishing mortality rate of no more than 0.1.
5. Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 15% from the TAC the preceding year the Parties shall fix a TAC that is no more than 15% greater or 15% less than the TAC of the preceding year.
6. Notwithstanding paragraph 5 the Parties may where considered appropriate reduce the TAC by more than 15% compared to the TAC of the preceding year.
7. A review of this arrangement shall take place no later than 31 December 2007.
8. This arrangement enters into force on 1 January 2005.”

The saithe management plan has not been evaluated by ICES.

Exploitation boundaries in relation to existing management plans indicate that at the present SSB level, F should be below 0.3 to be in accordance with the management plan. This corresponds to landings of 136 kt in 2007 and an SSB of 254kt in 2008.

**STECF COMMENTS:** STECF notes that although saithe is assessed together in area IV and VI, TACs are set separately for areas IV and VI. Saithe in the North Sea are mainly taken in a directed trawl fishery. STECF therefore considers the management advice for saithe in the North Sea to be compatible with the advice for North Sea cod provided the fishery for saithe can be shown to comply with the advice from ICES on fisheries with an incidental catch of cod.

The fishery in Subarea VI consists largely of a directed deep-water fishery operating on the shelf edge but includes a mixed fishery operating on the shelf. Therefore STECF considers the management advice for saithe in area VI must take into account the management adopted for area VI cod (no catch and discards for cod).

2.85. Saithe (*Pollachius virens*) in Div’s Vb (EU zone), VI, XII and XIV

Saithe in area VI has previously been assessed as a separate stock. This component has now been combined with saithe in the North Sea (Sub-area IV) and saithe in Skagerrak and Kattegat (Division IIIa). See section 2.84 of this report.
2.86. Saithe (Pollachius virens) in Div’s VII, VIII, IX, X
No stock assessment of saithe is conducted in this area.

2.87. Saithe (Pollachius virens) in the North East Arctic (Sub-areas I and II)

**FISHERIES:** Since the early 1960s, the fishery has been dominated by purse seine and trawl fisheries, with a traditional gill net fishery for spawning saithe as the third major component. Landings of saithe were highest in 1970-1976 with an average of 238,000 t and a maximum of 265,000 t in 1970. This period was followed by a sharp decline to a level of about 160,000 t in the years 1978-1984. Another decline followed and from 1985 to 1991, the landings ranged from 70,000 -122,000 t. An increasing trend was seen after 1990 to 171,498 t in 1996. Since then the annual landings have fluctuated between 136,000 and 176129 t. with the highest figure in 2005. EU landings contributed about 3757 t in 2005.

**SOURCE OF MANAGEMENT ADVICE:** This stock is currently managed by a joint Norwegian and Russian scientific advisory body. The fisheries are regulated according to bilateral agreements between Russia and Norway. ICES has been approached for advice on biological assessment and management of this stock.

The advice is based on an analytical assessment using data from catch at age, an acoustic survey and CPUE from two commercial fleets. There are no explicit management objectives for this stock although Norway has proposed a management strategy for North east Arctic saithe which has not, as yet been adopted or evaluated by ICES. For management objectives to meet precautionary criteria, their aim should be to reduce or maintain fishing mortality below $F_{pa}$ and to increase or maintain spawning stock biomass above $B_{pa}$. Work is in progress on the development of a management strategy.

**PRECAUTIONARY REFERENCE POINTS:** The precautionary reference points for biomass and fishing mortality were recalculated using the standard ICES approach and taking into account a change in the range of age groups used to calculate $F$. The new reference points are $B_{pa} =220000$, $B_{lim} =136000$, $F_{pa} = 0.35$, $F_{lim} = 0.58$

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as having full reproductive capacity. Based on the most recent estimates of fishing mortality, ICES classifies the stock to be harvested sustainably. Fishing mortality is stable and has since 1996 been below $F_{pa}$. The SSB has since 1994 been well above $B_{pa}$. After a long period of low stock size, the stock recovered during the 1990s with the recruitment of several above-average year-classes.

**RECENT MANAGEMENT ADVICE:**

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects*

The current estimated fishing mortality (0.19) is just above the lowest fishing mortality that would lead to high long-term yields ($F_{0.1} = 0.14$).

*Exploitation boundaries in relation to precautionary limits*

In the absence of an agreed management plan, which has been evaluated to be in agreement with the Precautionary Approach, ICES proposes that in order to harvest the stock within precautionary limits, fishing mortality should be kept below $F_{pa}$. This corresponds to landings of less than 247 000 t in 2007. Since the early 1960s, purse seiners and trawlers have dominated the fishery, with a traditional gillnet fishery for spawning saithe as the third major component. The
Purse seine fishery is conducted in coastal areas and fjords. Historically, purse seiners and trawlers have taken, approximately, equal shares of the catches. Regulation changes led to relatively less amounts being taken by purse seiners after 1990. In the Norwegian fishery, quotas may be transferred. In addition to quotas, the fisheries are managed by minimum mesh size limitations, sorting grids in the trawl fishery, minimum landing size, by-catch regulations and area closures. In 1999 the minimum landing size was increased.

**STECF COMMENTS:** STECF agrees with the advice from ICES.

2.88. **Salmon (Salmo salar) in the Baltic Sea, Div. IIIb,c,d (Main Basin and Gulf of Bothnia, Sub-div. 22-31)**

The STECF Summary review and advice for salmon in the Baltic Sea Main Basin and Gulf of Bothnia is given in Part 1 of the review of advice for 2007.

2.89. **Salmon (Salmo salar) in the Baltic Sea, Gulf of Finland (Sub-div. 32)**

The STECF Summary review and advice for salmon in the Baltic Sea Gulf of Finland is given in Part 1 of the review of advice for 2007.

2.90. **Sandeel (Ammodytidae) in the North Sea (IV)**

**FISHERIES:** Sandeel is taken by trawlers using small mesh gear. The fishery is seasonal, taking place mainly in the 2 and 3 quarter. Most of the catch consists of Ammodytes marinus and there is little by-catch of protected species. Sandeels are largely stationary after settlement and the North Sea sandeel must be considered as a complex of local populations. The stock is exploited predominantly by Denmark and Norway, with minor landings for the UK and the Faroes. Landings fluctuated between 300,000 and 1,114,000 t (1971-1998) and are very dependent on year-class strength. The EU fleet landings have been around 550,000t in 1999 and 2000 and have increased in 2001 and 2002 to around 650,000t. However, 2005 saw a dramatic decline in the fishery to around 154,000t for the EU fleet (mostly Denmark), probably due to an extremely weak 2002 year-class.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on a seasonal age-based assessment using commercial and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary biomass reference point is $B_{pa} = 600,000t$. No precautionary fishing mortality reference point has been proposed.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as having reduced reproductive capacity. SSB is estimated at below $B_{lim}$ since 2001.

In the absence of an F reference point, the state of the stock cannot be evaluated with regard to sustainable harvest. The fishing mortality in 2005 was close to the time-series mean and below that of the last 4 years. Fishing mortality from the completed 2006 fishery is lower than the time-series mean. Recruitment in the period 2002–2004 was low, but the 2005 year-class is estimated just below average.

**RECENT MANAGEMENT ADVICE:** Management of fisheries should try to prevent local depletion of sandeel aggregations, particularly in areas where predators congregate. The fishery should remain closed until information is available which assures that the stock can be rebuilt to $B_{pa}$ by 2007. The information on which this could be based includes a survey in
December 2006 and exploratory fishing in April 2007. ICES has classified sandeel in the North Sea as a critical stock.

**STECF COMMENTS:** STECF agrees on the objective of rebuilding the SSB for sandeel to above B-pa in 2007 and acknowledge the need for developing an effort limitation scheme for the fisheries that includes real time monitoring and a harvest control law.

Stock abundance in the prediction year is highly dependent on the incoming year-class for which no reliable estimate exists. If the survey to be carried out in late 2006 indicates that the 2006 year-class is at least about average, then real-time monitoring of a fishery in 2007 could be implemented. The monitoring would provide a more accurate estimate of the size of the 2006 year-class and enable more effective management of the fishery. It is, however, paramount that the harvest control rules are enforced expeditiously. In 2006 the fishery was closed when the main sandeel season was over, despite the recommendation from STECF to close the fishery in the middle of May.

In the light of studies linking low sandeel availability to poor breeding success of kittiwake, all commercial fishing in the Firth of Forth area has been prohibited since 2000, except for a maximum of 10 boat days in each of May and June for stock monitoring purposes. The closure was maintained for three years and has been extended until 2006, with an increase in the effort of the monitoring fishery to 20 days, after which the effect of the closure will be evaluated.

### 2.91. Rays and Skates in the North Sea (2.9.1)

The review of advice for rays and skates in the North Sea is given in Section 14.1.11.

### 2.92. Sole (*Solea solea*) in Sub-area IV (North Sea)

**FISHERIES:** Sole is mainly taken by beam trawl fleets in a mixed fishery for sole and plaice in the southern part of the North Sea. A relatively small part of the catch is taken in a directed fishery by gill-netters in coastal areas, mostly in the 2nd quarter of the year. The stock is exploited predominantly by The Netherlands with smaller landings taken by Belgium, Denmark, France, Germany and the UK. Landings have fluctuated between 14,000 and 31,000 t (1987-2005). The landings in 2005 are around 16,400t, whereas the TAC was set at 17,670t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using commercial and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.40$, $B_{pa} = 35,000t$.

**STOCK STATUS:**

Based on the most recent estimate of SSB and fishing mortality, ICES classifies the stock as being at risk of reduced reproductive capacity and as being at risk of being harvested unsustainably. SSB in 2006 was estimated at 30,000 t which is below $B_{pa} (35,000 t)$, and $F$ in 2005 (0.45) was above $F_{pa}$. The year-classes 2003 and 2004 are weak and surveys indicate that the year-class 2005 is above average.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.1

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* The current fishing mortality ($F_{sq}$) is estimated at 0.45, which is above the rate that would lead to high long-term yields. $F_{max}$ is not well defined and $F_{0.1}$ is 0.14.
Exploitation boundaries in relation to precautionary limits: The exploitation boundaries in relation to precautionary limits imply landings of less than 10 800 t in 2007, which is expected to lead to an SSB above $B_{pa} (=35 000$ t) in 2008

ICES further notes that

- Sole are mainly caught in a mixed beam trawl fishery with plaice and other flatfish using 80-mm mesh in the southern North Sea. The minimum mesh size in the mixed beam trawl fishery in the southern North Sea means that large numbers of undersized plaice and cod are discarded. Measures to reduce discarding in the mixed beam trawl fishery would greatly benefit these stocks. An increase in the minimum landing size of sole could provide an incentive to fish with larger mesh sizes and would therefore mean a reduction in the discarding of plaice. The minimum landing size of North Sea sole is 24 cm. An increased mesh size in the fishery would reduce the catch of undersized plaice and cod, but would also result in short-term loss of marketable sole.

- The peaks in the historical time-series of SSB of North Sea sole correspond with the occasional occurrence of strong year-classes. Due to a high fishing mortality the SSB has declined during the nineties. The fishery opportunities and SSB are now dependent on incoming year-classes and can therefore fluctuate considerably between years. The SSB and landings in recent years have been dominated by the 1996 and 2001 year-classes.

- The present advice framework implies large interannual changes in TAC advice when stocks are just above or just below $B_{pa}$. Such variations could be avoided with the development of a long-term management plan with a lower fishing mortality than that observed at present. This will make the stock size and catch opportunities less dependent on incoming year-classes.

- The TAC for 2006 has been set with an implied $F$ much higher than $F_{pa}$ and $F_{sq}$ and with an implied SSB in 2007 of below $B_{pa}$. The present forecast assumes $F$ status quo in 2006, which indicates that it is unlikely that the 2006 TAC will be taken.

STECF COMMENTS: STECF notes that the ICES forecast predicts a catch in 2006 of 13 500 t assuming $F_{sq}$ compared to an agreed TAC of 17 700 t. The predicted catch for 2007 at that will allow SSB in 2008 to be above $B$ is 10 800 t. If the realized catch in 2006 is greater than 13 500t then the predicted catch in 2007 should be revised downward in order to achieve $B_{pa}$ in 2008.

STECF notes that as sole are mainly caught in a mixed beam trawl fishery, the management measures for sole should take into account management measures adopted for other species especially North Sea cod for which stringent management is advised.

STECF reiterates its 2004 and 2005 comment that the fishery recently has been restricted because of the days-at-sea regulation in the light of the cod recovery plans. This restriction induces a more coastal fishing pattern in the Southern North Sea, which is the area where sole and juvenile plaice are abundant and this could lead to an increase in the discarding of plaice.

2.93. Sole (Solea solea) in Division IIIa

The STECF Summary review and advice for plaice in the Baltic is given in Part 1 of the review of advice for 2007.
2.94. **Sole (Solea solea) - Vb (EU zone), VI, XII, XIV**

STECF did not have access to any stock assessment information on sole in this area.

2.95. **Sole (Solea solea) in Division VIIa (Irish Sea)**

**FISHERY:** Sole are taken mainly in a beam trawl fishery that commenced in the 1960s and are also taken as a by-catch in the longer established otter trawl fisheries. Effort in the Belgian beam trawl fleet increased in the late 1980s as vessels normally operating in the North Sea were attracted into the Irish Sea by better fishing opportunities. In recent years, however, catch rates of sole have been low in the Irish Sea, and part of the beam trawl fleet has moved to other sole fishing grounds. Over the last 30 years, the total landings have been in the order of 1,000 t to 2,000 t. Landings in 2004 and 2005 were 700t and 800t respectively.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment which uses commercial and survey data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.30$, $B_{pa} = 3,800$ t.

**STOCK STATUS:**

Recent recruitment levels have been lower than earlier in the time-series. SSB has declined to low levels and is estimated to be close to the lowest observed level in 2005. Any rapid rise in SSB in the short term is unlikely given recent recruitment levels. Fishing mortality has been close to Flim throughout the time-series. $F$ status quo is estimated to be close to $F_{pa}$.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.3.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Fishing mortality is estimated to be well above $F_{0.1}$ (0.21). There will be little gain to the long-term yield by increasing fishing mortalities above $F_{0.1}$.

*Exploitation boundaries in relation to precautionary limits:* Given the low SSB and low recruitment since 2000, it is not possible to identify any non-zero catch which will be compatible with the precautionary approach. However, a zero catch in 2007 should allow SSB to achieve $B_{pa}$ in 2008. If the implied 100% reduction is not possible then ICES recommends that a recovery plan be implemented which ensures a safe and rapid rebuilding of SSB to levels above $B_{pa}$.

**STECF COMMENTS:** STECF agrees with the ICES advice for VIIa sole. The fisheries targeting sole take a bycatch of cod and other species. Hence the management measures for VIIa sole should take into account the management measures adopted for other species, especially cod and whiting for which stringent management is advised. However STECF also notes that the closures of cod spawning-grounds that have been in force since 2000 are unlikely to have had a big impact on the sole fishery. In 2000 the closure covered the Western and Eastern Irish Sea. Since then, closure has been mainly in the western part, whereas the main sole fishery has taken place in the eastern part of the Irish Sea.

2.96. **Sole (Solea solea) - VIIbc**

**FISHERIES:** Ireland is the major participant in this fishery. Sole are normally caught in mixed species otter trawl fisheries in Division VIIb. These vessels mainly target other demersal fish species and *Nephrops*. 
**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES.

**REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The state of the stock is unknown. No assessment was performed, due to the short series of data and lack of reliable tuning indices.

**RECENT MANAGEMENT ADVICE:** Recent catches have been close to the TAC of 65 t. ICES advises that catches should not be allowed to increase unless it can be shown that an expansion of the fishery is sustainable.

Council Regulation (EC) No. 1954/2003 established measures for the management of fishing effort in a biologically sensitive area in Divisions VIIb, VIIj, VIIg, and VIIh. Effort exerted within the biologically sensitive area by the vessels of each EU Member State may not exceed their average annual effort calculated over the period 1998–2002).

**STECF COMMENTS:** STECF agrees with the advice from ICES.

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2.97. **Sole** (*Solea solea*) in Division VIIId (Eastern English Channel)

**FISHERIES:** The main fleets, fishing for sole in Division VIIId, are Belgian and English offshore beam trawlers (> 300 HP), which also take plaice as a by-catch. These fleets also operate in other management areas. French offshore trawlers targeting roundfish also take sole as a by-catch. Also numerous inshore < 10 m boats on the English and French coasts target sole in the spring and autumn mainly using fixed nets. Between 1986–1997 the total landings have been fluctuating around 4,500 t. In 1998 the lowest landings were observed (3,400 t), since 2000 the landings have increased to 5,000 t in 2003 which is the highest of the time-series. Landings in 2004 and 2005 were slightly lower at 4,800 t and 4,400 t respectively. It should be noted that although sometimes official landings were declared according agreed TAC’s, it is apparent that since 1997 the uptake was always lower than the TAC.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Although corrected for, the analytical assessments, using catch-at-age and CPUE data from commercial fleets and surveys are considered uncertain due to under-reporting from the inshore fleet and mis-reporting by beam trawlers.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are \( F_{pa} = 0.40 \), \( B_{pa} = 8,000 \) t.

**STOCK STATUS:**
Based on the most recent estimate of SSB (12,000 t), ICES classifies the stock as having full reproductive capacity. The spawning stock biomass has been fluctuating around a mean of about 10,000 t since 1982, and is presently above \( B_{pa} \).

Based on the most recent estimates of fishing mortality (0.38), ICES classifies the stock as being harvested sustainably. The fishing mortality has decreased since 1999 and has been around \( F_{pa} \) since 2001.

Recent recruitment has been strong, with the 2001 and 2004 year-classes being the second-highest and highest, of the time-series (1982–2005).

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.1.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Target reference points have not been agreed for this stock. The current fishing mortality (\( F_{sq} \)) is estimated at 0.38, which is above the rate that would
lead to high long-term yields and low risk of stock depletion ($F_{0.1} = 0.13$). $F_{\text{max}} (= 0.30)$ is not well defined. Fishing at $F_{0.1}$ is expected to lead to landings in 2007 of 2400 t and SSB in 2008 of around 19,000 t.

**Exploitation boundaries in relation to precautionary limits:** The exploitation within the precautionary limits would imply landings of less than 6440 t in 2007, which is expected to lead to a 13% decrease in SSB in 2008 which is still well above $B_{pa}$.

**STECF Comments:** STECF agrees with the advice for VIIId sole. STECF notes that the 80mm mesh size in the mixed beam trawl fishery is not matched to the minimum landing size of plaice. Measures to reduce plaice discarding in the sole fishery would greatly benefit the plaice stock and future yields. Mesh enlargement would reduce the catch of undersized plaice, but would also result in short-term loss of marketable sole. Furthermore, an increase in the minimum landing size of sole could provide an incentive to fish with larger mesh sizes and therefore mean a reduction in the discarding of plaice.

**2.98. Sole (Solea solea) in Division VIIe (Western English Channel).**

**Fisheries:** Total landings reached a peak in the early 1980s, initially because of high recruitment in the late 1970s and later because of an increase in exploitation. In recent years, English vessels have accounted for around 60% of the total landings, with France taking approximately a third, and Belgian vessels the remainder. UK landings were low and stable between 1950 and the mid-1970s, but increased rapidly after 1978 due to the replacement of otter trawlers by beam trawlers. The principal gears used are otter-trawls and beam-trawls, and sole tends to be the target species of an offshore beam-trawl fleet, which is concentrated off the south Cornish coast and also catches plaice and anglerfish. The total landings have been stable over 1991-2000 and amounts to around 900 t. Since 2001, landings have been around 1,090 with the 2002 landings of 1,106 t being the highest in the time-series. In 2005 the landings were 1026 t.

**Source of Management Advice:** The main management advisory body is ICES. Analytical assessment based on landings, survey and commercial CPUE data.

**Precautionary Reference Points:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.20$, $B_{pa} = 2,800$ t.

**Stock Status:**

Based on the most recent estimates of SSB, ICES classifies the stock as being at risk of reduced reproductive capacity. SSB has declined since 1980 when fishing mortality increased and is close to a historic low in 2005. Based on the most recent estimates of fishing mortality, ICES classifies the stock as being harvested unsustainably. Fishing mortality has been above $F_{pa}$ since 1978, and mostly above $F_{\text{lim}}$ since 1982.

**Recent Management Advice:**

The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** Fishing mortality around $F_{0.1} = 0.12$ can be considered as candidate target reference points, which are consistent with taking high long-term yields and achieving a low risk of depleting the productive potential. The present fishing mortality (0.41) is above the candidate reference point.
**Exploitation boundaries in relation to precautionary limits:** Rebuilding the stock above $B_{pa}$ in just one year would require that fishing mortality to be reduced by at least 68%. This would correspond to landings of around 350 tonnes in 2007. If this reduction is not possible then ICES recommends that a recovery plan be implemented which ensures a safe and rapid rebuilding of SSB to levels above $B_{pa}$.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that that given the history of misreporting a reduction in effort is required rather than TAC controls only. STECF notes that the advice for an effective reduction in fishing mortality is consistent with the advice for plaice and cod in division VIIe.

STECF considers that any agreed recovery plan for sole in VIIe should take the following into account:

(a) the conservation status of the stock and,

(b) the economic impact of the measures on the fisheries concerned.

STECF further notes that although effort restrictions have been enforced since 2005 (Council Regulation (EC) No. 27/2005 and Council Regulation (EC) No 51/2006) no obvious reduction in nominal effort in 2005 compared to 2004 for the main fleets were encountered and the fishing mortality is increasing.

### 2.99. Sole (Solea solea) in Divisions VIIf,g (Celtic Sea)

**FISHERIES:** Sole are taken mainly in a beam-trawl fishery that commenced in the early 1960s and, to a lesser extent, in the longer established otter-trawl fisheries. In the 1970s, Belgian beam trawlers and Belgian and UK otter trawlers mainly carried out the fishery. The use of beam-trawls (to target sole and plaice) increased during the mid-1970s. The fisheries for sole in the Celtic Sea and Bristol Channel involve vessels from Belgium, taking around 60%, the UK around 20%, France around 5% and Ireland also around 5% of the total landings. The sole fishery is concentrated on the north Cornish coast off Trevose Head and around Lands End, and reported landings have generally declined since the mid 1980s, up to 1998. Since then they increased to around 1,300 t in the early 2000’s. Landings in 2005 were 1044 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based analytical assessment using catch-per-unit effort data from two commercial fleets and one survey.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.37$, proposed $B_{pa} = 2,200$ t.

**STOCK STATUS:**

Based on the most recent estimates of SSB, ICES classifies the stock as having full reproductive capacity. The exceptional year-class of 1998 has increased SSB to above the long-term average, but as the contribution of this year-class on SSB wanes, SSB declines again. Based on the most recent estimates of fishing mortality, ICES classifies the stock as being at risk of being harvested unsustainably. Fishing mortality has been fluctuating around a high level exceeding $F_{pa}$ since the mid-1980s. Recruitment has fluctuated with some peaks.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4.
Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects: Target reference points have not been agreed for this stock. A candidate for a target reference point which is consistent with taking high long-term yields and achieving a low risk of depleting the productive potential of the stock may be identified in the range of $F_{0.1} (0.13)$ and $F_{\text{max}} (0.27)$. There is no gain in yield having a target above this level. The risk to the stock at this level of fishing mortalities appears to be very low in the medium term.

Exploitation boundaries in relation to precautionary limits: A 24% reduction in $F$ is needed to reduce $F$ below $F_{\text{pa}}$. This corresponds to landings of less than 840 tonnes in 2007. Council Regulation (EC) No. 27/2005, Annex III, part A 12 (b) prohibited fishing in ICES rectangles 30E4, 31E4, and 32E3 during January March 2005 with the intention of reducing fishing mortality on cod. This restriction did not apply to beam trawlers during March 2005. Beam trawlers account for the vast majority of plaice landed by vessels in Divisions VIIf,g. The proportion of sole taken from the closed area about the same in 2005 as in previous years, but declined markedly in February and March 2006. Proportions taken in January and April, immediately before and after the closure, are higher than in previous years. Observed LPUE of plaice in February and March 2006 is not dramatically reduced, which may indicate that catch rates can be maintained outside of the closed area. The closure probably had little impact on the fishing mortality on sole. A similar conclusion can be drawn for plaice in VIIf,g, but the outcome with respect to cod in this area may be different (see Section 2.19.2).

STECF COMMENTS: STECF agrees with the advice from ICES. STECF notes that effort restrictions are in place for many areas but not in the Celtic Sea, which makes the latter vulnerable to unrestricted increases in effort. This is undesirable where stocks are already overexploited. There was a substantial effort increase by the major fleet (Belgian fleet) in 2004 and 2005. However, preliminary results from 2006 indicate that the effort displacement into the Celtic Sea by Belgian beam trawl vessels is decreasing due to the non-effort limitation in Subarea VIIId in 2006. STECF notes that plaice and sole are exploited in the same fishery and the status of plaice is such that a substantial reduction in fishing mortality or a recovery plan is needed. From simulations with long term-target $F$s both for sole and plaice, a range of fishing mortalities for sole from 0.27 to 0.49 are predicted to result in the highest long-term yields (around 950 t), whilst posing little risk of being below $B_{\text{lim}}$ in the long term. A Harvest Control Rule (HCR) could therefore be developed to reduce $F$ to this type of target level in the medium term whilst minimizing the risk of SSB decreasing below $B_{\text{lim}}$. As sole is mainly taken in mixed fisheries together with plaice, any HCR for sole should correspond with a similar HCR for plaice. A similar analysis for VIIf,g plaice indicating a target $F$ range for plaice between 0.15 and 0.31. (see also section 2.77 plaice in Divisions VIIfg – Celtic Sea).

2.100. Sole (Solea solea) – VIIhjk

FISHERIES: Sole are predominantly caught within mixed species otter trawl fisheries in Division VIIj. These vessels target mainly hake, anglerfish, and megrim. Beam trawlers and seiners generally take a lesser catch of sole. Ireland is the major participant in this fishery with around 50% of the international landings between 1993-2001. The catches in 2005 are estimated to be 254 tonnes. SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES.

REFERENCE POINTS: No precautionary reference points have been proposed for this stock.
STOCK STATUS: The state of the stock is not known in relation to biological reference points. Landings estimated by ICES have been fluctuating between 443 tonnes and 245 tonnes over the period 1996-2005. The 2005 landings are estimated to be 326 tonnes.

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4. For the stock specific advice, ICES recommends that catches in 2007 be no more than the recent average (2003-2005) of around 287 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment.

STECF COMMENTS: STECF agrees with the advice from ICES. STECF notes that over recent years the TAC has not been restrictive.

2.101. Sole (Solea solea) in Divisions VIIIa,b (Bay of Biscay)

FISHERIES: The French fixed net fishery for sole (largely in the spawning season) has increased over the assessment period, from less than 5% of landings prior to 1985, to around 70% in the recent years and this has resulted in an improvement of the selection pattern. Landings by Belgium beam trawlers increased rapidly in the late 1980s and since 1991 have been relatively constant at 8% of the total. For the last 15 years the total landings have varied from about 4,000 t to 7,400 t. The catches were 4,370t in 2005.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on an age-based analytical assessment based on landings and CPUE data series from surveys and commercial fleets. Partial discard information is available from 1984 to 2003, but is no longer included in the assessment in 2004 because of the low contribution of discards to the catch and therefore to the assessment. No recruitment indices are available for this stock.

PRECAUTIONARY REFERENCE POINTS: The proposed precautionary reference points for fishing mortality (revised in 2006) and biomass are $F_{pa} = 0.42$, $B_{pa} = 13,000$ t.

MANAGEMENT AGREEMENT:
The EC regulation 388/2006 of 23 February 2006 has established a management plan which set the objective of bringing the spawning stock biomass above 13 000 tonnes in 2008. Once the SSB is evaluated by ICES to be equal to or above this level, a long-term target fishing mortality shall be decided as well as a rate of reduction to reach it. The key articles of this “Multiannual plan for the sustainable exploitation of the stock of sole in the Bay of Biscay” are reproduced below.

Article 1. Subject matter
1. This Regulation establishes a multiannual plan for the sustainable exploitation of the sole stock living in the Bay of Biscay (hereinafter referred to as Bay of Biscay sole).
2. For the purpose of this Regulation ‘Bay of Biscay’ means the area of the sea delineated by the International Council for the Exploration of the Sea (ICES) as Divisions VIIIa and VIIIb.

Article 2. Objective of the management plan
1. The plan shall aim to bring the spawning stock biomass of Bay of Biscay sole above the precautionary level of 13 000 tonnes in 2008 or before and, thereafter, to ensure its sustainable exploitation.
2. This objective shall be attained by gradually reducing the fishing mortality rate on the stock.

Article 3. Legislative measures and annual TAC setting
1. Once the spawning stock biomass is evaluated by ICES to be equal to or above the precautionary level of 13 000 tonnes, the Council shall decide by qualified majority, on the basis of a Commission proposal, on:
   (a) a long-term target fishing mortality rate; and
   (b) a rate of reduction in the fishing mortality rate for application until the target fishing mortality rate decided under (a) has been reached.
2. Each year the Council shall decide by qualified majority, on the basis of a proposal from the Commission, on a TAC for the following year for Bay of Biscay sole.

Article 4. Procedure for setting the TAC
1. Where the spawning stock biomass of Bay of Biscay sole has been estimated by the Scientific, Technical and Economic Committee for Fisheries (STECF), in the light of the most recent report from ICES, to be below 13,000 tonnes, the Council shall decide on a TAC which, according to the STECF estimation, shall not exceed a level of catches which will result in a 10% reduction in fishing mortality rate in its year of application compared to the fishing mortality rate estimated for the preceding year.

2. Where the spawning stock biomass of Bay of Biscay sole has been estimated by the STECF, in the light of the most recent report from ICES, to be equal to or above 13,000 tonnes, the Council shall decide on a TAC which shall be set at a level of catches which, according to the STECF estimation, is the higher of:
   (a) that TAC whose application conforms with the reduction in fishing mortality rate that has been decided on by the Council in accordance with Article 3(1)(b);
   (b) that TAC whose application will result in the target fishing mortality rate that has been decided on by the Council in accordance with Article 3(1)(a).

3. Where application of paragraph 1 or 2 of this Article would result in a TAC which exceeds the TAC of the preceding year by more than 15%, the Council shall adopt a TAC which is 15% greater than the TAC of that year.

4. Where application of paragraph 1 or 2 would result in a TAC which is more than 15% less than the TAC of the preceding year, the Council shall adopt a TAC which is 15% less than the TAC of that year.

STOCK STATUS: Based on the most recent estimates of SSB, ICES classifies the stock as being at risk of reduced reproductive capacity. SSB has declined from the high levels of 1992–94, and has been below $B_{pa}$ since 1999. Based on the most recent estimates of fishing mortality, ICES classifies the stock as being harvested unsustainably. Fishing mortality has generally increased since 1984 and has been around $F_{lim}$ from 1992 to 2001. In 2002 the fishing mortality was exceptionally high; and for the past 3 years $F$ has been around $F_{pa}$. Since 1992 recruitment has been at a lower, but stable level up to 2000. Since then two low recruitments have occurred in 2001 and 2004.

RECENT MANAGEMENT ADVICE: The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.5.

Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects: Target reference points have not been agreed for this stock. The present $F$ (0.42) is well above the candidate reference point $F_{0.1}$.

Exploitation boundaries in relation existing management plans: According to the EU management plan, landings should be less than 4540 t in 2007, as they must be less than those resulting in a 10% reduction in $F$ (in 2007 compared to 2005), as long as SSB is below 13,000 t. This catch of 4,540 t for 2007 corresponds to a fishing mortality of 0.38, which is below $F_{pa}$.

Exploitation boundaries in relation to precautionary limits: In order for the predicted SSB to reach $B_{pa}$ in the short term, $F$ would have to be reduced to 0.41. This implies catches of less than 4830 t in 2007.

Conclusion on exploitation boundaries: Although ICES has not evaluated the agreed management plan, it uses the exploitation boundaries in relation to the management plan as basis for the advice for 2007, as this plan is expected to give higher long-term gains in the present situation and is already implemented. ICES therefore recommends to limit landings in 2007 to 4540 t.

STECF COMMENTS: STECF agrees with the advice from ICES.

2.102. Sole (Solea spp.) - VIIIcde, IX, X

STECF did not have access to any stock assessment information on sole in this area.
2.103.  **Sprat (Sprattus sprattus) in IIa and the North Sea.**

The information in this section is based on the ICES assessment of Sprat in the North Sea. **FISHERIES:** Denmark, Norway and UK exploit the sprat in this area. The fishery is carried out using trawlers and purse seiners. There are considerable fluctuations in total landings, from a peak in 1975 of 641,000 t to a low in 1986 of around 20,000 t. Since 1994, landings have varied from a high, in 1994, of 320,000t to a low, in 1997, of 103,400t. Estimated total landings in 2005 were around 208,000 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment is based on indicators derived from a research survey and on a two-stage Catch-Survey Analysis (CSA). The CSA model assumes that the population consists of two stages: the recruits and the fully recruited ages. There are difficulties in age reading resulting in unreliable estimates of numbers-at-age from the surveys and the commercial catches. Bootstrap analysis has suggested that the CSA estimates of stock size are very uncertain.

**PRECAUTIONARY REFERENCE POINTS:** There are no reference points for this stock.

**STOCK STATUS:** Sprat is a short-lived species with natural fluctuations in stock biomass. Precautionary reference points have not been defined for this stock and the available information is inadequate to estimate the absolute stock size. However, relative trends in biomass from an exploratory assessment indicate an increase over most of the time-series. The recent increase from 2004 to 2005 is due to the strong 2004 year-class recruiting to the fishery. The 2005 year-class is estimated to be very low in the IBTS survey carried out in 2006.

**RECENT MANAGEMENT ADVICE:** There are no precautionary reference points for this stock that can guide the single-stock exploitation boundaries. Two different approaches have been explored to evaluate potential harvest strategies for 2006:
1. The regression between survey index and catches suggests catches in 2006 in the order of 150 000 tonnes under the assumption of a similar exploitation rate.
2. An extrapolation of the exploratory assessment with a TAC in 2006 at the same level as in 2005 (257 000 tonnes) suggests that the stock is expected to decrease sharply. There is no basis for a specific numeric advice for the TAC in 2006. The two methods are expressions of the uncertainty of the forecasting process and show the trade-off between different assumptions and choices.

Even though, the by-catch of juvenile herring in the sprat fishery is low as percentage of the overall catch in that fishery, the very poor recruitment of the herring in recent years could still be further jeopardized by this by-catch. Therefore ICES recommends that the TAC of sprat in 2006 should be set well below the level of 2005 and that the maximum allowed percentage herring by-catch per trip should be lowered. There is no basis for a specific numeric advice for the TAC in 2006.

**STECF COMMENTS:** STECF agrees with the advice from ICES.

2.104.  **Sprat (Sprattus sprattus) in IIIbcd, Baltic Sea (Sub-div. 22-32)**

The STECF Summary review and advice for sprat in the Baltic Sea Sub-divisions 22-32 is given in Part 1 of the review of advice for 2007.
2.105. Sprat (*Sprattus sprattus*) in the Skagerrak and the Kattegat (IIIa).

**FISHERIES:** These are carried out by Denmark and Sweden using trawlers and along the Swedish coast by small purse seiners. Sprat in this area are short-lived with large annual natural fluctuations in stock biomass. Landings of sprat in Division IIIa averaged about 70,000 t in the 1970s, but since 1982 have typically been around 20,000 t, except in 1994–1995 when the ACFM catch were 96,000 t and 56,000 t respectively. ICES estimates the catch in 2005 to be 40,300 t, which is the highest recorded in the last ten years. The directed sprat fishery serves a very small market with most sprat catches taken in an industrial fishery where catches are limited by herring bycatch restrictions. This combination of factors has prevented full utilisation of the occasional strong year-class (which, in general, emerge and disappear very quickly). Multispecies investigations have demonstrated that sprat is one of the important prey species in the North Sea ecosystem.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. There have been no attempts to undertake an assessment in recent years and in 2006 ICES once again consider that the available information is inadequate to evaluate stock trends. Thus, the state of this stock remains unknown.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for sprat in Division IIIa.

**STOCK STATUS:** The state of the stock is unknown. Sprat in this area is short-lived with large annual fluctuations in stock biomass

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. ICES advises, however, that as sprat cannot be fished without significant by catches of herring (except in years with high sprat abundance, the most recent period when this occurred was 1994–1995) management of this stock should consider management advice given for herring in Subarea IV, Division VIIId, and Division IIIa. With the current management regime, where there are by-catch ceilings of herring as well as by-catch percentage limits, the sprat fishery is controlled by these factors. However, the decrease in recruitment for the North Sea Autumn-Spawning herring and probable high incoming sprat year-class may potentially result in a fishery for sprat with less bycatches of herring.

**STECF COMMENTS:** STECF agrees with the advice from ICES.

2.106. Sprat (*Sprattus sprattus*) in Divisions VIIId,e.

**FISHERIES:** Only the UK carries out a sprat fishery in this area. For the last 10 years the annual landings have been in the order of 1,200 to 5,400 t. Landings have decreased since 1999. Landings in 2004 were about 800 tonnes

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. There have been no attempts to undertake an assessment and in 2006 ICES once again consider that insufficient data are available to carry out an assessment.

**PRECAUTIONARY REFERENCE POINTS:** There are no reference points for this stock.

**STOCK STATUS:** The state of this stock remains unknown. Sprat is a short-lived species with natural fluctuations in stock biomass.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** No comments
2.107. Turbot (*Psetta maxima*) in the North Sea

STECF did not have access to any stock assessment information on turbot in this area.

2.108. Whiting (*Merlangius merlangus*) in Subarea IV (North Sea) and Division VIIId (Eastern Channel)

**FISHERIES:** Whiting are taken as part of a mixed fishery, as well as a by-catch in fisheries for *Nephrops* and industrial species. Substantial quantities are discarded. Historically total catches have varied considerably ranging between 25,000 and 129,000 t. In 2005, only 27,000 t were caught. TAC in 2005 was set at 28,500 t.

EU technical regulations in force since 2003 are contained in Council Regulation (EC) 850/98 and its amendments. The regulation prescribes the minimum target species composition for different mesh size ranges. In 2001, whiting in the whole of NEAFC region 2 were a legitimate target species for towed gears with a minimum codend mesh size of 100 mm. As part of the cod recovery measures, the EU and Norway introduced additional technical measures from 1 January 2002 (EC 2056/2001). The basic minimum mesh size for towed gears for cod from 2002 was 120 mm, although in a transitional arrangement running until 31 December 2002 vessels were allowed to exploit cod with 110 mm codends provided that the trawl was fitted with a 90 mm square mesh panel and the catch composition of cod retained on board was not greater than 30% by weight of the total catch. From 1 January 2003, the basic minimum mesh size for towed gears for cod was 120 mm, which should improve the whiting selection towards bigger fish.

Effort restrictions in the EC were introduced in 2003 (EC 2341/2002, Annex XVII, amended in EC 671/2003). Effort restriction measures were revised for 2004 (EC 2287/2003, Annex V) and 2005 (EC 27/2005, Annex IVa). Preliminary analysis of fishing effort trends in the major fleets exploiting North Sea cod indicates that fishing effort in those fleets has been decreasing since the mid-1990s due to a combination of decommissioning and days-at-sea regulations. The decrease in effort is most pronounced in the years 2002 and beyond.

A cod protection area has been implemented in 2004 (EC 2287/2003, amended in EC 867/2004), which defined the conditions under which certain stocks, including whiting, could be caught in Community waters.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES

Commercial catch-at-age data were disaggregated into human consumption, discards, and industrial bycatch components. Three survey CPUE series are available: English groundfish survey (EngGFS), Scottish groundfish survey (ScoGFS), and IBTS Q1. Due to non-mandatory reporting of effort (in terms of hours fished), commercial CPUE series were not considered reliable and were not included in the exploratory analyses.

Two assessment approaches, an age-based catch model (XSA) and an age-based survey model (SURBA) were used.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.65$, $B_{pa} = 315,000$ t. Without a reliable assessment for the whole time period, no revised reference points can be proposed.

**STOCK STATUS:** The available information is inadequate to evaluate the spawning stock in relation to precautionary approach reference points. The assessment is indicative of trends only. The stock is estimated at or near the lowest observed level. Landings and fishing mortality remain at a low level.
**RECENT MANAGEMENT ADVICE:** ICES’ advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of the North Sea (Section 16) and advises minimum by-catch of cod. In the light of the low estimate of stock size in combination with the low recent landings with indication of current low exploitation rates, ICES recommends that the human consumption landings in 2007 should not be allowed to increase above the recent (2003–2005) average of 15 100 t for Subarea IV and Division VIIId.

**STECF COMMENTS:** STECF agrees with the stock specific advice from ICES. However, in the absence of an analytical catch forecast, STECF is unable to determine the stock specific consequences in short term.

2.109. **Whiting (Merlangius merlangus), Skagerrak & Kattegat (IIIa)**

**FISHERIES:** The majority of whiting landed from the Skagerrak and Kattegat are taken as by-catch in the small-mesh industrial fisheries. Some are also taken as part of a mixed demersal fishery. As in the North Sea stock, landings decreased drastically and were below 1,000 t since 2000; nominal landings in 2005 were about 140 t while TACs was set at 1,500 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for whiting in the Skagerrak and Kattegat.

**STOCK STATUS:** The available information is inadequate to evaluate spawning stock or fishing mortality. It is likely that this stock is linked to the North Sea stock.

**RECENT MANAGEMENT ADVICE:** The landings in 2007 should be less than 1 500 t as a precautionary value to restrict the potential for re-expansion of the fishery and misreporting from other regions.

**STECF COMMENTS:** STECF agrees with the ICES advice. However, in the absence of an analytical catch forecast, STECF is unable to determine the stock specific consequences in short term.

2.110. **Whiting (Merlangius merlangus) Vb (EU zone), VI, XII & XIV**

**FISHERIES:** The fishery is restricted to Division VIa where whiting are taken as part of a mixed roundfish fishery, as well as a by-catch in fisheries for *Nephrops*. Scottish trawlers take most of the whiting catch in Division VIa. Since 1976, Scottish heavy trawl and seine effort has declined, whilst that of light trawlers has generally increased. Ireland and France take smaller proportions of the catch and all the remaining catch is taken by EU vessels. Approximately 50% of the total catch in weight is discarded. Since 1987, human consumption landings have declined from about 11,500 t to an historic low of 175 t reported officially in 2005. Emergency EU measures directed towards cod protection were established in the first half of 2001 and led to short-term area closures in the north of the Division VIa and, on a smaller scale, in the Clyde Sea area. The Clyde closure continued in 2002-2004 under national UK legislation.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. A survey based assessment was used to evaluate trends in SSB and recruitment.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.6$, $B_{pa} = 22,000$ t.

**STOCK STATUS:** Long-term information on the historical yield and catch composition all indicate that the present stock size is low. A survey-based assessment covering the more recent period indicates that the stock is at its lowest level over this time period. Total mortality is at the highest level over the time period.
**RECENT MANAGEMENT ADVICE:** ICES’ advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of the West of Scotland (Section 16) advising no catch or discards of cod. Catches in 2007 should be reduced to the lowest possible level. Survey and catch-at-age data are inconsistent, indicating substantial unaccounted removals. Based on the survey data the stock is at a low level similar to the one in the early 1990s but official catches are now much lower than during this period; however, the exact catch level is not known.

**STECF COMMENTS:** STECF agrees with the ICES advice.

**2.111. Whiting (Merlangius merlangus) in VIIa (Irish Sea)**

**FISHERIES:** Whiting is taken mainly as a by-catch in mixed-species otter trawl fisheries for Nephrops, cod, and other demersal species. Landings of whiting by all vessels, and discards of whiting estimated for *Nephrops* fisheries, have declined substantially. From 1989 to 2003, landings declined from 11,300 t to about 204 t. Catch figures for 2005 remained unreliable with only 62.2 t officially reported. Only EU vessels exploit the stock, with the UK and Ireland accounting for the majority of the landings, with smaller quantities taken by Belgium and France. Due to the small catches and low value of the catch, a high proportion of whiting are discarded mostly in the Nephrops fishery.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The last analytical assessment was undertaken in 2003 based on a catch-at-age analysis using catch estimates and the western Irish Sea survey. There has been no analytical assessment carried out for this stock since then. An analytical assessment was not possible this year because catch figures remain unreliable and because of poor internal and external consistency in the survey.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are $F_{pa} = 0.65$, $B_{pa} = 7,000$ t.

**STOCK STATUS** Long-term information on the historical yield and catch composition all indicate that the present stock size is low. The last assessment in 2003 indicated a decrease in SSB of a factor of 10 from 1980s to the 1990s. Survey information from the 1990s indicates that the stock has remained at the low level.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock is presented in the context of mixed fisheries and is found in Section 16.3. On the basis of the stock status ICES advises that catches of whiting in 2007 should be the lowest possible.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that in October 2003, ICES recommended that given the very low stock size, the recent poor recruitments and the continued substantial catch, a recovery plan which ensures a safe and rapid rebuilding of SSB to levels above $B_{pa}$ should be implemented. Such a recovery plan must include a provision for zero catch until the estimate of SSB is above $B_{lim}$ or other strong evidence of rebuilding is observed. STECF agrees with the ICES comments that fishing mortality cannot be managed by a TAC on whiting, and measures restricting landings alone will not be sufficient to allow recovery of the stock. There are reports of significant non-reported landings and therefore the current implementation of the TAC system is not able to restrict fishing. Unless management measures are able to restrict the fishery within TAC limits they are not precautionary. Adequate monitoring of implemented technical measures such as square mesh panels is required to evaluate their effect on whiting.
2.112. **Whiting (Merlangius merlangus) in VIIb-k**

The assessment for this management unit only covers VIIe-k, it does not include whiting from VIIb-c.

**FISHERIES:** Celtic Sea whiting are taken in mixed species (cod, whiting, hake, *Nephrops*) fisheries. French trawlers account for about 60% of the total landings, Ireland takes about 30%, and the UK (England and Wales) 7%, while Belgian vessels take less than 1%. The French *Nephrops* trawlers have for several years adopted a larger mesh, following bycatch restrictions and market demand for larger *Nephrops*. Catch levels peaked in the late nineties with over 24,000 t recorded (according to Official Statistics) and subsequently declined to less than 9893 t in 2004. The quality of catch figures in 2005 is uncertain with only 5428 t officially recorded. There is substantial discarding above the minimum landing size due to economic or other factors. Management regulations, particularly effort control regimes in other areas (VIIa, VI, & IV), became increasingly restrictive in 2004 and 2005 and resulted in a displacement of effort into the Celtic Sea. Some spatial restrictions on fishing were implemented in 2005 and early 2006, the effect of these has not so far been evaluated.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. Advice is based on an assessment, which is indicative, or trends only. Discarding is considered to be significant and the assessment does not include discard information. Not including discards biases the recruit estimates. There are conflicting signals and considerable noise in the survey data as well as some concerns about the accuracy of the landings statistics in some fleets. These factors mean that no reliable assessment and forecast could be provided.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference point for biomass is $B_{pa} = 21,000t$. No precautionary reference point for fishing mortality has been proposed for whiting in VIIb-k.

**STOCK STATUS:** The available information is inadequate to evaluate the spawning stock in relation to precautionary approach reference points. The assessment is indicative of trends only. The stock is estimated to have declined in recent years as the strong 1999 year-class passed through the fishery. There are some indications that recent recruitment has been low and stable. Fishing mortality was very high during the 1980s and decreased in the early 1990s; the estimates of recent fishing mortality are variable.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 16.4. Although the current estimates of $F$ and $SSB$ are uncertain, $F$ in recent years has been reduced and $SSB$ is probably above $B_{pa}$. In this context the stock should be managed by ensuring that the effort is not allowed to increase. ICES did not provide any recommendation on levels of catch.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF agrees with the ICES observation that considerable part of the whiting catch is discarded. Any measure to reduce discarding and to improve the fishing pattern should be encouraged. Such measures might include increased cod-end mesh size, square mesh panels, separator trawls, and increased top sheet mesh in towed gears.

2.113. **Whiting (Merlangius merlangus) - VIII**

STECF did not have access to any stock assessment information on whiting in this area.

2.114. **Whiting (Merlangius merlangus) - IX, X**

STECF did not have access to any stock assessment information on whiting in this area.
2.115. Witch (Glyptocephalus cynoglossus) in the North Sea

STECF did not have access to any stock assessment information on witch in this area.

3. Other stocks of the North East Atlantic of Community Interest

3.1. Deep-water fish (several species) in the Northern North Sea (IVA), IIIa, Vb, VI, VII, VIII, IX, X and XII.

The STECF Summary review and advice for deep-water fish in these areas is given in Part 1 of the Review of Advice for 2007.

3.2. Sardine (Sardina pilchardus) in VIIIc and IXa

**FISHERIES:** Sardine in these Divisions are exploited by purse seiners from Portugal and Spain. Historically during the last 55 years landings have fluctuated with periods of high landings during the 40’s, 60’s, 80’s, and low landings during the 50’s, 70’s and 90’s. The total catch in 2005 was 97,292 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment is based on combined Spanish and Portuguese March acoustic surveys, a DEPM (Daily Egg Production Method) survey series, and catch-at-age data. These have been analysed in a flexible age-structured model, combining these fishery-independent indices of abundance and catch-at-age information.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary approach reference points have been identified for sardine stock.

**STOCK STATUS:** ICES indicated that the state of the stock could not be evaluated with regard to biological reference points. The assessment indicates SSB was 386,000 t in 2005 and is expected to increase in 2006. The strong 2000 year-class contributed to rebuild the biomass to an average level. The 2004 year-class is confirmed to be strong and its contribution to the SSB in 2006 is considerable. Fishing mortality has been stable since 2002.

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. ICES recommends that fishing mortality should not increase above the 2003-2005 level of 0.21, corresponding to a catch of less than 114,000 t in 2007.

**STECF COMMENTS:** STECF agrees with ICES advice. STECF notes that the SSB is considered by ICES to be at an intermediate abundance in 2005 considering the stock in the last 10 years. The strong 2000 year-class appears to have been depleted faster than strong year-classes from the 1980s, and the 2002 and 2003 year-classes were weak. STECF further notes that the stock is now more dependent on the strength of the incoming recruitment than hitherto.

4. Stocks of the North West Atlantic (NAFO)

4.1. American plaice (Hippoglossoides platessoides) in Divisions 3L, 3N and 3O

**FISHERIES:** Historically, American plaice in Div. 3LNO, has comprised the largest flatfish fishery in the Northwest Atlantic.
In most years the majority of the catch has been taken by offshore otter trawlers. Catches decreased sharply from 40,000 tons in 1988 to 600 tons in 1995, but an increasing trend has been observed since then and remained at these levels until 2005. Total catch in 1999 was 2,565 tons, above the 1998 level of 1,600 tons. There was no directed fishing in 1994 and this fishery is under a moratorium since 1995. Total catch in 2005 was 4,110 tons, mainly taken in the Regulatory Area, and as by-catch in the Canadian yellowtail flounder fishery.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on biomass and abundance data from several surveys as well as on age sampling from Canadian by-catch and length, sampling from Russia, EU-Spain and EU-Portugal. An analytical assessment using the ADAPTive framework tuned to the Canadian spring and autumn surveys was used.

**PRECAUTIONARY REFERENCE POINTS:** No good recruitment has been estimated for this stock at SSB below 50,000 tons and this is currently the best estimate of Blim.

**STOCK STATUS:** The assessment concluded that SSB declined to the lowest observed levels in 1994 and 1995 and remains very low at just over 23,000 tons. Considering the stock is under moratorium, average $F$ is high. Based on overall indices for the current year, there is nothing to indicate a change in the status of this stock.

**RECENT MANAGEMENT ADVICE:** Scientific Council reiterates its recommendation for no directed fishing on American plaice in Div. 3LNO in 2006 and 2007. By-catches should be kept to the lowest possible level and restricted to unavoidable by-catch in fisheries directing for other species. Efforts should be made to reduce current levels of by-catch.

**STECF COMMENTS:** STECF agrees with the advice from NAFO remarking that the level of catches is too high for a stock under moratorium. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

### 4.2. American plaice (*Hippoglossoides platessoides*) in Divisions 3M (Flemish Cap)

**FISHERIES:** On Flemish Cap, the stock of American plaice mainly occurs at depths shallower than 600 m. Catches of Contracting Parties, in recent years, are mainly taken as by-catch in trawl fisheries directed at other species in this Division. Nominal catches increased during the mid-1960s, reaching a peak of about 5,300 tons in 1965, followed by a sharp decline to values less than 1,100 tons till 1973. Since 1974, when this stock became regulated, catches ranged from 600 t (1981) to 5,600 t (1987). Subsequently, catches declined to 275 t in 1993, caused partly by a reduction in directed effort by the Spanish fleet in 1992. The catch for 2005 was estimated to be 50 t. From 1979 to 1993 a TAC of 2,000 t was agreed for this stock. A reduction to 1,000 tons was agreed for 1994 and 1995 and a moratorium has been in place since 1996.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on biomass and abundance data from surveys carried out by USSR/Russia (1972-2002), EU (1988-2005) and Canada (1978-1986). Age-length keys were available from EU surveys (1988-2005). Length compositions were available from the 1988 to 2005 fisheries. In 2005 an analytical assessment was performed.

**PRECAUTIONARY REFERENCE POINTS:** Based on the 16 points available from the XSA to examine a stock/recruitment relationship, a proxy for Blim will be 5,000 tons of SSB.

**STOCK STATUS:** The stock biomass and the SSB are at a very low level and there is no sign of recovery.

**RECENT MANAGEMENT ADVICE:** There should be no directed fishery on American plaice in Div. 3M in 2007 and 2008. Bycatch should be kept at the lowest possible level.
STECF COMMENTS: STECF agrees with the advice from NAFO. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

4.3. Capelin (*Mallotus villosus*) in Division 3N and 3O.

FISHERIES: There has not been a directed fishery since 1993 when a moratorium was established, and no commercial catches have been reported since then.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. Capelin catches from Canadian bottom trawl surveys conducted in 1990-2004, as well as historical data sets from Russian and Canadian trawl acoustic surveys directed to capelin.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The only indicator of stock dynamics presently available is capelin biomass indices obtained during Canadian stratified-random bottom trawl surveys. The estimate of 2004 corresponds to a low level of stock size that was observed in 1996, 2002-2003.

RECENT MANAGEMENT ADVICE: Scientific Council noted that NAFO recognizes the role that capelin play in the Northwest Atlantic ecosystem as a very important prey species for fish, marine mammals and seabirds. Scientific Council recommends no directed fishery on capelin in Div. 3NO in 2006-2007.

STECF COMMENTS: STECF agrees with the advice from NAFO.

4.4. Cod (*Gadus morhua*) in Division 2J, 3K and 3L.

STECF did not have access to any new information on the stock of cod in NAFO Divisions 2J, 3K, L, hence the text below is reproduced from the Annual Review of advice for 2005 (SEC(2005)266).

FISHERIES: Considerable uncertainty exists about the structure of the Div. 2J+3KL stock. The available tagging, genetic, survey and biological data are consistent with the two hypotheses: a) the inshore population constitutes a separate subpopulation that is functionally separate from the one offshore; and b) the inshore and offshore fish together constitute a single functional population.

The only over-wintering aggregation of cod known to exist occurs in a deepwater inlet in northern Div. 3L: Smith Sound. Fish from this aggregation migrate seasonally out of the sound in the spring, mainly northward in Div. 3L and southern Div. 3K, supporting most of the commercial fishery which has taken place in the fall over the last three years. Elsewhere densities are extremely low throughout the stock area, with the exception of the southern portion of Subdiv. 3L where there is a seasonal migration of fish from Subdiv. 3Ps. This migration was much reduced in 2000.

Prior to the 1960s the Div. 2J and 3KL cod stock supported fisheries catching from 200,000 t to 300,000 t annually. During the 1960s, good recruitment, together with high exploitation rates, resulted in catches averaging about 580,000 t. The total catch peaked at 800,000 t in 1968. However the stock was in a period of decline from the 1960s until the mid-1970s. Reduced exploitation and some improved recruitment after that time, allowed the stock to increase until the mid-1980s, when catches were about 230,000 t. The rapid decline in the resource in the early-1990s led to reduced TACs and eventually to a moratorium on commercial fishing in 1992. A recreational fishery was permitted in 1992-94, 1996, 1998 and 1999 but not in 1995 and 1997. Catches also came from sentinel surveys in 1995-99 and a commercial Index fishery in 1998.
commercial fishery was reopened in 1999 with a TAC of 9,000 tons for the inshore areas only; in 2000 a TAC of 7,000 tons was established for sentinel surveys and a commercial index fishery in the inshore for vessels under 65 feet; and in 2001, 2002 and 2003 a TAC of 5,600 tons for commercial fishery. Total landings were of 4,900 tons in 2002 and 3,500 tons in 2003. The directed commercial and recreational fisheries were closed indefinitely in April 2003.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is Canada’s FRCC (Fisheries Resource Conservation Committee). NAFO Scientific Council is requested by the Coastal State of Canada to provide advice on the status of the stock but does not make management recommendations. The advice is based on data coming from a different source: Abundance and biomass indices were available from bottom-trawl surveys in autumn and spring (Div. 3L only). Removals-at-age in 2001 were available from the limited by-catch data, the sentinel survey, a food/recreational fishery and the commercial fishery. Exploitation rates were derived from inshore tagging studies. Data on growth and maturity were also available.

The last full analytical assessment of this stock was attempted in February 2003.

**PRECAUTIONARY REFERENCE POINTS:** Under the hypothesis of a single functional population (hypothesis a) a tentative spawner biomass limit reference point of 200,000 tons was suggested.

**STOCK STATUS:** The stock as a whole remains at a very low level. Total and spawning biomass indices are both extremely low relative to historic levels. Year-classes recruiting in the 1990s have been extremely weak.

The new information considered in the stock status update (2003) substantially increases the concerns noted in the 2001 assessment, regarding the sustainability of current levels of fishing, and found that there was no evidence of a recovery and considered that any fishery in the inshore would delay recovery.

**RECENT MANAGEMENT ADVICE:** For the bank sub-stocks to allow a sentinel fishery only with by-catch in fisheries directed to other species. It implies a capture of 1000t-1500t, with local management, which according to the FRCC would not impede stock growth. There are also four other management options that go from the Status Quo (TAC=5600 tons) to the total closure of the fishery and a mix of them (to allow some bycatch and a sentinel fishery which implies a TAC not lower than 2500 tones). The aim of the stock management is to rebuild the SSB up to 150,000 tons.

**STECF COMMENTS:** STECF agrees with the advice given by the FRCC. However, STECF notes that the results of the management options evaluated by FRCC are presented in the report of FRCC as qualitative statements. STECF urges that quantitative results of these evaluations should be presented in full to permit scrutiny by non FRCC scientists.

### 4.5. Cod (*Gadus morhua*) in Division 3M (Flemish Cap)

**FISHERIES:** The cod fishery on Flemish Cap has traditionally been a directed fishery by Portuguese trawlers and gill-netters, Spanish pair-trawlers and Faeroese long liners. Cod has also been taken as by-catch in the directed redfish fishery by Portuguese trawlers. Small amounts of cod are taken as a by-catch in the shrimp fishery by Canada and Norway based on observer data from these fleets in 1993-95, and were reported null in the Icelandic fishery in 1995 and 1996. The by-catch of cod in the past Russian pelagic fishery for redfish was also low.

Apart for the period 1995-1998, catches exceeded the agreed TAC from 1988 to 1994. Large numbers of small fish were caught by the trawl fishery in the most recent years. By-catches are estimated to have been low in the shrimp fishery since 1993. The directed fisheries since 1996 were very small compared with previous years. In 1999 the fishery was closed and catches were
estimated in that year as 353 tons, most of them taken from non-Contracting Parties based on Canadian Surveillance reports. Those fleets were not observed in 2000, 2001 or 2002, and catches were reduced to 55, 37 and 33 tons respectively, mainly obtained as by-catch of the redfish fishery. The catches were 19 tons in 2005.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. Several bottom trawl surveys have been conducted by Canada (1996) and EU (1988 to 2005). The last EU-bottom trawl survey was conducted in 2005 and data of the survey series from 1988 to 2002 were converted to the scale of the new vessel Vizconde de Eza introduced in 2003. The biomass level observed in the period 1998-2005 by the EU survey is 17 times below the observed mean in the 1988-1993 period.

PRECAUTIONARY REFERENCE POINTS: There are uncertainties about the precision of the SSB and recruitment estimates. Nevertheless, the SSB-recruitment plot from the VPA shows that there was reduced recruitment at SSBs below 14,000 tons, and this value might be considered as a preliminary estimate of \( B_{lim} \).

STOCK STATUS: The stock remains at a very low level. Although the abundance at age 1 in 2005 was the highest observed since 1993, it was well below in comparison to the pre-1993 level and, therefore, it is not expected that the stock will recover in the foreseeable future.

RECENT MANAGEMENT ADVICE: In 2006, NAFO advised that there should be no directed fishery for cod in Div. 3M in years 2007 and 2008. Also, bycatch of cod in fisheries directed to other species on Flemish Cap should be kept at the lowest possible level.

STECF COMMENTS: STECF agrees with the advice from NAFO. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

4.6. Cod (\textit{Gadus morhua}) in Divisions 3N and 3O

FISHERIES: Nominal catches increased during the late 1950s to the early 1960s, reaching a peak of about 227,000 t in 1967. During the period from 1979 to 1991, catches ranged from 20,000 t to 50,000 t. The continued reduction in recommended TAC levels contributed to reduced catches in recent years, which reached a level of 10,000 tons in 1993. There has been no directed fishery for cod in 3NO since February 1994. The estimated by-catch increased in 2003 but has decreased (to 900 tons) in 2004. The total catch of cod for 2005 in Div. 3NO from all fisheries was estimated to be 700 tons.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. Length and age composition data were available from the 2003 and 2004 fisheries to estimate the total removals at age. Canadian spring and autumn survey data provided abundance, biomass and age structure information. Canadian research survey data for young fish were available up to 1994. An analytical assessment was presented to estimate population numbers in 2006.

PRECAUTIONARY REFERENCE POINTS: The limit reference point for biomass is \( B_{lim} = 60,000 \) t. NAFO Scientific Council also concluded that in the recent period of low productivity, there are indications that recruitment is further reduced when spawning stock biomass is 30,000 t. The NAFO Scientific Council plans to review the biological reference points for this stock in the context of the PA framework. Simulations suggest that recovery time for this stock will largely depend upon which recruitment regime prevails in the future. The yield expected under the current low recruitment regime is about one-tenth of that expected from recruitment levels that existed in the 1960s and 1970s.

STOCK STATUS: In 2005 the assessment concluded that the total biomass and spawning biomass were estimated to be at extremely low levels. Based on overall indices for current year, there is nothing to indicate a change in the status of this stock.
RECENT MANAGEMENT ADVICE: There should be no directed fishing for cod in Div. 3N and Div. 3O in 2007. Bycatches of cod should be kept to the lowest possible level and restricted to unavoidable by-catch in fisheries directed for other species. Efforts should be made to reduce current levels of by-catch.

STECF COMMENTS: STECF endorses the advice from NAFO remarking that the levels of catches are too high for a stock under moratorium. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

4.7. Greenland Halibut (Reinhardtius hippoglossoides) in Sub-area 2 and Divisions 3KLMNO

FISHERIES: TACs prior to 1995 were set autonomously by Canada; subsequent TACs have been established by Fisheries Commission. Catches increased sharply in 1990 due to a developing fishery in the NAFO Regulatory Area in Div. 3LMNO and continued at high levels during 1991-94. The catch was only 15 000 to 20 000 tons per year in 1995 to 1998 as a result of lower TACs under management measures introduced by the Fisheries Commission. The catch increased since 1998 and by 2001 was estimated to be 38 000 tons, the highest since 1994. The estimated catch for 2002 was 34 000 tons. The 2003 catch could not be precisely estimated, but was believed to be within the range of 32 000 tons to 38 500 tons. A fifteen year rebuilding plan has been implemented by Fisheries Commission for this stock. The catches in 2004 and 2005 were 25 500 and 23 000 tons, which exceed the rebuilding plan TACs by 27% and 22%, respectively.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. The advice is based on CPUE data from otter trawl fisheries throughout the stock and the Portuguese otter trawl fishery in the Regulatory Area of Div. 3LMN. Abundance and biomass indices were available from Canadian (1978-2005) in 2J+3KLMNO, EU in 3M (1988-2005), and EU-Spain (1995-2005) research vessel surveys. The Canadian autumn surveys in 1996 to 1999 covered most of the stock distribution, including Div. 2GH. International commercial catch-at-age data were updated from 1989-99 providing a series from 1975 to 2005. An analytical assessment using Extended Survivors Analysis (XSA) tuned to the Canadian spring (Div. 3LNO; 1996-2005), autumn (Div. 2J, 3K; 1996-2005) and the EU (Div. 3M; 1995-2005) surveys was used to estimate the 5+ exploitable biomass, level of exploitation and recruitment to the stock. Natural mortality was assumed to be 0.20 for all ages.

PRECAUTIONARY REFERENCE POINTS: The current assessment results are not considered sufficiently reliable to allow estimation of formal reference points in quantitative terms. For this stock $F_{\text{max}}$ is computed to be 0.26 and $F_{0.1}$ is 0.15 based upon average weights and partial recruitment for the past 3 years. Scientific Council noted that fishing mortality should be reduced to a level not higher than $F_{0.1}$ in order to provide a consistent increase of the 5+ exploitable biomass.

