



**Scientific, Technical and Economic  
Committee for Fisheries (STECF)**

**REVIEW OF SCIENTIFIC ADVICE FOR 2009**

**Consolidated Advice on Stocks of Interest  
to the European Community**

PREPARED IN DRAFT BY THE  
STECF-SGRST-08-03, Helsinki, Finland 30 June - 4 July 2008, and  
STECF-SGRST/SGECA 08-03, Fuengirola, Spain 20 - 24 October 2008

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**SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES  
(STECF)**

**STECF COMMENTS ON THE REPORT OF THE SGRST/SGECA 08-03 WORKING  
GROUP**

**Fuengirola, Spain 20 - 24 October 2008**

**STECF UNDERTOOK THE REVIEW DURING THE PLENARY MEETING**

**HELD IN BRUSSELS 3-7 NOVEMBER 2008**

***Review of scientific advice on stocks of Community interest – part 2***

STECF is requested to review the report of the SGECA-SGRST-08-03 of October 20-24, 2008 (Fuengirola) meeting, evaluate the findings and make any appropriate comments and recommendations.

In accordance with Article 3 of Commission Decision 629/2005 of 26 August 2005 establishing a Scientific, Technical and Economic Committee for fisheries, STECF is requested to:

- Review the advice from ICES for 2009-2010 and make any appropriate comments or recommendations for the following stocks:
  - Hake in ICES division IIIa, ICES Subareas IV, VI & VII, ICES division VIIIa, VIIIb, VIIIc, VIId
  - Northeast Atlantic mackerel
  - Western horse mackerel (*Trachurus trachurus*) in ICES divisions IIa, IVa, Vb, VIa, VIIa-c, VIIe-k
  - Blue whiting in ICES subareas I-IX, XII & XIV
  - Norwegian spring spawning herring
- Review the most recent advice for stocks of interest to the EU from the following regions:
  - Stocks in the area of CECAF
  - Stocks in the area of WECAF
  - Stocks under the jurisdiction of CCAMLR
  - Stocks under the jurisdiction of GFCM (consistency or incongruities with SGMED achievements and advices shall be highlighted).
  - Stocks under the jurisdiction of ICCAT
  - Stocks under the jurisdiction of IOTC
  - Stocks under the jurisdiction of IATTIC
  - Stocks under the jurisdiction of ICCAT
  - Stocks in the Southeast Atlantic
  - Stocks in the Southwest Atlantic

In addition STECF is requested to provide a Description of environmental issues and fishery resources status of the EEZ outermost regions

**Background**

In the context of the formal requirement, STECF has to draw up an annual report on the status of Community fisheries including biological, economic and social aspects. Although in practice this review is more concentrated on stocks under the TAC regime, it is also convenient, for monitoring purposes, to include all Community fisheries independently from their legal status within the CFP. However, stocks around outermost regions (OR's) have not been assessed systematically by this committee and the last assessments known are for prawn and red snappers of French Guyana in 2003.

### **Terms of reference**

For fishery resources of the EEZ around outermost regions (Azores, Madeira, Canaries, French Guyana, Martinique, Guadeloupe and La Réunion), STECF is requested:

1) to describe the main fisheries exploited either by local fleets or by foreign fleets within the EEZ. The description should cover fish stock status, fishing fleets, fishing techniques and economic and social performance of these fisheries.

- A description of fisheries exploiting local, resident stocks around the Azores, Madeira and the Canary Islands. Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks.
- A description of fisheries exploiting local, resident stocks around Réunion Island. Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks.
- A description of fisheries exploiting local, resident stocks around French Guyana, Martinique and Guadeloupe. Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks.
- In the case un Guyana, describe and assess separately:
  - Coastal fisheries exploiting white fish (poissons blancs)
  - Coastal fisheries (including foreign vessels) exploiting red fish (poissons rouges, especially red snapper) and sharks
  - Fisheries exploiting *Penaeus* shrimps

2) to describe the main environmental issues related to these fisheries: by-catch of sensitive species, effects of fisheries on natural habitats and influence of the environmental quality of the water on fisheries performance.

### **STECF response**

STECF reviewed and adopted the report of the SGECA-SGRST-08-03 of October 20-24, 2008 (Fuengirola) meeting. This report was combined with the STECF report reviewing the advice for stocks in the ICES area prepared by the SGRST 08-02 meeting held in Helsinki from 30 June – 4 July 2008 and adopted by STECF at its Summer plenary meeting in July 2008. The resulting report represents the definitive STECF review of advice for 2009 for stocks of community interest.

This review presents summary information on the assessment and advice for stocks worldwide that are of interest to the EU. The information in the review supersedes that which was prepared in Part 1 of the Review of Advice for 2009.

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.

The STECF review of scientific advice was drafted by the STECF Sub-group on Resource Status (SGRST, Chair, J. Casey) during its meetings in Helsinki, Finland from 30 June – 4 July 2008 and in Fuengirola, Spain from 20-20 October 2008 and subsequently finalised and endorsed at the 29th STECF Plenary meeting (5-9 November 2007).

## **SGRST/SGECA 08-03 WORKING GROUP REPORT**

### **REVIEW OF SCIENTIFIC ADVICE FOR 2009**

#### **Consolidated Advice on Stocks of Interest to the European Community**

**Fuengirola, Spain 20 - 24 October 2008**

This report does not necessarily reflect the view of the European Commission and in no way anticipates the Commission's future policy in this area

### **REVIEW OF SCIENTIFIC ADVICE FOR 2009**

## **Introduction**

### **General request**

STECF is requested to review the most recent advice on stocks of interest to the European Community and provide appropriate comments and recommendations. STECF is requested, in particular, to highlight any inconsistencies in assessments and advice taking into account any additional information available. STECF is also requested to take account of data and information in the reports of any relevant assessment WGs.

### **Specific requests**

STECF is requested to provide the following:

- A description of fisheries exploiting local, resident stocks around the Azores, Madeira and the Canary Islands. Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks.
- A description of fisheries exploiting local, resident stocks around Réunion Island. . Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks.
- A description of fisheries exploiting local, resident stocks around French Guyana, Martinique and Guadeloupe. Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks.

In the case of Guyana, describe and assess separately:

- Coastal fisheries exploiting white fish (poissons blancs)
- Coastal fisheries (including foreign vessels) exploiting red fish (poissons rouges, especially red snapper) and sharks
- Fisheries exploiting *Penaeus* shrimps

## **Introduction to the STECF Review of Advice for 2009**

## **Background**

This report represents a consolidated version of two STECF SGRST Stock Review meetings convened in 2008. Part 1 of this review was endorsed by the STECF at its 28<sup>th</sup> plenary meeting in June 2008. However, since that time, some fisheries advisory bodies have published additional information and advice and this has been taken into account in the present report. This report therefore supersedes any advice previously given by the STECF for 2009.

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 2008 (REF), since no new information on the status of or advice for such stocks was available at the time the review took place.

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.

The STECF review of scientific advice for 2009 was drafted by the STECF Sub-groups on Resource Status (SGRST 08-03 and SGRST/SGECA 08-03, Chair, J. Casey) during their meetings in Helsinki, Finland from 30 June to 4 July and in Fuengirola, Spain 20-24 October 2008.

STECF acknowledges the extensive contribution made by the following participants:

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# 1. Resources of the North-east Atlantic for which the EU fixes a TAC or shares a TAC fixed multilaterally

## 1.1. 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 2006 was 1,753 t. and the estimated catch in 2007 (only from experimental fisheries) amounted to 141 t. There were no catches up to June in 2008. This fishery has been managed by annual TACs, which have been set at a fixed level (in the range of 30,000 t to 33,000 t) independent of the advice (from 1979 to 2005). 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 (1987–2008) and acoustic surveys (1989–2008) and catches from the French and Spanish fisheries.

**PRECAUTIONARY REFERENCE POINTS:** ICES considers that  $B_{lim}$  is 21,000 t, the lowest observed biomass in the 2003 assessment, and proposed  $B_{pa}$  be set a 33,000 t. There is no biological basis for defining  $F_{lim}$ , and ICES proposes that  $F_{pa}$  be established between 1.0 and 1.2. A  $B_{pa}$  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. As the assessment provides the probability distribution for SSB, it is now possible to estimate directly the risk of SSB falling below  $B_{lim}$ . ICES therefore will review the technical basis and the value of  $B_{lim}$  for this stock before the 2009 advice.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as being at risk of reduced reproductive capacity. SSB in 2008 is estimated to have a 23% probability of being below  $B_{lim}$ . The low recruitment since 2002 and almost complete recruitment failure of the 2004 year-class are the primary causes of the low stock size. The recruitment at age 1 in 2008 is lower than in 2006 and 2007 and is the second lowest in the time-series.

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. The present closure of the fishery aims at protecting the remaining stock until a strong year-class recruits to the stock. ICES recommends that the fishery should remain closed until the stock condition has improved. The stock condition can be re-evaluated when estimates of the 2009 SSB and 2008 year-class are available based on the spring 2009 acoustic and DEPM surveys. This implies a closure of the fishery until at least July 2009.

**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 also from the May surveys as was done for the first time by ICES in this year's assessment.

STECF further notes that with an assumed low recruitment for 2009, similar to in recent years (2002-2008), the probability of SSB in 2009 being below  $B_{lim}$  is always larger than 25%, even when no catches are taken.

**STECF recommendations:**

- With the current poor stock situation, maximum protection of the remaining spawning population is required.
- STECF **recommends** that the Biscay anchovy fishery should remain closed until reliable estimates of the 2009 SSB and 2008 year-class, based on the results from the spring 2009 acoustic and DEPM surveys, become available.
- STECF stresses that any recovery is entirely dependent on good incoming recruitment.

STECF notes that there is presently no agreed comprehensive long-term management plan for this stock and **recommends** that complementary management measures to output control (TAC) need to be further investigated to maintain the longer-term viability of the stock (closed seasons, closed areas, minimum size, etc.). These should only be considered after the stock has recovered to biologically safe levels, and would need to be scientifically evaluated prior to adoption.

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

### 1.2.1. 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.

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 (even with a fishing closure in the 2004 fourth quarter). However, in 2005 and 2006, the possible combination of a new fishing closure in the fourth quarter and a reduction in the number of active vessels fishing anchovy (from 135 vessels in 2004 to 106 vessels in 2005 and only 99 vessels in 2006) led to a marked decrease in fishing effort. Such a decreasing trend seemed to have affected all the fleet segments in 2005, whereas in 2006 the reduction in the annual effort was only evident in the Barbate's home-based fleets. The total landings of anchovy in 2006 and 2007 were approximately 4,500 t and 6,500 t respectively.

**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:** The new landings, cpue, and survey data available for this stock do not change the perception of the stock and do not give reason to change the advice from 2007. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: *“Catches should be restricted to 4,800 t (mean catches from the period 1988–2006 excluding 1995, 1998, 2001, and 2002, the years where catches were probably influenced by exceptionally high recruitment). This level should be maintained until the response of the stock to the fishery is known.”*

**STECF 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.

STECF also agrees with the ICES consideration that it is important that surveys are continued, in particular the acoustic survey in May and the recently initiated egg survey. It has not been possible to provide a reliable

analytic assessment for this stock as a basis for management. A better alternative would be to consider management rules based directly on survey observations.

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

There is no information on Anchovy in Sub-area X.

### 1.3. 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 2003. Provisional Official landings for 2007 are given as 11,300 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 1.4.

### 1.4. 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 5200 t in 2004. No estimate of total landings is available since 2005. Official landings in 2007 are around 4200 t. Anglerfish are caught widely in VIa with the highest catch rates occurring along the shelf edge in deeper waters.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The assessment now includes anglerfish from Sub-area IV. The information basis for anglerfish is being developed, with improvements to both industry related data and surveys. There is currently insufficient data to support an assessment of the state of the stock.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been agreed for this stock. ICES has previously defined a precautionary fishing mortality reference point of  $F_{pa}=0.3$  (based on  $F_{35\%SPR}$ ), but have been unable to discover the basis for this calculation and so no longer considers it appropriate.

**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. The new data available this year for this stock do not change the perception of the stock status.

**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 advice for the fishery in 2009 is the same as the advice given in 2007 for the 2008 fishery: 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 by-catch fish.

ICES will provide updated advice in 2009.

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

STECF also notes that following ICES suggestions in 2005 a number of initiatives were instigated covering anglerfish in Division IVa and Subarea VI: dedicated Scottish and Irish scientific anglerfish surveys which are coordinated to involve the use of both research vessels and commercial fishing vessels; a Scottish tally book scheme (linked to a longer time-series of personal diaries); increased observer coverage (short-term initiative in 2006). Data are currently being gathered, with improvements to both industry-related data and surveys covering Subarea VI and part of the North Sea. There are currently 3 years of survey-derived absolute abundance estimates and 2 complete years of Scottish tally book data providing commercial catch data.

### 1.5. 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 300t and 1,300 t, (320 t officially reported in 2006). 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. Landings of *L. piscatorius* have declined steadily from 23 700 t in 1986 to 12 800 t in 1992, then increased to 22 100 t in 1996 and declined to 14 900 t in 2000. The landings have increased since then reaching the maximum of the time series in 2007 (29 700 t). Landings of *L. budegassa* have fluctuated all over the studied period between 5 700 t to 9 600 t with a succession of high (1989-1992, 1998 and 2003) and low values (1987, 1994 and 2001). The total estimated landings for 2007 are 6,400 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. Lacking an analytical assessment the advice is based on survey data and catch information.

**PRECAUTIONARY REFERENCE POINTS:** For *L. piscatorius*, the proposed  $F_{pa} = 0.24$  ( $F_{lim} = 0.33$ ) and the proposed  $B_{pa} = 31,000t$ . For *L. budegassa*, the proposed  $F_{pa} = 0.23$  and the proposed  $B_{pa} = 22,000t$ . For both the stocks  $B_{lim}$  is not defined.

**STOCK STATUS:** The state of the stock is unknown. It has not been possible to quantify SSB, fishing mortality and recruitment for this stock. However, survey data indicate that biomass has been rather stable over the time-series and recent recruitment has been above average. The new landings and survey information available this year for these stocks does not change the perception of the stocks

**RECENT MANAGEMENT ADVICE:** The ICES advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries in Section 3.3.

The advice on these stocks for the fishery in 2009 is the same as the advice given in 2007 for the 2008 fishery: “The current stock status is unknown relative to precautionary reference points, but indicators point to the stocks being stable. Therefore ICES recommends that the landings should not exceed the average landings of 2004–2006. This corresponds to a TAC for both species combined of lower than 33,000 t.”

This advice will be updated in 2009.

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

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.

### 1.6. Anglerfish in Divisions VIIIa, b, d, e

Anglerfish within the two management areas VII and VIII a,b,d,e 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 1.5.

### 1.7. 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 to 3,600 t in 2005 and decreased to 2,300 t in 2007. For *L. budegassa* landings decreased from 3,700t in 1988 to 800 t in 2002 but have increased in recent years. In 2007 they were estimated at 1,300 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. In 2007, 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. This assessment has not been updated in 2008 as the new information available this year was not expected to result in any significant change in the perception of the stocks status.

**PRECAUTIONARY REFERENCE POINTS** Precautionary reference points have not been defined for these stocks. Within the present assessment framework of production models,  $B_{MSY}$  and  $F_{MSY}$  points can be used as a lower boundary for the biomass and an upper boundary for  $F$ .

**STOCK STATUS:** The assessment is considered indicative of stock trends, but only provides relative measures of stock status.

**RECENT MANAGEMENT ADVICE:** The advice on this stock for the fishery in 2009 is the same as the advice given in 2007 for the 2008 fishery: There are no indications that the stock has improved since last year. Fishing mortality equal to zero is not expected to bring the stock back to  $B_{MSY}$  in 2009. ICES therefore reiterates its previous advice to close the fishery and develop a recovery plan that will ensure rapid and safe recovery towards  $B_{MSY}$ . The ICES advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries in Section 3.3.

**STECF COMMENTS:** STECF notes that anglerfish in VIIIc and IXa are caught in the same fisheries as hake and *Nephrops*. The provisions of the management plan for hake and *Nephrops* are not being enforced and its objectives are not being met.

To ensure recovery of anglerfish in VIIIc and IXa, it is essential that the provisions of the management plan for hake and *Nephrops* are fully implemented and enforced. Failure to do so may severely compromise any recovery of the stock. STECF therefore recommends that enforcement of the provisions of the management plan for hake and *Nephrops* is given high priority and that measures to ensure compliance with the TAC for anglerfish and effort restrictions are put in place as a matter of urgency.

## 1.8. 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 330,000 t to 640,000 t per year in the first half of the nineties, after which catches increased to close to 1,000,000 in the latter part of the decade. Catches have been above 1,000,000 for most years after 2000 with 2003 and 2004 having recorded the highest catches (>2,200,000). In the southern areas (Subarea VIII, IX, Divisions VIId,e and g-k) catches have been stable in the range of 25,000 to 34,000 t between 1987 and 2006 with the exception of 2004 when 85,000 t were recorded. Catches in 2007 however, were at a historic low of 17,634 t. In Division IXa blue whiting is mainly taken as by-catch in mixed trawl fisheries.

Total landings over all areas in 2007 were 1.6 million t. Recent large landings were supported by high recruitments; however these have been steadily declining since 2001. The estimation of the last recruiting year-class 2006 is by far the lowest on record with 1.8 million new recruits. 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 is accommodated by transfers from some of the other countries and additional catches in the NEAFC area. ICES has evaluated this management plan in 2006 and found it not to be in accordance with the precautionary approach in a period of low recruitment. In July 2008 a new draft management plan was proposed by the Coastal States. ICES has evaluated the draft management plan and considers it precautionary if fishing mortality in the first year is immediately reduced to the fishing mortality that is implied by the HCR.

**SOURCE OF MANAGEMENT ADVICE:** The main body for management advice is ICES. The assessment uses catch-at-age data from commercial catches from 1981–2007 and three acoustic surveys (Norwegian spawning ground survey 1993–2003, international ecosystem survey in the Nordic Seas 2000–2008, and the international blue whiting spawning ground survey 2003–2008). The international blue whiting spawning ground survey is the only survey that covers almost the entire distribution area of the spawning stock.

**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 at increased risk. SSB increased to a historical high in 2003, but has decreased since then and is expected to be just above  $B_{pa}$  in 2009. The estimated fishing mortality is well above  $F_{pa}$ . Recruitment of the 2005 and 2006 year-classes are estimated to be in the very low end of the historical time-series. Surveys indicate that the 2007 year-class could also be low.

**RECENT MANAGEMENT ADVICE:** The agreed management plan would imply a catch of 1,150,000 t in 2009 and would result in an  $F$  of 0.59 and an SSB in 2010 just below  $B_{lim}$ . If the proposed management plan is implemented in 2009 and the required reduction in  $F$  is achieved in one year as recommended by ICES, an SSB of 2,420,000 t in 2009 would imply an  $F$  in 2009 of 0.17, which would correspond to a maximum catch of 408,000 t in 2009. If exploitation in relation to precautionary limits boundaries should be met, ICES recommend that catches should be less than 384,000 t in 2009 which would keep SSB above  $B_{pa}$  in 2010 and result in an  $F$  at 0.16.

The agreed management plan is not considered to be in accordance with the precautionary approach. Therefore, ICES concludes that the exploitation boundaries for this stock should be based on the precautionary approach (maximum catch in 2009 is 384 Kt) unless the proposed management plan is implemented as recommended by ICES (maximum catch in 2009 is 408 Kt).

**STECF COMMENTS:** STECF notes that previously the coastal states agreed to a TAC corresponding to fishing at  $F_{pa}$ . STECF notes that fishing at  $F_{pa}$  in 2009 is likely to result in a SSB in 2010 that is below  $B_{pa}$ . This underlines that appropriate management action should be taken. STECF therefore supports the advice given by ICES.

#### **1.8.1. Blue whiting (*Micromesistius poutassou* L.) in Sub -areas IIa (1)-North Sea (1)**

Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 1.8.

#### **1.8.2. Blue whiting (*Micromesistius poutassou* L.) in Sub -areas Vb (1), VI, VII**

Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 1.8.

#### **1.8.3. Blue whiting (*Micromesistius poutassou* L.) in Sub -areas VIIIa,b,d**

Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 1.8.

#### **1.8.4. Blue whiting (*Micromesistius poutassou* L.) in Sub -area VIIIe**

Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 1.8.

### **1.8.5. 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 1.8.

## **1.9. Brill (*Scophthalmus rhombus*) in the North East Atlantic**

### **1.9.1. Brill (*Scophthalmus rhombus*) in the North Sea**

ICES has not assessed this stock and STECF has no access to any stock assessment information on brill in this area.

A precautionary TAC (including turbot) in areas IIa and IV for 2008 was set to 5,263 t.

## **1.10. 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 closed and has remained so since then.

**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 (Report of the Arctic Fisheries Working Group (AFWG), 21-29 April 2008, ICES Copenhagen. ICES CM 2008/ACOM:01).

**PRECAUTIONARY REFERENCE POINTS:** The proposed limit reference point for biomass is  $B_{lim} = 200,000$  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 an increased risk of reduced reproductive capacity. The maturing component in autumn 2007 was estimated to be 0.84 million tonnes. The spawning stock in 2008 will consist of fish from the 2004 and 2005 year-classes, but the 2005 year-class will dominate. The survey estimate ranks the 2006 and 2007 year-classes above the long-term average.

**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  $B_{lim}$ , taking predation by cod into account. ICES considers the management plans to be consistent with the precautionary approach.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:** Since the probability of  $SSB < B_{lim}$  is about 15%, the agreed harvest control rule implies zero catches in 2008.

The  $B_{lim}$  rule is intended to be a safeguard against recruitment failure. However, it is likely that the recruitment would be larger with a larger spawning stock, especially for moderately good recruitment conditions. In such a situation a target-based control rule in addition to the  $B_{lim}$ -based rule could be appropriate. The negative influence of herring on capelin recruitment should be included in the  $B_{lim}$ -based rule if such a relationship can be described quantitatively. Adjustments of the harvest control rule should be investigated further to take into account the uncertainty in the predicted amount of spawners and the role of capelin as a prey item.

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

## **1.11. 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 Faroe 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 catches in 2004 and 2005 are estimated to be to 606,000 t and 641,000 t. In 2006, the catch was estimated to 538,000 t, and 487,000 t in 2007.

Under-reporting of landings has been an important issue for this stock in recent years. Two sets of estimates of non-reported landings (IUU) for the period 2002–2007 were available, ranging from 41,000–166,000 t and 9,000–41,000 t in recent years. ICES does not have a basis on which to choose one estimate over the other. The series with 41,000–166,000 t unallocated landings was taken forward in the calculations because this is the same method as the one used last year. The choice of the time-series of unreported landings does not affect the advice according to the agreed HCR. The discrepancies between the two methods for estimation of unreported landings must be resolved by the management authorities and made available to ICES.

The estimates of unreported landings have been reduced considerably from 2006 to 2007, which can probably be attributed to the introduction of port state control in the NEAFC area from 1 May 2007. For 2007, the estimate of unreported landings is around 10%.

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 logbook 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:** The main management advisory body is ICES. 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. The total effect of the discarding and IUU fishing is still unclear and requires more work before it can be included in the assessments.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for biomass and fishing mortality are  $B_{pa} = 460,000$  t,  $B_{lim} = 220,000$  t  $F_{pa} = 0.40$  and  $F_{lim} = 0.74$ .

**MANAGEMENT AGREEMENTS:** 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.

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).<sup>1</sup>*

Based on evaluations made in 2006 and 2007, ICES considers the management plan to be in accordance with the precautionary approach. If conditions change to outside the assumed range (with respect to biological conditions, assessment quality, or implementation error), the management plan may have to be revised.

**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 SSB has been above  $B_{pa}$  since 2002. Fishing mortality was reduced from well above  $F_{lim}$  in 1999 to  $F_{pa}$  in 2007. The cod recruitment in 2008 is expected to be above the long-term mean, while it is expected to be below the long-term mean both in 2009 and 2010.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:** The agreed management plan implies landings of 473,000 t in 2009 (maximum 10% change in TAC from 2008). This projection includes all landings and therefore the TAC must account for all unreported landings.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** The current fishing mortality is estimated to be at 0.40 ( $F_{pa}$ ), which also corresponds to the F that is associated with high long-term yield and low risk of depleting the production potential.

**Exploitation boundaries in relation to precautionary limits:** The agreed management plan has been found to be consistent with the precautionary approach and is therefore the basis for the advice. This implies landings of 473,000 t in 2009.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that TACs in this fishery have not been enforced in the past and unless measures are taken to do so, the realised fishing mortality is likely to exceed the one derived from the management plan in 2009. 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 2009 TAC.

## **1.12. 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 Faroe Islands. Cod are taken mainly by mixed fisheries using otter trawls, gill nets, long-lines and beam trawl. The stock is managed by TAC through joint negotiation between the EU and Norway, technical measures and supporting effort regulations in units of days at sea per vessel since 2003. Historically, landings peaked at about 350,000 t in the early 1970s, subsequently declining to around 200,000 t by 1988. From 1989 until 1998, landings remained between about 100,000 t and 140,000 t. Reported landings decreased sharply in 1999 to 96,000 t, and then declined steadily to 28,700 t and 27,142 t in 2005 and 2006 respectively. Reported landings for 2007 were about 24,400 t. 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 used the age-based model (B-ADAPT) incorporating landings and discards, and calibrated with two survey indices (from IBTS quarter 1 and quarter 3 surveys). For ICES Subarea IV and Divisions VIIId, discards were estimated from the Scottish discards sampling program up until 2005, raised to the total international fleet. For 2006, Denmark provided its own discard estimates. For 2007 Scottish, Danish, German, and England & Wales discard estimates were combined and used to raise landings-at-age for remaining nations in Subarea IV.

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<sup>1</sup> 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).

Discards in Division IIIa were based on observer estimates. For 2006 and 2007, Danish and Swedish discard estimates were combined to raise landings-at-age from the remaining nations in Division IIIa.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points for fishing mortality and spawning stock biomass have been agreed as  $F_{pa} = 0.65$ ,  $F_{lim} = 0.86$ ,  $B_{pa} = 150,000t$  and  $B_{lim} = 70,000 t$ .

**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 ( $B_{lim}$ ).*
- 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 ( $B_{pa}$ ) 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 details of the recovery plan adopted in 2004 are given in Council Regulation (EC) 423/2004:

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:** Based on the most recent estimate of SSB (in 2008) and fishing mortality (in 2007), ICES classifies the stock as suffering reduced reproductive capacity and as being harvested sustainably. The general perception of cod abundance remains unchanged, with a historical low in 2006. SSB has shown an increase since then but remains below  $B_{lim}$ . Fishing mortality has shown a decline since 2000, and is currently estimated to be just below  $F_{pa}$ . The 1997–2006 year-classes are all estimated to have been well below average. The 2005 year-class is estimated to be one of the most abundant amongst the recent below-average year-classes.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:**  $SSB_{2008}$  is below  $B_{lim}$ . However,  $SSB_{2009}$  can reach  $B_{lim}$  with a 50% probability under the assumption that  $F_{2008}$  is 90% of  $F_{2007}$ . Under these circumstances, the EU recovery plan stipulates that the following criteria be met, in order of increasing priority:

- $TAC_{2009}$  should not exceed a level that results in  $SSB_{2010}$  being 30% above  $SSB_{2009}$ ;
- There should be no more than a 15% change from  $TAC_{2008}$  to  $TAC_{2009}$ ;
- $F_{2009}$  should not exceed  $F_{pa}$ .

These criteria imply invoking the TAC constraint  $TAC_{2009} = 1.15 \square TAC_{2008}$ , which corresponds to a TAC in 2009 of 29 100 t for Area IV and Subdivisions VIIId and IIIa (Skagerrak).

The EU–Norway agreement stipulates that:

- (a) Every effort shall be made to maintain SSB above  $B_{lim}$ ;
- (b) If  $SSB > B_{pa}$  the TAC shall be set at the level achieved at  $F = 0.4$ , with a  $\pm 15\%$  constraint on annual change;
- (c) If  $SSB < B_{pa}$  the TAC shall be set lower than that achieved through a) and b).

These criteria imply a TAC in 2009 of less than 29 100 t ( $TAC_{2009} = 1.15 \square TAC_{2008}$ ) for Area IV and Subdivisions VIIId and IIIa (Skagerrak).

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:**  $F_{2007}$  is above the levels that would lead to high long-term yield and low risk of depletion of production potential, taking ecosystem effects into account.

**Exploitation boundaries in relation to precautionary limits:** Given the low stock size and recent poor recruitment, the stock cannot be rebuilt to  $B_{pa}$  at the start of 2010 even with a zero catch. However, simulations indicate that with the recent poor recruitment, a zero catch in 2009 and 2010 is likely to achieve the rebuilding of the stock to  $B_{pa}$  by 2011.

**Conclusions regarding exploitation boundaries:** Because the existing recovery plan is not considered to be in accordance with the precautionary approach, 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.

**STECF COMMENTS:** STECF agrees with the ICES advice and notes that ICES has not evaluated the consistency of the new management plan with the precautionary approach and considers the recovery plan as not being consistent with the precautionary approach.

STECF considers that the rationale presented in its Report of the 2007 November Plenary meeting (STECF-PLN 07-03) is still justified. In that report, STECF concluded that the fishing effort in units of kW\*days for all trawled gears in the areas of the Skagerrak, North Sea and Eastern Channel shows a clear downward trend since 2000 of 6% per year.

Taking into account i) the uncertainty in the assessment and ii) that updated information from the STECF assessment of effort regimes meeting (SGRST 08-02) confirmed the continuation of the previously observed downward trend in fishing effort, STECF agrees with the ICES assessment assuming a 10% reduction in  $F$  in 2008 compared to 2007 in the ICES catch forecasts for 2009. Consequently, SSB has a 50% probability of reaching  $B_{lim}$  (70,000 t) in 2009. This assumption also implies that in 2008, landings will be 38,800 t and discards will be 25,200 t.

STECF notes that under this assumption the provisions of the EU cod recovery plan and the EU-Norway agreement dictate that the TAC for cod in Area IV, and Divisions VIIId and IIIa in 2009 should be no more than 15% greater than the TAC for 2008, the ICES advice implies a TAC for 2009 of 29,100 t.

However STECF notes that this figure is derived by calculating a 15% increase in the combined 2008 TACs for Subarea IV and Division IIIa only (25,317 t), and to account for the additional component of the North Sea cod catch taken in Division VIIId, the value used by ICES (25,317 t) should be inflated by 4%. This gives a combined TAC for 2008 for Subarea IV, Divisions IIIa and VIIId of 26,372 t.

STECF therefore advises that according to the provisions of the EU cod recovery plan and the EU-Norway agreement, the TAC for cod in Subarea IV, Divisions IIIa and VIIId in 2009 should be 30,328 t ( $1.15 \times 26,372$  t).

STECF notes application of the management agreement and recovery plan, implies a reduction in fishing mortality of  $>40\%$  in 2009 compared to 2008 and an increase of  $>40\%$  in SSB by 2010 to above  $B_{lim}$ .

STECF therefore advises that setting a restrictive TAC for 2009, without other effective accompanying measures to restrict activities contributing to fishing mortality on cod, is unlikely to achieve the reduction in overall fishing mortality required for stock rebuilding, and is likely to lead to increased discarding.

STECF therefore **recommends** that in addition to any agreed TAC, accompanying fleet-based effort reductions also be implemented.

STECF recognises however, that the immediate and short-term economic and social implications of any drastic reductions in fishing opportunities may be huge and will no doubt be of prime concern for fishery managers. Nevertheless, if exploitation rates are not reduced sufficiently, there is a high probability that stock rebuilding will not occur, thereby maintaining or increasing the risk of reduced reproductive capacity of the North Sea cod stock, and prolonging the future risk of even greater economic and social consequences.

### **1.13. Cod (*Gadus morhua*) in the Kattegat**

**FISHERIES:** Cod in the Kattegat is exploited by Denmark, Sweden, and Germany. The fishery is conducted by both trawl and gillnets. Landings fluctuated between 4,000 and 22,000 t (1971-2001). Landings have decreased continuously since then. Reported landings were 645 t in 2007. Fishery-independent information indicates that removals from the stock are substantially higher than reported landings and that the mismatch between TAC/official landings and the total removals has increased in the most recent years.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment is considered indicative of trends only.

**MANAGEMENT AGREEMENT:** The European Commission has enacted a Council Regulation (EC) No. 423/2004 which establishes measures for the recovery of cod stocks, including cod in the Kattegat. The management plan requires annual predictions of spawning stock size, which are not available for this stock given the recent unreliable catch data.

**PRECAUTIONARY REFERENCE POINTS:**  $B_{pa} = 10,500$  t,  $B_{lim} = 6,400$ ,  $F_{pa} = 0.6$  and  $F_{lim} = 1.0$

**STOCK STATUS:** The assessment is indicative of trends. The absolute estimates for SSB and F from the exploratory analyses are considered uncertain due to unreliable catch data and divergent signals from surveys. However, the exploratory assessments show that SSB is well below  $B_{lim}$ . Recruitment has been at a low level in recent years. Level and trends for F cannot be reliably estimated, however, there is not indication of a major decline in F in recent years.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:** According to the recovery plan the TAC for 2009 shall be set at a level consistent with an increase in SSB of more than 30%. The available information does not allow for reliable catch forecasts.

**Exploitation boundaries in relation to precautionary limits:** Taking into account the current perception of the stock abundance and recruitment, fishing at any level will involve a risk of further depletion of the stock. There should therefore be no catches of this stock in 2009.

**Conclusion on exploitation boundaries:** Based on the current perception of the stock abundance and recruitment, there should be no catches from this stock in 2009.

Cod in the Kattegat is at present mainly caught as by-catch in fisheries targeting other species. Measures that could reduce cod catches with lower impact on catches of other species include:

- closed areas (i.e. the major spawning areas in the southern part of the Kattegat);
- closed seasons or effort restrictions in periods of high catch rates, such as the regulation implemented in 2008 with one fishing day counting as 2.5 days in the period from 1 February to 30 April;
- introduction of more selective trawls with low catchability on cod. Ongoing selectivity experiments indicate that new designs of escape windows can possibly improve the selectivity for cod. Usage of species-sorting grid in the *Nephrops* fishery has been shown to reduce by-catch of cod and other fin-fishes;
- removing directed fisheries on cod as an exploitation option in the border area between the Kattegat and Øresund (ICES square 41G2).

#### **Short-term implications**

**Outlook for 2009:** Due to uncertain catch data, reliable predictions cannot be made.

#### **STECF COMMENTS:**

STECF agrees with ICES advice.

STECF evaluated the effects of the cod recovery plan for all stocks subject to such plans including cod in the Kattegat and concluded that the plan has not delivered reductions in fishing mortality to the extent considered necessary for stock rebuilding. All information suggests that cod rebuilding is possible. STECF notes, however, that a significant reduction in fishing mortality on cod of more than 50 % is a prerequisite for stock rebuilding.

STECF furthermore notes that to maximise the probability for stock rebuilding, there should be no catches of cod from the Kattegat in 2009.

STECF notes that the absence of essential stock parameters of required precision, prevents the STECF from providing the advice necessary for the operation of the cod recovery plan and recommends a plan based on direct fleet-based effort management be considered, in combination with improved control and enforcement.

## **1.14. Cod (*Gadus morhua*) in the Skagerrak**

**FISHERIES:** Landings of Skagerrak cod fluctuated between 7,000 and 20,000 t (1984-2002). Annual landings since 2003 varied between 2,900 and 3,800 t. The assessment of the Skagerrak cod stock is included in the North Sea cod assessment. For other information on this stock (see section 1.12, Cod - North Sea).

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

### **1.15.1. Cod (*Gadus morhua*) in Vb1 (Faroe Plateau cod)**

**FISHERIES:** Faroe 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 Faroese 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 (1986-2007), almost entirely taken by non-EU fleets. In 2007 landings were 8,100 t, the lowest observed since 1993.t. The EU fishery on this stock has been managed together with cod in VI, Vb (EC waters), International waters of 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  $B_{pa} = 40,000$  t and limit reference points of  $F_{lim} = 0.68$  and  $B_{lim} = 21,000$  t.

**STOCK STATUS:** Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as suffering reduced reproductive capacity and being harvested unsustainably. All year-classes from 2001 onwards have been around one third of the long-term 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 of 0.70 in 2007. Assuming proportionality between effort and F and adherence to the management plan would imply a 36% reduction in effort for 2009. ICES considers that this reduction is insufficient to be in agreement with the precautionary approach.

**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 0.70 is above rates that would support an optimal yield and low risk of stock depletion ( $F_{0.1}$  and  $F_{max}$ ).

**Exploitation boundaries in relation to precautionary limits:** The stock is expected to remain below  $B_{lim}$  in the short-term even without a fishery. ICES, therefore, recommends a closure of the fishery and a development of a recovery plan aimed at rapidly rebuilding the stock to above  $B_{pa}$ .

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

### 1.15.2. Cod (*Gadus morhua*) in Vb2 (Faroe Bank cod)

**FISHERIES:** during the recent 10 years total catches for this stock have fluctuated between 4000 and 200 t. In the latest years EU landings have constituted 10-20% of the total. The EU fishery on this stock has been managed together with cod in VI, Vb (EC waters), International waters of XII and XIV.

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

**PRECAUTIONARY REFERENCE POINTS:** Biological reference points have not been defined for this stock.

**STOCK STATUS:** There is no analytical assessment for this stock. Survey indices indicate that the stock is severely depleted. Catches have declined strongly in the last three years despite a marked increase in the exploitation rate.

**MANAGEMENT OBJECTIVES:** There are no explicit management objectives for this stock

**RECENT MANAGEMENT ADVICE:** Because of the apparent very low stock size ICES advises that the fishery should be closed. Reopening the fishery should not be considered until both survey indices indicate a biomass at or above the average level of the period 1996–2002.

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

### 1.15.3. Cod in Division VIa (West of Scotland)

**FISHERIES:** Cod is taken in mixed demersal fisheries and in Division VIa is now regarded as a by-catch species. The fleets involved include French vessels targeting saithe and Scottish whitefish trawlers. 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 value of about 500 t in 2007. Landings restrictions in the first half of the 1990s led to considerable misreporting. Legislation introduced in Britain and Ireland in 2006 has reduced misreporting. Observer data, however, show an increase in discards starting in 2006. The management area for this stock also includes cod in VIb, Vb, XII and XIV with a specified share allocated to VIa.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. A catch-at-age model using catch data up to 1994 tuned by survey data and utilizing survey information alone from 1995 onward was used to evaluate trends in spawning-stock biomass and recruitment. Trends in SSB are similar to results from a model based on survey data alone.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points are  $F_{pa} = 0.6$  and  $B_{pa} = 22,000$  t.

**STOCK STATUS:** The spawning stock biomass has increased from an all time low in 2006 but remains well below  $B_{lim}$ . Total mortality is uncertain and probably high. Recruitment has been estimated to be low over the last decade. The 2005 year-class is estimated to be the largest for that decade, but still below the long-term average.

**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  $\pm 15\%$  (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.

The regulation is complemented by a system of fishing effort limitation (see EC 40/2008 for latest revision).

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. Simulations conducted by ICES in 2006 showed that, starting in 2007, 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:*

The management plan is not explicit about the level of reduction in the catch when the stock is below  $B_{lim}$ . Furthermore, due to the uncertainty in the level of fishing mortality, ICES is not in a position to give quantitative forecasts. Simulations conducted in 2006 showed that fishing should be closed for 3 years in order to bring SSB above  $B_{lim}$ .

*Exploitation boundaries in relation to precautionary limits:*

Given the low SSB and low recruitments in recent years, it is not possible to identify any non-zero catch, which would be compatible with the precautionary approach.

**STECF COMMENTS:** STECF agrees with the ICES advice. Because of the absence of essential stock parameters of required precision, STECF is unable to provide the definitive advice required for the operation of the cod recovery plan in 2009.

STECF recently evaluated the effects of the cod recovery plan for all stocks subject to such plans (SGRST 07-02) and concluded that the plan has not delivered reductions in fishing mortality to the extent considered necessary for stock rebuilding. All information suggests that cod rebuilding is possible. STECF notes, however, that a significant reduction in fishing mortality on cod of more than 50 % is a prerequisite for stock rebuilding.

STECF reiterates its advice (STECF/SCEGA-SGRST-07-02) arising from the above evaluation that the current management area does not fully encompass the distribution of the stock or fishery and that any further development of a rebuilding plan for the western European cod stocks should ensure all of the area occupied by the west of Scotland cod stock is effectively covered by the measures.

STECF notes that setting a restrictive TAC for 2009, without other effective accompanying measures to restrict activities contributing to fishing mortality on cod, is unlikely to achieve the reduction in overall fishing mortality required for stock rebuilding, and is likely to lead to increased discarding and may also result in an increase in unaccounted mortality. STECF therefore recommends that in addition to any agreed TAC, accompanying measures that further reduce fishing mortality such as appropriate direct fleet-based effort reductions, also be implemented. In the absence of a more precise measure of the relationship between fishing mortality and deployed fishing effort, STECF also recommends that if further reductions in fishing effort are implemented, these should be proportional to desired reductions in fishing mortality.

At its cod recovery review subgroup (SGRST 07-02), STECF pointed out that changes in fishing behaviour following reductions in days at sea allocations (such as greater concentration in cod rich areas) may prevent delivery of the required reduction in F. Hence, if managers decide to implement effort reductions through reduced days at sea allocations, additional supportive measures may also need to be considered. STECF notes that cod avoidance measures implemented by UK (Scotland) under its Conservation Credits scheme came into operation in 2008. STECF is expecting to be asked to evaluate the effect of this scheme but notes that in overall stock terms it is the ICES 2009 assessments that will provide first indications of any impact on F and SSB.

#### 1.15.4. Cod in Division VIb (Rockall)

**FISHERIES:** Rockall cod has been exploited predominantly by Scottish, Irish and Norwegian vessels using towed gears. Landings have fluctuated between 500 t and 2,000 t (1984-2000) but have shown a steady decline since 2001 to a level of about 60 t since 2005. 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.

**RECENT MANAGEMENT ADVICE:** No advice has been given.

**STECF COMMENTS:** STECF notes that because cod TACs are set to include all of Area VI, 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.

#### 1.15.5. Cod in areas XII and XIV

**FISHERIES:** The management area for this stock also includes cod in VI and Vb (see sections 1.15.1 - 1.15.3).

**SOURCE OF MANAGEMENT ADVICE:** No explicit management advice is given for cod in these areas.

### 1.16. 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 since then, landings have continuously declined to the record low value of 702 t in 2007. The quality of the commercial landings and catch-at-age data for this stock deteriorated in the 1990s following reductions in the TAC without associated control of fishing effort. Legislation introduced in Britain and Ireland in 2006 has reduced misreporting.

**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. Reported landings are replaced by estimates derived from a port-sampling scheme for the years 1991-1999. From 2000 the model estimates the removals needed for abundance estimates to follow the same trends as observed by surveys in the area.

**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 (in 2008), ICES classifies the stock as having reduced reproductive capacity. Based on the most recent estimates of fishing mortality (in 2007), ICES classifies the stock as being harvested unsustainably. SSB has been below  $B_{lim}$  since the mid-1990s. Recruitment has been below average for the past sixteen years, and the six most recent year-classes are amongst the smallest on record.

**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 in an attempt 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  $\pm 15\%$  (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 (see EC 40/2008 for latest revision).

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 consider the recovery plan not to be consistent with the precautionary approach.

#### **RECENT MANAGEMENT ADVICE:**

*Exploitation boundaries in relation to existing management plans:*

Given the highly uncertain estimates of fishing mortality resulting from the assessment it has not been possible to conduct a short-term forecast on the basis of the management plan.

*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  $F_{max}$  can be considered as candidate target reference points, consistent with taking high long-term yields and achieving a low risk of depleting the productive potential. The present fishing mortality is uncertain; however, it is estimated to be well above any candidate reference points.

*Exploitation boundaries in relation to precautionary limits:*

Given the low stock size and recent poor recruitment, it is not possible to identify any non-zero catch, which would be compatible with the precautionary approach.

*Conclusion on exploitation boundaries:*

Because the existing recovery plan does not include the elements or measures necessary to rebuild the stock at the current SSB (well below  $B_{lim}$ ), 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 2009 will prolong the recovery to  $B_{pa}$ .

#### **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 although the recent implementation of stricter landings enforcement has potentially improved the quality of the landings data from 2006 onwards.

STECF recently evaluated the effects of the cod recovery plan for all stocks subject to such plans (SGRST 07-02) and concluded that the plan has not delivered reductions in fishing mortality to the extent considered necessary for stock rebuilding. All information suggests that cod rebuilding is possible. STECF notes, however, that a significant reduction in fishing mortality on cod of more than 50 % is a prerequisite for stock rebuilding.

STECF notes that setting a restrictive TAC for 2009, without other effective accompanying measures to restrict activities contributing to fishing mortality on cod, is unlikely to achieve the reduction in overall fishing mortality required for stock rebuilding, and is likely to lead to increased discarding.

STECF therefore recommends that in addition to any agreed TAC, accompanying direct fleet-based effort reductions, in combination with improved control and enforcement, also be implemented. STECF also recommends that in the absence of

a more precise measure of the relationship between fishing mortality and deployed fishing effort, reductions in fishing effort should be proportional to desired reductions in fishing mortality.