STOCK STATUS: The exploitable biomass has been declining in recent years and is presently estimated to be at its lowest observed level. Recent recruitment has been below average, and fishing mortality has increased substantially in recent years, and is currently estimated very high.

RECENT MANAGEMENT ADVICE: Scientific Council noted that the 2004 and 2005 catches of 25 500 and 23 000 tons exceeded the rebuilding plan TAC by 27% and 22% respectively. Projections were conducted assuming that the catches in 2006 to 2007 do not exceed the rebuilding plan TAC (18 500 and 16 000 tons, respectively) and with catches in excess of 20%. Catches in 2008 were assumed equal to the 2007 removals. Projection results (see figures below) indicate that for both scenarios fishing mortality is projected to remain relatively high, and
projected biomass remains below the exploitable biomass in 2003 when the FC rebuilding plan was implemented. Scientific Council noted that in all of these projection scenarios, the 2009 exploitable biomass remains well below the target level of biomass specified in the FC rebuilding plan. Scientific Council noted that if in the remaining rebuilding plan, TACs are exceeded, the prospects for rebuilding would be further diminished.

**STECF COMMENTS:** STECF is aware of the severe decline suffered in this stock and agrees with the advice given by NAFO. However, STECF notes that there is considerable uncertainty regarding the absolute level of this stock and recommends that NAFO continues reducing some of the discrepancies in the stock indicators. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

### 4.8. Greenland Halibut (*Reinhardtius hippoglossoides*) in Sub-area 0 + Division 1A Offshore and Divisions 1B-1F

**FISHERIES:** Before 1984, USSR and GDR conducted trawl fisheries in the offshore part of Div. 0B. In the late-1980s catches were low and mainly taken by the Faeroe Islands and Norway. In the beginning of the 1990s catches taken by these two countries increased and Canada, Russia and Japan entered the fishery. In 1995 a Canadian gillnet fishery began. In 1997 and 1998 only Faeroe Island and Canada conducted a fishery in the area. Besides Canadian trawlers, trawlers from four different countries chartered by Canada participated in the trawl fishery in Div. 0A in 2001-2003. In 2004 all catches (3 740 tons) in Div. 0A were taken by Canadian vessels, almost exclusively trawlers.

In Div. 1A offshores and Div. 1B-1F almost all catches are taken offshore mainly by trawlers from Japan, Greenland, Norway, Russia, Faeroe Islands and EU (mainly Germany).

Due to an increase in offshore effort, catches increased from 2 000 tons in 1989 to 18 000 tons in 1992 and have remained at about 10 000 tons annually until 2000. Since then catches have increased gradually to 20 000 tons in 2003 primarily due to increased effort in Div. 0A and in Div. 1A. Catches dropped slightly in 2004 but was back at 20 000 ton in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on catch-at-age data from Div. 0B and Div. 1CD. Unstandardized catch rates were available from Div. 1AB and Div. 1CD. Biomass estimates from deep-sea surveys in 2005 were available from Div. 1CD. Recruitment data were available from Div. 1A-1F from 1989-2005. No analytical assessment could be performed.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Length compositions in the catches have been stable in recent years. Based on survey indices from Div. 1CD the stock has been increasing since 1994 and is now at the level of the late 1980s and early 1990s.

**RECENT MANAGEMENT ADVICE:** In 2006, NAFO advised that considering the relative stability in biomass indices and CPUE rates, for Greenland halibut in Div. 0B and 1C-1F the TAC for year 2007 should not exceed 11,000 tons.

Except for an update of the unstandardized catch rates in Div. 1A and the Greenland shrimp survey there was no new information in 2005 from Div. 0A and Div. 1A off shore + Div. 1B. Scientific Council advises that TAC in Div. 0A and Div. 1A offshore + Div. 1B for 2007 should not exceed 13 000 tons.

**STECF COMMENTS:** STECF endorses the advice from NAFO enforcing the recommendations given by the STACFIS of continuing the investigations of by-catch of juvenile
Greenland Halibut and the discards of it and the update of the CPUE series and catch-at-age for Greenland halibut from Div. 0B. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

4.9. Shrimp (*Pandalus borealis*) in Division 3M (Flemish Cap)

**FISHERIES:** The shrimp fishery in Div. 3M began in late-April 1993. Initial catch rates were favourable and, shortly thereafter, vessels from several nations joined. Since 1993 the number of vessels ranged from 46-110, and in 2002 there were approximately 40 vessels fishing shrimp in Div. 3M. Vessels from 16 nations have participated in this fishery. Total catches were approximately 27,000 tons in 1993, increased to 48,000 tons in 1996, declined in 1997 and increased steadily through 2000. Catches in 2004 were 45 000 tons then dropped during 2005 and 2006 to 11 500 tons and 3 700 tons (to September). The fishery was unregulated in 1993. Sorting grates and related by-catch regulations were implemented in 1996 and have continued to the present day.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on catch, effort and biological sampling data from trawlers from several nations. A standardised CPUE index was developed to account for changes in gear (single and double trawl), fishing power and seasonality. Time series of size and sex composition data were available from three countries and survey indices from the Faeroes (1997-2003) and EU bottom-trawl (1988-2005) surveys. A new research vessel was introduced in the EU survey in 2003. The biomass indices have been converted for years 2003 and 2004. No analytical assessment was possible in 2005 and fishing mortality is unknown. The interpretation of stock status is based upon interpretation of commercial fishery and research survey data.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Stock size indicators have been stable since 1998. The 2001 and 2002 year-classes are both above the average and are likely to contribute to the fishery in 2005 and 2006.

**RECENT MANAGEMENT ADVICE:** The stock appears to have sustained an average annual catch of about 48,000 tons since 1998 with no detectable effect on stock biomass. Among the year-classes that will be the main contributors to the fishery over the next few years, the 2000 year-class seems weak and the 2001 and 2002 year-classes appear above average. The Scientific Council advises a catch of 48,000 tons for 2006. Scientific Council concluded that there was no basis for change in the 2007 advice for this stock.

**STECF COMMENTS:** STECF agrees with the advice from NAFO.

4.10. Redfish (*Sebastes spp.*) in Divisions 3L and 3N

There are two redfish species of commercial importance in Div. 3LN: deep-water redfish (*Sebastes mentella*) and Acadian redfish (*Sebastes fasciatus*). These are very similar in appearance and are reported collectively as redfish in statistics. The relationship to adjacent NAFO Divisions, in particular to Div. 3O, is unclear and further investigations are necessary to clarify the integrity of the Div. 3LN management unit.

**FISHERIES:** In the early–1980s, the former USSR, Cuba and Canada were the main fleets targeting redfish. The rapid expansion of the fishery in 1986 and continued high catch in 1987 and 1988 was due to new entrants, primarily EU-Portugal and various non-Contracting Parties, most notably South Korea, Panama and the Cayman Islands. These countries accounted for a
catch of about 24,000 t in 1988. In the period from 1988 to 1994 they took between 1,000 t and 19,000 tons annually; however, since 1994 they have not fished in the area.

Catches averaged about 22,000 tons from 1959 to 1985, increased sharply to an historical high of 79,000 tons in 1987 and then declined steadily to about 450 tons in 1996. Catch increased to 900 tons by 1998 the first year under a moratorium on directed fishing, with a further increase to 2,600 tons in 2000. Catches declined gradually in 2001-2003 and stabilized in 2004-2005 at 650 tons level.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on USSR/Russian (1984-94) and Canadian (1978-05) bottom trawl surveys data. No analytical assessment was possible for this stock, this year.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The assemblage of Div. 3L and 3N survey indices, in order to give a picture of the relative size of this redfish management unit as a whole, suggests that stock was higher in the mid-2000s than in the early 1990s in terms of, biomass and female spawning biomass. However the considerable inter-annual variability of the survey indices, together with generally high (or very high, for some years) associated errors, makes difficult to quantify the relative magnitude of this increase.

Estimates of exploitation rate suggest that fishing mortality should be at a very low level when compared to the first half of the 1990s and that recent level of catches have not altered the upward trend of the stock, as shown by both spring and autumn surveys.

**RECENT MANAGEMENT ADVICE:** Scientific Council advises no directed fishing for redfish in Div. 3LN in year 2007 and that by-catches of redfish in fisheries targeting other species should be kept at the lowest possible level. STACFIS recommended that an update of the Div. 3L redfish bycatch information from the shrimp fishery be compiled on an annual basis, including the estimated weights and numbers of redfish caught annually as well as their size distribution.

**STECF COMMENTS:** STECF agrees with the advice from NAFO. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

### 4.11. Redfish (Sebastes spp.) in Division 3M

There are 3 species of redfish, which are commercially fished on Flemish Cap: deep-water redfish (Sebastes mentella), golden redfish (Sebastes marinus) and Acadian redfish (Sebastes fasciatus). The present assessment evaluates the status of the Div. 3M beaked redfish stock, regarded as a management unit composed of two populations from two very similar species (Sebastes mentella and Sebastes fasciatus). The reason for this approach is that evidence indicates this is by far the dominant redfish group on Flemish Cap.

**FISHERIES:** The majority of the commercial bottom trawl catches are composed of beaked redfish (Sebastes mentella and Sebastes fasciatus). The Div. 3M redfish stocks have been exploited in the past both by pelagic and bottom trawlers from the former USSR, former GDR and Korean non-Contracting party vessels. The redfish fishery in Div. 3M increased from 20,000 t in 1985 to 81,000 t in 1990, falling continuously since then until 1998-1999, when a minimum catch around 1,100 t was reported, mostly as a by-catch in the Greenland halibut fishery. The decline in the Div. 3M redfish catches from 1990 to 1999 is related with the simultaneous quick decline of the stock biomass and fishing effort. Catches increased to a somewhat higher level during 2000-2002 (around 3,000 tons) In 2004-2005 beaked redfish catch returned to the 3 000 tons level, with EU-Portugal consolidating its major role in the present fishery.
**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on catch-at-age data from 1989-2005 including by-catch information from the shrimp fishery. Catch rate data for 1959-93 are available from the NAFO database. Biomass indices as well as length and age data are provided by Russian (1983-93, 1995-96, and 2001-02), EU (1988-2005) and Canadian (1979-85 and 1996) surveys. In June 2003 a new Spanish research vessel, the RV Vizconde de Eza replaced the RV Cornide de Saavedra that had carried out the EU survey surveys with the exception of the years of 1989 and 1990. In order to preserve the full use of the 1988-2002 survey indices available, the original time series of mean catch per tow, biomass and abundance at length distributions for beaked redfish have been converted to the new vessel units so that each former time series could be comparable with the correspondent new indices obtained since 2003 with the RV Vizconde de Eza.

**PRECAUTIONARY REFERENCE POINTS:** No updated information on biological reference points is available in 2006.

**STOCK STATUS:** In 2005, survey biomass and abundance continue to increase, supported by the survival and growth of the above average 1998 and 2000 year-classes. Survey exploitable biomass and female spawning biomass record important and consistent increases as well that confirms the full assessment of this stock carried out in 2005.

**RECENT MANAGEMENT ADVICE:** In order to maintain relatively low fishing mortalities so as to promote stock recovery, The Scientific Council recommends that catch for Div. 3M redfish in year 2007 be in the range of 3 000-5 000 tons. The by-catch of juvenile redfish in the shrimp fishery should be kept at the lowest possible level. STACFIS recommended that an update of the Div. 3M redfish bycatch information be compiled on an annual basis, including the estimated weights and numbers of redfish caught annually in the Div. 3M shrimp fishery as well as their size distribution.

**STECF COMMENTS:** STECF endorses the advice from NAFO. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

**4.12. Redfish (Sebastes spp.) in Sub-area 1**

There are two redfish species of commercial importance in Sub-area 1: golden redfish (Sebastes marinus) and deep-sea redfish (Sebastes mentella). These are very similar in appearance and are reported collectively as redfish in statistics. Their relationship to other north Atlantic redfish stocks is unclear.

**FISHERIES:** Historically, redfish were taken mainly as a by-catch in the trawl fisheries for cod and shrimp. However, occasionally during 1984-86, a directed fishery on redfish was observed for German and Japanese trawlers. With the collapse of the Greenland cod stock during the early-1990s, resulting in a termination of that fishery, catches of commercial sized redfish were taken inshore by long lining or jigging and offshore in shrimp fisheries only. Recent catch figures do not include the weight of substantial numbers of small redfish discarded by the trawl fisheries directed at shrimp.

In 1977, total reported catches peaked at 31,000 t. During the period 1978-83, reported catches of redfish varied between 6,000 t and 9,000 t. From 1984 to 1986, catches declined to an average level of 5,000 t due to a reduction of effort directed to cod by trawlers from EU-Germany. With the closure of the offshore fishery in 1987, catches decreased further to 1,200 t, and have remained at that low level. Redfish is mainly taken as by-catch by the offshore shrimp trawlers;
reported by-catches in both 2004 and 2005 were 500 tons. However, this must be considered an underestimate.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on EU-German groundfish surveys (1982-2005), Greenland-Japan and Greenland deep-sea surveys (1987-95 and 2000), and Greenland bottom trawl surveys (1988-2005).

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS Golden redfish (Sebastes marinus):** The stock of golden redfish in Sub-area 1 remains severely depleted. There are indications that the probability of future recruitment is reduced at the current low SSB. Short-term recovery is very unlikely.

**STOCK STATUS Deep-sea redfish (Sebastes mentella):** The spawning stock of deep-sea redfish in Sub-area 1 remains severely depleted, and an increase is unlikely in a short term. Survey estimates from 2005 showed that the status of both stocks still is very poor.

**RECENT MANAGEMENT ADVICE:** In 2005, NAFO advised that no directed fishery should occur on redfish in Sub-area 1 in 2006 and 2007. By-catches of redfish in the shrimp fishery should be at the lowest possible level. The probability of recovery of the redfish stocks in Sub-area 1 would be enhanced if the by-catch of redfish taken in the shrimp fishery were significantly reduced.

**STECF COMMENTS:** STECF agrees with the advice from NAFO. STECF notes that management decisions on this stock are taken by the coastal state Greenland.

### 4.13. Redfish (Sebastes spp.) in Division 3O

There are two species of redfish that have been commercially fished in Div. 3O; the deep sea redfish (Sebastes mentella) and the Acadian redfish (Sebastes fasciatus). These are very similar in appearance and are reported collectively as redfish in statistics. Most studies the Council has reviewed in the past have suggested a closer connection between Div. 3LN and Div. 3O, for both species of redfish. However, differences observed in population dynamics between Div. 3LN and Div. 3O suggested that it would be prudent to keep Div. 3O as a separate management unit.

**FISHERIES:** Nominal catches have ranged between 3,000 and 35,000 tons since 1960. Up to 1986 catches averaged 13,000 tons then increased to 35,000 tons in 1988. From 2002-2003 catches averaged 17 200 tons then declined dramatically to about 3 800 tons in 2004. Total catch of redfish in 3O was estimated to be 11 300 tons en 2005.

**SOURCE OF MANAGEMENT ADVICE:** Within Canada’s fisheries jurisdiction redfish in Div. 3O have been under TAC regulation since 1974 and a minimum size limit of 22cm since 1995, whereas catch was only regulated by mesh size in the NRA of Div. 3O. The Scientific Council was unable to advice on a TAC in 2003. In September 2004, the Fisheries Commission adopted TAC regulation for redfish in Div. 3O, implementing a level of 20 000 tons per year for 2005-2007. This TAC applies to the entire area of Div. 3O.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Surveys indicate the stock has remained stable since 2001 but at a lower level than the mid-1990s. Based on survey indices for the current year, there is nothing to indicate a change in the status of the stock.

**RECENT MANAGEMENT ADVICE:** Catches have averaged about 13 000 tons since 1960 and over the long term, catches at this level appear to have been sustainable. The Scientific Council noted that over the period from 1960 to 2004, a period of 45 years, catches have
surpassed 20,000 tons in only three years. The Scientific Council noted there is insufficient information on which to base predictions of annual yield potential for this resource. Stock dynamics and recruitment patterns are also poorly understood. The scientific Council is unable to advice on an appropriate TAC for 2006 and 2007.

Differences observed in population dynamics between Div. 3LN and Div. 3O redfish suggest that it would be prudent to keep Div. 3O as a separate management unit from Div. 3LN.

**STECF COMMENTS:** STECF agrees with the advice from NAFO. STECF notes that management decisions on this stock are taken by the coastal states Greenland and Canada.

### 4.14. Roughhead grenadier (*Macrourus berglax*) in Sub-areas 2 and 3

**FISHERIES:** It has been recognised that a substantial part of the recent grenadier catches in Subarea 3, previously reported as roundnose grenadier correspond to roughhead grenadier. The misreporting has not yet been resolved in the official statistics before 1996, but the species are reported correctly since 1997. Roughhead grenadier is taken as by-catch in the Greenland halibut fishery, mainly in Div. 3LMN Regulatory Area.

The level of roughhead grenadier catches in Sub-areas 2 and 3 before the start of the Div. 3LMN Greenland halibut fishery remains uncertain. The average catch since 1990 has been about 4,000 t taken primarily by EU-Portugal and EU-Spain, around 90% of total landings, as by-catch in the fishery directed to Greenland halibut. Catches of roughhead grenadier in 1998 and 1999 increased to 7,200 t, and decreased thereafter to 3,100 tons in 2001. In 2002 they raised again up to 3,700 tons and in 2004 catches decrease to 3,200 tons. A total catch of 1 45 tons was estimated for 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on various bottom trawl surveys, which partially cover the distributional area of the roughhead grenadier population. Additionally, data on depth distribution and biological parameters are available. Because of limited time series, limited coverage and various vessel/gears conducting these surveys, the information is of limited value in determining resource status. It is not possible to provide an estimate of the absolute size of the stock.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for roughhead grenadier in Sub-areas 2 and 3.

**STOCK STATUS:** The biomass level is the highest in the time series from 1995. It should be noted that immature fish constituted 92% of the catch by weight in 2004. Based on overall indices for the current year, there is nothing to indicate a change in the status of the stock.

**RECENT MANAGEMENT ADVICE:** In 2006, NAFO advised that it is not possible to provide any advice for roughhead grenadier in Sub-areas 2 and 3.

**STECF COMMENTS:** STECF agrees with the advice from NAFO.

### 4.15. Roundnose Grenadier (*Coryphaenoides rupestris*) in Sub-areas 0+1

The roundnose grenadier (*Coryphaenoides rupestris*) stock in Davis Strait is probably connected to other stocks in the North Atlantic. The stock component found in Sub-areas 0+1 is at the margin of the distribution area for this species. Canadian and Russian surveys that covered both Subareas 0 and 1 showed that most of the biomass generally was found in Subarea 1.

**FISHERIES:** Recommended TACs were at 8,000 t over the period 1977-95. The advice since 1996 has been that the catches should be restricted to by-catches in fisheries targeting other species. There has been no directed fishery for this stock since 1978. An unknown proportion of
the reported catches of roundnose grenadier are roughhead grenadier (*Macrourus beglax*). A total catch of 12 tons has been reported for 2004 and 23 tons for 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on biomass estimates of roundnose grenadier from surveys in Div. 0B during the period 1986-92, from Div. 1CD during the period 1987-95, from 1CD in 1997-2004 and Div. 0B in 2000-2001. No analytical assessment could be performed in 2005.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for roundnose grenadier in Sub-areas 0+1.

**STOCK STATUS:** The stock of roundnose grenadier is still at the very low level observed since 1993. The biomass of the stock component in SA 0+1 has been at a very low level since 1993 and the stock is composed of small individuals. Recent survey data indicate that the stock biomass is on a very low level and the 2005 survey did not indicate a change.

**RECENT MANAGEMENT ADVICE:** In 2006, NAFO advised that there should be no directed fishing for roundnose grenadier in Sub-areas 0 and 1 in 2006-2008. Catches should be restricted to by-catches in fisheries targeting other species. In 2005 the status of this stock was reviewed and found no significant changes.

**STECF COMMENTS:** STECF endorses the advice from NAFO. STECF notes that management decisions on this stock are taken by the coastal state Greenland.

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4.16. **Northern Shortfin Squid (*Illex illecebrosus*) in Subareas 3 and 4**

The northern short-finned squid (*Illex illecebrosus*) is an annual species (1-year life cycle) and is considered to comprise a unit stock throughout its range in the Northwest Atlantic Ocean, from Newfoundland to Florida including NAFO Sub-areas 3-6.

**FISHERIES:** Catches in Sub-areas 3+4 increased during the late-1970s, averaging 81,000 t during 1976-81, and peaking at 162,000 t in 1979. Catches in Sub-areas 3+4 declined to 100 t in 1986, ranged between 600 and 11,000 t during 1987-95, increased to 15,800 t in 1997. After 1997, catches ranged between 100 tons in 2001 and 2,300 tons in 2004 and 600 tons in 2005. A TAC for Sub-areas 3+4 was first established in 1975 at 25,000 t, but was increased in 1978, 1979 and 1980. The Sub-area 3+4 TAC remained at 150,000 tons during 1980-1998 and was set at 75,000 tons for 1999 and 34,000 tons for 2000-2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for short finned squid in Sub-areas 3+4.

**STOCK STATUS:** Based on the below average biomass index and mean size of squid in the Div. 4VWX survey during 2005, the northern shortfin squid resource in Subareas 3+4 remained in a state of low productivity in 2005.

**RECENT MANAGEMENT ADVICE:** Based on available information, including an analysis of the upper range of yields that might be expected under the present low productivity regime (19 000-34 000 tons), the Council advises that the TAC for 2007 and 2008 be set between 19 000 and 34 000 tons. The advised TAC range is applicable only during periods of low productivity. During periods of high productivity, higher catches and TAC levels are appropriate.

**STECF COMMENTS:** STECF agrees with the advice from NAFO.
4.17. Thorny Skate (*Amblyraja radiata*) in Divisions 3L, 3N and 3O and Subdivision 3Ps

**FISHERIES:** Thorny skate in Div. 3LNO was previously treated as an assessment unit within NAFO. However, distribution dynamics and studies on biological characteristics suggest a single stock within Div. 3LNOPs. This report treats thorny skate within Div. 3LNOPs as the stock unit. Commercial catches of skates comprise a mix of skate species. However, thorny skate dominates, comprising about 95% of the skates taken in the Canadian and Spanish Nominal catches. Landings increased in the mid-1980s with the commencement of a directed fishery for thorny skate. Prior to the mid-1980s, this species was commonly taken as a by-catch in other fisheries and continued to be taken as a by-catch, mainly in the Greenland halibut fishery and the Canadian mixed fishery for thorny skate, white hake and monkfish. The main participants in this new fishery are EU-Spain, Canada, Russia and EU-Portugal. Catches peaked at about 31,500 tons in 1991 (STATLANT 21A). During the period from 1985 to 1991, catches averaged 22 300 tons, lower during 1992-1995 (9600 tons). Catch levels as estimated by STACFIS on Div. 3LNOPs have averaged 11 700 tons since 1996. This species has been regulated by quota in Div. 3LNO since 2005 (13 500 tons 2005-2007), and separately within Canadian waters in Subdiv. 3Ps (1,050 tons in 2005).

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on the length frequencies available from the Canadian spring (1984-2005) and autumn (1990-2005) surveys and the Spanish survey biomass indices (1997-2005).

**PRECAUTIONARY REFERENCE POINTS:** Reference points are not available for thorny skate at this time.

**STOCK STATUS:** The stock is presently near its lowest level over the standardized time series (since 1984). The current state of the stock is unclear compared to the historic (pre-1980s) period. The biomass has been relatively stable from 1996 to 2005 but at a lower level than in the mid-1980s During 1996-2005, average catch as estimated by STACFIS was about 11 700 tons.

**RECENT MANAGEMENT ADVICE:** Scientific Council recommended that thorny skate be managed as a unit within Div. 3LNO and Subdiv. 3Ps. Scientific Council recommended that for Div. 3LNOPs, catches not exceed 11 000 tons in 2007 and 2008.

**STECF COMMENTS:** STECF agrees with the advice from NAFO.

4.18. White hake (*Urophycis tenuis*) in Divisions 3N, 3O and Subdivision 3Ps.

The stock area is defined by Scientific Council as Div. 3NOPs, and is mainly concentrated in southern Subdiv. 3Ps and on the southwestern Grand Bank. Scientific Council is asked to provide advice on the portion of the stock in Div. 3NO only.

**FISHERIES:** Catches in Div. 3NO peaked in 1987 at 8,000 tons, and then declined from 1988 to 1994 (2,090-ton average). Average catch was at its lowest between 1995 and 2001 (455 tons); then increased to 6,700 tons and 4,800 tons in 2002-2003, respectively. Total average catch for 2004-2005 was 1 067 tons.

**SOURCE OF MANAGEMENT ADVICE:** Length frequency data from the Canadian fishery (1994-2005 preliminary), and from the catches of Spanish (2002, 2005), Portuguese (2003-2005), and Russian trawlers (2000-2005) were available. Biomass and abundance indices were available from annual Canadian spring in Div. 3NOPs (1975-82; 1984-2005), autumn in Div. 3NO (1990-2005) bottom trawl surveys and Spanish spring surveys in the NAFO Regulatory Area of Div. 3NO (2001-2005).
PRECAUTIONARY REFERENCE POINTS: The Scientific Council was unable to define reference points for this stock.

STOCK STATUS: There is nothing to indicate a change in the status of the stock from the previous year. However, 1998 and particularly 1999 were the dominant year-classes in the Div. 3NO catches in 2002-2003. The 1999 year-class is now 2.5% of its size in 2000. It appears that the stock has returned to a level of abundance similar to what was observed in 1992-1998. Catches during that period averaged approximately 900 tons.

RECENT MANAGEMENT ADVICE: Given the intermittent recruitment to this stock, and the change in fisheries between directed and by-catch, it is not possible to advise on an appropriate TAC. However, with lower biomass and poor recruitment after the 1999 year-class, Scientific Council advised that catches of white hake in Div. 3NO at the current TAC of 8 500 tons are not sustainable.

STECF COMMENTS: STECF agrees with the advice from NAFO.

4.19. Witch Flounder (Glyptocephalus cynoglossus) in Divisions 2J, 3K and 3L

FISHERIES: During the late-1970s and early-1980s witch flounder were widely distributed around the fishing banks, primarily in Division 3K. During the mid-1980s however, they were rapidly disappearing and by the early-1990s, had virtually disappeared from this area entirely; except from some very small catches along the continental slope in southern part of Division 3K. They now appear to be located only along the deep continental slope area, especially in Division 3L both inside and outside the Canadian 200-mile fishery zone. In recent years, catches have been reported from the Flemish Pass area of Div. 3M. This is likely to represent an extension of the Div. 3L component of the stock. In the past, the stock had been fished mainly in winter and spring time on spawning concentrations but is now only a by-catch of other fisheries.

The fishery for witch in this area began in the early 1960s and increased steadily from about 1,000 t in 1963 to a peak of over 24,000 t in 1973. Catches declined rapidly to 2,800 t by 1980 and subsequently fluctuated between 3,000 and 4,500 t to 1991. The catch in 1992 declined to about 2,700 t, the lowest since 1964, and further declined to around 400 t by 1993-1994. Although a moratorium on directed fishing was implemented in 1995, the catches in 1995 and 1996 were estimated to be about 780 and 1,370 tons, respectively. However, it is believed that these catches could be overestimated by 15-20% because of misreported Greenland halibut. The catches in 1997 and 1998 were estimated to be about 850 and 1 100 tons, respectively, most of which was reported from the Regulatory Area of Div. 3L. From 1999 to 2004 catches were estimated to be between 300 and 800 tons, and in 2005 catch was estimated at about 160 tons.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is Canada. NAFO Scientific Council has recently been asked to evaluate the status of the resource. The advice is based on abundance and biomass data from Canadian autumn surveys (1978-2005). Age based data have not been available since 1993, and none are anticipated in the near future. The last assessment of this stock was carried out in 2001 and no analytical assessment has been possible since then.

PRECAUTIONARY REFERENCE POINTS: In the absence of an analytical assessment, Blim was calculated as 15% of the highest observed biomass estimate (Blim = 9 800 tons). Since the highest observed biomass estimates are in the early part of the time series when the survey did not cover the entire stock area, Blim may be underestimated using this method. Nevertheless, the stock has been below this limit reference point since 1992.
STOCK STATUS: Based on the most recent data, it is considered that the overall stock remains at a very low level. Based on survey indices for the current year, there is nothing to indicate a change in the status of the stock.

RECENT MANAGEMENT ADVICE: In 2006, NAFO advised that there should be no directed fishing on witch flounder in Divisions 2J and 3KL in 2007 to allow the stock to rebuild. By-catches in fisheries targeting other species should be kept at the lowest possible level.

STECF COMMENTS: STECF agrees with the advice from NAFO. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

4.20. Witch Flounder (*Glyptocephalus cynoglossus*) in Divisions 3N and 3O

The stock mainly occurs in Div. 3O along the deeper slopes of the Grand Bank. Traditionally, the fishery took place on spawning concentrations in the winter and spring.

FISHERIES: Catches significantly exceeded the TAC during the mid-1980s. The catches from 1995-2002 ranged between 300-800 tons including unreported catches. Catch for 2003 was estimated to be between 844 and 2,239 tons. In 2004 the catch was estimated to be around 630 tons and in 2005 around 260 tons.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. The advice is based on converted abundance and biomass data from Canadian spring surveys during 1984-2005 and autumn surveys during 1990-2005 as well as Spanish surveys during spring 1995-2005. No analytical assessment was possible with current data.

PRECAUTIONARY REFERENCE POINTS: The reference points for this stock are not determined.

STOCK STATUS: Stock remains at a low level.

RECENT MANAGEMENT ADVICE: No directed fishing on witch flounder in the years 2007 and 2008 in Div. 3N and 3O to allow for stock rebuilding. By-catches in fisheries targeting other species should be kept at the lowest possible level.

STECF COMMENTS: STECF agrees with the advice from NAFO. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

4.21. Yellowtail Flounder (*Limanda ferruginea*) in Divisions 3L, 3N and 3O

FISHERIES: The stock is mainly concentrated on the southern Grand Bank and is recruited from the Southeast Shoal area nursery ground, where the juvenile and adult components overlap in their distribution.

Catches exceeded the TACs in each year from 1985 to 1993. During the moratorium (1994-97), catches decreased from around 2,000 tons in 1994 to about 280 tons in 1996 and increased to 800 tons in 1997, as by-catch in other fisheries. Since the fishery re-opened in 1998, catches have increased from 4,400 tons to 13,900 tons in 2005. TACs were exceeded each year from 1985 to 1993, and 1998-2001, but not since 2002.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. The advice is based on CPUE from Canadian trawlers’ data from 1965 to 2005. For 2005, length frequency data from the Canadian fishery and from by-catches of Portuguese trawlers were available. Abundance and biomass indices from annual Canadian spring (1971-82; 1984-2005) and autumn (1990-2005) bottom trawl surveys; annual USSR/Russian spring surveys (1972-91); co-operative Canadian Dept. Fisheries and Oceans/Canadian fishing industry surveys (1996-
An analytical assessment using a stock production model was presented to estimate stock status in 2006. Since the moratorium (1994-97), the catches have been low enough each year to allow the stock to grow.

**PRECAUTIONARY REFERENCE POINTS:** Scientific Council considers 2/3 Fmsy to be a fishing mortality target. By definition in the Scientific Council Precautionary Approach Framework, the limit reference point for fishing mortality (Flim) should be no higher than Fmsy. Scientific Council recommends that Blim be set at 30% Bmsy, following the recommendation of the Limit Reference Point Study Group in April 2004. Currently the biomass is estimated to be above Blim and F below Flim, so the stock is in the safe zone as defined in the NAFO Precautionary Approach Framework.

**STOCK STATUS:** Stock size has steadily increased since 1994 and now has begun to level off. It is estimated to be at a level well above that of the mid-1980s.

**RECENT MANAGEMENT ADVICE:** Total catches should not exceed 15 500 tons in 2007 and 2008. This corresponds to catch projections based on $F = \frac{2}{3} F_{\text{msy}}$ and an assumed catch of 15 000 tons (= TAC) in the year 2006. Scientific Council noted that catches exceeded TACs in 1998-2001, but were lower than the TACs since 2002. Scientific Council again notes that the advice applies to all removals (directed plus bycatch).

**STECF COMMENTS:** STECF agrees with the advice from NAFO. STECF notes that management decisions have already been taken during NAFO’s 28th Annual Meeting, 18-22 September 2006.

### 5. Resources in the area of CECAF

The latest assessment and advice is based on the reports of the CECAF Working Group meetings held in Conakry, Guinea from 19-29 September 2003 and Nouadhibou, Mauritania from 26 April – 5 May 2005 respectively. For some stocks, there is no updated advice and the text of the stock sections remains unchanged from the STECF Review of advice for 2004.

#### 5.1. Sardine (*Sardina pilchardus*) off Morocco and Western Sahara (under Moroccan administration)

**FISHERIES:** Sardine is exploited along the Moroccan and the Western Sahara shelves in four different fishing grounds referred to as north stock (between 33°N and 36°N), central stock including zone A (between 29°N and 32°N) and zone B (between 26°N and 29°N), and southern stock or zone C (between 22°N and 26°N). Currently, zone north is exploited by a reduced number of small purse seiners from the north of Morocco. Fisheries for sardine in zones A and B are exclusively carried out by Moroccan boats. Those in zone C were fished by 10 Spanish purse seiners, based in Arrecife de Lanzarote (Canary Islands), during the last fishing agreement currently elapsed, and by an unknown number of Moroccan purse seiners and long distance trawlers from Russia, Ukraine, Norway, Netherlands, and other countries. The non-Moroccan vessels operate under bilateral or private fishing agreements.

Catches in zones North have been exclusively Moroccan and have ranged from 4,300 t to 21,451 t in the period 1976-2004. The sardine stock in Zones A+B was exploited solely by the Moroccan fleet, made up of over 350 vessels of between 40 and 60 GRT. Sardine catch in Zone A fell from 74,000 t in 2003 to 60,000 t in 2004. This zone saw a drastic decrease in the 90s recording a
catch as low as 3,500 t in 1986. This decline in catch was due to a pronounced decrease in availability, the ratio between positive trips (with catch) and the total number of trips. On the other hand in Zone B the catches decreased slightly in the latest years (517,271 t in 2003 and 473,987 t in 2004). However, total sardine catch in Zone C reached 160,000 t in 2004.

In 2004 the zone between Cape Boujdor and Cape Blanc was exploited by Moroccan coastal purse seiners based in the port of Dakhla, by three Moroccan RSW vessels, by pelagic trawlers operating under the Morocco-Russian fishing agreement signed on 15 October 2002 and by boats chartered by Moroccan operators who had left the octopus fishery due to over-capacity of fishing. Beginning in 2004, the Russian pelagic trawlers (a maximum number of 12 vessels) were authorized to operate outside the 15 mile zone from the coast for a period of three years, targeting sardine, chub mackerel, horse mackerel, sardinella, hairtail and anchovy with 3 percent rejects authorized. The chartered vessels follow the same exploitation procedures as the Russian pelagic trawlers but for duration of four years beginning in 2004 with a maximum number of 20 vessels.

In Mauritania sardine catch off Cape Blanc has increased despite the fact that sardine is not the target species of the fleets fishing in Mauritanian waters. Catch of sardine in the Mauritanian zone has steadily increased going from 37,000 t in 2002 to more than 80,000 t in 2003 and 2004. Catches are carried out seasonally by the EU and Russian pelagic trawlers. An increase in fishing effort on sardine has been seen over the last few years due both to an increase in its abundance and to the decrease in traditionally targeted species (sardinella and horse mackerel).

Occasional catches of sardine have also been registered in Senegal over the last few years, an unusual situation which was last recorded in 1994.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). Assessment Working Groups meet on an ad hoc basis and have traditionally considered that the sardine from zones A and B belong to a single stock named the central stock, and that those from zone C constituted a separate unit stock called the southern stock. The last FAO Working Group on the Assessment of Small Pelagics off Northwest Africa was held in Nouadhibou, Mauritania, from 26 April to 5 May 2005 to assess pelagic resources and to analyse fisheries management and exploitation options that would ensure optimal and sustainable use of the pelagic resources in the area.

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been defined for this stock.

**STOCK STATUS:** The results obtained indicate that the current stock biomass is well above that producing maximum sustainable yield and the current fishing mortality is below the level of sustainable fishing mortality at the current level of biomass. On the other hand, results of the analysis showed heavy exploitation of the length classes between 18-21 cm and 23-25 cm. The heavy exploitation of the first classes can be explained by the demand of the canning industry. The other classes are exploited towards the end of each year according to their availability in the area of operation of the coastal purse seiners.

**RECENT MANAGEMENT ADVICE:**

**Central stock:** Despite the promising results, due to the fluctuations that this stock has seen and to be on the safe side, sardine catch in Zones A+B should not exceed the average catch of the last five years (600,000 t).

**Southern stock:** The results of the state of the sardine stock in Zone C show that with the current level of biomass, catch could be increased in comparison to previous years. Taking into account the instability of the stock which is very evident by the fall observed in 1997, continued
monitoring of the structure and abundance of the stock through scientific surveys, and independent of the data from commercial catches, should be guaranteed in order to detect unforeseen changes which could require urgent intervention.

**STECF COMMENTS:** STECF has no comments

### 5.2. Anchovy (*Engraulis encrasicolus*) off Morocco

**FISHERIES:** Anchovy is exploited in the northern region of the Moroccan coast by purse seiners from Morocco. Information on the fishery is very scarce. Catches in this region by purse seiners are mainly composed of anchovy, sardine (*Sardina pilchardus*) and mackerel (*Scomber japonicus*). The activity of Moroccan boats is unknown. It is possible that the anchovy existing in this zone belongs to the same stock occurring in the ICES division IX a (Gulf of Cádiz). In the sub-region the anchovy is mostly fished in Mauritania and Morocco. It is not targeted, but large quantities are caught as by-catch of certain target species of the industrial pelagic fishery in Mauritania and by Moroccan coastal purse seiners.

For the last five years the landings of anchovy have varied between 126,000 t in 2000 and 170,000 t in 2004 with an average of 150,000 t.

**SOURCE OF MANAGEMENT ADVICE:** There has never been an assessment of this stock.

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been proposed for this stock.

**STOCK STATUS:** Data from acoustic surveys conducted by IMR, Bergen (Norway) indicate that the estimated biomass in the sub-region from 2000 to 2004 shows fluctuations from one year to the next. A marked drop occurred between 2000 and 2001 going from 237,000 to 23,000 t. AtlantNIRO (Russia) acoustic survey in 2004 estimate the anchovy biomass at 38,294 t.

**RECENT MANAGEMENT ADVICE:** As a precautionary approach the WG recommended not increasing catch above the average levels of the last three years (160,000 t).

**STECF COMMENTS:** STECF has no comments

### 5.3. Octopus (*Octopus vulgaris*) off Western Sahara (under Moroccan administration)

**FISHERIES:** The cephalopod fishery in the northern-zone is carried out by an heterogeneous fleet: the artisanal fishery, the national and the foreign industrial fisheries. The different species of cephalopod caught are octopus (*Octopus vulgaris*), cuttlefish (*Sepia officinalis*, *Sepia hierreda*, *Sepia bertheloti*) and *Loligo vulgaris*. Of the cephalopods, the Octopus is the main target species, making up the majority of the catches (65 to 75%). The cephalopod fishery of the Western Sahara started at the end of the sixties. The number of the Spanish freezer vessels increased from 39 (in 1969) to 297 (in 1980). Following the signature of fishing agreements between Spain and Morocco, and continued by the EU, the size of the fleet was heavily reduced until it disappeared completely in 1999 with the end of the fishing agreements. The Moroccan cephalopod trawlers began operations from 1973 with four freezer trawlers. Today the Moroccan freezer trawler numbers 290. The vessel length is between 30 and 40 metres. Their tonnage varies between 200 and 600 GRT with an engine capacity of between 600 and 2,000 hp. The coastal freshwater fishery is made up of around a hundred vessels. The engine capacity and average tonnage is 400 hp and 60 GRT respectively. The artisanal fishery is composed of small wooden boats weighing less than two tonnes and equipped with outboard engines of a capacity between 15 and 25 hp. Currently there are more than 7,000 boats.
Over the last ten years octopus production in the Dakhla stock (26ºN-21ºN) has varied between 70,000 and 100,000 t. In 1995 the cephalopod fleet landed around 78,000 t which fell dramatically to about 50,000 t in 1997. This fall in catch was particularly felt due to the increased production means available to the octopus fishery in comparison to the previous period of nineties. However from 1998 there was a reversal which could be due to the lengthening of the closed season during the spring to protect the octopus and cuttlefish laying. The total catch reached around 107,000 t in 2000 before falling to 49,000 t in 2002.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and Octopus is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The results of the model showed that the current biomass is below that producing maximum sustainable yield. So, the stock risks being overexploited in relation to its biomass.

**RECENT MANAGEMENT ADVICE:** Taking into account the assessment results and the uncertainties surrounding them, the WG decided to recommend a reduction in fishing effort. The Moroccan authorities regulate this fishery by effort and gear regulations, combined with different closed areas and for national and foreign fleets.

**STECF COMMENTS:** STECF has no comments on the assessment or advice.

### 5.4. Cuttlefish (*Sepia* spp.) off Western Sahara (under Moroccan administration)

**FISHERIES:** Cuttlefish species are exploited in the same cephalopod fishery as octopus, where they are taken as a by-catch species (see Section 5.3 above for more details). The cuttlefish catch can be composed up to five different species among which only three (*Sepia hierredda*, *S. officinalis* and *S. bertheloti*) are landed commercially. The total catch of cuttlefish for the Dakhla stock (26ºN-21ºN) along the period 1990-2002 varied between 10,000 t (1993) and 31,000 (2000). Total catch for this stock showed a decreasing trend for all the fleets operating in the Northern region.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and Cuttlefish is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.

**STOCK STATUS:** The results showed that the stock is fully exploited or overexploited in relation to its biomass. The biomass is estimated to be above that producing maximum sustainable yield, the fishing mortality is estimated to be at the level of that producing a sustainable yield with the level of current biomass.

**RECENT MANAGEMENT ADVICE:** Taking into account the assessment results and the uncertainties still surrounding them, the WG decided to recommend a reduction in fishing effort. Moroccan authorities manage these fisheries in the general framework of the cephalopod fishery by means of effort and gear regulations combined with different closed areas and seasons applied differently to national and foreign fleets.

**STECF COMMENTS:** STECF has no comments.
5.5. Sole (*Solea vulgaris*) off Western Sahara (under Moroccan administration)  

**FISHERIES:** The sole forms part of the miscellaneous finfish by-catch in the cephalopod fishery. Catches are unknown.  

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF. No attempt has ever been made to assess this stock.  

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.  

**STOCK STATUS:** The status of the stock is unknown.  

**RECENT MANAGEMENT ADVICE:** Moroccan authorities manage this fishery in the general framework of the cephalopod fishery by means of effort and gear regulations combined with closed areas and seasons applied differently to national and foreign fleets.  

**STECF COMMENTS:** STECF has no comments.

5.6. Seabreams (*Sparidae*) off Morocco and the Western Sahara (under Moroccan administration)  

**FISHERIES:** Seabreams species occurring on fishing grounds along the Moroccan and the Western Sahara coasts are mainly composed of species belonging to the genera *Dentex*, *Pagellus*, *Pagrus*, *Diplodus* and *Spondyliosoma*. These species are caught in artisanal fisheries specifically targeting breams, as well as in other fisheries targeting other demersal species, (see 5.8 below for additional information) and also as a by-catch in almost every other fishery in the region. The total annual catches of breams are impossible to estimate. Considering the relative importance of the main species and the availability of data, the WG decided to assess: *Pagellus bellottii*, *Dentex macrophtalmus* and *Pagellus acarne*.  

The total catch of *Pagellus bellottii* has seen an increase since 1990 to 2002 (300-1,755 t). Subsequently the catches have fluctuated greatly, with a decrease in 1999. The total catches of *Dentex macrophtalmus* saw an increase from 1990, reaching a level of 3,800 t in 2001. Overall the catches of *Pagellus acarne* have increased since 1990 (1,015 t) to 2001 (3,974 t).  

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and Sparidae are now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.  

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.  

**STOCK STATUS:** The stocks of *Pagellus bellottii*, *Dentex macrophtalmus* and *Pagellus acarne* are fully exploited. Even though the biomass is estimated to be above that producing maximum sustainable yield, fishing mortality is higher than the one needed to extract the whole natural production of the stocks.  

**RECENT MANAGEMENT ADVICE:** The WG recommended that fishing effort in this fishery should not be increased. Taking into account that these species are an important bycatch of other fisheries, the bycatches of most of the demersal fisheries should be examined to better control of the catches.  

**STECF COMMENTS:** STECF has no comments.

5.7. Deepwater shrimps (*Parapenaeus longirostris*) off Morocco  

**FISHERIES:** Deepwater shrimps, particularly *Parapenaeus longirostris*, are the objective of ice and freezer trawlers from Morocco and Spain fishing (until 1999) in Moroccan waters north of Cape Juby (28°N). Ice trawlers (104 from Spain and 464 from Morocco in 1996) simultaneously
exploited the European hake (*Merluccius merluccius*) and the shrimps, as well as other deepwater crustaceans such as *Plesiopenaeus edwarsianus*, *Aristeomorpha foliacea* and *Aristeus antennatus*. In Morocco, shrimp are currently exploited by a national fleet composed of coastal trawlers, which operate on the continental shelf and at depths of less than 150 m and long-range, ocean-going trawlers. There are around 300 coastal trawlers. The Moroccan ocean-going shrimp fleet began operations in 1985 and numbered around 55 vessels at the beginning of 1999, with an average tonnage of 200 GRT, staying at sea for between 45 and 50 days. Catches of *P. longirostris* by ice trawlers ranged between 3,183 t and 8,996 t in the period 1981-1996. Freezer trawlers (34 from Spain and 43 from Morocco in 1996) target only crustaceans with *P. longirostris* the major component in their catches. The total catch of *P. longirostris* in these fleets varied between 489 t and 6310 t in the period 1985-1996. The annual catches in Morocco saw an increasing trend until 1995, then a fall of about 1,000 t in 1996. Subsequently there was a recovery and in 1999 the highest level of 13,521 t was recorded. They then fell off again, reaching 10,289 t in 2002.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *P. longirostris* is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** In Morocco, the pink shrimp stock is clearly overexploited. The biomass is far lower than that producing maximum sustainable yield, and the level of fishing mortality is clearly above the level that the current biomass can maintain over the long term.

**RECENT MANAGEMENT ADVICE:** The WG decided to recommend: a) to reduce current catch and effort levels, b) to enforce the use of regulation mesh sizes in order to reduce pressure on the juveniles, c) to encourage the use of separate trawls

**STECF COMMENTS:** STECF has no comments.

### 5.8. Other finfish off Morocco and the Western Sahara (under Moroccan administration)

**FISHERIES:** As mentioned in Section 5.6, demersal finfish in Moroccan and Western Sahara waters are exploited by a variety of fleets that catch them either as by-catch or as target species. At least 100 different species could be involved. They belong mainly to the families *Sparidae*, *Sciaenidae*, *Serranidae* and *Haemulidae*. The available estimates indicate that the amount of finfish caught as by-catch and discarded in fisheries directed at other species may represent a high proportion of the total catch. Fleets specifically targeting these finfish were based in villages along the Moroccan and the Western Sahara coasts, and in several ports of the Canary Islands.

The Spanish fleet was composed of around 40 wooden boats fishing in the Western Sahara zone south of Cape Bojador (26ºN) using hand lines and traps. Their catches ranged from 1,000 t and 5,000 t in the period 1975-1997. Information on the Moroccan fleet is very scarce. Apparently there are two different types of vessels; longliners and boats using so called small-scale gears (petit métiers). There are between 52 and 98 longline vessels based in Tan-Tan. Those using small-scale gears comprise over 1200 units that operate from different places in the Western Sahara. Catches of longliners in 1988 were 169 t, 117 t of which were seabreams. There is no information on the production of boats using small-scale gears.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF.
PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for finfish stocks in waters off Morocco and the Western Sahara.

STOCK STATUS: The status of these stocks is unknown.

RECENT MANAGEMENT ADVICE: Moroccan authorities manage these fisheries in the general framework of the different fisheries in which they occur, generally by means of effort regulations and gear restrictions. CECAF has advised a precautionary approach to management in order that effort on demersal stocks in the north of the CECAF region is not allowed to increase.

STECF COMMENTS: STECF has no comments.

5.9. Hake (*Merluccius merluccius*) off Morocco and the Western Sahara (under Moroccan administration)

FISHERIES: The fleets exploiting hake off Morocco until 1996 were: Moroccan ice trawlers, Spanish trawlers (composed of ice trawlers and “trios”), Spanish longliners, Spanish gillnetters and Portuguese polyvalent boats fishing with longlines and gill nets. Moroccan and Spanish ice trawlers were the same fleets that target deepwater shrimps (see section 5.7). Spanish “trios” used to fish in the Western Sahara between 24°N and 28°N but withdrew in 1990. Spanish longliners operated along the whole region (Morocco and Western Sahara) fishing both hake and Senegalese hake (*Merluccius senegalensis*), while the gillnetters, having the same target species, restrict their activities to the Moroccan shelf. Little information is available on the Portuguese polyvalent fleet but it is known that boats target European hake, with Senegalese hake as a by-catch (no more than 7% of the total catch). The overall total catch of hake varied from 7,400 t to 13,400 t in the period 1982-1996, with most of the catch taken by the Moroccan and Spanish fleets.

Since the 1999 fishing agreement between Morocco and the European Union ended, only the Moroccan fleet operates in these waters. The Moroccan fleet is composed of small coastal vessels, trawlers and low range longliners, which exploit the white hake and pink shrimp on the continental shelf. These boats rarely fish in depths greater than 150 m. The number of vessels in this category has not undergone any notable variation since 1992 when it stabilized at around 450 units. Since 2002, Spanish boat owners employing around a dozen longliners have set up joint ventures with Moroccan boat owners to exploit the white hake in Morocco. In 2003, some Spanish vessels, affected by the “Prestige” catastrophe, have also been permitted to fish in Morocco. Total catches of *M. merluccius* in Morocco from 1980 to 2002 ranged between 2,594 t (2000) and 13,375 t (1992). No estimate has been made of the rejects in the Moroccan fisheries.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is CECAF and *M. merluccius* is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for European hake off Morocco and Western Sahara.

STOCK STATUS: The stock is moderately to fully exploited, with the biomass close to the level producing maximum sustainable yield. The fishing effort has been estimated to be below the level, on average, of sustainable fishing effort for the level of biomass present.

RECENT MANAGEMENT ADVICE: The WG decided to recommend: a) to adopt a precautionary approach and not increase fishing mortality (the current level of fishing effort) until the next assessment. If no major changes take place, this measure should allow a gradual recovery of the stock, providing that the juveniles are protected, b) to stop fishing in the Larache-El Jadida zone so as to protect the white hake recruitment, c) to encourage the use of separate
trawls in order to separate the catches of white hake from those of shrimp, d) to encourage certain vessels to convert to a fishery of less exploited resources, e) to apply strict rules to the mesh size of the trawls. STECF COMMENTS: STECF has no further comments.

5.10. Black hake (*Merluccius senegalensis* and *Merluccius polli*) off Western Sahara (under Moroccan administration), Mauritania and Senegal

**FISHERIES:** The so-called black hake is a commercial category made of Senegalese hake (*Merluccius senegalensis*) and Benguela hake (*Merluccius polli*). These species tend to occur in waters south of Morocco, off Western Sahara, Mauritania and Senegal where the Spanish longline and gillnet fleets (see section 5.9, Fisheries) mainly exploit Senegalese hake. Hake are also exploited by a specialized fleet of Spanish trawlers that targets both species. This fleet operates on the shelf of all three countries, depending on the seasonal abundance of hake in the different areas. The combined catch of black hake by all the Spanish fleets varied between 10,586 t and 20,622 t over the period 1983-1995. Total landing of black hake show a slight decreasing trend. In Morocco, the catches show a marked decreasing trend until 1995 (370 t), followed by an increase up until the fishery stops with the end of the fishing agreement between Morocco and the EU in 1999 (3,600 t). In Mauritania, the catches have seen a strong increase since 1998, reaching an historic level of more than 15,500 t in 2002. For the Spanish trawler fleet, the catches have varied between 8,300 and 10,700 t between 1991 and 2001. In Senegal, although the catches vary greatly, the overall trend is declining: 4,636 t in 1983 and 2,400 t in 2001.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *Merluccius senegalensis* and *Merluccius polli* are now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for black hakes in this stock.

**STOCK STATUS:** In the case of Morocco, the results showed that this zone is clearly overexploited. The black hake biomass in this zone for the last year of the series was around half that producing maximum sustainable yield, whereas the fishing effort was above that necessary to extract the whole natural production of the stock. For Mauritania, the current abundance of black hake is below that producing maximum sustainable yield. Fishing effort is assumed to be at a sustainable level, on average, for the current level of biomass. In Senegal, the results showed that the black hake biomass is less than that producing maximum sustainable yield. Fishing effort is assumed to be at a sustainable level, on average, for the current level of biomass, which explains the increase in the stock.

**RECENT MANAGEMENT ADVICE:** For Morocco no recommendations can be given as the fishery ceased in 1999. For the Mauritanian stock, it was recommended that fishing effort be reduced in order to allow better yields in the future. This recommendation should be applied both to the fleet that directly targets hake and to fleets that target other demersal species, as these have large bycatches of hake. As far as Senegal is concerned, the WG recommended that fishing effort should not be increased, on the one hand because the stock should be allowed to replenish itself, and on the other because there are indications that this stock is the same as that in Mauritania.

**STECF COMMENTS:** STECF has no further comments.
5.11. Octopus (*Octopus vulgaris*) in Mauritania

**FISHERIES:** The cephalopod fishery in Mauritania started in 1965. Since then Japanese, Korean, Libyan, Spanish, Portuguese, Chinese and Mauritanian fleets have all exploited these resources. Currently, some 200 Mauritanian freezer trawlers, most of them re-flagged from the other nationalities, and a substantial artisanal fleet of around 900 canoes fishing with pots (poulpiers), continue to fish the cephalopods in Mauritania. Since 1995 Spanish vessels have returned to the fishery after several decades absence, with around 30 freezer trawlers currently involved in the fishery. Octopus is the target species in this fishery followed in importance by cuttlefish (*Sepia hierredda*), squid (*Loligo vulgaris*) and a miscellaneous group of many different finfish species. Catches have ranged from 15,000 t to 46,000 t in the period 1984-2002.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *Octopus vulgaris* is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been defined for these stocks in these areas.

**STOCK STATUS:** The results showed that current biomass is greatly below that producing maximum sustainable yield and that fishing mortality is much higher than that needed to extract the whole natural production of the stock. The Cap Blanc octopus stock is overexploited in relation to its biomass and fishing mortality.

**RECENT MANAGEMENT ADVICE:** Taking into account the assessment results and the uncertainties surrounding them, the WG decided to recommend a reduction in fishing effort.

**STECF COMMENTS:** STECF has no further comments.

5.12. Cuttlefish (*Sepia hierredda*) off Mauritania

**FISHERIES:** Cuttlefish species are taken as a bycatch in the same cephalopod fishery as octopus (see Section 5.11 above for more details). The cuttlefish catch can be composed of several different species among which only *Sepia hierredda* is known to be of commercial value. Production of that species varied between 4,000 t and 7,000 t over the period 1984-2002.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *Sepia spp.* are now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The results of fitting the model to the available data were not satisfactory and the WG was unable to interpret the results

**RECENT MANAGEMENT ADVICE:** Taking into account the assessment results and the uncertainties surrounding them, the WG decided to recommend a reduction in fishing effort.

**STECF COMMENTS:** STECF has no comments.

5.13. Penaeus shrimps (*Penaeus spp.*) off Mauritania

**FISHERIES:** The Crustaceans of commercial importance in Mauritanian waters are exploited by a specialized fleet from Spain that targets different species among which are, in order of importance, the shrimp (*Parapenaeus longirostris*), the prawns (*Penaeus notialis* and *Penaeus kerathurus*), the crab (*Chaceon maritae*) and the deep water shrimp (*Aristeus varidens*). Catches of *Penaeus notialis* made by these boats have varied between 405 t and 2,400 t over the period 1987-2002. There seems to be another fleet component composed of boats apparently chartered
by Mauritania, and has been landing crustaceans in Mauritanian ports during recent years. The average overall landings of all species combined by the chartered fleet in recent years is about 400 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *Penaeus spp.* is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.

**STOCK STATUS:** In Mauritania the stock appears to be fully exploited. The biomass is slightly over that producing maximum sustainable yield in the long term, and the level of fishing mortality is close to the sustainable level with current biomass.

**RECENT MANAGEMENT ADVICE:** Taking into account the assessment results and the uncertainties surrounding them, the WG decided to recommend no increase in the fishing effort until the next assessments have been carried out with more recent data.

**STECF COMMENTS:** STECF has no comments.

### 5.14. Deepwater shrimps (*Parapenaeus longirostris* and *Aristeus variens*) off Mauritania

**FISHERIES:** These species are fished in the same fishery described in section 5.13. *Parapenaeus longirostris* is the main target species in the fishery accounting more than 50% to the total catch. Catches of this species has ranged from 488 t to 3,200 t over 1987-2002, while that of *Aristeus variens* has varied between 43 t and 314 t during the period 1987-1996.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *Parapenaeus longirostris* is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.

**STOCK STATUS:** In Mauritania the stock appears to be fully exploited. The biomass is close to that producing maximum sustainable yield over the long term, and the level of fishing mortality is also close to a sustainable level given the current biomass.

**RECENT MANAGEMENT ADVICE:** The WG recommended no increase in fishing effort.

**STECF COMMENTS:** STECF has no comments.

### 5.15. Atlantic horse mackerel (*Trachurus trachurus*) and Cunene horse mackerel (*Trachurus trecae*) off Mauritania and other countries in the northern CECAF region.

**FISHERIES:** The Atlantic horse mackerel is distributed off Western Sahara (under Moroccan administration) and Mauritania, while the cunene horse mackerel is mainly found in Mauritania and Senegal waters. The limit of the distribution of these stocks is subject to long-term variations. This greatly influences the catch of these species in Mauritania. Off both Western Sahara and Mauritania, the catch of Atlantic horse mackerel is taken by foreign pelagic trawlers, mostly of East-European origin. The main part of this catch is taken in Western Sahara waters. Catches in the northern CECAF region have ranged from 22,000 t to 97,000 t in the period 1990-2004. In Senegal, the cunene horse mackerel is taken by artisanal fishermen, local industrial boats, and foreign trawlers. In Mauritania and Western Sahara, the catch is taken by foreign pelagic trawlers, mostly of East-European origin. These vessels target horse mackerel in preference to sardinella, because of the higher value of the horse mackerel. Catches of cunene
horse mackerel in the northern CECAF region during 1991-2004 have fluctuated around 70,000 t – 198,000 t showing an increasing trend in the two last years.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *Trachurus trachurus* and *Trachurus trecae* are now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks

**STOCK STATUS:** The results for *T. trachurus* indicated that the current biomass is at the level of the biomass producing the maximum sustainable yield, on average, but the current fishing mortality exceeds the sustainable one at the current biomass levels. The results for *T. trecae* indicated that the current biomass is below the level of biomass producing the maximum sustainable yield, on average, and that the current fishing mortality is close to the level corresponding to MSY fishing mortality.

**RECENT MANAGEMENT ADVICE:** Taking into account the possible uncertainties in the estimates the WG recommends that catches of *Trachurus* species should not exceed the average level of the last five years.

**STECF COMMENTS:** STECF has no comments.

5.16. Mackerel (*Scomber japonicus*) off Mauritania and other countries in the northern CECAF region.

**FISHERIES:** Catches of mackerel in the northern and southern CECAF region during 1990-2004 have fluctuated from 20,000 t to 224,000 t. In the Moroccan zone north, A and B, mackerel is a by-catch in the fishery for sardine. The total catch during 2004 reached about 56,000 t. In Southern stock, for the vessels working under joint ventures (from Ukraine and other countries), the catch was 148,000 t and 169,000 t in 2003 and 2004 respectively. In Mauritania, the total catch of the trawlers was 133,000 t and 97,000 t in the years 2003 and 2004 respectively. In Senegal and Gambia, mackerel is exploited by the artisanal and industrial fleets. The total catch in this area in 2003 and 2004 was around 14,000 – 6,200 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is CECAF and *Scomber japonicus* is now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The results of the model indicate that the actual biomass is above the level of that producing the maximum sustainable yield and that current fishing mortality is also above that necessary to maintain the current level of stock biomass.

**RECENT MANAGEMENT ADVICE:** The WG recommended, as a precautionary approach, that the levels of catch do not exceed those of 2004 (220,000 t)

**STECF COMMENTS:** STECF has no comment.

5.17. Sardinella (*Sardinella aurita* and *S. maderensis*) off Mauritania and other countries in the northern CECAF region.

**FISHERIES:** The two species of sardinella, *Sardinella aurita* and *S. maderensis*, have been lumped together because most of the commercial catches consist of a mixture of both species, and the species composition of these catches is either suspect or unknown. *Sardinella* is caught off Western Sahara (under Moroccan administration), Mauritania, Senegal and The Gambia. The
sardinellas are not target species in The Gambia. The landings in the artisanal fishery are very low and no major variations in landings have been observed. There are no industrial pelagic fishing vessels. In Senegal, the resources of coastal small pelagics are exploited by an artisanal fishery and an industrial one. The artisanal fishery uses motorised canoes and a variety of fishing gears. The industrial fleet consists mainly of trawlers and seiners, some of which are of foreign origin, which work under commercial contracts. In Mauritania and Western Sahara, an artisanal fishery for sardinella is virtually non-existent. The governments of these countries utilize the Sardinella resource by selling licenses to foreign pelagic trawlers. The Sardinella stock of Mauritania and Western Sahara has been exploited since the late 1960s by pelagic trawlers from Eastern Europe, and also by combinations of purse seiners and factory vessels from South Africa and Norway. The factory vessels and purse seiners terminated their operations in 1991, when they ran into economic problems due to the withdrawal of state support. After a decline in East-European effort, the Mauritania government invited EU ship owners to come to Mauritania and compensate for the decline of the East-European fishing effort. Starting from 1996, a fleet of 6-8 mainly Dutch vessels has been working in Mauritanian waters. In 2000, three large units have been added to the fleet. In 2001 a new regulation was introduced in Mauritania, which resulted in an extension of the fishing limits for pelagics trawlers from 12 miles to 13-25 miles off the coast. The exploitation of sardinellas in the Moroccan southern zone gained importance in the early 1990s. In the 1990s, this fishery was conducted mainly by pelagic trawlers that worked for Moroccan joint ventures, and trawlers operating under the fishery agreement between Morocco and the Russian Federation. The total catches in the region have varied between 219,000 t and 588,000 t from 1990 to 2004.

**SOURCE OF MANAGEMENT ADVICE:** The last FAO Working Group on the Assessment of Small Pelagics off Northwest Africa was held in Nouadhibou, Mauritania, from 26 April to 5 May 2005 to assess pelagic resources and to analyse fisheries management and exploitation options that would ensure optimal and sustainable use of the pelagic resources in the area.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.

**STOCK STATUS:** The current biomass of the two species together is very close to that producing the maximum sustainable yield and fishing mortality is practically at the sustainable level.

**RECENT MANAGEMENT ADVICE:** Considering the incertitude surrounding the change in abundance in the short term, and as a precautionary approach, the WG recommended not to increase the level of sardinella catch of 2004 (400,000 t)

**STECF COMMENTS:** SREC has no comments.

### 5.18. Other finfish in Mauritanian waters

**FISHERIES:** The situation of other finfish stocks in Mauritania is very similar to that in Western Sahara (see section 5.8). This group is composed of around 100 different species that can be taken either in directed fisheries or as by-catch in other fisheries. The directed fishery is conducted by an unknown number of small canoes that operate from many different places in the coast using a variety of artisanal gears. Other fisheries take these species as a by-catch and only retain onboard those that have any commercial interest, the remainder being discarded. The magnitude of the catches of these species is unknown.
SOURCE OF MANAGEMENT ADVICE: The management advisory body is CECAF those species are now assessed by the Demersal Species Working Group. A Working Group was held in Conakry, Guinea, from 19 to 29 September 2003.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for these stocks.

STOCK STATUS: The Working Groups in 2003 were unable to assess the status of these stocks.

RECENT MANAGEMENT ADVICE: Not available.

STECF COMMENTS: STECF has no comments.

5.19. Deepwater shrimps off Senegal

FISHERIES: Crustaceans resources in Senegal are mainly made of shrimps (Parapenaeus longirostris, Farfantepenaeus notialis and Aristeus varidens) and crab (Chaceon maritae). These species are exploited in a fishery mainly conducted by Spanish trawlers. From 1982 a certain number of Spanish vessels took Senegalese nationality, thus marking the beginning of the national trawler fleet. At 80% of the total crustacean catch, Parapenaeus longirostris is the main target species. The fishery targeting coastal shrimp, mainly F. notialis, is very developed in Senegal and The Gambia with two well-defined branches, the industrial fishery and the artisanal fishery. Over the last ten years, the shrimp catches in Senegal – The Gambia have fluctuated between 381 and 4771 tonnes with a decreasing trend in the last few years.