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

### **1.17.1. 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 landings sharply decreased to 1,600 t in 2001. In 2002, 3,100 t cod have been landed. In 2003 and 2004 consecutive record low values of 1,200 t and 800 t respectively were recorded. Landings in 2005 and 2006 are slightly higher at 1,000 and 1,100 t respectively. The 2007 landings account for 1,740 t. Cod from VIIId are included in the North Sea cod assessment. For other information on this stock (see section 1.12, 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 1.12 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 1.12.

The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.1.

**STECF COMMENTS:** STECF agrees with the advice from ICES. See also section 1.12, Cod – North Sea.

### **1.17.2. 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 3,500 and 13,000 t (1990-2004), all taken by EU fleets. Landings in the last three years have declined further to remain just above 3,000 t in 2005 and 2006 (the lowest level in the time series) and 4,300 in 2007.

**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.

Current management measures for Divisions VIIe-k also apply to cod in Divisions VIIbc and cod in Division VIIId. Similarly the TAC is set for Divisions VIIb-k, Subareas VIII, IX, X, and CECAF 34.1.1. Within this larger area there is no control over where the catches are taken.

The assessment area covers Divisions VIIe-k and the ICES advice applies to these areas only, while Cod in Division VIIId is assessed together with cod in the North Sea (the assessment of the stock in Division VIIId is combined with that of Sub-area IV and IIIa).

The TAC for Division VIIa is based on a separate assessment for that Division and has a separate TAC.

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:**

- Based on the most recent estimates of SSB (SSB2008 = 6,794), ICES classifies the stock as below  $B_{lim}$  (6,300) between 2004 and 2007 and above  $B_{lim}$  in 2008. Fishing mortality increased from the mid-1970s,

and stayed high into the early years of this century. Since 2002 however,  $F$  has declined and fell below  $F_{pa}$  in 2006 and 2007.

- The current fishing mortality is estimated at 0.60 and while this is considered to have a high probability of avoiding  $F_{lim}$  (0.90) and maintaining SSB above  $B_{pa}$  (8,800) in the medium term (assuming normal recruitment), it is well above the range that would lead to high long-term yields and low risk of stock depletion.
- Recruitment has been below average since 2002 and is currently estimated to be 88% of the geometric mean of the time series (1971 – 2007).
- The exploitation boundaries in relation to precautionary limits imply landings of less than 2,600 t in 2009, which is expected to rebuild SSB to the  $B_{pa}$  in 2010.
- STECF noted however the upward revision of the 2005 year-class by 74% and an upward revision of SSB in 2007 by 14%. In addition, the 2006 year-class which was assumed to be average in the forecast last year is now estimated 67% higher.

#### **RECENT MANAGEMENT ADVICE:**

The advice in 2007 was for a zero catch of cod because the forecast indicated that only a zero catch in 2008 would allow SSB to almost achieve  $B_{pa}$  in 2009. The advice this year is for a 50% reduction in fishing mortality, which is expected to allow rebuilding of the stock to  $B_{pa}$  in 2010.

The results of the current assessment are considered to be broadly consistent with those of last year in terms of trends in fishing mortality, SSB, and recruitment. STECF noted however the upward revision of the 2005 year-class by 74% and an upward revision of SSB in 2007 by 14%. In addition, the 2006 year-class, which was assumed to be average in the forecast last year, is now estimated 67% higher. This is included in the forecast catch for 2009 and the forecast SSB for 2010.

This stock has had a truncated age structure observed in the landings over many years. The historical dynamics of Celtic Sea cod have been “recruitment driven”, i.e. the stock increased in the past in response to good recruitments and decreased rapidly during times of poor recruitment. Recruitment has been below average since 2002, however it has increased annually since then and is currently estimated to be 88% of the geometric mean of the time series (1971 – 2007).

Fishing mortality should be reduced in the longer term to maximize the contributions of recruitment to future SSB and yield. However the displacement of effort from areas with existing effort control regimes (Division VIIa, Subareas VI and IV) can have a detrimental effect on measures to reduce mortality on cod in the Celtic Sea. Similarly recent changes to the fishing pattern for cod have included increased high-grading and discarding in response to restrictive quotas since 2002. High-grading has occurred in French fisheries since 2003 and was also apparent in UK fisheries in 2007. Due to quota restrictions all catches were discarded in the French fishery in quarter 4 in 2002, and in the Irish fishery in quarters 3 and 4 in 2007. This is expected to be a problem again in 2008 because around 80%+ of the Irish quota in the Celtic Sea area was caught by mid-March.

**STECF COMMENTS:** STECF agrees with the advice from ICES that the exploitation boundaries for this stock (in relation to precautionary limits) imply landings of less than 2,600 t in 2009. Landings at or below this level are expected to rebuild SSB to  $B_{pa}$  (= 8,800 t) in 2010.

STECF recommends that given the current state of the stock cod in VIIb-k a long-term management plan, which includes provision for stock recovery should be developed and implemented.

The 2008 ICES assessment forecast table (ACOM, 2008) which assumes  $F_{sq}$  in 2008 implies that landings in 2008 will be 4,800 t compared to an agreed TAC of 4,316 t.

Additional request:

With the background of the latest ICES advice, STECF is requested to advise the Commission of the fishing possibilities concerning this stock in 2008 according to the usual precautionary criteria.

In addition, and with reference to the Commission's "Policy Statement" Communication concerning the setting of TACs for 2008<sup>2</sup>, STECF is requested to advise

- (a) which "Policy Statement" category is applicable to this stock;

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<sup>2</sup> Communication from the Commission to the Council - Fishing Opportunities for 2008 : Policy Statement from the European Commission. COM/2007/0295 final.

(c) what TAC results from the application of the relevant "Policy Statement" rule.

STECF concludes that with the background of latest ICES advice and based on the usual precautionary criteria adopted by ICES (aim to achieve  $B_{pa}$  by 2009), the advice on fishing possibilities for 2008 would have been 4150 t. STECF notes that according to the precautionary criteria adopted by ICES in 2007, the advice was for a zero catch in 2008.

a) STECF further concludes that with the background of latest ICES advice and based on the Policy Statement Communication, for 2008 COM(2007) 295 final, the stock of cod in Divisions VII e-k would have been classified in 2008 as "outside safe biological limits".

b) STECF notes that COM (2007) 295 final, prescribes that the TAC for 2008 should be set at least 15% lower than that for 2007. STECF advises that this implies that the 2008 TAC (EU share) for cod in Divisions VIIb-k, VIII, IX, X CECAF 34.1.1 should have been no greater than 4,032 t.

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

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

ICES has not assessed this stock and STECF has no access to any stock assessment information on dab in this area.

A precautionary TAC (including flounder) in areas IIa and IV for 2008 was set to 18 810 t.

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

ICES has not assessed this stock and STECF has no access to any stock assessment information on flounder in this area.

A precautionary TAC (including dab) in areas IIa and IV for 2008 was set to 18 810 t.

## **1.20. Greenland halibut (*Reinhardtius 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. In 2007, the catch was estimated to amount to 15,000 t.

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. An exploratory assessment was based on commercial catch-at-age data, two survey series, and one commercial cpue series. The assessment is uncertain due to age-reading problems and lack of contrast in the data.

**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 (undertaken in 2007) indicates that SSB has been low since the late 1980s, but a slight increase is indicated until 2004. After 2004 the SSB has decreased again. 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 recruitment estimates are very uncertain.

**RECENT MANAGEMENT ADVICE:** The new data available for this stock (landings, survey, and cpue) do not change the perception of the stock. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: 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 should be below 13,000 t as advised since 2003; this is the level below which, SSB has increased in the past.

This advice will be updated in 2010. The evaluation of this stock is uncertain due to age-reading problems and lack of contrast in the data. The age-reading issue is being addressed and should be resolved in future years (2009). This will only influence the assessment results and management advice for 2011 onwards. Corrections to the whole time-series are required.

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

## 1.21. Greenland halibut (*Reinhardtius hippoglossoides*) in area V, VII, 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. This was followed by a decline to around 20,000 t. in 1999. In the recent period 2000 to 2005 landings were in the range 25000 to 31000 t. and landings in 2006 dropped to about 21,000 t. 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 data are insufficient for an analytical assessment. A number of indices from surveys and commercial cpue are available with which to examine stock biomass development. These data are of varying quality and cover different areas and different time spans. The stock is not managed according to international agreements and there is no management plan in place. ICES recommends that an adaptive management plan is developed and implemented, covering the whole stock area.

**REFERENCE POINTS:** The reference points used previously were linked to a specific assessment model, which is no longer used. Therefore, these reference points are no longer relevant. The new assessment approach provides information that will be used to suggest future reference points.

**STOCK STATUS:** In the absence of defined reference points, the state of the stock cannot be fully evaluated. The stock has been below  $B_{MSY}$  since the mid-1990s and is presently at a historical low. Present fishing mortality is estimated at twice the fishing mortality that is associated with maximum sustainable yield.

**RECENT MANAGEMENT ADVICE:** There is currently no explicit management objective for this stock. Given the continued poor state of the stock, there is a need to reduce the exploitation of the stock considerably. Therefore, the present high fishing mortality must be reduced to well below  $F_{MSY}$ , in order to increase the probability of a more rapidly stock recovery. ICES recommend restricting catches to no more than 5,000 tonnes in 2009 to ensure that fishing mortality is kept well below  $F_{MSY}$ . This reduction in catches could be part of an adaptive management plan that covers the whole stock area. ICES has previously advised on catches of no more than 15,000 t as an initial step in an adaptive management plan. The medium-term forecasts now available suggest that catches of 15,000 t could lead to a further decline in the stock. Stock recovery is slow under all fishing scenarios for a slow-growing and long-lived species as Greenland halibut, even in the case of no fishery. Therefore ICES recommends a reduction of the present high fishing mortality (two times  $F_{MSY}$ ) to well below  $F_{MSY}$ , in order to increase the probability of a more rapid stock recovery. Catches should be reduced to less than 5,000 t to ensure that fishing mortality is kept well below  $F_{MSY}$ . The management plan should include monitoring of the effort and stock development as well as a framework for adapting future fishing according to the response of the stock. Since Greenland halibut is a highly vulnerable species, it is expected that a change in stock dynamics may take several years and this should be taken into consideration in the adaptive management plan. Distribution of total fishing effort for Greenland halibut indicates that the fishery in 2007 is concentrated

in a much smaller area compared to the overall fishery in the period 1991–2007 for the species.

Available biological information such as tagging and genetic studies and information on distribution of the fisheries suggest that Greenland halibut in Divisions XIV and V belong to the same stock entity.

Because the nursery grounds are not known and therefore not monitored, and because Greenland halibut is a slow-growing species that first appears in the catches at age 5, a possible recruitment failure will only be detected in the fishery some 5–10 years after it occurs.

**STECF COMMENTS:** STECF agrees with the ICES advice and supports its conditions highlighted in its proposals for an adaptive joint management plan.

## 1.22. 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 is taken as by-catch 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 by-catch 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 70% of the landings. The total landings in 2007 were estimated to be 161,000 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Analytical assessment based on catch-at-age data, using three survey series. Estimates of cod predation on young haddock are included in the natural mortality. Two series of IUU catch were made available to ICES, but the advice is based on one series only. The surveys in 2006 had incomplete coverage, but the index calculation has been adjusted accordingly (ICES. 2008. Report of the Arctic Fisheries Working Group, 21–29 April 2008. ICES CM 2008/ACOM:01).

**REFERENCE POINTS:** The proposed precautionary reference points for biomass and fishing mortality are  $B_{pa} = 80,000$  t,  $B_{lim} = 50,000$  t,  $F_{pa} = 0.35$  and  $F_{lim} = 0.49$ .

**STOCK STATUS:** Based on the most recent estimates of SSB (in 2008) and fishing mortality (in 2007), ICES classifies the stock as having full reproductive capacity and being harvested sustainably. The SSB has been above  $B_{pa}$  since 1990. Fishing mortality was reduced from above  $F_{lim}$  in 1988 to below  $F_{pa}$  in 2006 and 2007. Recruitment has been at or above average since 2000. Surveys indicate that the year-classes 2004–2006 are very strong.

**MANAGEMENT AGREEMENTS:** A management plan has been in force since 2004 with the objectives of maintaining high long-term yield, year-to-year stability, and full utilization of all available information on stock dynamics. The plan aims to maintain  $F$  at  $F_{pa} = 0.35$  and minimize between-year TAC change to  $\pm 25\%$ , unless SSB falls below  $B_{pa}$  in which case the management targets should change.

At the 36th Session of the Joint Russian–Norwegian Fishery Commission (JRNFC) in autumn 2007 the parties agreed to modify the former three-year rule to a one-year rule in accordance with the results of ICES HCR evaluation.

The agreed HCR for haddock (2007) is as follows (Protocol of the 36th Session of The Joint Norwegian–Russian Fishery Commission, 10 October 2007):

- TAC for the next year will be set at level corresponding to  $F_{pa}$ .
- The TAC should not be changed by more than  $\pm 25\%$  compared with the previous year 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 and a year ahead) there should be no limitations on the year-to-year variations in TAC.*

In 2006 ICES evaluated the management plan that was agreed in 2004. The evaluation indicated that the management plan using a one-year prediction and no implementation error had low probabilities (<5%) of depleting the stock below  $B_{lim}$  and exceeding  $F_{lim}$ . With implementation errors of the order of magnitude as recently observed, the agreed management is still expected to have a low probability (<5%) of depleting the stock below  $B_{lim}$ , but the fishing mortality has an 8% probability of exceeding  $F_{lim}$ . In contrast to earlier conclusions, ICES now concludes that the low probability of depleting the stock below  $B_{lim}$  and the relatively low probability of exceeding  $F_{lim}$  means that the management plan is in agreement with the precautionary approach.

#### **RECENT MANAGEMENT ADVICE:**

***Exploitation boundaries in relation to existing management plans:*** The agreed management plan implies landings of 194 000 t in 2009 (maximum 25% change in TAC from 2008). This projection includes all landings and therefore the TAC must account for all unreported landings.

***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 0.35 is within the range that is expected to lead to high long-term yields and low risk of depleting the productive potential ( $F_{0.1} = 0.19 - F_{pa} = 0.35$ ).

***Exploitation boundaries in relation to precautionary considerations:*** The agreed management plan is considered to be consistent with the precautionary approach and is therefore the basis for the advice. This implies catches of 194 000 t in 2009.

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

### **1.23. 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 1963-2006, catches have ranged from 55,000 t to 930,000 t. In recent years catches have decreased and the estimates for 2005 to 2007 represent the three lowest on record. 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. However, 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) and revised in subsequent years by EC 2287/2003, Annex V, EC 27/2005, Annex IVa, EC 51/2006, Annex IIa, EC 41/2007, Annex IIa and EC 40/2008, Annex IIa. 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.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The advice is based on an age-based assessment model (XSA), which is calibrated with three survey indices. Discards and industrial by-catch were included in the assessment for the North Sea only. Discards were estimated from the discards sampling programme from several countries, with most observations coming from Scotland. Samples were

raised to the total international fleet. The 1999 and 2000 year-classes are slow-growing. This has been taken into account in the forecast.

**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 (in 2008) and fishing mortality (in 2007), ICES classifies the stock as having full reproductive capacity and being harvested sustainably. SSB in 2008 is estimated to be above  $B_{pa}$ . Fishing mortality in 2007 is estimated to be below  $F_{pa}$  but above the target  $F_{HCR}$  (0.3) specified in the EU-Norway management plan. The influence of the strong 1999 year-class on the stock is diminishing. The 2005 year-class is estimated to be above average.

**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 plan shall consist of the following elements:

1. Every effort shall be made to maintain a minimum level of Spawning Stock Biomass greater than 100,000 tonnes ( $B_{lim}$ ).
2. For 2007 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 0.3 for appropriate age-groups, when the SSB in the end of the year in which the TAC is applied is estimated above 140,000 tonnes ( $B_{pa}$ ).
3. Where the rule in paragraph 2 would lead to a TAC which deviates by more than 15% from the TAC of the preceding year the Parties shall establish a TAC that is no more than 15% greater or 15% less than the TAC of the preceding year.
4. Where the SSB referred to in paragraph 2 is estimated to be below  $B_{pa}$  but above  $B_{lim}$  the TAC shall not exceed a level which will result in a fishing mortality rate equal to  $0.3 - 0.2 * (B_{pa} - SSB) / (B_{pa} - B_{lim})$ . This consideration overrides paragraph 3.
5. Where the SSB referred to in paragraph 2 is estimated to be below  $B_{lim}$  the TAC shall be set at a level corresponding to a total fishing mortality rate of no more than 0.1. This consideration overrides paragraph 3.
6. In order to reduce discarding and to increase the spawning stock biomass and the yield 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.
7. In the event that ICES advises that changes are required to the precautionary reference points  $B_{pa}$  (140 000t) or  $B_{lim}$  (100 000t) the parties shall meet to review paragraphs 1-5.
8. No later than 31 December 2009, the parties shall review the arrangements in paragraphs 1 to 7 in order to ensure that they are consistent with the objective of the plan. This review shall be conducted after obtaining inter alia advice from ICES concerning the performance of the plan in relation to its objective.

This arrangement enters into force on 1 January 2007.

The evaluations of the management plan have been carried out using a recruitment model, which is thought to capture the sporadic nature of haddock recruitment. On this basis, a target  $F = 0.3$  with TAC constraint  $\pm 15\%$  leads to a low risk of  $< 12\%$  in any year, and a mean risk of 5% over all years of  $B < B_{lim}$  over the next 20 years. Lower  $F$ s lead to lower risks.

Although the management plan has not been fully tested (e.g. at lower fishing mortalities), ICES concludes that the management plan can be provisionally accepted as precautionary and be used as the basis for advice.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:** Following the agreed management plan (target  $F = 0.3$ ) implies landings in 2009 of 44 700 t, which is expected to lead to an SSB of 188 700 t in 2010. The constraint on inter-annual TAC variability ( $\pm 15\%$ ) is not invoked in this case.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** The current fishing mortality is estimated at 0.42, which is above the management plan target rate ( $F_{mp} = 0.3$ ) expected to lead to high long-term yields.

**Exploitation boundaries in relation to precautionary reference points:** The fishing mortality in 2009 should be at or below  $F_{pa}$ , corresponding to human consumption landings of no more than 87 900 t.

**Conclusion on exploitation boundaries:** The agreed management plan can be provisionally accepted as precautionary and ICES therefore advises according to this plan. This implies a TAC of 44,700 t in 2009, which should include industrial by-catch.

ICES' advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of Division IIIa (Skagerrak–Kattegat), in Subarea IV (North Sea), and in Division VIId (Eastern Channel) and is found in Section 3.1.

**STECF COMMENTS:** STECF agrees with ICES advice and notes that the predicted human consumption landings for 2009 are 44,700 t.

STECF notes that even under the option of a Norway pout fishery in 2009 of the order of 100,000t, based on recent historic estimates, the industrial by-catch of haddock is likely to remain low (around 1000 t). Such level of by-catch in 2009 should not affect the TAC advice for 2009 as haddock SSB in 2010 is expected to remain at the level of about 188 700 t, which is above  $B_{pa}$ .

STECF notes that in accordance with the advice for the North Sea cod, the by-catch and discards of cod associated with the fisheries that catch haddock should be kept to a minimum.

## **1.24. 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.

### **1.24.1. Haddock (*Melanogrammus aeglefinus*) 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. Since 1988 total landings from Vb have increased from 4,000 t to 27,000 t in 2003 but have dropped to 12633 t in 2007. 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 age disaggregated data from two surveys.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for this stock are  $F_{pa} = 0.25$  and  $B_{pa} = 35,000$  t.

**STOCK STATUS:** Based on the most recent estimates of SSB (in 2008) and fishing mortality (2007), ICES classifies the stock as having full reproductive capacity but being at risk of being harvested unsustainably. The 2007 estimate of fishing mortality is slightly above  $F_{pa}$ . SSB increased until 2003 as a result of strong recruitments, including the record-high 1999 year-class, but has declined since. Recruiting year-classes from 2003 onwards have all been well below average, and the 2005–2007 year-classes were close to the historical low.

**RECENT MANAGEMENT ADVICE:** ICES' advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries in Section 3.5.

**Exploitation boundaries in relation to existing management plans:** The management objectives are to achieve an exploitation rate equivalent to a fishing mortality of 0.45 on average. The current F estimate (0.31) is below the management target.

**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 0.31, is above  $F_{0.1}$  (0.16).

**Exploitation boundaries in relation to precautionary limits:** Given the recent poor recruitment and slow growth and the rapidly declining SSB, the forecast indicates that a zero fishing mortality in 2009 will not maintain the stock above  $B_{pa}$  in 2010. ICES recommends a closure of the fishery in 2009, and a recovery plan should be developed and implemented as a prerequisite to reopening the fishery.

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

### 1.24.2. 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 2006, catches including discards were estimated to have varied between about 13,000 t and 45,000 t, with the minimum in 1990. The large majority of the landings are made by EU-nations, with landings by non-EU fleets not exceeding 100 t over this period. In 2006, landings of 5,700 t were reported representing an increase by almost 100% compared with the record low in 2005 but reported landings for 2007 have reduced again to 3,700 t. 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 2002-2007 under national UK legislation. Days at sea regulations are set since 2003 (see EC 40/2008 for latest revision) in order to enhance the cod recovery plan.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The analytical age-based assessment is based on landings-at-age data, discard-at-age data, and indices from research vessel surveys. Due to uncertainties in landings quantity, catch data 1995–2007 were not used in the assessment. The assessment model therefore estimates total catch from the fishery.

**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 (in 2008) and fishing mortality (in 2007) ICES classifies the stock as being at risk of reduced reproductive capacity and at risk of being harvested unsustainably. The estimate of fishing mortality is above  $F_{pa}$  in most years since 1987. SSB varied around  $B_{pa}$  during the 1990s. The very strong 1999 year-class caused SSB to increase from a level near the historic low in 2000 to a peak in 2003 but it has declined since. The 2003, 2004 and 2006 year-classes are estimated to be weak. The 2005 year-class is of moderate strength.

#### **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 fishing mortality (2007) is estimated to be 0.56, which is above the rate expected to lead to high long-term yields and low risk of stock depletion.

***Exploitation boundaries in relation to precautionary limits:*** Even in the absence of fishing the stock is not expected to be rebuilt to  $B_{pa}$ .

***Conclusion on exploitation boundaries:*** Given the recent poor recruitment and the rapidly declining SSB, the forecast indicates that a zero fishing mortality in 2009 will not maintain the stock above  $B_{pa}$  in 2010. ICES recommends a closure of the fishery in 2009 and a recovery plan should be developed and implemented as a prerequisite to reopening the fishery.

ICES' advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of the West of Scotland and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the ICES advice and notes this is consistent with the precautionary approach and notes that this implies closure of all demersal fisheries in VIa that catch haddock. If this cannot be achieved, STECF recommends that measures should be taken to ensure a significant reduction in fishing mortality in 2009, which should be maintained in subsequent years until recovery is achieved.

According to the policy on setting of TACs for 2009 (COM (2008) 331), the haddock in VIa is classified in the category, zero catch. Accordingly, the TAC for haddock should therefore be reduced by at least 25% implying that the 2009 TAC should be set at a level no greater than  $(0.75 \times 6120 \text{ t}) = 4590$  t which corresponds to reduction in fishing mortality of more than 60%. Recovery measures should also be implemented including effort reductions and introduction of more selective fishing gear.

STECF recommends that an integrated long-term management plan for the fisheries exploiting haddock and other demersal stocks in VIa should be developed and implemented. STECF notes that the mixed fisheries advice implies a zero catch of haddock. 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 120-mm mesh nets since 2002 may have improved the selection pattern for haddock. The conflicting signals in the survey and the catch-at-age information indicate that since the mid-1990s there have been unaccounted catches.

### 1.24.3. 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. The TAC only applies to catches in the EU zone. 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 1987 and 2006, reported landings have varied between 2,300 t and 8,000 t. Reported landings in 2007 increased slightly to 3,300 t.

Following the NEAFC agreement in March 2001, an area of the NEAFC zone around Rockall was closed to fishing using demersal trawls. In spring 2002 part of the shallow water in the EU zone was also closed. Effort in the rectangle containing the closure declined when the closure came into effect. There was also a decline in UK effort across the bank as a whole at this time, but an increase of effort in other areas of Division VIb. Spawning biomass has increased since 2003; fishing mortality has decreased since 2004. The fishing mortality has decreased for small individuals (age 1 and 2) since 2001. However, it is difficult to determine to what extent this may be contributed to the efforts made to protect juveniles in the closed area.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The assessment is based on catch numbers-at-age and one survey index (Scottish Groundfish Survey). Discarding occurs in part of the fishery and has been estimated and used in the assessment. 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:** Based on the most recent estimates of SSB (in 2008) and fishing mortality (in 2007) ICES classifies the stock as having full reproductive capacity and it is harvested sustainably. Spawning biomass has increased in recent years as a result of the 2000 and 2001 year-classes. SSB has been above  $B_{pa}$  since 2003. Fishing mortality has been above  $F_{pa}$  throughout the time-series but has declined since 2005 to below  $F_{pa}$ .

**RECENT MANAGEMENT ADVICE:** It should be noted that the ICES advice for this stock is based on catch partitioned into landings and discards using the average ratio of discard to catch numbers over the years 1999 to 2007.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** Fishing mortality around  $F_{0.1}$  (0.21) can be considered as a candidate target reference point consistent with taking high long-term yields and achieving a low risk of depleting the productive potential (< 5%). The present fishing mortality (0.25) is above the candidate reference point.

**Conclusion on exploitation boundaries:** In the present situation with a stock that is well above  $B_{pa}$  and fishing mortality below  $F_{pa}$  there is little gain to the long-term yield by increasing fishing mortality above current levels. ICES therefore recommends to limit catches to 6490 t in 2009 and landings to 4330 t.

ICES' advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of the West of Scotland and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the advice from ICES and notes that advice for this stock is based on catch partitioned into landings and discards using the average ratio of discard to catch numbers over the years 1999 to 2007. The catch advice should apply to all areas and countries having fisheries for this stock. STECF notes that the basis for previous ICES advice (for 2007 and 2008) was based on F being below  $F_{pa}$  whilst that for 2009 is based on no increase in F above  $F_{sq}$ . This results in a significant reduction in forecasted landings for 2009 compared to the current TAC.

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 misreporting, 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.

The survey only covers part of the distribution area of haddock and the results could be sensitive to other effects (migration).

## **1.25. Haddock (*Melanogrammus aeglefinus*) in VII, VIII, IX & X**

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

### **1.25.1. 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 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 by-catches 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 1990s. Landings have since declined to about 674 t in 2003, remained at that low level until 2006 but rose to approximately 1,000 t in 2007. Official landing reports may substantially underestimate the true removal by the fishery although legislation introduced by the UK and Ireland has potentially improved the quality of landings data in 2006 and 2007. Discard-sampling levels have increased in recent years. The highly variable and very large estimates of discarding for this fishery that have been observed previously are still evident.

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. 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. An age-based assessment was carried out based on survey information only and is considered to be indicative of trends only.

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

**STOCK STATUS:** The state of the stock is uncertain. The assessment is indicative of trends in SSB and recruitment and is based on survey results. The trend in total mortality remains constant. SSB has shown an increase over the time-series. Recent recruitments appear to be above average and have contributed to the rise in the SSB.

**RECENT MANAGEMENT ADVICE:** ICES recommends that fishing effort should not be allowed to increase. The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries of the Irish Sea and is found in Section 3.2. 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.

**STECF COMMENTS:** STECF agrees with the single species exploitation boundary given by ICES. The mixed fisheries advice by ICES implies a zero catch of haddock in 2009. High rates of discarding have been observed and this should be reduced in order to improve medium to long-term yield prospects.

### **1.25.2. 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 2007, total ICES estimated landings amounted to 6,400 t.

The TAC for haddock is set for all of Subareas VII, VIII, IX, and X with separate allocations being defined for VIIa. 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 known 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. 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 VIIIh. 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 age-based analytical assessment was carried out for this stock and is considered to be indicative of trends only. The assessment used landing and discard data, two commercial cpue series, and two surveys. A major shortcoming is the lack of a time-series of discard data.

**PRECAUTIONARY REFERENCE POINTS:** No fishing mortality or biomass reference points have been established for this stock.

**STOCK STATUS:** The state of the stock is uncertain. Fishing mortality appears to be relatively stable. Recruitment is highly variable. Several high recruitments in 1999-2002 led to an increase in spawning-stock biomass to the highest level of the series in 2004, and SSB appears to have been declining since.

**RECENT MANAGEMENT ADVICE:** Future catches and SSB will be highly dependent on the strength of incoming year-classes and their discard mortality. No strong recruitment has been observed since 2002. In this context the stock should be managed by ensuring that fishing effort is not allowed to increase. The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries in the Southern Shelf waters and can be found in Section 3.2. Effort for much of the distributional area of this stock is currently capped at a recent average by Council Regulation (EC) No 1954/2003.

**STECF COMMENTS:** STECF agrees with the single species exploitation boundary given by ICES. The mixed fisheries advice by ICES implies a zero catch of haddock in 2009. 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.

### **1.26. Hake (*Merluccius merluccius*) in Skagerrak, Kattegat, IIIb,c,d (1) (Northern hake)**

Hake in the Skagerrak and Kattegat are assessed as part of the northern stock of hake (see section 1.28)

### **1.27. 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 1.28)

### **1.28. Hake (*Merluccius merluccius*) in Division Vb (1), VI and VII, and XII, XIV (Northern hake)**

The management area covers Skagerrak, Kattegat, IIa, 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 44 400 t in 2007. 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 in the recovery plan (EC Reg. No 811/204). The aim is to increase the SSB to above 140 000 t. An agreed fishing mortality of F

< 0.25 with a year on year constraint on TAC of 15%, unless the stock is below 100 000. In this case a lower TAC will be applied.

**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:  $B_{lim}$ : 100,000 t,  $B_{pa}$ : 140,000 t,  $F_{lim}$ : 0.35,  $F_{pa}$ : 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 is estimated to be about  $B_{pa}$  in 2008, and  $F$  has been around  $F_{pa}$  since 2001. Recruitment has been relatively stable over the last decade. .

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.2

**Exploitation boundaries in relation to existing management plans:** Applying a fishing mortality of  $F = 0.25$  as indicated in Article 5.2 of the agreed recovery plan is expected to lead to an SSB of 156,700 t in 2010, with estimated landings in 2009 of 51,500 t. This would imply a decrease in TAC of 5%.

**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 0.25, is above fishing mortalities that are expected to lead to high long-term yields and low risk of stock depletion ( $F_{0.1} = 0.10$  and  $F_{max} = 0.18$ ). 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 therefore lower the risk of observing the stock to be outside precautionary limits.

**Exploitation boundaries in relation to precautionary limits:** A fishing mortality of  $F_{pa} = 0.25$  is expected to lead to landings of 51,500 t in 2009 and an SSB of 156,700 t in 2010, which is above  $B_{pa}$ .

**Conclusion on exploitation boundaries:** ICES uses  $F_{pa}$  as a basis for advice in 2009, which coincides with the maximum fishing mortality allowed by the recovery plan. Accordingly ICES advises that landings for 2009 should not exceed 51,500 t.

**STECF COMMENTS:** STECF agrees with the ICES assessment of the state of the stock and agrees with the TAC advice for 2009. STECF notes that ICES is based on the precautionary approach and not on the agreed management plan. However the ICES approach results in a fishing mortality in 2009, which is consistent with the maximum fishing mortality allowed by the recovery plan.

STECF also agrees with ICES 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 if growth of hake is underestimated, the stock is likely to be smaller and fishing mortality higher and reference points would need to be revisited. STECF agrees with ICES concerns and considers that special attention must be paid to improve the accuracy of age determination and discards estimation.

### **1.29. 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 1.28).

### **1.30. Hake (*Merluccius merluccius*) in Divisions VIIIc, 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 2007 were 14,900 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 harvested unsustainably. Fishing mortality has been above  $F_{lim}$  for most of the time since 1994 and, though the SSB remains below  $B_{lim}$  the last three years have seen an increase in SSB. Recruitment was high in the mid-1980s and then decreased to low levels. Recruitment has increased since 2001 to a level comparable to the mid-1980s in the most recent year estimated in the assessment.

**MANAGEMENT OBJECTIVES:** There are explicit management objectives for southern hake and *Nephrops* established 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 recovery plan has the objective of bringing the spawning stock biomass of hake above 35 000 tonnes within 10 years and to reduce fishing mortality to 0.27. The main elements in the plan are a 10% annual reduction in  $F$  and a 15% constrain on TAC change between years.

ICES have not yet evaluated the plan. However, preliminary evaluation of the recovery plan indicated that the proposed level of  $F$  might be insufficient to rebuild the stock within 10 years.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.3.

*Exploitation boundaries in relation to existing management plans:* The recovery plan aims at bringing SSB to 35,000 t ( $= B_{pa}$ ) by 2015 by reducing fishing mortality 10% per year. According to a strict interpretation of the plan,  $F$  should in 2009 be reduced by 10% compared to  $F$  in 2008. If status quo  $F$  is applied to 2008, the landings in 2009 resulting from a 10% reduction in  $F$  would be 14,000 t (adjusted to include the Gulf of Cadiz). According to the 15% TAC constraint between years, the TAC in 2009 should not exceed 8,104 t.

If the EC chooses to apply the recovery plan in 2009 such that the fishing mortality rate has been reduced by 10% per year from the 2006 level when the recovery plan is adopted in 2009, the annual fishing mortality would need to be reduced to 0.30, which corresponds to a TAC of 7900 t (adjusted to include the Gulf of Cadiz). The corresponding SSB forecast in 2010 is 20 600 t, which is below  $B_{lim}$  (25 000 t).

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* The status quo fishing mortality is estimated at 0.69, well above levels that would support sustainable long-term yield ( $F_{max} = 0.23$ , estimated in 2007) and a low risk of stock depletion. *Exploitation boundaries in relation to precautionary limits:* Even with zero landings it is not possible to bring SSB above  $B_{pa}$  at the beginning of 2010.

*Conclusion on exploitation boundaries:* ICES has not evaluated the recovery plan in relation to precautionary limits. ICES continues to advise according to the precautionary limits; no landings should therefore be allowed in 2009.

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

STECF notes that the agreed TAC is consistently overshot, and fishing mortality is increasing. STECF therefore recommends that measures to ensure compliance with the agreed TAC and effort restrictions be put in place as a matter of urgency. STECF also recommends that the measures currently in place to recover the hake stock in Divisions VIIIc and IXa, should be extended to include all fisheries that exploit hake in these areas.

STECF further notes that a preliminary evaluation of the recovery plan indicated that even the agreed target level of  $F$  (0.27) might be insufficient to rebuild the stock within 10 years.

### **1.31. Herring (*Clupea harengus*) in Div. I and II. (Norwegian Spring-spawners)**

**FISHERIES:** The total catches in 2007 were 1.26 million t., mainly taken by Norway (779 000 t), Russia (162 000 t), Iceland (173 000 t), EU (83 000 t), and Faroe Islands (64 000 t). The fishery in general follows the migration of the stock closely as it moves from the wintering and spawning grounds along the Norwegian coast to the summer feeding grounds in the Faroese, Icelandic, Jan Mayen, Svalbard, and international areas. A special feature of the summer fishery in 2005 and 2006 was the prolonged fishery in the Faroese and Icelandic zone. In 2007 this fishery was hampered by the high concentrations of mackerel in the area.

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. Management regulations have restricted landings in recent years.

**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, larval survey, and 0-group survey). ICES investigated the use of a number of different models. When appropriately formulated, they all gave a similar perception of the trajectory for stock size and fishing mortalities. On this basis, the TASACS model was used.

**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 is well above  $B_{pa}$  in 2008 and near the highest in the recent time-series. Fishing mortality is well below  $F_{pa}$ . The productivity of the stock presently is high. In the last 10 years, four large year-classes have been produced (1998, 1999, 2002, and 2004). The 2004 year-class has not been fully recruited yet; consequently, catches and SSB are expected to increase in the near future.

**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. 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 considered by ICES to be precautionary and with targets consistent with high-term yield and low risk of depletion production potential. The management plan implies maximum catches of 1 643 000 t in 2009, which is expected to leave a spawning stock of 11.5 million t in 2010.

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

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

**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 VIId. At present, the stock is managed by five separate TACs in 4 different management areas (IIa, IIIa, IVa-b and IVc+VIIId) through joint negotiations by EU and Norway. For both the North Sea and IIIa two separate TAC's are set. One for fisheries using nets with a mesh size equal to or larger than 32 mm and one for catches taken in fisheries using mesh sizes smaller than 32 mm. This stock complex also includes the Downs winter-spawning herring in Divisions IVc and VIIId. Most reported catch data were official landings, but for some nations catch estimates were corrected for unallocated and misreported catch. Discard data are either incomplete or entirely missing. ACFM catch includes unallocated and misreported landings, discards and slipping. Denmark and Norway provided information on by-catches of herring in the industrial fishery. The catch estimate for 2007 by ICES amounts to 406,482 t including available estimates of discards. This represents an excess of the 2007 TAC of 19 %, which is an increase compared to the 2006 excess of 13%.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. The age-based assessment is based on landings from Subarea IV and Division IIIa and VIId and on four survey time series (Acoustic 1–9+ ring index, IBTS age 1–5+, 0-group and larvae SSB indices).

**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 being at risk of having reduced reproductive capacity and at risk of being harvested unsustainably. SSB in 2007 was estimated at 0.98 million t, and is expected to remain below  $B_{pa}$  (1.3 million t) in 2008. All the year-classes since 2002 are estimated to be among the weakest since the late 1970s. Due to the current circumstances of successive 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) for the HCR:

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1. Every effort shall be made to maintain a level of Spawning Stock Biomass (SSB) greater than the 800,000 tonnes ( $B_{lim}$ ).
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:
  - $0.25 - (0.15 * (1,300,000 - SSB) / 500,000)$  for 2 ringers and older, and
  - $0.12 - (0.08 * (1,300,000 - SSB) / 500,000)$  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.
9. A review of this arrangement shall take place no later than 31 December 2007.

Following a EU request to evaluate the current management rule ICES has concluded that the fishing mortality rate resulting from the current rule in the long run (with or without a 15% constraint on change on TAC) is too high and the rule is not precautionary under the current recruitment regime. ICES recommends that the rule be revised. A number of proposed HCRs that would conform to the precautionary approach have been identified.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:** With SSB at 1 Mt the agreed EU–Norway management plan implies a fishing mortality  $F_{2-6}$  of 0.17, and an  $F_{0-1}$  of 0.08. However, the juvenile fishery has been fished just above  $F = 0.05$  for the past five years (well below the management target) and this value has been maintained in the catch projections.

The agreed EU–Norway management plan has been evaluated by ICES and ICES concludes that because of the sequence of six poor recruiting year-classes, the risk of SSB falling below  $B_{lim}$  in the medium term is  $> 5\%$  and therefore the plan is no longer in agreement with the precautionary approach.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** The fishing mortality rate resulting from the current rule is above the fishing mortalities that are expected to give a high long-term yield and a low risk of stock depletion under the current environment-induced poor recruitment.

**Exploitation boundaries in relation to precautionary limits:** In order to bring the stock close to  $B_{pa} = 1.3$  million tonnes by 2010, there should be no fishing in 2009.

**Conclusion on exploitation boundaries:** ICES recommends the implementation of a proposed new HCR for North Sea herring, which contains a 15% constraint on TAC and one of the following options:

- **option 1** lower target fishing mortality: ( $F_{2-6} = 0.20$  above the trigger biomass = 1.3 Mt, and  $F_{0-1} = 0.05$ ), or;
- **option 2** higher trigger biomass: ( $F_{2-6} = 0.25$  above the trigger biomass = 1.5 Mt, and  $F_{0-1} = 0.05$ ),
- or;
- **option 3** closure of the juvenile fishery: ( $F_{0-1} = 0$ ).

All three options above would reduce the risk to below 5% of SSB falling below  $B_{lim}$  while the current low recruitment continues. Because the SSB in 2009 is forecast to be below the trigger biomass, the first two options lead to the same fishing mortality in 2009 ( $F_{2-6} = 0.149$  in the absence of TAC restriction) and the same catch advice.

The following scenarios were investigated;

- a) No fishing;
- b) The EU–Norway HCR with  $F_{2-6} = 0.25$  above the trigger biomass;
- c) Proposed **new HCR option 1 or 2 without a 15% TAC restriction**;
- d) Proposed **new HCR option 1 or 2 with a 15% TAC restriction**;
- e) Proposed **new HCR option 3**:  $F_{2-6} = 0.25$  above the trigger biomass = 1.3 Mt, and  $F_{0-1}=0$ ;
- f) Catches in 2009 maintained as assumed for 2008

For 2009, ICES recommendations are in accordance with the options of the proposed HCR corresponding to forecast scenario d or e. This leads to catches by fleet A of 171,000 t (scenario d) or less than 180,000t (scenario e) (See ICES catch options table).

**STECF COMMENTS:** STECF notes that the SSB in 2008 is estimated to be 977,700 t and well below  $B_{pa}$  (1.3 million t). STECF also notes that recruitment has been exceptionally poor for six consecutive years and at current levels of exploitation the risk that SSB will fall below  $B_{lim}$  in the medium term is  $>5\%$ . In order to reduce this risk one of the proposed new HCRs will have to be implemented.

STECF agrees with the ICES advice that catches in 2009 need to be reduced. STECF also notes that there is a history of TAC overshoot for this stock and notes that arresting the decline in SSB will be compromised if this situation continues.

STECF notes that the forecast scenario presented by ICES that proposes the closure of the juvenile fishery (scenario e) would have implications for all small mesh fisheries operating in the North Sea and for all fisheries catching herring in Division IIIa. Implementing scenario e would in practice mean a closure of all industrial fisheries in the North Sea, the Skagerrak and the Kattegat and closures of all herring fisheries in the Skagerrak and the Kattegat.

STECF furthermore notes that scenario e is not consistent with the advice provided for western Baltic/IIIa spring spawning herring.

ICES scenario d which assumes continued fishing by fleets B, C and D will lead to a lower F by fleet A, a higher total yield of herring and slightly higher SSB than scenario e. Scenario d is furthermore consistent with the advice for western Baltic/IIIa spring spawning herring.

The Commission has requested STECF to indicate the effects on the different fisheries exploiting the spring-spawners under the assumption of a 50/50 split of catches between Subdivision 22-24 and Division IIIa and evaluate whether or not the HCRs in the Policy Statement adequately addresses the situation for this stock, in particular the series of low recruitments. If not, what would be the options for the proposal for 2009 and how should the Policy Statement be amended in the future.

The STECF response to the Commissions request on consequences of a 50/50 split is given in section 4.4.1. Herring in the Skagerrak, the Kattegat and in the Western Baltic Sea (Sub-div. 22-24).

STECF notes that North Sea herring is subject to a long-term plan and scientists advise on the catch that corresponds to the plan. The HCR in the Policy Statement (COM (2008) 331) for stocks subject to long-term plans stipulates that the TAC must be set by following the provisions of the relevant plan.

STECF does not consider that the HCR rule in the Policy Statement addresses the situation for this stock. An evaluation of the current management plan for North Sea herring was conducted and ICES has concluded that the fishing mortality rate resulting from the current rule is too high and has recommended that the rule be revised. A reduction in fishing mortality is required.

STECF agrees with ICES' advice that the existing plan should be revised and recommends that the landings of North Sea autumn-spawning herring in 2009 be fixed in accordance with catch forecast scenario d as provided by ICES

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

**FISHERIES:** See also Section 1.36 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 particularly vulnerable to excessive fishing pressure. Otolith microstructure studies suggested that the proportion of Downs herring in the catches from the northern North Sea may vary considerably from year to year (26 to 60 %) and may also vary between fleets. 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 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  $F_{pa}=0.25$  for ages 2-6 (c.f. Sect. 2.36).

**STOCK STATUS:** See the Section 1.36 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. Larvae 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. Survey indices have indicated that downs herring have in general experienced good recruitment since the mid 1990s although there is considerable variation between year-classes.

**RECENT MANAGEMENT ADVICE:** See the Section 1.36 on herring in the North Sea and adjacent areas. Since 2003 the TAC for Downs herring has averaged 11% of the total TAC for herring in IV, VIId and IIIa (range 5.8-16.2%). This is based on the average share from 1989 – 2002. There are indications that the total mortality on the Downs component has been higher than for other components. Increases in the proportional allocations should be avoided. In the absence of any additional data this proportionality of TACs is thought to be an appropriate guide to distributing the harvesting among Downs herring and other stock components and therefore remains at 11%.

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

### 1.34. Herring (*Clupea harengus*) - Vb (EU zone), VIaN, VIb

#### 1.34.1. 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.

#### 1.34.2. 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 age structure of the catch of these last two fleets has become more similar. A stricter enforcement regime in the UK is responsible for the major decrease in area misreporting in 2006.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment in 2008 is based on catch data and an acoustic survey. This assessment is considered to be noisy but unbiased. Misreporting has decreased since 2006 and the quality of the catch data has improved. The basis for the advice

is the same as last year and is based on the proposed management plan. This management plan was evaluated by ICES in 2005 and found to be consistent with the precautionary approach.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary management reference points have only been set for spawning stock biomass ( $B_{lim}$  has been set at 50 000 t and  $B_{pa}$  is not defined). There are no proposed fishing mortality reference points.