SOURCE OF MANAGEMENT ADVICE: CECAF is the advisory body for this area. The last CECAF assessment working group on crustaceans was held in 2003. Assessments were conducted by application of dynamic production models (BioDyn). Results for P. longirostris show that the stock is fully exploited. The biomass is close to that producing maximum sustainable yield over the long term and the level of fishing mortality is also close to a sustainable level given the current biomass. As for F. notialis data for assessment were only available until 1999 and results indicate that the stock was already overexploited at that time.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for these stocks.

STOCK STATUS: Unknown

RECENT MANAGEMENT ADVICE: CECAF has advised that fishing effort on both stocks of shrimps should not be increased.

STECF COMMENTS: STECF has no comments.

5.20. Deepwater shrimps off Guinea Bissau

FISHERIES: Crustaceans resources in Guinea Bissau are mainly made of shrimps (Parapenaeus longirostris and Aristeus varidens), prawns (Farfantepenaeus notialis) and crab (Chaceon maritae). These species are exploited in a fishery mainly conducted by Spanish trawlers. Total catches of crustaceans in the period 1987-1996 have fluctuated between 378 t and 1,943 t.

SOURCE OF MANAGEMENT ADVICE: CECAF is the advisory body for this area. The last published report of CECAF assessment working group on crustaceans was in 1997. No attempt was made to assess the state of these stocks. In 1989, 1990, 1991 and 1995 IPIMAR conducted trawl surveys in a rectangle close to the Bijagó s archipelago. Biomass estimates for the prospected area in 1989, 1990, 1991 and 1995 are respectively 12.9t, 18t, 42.5t, 29.7t for P. longirostris, and 7.2, 9.7, 55.3, 14.8 for P. notialis. In 2005 a new assessment working group on
demersal resources, including crustaceans, from the southern area of the CECAF region was held in Cotonou (Benin) but results are still unpublished.  
**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.  
**STOCK STATUS:** Unknown  
**RECENT MANAGEMENT ADVICE:** Not available.  
**STECF COMMENTS:** STECF has no comments.

5.21. *Cuttlefish (Sepia hierredda)* off Guinea Conakry  
**FISHERIES:** In Guinea Conakry, cephalopods are targeted by industrial and artisanal fisheries. The industrial fishery is mostly conducted by Spanish freezer trawlers that started their activities in the area in 1986. In 1990 there were 27 units fishing for cephalopods but the number has decreased in successive years with only one vessel in 1994 and varied between one and four until 2001. The target species in this fishery is the cuttlefish (*Sepia hierredda*), with a by-catch of octopus (approximately 8% of the total catch). Reported catches of octopus have varied between less than a ton and 576 t during 1986-1996. Catches of the cuttlefish (*Sepia hierredda*) made by all fleets are in the order of an average of 6000 t in the period 1995-2001.  
**SOURCE OF MANAGEMENT ADVICE:** CECAF is the advisory body for this area. The last CECAF assessment working group on cephalopods was held in 2003. Assessments were carried out using dynamic production models (BioDyn).  
**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for cuttlefish in Guinea Conakry.  
**STOCK STATUS:** Results of fitting the model were not satisfactory due to an extremely high catch in 1996. Removing this catch from the data series results from the model showed that the stock was overexploited.  
**RECENT MANAGEMENT ADVICE:** Taking into account the results of the assessments and the uncertainties attached to the analyses the working group recommended a reduction in fishing effort.  
**STECF COMMENTS:** STECF has no comments.

5.22. *Octopus (Octopus vulgaris)*, Senegal  
**FISHERIES:** This octopus stock has been exploited actively in Senegal since 1986, when this species became abundant in the area. It is commonly hypothesized by scientists, that the development of this stock was a consequence of the sparid over-fishing in the area (as in Morocco and in Mauritania). This highly valuable stock is targeted seasonally by large-scale fisheries (bottom trawling, national and foreign fleets, including EU fleets) and artisanal fisheries (canoes fishing with hand line and jigs, all this catch being exported). Pots are not used in Senegal by the artisanal fishery. In recent years, the two gears used by the artisanal fishery have each accounted for about 50% of the artisanal catch.  
The artisanal and large-scale fisheries tend to operate in different fishing zones, the artisanal ones being more coastal, and there is probably little interaction between the them. Catches from this stock are highly variable from year to year, because the fishery exploits only one year-class (the life span of octopus is less than one year) and because the levels of recruitment are quite variable. This variability of recruitment is probably related to the upwelling strength: a strong upwelling producing high recruitment, followed by high catches during the subsequent year. Over 50,000 t of octopus was removed from this region in 1999 for example.
SOURCE OF MANAGEMENT ADVICE: The management advisory body is CECAF. The last CECAF assessment working group on cephalopods was held in 2003. Assessments were carried out using dynamic production models (BioDyn).

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The model provided a poor fit to the data being unable to reproduce the observed fluctuations in the CPUE series. Nevertheless, it appeared that the fishing capacity in the area, combining artisanal and industrial vessels, was already excessive.

RECENT MANAGEMENT ADVICE: A reduction in fishing effort was recommended by the working group.

STECF COMMENTS: STECF has no comments.

6. Resources in the area of WECAF

STECF was unable to update the stock status and advice for any of the stocks in the area of WECAF. Consequently, the text of section 6 reflects the stock status as described in the STECF Review of Stocks for 2004 (SEC (2005) 369)

6.1. Shrimp (Penaeus subtilis), French Guyana

FISHERIES: Shrimp in the French Guyana EEZ, are now exclusively taken by French shrimp trawlers. Over the historical time period of the fishery (1968-1999), catches have fluctuated between 1 500 t and 5 600 t. The high variations in catches are mainly the result of changes in fleet composition and activity (USA and Japanese fleets in the early period, and the French fleet latterly), and economical and social problems (strikes). Over recent years, landings have been stable (about 3 800 t). The assessment area includes the French Guyana EEZ.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the IFREMER Centre in Cayenne. The assessment is based on LPUE (Landings per Unit Effort), production model, and catch-at-length analysis (cohort analysis).

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The LPUE’s series of the shrimp fleet shows seasonal trends, fluctuating around 200 kg/day. Over the period 1990-1999 there was a strong increase in average yield per day, probably due to a change fishing strategy as the fleet re-directed effort towards smallest individuals in shallower waters. Production modelling indicates an increase in the stock biomass over the last few years, coincident with a decrease in fishing effort since the early 1980’s. The average biomass over 1996-1999 has been estimated at about 10 000 t, close to 2/3 of the estimated virgin biomass of 15 000 t -16,000 t. The estimated catch at 90% of MSY is close to 4 000 t, which is consistent with the present TAC of 4 108 metric tons established for the fishery. Estimated LPUE at 90% of MSY is around 250 kg per fishing day, close to the actual catch rates in the fishery. LPUE is directly affected by the level of recruitment. Cohort analysis shows that statistically, there is no relationship between effort and fishing mortality.

RECENT MANAGEMENT ADVICE: The stock is considered to be fully exploited. A precautionary multi-annual (5 years period) TAC of 4 108 metric tons was decided by the European Community.
6.2. Red Snapper (*Lutjanus purpureus*), French Guyana

**FISHERIES:** Red snappers in French Guyana EEZ are exclusively taken by Venezuelan handliners. Over the historical time period of the fishery (1986-1999), catches have increased from 680 t in 1986 to 1,960 t in 1996.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the IFREMER Centre in Cayenne. The assessment is based on CPUE (Catches Per Unit Effort), production model, and catch-at-length analysis (cohort analysis).

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been defined for this stock.

**STOCK STATUS:** The catch rates of red snapper in the fishery in the French Guyana EEZ, shows slight seasonal variation, fluctuating around 28 kg/hour. Catch rates are usually highest during the dry season (quarter 3 and 4) and lowest during the rainy season (quarters 1 and 2). After 1991, the mean length of red snapper landed, declined from 45 cm to 37 cm. No changes have been observed in hook selectivity. There is a good relationship between effort, F and landings. Then trend in recruitment is upward, despite an increase in fishing effort over the same period. Y/R and SSB/R analyses indicate that current F is above F_max.

**RECENT MANAGEMENT ADVICE:** The stock is considered to be overexploited. Fishing effort should be reduced. Considering the vulnerability of the snappers, only handlines should be authorised to catch this species.

**STECF COMMENTS:** STECF agrees with the advice given by IFREMER

7. Resources in the South-East Atlantic

7.1. Deepwater shrimp (*Aristeus varidens*), Angola

**FISHERIES:** The Deepwater shrimp resources in Angola waters were exploited until 2004 by Angolan nationals or under private fishing agreements (24 vessels) and Spanish (22 vessels) trawl fleets that targeted two different species which are, the rose shrimp (*Parapenaeus longirostris*) and the striped shrimp (*Aristeus varidens*). After concluding the Angola-EU fishing agreement, the current status of the fishery is unknown.

The depth distribution of each species is different, as well as, the nets used to harvest each one. Thus, the effort applied is independent for each resource. The crab *Chaceon maritae* is caught as by-catch in this fishery. Catches of *A. varidens* ranged between 1,323 t and 2,131 t over the period 1993-2004.

**SOURCE OF MANAGEMENT ADVICE:** There is not an international management advisory body for this region, although Angola has been participating in the CECAF meetings during the last years. Angola manages the fishery in the general framework of the crustacean fishery. Several surveys based on swept-area method were carried out to obtain biomass indices, within the Angolan-Spanish cooperation program and Fridtjof Nansen program. In 1999, FAO promoted a Workshop in Luanda (Angola) to attempt the assessment of shrimp and crab stocks in the southern part of the CECAF region, Angola and Namibia. The assessment of *A. varidens* was
based on CPUE data by applying simple surplus models. However, the uncertainties about the data available did not allowed to obtain very reliable or precise results. In 2005, the CECAF Working Group on the Assessment of Demersal Resources-South did not attempt the assessment of the deepwater shrimp in the southern part of the CECAF region. Nevertheless, there is an independent assessment of *A. varidens* based on the Spanish Catch-CPUE series (1993-2004) by applying a dynamic surplus model.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The CPUE’s series of the shrimp fleet shows a decreasing trend mainly during the last years, although with a weak slope. According to the independent assessment, the stock was overexploited ($B/B_{MSY} = 52\%$) with a tendency to recover under the current fishing mortality ($\frac{F_{cur}}{F_{SycurB}} = 62\%$).

**RECENT MANAGEMENT ADVICE:** Angola manages the fishery by means of mesh size restrictions, closing seasons, TAC and effort regulations. The 1999 Workshop recommended a reduction in the overall fishing effort.

**STECF COMMENTS:** none.

### 7.2. Deepwater shrimp (*Parapenaeus longirostris*), Angola

**FISHERIES:** The rose shrimp (*Parapenaeus longirostris*) is the most abundant species of the deepwater shrimps off Angola (see Section 7.1 above for more details about the fishery). Over the period 1993-2004, catches of *P. longirostris* ranged between 1,720 t and 4,529 t.

**SOURCE OF MANAGEMENT ADVICE:** There is not an international management advisory body for this region. Angola manages the fishery in the general framework of the crustacean fishery. Several surveys based on swept-area method were carried out to obtain biomass indices, within the Angolan-Spanish cooperation program and Fridtjof Nansen program. In 1999, FAO promoted a Workshop in Luanda (Angola) to attempt the assessment of shrimp and crab stocks in the southern part of the CECAF region, Angola and Namibia. The assessment of *P. longirostris* was based on CPUE data by applying simple surplus models and length-based model (LCA). However, the uncertainties about the data available did not give rise to very reliable or precise results for all approaches, although results could show some indication on the stock status. In 2005, the CECAF Working Group on the Assessment of Demersal Resources-South assessed the rose shrimp off Angola.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The CPUE’s series of the shrimp fleet shows cyclical fluctuations without any overall trend. The fishery is highly dependent of year-class strength and catches consist mainly of only 2 age groups. Results from LCA (FAO Workshop) show that the mean fishing mortality is close to $F_{max}$ and greater than $F_{0.1}$. According the different approaches the stock seems to be heavily
exploited (B/B_{MSY}= 95\%) with a tendency to a fast recovery under the current fishing mortality (F_{cur}/F_{SYcurB}=43\%).

**RECENT MANAGEMENT ADVICE:** Angola manages the fishery by means of mesh size restrictions, closing seasons, TAC’s and effort regulations. The 1999 Workshop recommended a reduction in the overall fishing effort. The CECAF Working Group (2005) recommended being cautious with potential increasing of fishing effort within the following years.

**STECF COMMENTS:** None.

### 7.3. Benguela hake (*Merluccius polli*), Angola

**FISHERIES:** The Benguela hake (*Merluccius polli*) has its southern distribution limit in Angola waters, overlapping with Cape hake (*Merluccius capensis*) to the south of the country. This species is discarded by trawlers in the deepwater shrimp fishery with other finfish species. Two or three Spanish vessels caught this species together with *M. capensis* in Angola waters, close to the border of Namibia. The catches of this fleet was around 1,200 t over 1989-1999. After concluding the Angola-EU fishing agreement, the current status of the fishery is unknown.

**SOURCE OF MANAGEMENT ADVICE:** There has never been an assessment of this stock in this region.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The status of the stock is unknown.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** None.

### 7.4. Cape hakes (*Merluccius capensis* and *Merluccius paradoxus*), South Africa and Namibia

**FISHERIES:** The two species of Cape hake are found throughout South African and Namibian waters. *Merluccius paradoxus* occurs in deeper waters than *Merluccius capensis*. The first one is mainly located in South African waters, although have been reported in the last years a significant longshore movement of this species to the North. The idea of a single stock for Namibian and South African shallow-waters hake is under discussion. The resource is mainly exploited by South African flagged vessels. From 1977 hake catches in South African waters have remained stable at just over 140,000 t per year. Catches recently downturn in South Africa and Namibia and a high proportion of juveniles appeared on the landings.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is the Marine and Coastal Management (South Africa). Hakes are assessed as one for management purposes, using commercial data in a locally-developed dynamic Schaefer form production model, and are tuned
by data from research swept-area surveys. In Namibia the advisory body is the Marine Resources Advisory Council (MRAC) and hakes are assessed by the estimation of absolute biomass using annual trawl surveys. The TAC is estimated as the 20% of fishable biomass.

**PRECAUTIONARY REFERENCE POINTS:** No information about precautionary reference points proposed for this stock.

**STOCK STATUS:** Estimations from a age-structured production model indicates that the stock has been stable over the past two decades, with signs of gradual increase in recent years at a level of 1,000,000 t of biomass.

**RECENT MANAGEMENT ADVICE:** The Demersal Working Group of South Africa makes annual TAC recommendations. In 2005 the TAC was 158,000 t. The TAC in the Namibian waters for 2004-05 was 195,000 t.

**STECF COMMENTS:** None.

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8. **Resources in the South-west Atlantic**

STECF was unable to update the stock status and advice for stocks in International waters. Consequently, the text for these stocks in section 8 reflects the stock status as described in the STECF Review of advice for 2005.

STECF would like to note that the South Atlantic Fisheries Commission (SAFC), a bilateral co-operation pact protecting regional fisheries resources comprising the governments of Argentina and the United Kingdom have not yet reached an agreement to mandate the currently stagnant situation that emerged from the Falkland Islands Government decision to grant 25-year licenses. The meeting held by both parties’ delegations in London last September did not bridge the gap between both viewpoints, which have been dissimilar since last year. One of the scientific consequences of this disagreement was that the yearly joint Argentinean/British pre-recruit survey of the *Illex* stock did not happen in 2006.

8.1. **Patagonian grenadier-Hoki (*Macruronus magellanicus*), Falkland Islands**

**FISHERIES:** Hoki is mainly caught in the western part of the Falkland Islands Interim Conservation and Management Zone (FICZ). This fish is targeted mainly by various European and Falkland Islands registered finfish trawlers. The catches of hoki increased from ~10,000 t in early 1990s to 16,670-26,970 t in 1998-2005, mostly 19,000-27,000. The lowest catch was obtained in the year 2005. Hoki is targeted in two seasons, in February-May and in July-October. The fish is taken also as a by-catch in Southern Blue Whiting fishery by surimi vessels, and in

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2 Sections related to stocks within Falkland/Malvinas waters (8.1-8.7) have been updated with information provided by the Falkland Islands Fisheries Department (FIFD).
Loligo fishery. A total catch in January – September 2006 was 15,159 t, which is higher than in the previous year (10,605 t) and lower than in 2002-2004 (18,281-19,048 t).

**SOURCE OF MANAGEMENT ADVICE:** Falkland Islands Government using advice from the Renewable Resources Assessment Group (RRAG), Imperial College, together with input from the South Atlantic Fisheries Commission (SAFC).

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed.

**STOCK STATUS:** The stock is considered to be in good condition, and is stable since 2002. However, from historical point of view the catches of hoki were quite variable, and there is a concern that current high catches could not be sustainable in the long term.

**RECENT MANAGEMENT ADVICE:** Fishing effort in Falkland Zones is being held constant.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

### 8.2. Southern blue-whiting (*Micromesistius australis australis*), Falkland Islands

**FISHERIES:** The area where fishing activity targeting to *Micromesistius australis australis* takes place is relatively limited. It extends from 45º S to 56º S, being the zone within 52º S, 55º S, 63º W and 64º W the most remarkable area where highest catches were collected by surimi fishing fleet since 1992. Southern blue whiting is also taken as an occasional by-catch by finfish trawlers.

The fleet targeting the southern blue whiting around Falkland Islands basically occurs within two areas. The first is located to the northeast of the Islands and is visited throughout the whole year, the second one, is situated on the west, spreading towards the southwest during the second half of the year when the spawning of *M. a. australis* occur.

The southern blue whiting is present throughout the year, but strong variations in its distribution and fishing yields were observed. *M. a. australis* has a northern limit located at latitude 47º S during winter and 52º S during summer.

Studies made in the past pointed out that *M. a. australis* spawns in a discontinuous way, with an annual spawning from August to September, extending occasionally until November in the Atlantic, whilst spawning in the Pacific takes place during mid July and September. Spawning fish migrate into the FICZ in dense schools in August-September, and remain there until March.

The catches of southern blue whiting were the highest in early 1990s (up to 72,000 t), then decreased to 23,371-28,554 t in 1999-2004 and further decreased to 17,008 t in 2005. A total catch in January – September 2006 was 7,849 t, which is higher than in the respective period.
2005 (6,874 t), but remarkably lower than in 2002 - 2004 (16,923 t, 18,745 t, and 11,726 t respectively).

**SOURCE OF MANAGEMENT ADVICE:** Falkland Islands Government using advice from the Renewable Resources Assessment Group (RRAG), Imperial College, together with input from the South Atlantic Fisheries Commission (SAFC).

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed.

**STOCK STATUS:** The stock has declined to about one third of initial level (observed in early 1990s), and recruitment has also declined to lower levels.

The stock assessment of Southern blue whiting performed by RRAG (Imperial College) in July 2003 suggested that the spawning stock biomass (SSB) stopped declining in 2002 at a level of ~325,000 t (FIG Fisheries Department, 2004). The spawning season of *M. australis* in the southwest Atlantic Ocean extends from August to October, with a main peak during September.

**RECENT MANAGEMENT ADVICE:** It was recommended that the total catch of SBW should be limited to 50,000 t in the Southwest Atlantic in order to halt the decline in biomass. It was agreed to restrict the total catch of SBW in Falkland Conservation Zones to 25,000 t.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

### 8.3. Red cod (*Salilota australis*), Falkland Islands

**FISHERIES:** Red cod is fished in the western part of the FICZ mainly as a by-catch during hoki and hake fisheries. Additionally, red cod is targeted by Spanish trawlers in spring (September-November) in its spawning grounds to the south-west of the Islands. Catches of red cod decreased from 4,649 – 9,313 t in 1996-2000 to 2,285-2,781 t in 2003-2005. A total catch in January – September 2006 was 2,803 t that is a little bit higher than during the respective period of the previous years (2004 – 2,053 t, 2005-1,832 t).

**SOURCE OF MANAGEMENT ADVICE:** Falkland Islands Government using advice from the Renewable Resources Assessment Group (RRAG), Imperial College.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed.

**STOCK STATUS:** The status of the stock is unknown, but a decrease in the total catch and CPUEs in recent years arise concerns to the appropriate management of the red cod stock in FICZ.
**RECENT MANAGEMENT ADVICE:** Fishing effort in Falkland Zones is being held constant or reduced. Red cod spawning grounds should be closed for any fishery activity in September – November.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

### 8.4. Argentine hake, Austral hake (*Merluccius hubbsi, Merluccius australis*), Falkland Islands

**FISHERIES:** Hakes are mainly caught in the western part of the FICZ (Austral hake is almost exclusively caught to the SW of the Islands). They are targeted by Spanish and Falkland Islands registered trawlers having a special license for unrestricted finfish. The total catch of hakes in FICZ/FOCZ (Falkland Islands Inter/Outer Conservation Zone) decreased from 12,000 t in 1990 to 1,500 t in 1994-1997, and then stabilised at the level of 1,678-3,069 t in 2000-2005. Hakes are targeted mainly in winter during their migrations to the Falkland waters from the Patagonian shelf. The fish is taken also as a by catch during the specialized *Loligo* fishery in the eastern part of the FICZ. The fishery in the year 2006 has been very successful so far – a total catch in January – September was 7,138 t that is much higher than the entire annual catches since 1991. It happened because of the stock re-distribution and intensive common hake migrations to the Falkland waters in August - September.

**SOURCE OF MANAGEMENT ADVICE:** Falkland Islands Government using advice from the Renewable Resources Assessment Group (RRAG), Imperial College.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed.

**STOCK STATUS:** The stock of common hake in the FICZ is a ‘shared’ stock with Argentina with only a small proportion of the stock occurring in Falkland Zones. Being before in a poor condition, after strong recruitments in 2001-2002 when juvenile abundance increased 5-10 times in respect to a period of 1996-2000 this stock is evidently improved.

**RECENT MANAGEMENT ADVICE:** Fishing effort in Falkland Zones is being held constant.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

### 8.5. Argentine short-finned squid (*Illex argentinus*), Falkland Islands

**FISHERIES:** This squid is usually a major fishery resource of the Falkland Islands in terms of total catch and licensing revenue. However, the abundance of this squid was very low recently in 2002 and 2004-2005 due to very poor recruitment of the winter-spawned cohort. *Illex* is targeted by Asian jigging fleet (mainly from Korea, Taiwan and Japan), and also by some trawlers in February-June. The main fishing area lies in the northern and north-western parts of the
FICZ/FOCZ (north of 52°S). The fishing effort was quite stable during 2000-2004 (80-120 jigging vessels), however in 2006 it decreased to 43 vessels due to the recent bad performance of the Illex fishery.

Amazingly, after several years of poor abundance, in 2006 Illex was back in great numbers. Overall, the performance of 2006 Illex fishery excelled with a total Falkland catch of 85,619 t. With the average daily catches being similar to the most successful Illex year of 1999 (40-50 tonnes per vessel), one could only guess how large the total catch might have been this year with the appearance of the normal number of jiggers (~100 vessels).

SOURCE OF MANAGEMENT ADVICE: Falkland Islands Government using advice from the Renewable Resources Assessment Group (RRAG), Imperial College, together with input from the South Atlantic Fisheries Commission (SAFC). Each year a joint Argentinean/British pre-recruit survey of the Illex stock was undertaken, but it did not happen in 2006 due to political reasons.

PRECAUTIONARY REFERENCE POINTS: Maximum fishing effort has been held constant in Falkland Zones in recent years with the significant decrease (by half) in 2006. In the event that the spawning stock biomass is likely to decline below the Precautionary Reference Point of a minimum of 40,000 t, there is an agreement that both Argentina and the UK will take an appropriate action.

STOCK STATUS: The status of the stock is changing every year due to the short life cycle of the squid (1 year). In 2006, the winter-spawning stock has been completely recovered after several years of very low abundance.

RECENT MANAGEMENT ADVICE: Stock management on the High Seas (international waters of 42°S and 45-47°S) remains one of the main issues of the current management advice, as it is not regulated by any organisation. To be able to predict the stock status for the following fishing season, joint multilateral studies of Illex spawning grounds are needed.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

8.6. Patagonian squid (Loligo gahi), Falkland Islands

FISHERIES: The second of the major fishery resources in the FICZ, and a domestic resource for the Falkland Islands. Loligo is targeted almost exclusively by Falkland Islands registered trawlers at depth range of 120-250 m in the region located to the southeast of the Falkland Islands (the so-called ‘Loligo box’). In recent years, timings of both fishing seasons have been changed, with the first season lasting 6 weeks from March until the second week of April, and the second season occurring between third week of July and of September. The fishing effort is stable, being 15 trawlers in the first season and 16 trawlers in the second season. In 2006, squid abundance was somewhat lower than in 2005. The first season yielded 19,415 t, and the second season 23,546 t, another successful year for the Loligo fishery. The fishery was closed prematurely on 5
September not to allow the spawning stock biomass to fall below the conservation target of 10,000 t.

**SOURCE OF MANAGEMENT ADVICE:** The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

**PRECAUTIONARY REFERENCE POINTS:** A minimum spawning stock biomass of 10,000 t at the end of the second season.

**STOCK STATUS:** Stocks of both cohorts of *Loligo* (autumn- and spring-spawning cohorts) are in good condition, with the conservation target to save 10,000 t of Spawning Stock Biomass having been met for both of them.

**RECENT MANAGEMENT ADVICE:** No recent management advice available.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

### 8.7. Patagonian toothfish (*Dissostichus eleginoides*), Falkland Islands

**FISHERIES:** *Dissostichus eleginoides* is the most valuable and highly priced resource in the Falkland Zones. Toothfish juveniles migrate from their spawning and nursery grounds around the Burdwood Bank and North Scotia Ridge to shallow waters of the Patagonian Shelf, where they are caught as by-catch during the finfish fishery. Adults migrate into deepwater of the Argentine basin, where they are targeted by specialized longlining vessels. Only two Falkland-flagged longliners are licensed to fish in the Falkland Zones. The annual catch of longliners was stable in 2000-2005 ranging from 1,310 to 1,725 t. Their catch in January – August 2006 was 1,377 t that is slightly higher than in the respective period of the previous years (979 - 1,220 t in 2003-2005). The by-catch of juvenile and immature toothfish by trawlers in January – August 2006 was 52 t which is lower than that observed in the respective periods of 2003 - 177 t, 2004-231 t, 2005 - 90 t). There is an evident trend in decrease of annual toothfish catch taken by trawlers from 1,997 t in 1999 to 123 t in 2005, which probably indicates either a decrease of recruitment or its re-distribution.

**SOURCE OF MANAGEMENT ADVICE:** Falkland Islands Government using advice from the Renewable Resources Assessment Group (RRAG), Imperial College, together with input from the South Atlantic Fisheries Commission (SAFC).

**PRECAUTIONARY REFERENCE POINTS:** TAC of 1,500 t has been assigned.

**STOCK STATUS:** Stock probably is in a stable condition with its biomass being about 40% of that in the virgin population.

**RECENT MANAGEMENT ADVICE:** No management advice has been given for this stock.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a
separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.

8.8. **Patagonian grenadier-Hoki (Macruronus magellanicus), Argentina**³

**FISHERIES:** Hoki is caught inside Argentinean waters by bottom trawlers and probably by artisanal and fresh fleets. Data from the Argentinean Undersecretariat for Fisheries reported 113,808 t of hoki landed in 2005. Preliminary figures from Secretaría de Agricultura, Ganadería, Pesca y Alimentación (Agriculture, Livestock, Fisheries and Food Secretariat, SAGPyA) indicate that between January and July 2006, landings of hoki were 81,689 t, against the 70,184 t registered during the same period last year. Following common hake, hoki was the second main Argentinean finfish species in terms of catches.

**SOURCE OF MANAGEMENT ADVICE:** The Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP) (Fishing Research and Development National Institute) is the organism responsible to give the necessary scientific support for the rational exploitation of the resources and to avoid the over fishing.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed or are unknown.

**STOCK STATUS:** STECF did not have access to any stock assessment in this area.

**RECENT MANAGEMENT ADVICE:** The most recent information used to elaborate this report comes from a paper by Wöhler *et al.* (1999). In this work, management measures were advised under the assumption of $M = 0.35$. The analysis showed that a fishing mortality rate $F = 0.15$ could be recommended as one exploitation alternative without risk of overfishing. From 1995 to 1998 total Hoki catches were quite stable, about 40,000 t. The recommended fishing mortality would mean to increase 5.5 times fishing effort in relation to that applied in 1995, which would be equivalent to allow for a total catch about 180,000 t during 1996, including either Argentine float and Malvinas licensed vessels. The simulations indicate that if equal efforts were successively applied, yields would begin to be stabilized about 145,000 t by the year 2000. A TAC of 200,000 t was set by the Federal Fisheries Council (Consejo Federal Pesquero, CFP) for 2006 (the same than for 2005).

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if this is a separate stock from Falklands and/or International waters stocks, so effort should be made to improve stock identification.

8.9. **Southern blue-whiting (Micromesistius australis australis), Argentina**

**FISHERIES:** It was in 1989, when the first ship for surimi production entered the fishery, that southern blue whiting catches carried out by the Argentine fleet became important. As of 1989

³ Information for sections 8.8-8.16 was collected through the Internet from several official organisms such as SAGPyA, DNPyA, CFP, INIDEP, etc, as well from specialized fisheries magazines (FIS and Pescare).
catches increased in a steady way to stabilize at near 100,000 annual t. At present, the Argentine surimi fleet catches amount to 95% of the total yield in the country and to over 70% of the total yield reported for the species in the Southwest Atlantic. Southern blue whiting fishing area extends from south of 45º S up to 56ºS. The largest catches come from a small sector located between 52º - 55º S and 63º - 64º W. A notorious seasonality in the fishery was not observed. Southern blue whiting represents almost 90% of the surimi ships catches, whereas for traditional factory vessels the figure amounts to only 14%. The total effort directed to southern blue whiting showed a general rising trend until 1993 when it started decreasing. The same trend was observed in catches. During 1989-1995, the average CPUE for the surimi fleet was estimated to be 6.65 t per trawl hour. The abundance of southern blue whiting in Argentine waters declined during 2005, after having been stable and growing since 2001. As of 2001, annual catches average around 45,000 t, but in 2005, the landings of this species totaled 34,735 t. The same declining situation seems to be continued in 2006, according to official statistics. SAGPyA preliminary figures indicate that between January and July 2006, 18,692 t of southern blue whiting were landed, while in the same period of 2005, this resource landings reached 23,655 t.

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the main advisory body.

**PRECAUTIONARY REFERENCE POINTS:** \( F_{30\%}=0.20 \) and \( F_{0.1}= 0.14 \) were established by INIDEP as biological reference points for southern blue whiting in 2001.

**STOCK STATUS:** In November 2002 a stock assessment of southern blue whiting of the Southwest Atlantic was carried out by INIDEP using data for the period 1987-1999, including CPUE of different fleets and data from Argentine-British research surveys.

The analysis showed that that the decreasing trend in biomass observed in previous studies went on during the last years. At the beginning of 1999, the spawning biomass was estimated at 518,000 t or 34% of the unexploited spawning stock.

**RECENT MANAGEMENT ADVICE:** A TAC of 60,000 t was set by the Federal Fisheries Council (CFP) for 2006 (55,000 t for 2005).

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if this is a separate stock from Falklands and/or International waters stocks, so effort should be made to improve stock identification.

### 8.10. Red cod (Salilota australis), Argentina

**FISHERIES:** Red cod is caught inside Argentinean waters by bottom trawlers and probably by artisanal fleets. Red cod landings, although small, showed an increasing trend as of 1990 that reached a maximum of 14,900 t in 1998. Most of the catches (85%) were obtained by the fleet operating around the Falkland/Malvinas Islands. The main fishing grounds were located off SW of the islands during the spawning season (September-October).

Total landings of red cod by all fleets (artisanal, bottom trawlers, longliners, etc) in Argentinean ports during the period 01/01/2005-31/08/2005 amounted up to 2,427 t.
SOURCE OF MANAGEMENT ADVICE: INIDEP is the main advisory body.

PRECAUTIONARY REFERENCE POINTS: The $F_{0.1}$ and $F_{30\%}$ biological reference points would be associated to high levels of biological collapse risk and should not be regarded as management objectives. On the contrary, another $F$ reference rate ($F_{safe}$) would allow keeping the stock at biologically acceptable levels in the long term.

STOCK STATUS: The most recent assessment of the red cod stock in the SW Atlantic (Patagonian shelf and Falkland/Malvinas Islands) to which STECF had access was carried out in 2001 by Wöhler et al. using commercial and research surveys data from 1992 to 1998. To calculate the optimum yield as a function of both age-at-first catch and fishing mortality, the Yield-per-Recruit model was used. Some biological reference points were also identified and an exploitation strategy based on low risk of collapse recommended.

The red cod biomass in the Patagonian shelf and adjacent slope, estimated with the swept area method, ranged between 101,000 and 208,000 t during the 1992-1998 period. Assuming fishing mortality rates of around 0.1-0.2, the optimum age-at-first catch was estimated at about 2.5-3.5 years (sizes between 26.8 and 33.2 cm TL). Age-at-first maturity was higher (4.18 years).

RECENT MANAGEMENT ADVICE: Considering the mean biomass estimates during the 1992-1998 period, taking $F_{safe}$ as an objective would imply allowing a maximum catch of 14,200 annual t in the area where the argentine fleet operates. A TAC of 5,000 t was set by the Federal Fisheries Council (CFP) for 2005.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if this is a separate stock from Falklands and/or International waters stocks, so effort should be made to improve stock identification.

STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

8.11. Argentine hake (*Merluccius hubbsi*), Argentina

FISHERIES: Argentine hake is targeted inside Argentinean waters by bottom trawlers and by artisanal vessels using different fishing gears. Important amounts of juveniles are discarded in the shrimp fisheries carried out by trawlers around San Matias Gulf.

Provisional data from the Argentinean Undersecretariat for Fisheries reported 360,478 t of Argentine hake landed in 2005, corresponding 235,000 t to the semi-industrial fleet and 73,650 to freezing trawlers. Of total landings, 296,116 t related to Southern stock, 61,260 t to Northern stock and 3,102 t to juveniles. SAGPyA preliminary figures indicate that between January and
July 2006, 159,863 t of argentine hake were landed, very similar volume to that one registered in the first half of last year (157,618 t).

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the main advisory body.

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been proposed for this stock or are unknown.

**STOCK STATUS:** Assessment of the stock status south of 41º S made by INIDEP in 2003 revealed that recruitments in the 3 previous years where good enough for a sustainable reported catch of about 300,000 t and a SSB slightly below this figure. It is possible that environmental conditions have caused acceptable recruitments. Biomass estimated during a cruise carried out in September 2003 resulted 1.2% lower than in 2002, but year-classes 2-6 decreased in number and biomass (13% and 18% respectively) coinciding with the decline of 13.5% observed in CPUE. The structure of the population was similar to these of 1997, with a year-class 1 higher in number to that of the mean of the period. The high abundance of this year-class compensates the diminution of the other groups, finally resulting in no variation of the biomass between 2002 and 2003.

The exploitation pattern shows that during 2002 and 2003, more than 70% of mean F was applied over year-class 2, meanwhile mean F over this year-class in previous years ranged from 15% to 40% of the total F.

Retrospective estimation of recruitment through XSA2 gave a recruitment for 2003 higher than this in 2002 and over 1.628 million individuals. For the third consecutive year, recruitments were near the historical average, but due to the strong fishing pressure, recruitments were not enough to restore the age structure of the population.

Total biomass estimated with XSA2 at the beginning of 2003 was 4.4% higher than in 2002 and 16.3% than in 2001. Nevertheless, SSB was practically constant under 300,000 t since year 2000. The difference in the trend of both biomasses was mainly due to the higher number of individuals of age 1 incorporated during three consecutive years in relation to the low recruitments observed in 1998-2000. Due to the high fishing mortality mainly affecting year-class 2, survivals were only able to maintain the spawners biomass. In accordance with the INIDEP last report on hake (Informe Técnico Nº 48 “Assessment on stock status north of 41º S and estimation of biologically acceptable catch for 2005”), total landings of age groups 1 and 2 during 2004 reached 77% of the total, being landings of age group 1 the biggest since 1986.

**RECENT MANAGEMENT ADVICE:** Several closed areas and/or seasons have been implemented in recent years by Argentinean authorities. Some of the protected areas are the nursery grounds around Isla Escondida and the shrimp fishing area around San Matias Gulf. Different Conservation measures are in force to the north and south of parallel 41º S respectively.

A TAC for 2004 was estimated to achieve a recovery of SSB to 400,000 t in 2005. A TAC of 301,000 t implies a recovery of SSB to about 500,000 t in 2005. A total TAC of 394,000 t was
set by the Federal Fisheries Council (CFP) for 2005, corresponding 84,000 t and 310,000 t to northern and southern stocks respectively, representing a cut of 11,000 t with respect to 2004. Risk analysis by INIDEP on stock north of 41º S was made with the same objective as in previous years of recovering and maintaining SSB at a level over 130,000 t. Results with the objective of a SSB over 200,000 t were also obtained. Due to the fact of a extremely high F and that SSB is well below B_Lim, short and medium term analyses were added to the traditional long term analysis with the objective of considering three different recovering options to the stock north of 41ºS:

<table>
<thead>
<tr>
<th>Objective</th>
<th>SSB&gt;130,000 t</th>
<th>SSB&gt;200,000 t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TAC 2005</td>
<td>TAC 2005</td>
</tr>
<tr>
<td>Long term (25 years)</td>
<td>87,139 t</td>
<td>76,403 t</td>
</tr>
<tr>
<td>Medium term (7 years)</td>
<td>78,944 t</td>
<td>62,956 t</td>
</tr>
<tr>
<td>Short term (3 years)</td>
<td>61,624 t</td>
<td>25,731 t</td>
</tr>
</tbody>
</table>

Source: INIDEP risk analyses northern stock

The Federal Fisheries Council set a TAC of 385,000 t of _M. hubbsi_ for 2006 (394,000 t in 2005), of which 309,400 t could be extracted to the south of parallel 41º S, and 75,600 t, to the north of this parallel. CFP-established TAC exceeds the provisional TAC that had been set by the Agriculture, Livestock, Fisheries and Food Secretariat (SAGPyA) at the beginning of the year by 5,000 t.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if this is a separate stock from Falklands and/or International waters stocks, so effort should be made to improve stock identification.

**8.12. Argentine short-finned squid (_Illex argentinus_), Argentina**

**FISHERIES:** _Illex argentinus_ is the major Argentine cephalopod fishery resource. The species was caught inside Argentinean waters since 1946 by artisanal vessels. Up to 1977 were bycatches of trawl fishery for hake. Then, trawler catches increased reaching 59,000 t in 1978. From 1993 a target fishery was developed with the incorporation of domestic (41) and chartered (45) jigging boats, which increased the catches to 204,730 t that year. Up to 2003 total catches ranged between 127,386 t in said year and 377,150 t in 1997. In the whole period total number of jigging boats varied between 65 and 150. The Argentinean Undersecretariat for Fisheries reported 146,184 t of _Illex_ squid landed in 2005 against the 76,485 t landed in 2004. According to preliminary figures provided by the SAGPyA, 253,517 t of _Illex_ squid were landed between January - May 2006, that is, 97% more than the same period last year, when 128,567 t were landed and indicating a signal of recovery of the resource. March 2006 registered the heftiest landings, with 80,466 t, whereas in April, 36,005 t.

Based on technical reports by the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP), reporting an increase of the Summer Spawning Stock (SSS), in 2006 the fishing season for _Illex_ was anticipated to the 16th of January instead of the 1st of February as usually, allowing the fishery between 44º and 46º 30’ S. Federal Council of Fisheries (CFP) decided to
close the *Illex* squid fishery south of parallel 45º S as of 20 June, in order to ensure the resource’s sustainability.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP), together with input from Comisión Técnica Mixta del Frente Marítimo (CTMFM) for the Common Fishing Zone of Argentina and Uruguay (north management area) and the South Atlantic Fisheries Commission (SAFC) for the south management area.

**PRECAUTIONARY REFERENCE POINTS:** Since 1995 two management areas and fishing seasons were established to the north and south of 44º S. Four stocks of *I. argentinus* are identified in the commercial catches. Two of them, Summer Spawning Stock (SSS) and Southpatagonic Stock (SPS), are caught south of 44º S during February-June. The remaining, Bonaerensis-northpatagonic Stock (BNPS) and Spring Spawning Stock (SpSS), are fished north of the latitude of reference during May-August. The fishing season is closed from September through January in the whole area in order to protect juvenile stages.

The initial stock abundance in each management area is estimated annually by a pre-recruit survey at the beginning of the fishing season. In February, a bottom trawl cruise is carried out between 45º S and 51º S in order to assess SSS and SPS, which involves the participation of British scientists as the SPS is a stock also fished around Malvinas/Falkland islands. In April, the second bottom trawl cruise is carried out between 37º and 43º S in order to assess BNPS and SpSS. During each fishing season the daily fishing effort and catch (in number) data are used to estimate the weekly decline of the stock in number through the catch/effort equation model.

The management measure of 40% of spawning biomass relative escapement rate is applied. When the relative escapement reaches 40%, closure of the fishing season is recommended (Early Warning System). In the particular case of SPS, a Precautionary Reference Point of a minimum of 40,000 t was agreed with the SAFC. In the event that the spawning stock biomass is likely to decline below this, there is an agreement that both Argentina and the UK will take an appropriate action. In such a case the *Illex* fisheries should be closed early in both areas.

**STOCK STATUS:** During a cruise carried out by INIDEP in February 2005 for assessment of *Illex* pre-recruits, mean density in the total area (2.18/nm²) was higher than the observed in 2004 (1.15/nm²). Observed mean density south of 48º S (0.90/nm²) was also higher than in 2004 (0.19/nm²). Mean density north of 48º S was 3.77/nm². Total pre-recruits estimations (121,355 t, +/- 39,081 t and 468 million individuals) indicate an increment in biomass and number with respect to 2004, but were lower than in 1995, which was the lowest historically recorded with a subsequent recovery of stock size.

As in other species of short life cycle, annual fluctuations of the abundance of the Argentine short-finned squid stocks were observed in the period 1993-2003. A recruitment failure in the South Patagonic and Bonaerense North Patagonian Stocks (SPS and BNPS respectively) in 2004 resulted in a collapse of the fishery. As a result, Summer Spawning Stock (SSS) accounted for most of the Argentine catches this year (70,000 t).
Stocks South of 44° S

_South Patagonic Stock (SPS)_

- SSB was very low at the end of fishing season 2003 (8,000-47,000 t, Inf. Téc. INIDEP 103/2003).
- Recruitment in 2004 was practically nil.
- There is a high probability of a nil/very low recruitment in 2005.
Summer Spawning Stock (SSS)

- SSB at the end of fishing season 2004 was low (1,400-8,200 t).
- Good reproductive index in 2004 added to environmental conditions favourable.
- to paralarvae survival allow the expectation for a normal recruitment in 2005.

Stocks North of 44º S

Bonaerense North Patagonian Stock (BNPS)

- SSB at the end of fishing season 2003 should be very low, although it couldn’t be assessed for two reasons: there was no research cruise in April, and the activity of the fleet was so reduced due to low catches, that catch/effort models couldn’t be applied (Inf. Téc. INIDEP 103/2003).
- Recruitment in 2004 was very low (9.354 t, +/- 5729 t, CI 95%; 34 million individuals, +/- 19 million individuals, CI 95%).
- There is a high probability of a nil/very low recruitment in 2005.

RECENT MANAGEMENT ADVICE: SAFC recommended the possibility of making the Early Warning System more conservative and increase the precautionary measures for the conservation of the species.

A ban on squid (*Illex argentinus*) fishing for all types of vessels for the area south of parallel 44° 30' south was decided by the Argentine Undersecretariat of Fisheries and Aquaculture (SSP&A), as of 11 April 2005. The Federal Fisheries Council (CFP) asked the Enforcement Authority to proceed with the closure of the squid (*Illex argentinus*) fishery south of parallel 42° 15' S as of 28 May. Another ban north of 39° 40' S was decided by CFP to be enforced as of 27 June.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if this is a separate stock from Falklands or International Waters stocks, so effort should be made to improve stock identification.

8.13. Patagonian squid (*Loligo gahi*), Argentina

FISHERIES: Even *Loligo gahi* abundance is lower inside the Argentine EEZ than in other areas, some quantities are caught as a by-catch by bottom trawlers in the finfish fisheries and perhaps by artisanal fleets. Total landings of Patagonian squid by all fleets (artisanal, bottom trawlers, longliners, etc) in Argentinean ports during the period 01/01/2005-31/08/2005 amounted up to 421 t.

SOURCE OF MANAGEMENT ADVICE: INIDEP is the organism responsible to give the necessary scientific support for the rational exploitation of the resources and to avoid the over fishing.
PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed or are unknown.

STOCK STATUS: STECF did not have access to any stock assessment in this area.

RECENT MANAGEMENT ADVICE: Unknown.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if this is a separate stock from Falklands or International waters stocks, so effort should be made to improve stock identification.

STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

8.14. Patagonian toothfish (*Dissostichus eleginoides*), Argentina

FISHERIES: Patagonian toothfish in Argentine waters is fished by trawlers and longliners. SAGPyA preliminary figures indicate that between January and July 2006, 480 t of Patagonian toothfish were landed, whereas in 2005, they reached 871 t in the same period.

SOURCE OF MANAGEMENT ADVICE: INIDEP is the organism responsible to give the necessary scientific support for the rational exploitation of the resources and to avoid the over fishing.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed or are unknown.

STOCK STATUS: Total initial biomass was estimated at the beginning of 1986 in 136,000 t (SSB 111,000 t), and at the start of 2002 it looked to have declined to 41,000 t (SSB 31,000t), representing 30% of the initial biomass at the beginning of the fishery. The reduction of the biomass was mainly observed from 1993 onwards, coinciding with the period of higher exploitation.

RECENT MANAGEMENT ADVICE: A TAC of 2,500 t was set by the Federal Fisheries Council (CFP) for 2006. The TAC established is based on criteria for prevention, and was agreed on after evaluating the technical report drafted by the National Institute of Fisheries Research and Development (INIDEP) on the state of the resource.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not
clear if this is a separate stock from Falklands or International waters stocks, so effort should be made to improve stock identification.

8.15. Patagonian shrimp (*Pleoticus muelleri*), Argentina

**FISHERIES:** Patagonian shrimp is fished by beam trawlers operating in the Gulf of San Jorge waters under a license regime by the Federal Fisheries Council (CFP). Statistics by the (SAGPyA) tell a downward tendency in recent years, given that during the first 10 months of 2003, shrimp catches reached 46,760 t, and in 2001 pegged at 56,018 t. Between January and October 2005, 6,287 t of shrimp were landed in the Argentine ports, considerable lower figures than previous year’s 25,693 t.

Conversely, results of a research cruise carried out by INIDEP in November 2005 foretelling a good fishing season in 2006 based on a reported increase of pre-recruits, were confirmed in October 2006, when official statistics reported 37,584 t of shrimp landed since January, representing more than 500% from previous year and a CPUE of about 600 kg/h, in opposition to 147 kg/h in 2005 (sources: SAGPyA, INIDEP). Official statistics also reported a 13% of hake by-catch.

Argentine red shrimp catches (1989-2006)

<table>
<thead>
<tr>
<th>Year</th>
<th>Tons</th>
<th>Year</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>11,352.9</td>
<td>1998</td>
<td>23,333.2</td>
</tr>
<tr>
<td>1990</td>
<td>9,647.8</td>
<td>1999</td>
<td>15,987.8</td>
</tr>
<tr>
<td>1991</td>
<td>8,336.5</td>
<td>2000</td>
<td>37,149.8</td>
</tr>
<tr>
<td>1992</td>
<td>24,495.4</td>
<td>2001</td>
<td>78,797.9</td>
</tr>
<tr>
<td>1993</td>
<td>19,270.9</td>
<td>2002</td>
<td>51,389.0</td>
</tr>
<tr>
<td>1994</td>
<td>16,669.8</td>
<td>2003</td>
<td>52,896.4</td>
</tr>
<tr>
<td>1995</td>
<td>6,203.2</td>
<td>2004</td>
<td>27,030.0</td>
</tr>
<tr>
<td>1996</td>
<td>9,874.4</td>
<td>2005</td>
<td>7,469.5</td>
</tr>
<tr>
<td>1997</td>
<td>6,481.9</td>
<td>2006</td>
<td>37,584*</td>
</tr>
</tbody>
</table>

* Provisional data

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the organism responsible to give the necessary scientific support for the rational exploitation of the resources and to avoid the overfishing

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed or are unknown.

**STOCK STATUS:**

Based on the results of a three-day prospecting carried out by researchers for the National Institute for Fisheries Research and Development (INIDEP) in August 2006 involving 12 commercial vessels, the Federal Fisheries Council (CFP) decided to close the Argentine red shrimp fishery in the national waters from 27th September onwards.
RECENT MANAGEMENT ADVICE: Unknown.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

8.16. Kingclip (Genypterus blacodes), Argentina

FISHERIES: Kingclip is one of the most important demersal fishes in argentine waters. It is found between 35° and 55°S, reaching high concentrations in summer located between 42° and 48°S. In winter, schools disperse over the whole range of distribution. Argentine kingclip fishery started developing in 1986 when catches surpassed 15,000 t/year to stabilize, in recent years, at around 23,000 t/year. The species is caught mainly as by-catch by bottom trawlers that direct their effort to hake (Merluccius hubbsi), representing approximately 50% of the total catch of kingclip.

SOURCE OF MANAGEMENT ADVICE: INIDEP is the organism responsible to give the necessary scientific support for the rational exploitation of the resources and to avoid the over fishing

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed.

STOCK STATUS: Two dynamic production models were applied to assess the status of kingclip (Genypterus blacodes) stock in the Southwest Atlantic. The simplest (biomass dynamic model) and a more complex one (structured production model) were fitted with commercial CPUE as abundance indices.

Although the stock is at its maximum biological production level (B98/k y B98r/kr >0.5 y B98/Brms >1), results from both models show a decrease of the resource. Present catch (~23,400 t) is 30% above the MSY estimated with the two models (~17,500 t). With present results, a collapse risk analysis was performed assuming three catch scenarios or constant effort: same as current (Cact-Fact), same as maximum sustainable yield (MSY) (Ccmp o Fcmp), and same as current situation plus a given quota for longliners. Risk analysis shows that, whatever the catch or effort assumption, the good state of the resource allows to envision collapse only as of the seventh year of projection. Collapse is highly probable in the long term because assumptions imply catches larger than the MSY. Risk is even higher when additional quotas to the present catches are considered and lower when present TAC levels (19,000 t) are maintained.

RECENT MANAGEMENT ADVICE: The only strategy to reduce risk is to establish a TAC equal or lower than the estimated MSY. However, taking into account the imminent effort reduction in the common hake fishery and considering that kingclip is caught mainly as hake by-catch, it is feasible to keep the TAC at present levels in the short term. Unless recovery of
kingclip as a consequence of effort reduction on hake is observed, to prevent risk enhancement, granting of additional quotas is not recommended.

Recommendations for year 2004 were:

- To maintain a TAC of 16,000 t.
- To limit catch of kingclip by trawlers during the first quarter of the year to a 25% of the total catch in each trip.
- To limit catch by longliners to 20% of the established TAC.

**STECF COMMENT:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organisation.

STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

8.17. Patagonian grenadier-Hoki (*Macruronus magellanicus*), International waters

**FISHERIES:** Hoki is fished as a by catch during *Illex* and hake fisheries by bottom trawlers from several countries -namely Spain-.

**SOURCE OF MANAGEMENT ADVICE:** No management advisory body exists for International waters of the Patagonian Shelf.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been defined for this stock.

**STOCK STATUS:** No assessment has been made so far for this stock, so that stock status is unknown.

**RECENT MANAGEMENT ADVICE:** No management advice has been made so far for this stock.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.

STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

8.18. Southern blue-whiting (*Micromesistius australis*), International waters
**FISHERIES:** Southern blue whiting is fished as a by catch during *Illex* and hake fisheries by bottom trawlers from several countries, mainly from Spain.

**SOURCE OF MANAGEMENT ADVICE:** No management advisory body exists for International waters of the Patagonian Shelf.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been defined for this stock.

**STOCK STATUS:** No assessment has been made so far for this stock, so that stock status is unknown.

**RECENT MANAGEMENT ADVICE:** No management advice has been given for this stock.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.

STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

8.19. Red cod (*Salilota australis*), International waters

**FISHERIES:** Red cod is caught as a by-catch during hake and *Illex* squid fisheries by bottom trawlers from several countries, mainly from Spain.

**SOURCE OF MANAGEMENT ADVICE:** No management advisory body exists for International waters of the Patagonian Shelf.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been defined for this stock.

**STOCK STATUS:** No assessment has been made so far for this stock, so that stock status is unknown.

**RECENT MANAGEMENT ADVICE:** No management advice has been given for this stock.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.
STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

8.20. Argentine hake, Austral hake (*Merluccius hubbsi*, *Merluccius australis*), International waters

**FISHERIES:** Argentine hake is targeted by bottom trawlers from several countries. The majority are from Spain. International waters are the most important area for Spanish trawlers targeting for hake in the SW Atlantic. The highest catches for this fleet in the Patagonian Shelf were observed in 1990 with more than 100,000 t, corresponding most of them to the High Seas. The main fishing grounds are located between parallels 44-47° S. Very reduced catches of Austral hake have been reported in this area.

The maximum effort in International waters and Falkland Islands by Spanish vessels (nº of boats) was also reported in 1990, decreasing since then, mainly due to the development of new fisheries in other areas.

**SOURCE OF MANAGEMENT ADVICE:** No management advisory body exists for International waters of the Patagonian Shelf.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been defined for this stock.

**STOCK STATUS:** No assessment has been made so far for this stock, so that stock status is unknown.

**RECENT MANAGEMENT ADVICE:** No management advice has been given for this stock.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.

8.21. Argentine short-finned squid (*Illex argentinus*), International waters

**FISHERIES:** The Argentine shortfin squid (*Illex argentinus*) is a common neritic species occurring in waters off Brazil, Uruguay, Argentina, the Falkland/Malvinas Islands and on the High Seas in the southwest Atlantic. *Illex* is the most important cephalopod species in the area and plays a significant role in the ecosystem. It is object of major fisheries using both trawlers and jigging vessels during the first half of the year. Bottom trawlers are mainly from Spain,
whereas jiggers belong to several Asian countries such as Japan, Korea and Taiwan. The main fishing area on the High Seas is between parallels 44-47º S.

Concentrations of shortfin squid are found 45-46º S in January or February and the animals gradually migrate southward towards the Falkland Islands while growing rapidly. Peak concentrations are found around the Falkland Islands between March and May. Towards the end of this period, animals start migrating northward to spawn and die around July or August.

Since the early 1980s, Argentine shortfin squid have been caught by Spanish bottom trawlers as a by-catch in the hake fishery. Nowadays, this squid species is considered as one of the target species for the Spanish fleet operating in the Southwest Atlantic, with mean annual catches of about 35,000 t. As an annual species, its catches fluctuate markedly from year to year depending on environmental conditions.

**SOURCE OF MANAGEMENT ADVICE:** No management advisory body exists for International waters of the Patagonian Shelf.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been defined for this stock.

**STOCK STATUS:** No assessment has been made so far for this stock, so that stock status is unknown.

**RECENT MANAGEMENT ADVICE:** No management advice has been given for this stock, even recommendations to extend conservation measures to the High Seas such as shelf restriction in catches have been proposed to vessels.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.

The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

### 8.22. Patagonian squid (*Loligo gahi*), International waters

**FISHERIES:** *Loligo gahi* is caught in relatively small quantities as a by-catch by bottom trawlers during hake and *Illex* fisheries. The main fishing area is around parallel 42º S, where big catches of mainly juvenile patagonian squid have been reported in different years by observers on board of Spanish vessels.

**SOURCE OF MANAGEMENT ADVICE:** No management advisory body exists for International waters of the Patagonian Shelf.
PRECAUTIONARY REFERENCE POINTS: Precautionary reference points have not been defined for this stock.

STOCK STATUS: No assessment has been made so far for this stock, so that stock status is unknown.

RECENT MANAGEMENT ADVICE: No management advice has been given for this stock.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.

STECF notes that the most recent information for this stock relates to the year 2003. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2005.

9. Mediterranean resources (GFCM)

The Management advisory body is the Scientific Advisory Committee (SAC) of the General Fisheries Commission for the Mediterranean (GFCM). The SAC is organised in Sub-Committees. The Sub-Committee on Stock Assessment (SCSA) gives advice on stock status and was held at FAO in Rome (Italy) from 11 to 14 September 2006. The state of the Mediterranean stocks is not regularly updated and assessments are only carried out locally and irregularly. For example, red mullet and hake are very important species throughout the Mediterranean, but in the report of the 2006 SAC, assessments for these species were carried out only in one (GSA 6) and three areas (GSAs 5, 6 and 7), respectively, even though data on these species in other areas are available in national databases. In the 2006 SAC meeting, twenty one (thirteen in 2005) assessments referring to small pelagic were carried out covering eight Geographical Sub-Areas (GSA) (six in 2005) and five species. Five assessments referred to shared stocks.

In 2006, as in 2005, nine assessments on demersal stocks were carried out. These covered four GSAs (5, 6, 7 and 17) as in 2005, and six species (striped mullet, red mullet, hake, common sole, blue and red shrimp and rose shrimp). One assessment on shared demersal stocks was presented. The assessment of the common sole was preliminary but noteworthy because it was the first time that this species has been assessed in the Mediterranean.

Assessments of small pelagics have risen from thirteen to twenty one and GSAs covered from six to eight. Stock assessment of demersal species needs to be extended to many other species and areas, while small pelagic assessment shows a strong increase but still needs to be extended to other GSAs. A stronger commitment to SAC-GFCM goals from EU member states would improve the present situation and in particular that of demersal stocks. During the STECF meeting, thanks to additional information coming from the research units working on trawling surveys in the Central Mediterranean sea, twelve new stock assessments on demersals (concerning six species and four GSAs) were added.
STECF notes that stock assessment should be presented and discussed in SAC meetings and time series assessments for all the stocks are needed to give appropriate and rational management advice. STECF recommends that member states should present assessments for all the stocks mentioned in the regulation 1639/2001 for each GFCM sub-area under European Community jurisdiction. STECF notes that the collaboration between Member States and GFCM should be improved in order to provide annual assessment of all stocks listed in the regulation 1639/2001, taking into account that national programmes for data collection are in force. During the last GFCM meeting, several Member States did not provide any updated assessment of stocks included in the EU regulation.

9.1. European anchovy (Engraulis encrasicolus) in Geographical Sub Area 1. Northern Alboran Sea

**FISHERIES:** The annual landings of anchovy (Engraulis encrasicolus) in the Northern Alboran Sea for the last fifteen years ranged between 0.2 and 3,000 t. Compared to other small pelagic species, anchovy has the highest unit value. Málaga Bay is the most important recruitment and fishery area. Only this area, which represents 85% of total landings, has been considered. During the period from 1990-2005, the anchovy stock of the Alboran showed great fluctuations in the catch. A successful recruitment as estimated by echo-acoustic tracking was observed during 2001 in the Alboran Sea (13,210 t) producing a strong increment of landings in 2002, besides to an increase of CPUE. Nevertheless, the catch dropped in 2003 and 2004 and in 2005 it has continued at low level (700 t). This decline is consistent with the echo-acoustic evaluation (550 tons in 2003, 2013 tons in 2004 and 1921 tons in 2005).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Biomass estimation comes from acoustic surveys and commercial landings and CPUEs.

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been defined for this stock.

**STOCK STATUS:** Low levels of biomass, recruitment and catch from 2003 to 2005.

**RECENT MANAGEMENT ADVICE:** The level of deployed fishing effort should not be increased above that observed for 2005. Length at first capture should not be less than length at first maturity, and adjust minimum legal landing size accordingly.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

9.2. European anchovy (Engraulis encrasicolus) in Geographical Sub Area 3. Southern Alboran Sea

**FISHERIES:** Fishing fleet is composed of 147 boats, distributed in seven Mediterranean ports, targeting small pelagics.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Data sources were acoustic surveys and landings.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The biomass estimate obtained by the acoustic survey performed in May 2006 is 3,700 tons.
RECENT MANAGEMENT ADVICE: No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

STECF COMMENTS: STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.

9.3. European anchovy (*Engraulis encrasicolus*) in Geographical Sub area 6. Northern Spain

FISHERIES: Anchovy and sardine are the main target species of the Spanish purse seine fleet in Sub-area 6. Mean GRT of boats is about 32.60. The annual landings of anchovy (*Engraulis encrasicolus*) in the GSA 6 for the last fifteen years ranged between 6,000 and 23,000 t. Compared to other small pelagic species, anchovy was the species with the highest unit value.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. The data considered were time series of acoustic surveys, landings and CPUE. The period in which the surveys were carried out corresponds to the recruitment season of the species (November – December). The acoustic evaluation provides an estimation of the recruitment of the species. There are two recruitment areas: one located between Barcelona and south of the Ebro River delta (the most important) and other in Rosas Bay. The studied area was divided in two regions (Tramontana Region, C. Creus–C. La Nao and Levantine Region, C. La Nao–C. Palos) in order to utilise the historical series of acoustic evaluation data (survey ECOMED). It is recorded in the Tramontana Region since 1990.

1. **Tramontana Region.** The estimated total biomass for the whole area in 2005 (9,000 t) is three times less than in 2004. There is no trend in calculated biomass since 1996. For this area, the surveys suggested that the recruitment was very low from 1996 to 2000, the population appeared to recover in 2001 and 2003, but it declined for 2004–2005. The landings, although with a light increase in 2002 (unfortunately, no acoustic data during 2002 were provided), present negative trend. CPUE in 2005 is higher than in 2004.

2. **Levantine Region.** The estimated biomass for 2005 was very low and the landings show the strongest negative trend for all the Mediterranean regions. It is important to note that for the last three years there was a gradual increase in the estimated biomass of other small pelagic species (mainly the three species of horse mackerel and bogue) which are either eggs and larvae predators or compete for the resources with anchovy. As regards 2005, the biomass of sardine and anchovy represented 40% of the total estimated biomass, in contrast to 63% and 83% in 2004 and 2003, respectively.

PRECAUTIONARY reference points: No precautionary reference points have been proposed for this stock.

STOCK STATUS: Declining trend in catches and CPUEs and low levels of recruitment in the last two years indicate that the stock may be in decline.

RECENT MANAGEMENT ADVICE: The level of deployed fishing effort should not be increased above that observed for 2005. Length at first capture should not be less than length at first maturity, and adjust minimum legal landing size accordingly.

STECF COMMENTS: STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). Because the stock is shared between the GSA 06 (Northern Spain)
and the GSA 07 (Gulf of Lions), STECF stresses the desirability to undertake joint acoustic surveys covering both GSAs.

9.4. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 7. Gulf of Lions

**FISHERIES:** The annual landings of anchovy in the last years are between 2,000 and 7,000 t in the Gulf of Lions. The landings are regulated by the market prices. When market price is low, the trawl fleet directs its activities towards demersal resources. Fifty trawlers target their activity on anchovy. The size structure from landings of 2002-2004 shows a lack of big fish in the most recent year, but in 2005 there were no fish from age 1. The evaluation of the resource is carried out through yearly echo-acoustic surveys since 1993. The anchovy resources in GSA 07 seem to decline for the last four years, averaging 37,000 t in the period from 2003 to 2005. There is no trend in mean weight calculated from acoustic evaluation from 1999 to 2004, but an increase in 2005, due to a lack of age 1 individuals. Mackerel biomass (*Scomber scombrus*) is increasing in 2004 and could have an effect on anchovy stock as predator of this species. The 2005 biomass estimate was very low but preliminary results of 2006 survey show that the anchovy stock is at the mean level of the years prior to 2005.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The data sources were time series of acoustic surveys, landings and CPUE.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Declining trend in biomass and catches from 2002 to 2005 and very low level of recruitment of the 2004 year-class. However, preliminary data from the 2006 survey suggest that the 2005 recruitment was good so an increase in total stock biomass above the 2005 level is expected in 2006.

**RECENT MANAGEMENT ADVICE:** The level of deployed fishing effort should not be increased above that observed for 2005.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). Because the stock is shared between the GSA 06 (Northern Spain) and the GSA 07 (Gulf of Lions), STECF stresses the desire to undertake, joint acoustic surveys covering both GSAs.

9.5. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 16. Strait of Sicily

**FISHERIES:** No data are available, even if this area is considered as one of the most productive in the central Mediterranean Sea. A large purse-seine fleet is based in southern Sicily and other purse-seiners are based in several Tunisian harbours, but data on these fleets are also not available.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Biomass estimation comes from acoustic surveys. The studied area corresponds to the area extending on the continental shelf from the southern Sicily coast up to a depth of about 200 m. The time series of acoustic biomass estimates for anchovy and sardine for the period 1998 – 2005 in the Strait of Sicily were also considered. The last two echosurveys were carried out both in GSA 16 and on the Maltese continental shelf area (GSA 15) in the framework of the FAO MedSudMed Project. Even though the biomass estimates do not include the biomass estimates
for small pelagics from the Maltese area, the analysis of acquired data highlighted the importance of conducting joint echosurvey in GSA 15 and 16 in order to assess small pelagics distribution patterns in relation to sea water circulation.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points.