**STOCK STATUS:** Based on the most recent estimates of SSB and fishing mortality, ICES considers that the stock is currently fluctuating at a low level and is being exploited above  $F_{MSY}$ . Recruitment has been low since 1998 and the 2001 and 2002 year-classes are very weak.

**MANAGEMENT AGREEMENT:** There is no agreed management plan, however a management plan, which is subject to an evaluation of a year-on-year TAC constraint, has been proposed as follows:

$F=0.25$	if SSB > 75 000 t	Optional year on year TAC constraint.
$F=0.2$	if SSB < 75 000 t	No constraint on TAC.
$F = 0$	if SSB falls below $B_{lim}$ .	

**RECENT MANAGEMENT ADVICE:**

*Exploitation boundaries in relation to the proposed management plan:* Fishing according to the proposed management plan would imply catches up to 13,000 tonnes.

*Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:* Fishing mortality is in the range of the target mortality of the proposed management plan, and this is expected to give a high long-term yield and a low risk of stock depletion.

*Exploitation boundaries in relation to precautionary limits:* Precautionary reference points for fishing mortality have not been defined for this stock. Any management measure should have a high probability of avoiding  $B_{lim}$ .

**Conclusions on exploitation boundaries:** In the absence of exploitation boundaries in relation to precautionary limits ICES recommends to fish according to the proposed management plan.

In addition, ICES offers the following considerations:

The stock identity of herring west of the British Isles was reviewed by the EU-funded project WESTHER. This identified Division VIaN as an area where catches comprise a mixture of fish from Divisions VIaN, VIaS, and VIIaN. Concerning the management plan for Division VIaN, ICES has advised that herring components should be managed separately to afford maximum protection. If there is an increasing catch on the mixed fishery in Division VIaN, this should be considered in the management of the Division VIaS component, which is in a depleted state. In 2008 ICES will begin to evaluate management for this Division and also VIaS and VIIaN. It will be a number of years before ICES can provide a fully operational integrated strategy for these units. In this context ICES recommends that the previously endorsed plans for Division VIaN should be continued. If the proposed management plan were to be implemented in 2008, the current low stock size would imply that the 15% TAC reduction limits would not apply.

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

STECF notes the ICES consideration regarding the results of the EU funded project WESTHER that have shown that the herring populations in this area and in VIaS, VIIb,c and VIIa (N) form a metapopulation. In 2008 ICES will investigate means to assess and manage this metapopulation. In the meantime, each population will continue to be managed separately. The management plan for VIaN is being followed, in the short-term whilst an ICES study group will consider joint assessment and management.

STECF notes that the ICES advice for 2008 was for a 56% TAC reduction. The TAC for 2008 was reduced by 20%. If this TAC is taken F will remain above the long-term target of  $F = 0.25$ .

STECF notes that implementation of the proposed management plan will lead to substantial annual changes in target fishing mortality if SSB remains in the region of 75,000 t. One way to avoid such a situation would be to have a management plan that is based on a linear relationship between target F and stock size when SSB is below the trigger level.

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

The following text remains unchanged 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 have been set at 800 t since 2006. Since 1999, annual landings have varied from no fishing in 2004 to around 600 t in 2007.

**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 2009.

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

### **1.36. 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 minimal landings taken by the Netherlands in 2007. Catches in 2007 amounted to 12 675 t which is a decrease on the 2006 figure (15,199 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. Exploratory assessment 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,  $B_{lim} = 81,000$  t  $F_{pa} = 0.22$  and  $F_{lim} = 0.33$ .

**STOCK STATUS:** Exploratory assessments suggest that SSB may be stable at a low level. The current level of SSB is uncertain but likely to be below  $B_{lim}$ . There is no evidence that large year-classes have recruited to the stock in recent years.  $F$  is likely to be above  $F_{pa}$  and also likely to be above  $F_{lim}$ .

#### **RECENT MANAGEMENT ADVICE:**

The updated exploratory assessment available for this stock does not change the perception of the stock and does not give reason to change the advice from 2007. The advice for the fishery in 2009 is therefore the same as the advice given for the 2008 fishery: "ICES recommends a rebuilding plan be put in place that will reduce catches. If no rebuilding plan is established, there should be no fishing. The rebuilding plan should be evaluated with respect to the precautionary approach".

In addition, ICES offers the following considerations:

The stock identity is complex as the juveniles mix with those from the west of Scotland and the adults mix with those from the Irish Sea and Division VIaN over the shelf areas to the west of Scotland after spawning. The stock identity has been reviewed by a EU-funded project WESTHER. Therefore, the assessment and advisory framework for this stock will be reviewed by a dedicated ICES study group in 2008 and 2009. The results of this work are expected to be available for the ICES advice in 2010.

There is no explicit management plan for this stock. The local Irish management committee developed the objective to rebuild the stock to above  $B_{pa}$  (110,000 t) and has a long-term objective to achieve catches of 25,000 t per year. Although there is little information on recruitment available, it is unlikely that it is above average and it may possibly be below average. The long-term catch aspiration of the local management committee is not likely to be achievable at current stock productivity.

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

STECF notes the ICES consideration regarding the results of the EU-funded project WESTHER, which have shown that the herring populations in this area and in VIaN, and VIIa (N) form a metapopulation. In 2008 ICES will begin to investigate means to assess and manage this metapopulation. In the meantime, each population will continue to be managed separately.

STECF notes that according to the policy on setting of TACs for 2009 (COM (2008) 331), herring in VIaS, VIIb, c are classified in the category, zero catch. Accordingly, the TAC for herring in VIaS, VIIb,c should therefore be reduced by at least 25% implying that the 2009 TAC should be set at a level no greater than  $(0.75 \times 11\,642\text{ t}) = 8,731\text{ t}$ . Recovery measures should also be implemented including effort reductions and introduction of more selective fishing gear.

### **1.37. 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 years. Since 1987 the landings have fluctuated between about 2,000 t and 10,000 t. Landings in 2007 were 4,600 t, which is slightly higher than 2005 and 2006 when 4,400 t were landed. Since 2002 the agreed TAC has been 4,800 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  $B_{pa} = 9,500\text{ t}$ ,  $B_{lim} = 6,000\text{ t}$ .  $F_{pa}$  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. SSB is unknown but thought to be stable at a low level. It seems likely that the stock has been relatively stable for the last 10 years.

#### **RECENT MANAGEMENT ADVICE:**

The new landings and survey data available for this stock do not change the perception of the stock and do not give reason to change the advice from 2007. The advice for the fishery in 2009 is therefore the same as the advice given for the 2008 fishery: “*SSB is unknown but thought to be stable at a low level. The recent (2005 and 2006) catches of 4,400 t do not appear to have been detrimental to the stock*”.

In addition, ICES offers the following consideration: The stock identity is complex as the juveniles mix with those of the Celtic Sea and the adults migrate from the Irish Sea after spawning. The stock identity has been reviewed by a EU-funded project WESTHER. Therefore, the assessment and advisory framework for this stock will be reviewed by a dedicated ICES study group in 2008 and 2009. Results of this work are expected to be available for the ICES advice in 2010

**STECF COMMENTS:** STECF agrees with the advice from ICES, which it interprets as meaning that catches in 2009 should not exceed 4,400 t.

STECF notes the ICES consideration regarding the results of the EU-funded project WESTHER, which have shown that the herring populations in this area and in VIaS, VIIb,c, and VIaN form a metapopulation. In 2008 ICES will begin to investigate means to assess and manage this metapopulation. In the meantime, each population will continue to be managed separately.

### **1.38. Herring (*Clupea harengus*) in Division VIIe,f**

**FISHERIES:** This stock is exploited by the UK and France. The TAC for this stock has been set at 1,000 t and has remained unchanged in recent years. This TAC is divided equally between the UK and France. Landings have fluctuated over the last ten years, from a low of 176 t to a high of 1,040 t. In 2004, 2005 and 2006 catches have been around 700 t. Catches in 2007 were around 500 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. No analytical assessment has been made in 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:** No management advice is provided for this stock.

**STECF COMMENTS:** No comments.

### **1.39. Herring (*Clupea harengus*) in the Celtic Sea (VIIg and VIIa South), and in VIIj Division VIIg,h,j,k**

**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 2007, landings decreased from 20,300 to just above 8,200 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. An increasing proportion of the catch is now being taken by RSW vessels and lower amounts by dry-hold 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 to be reasonably reliable. There is an acoustic survey; however, the results are considered uncertain. There is no recruitment index available for this stock. There was no quantitative assessment in 2008. 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 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,  $B_{lim} = 26,000$  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.*

There is no EU management plan for this stock. The long-term aspiration of the management committee to build the stock to a level that can sustain catches of 20,000 t per year has been evaluated and found that it is not attainable with the current levels of recruitment.

**STOCK STATUS:** The stock size continues to be uncertain, with several exploratory assessments all suggesting that the SSB is at a low level. The current stock size is likely to be as low as when it collapsed in the 1970s. F is high and has been increasing since the mid nineties. The stock is currently composed mainly of younger fish.

**RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to precautionary limits:** The current stock size is likely to be as low as when it collapsed in the 1970s. At recent levels of SSB there is a risk of reduced recruitment. Currently F is uncertain but too high and needs to be reduced. ICES recommends that a rebuilding plan be put in place that will reduce catches. If no rebuilding plan is established, there should be no fishing. The rebuilding plan should be evaluated with respect to the precautionary approach.

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

STECF notes that preliminary simulations have indicated that an F of 0.2 ( $\sim F_{0.1}$ ) is associated with a high likelihood of recovery. Under most circumstances a catch of around 5,000 t appears to be appropriate to ensure that F = 0.2.

STECF notes that according to the policy on setting of TACs for 2009 (COM (2008) 331), Celtic Sea herring are classified in the category, zero catch. Accordingly, the TAC for Celtic Sea herring should therefore be reduced by at least 25% implying that the 2009 TAC should be set at a level no greater than  $(0.75 \times 7\,890\text{ t}) = 59\,17\text{ t}$ . Recovery measures should also be implemented including effort reductions and introduction of more selective fishing gear.

#### **1.40. Horse mackerel (*Trachurus trachurus*) in the North Sea (Divisions IIIa eastern part, IVb,c, VIIId).**

**FISHERY:** Catches taken in Divisions IVb,c and VIIId 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 2007 was 41200 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 VIIId, 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 insufficient 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:** ICES reiterates the recommendation made since 2002 to limit the catches to below the 1982-1997 average of 18 000 t. It is necessary 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. Most of the catch of North Sea horse mackerel is taken in ICES Division VIIId. It is a key problem that the TAC for the western stock is allocated to this ICES division, but catches from this area are of North Sea horse mackerel.

- The current management units are incompatible with the stock units. The advice for horse mackerel assumes that all catches are counted against the TAC for each stock separately. In 2008 and before, the TAC covered only part of the distribution and fishing areas (EU waters). ICES advises that the management areas correspond to the distribution areas which include all EU, Norwegian, and Faroes waters where horse mackerel are caught. ICES further advises: The TAC for western horse mackerel should apply to all areas where western horse mackerel is caught (EU, Norwegian, and Faroes waters) and where necessary be subject to agreement.
- Catches from ICES Division VIIId should be taken against a TAC for the North Sea stock.
- Catches taken in Division VIIId need to be taken against a TAC for the western stock.

A directed juvenile fishery occurs in all three horse mackerel stocks, and measures should be taken to ensure that misreporting of juvenile catch taken in Divisions VIIe,h and VIId (the latter then belonging to the North Sea stock management area) is effectively hindered.

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

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

**FISHERY:** Catches of ‘Western’ horse mackerel 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. Following the changes in migration, a target fishery on horse mackerel developed in Division IVa by the Norwegian purse seiners. Most catches by other countries were taken in Sub-areas VI, VII and Divisions VIIIa-e.

The catches in Division IVa have dropped considerably since 1996 and Western horse mackerel has in recent years been taken in a variety of fisheries exploiting juvenile fish for the human consumption market (with mid-aged fish mostly for the Japanese market), and older fish either for human consumption purposes (mostly for the African market) or for industrial purposes. The juvenile fishery is mainly taken place in Divisions VIIe,h and VIIIa,d. Overall catch levels have declined from 155,000 t in 2006 to 123,000 t in 2007

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The triennial horse mackerel egg survey provides an index of SSB, which together with the catches form the basis for the proposed management plan. The information available for western horse mackerel is sparse, and concerns about the quality of underlying data remain. However, ICES considers that the current assessment forms a sufficient basis for evaluating the state of the stock.

**PRECAUTIONARY REFERENCE POINTS:** In 2008 ICES has introduced a  $B_{lim}$  at 1.4 million t based on the stock that produced the 1982 year-class. No reference values for F are available.

**STOCK STATUS:** Based on the most recent estimates of SSB (in 2008) ICES classifies the stock as having full reproductive capacity. In the absence of defined F reference points, the state of this stock cannot be evaluated with regard to these. Relatively high catch rates of the 2001 year-class in 2002–2006 and an increase in the egg production in 2007, suggest that SSB increased up to 2005 following the strong 2001 year-class. The 2001 year-class is around a third of the size of the 1982 year-class, but well above those in the early- to mid-90s. Fishing mortality in recent years is estimated to be relatively low.

**MANAGEMENT PLAN:** Following an EC request in 2007 to evaluate the consequences of the management plan proposed by the Pelagic RAC in July 2007, ICES has concluded that this plan for the period 2008 to 2010 is consistent with the precautionary approach, but that the plan is not precautionary in the longer term. The plan has provided a basis for the ICES advice on TACs for 2008–2010. The proposed management plan has yet to be formally adopted.

**RECENT MANAGEMENT ADVICE:** ICES recommends the adoption of the Pelagic RACs proposed management plan for the provision of scientific advice in the short-term (2008–2010) and specifically, a TAC of 180 000 tonnes for 2009.

The advice considers that the TAC applies to all fisheries catching Western horse mackerel.

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

STECF notes that management plan for Western horse mackerel proposed by the Pelagic RAC has been evaluated by ICES. STECF agrees with ICES that this plan is precautionary for the period 2008 to 2010, but not in the long-term. STECF notes that the management plan has been developed for all fisheries that catch western horse mackerel, and recommends that if a TAC is set under this rule, all catches of Western horse mackerel should be counted against this TAC.

STECF notes, that the objective of the management plan is to maintain the SSB above the level observed in 1982 and that ICES in 2008 proposed to use this value as  $B_{lim}$  for this stock based on the following rationale:

“It could be assumed that the likelihood of a strong year-class appearing would decline if stock size were to fall below the stock size at which the only such event has been observed. The WG therefore considers the biomass that produced the extraordinary 1982 year-class as a good proxy for  $B_{lim}$ .”

STECF considers that the justification for choosing SSB 1982 as  $B_{lim}$  is very weak. There is no clear relationship between SSB and recruitment for this stock and although the spawning stock in 1982 produced a very strong year-class it does not mean that the SSB in 1982 is a good proxy for  $B_{lim}$ . However, ICES’ recommendation that the management plan is consistent with the precautionary approach for the period 2008 to 2010 will still be valid even if  $B_{lim}$  was increased by 30%. STECF, therefore, concur with ICES evaluation of the management plan.

#### **1.42. Horse mackerel (*Trachurus trachurus* L.) in IXa**

**FISHERY:** Atlantic Horse mackerel in this Division 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 declined to a low of about 20,000 t in 2003. Catches since increased again to a level of 23,000 t to 24,500 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Information from two surveys and catch-at-age data is available for this stock. Age based assessments were made and catch forecasts have been provided.

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

**STOCK STATUS:** In the absence of defined reference points, the state of this stock cannot be evaluated with regard to these. Catches decreased from the early 1960s but have been relatively stable since the early 1990s. SSB has increased since 2003 and fishing mortality has been stable between 0.3 and 0.4 since 1999. The 2004 year-class has been above average, which may have driven an increase in SSB.

**RECENT MANAGEMENT ADVICE:** In the absence of precautionary reference points these cannot be used to derive an advice. The recent level of catches does not seem to be detrimental to the stock. ICES therefore recommends that catches in 2009 should not exceed the recent average catch of 25 000 t (2000–2004; 2003 is excluded because of the reduced effort following 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 estimated landings from this stock have been below the agreed TACs.

#### **1.43. 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.

A precautionary TAC in area X for 2008 was set to 1,280 t and is taken all from Portugal.

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

STECF did not have access to any stock assessment information on horse mackerel in this area.

A precautionary TAC in area X for 2008 was set at 1,280 t. It is taken exclusively by Spain.

#### **1.45. 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.

A precautionary TAC in area X for 2008 was set to 3,200 t and is taken all from Portugal.

#### **1.46. Lemon sole (*Microstomus kitt*) in the North Sea**

STECF did not have access to any stock assessment information on Lemon sole in this area.

A precautionary TAC (including witch) in areas IIa and IV for 2008 was set to 6,793 t.

#### **1.47. Mackerel (*Scomber scombrus*) - combined Southern, Western and North Sea spawning 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 stock 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. In the North Sea they mix with the North Sea component. Since it is currently 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 by convention the catches from the Southern and Western components are separated according to the area in which 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: 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, and Divisions VIII a,b,d,e). This component currently comprises 81% 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 summarized below. Current knowledge of the state of the spawning components is summarized 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. The results from 2007 indicate a 5 % increase from 2004 to 2007.

**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 triennial egg surveys in the North Sea both indicate similar egg production, but in 2008 it has decreased by about 40%. T

**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 by-catch 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, are highly variable, and give average estimates of around 16% of the combined NEA mackerel stock (1995–2007).

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICES. This assessment is based on catch numbers-at-age for the period 1972 to 2006 and triennial egg survey estimates of SSB from 1992 to 2007. Estimating proportions of catch discarded and slipped is problematic in pelagic fisheries due to high variability in discard and slipping practices. Recently information on these practices has been improving; current estimates from sampled fleets indicate that discarding is a small percentage of the total. Recruit surveys provide information on the distribution of young mackerel, but are subject to high variability and have not proved useful in estimating year-class strength.

**PRECAUTIONARY REFERENCE POINTS:** Following a NEAFC request, reference points were re-evaluated and ICES proposes new values for  $F_{lim}$  (0.42),  $B_{lim}$  (1.67 million t) and  $F_{pa}$  (0.23).  $B_{pa}$  = 2.3 million t has not been changed. Agreements between the EU, Norway and the Faroes specify a long-term management arrangement with a target fishing mortality between 0.15 and 0.20 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 at increased risk. Fishing mortality in 2007 is estimated to be just above  $F_{pa}$ . SSB has increased by 40% since 2002 and is now above  $B_{pa}$ . The 2002 year-class is well above average. The subsequent year-classes to 2005 are estimated close to the mean of the time-series. There is insufficient information to confirm the sizes of the 2006 and 2007 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 ( $B_{pa}$ ), 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.

**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 443 000 t and 578 000 t in 2009 with an expected increase in SSB of 4-9% in 2010 compared to 2008. ICES further 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.

## **1.48. 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.

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

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

**STOCK STATUS:** No assessment of the stock of megrim in Division IIa and Sub-area IV has been undertaken by ICES.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.1. There is no single stock advice available.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that scientific surveys show that a significant population of megrim exists in the northern part of Division IVa and landings are reported from this area. However, this stock component is not considered by any ICES expert group. Recent surveys aimed at providing a scientific basis for anglerfish management, could potentially be used for the assessment of megrim stocks in Subarea VI and Division IVa. Area misreporting between IVa and VI still appears to be a problem due to the association of megrim with anglerfish catches.

### **1.49. Megrim (*Lepidorhombus whiffiagonis*.) in Vb (EU zone), VI, XII & XIV**

**FISHERIES:** The main fishery is in Sub-Area VI where megrim is taken as a by-catch in trawl fisheries targeting anglerfish, roundfish species and *Nephrops*. The main exploiters are the UK, France Spain and Ireland. From 1990 to 2001 landings have ranged from 3,300 t to 5,300 t. Since then catches have declined and for 2007 landings are estimated to be 1,300 t. The official reported landings in 2007 were 800 t.

It is unclear if the reduction in landings reflects a decline in abundance or is a consequence of the general reduction in trawl effort observed in Sub-area VI.

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. The new landings, cpue, and survey data available for this stock do not change the perception of the stock status

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries and is found in Section 3.2.

The advice on this stock for the fishery in 2009 is the same as the advice given in 2007 for the 2008 fishery: *“Catches [...] should be based on the recent average (2004–2006), about 1400 t. This includes landings in Division VIa and VIb and unallocated landings in Subarea IV”*.

This advice will be updated in 2009.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that scientific surveys show that a significant population of megrim exists in the northern part of Division IVa and landings are reported from this area. However, this stock component is not considered by any ICES expert group. Recent surveys aimed at providing a scientific basis for anglerfish management, could potentially be used for the assessment of megrim stocks in Subarea VI and Division IVa. Area misreporting between IVa and VI still appears to be a problem due to the association of megrim with anglerfish catches.

### **1.50. Megrim (*Lepidorhombus whiffiagonis*) in VII**

Megrim in management areas VII and VIIIa,b,d,e 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, annual catches as estimated by ICES have been between 15,500 t to 21,800 t. In 2005 and 2006, catches dropped to 14,500 t. In 2007, catches were at 15,600 t. Discards have been estimated to vary between 1,100 t and 5,400 t.

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

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are  $F_{pa} = 0.30$ ,  $B_{pa} = 55,000$  t.

**STOCK STATUS:** The advice is based on information from three surveys. Data applicable to an age-structured analytic assessment are being collected, but at present they are considered insufficient to provide a reliable assessment. The current stock status is therefore not known with precision, but in recent years, the survey indicators point to the stock being stable and there were no indications of reduced recruitment. This year, the new survey data available for this stock do not change the perception of the stock.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries and is found in Section 3.2.

The advice on this stock for the fishery in 2009 is the same as the advice given in 2007 for the 2008 fishery: “The current stock status is unknown, but survey indicators and commercial data series point to the stock being stable. Therefore ICES recommends that the landings of *L. whiffiagonis* in 2009 should not exceed the average landings of 2004–2006. This corresponds to landings lower than 13,000 tonnes.”

This advice will be updated in 2009

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

### **1.51. 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 1.50).

### **1.52. Megrim (*Lepidorhombus whiffiagonis* & *Lepidorhombus boscii*) in VIIIc, IX & X**

**FISHERIES:** Megrim in the Iberian region are caught as a by-catch 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 and a combined advice is provided for the two stocks. Changes in the demersal fisheries in recent years have reduced the fishing effort on megrim. Landings of *L. whiffiagonis* and *L. boscii* declined from 1986 to record low levels in 2002. Landings of both stocks have increased slightly since then and reached 1,100 t for *L. boscii* and 160 t for *L. whiffiagonis* in 2007.

**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. These stocks and fishery have been rather stable for the last decade, so the new information available this year was not expected to result in any significant change in the perception of the stocks status

**RECENT MANAGEMENT ADVICE:** The advice on these stocks for the fishery in 2009 is the same as the advice given in 2007 for the 2008 fishery: At recent levels of fishing mortality for both species, SSB has been stable for *L. whiffiagonis* and showing some signs of increase for *L. boscii*. Fishing mortality should not be allowed to increase. This level of exploitation would correspond to landings of around 230 t for *L. whiffiagonis* and around 1,200 t for *L. boscii*. The combined landings at the current exploitation level would be around 1,430 t.

**STECF COMMENTS:** STECF agrees with the ICES view that exploitation on these stocks should not increase.

### **1.53. 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 only small landings from the Skagerrak. In more recent years minor landings have been taken by Germany. During the last 15 years, landings from IIIa varied between 3,000 t and 5,000 t. Peak landings of 5044 were recorded in 1998. In 2007 landings amounted to 4,512 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 the available assessment data indicate, that the stock(s) 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. Large amount of small *Nephrops* in the catches (discards) 2007 may indicate strong recruitment in that year.

**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. LPUE has shown an increasing trend but this is not necessarily an indication of increase in stock abundance, but may be a consequence of the current management system. There are no signs of overexploitation of *Nephrops* in IIIa.

ICES does not advise any specific catch options for this stock for 2009. ICES currently advises no catches for cod in IIIa, which is a significant by-catch species in the *Nephrops* fisheries. The current effort regulation (limiting days at sea for gears not using selective sorting grids) may increase the incentives to use sorting grids. This may reduce by-catch of cod.

**STECF COMMENTS:** STECF agrees with the comments and advice from ICES. STECF notes that the mismatch between minimum landing size (40 mm CL in Division IIIa) and the selectivity of the many of the trawls in use results in large quantities of *Nephrops* being discarded. There are also important considerations concerning the by-catch 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.

### 1.54. Norway lobster (*Nephrops norvegicus*) - IIa (EU zone), North Sea (EU zone)

Norway lobster (*Nephrops*) in the North Sea (IV) is assessed in a number of different stocks functional units (FU) treated as separate stocks (see below). However, for management purposes the North Sea is partitioned into 2 units only: The EU EEZ and Norwegian EEZ, each of which is treated as a single unit.

FU 9: Moray Firth	EU EEZ
FU 10: Noup	“
FU 7 Fladen ground	“
FU 32 Norwegian Deep	Norwegian EEZ
FU 6 Farn Deep	EU EEZ
FU8 Firth of Forth	“
FU 5 Botney Gut	“
FU 33 Horn’s Reef	“

The Norwegian EEZ comprises only one FU, but the situation is complicated in the EU EEZ, where it is not possible to implement the specific biological advice for the different FUs where the management operates for the (single) EU EEZ of the North Sea. In the EU EEZ catches can be taken anywhere, and this could imply inappropriate harvest rates from some parts. More importantly, vessels are free to move between grounds, which allow effort to develop on some grounds in a largely uncontrolled way. Management at the FU level could provide the controls to ensure that catch opportunities and effort are compatible and in line with the scale of the resources in each of the stocks defined by the Functional Units.

Since the 1990s there have been important developments in the methodology to assess the status of *Nephrops* stocks. The use of Underwater TV surveys (UWTV) has enabled the development of fishery independent indicators of abundance. STECF (2005) suggested that a combination of an absolute abundance estimate from an UWTV survey, in combination with a harvest rate based on  $F_{0.1}$  from a combined sex length cohort analysis (LCA) and the mean weight and selection pattern from the commercial fishery could be used to calculate appropriate landings. Since then, ICES workshops on the TV technique have provided more detail on the assumptions and uncertainties associated with the approach. At the ICES ACOM meeting in June 2009 it was argued that the use of UWTV surveys for absolute abundance estimates could lead to an overestimation bias due to misidentification of burrows, habitat estimation and occupancy rate although it is possible that in some areas, these factors could lead to underestimation. A proposal that, as a precautionary measure, the estimated absolute abundance estimates be reduced by 25%, before being used for estimation of H.R. However, this was ultimately rejected, as being more or less arbitrarily chosen. Instead it was decided to address the issue at a special workshop later in 2008 or early 2009 on using UWTV in the provision of catch advice with the possibility of redoing *Nephrops* assessments in 2009 on the basis of this. As a consequence of this unsolved problem, it was decided to use the UWTV survey estimates only as relative indicators of abundance in this year's assessments.

Because of these uncertainties, ICES did not base its advice for 2009 on estimates of absolute stock size in IV, VI and VII in 2009. Instead, the general ICES advice for these *Nephrops* stocks is based on the UWTV surveys as relative indices, which in most cases suggest stability of the stocks. Since the current levels of exploitation and effort appear to be sustainable, ICES advice for 2009 generally recommends not to increase effort and to restrict catches to the recent average values (2006-2007). This period follows the introduction of 'buyers and sellers' legislation and landings from this period are regarded as more accurate than in the preceding period when under-reporting was a problem.

**STECF COMMENTS:** STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of harvest rate approach advocated by STECF at least for the time being. STECF agrees with ICES approach and advice that as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

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.

The ICES advice is presented separately for each Functional Unit. There are increasing and significant landings from some isolated patches outside the Functional Units, most notably the Devil's Hole area. Overall landings in Subarea IV were around 24,500 t in 2007 (similar to landings in 2006) of which landings from other rectangles amounted to over 1,600 t. STECF agrees with ICES that the use of average landings of no more than 1,400 t (2006–2007) could be considered as an allowance for the fishery in the 'other' rectangles.

#### **1.54.1. Norway lobster (*Nephrops norvegicus*) in Moray Firth (FU 9)**

**FISHERIES:** 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 2007 were 1,843 t.

Discarding of undersized and unwanted *Nephrops* occurs in the fishery of Moray Firth. Discarding rates averaged over the period 2005 to 2007 for this stock were about 10% by number, or 5% 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. Owing to uncertainty in the absolute estimate of abundance from UWTV and possible unquantifiable bias, the assessment

of the state of the stock is based on relative changes in abundance and advice for 2009 is based on average landings from 2006-2007.

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

**STOCK STATUS:** The TV survey estimate of abundance for *Nephrops* in the Moray Firth suggests that the population decreased by around 55% in 2006, but rose again slightly to above the long-term average in 2007. 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.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should be not be allowed to increase relative to the past two years (2006-2007). This corresponds to landings of no more than 1,800 t for the Moray Firth stock.

**STECF COMMENTS:** STECF agrees with the ICES advice that effort should not increase relative to the last two years. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

#### 1.54.2. Norway lobster (*Nephrops norvegicus*) in the Noup (FU 10)

**FISHERIES:** Landings from this fishery are predominantly reported from Scotland.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on LPUEs and size composition data. There is only limited UWTV survey data on abundance.

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

**STOCK STATUS:** The LPUE indicator is increasing and mean length in the catches is stable. Current levels of exploitation appear to be sustainable.

**RECENT MANAGEMENT ADVICE:** Given the apparent stability of the stock, current levels of exploitation and effort appear to be sustainable. ICES maintains the previous advice (based on the average landings 2003-2005) for the Noup fishery - that is less than 240 t. This amount is almost identical to the long-term average for the time series.

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

#### 1.54.3. Norway lobster (*Nephrops norvegicus*) in Fladen Ground (FU 7) (Division IVa)

**FISHERIES:** There is only one Functional Unit in this area: FU 7 (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 100 trawlers, which are predominantly Scottish (> 97%), based along the Scottish NE coast. Nearly three quarters of the landings are made by single-rig vessels and one-quarter by twin-rig vessels. 80mm mesh is the commonest mesh size. Nearly 40% of the *Nephrops* landings at Fladen are reported as by-catch, in fisheries that may be described as mixed. In 2007 total landings amounted to nearly 12,000 t. of which U.K accounted for 99 %, the remaining part being Danish. Discarding rates averaged over the period 2005 to 2007 for this stock were 18% by number, or 11% by weight.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Owing to uncertainty in the absolute estimate of abundance from UWTV and possible unquantifiable bias, the assessment of the state of the stock is based on relative changes in abundance and advice for 2009 is based on average landings from 2006-2007.

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

**STOCK STATUS:** TV survey estimates of abundance for *Nephrops* on the Fladen Ground indicate that the stock has fluctuated without trend since 1992. Stock abundance rose in 2006 and 2007 to reach the highest estimated in the time series. Indicators of stock status based on size composition show a stable situation and the size range has not decreased through time. The mean size of *Nephrops* >35mm carapace length (CL) has fluctuated slightly without trend while for *Nephrops* <35mm CL the slight decline in the last couple of years is probably associated with increased recruitment that has led to increased abundance

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to the past two years (2006-2007). This corresponds to landings of no more than 11,300 t for the Fladen stock.

**STECF COMMENTS:** STECF agrees with the ICES advice that effort should not increase relative to the last two years. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing. STECF notes that the Fladen ground stock appears to be increasing.

#### **1.54.4. Norway lobster (*Nephrops norvegicus*) in the Norwegian Deep, FU 32 (Division IVa, East of 2° E + rectangles 43 F5-F7).**

**FISHERIES:** Landings from this area in 2007 were 755 t, a decline of 27 % compared to previous years. 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 1,110 t. As consequence of regulations, there was a switch to increasing Danish effort targeting *Nephrops* since 2002.

**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:** Landings per unit effort (LPUE) have been relatively stable over the last 14 years and suggest that current levels of exploitation are sustainable. A slight increase in mean size in the catches in 2007 could indicate a reduced exploitation pressure.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that effort should not be allowed to increase.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes the possibility, that only part of the stock is exploited at present, considering that the sediment maps indicate that there may be scope for the fishery expand into new grounds. STECF also notes the lack of survey data for this stock.

#### **1.54.5. Norway lobster (*Nephrops norvegicus*) in the Farn Deep (FU 6)**

**FISHERIES:** Total landings from Farn were approximately 3,000 t in 2007, a decline of almost 40% compared to 2006 landings. The UK fleet has accounted for virtually all landings from the Farn Deeps. Estimated discarding during this period has fluctuated around 40% by weight of the catch in the Farn Deeps.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Owing to uncertainty in the absolute estimate of abundance from UWTV and possible unquantifiable bias, the assessment

of the state of the stock is based on relative changes in abundance and advice for 2009 is based on average landings from 2006-2007

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

**STOCK STATUS:** The TV survey and LPUE data indicate a decline in abundance from the highest estimate in the time series in 2006 to levels comparable to 1997 and 2002. Mean length in the catches has increased. While landings reported in 2006 were the highest in the time-series, the latest signals indicate low recruitment in 2007. The available indices point to the stock in 2007 having been reduced to a lower level following the high abundances in 2005–2006.

**RECENT MANAGEMENT ADVICE:** Given the above-mentioned signals, ICES bases its advice for this stock on landings in 2007 only, and does not use landings data prior to 2007. It is recommended that the *Nephrops* fishery should not be allowed to increase relative to the 2007 level. This corresponds to landings of no more than 3 000 t in 2009 for the Farn Deeps stock.

**STECF COMMENTS:** STECF agrees with ICES on its evaluation of the state of the stock in this FU. STECF also agrees that effort should not increase relative to 2007. STECF notes that, whereas the ICES advice in 2006 was based on a harvest rate applied to UWTV surveys interpreted as estimates of absolute abundance, the outcome of recent TV workshop have led it to consider that the TV survey indices are unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of landings from a period when these are considered accurate offers a way of giving catch advice. Given the current stock signals for the Farn Deeps, STECF agrees with the use of advice based on landings for 2007. STECF also welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data so that future advice for this stock reflects stock developments.

#### 1.54.6. Norway lobster (*Nephrops norvegicus*) in Firth of Forth (FU 8)

**FISHERIES:** Landings from the Firth of Forth fishery are predominantly reported from Scotland, with very small contributions from England. The area is periodically visited by vessels from other parts of the UK. Estimated discarding rates are 43% by number (24% by weight) 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. Owing to uncertainty in the absolute estimate of abundance from UWTV and possible unquantifiable bias, the assessment of the state of the stock is based on relative changes in abundance and advice for 2009 is based on average landings from 2006-2007.

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

**STOCK STATUS:** The UWTV survey indicates that the stock abundance is currently at a high level since about 2002. The size composition of the commercial landings are stable and do not show a decrease over time. This stock appears to be exploited at a sustainable level.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should be not be allowed to increase relative to the past two years (2006-2007). This corresponds to landings of no more than 2 500 tonnes for the Firth of Forth stock.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

STECF also notes that *Nephrops* discard rates in the Firth of Forth are high and there is a need to reduce these and to improve the exploitation pattern. This is an additional reason for suggesting improved selectivity in this area relates to by-catch of other fish species.

#### 1.54.7. Norway lobster (*Nephrops norvegicus*) in Botney Gut (FU 5).

**FISHERIES:** Landings from Botney Gut were 1311 t in 2007. 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 6%. Long-term effort of the Belgian *Nephrops* fleet has shown an almost continuous decrease since the all-time high in the early 1990s. In 2007 around 34% of the total international landings were taken by Dutch trawlers for first sale in the Netherlands or in Belgium, and around 43 % by UK trawlers. Danish landings from this FU are insignificant at present.

**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 development in LPUEs

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

**STOCK STATUS:** The state of this stock is unknown. LPUE indicators show different trends for different fleets and not all of the indicators have been updated for 2006 and 2007.

**RECENT MANAGEMENT ADVICE:** There are no management objectives for this fishery. The state of the stock is unknown. ICES recommends that the level of effort should not be allowed to increase.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that for this FU assessment data have become sparse in the last 2 years. The available lpue figures from the Danish fisheries (continuous) and Belgian fisheries (up to 2005) must be viewed very cautiously as stock indicators.

#### 1.54.8. Norway lobster (*Nephrops norvegicus*) in Horns Reef (FU 33)

**FISHERIES:** For several years Denmark was the only country exploiting *Nephrops* in this FU, and accounted for more than 90% of total landings up to 2005. However in recent years Germany and Netherlands have expanded their share of this stock. In 2007 total landings amounted to 1,467 t, and were the highest recorded.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Information on this stock is considered inadequate to provide advice based on precautionary limits. The perception of the stock 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:** The state of this stock is unknown. The LPUEs from major fisheries does not indicate any decline in availability.

**RECENT MANAGEMENT ADVICE:** There are no management objectives for this fishery. ICES recommends that the level of exploitation, i.e. effort on this stock should not be increased.

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

#### 1.54.9. Norway lobster (*Nephrops norvegicus*) in ICES Div. Vb and Sub-area VI

There are no exploited *Nephrops* stocks in Div. Vb. In Sub-area VI, the following functional units are considered by ICES:

FU no.	Name	ICES Divisions	Statistical rectangles

11	North Minch	VIa	44–46 E3-E4
12	South Minch	VIa	41–43 E2-E4
13	Clyde	VIa	39–40 E4-E5

*Nephrops* also occur in other areas not contained within the Functional Units. TV surveys in deep water suggest widespread distribution at low density, and surveys at Stanton Bank indicate a population there.

Since the 1990s there have been important developments in the methodology to assess the status of *Nephrops* stocks. The use of Underwater TV surveys (UWTV) has enabled the development of fishery independent indicators of abundance. STECF (2005) suggested that a combination of an absolute abundance estimate from an UWTV survey, in combination with a harvest rate based on  $F_{0.1}$  from a combined sex length cohort analysis (LCA) and the mean weight and selection pattern from the commercial fishery could be used to calculate appropriate landings. Since then, ICES workshops on the TV technique have provided more detail on the assumptions and uncertainties associated with the approach. At the ICES ACOM meeting in June 2009 it was argued that the use of UWTV surveys for absolute abundance estimates could lead to an overestimation bias due to misidentification of burrows, habitat estimation and occupancy rate although it is possible that in some areas, these factors could lead to underestimation. A proposal that, as a precautionary measure, the estimated absolute abundance estimates be reduced by 25%, before being used for estimation of H.R. However, this was ultimately rejected, as being more or less arbitrarily chosen. Instead it was decided to address the issue at a special workshop later in 2008 or early 2009 on using UWTV in the provision of catch advice with the possibility of redoing *Nephrops* assessments in 2009 on the basis of this. As a consequence of this unsolved problem, it was decided to use the UWTV survey estimates only as relative indicators of abundance in this year's assessments.

Because of these uncertainties, ICES did not base its advice for 2009 on estimates of absolute stock size in IV, VI and VII in 2009. Instead, the general ICES advice for these *Nephrops* stocks is based on the UWTV surveys as relative indices that fluctuate without obvious trend. Time series of mean size in catches are stable. Since the current levels of exploitation and effort appear to be sustainable, ICES advice for 2009 recommends not to increase effort and to restrict catches to the recent average values (2006-2007). This period follows the introduction of 'buyers and sellers' legislation and landings from this period are regarded as more accurate than in the preceding period when under-reporting was a problem.

**STECF COMMENTS:** STECF notes that on the basis of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF at least for the time being. STECF agrees with ICES approach and advises that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

STECF notes that in the VIa TAC (which comprises three *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.

A summary of the advice for the three Functional Units in VIa is as follows: North Minch (FU11) 4,100 t, South Minch (FU12) = 5,000 t, Firth of Clyde (FU13) 5,700 t.

STECF notes there are also *Nephrops* catches in "other rectangles" in Division VIa, e.g. from offshore areas adjacent to Stanton Bank where Irish fishers frequently operate from the shelf edge. To provide some guidance on appropriate future landings for these areas, the use of average landings of 258 tonnes (2005–2007) could be considered.

#### 1.54.10. Norway lobster (*Nephrops norvegicus*) in North Minch (FU 11)

**FISHERY:** Total *Nephrops* landings increased in the recent years, from about 3,000 t in 2005 to around 4,000 t in 2007 (provisional). Available information indicates that landings from the late 1990s up to 2005 are most likely to be an underestimate of actual landings, but improved from 2006 with the introduction of buyers and sellers legislation. The *Nephrops* trawl fishery in this area takes by-catches of other species, especially haddock and

whiting, anglerfish. Creel fishing takes place mainly in the sea-loch areas of this FU accounting for 600-700 tonnes. Overall effort in creel numbers is not known.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Owing to uncertainty in the absolute estimate of abundance from UWTV and possible unquantifiable bias, the assessment of the state of the stock is based on relative changes in abundance and advice for 2009 is based on average landings from 2006-2007.

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

**STOCK STATUS:** Underwater TV surveys of the *Nephrops* stocks in the North Minch indicate a further rise in abundance in 2006 when the highest population abundances in the time-series were observed and a decline in 2007. Length composition indicators have been stable over a long period of time. Overall the stock is perceived to be stable.

**RECENT MANAGEMENT ADVICE:** Given the apparent stability of the stock, current levels of exploitation and effort appear to be sustainable. ICES recommends not to increase effort and catches above the recent average values (2006–2007). This corresponds to landings of less than 4,100 t for the North Minch. The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with ICES advice that effort should not increase relative to the last two years. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

#### 1.54.11. Norway lobster (*Nephrops norvegicus*) in South Minch (FU 12)

**FISHERY:** Total *Nephrops* landings increased in the recent years, from just less than 4,000 t in 2005 to around 5,500 t in 2007 (provisional). Available information indicates that landings from the late 1990s up to 2005 are most likely to be an underestimate of actual landings, but improved from 2006 with the introduction of buyers and sellers legislation. The *Nephrops* trawl fishery in this area takes by-catches of other species, especially haddock, whiting, anglerfish and megrim. Larger vessels operating on the western limits of the ground generally take higher by-catches of fish. Creel fishing takes place mainly in the sea-loch areas of this FU accounting for over 900 tonnes. Overall effort in creel numbers is not known.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Owing to uncertainty in the absolute estimate of abundance from UWTV and possible unquantifiable bias, the assessment of the state of the stock is based on relative changes in abundance and advice for 2009 is based on average landings from 2006-2007.

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

**STOCK STATUS:** Underwater TV surveys of the *Nephrops* stocks in the South Minch indicate continued high abundance in 2006 with a decrease in 2007. Overall the stock appears to have fluctuated without trend. Length composition indicators have been stable over a long period of time.

**RECENT MANAGEMENT ADVICE:** Given the apparent stability of the stock, current levels of exploitation and effort appear to be sustainable. ICES recommends not to increase effort and catches above the recent average values (2006–2007). This corresponds to landings of less than 5000 t for the South Minch. The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with ICES advice that effort should not increase relative to the last two years. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices

unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

#### **1.54.12. Norway lobster (*Nephrops norvegicus*) in Firth of Clyde (FU 13)**

**FISHERY:** Total *Nephrops* landings increased in the recent years, from around 3,400 t in 2005 to around 6,600 t in 2007 (provisional). Available information indicates that landings from the late 1990s up to 2005 are most likely to be an underestimate of actual landings, but improved from 2006 with the introduction of buyers and sellers legislation. The *Nephrops* trawl fishery in this area takes by-catches of other species, mainly haddock, whiting and some cod. Creel fishing takes place in parts of this FU accounting for about 200 tonnes. Overall effort in creel numbers is not known.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Owing to uncertainty in the absolute estimate of abundance from UWTV and possible unquantifiable bias, the assessment of the state of the stock is based on relative changes in abundance and advice for 2009 is based on average landings from 2006-2007.

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

**STOCK STATUS:** Underwater TV surveys of the *Nephrops* stocks in the Firth of Clyde suggest an increase in abundance in 2006 to the highest value in the series with a decrease in 2007. Overall the stock appears to have fluctuated with some indications of an upward trend since 1995 when surveys began. Length composition indicators have been stable over a long period of time.

**RECENT MANAGEMENT ADVICE:** Given the indications of a relatively stable stock, current levels of exploitation and effort appear to be sustainable. ICES recommends not to increase effort and catches above the recent average values (2006–2007). This corresponds to landings of less than 5700 t for the Firth of Clyde. The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with ICES advice that effort should not increase relative to the last two years. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

### **1.55. Norway lobster (*Nephrops norvegicus*) – VII**

Norway lobster in Division VII contains 6 Functional Units:

Irish Sea East (FU14)VIIa  
Irish Sea West (FU15)VIIa  
Porcupine Bank (FU16) VIIb,c,j,k  
Aran Grounds (FU17)VIIb  
Ireland SW and SE coast (FU19) VIIa,g,j  
Celtic Sea (FU20-22) VIIg,h

Since the 1990s there have been important developments in the methodology to assess the status of *Nephrops* stocks. The use of Underwater TV surveys (UWTV) has enabled the development of fishery independent

indicators of abundance. STECF (2005) suggested that a combination of an absolute abundance estimate from an UWTV survey, in combination with a harvest rate based on F0.1 from a combined sex length cohort analysis (LCA) and the mean weight and selection pattern from the commercial fishery could be used to calculate appropriate landings. This has previously been applied in VIIa. Since then, ICES workshops on the TV technique have provided more detail on the assumptions and uncertainties associated with the approach. At the ICES ACOM meeting in June 2009 it was argued that the use of UWTV surveys for absolute abundance estimates could lead to an overestimation bias due to misidentification of burrows, habitat estimation and occupancy rate although it is possible that in some areas, these factors could lead to underestimation. As a precautionary measure, a proposal to reduce the estimated absolute abundance estimates by 25%, before being used for estimation of H.R was made. However, this was ultimately rejected, as being more or less arbitrarily chosen. Instead it was decided to address the issue at a special workshop later in 2008 or early 2009 on using UWTV in the provision of catch advice with the possibility of redoing *Nephrops* assessments in 2009 on the basis of this. As a consequence of this unsolved problem, it was decided to use the UWTV survey estimates only as relative indicators of abundance in this year's assessments.