**STOCK STATUS:** Anchovy biomass in the period 1998 – 2005 oscillated between a minimum of 7,000 t in 1998 to a maximum value of 22,950 t in 2001. The estimated stock biomass in 2005 was 20,702 t

**RECENT MANAGEMENT ADVICE:** No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

**STECF COMMENTS:** STECF stresses the importance of providing to the SAC-GFCM SCSA the relevant data on the stock and the fisheries exploiting it. STECF notes that the joint echo-surveys carried out in GSA 15 and 16 under the umbrella of FAO MedSudMed Project are a useful development for stock assessment purposes. STECF encourages the rapid processing of data and information from such surveys in order to provide timely assessment advice.

9.6. **European anchovy (Engraulis encrasicolus) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic**

**FISHERIES:** Anchovy is one of the most important commercial species of the Adriatic Sea. The small pelagic fishery is widely dispersed in the Northern and Central Adriatic Sea and anchovy and sardine are shared stocks, exploited by the fleets of Italy, Slovenia and Croatia. The Italian fleet is composed of about 102 (51 pairs) pelagic trawlers (*volante*) mainly operating from Trieste to Ancona and about 42 *lampara* vessels (purse seiners with light), operating in the Gulf of Trieste (25 small *lampara*, average GT 9, average engine power 110 kW) and in the Central Adriatic (17 big *lampara*, average GT 91, average engine power 354 kW). The fishing fleet in 2005 is quite stable in comparison with 2004. The purse seine fleet also includes boats not registered in the ports of GSA 17, but usually fishing in this sub-area. The Slovenian fleet is composed of 1 pelagic trawler (2 in 2004) and 7 purse seiners (4 in 2004), while the Croatian fleet is composed of 20 (10 pairs) pelagic trawlers and 233 purse seiners. The Adriatic small pelagic fleet is targeting both anchovy and sardine. Nevertheless, in Italy, fish market price of anchovy is higher than sardine, while the opposite happens in the Eastern Adriatic. Fisheries by boat seiners and small trawlers targeting the transparent goby (*Aphia minuta*) as well as fries of small pelagic species are authorised for 60 days in wintertime in Italy. Italian regulations prohibit fishing with trawls and mid-water pair trawls for about 45 days between July and September. This closed season does not apply to purse seiners. Fishing activity is suspended during the weekend. Anchovy landings for the whole area are about 31,000 t per year (average of the last three years), with an increase in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Two independent approaches are currently applied in GSA 17 to assess anchovy and sardine: VPA from Italy (time series 1975-2005) and acoustic surveys from Italy (time series 1975-2005) and from Croatia (no new assessment has been presented by Croatia in 2006 SAC-GFCM meeting).

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The total stock biomass estimated by VPA (tuned with echo-survey data) shows a value of about 110,000 t (average of the period 2003-2005).
RECENT MANAGEMENT ADVICE: The level of deployed fishing effort should not be increased above that observed in 2005.

STECF COMMENTS: STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). STECF notes the potential importance to stock assessment of a joint acoustic survey between Italy and Croatia.

9.7. European anchovy (Engraulis encrasicolus) in Geographical Sub Area 18. Southern Adriatic

FISHERIES: Purse seiners are fishing vessels targeting anchovy (and sardine) in GSA 18. During spring and summer seasons they migrate in Central Adriatic because higher catches can be obtained in this area.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Biomass estimation is based on acoustic survey.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The biomass estimate obtained by 2005 acoustic survey is 29,000 t.

RECENT MANAGEMENT ADVICE: No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

STECF COMMENTS: STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.

9.8. European anchovy (Engraulis encrasicolus) in Geographical Sub Area 22. Aegean Sea

FISHERIES: A purse seine fleet based in the ports of Alexandroupolis, Kavala and Thessaloniki (Greece) operates in the area. The fishery closed season extends from the 15th of December to the end of February. Updated catch data are not available. The biomass of Aegean Sea anchovy stock was estimated in June 2003, June 2004 and June 2005 with the concurrent application of the Daily Egg Production (DEPM) and the Acoustic methods. Spawning stock biomass (SSB) based on the DEPM was 40,042 t in 2003, 22,799 t in 2004 and 20,533 t in 2005. Stock biomass based on acoustics was estimated at 47,838 t in 2003, 46,508 t in 2004 and 31,852 t in 2005.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Acoustic surveys and DEPM were applied to estimate biomass.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: Results showed a remarkable decline of anchovy biomass in the eastern part of the Aegean Sea between 2003 and 2004 and in the western part of the surveyed area between 2004 and 2005.

RECENT MANAGEMENT ADVICE: SAC-GFCM Sub-Committee on Stock Assessment (SCSA) underlines the need to shift the current fishing closed period (December-February) either to autumn (recruitment of anchovy) or to spring (recruitment of sardine). The yearly biomass estimates obtained by the acoustics and DEPM should be continued in order to obtain a clearer
picture of the stock. These estimates could be integrated with concurrent estimates of catch-at-age to improve the assessment of the stock. As this stock is shared between Greece and Turkey close collaboration between scientists of these countries is recommended.

**STECF COMMENTS:** STECF agrees with the advice of SAC-GFCM SCSA, underlining the necessity for close collaboration between Greece and Turkey to assess this stock.

### 9.9. Sardine (*Sardina pilchardus*) in Geographical Sub Area 1. Northern Alboran Sea

**FISHERIES:** The annual landings of sardine in the Northern Alboran Sea for the last fifteen years ranged between 4,000 and 11,000 t. This species is the most fished one although its economical value is low. The period in which the surveys were carried out corresponds to the beginning of the species reproductive season (November – December). The estimated biomass from Gata Cape to Fuengirola in 2005 is four times higher than in 2004. Landings and CPUE present a strong annual fluctuation with an increase in both.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is the GFCM. Data sources were time series of acoustic surveys, landings and CPUE.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Biomass, catches and CPUEs are higher in 2005 than 2004. Prior to 2005 there had been a decreasing trend in cpue..

**RECENT MANAGEMENT ADVICE:** Since there is no in-year assessment and considering the high fluctuation of the pelagic fish stocks, it is considered advisable not to increase the actual level of fishing effort..

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

### 9.10. Sardine (*Sardina pilchardus*) in Geographical Sub Area 3. Southern Alboran Sea

**FISHERIES:** The sardine is the most important pelagic fish in the Mediterranean Moroccan waters with a mean yearly landing of 14,000 t. There is a special sardine fleet composed of 147 boats, distributed in seven Mediterranean ports.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is the GFCM. Data sources were acoustic surveys and landings.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The biomass estimate obtained by the acoustic survey performed in May 2006 is 80,000 t. Yield per-recruit analyses carried out prior to 2006 indicated that the stock was fully exploited.

**RECENT MANAGEMENT ADVICE:** No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

**STECF COMMENTS:** STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.
9.11. Sardine (*Sardina pilchardus*) in Geographical Sub Area 6. Northern Spain

**FISHERIES:** The annual landings of sardine in Northern Spain for the last fifteen years ranged between 19,000 and 53,000 t. This species is the most fished one although its economical value is low. The studied area was divided in two regions (Tramontana Region, C. Creus-C. La Nao and Levantine Region, C. La Nao-C. Palos) in order to use the historical series of acoustic evaluation data (survey ECOMED), recorded in the Tramontana Region since 1990. The period in which the surveys were carried out corresponds to the beginning of the species reproductive season (November – December).

1. Tramontana Region. From 1990 to 2005, the estimated biomass fluctuated from 200,000 t in 1992 to 37,000 t in 2005. The estimation for 2005 appeared stable with respect to 2004, but there is a negative trend in biomass from 1992. The same trend was observed in the abundance of juvenile. Landings show the same negative biomass trend, but there is an increase in the CPUE, which is recorded for the main ports in the region.

2. Levantine Region. The estimated biomass for 2005 was 9,000 t, nearly similar to that of 2003(8,000 t). Landings show the strongest negative trend for all the Mediterranean regions. There is a strong CPUE increase in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Data sources were time series of acoustic surveys, landings and CPUE.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Declining trend in catches during the last decade. Declining trends in biomass and recruitment from 1992 onwards.

**RECENT MANAGEMENT ADVICE:** Taking into account the actual level of biomass and catches and negative trend, it would be recommended not to increase the actual level of fishing effort.

**STECF COMMENTS:** STECF notes that with the exception of recent increases in catch rates, all other stock indicators show a continual decline since the early 1990s. Biomass has steadily declined from about 200,000t in 1992 to an estimated biomass of 37,000 t in 2005. In the absence of any detailed explanation for the observed increase in cpue in 2005, and in an attempt to halt any further decline in stock biomass, STECF advises that catches from the stock be restricted to a level less than the recent average. STECF also advises that effort in the fishery should be closely monitored and controlled and as a minimum measure, effort on the stock should not increase above recent levels.


**FISHERIES:** The sardine landing in the Gulf of Lions averages 8,000 t, for the period from 2003-2005. The landings and fishing effort have been monitored since 1985 but the most reliable values have been collected since 1999. Compared to anchovy, production is less regulated by the market, but trawlers can easily shift to demersal resources. The acoustic evaluation has been carried out since 1993 in the Gulf of Lions during the summertime. Sardine biomass is very variable, but remains in 2004 quite at the same level as in 2002, that is up to 110,000 t. Biomass increase strongly in 2005 up to 231,000 t. There is a downward trend in mean weight calculated from acoustic evaluation till 2004 but a higher value in 2005. The survey series also provides data on resource variability for other small pelagic species (mackerel, horse mackerel, sardinella and sprat).
SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Data sources were time series of acoustic surveys, landings and CPUE.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: Increasing from 2003 to 2005. However, preliminary data from the acoustic survey indicate a decrease in stock biomass in 2006.

RECENT MANAGEMENT ADVICE: No specific advice is given by the SAC-GFCM Subcommittee on Stock Assessment (SCSA).

STECF COMMENTS: STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.

9.13. Sardine (Sardina pilchardus) in Geographical Sub Area 16. Strait of Sicily

FISHERIES: No data are available, even if this area is considered as one of the most productive in the central Mediterranean Sea. A large purse-seine fleet is based in southern Sicily and other purse-seiners are based in several Tunisian harbours, but data on these fleets are also not available. The studied area corresponds to the area extending on the continental shelf from the southern Sicily coast up to a depth of about 200 m. The time series of acoustic biomass estimates for anchovy and sardine for the period 1998 – 2005 in the Strait of Sicily were also considered. The last two echosurveys were carried out both in GSA 16 and in Maltese continental shelf area (GSA 15) in the framework of the FAO MedSudMed Project. Even though the presented biomass estimates do not include the small pelagics biomasses from Maltese area, the analysis of acquired data singled out the importance of conducting joint echosurvey in GSA 15 and 16 in order to assess small pelagics distribution patterns in relation to seawater circulation.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Biomass estimation comes from acoustic surveys.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The sardine biomass time series shows a sharply decreasing trend in the period 1999 – 2002 followed by increasing biomass values from 6,000 t in 2002 to 21,219 t in 2005. The assessment indicates that the stock has undergone large inter-annual fluctuations in biomass.

RECENT MANAGEMENT ADVICE: No specific advice is given by the SAC-GFCM Subcommittee on Stock Assessment (SCSA).

STECF COMMENTS: STECF stresses the importance of providing to the GFCM-SAC SCSA the relevant data on the stock and the fisheries exploiting it. STECF notes that the joint echosurveys carried out in GSA 15 and 16 under the umbrella of FAO MedSudMed Project are a useful development for stock assessment purposes. STECF encourages the rapid processing of data and information from such surveys in order to provide timely assessment advice. STECF notes that previous advice from the GFCM has highlighted the need to assess the impact of local fisheries for larval and juvenile sardine.

FISHERIES: Sardine is one of the most important commercial species of the Adriatic Sea. The small pelagic fishery is widely dispersed in the Northern and Central Adriatic Sea and anchovy and sardine are shared stocks, exploited by the fleets of Italy, Slovenia and Croatia. Description of the fleet targeting sardine in GSA 17 can be found in section of Anchovy in Geographical Sub-Area 17. Sardine landed catches of the whole area show a modest decrease since 2000 (only in 2004 catches showed a slight increase). The average landings for the period 2000-2005 is 19,300 t, while the average of 1996-2000 was 26,200 t. Due to low market price for sardine in Italy, discards of sardine at sea may occur. Between 1987 and 1999, discard estimates averaged about 2,000 t per year. No information on discards for the period 2000-2005 is available, but it is reasonable to consider discards negligible, because of the decrease of catches.

SOURCE OF MANAGEMENT ADVICE: Two independent approaches are currently applied in GSA 17 to assess anchovy and sardine: VPA from Italy (time series 1975-2005) and acoustic survey from Italy (time series 1975-2005) and from Croatia (no new assessment has been presented by Croatia in 2006 SAC-GFCM meeting).

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The biomass estimated by VPA (tuned with echosurvey data) shows a value of about 84,000 t (average of the period 2003-2005). Even though during 2004 and 2005 a slight increase of biomass is observed, it would be unwise for fishing effort to be allowed to rise, because decline of stock biomass is observed after the peak in the first half of 1980s and lowest values of this series correspond to recent years.

RECENT MANAGEMENT ADVICE: The actual level of fishing effort should not be increased.

STECF COMMENTS: STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). STECF notes the potential importance to stock assessment of a joint acoustic survey between Italy and Croatia. STECF suggests reducing fry fishing because of the sharp decrease of the spawning biomass in the last 15 years.

9.15. Sardine (Sardina pilchardus) in Geographical Sub Area 18. Southern Adriatic

FISHERIES: Purse seiners are fishing vessels targeting sardine (and anchovy) in GSA 18. During spring and summer seasons they migrate in Central Adriatic because higher catches can be obtained in this area.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Biomass estimation is based on acoustic survey.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The biomass estimate obtained by 2005 acoustic survey is around 7,000 t.

RECENT MANAGEMENT ADVICE: No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

STECF COMMENTS: STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological
reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.

**9.16. Sardine (Sardina pilchardus) in Geographical Sub Areas 20 and 22. Eastern Ionian Sea and Aegean Sea**

**FISHERIES:** A purse seining fleet based in the ports of Volos, Chalkis, Corinthos and Patras (Greece) operates in the area. No data are available on fishing effort, trends in catches, landings and discards.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Biomass estimation of sardine stocks in central Aegean and eastern Ionian Seas based on DEPM.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** According to the stock assessment carried out in 2003, total spawning biomass was estimated in 2000 to be 19,826 t.

**RECENT MANAGEMENT ADVICE:** No advice on management is available for this stock.

**STECF COMMENTS:** STECF notes that no assessments were presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2004, 2005 and 2006.

**9.17. Sprat (Sprattus sprattus) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic**

**FISHERIES:** Sprats are fished by the same fleet targeting anchovy and sardine (see section of Anchovy in Geographical Sub-Area 17 for fleet description). Italian fleet discard sprats at sea, while Slovenian and Croatian land them. The level of catches is unknown.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Biomass estimation is based on acoustic survey.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The biomass estimate obtained by the 2005 acoustic survey is 21,000 t.

**RECENT MANAGEMENT ADVICE:** No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

**STECF COMMENTS:** STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.

**9.18. Mackerel (Scomber japonicus) in Geographical Sub Area 3. Southern Alboran Sea**

**FISHERIES:** Fishing fleet is composed by 147 boats, distributed in seven Mediterranean ports, targeting small pelagics. The level of catches is unknown.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Data sources were acoustic surveys and landings.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.
STOCK STATUS: The biomass estimate obtained by the acoustic survey performed in May 2006 is 3,000 t.

RECENT MANAGEMENT ADVICE: No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

STECF COMMENTS: STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.


FISHERIES: Fishing fleet is composed by 147 boats, distributed in seven Mediterranean ports, targeting small pelagics. The level of catches is unknown.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Data sources were acoustic surveys and landings.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The biomass estimate obtained by the acoustic survey performed in May 2006 is 71,000 t.

RECENT MANAGEMENT ADVICE: No specific advice is given by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

STECF COMMENTS: STECF notes that the information presented on this stock and fishery is poor and in the absence of any reliable biological reference points, is unable to assess the status of the resource or its exploitation rate. Consequently, STECF is unable to advise on an appropriate exploitation rate for this stock. STECF recommends that if possible, biological reference points should be estimated by the SAC-GFCM SCSA to provide the basis for management advice.

9.20. Striped mullet (*Mullus surmuletus*) in Geographical Sub Area 5. Balearic Islands

FISHERIES: Fleets, catching this species, are widely dispersed over the entire Mediterranean Basin. This species is a very valuable resource for artisanal fisheries, which exploit it with set gears, especially trammel-nets and gillnets. Besides it appears in the mixed catches of bottom trawlers operating close to rocky areas. Striped red mullet (*Mullus surmuletus*) is one of the most important target species for the trawl fishery developed by around 40 vessels off Mallorca (Balearic Islands, GFCM-GSA 5). The annual landings of this species, which represents 80-90% of red mullets (*Mullus* spp.) landings, oscillated between 65 and 100 t in the last decade.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. The assessment of this stock has been carried out applying tuned VPA (Extended Survivor Analysis, XSA) on a data series covering 6 years (2000-2005) and both VPA and Y/R analysis on mean pseudo-cohorts from that period. These approaches were performed using monthly size composition of catches, official landings and the biological parameters estimated in the framework of the Data Collection Programme (2003-2004). The VPA was tuned with CPUE from commercial trawl fleet (2000-2005) and bottom trawl surveys (2001-2005). The software
used were the Lowestoft VPA program (Darby & Flatman, 1994) for the XSA analysis and the VIT program (Lleonart & Salat, 1992) for the cohort and Y/R analysis.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The results of this assessment indicate that the resource is fully exploited in the Balearic Islands (GSA 05).

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recommends not to increase the fishing effort.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM SCSA.


**FISHERIES:** This species mainly appears in the mixed catches of bottom trawlers operating in sandy areas, being also caught with set gears, in particular trammel-nets and gillnets. Catch data are incomplete. Red mullets (*Mullus barbatus* and *Mullus surmuletus*) are one of the most important target species for the trawl fisheries. In the GSA 1 there are 142 trawlers that land over 150 t by year.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The state of exploitation of these demersal resources was assessed by applying length cohort analysis (LCA) and yield per recruit (Y/R) analysis on a mean pseudo-cohort, based on size composition of trawl catches (obtained from on board and in port monthly samplings) and official landings. The input parameters sets were obtained from available previous assessments. Transition analysis was also performed in order to simulate different management strategies. The present work is the first attempt to assess the state of exploitation of red mullets caught by trawlers in the whole Spanish Mediterranean coast.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** In the Alboran Sea (GSA 1), the fishery is mostly concentrated on recruits. The 2004 WG noted that this was the first assessment of red mullets (*Mullus* sp.) stocks in this GSA. The best available data were used while longer time series including catches from other gears will have to be used in the future. Transition analysis was made reducing the fishing effort by 20% and using 40 mm square mesh size. The results showed that the increase in Y/R was higher after improving the selectivity than reducing fishing effort. There were gains in the second year after the application of this management measures. *Mullus barbatus* in GSA 1 is overexploited. Growth overfishing was detected.

**RECENT MANAGEMENT ADVICE:** The WG recommended:

- A more effective control in closed coastal areas in order to protect recruitment. Seasonal closures are encouraged.
- To improve the selectivity for both species with a more strict control of the legal mesh size, moreover, in comparison with the 40 mm diamond mesh size, the use of 40 mm square mesh size would improve the exploitation pattern.

The SC recognizes the need of updating the biological parameters and also the importance of sensitivity analysis for natural mortality. Moreover, it stresses the importance of including trawl survey data for a more reliable assessment. The SC considers that by improving the selectivity and by applying seasonal closures, in addition with the strong enforcement of regulations, the exploitation of the red mullet stock would be improved.
**STECF COMMENTS:** No new assessment has been presented to SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006 and it is unclear if previously suggested management measures have been implemented.

**9.22. Red mullet** (*Mullus barbatus*) **in Geographical Sub Area 3. Southern Alboran sea**

**FISHERIES:** Red mullet is a target species for trawlers. The fleet consists of 120 trawlers. Trawler catches are landed mainly in three harbours: Nador (62.6%), Al Hoceima (23.2%) and M’diq (14.2%). Landings of this species constitute, together with *Parapenaeus longirostris*, 12% of the total demersal landings. *Mullus barbatus* is the target species in coastal areas while *Parapenaeus longirostris* is fished offshore in deeper waters. The two fishing activities partially overlap.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. An analysis of length frequency distribution obtained from sampling of landings has been performed by means of analytical models (VPA based on pseudocohort) for the main resources exploited by the Mediterranean fleet of Morocco. The Y/R analysis was utilised to test the behaviour of the populations to different exploitation levels. A vector of natural mortality was used to account for changes by age.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** *Mullus barbatus* in GSA 03 is overexploited.

**RECENT MANAGEMENT ADVICE:** The possibility of reducing the fishing mortality in coastal areas by moving the fleet activity further offshore was considered with its implications on the level of exploitation of *Parapenaeus longirostris*: this was considered feasible only under a strict control of the fishing capacity.

The 2004 SAC WG recommended:

- A reduction of the fishing effort in coastal areas that could be achieved by transferring part of the fishing effort to more offshore fishing grounds.
- Enforcement of legal mesh size regulations and coastal areas closures.

The SAC taking into account that the two fishing activities (inshore for red mullet and offshore for *Parapenaeus longirostris*) partially overlap, acknowledges that a better condition for red mullet stock could be achieved by transferring part of the fishing effort to more offshore fishing grounds, but under a strict control of fishing capacity and enforcement of the regulations.

**STECF COMMENTS:** No new assessment has been presented in SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006 and it is unclear if previously suggested management measures have been implemented.

**9.23. Red mullet** (*Mullus barbatus*) **in Geographical Sub area 6. Northern Spain**

**FISHERIES:** Red mullet (*Mullus barbatus*) is one of the target species of the trawl fishery in the GFCM geographical sub-area 6 (Northern Spain). The trawl fleet operating in this area is composed by 647 boats averaging 47 TRB, 58 GT and 297 HP. Some of these units (smaller vessels) operate almost exclusively on the continental shelf, targeting red mullet, octopus, hake and different species of sea breams. According to official data, landings increased considerably between 1973 and 1982 and from this year until now a decreasing trend has been observed. In the period 1998-2004 landings of this species averaged 1315 t per year.
**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The state of exploitation was assessed by VPA, tuned with standardized CPUE from the commercial fleet and abundance indices from trawl surveys and applying the Extended Survivor Analysis (XSA) method (Lowestoft programme; Darby and Flatman, 1994). Yield-per-recruit (Y/R) analysis (VIT programme; Lleonart and Salat, 1992) on a mean pseudo-cohort 1998-2005 was also applied. Both methods were performed using size composition of trawl catches from 1998 to 2005. Biological parameters of growth and maturity were the same applied in the previous assessment, but a M-at-age vector has been used in the current assessment. Transition analysis was carried out considering two different management strategies aimed at improving the state of this resource: (1) a 20% reduction in current effort and (2) a change of mesh type in cod-end, from the current 40 mm diamond shape to 40 mm square.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Results of LCA show a growth overfishing, with $F_{max} = 0.26$ as a factor of current $F$. Important increment in Y/R could be obtained reducing fishing effort but, especially, with the use of square mesh in the cod-end.

**RECENT MANAGEMENT ADVICE:** Important increment in Y/R could be obtained reducing fishing effort by 20% and/or with the use of square mesh in the cod-end.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) but notes that the advice given is for only two ways to improve yield in the long-term. Alternative scenarios for improving yield have not been evaluated.


**FISHERIES:** *Mullus barbatus* is among the most commercially valuable species in the area and forms part of a species assemblage that is the target of the bottom trawling fleets that operate near shore and a specific target in some particular periods when the species is densely concentrated near the coast. It is caught mainly with three different variants of the bottom trawl net. The fishing pressure on this species varies between the different zones within sub-area 9 as the composition of the various fleets and their individual target species varies between sub-areas. *Mullus barbatus* catches are higher during the post-recruitment period (from September to November). About 350 trawlers and a small number of artisanal vessels exploit the species. Annual landings are around 700 t, mostly from trawlers. Discarding of undersized individuals is in general negligible, due to the fact that immediately after recruitment, small sized individuals are still concentrated inside the 3 miles trawl exclusion zone. Illegal catches of juveniles do occur.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Data proceed from trawl-surveys (GRUND and MEDITS programmes) as well as from Catch Assessment Surveys that includes data collection of size structure of the landings. Length Cohort Analysis, Composite Production Models and Yield-per-Recruit analysis were used to assess the status of the stocks in the area. Assessment was performed considering both the whole GSA 9 and four zones with different exploitation levels.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** According to the stock assessment carried out in 2004, the species is considered fully exploited and in some areas overexploited, depending on the fishing grounds.
where the different fishing fleets operate with different levels of fishing effort. The current (2004) level of the Spawning Stock Biomass if compared with the pristine SSB is considered too low, suggesting a risk of recruitment overfishing. Biomass index from GRUND surveys (2003-2004) shows a decrease of the species; on the contrary abundance index from MEDITS for the same years indicates an increasing trend.

**RECENT MANAGEMENT ADVICE:** The enforcement of a seasonal fishing ban of a period during the late summer and early autumn should be the management measure to produce a shift in the size of first capture. Moreover, $Z_{\text{mp}}$ and $Z_{\text{sh/shb}}$ values suggest the necessity of a reduction of the current $Z$, that can be obtained through the reduction of fishing effort or fleet capacity.

**STECF COMMENTS:** No new assessment has been presented to SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This update has been produced by the research units working on trawl surveys in the GSA 9. STECF notes the conflicting trends given by the different survey series. This is most probably an effect of the surveys taking place at different times of the year and reflecting changing abundance of different age classes.

### 9.25. Red mullet (*Mullus barbatus*) in Geographical Sub Area 10. Southern and central Tyrrenian

**FISHERIES:** *Mullus barbatus* is among the most commercial valuable species in the area and consists partly of a species assemblage that is the target of the bottom trawling fleets, which operate near shore. No commercial catch data and no information on the fleets were reported to the SAC.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Trawl survey data comes from MEDITS and SAMED EU projects. The data considered were the indices of abundance (weight and number per square km by swept area method), size composition at sea by sex, sex ratio, maturity, growth, natural and total mortality. The Length frequency analysis, Chen & Watanabe vector, Alagaraja formula, length converted catch curve, simulation of different scenarios using a dynamic pool model were performed.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Full exploitation and growth overfishing can be assumed for the species. There are no significant trends in biomass abundance estimates.

**RECENT MANAGEMENT ADVICE:** A reduced (total) mortality of 10% – 15% could be achieved by enforcing area and temporal closures currently in place, which, in turn, could lead to a more desirable ratio between average Spawning Stock Biomass and average virgin Spawning Stock Biomass (SSB/SSBo).

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). No new assessment has been presented to SAC-GFCM in 2006. It is necessary to get proper information about the fishery data from this GSA.


**FISHERIES:** *Mullus barbatus* is among the most commercially important species in the area and forms part of an assemblage that is the target of the bottom trawling fleets, which operate near shore. From 1994 to 2004, in GSA 11, the trawling-fleet has remarkably changed. The change has mostly consisted of a general increase of the number of vessels and by the replacement of the
old, low tonnage wooden boats by larger steel boats. For the entire GSA a decrease of 20% for the smaller boats (<30 GRT), which principally exploit this species, was also observed.

**SOURCE OF MANAGEMENT ADVICE:** The data refer to trawl surveys carried out between 1994 and 2004. For the same years the commercial data was also analysed. Density and biomass indexes were used. Y/R analysis was performed as a function of F and tc. Assessment was performed considering both the whole GSA 11 and different zones with different exploitation levels.

**PRECAUTIONARY REFERENCE POINTS:** The analyses made using the Beverton & Holt model proved to be useful in identifying the value of $F_{\text{max}}$ as Limit Reference Point. For a more cautious assessment, however, the value of $F_{0.1}$ seems to be a good Target Reference Point.

**STOCK STATUS:** The renovation of fishing vessels led to a great increase in the number of bigger boats (total gross tonnage, TGT>70) and consequently a shift of the fishing effort towards deep resources: this favoured all the species living in shallow waters, such as red mullet. In Sardinian waters abundance and density indices of *Mullus barbatus* have markedly increased in the last years, particularly in the southern area where a significant trend is detected. Commercial catch rates and total landings have remained relatively constant since the mid 1990s. In general, the Sardinian red mullet stock does not seem to suffer from overexploitation: in the different zones, characterized by different trawling surfaces, wind exposition, bottom features and levels of exploitation, fishing mortality rates exceeded the estimated $F_{\text{max}}$ only in some of the years analyzed.

**RECENT MANAGEMENT ADVICE:** Management actions such as the enforcement of a mesh size of 40 mm, a “seasonal fishing ban” on fishing activities and more active surveillance of Essential Fish Habitats (EFHs) could lead to a reduced mortality of the younger cohorts and help to safeguard juveniles. Protection areas play an additional important role in safeguarding recruits and juveniles from overexploitation.

**STECF COMMENTS:** No new assessment has been presented to SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This update has been produced by the research units working on trawl surveys in the GSA 11. STECF has no further comments.

9.27. Red mullet (*Mullus barbatus*) in Geographical Sub Area 19. Western Ionian Sea

**FISHERIES:** *Mullus barbatus* is among the species with high commercial value. The highest trawl fishing pressure occurs along the Calabrian coast while the presence of rocky bottoms on the shelf along the Apulian coast prevents the fishing by trawling in this sector. The landings in the 2004 in the whole GSA 19 were detected around 321 t coming mainly from bottom trawling and small-scale boats.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Systematic studies on this demersal resource come from national research programs (GRUND) and international trawl surveys (MEDITS), as well as Catch Assessment Surveys (CAMPBIOL) that include data collection of size/age structure of the catches. Density and biomass indexes, length frequency distributions, growth parameters, length converted catch curve analysis to estimate total mortality (Z), Pauly’s formula for natural mortality (M) and yield-per-recruit analysis were used to assess the status of the stock in the area, as well as simulations of changes of $t_c$ and F. Series data of abundance indexes, average length and total mortality rates from 1994 to 2004 were produced.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.
STOCK STATUS: *Mullus barbatus* shows a moderate status of overfishing evaluated by means of yield per recruit models. However, no significant decline in catch rates from experimental surveys can be detected.

RECENT MANAGEMENT ADVICE: Enforcement of the legal minimum mesh size in the trawl net and improved control of illegal fishing in very shallow waters during the recruitment period should be ensured. The closed season during the late summer-early autumn should be maintained in order to reduce the fishing mortality on the juveniles.

STECF COMMENTS: No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This information has been produced by the research units working on trawl surveys in the GSA 19. STECF agreed with the above advice.

9.28. Hake (*Merlucius merlucius*) in Geographical Sub Area 1. Northern Alboran Sea

FISHERIES: Hake (*Merlucius merlucius*) is one of the most important target species for the trawl fisheries. In the GSA 1 there are 140 trawlers landing around 400 t by year, mainly composed by juveniles living on the continental shelf.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. The state of exploitation was assessed applying a length cohort analysis (LCA) and yield per recruit (Y/R) analysis on a mean pseudo-cohort (2001-2003), based on size composition of trawl catches (obtained from on board and on port monthly sampling) and official landings. The input parameters set and the program (VIT) used were the same as previous assessments of the species in the area. Transition analysis were also performed, on a 20 year basis with constant recruitment, in order to simulate different management strategies directed to improve the exploitation pattern of this species in the area.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: Transition analysis was made reducing the fishing effort by 20% and using 40 mm square mesh size. The results showed that the increase in Y/R was higher after improving the selectivity than reducing fishing effort. There were gains in the second year after the application of this management measures. The stock status was considered under a growth overexploitation. Current level of $B$ is very low compared to $B_0$.

RECENT MANAGEMENT ADVICE: The 2004 SAC WG noted that there are differences in the exploitation pattern in the different GSAs although the stock can be considered as one unit. The need for sensitivity analysis and for an update of the growth and mortality parameters was raised, as well as the need to monitor discards mainly in GSA 1 and in the future to move to non equilibrium assessments. Assessments including also trawl survey data were encouraged. The GFCM recommended:
- to improve the selectivity: in comparison with the 40 mm diamond mesh size the use of 40 mm square mesh size is more effective and
- to control the effort on the main nursery areas.

The GFCM, taking into account that the stock is heavily overexploited and that biomass is very low in comparison with the virgin one, highlights the necessity of both improving the selectivity and reducing the fishing effort.

STECF COMMENTS: STECF agrees with the advice of the GF CM Scientific Advisory Committee. No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006.
9.29. Hake (*Merluccius merluccius*) in Geographical Sub Area 5. Balearic Islands

**FISHERIES:** Hake (*Merluccius merluccius*) is a target species for the trawl fishery developed by around 40 vessels off Mallorca (Balearic Islands, GFCM GSA 5). Annual landings have oscillated between 50 and 190 t in the last decades.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The assessment of this stock has been carried out using tuned VPA (applying the Extended Survivor Analysis (XSA) method) on the period 1980-2005, and VPA and Y/R analysis on mean pseudo-cohorts from the period 2000-2005. These approaches were performed, using monthly size composition of catches, official landings and the biological parameters estimated from the Data Collection Programme (2003-2004). The natural mortality was estimated by age class. The VPA was tuned with CPUE from commercial trawl fleet (2000-2004) and bottom trawl surveys (2001-2005). Transitional analysis was also applied to simulate different management strategies, based on effort reduction and the improvement of gear selectivity.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** XSA results showed high variability (without significant tendency) in population parameters, such as biomass, fishing mortality, recruitment and SSB, which ranged between 40-200 t, 0.5-2, 0.5-3.5 millions and 10-60 t, respectively. The mean pseudo-cohort analysis estimated a mean F of 0.9, a current stock mean and critical age of 0.6 and 1.0 years, respectively, and a mean biomass of the stock around 8% of its virgin biomass. The current Y/R (33 g/recruit) is lower than the maximum Y/R (47 g/recruit). The SAC WG concluded that this resource is over exploited (growth over-fishing, a reduction of about 60% in the current effort is necessary to reach maximum Y/R).

**RECENT MANAGEMENT ADVICE:** The use of 40 mm square mesh in the cod-end or the reduction of 20% in the fishing effort could improve in a similar way both yields and the state of the stock.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).


**FISHERIES:** Hake (*Merluccius merluccius*) is one of the most important target species for the trawl fisheries carried out by around 647 vessels along the GFCM geographical sub-area Northern Spain (GSA 6). In the last years, the annual landings of this species, which are mainly composed by juveniles living on the continental shelf, were situated around 3,900 t in the whole area.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The state of exploitation was assessed for the period 1992-2005 by means of a LCA and yield-per-recruit (Y/R) analysis (VIT program; Lleonart and Salat, 1992) on a mean pseudo-cohort 1992-2005 for the GFCM geographical sub-area Northern Spain (GSA 6). In addition, a VPA Separable, tuned with standardised CPUE from commercial fleet and abundance indices from two trawl surveys, was carried out applying the Extended Survivor Analysis (XSA) method (Lowestoft program; Darby and Flatman, 1994) over the period 1992-2005. Both methods were performed from size composition of trawl catches (obtained from on board and in port monthly
sampling) and official landings, transforming length data to age data by slicing. Transitional analysis was also made to simulate different management strategies for the improvement of the state of this resource. In this assessment a natural mortality vector (Caddy and Abella, 1999) was considered.

The general results are quite similar to those obtained for the 1992-2004 period. Figures of recruitments and biomass result higher, especially in the 0 and 1-year-old classes, when applying natural mortality vector. A decreasing trend may be observed, both in landings and total biomass of the stock, along the studied period. On the contrary, fishing mortality (Fbar) increases. The SSB-R relationship also shows a decreasing trend in both components. The current Y/R value represents a 35% of Y/Rmax, meanwhile B/R represents a 12.5% of the B/Rmax, being necessary a reduction of 65% in the current effort to reach the Y/Rmax values.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The resource is clearly over-exploited (growth over-fishing). The current biomass is lower than 10% of virgin biomass, with a possible risk of recruitment overexploitation. A decreasing trend in landings, total biomass and SSB is observed.

**RECENT MANAGEMENT ADVICE:** The need to take immediate action to reduce growth overexploitation and to avoid recruitment overfishing was stressed by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). The final target effort level would be about half the current level. The adoption of the 40 mm square mesh is recommended. It is also suggested the establishment of temporal closures for long line and gillnet during the period of maximum spawning and for trawling in the recruitment period.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

9.31. Hake (*Merluccius merluccius*) in Geographical Sub Area 7. Gulf of Lion

**FISHERIES:** Hake (*Merluccius merluccius*) is one of the most important demersal target species of commercial fisheries in the Gulf of Lions (GFCM geographical sub-area 7). In this area, hake is exploited by French trawl, French gillnet, Spanish trawl and Spanish long-line. Around 250 boats are involved in the fishery. According to the official statistics the total annual landings decreased from 2,751 t in 2003 to 1,341 t in 2004 (this is mainly due to the decrease of the French trawlers landings (from 2,024 to 1,023 t) and of the Spanish trawlers landings (from 207 to 101 t).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Assessment of the stock has been carried out using methods of tuned VPA (Extended survivor Analysis, XSA) and a yield per recruit analysis (Y/R) on the 1998-2004 data series. Data used were: (i) commercial hake catches by fishery, registered in seven French harbours and three Spanish harbours; (ii) size composition of landings, obtained from monthly length sampling in the main landing ports; (iii) and available CPUE data series, both of commercial fisheries (French trawl, Spanish trawl and Spanish long-line) and scientific survey (MEDITS_FR). Distribution length was weighted to annual catches and sex ratio, calculated for the species in the area (Aldebert & Recasens, 1996), was applied to obtain annual length frequency distributions of hake catches by gear and sex. The assessment of the stock has been carried out using the methods of cohort analysis (Darby & Flatman, 1994) and length cohort analysis (Lleonart & Salat, 1992).
PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: There is growth overexploitation with a risk of recruitment overexploitation. A declining trend in recruitment was detected.

RECENT MANAGEMENT ADVICE: The management objectives, as identified by the SAC-GFCM Sub-Committee on Stock Assessment (SCSA), are to reduce growth overfishing by improving the selectivity of the trawl in order to raise the minimum length at capture equal to the minimum legal size and reduce the fishing mortality of trawlers. Previous transition analysis showed that the improvement of trawl selectivity could be the most appropriate management measure. Moreover the respect of the minimum legal landing size of 20 cm should be enforced. To avoid the risk of recruitment overfishing, the reduction of the fishing mortality of longline and gillnets in order to increase (or at least maintain) the SSB is recommended by the SAC-GFCM SCSA. This could be done by reducing the effort and/or establishing temporal closures for longline and gillnet during the period of maximum spawning.

STECF COMMENTS: STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA).

9.32. Hake (Merluccius merluccius) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian

FISHERIES: Merluccius merluccius is one of the most important species in the Geographical Sub Area 9, considering both the amount of catch and commercial value. It is fished with different strategies and gears (bottom trawling, gill nets, hooks). Annual landings in the area are around 2000 t. Within the area, several fleets operating from different ports exploit this species. The fishing pressure varies among fishing grounds. About 350 trawlers and about 100 artisanal vessels currently exploit this species.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Data sources were trawl-surveys (GRUND and MEDITS programmes) as well as Catch Assessment Surveys that include data collection of size structure of the landings. Length Cohort Analysis and Yield-per-Recruit analysis were used to assess the status of the stock in the area as well as simulations of changes of mesh size. All the analyses were carried out under different assumptions of natural mortality. Assessment was performed considering both the whole GSA 9 and four zones with different exploitation levels.

PRECAUTIONARY REFERENCE POINTS: Precautionary reference points have not been proposed for this stock.

STOCK STATUS: According to the assessment carried out in 2004, this species is considered overexploited. Commercial catch rates and total landings have shown downward trends during the last ten years. The current level of the Spawning Stock Biomass if compared with the pristine SSB is generally considered too low, suggesting the risk of recruitment overfishing. However, standing stock size estimated through trawl-surveys suggests an increase in biomass of the species in most of the Geographical Sub Area 9.

RECENT MANAGEMENT ADVICE: The 2003 SAC Sub-committee on stock assessment recommended a reduction of 60% in fishing mortality and an improvement of the exploitation pattern. In order to enhance the spawning stock biomass a reduction of fishing activity on the spawning grounds is desirable. Recently, the temporal and spatial closure of Essential Fish Habitats for recruits (nurseries) has been considered as a management option to reduce
mortality of juveniles and increasing the length of first capture of trawl fleet. Nurseries have been identified based on the analysis of time series of georeferenced density data. Recruits reached the highest abundance around the shelf break, between 120 and 250 m depth. The main nurseries showed a quite stable spatial distribution over time. Four main areas have been identified, respectively offshore the north Tuscany coasts (southern Ligurian Sea), south the Elba Island and around the Giglio Island (south Tuscany coasts, north Tyrhenian Sea), off the southern Latium coasts (central Tyrrenian Sea). In the period considered (from 1985-87 to 2002-03) these nurseries covered an area between 2.0 and 5.0% of the total GSA 9 area (42,410 Km²) hosting a proportion of recruits between 8.0% and 13% of total recruitment.

STECF COMMENTS: No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This update has been produced by the research units working on trawl surveys in the GSA 9. STECF has no further comments.

9.33. Hake (*Merluccius merluccius*) in Geographical Sub Area 11. Sardinian Sea

FISHERIES: The hake is commercially one of the most important species in the Sardinian seas where the biology, population dynamics have been studied intensively in the past fifteen years. From 1994 to 2004, in GSA 11, the trawling-fleet has remarkably changed. The change has mostly consisted of a general increase in the number of vessels and by the replacement of the old, low tonnage wooden boats by larger steel boats. For the entire GSA an increase of 85% for boats >70 Tons class occurred. A decrease of 20% for the smaller boats (<30 GRT) was also observed.

SOURCE OF MANAGEMENT ADVICE: The data refer to trawl surveys carried out between 1994 and 2004. For the same years the commercial data was also analysed. Density and biomass indexes were used. Y/R analysis was performed as a function of F and tc.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The population growth rates show a significant increasing trend. However, the decreasing trend of mean weight and mean length highlights the increase of fishing mortality. Commercial catch rates and total landings have also shown upward trends during the last ten years. The analysis of the yield per recruit demonstrates the condition of overexploitation of the resource, with a value of E higher than E_max.

RECENT MANAGEMENT ADVICE: The management measures such as the enlargement of the legal mesh size, imposition of the size at first capture and protection of Essential Fish Habitats (EFHs) could lead to a more desirable condition of the resource. No increase of fishing effort is recommended.

STECF COMMENTS: No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This information has been produced by the research units working on trawl surveys in the GSA 11. STECF has no further comments.

9.34. Hake (*Merluccius merluccius*) in Geographical Sub Area 18. Southern Adriatic Sea

FISHERIES: *Merluccius merluccius* is one of the most important species in the Geographical Sub Area 18 representing more than 20% of landings from trawlers. Trawling represents the most important fishery activity in the southern Adriatic Sea and a yearly catch of around 30,000 t could be estimated for the last decades. Demersal species catches are landed on the western side (Italian coast) and the eastern side (Albanian coast), with an approximate percentage of 97% and 3%,
respectively. Trawling is the most important fishery activity on the whole area (≅ n° 900 boats, 60% of total number of fishing vessels; 85% of gross tonnage). The Mediterranean hake is also caught by off-shore bottom long-lines, but these gears are utilised by a low number of boats (less than 5% of the whole South-western Adriatic fleet).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Data sources were trawl-surveys (national and MEDITS programmes) as well as Catch Assessment Surveys that include data collection of size structure of the catches.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** Trend of abundance indices highlighted a decrease from 1996 to 2003, while a slight increase is reported for 2004 and 2005. Most of the assessment carried out previously in the basin using data from trawl surveys and analytical methods underlined an overexploitation of the stock although no clear trend in the Z values has been reported. The decreasing trend of index of relative biomass of the hake appears mostly related to the adult fraction of the population while the recruitment consistence seems to be quite stable. Some possible causes of such a decrease could be linked to the fishing mortality exerted on large individuals by bottom long-liners and/or the increase of demersal fishing effort in the eastern Adriatic sector since 1990.

**STECF COMMENTS:** No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This information has been produced by the research units working on trawl surveys in the GSA 18. STECF has no further comments.

**9.35. Hake (Merluccius merluccius) in Geographical Sub Area 19. Western Ionian Sea**

**FISHERIES:** *Merluccius merluccius* is one of the most important teleost species in the Geographical Sub Area 19, considering both the amount of catch and commercial value. It is fished with different strategies and gears (bottom trawling and longline). In the year 2004 the landings in the Ionian area were detected around 850 t (IREPA data). The main fisheries operating in GSA 19 are Gallipoli, Taranto, Schiavonea and Crotone. The fishing pressure varies between fisheries and fishing grounds.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Systematic studies on this demersal resource come from national research programs (GRUND) and international trawl surveys (MEDITS), as well as Catch Assessment Surveys (CAMPBIOL) that include data collection of size/age structure of the catches. Density and biomass indexes, length frequency distributions, growth parameters, length converted catch curve analysis to estimate total mortality (Z), Pauly’s formula for natural mortality (M) and yield-per-recruit analysis were used to assess the status of the stock in the area as well as simulations of changes of t_c and F. Series data of abundance indexes, average length and total mortality rates from 1994 to 2004 were produced.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** Although yield per recruit models showed an overexploitation condition, since the bulk of the catches are made up of juveniles, no significant trend of reduction in the catches has been observed. Indeed, the trawl net does not catch adequately the adult fraction of the stock which, instead, is mostly captured by longline.
RECENT MANAGEMENT ADVICE: The reduction of fishing mortality could be obtained by adopting the reduction of fishing activity in the nursery areas distributed along the Ionian Sea. In this respect, “no-take zones” (ZTB) should be adopted in the GSA 19.

STECF COMMENTS: No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This information has been produced by the research units working on trawl surveys in the GSA 19. STECF has no further comments.

9.36. Hake (*Merluccius merluccius*) in part of Geographical Sub Area 22. Saronikos Gulf

FISHERIES: Hake (*Merluccius merluccius*) is the main target species of trawlers but is also fished by long-lines or nets. In the Saronikos Gulf the trawler catch of hake represents 45% of the total hake catch in this area, while that of both long-lines and nets about 50%. In 2004, the trawler catch was 404 t. The state of stock was examined by the Y/R analysis on the 2004 pseudocohort applying the VIT software (Lleonart et al., 1999-2000). It was found that the fishing effort should decrease by 68%. Previous assessments have been carried out in the Saronikos Gulf in 1988-92 and 1998. In 1988-1992 the stock had been assessed as overexploited and the fishing effort had to decrease by 72%, while in 1998 was found as well overexploited at the same level as that of 1988-92. Although since 1998, the increase in trawler cod end mesh size from 28 mm to 40 mm between stretched knots was implemented and the yield had increased by 11%, the stock is far from the MSY. However the reaction of the stock to the management measure was highlighted indicating the necessity to further enforce the existing regulations on mesh size and minimum landing size. Assuming the current state to be that of 1992, transition analysis was made in order to predict the catch values after the implementation of the increase in mesh size in 1998 and to compare the predicted values with the actual ones.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. LCA and Y/R (VIT) were carried out with 2004 data, with a transition analysis performed increasing mesh size from 28 to 40 mm.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: This stock is overexploited and far from sustainable.

RECENT MANAGEMENT ADVICE: SAC-GFCM pointed out that the assessment was carried out on a portion of the stock. The analysis recommended, with the present mesh size, a decrease of 68% of the effort to reach MSY, as a long-term objective. This figure could be less pessimistic if the exploitation pattern was improved. It is advisable in the future to include in the analysis data coming from all the gears (nets and long-lines) exploiting this resource. The SAC-GFCM Sub-Committee recommended not to increase the fishing effort and to enforce the existing regulations on mesh size and minimum landing size.

STECF COMMENTS: STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). No new assessment has been presented to the SAC-GFCM in 2006.


FISHERIES: *Pomatomus saltatrix* is caught by purse seine (55%), gill nets (40%) as well as bottom trawls (5%). Landings for 2003 were around 1,000 t.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. State of stock was assessed by applying a LCA using the VIT software.
PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: Fully exploited. Annual mean biomass was estimated at 1,570 t.

RECENT MANAGEMENT ADVICE: Do not increase the fishing effort.

STECF COMMENTS: STECF agrees with the advice of the GFCM Scientific Advisory Committee. No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006.

9.38. Common Sole (Solea solea) in Geographical Sub Area 17. Northern and Middle Adriatic

FISHERIES: The common sole, Solea solea, is a very important resource in the northern and central Adriatic Sea (GSA 17), which represents the main spawning and nursery area, as well as the area of highest concentration for this species in the whole Adriatic Sea. In GSA 17 the common sole stock is shared between Italy, Slovenia and Croatia.

In this area S. solea is targeted by both rapido trawlers (which exploit it all the year around) outside 3 nm offshore and set netters (mainly from spring to fall) using trammel nets and specific sole gillnets in the coastal areas. Moreover, it is included in the mixed-species catches of bottom trawlers, but the amounts are very low in this case. At present the Italian active fleets targeting the common sole include 133 rapido trawlers, and around 700 small-scale vessels, but their number can vary from year to year depending on the abundance of the different resources at sea. The use of gillnets for sole has noticeably increased in the last few years, both in number of fishing vessels and in spatial and temporal terms. In addition, there are a few rapido trawlers in Slovenia and several small-scale vessels along the Istrian coast, (the most important Croatian region for the exploitation of this species), but data for these two fleets are not available. In the European Mediterranean the total mean landings of this species fluctuated around 6,000 t, showing a decreasing trend since 1995, meanwhile in the Italian Adriatic the trend has remained more stable, around 1,600 t.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Starting from 2005 the stock of S. solea in GSA17 has been assessed for the first time through *ad hoc* seasonal rapido-trawl surveys (spring and fall).

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The results show that the spatial distribution of S. solea is strictly related to the bottom depth: the smallest specimens concentrate along the Italian coast up to 30 m depth and gradually move offshore towards deeper waters as they grow. Total biomass estimated in 2005 amounted to 967 t in spring and 1,157 t in fall. In the latter season, about 55% of the population at sea consisted of recruits, mainly gathered from the Italian coast up 30 m depth, and about 11% was made up by spawning females mostly concentrated between 40 and 60-70 m depth in a wide area extending from the Istrian coast to the centre of the Adriatic Sea, within meridians 13°00’ and 14°20’ E and parallels 44°10’ and 45°20’ N. Estimated fishing mortality was 0.44, and the exploitation rate F/Z 0.49. Taking into account that some recent management advice for sole stocks, given by ICES indicate a precautionary F value of 0.3, and upper limits around 0.4-0.5, the results of the assessment would suggest that the Adriatic stock of common sole might be close to fully exploitation.

RECENT MANAGEMENT ADVICE: No advice from the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). SGMED-STECF suggested not increase the fishing effort.
STECF COMMENTS: STECF agrees to not increase the fishing effort.

9.39. Dolphin fish (*Coryphaena hippurus*) Mediterranean

FISHERIES: Dolphin fish is an epipelagic species, appearing seasonally in the Mediterranean Sea, where it is the target of important small-scale fisheries in Malta, Italy (Sicily), Tunisia and Spain (Balearic Islands). According to the genetic evidence, there is a single unit stock in the Mediterranean.

Fish aggregating devices (FADs) are used in the exploitation of dolphin fish with fish caught by surrounding nets with or without purse line. In two countries (Spain and Malta), each vessel is provided with a detailed permit for the location of FADs. The net used in Majorca is a special surrounding net, called “lampughera”. Several thousands of FADs are set every year on the Mediterranean seafloor and the limestones are left on the sea-bottom. This fact is creating some problems and conflicts with the trawl fishery. The fishing season occurs from August to December in Sicily and in the Balearic area.

According to the EC Study Projects 94/031 and 95/73, during 1995 and 1996 the number of vessels involved in the Dolphin fish fishery decreased in Menorca (Balearic Islands-Spain) and in Sicily, by almost 20%.

In Majorca (Balearic Islands-Spain), the catches range from 8.4 t in 1981 to 127.8 t in 1995 but decreased in 1996, when the catch was 52.1 t. The total catch in Sicily was 377.4 t in 1996. No recent catch data are available.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM.

SAC Stock Assessment working group on *Coryphaena hippurus* had tried to carry out a preliminary stock assessment on this species but the results were not robust.

PRECAUTIONARY REFERENCE POINTS: No reference points have been defined for this stock.

STOCK STATUS: Genetic studies suggest that there is a single Mediterranean stock. No robust stock assessment exercise has been carried out to date due to the particular biological and behavioral dynamics of the species and lack of essential data.

RECENT MANAGEMENT ADVICE: The 2005 SAC approved a proposal for the regulation of the *Coryphaena hippurus* fishery in the Mediterranean. A Total Allowable Effort (TAE) regional management regime was established as follows:

1. FAD fisheries targeting *Coryphaena hippurus* can operate between 15th August and 31st December.
2. The number of FADs deployed within a given sub-regional fishery management zone should not exceed an average of 10 FADs per square nautical mile.
3. The total number of fishing trips for each vessel operating within a given fishery management zone during a fishing season should not exceed 72 one-day fishing trips or equivalent.

It was also suggested that, whilst recognizing that the size at first maturity was difficult to establish for this species, a minimum landing size should be adopted.

STECF COMMENTS: STECF agrees with the advice of the GFCM Scientific Advisory Committee. No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006.
9.40. Blackspot seabream (*Pagellus bogaraveo*) in Geographical Subareas 1 and 3. Strait of Gibraltar area

**FISHERIES:** Blackspot sea bream is a widely spread species in the Mediterranean, exploited by several fisheries, even if the information from most of the other areas is scarce or not existing. The Spanish South Mediterranean is an important fishing ground for this species. Juveniles gradually join the area of the Strait of Gibraltar namely the eastern fishing grounds, where the fleet of Algeciras fish. The fishing grounds in Gibraltar Strait are the most important habitats for adults, while the continental shelf north of Alboran Sea and Gulf of Cadiz are important habitats for juveniles. The fishing gear used in the Strait of Gibraltar consists of a bottom long-line with special features that makes it different and more species-selective from the ones used in other fishing areas. Bottom trawl, other fixed gears and recreational fisheries in the surrounding areas also exploit this species. Total annual catches have change from more than 870 t in 1994 to 270 t recorded between 1999 and 2001 (STECF, 2002). No recent catch data area available.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been defined for this stock.

**STOCK STATUS:** A study on the blackspot seabream was carried out in the Strait of Gibraltar by IEO and submitted to STECF in 2003. The evaluation of the resource by different methods leads to the conclusion that there has been a continuous fall in the biomass of this species in the Strait of Gibraltar since 1992. The situation seems to be the result of an increase in fishing activity in the area. Total catches and catch per unit effort show sharp decreasing trends since the second half of the 1990s.

**RECENT MANAGEMENT ADVICE:** A recovery plan for this stock in 1999-2000 was submitted by the Andalucia Government to the EC and accepted in 2003. No new data and advice were available.

**STECF COMMENTS:** No comments. No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006.

9.41. Norway lobster (*Nephrops norvegicus*) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian

**FISHERIES:** *Nephrops norvegicus* is a very important species with a very high commercial value. It is the target of a variable fraction of all the bottom trawl fleets operating in the Geographical Sub Area 9 during the whole year. Annual landings in the area are less than 150 t. The species is caught with the traditional Italian bottom trawl net at depths between 250-500 m. About 100 vessels exploit the species in the area. There are no discards since almost all individuals caught are around or beyond the legal minimum size. In recent years for some areas, fishing effort targeting on Norway lobster is increasing.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Data were collected during trawl-surveys (GRUND and MEDITS programmes) as well as from Catch Assessment Surveys that includes data collection of size structure of the landings. Length Cohort Analysis and Yield-per-Recruit analysis were used to assess the status of the stocks in the area.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.
STOCK STATUS: The species is considered to be fully exploited by the different fishing fleets. Biomass index from GRUND surveys, abundance index from MEDITS and LPUE have generally increased during the last five years.

RECENT MANAGEMENT ADVICE: The resource can probably sustain the current level of effort and fishing pattern.

STECF COMMENTS: No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This update has been produced by the research units working on trawl surveys in the GSA 9. STECF has no further comments.

9.42. Blue and Red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 1. Northern Alboran Sea

FISHERIES: The red shrimp (*Aristeus antennatus*) is one of the most important resources of bottom trawling in Alboran Sea. It is fished on the slope between depths of 400 to 800 m. Landings in the period 1976-2001 were around 300 t with a maximum of 517 t in 1991 and a minimum in 2001 with 115 t. No recent catch data are available. Mean size in the landings was 27 mm CL and the catches in the period 2001-2003 have decreased since the most recent peaks by about 50%. *Aristeus* discards are negligible in this fishery.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Size composition of landings from 1996 to 2003 was used to run a standard VPA. Extended Survivor Analysis was followed as a tuning method applying the Lowestoft VPA program on age groups generated by slicing the length distribution with L2AGE program. MFDP program was used for short time prediction and MFYPR was used for a yield per recruit estimation.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for red shrimp in the Mediterranean.

STOCK STATUS: The VPA carried out in 2004 detected some sign of slight overexploitation. Results obtained were quite similar to those presented in the previous assessment working groups (2002, 2003) using LCA and Y/R methods. The short-term predictions suggest that at current level of fishing mortality the stock biomass for females will continue decreasing. At current levels of fishing mortality, Spawning Stock Biomass is expected to decrease in 2006 at half of the current values. The long-term Y/R curves indicate that the females are over-exploited, with current F well above Fmax, but without large gains in yield from a reduction in fishing effort. The Y/R curve is very flat-topped in males.

RECENT MANAGEMENT ADVICE: According to the stock assessment outputs the GFCM Working Group recommended that fishing effort should not increase.

STECF COMMENTS: STECF points out that no new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006.

9.43. Blue and Red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 5. Balearic Islands

FISHERIES: The red shrimp is one of the most important resources of bottom trawling in the Balearic Islands. It is fished on the slope between 400 and 800 m depth. In biomass, it represents an average of 5% of the overall catches, but its economic value is 30% of the total earnings of the fishery. Updated information on landings and effort collected on annual basis (1992-2005) show that throughout the late 1990s, landings decreased to a minimum value
of 100 t. During early 1990s and from 2000s they fluctuated between 200 and 250 t. Females dominate in the landings nearly 70-80% of the total. Discards of the red shrimp are zero. The number of red shrimp vessels for the whole GSA 05 has been decreased steadily from the early 1990s. In the period 2002-2005, the registered red shrimp fleet is estimated to be 36% inferior to the former fleet. LPUEs fluctuated around long-term average of 6.4 Kg/hour. Effort indices (Landings/LPUE) remained fairly stable.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Separable VPA and Extended Survivor Analysis (XSA) methods and yield-per-recruit (Y/R) analysis (Lowestoft program; Darby and Flatman, 1994) have been performed to assess the red shrimp Spanish fishery for the whole Geographical Sub-area 05 and 06 (years 1992-2005). Y/R analysis was based on outputs of the XSA combined sex.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for red shrimp in the Mediterranean.

**STOCK STATUS:** Total biomass (TB) decreased from 898 t in 1992 to 533 t in 1997. Since then, there has been an increase to 628 t in 2005. For the overall TB time series, the stock is still 30% lower than the beginning of the time series. Recruitment shows a decreasing trend from 1992 (45 million) to 1996 (25 millions), recovering from 1997 to 2000 (30 millions) and decreasing again to a value of 22 millions in 2002. From 2003 recruitment appear stable around 30 millions.

FBar has fluctuated mainly between 0.2 and 0.5 from 1992 to 1999, after that it remained fairly stable around 0.3. The average FBar across the time series is 0.39.

Compared to the assessment of last year, the present one shows slight differences. Biomass and recruitment appear to be higher. The Separable VPA and Extended Survivor analysis (XSA) indicate a stable fishery and resource, with slight variations in the reference period. However, the resource appears close to the maximum yield and fully exploited.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) reccomends not to increase the fishing effort. Preferably a reduction of 30% of the present effort is proposed using a F35%spr biological reference point. The reduction of the effort by technical measures concerning the gear, such as increasing the mesh size or shift to a square mesh design can improve the current Y/R.

**STECF COMMENTS:** STECF is not convinced that the introduction of square mesh in shrimp trawls will have the desired improvement in Y/R.

**9.44. Blue and Red Shrimp (Aristeus antennatus) in Geographical Sub Area 6. Northern Spain**

**FISHERIES:** The red shrimp is one of the most important resources of bottom trawling in this sub area. It is fished on the slope between depths of 400 to 800 m. Updated information on landings and effort has been done on annual basis (1996-2005). Throughout the time series landings fluctuated between 300 and 400 t. Throughout the late 1990s, the landings decreased bellow 300 t. From 2002 they recovered up to the initial values, overcoming 300 t. Females predominate in the landings nearly 70-80% of the total. Discards of the red shrimp are null. Forteen harbours with red shrimp fleets exist in the whole area. The effort was estimated on daily vessels sale sheets information obtained through the National Sampling Programme available for the Santa Pola fleet. The LPUEs fluctuated around long-term average of 30 Kg/day. Effort data indices (Landings/LPUE) remain fairly stable.
SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Separable VPA and Extended Survivor Analysis (XSA) methods and yield-per-recruit (Y/R) analysis (Lowestoft program; Darby and Flatman, 1994) have been performed to assess the red shrimp Spanish fishery for the whole Geographical Sub-area 05 and 06 (years 1996-2004). Y/R analysis was based on outputs of the XSA combined sex.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for red shrimps in the Mediterranean.

STOCK STATUS: Total biomass (TB) fluctuated between 3,500 and 4,500 t. The minimum TB was estimated in 2002 at 3,594 t and the maximum in 2005 at 4,442 t. Recruitment fluctuated without trend, average recruitment estimation was 115 t. Lower values correspond to 1998, 2000 and 2002 (80-90 million). The maximum recruitment (177 millions of individuals) was estimated in 2003. FBar has mainly fluctuated between 0.1 and 0.4. The average FBar along the time series is 0.2. Compared to the assessment of the last year the present one shows slight differences. Biomass and recruitment appear to be higher. The Separable VPA and Extended Survivor analysis (XSA) indicate a stable fishery and resource, with slight variations on the reference period. However, the resource was considered fully exploited from the previous assessments, and at present the diagnostic of a fully exploited resource is still confirmed.

RECENT MANAGEMENT ADVICE: The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recommends not to increase the fishing effort.

STECF COMMENTS: STECF agrees with the advice of the SAC-GFCM SCSA. .

9.45. Blue and Red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 19. Western Ionian Sea

FISHERIES: This shrimp represents the most valuable deep-water resource in the GSA 19. It is caught in all fisheries of the Ionian Sea and particularly in the Gallipoli district where this shrimp provides over 55% of the weight on the total catch corresponding to about 65% of the economic value. Moreover, in the Gallipoli fishing grounds this shrimp is generally caught with the greatest sizes in the whole Ionian Sea.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Systematic studies on this demersal resource come from national research programs (GRUND) and international trawl surveys (MEDITS), as well as Catch Assessment Surveys (CAMPBIOL) that include data collection of size/age structure of the catches. Density and biomass indexes, length frequency distributions, growth parameters were assessed. Various analyses to estimate total mortality (Z) and natural mortality (M) as well as yield-per-recruit were used to assess the status of the stock in the area. Series data of abundance indexes, average length and total mortality rates from 1994 to 2004 were produced.

PRECAUTIONARY REFERENCE POINTS: Precautionary reference points have not been proposed for this stock.

STOCK STATUS: The application of the yield per recruit model to the exploited stock, according to different scenarios, indicated conditions close to optimal harvesting.

RECENT MANAGEMENT ADVICE: The enlargement of mesh size up to 60 mm stretched in the codend should be adopted for this deep-water resource.

STECF COMMENTS: No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This information has been produced by the research units working on trawl surveys in the GSA 19. STECF has no further comments.
9.46. Red Shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 11. Sardinian Sea

**FISHERIES:** The total amount of catches together with its commercial value allows the nomination of *Aristaeomorpha foliacea* as one of the most important species in the Geographical Sub Area 11. In this area, the trawling-fleet has remarkably changed from 1994 to 2004. The change has mostly consisted of a general increase of the number of vessels and by the replacement of the old, low tonnage wooden boats by larger steel boats. For the entire GSA an increase of 85% for boats >70 Tons class occurred.

**SOURCE OF MANAGEMENT ADVICE:** Data refer to trawl surveys carried out between 1994 and 2004. For the same period commercial data were also analysed. Density and biomass indexes were used. Y/R analysis was performed as a function of F and tc. Assessment was performed in the whole GSA. Furthermore, zones with different exploitation levels were taken into account.

**PRECAUTIONARY REFERENCE POINTS:** The application of the Beverton & Holt models allows to identify $F_{\text{max}}$ as a Limit Reference Point. The use of $F_{0.1}$ as a target for management of fishing effort could be a good starting point to reach a more sustainable exploitation.

**STOCK STATUS:** The fishing mortality rate of *A. foliacea*, considering the GSA as a whole, shows an increasing trend. Nevertheless, the red shrimp population appeared to be always well structured and composed by all classes age (0+ - 3+). The resource does not seem to be under stress. A new picture is obtained analysing the zones with diverse levels of exploitation. In some zones the demographic evaluation underlines a gradual disappearance of the older age class and a progressive increase of $Z$ in favour of cohort 1. Therefore, the catches of the red shrimp are recruitment dependent increasingly in the last years. In the deep waters the enlargement of the fleet lead to a gradual increase in fishing mortality and to a landings reduction. The south-eastern part of Sardinia seems to be the most sensitive area to these changes.