Because of these uncertainties, ICES did not base its advice for 2009 on estimates of absolute stock size in IV, VI and VII in 2009. Instead, the general ICES advice for these *Nephrops* stocks is based on the UWTV surveys as relative indices, which in most cases suggest stability of the stocks. Since the current levels of exploitation and effort appear to be sustainable, ICES advice for 2009 generally recommends not to increase effort and to restrict catches to the recent average values (2006-2007). This period follows the introduction of 'buyers and sellers' legislation and landings from this period are regarded as more accurate than in the preceding period when under-reporting was a problem. In the case of Subarea VII, landings are made by Ireland where 'sales note' information has improved the accuracy of landings from 2007 onwards.

**STECF COMMENTS:** STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of harvest rate approach advocated by STECF at least for the time being. STECF agrees with ICES approach and advice that as a temporary measure the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

STECF notes that in the ICES Area VII, (which comprises 6 *Nephrops* Functional Units), the present aggregated TAC 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.

#### **1.55.1. Norway lobster (*Nephrops norvegicus*) in Irish Sea East (FU 14) (Division VIIa)**

**FISHERIES:** Prior to 2007 landings from these FUs were believed to be under-reported. However, new legislation in 2007 increased the reliability of the landings data. Estimates of landings in 2007 were 959 t. Most of the landings are taken by the UK with the Republic of Ireland taking the remainder. The *Nephrops* trawl fisheries take by-catches 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 trends in the surveys and fisheries indicators.

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

**STOCK STATUS:** Mean size and sex ratios in the catches are stable. Landing per unit effort (lpue) indicators do not show signs of decrease in recent years. The stock is considered to be stable.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to 2007. This corresponds to landings of no more than 1,000 tonnes for the Eastern Irish Sea stock (FU 14). The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that landings by some fleets prior to 2007 are thought to have been under-reported. The implementation of the Buyers and Sellers legislation in the UK in 2006 and “sales notes” in Ireland in 2007, coupled with the increased TAC in 2007, is thought to have improved the reliability of reported landings data. Therefore the advice for this stock refers to landings in 2007 only and does not use landings data prior to 2007. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

#### **1.55.2. Norway lobster (*Nephrops norvegicus*) in Irish Sea West (FU 15) (Division VIIa)**

**FISHERIES:** Prior to 2007 landings from this FU are believed to be under-reported. However, new legislation in 2007 increased the reliability of the landings data. Estimates of landings in 2007 were 8461 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 by-catches 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 trends in the surveys and fisheries indicators.

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

**STOCK STATUS:** The UWTV survey and the trawl survey show a declining trend in abundance after 2003. The trawl survey catch rate in 2007 was around the average of the time-series. Sex ratio and mean size from commercial catches and surveys remain stable.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to 2007. This corresponds to landings of no more than 8,500 tonnes for the Western Irish Sea stock (FU 15). The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that landings by some fleets prior to 2007 are thought to have been under-reported. The implementation of the Buyers and Sellers legislation in the UK in 2006 and “sales notes” in Ireland in 2007, coupled with the increased TAC in 2007, is thought to have improved the reliability of reported landings data. Therefore the advice for this stock refers to landings in 2007 only and does not use landings data prior to 2007. STECF notes that on the bases of recent TV workshop outcomes, ICES considers the TV survey indices unsuitable at the present time as estimates of absolute abundance. STECF further notes that this precludes the use of the harvest rate approach advocated by STECF (2005) at least for the time being. STECF agrees with ICES approach and advice that, as a temporary measure, the use of average landings from a period when these are considered accurate offers a way of giving catch advice. STECF welcomes the commitment by ICES to hold a workshop specifically tasked to develop improved methods for utilising TV survey data, particularly in view of the fact that average landings approaches are unsuitable in situations where the stock abundance is observed to be increasing or decreasing.

#### **1.55.3. Norway lobster (*Nephrops norvegicus*) in Porcupine Bank (FU16) Divisions VIIb,c,j,k**

**FISHERIES:** Reported landings combined for this FU were 1985 t in 2007, but there are concerns about the accuracy of the landings statistics in some fleets. Landings, effort and LPUEs in this fishery indicate increased targeting of *Nephrops* over the last two years by all countries involved in the fishery.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. There are some length-structured data available but growth rates cannot be well determined. Analytical assessments are not feasible at present.

**PRECAUTIONARY REFERENCE POINTS:** There are no precautionary reference points for this fishery.

**STOCK STATUS:** Effort in the Irish and French fleets has rapidly increased in the past four years. Landings per unit effort (lpue) information shows mixed signals, but with a generally declining trend in most fleets over the time-series available. Mean size indicators in all fleets and a survey indicate a large increase in mean size for both sexes in the past four years. Proxies for exploitation show an increase in exploitation in recent years and proxies for recruitment show very low recruitments since 2004. Landings have declined since the mid-1980s to a low point of the time-series in 2000, but have recently increased again.

**RECENT MANAGEMENT ADVICE:** Because of the apparent low recruitment and the recent expansion of the fishery there is an associated increased exploitation. ICES recommends reduction in the exploitation rate and restricting catches in 2009 to no more than 1,000 t, which corresponds to the catch level before the expansion of the fishery (2000–2003). The fishery should not be allowed to expand again unless it can be shown that it is sustainable. The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the advice from ICES based on currently available data. STECF notes that in the past, this functional unit supported a larger fishery sustained over a considerable period and that a reduction in the fishery coincided with reduced activity by Spain and France. STECF notes concerns expressed by ICES about the accuracy of fishery data for some fleets and concludes that improvements are required in order to increase confidence in the assessment. STECF notes that this Functional Unit is part of the larger Subarea VII TAC area and there is a risk that inappropriate levels of effort may occur for these stocks due to effort shifts from other areas.

#### **1.55.4. Norway lobster (*Nephrops norvegicus*) in Aran Grounds (FU17) (Division VIIIb)**

**FISHERIES:** Reported landings for this FU were 931 t in 2007. In the Aran Grounds the most recent change in the fishery is the proportion of twin-rig vessels, which has increased to over 90 % of the fleet in the past eight years. This implies that nominal fishing effort is not an appropriate indicator of effective fishing effort.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. There are some length-structured data available but growth rates cannot be well determined. Analytical assessments are not feasible at present.

**PRECAUTIONARY REFERENCE POINTS:** There are no precautionary reference points for this fishery.

**STOCK STATUS:** LPUE indicators do not show signs of decrease in recent years. The UWTV survey conducted since 2002 estimates abundance to have fluctuated with a peak in 2004. The stock is considered to be stable.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to 2007. This corresponds to landings of no more than 900 tonnes for the Aran Grounds (FU 17). The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that landings by some fleets prior to 2007 are thought to have been under-reported. The implementation of “sales notes” in Ireland in 2007, coupled with the increased TAC in 2007, is thought to have improved the reliability of reported landings data. Therefore the advice for this stock refers to landings in 2007 only and does not use landings data prior to 2007. STECF notes that this Functional Unit is part of the larger Subarea VII TAC area and there is a risk that inappropriate levels of effort may occur for these stocks due to effort shifts from other areas.

#### 1.55.5. Norway lobster (*Nephrops norvegicus*) in SW and SE Ireland (FU19) (Divisions VIIa, g, j)

**FISHERIES:** Reported landings for this FU were 784 t in 2007, but there are concerns about the accuracy of the landings statistics in some fleets. In Aran Grounds the most recent change in the fishery is the proportion of twin-rig vessels, which has increased to over 90 % of the fleet in the past eight years. This implies that nominal fishing effort is not an appropriate indicator of effective fishing effort.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. There are some length-structured data available but growth rates cannot be well determined. Analytical assessments are not feasible at present.

**PRECAUTIONARY REFERENCE POINTS:** There are no precautionary reference points for this fishery.

**STOCK STATUS:** Landings have been variable throughout the time-series, reaching the highest observed levels in 2002–2004. Landings from 2005 onwards have been around the average. LPUE has fluctuated without a detectable trend over the short time-series.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to 2007. This corresponds to landings of no more than 800 tonnes for the Ireland SW and SE Coast (FU 19). The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes that landings by some fleets prior to 2007 are thought to have been under-reported. The implementation of “sales notes” in Ireland in 2007, coupled with the increased TAC in 2007, is thought to have improved the reliability of reported landings data. Therefore the advice for this stock refers to landings in 2007 only and does not use landings data prior to 2007. STECF notes that this Functional Unit is part of the larger Subarea VII TAC area and there is a risk that inappropriate levels of effort may occur for these stocks due to effort shifts from other areas.

#### 1.55.6. Norway lobster (*Nephrops norvegicus*) in Celtic Sea FU 20-22 (Divisions VII, g, h)

**FISHERIES:** There are three Functional Units in the Celtic Sea area but they are treated as one. Landings from this stock are reported by France, the Republic of Ireland and the UK. The contribution of the French landings to the total quantity (5261 t in 2007) gradually decreased from 80-90% at the end of the 1980s to 50-60% at the beginning of the 2000s. There has been a considerable increase in Irish landings, from around 500 t in 1990 to more than 3,200 t in 2007. There has also been increasing effort by Irish vessels targeting *Nephrops* in the Celtic Sea in recent years. Discarding is substantial, but varies between fleets and areas.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on recent average landings and indicators for LPUE and CPUE.

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

**STOCK STATUS:** Landings have fluctuated around 4600 t since the mid-1990s. In 2006 and 2007 mean sizes in landings for the Irish and French fleets decreased consistent with higher recruitment in recent years. LPUE indicators do not show signs of decrease in recent years. The stock is considered to be stable.

**RECENT MANAGEMENT ADVICE:** The current fishery appears sustainable. Therefore, ICES recommends that *Nephrops* fisheries should not be allowed to increase relative to 2007. This corresponds to landings of no more than 5300 tonnes for the Celtic Sea stock (FU20-22). The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the advice from ICES. Landings by some fleets prior to 2007 are thought to have been under-reported. The implementation of the Buyers and Sellers legislation in the UK in 2006 and “sales notes” in Ireland in 2007, coupled with the increased TAC in 2007, is thought to have improved the reliability of reported landings data. Therefore the advice for this stock refers to landings in 2007 only and does not use landings data prior to 2007. STECF notes that the TAC is set for Subarea VII, and this may allow unrestricted catches for Functional Units where restrictions on catches should in fact apply. STECF further notes that the discarding of small *Nephrops* is substantial.

### **1.56. Norway lobster (*Nephrops norvegicus*) in Divisions VIIIa, b(FU 23 & FU 24)**

**FISHERIES:** There are two Functional Units in these divisions: a) Bay of Biscay North (FU 23) and b) Bay of Biscay South (FU 24), 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. In 2007 total landings amounted to 3173 t. The corresponding estimated discards were 2411 t. 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 sampled length distributions were combined for males and females.

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

**STOCK STATUS:** Spawning biomass has been relatively stable over the entire period. The fishing mortality is well above the  $F_{max}$  of 0.15. Recruitment showed a declining trend up to 1998, but seems to have recovered since then. Landings declined until 2000, but they were stabilized in the early 2000s with a slightly increasing trend. The fishing mortality is well above the  $F_{max}$  of 0.15.

**RECENT MANAGEMENT ADVICE:** Since the SSB has been relative stable; the current landings can be maintained. ICES advice for 2009 generally recommends not to increase effort and to restrict catches to the recent average value of 3,400 t (2006-2007 average). The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.3.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF also notes, that application of age based assessment methodology using slicing for creating pseudo-ages has been criticised by ICES. A main problem being that application of knife-edge slicing technique for creating pseudo ages may lead to biases in estimates of F.

### **1.57. Norway lobster (*Nephrops norvegicus*) in Division VIIIc (FU 25 & FU 31)**

**FISHERIES:** There are two Functional Units in this Management Area: a) North Galicia (FU 25) and b) Cantabrian Sea (FU 31). All catches from these FUs are taken by Spain. *Nephrops* constitutes a small component of mixed fishery landings taken by bottom trawlers. Hake constitutes a main component of these landings. Landings and effort in both functional units have declined and landings are now at extremely low levels compared to earlier years (<100 t in 2007 compared to landings of about 500 t in the early 1990s).

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Advice is based on fishery statistics, LPUE data and trends in mean size for both FUs

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

**STOCK STATUS:** The trends in LPUE indicate low stock level in both stocks. Increasing mean size in catches indicate failing recruitment in both stocks.

**RECENT MANAGEMENT ADVICE:** Given the very low state of the stock, ICES advises zero catches in 2009 for both stocks (FU 25 & FU 31).

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 advises a zero TAC for both FUs in this Management Area. The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.3.

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

According to article 6 of the recovery plan the TACs for Norway lobster in Divisions VIIIc and IXa shall be set at a level that will result in the same relative change in its fishing mortality rate as the change in fishing mortality rate achieved for the hake stock. However, the changes in TAC shall be limited to no more than +/- 15 %.

The TAC advised by ICES for hake for 2009 consistent with the recovery plan is 8,104 t. This reflects an increase in the hake TAC of 15 % and if fully enforced, corresponds to a reduction in the fishing mortality on hake of more than 50 % compared to the value of fishing mortality assumed by ICES for 2008.

The latest assessment of the five functional *Nephrops* units recognised in Divisions VIIIc and IXa conducted in 2006 does not include information allowing precise catch predictions. However, the information available indicates that a reduction in the fishing mortality on *Nephrops* of about 50 % would result in reduction in catches of more than 15 %. STECF therefore advises that the TACs for *Nephrops* in Divisions VIIIc and IXa consistent with the recovery plan should be set equal to 15 % reduction of the 2008 TACs corresponding to a TAC in 2009 for *Nephrops* in VIIIc of 105 t.

### **1.58. Norway lobster (*Nephrops norvegicus*) in Divisions VIIIc, 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.

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

**FISHERIES:** There are five Functional Units (FU) in Division IXa: a) West Galicia (FU 26), b) North Portugal (FU 27), c) Southwest Portugal (FU 28), d) South Portugal (FU 29), and e) Gulf of Cadiz (FU 30). There are no reported landings of *Nephrops* from Division IXb and Subarea X.

*Nephrops* represents a small, but valuable by-catch 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 around 500 t in 2007, of which around half were taken from FU 28 and FU 29.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The advice for the stocks in FUs 26 and 27 (West Galicia and North Portugal), and FU 30 (Gulf of Cadiz) was based on trends in LPUE data and data on mean size, while the advice for the stocks in FU 28 and FU 29 (Southwest and South Portugal) was based on an age-based assessment using catch-at-age data generated by slicing of sampled length distributions.

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

**STOCK STATUS:** West Galicia (FU 26) and North Portugal (FU 27): The available information indicates that the stocks are at a very low level of abundance in SW and S Portugal (FU 28 & FU 29): Stock status is uncertain, but appears to have recovered from its low level in 1996 to almost the level of the mid-1980s in 2002 and has been relatively stable since then.

Gulf of Cadiz (FU 30): State of the stock is unknown, but abundance has been stable in recent years.

**RECENT MANAGEMENT ADVICE:** FUs 26–27: These stocks are at an extremely low level. Mean sizes and previous assessments (2006) indicated that the stocks suffer a progressive recruitment failure. ICES advises no fishing on *Nephrops* until there is evidence of stock improvement.

FUs 28–29: these stocks appear to have recovered from its low level in 1996 to almost the level of the mid-1980s by 2002 and have been relatively stable since then. The average landings during the period when the stock was recovering (1996–2002) was about 200 t. Therefore, ICES advises that landings in 2009 should not exceed 200 t. The advice on the exploitation of this stock in 2007 is presented in the context of mixed fisheries and is found in Section 3.3.

**STECF COMMENTS:** STECF agrees with the advice from ICES. According to article 6 of the recovery plan the TACs for Norway lobster in Divisions VIIIc and IXa shall be set at a level that will result in the same relative change in its fishing mortality rate as the change in fishing mortality rate achieved for the hake stock. However, the changes in TAC shall be limited to no more than +/- 15 %.

The TAC advised by ICES for hake for 2009 consistent with the recovery plan is 8,104 t. This reflects an increase in the hake TAC of 15 % and if fully enforced, corresponds to a reduction in the fishing mortality on hake of more than 50 % compared to the value of fishing mortality assumed by ICES for 2008.

The latest assessment of the five functional *Nephrops* units recognised in Divisions VIIIc and IXa conducted in 2006 does not include information allowing precise catch predictions. However, the information available indicates that a reduction in the fishing mortality on *Nephrops* of about 50 % would result in reduction in catches of more than 15 %. STECF therefore advises that the TACs for *Nephrops* in Divisions VIIIc and IXa consistent with the recovery plan should be set equal to 15 % reduction of the 2008 TACs corresponding to a TAC in 2009 for *Nephrops* in IX, X and EC waters of CECAF 34.1.1 of 353 t.

### **1.60. Northern shrimp (*Pandalus borealis*) in Division IIIa and Division IVa East (Skagerrak and Norwegian Deep)**

**FISHERIES:** *Pandalus borealis* is fished by bottom trawls at 150–400 m depth throughout the year by Danish, Norwegian and Swedish fleets. Total landings have varied between 10,000 and 15,000 t in the period 1985–2007. Discarding of small shrimp due to high grading takes place, mainly due to high grading. In 2007 total landings were around 13,200 t, while estimated catches (including discards) were around 15,100 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. 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 have not been defined for this stock.

**STOCK STATUS:** As no reference points are defined, the state of the stock cannot be evaluated with regard to biological reference points, and the state of the stock is uncertain. The current state of the stock appears to be stable. LPUEs and survey indices do not show any significant changes in stock biomass from 2006 to 2008. The perception of the state of the stock in 2007 is based on trends in Danish and Norwegian commercial LPUEs and biomass and recruitment indices from Norwegian surveys up to 2008. The recruitment index in 2008 seems to be lower than in the two preceding years.

**RECENT MANAGEMENT ADVICE:** The assessment in 2008 gives no reason to change the advice given for the 2008 fishery: It is recommended that the total landings from IIIa and IVa East in 2009 should not increase above the recent averages landings (2003–2006) of 15,000 t. ICES recommends that sorting grids should be mandatory in this fishery in order to minimise by-catch.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF also endorses that sorting grids facilitating the escape of fish should be mandatory in this fishery as they are in all other *Pandalus borealis* fisheries in the North Atlantic

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

**FISHERIES:** In the EU zone of the North Sea, *Pandalus* on the Fladen Ground (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. 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. No catches were recorded in 2006–2007.

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, and no catches were recorded in 2006 and 2007. 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:** 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 recommendation

### **1.62. 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 Northeast 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 since decreased: 60,000 t in 2002, around 40 000 t in 2003-2005 and around 30 000 t in 2007.

**SOURCE OF MANAGEMENT ADVICE:** This stock is currently managed jointly by Norway and Russia. ICES provides biological advice for management of this stock.

**PRECAUTIONARY REFERENCE POINTS:** Following a NAFO recommendation for stocks assessed by stock production models, a limit reference values ( $B_{lim}$ ) defined as 30% of  $B_{MSY}$  is used.

**STOCK STATUS:** Stock biomass was well above  $B_{MSY}$  and  $F$  below  $F_{MSY}$  at the end of 2007. Since 2006 this stock has been assessed by a Bayesian version of a surplus production model, using a) total catch and b) 2 different sets of indices (Norwegian and Russian) of stock biomass as input. This model provides estimates of biomass relative to  $B_{MSY}$ . According to this model the biomass has fluctuated above  $B_{MSY}$  since the late 1980s. Correspondingly  $F_{MSY}$  has been below  $F_{MSY}$ . However, the effect of predation by the Barents Sea cod stock has not yet been included in the model.

**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  $B_{lim}$ , ICES recommends that the TAC for 2009 should not exceed 50000 t. According to the model output such catch level would imply a low risk (probability) that the biomass falls below  $B_{lim}$  and  $F$  being above  $F_{lim}$ .

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. Estimates of cod consumption of shrimp are on average much higher than shrimp landings.

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

### **1.63. Norway pout (*Trisopterus esmarki*) in IIa, IIIa and the North Sea**

**FISHERIES:** The fishery is mainly by Danish and Norwegian vessels using small mesh trawls in the northern North Sea.

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. The fishery was closed in 2005, reopened in 2006 and closed again in 2007. The TAC for 2008 is 123 000 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The age-based assessment is based on catch data and research surveys.

**PRECAUTIONARY REFERENCE POINTS:** No  $F_{pa}$  is set for this stock. The proposed  $B_{pa} = 150,000t$ ,  $B_{lim} = 90,000$ .

**STOCK STATUS:** Based on the most recent estimates of SSB (September 2008), ICES classifies the stock at increased risk of suffering reduced reproductive capacity. The targeted fishery for Norway pout was closed in 2005, the first half year of 2006, and in all of 2007, and fishing mortality and effort have accordingly reached historical minima in these periods. The 2008 year-class is estimated to be around 70% of the long-term average.

**RECENT MANAGEMENT ADVICE:** Catches in 2009 of up to 35 000 t correspond to a fishing mortality of 0.15 and are expected to bring the stock above  $B_{pa}$  in 2010.

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

## 1.64. 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, 2005 and 2006 landings of 66,500 t, 61,400t 55,700 t and 57,900 t respectively were the lowest recorded since 1957. Landings in 2007 reached a record low of 49,700 t.

The combination of days-at-sea regulations, high oil prices, and the decreasing TAC for plaice and the relatively stable TAC for sole, appear to have induced a more southern fishing pattern in the North Sea. This concentration of fishing effort results in increased discarding of juvenile plaice that are mainly distributed in those areas. This process could be aggravated by movement of juvenile plaice to deeper waters in recent years where they become more susceptible to the fishery. Also the lpue data show a slower recovery of stock size in the southern regions that may be caused by higher fishing effort in the more coastal regions.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment using landings and discards, calibrated with three survey indices.

**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.  $B_{lim}$  is set as  $B_{loss}$  (160,000t) the lowest observed biomass in 1997 as assessed in 2004.  $B_{pa}$  is based on  $1.4*B_{lim}$  and set at 230,000 t.  $F_{pa}$  is based on  $F_{lim}$  ( $=F_{loss}$ ) and set at 0.6, which is the 5<sup>th</sup> percentile of  $F_{loss}$  (0.74) and gives a 50% probability that SSB is around  $B_{pa}$  in the medium term.

**MANAGEMENT AGREEMENTS:** The management agreement (1999), previously agreed between the EU and Norway was not renewed for 2005 and since that year has not been in force. A multi-annual plan for fisheries exploiting stocks of plaice and sole in the North Sea was established on 11 June 2007 (Council Regulation (EC) No 676/2007). This plan has two stages. The first stage aims at an annual reduction of fishing mortality by 10% in relation to the fishing mortality estimated for the preceding year, with a maximum change in TAC of +or- 15% until the precautionary reference points are reached for both plaice and sole in two successive years. ICES has interpreted the F for the preceding year as the estimate of F for the year in which the assessment is carried out. The basis for this F estimate in the preceding year will be a constant application of the procedure used by ICES in 2007. In the second stage, the management plan aims for exploitation at  $F = 0.3$ .

ICES has evaluated the agreed long-term management plan (Council Regulation (EC) No. 676/2007) for plaice and sole. For plaice, the management plan evaluation is not yet conclusive with regards to consistency with the precautionary approach due to the following shortcomings:

- Lack of robustness to the starting values for population abundance
- Systematic over-estimation of historic landings
- Under-estimation of bias and variance in the assessment model

**STOCK STATUS:** Based on the most recent estimate of SSB (for 2008) and fishing mortality (for 2007), ICES classifies the stock as having full reproductive capacity and as being harvested sustainably. SSB is now estimated to have increased above the  $B_{pa}$ . Fishing mortality is estimated to have decreased to below  $F_{pa}$ . Recruitment has been below the long-term average since 2004; however, recruitment in 2007 is of average strength.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.1.

**Exploitation boundaries in relation to existing management plans:** According to the management plan adopted by the EC in 2007, the fishing mortality in 2009 should be reduced by 10% compared to the fishing mortality estimated for the preceding year ( $F_{2007} = F_{2008} = 0.39$ ) with the constraint that the annual change in TAC should not be more than 15%. A 10% reduction in fishing mortality corresponds to an  $F$  of 0.35 and landings of 55,500 t in 2009, which is within the 15% TAC change (TAC 2008 = 49,000 t).

ICES has not yet concluded on the status of the EC management plan in relation to precautionary approach.

**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 to be 0.39, which is above the rate expected to lead to high long-term yields and low risk of stock depletion.

**Exploitation boundaries in relation to precautionary limits:** The exploitation boundaries in relation to precautionary limits imply human consumption landings of less than 86,000 t in 2009, which is expected to maintain SSB above  $B_{pa}$  in 2010, while maintaining  $F$  below  $F_{pa}$ .

**Conclusion on exploitation boundaries:** The evaluation of the EU management plan has not been conclusive. However, in the present situation, the fishing mortality in 2009 when applying the management plan is expected to give benefits in terms of long-term yield and low risk to the stock compared to the application of  $F_{pa}$ . ICES therefore advises to limit landings to 55,500 t for the year 2009.

**STECF COMMENTS:** STECF recommends that the 2009 TAC for plaice in IV should be set in accordance with the provisions of the management plan.

STECF notes that the ICES catch forecast for North Sea plaice assumes a status quo fishing mortality rate on age groups 2-6 for the year 2008 of 0.39 (equal to the fishing mortality rate on those age groups estimated for 2007). In recent years STECF has based its advice on a catch forecast assuming a downward trend in North Sea beam trawl effort of 4% per year. However, the time-series of beam trawl effort data was revised in 2008 and data indicate that effort has been relatively stable for the past six years. STECF therefore agrees that ICES assumption for Status Quo fishing mortality in 2008 is appropriate and agrees with the ICES advice for 2009.

However, STECF notes that a major part of the fleet fishing for sole and plaice in the North Sea is reported to have spent less effort in that area in 2008 compared to 2007. The magnitude of the effort reduction in 2008 is not quantifiable at present, but if it results in a reduction in fishing mortality on sole and plaice in 2008, STECF advises that forecasted catches and stock biomass for 2009 are likely to be underestimated.

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.

## 1.65. Plaice (*Pleuronectes platessa*) in Kattegat and Skagerrak (Division 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 11,560 t in 2001 but subsequently decreased and amounted to 6,905 in 2005 and 9,400 in 2006 compared to a TAC of 9,600 t. Landings in 2007 are estimated to be approximately 8,800 t.

**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  $F_{pa} = 0.73$ ,  $B_{pa} = 24,000t$ . 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. These surveys do not cover the area where most of the catches are reported.

**RECENT MANAGEMENT ADVICE:** The ICES advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries in Section 3.1.

The new analysis available for this stock has not given a reason to change the advice from 2007. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: “Landings should not exceed the level recorded in 2006 of 9,400 t.”

In addition, ICES offers the following consideration:

In 2007, ICES identified key issues that would need to be resolved before reaching further improvements in the assessment. The various surveys give a reasonably consistent result for the eastern part of the area. The status of the western part is more uncertain, due to potential mixing with North Sea plaice and limited survey coverage. The landings-at-age matrix does not show proper tracking of the cohorts, probably due to i) mixing of the IIIa stock with the North Sea plaice stock on the main fishing ground in south-western Skagerrak, and ii) age misspecification due to low sampling levels and uncertainty in age reading.

This advice will be updated in 2009.

**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.

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

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

### **1.67. 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 declined from the 1987 peak of 6,200 t to between 1,100-1,500 t from 1999-2005, well below the agreed TAC. Landings fell to 932 t in 2006 and 2007 landings are the lowest in the time series with 804 t.

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

**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 (in 2008) and fishing mortality (in 2007), ICES classifies the stock as having full reproductive capacity and being harvested sustainably. The SSB in 2008 was well above  $B_{pa}$ . Fishing mortality on this stock has been declining since the late 1980s and has been below  $F_{pa}$  since 1998.

**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 fishing mortality (2007) is estimated to be 0.09, which is below the

rate expected to lead to high long-term yields and low risk of stock depletion. There would be little gain to the long-term yield by increasing fishing mortalities above current levels. Fishing at  $F_{0.1}$  corresponds to landings in 2009 of 1430 t.

**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 3,960 t in 2009 and will lead to a reduction in SSB to 7,730 t in 2010.

**Conclusion on exploitation boundaries:** In the present situation with a stock that is well above  $B_{pa}$  and fishing mortality below  $F_{pa}$  and below  $F_{0.1}$ , there is little gain to the long-term yield by increasing fishing mortality above current levels. Hence, ICES recommends that landings in 2009 be limited to no more than 1430 t.

The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries in the Irish Sea and is found in Section 3.2

**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.

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

**FISHERIES:** Ireland is the major participant in this fishery with around 90% of the international landings between 1993-2006. Plaice are normally caught in mixed species otter trawl fisheries in Division VIIb. These vessels mainly target other demersal fish species and *Nephrops*. Official landings have declined from 251t in 1996 to 30t in 2007.

**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 available information is inadequate to evaluate the state of the stock. Landings show a declining trend in recent years with a record low of 30t in 2007. The new data available do not change the perception of the stock and do not give reason to change the advice from 2007.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries and is found in Section 3.2.

The new data available for this stock do not change the perception of the stock and do not give reason to change the advice from 2007. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: "Catches should be no more than the recent average (2004–2006) of around 40 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.

## 1.69. Plaice (*Pleuronectes platessa*) – VIIde

Plaice in Divisions VII d and e are assessed separately but the TAC is set for both divisions combined.

### 1.69.1. Plaice (*Pleuronectes platessa*) in Division VIId (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 (1976-2006). Landings fluctuated hardly in the last decennia but declined slightly in the last 5 years from 5,800 t to 3,510 t in 2007.

**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:** In the absence of a reliable assessment, the state of the stock cannot be evaluated in relation to the precautionary approach. An exploratory assessment conducted last year suggests that the spawning-stock biomass has declined through the last 15 years and that the current level of SSB is low. The new landings, cpue, and survey data available for this stock do not change the perception of the stock

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries and is found in Section 3.1.

The advice for the fishery in 2009 is the same as the advice given in 2007 for the 2008 fishery: “*In the absence of short-term forecasts, ICES recommends that landings [...] do not increase above the average of landings from the last three years (2004–2006), corresponding to 3,500 t.*”

This advice will be updated in 2009

**STECF COMMENTS:** STECF agrees with the advice for VIId plaice.

STECF reiterates its previous comments:

- i) 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.
- ii) 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 VIId.
- iii) There is some uncertainty about the stock structure. Historical tagging information indicates that there may be significant migration of plaice between ICES divisions VIId, e and IVc.
- iv) Finally, the lack of discard information also adds to the overall uncertainty of the status of the stock since discards are not included in the assessment.

### 1.69.2. Plaice (*Pleuronectes platessa*) in Division VIle (Western English Channel)

**FISHERIES:** The fisheries taking plaice in the Western Channel mainly involve vessels from the bordering countries: the total landings (2007) are split among UK vessels (76%), France (14%), and Belgium (10%). 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 by-catch 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 new assessment available for this stock does not change the perception of the stock. The stock remains below  $B_{pa}$ .

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries and is found in Section 3.2.

The advice for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: “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

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

STECF notes that although effort restrictions have been enforced since 2005 (Council Regulation (EC) No. 27/2005, Council Regulation (EC) No 51/2006 and Council Regulation (EC) No 41/2007) and a reduction in nominal effort of about 20% in 2006 compared to 2005 for the main fleets were encountered, fishing mortality still is increasing.

### **1.70. Plaice (*Pleuronectes platessa*) in the Celtic Sea (Divisions VIIf and g)**

**FISHERIES:** The fishery for Celtic Sea plaice involves vessels from France, Belgium, England and Wales and Ireland. In the 1970s, the VIIf, 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.

Currently the main fishery occurs in the spawning area off the north Cornish coast, at depths greater than 40 m, about 20 to 25 miles offshore. Although plaice are taken throughout the year, the larger landings occur during February–March after the peak of spawning, and again in September. (Note: Recent increases in fuel costs are thought to have restricted the range of some fleets and may have resulted in a reduction in effort in Divisions VIIf,g).

Since 2000 the estimated landings have been below the TACs, and lowest catch levels of 389 t were recorded in 2005. Nevertheless, according to the catch forecast the predicted landings in 2008 (at status quo fishing mortality) are 7% higher than the agreed TAC for 2008.

Plaice in the Bristol Channel and Celtic Sea (ICES Divisions VIIf and VIIg) is managed by TAC and technical measures. Technical measures in force for this stock are minimum mesh sizes, minimum landing size, and restricted areas for certain classes of vessels. Technical regulations regarding allowable mesh sizes for specific target species, and associated minimum landing sizes, came into force on 1 January 2000. The minimum landing size for plaice in Divisions VIIf,g is 27 cm.

**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 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 having reduced reproductive capacity. SSB peaked in 1988–1990, following a series of good year-classes, then declined rapidly and has since 2002 been below or around  $B_{lim}$ . Fishing mortality has fluctuated around an average level (0.60) for the entire time-series but has declined since 2004. Recruitment was relatively high in most years during the 1980s, but has been lower since then. Some very weak year-classes have occurred since the late 1990s.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2008 is presented in the context of mixed fisheries and is found in Section 3.2

***Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:*** The current fishing mortality (2007) is estimated at 0.40, which is above the range that would lead to high long-term yields and low risk of stock depletion.

***Exploitation boundaries in relation to precautionary considerations:*** A 75% reduction in F is needed to increase SSB to around  $B_{pa}$  in 2010. This corresponds to landings of less than 170 t in 2009.

If the advised large reduction in F is not achievable in the short-term, ICES urges a Recovery plan to 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.

Since 2005, ICES rectangles 30E4, 31E4, and 32E3 have been closed during the first quarter (Council Regulations 27/2005, 51/2006, and 41/2007) with the intention of reducing fishing mortality on cod. There is evidence that this closure has redistributed effort to other areas. Many vessels (particularly beam trawlers from the UK and Belgium) fished close to the borders of the closed rectangles during the closure, and fished intensively inside the rectangles when they were re-opened. Information from the UK shows that plaice can be caught in areas outside of the closed area with the same catch rates. Therefore the closed area probably had little impact on the fishing mortality on plaice.

Discard rates are high for this stock in some seasons/fleets. The high level of discarding indicated in this mixed fishery would suggest a mismatch 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 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.

**STECF COMMENTS:** STECF agrees with the advice from ICES that the current fishing mortality (2007, estimated at 0.40) is above the range that would lead to high long-term yields and low risk of stock depletion and, consequently, a 75% reduction in F is needed to increase SSB to around  $B_{pa}$  in 2010. This corresponds to landings of less than 170 t in 2009.

Furthermore, STECF notes that adopting a target F in the range  $F=0.14$  to  $F=0.28$  for Celtic Sea plaice is desirable whilst also take into account the interactions with Celtic Sea sole.

- 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 mismatch 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.

### **1.71. Plaice (*Pleuronectes platessa*) in VIIIh,j,k**

**FISHERIES:** Ireland, UK, France and Belgium are the major participants in this fishery. Plaice are predominantly caught within mixed species otter trawl fisheries in Division VIIj.

Official landings have declined from 790 t in 1998 to 112 t in 2007.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment for this stock in 2002 was preliminary. In 2007 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 available information is inadequate to evaluate the state of the stock. Landings have decreased continuously since the beginning of the time-series. However, the new data available do not change the perception of the stock and do not give reason to change the advice from 2007.

**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 3.2 of this report.

The new data available for this stock do not change the perception of the stock and do not give reason to change the advice from 2007. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: “*Catches should be no more than the recent average (2004–2006) of around 177 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 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.

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

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

### **1.73. Pollack (*Pollachius pollachius*) in all areas.**

STECF has no assessment information or advice for pollack in the North-east Atlantic for which the EU sets a TAC or shares a TAC fixed unilaterally.

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

**FISHERIES:** Traditionally, the directed fishery has been conducted by Russia and other East-European countries in the areas from south of Bear Island to Spitsbergen. From the mid-1970s to the mid-1980s, large catches were taken. In the mid-1980s, Norwegian trawlers started fishing along the continental slope (around 500-m depth) further south, in areas never harvested before, and inhabited primarily by mature fish. After a sharp decrease in the landings from the traditional area until 1987, this fishery on new grounds resulted in a temporary increase in the landings until 1991, after which the landings declined. Since 1991, the fishery has been dominated by Norway and Russia.

By-catches 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 not sorted out by the grid but their catches are regulated by the maximum number of redfish per kilogram shrimp (from 2006 onwards, i.e. 3 juvenile redfish per 10 kg shrimp).

Since 1 January 2003, all directed trawl fisheries for *S. mentella* have been forbidden in the Norwegian EEZ north of 62°N and in the Svalbard area. Additional protection for adult *S. mentella* comprises area closures. Outside permanently closed areas it is, however, legal to have up to 20% redfish (*S. mentella* and *S. marinus* combined) in round weight as by-catch per haul and on-board at any time when fishing for other species. Since 1 January 2005, the by-catch percentage has been reduced to 15% (both species combined).

A directed pelagic fishery for *S. mentella* in international waters of the Norwegian Sea outside EEZ has developed since 2004. Landings of *S. mentella* taken in the pelagic fishery for blue whiting and herring in the Norwegian Sea have been reported to the working group in 2004 and 2005. In 2006 this fishery developed further to become a directed fishery with 11 countries and more than 40 trawlers landed around 27,000 t.

An area closure in the first half of 2007 was implemented by NEAFC. The landings of *S. mentella* in 2007 are estimated to be about 20,000 t.

**MANAGEMENT AGREEMENT:** The *S. mentella* occurrences inside the Norwegian and Russian EEZs are currently managed by a joint Norwegian and Russian scientific advisory body. The fisheries are regulated according to bilateral agreements between Russia and Norway.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICES. ICES notes that it was not possible to conduct an analytical assessment of this stock. 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. The management body of the pelagic redfish fishery is NEAFC.

**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. Surveys indicate that the demersal stock is currently near a historical low. The only year-classes that can contribute to the spawning stock are those prior to 1991 as all of the following year-classes have been extremely poor.

The state of the pelagic occurrences of *S. mentella* is unknown.

**RECENT MANAGEMENT ADVICE:** The new data available for this stock (landings and survey) do not change the perception of the stock. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: There should be no directed trawl fishery on *Sebastes mentella* in Subareas I and II in 2009. Area closures should be maintained and by-catch limits should be as low as possible until a significant increase in the spawning-stock biomass (and a subsequent increase in the number of juveniles) has been verified.

In addition, ICES offers the following consideration:

A pelagic fishery has developed in the Norwegian Sea outside EEZs since 2004. In 2004–2006 this fishery developed further to become a directed and free fishery in 2006. During this period catches have increased from 1,500 t to 29,000 t. The North-East Atlantic Fisheries Commission (NEAFC) capped these landings by setting a

TAC from 2007 onwards that could be fished in international waters in an Olympic fishery (i.e., free competition among vessels until the TAC is taken).

This advice will be updated in 2009.

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

### **1.75. 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 by-catch) 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 Møre 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 from 2004 to 2007 annual landings were estimated to be about 7,000 t. EU landings reached 184 t in 2006 and about 235 t in 2007.

Since 1 January 2003, all directed trawl fisheries for *S. marinus* have been forbidden in the Norwegian EEZ north of 62°N and in the Svalbard area. A minimum legal landing size of 32 cm has been set for all Norwegian fisheries and international fisheries in the Norwegian EEZ, with an allowance to have up to 10% undersized (i.e., less than 32 cm) specimens of *S. marinus* (in numbers) per haul. From January 2006, it is forbidden to use gillnets with mesh size less than 120 mm when fishing for redfish. The closed seasons enforced since 2004 seem to have reduced the gillnet catches by about 2,500 t, while the catches taken by other gears have not decreased, and in some cases increased, causing the total international catches to remain at the same level of about 7,500 t during the last four years. Unfortunately, this appears insufficient in preventing a further reduction of this stock, which is also confirmed by increased fishing mortalities in the experimental analytical assessment.

**MANAGEMENT AGREEMENT:** The stock is currently managed by a joint Norwegian and Russian scientific advisory body and regulated according to bilateral agreements between Russia and Norway.

**SOURCE OF MANAGEMENT ADVICE:** No explicit management objectives have been established for this stock. 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 1986-2006. Input data included catches and the annual Barents Sea joint bottom trawl survey. 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. Information on year-class strength indicates record-low levels for the last decade. Therefore, this stock is presently in very poor condition. Given the low productivity of this species, this situation is expected to remain for a considerable period.

**RECENT MANAGEMENT ADVICE:** The new data available for this stock (landings and survey) do not change the perception of the stock. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: There should be no directed fishery on *Sebastes marinus* in Subareas I and II. Area closures should be maintained and by-catch limits should be kept as low as possible until a significant increase in the spawning-stock biomass (and a subsequent increase in the number of juveniles) has been verified.

This advice will be updated in 2009.

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

### **1.76. 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 the North Atlantic. Within the entire *S. marinus* distribution area including the Reykjanes 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. 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 1.76.2) 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.

STECF agrees with ICES’ conclusion about inadequate evidence to revise advisory units.

### **1.76.1. 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. Icelandic trawlers account for the majority of the catches from Division Va, while Faroese trawlers take most of the catches from Division Vb. In Sub-area XIV, the catches are mainly a by-catch in shrimp fisheries. 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 40,000 t during the mid 1990s. Since then, the annual catches varied without a clear trend and in 2006, total landings amounted to 42,000 t. Landings in 2007 are estimated to be 43,300 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 (GADGET). Survey data available from Divisions Vb and XIV are not used in the forecast. There are no explicit management objectives for this stock.

**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,  $U_{max}$ , as well as the present state. Given these data, ICES has proposed that  $U_{pa}$  be set at 60% of  $U_{max}$ , the highest observed survey index.

**STOCK STATUS:** Based on the most recent indicator of SSB (in 2007) ICES classifies the stock as being at risk of having reduced reproductive capacity. In recent years the survey index in Icelandic waters has fluctuated around  $U_{pa}$  and at present, is slightly below. Survey indices of both pre-fishery recruits and of fishable size in East Greenland have increased in recent years.

In Division Vb the Faroese groundfish survey (covering 1994–2008) indicates that the abundance has been stable at a low level since 2001. Landings have declined since 1985 to a low level in recent years, and this decline is also reflected in the Faroese summer survey).

#### **RECENT MANAGEMENT ADVICE:**

*Exploitation boundaries in relation to precautionary limits:* Catches in 2009 should be less than 30 000 t, because this is expected to keep the stock above  $U_{pa}$  in the medium term.

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

### **1.76.2. Deep-sea Redfish (*Sebastes mentella*) on the continental shelf in Sub-areas V, VI and XIV**

**FISHERIES:** In 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 by-catch is taken by other countries fishing demersal species. In Subarea XIV, the catch is mainly taken as by-catch 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. Since 2004, total annual catches varied around 21,000 t. Landings in 2007 are estimated to be the lowest since that time at 17,600 t. The catch figures of demersal *S. mentella* do include catches taken by pelagic gears close to the bottom and east of a management line in the Icelandic EEZ, which by definition separates Icelandic demersal from pelagic catches of *S. mentella*.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. Survey data is used from the German groundfish survey in Subarea XIV (1982-2007), the Greenland halibut survey in Subarea XIV (1998-2007) and from the Icelandic groundfish survey in Va (2000-2007). Cpue data was used from Icelandic trawlers in Division Va (1986-2007) and from the Faroese fishery in Division Vb (1991-2007). There are no explicit management objectives for this stock.

**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. Available survey biomass indices show that in Division Va the biomass has been low but stable in the last 6 years, while it has increased in Subarea XIV.

**RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to precautionary considerations:** ICES advises that a management plan be developed and implemented which takes into account the uncertainties in science and the properties of the fisheries. ICES suggests that catches of *S. mentella* are set no higher than 10,000 t as a starting point for the adaptive part of the management plan. The ICES advice for 2009 is to reduce catches to 10,000 t.

ICES suggests that catches of *S. mentella* are set at 10,000 t as a starting point for the adaptive part of the management plan. ICES has previously advised that most deep-water species like redfish can only sustain low rates of exploitation, since slow-growing, long-lived species that are depleted have a long recovery period. Fisheries should only be allowed to expand when indicators have been identified and a management strategy including appropriate monitoring requirements has been decided and is implemented.

The basis of the 10,000 t is that this is a significant reduction in catches compared with the recent past. This is expected to result in a lower exploitation rate, but the absolute magnitude cannot be estimated. Subarea XIV is an important nursery area for *S. mentella* and *S. marinus*. The survey index of the fishable stock of *S. mentella* in Subarea XIV has increased in recent years to the highest in the time-series. Measures to protect juvenile redfish in Subarea XIV should be continued (sorting grids in the shrimp fishery). In Subarea XIV, redfish and cod are found in the same areas and depths and historically these species have been taken in the same fisheries. A redfish fishery may therefore affect cod. ICES presently advise that no fishery should take place on cod in Greenland waters.

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

### **1.76.3. 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 73,000 t, about half the previous level. This was associated with a strong decline in cpue. In 2006, the catch is estimated to amount to 83,000 t. Landings in 2007 are estimated by ICES to be 64,000 t. 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 at greater depth (around 900m).

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES, the stock is managed by NEAFC in cooperation with NAFO. ICES again had difficulties in obtaining catch estimates from the various fleets and there are indications that unreported catches are substantial. Furthermore, landings data were missing from some ICES member countries. In spite of the best of efforts there is a need for a special action through NEAFC and NAFO to provide ICES with all information that might lead to more reliable catch statistics. Cpue 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. Stock status is based mainly on the perception of stock trends derived from survey indices. The acoustic-trawl survey in 2007 indicates that the stock size is low compared to the early 1990s, but stock size has not shown any clear trends since 1999. The exploitation rate for this stock is unknown.

**RECENT MANAGEMENT ADVICE:** The new landing and logbook data available for this stock do not change the perception of the stock. The advice for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: ICES advises that a management plan be developed and implemented which takes into account the uncertainties in science and the properties of the fisheries. ICES suggest that catches of *S. mentella* are set at 20,000 t as a starting point for the adaptive part of the management plan.

This advice will be updated in the fall of 2009 on the basis of new survey information and the results of an ICES/NAFO expert group that will review available information on stock identification in early 2009.

**STECF COMMENTS:** Given the uncertainty in catch and survey data, STECF agrees with ICES but is unable to advise on a specific TAC for 2009.

### **1.77. Saithe (*Pollachius virens*) in Divisions IIa (EU zone), IIIa, Subareas 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 1967-2006, ICES Working Group reported landings have varied between 88,326t and 34,3967t and have been relatively stable over the last 19 years (mostly just over 100,000 t). In 2007 landings were 100,404 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.

The Norwegian fisheries authorities annulled the maximal vessel saithe quota for bottom trawlers and pelagic trawlers in the North Sea and Skagerrak from 30th April 2008. On request from the industry, Norwegian authorities are now discussing the possibilities of opening the summer closure for the saithe fishery (23 June–3 August) in 2008. An opening of this fishery may influence the exploitation pattern as the large 2004 cohort will then be available for the fleet, despite the use of cod-ends with mesh size of 135 mm.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment (XSA) calibrated using data from two commercial cpue series and indices from two surveys. There are no discard estimates for the majority of this fishery. Discarding of saithe occurs in the non-targeted fisheries, but the level of discard is considered to be small compared to the total catch of saithe.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are  $F_{pa} = 0.40$ ,  $F_{lim} = 0.6$ ,  $B_{pa} = 200,000t$  and  $B_{lim} = 106,000 t$  respectively.

**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 has been below  $F_{pa}$  since 1997. SSB was below  $B_{pa}$  from 1984 to 1998 (and was below  $B_{lim}$  from 1990–1993), but increased in the late 1990s and is estimated to have been at or above  $B_{pa}$  since 1998.

## MANAGEMENT AGREEMENT:

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 management plan was evaluated by ICES in 2008 (ICES Advice 2008, Book 6, Section 6.3.3.3), and the management plan is considered by ICES to be consistent with the precautionary approach in the short-term (< 5 years).

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 18.1.

**Exploitation boundaries in relation to existing management plans:** At the present SSB level, F should be below 0.3 to be in accordance with the management plan. This corresponds to landings of 139,000 t in 2009.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential, and considering ecosystem effects:** The current fishing mortality (2005-2007 average) is estimated at 0.27, which is close to the management plan target rate expected to lead to high long-term yields ( $F = 0.3$ ).

**Exploitation boundaries in relation to precautionary limits:** The exploitation boundaries in relation to precautionary limits imply landings of less than 175 000 t in 2009, and the SSB is expected to remain above  $B_{pa}$  (200 000 t) in 2009.

**ICES conclusion on exploitation boundaries:** ICES has evaluated the agreed management plan to be in accordance to the precautionary approach, and the target fishing mortality in the management plan is expected to give high long-term yield in the present situation with a stock that is above  $B_{pa}$ . ICES therefore recommends to limit landings in 2009 to 139,000 t.

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

STECF notes that the most recent (2005) data available on landings by ICES statistical rectangle show that all significant landings come from statistical rectangles west of the ‘west of Scotland management line’, or from rectangles bisected by that line. It is therefore possible that the majority of cod landings from Division VIa in recent years could be from vessels unaffected by cod recovery measures and unrestricted in their catch composition (including vessels targeting saithe). It is important that cod recovery measures include all areas occupied by the depleted stock.

STECF further 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).

### **1.78. Saithe (*Pollachius virens*) in Divisions Vb (EU zone), VI, XII and XIV**

**FISHERIES:** In the present management regime, the stocks of cod, haddock, and saithe are regulated by gear and fleet specifications, area closures, and number of fishing days. Consequently, the status of each of the stocks must be taken into account in the regulation. Several of the fisheries could be described as mixed cod-haddock fisheries (i.e. the longline fisheries), whereas others (i.e. pair trawlers and occasionally single trawlers) are saithe fisheries with by-catches of cod and haddock. Landings of saithe have been generally increasing from about 22,000t in the mid 1990s to more than 60,000 t in recent years. The 2007 landing was about 60,827 t.

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

**MANAGEMENT OBJECTIVES:** The management objective is to achieve sustainable fisheries. An effort management system was implemented in the Faroese demersal fisheries (Division Vb) in 1996 and aims at harvesting, on average, 33% of the saithe stock in numbers. This translates into an average F of 0.45, above the  $F_{pa}$  of 0.28. ICES consider this to be inconsistent with the precautionary approach.

**PRECAUTIONARY REFERENCE POINTS:**  $B_{lim}$  is set at the lowest observed SSB in 1999 (60,000 t).  $B_{pa}$  is 85 000 t (former MBAL).  $F_{lim}$  is 0.40.  $F_{pa}$  is 0.28 and  $F_y$  at about 0.45, which is the fishing mortality for a 33% harvest of the exploitable stock in numbers.

**STOCK STATUS:** The state of the stock is uncertain, but stock trends indicate that the spawning biomass in recent years is around the average of the time-series. There are indications that fishing mortality has been relatively high in recent years. Recruitment in the past 10 years has been above the long-term average, but the mean weight-at-age has declined significantly over the same period.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to precautionary considerations:** The estimates of fishing mortality and SSB are uncertain, but fishing mortality appears to be relative high. ICES consider that fishing mortality should be reduced. ICES recommends a reduction of fishing effort of around 20% as an arbitrary first step taking into account trends in stock size and growth rates.

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

### **1.79. Saithe (*Pollachius virens*) in Div's VII, VIII, IX, X**

No stock assessment of saithe is conducted in this area.

### **1.80. Saithe (*Pollacius 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. 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 a reduction in the amounts being taken by purse-seiners after 1990.

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 212,480 t. with the highest figure in 2006. Landings in 2007 were 197,000 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.

The Norwegian Ministry of Fisheries and Coastal Affairs asked ICES to evaluate whether the harvest control rule for setting the annual fishing quota (TAC) for Northeast Arctic saithe is consistent with the precautionary approach. The proposed harvest control rule contains the following elements:

- *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 +/- 15% compared with the previous year's TAC.*
- *if the spawning stock biomass (SSB) in the beginning of the year for which the quota is set (first year of prediction), is below  $B_{pa}$ , the procedure for establishing TAC should be based on a fishing mortality that is linearly reduced from  $F_{pa}$  at  $SSB=B_{pa}$  to 0 at SSB equal to zero. At SSB-levels below  $B_{pa}$  in any of the operational years (current year and 3 years of prediction) there should be no limitations on the year-to-year variations in TAC.*

ICES has evaluated the Harvest Control Rule (HCR) and concluded that it is consistent with the precautionary approach under the conditions that the assessment uncertainty and error are not greater than those calculated from historic data. This also holds true when an implementation error (difference between TAC and catch) equal to the historic level of 3 % is included. The proposed management plan is in accordance with the precautionary approach and ICES therefore advises according to this plan.

The advice for 2009 is based on an analytical assessment using data from catch at age, an acoustic survey and CPUE from one commercial fleet (Report of the Arctic Fisheries Working Group, 21–29 April 2008 (ICES CM 2008/ACOM:01)).

**PRECAUTIONARY REFERENCE POINTS:** The reference points were recalculated at the 2005 WG using the standard approaches for the determination of reference points within ICES, taking into account the changes in the age groups used in the calculation of fishing mortality ( $F_{bar}$ ). The reference points, derived using standard ICES approach, are provided below. The new reference points are  $B_{pa} = 220,000$  t,  $B_{lim} = 136,000$  t,  $F_{pa} = 0.35$ ,  $F_{lim} = 0.58$

**STOCK STATUS:** Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having full reproductive capacity and to be harvested sustainably. Fishing mortality is stable and has since 1996 been below  $F_{pa}$ . The SSB has since 1994 been well above  $B_{pa}$ . Recruitment in 2002 was the highest in the time-series, while 2003 was the lowest.

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to proposed and evaluated management plan:** The implemented management plan implies a TAC based on the average catches for the coming 3 years based on  $F_{pa}$ . This results in a TAC of 225,000 t in 2009, and a fishing mortality of 0.29.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** The current fishing mortality is lower than the  $F$  associated with high long-term yield when applied within the agreed HCR.

**Exploitation boundaries in relation to precautionary limits:** The implemented management plan has been found to be consistent with the precautionary approach and ICES therefore advises according to this plan. This results in a TAC of 225,000 t in 2009.

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

### **1.81. Sandeel (*Ammodytidae*) in the North Sea (IV), Skagerrak and Kattegat (IIIa)**

Sandeel in the North Sea, the Skagerrak and the Kattegat includes five species. *Ammodytes marinus* is dominating in the North Sea while *Ammodytes tobianus* is relatively more abundant in the Skagerrak and the Kattegat. ICES therefore assess sandeel in the area as two separate stocks, one for the North Sea and one for the Skagerrak and the Kattegat. No analytical assessment is available for sandeel in the Skagerrak and the Kattegat.

**FISHERIES:** Sandeel is taken by trawl with codend mesh sizes of less than 16 mm. The fishery is seasonal, taking place from April to July. Most of the catch in the North Sea consists of *Ammodytes marinus* while

*Ammodytes tobianus* constitute a substantial part of the catches in the Skagerrak and the Kattegat. By-catch of other species is low. Sandeel are largely stationary after settlement and the sandeel must be considered as a complex of local populations.

The stocks are exploited predominantly by Denmark and Norway, with minor landings taken by the UK, Sweden, Germany and the Faroes. Landings fluctuated between 550,000 and 1,140,000 t in the period 1980 to 2002 with the highest catches observed in 1997. Catches dropped in 2003 and have since then been well below average reaching a minimum of 177,000 t in 2005. Catch possibilities are largely dependent on the size of the recruiting 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 CPUE data.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary biomass reference point for the North Sea stock is  $B_{pa} = 600,000t$ . No precautionary fishing mortality reference point has been proposed.

**STOCK STATUS:** ICES classifies the stock as having full reproductive capacity, but the stock is forecast to decline below  $B_{pa}$  at the start of 2009. Fishing mortality has been decreasing since 2001 and is now close to its lowest historical level, but the present absolute level is uncertain. In the absence of an F reference point, the state of the stock cannot be evaluated with regard to sustainable harvest.

**RECENT MANAGEMENT ADVICE:** ICES recommends that the management of sandeel fisheries should implement measures to prevent depletion of local aggregations, particularly in areas where predators congregate. ICES furthermore recommends that fishing grounds that are known to be commercially depleted should be closed to fishing until there is evidence from monitoring programmes that local populations have recovered. On other fishing grounds, a fishery should only be allowed in 2009 if analysis of monitoring indicates that the stock can be rebuilt to  $B_{pa}$  by 2010.

In 2008, the sandeel age composition in the northern part of the North Sea was dominated by 2-group, and cpue for 1- group decreased in relation to 2007, indicating that the spawning stock locally may be at a low level in the Norwegian EEZ in 2009. Hence, additionally to setting a TAC for the North Sea based on an in-year monitoring fishery, protection of sandeel in the Norwegian EEZ should be accomplished by further closing local fishing grounds with evidence of commercial depletion.

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

Fishing possibilities are highly dependent on the size of the incoming year-class for which no reliable estimate exists prior to the start of the fishing season. Since 2005, the fisheries have been managed by a precautionary fishing effort ceiling covering a monitoring fishery in the first part of the fishing season, and a final TAC has been set on the basis of the results of the real time monitoring fishery and an agreed harvest rule.

STECF therefore advises that the same procedure as used in 2008 should be applied in 2009 using the revised relationship provided by the ICES Working Group on Assessment of Demersal stocks in the North Sea and Skagerrak as follows:

$$TAC = -287 + \left( R_{1,2009} \cdot 3.98 \cdot \frac{W_{obs}}{W_m} \right)$$

where  $W_{obs}$  is mean weight of age 1 sandeel observed during 2009 real time monitoring, R is the recruitment estimate derived from real-time monitoring and  $W_m$  is the mean weight of age 1 sandeel observed in real time monitoring in 2004 to 2008.

STECF notes that the above relationship proposed by the ICES Working Group only applies to the North Sea sandeel but that the TAC management area includes the Skagerrak and Kattegat as well. Hence, the likely catches of sandeel in the Skagerrak and the Kattegat should be taken into account in deriving a TAC for the whole management area. No information is presently available to allow STECF to predict the likely catches in the Skagerrak and the Kattegat in 2008. Landings from IIIa have over the last 20 years constituted 4.23 % of the North Sea landings. STECF suggests that a pragmatic approach would be to use the same percentage to raise the TAC for the North Sea to a TAC for IV and IIIa combined.

## 1.82. 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 11,000 and 35,000 t (1957-2006). The landings in 2007 are around 14,600 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 fishing mortality and biomass are  $F_{pa} = 0.40$ ,  $B_{pa} = 35,000t$ ,  $B_{lim} = 25,000 t$ .

**MANAGEMENT AGREEMENTS:** A multi-annual plan for fisheries exploiting stocks of plaice and sole in the North Sea was established on 11 June 2007 (Council Regulation (EC) No 676/2007). This plan has two stages. The first stage aims at an annual reduction of fishing mortality by 10% in relation to the fishing mortality estimated for the preceding year, with a maximum change in TAC of +or- 15% until the precautionary reference points are reached for both plaice and sole in two successive years. ICES has interpreted the F for the preceding year as the estimate of F for the year in which the assessment is carried out. The basis for this F estimate in the preceding year will be a constant application of the procedure used by ICES in 2007. In the second stage, the management plan aims for exploitation at  $F = 0.2$ .

ICES has evaluated the agreed long-term management plan (Council Regulation (EC) No. 676/2007) and concluded that it leads on average to a low risk of  $B < B_{lim}$  within the next 10 years. ICES conclude that for sole the management plan can be provisionally accepted as precautionary.

**STOCK STATUS:** Based on the most recent estimate of SSB (for 2008) and fishing mortality (for 2007), ICES classifies the stock as having reduced reproductive capacity and as being at risk of being harvested unsustainably. SSB has fluctuated around the precautionary reference points for the last decade. Fishing mortality has declined since 1995 and is currently estimated to be above  $F_{pa}$ . The year-classes of 2003 and 2004 are weak, year-class 2005 is strong, and the assessment indicates that the year-class 2006 is below average.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.1.

**Exploitation boundaries in relation to the agreed management plan:** According to the management plan adopted by the EC in 2007, fishing mortality in 2009 should be reduced by 10% compared to the fishing mortality estimated for the preceding year ( $F_{sq} = \text{mean } F (05-07) = F_{2008} = 0.47$ ) with the constraint that the change in TAC should not be more than 15%. The 10% reduction in fishing mortality corresponds to a fishing mortality of 0.42 and landings of 14,000 t in 2009, which is an approximate 9% TAC change (TAC 2008 = 12,800 t). The expected SSB in 2010 would be around 28,900 t, which is below  $B_{pa}$ .

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

The current fishing mortality is above the range that is expected to lead to high long-term yields and low risk of stock depletion.

**Exploitation boundaries in relation to precautionary limits:** To rebuild the stock to above  $B_{pa}$  in 2010 requires a fishing mortality of 0.21, which implies landings of less than 7,500 t in 2009.

**Conclusion on exploitation boundaries:** According to the evaluation the agreed management plan can be provisionally accepted as precautionary for sole and could be used as a basis for the management of the stock in the short-term. ICES therefore advises according to this plan and advises landings of 14,000 t in 2009.

Additional evaluations of the management plan are necessary to take into account retrospective bias of the assessment and the sporadic nature of recruitment.

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 2001 and 2005 year-classes. The predicted SSB in 2010 is largely dependent on the above-average recruitment of the 2005 year-class.

**STECF COMMENTS:** STECF recommends that the TAC for sole in IV should be set in accordance with the provisions of the management plan.

STECF notes that the ICES catch forecast for North Sea sole assumes a status quo fishing mortality rate on age groups 2-6 for the year 2008 of 0.47 (equal to the mean fishing mortality rate on those age groups over the last three years (2005-2007), in an attempt to take into account the retrospective bias in the assessment for underestimating F in the terminal year). STECF agrees with the rationale applied by ICES for taking a three-year average as a status quo fishing mortality for 2008. In recent years STECF has based its advice on a catch forecast assuming a downward trend in North Sea beam trawl effort of 4% per year. However, the time-series of beam trawl effort data was revised in 2008 and data indicate that effort has been relatively stable for the past six years. STECF therefore agrees that ICES assumption for Status Quo fishing mortality in 2008 is appropriate and agrees with the ICES advice for 2009.

However, STECF notes that a major part of the fleet fishing for sole and plaice in the North Sea is reported to have spent less effort in that area in 2008 compared to 2007. The magnitude of the effort reduction in 2008 is not quantifiable at present, but if it results in a reduction in fishing mortality on sole and plaice in 2008, STECF advises that forecasted catches and stock biomass for 2009 are likely to be underestimated.

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 plaice and North Sea cod for which stringent management is advised.

### **1.83. Sole (*Solea solea*) in Division IIIa**

**FISHERIES:** The fishery is mainly conducted by Denmark, with smaller landings taken by Germany and Sweden. Significant amounts of sole are taken as by-catch in the fishery for *Nephrops*. Landings fluctuated between 200 t and 1,400 t (1971-2007). In 2007 landings were 540 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The advice is based on an age-based assessment using cpue data from three commercial tuning series (reference fleets) and one scientific survey series. Different assumptions on misreporting/discarding have been explored. .

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are  $F_{pa} = 0.30$ ,  $B_{pa} = 1,060$  t.

**STOCK STATUS** Based on the most recent estimates of SSB (in 2008) and F (in 2007), ICES classifies the stock as having full reproductive capacity and being harvested sustainably. SSB has increased since 1998 to well above  $B_{pa}$ . Fishing mortality has decreased from 2006 to well below  $F_{pa}$ .

#### **RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:** There is no management plan implemented for this stock.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential, and considering ecosystem effects:** The current fishing mortality is in the range of F's that are expected to be consistent with taking high long-term yields and achieving a low risk of depleting the productive potential of the stock.

**Exploitation boundaries in relation to precautionary limits:** The fishing mortality in 2009 should be kept below  $F_{pa}$ , corresponding to catches of less than 800 t.

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

#### **1.84. Sole (*Solea solea*) - Vb (EU zone), VI, XII, XIV**

STECF did not have access to any stock assessment information on sole in this area.

#### **1.85. 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 long 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 2005, 2006 and 2007 were 860t, 570 t and 490 t respectively.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The advice is based on an age-based assessment, which uses commercial landings data and two scientific surveys.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are  $F_{pa} = 0.30$ ,  $B_{pa} = 3,100$  t. The biomass reference point was revised in 2007 as the SSB estimates have been rescaled.

**STOCK STATUS:** Based on the most recent estimates of SSB (in 2008) and fishing mortality (in 2007), ICES classifies the stock as suffering reduced reproductive capacity and being harvested unsustainably. SSB has declined since 2001 to low levels and reached the lowest level in 2007. Fishing mortality has been close to or above  $F_{lim}$  throughout most of the time-series. Recent recruitment levels have been lower than earlier in the time-series.

**RECENT MANAGEMENT ADVICE:**

***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  $F_{0.1}$  (0.19). 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. ICES recommends a closure of the fishery in 2009 and a recovery plan should be developed and implemented as a prerequisite to reopening the fishery.

The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the ICES advice for VIIa sole.

#### **1.86. 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 varied between 78 t in 2000 and 40 t in 2007 and have been close to the TAC.

***Single-stock exploitation boundaries:*** The new landings, cpue, and survey data available for this stock do not change the perception of the stock and do not give reason to change the advice from 2007. The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: "Catches

should be no more than the recent average (2004–2006) of around 50 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.

### **1.87. Sole (*Solea solea*) in Division VIId (Eastern English Channel)**

**FISHERIES:** The main fleets, fishing for sole in Division VIId, 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 and 1997, the total landings have been fluctuating around 4,500t. In 1998 the lowest landings were observed (3,400t), since 2000 the landings have increased to 5,000t in 2003, which is the highest of the time-series. Landings in the last 4 years were slightly lower at around 4,500 tonnes. It should be noted that although in some cases officially declared landings were in accordance with 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 misreporting 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 (in 2008) and fishing mortality (in 2007), ICES classifies the stock as having full reproductive capacity and at risk of being harvested unsustainably. The spawning-stock biomass has been fluctuating around a mean of about 10,000 t since 1982, and has been above  $B_{pa}$  since 2002. The fishing mortality has decreased since 1999 and has been around  $F_{pa}$  since 2001 and currently just above  $F_{pa}$ . Recent recruitment has been strong, with the 2001 and 2004 year-classes being the two highest since 1990. The 2006 year-class is the weakest in the time-series.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.1.

***Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential, and considering ecosystem effects:*** The current fishing mortality is estimated at 0.41, just above the range that would lead to high long-term yields and low risk of stock depletion.

***Exploitation boundaries in relation to precautionary limits:*** The fishing mortality in 2009 should be below  $F_{pa}$  corresponding to landings less than 4,380 t in 2009, which is expected to keep SSB above  $B_{pa}$  in 2010.

**STECF COMMENTS:** STECF agrees with the advice for VIId 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.

### **1.88. 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.

Sole are widespread and usually taken in conjunction with other species to varying degrees, dependent on location and season. The most productive sole fishery grounds are located close to ports, while the highest catches of anglerfish for example are taken further south and west in Division VIIe.

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 1991-1999 and amounts to around 900 t. Since 2000, landings have been around 1,090 with the 2006 landings of 958 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:** ICES classifies the stock as being at risk of reduced reproductive capacity and being harvested unsustainably. SSB has declined since 1980 and is estimated at a historic low in 2006–07. Fishing mortality has been above  $F_{pa}$  since 1979, and mostly above  $F_{lim}$  since 1982. Fishing mortality has generally increased since the mid-1990s.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.2.

Council Regulation (EC) No. 509/2007 establishes a multi-annual plan for the sustainable exploitation of Division VIIe sole. Years 2007–2009 are deemed a recovery plan, with subsequent years being deemed a management plan. For 2009 the TAC shall be set at the highest value resulting from either a 20% reduction in F compared to  $F_{bar}$  (03–05) or an F of 0.27, with a maximum TAC variation of no more than 15%.

STECF noted that the management plan has not, to date, been evaluated by ICES and, consequently, ICES has not conclude whether this management plan is in accordance with the precautionary approach. ICES will carry out an evaluation of the agreed management plan over the summer of 2008 and will report on results of such an evaluation in September 2008. However, in 2005 ICES explored simulations with long-term target Fs from 0.1 to 0.3 that are predicted to result in the highest long-term yields, whilst posing little risk of being below  $B_{lim}$  in the long-term. The agreed F target is within this range, but is above  $F_{pa}$ .

	Type	Value
Precautionary approach	$F_{lim}$	0.28
	$F_{pa}$	0.20
Targets	$F_v$	0.27

**Exploitation boundaries in relation to existing management plans:** The multi-annual plan implies a 20% reduction in F compared to average F(03–05), corresponding to landings of 650 t. This is a 15% reduction in the TAC compared to 2008.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** Fishing mortality around  $F = 0.27$  can be considered as a candidate target reference point consistent with taking high long-term yields and achieving a low risk (< 5%) of depleting the productive potential. The present fishing mortality (0.42) 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 is reduced by 70%. This would correspond to landings of around 320 tonnes in 2009.

**Conclusion on exploitation boundaries:** Considering that the management plan has not been evaluated by ICES, ICES advises on the basis of precautionary limits. This corresponds to a TAC of less than 320 t in 2009, much lower than the TAC resulting from application of the management plan.

**STECF COMMENTS:** STECF agrees with the advice from ICES. STECF notes current F is well above sustainable levels and that in order to reduce fishing mortality a reduction in effort is required rather than TAC controls alone. This advice for a reduction in fishing mortality for sole in VIIe is consistent with the advice for plaice in this area.

STECF notes that effort restrictions have been in force since 2005 ((Council Regulation (EC) No. 27/2005, Council Regulation (EC) No 51/2006, Council Regulation (EC) No 41/2007 and Council Regulation (EC) No

509/2007). At the same time, there has been a reduction in nominal effort by about 20% from 2005 to 2006 for the main fleets. However the estimated fishing mortality has increased over this period.

STECF notes that management of this stock has been mainly by TAC, which has largely been ineffective at regulating the fishery. To address this issue effort restrictions for towed gears have been in force since 2005 ((Council Regulation (EC) No. 27/2005, Council Regulation (EC) No 51/2006, Council Regulation (EC) No 41/2007 and Council Regulation (EC) No 509/2007). To date these restrictions appear not to have been limiting in this fishery, in part due to the large numbers of days available, but also because in the UK fleet there appears to be a considerable amount of latent effort in the beam trawl fleet.

### **1.89. Sole (*Solea solea*) in Divisions VIIIf,g (Celtic Sea)**

**FISHERIES:** The sole fishery is concentrated on the north Cornish coast off Trevoze Head and around Lands End. Reported landings have generally declined since the mid 1980s, up to 1998. Since then they increased to around 1,300 t in the early 2000s. Landings in 2007 were 938 t.

Sole are taken mainly in a beam trawl fishery that started in the early 1960s and, to a lesser extent, in the longer established otter trawl fisheries. In the beam trawl fishery sole is mainly taken as part of a mixed demersal fishery with plaice and, to a lesser extent, cod. Both of the latter stocks require a reduction in fishing mortality.

In the 1970s, the fishery was mainly carried out by Belgian beam trawlers and Belgian and UK otter trawlers. The use of beam trawls (to target sole and plaice) increased during the mid-1970s, and the Belgian otter trawlers have now been almost entirely replaced by beam trawlers. Effort in the Belgium beam trawl fleet increased in the late 1980s as vessels normally operating in the North Sea were attracted to the west by improved fishing opportunities. Beam trawling by UK vessels increased substantially from 1986, reaching a peak in 1990 and decreasing thereafter. In the Celtic Sea, the beam and otter trawl fleets also take other demersal species such as plaice, cod, rays, brill, turbot, and anglerfish.

Currently the fisheries for sole in the Celtic Sea and Bristol Channel involve vessels from Belgium, taking around 65%, the UK around 25%, France around 5% and Ireland also around 5% of the total landings.

The Celtic Sea is an area without days-at-sea limitations for demersal fisheries. In the past this has resulted in increased effort in the Celtic Sea as a direct result of restrictive effort in other areas. This was particularly the case in 2004–2005 when effort in the sole fishery increased because of restrictive days at sea in the eastern channel (Division VIIId).

**SOURCE OF MANAGEMENT ADVICE:** The advice is based on an analytical age-based assessment using landings, two commercial cpue series, and one survey index.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference points for fishing mortality and biomass are  $F_{pa} = 0.37$ , proposed  $B_{pa} = 2,200$  t. There are no specific management objectives for this stock.

**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 in 2008 is estimated to be above  $B_{pa}$ . Fishing mortality in 2007 is estimated to be below  $F_{pa}$ .

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.2.

***Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:*** The current fishing mortality (2007) is estimated to be 0.33, which is above the rate expected to lead to high long-term yields and low risk of stock depletion.

***Exploitation boundaries in relation to precautionary limits:*** F should be kept below  $F_{pa}$ , corresponding to landings of less than 1090 tonnes in 2009. This is expected to keep the stock above  $B_{pa}$ .

***Comparison with previous assessment and advice:*** The general trends in the estimates of the stock numbers, fishing mortality, and recruitment are similar to those of the previous assessment. In this assessment SSB and fishing mortality have been revised over several years. There has been an upward revision of SSB by 10% in 2007, and a downward revision of fishing mortality by 20%.

The advice last year was based on  $F_{pa}$ . This advice this year is based on no increase in  $F$  because there is no long-term gain in increasing fishing mortality.

**Conclusion on exploitation boundaries:** In the present situation with a stock that is above  $B_{pa}$  and a fishing mortality below  $F_{pa}$ , there is no long-term gain in yield to increase fishing mortality. ICES therefore recommends to limit landings in 2009 to no more than 940 t.

**Regulations and their effects:** Since 2005, ICES rectangles 30E4, 31E4, and 32E3 have been closed during the first quarter (Council Regulations 27/2005, 51/2006, 41/2007 and 40/2008) with the intention of reducing fishing mortality on cod. The effects of the closure on sole are not known although there have been spatial and temporal changes in the distribution of effort.

#### **Changes in fishing technology and fishing patterns**

Beam trawlers account for the majority of the vessels targeting sole. Recent increases in fuel costs are thought to have restricted the range of some fleets and may have resulted in a reduction in effort in Division VIIfg. In addition, several vessels of this fleet segment are developing methods to reduce fuel costs.

A decommissioning scheme reduced the capacity in the UK SW beam trawl fleet in 2007. Nine Belgian beam trawlers were decommissioned between August 2005 and November 2006. Over the period 2000–04, these vessels accounted for an average 17.6% of the total kW-days in the Celtic Sea.

**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.

As sole is mainly taken in mixed fisheries together with plaice, any HCR for sole should correspond with a similar HCR for plaice (see also section 1.70 plaice in Divisions VIIfg – Celtic Sea).

### **1.90. 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. Landings have been fluctuating between 655 tonnes and 1104 tonnes over the period 1973–1998. Since then landings have been around 500 tonnes. Landings in 2006 are estimated to be 253 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 unknown. No assessment was performed, due to the short series of data and lack of reliable tuning indices. In their most recent advice ICES noted that “the new data available for this stock are too sparse to revise the advice given last year: *“Catches should be no more than the recent average (2004–2006) of around 300 t, in order to avoid an expansion of the fishery until there is more information to facilitate an adequate assessment”*”.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.2

For the stock specific advice, ICES recommends that catches in 2009 be no more than the recent average (2004–2006) of around 300 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.

### **1.91. Sole (*Solea solea*) in Divisions VIIa,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 90% 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 7,300 t. The catches were 4,560 t in 2006.

**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 since 2004 because of the low contribution of discards to the catch and therefore to the assessment. No recruitment indices are available for this stock.

STECF also notes that this assessment is tuned almost entirely by commercial fleets and that whereas the data examination conducted in 2005 allows confidence in the lpue trends, the proportion of the catch taken by vessels considered in the lpue is decreasing and in the future the index may no longer be useful. STECF also notes that an age-reading discrepancy causes a difference between the French and Belgian numbers-at-age distribution and the weights-at-age.

**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. The current estimate of the SSB from the most recent assessment is 12,726, that is, approximately 13,000 t.

According to the multi-annual plan, a target fishing mortality should be established by the Council. Until this is done the plan offers no practical guidance for managing the fishery.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as being at increased risk of reduced reproductive capacity. SSB has declined from the high levels of 1992–94, reaching an all time low of 9,620 in 2003. It was below  $B_{pa}$  from 1999 until the current assessment. Based on the most recent estimates of fishing mortality, ICES classifies the stock as being overfished. Fishing mortality has increased in the last two years and is above  $F_{pa}$ .

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.3.

***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  $F_{sq}$  (0.46) is well above the candidate reference points  $F_{0.1}$  and  $F_{max}$ .

***Exploitation boundaries in relation existing management plans:*** The agreed management plan aims to bring SSB above 13,000 t in 2008 in a first step. The SSB estimate for 2008 is approx. at 13,000 t. According to the multi-annual plan a target fishing mortality should be established by the Council. Until this is done the plan offers no practical guidance for managing the fishery.

***Exploitation boundaries in relation to precautionary limits:*** Applying  $F_{pa}$  in 2009 results in landings of 4,430 t in 2009 and an SSB in 2010 of 13,310 t.

***Conclusion on exploitation boundaries:*** ICES recommends that the landings in 2009 should not exceed 4430 t; this is in accordance with the precautionary approach.

**STECF COMMENTS:** STECF agrees with the ICES assessment for Bay of Biscay sole and notes that the best estimate for SSB in 2008 is 12,726 t. Article 2 of the management Plan for sole in the Bay of Biscay (Council Regulation 388/2006 of 23 February 2006) states (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 and (2) This objective shall be attained by gradually reducing the fishing mortality rate on the stock.*

STECF therefore concludes that technically the provisions of Article 2 of Council Regulation 388/2006 of 23 February 2006 have not been met and as a result, the provisions of Article 3 do not apply. In such circumstances STECF notes that Article 4 should be applied in setting a TAC for 2009.

Article 4 States (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. Accordingly STECF advises that for sole in the Bay of Biscay, the TAC for 2009 should be set at a level no greater than 4,390 t.

### **1.92. Sole (*Solea spp.*) - VIIIcde, IX, X**

STECF did not have access to any stock assessment information on sole in this area.

### **1.93. Sprat (*Sprattus sprattus*) in IIa and 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. In the last 10 years landings have been below 200,000 t. Estimated total landings in 2007 were around 83,800 t, which is the lowest in the entire time series.

**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. Uncertainties in both the assessment method and the survey indices make the current understanding of this stock extremely poor. Detailed study of improved or alternative assessment methods (e.g. length-based assessment) and the use of additional information sources (e.g. acoustic surveys, catch per unit effort) are required in order improve our level of understanding and ability to adequately manage this stock.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been defined for this stock.

**STOCK STATUS:** The available information is inadequate to estimate the absolute stock size. However, relative trends in biomass from an exploratory assessment indicate that the stock has fluctuated without trend for the last 10-years. Sprat is a short-lived species with large natural fluctuations in stock biomass.

**RECENT MANAGEMENT ADVICE:** There are no precautionary reference points for this stock that can guide the single-stock exploitation boundaries. A regression between survey index and catches suggests catches in 2008 in the order of 170,000 t under the assumption of a similar exploitation rate (in-year advice).

As the North Sea sprat stock and catches are mostly driven by the recruiting year-classes there is no basis at present for a specific numerical advice for the TAC in 2009.

Sprat has recently been fished with a 10% by-catch of juvenile herring. The absolute by-catch of herring in 2006 was around 12,000 t. The by-catch of juvenile herring was taken from a North Sea herring stock that is experiencing severe recruitment failures. Although the by-catch of juvenile herring (8,000t) was much lower than the allowed by-catch ceiling (31,900 t), the poor recruitment of herring warrants that the by-catch be constrained even further.

**STECF COMMENTS:** Noting that because of the current recruitment problems for North Sea herring, STECF recommends that the by-catch quota for herring taken in fisheries conducted with fishing gears with mesh sizes below 32 mm in the North Sea should be significantly reduced.

### **1.94. Sprat (*Sprattus sprattus*) in the Skagerrak and the Kattegat (IIIa).**

**FISHERIES:** The fisheries in IIIa are carried out by Denmark and Sweden using trawlers and along the Swedish coast by small purse seiners. Landings of sprat in Division IIIa averaged about 70,000 t in the 1970s, but since 1982 have typically been around 20,000 t, with the exception of 1994–1995 when the ACFM catches were 96,000 t and 56,000 t respectively. Landings in the last ten years have been below 30,000 t, except for 2005 when 40,000 t were reported. ICES estimates the catch in 2007 to be 15,700 t, an increase from 2006 landings of 12,500 t, which was the lowest recorded in the last ten years. The directed human consumption sprat fishery serves a very small market while most sprat catches are taken in an industrial fishery, where catches are

limited by herring by-catch restrictions. This combination of factors has prevented full utilisation of the occasional strong year-classes (which, in general, emerge and disappear very quickly).

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

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for sprat in Division IIIa.

**STOCK STATUS:** The available information is inadequate to evaluate stock trends and therefore the state of the stock is unknown. Sprat in this area is short-lived with large annual natural fluctuations in stock biomass.

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. ICES considers that sprat cannot be fished without by-catches of herring except in years with high sprat abundance or low herring recruitment. Management of this stock should consider management advice given for herring in Subarea IV, Division VIIId, and Division IIIa. ICES advises, however, that as sprat cannot be fished without significant by-catches of herring, the advice provided for the 2009 fishery remains unchanged. As sprat in Division IIIa is mainly fished together with juvenile herring, the exploitation of sprat is limited by the restrictions imposed on fisheries for juvenile herring.

**STECF COMMENTS:** STECF has no basis on which to advise an appropriate catch level.

### **1.95. Sprat (*Sprattus sprattus*) in Divisions VIIId,e.**

**FISHERIES:** Only the UK carries out a sprat fishery in this area. For the last 20 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 the lowest in the time series, at about 800 t. Slight increases in landings were seen in 2005 and 2006 with about 1,600 t and 2,000 t reported respectively. Landings in 2007 were around 1,800 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. There have been no attempts to undertake an assessment and in 2008 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

### **1.96. Turbot (*Psetta maxima*) in the North Sea**

ICES has not assessed this stock and STECF has no access to any stock assessment information on turbot in this area.

A precautionary TAC (including brill) in areas IIa and IV for 2008 was set to 5,263 t.

### **1.97. 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 153,000 t. In 2007, the Working Group estimated that about 27,000 t were caught. The human consumption landings were around 19,000 t whereas the TAC for 2007 was set at 23,800 t.

Whiting are caught in mixed demersal roundfish fisheries, fisheries targeting flatfish, the *Nephrops* fisheries, and the Norway pout fishery. The current minimum mesh-size in the targeted demersal roundfish fishery in the northern North Sea has resulted in reduced discards from that sector compared with the historical discard rates. Mortality has increased on younger ages due to increased discarding in the recent year as a result of recent

changes in fleet dynamics of *Nephrops* fleets and small mesh fisheries in the southern North Sea. The by-catch of whiting in the Norway pout and sandeel fisheries is dependent on activity in that fishery, which has recently declined after strong reductions in the fisheries. There is likely to be an increase with a re-opened Norway pout fishery in 2008.

Catches of whiting in the North Sea are also likely to be affected by the effort reduction seen in the targeted demersal roundfish and flatfish fisheries, although this will in part be offset by increases in the number of vessels switching to small mesh fisheries.

Recent measures to improve survival of young cod, such as the Scottish Credit Conservation Scheme, and increased uptake of more selective gear in the North Sea and Skagerrak, should be encouraged for whiting.

The minimum mesh size increased to 120 mm in the northern area in 2002 and this may have contributed to the substantial decrease in reported landings. Landings compositions from the northern area, in 2006 and 2007, indicate improved survival of older ages. In addition, the total number of fish discarded appears to have been significantly reduced since 2003, from around 60% in 2003 to around 30% in 2007.

Scotland has implemented a national scheme known as the 'Conservation Credits Scheme'. The principle of this two-part scheme involves additional time at sea in return for the adoption of measures that reduce mortality on cod and lead to a reduction in discard numbers. The initial basic scheme was implemented from the beginning of February 2008 and essentially grants vessels their 2007 allocation of time at sea in return for: observance of Real Time Closures (RTC), observance of a one-net rule, adoption of more selective gears, agreeing to participate in additional gear trials, and participation in an enhanced observer scheme. This should enhance the information available on whiting and should help to reduce discards.

Scotland has seen a shift in Scottish vessels, from using 100 mm–110 mm for whitefish on the west coast ground (Area VI) to using 80 mm codends in the North Sea (Area IV). Fuel costs are a major driver, in this as in all fisheries. The implications are that there will be increased effort in the North Sea by less selective gears; signifying increased by-catches and discards. However, the simultaneous requirement to use 110 mm square mesh panels in these fisheries may mitigate unwanted selectivity implications. In Belgium the use of bigger meshes in the top panel of beam trawler gear is expected to reduce the by-catch of roundfish species, especially haddock and whiting.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES Commercial catch-at-age data were disaggregated into human consumption, discards, and industrial by-catch components. Three survey CPUE series are available: English groundfish survey (EngGFS), Scottish groundfish survey (ScoGFS), and IBTS Q1

Partial fishing mortalities from these catch components were calculated from their average contribution over 2005–2007. This could not be done on an area basis. Discards were estimated based on data from Scotland, England, Denmark and Germany and raised to the total international fleet in the North Sea. Discard information was not available for a major component of the catch from French fleets fishing in Areas IV and VIIId.

There are considerable discrepancies in stock trends prior to 1990 between the survey time-series and the assessment based on commercial catch data. Calibration data prior to 1990 were therefore omitted from the time-series.

**PRECAUTIONARY REFERENCE POINTS:** The previously defined precautionary reference points (based on data from 1980 onwards) are no longer considered appropriate because of discrepancies between survey data and the catch data in the period before 1990. The assessment is now based on the period where catch and survey data are consistent (from 1990 onwards).

**STOCK STATUS:** In the absence of defined reference points, the state of the stock cannot be evaluated. An analytical assessment estimates SSB in 2008 a being at the lowest level since the beginning of the time-series in 1990. Fishing mortality has decreased through the time-series, but increased in recent years to twice  $F_{max}$ . Recruitment has been very low since 2001.

**RECENT MANAGEMENT ADVICE:** The advice on the exploitation of this stock in 2009 is presented in the context of mixed fisheries and is found in Section 3.1.

There are no explicit management objectives for this stock. As a result of the very low recent recruitment ICES cannot recommend any fishing mortality above  $F_{max}$  of 0.19 in 2009. This corresponds to catches of less than 11,000 t (human consumption landings of 5,900 t), which will lead to a SSB of 72,400 t in 2010.

The landings in Divisions IV, IIIa, and VIIId are calculated as 73%, 7%, and 20% of the combined area total. The figures used as the basis for the division of the TAC are the average proportion of the official landings for the past three years.

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

### **1.98. 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 in the Skagerrak and Kattegat drastically and were below 2,000 t since 1997. Nominal landings for 2007 are at record low with 378 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. Survey information (1980-2007) shows a decline in the stock size since 2002 and the stock is now below the average of the time-series (1980-2007).

**RECENT MANAGEMENT ADVICE:** The new data available for this stock (landings and survey indices) give no reason to change the advice from 2007. The advice for this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: “The landings should be less than the recent average (2003–2005) landings of 1,050 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.

### **1.99. Whiting (*Merlangius merlangus*) Vb (EU zone), VI, XII & XIV**

This management unit comprises two distinct whiting stocks (VIa and VIb) that are assessed separately.

#### **1.99.1. Whiting (*Merlangius merlangus*) in Division VIa (West of Scotland)**

**FISHERIES:** 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 declined from about 11,500 t to an historic low of 290 t reported officially in 2005. Reported landings for 2007 have increased to 480 t.

The fishery is regulated by a TAC that does not, however, seem to restrict catches. However, the increase in minimum mesh size from 100 to 120 mm in 2001/2002 (before the introduction of effort regulation 27/2005) partly caused a shift to 80-mm mesh sizes in the mixed fishery trawls, due to the loss of valuable *Nephrops* catches. Poorer selectivity at this mesh size may have led to increased discarding and high grading. With the introduction of effort regulation, vessel operators have effectively been further encouraged to reduce mesh size and shift to other fisheries, particularly *Nephrops* trawling, in order to gain more days-at-sea. There is insufficient information to quantify any effect mesh size changes and effort limitations may have had on the stock of whiting. However, any management measures leading to a shift of vessels to smaller mesh sizes will result in a worse exploitation pattern and higher discards.

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 2002-2008 under national UK legislation.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. No assessment was carried out in 2008. Previously a survey-based assessment was used to evaluate trends in SSB, total mortality, 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:** The state of the stock is unknown, but long-term information on the historical yield and catch composition and the survey-based assessment conducted in 2007 all indicate that the present stock size is at a historical low. Total mortality has been higher in the last decade than in the previous one. Recruitment in the most recent years is estimated to be very low.

**RECENT MANAGEMENT ADVICE:** ICES advice is unchanged from 2007. Given that SSB is estimated at the lowest observed level and total mortality at the highest level over the time period, catches in 2009 should be reduced to the lowest possible level.

ICES' advice on the exploitation of this fish stock is now presented in the context of the mixed fisheries of the West of Scotland and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF notes that the mixed fisheries advice implies a zero catch of whiting

### **1.99.2. Whiting (*Merlangius merlangus*) in Division VIb (Rockall)**

**FISHERIES:** Landings of whiting from Division VIb are negligible.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. No assessment has been carried out.