**RECENT MANAGEMENT ADVICE:** The strong increase in fishing effort since 1994 has generated the actual state of the resource. A system of temporarily closed areas or differentiate management solutions by zones (fishing compartment) could reduce local situations of overexploitation. This measure with the enlargement of the legal mesh size and the imposition of the size at first capture could lead to a more desirable condition of the resource.

**STECF COMMENTS:** No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This update has been produced by the research units working on trawl surveys in the GSA 11. STECF has no further comments.

9.47. Rose shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 3. Southern Alboran Sea

**FISHERIES:** The main demersal resources in the area are *Mullus barbatus* and *Parapenaeus longirostris*. They are target species for trawlers. The fleet consists of 120 trawlers. Landings of these two species constitute 12% of the total demersal landings. *Mullus barbatus* is the target species in coastal areas, while *Parapenaeus longirostris* is fished offshore in deeper waters. The two fishing activities partially overlap.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for rose shrimp in the Mediterranean.
**STOCK STATUS:** An analysis of length frequency distribution obtained from sampling of landings has been performed by means of analytical models (VPA based on pseudocohort) for the main resources exploited by the Mediterranean fleet of Morocco. The Y/R analysis was utilised to test the behaviour of the populations to different exploitation levels. A vector of natural mortality was used to account for changes by age. The final result of the assessment indicates that *Parapenaeus longirostris* is fully exploited.

**RECENT MANAGEMENT ADVICE:** No management advice by the SAC-GFCM Subcommittee on Stock Assessment SCSA.

**STECF COMMENTS:** No new assessment has been presented to the SAC-GFCM SCSA in 2006 but according to the output of the assessment, STECF suggests that fishing effort should be controlled.

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9.48. **Rose shrimp** (*Parapenaeus longirostris*) in Geographical Sub Area 6. Northern Spain

**FISHERIES:** The deep-water pink shrimp (*Parapenaeus longirostris*) is one of the most important crustacean species for the trawl fisheries in the GFCM GSA 6 (Northern Spain). This resource is an important component of the commercial landings in some ports of the Mediterranean Northern Spain and occasionally a target species of the trawl fleet, around 260 vessels, operating on the upper slope. During the last years, a sharp increase in landings was observed, starting in 1998 and reaching the maximum value in 2000, followed by a decreasing trend in 2001-2005. In 2005 the annual landings of this species in the whole area amounted to 63 t, which represents the lowest value of the historical data series.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The state of exploitation was assessed for the period 1992-2005 by means of LCA and yield-per-recruit (Y/R) analysis (VIT program; Lleonart and Salat, 1992) on the mean pseudo-cohort 2001-2005 for the GSA-06. In addition, a VPA separable, tuned with standardised CPUE from commercial fleet and abundance indices from two trawl surveys, was carried out applying the Extended Survivor Analysis (XSA) method (Lowestoft program; Darby and Flatman, 1994) over the period 2001-2005. Both methods were performed from size composition of trawl catches (obtained from on board and on port monthly sampling) and official landings, transforming length data to age data by slicing. Available CPUE data series, both of commercial fisheries, from Santa Pola fleet, and scientific surveys (MEDITS – LEDER) were used.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for the rose shrimp in the Mediterranean.

**STOCK STATUS:** The results show a decreasing trend, both in landings and total biomass of the stock, along the studied period. The SSB-R relationship also shows a decreasing trend in both components. Fishing mortality (Fbar) has increased in the last year. It can be concluded that the resource is seriously over-exploited, with a clear risk of recruitment over-exploitation. On the contrary, the results of Y/R analysis show a scheme not so close to the overexploitation. In the GSA 06 area, this resource is characterized by high temporal variability, due probably to both biotic and abiotic factors. However the decline in stock is steep and current indicators are only 10% of the values observed five years ago. Even though Y/R analysis seems not totally pessimistic, this species appears over-exploited and fishing effort should be reduced.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recognises that the serious decline of biomass (through VPA assessments) should be considered an important warning signal but, as the various analyses give contradictory analysis,
there is no specific recommendation for the current year. It would be in any case unwise to let the effort increase.

**STECF COMMENTS:** STECF notes that the stock status suggests a reduction of fishing effort on this species.

**9.49. Rose Shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 18. Southern Adriatic Sea**

**FISHERIES:** The rose shrimp is actually one of the most important species in the Geographical Sub Area 18 representing more than 7-8% of landings from trawlers. Trawling represents the most important fishery activity in the southern Adriatic Sea and a yearly catch of around 30,000 t could be estimated for the last decades. Demersal species catches are landed on the western side (Italian coast) and the eastern side (Albanian coast), with an approximate percentage of 97% and 3%, respectively. Trawling is the most important fishery activity on the whole area (≥ n° 900 boats, 60% of total number of fishing vessels; 85% of gross tonnage). No others gears are used to catch the species in the basin.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Data sources were trawl-surveys (national and MEDITS programmes) as well as Catch Assessment Surveys that include data collection of size structure of the catches.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Trend of abundance indices highlighted a sharp increase since 2000 in the basin and expansion of the range of its geographical occurrence in GSA 18, as indicated also by the GIS representations. Moreover, the Z value time series seems to be inversely related to the biomass index trend (high biomass, low Z value). Some possible causes of the increase of the resource in the last years could be linked to the effects of environmental conditions (i.e. increase of bottom temperature) and/or to the variation of inter-specific ratios (e.g. predator-prey relationships).

**RECENT MANAGEMENT ADVICE:** No recent management advice is available.

**STECF COMMENTS:** No new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2006. This information has been produced by the research units working on trawl surveys in the GSA 18. Given that abundance idices show an increasing trend with a relatively stable annual catch, STECF considers that the current rate of removals is sustainable in the short-term.

**9.50. Rose Shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 19. Western Ionian Sea**

**FISHERIES:** *Parapenaeus longirostris* is the most important shelf-break crustacean in the GSA 19 both for the abundance and the commercial value. The main fisheries operating are Gallipoli, Taranto, Schiavonea and Crotone. The landings in the 2004 in the whole GSA 19 were detected around 1,037 t (IREPA data).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Systematic studies on this demersal resource come from national research programs (GRUND) and international trawl surveys (MEDITS), as well as Catch Assessment Surveys (CAMPBIO) that include data collection of size/age structure of the catches. Density and biomass indexes,
length frequency distributions, growth parameters, length converted catch curve analysis to estimate total mortality \( Z \), Pauly’s and Hoenig’s methods for natural mortality \( M \) and yield-per-recruit analysis were used to assess the status of the stock in the area, as well as simulations of changes of \( t_c \) and \( F \). Series data of abundance indexes, average length and total mortality rates from 1994 to 2004 were produced.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** \( P. \) longirostris shows a moderate status of overfishing according to the yield per recruit models. However, no significant trend of reduction has been shown in the catches and a significant increase of the mean length was detected from surveys data.

**RECENT MANAGEMENT ADVICE:** Since the distribution of the young-of-the-year in deep-water rose shrimp overlaps with that of the hake juveniles, a reduction of fishing mortality on both rose shrimp and hake could be obtained by adopting the reduction of fishing activity in the hake nursery areas distributed along the Ionian Sea. In this respect, “no-take zones” (ZTB) should be adopted in the GSA 19.

**STECF COMMENTS:** No new assessment has been presented to the SAC-GFCM Subcommittee on Stock Assessment (SCSA) in 2006. This information has been produced by the research units working on trawl surveys in the GSA 19. STECF has no further comments.

### 10. Highly migratory fish (Atlantic and Mediterranean)

The ICCAT Convention, states that the stocks should be managed at MSY. \( F_{MSY} \) is thus probably the most appropriate fishing mortality-based target reference point, whereas the corresponding \( B_{MSY} \) is only appropriate as a target in an average or equilibrium sense. For this reason, ICCAT like most of the tuna commissions, have not defined any precautionary reference points, for these stocks.

#### 10.1. Bluefin (Thunnus thynnus), Eastern Atlantic and Mediterranean

**FISHERIES:** Bluefin fisheries have been very active in the Mediterranean Sea since ancient times. The eastern bluefin stock is taken by a variety of vessels and types of fishing gears, with many landing sites located in many countries. The main gears are longline, trap and baitboat for the east Atlantic, and purse-seine, longline and traps for the Mediterranean. The driftnet fishery for tuna has been banned since January 1st 2002 in EU countries and from 2004 in all the ICCAT Mediterranean countries, but it is known that some illegal fishing is still occurring. Catches reached an average of 30,000 t in the 1950-65 period and then decreased to an average of 14,000 t during the period 1965-1980. Since then, there has been a continuous increase in bluefin catches, mostly taken by purse-seiners and longliners in the Mediterranean Sea. Reported landings exceeded 50,000 t in 1996, about 39,000 t in 1998 and around 33,000 t thereafter; the reported catch for 2003 is 28,205 t; in 2004 the reported catch at the time of the ICCAT/SCRS meeting reached about 32,500 t, of which about 25,000 were declared for the Mediterranean. Catch data concerning 2005 were still incomplete at the time of SCRS meeting and they temporarily account for about 21,000 t only. SCRS clearly stated that its feeling, based on other available information, is that catches have been seriously under-reported in recent years. According to a conservative estimate made the SCRS WG on BFT in 2006, based on the number
of vessels operating in the Mediterranean and their respective catch rates, indicates that the volume of catch taken in recent years likely significantly exceed TAC levels and probably is close to the levels reported in the mid-1990s, i.e. 43,000 t in the Mediterranean and thus about 50,000 t in the east Atlantic and the Mediterranean. This apparent lack of compliance with the TAC and underreporting of the catch undermine conservation of the stock. Available indicators from small fish (juvenile) fisheries in the Bay of Biscay did not show any consistent trend since the mid 1970’s. According to SCRS, this result is not particularly surprising because of inter-annual variation in year-class strength, which makes trend detection difficult for young ages. Indicators from fisheries taking spawning aged fish show evidence of recent decline for older fish and one indicator shows a general decline since the mid 1970s. The ICCAT/SCRS has again a strong and serious concern about the quality of catch, effort and catch-at-size data, and suspects over-reporting between 1993 and 1997 and increasing under-reporting since 1998 (date of the reinforcement of the TAC). Unless this situation improves, the quality of the advice that the ICCAT/SCRS can provide will continue to deteriorate. This deteriorating situation of the data largely occurred since the rapid development of tuna farming in the Mediterranean Sea, which induces further pressure on this stock and compounds the serious problem in data collection, only partially reduced by the ICCAT Rec. 04/06 and the consequent EC Regulation. Data on juveniles (both catches and size) are missing from the catch statistics in the Mediterranean since many years, even if it is commonly known that many fisheries targeting on the first two year-classes occur in many areas. This lack of data also seriously affect the SCRS advice.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT. The last stock assessment took place in 2002 with the same technical analysis as that of 1998, i.e., a virtual population analysis tuned with standardized catch rates of several commercial fleets assumed as abundance indices. More simple methods (i.e. yield per recruit analysis) have been also tested in 2006 stock assessment. The SCRS WG conclusions in 2004 were that the uncertainties in catch data (especially in size composition) are so numerous that it is not defensible to assess the East Atlantic and Mediterranean stock using methods that assume that the catch-at-size (age) is known exactly (e.g., VPA).

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** The SCRS recognized that the poor quality of the catch, effort and catch-at-size data has seriously impaired the advice in 2006 and the quality of the advice will continue to deteriorate if this situation does not improve in the future. During the last decade, there has been an apparent overall shift in targeting towards large bluefin. As the majority of these fish are destined for farming operations, their size and age composition are becoming more difficult to determine precisely, which in turn affects the quality of the analyses. Furthermore, to the detriment of the assessment, unenforced TACs are allowing under-reporting of overall catches, and incomplete compliance with size limit regulations may be affecting information on catches of small bluefin. With these factors combined with the lack of reliable historical information for many fleets, the stock cannot be monitored with confidence and therefore severe over-fishing can easily go undetected. A collapse in the near future is a possibility given the estimation of the SCRS of the fishing capacity of all fleets combined and current fishing mortality rates, unless adequate management measures are implemented. The ICCAT/SCRS evaluated various scenarios, including an alternative catch table. The results of the 2006 assessment are similar to the results obtained in 1998 and 2002 in terms of trends (the SSB has declined since 1970), but are more pessimistic in terms of current depletion (SSB in 2002-04 is about 48% of the 1970-74 value). The 2004 level of fishing mortality was almost 3.1 times that which maximizes yield per recruit. (about 25% higher than the value in 2002). This combination of high F and low SPR is
considered to result in a high risk of fisheries and stock collapse. The assessment indicated two peaks in the spawning stock (the last being in 1993) and an increase in fishing mortality rates, especially for older fish after 1993. The recruitment was relatively high and did not display any trend since the early 1980s. Projections indicate that the current yields are not sustainable in the long-term under the current selectivity pattern and current fishing mortality rate. For all the scenarios, long-term sustainable yields are at around 25,000 t. However, if the fishing mortality of small fish (juveniles) or both small and big fish could be reduced, projections indicated that current or even higher yields could be sustained. The ICCAT/SCRS remains concerned about the intensity of fishing pressure on small fish. This contributes substantially to growth over-fishing, and it seriously reduces the long-term potential yield from the resource. Additionally, the abrupt increase of catches of large fish since 1994 is of grave concern because these levels are considered unsustainable. Furthermore, the ICCAT/SCRS believes recent catches are substantially underreported, thus leading to the false impression of potential for improved stock condition.

**RECENT MANAGEMENT ADVICE:** ICCAT recommended in 1998 that yields should be reduced to 32,000 t in 1999 and 29,500 t in 2000 and 2001. In 2002, ICCAT fixed the Total Allowable Catch for the East Atlantic and Mediterranean bluefin tuna at 32,000 t per year for the period 2003 to 2006, subject to revision of scientific advice after the 2006 stock assessment. The available information indicates that the current fishing mortality rate (under the current overall fishing pattern) may be more than three times the level which would permit the stock to stabilize at the MSY level. Current fishing is expected to drive the spawning biomass to a very low level. Those low levels are considered to give rise to a high risk of fishery and stock collapse. In order to reverse these declines and to initiate rebuilding, substantial reductions in fishing mortality and catch need to be implemented. The SCRS evaluated a number of alternative management scenarios which might be used to begin recovery. The only scenarios which have potential to address the declines and initiate recovery are those which (in combination) close the Mediterranean to fishing during spawning seasons and decrease mortality on small fish through fully enforced increases in minimum size. Realized catches during the next few years imply by fully implementing these actions are expected to be in the order of 15,000 t. The long-term gain resulting from these actions could lead to catches of 45,000 t or more with substantial increases in spawning biomass. For a long-lived species such as bluefin tuna, it will take some time (> 10 years) to realize the benefit. In the short-term, actions like those above should be taken to reduce the catch to a level that will reverse the decline in spawning biomass and initiate rebuilding. Clearly, an overall reduction in fishing effort and mortality is needed to reverse current trends. Current fishing capacity largely exceeds the current TAC. Therefore, management actions are also needed to mitigate the impacts of overcapacity as well as to eliminate illegal fishing.

A complex package of measures has been adopted by ICCAT in 2002 and 2004. This includes:
- A prohibition on the catching, retaining on board or selling of tuna less than 10 kg in the Mediterranean; this limit will remain at 6.4 kg in the Eastern Atlantic. No tolerance is allowed.
- A closed fishing season in the Mediterranean from 16th July to 15th August for purse seiners.
- A closed fishing season in the Mediterranean during June-July for long-line vessels greater than 24 m.
- A prohibition on the use of aircraft support during June in the Mediterranean.
- Specific recommendations in respect of data requirements and data collection for tuna farms.
- A prohibition to use nets and longlines in sport and recreational fishery in the Mediterranean Sea (ICCAT Rec. 04-12).
Due to data deterioration process, a data exploratory workshop was held in 2004. The main problems identified by the group relate to: (i) probable misreporting of catch data (especially after the TAC implementation), (ii) the low proportion of size samples (used to build catch and effort data), (iii) the very large amount of substitutions to estimate the size composition of the various fleets for which no size samples are available (most of them being problematic) and (iv) high uncertainties in the ageing of older age-classes. Consequently, the working group concluded that the uncertainties in catch data (especially in size composition) are so numerous that it is not defensible to assess the East Atlantic and Mediterranean stock using methods that assume that the catch-at-size (age) is known exactly (e.g., VPA). In 2005 and 2006, ICCAT/SCRS reiterated its concerns about the occurring of substantial underreporting of catch data and the need to collect basic catch and effort data, particularly in the Mediterranean Sea.

**STECF COMMENTS:** STECF agrees with the most recent ICCAT/SCRS advice, sharing the serious worries about the risks for the east Atlantic bluefin tuna stock, even if the combined effects of lack of reliable catch data and size frequency for some fisheries, together with the total lack of recent data about catch and size of juvenile tunas on the assessment are unknown. STECF is worried about the underestimated absolute current level of F and the overall increasing trend on juveniles and adults. The impact of the tuna sport fishing and the illegal fishery on juveniles should be better assessed, particularly in the Mediterranean, even if positive steps have been done. Because the recreational and sport fishery has been already included in the 2005-2006 EC data collection programme. STECF again further stresses the importance of reinforcing controls on current regulations and urgently improving the quality of the catch, effort and size data. In the meantime, improving the existing measures on size limits by setting them on the basis of the available biological evidence (i.e.: to the first size of maturity, which is about 25 kg) and strictly enforcing the same measures over the full distribution range of this stock would be a strong positive action to limit the mortality of juvenile fish. This action, together with a remarkable limitations of fishing effort (i.e.: a significant time-area closure in the whole Mediterranean, able to reduce the effort on both spawners and juveniles, to be repeated for at least three years with the purpose to provide scientific evidence of the effects and assess them, as a minimal precautionary measure) appear to be the most appropriate management tool in the short time.

STECF **recommends** that regulations on bluefin tuna farming be more properly implemented and enforced as soon as possible, particularly for the aspects related to the data collection. A stricter monitoring of the tuna purse seine fishery (i.e., with mandatory observers on board on all the vessels, defined landing points, VMS data accessible for scientific uses, etc.) are also required. These measures will allow a better check on whether the size and geographical distribution of catches respect ICCAT rules. A particular attention should be devoted in better defining the effort parameters needed from this particular fishery including the use of aircraft for detecting tuna abundance. Current measures of CPUE are meaningless. STECF also stresses again the importance of archival tagging and additional biological investigations, to better explore the stock mixing and other natural history migratory features of the bluefin tuna to resolve the unknown features of the stock structure.

**10.2. Bluefin (Thunnus thynnus), Western Atlantic**

**FISHERIES:** Western bluefin fisheries have been managed since the early eighties and catches have not varied much since 1983 (the range over this period is 1,928 to 3,215 t), because of the enforcement of the TAC since 1981. Mostly three countries, USA, Canada and Japan, report catches from this stock using various gears, but some other coastal countries of the West Atlantic
(Brazil, Mexico, Bermuda, Argentina, Portugal, Korea, Sta. Lucia and Uruguay) also catch bluefin tuna. Since 1998, a substantial amount of additional catch that was not in accordance with the Commission’s recommended catch allocation was recorded through the Bluefin Tuna Statistical Document system. The reported total catches of western Atlantic bluefin tuna increased from about 2,600 t in 1998 to about 3,200 t in 2002 and have subsequently fallen below 2,000 t in 2004 and 2005. The reported total catches in 2005, updated at the 2005 ICCAT/SCRS, accounted to about 1,800 t (including 302 t estimated for Japan), being the lowest since 1982, when ICCAT catch restrictions were first established.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT. The last stock assessment took place in 2006 with the same technical analysis as that of 1998, 2000 and 2002, i.e., a virtual population analysis tuned with standardized catch rates of several commercial fleets assumed as abundance indices.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** The 2006 assessment results are similar to those from previous assessments. They indicate that the spawning stock biomass declined steadily from 1970 through the late 1980s, with a more gradual decline through the early 1990’s to about the 28% of the 1975 level in 1998 and then to about 19% of the 1975 level in 2004. Conversely, after the large decline in recruitment in the early 1970’s, recruitment since then has varied from year to year without trend. While the large decline in SSB since the early 1970s is clear from the assessment, the potential for rebuilding is less clear. The 1994 year-class (recruitment in 1995) continues to be estimated as a relatively strong one, although it is still much less than the recruitment that occurred in the early 1970’s. The ICCAT/SCRS remains uncertain as to the causes of the relatively poor recruitment since 1976 and, therefore, we are less certain about the outlook for recruitment in the future. Also, note that the assessment incorporates data through 2004, since 2005 data were not fully available. Therefore, projections were made using preliminary catches for 2005. These data indicate that in 2005, about one third of the TAC was not taken, which is by far the largest shortfall since a TAC was established in 1981. The plausible explanations for relatively low catch in 2005 are (1) that availability of fish to the US fishery was abnormally low, and/or (2) the overall size of the population in the Western Atlantic declined substantially from the level of recent years. The fact that Canada and probably Japan did not have abnormally low catches in 2005 supports the first explanation. On the other hand, other fishery indicators in 2005 (some abundance indices, declining size composition in some areas) support the second explanation. The SCRS noted that the failure of a fishery to take about a third of its TAC, particularly for a valuable species like bluefin tuna, is a reason for concern. It noted that this phenomenon has been seen in other fisheries prior to it becoming clear that they were in trouble. It should also be noted that the relatively low catch in 2005 was incorporated into short-term projections (from 2004 to 2005). This leads to somewhat of an increase in projected abundance in the first few years of the projections. If the second explanation is correct, this is an overly optimistic outlook. The SCRS cautioned that the conclusions of this assessment do not capture the full degree of uncertainty in the assessments and projections. An important factor contributing to uncertainty is mixing between fish of eastern and western origin. Furthermore, the projected trends in stock size are strongly dependent on estimates of recent recruitment, which are a particularly uncertain part of the assessment. In general, the outlook for bluefin tuna in the West Atlantic is more pessimistic than that presented in the previous assessment in 2002, primarily because the 1994 and 1997 year-classes, which were estimated to be about twice the average, are now estimated to be average. Projections show predictable degrees of short-term response in SSB, depending upon the amount of catch extracted.
RECENT MANAGEMENT ADVICE: A combination of TAC and size limits have been recommended and apparently applied quite strictly on this stock for more than 20 years. A TAC of 2,700 t has been adopted by ICCAT for 2003. The SCRS in 2006 is proposing to ICCAT the following advice:
1) Given the current recruitment that has been exhibited by western Atlantic bluefin, it is extremely unlikely that SSB can recover to levels that were exhibited in the 1970’s in the next 15 years or so without reducing catch to near zero.
2) The current TAC (2,700 t) is not expected to result in major changes in SSB from 2007-2009 (small declines on the order of 3% per year).
3) Fishing at F_MSY (conditional on current recruitment) during the period 2007-2009 would be expected to increase SSB over that period by about 1.5% per year.
4) A constant TAC over the period 2007-2009 which would produce gains in SSB equivalent to those gains in 3) would be about 2,100 t.
5) The constant TAC over the period 2007-2009 which would be expected to maintain SSB at 2006 levels would be about 2,300 t.

The SCRS notes that evidence is accumulating which indicates that both the productivity of western Atlantic bluefin and western Atlantic bluefin fisheries are linked to the eastern Atlantic and Mediterranean stock. Therefore, management actions taken in the eastern Atlantic and Mediterranean are likely to impact the recovery in the western Atlantic, because even small rates of mixing from East to West can have significant effects on the West due to the fact that Eastern plus Mediterranean resource is much larger than that of the West.

STECF COMMENTS: STECF agrees in principle with the advice from ICCAT, stressing the relevance of archival tagging and biological investigation, to better study the stock mixing problem. At the same time, STECF underlines that it might be difficult to strictly link the fishery on the East Atlantic bluefin tuna stock to the current situation of the West Atlantic stock due to the insufficient scientific data on the stock mixing. Anyway, if this is the case, the suggested management actions indicated to reduce the fishing effort on the East Atlantic stock should possibly result in a positive effect on the West Atlantic bluefin tuna stock.

10.3. Albacore (Thunnus alalunga), North Atlantic Ocean

FISHERIES: The Northern Albacore stock is exploited by both surface and longline fleets. Traditional surface fleets include Spanish troll and baitboats, used mainly in the Bay of Biscay and adjacent waters, and some Spanish and Portuguese baitboats around the Azorian Islands. France introduced other surface gears including driftnets and pair-pelagic/midwater trawling in 1987 in the Bay of Biscay and adjacent waters. Ireland and the United Kingdom joined the driftnet fishery at the beginning of the 1990's and in 1998 Ireland initiated experimental fishing trials using pelagic trawling and trolling. The surface fleets mainly target juveniles and sub-adults (50 to 90 cm FL). A longline fleet from Chinese Taipei was targeting sub-adult and adult albacore (60-120 cm) in the central and western North Atlantic, however this fleet is now mostly targeting inter-tropical bigeye. Other fleets make minor catches and in most cases albacore constitute a component of the by-catch. In 2002, with the full implementation of the European Unions ban on the use of driftnets, major changes occurred in both the French and Irish albacore fisheries. The number of vessels licensed to fish albacore using pair-pelagic/midwater trawling increased in both countries. Total catches of albacore in the north Atlantic have shown a downward trend since their peak over 60,000 t in the mid-1960's. This is in part due to a global
reduction of fishing effort by the traditional surface and longline fleets, and possibly also to natural fluctuations that may correspond to environmental cycles. During the last decade landings have remained relatively stable around 30,000 t/year. Catches decreased to the lowest on record in 2002 caused by a decrease in catches in the surface fishery. The declared catch in 2005 was 34,624 t, higher than the reported catch of 25,159 t in 2004. It was observed that reported landings in 2005 were incomplete. The surface fisheries accounted for the bulk of the total catch (90%) observed in 2005. The baitboat and troll fleets catches increased by approximately 28% and 36%, respectively, in comparison to 2004 catch. The surface fishery for EC-France was almost 3 times higher than the reported catch in 2004. On the other hand, reported longline catches of Chinese Taipei showed a decrease of almost 50% as compared to 2004 catch due to decline of fishing effort.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT, which in 2003 carried out an initial analysis of the state of the northern stock using a model (VPA) essentially the same as that used in previous assessments. However revisions to catch-at-size data altered the historical data series. The impacts of these revisions are such that ICCAT/SCRS concluded that it was not appropriate to proceed with an assessment based on the 2003 catch-at-age. In 2006 ICCAT Albacore data review meeting was held. Throughout revision of North Atlantic Task I and Task II data was done and a more robust method for catch-at-size analyses was tested in preparation for the 2007 assessment session. The 2000 assessment was based on an analysis of catch at age data (ADAPT VPA) tuned with standardized catch rates obtained from commercial fleets assumed as abundance indices (by-caught for the adult fraction and target fishery for the juvenile fraction from some fleets). The CPUE trends have varied since the 2000 assessment, and in particular differed between that representative of the surface fleets and those of the longline fleets. The variability associated with all of these catch rate estimates prevents definitive conclusions about recent trends of albacore catch rates.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The current state of the north albacore stock is based primarily on the last assessment conducted in 2000 together with observations of CPUE and catch data provided to the Committee in 2003. The SCRS noted that CPUE trends have varied since the last (2000) assessment, and in particular differed between those representative of the surface fleets (Spain Troll age 2 and Spain Troll age 3) and those of the longline fleets of Japan, Chinese Taipei and the United States. The Spanish age 2 troll series, while displaying an upward trend since the last assessment, nonetheless declines over the last 10 years. For the Spanish age 3 troll series the trend in the years since the last assessment is down, however, the trend for the remainder of the last decade is generally unchanged. For the longline fleets, the trend in CPUE indices is either upwards (Chinese Taipei and US) or unchanged (Japan) in the period since the last assessment. However, variability associated with all of these catch rate estimates prevented definitive conclusions about recent trends of albacore catch rates. Equilibrium yield analyses, carried out in 2000 and made on the basis of an estimated relationship between stock size and recruitment, indicate that spawning stock biomass was about 30% below that associated with MSY. However, there were considerable uncertainties in these estimates of current biomass relative to the biomass associated with MSY (BMSY), owing to the difficulty of estimating how recruitment might decline below historical levels of stock biomass. Thus, the Committee concluded that the northern stock is probably below BMSY, but the possibility that it is above it should not be dismissed. However, equilibrium yield-per-recruit analyses made by the Committee in 2000 indicate that the northern stock is not being growth-over fished (F < Fmax). In addition, the
SCRS notes that the current estimate of MSY is below the level of catch realized for several decades in the past. There are several hypotheses that could explain this (e.g. environmental vs fishery changes) which could be addressed by including a more extensive historical time series of data in the next assessment.

**RECENT MANAGEMENT ADVICE:** In 2000 ICCAT/SCRS recommended that in order to maintain a stable Spawning Stock Biomass in the period 2001-2002 the catch should not exceed 34,500 t (the 1999 catch level). It further noted that should the ICCAT wish the Spawning Stock Biomass to begin increasing towards the level estimated to support MSY, the SCRS advice in 2006 is that should not exceed 32,000 t. The 2006 ICCAT/SCRS reiterated its previous advice and extends it until the next assessment in 2007.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT. STECF additionally recommends that during the next assessment further attempts be made to explain the uncertainty in the assessment; this should, where possible, include the use of historic landings and effort and biological data and the effect of environmental variability on this stock, also taking advantage of the EC Data Collection Regulation in recent years.

### 10.4. Albacore (*Thunnus alalunga*), South Atlantic Ocean

**FISHERIES:** The major fleets exploiting the southern albacore stock are the surface baitboat fleets of Namibia and South Africa, and the longline fleets of Brazil and Chinese Taiwan. There are also some minor catches by the purse seine fleet in the tropical area. Since the mid 1970s, the Chinese Taiwan fleet has targeted albacore at a fairly high level of effort. Catches by the baitboat fleets of South Africa and, to a lesser extent, Namibia are strongly influenced by the availability of albacore in near shore waters which is, in turn, influenced by environmentally induced changes in fish distribution. Both Namibia and South Africa have initiated tuna-directed longline fisheries that take a small by-catch of albacore.

Surface and longline catches had remained relatively constant during the period 1995-2000 at around 7,500 and 20,500 t, respectively. Such catches were generally below the replacement yield of 29,200 t estimated by the ICCAT in 2000. Annual albacore catches exceeded the South Atlantic catch limit within 2000-2002. The 2005 reported catches were of 17,928 t and decreased by about 4,500 t compared to 2004, being the lowest on record since 1984. This strong decrease, according to SCRS report, is possibly due to a strong reduction in fishing effort and fleets, with a parallel different distribution of the species. No assessment has been conducted in 2006.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** In 2003, ICCAT/SCRS estimates of MSY and replacement yield from the 2003 Base Case (30,915 t and 29,256 t, respectively) were similar to those estimated in 2000 (30,274 t and 29,165 t). In both 2003 and 2000 the fishing mortality rate was estimated to be about 60% of FMSY. Spawning stock biomass has declined substantially relative to the late 1980s, but the decline appears to have levelled off in recent years and the estimate for 2002 remains well above the spawning stock biomass corresponding to MSY. Both the 2000 and 2003 albacore assessments estimated that the stock status is somewhat above BMSY and catch of 31,000 t, on average, would be expected to reduce the stock further towards BMSY. **RECENT MANAGEMENT ADVICE:** ICCAT established a TAC (in 2001-2003 the TAC has been set to 29,200 t) and, in 2003 extended it to 2004. ICCAT/SCRS recommended that in order to maintain...
SSB in the near future the catch should not exceed 31,000 t, until the next scheduled assessment in 2007.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT.

### 10.5. Albacore (*Thunnus alalunga*), Mediterranean Sea

**FISHERIES:** Albacore fishing is a traditional activity for a number of fleets in the Mediterranean including those of Cyprus, Greece, Italy, Spain, and Malta. ICCAT statistics, however, are considered quite incomplete due to unreported catches from several countries and the lack of data in some years from other countries. In addition, a species mix-up in recent reported catches from Greece and Turkey to ICCAT should decrease the precision level in determining the albacore catches in the Mediterranean.

Since 1985, the Spanish baitboat and troll fleets based in the Atlantic have also made some albacore catches in the western Mediterranean and the Alboran Sea in autumn. Reported albacore catches in the Mediterranean have fluctuated between 1,350 t and 5,577 t since 1984. The highest catch (7,893 t) was reported in 2003. The 2005 catches account only for 3,310 t (even if the data are still incomplete), showing a decrease of nearly 60% from 2003 catches and 32% from the 2004 level. The albacore fishery in the Mediterranean appears to have had some important changes in the last eight years including the availability of albacore in areas where it was not present in the past. This is particularly evident in the Straits of Sicily and in the central-southern Mediterranean, where catches have been reported since 1997, increasing till 2005, particularly during spring. The unusual climate and oceanographic situation reported for the last four years may have a bearing on this. On the contrary, catches of this species had become more occasional in the Ligurian Sea and sometimes in the western Mediterranean. The driftnet fishery for albacore has been banned since January 1st 2002 in the EC countries and from 2004 in all the ICCAT Mediterranean countries, but it is known that illegal fishing activity still occurs in some areas.

**SOURCE OF MANAGEMENT ADVICE:** The advisory bodies are ICCAT and FAO/GFCM, through the ICCAT/GFCM expert consultation.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Due to the lack of adequate data, an assessment of the Mediterranean stock has never been carried out by the ICCAT. Many countries are not yet reporting their data, making the assessment extremely difficult. However, according to available information, the Mediterranean stock does not appear to show any particular trend, except for the recent increasing in catches in areas where this fishery was not providing catches before. In addition the mixing rate with the Atlantic stock appears to be insignificant.

**RECENT MANAGEMENT ADVICE:** ICCAT currently does not provide management recommendations for the Mediterranean stock. ICCAT recommends that reliable data be provided on catch, effort and size for Mediterranean albacore and that effort be made to recover historic data.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT, and notes that data collection for this species is mandatory within the EC data collection programme. STECF additionally strongly supports the previous recommendation of the ICCAT/SCRS concerning the timely provision of catch and effort data and the collation of historical data.
10.6. **Yellowfin (Thunnus albacares), Atlantic Ocean**

**FISHERIES:** Yellowfin tuna are caught between 45°N and 40°S by surface (purse seine, baitboat, troll and handline) and sub-surface gears (longline). In contrast to the increasing catches of yellowfin tuna in other oceans worldwide, there has been a steady decline in overall Atlantic catches since 2001. Atlantic surface fishery catches have shown a declining trend from 2001 (160,196 t) to 2005 (108,143 t), whereas longline catches have generally increased in the eastern Atlantic while remaining about the same in the western Atlantic. In the eastern Atlantic, purse seine catches declined from 89,569 t in 2001 to 57,451 t in 2005, a 37% reduction. Baitboat catches declined by 28%, from 19,886 t to 14,366 t. This decrease is largely due to reduced catches by Ghana baitboats, which resulted from a combination of reduced days fishing, a lower number of operational vessels, and the observance of the moratorium on fishing using floating objects. In the western Atlantic, purse seine catches declined from 13,072 t to 2,634 t, an 80% reduction. Baitboat catches declined by 28%, from 7,027 t to 5,065 t. In the eastern Atlantic, longline catches increased from 5,479 t to 8,155 t, a 49% increase. In the western Atlantic, longline catches decreased only slightly from 12,740 t to 12,700 t. However, the decrease in western Atlantic purse seine catch rates could be linked to specific environmental conditions, especially considering that decreases are also seen in skipjack catch rates, and it is therefore difficult to conclude that these rates reflect abundance trends. The increase in South African catches in the eastern Atlantic, from 402 t in 2004 to 1156 t in 2005, appears to be the result of a spillover of Indian Ocean fish caught just inside the Atlantic boundary. At the same time, the nominal effort in the purse seine fishery was declining. As an indicator, the number of purse seiners from the European and associated fleet operating in the Atlantic declined from 44 vessels in 2001 to 27 vessels in 2005, with an average age of about 25 years. On the other hand, the European and associated baitboat fleet increased from 15 to 21 vessels during the same period.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT. A full assessment was conducted of yellowfin tuna in 2003 applying various age-structured and production models to the available catch data through 2001. An age-structured virtual population analysis (VPA) was made using eight indices of abundance. The VPA estimates that the levels of fishing mortality and spawning biomass in recent years have been very close to MSY levels.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Since reported yellowfin landings in 2001 appear to be somewhat above the MSY level estimated during the 2003 assessment and fishing effort and fishing mortality may be in excess of the levels associated with MSY, it is important to ensure that effective effort does not increase beyond the current level. Projections indicate that stock biomass is likely to decrease if fishing mortality increases to the level estimated for 1992, which is currently being approached or exceeded. Thus the possibility that the fishing power of the purse seine and other fleets may further increase, even if the total capacity of the fleet were to remain constant, is also cause for concern. It should be noted that the current estimate of total yellowfin landings in 2002 and 2004, were below MSY (~148,000 t). In 2005, the ICCAT/SCRS evaluated the effects of replacing the moratorium by the time-area closure, estimating that it will result in higher yellowfin juvenile catches. Until a new full assessment is conducted, it may not be possible to confirm whether catch declines are due to stock level declines or to reduction in effort or other factors. Declines in nominal catch rates could suggest decreases in abundance or availability, and a clear picture does not emerge from the available fishery indicators. Recent signals in the fishery data could result in
a different evaluation of stock status than that which is here summarized. It is important that the next assessment takes these and other indicators into account.

**RECENT MANAGEMENT ADVICE:** The ICCAT/SCRS reaffirmed its support for the 1993 recommendation that there should be no increase in the level of effective fishing effort exerted on Atlantic yellowfin tuna, over the level observed in 1992. As measured by fishing mortality estimates from the 2003 assessment, effective effort in 2001 appeared to be approaching or exceeding the 1992 levels. Catches have been declining since 2001, as has the nominal effort of the purse seiners, but the trend in effective effort is not clear.

ICCAT also continues to recommend that effective measures should be found to reduce fishing mortality of small yellowfin. An evaluation of the effects on yellowfin tuna of the moratorium on fishing on floating objects (and other measures to reduce catches of small fish) was not fully achieved due to insufficient data. In general, the approach was intended to benefit bigeye tuna and is not expected to reduce the mortality of juvenile yellowfin tuna. In fact, the fishing mortality on juvenile yellowfin tuna appears to have increased substantially during the moratorium years, although it is unclear that this is related to the moratorium.

Although the minimum size limit for yellowfin tuna has been eliminated [Rec. 05-01, effective in 2006] for this reason, the protection of juvenile tunas may be important and alternative approaches to accomplish this should be studied.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT, namely on the elimination of the minimum size limit for yellowfin tuna, since the minimum size limit for bigeye tuna has been eliminated. STECF notes that SCRS has adopted the same approach suggested in 2005 by STECF.

### 10.7. Bigeye (*Thunnus obesus*), Atlantic Ocean

**FISHERIES:** The stock is exploited by three major gears: longline, purse seine and baitboat with corresponding catches in 2004 of 47,436 t (62%), 13,388 t (18%) and 14,035 t (19%). The main baitboat fisheries are located in Ghana, Senegal, the Canary Islands, Madeira and the Azores. Japan and Chinese Taipei deploy the two major longline fleets whose catch accounted for about 46% of total catch in 2003. Tropical purse seine fleets operate in the Gulf of Guinea and off Senegal in the East Atlantic comprising French, Spanish, Ghanaian and other flag vessels managed by EU countries and off Venezuela in the West Atlantic. Since 1991 the use of FAD’s by the purse seine and Ghanaian baitboat fleets and the use of baitboats as FADs by the baitboat fleets in Senegal and the Canary Islands has produced an increase in the catch of small bigeye. These new techniques have apparently improved fishing efficiency and contributed to the increase of the bigeye catch.

Total annual catch exhibited an increase up to the mid-1970s (reaching 60,000 t) and reached an historic high of about 132,000 t in 1994. It has declined since then with some fluctuation. The total provisional reported catch for 2005 was about 60,000 t, which indicated a decrease of 16,275 t over 2004, but this figure is very incomplete, due to the lack of reporting by some countries. The decline of longline catch is nearly 50% between 1999 and 2005, and this 2005 low longline catch (35,000 t) was not recorded since 1983. Purse seine and baitboat catches also decreased by similar percentage. The number of boats for purse seine and baitboat operating in the equatorial waters also indicated a large decline. In addition, most of the purse seiners operating in the Atlantic consisted of aged boats over 25 years old. Among the surface fishing countries, Spain, Ghana and France also reduced their catch while Portugal recovered its catch since 1998. The area of fishing has not shifted during the recent years.
Although a full evaluation of the moratorium on the use of FADs was not possible, this regulation appears effective in reducing fishing mortality for juvenile bigeye, at least for the purse seine fishery that complied with this regulation. The full compliance with this regulation by all the fisheries, including baitboats, will greatly increase the effectiveness in reducing fishing mortality for juvenile.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The ICCAT/SCRS noted that the current estimate of MSY of bigeye (about 100,000 t) is considerably higher than that estimated by the SCRS up to the mid-1990s (close to 70,000 t). This increase is chronologically linked, on the one hand to the increased catches of small bigeye associated with FADs (which has logically decreased the MSY), and on the other hand to the increase in longline effort targeting adult bigeye. This increase in the CPUE was totally unforeseen by the SCRS ten years ago. It is essential that the assessments that will be carried out by the SCRS in 2007 attempt to explain the causes of this unforeseen increase in the estimated MSY and, in particular, whether or not it is due to the increased productivity of the stock or artificial causes in data and methodologies applied by the SCRS in the early 1990s. The 2004 assessment indicated that the stock has declined due to the large catches made since around the mid-1990s to around or below the MSY level, and that fishing mortality exceeded FMSY for several years during that time period. Projections indicate that catches of more than 100,000 t will result in continued stock decline. Given the high uncertainties in the catches, abundance indices and other parameters used in the assessment, catch levels of around 90,000 t or even lower values would facilitate the recovery of the stock. However, updated relative abundance on bigeye suggests that the stock has continued to decline in recent years in contradiction to the projection result. Thus, a full stock assessment for this stock in 2007 is warranted.

**RECENT MANAGEMENT ADVICE:** The ICCAT/SCRS reports that while a minimum size regulation of 3.2 kg was adopted in 1980 it is clear that a large quantity of juvenile bigeye tuna (smaller than 3.2 kg) continues to be taken and mostly from the equatorial baitboat and purse seine fleets. The percentage of these fish has increased since 1990 and was more than 50% of the total fish caught thereafter except in 2000. The moratorium on FAD fishing by surface gears in the Gulf of Guinea were observed by all fishing sectors, including Ghanaian surface fleet during 2004/2005 season. However, available purse seine catch and effort data indicated significant fishing on FADs in the moratorium area. For the major fishing countries (whose 1999 catch exceeded 2,100 t) catches in 2001 and thereafter was limited to the average catches taken in 1991 – 1992. In 2004 ICCAT established a TAC for Atlantic bigeye tuna at 90,000 t for each year during 2005-2008 and further established catch limitations for some of the major fishing countries. A season/area closure was implemented in June 2005, replacing the moratorium on the use of FADs in the Gulf of Guinea. Since 2005 is a transitional year from a old closure of surface fishing to new one, the evaluation of effectiveness of this closure is too early to make it.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT/SCRS. Additionally STECF expressed its regret and surprise by the ICCAT decision of replacing the moratorium on the use of FADs by the season/area closure, being made without scientific advice and without taking into account analyses of the moratorium conducted by the ICCAT/SCRS in the past.
10.8. Swordfish (*Xiphias gladius*), North Atlantic

**FISHERIES:** Because of the broad geographical distribution of the Atlantic swordfish, in coastal and offshore areas, mostly ranging from 45°N to 45°S, this species is available to a large number of fishing countries. The largest proportion of the Atlantic catches are made using surface drifting longline. However, many additional gears are used, including traditional gillnets off the coast of western Africa. The SCRS noted many recent developments and changes in fisheries and their potential effect on the available data, its continuity and complexity and therefore its interpretation. Specific research actions about these issues are needed in the near future. For the past decade, the North Atlantic estimated catch (landings plus discards) has averaged about 11,900 t, although the 2005 catch (including carry-overs) was reduced to 12,143 t (reported catch was 11,775 t). Most of the swordfish catches in the North Atlantic in 2005 were taken by directed longline fisheries, mostly by Spain (5,521 t), United States (2,162 t), Canada (1,558 t) and Portugal (900 t). In 2005, there was a 40% decrease in estimated catches (including discards and carry-overs) since the 1987 peak in North Atlantic landings of 20,236 t. Reduced landings have also been attributed to shifts in fleet distributions, including movement of some vessels to the South Atlantic and out of the Atlantic. In addition, some fleets, including Canada, EC-Portugal, EC-Spain, and the United States, have changed operating procedures to opportunistically target other large pelagic species (tuna and/or sharks), taking advantage of market-price conditions and their high relative catch rates. The available age-specific indices of abundance from the various fleets harvesting northern Atlantic swordfish show generally consistent trends over the period of overlap, with a few exceptions especially in the most recent period. There appears a pattern of relatively strong recruitment in the mid 1990’s which then progressed into medium size and spawning-size swordfish. This, in combination with lower catches resulted in an increase in spawning biomass. Unfortunately, there is little information available with which to judge the most recent recruitment levels. The overall indicator of northern Atlantic swordfish biomass from the major fisheries reflected an increase in biomass in the late 1990s.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is the ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been defined for this stock.

**STOCK STATUS:** The 2006 assessment indicated that North Atlantic swordfish biomass had improved possibly due to strong recruitment in the late 1990s, combined with reductions in reported catch since then, especially compared to the peak catch values of 1987. The estimate of maximum sustainable yield from production model analyses is about 14,100 t. The biomass at the beginning of 2006 was estimated to be about 99% of the biomass needed to produce MSY and the 2005 fishing mortality rate was estimated to be about 14% below the fishing mortality rate at MSY. Although there is some uncertainty in these estimates, most of the bootstrap outcomes show that current F is less than FMSY, while about half of the current biomass estimates are less than BMSY. The replacement yield for the year 2006 (14,438 t) was estimated to be slightly more than the MSY level. As the TAC for North Atlantic swordfish for 2005 was 14,000 t (about equal to MSY), it was considered likely that biomass would continue to approach or attain the BMSY level under those catch levels. The Committee believes that it is likely that the northern swordfish stock is nearly rebuilt to BMSY. Although there is some uncertainty associated with this conclusion, almost half of the bootstrap estimates of current biomass were greater than or equal to BMSY. If the current TAC management strategy is maintained, the stock is likely to remain near the level that would produce MSY. The SCRS is concerned that in some cases
regulations have resulted in the discard of swordfish caught in the North stock and considers that regulations may have had a detrimental effect on the availability and consistency of scientific data on catches, sizes and CPUE indices of the Atlantic fleet. The SCRS expressed its serious concern over this limitation on data for future assessments.

**RECENT MANAGEMENT ADVICE:** In order to maintain the northern Atlantic swordfish stock close to a level that would produce MSY, the ICCAT/SCRS recommends continuing the present TAC (14,000 t). Given the current estimate of stock productivity \( r=0.49 \) and MSY (14,100 t), this TAC should be sustainable into the future, and reflects the maximum yield that could be harvested from the population under existing environmental and fishery conditions.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT. STECF remarks that due to the low size-selectivity of the longlines, the minimum landing size regulation of 125 cm may have resulted in under-reporting of juvenile catches. Alternative methods for reducing juvenile catches, such as time and/or area closures, are probably more efficient and their applicability should be further investigated. There is a need to evaluate the uncertainty concerning the stock structure of Atlantic swordfish.

### 10.9. Swordfish (*Xiphias gladius*), South Atlantic

**FISHERIES:** The historical trend of catch (landings plus discards) can be divided in two periods: before and after 1980. The first one is characterized by relatively low catches, generally less than 5,000 t (with an average value of 2,300 t). After 1980, landings increased continuously up to a peak of 21,780 t in 1995, levels that match the peak of North Atlantic harvest (20,236 t). This increase of landings was in part due to progressive shifts of fishing effort to the South Atlantic, primarily from the North Atlantic, as well as other waters. Expansion of fishing activities by southern coastal countries, such as Brazil and Uruguay, also contributed to this increase in catches. The reduction in catch following the peak in 1995 resulted from regulations and is due in part to a shift to other oceans and target species. In 2004, the 12,902 t reported catches were about 40% lower than the 1995 reported level. The reported 2005 catch is 12,687 t, and should be considered provisional and is probably an underestimate. Since 1991, several fleets have reported discards. The volume of Atlantic-wide reported discards since then has ranged from 215 to 1139 t. The most recent (2005) reported level of discards is 348 t, a reduction of 67% from the peak level reported for 2000.

Almost all the reported swordfish catches from the South Atlantic are taken by directed longline fisheries, and mostly by Spain (43% of the reported catches in 2005), and Brasil (30%), along with catch and by-catch reported by fleets from Japan, Chinese Taipei, Namibia, South Africa, Uruguay Portugal and other countries.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is the ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** A new assessment of the South Atlantic swordfish stock was conducted in 2006. If the available CPUE information is used in a simple production model, two different conclusions are reached about the status of southern Atlantic swordfish. Using by-catch fishery data leads to overly-pessimistic results, while using target fishery data leads to optimistic results. The SCRS believes that in the case of the by-catch CPUE data, the estimates of MSY and intrinsic growth rate obtained could not be supported by current knowledge of swordfish population dynamics and historical catch levels. On the other hand, the SCRS believed that the recent increase in the Target pattern CPUE was more likely due to changes in catchability than it
was to an increase in abundance, possibly leading to an overestimation of the intrinsic growth rate. As a result, the SCRS has based its base case analyses on a Composite CPUE pattern that has been constructed from both types of fisheries. Recognizing that further research is required in order to make better use of the available data, the results obtained indicate that the stock is in good condition: The current estimated fishing mortality rate is likely below that which would produce MSY, and the current biomass is likely above that which would result from fishing at Fmsy in the long term. The estimated MSY (about 17,000 t) is 33% higher than current reported landings. While the SCRS believes the southern swordfish stock appears to be in a healthy condition at present, it is unclear if substantially higher catches than currently envisioned by the Commission could be sustained in the long-run, due to the divergent views of stock status provided by the targeted and by-catch fisheries indicators.

**RECENT MANAGEMENT ADVICE:** Until sufficiently more research has been conducted to reduce the high uncertainty in stock status evaluations for the southern Atlantic swordfish stock, the ICCAT/SCRS recommends that annual catch should not exceed the provisionally estimated MSY (about 17,000 t).

**STECF COMMENTS:** STECF agrees with the advice from ICCAT. There is a need to evaluate the uncertainty concerning the stock structure of Atlantic swordfish.

### 10.10. Swordfish (Xiphias gladius), Mediterranean Sea

**FISHERIES:** Swordfish fishing has been carried out in the Mediterranean using harpoons and driftnets since ancient times. Mediterranean swordfish fisheries are characterized by high catch levels. It should be noted that average annual reported catches (fluctuating between 12,000 to 16,000 t in the last decade) are similar to those of larger areas such as the North Atlantic. This could be related to higher recruitment levels in the Mediterranean than in the North Atlantic, different reproduction strategies (larger spawning areas) and the lower abundance of large pelagic predators (e.g. sharks) in the Mediterranean. However, the potential reproductive area in the Mediterranean is probably relatively larger than that in the Atlantic. Further, the productivity of the Mediterranean Sea is thought to be very high. Landings showed an upward trend from 1965-72, stabilised between 1973 and 1977, and then resumed an upward trend reaching a peak of about 20,000 t in 1988. Since then, the reported landings have declined and since 1990 they fluctuate from about 12,000 t to 16,000 t. The total 2004 catch was 14,016 t, while the preliminary total 2005 catch is estimated to exceed 13,000 t but a final figure cannot be given as the currently available catch data (12,417 t) do not include all Mediterranean countries. The biggest producers of swordfish in the Mediterranean Sea in the recent years are EC-Italy, EC-Greece, EC-Spain and Morocco. Also, Algeria, EC-Cyprus, EC-Malta, EC-Portugal, Tunisia and Turkey have fisheries targeting swordfish in the Mediterranean. Incidental catches of swordfish have also been reported by Albania, Croatia, EC-France, Japan, and Libya. The Committee recognized that there may be additional fleets taking swordfish in the Mediterranean, for example, Egypt, Israel, Lebanon, Monaco and Syria, but the data are not reported nor to ICCAT or GFCM/FAO.

Prior to 2002 longlines and driftnets were the main gears used, but minor catches were also reported by harpoon, traps and sport fishing. The driftnet fishery for swordfish has been banned since January 1st 2002 in the EU countries and from 2004 in all the ICCAT Mediterranean countries, but illegal fishery is known to still occur in various areas. The use of nets and longlines in sport and recreational fishery was banned since 2004 (ICCAT Rec. 04-12). There is a high and growing demand for swordfish for fresh consumption in most Mediterranean countries.
SOURCE OF MANAGEMENT ADVICE: The advisory bodies are GFCM and ICCAT through the joint GFCM/ICCAT working groups. In 2003 the SCRS carried out the assessment of the Mediterranean stock based on fisheries data from the central and eastern Mediterranean.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: A Workshop on swordfish stock structure took place in Crete in early 2006. The results demonstrated that Mediterranean swordfish compose a unique stock separated from the Atlantic ones but further research is needed to clearly define stock boundaries. The status of the stock, the high exploitation rate (taking into account the very large reported catch of nearly 15,000 t taken in a small area), the extremely large and uncertain catch of very small fish, and warning signs from the fishery are causes for serious concern. The 2003 assessment shows that both production model and age-based VPA indicated the presence of a stable situation in terms of recruitment, total and spawning biomass. These findings suggest that the current exploitation pattern and level of exploitation are sustainable, in the short-term, as long as the stock does not decline. However, the lack of sufficient historical data did not allow the determination of stock status relative to MSY benchmarks. The VPA analysis suggested that recent F estimates were higher than the calculated Y/R and SPR benchmarks. The SCRS noted the large catches of small size swordfish, i.e. less than 3 years old (many of which have probably never spawned) and the relatively low number of large individuals in the catches. Fish less than 3 years old represent 50-70% of the total yearly catches. A reduction of the volume of juvenile catches would improve yield per recruit and spawning biomass per recruit levels.

RECENT MANAGEMENT ADVICE: The joint GFCM/ICCAT working group noted that the quality of available data has greatly improved since 1995. Given the uncertainties in the MSY benchmarks, the SCRS recommends that the current levels of exploitation not be exceeded, under the current exploitation patterns. The recent fishing mortality rates were well above the levels taken as appropriate to achieve MSY for most of the stocks. Accordingly, the SCRS remains concerned about the high level of fishing mortality rates estimated for Mediterranean swordfish. The percentage of juveniles in the catches is relatively high and a reduction of their catches would improve the yield and spawning biomass per recruit. In the past, adoption of a minimum landing size regulation of 120 cm may have resulted in under-reporting of juvenile catches and appeared not to be practical in all situations, considering the low size-selectivity of the fishing gears used. Alternative methods for reducing juvenile catches, such as time and/or area closures, are mentioned in the 2001 SCRS Report) and their applicability should be further investigated. The 2006 SCRS Reports have tried to better investigate some of the options. Assuming low variation (10%) on the annual recruitment levels, a document presented in the SCRS meeting indicated that a four-month fishery closure during the recruitment period would, in the medium term, result in an increase of the total annual catch of about 6% in terms of weight, and in a reduction of the number of juvenile fish in the catch by 18-23%.

In addition, given the uncertainty of the location of the boundary between the Mediterranean and North Atlantic stocks, it is important to identify the biological origin of those catches reported at or near the boundary so that the resulting knowledge can be considered in the management of the North Atlantic and/or Mediterranean stocks. The SCRS continues to recommend that the ICCAT ensure that reliable data be provided on catch effort and size for Mediterranean swordfish. Improvements to these basic inputs to the stock assessment are essential to improve future estimates.

STECF COMMENTS: STECF agrees with the advice from ICCAT and recommend that the EU Data Collection programme should be adjusted to be consistent with the format used by ICCAT.
for assessment purposes, with a particular attention to CPUE data. STECF also stress the importance to better define the mixing rate between the Mediterranean and the Atlantic swordfish stock already known to occur in Atlantic area close to Gibraltar.

### 10.11. Skipjack (*Katsuwonus pelamis*), Eastern Atlantic

**FISHERIES:** The total catches obtained in 2005 in the entire Atlantic Ocean were close to 166,200 t, which represents an increase on the order of 17% as compared to the average of the last five years. The numerous changes that have occurred in the skipjack fishery since the early 1990s (such as the use of FADs and the expansion of the fishing area towards the west) have brought about an increase in skipjack catchability and in the proportion of the skipjack stock that is exploited. The maximum historical catch was reported in 1991 with 170,000 t. Since that year, the level of skipjack catches have decreased despite a massive use of FADs. In 2000 and 2001, skipjack catches in the eastern Atlantic amounted to only 118,000 t and 93,000 t respectively. However, during the last two years the catches have increased. At present, the major fisheries are the purse fisheries, particularly those of EC-Spain, EC-France, NEI, Cape Verde, Guatemala and Ghana, followed by baitboat fisheries of Ghana, EC-Spain and EC-France. The catches made in 2005 in the East Atlantic amounted to 138,218 t, representing an increase of 19% as compared to the average of 2000-2004. SCRS noted that important catches of skipjack are landed as “false tuna” in Côte d’Ivoire (unreported catches on the order of 6,000 to 8,000 t between 2004 and 2005) and it will try to integrate them in the precise manner possible in the reported catches for the purse seiners (as well in the historical catches).

In 2002 ICCAT reviewed the current stock structure hypothesis of two separate management units, East and West Atlantic, separated at 30°W. In recent years the East Atlantic fisheries have extended to the West of 30°, following the drift of FADs. This would imply the possibility of a certain degree of mixing.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The last detailed stock assessment for the eastern Atlantic skipjack stock was conducted in 1999. Although the fisheries operating in the east are extending towards the west beyond 30°W longitude, the SCRS decided to maintain the hypothesis in favor of two distinct stock units, based on available scientific studies. However, taking into account the biological characteristics of the species and the geographic distances between the various fishing areas, the use of smaller stock units continues to be the envisaged hypothesis. The ICCAT/SCRS considers that, in spite of the characteristics of this species, growth overfishing of skipjack has probably been reached, at least in specific areas. However, there are doubts as regards the generalization of this conclusion to the overall stocks in the East Atlantic, due to the moderate mixing rates that seem to occur among the different sectors of this region. The application of a non-equilibrium production model based on a generalized model confirms the previous analysis, showing a possible decline in the yield of the East Atlantic stock following the introduction of FADs. The last model estimated a general increase in the efficiency of the fishing gears of about 5% annually for this species.

**RECENT MANAGEMENT ADVICE:** While there are no definitive conclusions on the status of this stock, current results suggest that there may be over-exploitation within the FAD fishery. However the ICCAT/SCRS recommended the implementation of a similar moratorium that was
from 1999 to January 2005. This moratorium has had an effect on skipjack catches made with FADs.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT. Additionally STECF stresses that the effect of the moratorium on FADs be evaluated. Additionally STECF expressed its regret and surprise by the ICCAT decision of replacing the moratorium on the use of FADs by the season/area closure, being made without scientific advice and without taking into account analyses of the moratorium conducted by the ICCAT/SCRS in the past.

### 10.12. Skipjack (*Katsuwonus pelamis*), Western Atlantic

**FISHERIES:** In the West Atlantic, the major fishery is the Brazilian baitboat fishery, followed by the Venezuelan purse seine fleet. Catches in 2005 in the West Atlantic amounted to 28,028 t, a level close to the average of the historical period in recent years. The most important fishery is the baitboat fishery of Brazil, whose only target species is skipjack and to a lesser extent Venezuela. The catches taken by EU vessels on this stock have been, historically, negligible.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is the ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No reference points have been defined for this stock.

**STOCK STATUS:** The last stock assessment was conducted in 1999. In 2002 the current stock structure hypothesis that consists of two separate management units, one in the East Atlantic and another in the West Atlantic, separated at 30°W was reviewed (see Skipjack, eastern Atlantic). The nominal CPUEs of Brazilian baitboats remain stable while that of Venezuelan purse seiners decreased in recent years. This decrease, also observed in the yellowfin CPUE time series, could be linked to specific environmental conditions (high surface temperatures, lesser accessibility of prey), and it is therefore difficult to draw conclusions on the state of the stocks.

**RECENT MANAGEMENT ADVICE:** No management recommendations were proposed by the ICCAT.

**STECF COMMENTS:** No comment.

### 10.13. Marlins, spearfish and sailfish, Atlantic Ocean

**FISHERIES:** The ICCAT/SCRS used Task I catches as the basis for the estimation of total removals. In recent years large catches of billfish continue to be reported as unclassified billfish and reporting gaps remain for some important fleets. Total removals for the period 1990-2004 were obtained by modifying Task I values with the addition of blue marlin and white marlin that the SCRS estimated from catches reported as billfish unclassified. Additionally the reporting gaps were filled with estimated values for some fleets. In recent times new fleets have harvested large catches of blue marlin, including the artisanal FAD fisheries in the eastern Caribbean islands and a new artisanal fleet of small longliners operating off Brazil between 20°S and 26°S. Catches of blue marlin and white marlin continued to decline through 2004 and 2005. The yearly average catches of blue and white marlin, spearfish and sailfish in the Atlantic Ocean over the last decade amounts to 7,169 t. The corresponding catch in 2004 is 5,875 t (although this figure is incomplete and may represent a substantial underestimate of the real catch, because of the lack of reports from some of the fleets that have historically landed large numbers of this species). It comprises 2,897 t of blue marlin, 475 t of white marlin, 1,692 t of sailfish and spearfish. Preliminary 2005 catch reports a combined total of 9491 t (5,794 t of blue marlin, 2,005 t of white marlin and 1,692 t of sailfish and spearfish). Catches of Sailfish continue to be reported together with spearfish by many longline fleets. At present it is not possible to
appropriately separate the catches of these two species. Large catches of unclassified billfish continue to be reported to the SCRS. From 2001 to 2004 reported catch of unclassified billfish ranged from 12% to 30% of the reported catch of all billfish. For some fisheries this percentage is much greater. This continues to make the estimation of sailfish catch difficult.

The group are primarily taken by longline fisheries (including various EU longline fisheries), but also by purse seiners (including EU purse seiners catching a few hundreds tonnes yearly), by some artisanal gears which are the only fisheries targeting marlins (Ghana, Cote d'Ivoire, including EU ones in the Antillas) and also by various sport fisheries located in both sides of the Atlantic. This group of species is becoming important in the Atlantic because of their charismatic status and the sport fisheries lobby (and because of the latter’s active financial support to the ICCAT scientific researches on these species). The increasing use of anchored FADs by various artisanal and sport fisheries is increasing the vulnerability of these stocks.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.

**STOCK STATUS:**

**BLUE MARLIN:** The recent biomass level most likely remains well below the Bmsy estimated in 2000. Current and provisional diagnoses suggest that F has recently declined and is possibly smaller than F_replacement but larger than the Fmsy estimated in the 2000 assessment. Over the period 2001-2005 several abundance indicators suggest that the decline has been at least partially arrested, but some other indicators suggest that abundance has continued to decline. Confirmation of these recent apparent changes in trend will require at least an additional four or five years of data, especially since the reliability of the recent information has diminished and may continue to do so.

**WHITE MARLIN:** The recent biomass most likely remains well below the Bmsy estimated in the 2002 assessment. Current and provisional diagnoses suggest that F is probably smaller than F_replacement and probably also larger than the Fmsy estimated in the 2002 assessment. Over the period 2001-2004 combined longline indices and some individual fleet indices suggest that the decline has been at least partially reversed, but some other individual fleet indices suggest that abundance has continued to decline. Confirmation of these recent apparent changes in trend will require at least an additional four or five years of data, especially since the reliability of the recent information has diminished and may continue to do so.

**SAILFISH and SPEARFISH:** The most recent assessments of sailfish were conducted in 2001. It is unknown if the western or eastern sailfish stocks are undergoing over-fishing or if the stocks are currently over-fished. For the western sailfish stock apparently the current catch level is sustainable. For the eastern Atlantic sailfish, recent reported catches have been in decline, as have the available coastal abundance indices. **RECENT MANAGEMENT ADVICE:** ICCAT recommends that steps be taken to reduce the catch of blue marlin and other billfish species as much as possible. Steps such as release of live fish from fishing gear, reductions in fleet-wide effort, a better estimation of dead discards, and establishment of time area closures, along with scientific observer sampling for verification could be considered. Observer programmes have been also recommended. SCRS also recommends additional implement plans to improve compliance with the current regulation, encouraging the use of circle hooks in fisheries where this use has been shown to be beneficial, broader application of time/area restriction, a regulation to control the fishing mortality generated by artisanal fisheries and research on development of methods to incorporate environmental information into stock assessment. The current western
Atlantic assessment leads the SCRS to recommend that the western Atlantic sailfish catches should not exceed current levels. For the east Atlantic, sailfish catches should not exceed current levels and the ICCAT should consider practical and alternative methods to reduce fishing mortality and assure data collection systems. The SCRS is concerned about the incomplete reporting of sailfish catches, particularly for the most recent years. The SCRS recommends all countries landing sailfish and spearfish or having dead discards of these, report these data by species to the ICCAT Secretariat.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT. Furthermore, STECF stresses the need to better identify and reports the billfish species in all EC fisheries, according to DCR.