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

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

**RECENT MANAGEMENT ADVICE:** No advice has been provided.

**STECF COMMENTS:** STECF has no comments.

### **1.100. 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 2006, reported landings declined from 11,300 t to less than 100 t. Reported landings in 2007 increased to approximately 200 t. Only EU vessels exploit the stock, with the UK and Ireland accounting for the majority of the landings, with very smaller quantities landed by Belgium and France. Due to the low value of the catch, a high proportion of whiting are discarded. Reports of significant non-reported landings indicate that the current implementation of the TAC system is not able to restrict fishing.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. The last analytical assessment was undertaken in 2003. Since then analytical assessment has not been possible because of low and unreliable catch figures and because of poor consistency in the survey results.

**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. Survey information indicates a decline in SSB.

**RECENT MANAGEMENT ADVICE:** On the basis of the stock status ICES advises that catches of whiting in 2009 should be the lowest possible.

The advice on the exploitation of this stock is presented in the context of mixed fisheries in the Irish Sea and is found in Section 3.2.

**STECF COMMENTS:** STECF agrees with the advice from ICES that catches should be the lowest possible. STECF notes that the high level of discard and non-reported landings indicates that the current TAC and quota system is inefficient in regulating fishing mortality. STECF therefore recommends that the TAC system be supplemented with enhanced control measures to reduce unreported landings and measures reducing discards. STECF is currently not in the position to provide advice on concrete measures to reduce discards and

recommends that such measures be developed in close cooperation between the fishing sector, managers and scientists

### **1.101. Whiting (*Merlangius merlangus*) in VIIb-k**

There is a mismatch between management area and assessments units. Whiting in VIIe-k is assessed as one stock, VIIId whiting are included in the North Sea whiting and whiting from b--c is not included in any assessment.

**FISHERIES:** Celtic Sea whiting are taken in mixed fisheries along with cod, whiting, hake and *Nephrops*. 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%. Catch levels peaked in the late nineties with over 23,000 t reported by ICES and subsequently declined to less than 10,000 t in 2006.

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.

Since 2005, ICES rectangles 30E4, 31E4, and 32E3 have been closed during the first quarter (Council Regulations 27/2005, 51/2006, 41/2007 and 40/2008) with the intention of reducing fishing mortality on cod. The effects of the closure on whiting are not known although there have been spatial and temporal changes in the distribution of effort.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is ICES. Advice is based on an exploratory assessment, which is indicative of trends only. Discarding is considered to be significant and the assessment does not include discard information.

**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 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 stable at low levels. 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 the Celtic Sea stock in 2008 is presented in the context of mixed fisheries and is found in Section 3.2.

The new exploratory assessment available for this stock does not change the perception of the stock and does not give reason to change the advice from 2007.

The advice on this stock for the fishery in 2009 is therefore the same as the advice given in 2007 for the 2008 fishery: *“The current estimates of fishing mortality and SSB are uncertain, but SSB shows a decreasing trend while recruitment is low. In order to reverse this trend, ICES considers that fishing mortality should be reduced. However, ICES cannot quantify the required reduction in fishing mortality.”*

**STECF COMMENTS:** STECF agrees with the advice from ICES that fishing mortality should be reduced. In addition STECF notes that (according to ICES) surveys indicate the 2007 year-class may be strong and therefore management measures should be introduced in the Celtic Sea to reduce discarding of this year-class in order to maximize its contribution to future yield and SSB.

### **1.102. Whiting (*Merlangius merlangus*) - VIII**

STECF did not have access to any stock assessment information on whiting in this area.

### **1.103. Whiting (*Merlangius merlangus*) - IX, X**

STECF did not have access to any stock assessment information on whiting in this area.

### **1.104. Witch (*Glyptocephalus cynoglossus*) in the North Sea**

ICES has not assessed this stock and STECF has no access to any stock assessment information on turbot in this area.

A precautionary TAC (including lemon sole) in areas IIa and IV for 2008 was set to 6,793 t.

## **2. Other stocks of the North East Atlantic of Community Interest**

### **2.1. 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 '40s, '60s and '80s, and low landings during the '50s, '70s and '90s. The total catch in 2007 was 96469t.

**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. The main uncertainties in the assessment relate to the extent of sardine movement across the northern stock boundary, the weighting of Portuguese and Spanish acoustic surveys in the combined abundance index, and the estimation of selection for the older ages.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary approach reference points have been identified for sardine stock.

**STOCK STATUS:** In the absence of defined reference points, the state of this stock cannot be evaluated with regard to these. Based on the most recent assessment, SSB in 2008 was around the long-term average, having decreased in the past two years due to successive low recruitments. Fishing mortality has decreased since 1998 and is now at a low level. Short-term predictions indicate a substantial decline in SSB in 2009 (30%) at the assumed fishing mortality level, providing the 2007 recruitment is confirmed to be below average and no strong recruitment occurs in 2008. Therefore, the catch in 2009 should be reduced.

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. ICES states that the development of the stock is largely driven by the incoming recruitment. Therefore, the current fishing mortality could be maintained as a guide for management. This implies a catch of 71 000 tonnes in 2009 corresponding to the status quo fishing mortality ( $F_{sq}$ ) of 0.2.

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

## **3. Regional fisheries advice for the ICES area**

### **3.1. Advice for fisheries in Division IIIa (Skagerrak- Kattegat), in Subarea IV (North Sea) and in Division VIId (Eastern Channel)**

#### **Identification of critical stocks**

ICES has evaluated 45 stocks fished in the Kattegat, the Skagerrak, the North Sea and the Eastern Channel. The available information only allowed ICES to assess the status of 21 of these stocks. The stocks for which spawning stock biomass (SSB) are assessed by ICES to be at reduced reproductive capacity are: cod in the North Sea, Eastern Channel and Skagerrak and sole in the North Sea. Stocks at increased risk are herring in the North Sea, VIId and IIIa (autumn spawners). Spurdog has been categorized as depleted and may be in danger of collapse. Common skates in the North Sea have also been categorized as depleted. Angel shark has been

categorized as extirpated. Although the stock status of whiting in the North Sea is undefined, it is currently at the lowest level in the time-series.

The stocks of overriding concern in the management of all demersal fisheries are:

- For cod in the North Sea, Eastern Channel, and Skagerrak, and for cod in Kattegat ICES recommends zero catch in 2009.
- For herring in Division IIIa and Subdivisions 22–24 (spring-spawners), and for whiting in the North Sea, ICES recommends catches to be reduced significantly.

There is a general concern about the overexploitation of herring in this region, caused by the serial poor recruitment. ICES recommends that all catches of herring should be reduced.

There is concern about the stocks of spurdog, porbeagle, and most other ray species taken as by-catch in fisheries directed towards other species. The advice provided in 2008 for these stocks is valid for 2009 and 2010.

### **Advice for fisheries management**

Fisheries in Division IIIa (Skagerrak–Kattegat), in Subarea IV (North Sea), and in Division VIIId (Eastern Channel) should in 2009 be managed according to the following rules, which should be applied simultaneously:

#### Demersal fisheries

- should minimize by-catch or discards of cod;
- should implement TACs or other restrictions that will curtail fishing mortality for those stocks mentioned above for which reduction in fishing pressure is advised;
- should be exploited within the precautionary exploitation limits or where appropriate on the basis of management plan results for all other;
- where stocks extend beyond this area, e.g. into Division VI (saithe and anglerfish) or are widely migratory (Northern hake), should take into account the exploitation of the stocks in these areas so that the overall exploitation remains within precautionary limits;
- should have no landings of angel shark and minimum by-catch of spurdog, porbeagle, and common skate and undulate ray.

Pelagic fisheries exploiting herring (western Baltic spring-spawning and North Sea autumn-spawning stocks), mackerel, and horse mackerel

- should minimize by-catch or discards of cod;
- should minimize catch of North Sea mackerel, respecting the closed season as advised in October 2006;
- should be exploited within the precautionary exploitation considerations for the herring stocks, taking into account the exploitation of herring in the western Baltic (Subdivisions 22–24), and limit the by-catch of small herring;
- where stocks extend beyond this area, e.g. widely migratory species (NEA mackerel and blue whiting), should take 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

- should minimize by-catch of cod and other fish used for human consumption;
- should minimize by-catch of cod, haddock, saithe, and whiting in the Norway pout fisheries;
- should be exploited within the single-stock exploitation limits for all other stocks.

ICES notes that this advice presents a strong message to fisheries to avoid catching species that are identified as critical stocks. Industry-initiated programmes to minimize these catches should be encouraged, but must include a high rate of independent observer coverage, or other fully transparent methods for ensuring that their catches of critical stocks are fully and credibly reported. Such programmes could be considered in the management of these fisheries.

Reductions in fishing mortalities have been advised for several demersal stocks in the North Sea. Fishing mortality is generally high, but for some stocks there are now indications that fishing mortality has been decreasing in recent years. This is consistent with the observed decrease in fishing effort due to days-at-sea regulations and decommissioning in the major fleets. ICES reiterates that required reductions in fishing mortality can only be achieved if significant reductions in effort are included in management, and effective deterrents to discarding are implemented. Extensive discarding occurs in most fisheries on roundfish, flatfish, and *Nephrops* in the North Sea. These discards are largely small and juvenile fish. They always result in foregone potential yield, and for depleted stocks they are a serious impediment to rebuilding.

**STECF COMMENTS:** STECF agrees with the ICES identification of critical stocks and the advised overall rules for management of the fisheries in the North Sea. STECF notes that for those stocks for which an estimate of fishing mortality is available, none have been assessed to be harvested unsustainably.

### **3.2. Mixed Fisheries Advice for Demersal fisheries in West of Scotland, Celtic Sea, Irish Sea, areas West of Ireland and the Western Channel.**

ICES advice regarding the management of demersal fisheries West of Scotland (Division VIa), West of Ireland (Divisions VIIb,c), in the Irish Sea (Division VIIa), 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.

ICES identified the following stocks that are outside precautionary reference points or are at critically low levels:

- Cod and whiting in Division VIa;
- Cod, whiting and sole in Division VIIa;
- Cod in Divisions VIIe–k;
- Plaice in Divisions VIIfg;
- Plaice and sole in Division VIIe;
- Herring in Divisions VIa south + VIIbc;
- Common skate, undulate ray, white skate, and angel shark in Subarea VII.

In addition, spurdog (as advised under Widely Distributed and Migratory Stocks) is in a critical state.

Advice on fisheries management

Fisheries in the Celtic Seas should in 2009 be managed according to the following rules, which should be applied simultaneously. In these fisheries, there should be:

- no catch or discard of cod and whiting in Division VIa and in Division VIIa, of haddock in Division VIa and sole in Division VIIa, or of spurdog, white skate, and angel shark;
- minimal catch of common skate and undulate ray;
- adherence to the recommended reduction in fishing mortality for cod in Divisions VIIe–k, whiting in Divisions VIIe-k, plaice in Divisions VIIfg, and plaice and sole in Division VIIe;
- development of rebuilding plans for herring in Divisions VIa (South) and VIIb,c and Celtic Sea herring (VIIg,j, VIIa south). Both stocks are in need of rebuilding and fishing should not proceed without rebuilding plans;
- consideration of ICES Advice 2008 Volume 9 for deepwater stocks fished in Subareas VII and VIII;
- fisheries for all other stocks that were conducted within the exploitation boundaries (see text tables above).

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 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.

### **3.3. Mixed fisheries advice for the Bay of Biscay and Iberian waters (Div. VIIIc and Sub-areas IX and X)**

A large number of commercial and non-commercial fish species are caught for human consumption in this eco-region. The fisheries in the Bay of Biscay and Atlantic Iberian Peninsula exploit demersal and pelagic fish species, crustaceans, and cephalopods. Different kinds of French, Spanish, and Portuguese fleets operate in this area, and occasionally also fleets from other countries.

The main pelagic species in the Iberian Peninsula are sardine (*Sardina pilchardus*) and anchovy (*Engraulis encrasicolus*) (small pelagic) and mackerel (*Scomber scombrus*) and horse mackerel (*Trachurus trachurus*) (middle-size pelagic). These species form the basis of important fisheries in the Iberian Peninsula and in the Bay of Biscay, which represent an important source of income for local economies. Also characteristic are other species more common to temperate and subtropical waters, such as Spanish mackerel (*Scomber colias*), 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 (*Merluccius merluccius*), megrim (*Lepidorhombus whiffiagonis*), four-spot megrim (*Lepidorhombus boscii*), anglerfish (*Lophius piscatorius* and *L. budegassa*), and Norway lobster (*Nephrops norvegicus*).

#### **Identification of critical stocks**

The critical stocks for which advice is provided and which are below  $B_{lim}$  are the southern hake stock and anchovy in Subarea VIII. ICES advises that there should be no catches on *Nephrops* in FU 25 (Northern Galicia), FU 31 (Cantabrian Sea), and FUs 26–27 (West Galicia and North Portugal). For both southern anglerfish species ICES advises a zero catch in 2009 in order to bring SSB back to  $B_{MSY}$ . These should also be considered critical stocks. ICES also advises a reduction in the exploitation for sole in the Bay of Biscay.

#### **ICES Advice for fisheries management**

Anchovy, southern horse mackerel, and sardine 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, and *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 would ensure rapid rebuilding of the stock, and which ensures large reductions in  $F$  in 2009 and later. The rebuilding plan adopted in 2006 for southern hake and *Nephrops* appears to be insufficient for rebuilding anglerfish stocks.

The fishing of each species should be restricted within the precautionary limits as indicated in the table of individual stock limits above.

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

STECF notes that ICES has not mentioned that mixed longline fishery targeting black scabbardfish operating in Subarea IXa, has a by-catch of deep-water sharks, mainly Portuguese dogfish and Leafscale gulper shark, of about 10% in weight.

### **3.4. 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 cod in the East Greenland area, Greenland halibut, Icelandic saithe, Icelandic capelin, demersal *S. mentella* and pelagic *S. mentella* 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 in the area. 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. Concerning the fisheries in the East Greenland area (Division XIV) in 2009 there should be no fishery on Greenland cod.
2. For other species, fishing of each species should be restricted within the precautionary limits as indicated in the table of individual stock limits above. Many of these stocks are confined to only part of the areas under consideration 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 has no comments.

## **3.5. Overview of Mixed Fisheries Advice for the Faroe Plateau Ecosystem**

### **ICES Advice on fisheries management**

The Faroese effort management system links fishing mortality on the demersal stocks, i.e. that the effort (number of fishing days) concurrently determines the fishing mortality on all three demersal stocks. The longline fisheries for cod and haddock are closely linked. The fishery for saithe is a more directed fishery, albeit with by-catches of cod and haddock.

For the Faroe Plateau cod, the spawning-stock biomass has declined rapidly in the last few years, and the fishing mortality has increased. For haddock the spawning-stock biomass is below  $B_{pa}$  and declining, while the present fishing mortality is above the  $F_{pa}$ . Stock trends in Faroe saithe indicate that fishing mortality was high in 2007 and should be decreased.

- For cod, ICES recommends no fishery in 2009. This applies both to cod on the Faroe Plateau and the Faroe Bank.
- For Faroe Plateau cod ICES advises to develop a recovery plan.
- For haddock, ICES recommends no fishery in 2009 and the development of a recovery plan.
- For saithe, ICES recommends a reduction in fishing mortality in 2009.

In general demersal fisheries in the Faroe waters should in 2009 be managed ensuring a minimal by-catch or discarding of cod and haddock.

**STECF COMMENTS:** STECF has no comments.

## **3.6. Overview of advice for widely distributed stocks**

### **ICES Advice on fisheries management**

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 only expand very slowly when 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 have been decided upon and are 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 when 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.

**STECF COMMENTS:** STECF has no comments.

## 4. Resources in the Baltic Sea

### 4.1. Cod (*Gadus morhua*) in the Baltic Sea (Subdivisions 22-24)

**FISHERIES:** Cod in Subdivisions 22-24 is exploited predominantly by Denmark and Germany, with smaller catches taken by Sweden and Poland. The fishery is conducted by trawl and gillnets. Landings fluctuated between 40,000 and 54,000 t from 1965 to 1985, falling in the late 1980s reaching a record low value in 1991. Landings increased again in the 90's to former levels. After 2000 landings have declined again and have in recent years been around 23,000 t.

The fishery is largely based on recruiting year-classes (3 years and younger) ICES has estimated discards to 8% of the total catch in weight and 19 % when measured in numbers.

**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  $B_{pa} = 23,000$  t. The basis for  $B_{pa}$  is MBAL (minimum biological acceptable level of SSB). ICES consider that  $B_{lim}$ ,  $F_{pa}$  and  $F_{lim}$  are not yet defined.

**MANAGEMENT AGREEMENT:** The EC has agreed on a management plan for cod in the Baltic Sea in September 2007. For Western Baltic cod the aim is to reach a fishing mortality rate no higher than 0.6. This should be reached by fixing the TAC consistent with an annual reduction in  $F$  by 10% and by annually reducing the total number of days a vessel can fish in the area by 10 % until the target  $F$  of 0.6 has been reached. The plan sets a maximum change of 15% of the TAC between consecutive years, unless the fishing mortality is estimated to be higher than 1.

Only two types of trawls (BACOMA with 110 mm square mesh panel and T90) are allowed in the cod trawl fishery.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as being at risk of reduced reproductive capacity, with the spawning stock being at  $B_{pa}$  in 2008. In the absence of defined precautionary fishing mortality reference points the state of the stock cannot be evaluated with regard to these.  $F_{sq}$  (average 2005 to 2007) was estimated to be 0.96. At the present exploitation rate the stock is dependent upon the strength of incoming year-classes. The four latest year-classes are estimated to be well below average.

**RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plan:** The multi-annual plan implies a 15 % reduction of the TAC corresponding to landings of 16,337 t for 2009. This corresponds to a reduction in  $F$  of 9 % compared to fishing mortality assumed for 2008. ICES has not evaluated whether this management plan is consistent with the precautionary approach.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** ICES has previously recommended target fishing mortalities of 0.3 - 0.6 which would result in a low risk to reproduction and high long-term yields. This would correspond to landings of 7,000-12,000 t in 2009.

**Exploitation boundaries in relation to precautionary limits:** A reduction of  $F$  by 28% is needed to bring SSB above  $B_{pa}$  in 2010. This corresponds to landings of 13,700 t in 2009.

**Conclusions on exploitation boundaries:** In the absence of an agreed management plan that has been evaluated as being consistent with the precautionary approach, ICES concludes that the exploitation boundaries for this stock should be based on the precautionary limits. Accordingly, the catch in 2009 should be less than or equal to 13,700 t.

**STECF COMMENTS:** STECF notes that ICES has not evaluated whether the multi-annual management plan recently adopted is in accordance with the precautionary approach. ICES, however, in 2005 on request from the European Commission investigated long-term management strategies for Baltic cod stocks and concluded: that for western Baltic cod, under the assumption of the current exploitation pattern, target fishing mortalities (including all catches) between 0.3 and 0.6 (ages 3 to 6) result in a low risk to reproduction and high long-term yields. There is presently not an estimate of  $B_{lim}$  available for this stock, but this conclusion was robust to assumptions of  $B_{lim}$  up to 30 000 t. A major improvement to the stock development and to the landings is expected if an additional reduction of juvenile mortality could be achieved. If juvenile mortality is halved the upper range of the target fishing mortality could be increased by 0.1.

The objectives of the multi-annual management plan are in line with the ICES findings and STECF considers that rebuilding of the cod stock is possible under the plan if it is fully implemented and enforced.

STECF notes that in accordance with the multi-annual management plan landings in 2009 should be 16,337 t. This figure is calculated on the basis of a maximal annual variation in TAC of +/- 15 %. This corresponds to a reduction in fishing mortality in 2009 of 9% compared to 2008 and is expected to result in an SSB in 2010 of about 20,000 t .

STECF notes that the ICES advice for 2009 is based on the precautionary reference point ( $B_{pa}=23,000$  t) and implies landings no greater than 13,724 t and an  $F$  of 0.68, which exceeds the fishing mortality that ICES has indicated would be sustainable ( $F=0.3 - F=0.6$ ). STECF notes that the reduction in fishing mortality implied by the ICES advice is 29%. STECF agrees with the ICES advice that if the objective of managers is to maintain the stock above  $B_{pa}$  (23,000 t) in 2010, landings in 2009 should be no greater than 13,724 t.

STECF notes that for the Eastern Baltic cod stock ICES has based its TAC advice on the EC multi-annual management plan whereas for the Western Baltic cod stock ICES has taken the opposite approach and based its TAC advice on the precautionary reference point.

## **4.2. Cod (*Gadus morhua*) in the Baltic Sea (Subdivisions 25-32)**

**FISHERIES:** Cod in Subdivisions 25-32 is exploited predominantly by Poland, Sweden, and Denmark, the remaining catches taken by Latvia, Lithuania, Russia, Germany, Finland, and Estonia. Cod is taken primarily by

trawlers and gillnetters. The use of gillnets started in the 1990s and peaked shortly thereafter; at present this fishing method contributes about 30% to the total catch.

The reported landings for the years 1992–1995 are known to be incorrect due to incomplete reporting and these landings have therefore been estimated. The extent of unreported and misreported catches from 1993 - 1996 range between about 7% and 38%.

Estimates are available for misreporting in recent years from a range of industry and enforcement sources. These indicate that catches have been around 32 - 45% higher than the reported figures. Landings have fluctuated between 45,000 t and 392,000 t (1965 - 2007). In 2007 the landings including unreported landings amounted to 51,000 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 precautionary reference points for fishing mortality proposed by ICES are  $F_{pa} = 0.6$  and  $F_{lim} = 0.96$ . Integrated ecosystem assessment carried out by ICES has demonstrated a major shift in food web composition and ICES considers that the precautionary biomass reference points ( $B_{pa} = 240,000$  t and  $B_{lim} = 160,000$  t) so far recommended for the Eastern Baltic cod stock are not considered applicable any more. No new biomass reference points have been proposed by ICES.

**MANAGEMENT AGREEMENT:** The EC has agreed on a management plan for cod in the Baltic Sea in September 2007. For Eastern Baltic cod the aim is to reach a fishing mortality rate no higher than 0.3. This should be reached by fixing the TAC consistent with an annual reduction in F by 10% and by annually reducing the total number of days a vessel can fish in the area by 10 % until the target F of 0.3 has been reached. The plan sets a maximum change of 15% of the TAC between consecutive years, unless the fishing mortality is estimated to be higher than 1.

Only two types of trawls (BACOMA with 110 mm square mesh panel and T90) are allowed in the cod trawl fishery.

The EC Council Regulation for the Baltic TAC and quota 2007 involves reductions in the effort (10% in terms of number of fishing days) and TACs for all Baltic cod fisheries (10%), as well as strengthening control measures.

**STOCK STATUS:** In the absence of applicable biomass reference points, the state of the stock cannot be evaluated with regards to these. SSB (in 2008) is estimated to be around 40% below the long-term average (1966–2007). An increase in spawning-stock biomass has been observed since 2005 although it is still at a historic low level. Based on the most recent estimates of fishing mortality (for 2007) ICES classifies the stock as being harvested sustainably, but above the agreed target. The 2003 and 2005 year-classes are above the average of the past 15 years.

**RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to existing management plans:** A reduction of 10% of the 2008  $F = 0.50$ . This results in an F in 2009 of 0.45, corresponding to landings of 79,900 t. For this advice, ICES defines “F” as the total fishing mortality including discards and unallocated landings, and “landings” to comprise all landings, whether they are legal or illegal, but excluding predicted discards.

The management plan limits the deviation of the TACs between consecutive years to a 15% increase of the total TAC, which would result in a TAC of 48,600 t for 2009. Landings of 48 600 t in 2009 are expected to be associated with discards of 1 400 t. This catch corresponds to  $F = 0.25$  for 2009.

**Exploitation boundaries in relation to high long-term yield, low risk of depletion of production potential and considering ecosystem effects:** ICES has previously recommended a target fishing mortality of 0.3, which would result in a low risk to reproduction and high long-term yields. Such a fishing mortality corresponds to landings of 56,400 t.

**Exploitation boundaries in relation to precautionary limits:** Fishing at  $F_{pa}$  in 2009 corresponds to landings of less than 100 400 t.

**Conclusion on exploitation boundaries:** The management plan has not been evaluated by ICES. However, in the present situation, the expected fishing mortality in 2009 when applying the management plan is closer to the target suggested by ICES. It is therefore expected to give benefits in terms of long-term yield and low risk to the stock compared to the application of  $F_{pa}$ . ICES therefore advises to limit landings to 48 600 t for the year 2009.

**STECF COMMENTS:** STECF notes that ICES has not evaluated whether the multi-annual management plan recently adopted is in accordance with the precautionary approach. ICES, however, in 2005 on request from the European Commission investigated long-term management strategies for Baltic cod stocks and concluded: that for eastern Baltic cod, under the assumption of the current exploitation pattern, target fishing mortalities (including all catches) close to 0.3 (ages 4-7) would result in a low risk to reproduction and high long-term yields. The management plan is only in accordance with the precautionary approach if effectively implemented and enforced. The situation in recent years with significant amounts of non-reported cod landings indicates that overall, enforcement has not been effective.

STECF notes that for the Eastern Baltic cod stock ICES has based its TAC advice on the EC multi-annual management plan whereas for the Western Baltic cod stock ICES has taken the opposite approach and based its TAC advice on the precautionary reference points.

STECF notes that the TAC of 48,600 t for 2009 set in accordance with the multi-annual management plan will, because of the constraint on annual variation in TAC, result in a fishing mortality of 0.25 which is well below the target  $F$  of 0.3 and is equivalent to a reduction in  $F$  of 50 % compared to 2008.

STECF notes that the objective of the multi-annual management plan is to ensure the sustainable exploitation of eastern Baltic cod by gradually reducing and maintaining the fishing mortality rate at a level no lower than  $F=0.3$ . STECF notes that fishing at  $F$  of 0.3 in 2009 will correspond to landings of 56,400 t. STECF advises that a TAC of 56,400 t for 2009 based on a target fishing mortality of 0.3 is consistent with the objective of the multi-annual management plan.

STECF also considers that both of the above mentioned options result in fishing mortalities in 2009 that are well below  $F_{pa}$ .

$F_{pa}$  is above the assumed fishing mortality in 2008 and fishing at  $F_{pa}$  in 2009 will therefore not result in a reduction in  $F$ .

STECF furthermore notes that the reduction in effort by 10 % from 2008 to 2009 following from the multi-annual management plan would correspond to a fishing mortality of 0.45 and landings of 80,000 t. in 2009, assuming that the effort is fully deployed and there is a one to one relationship between effort and fishing mortality. There is therefore a discrepancy between the allowed fishing effort and the effort required to take the TAC resulting from the management plan. To ensure that this discrepancy does not result in increased discarding or unreported landings, it is important that the fisheries catching cod in 2009 be regulated in such a way that all landings of cod do not exceed the agreed TAC.

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

**FISHERIES:** All countries surrounding the Baltic Sea report landings of flounder. It is mainly taken as by-catch in fisheries for cod, but there are also local coastal fisheries targeting this species. Since 1973 total recorded landings have fluctuated between 10-20 thousand t. During the mid-1990s flounder landings were misreported (over-reported) from the cod trawl fishery, mainly for Subdivisions 24 and 25. In 2007 the reported landings reached 19,315 t, which is the same record high level as observed in 2002 and 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. No assessment of the state of the stock is presented by ICES.

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

**STOCK STATUS:** Baltic flounder is composed of several sub-stocks but the information is insufficient to define stock boundaries in the area. The most recent ICES advice states that the size of most of the stocks is unknown. An exploratory analytical assessment using data up to 2006 was undertaken last year for the flounder stock in Subdivisions 24 and 25. The results indicated a stable spawning stock in the entire period of the assessment (since 1978). There were indications of above average recruitment in recent years, fishing mortality has increased slightly over this period, and landings have increased since the late 90s. However, the assessment

was rejected by ICES and remained exploratory. It is unlikely that an age-based assessment can be conducted before an improvement in the basic data quality can be demonstrated.

**RECENT MANAGEMENT ADVICE:** There are no explicit management objectives for this stock. Data are insufficient for management advice and no advice is available from ICES.

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

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

The present ICES stock assessment units of Baltic herring and the existing management units are shown in the text table below:

Herring Unit	Existing Management Area
Herring in Sub-divisions 22-24	South-western Baltic, Subdivisions 22,23,24
Central Baltic Herring	Sub-divisions 25,26,27,29, 32 and 28 (excl. Gulf of Riga) Central Baltic
Gulf of Riga Herring	Gulf of Riga (part of Sub-division 28)
Herring in Sub- division 30	Management Unit 3 (Sub-divisions 30-31)
Herring in Sub-division 31	Management Unit 3 (Sub-divisions 30-31)

##### 4.4.1. Herring (*Clupea harengus*) in the Skagerrak, the Kattegat and in the Western Baltic Sea (Sub-div. 22-24).

**FISHERIES:** Herring of this the stock of spring-spawners are taken in the North-eastern part of the North Sea, Division IIIa and Sub-divisions 22–24. Division IIIa has directed fisheries by trawlers and purse seiners, while Sub-divisions 22–24 have directed trawl, gillnet and trap net fisheries. The herring taken in the Skagerrak and the Kattegat including by-catches taken in Division IIIa in the small mesh trawl fisheries for sprat, Norway pout and sandeel are mainly consists of autumn-spawners from the North Sea stock and spring-spawners from the area and from the western Baltic. After a period of high landings in the early 1980s the combined landings of all fleets have decreased to below the long-term average. In recent years approximately 50% of the catches from this the spring-spawner stock are taken in the western Baltic.

Two TACs are set for Division IIIa. One covering the catches taken in fisheries using nets with a mesh size equal to or larger than 32 mm and one for fisheries using nets with a mesh size smaller than 32 mm. The TACs comprises both the autumn- and spring-spawning stocks in the area The TAC for the North Sea is based on the advice for the autumn spawners and does not take into account the likely catches of spring-spawners.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The mixing in Divisions IIIa and IVa of the autumn spawners from the North Sea with this spring spawning stock complicates assessment as well as management of both these stocks. The analytical assessment of the spring-spawners in IIIa and western Baltic is based on catch data and acoustic and trawl survey results.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary Approach Reference Points have not been defined. Candidates for reference points consistent with high long-term yields and a low risk of depleting the productive potential of the stock are around  $F_{0.1}$ . Preliminary HCR evaluations are consistent with this view and have shown that candidates for  $F_{MSY}$  can be found in the region of  $F = 0.25$ .

**STOCK STATUS:** In the absence of defined reference points, the state of the stock cannot be evaluated with regard to these. The recent assessments show that the SBB has been stable over a number of years and is around the lowest level since the beginning of the time-series. Fishing mortality has also been stable well above any proxy of  $F_{MSY}$ . Recruitment has declined since 2003 and is now at the lowest observed level.

**RECENT MANAGEMENT ADVICE:**

**Exploitation boundaries in relation to long-term yield:** The current fishing mortality in 2007 is estimated at 0.47, well above the range that would lead to high long-term yields and low risk of stock depletion.

**Exploitation boundaries in relation to precautionary considerations:** In the absence of precautionary reference points ICES considers that management should take account of the fact that the recruitment has shown a declining trend in recent years and fishing mortality is estimated to be at a high level. Continued exploitation at current fishing mortality levels is therefore expected to lead to a further decline in the stock.

**Conclusion on exploitation boundaries:** Because of the very low recruitment in recent years ICES recommends a substantial reduction in fishing mortality in 2009. In the absence of a management plan and agreed target and precautionary reference points ICES advises that fishing mortality should be less than the F related to high long-term yield ( $F = 0.25$ ). This will correspond to landings of less than 32,800 t in 2009.

**STECF COMMENTS:** STECF notes that the assessment in 2008 is consistent with the 2007 assessment and agrees with the advice from ICES. STECF notes that because the proportion of the herring in IIIa that are IVa autumn spawners cannot be predicted in advance, management measures applied to IIIa will have an influence on the exploitation rate of both the IIIa spring spawning herring and the North Sea autumn spawners.

STECF notes that the advice for 2009 differs from that for 2008 and that ICES now advises an immediate reduction to  $F = 0.25$  and not a progressive reduction.

STECF notes that the catches of herring in Division IIIa consist of a mixture of North Sea autumn spawning and Western Baltic/IIIa spring spawning herring and that ICES advises that the primary limiting factor for the herring fisheries in IIIa should be the concern for the Western Baltic/IIIa spring spawning stock.

The Commission has requested STECF to indicate the effects on the different fisheries exploiting the spring-spawners under the assumption of a 50/50 split of catches between Subdivision 22-24 and Division IIIa and evaluate whether or not the HCRs in the Policy Statement adequately addresses the situation for this stock, in particular the series of low recruitments. If not, what would be the options for the proposal for 2009 and how should the Policy Statement be amended in the future

The table below provides catch forecasts by fleet for 2009 for herring in Division IIIa and Sub-divisions 22 to 24 for the same four catch options as presented by ICES but applying a fifty-fifty allocation of catches of spring-spawners between Division IIIa (including 1,100 t assumed to be taken in the North Sea) and Sub-divisions 22-24. It should be noted that the forecasted catches for fleets C and D presented below for a recommended total catch of Western Baltic/IIIa spring spawning herring of 32,800 t are inconsistent with the ICES advice for North Sea herring. The forecast table for herring in Division IIIa and Sub-divisions 22 to 24 presented by ICES, which assumes that 40.5 % of the spring-spawner catches are taken in IIIa and a total catch of spring-spawners of 32.800 t, is consistent with the advice for North Sea herring.

Basis	Total catches of WBSS herring	WBSS herring				NSAS herring		Total catches of both stocks in Div. IIIa		% Change in catch <sup>1)</sup>		Subdiv. 22-24	%Change in catch <sup>1)</sup>
		Fleet A	Fleet C	Fleet D	Fleet F	Fleet C	Fleet D	Fleet C	Fleet D	Fleet C	Fleet D	Fleet F	Fleet F
$F_{sq} = 0.25$	32.8	1.1	14.0	1.3	16.4	9.0	1.9	23.0	3.2	-56	-72	16.4	-63
$F_{sq} = 0.31$	40	1.1	17.3	1.6	20	11.1	2.4	28.4	4.0	-45	-65	20	-55
$F_{sq} = 0.40$	50	1.1	21.9	2.0	25	14.0	3.0	35.9	5.0	-31	-56	25	-44
$F_{sq} = 0.48$	56.7	1.1	25.0	2.3	28.35	16.0	3.4	40.9	5.7	-21	-50	28.4	-36

STECF assess the Western Baltic/IIIa spring spawning herring stock to be outside safe biological limits. The HCR in the Policy Statement for this stock category stipulates that the TAC should be set to the forecast catch that will result in a 30% reduction in fishing mortality rate, but do not decrease the fishing mortality so far as to prejudice long-term yields and do not reduce the TAC by more than 20%.

No single TAC applies to this stock. The two TACs (target and by-catch TACs) in IIIa cover both catches of spring-spawners and autumn spawners. However, the basis for setting the TACs for 2008 was a fifty-fifty split of the catch of spring-spawners between Western Baltic and IIIa. The TAC for Western Baltic is 44,550 t for 2008. This corresponds to a total TAC for the spring-spawners of 89,100 t. Applying the HCR rule in the Policy Statement would lead to a TAC for 2009 of 71,280 t. According to the forecast provided by ICES a total catch of 71,280 t would result in an increase in fishing mortality from 2008 to 2009 of more than 30 %.

STECF does not consider that the HCR rule in the Policy Statement addresses the situation for this stock. A substantial reduction in fishing mortality is required and STECF concurs with ICES advice and recommends that the landings of the stock should be less than 32,800 t. Furthermore, STECF advises that the TACs for herring in Division IIIa and the western Baltic (Subdivisions 22-24) should be based on the ICES catch option table for a total catch of 32,800 t. Applying this option would give the following TACs for 2009:

- 20,000 t for herring taken in IIIa fisheries using nets with mesh sizes equal to or larger than 32 mm;
- 2,800 t for herring taken in IIIa fisheries using nets with mesh sizes smaller than 32 mm;
- 18,400 t for herring taken in Sub-divisions 22 – 24.

#### **4.4.2. Herring (*Clupea harengus*) in Subdivisions 25-29 (excluding Gulf of Riga) and 32.**

**FISHERIES:** All the countries surrounding the Baltic, exploit the herring in these areas as part of fishery mixed with sprat. Over the last 30 years, landings of herring have decreased from a peak of 369,000 t in 1974 to 91,300 t in 2005. Since then landings have increased to 116,000 t

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The assessment is based on catch data and on an international acoustic survey. Natural mortality is derived from a multi-species model that was last updated in 2006 and takes cod predation into account. Recruitment estimates for forecasts are based on the acoustic survey. Catches of central Baltic spring-spawning herring taken in the Gulf of Riga are included in the assessment.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference point for fishing mortality is  $F_{pa} = 0.19$ . There is no biological basis at present for determining biomass reference points.

**STOCK STATUS:** In the absence of defined biomass reference points the state of the stock cannot be evaluated with regard to these. The SSB has decreased steadily between the mid-1970s and the beginning of the century and increased since. The SSB estimate for 2008 is 750,000 t., 25 % below the long-term average. Based on the most recent estimates of fishing mortality, the stock is classified to be harvested sustainably. F has been stable in recent years and is now at a historic low (0.16).

#### **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 fishing mortality, estimated at 0.16, is below candidate target reference points.

**Exploitation boundaries in relation to precautionary limits:** The fishing mortality in 2009 should be below  $F_{pa} = 0.19$ , corresponding to landings of less than 147,000 t.

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

STECF notes that the current assessment has revised the value of SSB in 2006 downwards by 24%. The estimate of F in 2006 has been revised upwards by 36%. The result is a substantially downwards revision of the TAC advice in a situation where the stock is increasing.

#### **4.4.3. Herring (*Clupea harengus*) in the Gulf of Riga.**

**FISHERIES:** Herring catches in the Gulf of Riga include both Gulf herring and open-sea herring, which enter the Gulf of Riga from April to June for spawning. In the past 25 years landings have fluctuated between 15,000 and 40,000 t. The herring in the Gulf of Riga is fished by Estonia and Latvia. The structure of the fishery has

remained unchanged in recent decades. Approximately 70% of the catches are taken by the trawl fishery and 30% by a trap net fishery on the spawning grounds. Landings in 2007 were 35,000 t.

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

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference point for F ( $F_{pa}$ ) is set at 0.40;  $F_{lim}$  is not defined. An integrated ecosystem assessment shows a major shift in food web composition and in environmental drivers, and therefore the biomass reference points used in previous assessments were not considered applicable anymore.

**STOCK STATUS:** In the absence of applicable biomass reference points, the state of the stock cannot be evaluated with regard to these. Following high recruitment, SSB increased in the mid-1980s and has been around 23% above the long-term average. Based on the most recent estimates of fishing mortality, ICES classifies the stock as being harvested sustainably. The fishing mortality has been below  $F_{pa}$  in the last two years. The year-classes of 2005 and 2007 are strong, while the year-class of 2006 is poor

**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 fishing mortality, estimated at 0.40, is within the range of  $F_{0.1}$  and  $F_{pa}$  that is expected to lead to high long-term yields and low risk of depletion.

*Exploitation boundaries in relation to precautionary limits*

The fishing mortality in 2009 should be below  $F_{pa}$  (= 0.4), corresponding to landings of less than 31,500 t.

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

#### **4.4.4. Herring (*Clupea harengus*) in Subdivision 30, Bothnian Sea (Management Unit 3)**

**FISHERIES:** Finland and Sweden carry out herring fishery in this area, mainly with bottom trawls. On average 90% of the total catch is taken by trawl fishery. The trap-net fishery is of minor importance. In the trawl fishery more effective and larger trawls have been introduced in the 1990s. Landings were relative stable around 20 to 30,000 t until 1992, after which they increased to between 50 and 60,000 t. A further increase in landings has taken place in 2006 and 2007 and reached a record high level of 75,000 t in 2007.

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

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference point for SSB ( $B_{pa}$ ) is set at 200,000t while  $B_{lim}$  is considered to be 145,000t. The proposed precautionary reference point for F ( $F_{pa}$ ) is set at 0.21 while  $F_{lim}$  is considered to be 0.3.

**STOCK STATUS:** The quality of the assessment in 2007 was considered to be poor because no fishery-independent data are available. The stock and removals appeared to be stable.

**RECENT MANAGEMENT ADVICE:** The new information that is available for herring in Subdivision 30 gives no reason to change the advice from 2007. The advice for 2009 is therefore the same as the advice given in 2007: "Landings should be less than 67 300 t."

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

#### **4.4.5. Herring (*Clupea harengus*) in Sub-div. 31, Bothnian Bay (Management Unit 3)**

**FISHERIES:** Trawl fisheries account for the main part of the total catches. Normally the trawl fishing season begins in late April and ends before the spawning season in late May to July. It resumes in August/September and continues, until the ice cover appears, usually in early November. The catch in 2007 was about 3,000 t.

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

**PRECAUTIONARY REFERENCE POINTS:** Precautionary Approach reference points are not defined.

**STOCK STATUS:** In the absence of defined reference points, the state of the stock cannot be evaluated with regard to these, however a tentative analytical assessment indicates that SSB has been higher in the 1980s and has declined considerably in the mid-1990s to a low level where it has remained since.

**RECENT MANAGEMENT ADVICE:** The only new information that is available for herring in Subdivision 31 is landings data which gives no reason to change the advice from 2007. The advice for 2009 is therefore the same as the advice given in 2007: *Catches should not be allowed to increase. At such a comparatively low catch level, an immediate threat to the stock appears to be unlikely.*

**STECF COMMENTS:** STECF notes that recent average catches 2002-2006 have been below the long-term mean. In addition the fishery is currently being largely supported by the 2002 year-class. Given that these observations indicate that the stock may be reduced compared to its long-term status, and that the exploitation rate is unknown, STECF has no basis on which to advice on an appropriate catch level. STECF disagrees with the ICES statement that at such a comparatively low catch level (3,000 t), an immediate threat to the stock appears to be unlikely.

#### **4.5. Plaice (*Pleuronectes platessa*) in the Baltic Sea (Subdivisions 22-32)**

**FISHERIES:** Plaice is taken as a by-catch mainly in the cod fishery. Landings peaked in the late 1970s (8300 t in 1979), were reduced to less than 300 t in the 1990s and then increased again. Reported landings were 2,837 t in 2007. ICES Subdivision 22 is the main fishing area, and Subdivisions 24 and 25 follow in importance. The fluctuations in catches are assumed to be caused by migration of plaice from the Kattegat into the western Baltic Sea.

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

**PRECAUTIONARY REFERENCE POINTS:** There are no precautionary reference points proposed for plaice in the Baltic.

**STOCK STATUS:** The stock status is unknown. The only information available for this stock is landing statistics.

**MANAGEMENT OBJECTIVES:**

No management objectives have been defined for this stock.

**RECENT MANAGEMENT ADVICE:** The available data are insufficient for assessing the current stock size and exploitation, and ICES gives no management advice on the Plaice stocks in the Baltic.

**STECF COMMENTS:** STECF has no comments.

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

**FISHERIES:** The total catch in the Baltic Sea (including rivers) has declined by almost 80 % since 1990, from 5636 (1990) to 1,180 t (2007). The decline has been largest in the offshore fishery where landings in 2007 were 550 t or only 15 % of landings reported in 1990. Landings from coastal areas have declined by almost 75 % to 350 t in 2007, while river catches have shown no clear trend with reported landings in 2007 of 140 t. 69% of the EC quota for 2007 was landed.

Non-reported catches and discards are estimated to be about 25% of the total catches in 2007.

The decreased catches are largely explained by quota restrictions, reduced post smolt survival, declining effort mainly in the offshore fishery, which again is linked, to poor market prices and market restrictions related to high dioxin contents.

There has been an increase in the proportion of wild salmon in catches, relative to reared salmon, which reflects the increased wild smolt production. The share of non-commercial (recreational) catches has increased and will likely increase further

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

**PRECAUTIONARY REFERENCE POINTS:** To evaluate the state of the stock ICES uses the smolt production in 2010 relative to the 50% level of the natural production capacity on a river-by-river basis. Due to

difficulties with the assessment model ICES was not able to present the production capacity for the individual rivers.

**MANAGEMENT AGREEMENTS:** In 1997 IBSFC adopted the Salmon Action Plan (SAP) running 1997–2010 where the long-term objectives are:

1. To prevent the extinction of wild populations, further decrease of naturally produced smolts should not be allowed.
2. The production of wild salmon should gradually increase to attain by 2010 for each salmon river a natural production of wild Baltic salmon of at least 50% of the best estimate potential and within safe genetic limits, in order to achieve a better balance between wild and reared salmon.
3. Wild salmon populations shall be re-established in potential salmon rivers.
4. The level of fishing should be maintained as high as possible. Only restrictions necessary to achieve the first three objectives should be implemented.
5. Reared smolts and earlier salmon life stage releases shall be closely monitored.

No update of objectives has been set by the EU Commission replacing the IBSFC Salmon Action Plan (SAP).

**STOCK STATUS:** In order to better support the management of wild salmon stocks, ICES has established five assessment units for the Baltic Main Basin and the Gulf of Bothnia.

Assessment unit	Name	Salmon rivers included
1	Northeastern Bothnian Bay stocks	On the Finnish-Swedish coast from Perhonjoki northward to the river Råneälven, including River Tornionjoki
2	Western Bothnian Bay stocks	On the Swedish coast between Lögdeälven and Luleälven
3	Bothnian Sea stocks	On the Swedish coast from Dalälven northward to Gideälven and on the Finnish coast from Paimionjoki northwards to Kyrönjoki
4	Western Main Basin stocks	Rivers on the Swedish coast in Divisions 25–29
5	Eastern Main Basin stocks	Estonian, Latvian, Lithuanian, and Polish rivers

The total wild smolt production has increased about fourfold in assessment units 1–3 since the Salmon Action Plan was adopted in 1997. Wild smolt production is now estimated to be around two thirds of the potential total smolt production. However smolt production is still low in rivers where salmon were extirpated and are now being reintroduced.

The post-smolt survival in 2004 and 2005 was low. However, the overall estimated smolt production has been increasing and will continue to stay high in the near future. The number of spawners are estimated to increase slightly in 2008 and again in 2009. Overall though, the smolt production during the early 2010s is expected to be low.

Reaching 50% of the natural production capacity is likely or very likely to be met for several large rivers in the Northern Baltic Sea area while the status of less productive wild stocks, especially in the Southern Baltic Sea area is poor. Within assessment unit 4 a decreasing trend in smolt production has been observed

**RECENT MANAGEMENT ADVICE:** Because of the low at-sea survival of salmon in recent years in combination with the past high harvest rate, the spawning populations of salmon are estimated to be low. Due to the ban on the driftnet fishery as of January 2008, the catches for 2008 are expected to be lower than in 2007. This will likely result in an increased number of spawners during the next few years; however, the impact of this increased number of spawners will be offset by continued low rates of at-sea survival. In order to ensure recovery of the salmon stocks ICES recommends for 2009 that landings do not exceed the reduced catches expected for 2008.

Salmon management should be based on the assessments of the status of individual stocks in the rivers. Fisheries on mixed stocks, either in coastal waters or open sea areas, pose particular difficulties for management, because the fisheries cannot target only those stocks that are close to or above their targets. Fisheries in estuaries and rivers are more likely to fulfil this requirement.

There are a number of rivers that need longer-term stock rebuilding measures, including habitat restoration and removal of physical barriers. For the smallest and weakest rivers (Emån, Rickleån, Öreälven, Pärnu, and Nemunas basin), it is recommended that extra measures be taken to further decrease exploitation of these stocks. In addition to reduction of mixed stock fisheries in the Main Basin due to the driftnet ban, exploitation in the coastal and estuarine fisheries should be further reduced. Salmon of the rivers Rickleån and Öreälven pass the Åland Sea and Bothnian Sea on their spawning migration. Salmon spawners of the river Pärnu pass the coastal waters of the Gulf of Riga. Salmon of the river Emån pass the coastal waters around the Öland Island, and salmon of the Nemunas basin pass the coastal waters around the Curonian lagoon on their spawning migration.

**STECF COMMENTS:** STECF notes that ICES recommends that the landings in 2009 do not exceed the landings in 2008. The 2008 landings figures will not be available until sometime in 2009 and it is therefore not possible to translate the ICES advice into an exact figure at this time.

Given that the overall estimated smolt production has been increasing and will continue to stay high in the near future and the number of spawners are estimated to increase slightly in 2008 and again in 2009, STECF recommends that catches should not be allowed to increase above recent levels. This implies that the EC quota should be set at no more than 364 000 specimens.

STECF underlines the need to establish new operational aims for the Baltic salmon stocks for the future management. STECF notes that since the dissolution of the IBSFC the salmon action plan has not been replaced and there is currently no formal management plan for salmon in this area.

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

**FISHERIES:** The salmon fishery in the Gulf of Finland is mainly based on reared fish. Estonia, Finland and Russia are participating in the salmon fishery. Salmon catches in the area are low, and although commercial effort is low there is substantial (but poorly quantified) effort and catches by recreational fishers. Since 1996 the landings decreased continuously. In 1996 the landings still amounted to about 80,000 specimens, but in 2007 the landings only amounted to 13,000 specimens or 84 t. This was one of the lowest recorded catches since 1981.

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

**PRECAUTIONARY REFERENCE POINTS:** Not established.

**STOCK STATUS:** The new data available for this stock are too sparse to revise the advice from last year.

**MANAGEMENT AGREEMENTS:** The objective of the Salmon Action Plan (SAP), as adopted by the former IBSFC, is to increase the natural production of wild Baltic salmon to at least 50% of the natural production capacity of each river by 2010, while retaining the catch level as high as possible. In addition, objectives state that the genetic diversity of the stocks should be maintained. The management objective concerned has expired in practice because catch options for 2007 mainly influence smolt year-classes beyond year 2010. No update of objectives has been set by the EU Commission after the former IBSFC Salmon Action Plan (SAP).

**RECENT MANAGEMENT ADVICE:** ICES recommends there should be no catch of wild Estonian salmon in 2008 in the Gulf of Finland.

Fisheries should only be permitted at sites where there is virtually no chance of taking wild salmon from the Gulf of Finland stocks along with reared salmon. To improve selectivity of harvesting, coastal fisheries at sites likely to be on migration paths of wild salmon from Estonian rivers should be prohibited. Poaching occurs in these rivers and must be stopped. Fishing in rivers and river mouths supporting wild stocks should be prevented.

This advice will not be updated until 2010 (for fishing in 2011) unless there is a significant change in the available data.

**STECF COMMENTS:** STECF agrees that there should be no catches of wild salmon in the Gulf of Finland.

#### **4.8. Sprat (*Sprattus sprattus*) in IIIbcd, Baltic Sea (Sub-div. 22-32)**

**FISHERIES:** All countries surrounding the Baltic Sea report landings of sprat. During the 1990s total catches increased considerably, from a level of 86,000 t in the 1990 to 529,000 t in 1997. Since then there has been a decrease and landings have since 2000 been fluctuating around 375,000 t. In 2007 total catches reached 388,000

t. Trawlers account for most of the catches. The increase in catches since 1992 is due to the development of an industrial pelagic fishery. Varying amounts of herring are taken in the fisheries for sprat.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. The age-structured assessment is based long-term catch data and three survey indices.

**MANAGEMENT AGREEMENT:** The IBSFC long-term management plan for the sprat stock was terminated in 2006. The present advice was given in relation to precautionary limits.

**PRECAUTIONARY REFERENCE POINTS:** The proposed precautionary reference point for  $F$  ( $F_{pa}$ ) is set at 0.40;  $F_{lim}$  is not defined. An integrated ecosystem assessment shows a major shift in food web composition and in environmental drivers, and therefore the biomass reference points used in previous assessments were not considered applicable anymore.

**STOCK STATUS:** Based on the most recent estimates of SSB, ICES classifies the stock as having full reproductive capacity and based on the most recent estimate of fishing mortality, ICES classifies the stock to be harvested sustainably.

**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 fishing mortality, estimated at 0.46, is above the range of fishing mortalities (0.39-0.40) that is expected to lead to high long-term yield and low risk to depletion of production potential.

*Exploitation boundaries in relation to precautionary limits:* Fishing mortality in 2009 should be below  $F_{pa} = 0.40$ , corresponding to landings of less than 291 000 t.

**STECF COMMENTS:** STECF agrees with the ICES advice on the exploitation of Baltic sprat.

STECF notes that the variability in the annual assessments of absolute stock size heavily influences the reliability of the catch forecasts for this stock. STECF recommends that a management plan that includes a harvest control rule that takes into account the imprecision in the catch forecasts be developed.

## **4.9. Regional fisheries advice for the Baltic Sea**

### **ICES advice for fisheries management**

Fisheries in the Baltic should in 2009 be managed according to the following rules:

- for Baltic Cod:
  - o eastern Baltic cod (Subdivisions 25–32): landings should not exceed 48,600t;
  - o western Baltic cod (Subdivisions 22–24): landings should not exceed 13,700 t.
- for Herring in Division IIIa and Subdivisions 22–24: advice will be available in June 2008.
- for Herring in Subdivisions 25–29+32 (excl. Gulf of Riga): catches should be less than 147, 000 t.
- for Sprat in Subdivisions 22–32: catches should be less than 291,000 t.
- for Salmon in 22–31: Because of the low at-sea survival of salmon in recent years in combination with the past high harvest rate, the spawning populations of salmon are estimated to be low. Due to the ban on the driftnet fishery as of January 2008, the catches for 2008 are expected to be lower than in 2007. This will likely result in an increased number of spawners during the next few years. However, the impact of this increased number of spawners will be offset by continued low rates of at-sea survival. In order to ensure recovery of the salmon stocks ICES recommends for 2009 that landings do not exceed the reduced catches expected for 2008.
- for Salmon in the Gulf of Finland: There should be no catch of wild salmon. Fisheries should only be permitted at sites where there is virtually no chance of taking wild salmon. To improve selectivity of harvesting, coastal fisheries at sites likely to be on migration paths of wild salmon from Estonian rivers should

be prohibited. Poaching occurs in these rivers and must be stopped. Fishing in rivers and river mouths supporting wild stocks should be prevented.

- for Sea trout: In the Gulf of Bothnia and Gulf of Finland spatial fishing restrictions, minimum mesh size for gillnets, and effort limitations should be implemented for the fisheries in the sea and in rivers carrying wild sea trout populations in order to decrease the exploitation rate. The restoration of rearing habitats and building of new fish ways should be carried out on many rivers. In the Main Basin, sea trout densities are in general below the potential levels in the area. Habitat improvements by restoration are needed and accessibility to spawning and rearing areas should be improved in many rivers. Also fishing restrictions should take place in some regions in the area.
- for other stocks (herring in the Gulf of Riga, in the Bothnian Sea, and in the Bothnian Bay) fisheries should be managed according to the precautionary limits stated in the table of individual stock limits above.

#### **STECF COMMENTS:**

STECF notes that no mixed fisheries advice for the Baltic Sea is provided by ICES. The rules provided by ICES for the management of the fisheries in the Baltic Sea are all based on single species considerations and ICES interpretation of the precautionary approach.

## **5. Deepwater Resources in the North-east Atlantic**

### **5.1. Deep-water fish (several species) in IVA, IIIa, Vb, VI, VII, VIII, IX, X and XII.**

#### **GENERAL COMMENTS AND DESCRIPTION OF FISHERIES**

The term ‘deep-water’ is defined by ICES to include waters of depths greater than 400 m. Deep water in the ICES area covers the deep parts of ICES Sub-areas I, II, III, V-X, XII, and XIV. However, some of the species included as deep-water species in the management advice by ICES are also distributed in more shallow waters, e.g. ling and tusk. Other species/stocks, which have similar depth distributions, e.g. anglerfish and Greenland halibut, are already assessed by ICES in area-specific assessment working groups.

Deep-water covers a huge area from the Arctic north to the sub-tropical south. It also covers ridges and underwater seamounts often with a quite unique biology. Productivity is very low in the deep-water. The diversity of deep-water life history strategies is considerable, but many species of fish targeted by fisheries are particularly vulnerable to disturbance because they grow slowly, mature late in life, and form aggregations easily accessible to fisheries. Recovery rates are much slower than in shallower waters. The knowledge of central biological characteristics such as stock identity, migration, recruitment, growth, feeding, maturation, and fecundity of most deep-water species still lags considerably behind that of commercially exploited shelf-based species. Such information is required to expand our understanding of the population dynamics of deep-water fishes, which in turn is required to underpin stock assessments.

Fisheries data including length and age compositions, discards, and cpue, are slowly increasing for deep-water stocks but time-series data are often short and are not available in sufficient spatial resolution for some stocks e.g. orange roughy and alfonosinos. VMS data are not readily available for most fleets.

In many cases, information on stock structure of deep-water species is lacking. This year, ICES provides advice on separate stocks of tusk (*Brosme brosme*) on the basis of new genetic evidence considered in 2007, but for the other species there is no conclusive information on stock structure. In those cases “management units” have been used that have previously been suggested on the basis of distribution, life history and biological parameters, and bathymetrical considerations.

Fisheries on deep-water species have developed rapidly and the resources they exploit are generally especially vulnerable to over-fishing. Within the ICES area species/stocks have been depleted before appropriate management measures have been implemented e.g. orange roughy. It is also of concern that the landings statistics available may not reflect the true scale of the recent fishing activity, especially in waters outside national EEZs.

In ICES Division IVa there is a by-catch of Greater silver smelt (*Argentina silus*) in the industrial trawl fishery. A longline fishery targets tusk (*Bosme brosme*) and ling with forkbeard (*Phycis blennoides*) and grenadier as a by-catch. Some deepwater species are landed as a by-catch in the trawl fisheries targeting anglerfish and Greenland halibut.

In ICES Division IIIa there is a targeted trawl fishery for roundnose grenadier (*Coryphaenoides rupestris*) and greater silver smelt. Several deep-water species are also taken as a by-catch in, for instance, the trawl fisheries for northern shrimp.

In ICES Sub-area V there are trawl fisheries targeting blue ling, redfish species, argentine and orange roughy (*Hoplostethus atlanticus*), which have as by-catch a great number of other deep-water species. There are also traditional longline fisheries for ling and tusk, and trawl and gill net fisheries for Greenland halibut and anglerfish.

In ICES Sub-areas VI and VII there are directed fisheries for blue ling, roundnose grenadier, orange roughy, black scabbardfish and deep-water sharks.

In Sub-area VIII there is a longline fishery, which mainly targets greater forkbeard, and trawl fisheries for hake, megrim, anglerfish and *Nephrops* which have a by-catch of deep-water species.

In ICES Sub-area IX some deep-water species are a by-catch of the trawl fisheries for crustaceans. Typical species are bluemouth (*Helicolenus dactylopterus*), greater forkbeard, conger eel (*Conger conger*), blackmouth dogfish (*Galeus melastomus*), kitefin shark (*Dalatias licha*), gulper shark (*Centrophorus granulosus*) and leafscale gulper shark (*Centrophorus squamosus*). There is a directed longline fishery for black scabbard fish (*Aphanopus carbo*) with a by-catch of the Portuguese dogfish (*Centroscymnus coelolepis*) and leafscale gulper shark (*Centrophorus squamosus*). There is also a longline (Voracera) fishery for *Pagellus bogaraveo*.

In ICES Sub-area X the main fisheries are by handline and longline near the Azores, and the main species landed are red (blackspot) seabream (*Pagellus bogaraveo*), wreckfish (*Polyprion americanus*), conger eel, bluemouth, golden eye perch (*Beryx splendens*) and alfonsino (*Beryx decadactylus*). At present the catches of kitefin shark are made by the longline and handline deepwater vessels and can be considered as accidental. There are no vessels at present catching this species using gillnets. Outside the Azorean EEZ there are trawl fisheries for golden eye perch, orange roughy, cardinal fish (*Epigonus telescopus*), black scabbard fish, and wreckfish.

In ICES Sub-area XII there are trawl fisheries on the mid-Atlantic Ridge for orange roughy, roundnose grenadier, and black scabbard fish. There is a multispecies trawl and longline fishery on Hatton Bank, and some of this occurs in this sub-area, some in Sub-area VI. There is considerable fishing on the slopes of the Hatton Bank, and effort may be increasing. Smoothheads (*Alepocephalus* species.) were previously usually discarded but now feature to a greater extent in the landings statistics.

In ICES Sub-area XIV there are trawl and longline fisheries for Greenland halibut (*Rheinhardtius hippoglossoides*) and redfish that have by-catches of roundnose grenadier, roughhead grenadier (*Macrourus berglax*) and tusk.

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

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been defined for these stocks.

**STOCK STATUS:** No update or benchmark stock assessments could be made in 2008, and information on exploitation rates remains uncertain. The information on stock status of deep-water species derives from different sources. In many cases the main source of information is catch rates from the commercial fisheries, although in some cases there is also information from research surveys. A number of research surveys have been initiated in recent years, and these are expected to aid the future knowledge on these species.

**MANAGEMENT MEASURES** Some fisheries are regulated by unilateral or internationally agreed TACs and these may have reduced exploitation /curbed expansion.

In the NEAFC regulatory area, NEAFC has in recent years introduced measures requiring that effort should be reduced by a total of 35% by 2008 and the EU introduced measures in 2006 that set effort for vessels holding deepwater licences to 80% of the 2003 level.

**RECENT MANAGEMENT ADVICE:** For a number of deep-water and elasmobranch stocks, the new information available since the last advice in 2006 is too sparse to warrant a new advice. This generally refers to situations where only landings information is available from which stock status cannot be derived. In those cases, ICES presents the updated (landings) information but reiterates the advice provided in 2006 and does not

provide the full descriptions of the background of the fisheries and the assessment. To improve the knowledge base on these stocks, it is vital to develop indicators of abundance (i.e. surveys, cpue) and/or indicators of exploitation (i.e. fishing effort).

Deep-water stocks have previously been classified by ICES (ICES, 2005) on the basis of longevity and growth rate.

Only in very rare cases did ICES have information on indicators for exploitation pressure (e.g. fishing mortality). The approach to the ICES advice on deep-water species has been largely driven by the interpretation of the available abundance indicators (cpue or survey indicators) and the classification according to life history parameters:

- For species in cluster 1 (highly vulnerable)
  - When cpue information shows declines and life history information indicates that species are highly vulnerable, ICES generally recommends no catches of that species.
- For species in cluster 2 (less vulnerable)
  - When recent cpue is much lower than historical cpue, ICES generally recommends a reduction in catch or a low catch, maintaining that level until there is sufficient information that the species can sustain higher exploitation.
  - When cpue information shows no clear trend, ICES generally recommends recent average catches.
  - When surveys show a clear increase in abundance, ICES generally recommends no increase in current catches.

ICES reiterates that effort should be a driving management tool in these mixed deep-water fisheries. However, in the absence of pressure indicators, ICES has attempted to interpret the available landings and cpue data in a way that could be useful even when effort information is not available. The perceived tendency of the stock indicators (cpue, surveys) has been used to argue for the suggested changes to the landings. While acknowledging that a one-to-one relationship between catches and effort is unlikely ICES, in the absence of information, considers that the suggested reductions in landings would result in reductions of effort.

The ICES advice for deep-water species is provided every second year. The advice is applicable for 2009 and 2010.

These have been supplemented by new advice arising from recent requests to ICES made by NEAFC. New ICES advice on deep-water species will be provided in 2010.

**STECF COMMENTS:** STECF agrees with the ICES recommendation and considers the proposals as a constructive way forward in the light of uncertainties on the states of these stocks and the likely risks to them. STECF notes that appropriate sustainable exploitation rates for most deepwater species have not been determined and the risks associated with current fishing effort are not quantified. Given the biology of many of these species, very low exploitation rates or zero fishing are likely to be advised in most cases.

STECF once again reiterates its comment that management measures based on effort/fleet regulation are a more appropriate long-term approach for management of these fisheries and consequently fisheries based advice, in addition to that currently given, has value. STECF notes that in its advice for some species, ICES groups together stock components that are characterised by a shortage of data rather than on a biological basis. STECF suggests that in order to provide rational fisheries based advice, there is a need to define groupings, which have a spatial coherence that facilitates management. STECF further suggests that continued efforts should be made to define biological units based on, for example, genetic studies.

ICES has commented in 2006 on the precautionary reference points used for some stocks. Reference points that were previously suggested were:  $U_{lim} = 0.2 * U_{max}$  and  $U_{pa} = 0.5 * U_{max}$  (where U is the index of exploitable biomass). The ICES SGPA and NAFO proposed these reference points in 1997 for use in data poor situations. However, for most stocks ICES does not consider the available cpue series as suitable for defining  $U_{max}$  because the series are too short and  $U_{max}$  is not an index virgin biomass. STECF agrees that this is a valid point but in a data-poor situation and in the precautionary context, these reference points are likely to be the best available for these stocks, even though they may underestimate depletion/overestimate recovery in relation to actual  $U_{max}$ .

STECF notes that in any scheme to reduce existing fisheries in the short-term, attention would need to be paid to potential effort displacement into other neighbouring fisheries on the continental shelf. STECF further notes that several of these deep-water fisheries take place in international waters outside national or EU jurisdiction. Hitherto this has rendered it difficult to enforce management measures for these fisheries.

## 5.2. Alfonsinos/Golden eye perch (*Beryx spp.*)

**FISHERIES:** The section deals with two species, *Beryx splendens* and *B. decadactylus*. Most of the landings of *Beryx* are from hand-lines and long-lines within the Azorean EEZ of Sub-area X and by trawl outside the EEZ on the Mid-Atlantic Ridge. The trawl fishery landings refer to both species combined. Under reporting of catches from international waters is suspected. Alfonsinos aggregate in shoals, often associated with seamounts, and the fisheries have high catch rates once the shoals are located. Localized sub-units of the population can be quickly depleted by fisheries, even within a single season. In various seamounts of ICES Sub-area X there are some indications that the stocks were intensely exploited during the last decade.

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

**STOCK STRUCTURE:** The stock structure of both species is uncertain. They are distributed over a wide area, which may be composed of several populations.

**REFERENCE POINTS:** No precautionary reference points have been proposed for the stock(s) of Alfonsino/golden eye perch in the NE Atlantic, due to the lack of appropriate data.

**STOCK STATUS:** Assessment data are sparse and reliable assessments are not possible at present.

**RECENT MANAGEMENT ADVICE:** Due to their spatial distribution associated with seamounts, their life history and their aggregation behaviour, alfonsinos/golden eye perch are easily overexploited by trawl fishing; they can only sustain low rates of exploitation. Fisheries on such species should not be allowed to expand above current levels unless it can be shown that such expansion is sustainable. To prevent wiping out entire subpopulations that have not yet been mapped and assessed the exploitation of new seamounts should not be allowed.

**STECF COMMENTS:** STECF agrees with the ICES advice, and notes that there may be a need to harmonise management measures in Sub-area X with those for red (blackspot) seabream.

## 5.3. Ling (*Molva molva*)

**FISHERIES:** Ling is primarily fished in the depth range 200-500 m, though it is also found in shallower depths. This species does not have such extreme low productivity and high longevity as typical deep-water species, though specific data for many areas are lacking. The major fisheries are the longline and gillnet fisheries, but there are also by-catches in other gears, i.e. trawls and handline.

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

**STOCK STRUCTURE:** There is insufficient scientific information to establish the extent of putative stocks; however, ling may be sufficiently isolated at separate fishing grounds to be considered as individual management units. On this basis ICES advice is presented for the following management units:

- Divisions I and II (Arctic)
- Va (Iceland)
- Vb (Faroes)
- IIIa, IVa, VI, VII, VIII, IX, XII, and XIV (other areas).

### 5.3.1. Ling in Divisions I and II (Arctic)

**REFERENCE POINTS:** No precautionary reference points have been established.

**STOCK STATUS:** Commercial cpue for Norwegian longliners has in recent years been lower than observed in the 1970s and 80s. There is some evidence of a recent increase.

**RECENT MANAGEMENT ADVICE:** Cpue in Areas I and II has been at a reduced level. ICES reiterates the advice to constrain catches to 6,000 t and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

**STECF COMMENTS:** STECF agrees with the ICES advice, but notes there may be a need to harmonise management measures for ling and tusk in this area.

### 5.3.2. Ling in Va (Iceland)

**REFERENCE POINTS:** In common with other deep-water stocks,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998). In the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be calculated.

**STOCK STATUS:** A survey biomass index shows increasing abundance since 2000. The levels are currently at a similar high level as in the start of the series. There are indications that fishing mortality may have declined in recent years.

**RECENT MANAGEMENT ADVICE:** Surveys indicate that the overall biomass is increasing. Landings have also increased. ICES recommends constraining catches to 7500 t (recent average 2006–2007) and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

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

### 5.3.3. Ling in Vb (Faroes)

**REFERENCE POINTS:** In common with other deep-water stocks,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998). In the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be calculated.

**STOCK STATUS:** Abundance indices suggest that ling in the management unit Vb is stable at a low level compared with the 1970s and 80s.

**RECENT MANAGEMENT ADVICE:** Cpue in Area Vb has been at a reduced level. ICES reiterates the advice that effort should not be allowed to increase and that information should be collected that can be used to evaluate a long-term sustainable level of exploitation.

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

### 5.3.4. Ling in IIIa, IVa, VI, VII, VIII, IX, XII, and XIV (Other areas)

**REFERENCE POINTS:** In common with other deep-water stocks,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998). In the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be calculated.

**STOCK STATUS:** The cpue series of the main fleet in Divisions IVa, Via, and VIb suggest that the abundance has remained at a reduced level after the decline in the 1970s to 1990s.

**RECENT MANAGEMENT ADVICE:** Cpue in these areas has been at a reduced level. ICES reiterates the advice to constrain catches to 10,000 t and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

**STECF COMMENTS:** STECF agrees with the ICES advice but notes there is a need to harmonise management measures for ling and tusk in these other areas. STECF considers that there is no biological basis to consider ling in these areas as a unit stock and should not be considered as a single management unit.

## 5.4. Blue Ling (*Molva dypterygia*).

**FISHERIES:** The majority of landings are from the Norwegian coast (II), Iceland (Va), Faroes (Vb), west of Scotland and Rockall Trough (VI) and the Mid-Atlantic Ridge and Hatton Bank (XII). Landings from the west

of Ireland and Western Approaches (VII) and further south are very small. A major part of this fishery is on spawning aggregations. Landings from Division IIa are mainly catches in a gillnet fishery off mid-Norway, elsewhere this species is taken mainly as by-catch in trawl fisheries.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. No reliable analytical assessments are available.

**STOCK STRUCTURE:** There is insufficient scientific information to establish the extent of putative stocks; however, blue ling may be sufficiently isolated at separate fishing grounds to be considered as individual management units. On this basis advice is presented for the following management units:

- Subdivisions Va and XIV (Iceland and Reykjanes ridge);
- Subdivisions Vb, VI, and VII (Faroes Rockall and Celtic shelf); and
- Subdivisions I, II, IIIa, IVa, VIII, IX, and XII.

The latter grouping is a combination of isolated fishing grounds and these areas are grouped thus due to lack of data. Blue ling is more vulnerable to over-exploitation than ling due to a slower growth rate and higher age at first maturity. It is particularly susceptible to rapid local depletion due to its highly aggregating behaviour during spawning. Ageing is a problem in this species, and thus age-structured analytical assessments are unlikely in the short-term.

#### 5.4.1. Blue Ling in Va and XIV

**REFERENCE POINTS:** In common with other deep-water stocks,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998). In the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be calculated.

**STOCK STATUS:** Cpue of blue ling in Va and XIV has steadily declined from 1991 to 2000 and has remained at a low level since then.

**RECENT MANAGEMENT ADVICE:** There should be no directed fisheries and measures should be implemented to minimise catches in mixed fisheries. Blue ling is susceptible to sequential depletion of spawning aggregations and closed areas to protect spawning aggregations should therefore be maintained and expanded where appropriate.

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

#### 5.4.2. Blue Ling in Vb, VI and VII

**REFERENCE POINTS:** In common with other deep-water stocks,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998). In the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be calculated.

**STOCK STATUS:** Cpue information suggests that the abundance of blue ling remains at a low level.

**RECENT MANAGEMENT ADVICE:** There should be no directed fisheries for blue ling in Subdivisions Vb, VI and VII and measures should be implemented to minimise catches in mixed fisheries. Blue ling is susceptible to sequential depletion of spawning aggregations and closed areas to protect spawning aggregations should therefore be maintained and expanded where appropriate.

**STECF COMMENTS:** STECF agrees with the ICES advice. To discourage any directed fishing on blue ling, STECF recommends the following:

- the current trip limit of 25 t per trip should be substantially reduced.
- closure of spawning areas

The additional information available following the ICES response to the NEAAFC request (ICES advice 2008, book 9, section 9.3.2.7) on spawning aggregations of blue ling is sufficient to identify specific spawning aggregations on Hatton Bank, Rosemary Bank, Lousy Bank and the continental slope to the NW of Scotland (see section 11.1 of the STECF/PLEN-08-02 report).

### 5.4.3. Blue ling in other areas (I, II, IIIa, IVa, VIII, IX, and XII)

**REFERENCE POINTS:** No precautionary reference points have been established for this species in these areas.

**STOCK STATUS:** Trends in landings suggest serious depletion, at least in Sub-areas IIa and IIb.

**RECENT MANAGEMENT ADVICE:** There should be no directed fisheries and management measures should be taken to minimise the by-catch of this species in mixed fisheries. Blue ling is susceptible to sequential depletion of spawning aggregations and closed areas to protect spawning aggregations should therefore be maintained and expanded where appropriate.

**STECF COMMENTS:** STECF agrees with the ICES advice. STECF considers that there is no biological basis to consider blue ling in these areas as a unit stock and should not be considered as a single management unit.

## 5.5. Tusk (*Brosme brosme*)

**FISHERIES:** Tusk is primarily fished in the depth range 200-500 m, though it is also found at shallower depths. Tusk is more vulnerable to overexploitation than ling due to a slower growth rate and higher age at first maturity. The majority of landings are from ICES sub-areas IIa, IIIa, from along the Norwegian coast of IVa, Va (around Iceland), and Vb (around Faroe Islands). This species is taken mainly in long line fisheries, and most of the catches are by-catches in ling fisheries. Tusk is also taken as by-catch in bottom trawl fisheries.

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

**STOCK STRUCTURE:** This year, ICES provided advice on separate stocks of tusk on the basis of new genetic evidence considered in 2007. On this basis advice is presented for the following revised management units:

- I and II (Arctic)
- Division Va and Subarea XIV
- The Mid-Atlantic Ridge (Division XII excluding XIIb)
- Subarea VIIb (Rockall)
- IIIa, IV, Vb, VIa, VII, VIII, IX, XIIb, . (This latter grouping is a combination of isolated fishing grounds and these areas are grouped due to their mutual lack of data.)

### 5.5.1. Tusk in Divisions I and II (ARCTIC)

**REFERENCE POINTS:** In common with other deep-water stocks,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998). In the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be calculated.

**STOCK STATUS:** Tusk has been exploited in Sub-areas I and II for centuries, but landings increased from the 1950s onwards. The state of the stock is unknown. CPUE has in recent years been well below historical levels.

**RECENT MANAGEMENT ADVICE:** Cpue in Areas I and II has been at a reduced level. ICES reiterates the advice to constrain catches to 5,000 t and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

**STECF COMMENTS:** STECF agrees with the ICES advice, but notes there is a need to harmonise management measures for ling and tusk in this area.

### 5.5.2. TUSK Va and Subarea XIV

**REFERENCE POINTS:** In common with other deep-water stocks,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998). In the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be calculated.

**STOCK STATUS:** The state of the stock is unknown. Recruitment has increased from a low level in 1995. There are indications that fishing mortality may have declined in recent years.

**RECENT MANAGEMENT ADVICE:** Surveys indicate that the overall biomass is increasing but consists mostly of small individuals. ICES reiterates the earlier advice to constrain catches to 5000 t (average 2001–2004) to allow the juveniles to recruit to the adult stock. ICES also recommends collecting information that can be used to evaluate a long-term sustainable level of exploitation.

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

### **5.5.3. Tusk on the Mid-Atlantic Ridge (Division XII excluding XIIb)**

**REFERENCE POINTS:** Reference points for this stock have not been calculated. Reference points that were previously suggested for tusk would be based on unexploited abundance; however, the data to calculate this point do not exist.

**STOCK STATUS:** Fisheries in this area take very small catches of tusk. There is no information on the state of the stock.

**RECENT MANAGEMENT ADVICE:** Fisheries on tusk should be accompanied by programmes to collect data on both target and by-catch fish. Fisheries should not be allowed to expand unless there is information that can be used to evaluate a long-term sustainable level of exploitation.

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

### **5.5.4. Tusk in Subarea VIb (Rockall)**

**REFERENCE POINTS:** Reference points for this stock have not been calculated. Reference points that were previously suggested for tusk would be based on unexploited abundance; however, the data to calculate this point do not exist.

**STOCK STATUS:** The state of the stock is unknown. Cpue does not indicate apparent changes under the historic catch regime.

**RECENT MANAGEMENT ADVICE:** Cpue in Rockall does not indicate any clear trends. Therefore, recent levels of catches do not appear to have had a negative impact. ICES recommends that catches should be constrained to 530 t (average 2003–2007) and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

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

### **5.5.5. Tusk in IIIa, IV, Vb, VIa, VII, VIII, IX, XIIb (Other areas)**

**REFERENCE POINTS:** Reference points for this management unit have not been calculated. Reference points that were previously suggested for tusk would be based on unexploited abundance; however, the data to calculate these points do not exist.

**STOCK STATUS:** Cpue indicators for Divisions IVa, VIa, and Vb suggest that tusk abundance has been at a reduced level but may be increasing.

**RECENT MANAGEMENT ADVICE:** Cpue in these areas has been at a reduced level but may have been increasing in recent years. Because of these uncertainties, ICES recommends to constrain catches to 5000 t and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

**STECF COMMENTS:** STECF agrees with the ICES advice but notes there is a need to harmonise management measures for ling and tusk in these areas. STECF considers that there is no biological basis to consider tusk in these areas as a unit stock and should not be considered as a single management unit.

## 5.6. Greater silver smelt or argentine (*Argentina silus*)

**FISHERIES:** Argentine is primarily fished in the depth range 100 to 700 m. The majority of landings are from ICES sub-areas IIa, IIIa, IVa along the Norwegian coast, Va (around Iceland), and Vb (around Faroe Islands). This species is taken mainly in long line fisheries, and most of the catches are by-catches in ling fisheries. This species is also taken as by-catch in bottom trawl fisheries. The Norwegian fishery accounts for the more than 50% of total catches.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is ICES. No reliable analytical assessment is available.

**STOCK STRUCTURE:** There is insufficient scientific information to establish the extent of putative stocks; however, argentine may be sufficiently isolated at separate fishing grounds to be considered as individual management units. On this basis advice is presented for the following management units:

- Sub-area Va (Iceland); and
- Sub-areas I, II, IIIa, IVa, Vb, VI, VII, VIII, IX, and XII (other areas).

The latter grouping is a combination of isolated fishing grounds and these areas are thus grouped due to their mutual of lack of data.

### 5.6.1. Greater silver smelt in Va

**REFERENCE POINTS:** No precautionary reference points have been established for stocks of this species.

**STOCK STATUS:** The status of greater silver smelt in Subdivision Va is unknown.

**RECENT MANAGEMENT ADVICE:** Due to its low productivity greater silver smelt can only sustain low rates of exploitation. Fisheries on such species should always be accompanied by programmes to collect data on both target and by-catch fish. The fishery should not be allowed to expand unless it can be shown that it is sustainable.

**STECF COMMENTS:** STECF agrees with the comments of ICES, but notes there may be a need to harmonise management measures with those for redfish and blue whiting.

### 5.6.2. Greater silver smelt in other areas (I, II, IIIa, IV, Vb, VI, VII, VIII, IX, X, XII and XIV)

**REFERENCE POINTS:** No precautionary reference points have been established for stocks of this species.

**STOCK STATUS:** The state of the silver smelt resource in other areas is unknown. Catches increased considerably in recent years, but were reduced in 2003 in some areas, partly due to introduction of TAC management in EU waters. In Subarea VI the frequency of old fish (20+) in the catches declined significantly after a few years of target fisheries. Such changes suggest high exploitation rates.

**RECENT MANAGEMENT ADVICE:** Due to its low productivity greater silver smelt can only sustain low rates of exploitation. Fisheries on such species should always be accompanied by programmes to collect data on both target and by-catch fisheries. The fishery should not be allowed to expand unless it can be shown that it is sustainable.

**STECF COMMENTS:** STECF agrees with the comments from ICES, but notes there may be a need to harmonise management measures with those for roundnose grenadier in IIIa and small-mesh bottom trawl industrial fisheries mainly in IVa.

## 5.7. Black scabbardfish (*Aphanopus carbo*)

**FISHERIES:** Black scabbardfish is caught in two very different fisheries: (1) in waters off Mainland of Portugal (Division IXa) and (2) to the west of British Isles. In the waters off Mainland of Portugal it is taken in a targeted artisanal longline fishery and CPUE data have been relatively stable over the years. To the west of the British Isles it is taken in a mixed species, mainly French trawl fishery along with roundnose grenadier and sharks.

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

**STOCK STRUCTURE:** The stock structure is uncertain. This section deals with a species distributed over a wide area which may be composed of several populations. Three management units are considered:

- northern (Sub-areas V, VI, VII, and XIIb);
- southern (Sub-areas VIII and IX).
- Other areas (Sub-areas I, II, IIIa, IV, X, and XIV)

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

**STOCK STATUS:** The status of the species is unknown. In the northern area, indicators show a decline in abundance since 1990. In the southern area indicators have been relatively stable during the past decade. In the other areas only very small catches have been taken. Due to its low productivity, black scabbardfish can only sustain low rates of exploitation.

**RECENT MANAGEMENT ADVICE:** Despite the lower landings in recent years, cpue in Areas Vb, VI, VII, and XIIb has declined to about 20% of its initial level. ICES recommends that catches should be constrained to 2000 t (50% of the level before the expansion of the fishery, 1993–1997). The fishery should not be allowed to expand unless it can be shown that it is sustainable.

Cpue in Subareas VIII and IX does not indicate any clear trends, but no information is available before 1996. Recent levels of catches do not appear to have had a negative impact. ICES recommends that catches in these areas should be constrained to 2800 t (average 2003–2007) and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

**The fishery in other areas should not be allowed to expand unless it can be shown that it is sustainable.**

**STECF COMMENTS:** STECF recommends that in order to reverse the observed decline in the stock of black scabbard in Vb, VI, VII and XIIb, a significant reduction in fishing mortality is required. STECF advises that if fully enforced, the measures advised by ICES may achieve such a reduction.

STECF recommends that an attempt be made to harmonise management measures for black scabbard in Vb, VI, VII and XIIb with those for other species taken in the mixed trawl fishery in these areas, particularly deep-water sharks and roundnose grenadier.

For black scabbard in other areas, STECF agrees with the ICES advice.

## **5.8. Greater forkbeard (*Phycis blennoides*)**

**FISHERIES:** The landings of greater forkbeard are mainly by-catch from both trawl and longline fisheries. Landings from Sub-areas VI and VII comprise around the 85% of the total landings of this species in the ICES area. Fluctuations in landings are probably the result of changing effort on different target species and/or market prices. The increase in landings in Sub-areas VIII and IX probably represents a directed longline fishery.

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

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

**STOCK STATUS:** There is no information available that allows for evaluation of the stock trends. The state of the stock is unknown.

**RECENT MANAGEMENT ADVICE:** Fisheries on greater forkbeard should be accompanied by programmes to collect data. The fishery should not be allowed to expand unless it can be shown that it is sustainable.

**STECF COMMENTS:** STECF agrees that fisheries catching Greater forkbeard should not be allowed to expand unless there is information that can be used to evaluate a long-term sustainable level of exploitation.

## **5.9. Orange roughy (*Hoplostethus atlanticus*)**

**FISHERIES:** The directed fishery for orange roughy aggregations west of Ireland in Sub-area VII has now ceased. The fishery in Sub-area VI has decreased dramatically since the depletion of the main aggregation on the Hebrides Terrace Seamount in the early 1990s and there has not been a major directed fishery since 2002. Faroese fisheries in Sub-areas VI, XII, and X have ceased and so has an Icelandic fishery in Division Va.

. In Sub-area XII, the Faroes dominated the fishery throughout the 1990s, with small landings by France. In recent years, New Zealand and Ireland have targeted orange roughy in this area. There are many areas of the Mid-Atlantic Ridge where aggregations of this species occur, but the terrain is very difficult for trawlers.

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

**STOCK STRUCTURE:** It is not known if individual aggregations are reproductively distinct.

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

**STOCK STATUS:** Orange roughy form discrete aggregations, which are susceptible to sequential depletion.

Orange roughy catches in Subarea VI increased rapidly and subsequently dropped. Orange roughy cpue in Subarea VI has shown a strong declining trend since early 1990s. It is presumed that the aggregations were fished out. Landings have declined to low levels in each management area (VI, VII, and other).

Orange roughy fisheries in Subarea VII have exhibited a similar pattern to that in VI. High catches have not been sustained by individual fleets and have dropped to low levels, suggesting sequential depletion. Orange roughy cpue in Subarea VII has shown a strong declining trend since the early 1990s. It is unclear if there are unfished aggregations remaining in Subarea VII.

**RECENT MANAGEMENT ADVICE:** Orange roughy can only sustain very low rates of exploitation. Currently, it is not possible to manage a sustainable fishery for this species. ICES recommends no directed fishery for this species. By-catches in mixed fisheries should be as low as possible.

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

## **5.10. Roundnose grenadier (*Coryphaenoides rupestris*)**

**FISHERIES:** The majority of international landings are from the Skagerrak (III), Faroes (Vb), west of Scotland and Rockall Trough (VI), west of Ireland and Western Approaches (VII) and the Mid-Atlantic ridge and western Hatton Bank (XII). In most areas, roundnose grenadier is the target species of mixed trawl fisheries.

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

**STOCK STRUCTURE:** This section deals with a species distributed over a wide area, which may be composed of several populations. The scientific basis for stock identification is uncertain. The Wyville-Thomson Ridge and fjord sills, between Western Scotland and the edge of the North Sea slope, could be natural physical boundaries. It is therefore considered that the northern North Sea and the Norwegian Deep could represent a separate unit. The roundnose grenadier on the Mid-Atlantic Ridge and the Hatton Bank are separated by a major oceanic basin and may constitute separate units. This would indicate that the units could be split as:

- Divisions IIIa;
- Divisions Vb, VI, VII, and XIIb (Hatton bank);
- Mid-Atlantic ridge (Subdivisions Xb, XIIc, Va1, XIIa1, and XIVb1) ;
- All other areas (I, II, IV, Va2, VIII, IX, XIVa, XIVb2).

### 5.10.1. Roundnose grenadier in Division IIIa

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

**STOCK STATUS:** It has not been possible to assess the status of the stock. However, as scientific investigations have indicated slow growth of this species, the drastic increase in exploitation of this stock during the years 2003–2005 gave rise for serious concern, even if no clear signs of the increasing fishing pressure were observed in recent years. No directed fishery has taken place since 2007. A decrease in mean length in the catch from 1987 to 2004 and 2005 indicates heavy exploitation on this stock.

**RECENT MANAGEMENT ADVICE:** Due to its low productivity, roundnose grenadier can only sustain low rates of exploitation. ICES reiterates the advice to constrain catches to 1000 t, which corresponds to the catch level before the expansion of the fishery (1988–1991). The fishery should not be allowed to expand again unless it can be shown that it is sustainable.

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

### 5.10.2. Roundnose grenadier in Subareas VI and VII and in Divisions Vb and XIIb

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

**STOCK STATUS:** Overall the stock status is uncertain, but there is some evidence of biomass depletion for Vb, VI and VII.

Survey data from the west of Scotland (Division VI) indicate that grenadier does not occur in the shallower waters. Length distribution of French landings indicates a change towards smaller fish. The results of an exploratory age-structured assessment of the stock in Subareas VI and VII and in Division Vb indicate that the total biomass has declined consistently since 1996.

**RECENT MANAGEMENT ADVICE:** Due to its low productivity, roundnose grenadier can only sustain low rates of exploitation. Cpue in the areas has been at a reduced level. ICES recommends that catches should be constrained to 6000 t (50% of the level before the expansion of the fishery, 1990–1996). The fishery should not be allowed to expand unless it can be shown that it is sustainable.

**STECF COMMENTS:** STECF recommends that in order to reverse the observed decline in the stock of roundnose grenadier in Vb, VI, VII and XIIb, a significant reduction in fishing mortality is required. STECF notes the dramatic decline in the landings of roundnose grenadier from this area from a level of 50,000 t in 2001 to 9,000 t in 2006. The reported landings for 2007 are about 3,000 t.

To ensure a significant reduction in fishing mortality STECF advises that it may be necessary to ensure that catches are lower than the TAC advised by ICES.

Given that roundnose grenadier is taken in a deepwater mixed fishery, there is a need to harmonise management measures to account for the management requirements for other species taken.

### 5.10.3. Roundnose grenadier on the Mid-Atlantic ridge (Xb, XIIc, Va1, XIIa1, and XIVb1)

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

**STOCK STATUS:** The state of the stock is uncertain. Soviet data suggested a high biomass in the 1970–1980s. Cpue data suggest an overall decline in catch rates after the 1970s (Figure 9.4.15.3.1). A Russian trawl acoustic survey in 2003 showed relatively low biomass of the pelagic component of the stock, an increasing depth of the aggregations, and a higher number of small immature fish.

**RECENT MANAGEMENT ADVICE:** Due to its low productivity, roundnose grenadier can only sustain low rates of exploitation. Fisheries on such species should always be accompanied by programmes to collect data on both target and by-catch fisheries. The fishery should not be allowed to expand from the current low level unless it can be shown that it is sustainable.

**STECF COMMENTS:** STECF recommends that fisheries on the mid-Atlantic ridge should not be allowed to expand unless there is information that can be used to evaluate a long-term sustainable level of exploitation for roundnose grenadier.

#### **5.10.4. Roundnose grenadier in all other areas. (I, II, IV, Va2, VIII, IX, XIVa, and XIVb2)**

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

**STOCK STATUS:** This assessment unit consists of a number of discrete areas in which only very small catches of roundnose grenadier occur.

**RECENT MANAGEMENT ADVICE:** Due to its low productivity, roundnose grenadier can only sustain low rates of exploitation. Fisheries on such species should always be accompanied by programmes to collect data on both target and by-catch fisheries. The fishery should not be allowed to expand unless it can be shown that it is sustainable.

**STECF COMMENTS:** STECF recommends that deepwater mixed fisheries in I, II, IV, Va<sub>2</sub>, VIII, IX, XIVa, and XIVb<sub>2</sub> should not be allowed to expand unless there is information that can be used to evaluate a long-term sustainable level of exploitation for roundnose grenadier.