### 10.14. Small tunas (Black skipjack, Frigate tuna, Atlantic bonito, Spotted Spanish mackerel, King mackerel), Atlantic and Mediterranean

**FISHERIES:** There are over ten species within the ICCAT category of small tunas, which includes Blackfin tuna (*Thunnus atlanticus*), Bullet tuna (*Auxis rochei*), Frigate tuna (*Auxis thazard*), Bonito (*Sarda sarda*), Plain bonito (*Orcynopsis unicolor*), Serra Spanish mackerel (*Scomberomorus brasiliensis*), Cero (*Scomberomorus regalis*), King mackerel (*Scomberomorus cavalla*), Scomberomorus unclassified (*Scomberomorus spp.*), Atlantic black skipjack (*Euthynnus alletteratus*), West African Spanish mackerel (*Scomberomorus tritor*), Atlantic Spanish mackerel (*Scomberomorus maculatus*) and Wahoo (*Acanthocybium solandri*), but only five of these account for 85% of the total catch by weight each year, according to the official statistics. In 1980, there was a marked increase in reported landings compared to previous years, reaching a peak of about 139,412 t in 1988. Reported landings for the 1989-1995 period decreased to approximately 87,941 t, and then an oscillation in the values in the following years up to 2001 is observed, when the catch was 84,093 t. From that year on catches continued to decrease reaching 43,879 t in 2005 (provisional data). This decrease seems to be related to unreported catches, as these species generally comprise part of the by-catch and are often discarded, and therefore do not reflect the real catch. The SCRS pointed out the relative importance of small tuna fisheries in the Mediterranean Sea, which account for 26% of the total reported catch in the 1980-2005.

The 2004 catch (the last complete data set) amounted to 63,522 t, of which: 1,931 t of Blackfin tuna in the Atlantic; 8,521 t of Bonito; 12,112 t of Atlantic Black Skipjack; 8,394 t of Frigate tuna; 12,667 t of King mackerel; 13,582 t of Atlantic Spanish mackerel; 3,410 of Serra Spanish mackerel; 1,977 t of Wahoo and 402 t of the Bullet tuna in the Atlantic. As concerns the late species, there is the strong suspicion that Mediterranean catches are not reported. Small tunas are exploited mainly by coastal fisheries and often by artisanal fisheries, although substantial catches are also made, either as target species or as by-catch, by purse-seiners, mid-water trawlers, handlines, driftnets, surface drifting long-lines and small scale gillnets. Several recreational fisheries also target small tunas. Declared catches have increased since the 1950s to the end of the 1980s (peak of 144,000 t in 1998) and then declined (less than 100,000 t recently) to about 44,000 t in 2005. The small tuna fisheries in the Mediterranean accounted for about 26% of the total reported catch between 1980 and 2003. It is commonly believed that Mediterranean catches are strongly affected by unreported or underreported data. Since 1991, the use of FADs by tropical purse-seiners may have led to an increase in fishing mortality of small tropical tuna species. The same fishing technique has been employed for a long time in the Mediterranean to catch dolphin fish (*Coryphaena hippurus*) but also small tunas; there are no statistics on these
catches, even if it is known that the FAD fishery is now quite widespread in the Mediterranean according to the data provided to the ICCAT/GFCM joint expert working group in 2002. Data on the catch composition, biology, effort and trends are extremely poor, particularly for the Mediterranean, even if some new data have been made available by the new EC data collection system. The small tuna fishery seems to be quite important for the coastal fishermen, both economically and as a source of proteins.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT, which operates also through the GFCM/ICCAT joint expert working group.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for these stocks.

**STOCK STATUS:** Current information does not generally allow for an evaluation of stock status for most of these pelagics species. The only useful data series concerns the Atlantic Spanish mackerel and king mackerel, where the adoption of management measures improved the stock status.

**RECENT MANAGEMENT ADVICE:** No management recommendations have been presented by ICCAT due to the lack of data and analyses. ICCAT/SCRS reiterated its recommendation to carry out studies to determine the state of these stocks and the adoption of management solutions. However, the information available for the major part of the stocks suggests that the majority of the stocks can be managed at the regional or sub-regional level.

**STECF COMMENTS:** No comment on the advice. STECF recommends that the EC Data Collection programme should be adjusted to include at least either bullet tuna (*Auxis rochei*) or frigate tuna (*Auxis thazard*), due to the possible confusion in the species identification. Catch statistics should be collected in a much more detailed format, by species.

10.15. **Mediterranean Spearfish (*Tetrapturus belone*)**

**FISHERIES:** The Mediterranean fisheries catch mostly one species among sailfish and spearfish, the Mediterranean Spearfish (*Tetrapturus belone*), usually a by-catch in longline and drift net fishery, but one of the target species for the traditional harpoon fishery and occasionally in sport fishing activity. Catches are unofficially known to occur in all the Mediterranean States where drift net and longline fishing is currently carried out. The landings are unknown, although they seem to have increased in the most recent years, certainly over a level of about 100 t, even considering that only a very few Countries (Italy, Spain and Portugal) are reporting their catches to ICCAT. In 2005 and 2006 catches have shown fluctuation, while the geographic distribution of the species seem to be affected by the oceanographic situation. The other billfish and spearfish species are only very rarely present in most of the Mediterranean sea, but recent data shows that catches could occur with a relative higher frequency in the western basin, particularly around the Strait of Gibraltar.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is the ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** No attempt has been made until now to analyze the status of the Mediterranean Spearfish, due to the lack of data from many fisheries.

**RECENT MANAGEMENT ADVICE:** ICCAT have not provided any kind of management recommendations for this stock.

**STECF COMMENTS:** While generally not a target species for commercial fleets, spearfish and billfish catches, including those from the recreational fishery, should be monitored carefully due
to the probable small size of the Mediterranean spearfish stock and to the scientific importance of the other species.

10.16. Luvarus (Luvarus imperialis), Mediterranean Sea

FISHERIES: The Luvarus is usually a species not considered among the catches of the Mediterranean fisheries, but this poorly known species regularly occurred as a commercial by-catch in several driftnet fisheries, particularly between May and June, when this fishing activity was largely practiced. Catches may be significant in some periods; individuals of this species can exceed 80 kg. A minor by-catch occurs even in long-line fisheries. To date landings have not been never officially reported by any Country, although this species commands a high price on the market.

SOURCE OF MANAGEMENT ADVICE: The advisory body is FAO/GFCM.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: No attempt has been made until now to analyze the status of the Luvarus stock, due to the total lack of data. The ban on the use of driftnets by EC fleets since January 1st 2002 and from 2004 in all the ICCAT Mediterranean countries could results in a partially positive effect for the stock, even if illegal driftnet fishery is known to still occur in various areas.

RECENT MANAGEMENT ADVICE: GFCM have not provided any kind of management recommendations for this stock.

STECF COMMENTS: No comments.

11. Highly migratory fish (Indian ocean)

As a general remark, all the highly migratory species in the Indian Ocean are now managed by the Indian Ocean Tuna Commission (IOTC), an FAO body. This Commission faces a number of difficulties, some of which are related to the number of States taking part in these fisheries. Despite improvements, statistical tables are still not available for all fisheries and particularly for several artisanal fisheries, a very important component for most countries in that area. Many smaller tuna and tuna-like species are not currently examined by the IOTC and data on these species are not available.

11.1. Albacore (Thunnus alalunga)

FISHERIES: Since the mid-1960s, total yields varied between 15,000 and 30,000 tonnes, but suddenly increased up to 40,000 tonnes during the period from 1998 to 2000. Over the last five years the mean catch was 30,600 t. In 2006, the last available data, total catch amounted to 20,100 t with a decrease of about 16% on 2003 catch data. A fleet using drifting gillnets targeting juvenile albacore operated in the southern Indian Ocean (30° to 40° South) between 1985 and 1992 harvesting important amounts of this species. This fleet, from Taiwan China, had to stop fishing in 1992 due to a UN worldwide ban on the use of drifting gillnets. Albacore is currently both a target species and a by-catch of industrial longline fisheries and a by-catch of other fisheries. The great majority of the catches (98%) are due to longliners, which caught big albacore (>80 cm). Taiwan is the main country exploiting this stock.

SOURCE OF MANAGEMENT ADVICE: The advisory body is IOTC.

PRECAUTIONARY REFERENCE POINTS: None
STOCK STATUS: The status of this stock remains unknown. The quality of the reporting of catches and effort for albacore has been declining since the mid-eighties. Nevertheless, the completeness of the catch and catch-and-effort data was considered still good. In contrast, the size frequency statistics are poorly represented. A stock assessment was attempted in 2004 by the Working Party on Temperate Tunas. Results of the analyses conducted were considered unreliable by the IOTC, although one of the results suggested that current catch levels might not be sustainable. Other indicators, such as the average size in the catch and catch rates, have not shown declines in recent years.

RECENT MANAGEMENT ADVICE: IOTC did not provide management recommendations for this stock, but the scientific committee was concerned by the sharp increase in the catches since 1998. The IOTC acknowledged the advice from the Scientific Committee (reiterated in 2006) to be very cautious in allowing any increases of catches or fishing effort for this species until the problems with the assessments have been resolved.

STECF COMMENTS: STECF recommends that albacore in the Indian Ocean be assessed again as soon as possible in a reliable way, providing all the necessary catch data.

11.2. Yellowfin tuna (*Thunnus albacares*)

FISHERIES: From the mid-1960s to 1983, yields were stable at about 50,000 tonnes. There was a sharp increase during the 8 following years due to the arrival of EU purse seiners in the Indian Ocean. Since 1992, the yields remain relatively stable and fluctuate between 250,000 and 300,000 tonnes. A remarkable increase was reported in the last five years, with a mean catch of 393,340 t. In 2004 total catch amounted to 525000 t, a record for this species in the Indian Ocean, while higher catches were also preliminary reported for 2005 (about 500,000 t). This stock is firstly exploited by purse seines (about 67% of the catch), then by longlines and artisanal fishery (including baitboat and gillnet). There are some concerns regarding purse seine fishing using floating FADs, which has led to a rapid increase in the catch of juvenile yellowfin. After an initial decline, mean weights in the whole fishery remained quite stable from the 1970s to the early 1990s. Since 1993, mean weights in the catches in the industrial fisheries have declined. Prior to 2003, although total catch in biomass has been stable for several years, catches in numbers have continued to increase, as there has been more fishing effort directed towards smaller fish. As described above, this situation changed during 2003 and 2004; where most of the very large catches were obtained from fish of larger sizes. The very recent increases in catches in general has not been as a result of geographic expansion to previously unfished areas, but rather as a result of increased fishing pressure on existing fishing grounds.

SOURCE OF MANAGEMENT ADVICE: The advisory body is IOTC.

PRECAUTIONARY REFERENCE POINTS: None

STOCK STATUS: A first assessment took place in 2002 and a second in 2005. Various methods have been applied and they consistently indicated that fishing mortality rates between 1992 and 2002 have been close to or at levels of F corresponding to the Fmsy. Catches during this period were in the vicinity of, or possibly above, the MSY levels. Estimated catches in 2003 and 2004 were well above those MSY levels, and projections carried out indicate that these are not sustainable unless supported by very high recruitments. The IOTC Scientific Committee emphasized, however, that there remain strong uncertainties in each of the assessments conducted. The IOTC noted that the high catches in 2003 and 2004 could most likely to be attributed to an increase in catchability and/or increase in the fishing efficiency and/or increase of biomass or, most likely, to a combination of these factors. In such a scenario, the very large
catches would not be sustainable. Furthermore, they could lead to a rapid decline of the existing adult biomass of yellowfin tuna and a serious overexploitation of the stock. A continuation of the recent rapid increase in the catches and effort would imply that the fishery would exceed MSY.

**RECENT MANAGEMENT ADVICE:** It is recommended that the fishing effort does not increase in the near future above the 1999-2002 average level and the need for a reduction in the fishing mortality on juvenile yellowfin tuna caught by purse seines fishing on floating object.

**STECF COMMENTS:** STECF agrees with the advice from IOTC and stresses the importance of reducing the catches of juveniles, avoiding a further increase of fishing effort and catches above the 1999-2002 level, because these catches would not be sustainable in the longer term unless supported by continued high recruitments. STECF believes that this stock should be continuously monitored by IOTC.

### 11.3. Bigeye tuna (*Thunnus obesus*)

**FISHERIES:** Bigeye tuna is predominantly caught by industrial (long line and purse seine) and occasionally by artisanal fisheries. Longline fisheries started to target bigeye in the 1970s and mainly catch adults > 80 cm. There was a rapid development of the purse seine fisheries during the 1990s in association with drifting and floating FADs. These fleets mainly catch small fish < 80 cm. Reported total catches in the Indian Ocean of bigeye tuna peaked during 1997-99 at 144-150,000 t per year. Total annual catches averaged 119,000 t over the period 2000 to 2004: catches decreased in 2000 and 2001 relative to earlier years, but have increased slightly in 2002 (130,000 tons) and again in 2003 (139,300 t), decreasing again in 2004 (126,518 t) and 2005 (116,400 t) reflecting a drop in longline fishery which provided about 78% of total bigeye catches in the Indian Ocean in 2004. The average increase in catches in the eastern Indian Ocean in the last five years is mostly due to increased activity of small longliners fishing for fresh tunas. In the western Indian Ocean, the catches of bigeye are mostly the result of the activity of large longliners and purse seiners. An important part of the longline and purse-seine catch is due to vessels from non-reporting flag states. Most of the bigeye catches reported under purse seiners are juveniles (under 10 kg), and this results in purse seiners taking a larger numbers of individual fish than longliners. Large bigeye tuna (above 30 kg) are primarily caught by longlines, and in particular deep longliners.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** A new assessment took place in 2006 using various models (SS2, ASPM, ASPIC, SPBayes-Bayesian Pella-Thompson and CASAL). The IOTC/WPTT decided to use the results obtained by ASPM model. The population is currently above MSY, which has been estimated at 90,000 tonnes but has been declining since late 1980s. The results of the various stock assessments conducted in 2006 were broadly similar and, in general, were more optimistic than previous ones. These ASPM results indicate that the 2005 catch is close to the MSY. Furthermore, spawning stock biomass seems to be above the level that would produce MSY, and the fishing mortality in 2004 seems to below the MSY level. Current (2004) catches of juveniles bigeye by the surface fleets are also less detrimental in terms of yield-per-recruit that previous patterns. However, the current outlook could revert to a more pessimistic one, if the exploitation pattern is to return to the pre-2003 levels, as expected. It should be noted that considerable uncertainty remains about the estimates of current fishing mortality and the estimated fishing mortality at MSY. Biomass trajectories obtained in 2006 indicate that the spawning stock biomass is currently just above the MSY level, but it has been declining since the late 1970’s.
Similarly, the current fishing mortality is estimated to be just above the MSY level, but fishing mortality has been increasing steadily since the 1980’s. These results are, however, impaired by various uncertainties, among which the recruitment level (which has been assumed independent of the spawning stock biomass), the growth, the conversion factors, changes in catchability and the lack of catch-at-size data for various fisheries.

**RECENT MANAGEMENT ADVICE:** Regarding the current rapid increase in the catches and the more optimistic results of the 2006 assessment, it was recommended that catches and effort from all gears should not increase further along with a reduction in the fishing mortality on juvenile bigeye tuna. The recent increase of fish laundering and IUU activities has a detrimental effect in distorting the stock assessments. It is likely that current catches are still above MSY and it is possible that fishing effort in the last five years has exceeded the effort that would produce MSY.

**STECF COMMENTS:** STECF agrees with IOTC advice and stresses the importance of keeping the total catch and effort under a strict control, to reduce the catches of juveniles and to adopt strategies able to eliminate IUU activities.

### 11.4. Skipjack (*Katsuwonus pelamis*)

**FISHERIES:** During the 1970s, the catches were around 50,000 tonnes, but rapidly increased during the 1980s and 1990s to reach 400,000 tonnes in 1999. The trend in catches indicates a large and continuous increase in the catches of skipjack tuna since the mid-1980s (they reached 400,000 tonnes in 1999), particularly due to an expansion of the FAD-associated fishery. There is no sign that the rate of increase is diminishing in recent years. Skipjack is caught in similar proportion by industrial (mainly purse seine fishing under floating FADs) and artisanal fisheries (especially the bait boats from the Maldives, which is probably the oldest live bait boat fishery in the world). Catches reached a peak in 2002 with 563,200 tons but even 2004 catches were quite high (529,000 t). Preliminary catch report for 2005 appears close to 585,000 t. The mean catch over the last five-year was 528,000 t. In recent years, skipjack catches were shared in similar proportions between the industrial purse seine fishery and the different artisanal ones (baitboat, gillnets and others), the majority of this catch originating in the western Indian Ocean. Little information is available on the (drifting?) gillnet fisheries (mainly from Sri Lanka, Iran, Pakistan, India and Indonesia) which take around 30 to 40 % of the total catch of skipjack. In general, there is low inter-annual variability when compared with similar fisheries in other oceans. The average size of skipjack caught in the Indian Ocean remains relatively large (greater than in the Atlantic, but lower than in the Pacific) with 2.5 kg for purse-seine, 3.0 kg for the Maldivian baitboats and 4-5 kg for the gillnet. The increasing fishing activity on FADS targeting skipjack might affect juveniles of bigeye and yellowfin tuna, because large catches of these two species are currently reported.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** An attempt was made in 2003 to assess the stock status and no new trials are available. However, due to the large uncertainties in the information needed to conduct a complete assessment, IOTTC analysed different fishery indicators that could provide a general understanding of the state of the stock (ie. trends in catches and nominal CPUEs, average weight in the catches, length-based cohort analysis). In spite of not having a full stock assessment for skipjack, the analysis did not show reasons for concern, as catches have continued to increase as effort increased and the majority of the catch comes from fish that is already sexually mature.
(greater than 40cm), as the fishing pattern by size indicates. Anyway, length-based cohort analyses indicated a growing catch of smaller size fish due to the FAD fishery.

**RECENT MANAGEMENT ADVICE:** Although there might be no reason for concern about the status of skipjack tuna as the stock is assumed to be healthy, it is clear that the catches cannot be increased at the current rate indefinitely. No management measures were adopted for this species.

**STECF COMMENTS:** STECF agrees with IOTC recommendations but the effect of FAD fishery on juveniles of other tuna species should be strictly monitored and evaluated.

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### 11.5. Swordfish (Xiphias gladius)

**FISHERIES:** Swordfish in the Indian Ocean is mainly caught by longline and secondarily by driftnets. Yields of swordfish were less than 5,000 tons during the 1970s and 1980s. In the 1990’s, exploitation of swordfish increased by over 500%, peaking in 1998 at around 35,000 tones. By 2004, thirty-one countries were reporting catches of swordfish, and the total catch had decreased to about 31,000 t. The most relevant fishing fleet is from China-Taiwan. The largest catches are obtained in the southwestern Indian Ocean. By-catches and discards (mainly sharks and billfish) are important in these fisheries. The main problems that affect the data available for swordfish (as well as all billfish) are: gaps in time series, aggregation and misidentification, under-reporting of discards and lack of size-frequency data, even if the data situation is improving over time.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC/ Working Party on Billfish (WPB).

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** Stock indicators suggest that there has been a marked decline in the stocks of Indian Ocean swordfish since targeting of the species began in the early 1990’s. Stock assessments of Indian Ocean swordfish stocks are preliminary, and rely heavily on indicators of abundance and stock status such as trends in CPUE and size composition of the catch. The 2006 stock indicators and the assessments suggested under all scenarios that overfishing is likely to be occurring (current exploitation rates are likely above FMSY. The decline in the stock since 1952 estimated using the long CPUE series is much more severe than that estimated using the short CPUE series. The low productivity scenarios suggest that the stock might be overfished relative to BMSY and current catches appear to be above the estimated MSY. The depletion estimators are very similar among models because relative abundance closely tracks the CPUE trend, while the MSY-related indicators are sensitive to the functional form of the surplus production curve (which cannot be reliably estimated from the available data). Although there is high uncertainty, the indicators and assessments suggest that the situation may be more serious in the Western Indian Ocean than the Eastern Indian Ocean. In general, the current catch level is above the estimated MSY and probably not sustainable.

**RECENT MANAGEMENT ADVICE:** For the IOTC/WPB the current level of catch (about 30,000 tones) is unlikely to be sustainable and any further increase in effort in the Western Indian Ocean (particularly the SW) would increase the risk of overfishing the swordfish stock. Any increase in the catch of, or fishing effort on, swordfish should not be allowed. Furthermore, management measures focused on controlling and/or reducing effort, especially in the southwest Indian Ocean are recommended.

**STECF COMMENTS:** STECF agrees with the advice from IOTC and stresses the importance to recover historical data series, to better improve the recent series and to define the stock
structure, with the purpose to conduct a much more complete assessment of swordfish stocks in the Indian Ocean.

11.6. Marlins, spearfish and sailfish (Billfish)

FISHERIES: The total billfish catches remain uncertain because of potential under-reporting, particularly from the artisanal and the recreational fisheries. The reported landings are much higher than in the Atlantic and could have reached 40,000 tonnes (or more) during the last years. The most common species are: Indo-Pacific sailfish (~22,300 t), blue marlin (~11,000 t), striped marlin (~5,500 t), black marlin (~500 t) and shortbill spearfish (~220 t). STECF remarks a serious discrepancy in the last IOTC report about the total catches of marlins in 2006: the text reports a combined total of about 11,000 t, while the graph shows different values per species which, accumulated, are about 17,000 t; the graph data fit with the descriptive text in the report. STECF is unable to choose the most reliable catch amount for marlins in 2004. Billfish are mostly, but not always (e.g., recreational fishing), taken as by-catches from tuna and swordfish longline fisheries (which include various EU fleets). The main problems that affect the data available for all billfish are: gaps in time series, aggregation and misidentification, under-reporting of discards and general lack of size-frequency data.

SOURCE OF MANAGEMENT ADVICE: The advisory body is IOTC.

PRECAUTIONARY REFERENCE POINTS: None.

STOCK STATUS: Meeting on billfish took place in 2004 and 2006, but no assessment could be carried out because of the critical lack of data. The 2000 IOTC /WPB, in a very preliminary analysis, based on limited CPUE data sets, reported an apparent negative trend for the Black Marlin, an increasing trend for the Blue Marlin and an increasing vulnerability for the Striped Marlin. However, these series are likely to be strongly biased and it was agreed that deeper analysis with larger data sets are necessary. No new trends have been detected by IOTC/WPB in 2004 and 2006.

RECENT MANAGEMENT ADVICE: IOTC has not provided any management recommendation for these stocks, but has strongly recommended that better estimates of catches and discards of billfish, by species and by gear, by size and sex, be reported. It is also recommended that past and future catch of marlins taken as by-catches by purse seines be estimated.

STECF COMMENTS: STECF agrees with IOTC recommendations and stresses the importance to provide basic catch and size data by species, along with other essential parameters to be used for a future stock assessment of the various billfish species taken in the Indian Ocean.

11.7. Southern bluefin (Thunnus thynnus maccayi)

FISHERY: This circumpolar stock is exploited in the Indian Ocean, Pacific and Atlantic by longliners and purse seiners (primarily from Japan, Australia and New Zealand). Australian and Japanese fleets have been exploiting this stock for more than 40 years. During this period, the Japanese longline fishery (taking older aged fish) recorded its peak catch of 77,927 tonnes in 1961 and the Australian catches of young fish by surface fishery peaked at 21,501 tonnes in 1982. New Zealand, Chinese-Taipei and Indonesia have also exploited southern bluefin tuna, and Korea started a fishery in 1991. The proportion of catch made by the surface fishery peaked around the 1980s at the level of close to 50% of total catch, but declined afterward to 13%. The catches of Australia, Japan and New Zealand have been controlled with quota since 1985. The current catch limits are 5,265 tonnes for Australia, 6,065 tonnes for Japan, and 420 tonnes for
New Zealand, which has remained at the same level since 1990. However, the catches by nations other than the aforementioned three have increased steadily (about 4,689 tonnes in 1996). The 2003 preliminary total catch is of about 14,024 tonnes, continuing a declining trend in total catches from a recent peak of 19,529 t in 1999, to 13,490 in 2004. EU vessels have never exploited this stock. 73% of the southern bluefin tuna catch has been made in the Indian Ocean, 21% in the Pacific Ocean and 6% in the Atlantic Ocean. The Atlantic Ocean catch has varied widely between 400 and 8,200 t since 1968, averaging about 1,000 t over the past two decades, and reflecting shifts in longline effort between the Atlantic and Indian Oceans. Fishing in the Atlantic occurs primarily off the southern tip of South Africa. No new data are available.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is CCSBT.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** Southern bluefin tuna assessments were updated in 2005. Data indicate that there was a drop in spawning stock biomass in 1995 and data from the Indonesian fishery for 2000 to 2005 are consistent with a declining spawning stock biomass. Current assessments suggest the southern bluefin tuna spawning biomass is at a low fraction of its original biomass, and well below the 1980 biomass. The stock is estimated to be well below the level that produces maximum sustainable yield. Rebuilding the spawning stock biomass would almost certainly increase sustainable yield and provide security against unforeseen environmental events. Recruitments in the last decade are estimated to be well below the levels over the period 1950-1980. The evidence shows that there have been at least two recent years (2000 and 2001) of very low recruitment. The probability of further stock decline under current catch levels is now judged to be greater than in 2001, when an increase or decline under current catches were considered equally likely.

**RECENT MANAGEMENT ADVICE:** CCSBT agreed to the following national catch limits for 2004-2005: Japan 6,065 t, Australia 5,265 t, Republic of Korea 1,140 t, Chinese Taipei 1,140 t and New Zealand 420 t. An additional catch limit of 900 t has also been implemented for cooperating non-members, including 50 t for the Philippines (which was recently admitted as a cooperating non-member) and 800 t for Indonesia. Members committed themselves to a strong reduction of catches in 2007. While the CCSBT established in May 1994 that it has competence on the management of this species as a whole in the three oceans, ICCAT is responsible for the management of southern bluefin tuna in the Atlantic Ocean.

**STECF COMMENTS:** STECF remarks that no new information is available for this species in the last year and even ICCAT/SCRS was not able to recover any data, because the CCSBT meeting was held in October 2006. The new CCSBT report was not available also at the time of the STECF meeting. A more focused attention on this species should be desirable, according to the poor status of this stock.

### 11.8. Seerfish (Scomberomorus spp., Spanish mackerels)

**FISHERIES:** The Indian Ocean fisheries catch about 15,000 to 20,000 tonnes of seerfish annually. These species are primarily taken by artisanal gears in coastal waters and are an important source of proteins for several coastal communities. Seerfish are not taken by EU vessels in significant quantities, but data have not reported to IOTC in recent years. No updated data are available

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC.
PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for these stocks.

STOCK STATUS: Unknown. Nothing is mentioned about these species in the last two IOTC report.

RECENT MANAGEMENT ADVICE: IOTC have not provided management recommendations.

STECF COMMENTS: STECF notes that the most recent information for this stock relates to the year 2002. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2004 (SEC (2004) 372).

12. Highly migratory fish (North-Eastern, Eastern, Southern and Western-Central Pacific)

As a general remark, the management of the highly migratory species in the Pacific Ocean remains unclear. The Inter-American Tropical Tuna Commission (IATTC), an FAO body, is managing the stocks in the Eastern Pacific Ocean since many years; the Western Central Pacific Fishery Commission (WCPFC) is managing the stocks in the Western and Central Pacific Ocean; the Southern Pacific Communities (SPC) is also playing a role in managing some stocks in the Southern Pacific Ocean while, more recently, the International Scientific Committee for Tuna and Tuna-like species in the North Pacific Ocean (ISC) is trying to provide management to the migratory tuna and tuna-like species in the Northern Pacific Ocean. Other smaller bodies are also trying to play a role. These Commissions faces a number of difficulties, some of which are related to the number of States taking part in these fisheries and the huge marine area concerned. Despite improvements, statistical tables are still not available for all fisheries and particularly for several artisanal fisheries, a very important component for most countries in that area. Under this situation, the management of several stocks is quite uncertain and undefined, without specific boundaries, with several overlapping of competeces and showing data sometimes having contrasting numbers. Many smaller tuna and tuna-like species are not currently monitored or assessed by these Commissions and data on those species are not available.

12.1. Pacific Bluefin tuna (Thunnus orientalis)

FISHERIES: Pacific bluefin tuna is primarily exploited by Japanese, Korean, Taiwanese, Mexican and US fleets. The total catches of bluefin have fluctuated considerably during the last 50 years. The presence of consecutive years of above-average catches (mid-1950s to mid-1960s) and below-average catches (early 1980s to early 1990s) could be due to consecutive years of above-average and below average recruitment. Total catch between 1976 and 2005 ranged between 31,376 t to 6,721 t in the WPO and from 32,482 t to 8,376 t in the EPO. Catches in the WPO are showing a decling trend since 2000 and accounted 12,771 t in 2004, while provisional catches for 2005 are about 13,336 t. The trend in catches in the EPO is downward since 2000. Preliminary reported total catch in 2005 in the EPO are about 17,881 t, a value 18% lower of the catch in 2004 (21,707 t). No data are available from other areas. In recent years a considerable portion of the purse-seine catch of bluefin has been transported to holding pens, where the fish are held for fattening and later sale as sashimi-grade fish and this activity is now growing. Lesser amounts of bluefin are caught by recreational, gillnet, and longline gear. This stock has never been exploited by EU vessels.
SOURCE OF MANAGEMENT ADVICE: It is unclear which management body is taking care of this species in the Pacific Ocean, but IATTC is providing the management advice for the EPO, while most of the data are provided by the International Scientific Committee for Tuna and Tuna-like species in the North Pacific Ocean (ISC).

PRECAUTIONARY REFERENCE POINTS: None.
STOCK STATUS: Unknown. However, IATTC has calculated various indices of abundance of bluefin in the EPO, but none of these is entirely satisfactory. A preliminary stock assessment was carried out by ISC. A preliminary cohort analysis has indicated that the biomass of the spawning stock was relatively high during the 1960s, decreased during the 1970s and 1980s, and then increased during the 1990s. The recruitment was estimated to be highly variable, with four or five strong cohorts produced during the 1960-1998 period. The results of yield-per-recruit and cohort analyses indicate that greater catches could be obtained if the catches of age-0 and age-1 fish were reduced or eliminated. The projections indicated that, provided fishing mortality remains at recent levels, a strong year-class in 2001 would maintain spawning stock biomass above recent levels until 2010.

RECENT MANAGEMENT ADVICE: Noting the uncertainty in the assessments, the ISC in 2006 agreed that bluefin tuna fishing mortality not be increased above recent levels as a precautionary measure.

STECF COMMENTS: STECF underlines the need to have a clear management responsibility for this species attributed to a single Fishery Commission or to a Joint Expert Group, to avoid the possible overlapping of competences and advice.

12.2. Eastern Pacific Yellowfin (Thunnus albacares)
FISHERIES: In term of yield, yellowfin is the most important tuna species in the area. Yellowfin tuna is primarily caught by purse seine; catches of longline and live bait boat are generally low. An important proportion of the yellowfin catch is harvested in association with dolphins. This association is quite unique in the world, but yellowfin tuna is also caught in free schools and increasingly under FADs. Some EU vessels are active in this fishery. The average annual retained catch of yellowfin in the EPO during 1988-2002 was 278,000 t. Record catches have been taken during 2001-2003, following a very strong recruitment in 1998-2000. The preliminary estimate of the total catch of yellowfin in 2005 amounted to 280,879 t, which represents a decrease of 3.5% over the previous year. Total retained catch in 2005 by purse-seiners was 268,156 t (plus 3,101 t discarded), while total catch from longlines was 3,853 t; 2,067 t by baitboats and additional 3,702 t by other gear.

SOURCE OF MANAGEMENT ADVICE: The advisory body is IATTC. Stock assessment was carried out in 2006, by using A-SCALA an age-structured statistical catch-at-length model.

PRECAUTIONARY REFERENCE POINTS: None, but the last assessment proposed the use of spawning stock biomass ratio (SBR).
STOCK STATUS: Since 1984, the yellowfin stock appears at or above MSY (about 280,000 t) under the present fishing pattern. Results suggest that recruitment would have been rather low between 1975 and 1983 and higher between 1984 and 2001. However, these apparent changes in recruitment could be spurious and due to changes in catchability, an increase in fishing efficiency and fishing area which are not taken into account in the modelling assumptions. The biomass has further declined in 2003, but 2004 data are less defined. This stock appears close to full exploitation, but previous projections indicate that the high catches and high F of 2001, 2002 and 2003 are not sustainable. A sensitivity analysis using a stock recruitment relation provided a
plausible scenario which estimated fishing mortality greater than the MSY level. However, uncertainty about the last assessment still remains strong. According to the most recent assessment, the status of this stocks is still undefined, because some assumptions are more pessimistic, indicating that current biomass is well below of the level corresponding to the AMSY for most of the model period. But, even in 2006, the AMSY calculations indicate that, theoretically, at least catches could be greatly increased if the fishing effort were directed toward longlining and purse-seine sets on yellowfin associated with dolphins. The 2006 analysis indicates that strong cohorts entered the fishery in 1998-2000, and that these cohorts increased the size of the spawning stock during 1999-2001. However, they have now moved through the population, so the size of the spawning stock decreased during 2002-2005.

**RECENT MANAGEMENT ADVICE**: Since 1962 IATTC has implemented a TAC, which can be increased under the supervision of the IATTC Director. In 2003, IATTC recommended that current fishing mortality should not be allowed to increase and that closed season for selected gear might help substantially the recovery of the stock. In 2004 IATTC (Res. C-04-09) called for a 6-week closure in the fourth quarter for purse seine fishery and longline catches do not exceed 2001 levels.

**STECF COMMENTS**: STECF agrees in general with IATTC recommendation but points out the need to find a better agreement about the type of data and hypothesis to be used in the models, in order to reduce uncertainty.

### 12.3. Western and Central Pacific Yellowfin (*Thunnus albacares*)

**FISHERIES**: The development of this fishery is recent in comparison to many other tuna fisheries. Since 1990, the yellowfin tuna catches in the WCP varied between 309,000 and 462,000 tonnes. Purse seiners harvest about 50%, while longline and pole-and-line fleets comprise 15% and 3% respectively. EU tuna fleets have not been active in the past in this fishery, but this situation could change in the near future. The catches of juvenile yellowfin in the Philippine and Indonesian domestic fisheries have also increased significantly since 1990, with these increases continuing to 2003. The low catch rates observed during 2002 in the purse-seine fishery are considered unusual for an El Nino event. The total catch of WCP yellowfin reached 407,509 t in 2004, one of the lowest for several years, due to a relatively low purse-seine catch. In 2004 the purse-seine catch was 179,310 t (43% of the total WCPO), the longline catch was estimated to be 70,757 t, or 17% of the catch by all gears), the pole-and-line fisheries took 12,253 t (3% of the total) while ‘other’ fisheries (largely taken by fisheries in the Philippines and Indonesia) accounted for about 150,000 t (37% of the total). Total catch data in 2005 for the WCP reached 423,468 t (+4% compared to 2004).

**SOURCE OF MANAGEMENT ADVICE**: While there is no specific management body for this species, the WCPFC is providing management advice, supported by the Oceanic Fishery Programme of the Secretariat of the Pacific Community (SPC), but also by the NPC. The primary assessment tool was MULTIFAN-CL (a sophisticated statistical model that takes into account explicitly the spatial heterogeneity and migration patterns by incorporating tagging data). The SA-SWG of SPC had revised all the available data in 2005.

**PRECAUTIONARY REFERENCE POINTS**: None.

**STOCK STATUS**: The fit of the model to the data was good. It was noted that the 2005 assessment was somewhat more pessimistic than 2004. It was recognized that changes in the CPUE weightings were the most influential change, representing a substantial improvement over the previous year. Estimates in catchability trends in the 2004 assessment suggested that a 4%
efficiency increase was nor unreasonable for some fleets. The recruitment strongly increased during the late 1970s and 1980s, then slightly declined during the 1990s. Consequently, the total biomass increased until the early 1990s, but declined since the mid-1990s and revealed a high sensitivity to the standardized effort indices. Fishing mortality rates steadily increased over the time series for the adults and since 1992 for juveniles (important catches are reported on age 0-1 by Indonesia). The MSY under recent recruitment average is 312,200, ranging between 236,000 to 313,000 t, depending on the assumptions on the recruitment levels (i.e., high or low). The more pessimistic results of the 2005 assessment indicate that fishing mortality at current levels will probably move the yellowfin stock to an overfishing state. However, the assessment also indicates that the equatorial regions are likely to be fully or overexploited, while the temperate regions are likely to be lightly exploited. The 2006 and 2005 assessment results were consistent; the recent trajectory of the stock status reference points indicates that the stock has been declining rapidly in recent years, and fishing mortality at current levels will probably move the yellowfin stock into an overfished state.

RECENT MANAGEMENT ADVICE: SPC recommends that catches should be reduced to be sustainable on the long term, and further increases in fishing mortality (particularly on juvenile specimens) in the WCPO should be avoided. Spatial patterns of fishing impact in the WCPO have been increasing over recent years and more urgent management actions may be required for this area.

WCPFC, in 2005, established new TAC stratified by gear type, limiting the purse-seine effort to 2001-2004 average levels, with a potential 15% increase in longline fishing effort over 2001-2003 average levels. This opinion was also revised by ISC. The Scientific Committee of the WCPFC in 2006 reiterated the SPC advices and recommended a 10% reduction in fishing mortality from the average levels from 2001-2004 and even further reductions to maintain equilibrium average biomass at levels above BMSY.

STECF COMMENTS: STECF supports the management advice made by SPC. At the same time, STECF also remarks the different management approach followed by the WCPFC, noting that these measures appear partially contradictory with the other advices. STECF underlines the need to have a clear management responsibility for this species attributed to a single Fishery Commission or to a Joint Expert Group, to avoid the already existing overlapping of advice and at least two stock assessments for the areas covered by each Commission.

12.4. Pacific Bigeye (Thunnus obesus)

FISHERIES: The stock structure of bigeye stock remains unclear and one single Pacific stock is currently assumed. Overall, the catches in both the EPO and WCPO have increased, but with considerable fluctuation. The catches in the EPO reached 105 thousand t in 1986, and have fluctuated between about 73 and 148 thousand t since then, with the greatest reported catch in 2000. In the WCPO the catches of bigeye increased to more than 77 thousand t during the late 1970s, decreased during the 1980s, and then increased, with lesser fluctuations, until 1999, when the catches reached more than 118 thousand t. The greatest reported catch of bigeye in the WCPO, about 122 thousand t, occurred in 2002. Total catches in WCP in 2005 accounted for 163,419 t. A preliminary estimate of the total catch in the EPO in 2005 is 110,593 t (including 1,894 t of discards), a value very close to that of 2004. The total bigeye tuna catch in the WCPO for 2004 was 116,529 t, with an increase of 3% over the previous year. This represents 52% of the total Pacific catch in the same year (225,943). Available statistics indicate that 67% of the WCPO catch was taken by longline, and most of the remainder by purse seine (20%) and by the
domestic fisheries of Indonesia and Philippines and others (13%). Longliners account for the major part of the catches, but only those of Japan are reported, so that longline catches are probably under-reported to IATTC. The purse seine fisheries, including EU vessels, are now catching large amounts of small bigeye under floating and drifting objects (FADs). It was noted that while trends in catch in each region are very similar, the catch by fleet was markedly different. Total catch of small bigeye is often mixed with small yellowfin tuna and is therefore uncertain.

**SOURCE OF MANAGEMENT ADVICE**: While there is no specific advisory body for this species, the IATTC, the WCPTC, the NPC and SPC are conducting assessments for this stock. The SA-SWG of SPC had revised all the available data in 2005 and carried out a new stock assessment. So was done by IATTC in 2006 by using the A-SCALA method.

**PRECAUTIONARY REFERENCE POINTS**: No precautionary reference points have been proposed for this stock.

**STOCK STATUS**: IATTC have undertaken a stock assessment on the eastern component of Pacific bigeye in 2002 and 2003, 2005 and 2006. Several inputs into the latest assessment differ from that for 2004. Recent catch and effort data have been incorporated. Earlier data have been updated. The biomass of bigeye in the EPO has been declining since 1987, initially because of the impact of longline fishing and, since 1993, purse seining, which now has a greater impact. The decline was interrupted by strong recruitment during 1995-1998, which produced a peak biomass in 2000, and (with less certainty) strong recruitment during 2004 and 2005. At the beginning of 2006, the spawning biomass of bigeye tuna in the EPO was recovering from the lowest level previously seen. At that time the spawning biomass ratio (SBR) was estimated to be slightly less than the level corresponding to the AMSY (SBR_{AMSY}). Estimates of the average SBR projected to occur during 2006-2011 indicate that the SBR is likely to increase to the level corresponding to the AMSY and subsequently continue its decline unless fishing mortality is greatly reduced. Recent fishing mortality levels are nearly 50% greater than those corresponding to the AMSY. As a consequence, if fishing effort is not reduced, total biomass and spawning biomass will eventually decline to levels at least as low as that observed in 2004. The current status and future projections are considerably more pessimistic in terms of stock status if a stock-recruitment relationship ($h = 0.75$) exists. These conclusions are robust to all but one alternative model and data formulations considered in this and previous analyses.

SPC carried out a comprehensive stock assessment in 2005 for the WCPO. All analyses considered suggest that at the start of 2005 the spawning biomass in the EPO was below the level corresponding to the A_{MSY}. Furthermore, under all scenario considered, fishing mortality is well above the level corresponding to AMSY. According to the recent assessment, the SBR is likely to reach an historic low level in 2007-2008 and remain below the AMSY for many years unless fishing mortality is greatly reduced or recruitment is greater than the average level for a number of years. In contrast, at the WCPO the current fishing mortality was estimated to be above to MSY level (93,300 t) and the current biomass to be above the MSY level. However, the FPOW were more pessimistic.

**RECENT MANAGEMENT ADVICE**: IATTC concluded that no drastic management actions are needed, but a reduction in fishing effort under floating objects (FADs) of 2 to 3 months would be precautionary. IATTC recognized that the recent measures on size limits appear inadequate. In 2004 IATTC (Res. C-04-09) called for a 6-week closure in the fourth quarter for purse seine fishery and longline catches do not exceed 2001 levels. If the effort is reduced to levels corresponding to AMSY, the stock will rebuild to SBR_{AMSY} by 2007 and remain above that until 2011.
Specific catch levels have been adopted by IATTC for the longline fishery in the Eastern Pacific for China (2,639 t), Japan (34,076), Korea (12,576) and Chinese Taipei (7,953), while other parties shall keep their annual longline catch will not exceed their 2001 catch level. Monthly data must be provided by all contracting parties. Taking all above information into consideration SPC recommended that the effort level, in the most optimistic case, should keep the catch level at 5% less than the average 2001-2003 level, because the maintenance of current level of fishing mortality will move the stock to an overfished state. This likelihood is increased should future recruitment fall back to average levels. Further decrease in total catch and effort is likely to be necessary in order to maintain the stock at a sustainable level. Spatial patterns of fishing impact in the WCPO have been increasing over recent years and more urgent management actions may be required for this area.

WCPFC, in 2005, established new TAC stratified by gear type, limiting the purse-seine effort to 2001-2004 average levels, with a potential 15% increase in longline fishing effort over 2001-2003 average levels. The Scientific Committee of the WCPFC suggested further reduction of the fishing mortality to maintain equilibrium average biomass above BMSY, along with a more pessimistic overview of this stock.

**STECF COMMENTS:** STECF agrees in general with the recommendation of the IATTC and SPC, and acknowledges the recent comprehensive stock assessment, sharing its conclusions. At the same time, STECF also remarks the different management approach followed by the WCPFC, noting that these measures appears partially contradictory with the other advices. STECF underlines the need to have a clear management responsibility for this species attributed to a single Fishery Commission or to a Joint Expert Group, to avoid the already existing overlapping of advice and at least two stock assessments for the areas covered by each Commission.

### 12.5. Eastern Pacific Skipjack (*Katsuwonus pelamis)*

**FISHERIES:** Catches have varied roughly between 52,000 and 302,000 t over the time series. During 1988-2005 the annual retained catch of skipjack from the EPO averaged 150,000 t. The preliminary estimate of the total catch of skipjack in 2005 is 282,152 t (including 18,946 t of discards), 30% higher than the 2004 catch. Fishing zones of skipjack have also shown a great variability during the same period. Part of this variability is due to the fact that yellowfin is often preferred to skipjack in the area. Skipjack is primarily caught by purse seiners from Mexican and Equadorian fleets along with the EU and other South American countries.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IATTC. A stock assessment was carried out in 2006, by using the A-SCALA model.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** This stock has been assessed in 2001, 2002, 2004 and 2004, but these assessments are still considered preliminary since they gave dissimilar results. The results of the 2006 assessment look more reasonable, possibly due to the improvement of data. One main point is that skipjack recruitment is highly variable in this area and induces fluctuations in the biomass, so that it is difficult to estimate the status of this stock with A-SCALA. New data have been included in 2006 trials, showing that strong cohorts entered into the fishery in 2002-2003, increasing both the biomass and the catches in 2003. The results of a new analysis in 2006, in which an index of relative abundance was developed from the ratio of skipjack to bigeye tuna in the floating object fishery, were consistent with previous assessments, and suggest that there is no
management concern for skipjack tuna, apart from the associated catch of bigeye in floating-object sets. However, the results are still very uncertain.

RECENT MANAGEMENT ADVICE: IATTC has given no management advice.

STECF COMMENTS: No comment.

12.6. Western and central Pacific skipjack (*Katsuwonus pelamis*)

FISHERIES: Skipjack tuna catches increased steadily since 1970, more than doubling during the 1980s. The yields were relatively stable during the 1990s and ranged from 870,000 to 1,300,000 t. A Japanese pole-and-line fleet previously dominated the fishery, which is now dominated by purse seiners. Over the past 5 years, the catch has been at record high levels exceeding 1.2 Million t annually and accounting for more than 65% of the annual catch of principal tuna species landed from the region. In 2004, an estimated catch of about 1,369,838 t of skipjack was landed. 78% of the catch was taken by purse seiners, 18% by pole and line and 4% by other gear types. The geographic distribution of fishing activities shows some recent changes. Catches had reached the highest record for this stock in 2005, with 1,443,127 t.

SOURCE OF MANAGEMENT ADVICE: The WCPFC is the management body, supported by the Oceanic Fishery Programme of the Secretariat of the Pacific Community (SPC) A stock assessment was performed in 2005 (using also MULTIFAN-CL). The SA-SWG of SPC had revised all the available data in 2005.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The fit of the model to the data was good. The results displayed a strong increase in the purse seine catchability, while this of pole-and-line decreased. The recruitment has been higher since the mid-1980s, which seem to be related to the higher frequency of *El Niño* events. Recent recruitment is estimated to be exceptionally high. Biomass increased firstly in the mid-1980s in response to recruitment, and current biomass is well above biomass that would produce MSY. Fishing mortality is lower for juveniles and has increased for both adults and juveniles until 1997 and decreased since then due to increase in the stock biomass, reaching a modest level of approximately 0.20-0.25 per year. Fishing mortality for adults vary considerably between regions The maximum equilibrium yield varied between 620,000 and 950,000 t, depending on the assumptions made about recruitment levels. Overall, the results suggest that is currently exploited at a modest level relative to its biological potential. Continued catches at the 1,200,000 t level is sustainable with continued high levels of recruitment which are believed to be determined principally by environmental factors rather than a strong spawner-recruit relationship. In conclusion, stock size and fishery performance are firstly driven by recruitment variability, which is influenced by environmental conditions (*El Niño*). Even if no assessment was carried out in 2006, the WCPFC reiterates its positive outlook on the stock status of this species.

RECENT MANAGEMENT ADVICE: Any increase in purse seine catches of skipjack may results in a corresponding increase in fishing mortality for yellowfin and bigeye tuna. WCPFC, in 2005, had decided some management measures, like a limitation of the fishing efforts by purse-seiners to the 2004 or to the average 2001-2004 levels, a control of FAD sets, observers on board on vessels operating between 20°N and 20°S and a catch limit by longline fishery to the 2004 or to the average 2001-2004 levels.

STECF COMMENTS: Besides of the steady positive outlook of this stock, STECF is concerned either by the very high level of catch in recent years and the difficulties in monitoring the various fleets concerned. Due to the very high relevance of this stock in terms of fishery, economy,
proteins and social benefits and, at the same time, its role in marine ecosystem, a very high level of removals over many years might result in major undesired and unpredictable changes in various sectors, including the pelagic ecosystem. Better data should be provided to the relevant management body, with the purpose to improve the stock assessment and the consequent management decisions.

12.7. Northern Pacific Albacore (*Thunnus alalunga*)

**FISHERIES:** This stock is fished by longliners (from Taiwan, Japan and USA) and by surface fleets (USA). EU vessels have never been reported fishing on this stock. Total catches of albacore from the North Pacific peaked in the early 1970s at over 100,000 t per year, and then declined. Catches recovered during the 1990s, and reached a peak of 119,604 t in 1999. In 2003 the catches were on the order of 98,500 t, a 5% decrease over the 2002 catch. The catch in 2004 was 86,107 mt, which is 6% below the 2000-2004 average. Preliminary catch estimates in EPO in 2005 were 21,729 t, a value 44% lower than catch in 2004 in the same area.

**SOURCE OF MANAGEMENT ADVICE:** While there is no well-defined advisory body for this species, the US National Marine Fisheries Service (NMFS) monitors the stock. The IATTC is also taking care of this stock. A stock assessment was carried out in 2004 using the age-structuring model VPA-2BOX. In 2005, even the ISC provided its advice on this stock.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** According to the 2004 assessment, the biomass was estimated in 429,000 t (ranging from 329,000 to 563,000 t), while the SSB was estimated in 165,000 t. The forecast of future SSB are affected by the decline of recruitment that, coupled with a growing fishing mortality, may be cause for concern of the stock status. Future conditions are less well known, but if F continues at assumed levels, it is unlikely that SSB will rebuild to SSB_{MSY} levels within 5-year time horizon. Another stock assessment is planned in 2006 by ISC.

**RECENT MANAGEMENT ADVICE:** The 19th North Pacific Albacore Workshop in 2004 provided several management options to be further discussed and the 2005 meeting of the International Scientific Committee (ISC) gave the advice that future SSB can be maintained at or above the minimum “observed” SSB (43,000 t in 1977) with F’s slightly higher than the current F range. Due to uncertainty caused low reliability of “observed” SSB, ISC advice that current F should maintain SSB at or above the 10th percentile threshold but a modest reduction of F may be needed to maintain SSB at or above the 25th percentile threshold. IATTC had revised this advice, and suggested that biomass may decline if current levels of fishing mortality persist. WCPFC, in 2005, adopted some management decisions, like limiting the fishing effort north of the equator at the current level, also supporting a better data collection in the area.

**STECF COMMENTS:** Besides the lack of any management advice, STECF notes that fishing mortality has markedly increased in the last two years. STECF underlines the need to have a clear management responsibility for this species attributed to a single Fishery Commission or to a Joint Expert Group, to avoid the possible overlapping of competences and advice.

12.8. Southern Pacific Albacore (*Thunnus alalunga*)

**FISHERIES:** The development of this fishery is relatively recent in comparison to many other tuna fisheries. Catches from Pacific Island Country have increased in recent years, accounted for 50% of the total longline catches in 2002. Total catch in 2004 was about 55,000 t less than the peak of 62,000 t obtained in 2002. Since driftnet fishery ceased in 1991, most catches came from
New Zealand and USA troll fleet south of 30°S and by longline fleets that operated in waters 10°-50° S. The catches reported in WCP in 2005 accounted for 115,353 t.

**SOURCE OF MANAGEMENT ADVICE:** While there is no specific advisory body for this species the Oceanic Fishery Programme of the Secretariat of the Pacific Community (SPC) has performed a comprehensive assessment of this stock in 2005 (using also MULTIFAN-CL) supported by the WCPFC.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The 2005 stock assessment, carried out by using the MFCL model by the SA-SWG of SPC, was based on analytical conditions that differed from those of the 2003 assessment, taking into account 23 fisheries. An estimation of catch trends indicates that total catches were relatively stable over the period 1960 to 1995, but that they are increasing in recent years. The more recent investigation revealed that the main component of the longline exploitable biomass resides in a relatively small area, suggesting a modest stock size. According to the model outputs, this stock appears not overexploited. However, there remains considerable uncertainty about the overall level of stock size. The yield analysis indicates that fishing mortality (effort) could be greatly increased from the 2000-2002 average. The stock assessment also indicates that substantially higher long-term sustainable yields could be taken from the stock; MSY is estimated to be about 180,000 mt, approximately three times the level of recent annual catches (about 55,000 mt). However, given the current distribution of fishing effort, effort by all fisheries would have to increase by 19-fold to achieve the MSY (i.e. FMSY). The resulting reduction in biomass (to BMSY) would result in a reduction in catch rates in all fisheries, although the magnitude of the decline in vulnerable biomass and the corresponding reduction in CPUE would vary between fisheries.

**RECENT MANAGEMENT ADVICE:** No management advice has been specifically provided for this stock by the SA-SWG of SPC, but the results of the stock assessment appear much more optimistic than the previous indication to keep the catch level at 23% less than the average 2001-2003. Current catch levels from the South Pacific albacore appear to be sustainable and yield analysis suggests increases in fishing mortality and yields are possible. However, given the age-specific targeting of the longline fleets, any significant increase in effort would reduce CPUE to low levels with only moderate increases on yield. CPUE reductions may be more severe in areas of locally concentrated fishing effort. According to the most recent CPC review in 2006, this conclusion does not adequately address the management issues faced by the domestic longline fleets in PICTs. The PICTs fisheries principally catch larger, older albacore, which represent a relatively small proportion (about 30%) of the total adult biomass of albacore. At a regional level, increases in fishing effort in the PICT domestic longline fisheries will result in declines in CPUE due to a decline in exploitable biomass. At a local scale, very high levels of fishing effort appear to be capable of causing localized depletion of albacore tuna. This is principally an issue for domestic longline fleets where fishing effort is concentrated in a relatively small area, largely due to operational constraints of the fleet. Indications from the Fiji longline fishery is that, on average, catch rates may be reduced by about 20% at high levels of fishing effort.

WCPFC, in 2005, had adopted some management measures, like the limitation on the number of fishing vessels to the current level or recent historical (2000-2004) levels.

**STECF COMMENTS:** STECF notes that the most recent information does not improve the poor understanding of the status of this stock and indicates that, according to the latest analysis, increasing the effort in albacore concentration area results in a sudden reduction of CPUEs.
12.9. Black skipjack (*Euthynnus alletteratus*)

**FISHERIES:** Total catch in the EPO ranged from about 100 to 4250 t, with a peak in 1993. Total catch in 2005 was about 3,360 t, about 58% higher than the previous year. Almost all the catches are provided by purse-seiners (1,446 t retained and 1,909 t discarded).

**SOURCE OF MANAGEMENT ADVICE:** It is unclear which management body is taking care of this species in the Pacific Ocean, but IATTC is providing the management for the EPO.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** no data.

**RECENT MANAGEMENT ADVICE:** No management advice.

**STECF COMMENTS:** no comments.

12.10. Pacific bonito (*Sarda spp.*)

**FISHERIES:** Total catch in the EPO ranged from about 26 to 14,200 t, with a peak in 1990. Total catch in 2005 was about 331 t, more than 4 times higher than the previous year. Almost all the catches are provided by purse-seiners (313 t retained and 18 t discarded).

**SOURCE OF MANAGEMENT ADVICE:** It is unclear which management body is taking care of this species in the Pacific Ocean, but IATTC is providing the management for the EPO.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** no data.

**RECENT MANAGEMENT ADVICE:** No management advice.

**STECF COMMENTS:** no comments.

12.11. Pacific swordfish (*Xiphias gladius*)

**FISHERIES:** Swordfish occur throughout the Pacific Ocean between about 50°N and 50°S. They are caught mostly by the longline fisheries of Far East and Western Hemisphere nations. Lesser amounts are taken by gillnet and harpoon fisheries. They are seldom caught by recreational fishermen. During the most recent three-year period the greatest catches in the EPO have been taken by vessels of Spain, Chile, and Japan, which together harvested about 72% of the total swordfish catch taken in the region. Of these three, Spain and Chile have fisheries that target swordfish, while swordfish taken in the Japanese fishery are incidental catches in a fishery that predominately targets bigeye tuna. The average annual catch during 1998-2002 for the northern region has been about 4,800 t, and for the southern region about 9,100 t. Catches in the southern region have doubled during this period, reaching 13,300 t in 2002, which exceeded the previously-recorded high catch of 12,400 t reported in 1991. Swordfish are caught in the EPO with large-scale and artisanal longline gear, gillnets, harpoons, and occasionally with recreational gear. The average annual longline catch of swordfish during 1990-2004 was 10 thousand t, but during 2001-2004 was about 16 thousand t. It is not clear whether this is due to increasing effort directed toward swordfish. Total swordfish catches in the EPO reached 19,726 tons in 2002, decreasing to 15,345 t in 2004 (14,854 tons by longlines, 488 by other gear and 3 t discarded), while preliminary and incomplete catch reports in 2005 account to only 2,377 in total. Total swordfish catch in WPO were 19,431 t in 2000, then dropping to 12,707 t in 2004 and 1,965 t in 2005 (but this two last data sets are considered provisional and incomplete by ISC).
SOURCE OF MANAGEMENT ADVICE: the advisory bodies are the IATTC, the ISC, the WCPFC and the SPC, without a clear distinction of competencies.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: New analyses of the North Pacific swordfish stock CPUEs based on data from Japanese longline vessels now show declining trends mainly driven by declines in CPUE in the northwest portion of the study area (north of 10° N and west of 170° E). The cause of the decline is not known at present. It is unclear whether observed changes in indices are a result of fluctuations in abundance, or the preliminary nature of both CPUE and MULTIFAN-CL analyses. It is clear that the fishery should be monitored closely. The CPUEs of longline fisheries in the northern and southern regions of the EPO and trends in relative abundance obtained from them do not indicate declining abundances. It appears that swordfish are not overfished in the northern and southern regions of the EPO. It is not expected that further increases in the catch levels observed in recent years would be sustainable. No attempts have been made to estimate the level of AMSY that could be obtained by each fishery operating exclusively. However, it is likely that the fisheries that capture younger fish (e.g. the longline fisheries of Chile, Japan, and Spain) are less efficient at maximizing yield.

In the WCP the model predicts that total biomass in 2004 was between 31% and 69% of the unfished level, and that spawning stock biomass in 2004 was between 15% and 65% of the unfished level. Most projections undertaken using 2004 effort levels predicted further declines in biomass over the next five years. Model uncertainty and estimated variability in the stock-recruitment relationship undermined the usefulness of the MSY-related reference points. However, in so far as these reference points have been calculated, the majority of estimates from the plausible model ensemble suggest that total biomass and spawning biomass are probably above levels that would sustain MSY and fishing mortality is probably below FMSY. Nevertheless, the results also indicate the possibility that the stock may currently be in an overfished state and that overfishing may be occurring.

RECENT MANAGEMENT ADVICE: IATTC has no management recommendations, while ISC remarked the need to improve the data with those of some relevant fisheries and incorporate some important biological parameters before the next assessment, with the purpose to provide a reliable advice. The Scientific Committee of the WCPFC recommended a precautionary measure that there be no increase in fishing mortality on this stock, as this is likely to move the stock towards an overfished state.

STECF COMMENTS: STECF is concerned about the possible effects of growing international markets requiring swordfish and the possible consequent increasing of fishing effort target on this species in the Pacific. This fishery should be closely monitored and all the attempt to have an assessment should be encouraged by the various Commissions concerned.

12.12. Pacific Blue Marlin (*Makaira nigricans*)

FISHERY: Blue marlin are taken by longline vessels of many nations that fish for tunas and billfishes between about 50°N and 50°S. Lesser amounts are taken by recreational fisheries and by various commercial surface fisheries. The fisheries in the EPO have historically captured about 10 to 18% of the total harvest of blue marlin from the Pacific Ocean (42,000 tons in 2002), with captures in the most recent 5-year period averaging about 10% of the total harvest. Preliminary reported total catch in the EPO in 2005 was 2,320 t, while in the same area catches in 2004 were about 3,188 t.
SOURCE OF MANAGEMENT ADVICE: The advisory body is IATTC.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: A recent analysis, using MULTIFAN-CL, was conducted to assess the blue marlin stocks in the Pacific Ocean and to evaluate the efficacy of habitat-based standardization of longline effort. There is considerable uncertainty regarding the levels of fishing effort that would produce the $AMSY$. However, it was determined that blue marlin in the Pacific Ocean are close to fully exploited.

RECENT MANAGEMENT ADVICE: No management advice.

STECF COMMENTS: STECF remarks that relevant quantities of billfish caught in the EPO are still not attributed to single species, while many catches in other areas are not reported at all, affecting the understanding of this stock.

12.13. Pacific Striped Marlin (Tetrapturus audax)

FISHERY: Striped marlin occurs throughout the Pacific Ocean between about 45°N and 45°S. They are caught mostly by the longline fisheries of Far East and Western Hemisphere nations. Lesser amounts are caught by recreational, gillnet, and other fisheries. Catches in the WPO showed an increasing trend till 1970, then a decreasing trend till recent years. Catches in WPO were 5,998 t in 2000, while incomplete reported catches dropped to 2,225 t in 2004 and 492 t in 2005. During recent years the greatest catches in the eastern Pacific Ocean (EPO) have been taken by fisheries of Costa Rica, Japan, and the Republic of Korea. Landings of striped marlin decreased in the EPO from 1990-1991 through 1998, and this decline has continued, with an average annual catch during 2000 to 2005 of about 1750 t (ranging between about 827 and 2,235 tons). The preliminary reported catches in the EPO in 2005 account only to 827 t, the lowest historical catch in this area.

SOURCE OF MANAGEMENT ADVICE: The advisory body is IATTC, but also ISC and the WCPFC are now dealing with this species.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been proposed for this stock.

STOCK STATUS: The stock structure of striped marlin in the Pacific Ocean is not well known. Analyses of stock status made using two production models, taking into account the time period when billfish were targeted by longline fishing in the EPO, were considered the most plausible. A Pella-Tomlinson model yielded estimates of the average maximum sustained yield ($AMSY$) in the range of 3,700 to 4,100 t, with a current biomass to be about 47% of the unfished biomass. The current biomass is estimated to be greater than the biomass that would produce the $AMSY$. An analysis, using the Deriso-Schnute delay–difference model, yielded estimates of $AMSY$ in the range of 8,700 to 9,200 t, with current biomass greater than that needed to produce the $AMSY$ and about 70% of the size of the unexploited biomass. The stock(s) of striped marlin in the EPO are apparently in good condition, with current and near-term anticipated fishing effort less than that required to produce the AMSY. The most recent analysis carried out by ISC indicates that the biomass has been reduced. The results of these assessments are considered provisional. According to WCPFC, several of the plausible model scenarios investigated indicate that current levels of fishing mortality may approximate or exceed the reference level $F_{MSY}$ and current spawning biomass levels may approximate or be below the biomass based reference point $B_{MSY}$.

RECENT MANAGEMENT ADVICE: No management advice have been provided by IATTC which still stated that this stock is probably in good condition, at or above the AMSY level. On
the contrary, the ISC recommended that fishing mortality for striped marlin in the north Pacific not be permitted to exceed current levels. The same measure was recommended by the Scientific Committee of the WCPFC for the area covered by the Commission.

**STECF COMMENTS**: STECF is skeptical about the contrasting advices provided by the two Commissions concerned, because both are based on very incomplete data and provisional results. STECF remarks that relevant quantities of billfish caught in the EPO are still not attributed to single species, while many catches in other areas are not reported at all and these facts undermine the understanding of the status of the various stocks..

### 12.14. Pacific Black Marlin (*Makaira indica*)

**FISHERY**: The Pacific Black Marlin is a by-catch mostly from the long-line fishery, but is a target species in some artisanal and recreational fisheries. Catches reached a peak of about 905 tons in 1973, decreasing in the following years. Total catch in the EPO from 1976 to 2005 ranged between 111 t to 621 t; the average catch in the period between 2000 to 2005 was 207 t. The preliminary total catch in the EPO for 2005 is 210 t, a value about 90% higher than the 2004 catch.

**SOURCE OF MANAGEMENT ADVICE**: The advisory body is IATTC.

**PRECAUTIONARY REFERENCE POINTS**: No precautionary reference points have been proposed for this stock.

**STOCK STATUS**: No recent stock assessments have been made for this species, although there are some data presented in the IATTC Bulletin series published jointly by scientists of the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan and the IATTC that show trends in catches, effort, and CPUEs.

**RECENT MANAGEMENT ADVICE**: No management advice.

**STECF COMMENTS**: STECF remarks that relevant quantities of billfish caught in the EPO are still not attributed to single species and this fact undermine the understanding of the status of the various stocks, while many catches in other areas are not reported at all, affecting the understanding of this stock..

### 12.15. Pacific Shortbill Spearfish (*Tetrapturus angustirostris*)

**FISHERY**: The shortbill spearfish is occasionally taken as a by-catch in various fisheries or is a target species in some artisanal or recreational fisheries. Reported catches were growing since 1994, reaching a peak of 304 tons in 2001. But the most recent five years are showing a general declining trend. Preliminary catch estimate in 2005 is only 12 tons, a value representing only 6.4% of the previous year catch in the same area.

**SOURCE OF MANAGEMENT ADVICE**: The advisory body is IATTC.

**PRECAUTIONARY REFERENCE POINTS**: No precautionary reference points have been proposed for this stock.

**STOCK STATUS**: No recent stock assessments have been made for this species, although there are some data presented in the IATTC Bulletin series published jointly by scientists of the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan and the IATTC that show trends in catches, effort, and CPUEs.

**RECENT MANAGEMENT ADVICE**: No management advice.

**STECF COMMENTS**: STECF remarks that relevant quantities of billfish caught in the EPO are still not attributed to single species and this fact undermine the understanding of the status of the
various stocks, while many catches in other areas are not reported at all, affecting the understanding of this stock..

12.16. Indo-Pacific Sailfish (*Istiophorus platypterus*)

**FISHERY:** Indo-Pacific sailfish is not uncommon among longline catches in the Pacific Ocean. Reported catches are very fluctuant, reaching a peak of 2,303 tons in 1993. Between 1997 to 2002 catches in the EPO ranged between 1,245 to 2,083 tons. Preliminary estimates in 2005 report about 614 tons.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IATTC.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** No recent stock assessments have been made for this species, although there are some data presented in the IATTC Bulletin series published jointly by scientists of the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan and the IATTC that show trends in catches, effort, and CPUEs..

**RECENT MANAGEMENT ADVICE:** No management advice.

**STECF COMMENTS:** STECF remarks that relevant quantities of billfish caught in the EPO are still not attributed to single species and this fact undermine the understanding of the status of the various stocks.

13. **Resources in the Antarctic**

STECF Resources in the Antarctic are managed under a convention administered by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). 14 CCAMLR member countries participate in the fisheries (Australia, Chile, France, Japan, Republic of Korea, New Zealand, Poland, Russia, South Africa, Spain, Ukraine, UK, USA and Uruguay). The review of Antarctic resources, below, is based on CCAMLR (Report of the Scientific Committee 2006; www.ccamlr.org, publications).

13.1. **Toothfish (*Dissostichus* spp.)**

The total landings of toothfish in the CCAMLR Convention Area during the 2005/06 season were 13,704 t (16,250 in 2004/5). Catches outside the Convention Area were 8,048 t, compared with 12,847 t in the previous year. The estimated unreported catch for all subareas and divisions in the Convention Area was 3,080 t. With the exception of exploratory fisheries, toothfish are exploited under the conservation measures in two main areas (Subareas 48.3 and 58.5.2):

13.1.1. **Patagonian toothfish (*Dissostichus eleginoides*) in Subarea 48.3**

**FISHERIES:** The total catch of *Dissostichus eleginoides* in the Subarea 48.3 in 2005/2006 was 3,534 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the CCAMLR. The assessment is based on an integrated assessment (CASAL) that uses catch at length of two fleets, CPUE and tagging data. CASAL model structure and assumptions are detailed in the WG-FSA Report (2006).
PRECAUTIONARY REFERENCE POINTS: \( SSB_{t+35\text{years}} \geq 50\% \ SSBO \); probability of SSB dropping below 20\% of \( SSBO \) <0.1

STOCK STATUS: The stock in Sub area 48.3 is considered fully exploited. \( SSB_{\text{current}} > 50\% \ SSBO \).

RECENT MANAGEMENT ADVICE: Long-term annual yield of 3,554 t.

STECF COMMENTS: STECF has no comments.

13.1.2. Patagonian toothfish (\textit{Dissostichus eleginoides}) in Subarea 58.5.2

FISHERIES: The total catch of \textit{Dissostichus eleginoides} in Subarea 58.5.2 was 1,825 t for the period from 1 Dec. 2005 until the 5 Oct. 2006 (the season was finished on 30 Nov. 2004).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. The assessment is based on CPUE and assessing long-term annual yields using GYM that incorporate time series of recruitments. This year also an integrated assessment was applied using CASAL for combined sex, single-area, and a three-season model. CASAL model structure and assumptions are detailed in the WG-FSA Report (2006). The results arising from CASAL and GYM are similar when the model structure is similar. The CASAL yield estimate is used for the advice.

PRECAUTIONARY REFERENCE POINTS: \( SSB_{t+35\text{years}} \geq 50\% \ SSBO \); probability of SSB dropping below 20\% of \( SSBO \) <0.1

STOCK STATUS: The stock in Subarea 58.5.2 is considered fully exploited.

RECENT MANAGEMENT ADVICE: Long-term annual yield of 2,427 t.

STECF COMMENTS: STECF has no comments.

13.1.3. Toothfish (\textit{Dissostichus spp.}) in Subareas 88.1 and 88.2

FISHERIES: Catch in 2005/06 was 2,952 t in 88.1 (Ross Sea) and 465 t in 88.2.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. The assessment is based on an integrated assessment (CASAL) that uses catch at age by sex, CPUE and tagging data. CASAL model structure and assumptions are detailed in the WG-FSA Report (2006).

PRECAUTIONARY REFERENCE POINTS: \( SSB_{t+35\text{years}} \geq 50\% \ SSBO \); probability of SSB dropping below 20\% of \( SSBO \) <0.1

STOCK STATUS: \( SSB_{\text{current}} > 50\% \ SSBO \)

RECENT MANAGEMENT ADVICE: Is recommended the yield of 3,072 t for the Ross Sea.
STECF COMMENTS: STECF has no comments.

13.1.4. Exploratory fisheries for toothfish (Dissostichus spp.): Subareas 48.6 and 58.4

FISHERS: Catch in 2005/06: various.

SOURCE OF MANAGEMENT ADVICE: Precautionary exploratory catches only.

PRECAUTIONARY REFERENCE POINTS: none assessed yet

STOCK STATUS: none assessed yet

RECENT MANAGEMENT ADVICE: Catch limit for 2006/07: various (see SC-CCAMLR Report, 2006).

STECF COMMENTS: STECF has no comments.

13.2. Antarctic icefish (Chamsocephalus gunnari), Subarea 48.3

FISHERS: During the 2005/06 season the catch of C. gunnari was 2,171 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. Advice was based on a single short term (2 year) Generalised Yield Model projection of age 2+ using survey-derived estimates of current biomass.

PRECAUTIONARY REFERENCE POINTS: \( \text{SSB}_{t+2\text{years}} \geq 75\% \text{ SSB}_{\text{current}} \)

STOCK STATUS: Stocks are at a lower level than in the 1980s.

RECENT MANAGEMENT ADVICE: The projected yield in the 2006/07 season is 4,337 t.

STECF COMMENTS: STECF has no comments.
13.3. Lantern fish (*Electrona carlsbergi*), Subarea 48.3

**FISHERIES:** The last year in which there were catches from *E. Carlsbergi* fishery was 1991/92 (51,865 t). There was no catch of lantern fish in this area in 2005/06.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is CCAMLR. The fishery has not been assessed since 1994.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The state of the stock was last assessed in 1994. A precautionary catch limit has initially been set at 109 000 t by CCAMLR, since then including provisions for the catch of this species at Shag Rocks, the by-catch of notothenioids in this fishery, data reporting and research (Conservation Measure 32-17 (2003). Since the average life span of this species is about five years, the 1994 assessment is no longer applicable. CCAMLR decided to close the fishery on this species in 2003.

**RECENT MANAGEMENT ADVICE:** Due to the lack of new information on the current status of the stock, the Working Group recommended that the fishery remains closed. It should only be reopened after a new survey on this species is conducted and results have been evaluated by CCAMLR.

**STECF COMMENTS:** None.

13.4. Krill (*Euphausia superba*) Area 48

**FISHERIES:** In the 2004/05 season, a total of 127,035 t of krill have been reported. The catches were taken by Vanuatu, Japan, Republic of Korea, Poland, Ukraine and the USA. In the 2005/06 season, Japan, Republic of Korea, Poland, Ukraine, Malta and Norway had reported 64,415 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is CCAMLR. Advice was based on a long term (10 year) Generalised Yield Model projection using survey-derived estimates of current biomass and recruitment variability.

**PRECAUTIONARY REFERENCE POINTS:** $SSB_{t+35years} >= 75\% SSB_0$; probability of SSB dropping below 20% of $SSB_0 <0.1$

**STOCK STATUS:** Results from the 2000/01 season indicated above-average krill abundance and recruitment in the Elephant Island area, resulting from successful spawning during 1999/2000. A second year of high recruitment was also predicted for the 2001/02 season. In this season the recruitment index was one of the highest values observed since the strong 1994/95 year-class.

**RECENT MANAGEMENT ADVICE:** Under conservation measure 51-01 (2002) the total catch of krill in Area 48 was limited to 4 million t until catches exceed 620,000 t, subdivided as follows:
<table>
<thead>
<tr>
<th>Subarea</th>
<th>Potential yield (000,000 t)</th>
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<tr>
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</tr>
<tr>
<td>48.2</td>
<td>1.104</td>
</tr>
<tr>
<td>48.3</td>
<td>1.056</td>
</tr>
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<td>0.832</td>
</tr>
</tbody>
</table>

**STECF COMMENTS:** STECF has no comments.

**13.5. Krill (Euphausia superba), Division 58.4.1**

**FISHERIES:** There was no catch of krill in this area in 2005/06.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the CCAMLR.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** A previous survey in the region provided a $B_0$ estimation of 4.83 million t.

**RECENT MANAGEMENT ADVICE:** The catch limit proposed under Conservation Measure 51-02 (2002) is 440,000 t.

**STECF COMMENTS:** None.

**13.6. Krill (Euphausia superba), Division 58.4.2**

**FISHERIES:** There was no catch of krill in this area in 2005/06.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the CCAMLR.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The Working Group on Ecosystem Monitoring and Management endorsed the need to carry out surveys as soon as is practicable in Division 58.4.2, to provide a new biomass estimate.

**RECENT MANAGEMENT ADVICE:** The catch limit proposed under Conservation Measure 51-03 (2002) is 450,000 t.

**STECF COMMENTS:** None.
13.7. Antarctic squid (*Martialia hyadesi*), Subarea 48.3

**FISHERIES:** No target fishery for squid (*Martialia hyadesi*) was carried out since 2002/03, and no new request has been submitted to CCAMLR to continue exploratory fishing for this species in 2006/07.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the CCAMLR.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** The exploratory fishery on *M. hyadesi* was subject to Conservation Measure 61-01.

**RECENT MANAGEMENT ADVICE:** The Working Group recommended that the existing Conservation Measure 61-01 should remain in force.

**STECF COMMENTS:** No comment.

13.8. Crabs (*Paralomis spinosissima* and *Paralomis formosa*), Subarea 48.3

**FISHERIES:** Stone crabs were not exploited since 2002/03. No proposal for the harvest of crabs has been received by CCAMLR for the 2006/07 season.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the CCAMLR.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock.

**STOCK STATUS:** No information available.

**RECENT MANAGEMENT ADVICE:** Stone crabs are subject to Conservation Measures 52-01 and 52-02 regulating the fishery and experimental harvest of crabs. The Working Group recommended that these conservation measures should remain in force.

**STECF COMMENTS:** None.
14. Elasmobranch Resources (14.1++)

14.1. Elasmobranch Resources (Northeastern Atlantic)

14.1.1. General Comments

In European waters approximately 145 chondrichthyan species are listed, though this includes many species that are found either in the Mediterranean, or that have northerly records in the NE Atlantic off either Northwest Africa or Madeira (i.e. south of ICES Division IX). Many of these species are deep-water species for which the biology is poorly known.

**FISHERIES:** Historically, the value of commercial fisheries directed to elasmobranch species has ranked low in relation to other marine fisheries (Bonfil, 1994). In the Northeast Atlantic, although some elasmobranchs are taken in directed fisheries, the majority is landed as a by-catch from fisheries (various trawl, seine, longline and setnet fisheries) targeting commercial teleost species. Only basking shark (*Cetorhinus maximus*), porbeagle (*Lamna nasus*), skates and rays in the North Sea, and the deepwater sharks are subject to catch controls. Recreational fisheries, including charter angling, for elasmobranchs may be an important component of the tourist industry in some areas.

Fisheries data for elasmobranchs in the ICES area are very poor, this is due to the use by so many countries of “NEI” (not elsewhere identified) categories. Furthermore, landings data is considered inaccurate for a number of reasons:

a) Quota species may be reported as elasmobranchs to avoid exceeding quota. This would lead to overreporting.

b) Fishermen may not take care when completing landings data records, for a variety of reasons.

c) Administrations may not consider that it is important to collect accurate data for these species.

d) Some species could be underreported to avoid highlighting that bycatch is a significant problem in some fisheries.

WGEF attempts to disaggregate landings to species levels and aims to arrive at an agreed set of data for each species and will document any changes to these data sets in the relevant working group report.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES and ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** The reference points of deepwater sharks are Ulim at 0.2 × virgin biomass and Upa at 0.5 × virgin biomass. There are no reference points for spurdog, catsharks and nursehounds, basking sharks, porbeagles, tope, and ray and skates in the North Sea.

**STOCK STATUS:** Elasmobranchs are typically slow-growing, have a high age-at-maturity and a low reproductive capacity. As a result of their life history traits, they are particularly sensitive to exploitation. They can be depleted very quickly and recovery will be slow. Most, though not all elasmobranchs in the ICES area, have exhibited declines under pressure of exploitation.

**RECENT MANAGEMENT ADVICE:** Elasmobranch fisheries *per se* are essentially unregulated and unmanaged within the Northeast Atlantic. Due to their life history traits it is recommended that exploitation of elasmobranchs should only be allowed when indicators and reference points for stock status and future harvest have been identified and management strategies, including appropriate monitoring requirements have been decided upon and are implemented.
There are potential problems in introducing effective management measures that will target elasmobranch species, which tend to be taken as a by-catch in multi-species fisheries, when management of the exploitation of other species inhabiting the same grounds may be a priority. Nevertheless, the possible benefits of implementing management measures (e.g. minimum and maximum landing sizes, and measures designed to protect nursery and breeding grounds) need to be fully investigated. In the NAFO area, some directed fisheries for spurdog and skate are regulated by quota controls.

14.1.2. Spurdog (Squalus acanthias) in the North-east Atlantic

**FISHERIES:** Spurdog is a widely distributed species occurring throughout the ICES area, and also widespread in the NW Atlantic, Pacific and other major oceans. Spurdog is one of the most important commercial elasmobranchs, with catches in directed and bycatch fisheries. There have been directed longline and gillnet fisheries in IIa, Iva, VIa, VIIa and VIIb-k and there are by-catches from demersal otter trawl and seine fisheries throughout the range of the stock. The main fishing grounds for spurdog are: Norwegian Sea (ICES Sub-area II); North Sea (ICES Sub-area IV); NW Scotland (ICES Sub-area VI) and the Celtic Sea (ICES Sub-area VII). Some landings are also from the Skagerrak and Kattegat (ICES Sub-area IIIa) and Iceland (ICES Sub-area V). In the Celtic Sea, spurdog is caught primarily by French trawlers and by English and Welsh longliners. In the Bristol Channel and Irish Sea by fixed gill nets. Scottish and Irish trawlers and seiners fish for spurdog off the west coast of Scotland, and some English longliners from the east coast moved into this area after continuous poor fishing in the North Sea. They are also taken in small quantities in the Bay of Biscay (ICES Sub-area VIII) and off Greenland. These last areas are considered to be outside the main area of the NE Atlantic stock, which is also considered to be separate (at least for assessment and management purposes) from the NW Atlantic stock. Although most spurdog are now taken as by-catch in otter trawls and seiners aimed principally at whitefish, directed fisheries for this species continue to operate locally and seasonally. Landings of this species remain difficult to quantify due to differences in the level to which they are identified in national landing statistics. Landings which are specifically identified as *S. acanthius* probably represent a minimum estimate, while a maximum estimate includes categories such as “Squalidae”, “dogfish” or “dogfish and hounds” which may include a number of other species (e.g. deep-water squalids, spotted dogs, smoothhound and tope). Though not complete, the landings data for spurdogs show a marked decline since the mid-1980s. In earlier times, up to 60,000 t were landed annually in the early 1960s, landings averaged about 35,000 t throughout the 1980s, then steadily declined to an average of about 15,000 t by the late 1990s. The landings for 2005 are uncertain but are reported to be as low as 5600t, the lowest for many decades.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. Survey and landings data are available. A number of different methods have been explored making use of the long time-series of landings data, including surplus production models, separable age-based assessments and length-structured approaches. Survey data have also been analysed in terms of trends in CPUE and frequency of occurrence in survey hauls. All analyses indicate similar stock trends.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been defined or agreed for spurdog in the Northeast Atlantic.
STOCK STATUS: The stock is depleted. All experimental assessments indicate that the stock is at a record low level. The frequency of the occurrence of spurdog in trawl surveys has declined and, although large shoals are still caught, the frequency of these has also declined. Survey CPUE also indicates a declining trend. The absolute level of exploitation is unknown but the trends in fishing mortality and the continuous decline in landings indicates that exploitation has been, and continues to be well above sustainable levels. NEA spurdog is listed as vulnerable on the IUCN red list and Sweden has recently added spurdog to their national Red List.

RECENT MANAGEMENT ADVICE: The stock is depleted and may be in danger of collapse. ICES therefore advises that targeted fisheries should not be permitted to continue, and by-catch in mixed fisheries should be reduced to the lowest possible level. The TAC should cover all areas where spurdog are caught in the northeast Atlantic and should be set at zero for 2007. In addition, ICES advises that a large proportion of spurdog are taken as bycatch in mixed demersal trawl fisheries and they would benefit from a reduction in overall demersal fishing effort. Spurdog forms size- and sex-specific schools and these are subject to directed fisheries specifically targeting large fe-males. Additional management measures, which would deter the targeting of mature females, could include, for example, a maximum landing length.

STECF COMMENTS: STECF agrees with the ICES advise. STECF notes that in 2004, Germany has asked the EU to propose that spurdog be listed under Appendix II of CITES (i.e. so that nations involved in the import/export trade would have to show that the harvesting and utilization was sustainable).

14.1.3. Catsharks and nursehounds (Scyliorhinus canicula and Scyliorhinus stellaris) in the north-east Atlantic

FISHERIES: In the NE Atlantic nursehounds (Scyliorhinus canicula and Scyliorhinus stellaris) appear to be much more sedentary than the spurdog, and the few available tagging results indicate quite restricted movement. The nursehound is found on rough, even rocky grounds to the south and west of the UK, extending to the Mediterranean. Because it is comparatively scarce it has only a minor contribution to commercial fisheries. Lesser spotted dogfish Scyliorhinus canicula is common on all coasts, from Mediterranean latitudes to south Norway, and contributes substantially to the landings of ‘dogfish’ from the North Sea, English Channel, Celtic Sea and Iberian waters. This species is taken primarily as a by-catch in demersal fisheries targeting other species and a large proportion of the catch is discarded, although in some coastal areas there are seasonal small-scale directed fisheries. In areas III, IV and VIId, landings for Scyliorhinus canicula increased from 0.1 in 2001 to 160 t in 2005. In the Bay of Biscay and Iberian waters landings of Scyliorhinus spp have recorded since the mid nineties and have fluctuated between 1500 and 2000 t. Landings were 1457 t in 2005.

SOURCE OF MANAGEMENT ADVICE: The main source of information on lesser-spotted dogfish in the Northeast Atlantic is ICES but no species specific advice was given. The most recent advise on lesser-spotted dogfish in the Northeast Atlantic was given in 2002 by the STECF-SGRST Working Group Report on Elasmobranch Fishes.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been agreed for S. canicula or S. stellaris in the Northeast Atlantic.

STOCK STATUS: The stock structure is unknown although it is admitted separate stocks reside in separate ICES Divisions and that immigration and emigration from adjacent populations are either insignificant or on a par. Except for the Cantabrian Sea, there are no reliable assessments of the status of Lesser-spotted dogfish in the NE Atlantic due to the lack of catch information. An
assessment of S. canicula in the Cantabrian Sea indicates an increase in the stock. Possible explanations for this increase in abundance of lesser-spotted dogfish is the tradition of dumping most of the catch alive, plus the fact that other discarded fish might be providing additional food sources to the dogfish. There is no information on the status of S. stellaris in the NE Atlantic.

**RECENT MANAGEMENT ADVICE:** The STECF-SGRST Working Group Report on Elasmobranch Fishes has advised S. canicula populations would best be managed as local populations (e.g. on the level of an ICES division). No specific management advice for S. stellaris in the NE Atlantic is available from ICES.

**STECF COMMENTS:** STECF agrees with ICES advise.

### 14.1.4. Basking shark (Cetorhinus maximus) in the north-east Atlantic

**FISHERIES:** There have been directed fisheries for this species by Ireland, the UK, and Norway. The last directed fishery was that of Norway, and was prosecuted in II, IV, VI and VII. This fishery is now at a low level of activity. The geographical and temporal distribution of the Norwegian domestic basking shark fishery changes markedly from year to year, and this was suggested by Stott (1982) to be due to the unpredictable nature of the sharks’ inshore migration. The Norwegian fleet has prosecuted local fisheries from the Barents Sea to the Kattegat, as well as more distant fisheries ranging across the North Sea and as far as the south and west of Ireland, Iceland and Faeroe. Since the mid-1940s, catches have varied considerably. In the late 1970s catches were about 10000t, in early 1980s about 4000t and in recent years a serious decline has been registered with catches ranging between 77 and 293 t in the last eight years. Catches in 2005 were 221 t.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. There is no assessment of this stock. The evaluation is based on landings data and anecdotal information.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been agreed for basking shark in the Northeast Atlantic.

**STOCK STATUS:** Available landings and anecdotal information suggest that the stock is severely depleted. The IUCN red data list classifies basking shark as endangered in the NE Atlantic.

**RECENT MANAGEMENT ADVICE:** ICES advises that no targeted fishing for basking shark should be permitted and additional measures should be taken to prevent bycatch of basking shark in fisheries targeting other species. A TAC should cover all areas where basking sharks are caught in the northeast Atlantic. This TAC should be set at zero for 2007. ICES further advises that the TAC area should correspond to the entire stock distribution (all ICES Areas). The present TAC only covers Areas IV, VI & VII, although most of the recorded landings are in Areas I & II. Proper quantification of the impact of bycatch, discarding, and ship strikes on this species in the ICES area is required. Where national legislation prohibits landing of bycaught basking sharks, measures should be put in place to ensure that incidental catches are recorded and carcasses made available for research.

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) lists basking shark Cetorhinus maximus in Appendix III, which requires “regulation of species populations to keep them out of danger”. Basking shark is also listed in Appendix II of CITES (Convention on international trade in endangered species), meaning that international trade in its products should be accompanied by permit and a ‘no-detriment finding’ that states
that the harvest of the species is sustainable. The UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks calls for Parties to protect marine biodiversity, minimize pollution, monitor fishing levels and stocks, provide accurate reporting of and minimize by-catch and discards, and gather reliable, comprehensive scientific data as the basis for management decisions. It mandates a precautionary, risk-averse approach to the management of these species when scientific uncertainty exists. The Agreement also directs States to pursue co-operation in relation to listed species. Basking shark is listed in the agreement. A Biodiversity action plan for basking shark has been developed in the UK and it has been nominated for inclusion in OSPAR (2002).
Since 2002, there has a complete ban on the landings of basking shark from within the EU waters of ICES Sub-areas IV, VI and VII (Annex ID of Council Regulation (EC) 2555/2001).

**STECF COMMENTS:** STECF agrees with ICES advice.

### 14.1.5. Tope (Galeorhinus galeus) in the north-east Atlantic

**FISHERIES**
There are no currently no targeted commercial fisheries for tope in the north-eastern Atlantic, though they are taken as a bycatch in trawl, gillnet and longline fisheries, including demersal and pelagic set gears. Though tope are discarded in some fisheries, due to their low market value, other fisheries land this bycatch. Tope is also an important target species in recreational sea angling and charter boat fishing in several areas, with most anglers and angling clubs following catch and release protocols. Landings data are limited, as landings data are often included as “dogfishes and hounds” (DGH). Nevertheless, England and France have some species-specific landings data, and there are also limited data from Denmark, Ireland, Portugal and Spain in recent years. Many of the reported landings are from the English Channel, Celtic Sea and northern Bay of Biscay. Tope is also caught in Spanish fisheries in the western Cantabrian Sea (Galicia), where about 80% of the landings are from longline vessels, with the remainder from trawl and small gillnets. Tope also feature in the catches off mainland Portugal, and are an important component of Azorean bottom long line fisheries. Tope are also caught in offshore long-line fisheries in this area.

**SOURCE OF MANAGEMENT ADVICE:** The main recent source of information is ICES however no species specific management advise is given.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been agreed for porbeagle in the Northeast Atlantic.

**STOCK STATUS:** Stock structure is unknown. However, the facts that this coastal shark is known to travel large distances and does not occur in the North-west Atlantic, give support to the hypothesis of the existence a single Northeast Atlantic stock. The STECF-SGRST Working Group Report on Elasmobranch Fishes estimates that tope is biologically vulnerable and that some populations are extremely depleted. Tope is listed in the UK Biodiversity priority list and is classified as Vulnerable in the IUCN Red data List.

**RECENT MANAGEMENT ADVICE:** There is no species specific management advice for Tope in the NE Atlantic. However ICES considers that Tope is highly vulnerable to over-exploitation, as they have low population productivity, relatively low fecundity and protracted reproductive cycle. Unmanaged, targeted fisheries elsewhere in the world have resulted in stock collapse (e.g. off California and in South America).

**STECF COMMENTS:** STECF has no comments
14.1.6. Portuguese dogfish (*Centroscymnus coelolepis*) in the north-east Atlantic

**FISHERIES** Portuguese dogfish are caught in virtually all deep-water fisheries in the NE Atlantic although catch data is patchy and incomplete. French trawlers, UK and German longliners and gillnetters in VI and VII are the fleets targeting this species. These fisheries began in 1991 and before that the species was not exploited. There are also directed longline fisheries in VIII and IX and some bycatches from XII. Landings of this species have been routinely grouped together with Leafscale gulper shark and reported as siki. Combined siki landings began in 1988 (although an unknown quantity is likely to have been discarded prior to this) and increased rapidly to over 8000 tonnes in 1997. Since 1997 landings have fluctuated with an overall upward trend, reaching a maximum of over 10 000 tonnes in 2003. Since 2003, reported landings have declined, possibly as a result of the introduction of quotas on deepwater sharks and the reduction quotas for other species in the mixed trawl fisheries.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. No analytical assessment was carried out in 2006. The assessment is based on commercial CPUE trends and survey trends. Landings data on these species remain very problematical and, in many cases, reliable data are only available for combined siki sharks. Many countries continue to report landings in amalgamated categories such as various sharks N.E.I. Retrospective splitting of the data into species categories and reconstruction of historic data from mixed categories is based on limited information and is problematic.

**PRECAUTIONARY REFERENCE POINTS:** Ulim is set at 0.2 × virgin biomass and Upa is set at 0.5 × virgin biomass.

**STOCK STATUS:** This species cannot be assessed separately from leafscale gulper shark because most landings and effort data are combined. Total international landings of both species combined have risen from very low levels to around 11 000 t in 2003 and appear to have declined since. Substantial declines in CPUE series for both *C. coelolepis* and *C. squamosus* in Subareas VI, VII, and XII suggest that the stocks of both species are depleted. CPUE for both species in the northern area have displayed strong downward trends leading to the conclusion that the stocks are being exploited at unsustainable levels. In Division IXa, CPUE series, although short, appear to be stable. The IUCN lists this species as nearly threatened.

**RECENT MANAGEMENT ADVICE:** ICES advises that no target fisheries should be permitted unless there are reliable estimates of current exploitation rates and stock productivity. The TAC should be set at zero for the entire distribution area of the stocks and additional measures should be taken to prevent bycatch of Portuguese dogfish in fisheries targeting other species. Annual fishing opportunities in EU waters and in certain non-EU waters for stocks of deep-sea species have been proposed for 2007 and 2008. The TAC’s proposal for deepwater sharks covers ICES areas V, VI, VII, VIII, IX; area X and area XII and applies to the following list of species: Portuguese dogfish (*Centroscymnus coelolepis*), Leafscale gulper shark (*Centrophorus squamosus*), Birdbeak dogfish (*Deania calceus*), Kitefin shark (*Dalatias licha*), Greater lanternshark (*Etmopterus princeps*), Velvet belly (*Etmopterus spinax*), Black dogfish (*Centroscyllium fabricii*), Gulper shark (*Centrophorus granulosus*), Blackmouth dogfish (*Galeus melastomus*), Mouse catshark (*Galeus murinus*), Iceland catshark (*Apristurus* spp.) and *Daenia histrionica* and *Daenia profundorum* for area XII only. The TAC proposals for 2007 are a 33% reduction from catch levels in 2005; the TAC proposal for 2008 is a further 51% reduction from the 2007 TAC.
STECF COMMENTS: STECF notes that the 2007 and 2008 EU TAC proposal is above the recommended catch advise given by ICES. STECF therefore reiterates ICES advise that EU fisheries should not proceed if adequate data are not collected to assess the sustainable exploitation levels. STECF further advises that in order to maximise protection of deep water sharks to continue the gill netting ban introduced in 2006 (EC council regulation 51/2006Annex III) in waters deeper than 600m

14.1.7. Leaf-scale gulper shark (Centrophorus squamosus) in the north-east Atlantic

FISHERIES Leaf-scale gulper shark are caught in virtually all deep-water fisheries in the NE Atlantic. Catch data is patchy and incomplete. French trawlers in VI and VII target this species. Gill-net vessels registered in the UK (England and Wales), UK (Scotland) and Germany, target this and other deepwater species since the mid1990’s and takes place mainly west of the British Isles (Sub-areas VI and VII). There are also directed longline fisheries in VIII and IX and some by-catches from XII. Landings of this species have been routinely grouped together with Portuguese dogfish and reported as siki. Combined siki landings began in 1988 (although an unknown quantity is likely to have been discarded prior to this) and increased rapidly to over 8000 tonnes in 1997. Since 1997 landings have fluctuated with an overall upward trend, reaching a maximum of over 10 000 tonnes in 2003. Since 2003, reported landings have declined, possibly as a result of the introduction of quotas on deepwater sharks and the reduction quotas for other species in the mixed trawl fisheries.

SOURCE OF MANAGEMENT ADVICE: The main advisory body is ICES. No analytical assessment was carried out in 2006. The assessment is based on commercial CPUE trends and survey trends. Landings data on these species remain very problematical and, in many cases, reliable data are only available for combined siki sharks. Many countries continue to report landings in amalgamated categories such as various sharks N.E.I. Retrospective splitting of the data into species categories and reconstruction of historic data from mixed categories is based on limited information and is problematic.

PRECAUTIONARY REFERENCE POINTS: Ulim is set at 0.2 × virgin biomass and Upa is set at 0.5 × virgin biomass.

STOCK STATUS: This species cannot be assessed separately from leafscale gulper shark because most landings and effort data are combined. Total international landings of both species combined have risen from very low levels to around 11 000 t in 2003 and appear to have declined since. Substantial declines in CPUE series for both C. coelolepis and C. squamosus in Subareas VI, VII, and XII suggest that the stocks of both species are depleted. CPUE for both species in the northern area have displayed strong downward trends leading to the conclusion that the stocks are being exploited at unsustainable levels. In Division IXa, CPUE series, although short, appear to be stable. The IUCN lists this species as vulnerable.

RECENT MANAGEMENT ADVICE: ICES advises that no target fisheries should be permitted unless there are reliable estimates of current exploitation rates and stock productivity. The TAC should be set at zero for the entire distribution area of the stocks and additional measures should be taken to prevent bycatch of Portuguese dogfish in fisheries targeting other
species. Annual fishing opportunities in EU waters and in certain non-EU waters for stocks of
depth-sea species have been proposed for 2007 and 2008. The TAC’s proposal for deepwater
sharks covers ICES areas V, VI, VII, VIII, IX; area X and area XII and applies to the following list
of species: Portuguese dogfish (*Centroscymnus coelolepis*), Leafscale gulper shark
(*Centrophorus squamosus*), Birdbeak dogfish (*Deania calceus*), Kitefin shark (*Dalattias licha*),
Greater lanternshark (*Etmopterus princeps*), Velvet belly (*Etmopterus spinax*), Black dogfish
(*Centroscyllium fabricii*), Gulper shark (*Centrophorus granulosus*), Blackmouth dogfish (*Galeus
melastomus*), Mouse catshark (*Galeus murinus*), Iceland catshark (*Apristuris* spp.) and *Daenia
histricosa* and *Daenia profundorum* for area XII only. The TAC recommendation for 2007 are a
33% reduction from catch levels in 2005; the TAC recommendation for 2008 are a further 51%
reduction from the 2007 TAC.

**STECF COMMENTS:** STECF notes that the EU TAC proposal is above the recommended
catch advice given by ICES. STECF therefore reiterates ICES advise that EU fisheries should not
proceed if adequate data are not collected to assess the sustainable exploitation levels. STECF
further advises that in order to maximise protection of deep water sharks, to continue the gill
netting ban introduced in 2006 (EC council regulation 51/2006 Annex III)) in waters deeper than
600m.

### 14.1.8. Kitefin shark (*Dalattias licha*) in the north-east Atlantic

**FISHERIES** Kitefin shark are caught in the deep water fisheries in ICES Sub-areas VIII, IX and
X and the Mediterranean but the main fishing is in Sub-area X (Azores). In this sub-area X
(Azores) this species is a by-catch in demersal deepwater fisheries. At present, there are no
directed fisheries for this species. There is the risk that sporadic small-scale target fisheries may
develop in the Azores, as a function of the markets. Excluding ICES Subarea X (Azores) where
species-specific landings are available, landings of this species are incomplete and have mostly
been reported with other species as *Squalidae*.

**SOURCE OF MANAGEMENT ADVICE:** The main recent source of information and advice
on kitefin shark in the Northeast Atlantic is ICES. No assessment was carried out in 2006.

**PRECAUTIONARY REFERENCE POINTS:** \( U_{\text{lim}} \) is set at 0.2* virgin biomass and \( U_{\text{pa}} \) is set
at 0.5* virgin biomass. **STOCK STATUS:** The assessment carried out on kitefin shark in 2002
showed a decline of the stock from the beginning of the time series and suggested that the stock
was recently around half of the virgin biomass. In recent years, the catch of kitefin shark from
targeted fisheries has been very low. Bycatches may have occurred, but the amount is unknown.

**RECENT MANAGEMENT ADVICE:** This stock is managed as part of the deep-sea shark
fisheries. ICES advises that no targeted fisheries should be permitted unless there are reliable
estimates of current exploitation rates and sufficient data to assess productivity. Annual fishing
opportunities in EU waters and in certain non-EU waters for stocks of deep-sea species have been
proposed for 2007 and 2008. The TAC’s proposal for deepwater sharks covers ICES areas
V, VI, VII, VIII, IX; area X and area XII and applies to the following list of species: Portuguese
dogfish (*Centroscymnus coelolepis*), Leafscale gulper shark (*Centrophorus squamosus*),
Birdbeak dogfish (*Deania calceus*), Kitefin shark (*Dalattias licha*), Greater lanternshark
(*Etmopterus princeps*), Velvet belly (*Etmopterus spinax*), Black dogfish (*Centroscyllium
fabricii*), Gulper shark (*Centrophorus granulosus*), Blackmouth dogfish (*Galeus melastomus*),
Mouse catshark (*Galeus murinus*), Iceland catshark (*Apristuris* spp.) and *Daenia histricosa* and
Daenia profondorum for area XII only. The TAC recommendation for 2007 are a 33% reduction from catch levels in 2005; the TAC recommendation for 2008 are a further 51% reduction from the 2007 TAC.

**STECF COMMENTS:** STECF notes that the EU TAC proposal is above the recommended catch advise given by ICES. STECF therefore reiterates ICES advise that EU fisheries should not proceed if adequate data are not collected to assess the sustainable exploitation levels. STECF further advises that in order to maximise protection of deep water sharks, to continue the gill netting ban introduced in 2006 (EC council regulation 51/2006Annex III) in waters deeper than 600m.

### 14.1.9. Rays and Skates in the North Sea

**SPECIES:**

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<thead>
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<th>Species</th>
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<tr>
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<td>Amblyraja radiata</td>
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<td>Common skate</td>
<td>Dipturus batis</td>
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<td>Long-nose skate</td>
<td>Dipturus oxyrinchus</td>
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<td>Cuckoo ray</td>
<td>Leucoraja naevus</td>
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<td>Thornback ray</td>
<td>Raja clavata</td>
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**DISTRIBUTION OF SKATES:** Collectively, skates have a wide distribution in coastal waters of the Northeast Atlantic, though individual species can be localized in a relatively small area where their preferred habitat occurs. The most abundant skate species in the North Sea is starry ray (*Amblyraja radiata*). Cuckoo ray (*Leucoraja naevus*), is a relatively small-bodied species (*Lmax = 75cm*) that lives in shallow to moderate depths from 20 m down to about 150 m in the north-west sector of the North Sea. Thornback ray (*R. clavata*) has a more coastal distribution, being found in water depths down to 60 m. It occurs in a number of local concentrations in the North Sea, between which there appears to be a regular exchange of individuals (Walker et al., 1997).

All rays have a commercial value, except for starry ray (*A. radiata*), though even this species is landed incidentally in the Danish industrial fisheries and is taken in Icelandic fisheries. Common skate (*Dipturus batis*) tends to be found in water from 30 to 600 m deep, whilst the long-nose skate (*D. oxyrinchus*) is found in deeper water from 150 to 900 m, although juveniles can be found in shallower water (Wheeler, 1969). The distribution of the latter species is not as extensive as that of the common skate, being found off southern Norway and around Scotland. In the past, the common skate was considered to be extensively distributed throughout the central and northern North Sea, but in the last few decades this species appears to have retreated to the very northern North Sea and is currently caught only off Shetland (Walker, 1995).

**FISHERIES:** Rays and skates are taken as target and bycatches in most demersal fisheries in the ICES area, with the exception of the Baltic. There are some directed fisheries, for example, in VIIa, but most ray and skate landings are bycatches in trawl and in seine fisheries.

Prior to the generic TAC introduced in 1999 for all skate and ray species in the North Sea, there has been no obligation for fishermen to record catches in the logbooks used for monitoring quota uptake of TAC species. As a consequence, there is a lack of information on the fisheries for rays. Statistical information by species is also limited because few European countries differentiate between species in landings statistics and they are collectively recorded as skates and rays. The
main exception is France, for which the cuckoo ray and the thornback ray are the most important species landed.

After France, the UK lands a greater weight of mainly thornback, cuckoo, blonde and spotted rays than any other European country. The majority of rays landed by both these countries, and from the Netherlands, Belgium, Denmark, Germany and Sweden are taken as a by-catch in otter trawls and seines aimed principally at gadoids and flatfish. There are, however, a number of small-scale fisheries using large meshed tangle nets directed at thornback ray, and there have been directed longline fisheries for common skate.

Ray fisheries occur in coastal waters and tend to be seasonal, and size selection in towed gears is minimal owing to the shape of rays, though selection on board has occurred to comply with the market’s preference for larger fish. Rays have been subjected to intensive exploitation in the North Sea: Landings decreased significantly during the 1930s, but increased after World War II, during which period fishing had almost ceased. In the southern North Sea, landings have declined since 1948, whereas in the northern and central area the major decline started around 1965. Walker (1994) reports that, despite an increase in fishing effort, landings dropped from 12 to 5 thousand tonnes between 1954 and 1974. Since the mid-1970s, total landings of rays from the North Sea have remained more or less constant and, in recent years, Norwegian landings from the northern North Sea and Norwegian Sea have seldom exceeded 1000 t.

Overall landing figures for Rays and Skates in the North Sea have decreased in the last 10 years from almost 5,000t in 1996 to just over 2,000t in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES

**PRECAUTIONARY REFERENCE POINTS:** There are no agreed reference points for rays and skates in the North Sea.

**STOCK STATUS:** Landings of skates and rays in the North Sea, Skagerrak, and eastern English Channel have generally declined, and this is associated with changes in species composition and relative abundance. Trends of individual species are largely based on the analysis of IBTS surveys.

Thornback ray (*Raja clavata*) – distribution area and abundance have strongly decreased over the past century. The area occupied has significantly decreased since 1990. Although local abundance remains high, the North Sea stock is considered depleted. The stock appears to have been stable in the last 30 years within this reduced area of distribution.

Spotted ray (*Raja montagui*) – area occupied and abundance has fluctuated without trend. Stock status is uncertain.

Starry ray (*Amblyraja radiata*) – survey catch rates increased from the early 1970s to the early 1990s and stabilized thereafter.

Cuckoo ray (*Leucoraja naevus*) – since 1990 the area occupied has fluctuated without trend. Survey catch rates increased from the early 1970s to the early 1990s and declined thereafter. Stock status is uncertain.

Common skate (*Dipturus batis*) – is depleted. It was formerly widely distributed in the North Sea but is now only rarely found and only in the northern part of the North Sea.
Blonde ray (*Raja brachyura*) – has a patchy occurrence in the North Sea. It is at the edge of its distributional range in this area and consequently ICES does not provide advice for this species.

Lesser spotted dogfish (*Scyliorhinus canicula*) – abundance and area occupied are increasing.

Smooth hound and starry smooth hound (*Mustelus mustelus* and *M. asterias*) – abundance appears to have been increasing in recent years. Identification by species is considered unreliable in the surveys.

Angel shark (*Squatina squatina*) is still extinct in the North Sea.

**RECENT MANAGEMENT ADVICE** The stocks of common skates and thornback rays are depleted. Target fisheries should not be permitted and bycatch in mixed fisheries should be reduced to the lowest possible level.

If the fisheries for rays continue to be managed with a common TAC for all ray species, this TAC should be set at zero for 2007.

**STECF COMMENTS:** STECF recommends that catch and effort data be reported by species.

14.2. **Elasmobranchs (Mediterranean)**

A long list of elasmobranch species has been reported to occur in the Mediterranean fisheries (67 different species are taken by the Mediterranean fisheries. According to the official statistics provided to FAO, a total of 11,265 tonnes of elasmobranch catches have been reported in 1999 in the whole Mediterranean Sea. The most important landings have been reported by Turkey (2,115 MT), Tunisia (2,018 MT), Greece (1,602 MT), Italy (1,557 MT) and Spain (1,466 MT), but there is the strong suspect that reported catches are only an undefined portion of the real catches. The peak of catches was reached in 1987, with about 25,000 tonnes.

Under this situation, it is quite difficult to better define the most important stocks, even due to the data mixing in the statistics. The following list of species has been defined as a starting point for a better future definition, also taking into account the issues raised by the ICCAT, GFCM and the STECF-SGRST.

STECF notes that for most of the species listed below, the most recent information useful for assessment relates to the year 2002. However, in the present report some updates, describing fisheries and stock status, have been added. STECF notes that more data, necessary for providing management advise for these stocks, is needed in the future. In general, none of the species dealt with in this section of the report are the subject of formal stock assessments and the text largely provides a summary of the stock and fishery related information available to STECF at the time of preparing the report.

14.2.1. **Basking shark (Cetorhinus maximus)**

**FISHERIES:** The Basking shark is a by-catch in several fisheries with a very low market interest. According to the most recent information, the drift-net fishery mainly took this species in the past (drift-nets have been banned since January 1, 2002 from the EU fleets). Catch data from drift-nets are only poorly available, but some observers data in 1990-91 assessed this
species as 0.1% in number and 4.2% in weight of the total drift-net catches. Drif-net catch estimates amount to 110 MT (246 specimens) of basking shark in 1994 and 179 MT (395 specimens) in 1995. Besides these estimates, only about 500 specimens have been reported to be caught in the last century by several other fishing gears in the Mediterranean, mostly by set gill and trammel nets or occasionally in pelagic trawls. According to the FAO data, basking shark accounted about 9.2% of the total elasmobranch catches in the Mediterranean in 1998 and 1.7% in 1999. Documented fisheries in several regions have usually been characterised by rapidly declining local populations as a result of short-term fisheries exploitation, followed by very slow or no recorded population recovery. There is likely potential for similar population declines to occur in the future from directed and by-catch fisheries, driven at least in part by the demand for fins in international trade. This species is considered extremely vulnerable to overfishing, perhaps more than most sharks, ascribed to its slow growth rate, lengthy maturation time, long gestation period, probably low fecundity and probable small size of existing population. A number of specimens used to be taken in large driftnet fisheries, but this fishery is now prohibited by the EC, though non-EC nations may still use this gear. With the moratoria of drift nets in the Mediterranean (as of January 2002), it is expected that the undesired fishing mortality of this species will be reduced.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** no data available.

**RECENT MANAGEMENT ADVICE:** The Mediterranean is considered as a separate management unit. The Basking shark is a protected species in the Mediterranean, according to the Barcelona Convention (Appendix 2) and the Bern Convention (Appendix 2), also listed in Appendix II of CITES. This species is listed as Vulnerable (VU A1ad+2d) in the IUCN Red List.

**STECF COMMENTS:** STECF recommends a better reporting of the Basking shark catches from all the fisheries involved, with the purpose to assess the possible impacts. The EC drift-net ban will certainly results in a direct conservation measure for this species.

### 14.2.2. Shortfin Mako (Isurus oxyrinchus)

**FISHERIES:** This pelagic species is taken by a variety of fishing gears, always as by-catch, but it is often retained on board and sold on the market for its good price. Data on catches are extremely poor: shortfin mako represented 0.7% in number of individuals of the total Italian drift-net catches, reaching an average of 5 to 10 tonnes in 1990-91. Further studies conducted on large pelagic long-line fisheries report an incidence of 8.7% on the elasmobranch total long-line catches in 1998 and 3% in 1999. CPUE data in 1998-99 varied according to the target species of the long-line fishery, from 1.1 kg and 0.01 individuals per 1000 hooks in the swordfish long-line, to 0.07 kg in average for the whole large pelagic long-line activity in Spain, Italy and Greece. Only a few Mediterranean countries (Italy and Spain) are reporting catch data to ICCAT and catch statistics are very poor. Surface long-line fisheries that target tuna and swordfish also catch *Isurus oxyrinchus*. Fishing activities targeting swordfish are more common in the southern parts of the Mediterranean (e.g. Italy, Malta, Morocco, Tunisia and Crete Island). A number of specimens might be taken in large driftnet fisheries, but this fishery is now prohibited by the EC, though non-EC nations may still use this gear. With the moratoria of drift nets in the Mediterranean (as of January 2002), it is expected that the undesired fishing mortality of this species will be reduced.
SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM, but this species is also under the ICCAT responsibility.

PRECAUTIONARY REFERENCE POINTS: None.

STOCK STATUS: The Mediterranean is considered as a separate management unit for this species. The Shortfin Mako shark is listed in the Barcelona Convention (App. III) and in the Bern Convention (App. III). It is also considered a high priority species. However, the species is very wide-ranging and has a relatively fast growth rate. There is no evidence to suggest that its global population has been sufficiently depleted for it to warrant “Vulnerable” status at the present time. For this reason it is listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

RECENT MANAGEMENT ADVICE: data should be collected in the ICCAT area.

STECF COMMENTS: STECF recommends a better reporting of the Shortfin Mako catches from all the fisheries involved, with the purpose to assess the possible impacts. The EC drift-net ban should possible result in a decreasing in catches of this species.

14.2.3. Porbeagle (Lamna nasus) in the north-east Atlantic

FISHERIES: Porbeagle is a highly migratory and schooling species. Sporadic targeted fisheries develop on these schools. Porbeagle fisheries are highly profitable. The main countries catching or having caught porbeagles are Spain and France. However in the past, important fisheries were prosecuted by Norway, Denmark and Faeroe Islands.

The only regular, directed target fishery that still exists is the French fishery. Several countries have sporadic fisheries taking porbeagles (which also takes occasional tope and blue sharks), in North Sea, west of Ireland and Biscay, as they appear. These include Denmark, UK, and French vessels fishing to the south and west of England. There is a bycatch by demersal trawlers from many countries, including Ireland, UK, France and Spain.

SOURCE OF MANAGEMENT ADVICE: The main recent sources of information and advice on porbeagle in the Northeast Atlantic is ICES. There is no fishery-independent information on this stock. Landings data for porbeagle may be reported as porbeagle, as various sharks nei, or as Sharks, rays, skates, etc. nei in the official statistics. This means that the reported landings of porbeagle are likely an underestimation of the total landing of the species from the NE Atlantic.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been agreed for porbeagle in the Northeast Atlantic.

STOCK STATUS: Available information from Norwegian and Faroese fisheries shows that landings declined strongly and these fisheries ceased in the ICES area. These fisheries have not resumed, implying that the stock has not recovered, at least in the areas where those fisheries took place. The available information from the French fishery suggests that CPUE reached a peak in 1994 and afterwards has declined. The CPUE has been stable at a much lower level since 1999, despite relatively constant number of vessels involved.

Porbeagle is subject to the UN agreement on highly Migratory Stocks and the UK Biodiversity priority list. In IUCN, porbeagle is classified as Vulnerable for the depleted unmanaged population in the northeast Atlantic, and Lower Risk (conservation dependent) for the northwest Atlantic, in recognition of the introduction of the US and Canadian Fisheries Management Plans (IUCN 2000).

RECENT MANAGEMENT ADVICE: No targeted fishing for porbeagle should be permitted on the basis of their life history and vulnerability to fishing. In addition, measures should be taken to prevent by-catch of porbeagle in fisheries targeting other species, particularly in the depleted northern areas.
STECF COMMENTS: STECF agrees with ICES. STECF notes the German proposal to add this species to the CITES Appendix II so that nations involved in the import/export trade would have to show that the harvesting and utilization was sustainable.

14.2.4. Blue shark (Prionace glauca)

FISHERIES: This pelagic species is often taken by several fishing gears, always as by-catch and sometimes marketed. Data on catches exist but they are very partial. Studies conducted on Spanish, Italian and Greek large pelagic long-line fisheries report an incidence of 68.3% on the total elasmobranch long-line catches in weight in 1998 and 81.9% in 1999. According to the available data, 2,157 specimens (80 tonnes) of blue sharks were caught by the Italian large pelagic fisheries in 1994 in the Tyrrhenian Sea and Strait of Sicily, reaching a total of 3,193 specimens (157 tonnes) in 1995. In 1994, the blue shark represented 4.7% of the total catch in pelagic long-line activities. CPUE data are very variable: it was 0.03kg/1000 m in Italian drift-nets in 1991 while, in the period 1998-99 shows values of 1.24kg/1000 hooks in swordfish long-line, 0.45 kg in the US-type swordfish long-line, 0.07 kg in albacore long-line and 0.25 kg in bluefin tuna long-line. Only a few Mediterranean countries (Italy and Spain) are reporting catch data to ICCAT and catch statistics are very poor.

A local artisanal fishery targeting Prionace glauca utilises the so-called “stese” (short lines with hooks placed near the surface), and this fishery operates mainly in spring along the Calabria and Apulia (Italian southern regions). Modest catches of P. glauca have been landed as by-catch of the swordfish and albacore fisheries with surface longlines. Depending on hook selectivity and seasonal cycles, swordfish fisheries land blue sharks greater (mean weight 25 kg) than albacore (3 kg). In the Northern Adriatic Sea, gillnets (often set for demersal species) also have a by-catch of pelagic species, with P. glauca taken during the summer. P. glauca is also caught by offshore pelagic fisheries along the Algerian coasts. Surface long-line fisheries that target tuna and swordfish, also catch P. glauca. Fishing activities targeting swordfish are more common in the southern parts of the Mediterranean (e.g. Italy, Malta, Morocco, Tunisia and Crete Island), and small driftnets may be used in some areas, having a by-catch of this species. A number of specimens may be taken in large driftnet fisheries, but this fishery is now prohibited by the EC, though non-EC nations may still use this gear. With the moratoria of drift nets in the Mediterranean (as of January 2002), it is expected that the undesired fishing mortality of this species will be reduced.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM.

PRECAUTIONARY REFERENCE POINTS: None.

STOCK STATUS: The Mediterranean is considered to host a separate stock of blue shark and should be managed as a separate unit. The blue shark is listed in the Barcelona Convention (App. III) and in the Bern Convention (App. III), even if it is the most common shark taken by pelagic fisheries. It is listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List because blue sharks are among the most abundant, widespread, fecund and faster growing elasmobranchs.

RECENT MANAGEMENT ADVICE: data should be collected in the ICCAT area. STECF COMMENTS: STECF recommends improving the data collection on the blue shark from all the fisheries involved, with the purpose of assessing the status of this stock. The EC drift-net ban should possibly result in a decrease in catches for this species.
14.2.5. Thresher shark (Alopias vulpinus)

**FISHERIES:** This pelagic species is sometimes taken by several fishing gears, always as by-catch, but it is often retained on board and sold on the market for its good price. In the Northern Adriatic Sea, gillnets (often set for demersal species) also have a by-catch of pelagic species, with *Alopias vulpinus* taken during the summer. A number of specimens of this species may be taken in large driftnet fisheries, but this fishery is now prohibited by the EC, though non-EC nations may still use this gear. With the moratoria of drift nets in the Mediterranean (as of January 2002), it is expected that the undesired fishing mortality of this species will be reduced. Surface long-line fisheries that target tuna and swordfish, also catch *A. vulpinus*. Fishing activities targeting swordfish are more common in the southern parts of the Mediterranean (e.g. by Italy, Malta, Morocco, Tunisia and Crete Island), and small driftnets may be used in some areas, having a by-catch of *A. vulpinus*.

Data on catches are extremely poor and sometimes include another species (*Alopias superciliosus*), much more rare in the Mediterranean. Studies conducted on Spanish, Italian and Greek large pelagic long-line fisheries report an incidence of 1% in weight on the total elasmobranch long-line catches in 1998 and 1.7% in 1999. According to the available data, CPUE values are very variable: 0.002 kg/1000 m in Italian drift-nets in 1991, 0.006 kg/1000 hooks in swordfish long-line and 0.02 kg in the US-type swordfish long-line in the period 1998-99. More recent catch data are not available.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** The Mediterranean is considered as a separate management unit for this species. A lack of catch data, incomplete knowledge of stock structure, and uncertainty over life history parameters make it impossible to determine population size and fluctuations and make this species to be listed as DD (Data Deficient) in the IUCN Red List.

**RECENT MANAGEMENT ADVICE:** none.

**STECF COMMENTS:** STECF recommends the collection of basic information on the catches, to better understand the current state of the stock. The EC drift-net ban should result in decreasing catches for this species.

14.2.6. Tope shark (Galeorhinus galeus)

**FISHERIES:** This pelagic species is taken by a variety of fishing gears, always as by-catch, but it is often retained on board and sold on the market. Data on catches are extremely scarce, often mixed with other species. Studies conducted on Spanish, Italian and Greek large pelagic long-line fisheries report an incidence of 0.84% on the total elasmobranch long-line catches in 1998 and 0.81% in weight in 1999. According to the available knowledge, CPUE data are very variable: in the period 1998-99 it shows values of 0.003 kg/1000 hooks in swordfish long-line and 0.01 kg in the US-type swordfish long-line. The analysis of the MEDITS trawl survey data from 1994-1999 shows a very low frequency of occurrence for *G. galeus* in the Mediterranean (only 5 positive hauls or 0.05%), although it should be noted that trawling is a minor threat to this species and numbers in trawl surveys would not be expected to be high. Its overall biomass was estimated to be 0.2 kg/km² for the Mediterranean. The standing stock biomass was estimated at 126 tonnes (0.23%). In the Adriatic Sea, the by-catch of trammel nets consists of several demersal species, including *Galeorhinus galeus*. In the Northern Adriatic, gillnet fisheries take this species especially during the spring and winter.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.
PRECAUTIONARY REFERENCE POINTS: None

STOCK STATUS: The Mediterranean is considered as a separate management unit for this species. It is considered as a medium priority species. Although there are no target fisheries for *G. galeus* in the Mediterranean, declines are suspected to have occurred, and it is only rarely seen as by-catch. Overfishing, together with habitat degradation caused by intensive bottom trawling, are considered the main factors that have produced the suspected decline of the Mediterranean stock. Due to lack of data to form the basis of an accurate assessment, the species is considered Data Deficient in the Mediterranean (IUCN Red List).

RECENT MANAGEMENT ADVICE: none.

STECF COMMENTS: STECF recommends the collection of basic information on catches, to better understand the current situation. The EC drift-net ban should result in decreasing catches for this species.

14.2.7. Smooth hammerhead (Sphyrna zygaena)

FISHERIES: A relatively common and widespread shark, captured in a number of fisheries throughout its range, mostly by gillnet and longline. There might be a significant mortality of this species in large-scale longline and driftnet fisheries, although the impact on populations is unknown at present. Fins from hammerhead sharks are prized in Asia and individuals caught as by-catch are unlikely to be released alive. Data on catches are extremely scarce. Studies conducted on Spanish, Italian and Greek large pelagic long-line fisheries report an incidence of 0.36% in weight on the total elasmobranch long-line catches in 1998 and 3.34% in 1999. CPUE data are rarely available: in the period 1998-99 shows values of 0.4 kg and 0.01 individuals per 1000 hooks in swordfish long-line. Total catches are only available for the Tyrrhenian Sea and the Strait of Sicily in 1994 and 1995, within the range of 2 to 5 tonnes per year. A number of specimens of this species may be taken in large driftnet fishery, which is now prohibited by the EC, though non-EC nations may still use this gear. With the moratoria of drift nets in the Mediterranean (as of January 2002), it is expected that the undesired fishing mortality of this species will be reduced.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM.

PRECAUTIONARY REFERENCE POINTS: None

STOCK STATUS: It is listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

RECENT MANAGEMENT ADVICE: none.

STECF COMMENTS: STECF recommends the collection of basic information on catches, to better understand the current situation. The EC drift-net ban may result in a decreased catch for this species.


FISHERIES: In Mediterranean waters the genus *Carcharhinus* is represented by 8 different species (taxonomic problems possibly exist), many of which occur primarily in the western parts, close to the Gibraltar Strait (FAO statistical sub-area 1.1) and North African coasts. This genus contains several coastal and oceanic species, and they are often taken as by-catch. In Libya they can sometimes be considered as target species. Management units are suggested for all species known to occur in the Mediterranean, except for the blacktip shark *C. limbatus*, which is a Lessepsian migrant (i.e. had invaded the eastern Mediterranean from the Red Sea) and not native to EC waters. Surface long-line fisheries that target tuna and swordfish also catch *Carcharhinus*
spp. A number of specimens may be taken in large driftnet fisheries, but this fishery is now prohibited by the EC, though non-EC nations may still use this gear. With the moratoria of drift nets in the Mediterranean (as of January 2002), it is expected that the undesired fishing mortality of this species will be reduced. Important catches of carcarinids species (*C. brachyurus*, *C. brevipinna*, *C. falciformis*, *C. obscurus*, *C. plumbeus* and *C. altimus*) are obtained by pelagic long-line fishery operating from ports in the east of the Algeria. More recent catch data are not available.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** Sandbar shark (*Carcharhinus plumbeus*) is one of the most widely distributed members of this genus in the Mediterranean, and it has important nursery grounds in certain areas (e.g. in FAO sub-area 3.1). As a preliminary measure, three separate management units are proposed (FAO statistical areas 1, 2 and 3). It is listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

 Spinner shark *Carcharhinus brevipinna* and blacktip shark *C. limbatus* are both widely distributed throughout the Mediterranean, although they may be more common along the coasts of North Africa. The suggested management unit for these two species is the Mediterranean. They are listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

 Bignose shark *Carcharhinus altimus*, copper shark *C. brachyurus*, and dusky shark *C. obscurus* are all species that occur in the Northeast Atlantic and western Mediterranean, although occasional specimens are recorded from eastern Mediterranean basins. Each of these species should be managed for the Northeast Atlantic, including the Mediterranean. *C. brachyurus* is listed as Near Threatened (NT) and *C. brachyurus* LR/nt (Lower Risk, near threatened) in the IUCN Red List.

 Silky shark *Carcharhinus falciformis* is an oceanic species that is occasionally reported from the Mediterranean and off Spain. This species should be managed as a North Atlantic population, which includes the Mediterranean.

**RECENT MANAGEMENT ADVICE:** none.

**STECF COMMENTS:** STECF recommends the collection of basic information on catches.

### 14.2.9. Sixgill shark (*Hexanchus griseus*)

**FISHERIES:** This large demersal species is occasionally taken by several fishing gears, always as by-catch, and sometimes retained on board and sold on the market. Data on catches are extremely scarce. Studies conducted during the MEDITS project (1994-1999) assess the standing stock biomass in the Mediterranean at about 440 tonnes. Deep commercial trawl surveys (1998-99) in the western Italian basins show yields of about 1.2 kg/hour in average, with a peak of 4.7 kg/h in the Tyrrhenian Sea. Surface long-line fisheries that target tuna and swordfish also catch *Hexanchus griseus*. More recent catch data are not available.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** Due to the little information available, the stock should be managed for the whole Mediterranean. It is listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

**RECENT MANAGEMENT ADVICE:** none.

**STECF COMMENTS:** STECF recommends the collection of basic information on catches, to better understand the current situation of this long-living species.
14.2.10. **Spurdog (Squalus acanthias)**

**FISHERIES:** This demersal species is commonly taken by trawlers and often retained on board and sold on the market. Data on catches are good in some countries (i.e.: Greece) and poor in others, according to the various statistical systems adopted. Total catches of spurdog in Greece reached 36.8 tonnes in 2000, 28 tonnes in 2001 and 30.9 tonnes in 2002. Studies conducted during the MEDITS project (1994-1999) assess the standing stock biomass in the Mediterranean at about 6,682 tonnes. Deep commercial trawl surveys (1998-99) in the western Italian basins show yields of about 0.14 kg/h in average, with a peak of 0.64 kg/h in the Sardinian Sea. In the Adriatic Sea, the by-catch of trammel nets consists of several demersal species, including *Squalus acanthias*. In the Northern Adriatic Sea, gillnet fisheries take this species especially during the spring and winter. More recent catch data are not available.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** Although naturally abundant, this is one of the more vulnerable species of shark to over-exploitation by fisheries because of its late maturity, low reproductive capacity, longevity, long generation time (25-40 years) and hence a very low intrinsic rate of population increase (2-7% per year). Population segregation and an aggregating habit make mature (usually pregnant) females highly vulnerable to fisheries even when stocks are seriously depleted. Mediterranean and Black Sea stocks are unmanaged, with a >60% decline reported in a Black Sea stock assessment for 1981-1992. For these reasons this species was listed as Endangered for the Mediterranean and Black Sea by the IUCN Red List (EN A2bd+4bd).

**RECENT MANAGEMENT ADVICE:** Due to the information available, the stock should be separately managed in the Western Mediterranean, in the Eastern Mediterranean and in the Black Sea.

**STECF COMMENTS:** STECF recommends the collection of data on catches, separated for the management unit proposed.

14.2.11. **Lesser spotted dogfish (Scyliorhinus canicula)**

**FISHERIES:** The small-spotted catshark *Scyliorhinus canicula* is common over all the shelf of the northern Mediterranean Sea excluding the southern portion of Italy where it is very scarce. Trawlers and set gillnets very commonly take this demersal species which is often retained on board and sold on the market. Data on catches are good in some countries (i.e.: Greece) and poor in others, according to the various statistical systems adopted. Total catches of lesser-spotted dogfish in Greece reached 17.3 tonnes in 2000, 20.5 tonnes in 2001 and 19.2 tonnes in 2002. Studies conducted during the MEDITS project (1994-1999) showed a high frequency of occurrence (>5% of the hauls) and abundance (>10 kg/km² or >10% of relative biomass) for this species. MEDITS project assessed the standing stock biomass in the Mediterranean at about 8,396 tonnes, the highest value among all the elasmobrach species. The highest densities of the mentioned species (more than 100 kg/km²) are located around Corsica and Sardinia Islands, but significant densities (30-50 kg/km²) can also be found in the Gulf of Lion, Catalan and Aegean Seas. Because of the large extension of the Greek shelf in the Aegean Sea, and perhaps also due to under-exploitation, here is located the most representative biomass of small-spotted catshark in the Mediterranean (about 2,900 tons).

By analysing the western part of the Mediterranean coasts from France to Morocco, *S. canicula* shows a latitudinal distribution pattern, with both density and biomass dominating in Catalan Sea and decreasing towards lower latitudes (Morocco).
The presence of *S. canicula* in the Mediterranean Sea is mainly linked to the continental shelf with the highest densities between 50 and 200 m. The main concentration areas of the juveniles (total length <28 cm, weight <68 g) are located at greater depths, essentially between 200 and 500 m (Corsica and Sardinia), with the exception of the western Morocco (100-200 m depth).

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** This species is considered vulnerable but with a medium-low priority. Indications at the present time are that this species is Least Concern (LC, proposed for the IUCN Red List).

**RECENT MANAGEMENT ADVICE:** Due to the information available, the Mediterranean stock should be managed according to the local populations identified.

**STECF COMMENTS:** STECF recommends the collection of data on catches and basic biological data to better define the stock status and the local populations.

### 14.2.12. Blackmouth catshark (*Galeus melastomus*)

**FISHERIES:** Common to abundant where it occurs, from upper continental slope between 200 and 1200 m of depth, mainly at 300 to 400 m in all the Mediterranean basin (excluding north Adriatic sea and the Black sea). Blackmouth catshark is often taken as by-catch by trawl nets and bottom long-lines and has not a high commercial value with most captured specimens discarded at sea, especially in the Italian seas. Studies conducted during the MEDITS project (1994-1999) show no apparent trend in density over the time. The species shows a high occurrence and abundance (>5% of the hauls and >10 kg/km² or >10% of relative biomass) throughout the areas surveyed. Particularly high abundances were found in the Alboran Sea, central Tyrrhenian, south Adriatic Sea and the Sicilian Channel, with locally very high concentrations up to 480 kg/km². The standing stock biomass in the Mediterranean was assessed at about 6,891 tonnes, one of the highest values among all the elasmobrach species. Deep commercial trawl surveys (1998-99) in the western Italian basins show yields of about 1.3 kg/hour in average, with a peak of 2.7 kg/h in the central Tyrrhenian Sea. Along Morocco, Spain, France and around Crete Island the specimens larger than 30 cm of total length are dominating (78% of the total). The opposite happens around Corsica and Sicily islands, in the Ionian, and south Adriatic and Aegean Seas, where the specimens over 30 cm only represent the 23% of the total sampled population. An intermediate situation can be observed in the Tyrrhenian Sea where 44% of the sampled population is below 30 cm TL. The absence of negative trends of abundance at sea suggests that the current levels of catches and mortality by age produced by fishing activity are sustainable. Moreover, considering its low commercial value, all the individuals under the size at first maturity are discarded and only a small fraction of adults are landed.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** All indications at the present time are that this species is Least Concern (LC, proposed for the IUCN Red List). Mature individuals of this species are found at the shallowest depths exploited by commercial deepwater trawl vessels, targeting these sharks. The targeting of mature individuals may lead to detrimental impacts and thus the species should be monitored.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF recommends the collection of basic data on catches.
14.2.13. Blue stingray (Pteroplatytrigon violacea)

**FISHERIES:** This species is very commonly taken by pelagic gears (long-lines, drift-nets) as by-catch and more rarely by trawlers; it is sometimes retained on board and sold on the market. Data on catches are usually extremely poor. Studies conducted during the MEDITS project (1994-1999) based on trawl surveys assess the standing stock biomass in the Mediterranean at only 5 tonnes, due to the fact that this species is much more common in surface fisheries. On the opposite, this species represented 9.3% in weight of the total catches obtained by swordfish long-lines in 1991 in the Tyrrhenian Sea. The CPUE shows values of 15.9 kg and 3.53 individuals/1000 hooks in the large pelagic fishery in the Tyrrhenian Sea. A number of specimens may be taken in large driftnet fisheries, but this fishery is now prohibited by the EC, though non-EC nations may still use this gear. With the moratoria of drift nets in the Mediterranean (as of January 2002), it is expected that the undesired fishing mortality of this species will be reduced. During twenty-two GRUND surveys carried out from 1985 to 1998 in the Italian waters the percentage presence of *P. violacea* was low (6.2%). The highest medium yields (kg/h) were registered in the central and southern Tyrrhenian sea in 1998 (5 kg/h) and in 1996 (3.3 kg/h), even if the average catches in numbers were very low (0.1 and 0.2 N/h respectively). In the waters off north Sicily, from 1990 to 1995, were registered very low average catches in number of individuals and biomass: 0.3-0.8 N/h and 0.52-1.80 kg/h. In this area were probably caught smaller individuals. *P. violacea* was always caught between 0 and 50 m of depth.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** Proposed as Near Threatened (NT) species for the IUCN Red List.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF recommends the collection of basic data on catches, due to the high number of specimens reported in surface fisheries.

14.2.14. Skates (Rayformes)

**FISHERIES:** Fifteen species of skate occur in the Mediterranean Sea (*Dipturus batis, D. oxyrynchus, Leucoraja circularis, L. fulonica, L. melitensis, L. naevus, Raja asterias, R. brachyura, R. clavata, R. miraletus, R. montagui, R. polystigma, R. radula, R. undulata and Rostroraja alba*), including several species of Atlantic skate that are distributed in the western Mediterranean only, with fewer species occurring in the eastern Mediterranean. As in Atlantic regions, the genus *Raja* dominates in coastal waters, with *Leucoraja* spp. and *Dipturus* spp. abundant further offshore. For example, Italian fisheries operating in deep-waters (350-800 m) take *D. batis, D. oxyrinchus, and L. circularis.* There are two endemic skates present: the Maltese ray (*Leucoraya melitensis*) and speckled ray (*Raya polystigma*). For *Raja asterias*, a nursery ground in the Tyrrhenian Sea was reported. All these species are very commonly taken by trawlers and by artisanal coastal fisheries; some of them are retained on board and sold on the market. Data on catches are usually extremely poor and mixed. Studies conducted during the MEDITS project (1994-1999) based on trawl surveys assess the standing stock biomass in the Mediterranean of all these species at 16,744 tonnes in total. The most common species is *Raya clavata,* having a standing stock biomass of 8,151 tonnes. Good catch rates of *R. clavata* are found in the Gulf of Lions, Corsica, Sardinia and Greece waters. It is worth noting that up 64% of the total Mediterranean chondrichthyans biomass is located in the Aegean Sea, where trawling deeper than 400 m is practically inexistent. Considering the mean size at first maturity calculated
for all the Mediterranean area, the Ionian Sea is the most important area where the juvenile specimens are concentrated.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM.

PRECAUTIONARY REFERENCE POINTS: None.

STOCK STATUS: No data.

RECENT MANAGEMENT ADVICE: Protection measures of coastal and offshore nurseries areas of these species should be enforced.

STECF COMMENTS: STECF recommends the collection of basic data on catches, due to the importance of their total volume.

14.3. Pelagic sharks (Atlantic Ocean)

Pelagic sharks are caught in a variety of gears in the Atlantic Ocean, Gulf of Mexico and Caribbean, including longlines, gillnets, handlines, rod and reel, trawls, trolls, and harpoons, but they are mostly caught as by-catch in pelagic longline fisheries targeting tuna and swordfish and sometimes targeted. There are also recreational fisheries in some countries like the United States, Canada, EC-UK, EC-Ireland and EC-Portugal. Surface longline fisheries for tuna and billfish fisheries has developed rapidly since the 1940s and the 1980s, most of which were discarded due to their low value. During the late 90’s the total landings of pelagic sharks from the swordfish fishery had risen to over 42,000 t, with about 85% of the landings comprising blue shark. In recent years the by-catch landings of pelagic sharks from the Atlantic have decreased due to ICCAT regulation measures regarding swordfish. Little is known on the pelagic sharks taken in European fisheries. In the DELASS (Development of Elasmobranch Assessments) Final Report (Heessen 2003) there is a description of the European fisheries catching blue sharks. Off the West African coast there are local artisanal fisheries and industrial fisheries for tuna and tuna-like species by EC vessels, which are known to have significant by-catches of sharks, a part of which is discarded at sea. Information and data which can be used to describe the fisheries of pelagic sharks in the Central and South Atlantic and their evolution are, therefore, generally scarce compared to those for teleost fisheries, though this situation has improved through ICCAT efforts. The species of sharks caught in tuna fisheries consists mainly of blue shark *Prionace glauca*, hammerheads, mainly *Sphyrna lewini* and *S. zygaena* (juveniles and adults) and short-fin mako *Isurus oxyrinchus*. Other regularly caught species are *Carcharhinus* sp., *Mustelus mustelus*, *Leptocharias smithii* and thresher shark *Alopias vulpinus*. The use of the category NEI sharks (Not Elsewhere Included) is widespread for pelagic sharks. For mako and blue sharks, ICES is only a small part of the stock area and efforts at assessment have been made by ICCAT. However, the lack of complete catch, landings or dead discards data has hampered these efforts. There is in particular a lack of data from the ICES area for these pelagic sharks.

14.3.1. Blue shark (Prionace glauca)

FISHERIES: Currently blue sharks are taken mostly by swordfish longline vessels operating in the Atlantic Ocean, Gulf of Mexico and Caribbean. Apart from these longline fisheries, the most important source of mortality on blue sharks probably arises where they are taken as a by-catch in the high seas longline and driftnet fleets targeting tuna and billfish from the nations of Japan, Taiwan, Korea and Russia. These fisheries operate throughout the blue shark's geographical range. There is usually no requirement for these fisheries to record their blue shark catch and,
because the entire catch is not retained on all fishing trips, the available landing data might not be indicative of stock trends. The most recent database provided by ICCAT shows that the blue shark catches dramatically increased in the late 1990s, reaching a peak of 37,000 t in 1997, remaining stable thereafter around 34,000 t. In 2005 there was a marked decrease to just less than 19,000 t.

**SOURCE OF MANAGEMENT ADVICE:** The main recent sources of information and advice on blue shark are ICES and ICCAT. The later have produced the most recent reports on this species. Two separated stocks are considered by ICCAT: North Atlantic and South Atlantic.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been agreed for blue shark in Atlantic Ocean.

**STOCK STATUS:** The STECF-SGRST Working Group Report on Elasmobranch Fishes estimated that blue shark in the Northeast Atlantic is heavily exploited as target and by-catch, and the stock is depleted. It is classified as near threatened in the IUCN Red list. ICCAT performed in 2004 the first stock assessment for the north and south Atlantic stocks, reporting that the current biomass appears to be above the biomass that would support MSY. In many of the model runs conducted, stock status appeared to be close to unfished biomass levels. However, the results are highly conditional on the assumptions made. Those assumptions include (i) estimates of historical shark catch, (ii) the relationship between catch rates and abundance, (iii) the initial state of the stock in 1971, and (iv) various life-history parameters. Until better statistics are available, ICCAT reports that it will be difficult to provide better evaluations of stock status.

**RECENT MANAGEMENT ADVICE:** There is no species specific management advice for blue sharks in the Atlantic Ocean.

**STECF COMMENTS:** There is a need for long-term database of blue shark data. STECF recommends that all EU fleets operating in the Atlantic Ocean provide required input data on catch, effort and catch-at-size and also a broader use of trade statistics (fins, etc.) to extend the historical time series of estimates of removals. EC should encourage other nations to report their blue shark catch data.

### 14.3.2. Shortfin Mako (Isurus oxyrinchus)

**FISHERIES:** The shortfin mako is a high sea pelagic and highly migratory species being caught frequently as bycatch mostly in longline fisheries targeting tuna and billfish. There is considerable bycatch of shortfin mako sharks in Japanese tuna longliners operating in the Atlantic. Documentation is incomplete but annual estimates of shortfin mako bycatch of 300 to 500 t have recently been published. Observations on fin trade markets in Asia, e.g. Hong Kong and the numbers of fins traded there, led to even higher estimates of catch numbers of Atlantic tuna longliners, ranging from 130,000 to 180,000 t of blue shark annually in the recent past. However the most recent database provided by ICCAT shows that the shortfin mako catches have steadily increased in the last 20 years with record levels of over 7,000 t in 2003 and 2004. The reported catch for 2005 was below 3,800 t.

**SOURCE OF MANAGEMENT ADVICE:** The main recent sources of information and advice on mako shark are ICCAT and ICES. ICCAT completed a stock assessment in 2004 but no management recommendations were made.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been agreed for shortfin mako in the Atlantic Ocean.
STOCK STATUS: In 2004, ICCAT has held an assessment meeting to assess stock status of shortfin mako. The North Atlantic shortfin mako shark stock is likely to have historically experienced some level of stock depletion as suggested by the historical CPUE trend and model outputs. The ICCAT/SCRS do cannot rule out the possibility that the current stock size is below the biomass that can support MSY, as trends in CPUE suggest depletions of 50% or more. For the South Atlantic, the stock may have decreased since 1971, but the magnitude of decline appears to be less than in the North Atlantic. The current stock biomass may be above the biomass at MSY, but due to the lack of a clear signal from the catch rates, there is a wider variety of possible historical stock trends: from virtually undepleted, to fully exploit. The assessment of shortfin mako stocks is also highly conditional on the assumptions listed above for blue shark. In particular, life history parameters of shortfin mako shark are more uncertain than for blue shark.

RECENT MANAGEMENT ADVICE: ICCAT/SCRS believes measures to reduce fishing mortality should be taken in order to improve the status of this stock. However, because the overall knowledge on catch levels is inadequate, as shortfin mako sharks are taken in a broad range of fisheries, both as targeted catch and as by-catch, there is no basis for recommending catch limits for this stock. Although technical measures such as modifications to fishing gear, restrictions on fishing areas and times, minimum or maximum sizes for allowable retained catch might prove beneficial. Reductions in fleet capacity and effective effort could provide the most direct benefit to shortfin mako sharks.

STECF COMMENTS: There is a need for long-term database of shortfin mako data. STECF recommends that all EU fleets operating in the Atlantic Ocean provide required input data on catch, effort and catch-at-size and also a broader use of trade statistics (fins, etc.) to extend the historical time series of estimates of removals. EC should encourage other nations to report their shortfin mako catch data.

14.3.3. Porbeagle (Lamna nasus) in the north-east Atlantic

FISHERIES: Porbeagle is a highly migratory and schooling species. Sporadic targeted fisheries develop on these schools. Porbeagle fisheries are highly profitable. The main countries catching or having caught porbeagles are Spain and France. However in the past, important fisheries were prosecuted by Norway, Denmark and Faeroe Islands.

The only regular, directed target fishery that still exists is the French fishery. Several countries have sporadic fisheries taking porbeagles (which also takes occasional tope and blue sharks), in North Sea, west of Ireland and Biscay, as they appear. These include Denmark, UK, and French vessels fishing to the south and west of England. There is a bycatch by demersal trawlers from many countries, including Ireland, UK, France and Spain.

SOURCE OF MANAGEMENT ADVICE: The main recent sources of information and advice on porbeagle in the Northeast Atlantic is ICES. There is no fishery-independent information on this stock. Landings data for porbeagle may be reported as porbeagle, as various sharks nei, or as Sharks, rays, skates, etc. nei in the official statistics. This means that the reported landings of porbeagle are likely an underestimation of the total landing of the species from the NE Atlantic.

PRECAUTIONARY REFERENCE POINTS: No precautionary reference points have been agreed for porbeagle in the Northeast Atlantic.

STOCK STATUS: Available information from Norwegian and Faroese fisheries shows that landings declined strongly and these fisheries ceased in the ICES area. These fisheries have not resumed, implying that the stock has not recovered, at least in the areas where those fisheries took place. The available information from the French fishery suggests that CPUE reached a peak
in 1994 and afterwards has declined. The CPUE has been stable at a much lower level since 1999, despite relatively constant number of vessels involved.

Porbeagle is subject to the UN agreement on highly Migratory Stocks and the UK Biodiversity priority list. In IUCN, porbeagle is classified as Vulnerable for the depleted unmanaged population in the northeast Atlantic, and Lower Risk (conservation dependent) for the northwest Atlantic, in recognition of the introduction of the US and Canadian Fisheries Management Plans (IUCN 2000).

**RECENT MANAGEMENT ADVICE:** No targeted fishing for porbeagle should be permitted on the basis of their life history and vulnerability to fishing. In addition, measures should be taken to prevent by-catch of porbeagle in fisheries targeting other species, particularly in the depleted northern areas.

**STECF COMMENTS:** STECF agrees with ICES.

### 15. European eel

**FISHERIES:** The European eel (*Anguilla anguilla* (L.)) is found and exploited in fresh, brackish and coastal waters in almost all of Europe, in northern Africa and in Mediterranean Asia. Eel fisheries are found throughout the distribution area. Fisheries are generally organised on a small scale (a few fishermen catching 1-5 tonnes per year) and involve a wide range of gears. The fisheries are managed on a national (or lower, regional or catchment) level. Landings peaked around 1965 at 40,000 tonnes, since when a gradual decline occurred to a historical low of 20,000 tonnes in the late 1990s, but throughout the decades, landing statistics cover only about half the true catches. Recent years show a rapid decline in reported catches, to below 10,000 tonnes. Recruitment remained high until 1980, but declined afterwards, to a historical low level of only 2% of former levels in 2001, and has remained low since. Aquaculture of wild-caught recruits (glass eel) has been expanding since 1980, in Europe as well as in eastern Asia (using European glass eel). Other anthropogenic factors (habitat loss, contamination and transfer of diseases) have had negative effects on the stock, most likely of a magnitude comparable to exploitation.

**SOURCE OF MANAGEMENT ADVICE:** Management advice has been provided by ICES/ACFM and FAO/EIFAC. The joint ICES/EIFAC working group is the main assessment body.

**STOCK STATUS:** In the absence of defined reference points, the state of the stock cannot be fully evaluated. An analytical assessment of the state of the European eel stock is not available and reference points for the stock have not been defined. Nevertheless, all available information indicates that the stock is at a historical minimum in most of the distribution area and continues to decline. Fishing mortality is thought to be high both on juvenile (glass eel) and older eel (yellow and silver eel). Recruitment is at a historically low level (15% of the pre-1980 level) and most recent observations do not indicate recovery. Estimated total yield has declined to about half that of the mid-1960s.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been agreed for eel. The EC proposal for an Eel recovery plan (COM(2005) 472) is based on target reference points of a 40% escapement of adult silver eel from each river basin. Exploitation that leaves 30% of the virgin spawning stock biomass is generally considered to be a reasonable target for escapement. Due to the large uncertainties in eel management and biology (one single stock,
spawning only once in their lifetime), ICES has proposed an escapement target of 50% (ICES, 2003). An intermediate rebuilding target could be the pre-1980s average SSB level which has generated normal recruitments in the past.

MANAGEMENT OBJECTIVES: The European Commission has presented a proposal for the recovery of the European eel stock (COM(2005) 472 final). The objective of this Eel Recovery plan is to achieve a recovery of the stock of European eel to previous historic levels of adult abundance and the recruitment of glass eel. More specifically: the principal element of the Regulation is the establishment of national eel management plans, by means of which each Member State will achieve the objective of a 40% escapement of adult silver eel from each river basin (measured with respect to undisturbed conditions). The proposal by the European Commission has not yet been accepted by the Council of Ministers.

RECENT MANAGEMENT ADVICE: Exploitation boundaries in relation to precautionary considerations: The recruitment of glass eels to Europe has showed a sharp decline in the last 25 years. The historically low recruitment levels in recent years are an indication that the reproduction is seriously impaired and that the stock is likely to be severely depleted. In order to restore the spawning stock, protective measures have to be implemented. ICES repeats its recommendation that a recovery plan for the whole stock should be implemented urgently. An important element of such a recovery plan should be a ban on all exploitation (including eel harvesting for aquaculture) until clear signs of recovery can be established. Other anthropogenic impacts should be reduced to a level as close to zero as possible.

STECF COMMENTS: STECF agrees with the advice of ICES and EIFAC and notes that the long-standing call for the introduction of an international management plan has recently been proposed by the European Commission. This proposal follows a wide-ranging consultation between Member States and stakeholders. STECF further notes that the proposal has not yet been agreed and recommends that it be adopted and implemented as soon as practicable. Development of adequate tools for setting reference points, for stock assessment, and for post-evaluation will be required, to support the development of national management plans.

16. Regional mixed fishery advice for the ICES area

16.1. Mixed Fisheries Advice for Demersal fisheries in Division IIIa (Skagerrak-Kattegat), in Subarea IV (North Sea) and in Division VIIId (Eastern Channel)

Identification of critical stocks
The stocks for which spawning stock biomass is at reduced reproductive capacity are: cod in the North Sea, Eastern Channel and Skagerrak; cod in Kattegat; sandeel and Norway pout in the North Sea. Those stocks where fishing mortality indicates unsustainable harvesting of the stock are cod in the North Sea, Eastern Channel and Skagerrak, cod in Kattegat. The North Sea mackerel component is still considered to be severely depleted and should be protected. These stocks are of overriding concern in the management of all these fisheries:
• For cod in the North Sea, Eastern Channel and Skagerrak, for cod in Division IIIa, North Sea and Eastern Channel and for cod in Kattegat, it is not possible to identify any non-zero catch which will be compatible to the precautionary approach. ICES therefore recommends a zero catch;

• For sandeel and Norway pout in the North Sea ICES recommends that the fishery should remain closed until information is available which indicates that the stock can be rebuilt to $B_{pa}$ by 2008. For sandeel, the information on which this could be based includes a survey in December 2006 and exploratory fishing in April 2007. For Norway pout the IBTS surveys in February 2007 will provide the necessary information.

• For sole in the North Sea, which is at risk of being harvested unsustainably, ICES recommends that catch should be less than 10 800 t in order to allow SSB to reach $B_{pa}$ in 2008.

There is also concern about the overexploitation of North Sea herring, caused by the serial poor recruitment and increase in fishing effort. ICES recommends that the catch of herring should be reduced to around 275 000 tonnes from all fleets, implying a TAC of approximately 240 000 t for fleet A and a bycatch of 5000-9000 tonnes for fleet B.\footnote{Fleet A: Directed herring fisheries with purse seiners and trawlers (with 32-mm minimum mesh size) in the North Sea. Bycatches in industrial fisheries by Norway are included. Fleet B: Herring taken as bycatch in the small-mesh fisheries in the North Sea (with mesh size less than 32 mm).}

There are also concern about the stocks of spurdog, porbeagle, and most other ray species taken as bycatch in fisheries directed at other species.

Advice for fisheries management

Fisheries in Division IIIa (Skagerrak-Kattegat), in Subarea IV (North Sea) and in Division VIIId (Eastern Channel) should in 2007 be managed according to the following rules, which should be applied simultaneously:

Demersal fisheries

• with minimal bycatch or discards of cod;

• Implement TACs or other restrictions that will curtail fishing mortality for those stocks mentioned above for which reduction in fishing pressure is advised;

• within the precautionary exploitation limits for all other stocks (a text table is provided in the ICES North Sea overview)

• Where stocks extent beyond this area, e.g. into Division VI (saithe and anglerfish) or is widely migratory (Northern hake) taking into account the exploitation of the stocks in these areas so that the overall exploitation remains within precautionary limits;

• With minimum by-catch of spurdog, porbeagle and thornback ray and skate.

Pelagic fisheries exploiting herring (western Baltic spring spawning and North Sea autumn spawning stocks), mackerel and horse mackerel

• with minimal bycatch or discards of cod;
• with minimal catch of North Sea mackerel, respecting the closed season;
• within the precautionary exploitation limits for the herring stocks taking into account the exploitation of herring in the western Baltic (Subdivisions 22-24);
• Where stocks extent beyond this area, e.g. widely migratory species (NEA mackerel and blue whiting) taking into account the exploitation of the stocks in these areas so that the overall exploitation remains within precautionary limits;

Fisheries with small meshed gears for industrial purposes
• with minimal bycatch of cod and other fish used for human consumption;
• without fishing for Norway pout or sandeel except if the fisheries are reopened on basis of information that they will rebuild to Bpa.
• within the single-stock exploitation limits for all other stocks (see text table provided in the ICES North Sea overview)

STECF COMMENTS: STECF has no comments.

16.2. Mixed Fisheries Advice for West of Scotland and Rockall (Sub-area VI; Northern Shelf demersal fisheries)

Identification of critical stocks
A summary table identifies the stocks outside precautionary reference points. Spurdog, cod in Division VIa, and whiting in VIa are in a critical state. Stocks for which reduction in exploitation is required is haddock in Division VIa.

• for the cod and spurdog in Division VIa, ICES recommends a zero catch;
• for whiting in VIa ICES recommends the lowest possible catch
• reduction in fishing mortality has been advised for haddock in VIa

Advice on fisheries management
Demersal fisheries in Subarea VI should, in 2007, be managed according to the following rules, which should be applied simultaneously:
They should fish:
• Without catch and discards of cod in Subarea VI;
• With the lowest possible catch of whiting in VIa
• Without catch or discards of spurdog;
• Without jeopardizing the recommended reduction in fishing mortality of haddock in Division VIa
• Concerning deep water stocks fished in Subarea VI (see Volume 9)
• within the biological exploitation limits for all other stocks (according to the table in the ACFM advice)

Furthermore, unless ways can be found to harvest species caught in mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.
**STECF COMMENTS:** STECF notes that ICES has not assessed the catch implications under mixed fisheries considerations where agreed management plans exist.

### 16.3. Mixed Fisheries Advice for the Irish Sea (Division VIIa)

**Identification of critical stocks**

The critical stocks are spurdog, cod, whiting, and sole. For haddock a reduction in exploitation is required. These stocks are the overriding concerns in the management advice for all fisheries where the interactions between stocks taken in the same fisheries should be considered:

- for cod the advice is for zero catch;
- for spurdog the advice is for zero catch;
- for sole the advice is a zero catch or recovery plan that ensures safe and rapid rebuilding of SSB to levels above $B_p$;
- for whiting the advice is to reduce catch to the lowest possible levels.
- for haddock a reduction in exploitation is required.

**Advice on fisheries management**

Fisheries in the Irish Sea should in 2007 be managed according to the following rules, which should be applied simultaneously:

They should fish:

- without bycatch or discards of cod, sole and spurdog, and with minimal catch of whiting;
- without jeopardizing the recommended reduction in fishing mortality of haddock;
- within the biological exploitation limits for all other stocks.

Furthermore, unless ways can be found to harvest species caught in mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.

**STECF COMMENTS:** STECF notes that ICES has not assessed the catch implications under mixed fisheries considerations where agreed management plans exist. However STECF notes that work is in progress to define operational fishery units, which is intended to facilitate fleet-based management.

### 16.4. Mixed Fisheries Advice for Demersal fisheries in Celtic Sea, areas West of Ireland and the Western Channel.

ICES advice regarding the management of demersal fisheries West of Ireland (Divisions VIIb,c), in the Celtic Sea and Southwest of Ireland (Divisions VIIf,g,h,j,k) and the Western Channel (Division VIIe) takes into consideration the mixed nature of these fisheries.
According to ICES, the main interactions between the stocks in the Celtic Sea, Southwest of Ireland and the Western Channel are between:

- anglerfish, megrim, and hake in the otter board trawl fishery in medium to deep water;
- Nephrops, cod, and whiting in the Nephrops fishery in the Celtic Sea, and between Nephrops and hake in the Bay of Biscay;
- gadoids (cod, haddock, and whiting) within the trawl fishery for roundfish, mainly within Divisions VIIIf,g;
- sole and plaice in the beam trawl fishery in Divisions VIIIf,g and VIIe, and sole and anglerfish in VIIIa,b;
- haddock, whiting, cod, sole, plaice, hake, megrim, anglerfish, squid, elasmobranchs, and other species within the mixed demersal trawl fisheries.

The directed fisheries for hake (trawl, longlines, and gillnets) have few interactions with other stocks.

For 2006, ICES identifies the Spurdog stock and cod in VIIe-k as being in a critical state. Furthermore, several stocks require reduction in exploitation: sole and plaice in Divisions VIIIfg; plaice and sole in Division VIIe; Celtic Sea herring and VIIa VIIbc herring. These stocks are the overriding concerns in the management advice for all fisheries where the interactions between stocks taken in the same fisheries should be considered:

- For spurdog and cod in VIIe-k the advice is for a zero catch;
- For sole and plaice in Division VIIe, and plaice in Division VIIIf,g: either catches in 2007 as indicated in the single species advice, or recovery plans to define the limits within which the fisheries can take place and which ensure a large reduction in F in 2007;
- Reduction in fishing mortality has been advised for sole in Divisions VIIIfg; for plaice and sole in Division VIIe; for Celtic Sea herring and VIIa VIIbc herring.
ICES advises that, in 2007, the fisheries in the Celtic Sea, Southwest of Ireland and Western Channel should be managed according to the following rules, which should be applied simultaneously:

They should fish:
- With no catch or discard of spurdog and cod in VIIe-k;
- without jeopardizing the recommended reduction in fishing mortality of sole and plaice in Divisions VIIIfg; plaice and sole in Division VIIe; Celtic Sea herring and Via VIIbc herring;
- concerning deepwater stocks fished in Subareas VII and VIII,
- within the biological exploitation limits for all other stocks.

Furthermore, unless ways can be found to harvest species caught in mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.

**STECF COMMENTS:**

STECF notes that ICES has not assessed the catch implications under mixed fisheries considerations where agreed management plans exist. However STECF notes that work is in progress to define operational fishery units which is intended to facilitate fleet-based management.

### 16.5. Mixed fisheries advice for the Bay of Biscay and Iberian waters (Div. VIIIc and Sub-areas IX and X)

The fisheries in the Bay of Biscay and Atlantic Iberian Peninsula exploit demersal and pelagic fish species, crustaceans and cephalopods. The main pelagic species in the Iberian Peninsula are sardine and anchovy (small pelagic) and mackerel and horse mackerel (middle-size pelagic). Also characteristic are other species more common to temperate and subtropical waters, such as chub mackerel (*Scomber japonicus*), Mediterranean horse mackerel (*Trachurus mediterraneus*), and blue jack mackerel (*Trachurus picturatus*). Small pelagic fishes are generally caught by purse seiners, while a wider variety of gears are used to catch middle-sized pelagic fishes, e.g. handlines and bottom trawl gears. The demersal fisheries mainly target the following southern stocks: hake, megrim, four-spot megrim, anglerfish (*Lophius piscatorius* and *L. budegassa*), and *Nephrops*.

**Identification of critical stocks**

The critical stocks which are below $B_{lim}$ are the southern hake stock and anchovy in Subarea VIII. ICES has advised that there are no catches on *Nephrops* for FU 25 (Northern Galicia), FU 31 (Cantabrian Sea), and FUs 26–27 (West Galicia and North Portugal), and for both southern anglerfish species a fishing mortality equal to zero in 2007 is required to bring SSB back to $B_{MSY}$ in the short term. These should also be considered critical stocks. Other stocks for which reduction in exploitation is required are the NEA mackerel and sole in Bay of Biscay.

These stocks are the overriding concerns in the management advice for all fisheries where the interactions between stocks taken in the same fisheries should be considered.

**ICES advice for fisheries management**

Sardine and anchovy should be fished according to the single-stock boundaries.
The demersal fisheries in the Iberian Region should be managed such that the following rules apply simultaneously:

- For southern hake, anglerfish, *Nephrops* in FU 25, FU 31, and FUs 26–27: zero catch unless a rebuilding plan is implemented which is consistent with the precautionary approach.
- For anglerfish a rebuilding plan should be established that will ensure rapid rebuilding to precautionary levels, and which ensures large reductions in F in 2007. The rebuilding plan implemented in 2006 for southern hake and *Nephrops* appears to be insufficient for reaching its aim.
- Fisheries on most deep-sea species should be permitted only when they are accompanied by programmes to collect data and should expand very slowly until reliable indicators show that increased harvests are sustainable. For black scabbardfish a *statu quo* exploitation level is advised in the Southern area (VIII and IX).
- The fishing of each species should be restricted within the precautionary limits. Furthermore, unless ways can be found to harvest species caught in mixed fisheries within precautionary limits for all those species individually then fishing should not be permitted.

**STECF COMMENTS:** STECF notes that ICES has not assessed the catch implications under mixed fisheries considerations where agreed management plans exist. However STECF notes that work is in progress to define operational fishery units which is intended to facilitate fleet-based management.

**16.6. Mixed fisheries advice for North-western Areas (Division Va and Sub-areas XII and XIV)**

**Identification of critical stocks**

The stocks which require closures or large reductions in fisheries are Greenland cod in the East Greenland area and capelin in the Iceland-East Greenland-Jan Mayen area, as well as pelagic redfish (*S. mentella*) and Greenland halibut in the Irminger Sea and adjacent areas.

**Advice for fisheries management**

The present advice does not cover all stocks taken in that area. If a proper fishery-based advice taking mixed fisheries issues into account should be given for the Icelandic fishery ICES would need to evaluate the status of all stocks. ICES is therefore not in a position to provide mixed fisheries advice for these fisheries. For the stocks covered by the present advice ICES can provide the following advice:

For the area around Iceland Division Va, Subarea XII and the East Greenland area (Division XIV) the following apply:

1. The advice concerning pelagic *S. mentella*: includes all parts of the unit which occurs in the NAFO Convention Area and in Division Va and subareas XII and XIV. The advice for this stock will be finalised in October 2005.
2. For deep-sea fisheries the advice will be finalised in October 2005.
3. For capelin there should be no catch until new information on stock size, showing a spawning stock biomass of at least 400 000 t in March 2006 becomes available. As capelin is taken in a separate fishery there are no mixed fisheries concerns regarding protection of *capelin*.
4. Concerning the fisheries in the East Greenland area (Division XIV) in 2006 there should be no fishery on Greenland cod and *S. marinus*. 

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5. For other species, fishing of each species should be restricted within the precautionary limits as indicated in the table of individual stock limits. Many of these stocks are confined to only part of the areas under considerations and the advice only pertains to the stock area;
Furthermore, unless ways can be found to harvest species caught in a mixed fishery within precautionary limits for all those species individually, then fishing should not be permitted.

STECF COMMENTS: STECF notes that the most recent information for this region relates to the year 2005. The above text is unchanged from the STECF Review of Scientific advice on stocks of Community interest for 2006.

16.7. Advice for widely distributed and migratory populations

ICES advice on widely distributed and migratory species

Blue whiting combined stock (Subareas I–IX, XII, and XIV): ICES notes that the proposed management plan is not in accordance with the precautionary approach. ICES concludes that the exploitation boundaries for this stock should be based on the precautionary limits and that fishing at Fpa implies catches of less than 980 thousand t in 2007. This will result in a spawning stock biomass in 2008 well above Bpa.

Norwegian spring-spawning herring: ICES advises that this fishery should be managed according to the agreed management plan with a fishing mortality of no more than $F = 0.125$, implying maximum catches of 1 280 000 t in 2006. This is expected to lead to a spawning stock of 10.2 million tonnes in 2008.

NEA mackerel: ICES advises following the agreed management plan ($F$ between 0.15 and 0.20) which would imply catches between 390 000 t and 509 000 t in 2007.

Western horse mackerel: ICES recommends that catches of horse mackerel in Divisions IIa, IIIa (western part), IVa, Vb, VIa, VIIa–e,k, and VIIa–e be limited to less than 150 000 t.

Northern hake: ICES recommends to follow the agreed recovery plan because this plan is expected to have long-term gains in the present situation and is already implemented. According to Article 5.5a, the annual increase of TAC should be limited to 15% between any two years. This corresponds to a TAC of 50 485 t in 2007 and an expected SSB in 2008 of 160 600 t.

NEA spurdog: stock is depleted and may be in danger of collapse. Target fisheries should not be permitted to continue, and bycatch in mixed fisheries should be reduced to the lowest possible level. A TAC should cover all areas where spurdog are caught in the northeast Atlantic. This TAC should be set at zero for 2006.

NEA porbeagle and NEA basking shark: ICES advises that given the apparent depleted state of these stocks, no fishery should be permitted on these stocks.

STECF COMMENTS: STECF agrees with the ICES advice for the above stocks.

16.8. Advice for deepwater fisheries

The ICES advice on specific deepwater resources was reviewed and summarized in the STECF Review of advice for 2007 PART 1 ADVICE ON DEEPWATER RESOURCES AND STOCKS
IN THE BALTIC SEA. The following represents a summary of the general advice from ICES on deepwater fisheries given in October 2006.

**ICES advice on deepwater fisheries**

Biomass (state) and fishing mortality (impact) are used as indicators in the ICES advisory framework. For the deep-sea species, the state and impact indicators are difficult to measure and in addition, because of the life cycle length, it will require a long time to monitor a response or before positive effects can be expected. Consequently, ICES recommends that pressure indicators such as effort be used supplementary in the management of these stocks. At present ICES does not have access to effort data that can be used as pressure indicators, but these indicators should be made available as a matter of urgency. In the absence of pressure indicators, ICES has generally recommended reductions in landings, which should be coupled to reductions in fishing effort.

Most deep-sea species can only sustain low rates of exploitation. Fisheries on such species should be permitted only when they are accompanied by programmes to collect data and should expand very slowly until reliable indicators show that increased harvests are sustainable.

The recommended basic harvest control rule for deep-sea stocks is that fisheries on these species should only be allowed to expand when indicators and reference points for future harvest have been identified and a management strategy, including appropriate monitoring requirements has been decided upon and is implemented. An adaptive management strategy for these fisheries would thus consist of an initial low fishery, which is closely monitored, and identification of a long-term strategy for sustainable harvest on the basis of this information. A gradual expansion of the fishery should only be allowed to the extent such a strategy can be identified and has been decided upon. Such gradual expansion should be accompanied by close monitoring, enabling adjustment of the management plan according to the outcome of the fisheries.

The initial situation will be different for existing and new fisheries:

- For existing fisheries, the fishing pressure should in general be reduced considerably to low levels and should only be allowed to expand again very slowly if and when reliable indicators show that harvests are sustainable.
- When new fisheries develop or existing fisheries spread into new areas, relevant pressure, state, and impact indicators should be established on the basis of small, initial fisheries, which should only be allowed to expand very slowly if and when reliable indicators show that harvests are sustainable.

For both existing and new fisheries in the longer term, when state reference points such as \( U_{\text{max}} \) have been established through closely monitored fisheries at a low level, a harvest control rule on the basis of these reference points and including decision rules about maintaining the pressure within sustainable bounds could be implemented.

**STECF comments:** STECF agrees with the ICES advice and notes that supports for several species there is a concern that catch rates can only be maintained by sequential depletion of relatively isolated concentrations/sub-units of a stock. The smallest unit for which data are reported at present is the ICES Subarea and Division, and this spatial resolution may not be appropriate for monitoring or managing this type of fishing activity. The depth range within an area may be very wide, and the sizes of the areas are very different. STECF therefore supports the ICES recommendation that systems are developed and implemented for recording effort and
catches at a finer temporal and geographical scale, and that management actions are implemented that take into account spatial resolution at a finer scale than at present.

17. **Overview of Mediterranean fisheries**

There are several reports about the status of stocks and the characteristics of Mediterranean fisheries, but the most up to date and agreed at the international level are the GFCM reports, the STECF report SEC(2002)1374, the STECF-SGMED report SEC(2004)772 and the STECF-SGMED-06-01 report of the Working Group on Sensitive and Essential Fish Habitats in the Mediterranean Sea. Mediterranean fisheries are relatively unique compared to other EU fishing regions, primarily due to the high number of artisanal fishing activities, the very low presence of industrial fishing, the high variety of fishing gears used, the multi-species targets, and the high number of species accepted by the markets. In addition, the majority of fish are sold fresh because of market preferences and there is relatively little processing (filleting or freezing) of the catch.

The main characteristic of the Mediterranean fisheries is the very high number of small vessels and the diversity of fishing techniques used by artisanal (skipper owner) fishermen throughout the coasts of bordering countries and islands. This feature is important from both a socio-economic and a management standpoint, and rules and regulations need to take into account this large diversity. This large fleet of small vessels lands its catches to many small and sometimes isolated ports and beaches, which not only creates problems with regard to enforcement and control, but also makes recording of catches and effort rather difficult.

Fisheries statistics in the Mediterranean have been relatively poor for many years and while the situation has improved in recent years, they are still largely incomplete.

The overall health and productivity of the Mediterranean fisheries has been relatively stable over many decades. The main important change occurred after the Second World War with introduction of engines in an increasing number of vessels and artificial fibres for nets and lines. These innovations had a large influence on the general fishing pattern of the fisheries allowing exploitation of offshore and deep-water resources and permitting vessels to spend more time at sea.

In addition to the small scale fisheries discussed above there are also important fishing activities carried out by larger vessels (bottom and pelagic trawlers, long-liners, purse-seiners, etc.), which provide the larger markets with larger quantities of sea products. The industrial (corporate) fishery is limited to the tuna purse-seines and to the very recent activity of tuna farming.

Local fishing patterns and exploitation rates may be an important issue for management of Mediterranean stocks. This implies that fishery data should be collected on a fine scale in order to take into account the variability of catches and exploitation rates. Most of the Mediterranean species are not well defined either in terms of stock units or management units.

Management of fisheries in the EU Mediterranean Countries was originally under national jurisdiction. National management regimes were then supplemented by EU regulations. The management of tuna and tuna-like species is under the responsibility of the ICCAT (the EC is an active member), while management advice for some shared stocks is provided at Mediterranean level by GFCM. The GFCM is currently in the process of changing the form of most of its management advice from stock-oriented advice to fisheries-oriented advice. Management in the Mediterranean is primarily by effort control and minimum catching or landing size. TACs and
quotas are restricted to internationally agreed TACs for bluefin tuna, and national quota limits for clams off the Italian Adriatic coast and for some small-pelagic stocks under Spanish jurisdiction. Stock assessments for most of the species are under the responsibility of the GFCM-SAC. During the STECF meeting twelve new assessments on demersal species (concerning six species and four GSAs), based on data furnished by research units working on trawling surveys in the Central Mediterranean Sea, have been added.

The current list of species for which the GFCM undertakes assessment and provides advice is as follows:

**Anchovy** (*Engraulis encrasicolus*)
- Stock in Geographical Sub Area 1 Northern Alboran Sea. (Presented in SAC-SCSA 2006).
- Stock in Geographical Sub Area 7 Gulf of Lions. (Presented in SAC-SCSA 2006).
- Stock in Geographical Sub Area 16 Sicily Channel. (Presented in SAC-SCSA 2006).

**Sardine** (*Sardina pilchardus*)
- Stock in Geographical Sub Area 1 Northern Alboran Sea. (Presented in SAC-SCSA 2006).
- Stock in Geographical Sub Area 7 Gulf of Lions. (Presented in SAC-SCSA 2006).
- Stock in Geographical Sub Area 16 Sicily Channel. (Presented in SAC-SCSA 2006).

**Sprat** (*Sprattus sprattus*)

**Mackerel** (*Scomber japonicus*)

**Horse mackerel** (*Trachurus trachurus*)
Hake (*Merluccius merluccius*)
- Stock in Geographical Sub Area 1 Northern Alboran Sea. (Presented in SAC-SCSA 2004).
- Stock in Geographical Sub Area 5 Balearic Islands. (Presented in SAC-SCSA 2006).
- Stock in Geographical Sub Area 7 Gulf of Lions. (Presented in SAC-SCSA 2006 – data up to 2004).

Striped Mullet (*Mullus surmuletus*)
- Stock in Geographical Sub Area 5 Balearic Islands. (Presented in SAC-SCSA 2006).

Red Mullet (*Mullus barbatus*)
- Stock in Geographical Sub Area 1 Northern Alboran Sea. (Presented in SAC-SCSA 2004).
- SAC-SCSA

Common sole (*Solea solea*)
- Stock in the Geographical Sub Area 17 Northern and Central Adriatic (Presented at SAC-SCSA 2006).

Blue fish (*Pomatomus saltatrix*)

Blue and Red Shrimp (*Aristeus antennatus*)
- Stock in Geographical Sub Area 1 Northern Alboran Sea. (Presented in SAC-SCSA 2004).
- Stock in Geographical Sub Area 5 Balearic Islands. (Presented in SAC-SCSA 2006).

Deep water rose shrimp (*Parapenaeus longirostris*)

Stock assessments based on data provided by research units during the STECF meeting:

Hake (*Merluccius merluccius*)
• Stock in Geographical Sub Area 9 Ligurian and Northern Tyrrhenian. (Updated in 2006).
• Stock in Geographical Sub Area 11 Sardinian Sea. (Updated in 2006).
• Stock in Geographical Sub Area 18 Southern Adriatic Sea. (Updated in 2006).
• Stock in Geographical Sub Area 19 Western Ionian Sea. (Updated in 2006).

Red Mullet (Mullus barbatus)
• Stock in Geographical Sub Area 9 Ligurian and Northern Tyrrhenian. (Updated in 2006).
• Stock in Geographical Sub Area 11 Sardinian Sea. (Updated in 2006).
• Stock in Geographical Sub Area 19 Western Ionian Sea. (Updated in 2006).

Blue and Red Shrimp (Aristeus antennatus)
• Stock in Geographical Sub Area 19 Western Ionian Sea. (Updated in 2006).

Deep water rose shrimp (Parapenaeus longirostris)
• Stock in Geographical Sub Area 18 Southern Adriatic Sea. (Updated in 2006).
• Stock in Geographical Sub Area 19 Western Ionian Sea. (Updated in 2006).

Red shrimp (Aristeomorpha foliacea)
• Stock in Geographical Sub Area 11 Sardinian Sea. (Updated in 2006).

Norway lobster (Nephrops norvegicus)
• Stock in Geographical Sub Area 9 Ligurian and Northern Tyrrhenian. (Updated in 2006).

Stock assessment for the large pelagic species are under the responsibility of the ICCAT-SCRS and the updated list is the following:

Bluefin Tuna (Thunnus thynnus)
• Stock in Eastern Atlantic and Mediterranean. (Assessed in 2006).

Swordfish (Xiphias gladius)
• Stock in the Mediterranean Sea. (Assessed in 2003).

According to the EU Fleet Register updated to 2006, the EU Mediterranean fleet comprises 41,479 vessels, with about 30% of vessels below 6 meters overall length. This is likely to be an underestimate, since in some countries, fishing vessels less than 5 meters overall length are not included in the fishing vessel register.

A. Bottom trawling
Minimum mesh size is 40 mm stretched for all EU member state fleets in Mediterranean according to the regulation EU 1626/1994. Fishing is forbidden in depth less than 50 m or at a distance less than three miles from the coast. Fishing effort restrictions exist in all the member states.
All the bottom trawl fisheries in Mediterranean are multi-species fisheries. Two main categories can be identified.
a) Shelf fishery (down to 200 m) targeting: red mullets, hake, poor cod, sparids, sole, horse mackerels, anglerfish, small pelagics (pelagic trawls), octopuses, cuttlefish, squids, mantis shrimp, caramote prawn.

b) Slope fishery (deeper than 200 m) targeting: hake, blue whiting, anglerfish, Norway lobster, rose shrimp, deep red shrimps.

Besides these main species the catch usually includes many other species (more than 60) and nearly all of them are landed and contribute to the income of the fishing fleets.

Spain

The Spanish bottom trawl fleet consists of 1060 vessels. The fleet mainly operates in the Spanish fishing grounds, although a limited number of units traditionally go fishing to the Gulf of Lions. In a general way, the fleet can be segmented into two groups: trawlers developing their activity mainly on the continental shelf (“Arrastreros de plataforma”) and those operating on the continental slope (“Arrastreros de talud”). The trawlers are stern trawlers. The activity of bottom trawlers is limited to a maximum of 5 days per week and some of them fish 12 hours per day. Pelagic trawling is forbidden. Additionally, bottom trawling usually stops for 60 days per year mainly in spring.

France

There are 144 French Mediterranean otter trawlers and they variously practise bottom trawling and pelagic trawling according to specific fishing strategies targeting either pelagic fish or bottom and demersal fish or both. Some of them are specialized on one métier, the other practice indifferently the 2 techniques. Consequently, there are three main groups of trawl métiers: bottom trawling, pelagic trawling and mixed trawling. Regional regulation limits the trawl fishing activity to a period of maximum 17 hours during the day and to working days. The bottom trawlers work around 200 or 220 days/year, from 1,200 to 2,000 h of fishing time/year/boat.

Italy

According to the EU fleet register in Italy there are 3,469 trawlers, including bottom otter trawlers, beam trawlers and midwater trawlers. Trawling is allowed 5 days per week with local regulations regarding the number of hours per day. Additionally, fishing activity is usually stopped for 45 days in summer. Specific local closed areas to trawls are enforced.

Greece

According to the EU fleet register, the trawler fleet of Greece consists of 364 vessels using bottom trawl net as the main gear. According to the data of the Ministry of Agriculture the number of the bottom trawlers decreased from 1990 to 2001 by 14.3%, the gross tonnage increased by 12.7% and the engine power decreased by 14%. The bottom trawl fishery is closed in the entire area from 1st June until 30 September every year. There are some other local restrictions concerning closed gulfs where bottom trawling is forbidden during all the year or during a shorter period. For example, in Amvrakikos and Pagassitikos Gulfs, bottom trawl fishery is closed all over the year whereas in Patraiokos and Korinthiakos Gulfs the fishery is open for six months.

Malta

According to the EU fleet register, the trawler fleet consists of 21 vessels, including bottom trawlers, midwater pelagic trawlers and beam-trawlers.

Cyprus
According to the EU fleet register, the trawler fleet consists of 20 vessels, using bottom trawl net.

**Slovenia**
According to the EU fleet register, the trawler fleet of Slovenia consists of 21 vessels, including bottom trawlers and midwater pair trawlers.

**B. Purse seining for small pelagics**
Main target species are anchovy, sardine, mackerels, horse mackerels, bogue. Generally fishing takes place close to the coast, in depths down to 150 m using lights. Daily purse seine fishing in Greece is targeting migratory species.

**Spain**
The purse seine fleet from the South Mediterranean Region (SMR) continuously decreased in the last two decades, reaching a total of 321 vessels in 2003. The purse seine is not authorised in waters shallower than 35 m. The minimum distance between boats is 500 m. Fishing is permitted only 5 days a week.

**France**
This fleet, which involved more than 150 units in the seventies, today is reduced to only 44 vessels, and most of them are from wood and of more of 25 years old. The crew is composed of 4 to 8 men.

**Italy**
According to the EU fleet register the purse seine fleet consists of 2177 vessels, part of which using lights and then called “lampara”. Purse seine fishing is allowed 5 days a week and stops in full moon days.

**Greece**
According to the EU fleet register the Greek fleet using the purse seine as main gear consists of 291 vessels. In addition, there are several bottom trawlers using purse seine as second gear. Since 1991 the number of vessels has reduced by about 15%. Purse seines are distinguished into two major types: day fishing and night fishing with lights. There are no significant differences between the two types as far as the equipment and vessel construction are concerned. The most important difference is related to the mesh size of the net (14 mm for the night and 40 mm for the day, full mesh both). Seining is forbidden inside 300 m from the coast and/or in depths less than 30 m. There is a closed season from 15th of December to the end of February for the night purse seines, and from 1st of July to 31st of August for the day purse seiners. In some areas there are local restrictions (e.g. Amvrakikos Gulf is closed throughout the year). Purse seining is prohibited during full moon, two days before and two days after. The intensity of the light must be up to 2,000 candles per light.

**Malta**
According to the EU fleet register, the purse seine fleet consists of 44 vessels, 39 of which using light and are called “lampara”.

**Cyprus**
According to the EU fleet register, the purse seine fleet consists of only 1 vessel.
Slovenia
According to the EU fleet register, the purse seine fleet of Slovenia consists of 7 vessels.

C. Large pelagic fisheries
The large pelagic fisheries are carried out by a composite fleet of Mediterranean vessels: large tuna purse-seines, normal purse-seines, surface drifting long-lines, small vessels using trolling and hand-lines and a very small fleet of traditional harpoon vessels in the Strait of Messina (14) and in Greece. All the vessels over 24 m fishing for tunas are registered by ICCAT. Originally, there was a huge fleet of drift-net vessels, able to get important catches of swordfish and albacore, but all the drift-nets were banned by the EU Countries since 1st January 2002, even if it is known that some driftnet fishery is still illegally carried out. The fishing activity is carried out all the year round, but it changes according to the target species and the local habits. Target species are Thunnus thynnus, Thunnus alalunga, Xiphias gladius, Euthynnus alletteratus, Auxis thazard, Auxis rochei, Sarda sarda and other tuna and tuna-like species. The regulation is made by the ICCAT and it includes bluefin tuna catch quota, closed areas and seasons for specific gear, the prohibition to use aircrafts in June and size limits for the bluefin tuna. GFCM also adopted the driftnet ban. The EC also issued several regulations, including the maximum length for long-lines. Other regulations exist at a national level. Recently, tuna farming has been developed as a new activity in many Mediterranean countries and ICCAT had already issued some regulations. This is mostly an economic activity for fattening wild bluefin tuna and selling them to the Japanese market at the highest price, but it is causing many management and data problems.

D. Small scale fisheries
Small-scale fisheries are a very important segment all over the Mediterranean. Their significance varies among countries. The inshore fisheries are targeting a high number of species. Many vessels shift metier during the same year. The allocation of the effort to fishing gear used or to a single target species is extremely difficult. The available data on catch and size composition, discards etc. are very poor, sporadic and geographically restricted. For important species (e.g. lobster) there are almost no data.

The inshore fisheries are much more species selective than bottom trawl and some of them can be characterized as single species metiers (e.g. Pagellus bogaraveo). Although these gears are selective for small sized species, for large sized species (e.g. Dentex dentex) the selectivity is significantly reduced. In addition, compared to towed gears, the inshore fishing gears can usually operate on any kind of substrate and consequently there are no natural shelters for the target and for the by-catch species. Some stocks have collapsed locally (e.g. Pagellus bogaraveo, Polyprion americanum) under the exploitation of small-scale fishing gears.

Trammel nets are the most important gear of the inshore fishery. This gear is used all over the year in nearly all the places. There are different kinds of trammel nets defined by technical characteristics and according to target species. Some metiers are dispersed almost throughout the Mediterranean but there are other metiers having only a local interest. Target species of the trammel nets are: Mullus surmuletus, Merluccius merluccius, Peneaus kerathurus, Solea solea, Diplodus sargus, Mullus barbatus, Pagellus erythrinus, Dentex dentex, Sepia officinalis and other Sparidae species.

Gill nets are very common fishing gears, used by the majority of the inshore fishery fleet. The extent of the gear’s use changes from port to port. In some places it is used all over the year while in other places it is used during short time periods. Target species in the gill net fisheries are: Mullus barbatus, Mullus surmuletus, Boops boops, Caranx sp., Pagellus erythrinus, Sarda sarda,
**Sepia officinalis**, **Solea solea**, **Sparidae**, **Scomber scombrus**, **Scomber j. colias**, **Sphyraena sphyraena**, **Merluccius merluccius** and **Atherina hepsetus**.

Bottom long-lines are used throughout the Mediterranean Sea. The technological features, the length, the fishing period and the depth vary according to the target species. For species of the Sparidae family fishing takes place along the coast with long-lines with small hooks, for hake in depths between 300 and 600 m and for sharks in depths down to 1000 m. Most common target species are: *Anguilla anguilla*, *Dentex dentex*, *Diplodus sargus*, *Epinephelus spp*, *Conger conger*, *Merluccius merluccius*, *Mustelus spp*, *Pagellus erythrinus*, *Sparus aurata*, *Pagrus pagrus*, Sparids.

Various other gears as traps, pots, fyke nets, harpoons, jiggling hooks etc., targeting mullets, octopus, Norway lobster, cuttlefish etc., have local interest in many Mediterranean areas.

**E. Hydraulic dredges**

Hydraulic dredges are used for clam fishing in Italy, a practice almost entirely based in the Adriatic Sea. This type of fishing is strictly regulated and is aimed to collect mostly *Chamelea gallina* and the regulations in force allow a fixed number of licenses for each port of registry. In Spain towed dredges are used for clam fishing. In Greece some vessels are using dredges for bivalves.

**18. Data sources**

**Sections 2 and 3**

**Section 4**

**Section 8**
4) Consejo Federal Pesquero (Federal Fisheries Council, CFP).
7) INIDEP, Informe Técnico Nº 32/06: Informe preliminar de la prospección de langostino en aguas nacionales.
8) Instituto Español de Oceanografía (IEO), onboard scientific observers’ program.
9) National Directorate of Fisheries and Aquaculture (DNPyA).
10) Secretaría de Agricultura, Ganadería, Pesca y Alimentación (Agriculture, Livestock, Fisheries and Food Secretariat (SAGPyA).
Section 9

Sections 10, 11 and 12


Section 13


Section 15 and 16


Section 17


Section 18

43) Consejo Federal Pesquero (Federal Fisheries Council, CFP).

46) INIDEP, Informe Técnico Nº 32/06: Informe preliminar de la prospección de langostino en aguas nacionales.
47) Instituto Español de Oceanografía (IEO), onboard scientific observers’ program.
48) National Directorate of Fisheries and Aquaculture (DNPyA).
49) Secretaría de Agricultura, Ganadería, Pesca y Alimentación (Agriculture, Livestock, Fisheries and Food Secretariat (SAGPyA).
19. List of Acronyms

ACFM  The Advisory Committee on Fishery Management
ASPM  Age structured population model
BRP   Biological Reference Points
CCAMLR Committee for the Conservation of Antarctic Marine Living resources
CCSBT Commission for the Conservation of Southern Bluefin Tuna
CECAF Committee for Eastern Central Atlantic Fisheries
CPFD  Catch per fishing day
CPS   Commission du Pacifique Sud
CPUE  Catch per unit effort
CTMFM Comisión Técnica Mixta del Frente Marítimo
DEPM  Daily egg production method
DFO   Department of Fisheries and Oceans
EIAA  Economic Interpretation of the ACFM Advice
EIFAC European Inland Fishery Advisory Committee
EEZ   Exclusive economic zone
EPO   Eastern Pacific Ocean
F     Fishing mortality
FAO   Fisheries and Agriculture Organization
FAD   Fishing Attracting Device
FARWEST Fisheries Assessment Research in Western Mediterranean
FIGIS  Fisheries Geographical Information System
FICZ  Falkland Island Inner Conservation Zone
FIFD  Falkland Islands Fisheries Department
FOCZ  Falkland Island Outer Conservation Zone
FRCC  Fisheries Resources Conservation Committee
FU    Functional Units
GFCM  General Fisheries Commission for the Mediterranean
GRUND GRUppo Nazionale Demersali (Italy)
IATTC Inter American Tropical Tuna Commission
IBSFC International Baltic Sea Fisheries Commission
ICA   Integrated catch at age analysis
ICCAT International Commission for Conservation of Atlantic Tuna
ICES  International Council for the Exploration of the Sea
ICS   International Scientific Committee for Tuna and Tuna-like species in the North Pacific Ocean
IFREMER Institut Français de Recherche pour l’Exploitation de la Mer
IEO   Instituto Español de Oceanografía
INIDEP Instituto Nacional de Investigación y Desarrollo Pesquero
IOTC  Indian Ocean Tuna Commission
IUU   Illegal, Unregulated and Unreported
LCA   Length-based cohort analysis
LLUCET Project to study the recruitment and juveniles of hake
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>LPUE</td>
<td>Landings per unit effort</td>
</tr>
<tr>
<td>MBAL</td>
<td>Minimum biologically acceptable level</td>
</tr>
<tr>
<td>MEDITS</td>
<td>International Bottom Trawl Surveys in the Mediterranean</td>
</tr>
<tr>
<td>MEDLAND</td>
<td>Mediterranean Landings</td>
</tr>
<tr>
<td>MSY</td>
<td>Maximum sustainable yield</td>
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<tr>
<td>MSVPA</td>
<td>Multi Species VPA</td>
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<tr>
<td>NAFO</td>
<td>Northwest Atlantic Fisheries Organisation</td>
</tr>
<tr>
<td>NEA</td>
<td>North East Atlantic</td>
</tr>
<tr>
<td>NEI</td>
<td>Not Elsewhere Included</td>
</tr>
<tr>
<td>NEMED</td>
<td><em>Nephrops</em> in Mediterranean Sea</td>
</tr>
<tr>
<td>NRIFSF</td>
<td>National Research Institute for Far Seas Fisheries - Japan</td>
</tr>
<tr>
<td>PA</td>
<td>Precautionary Approach</td>
</tr>
<tr>
<td>PICTs</td>
<td>Pacific Islands Countries and Territories</td>
</tr>
<tr>
<td>PO</td>
<td>Pacific Ocean</td>
</tr>
<tr>
<td>RRAG</td>
<td>Renewable Resources Assessment Group</td>
</tr>
<tr>
<td>SAC</td>
<td>Scientific Advisory Committee (GFCM)</td>
</tr>
<tr>
<td>SAFC</td>
<td>South Atlantic Fisheries Commission</td>
</tr>
<tr>
<td>SCRS</td>
<td>ICCAT Standing Committee on Research and Statistics</td>
</tr>
<tr>
<td>SCSA</td>
<td>Sub-Committee on Stock Assessment (GFCM)</td>
</tr>
<tr>
<td>SCTB</td>
<td>Standing Committee on Tuna and Billfish (western and central Pacific Ocean)</td>
</tr>
<tr>
<td>SGRST</td>
<td>STECF Subgroup on Resource Status</td>
</tr>
<tr>
<td>SPC</td>
<td>Southern Pacific Commission</td>
</tr>
<tr>
<td>SSB</td>
<td>Spawning stock biomass</td>
</tr>
<tr>
<td>SSB/R</td>
<td>Spawning stock biomass per recruit</td>
</tr>
<tr>
<td>STECF</td>
<td>EC Scientific, Technical and Economic Committee for Fisheries</td>
</tr>
<tr>
<td>TAC</td>
<td>Total Allowable Catch</td>
</tr>
<tr>
<td>WCPO</td>
<td>Western Central Pacific Organisation</td>
</tr>
<tr>
<td>WCPFC</td>
<td>Western Central Pacific Fishery Organisation</td>
</tr>
<tr>
<td>WECAF</td>
<td>Committee for Western Central Atlantic Fisheries</td>
</tr>
<tr>
<td>WGEF</td>
<td>Working Group on Elasmobranches Fishes</td>
</tr>
<tr>
<td>WIO</td>
<td>Western Indian Ocean</td>
</tr>
<tr>
<td>WP</td>
<td>IOTC Working Parties</td>
</tr>
<tr>
<td>WPB</td>
<td>IOTC Working Parties on Billfish</td>
</tr>
<tr>
<td>WPTT</td>
<td>IOTC Working Parties on Tropical Tunas</td>
</tr>
<tr>
<td>WPO</td>
<td>Western Pacific Ocean</td>
</tr>
<tr>
<td>XSA</td>
<td>Extended survivors analysis</td>
</tr>
<tr>
<td>Y/R</td>
<td>Yield per recruit</td>
</tr>
</tbody>
</table>
20. Annex I: List of participants at the STECF-SGRST meeting

John CASEY (chairman)
CEFAS Fisheries Laboratory
Pakefield Road
UK – Lowestoft NR33 OHT
Tel. : +44 150 25 24 251
Fax : +44 150 25 24 511
e-mail : j.casey@cefas.co.uk

Antonio DI NATALE
Aquastudio
Via Trapani 6
I – 98121 Messina
Tel. : + 39 090 34 64 08
Fax : + 39 090 36 45 60
e-mail : aquauno@tin.it

Willy VANHEE
CLO – Sea Fisheries Department
Ankerstraat 1
B – 8400 OSTENDE
Tel. : + 32 59 34 22 55
Fax : + 32 59 33 06 29
e-mail : willy.vanhee@dvz.be

Antonio Celso FARINA PEREZ
Calle San Pablo N° 5 2 DCHA
ES – 15001 A Coruña
Tel : + 34 981 20 53 62
Fax : + 34 981 22 90 77
e-mail : celso.farina@ce.ieo.es

Ane IRIONDO
Fundación AZTI
Txatxarramendi irla, s-n
ES 48395 Sukarrieta
Tel. : 94 60 29 400
Fax : 94 68 70 006
e-mail : airiondo@suk.azti.es

Julio MARTÍNEZ PORTELA
Avda Ricardo Mella 610
ES – 36392 VIGO
Tel. : + 34 986 46 29 40
Fax : + 34 986 49 86 26
e-mail : julio.portela@vi.ieo.es
Nick BAILEY
The Marine Laboratory
375 Victoria Road
Torry
UK Aberdeen AB119DB
Tel.: + 44 1224 29 53 98
Fax: + 44 1224 29 55 15
e-mail: baileyn@marlab.ac.uk

Leonie DRANSFIELD
Galway Technology Park,
Parkmore,
Galway, Ireland.
Tel: +35 391730400
Fax: +35 391730480
e-mail: leonie.dransfield@marine.ie

Nando CINGOLANI
Largo Fiera della Pesca,
60125 Ancona,
Italy.
Tel:+39 0712078851
Fax:+39 07155313
e-mail:n.cingolani@ismar.cnr.it

Anna CHILARI
Hellenic Centre for Marine Research,
Aghios Kosmas, Hellinikon, 16610, Athens,
Greece.
Tel: +30 210 9822557
Fax:+30 2109811713
e-mail: annachil@ncmr.gr

Hans FROST
Rolighedsvej,25,1958,
Frederiksberg Castle,
Denmark.
Tel:+45 35286893
e-mail:hf@foi.dk.

Giandomenico ARDIZZONE
University of Rome
Italy
Tel.: 0649914773
e-mail: giandomenico.ardizzone@uniroma1.it

Gianna FABI
CNR - Istituto di Scienze Marine Largo Fiera della Pesca
60125 Ancona Italy
Tel.: +39 071 2078825
Fax: +39 071 55313
e-mail: g.fabi@ismar.cnr.it

**STECF Secretariat**

Sarunas ZABLECKIS  
Joint Research Centre,  
Ispra, Italy,  
Tel: +39 0332785995  
e-mail: sarunas.zableckis@jrc.it

**Participated by e-mail:**

Michel BERTIGNAC  
IFREMER,  
Centre de Brest 4525,  
BP 70-29280,  
Plouzane, France.  
Tel:+33(0)298224525  
Fax:+33(0)298224653  
e-mail:michel.bertignac@ifremer.fr

Michael KEATINGE  
Crofton Road,  
Dun Laoghaire,  
County Dublin, Ireland.  
Tel: +35 312144230  
e-mail: keatinge@bim.ie

Hans-Joachim RÄTZ  
Bundesforschungsanstalt für Fischerei  
Institut für Seefischerei  
Palmaille 9  
D-22767 Hamburg  
Germany  
Tel. : + 49 40 38905 169  
Fax : +49 40 38905 263  
e-mail : hans.joachim.raetz@ish.bfa.fisch.de

Enrico ARNERI  
Consiglio Nazionale Ricerche  
Largo fiera della Pesca  
I – 60129 Ancona  
Tel : +(39) 071 2078849  
Fax : +(39) 071 55313  
e-mail : e.arneri@ismar.cnr.it

Luis Miguel Neves dos SANTOS  
Av. Dr Julio Almeida Carrapato 95 – 1º E  
PT – 8000 FARO  
Tel. : +351 91 93 93 935  
Fax : + 351 70 0535
mnsantos@cripsul.ipimar.pt

Eduardo Balguerias,
e-mail: eduardo.balguerias@ca.ieo.es

Luis Abellán
e-mail: luis.lopez@ca.ieo.es

Sasha Arkhipkin
Falkland Islands Fisheries Department
e-mail: aarkhipkin@fisheries.gov.fk