### **5.11. Red (blackspot) seabream (*Pagellus bogaraveo*)**

**FISHERIES:** There is a directed hand-line and longline fishery in Sub-areas IX and X. Red seabream have been caught in hook and line fisheries off the Azores since the 16th Century. There are now directed artisanal hand-line as well as longline fisheries in area Xa2. Historically, improvements in fishing technology have taken place in the directed hand-line and longline fisheries. These include the introduction of bottom longlines and bigger fishing vessels. The resulting improvement on fishing efficiency has not been quantified. Red seabream is caught by Spanish and Portuguese fleets in Sub-area IX. The Spanish artisanal longline fishery targeting red sea began in early 1980s. After 1997 there was a serious decline in landings. In Sub-areas VI, VII and VIII Red seabream appears as by-catch in the longline and trawl fisheries for hake, megrim, anglerfish, and *Nephrops*.

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

**STOCKS STRUCTURE:** The stock structure is uncertain. This section deals with a species distributed over a wide area, which may be composed of several populations. Three units are considered:

- Sub-areas VI, VII, and XII;
- Sub-area IX;
- Sub-area X.

This management unit division is supported by information on genetics and tagging.

**REFERENCE POINTS:** No precautionary reference points have been established for the stock(s) of this species.

#### **STOCK STATUS (ALL STOCKS):**

Red seabream in VI, VII, and VIII appears to be severely depleted based on historical catches.

Red seabream in Subarea IX is depleted and there is no evidence of a significant recovery as a result of the local recovery plan in Spanish waters of the Strait of Gibraltar.

The status in Subarea X is uncertain but there are signs of increases in indices of abundance from surveys. The cpue in the fishery is stable. It is possible that sequential depletion of local populations may occur and this may contribute to the stability of the commercial cpue series.

**RECENT MANAGEMENT ADVICE:** Catches in Subareas VI, VII, and VIII have been very low for the last 20 years and ICES recommends that the fishery should not be allowed to expand unless it can be shown that it is sustainable.

ICES recommends that catches in Areas IXa and Xa should be constrained to recent average catches (2003–2007) of 500 t in Area IXa and 1050 t in Area Xa and to collect information that can be used to evaluate a long-term sustainable level of exploitation.

**STECF COMMENTS:** STECF agrees with the ICES advice and notes that studies focussing on defining the spatial distribution of juveniles should be carried out with the aim of implementing management measures to protect juveniles and to conserve the proportion of males in the populations (which may require increasing minimum landing sizes in all areas to 35 cm). In Sub-area IX, the local technical measures relating to the Regional Recovery Plan for this species should be maintained/improved.

## **5.12. 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 by-catches 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 due to stock depletion and the introduction and gradual reduction in EU TACs and quotas in response to ICES advice, which in recent years has been for a zero TAC. However, deep-water sharks continue to be taken as a by-catch in a mixed deep-water trawl fishery in Vb, VI and VII and in a long-line fishery in Sub-area IX.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. No analytical assessment was carried out in 2008. 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:** No reference points have been defined for this species. In common with other deep-water species, Ulim has previously been proposed at 0.2\* virgin biomass and Upa at 0.5\* virgin biomass (ICES, 1998) but in the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be estimated.

**STOCK STATUS:** There is insufficient information to separate the landings of Portuguese dogfish *Centroscymnus coelolepis* and leafscale gulper shark *Centrophorus squamosus*. Total international landings of the combined species have steadily increased to around 11 000 t in 2003 and have rapidly declined after 2003 to the lowest levels since the fishery started. Substantial declines in cpue series for the two species in Subareas V, VI, and VII suggest that both species are severely depleted and that they have been exploited at unsustainable levels. In Division IXa, lpue series are stable for leafscale gulper shark and declining for Portuguese dogfish.

**RECENT MANAGEMENT ADVICE:** Due to its very low productivity, Portuguese dogfish and leafscale gulper shark can only sustain very low rates of exploitation. The rates of exploitation and stock sizes of deepwater sharks cannot be quantified. However, based on the cpue information, Portuguese dogfish and leafscale gulper shark are considered to be depleted. Given their very poor state, ICES recommends a zero catch of Portuguese dogfish and leafscale gulper shark.

**STECF COMMENTS:** STECF agrees with the ICES advice for Portuguese dogfish and leafscale gulper shark.

STECF also recommends that EU fisheries exploiting deepwater sharks should not proceed until sustainable exploitation rates for deepwater sharks have been determined.

STECF further advises that in order to maximise protection of deep-water sharks, the gill netting ban introduced in 2006 (EC council regulation 51/2006Annex III) in waters deeper than 600m should be maintained. STECF supports the proposal to extend the gill net ban to other areas (Council regulation (EC) 40/2008, Annex III)

### **5.13. 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 mid-1990s 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 due to stock depletion and the introduction and gradual reduction in EU TACs and quotas in response to ICES advice, which in recent years has been for a zero TAC. However, deep-water sharks continue to be taken as a by-catch in a mixed deep-water trawl fishery in Vb, VI and VII and in a long-line fishery in Sub-area IX.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. No analytical assessment was carried out in 2008. 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:** No reference points have been defined for this species. In common with other deep-water species, Ulim has previously been proposed at 0.2\* virgin biomass and Upa at 0.5\* virgin biomass (ICES, 1998) but in the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be estimated.

**STOCK STATUS:** There is insufficient information to separate the landings of Portuguese dogfish *Centroscymnus coelolepis* and leafscale gulper shark *Centrophorus squamosus*. Total international landings of the combined species have steadily increased to around 11 000 t in 2003 and have rapidly declined after 2003 to the lowest levels since the fishery started. Substantial declines in cpue series for the two species in Subareas V, VI, and VII suggest that both species are severely depleted and that they have been exploited at unsustainable levels. In Division IXa, lpue series are stable for leafscale gulper shark and declining for Portuguese dogfish.

**RECENT MANAGEMENT ADVICE:** Due to its very low productivity, Portuguese dogfish and leafscale gulper shark can only sustain very low rates of exploitation. The rates of exploitation and stock sizes of deepwater sharks cannot be quantified. However, based on the cpue information, Portuguese dogfish and leafscale gulper shark are considered to be depleted. Given their very poor state, ICES recommends a zero catch of Portuguese dogfish and leafscale gulper shark.

**STECF COMMENTS:** STECF agrees with the ICES advice for Portuguese dogfish and leafscale gulper shark.

STECF also recommends that EU fisheries exploiting deepwater sharks should not proceed until sustainable exploitation rates for deepwater sharks have been determined.

STECF further advises that in order to maximise protection of deep-water sharks, the gill netting ban introduced in 2006 (EC council regulation 51/2006Annex III) in waters deeper than 600m should be maintained. STECF supports the proposal to extend the gill net ban to other areas (Council regulation (EC) 40/2008, Annex III)

### **5.14. Kitefin shark (*Dalatias 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 2008.

**PRECAUTIONARY REFERENCE POINTS** No reference points have been defined for this species. In common with other deep-water species,  $U_{lim}$  has previously been proposed at 0.2\* virgin biomass and  $U_{pa}$  at 0.5\* virgin biomass (ICES, 1998) but in the absence of abundance indices that correspond to the start of the fishery, the reference points cannot be estimated.

**STOCK STATUS:** No new information available.

**RECENT MANAGEMENT ADVICE:** The new information available for kitefin shark (*Dalatias licha*) in the North Atlantic is too sparse to revise the advice from 2006. The advice for 2009 and 2010 is therefore the same as the advice given in 2006: “This stock is managed as part of the deep-sea shark fisheries. No targeted fisheries should be permitted unless there are reliable estimates of current exploitation rates and sufficient data to assess productivity.”

**STECF COMMENTS:** STECF agrees with the ICES advice for kitefin shark.

STECF also recommends that EU fisheries exploiting deepwater sharks should not proceed until sustainable exploitation rates for deepwater sharks have been determined.

STECF further advises that in order to maximise protection of deep-water sharks, the gill netting ban introduced in 2006 (EC council regulation 51/2006 Annex III) in waters deeper than 600m should be maintained. STECF supports the proposal to extend the gill net ban to other areas (Council regulation (EC) 40/2008, Annex III)

## 6. Elasmobranch Resources in the NE Atlantic

### 6.1. 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 increase of commercial fisheries directed to elasmobranch species and the economic value of them rank low among marine commercial fisheries (Bonfil, 1994). In the Northeast Atlantic, although some elasmobranchs are taken in directed fisheries (a few inshore vessels target skates and rays), the majority is landed as a by-catch from fisheries (various trawl, seine, longline and set net fisheries) targeting commercial teleost species. 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 in most of the cases, because the use of many countries “NEI” (not elsewhere identified) category. 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 over reporting.
- 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 under-reported to avoid highlighting that by-catch is a significant problem in some fisheries.

In most countries skates and rays are landed together, most often sorted in particular size categories, rather than by species. They are usually gutted, and sometimes only wings are landed. For assessment purposes, species-specific catch data are essential. Only some countries report (part of) the landings by species, e.g. Sweden, France and lately Spain (Basque country). As a result of market sampling programmes the species composition of the landings can now be estimated for some of the countries landing skates and rays. In the North Sea (IIa & IV), for 2008 onwards, countries are obliged to report landings for the major skate species separately. On the basis of a longer track record on a species basis (at least 5 years) it will be possible in future to advise on species-specific catches (ICES advice 2008 book 9).

Until 1999, the only control on elasmobranch species in the North-east Atlantic were TACs for basking shark and porbeagle agreed between Norway and the EU for Norwegian vessels fishing in EU waters. Since then, in

1999, TAC introduced for “skates and rays” in the North Sea, for spurdog in area IV and division IIa and in 2007 for spurdog in IIIA , I, V, VI, VII, VIII, XII and XIV (ICES WGEF Report 2007) (subsequently altered to cover I, V, VI, VII, VIII, XII & XIV in 2008). In the NAFO area, some directed fisheries for spurdog and skate are regulated by quota controls

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES and ICCAT (for pelagic sharks).

**PRECAUTIONARY REFERENCE POINTS:** The reference points of deepwater sharks are  $U_{lim}$  at  $0.2 \times$  virgin biomass and  $U_{pa}$  at  $0.5 \times$  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 fishing activity.

**RECENT MANAGEMENT ADVICE:** Survey data are the basis for the advice of skates, rays and demersal sharks in the North Sea and in the Celtic Seas. These data are the most reliable species-specific data available for demersal skates. However, many of the fishery-independent surveys in this ecoregion are not based on extensive time-series. These surveys are designed primarily for other types of fish and so the gears and sampling grids are not ideal for skate stocks, especially those species with patchy distributions (ICES advice 2008 book 5). In addition, the analysis of survey data is hampered by uncertainties about the proper identification of some species of skate, and starry ray may have been misidentified as thornback ray on some occasions. This leads to problems in the interpretation of some survey data (ICES advice 2008 book 9).

In 1997 ICES gave an overview of the relative status of the main skate species in the North Sea. In 2005 ICES produced advice for these species for the first time. ICES previously recommended that the catches for skates and rays be set to zero if, and only if skates and rays were landed as a generic group. Since it is now required to report by species, ICES is now providing advice for the main species. The basis for the advice is the same as in 2006. ICES in 2008 provided advice for the Celtic Seas and Bay of Biscay/Iberian demersal elasmobranchs for first time.

Due to their life history traits it is recommended that directed fisheries to exploit 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.

A Maximum Landing Length (MLL) of 100 cm for all skates and rays would be beneficial for common skate while not influencing most other species (ICES advice 2008 book 9). Because the elasmobranch species are caught as a by-catch in demersal fisheries, they would benefit from a reduction in the overall demersal fishing effort. Mesh-size regulations are probably not restrictive as there are few directed fisheries for these species (ICES advice 2008 book 5).

From 2005 to 2008 the TAC for North Sea skates and rays has been reduced by approximately 50%, and is now significantly lower than average recent landings. TACs only regulate the landings, and a low TAC on a low-value by-catch species could induce more discards. Discard survival is unknown although for some species is believed to be high, especially for the adult specimens.

Management objectives have not been adopted. An European sharks action plan was published by the European Commission in December 2007 and went out for consultation in 2008.

## **6.2. Spurdog (*Squalus acanthias*) in the North-east Atlantic**

**FISHERIES:** Spurdog is a relatively small (<130 cm TL), 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 by-catch 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 seines aimed principally at whitefish, directed fisheries for this species continue to operate locally and seasonally.

In the UK (E&W), just over 50% of spurdog landings were taken in line and net fisheries in 2006, with most landings coming from Sub-area VII and in particular the Irish Sea. About 45% of the Scottish landings originating from demersal trawl fisheries and less than 30% of the Irish landings coming from the gill nets and line fisheries (ICES CM 2007/ACFM: 27).

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. acanthias* 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 squalidae, spotted dogs, smoothhound and tope). Though not complete, the landings data for spurdog show a marked decline since the mid-1980s. In earlier times, up to 60,000t were landed annually in the early 1960s, landings averaged about 35,000t throughout the 1980s, then steadily declined to an average of about 15,000t by the late 1990s. The landings for 2005 were reported to be as low as 5600t and for 2006 3000t, the lowest for many decades.

A TAC has been introduced for the EU waters of Subarea IV and Division IIa in 1999. This TAC has been reduced from 8870t in 2001 to 1051t in 2006. A by-catch quota of 841t has been set in 2007 for IIA(EC) and IV. These species shall not comprise more than 5 % by live weight of the catch retained on board. A TAC has been set for first time in 2007 for IIIA , I, V, VI, VII, VIII, XII and XIV of 2828t, but this was subsequently altered to 2004 t covering only areas I, V, VI, VII, VIII, XII and XIV in 2008. In 2008 there was no TAC for Division IIIa. Norway has a 70-cm minimum landing size, but it is not known if this is effective in reducing the exploitation of mature females. (ICES advice 2006 widely distributed stocks).

In 2007 Norway introduced a general ban on fishing and landing of spurdog in the Norwegian economic zone and in international waters in ICES areas I-XIV. However, boats less than 28m in length are allowed to fish for spurdog with traditional gear inshore and in territorial waters (4 nm). Spurdog caught as by-catch in other fisheries have to be landed and Fiskeridirektoratet are allowed to stop the fishery when catches reach last years level. Norway has a 70 cm minimum landing size. In 2004, Germany proposed that the EU 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). Sweden has recently added spurdog to their national Red List.

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

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been defined or agreed for spurdog in the Northeast Atlantic.

**STOCK STATUS:** All analyses presented in previous reports of WGEF have indicated that the NE Atlantic stock of spurdog has been declining rapidly and is at its lowest ever level. Preliminary assessments making use of the long time-series of commercial landings data suggest that this decline has been going on over a long period of time and that the current stock size may only be a small fraction of its virgin biomass (< 10%). In addition, spurdog are less frequently caught in groundfish surveys than they were 20 years ago, and the preliminary analysis of Scottish survey data presented in 2006 (and in Dobby *et al.*, 2005) indicate significant declines in catch-rate (> 75% decline in CPUE since 1985). Input data are too limited to give an accurate estimate of current stock status in terms of absolute biomass and fishing mortality, but the illustrated trends in the stock biomass are undeniable (ICES CM 2007/ACFM:27).

**RECENT MANAGEMENT ADVICE:** The biology of spurdog is relatively well known in comparison to most other elasmobranch. 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-structure 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. Although these models have not proved entirely satisfactory (due to the quality of the assessment input data), these exploratory assessments and survey data, indicate a decline in spurdog (ICES CM 2007/ACFM:27).

The ICES 2008 advice for 2009 and 2010 is the same as the advice given in 2006 since the only new information available for the stock was landings data that does not offer any reason to change the 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 2009.

Additionally to the 2006 advice, ICES offers the following considerations:

Simulation modelling has shown there are strong potential benefits to the stock by protecting mature female spurdog in this long-lived species. If a non-zero TAC would be set, ICES recommends the introduction of a **maximum** landing length (MLL). This is expected to deter fisheries targeting areas where large females occur.

The maximum landing length should initially be set at 100 cm. The length at 50% maturity for female spurdog is just over 80 cm and the maximum size of females is about 120 cm. The maximum size of males is about 90 cm. Fecundity of spurdog increases with length and females of 100–120 cm length generally produce the highest amount of pups (10–21). Survivorship of spurdog released from longline fisheries is thought to be high, but will be lower in gillnet and trawl fisheries.

It is recommended that exploitation of this species should only be allowed when indicators and reference points for stock status and future harvest have been identified and a management strategy, including appropriate monitoring requirements has been decided upon and is implemented. (ICES advice 2006 widely distributed stocks).

In addition, because a large proportion of spurdog are taken as by-catch in mixed demersal trawl fisheries, ICES supports the opinion that and the stock would be benefited from a reduction in overall demersal fishing effort. Spurdog form size- and sex-specific schools and these have historically been subject to directed fisheries specifically targeting large females.

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

### **6.3. 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 1633 in 2000 to 1842t in 2006. In the Bay of Biscay and Iberian waters landings of *Scyliorhinus* spp have recorded since the mid nineties and have fluctuated between 1500t and 2000t. Landings were 1688t in 2005 and 1572 in 2006.

**SOURCE OF MANAGEMENT ADVICE:** The main source of information on lesser-spotted dogfish in the Northeast Atlantic is ICES.

**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. 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 are the high survival of discards, plus the fact that other discarded fish might be providing additional food sources to the dogfish. The stock of the lesser-spotted dogfish in North Sea shows a general increase in abundance, whereas in areas VIa and VII is stable/increased. The greater spotted dogfish in area VII is locally stable and is increasing in area VIIa. (ICES advice 2008). Both species have a high discard survival ratio.

**RECENT MANAGEMENT ADVICE:**

Appropriate species-specific landings (for *Scyliorhinus* spp.) are required before the level of a *status quo* catch could be advised on. There are no management measures in place for the demersal sharks (*Scyliorhinus*) in North Sea and Celtic Seas. The current exploitation rates on this species appear to be sustainable. As there are no apparent detrimental impacts on the stock from current commercial fisheries, no management actions are required for this species at this time. The greater spotted dogfish in Celtic seas has a restricted distribution and is locally abundant in parts of the Celtic Seas ecoregion, and should be monitored appropriately.

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

#### **6.4. Basking shark (*Cetorhinus maximus*) in the north-east Atlantic**

**FISHERIES:** According to WGEF a single stock of basking sharks *Cetorhinus maximus* exists in the ICES area. There is no information on transatlantic migrations. A genetics study underway in the UK aims to differentiate distinct stocks globally. They are known to congregate in areas with a high zooplankton biomass (e.g. fronts) and, therefore, may be locally important, but the locations of these areas are variable.

Biological data are limited, although all lamniform sharks have a very low fecundity and late age at maturity and they are likely to be sensitive to additional mortality.

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. 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. 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. Recent studies have highlighted the important role that oceanographic conditions can play in affecting basking shark distribution.

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 77t and 293t in the last eight years. Catches in 2005 were 221t and in 2006 16t (Norwegian by-catch) which was considerably less than in 2005. It is not known whether this decrease is related to marked price reductions, or that release of live specimens has increased, or because actual abundance has declined.

Limited quantitative information exists on basking shark discarding in non-directed fisheries. However, anecdotal information is available indicating that this species is caught in gillnet and trawl fisheries in most parts of the ICES area. Most of this by-catch takes place in the summer months as the species moves inshore. The total extent of these catches is unknown. The requirement for EU fleets to discard all basking sharks caught as by-catch means that information cannot be obtained on these catches. A better protocol for recording and obtaining scientific data from by-catches is necessary for assessing the status of the stock.

Since 2006, there is no targeted fishery for basking sharks in Norway, UK or Ireland. Based on ICES advice Norway banned all directed fisheries for basking shark in 2006, but dead or dying by-catch specimens can be landed and sold as before. The basking shark has been protected from killing, taking, disturbance, possession and sale in UK territorial waters since 1998. In Sweden it is forbidden to fish for or to land basking shark. 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). Since 2007, the EU has prohibited fishing for, retaining on board, transshipping or landing basking sharks by any vessel in EU waters or EU vessels fishing anywhere (Council regulation (EC) No 41/2006).

Basking shark was listed on Appendix II of the Convention on International Trade in Endangered Species (CITES) in 2002, on Appendices I and II of the Convention on the Conservation of Migratory Species (CMS) in 2005, on Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea (UNCLOS) and on

the OSPAR (Convention on the protection of the marine environment of the north-east Atlantic) list of threatened and / or declining species in 2004.

**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 proposed for basking shark in the Northeast Atlantic.

**STOCK STATUS:** Available landings and anecdotal information suggest that the stock is severely depleted.

**RECENT MANAGEMENT ADVICE:** The only new information available in 2008 for basking shark is landings data, which gives no basis to revise the advice from 2006. The advice for 2009 and 2010 is therefore the same as the advice given in 2006: “No targeted fishing for basking shark should be permitted and additional measures should be taken to prevent by-catch 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.” At present there is no directed fishery for this species. The WGEF considered that no targeted fishery should be permitted unless a reliable estimate of a sustainable exploitation rate is available. The TAC area should correspond to the stock’s distribution, thus the entire ICES area. 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 by-catch, 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. ICES advises that additional measures should be taken to prevent by-catch of basking shark in fisheries targeting other species.

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

## **6.5. Tope (*Galeorhinus galeus*) in the north-east Atlantic**

**FISHERIES:** There are no currently no targeted commercial fisheries for tope in the northeastern Atlantic, though they are taken as a by-catch 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 by-catch. 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. There were no major changes to the fishery noted in 2006. It has been suggested that there may be a greater retention of tope in some UK inshore fisheries operating in ICES Division IVc, as a result of by-catch limits on skates and rays, although no data are currently available to examine this.

Landings were increased since 1992 until 2002 (from 427t to 798t), then dropped to 372t in 2005. In 2006 landings were 497t. The degree of possible misreporting or under-reporting is not known. Landings indicate that France is one of the main nations landing tope. The United Kingdom also land tope, though species-specific data are not available prior to 1989. Since 2001, Ireland, Portugal and Spain have also declared species-specific landings, though recent data were not available for Spanish fisheries. Though some discards information is available from various nations, data are limited for most nations and fisheries. The available data (England and Wales) indicated that juvenile tope tend to be discarded in demersal trawl fisheries, though larger individuals are usually retained, with tope caught in drift and fixed net fisheries usually retained.

**SOURCE OF MANAGEMENT ADVICE:** The main recent source of information is ICES. However no species-specific management advice is given.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been agreed for tope in the Northeast Atlantic.

**STOCK STATUS:** Stock structure is unknown. No assessment was undertaken, due to insufficient data. WGEF considers that there is a single stock of tope in the ICES area, with the centre of the distribution ranging from Scotland and southern Norway southwards to the coast of northwestern Africa and Mediterranean Sea. Hence, the North East Atlantic tope stock covers the ICES Area (II–X), Mediterranean Sea (Subareas I–III) and northern part of the CECAF area, and any future assessment of the Northeast Atlantic tope stock may need to be undertaken in conjunction with the General Fisheries Commission for the Mediterranean (GFCM) and Fishery Committee for the Eastern Central Atlantic (CECAF). The stock unit identified by WGEF was based on published tagging studies, which clearly indicate that tagged fish move widely throughout the northeastern Atlantic). 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.

## 6.6. Rays and Skates in the North Sea and Celtic Seas

### SPECIES:

Common skate	<i>Dipturus batis</i>	North Sea	Celtic Seas
Thornback ray	<i>Raja clavata</i>	North Sea	Celtic Seas
Spotted ray	<i>Raja montagui</i>	North Sea	Celtic Seas
Starry ray	<i>Amblyraja radiata</i>	North Sea	Celtic Seas
Cuckoo ray	<i>Leucoraja naevus</i>	North Sea	Celtic Seas
Blonde ray	<i>Raja brachyura</i>	North Sea	Celtic Seas
Undulate ray	<i>Raja undulata</i>	North Sea	Celtic Seas
Smalleyed ray	<i>Raja microocellata</i>		Celtic Seas
Sandy ray	<i>Leucoraja circularis</i>		Celtic Seas
Shagreen ray	<i>Leucoraja fullonica</i>		Celtic Seas
White skate	<i>Rostroraja alba</i>		Celtic Seas

**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 ( $L_{max} = 75\text{cm}$ ) that lives in shallow to moderate depths from 20 m down to about 150 m in the northwest 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 by-catches 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 by-catches in trawl and in seine fisheries.

A generic TAC introduced for all skate and rays species in North Sea in 1999 but not yet for Celtic Seas. Prior 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 of skates and rays 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 3,000t in 2005, and 2,800 in 2006. For 2007, the landings estimated to be 1,100 t (preliminary data). In Celtic Seas, landings from 19,000 in 2006 decreased to 10,000 in 2006.

**SOURCE OF MANAGEMENT ADVICE:** The main advisory body is ICES. In 2008, ICES gave advice for Celtic Seas rays and skates for first time.

**PRECAUTIONARY REFERENCE POINTS:** There are no agreed reference points for rays and skates in the North Sea.

**STOCK STATUS:** In the absence of defined reference points, the status of the stocks of demersal skates and rays (members of the family *Rajidae*) cannot be evaluated. The following provides a qualitative summary of the general status of the major species based on surveys and landings:

### North Sea

*Common skate* – is depleted in IVa (likely merging with VIa & IIa). It was formerly widely distributed over much of the North Sea but is now found only rarely, and only in the northern North Sea. The distribution extends into the west of Scotland and the Norwegian Sea.

*Thornback ray* – Stable/increasing in areas IVc, VIId and uncertain in IVa,b. The distribution area and abundance have decreased over the past century, with the stock concentrated in the southwestern North Sea where it is the main commercial skate species. Its distribution extends into the eastern Channel. Survey catch trends in Division IVc have been stable/increasing in recent years. The status of *R. clavata* in Divisions IVa,b is uncertain.

*Spotted ray* – stable/increasing in IVb,c. The area occupied and abundance has fluctuated without trend.

*Starry ray* – stable in IVa,b, IIa. Survey catch rates increased from the early 1970s to the early 1990s and have decreased slightly since then.

*Cuckoo ray* – stable in IVa,b. Since 1990 the area occupied has fluctuated without trend. Abundance has decreased since the early 1990s, but has been stable in recent years.

*Blonde ray* – uncertain in IVc, VIId. This species has a patchy occurrence in the North Sea. It is at the edge of its distributional range in this area.

*Undulate ray* – uncertain, reason for concern in VIId, merges with VIIe. Mainly limited to Division VIId where it merges with Division VIIe. Occasional vagrants in Division IVc. The biology of the species and recent disappearance from surveys give rise to concern. It has a patchy and localized distribution, possibly forming discrete stocks, which make the undulate ray sensitive to local depletion. Additionally, the species has disappeared from the English beam trawl survey in Division VIId in the last two years.

### **Celtic Seas**

*Common skate* – Depleted in areas VI, VII. It was formerly widely distributed in the Irish Sea (VIIa), but is now rarely found in this division. Now mostly found off Northwest Scotland (VIa), west of Ireland (VIIb,c), and in the deeper waters of the Celtic Sea (VIIg–j), with occasional individuals in shallower areas (VIIe–f).

*Thornback ray* – Stable/increasing in areas VIa, VIIa,f,g. Catches in the main areas of abundance (VIa, VIIa,f,g) have been stable/increasing in recent years

*Spotted ray* – Stable/increasing in areas VIa, VIIa,f,g. Catches in the main areas of abundance (VIa, VIIa,f,g) have been stable/increasing in recent years

*Cuckoo ray* – Stable/increasing in area VIa, uncertain in area VII. Uncertain and more robust studies on stock identity are required. Data from surveys give contrasting signals showing stable/increasing catches in VIa, but stable or declining catches within Subarea VII. French lpue in the Celtic Sea is also declining.

*Blonde ray* – Uncertain in areas, VIa, VIIa, f. This species has a patchy distribution in the Celtic Seas ecoregion, so interpretation of survey trends is problematic.

*Undulate ray* – Uncertain in areas VIIj and VIId,e. Given that this large-bodied species has a patchy distribution in the inshore waters of the Celtic Seas ecoregion, it is susceptible to localized over-exploitation.

*Small-eyed ray* – Stable/increasing in area VIIf. Catches in the main area of the stock distribution (VIIf) have been stable/increasing over the survey time-series.

*Sandy ray* – Uncertain in area VI, stable/increasing in area VIIb,c,h-k. This offshore species is not well sampled in most groundfish surveys. Catches on the Porcupine Bank have been stable/increasing in recent.

*Shagreen ray* – Uncertain in area VII. This offshore species is not well sampled in most groundfish surveys.

*White skate* – Severely depleted in area VII. Possibly extirpated from most parts of this ecoregion. No authenticated records in recent groundfish surveys.

**RECENT MANAGEMENT ADVICE:** In 2006 the EC TAC for skates and rays for areas IIa (EC waters) and IV (EC waters) was set at 2737t, which was 15% less than the TAC for 2005. The TAC for 2007 was set at 2190t, 20% less than that for 2006 (on no particular scientific ground). This TAC is indicated to comprise of “by-catch quota” and it is specifically mentioned that “These species shall not comprise more than 25% by live weight of the catch retained on board”. Subject to the individual recording of landed species, combined catches for demersal skates and rays should be set on the basis of the recent average landings (2002–2006). The ICES advice for 2008 was zero catch while for 2009 and 2010 is the combined catches of recent average landings (2002–2006). According to this advice, the predicted landings for 2009 and 2010 are expected to be 3100t for IIIa, IV and VIId. Targeted fisheries of the most threatened species (common skate and undulate ray) should not be permitted, and measures should be taken to minimize by-catch.

From 2005 to 2008 the TAC for North Sea skates and rays has been reduced by approximately 50%, and is now significantly lower than average recent landings. Based on the level of recent landings it is obvious that the current TAC has become restrictive for some countries, which may increase discarding. Discard survivorship, however, is not known. A Maximum Landing Length (MLL) of 100 cm for all skates and rays would be beneficial for common skate while not influencing most other species.

### **Species-specific advice in North Sea**

Common skate and Undulate ray: **No target fisheries** (target fisheries for these species should not be permitted and measures should be taken to minimize by-catch).

Spotted ray, Starry ray, Cuckoo ray and Thornback ray (in Division IVc): **Status quo catch** (fishing mortality should not increase and the fishery should be closely monitored. Measures to deter fisheries that target spawning concentrations of thornback ray in Division IVc should be considered because this is the most vital part of the thornback ray spawning in the south-western North Sea).

Blonde ray Thornback ray (in Division IVa,b): **No advice** (Because these species have a tendency to form aggregations, they may be prone to localized depletion).

### **Species-specific advice in Celtic Seas**

White skate: **No fisheries** (has a localized and patchy distribution, and is extirpated from most parts of the Celtic Seas ecoregion. It should receive the highest possible protection. Any incidental by-catch should not be landed, but returned, to the sea, as they are likely to have a high survival rate).

Common skate, Undulate ray: **No target fisheries** (Common skate has declined in many inshore areas of England and Wales, although is still present in the inshore areas of Scotland and Ireland. Target fisheries for this species should not be permitted and measures should be taken to minimize by-catch and undulate ray has a patchy distribution, with some of these areas showing signs of depletion. As a precautionary measure, target fisheries for this species should not be permitted unless exploitation rates are shown to be sustainable).

Thornback ray, spotted ray in VIa and VIIa,f,g., cuckoo ray in VIa and small-eyed ray in VIIf: **Status quo catch** (small-eyed ray has a restricted distribution and is locally abundant in the Bristol Channel, this stock should be monitored to ensure that it does not decline).

Cuckoo ray in VII, blonde ray, sandy ray, shagreen ray: **No advice** (For cuckoo ray, further studies to better understand stock structure are required, although this species is one of the more abundant skates in the Celtic Seas ecoregion, blonde ray is widely distributed in the Celtic Seas ecoregion, but it has a tendency to form local aggregations and so may be prone to localized depletions, sandy ray is most abundant on the outer continental shelf and upper continental slope, it is not well sampled in most existing groundfish surveys and shagreen ray is most abundant on the outer continental shelf and upper continental slope, it is not well sampled in most existing groundfish surveys).

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

## **6.7. 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 the Faeroe Islands.

The only regular, 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 the 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 by-catch 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, or as ‘various sharks 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 1996.

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:** Given the state of the stock, no targeted fishing for porbeagle should be permitted and by-catch should be limited. Landings of porbeagle should not be allowed.

Porbeagles are particularly vulnerable to fishing mortality, because the population productivity is low (long-lived, slow growing, high age-at-maturity, low fecundity, and a protracted gestation period) and they have an aggregating behaviour. In the light of this, risk of depletion of reproductive potential is high. It is recommended that exploitation of this species should only be allowed when indicators and reference points for stock status and future harvest have been identified and a management strategy, including appropriate monitoring requirements has been decided upon and is implemented.

**STECF COMMENTS:** STECF agrees with the ICES advice that no targeted fishing for porbeagle should be permitted. STECF also agrees with ICES that it should be a requirement for all countries to document all incidental by-catches of this species.

To afford the stock maximum protection, STECF recommends that there should be no catches of porbeagle from the Northeast Atlantic.

## 7. Stocks of the North West Atlantic (NAFO)

### 7.1. American plaice (*Hippoglossoides platessoides*) in Divisions 3L, 3N and 3O

Multi-year Advice for 2008-2009 was provided for this stock in 2007.

**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. There was no directed fishing in 1994 and there has been a moratorium since 1995. Catches increased after the moratorium until 2003 after which they began to decline. Total catch in 2006 was 2 800 tons and 3 620 t in 2007.

**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 (2006 only). An analytical assessment using the ADAPTive framework tuned to the Canadian spring and autumn surveys and Spanish Div. 3NO survey 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  $B_{lim}$ .

**STOCK STATUS:** The stock remains low compared to historic levels. Biomass and SSB are very low compared to historic levels. SSB declined to the lowest estimated level in 1994 and 1995. It has increased since then but still remains very low at about 36 000 tons. Estimated recruitment at age 5 indicates that all year-classes since those of the mid-1980s have been very weak. Since 1995, the average fishing mortality on ages 9 to 14 increased but since 2003 has declined.

**RECENT MANAGEMENT ADVICE:** Scientific Council reiterates its recommendation for no directed fishing on American plaice in Div. 3LNO in 2008 and 2009. By-catches of American plaice 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.

### **7.2. American plaice (*Hippoglossoides platessoides*) in Divisions 3M (Flemish Cap)**

Information on this stock is updated from NAFO Scientific Council Reports, 2008.

**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. 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. The catch for 2007 was estimated to be 76 t.

**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 (1988-2007) and Canada (1978-1986). Age-length keys were available from EU surveys (1988-2007). Length compositions were available from the 1988 to 2007 fisheries. In 2008 an analytical assessment (XSA) was performed.

**PRECAUTIONARY REFERENCE POINTS:** Based on the 18 years data available from the XSA to examine a stock/recruitment relationship, a proxy for  $B_{lim}$  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 2009, 2010 and 2011. By-catch should be kept at the lowest possible level.

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

### **7.3. Capelin (*Mallotus villosus*) in Division 3N and 3O.**

Multi-year Advice for 2008-2009 was provided for this stock in 2007.

**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 1990-2006, 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 2006 corresponds to a low level of stock size that was observed in 1997, 1999 and 2001.

**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 2008 and 2009.

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

### **7.4. Cod (*Gadus morhua*) in Division 2J, 3K and 3L.**

The most recent information on this stock relates to the Canadian Science Advisory Secretariat Science Advisory Report of 2007.

**FISHERIES:** Catches of northern cod increased during the 1960s to a peak of over 800,000 t in 1968, declined steadily to a low of 140,000 t in 1978, recovered to about 240,000 t through much of the 1980s, and then declined rapidly in the early 1990s in advance of a moratorium on directed fishing in 1992.

Catches during 1993-1997 came from by-catches, food/recreational fisheries, and DFO-industry sentinel surveys that started in 1995. In addition, catches from 1998-2002 also came from a limited index/commercial inshore fishery restricted to fixed gear and small vessels (<65 feet)(Table 1). The directed commercial and recreational fisheries were closed in April 2003. During 2004 and 2005, substantial by-catches (>600 t) of cod were taken in the inshore, mostly in 3KL, in the winter flounder (blackback) fishery.

A directed commercial fishery and recreational fishery for cod was re-opened during 2006 in the inshore of 2J3KL for a six-week period. Reported landings in 2006 were 2,679 t, including 380 t in the recreational fishery, 159 t in the sentinel surveys, and 45 t of by-catch, 20 t of which came from the offshore.

An estimate is not yet available for the 2006 catch by non-Canadian fleets outside the 200 nautical mile limit on the Nose of the Grand Bank (Div. 3L). The Scientific Council of the Northwest Atlantic Fisheries Organization (NAFO) estimated that annual catches during 2000- 2005 were 80 t or less.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the Canadian Science Advisory Secretariat. 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 year 2007.

**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 autumn research bottom-trawl survey is the only data source that provides information on the status of cod throughout the offshore. The biomass index in 2006 was 62,500 t, which is about 5% of the level in the 1980s. Recruitment remains very low and mortality extremely high. The current biomass of the stock as a whole is a very small proportion of the approximately 3 million t (of ages 3 and older) estimated for the early 1960s.

**RECENT MANAGEMENT ADVICE:** Mortality of cod in the offshore is extremely high. The high rate of mortality is a major impediment to stock recovery. The extent to which ongoing fishing activities may be contributing to this mortality, from by-catch, incidental mortality, or directed fishing on seasonal migrants that move inshore, has not been determined. Nevertheless, it is recommended that the moratorium on directed fishing be continued, and that by-catch be minimized.

**STECF COMMENTS:** STECF agrees with the advice given by the Canadian Science Advisory Secretariat.

## **7.5. Cod (*Gadus morhua*) in Division 3M (Flemish Cap)**

Information on this stock is updated from NAFO Scientific Council Reports, 2008.

**FISHERIES:** The fishery is under moratorium since 1999. Yearly by-catches between 2000 and 2005 were below 60 t, rising to 339 and 345 t in 2006 and 2007, respectively.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. Length and age compositions of the 2002-2005 by-catch were not available. Length distributions were available for 2006 and 2007, although sampling levels were low. Abundance at age indices were available from the EU bottom trawl survey since 1988, covering the whole distribution area of the stock. Survey age-length keys were applied to the by-catch.

An analytical assessment based on an age-structured model was accepted to estimate the state of the stock.

**PRECAUTIONARY REFERENCE POINTS:** A spawning biomass of 14 000 t has been identified as *Blim* for this stock. There is 20% probability that spawning biomass is below *Blim* in 2008.

**STOCK STATUS:** Despite the significant spawning biomass increase, stock numbers are still much lower than before 1995. As a result of changes noted in weight and maturity, it is unclear whether the meaning of spawning biomass as an indicator of stock status is the same as in the earlier period. Whereas recruitment has been better during 2005-2007, it is below levels in the earlier period. Hence, the state of the stock, although improved, is still poor.

As a redfish fishery has developed in recent years in depths shallower than 350 m, and as cod is a by-catch species in that fishery, it may be expected that fishing mortality levels will increase during the next few years and may cause stock decline.

**RECENT MANAGEMENT ADVICE:** In order to allow spawning biomass to grow above *Blim* with a high probability in the near future, Scientific Council recommended that *no directed fishery for cod in Div. 3M in 2009. By-catch of cod on the Flemish Cap should be kept at a low level.*

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

## **7.6. Cod (*Gadus morhua*) in Divisions 3N and 3O**

Multi-year Advice for 2008-2009 was provided for this stock in 2007.

**FISHERIES:** This stock occupies the southern part of the Grand Bank of Newfoundland. Cod are found over the shallower parts of the bank in summer, particularly in the Southeast Shoal area (Div. 3N) and on the slopes of the bank in winter as cooling occurs. There has been no directed fishery since mid-1994 but catches increased steadily during this moratorium to 2003. The total catch of cod for 2007 in Div. 3NO from all fisheries was estimated to be 845 t.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. Length and age composition data were available from the 2005 and 2006 fisheries to estimate the total removals at age. Canadian spring (1984-2005) and autumn (1990-2006) survey data provided abundance, biomass and age structure information. Canadian juvenile research survey data were available up to 1994. Canadian Cooperative Industry surveys were available from 1996-2004. Spanish Div. 3NO surveys were available from 1997-2006.

An analytical assessment was presented to estimate population numbers in 2007.

**PRECAUTIONARY REFERENCE POINTS:** The current best estimate of *Blim* is 60 000 tons. It was also concluded that in the recent period of low productivity, there is an indication of even further reduction in recruitment at about half the *Blim* level. The Scientific Council will review in detail the biological reference points in the context of the PA framework when the SSB has reached half the current estimate of *Blim*.

**STOCK STATUS:** In 2007 the assessment concluded that the total biomass and spawning biomass were estimated to be at extremely low levels. Based on overall indices for the current year, there is nothing to indicate a change in the status of this stock. It is too early to determine if the 2006 and 2005 year-classes are larger than other recent cohorts.

**RECENT MANAGEMENT ADVICE:** There should be no directed fishing for cod in Div. 3N in 2008, 2009 and 2010. By-catches 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. The next full assessment will be in 2010.

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

## **7.7. Greenland Halibut (*Reinhardtius hippoglossoides*) in Sub-area 2 and Divisions 3KLMNO**

Information on this stock is updated from NAFO Scientific Council Reports, 2008.

**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 for this stock has been implemented by Fisheries Commission. The catches in 2004 - 2007 have exceeded the rebuilding plan TACs by 27%, 22%, 27% and 42% respectively, despite reductions in fishing effort.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on CPUE data throughout the stock area were available from fisheries conducted by Canada, EU-Spain and EU-Portugal. Abundance and biomass indices were available from research vessel surveys by Canada in Div. 2J+3KLMNO (1978-2007), EU in Div. 3M (1988-2007) and EU-Spain in Div. 3NO (1995-2007). Commercial catch-at-age data were available from 1975-2007.

An analytical assessment using Extended Survivors Analysis (XSA) tuned to the Canadian spring (Div. 3LNO; 1996-2007), and autumn (Div. 2J, 3K; 1996-2007) and the EU (Div. 3M; 1995-2007) surveys was used to estimate the 5+ exploitable biomass, level of exploitation and recruitment to the stock. Natural mortality was assumed to be 0.2 for all ages.

**PRECAUTIONARY REFERENCE POINTS:** Limit reference points could not be determined for this stock. For this stock  $F_{max}$  is estimated to be 0.34 and  $F_{0.1}$  is 0.18 based upon average weights and partial recruitment patterns from the past 3 years.

**STOCK STATUS:** The exploitable biomass has declined in recent years and the current estimates (2004-2008) are amongst the lowest in the series. Recent recruitment has been below average, and fishing mortality, although decreasing, remains high.

**RECENT MANAGEMENT ADVICE:** Scientific Council **recommended** that *fishing mortality should be reduced to a level not higher than  $F_{0.1}$ .*

The Council reiterates its concern that the catches taken from this stock consist mainly of young, immature fish of ages several years less than that at which sexual maturity is achieved. In recent years, the proportion of older individuals in the catch has decreased. Scientific Council noted that the prospects of rebuilding this stock have, to date, been hampered by-catches that have exceeded the Rebuilding Plan TACs.

Scientific Council expressed concern that most of the year-classes that will recruit to the exploitable biomass in coming years are presently estimated to be well below average. Scientific Council reviewed the issue of using CPUE indices in the assessment and confirmed its view that CPUE indices for this stock should not be interpreted to reflect stock size, and they were therefore not used in the current population model. During previous assessments, Scientific Council has noted that fishing effort should be distributed in a similar fashion to biomass distribution in order to ensure sustainability of all spawning components.

**STECF COMMENTS:** STECF agrees with the advice given by NAFO.

## **7.8. 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 offshore 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 19 000 tons in 2003 primarily due to increased effort in Div. 0A and in Div. 1A. Catches stayed at that level in 2004-2005. Catches increased in 2006 to 24 000 tons due to increased effort in Div. 0A and 1A and stayed at that level in 2007.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. No analytical assessment could be performed. The combined Div. 0B+1CD standardized CPUE series has been stable in the period 1990-2001, declined somewhat in 2002, increased again until 2006 but decreased slightly in 2007 to the

second highest seen since 1989. Standardized catch rates in Div. 0A decreased slightly between 2006 and 2007 and is about average for the time series. Standardized catch rates in Div. 0B have decreased slightly since 2005 but is still above the level seen during 1999- 2004. Standardized catch rates in Div. 1CD have increased in recent years. Non-standardized catch rates decreased slightly in Div. 1A.

**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 relatively stable since 2001 and at the level observed in the late 1980s and 1990s.

**RECENT MANAGEMENT ADVICE:** Considering the relative stability in biomass indices and CPUE rates, for Greenland halibut in Div. 0B and 1C-1F the TAC for year 2009 should not exceed 11 000 t.

Considering the relative stability in biomass indices and CPUE rates, for Greenland halibut in Div. 0A and 1AB Scientific Council advises that TAC in Div. 0A and Div. 1A off shore + Div. 1B for 2009 should not exceed 13 000 t.

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

## 7.9. Shrimp (*Pandalus borealis*) in Division 3M (Flemish Cap)

STECF noted that the requests for advice on northern shrimp (Northern shrimp in Div. 3M and Div. 3LNO (Item 1)) will be undertaken during the NAFO Scientific Council Meeting scheduled for 22-30 October 2008). The text below reflects the advice given in 2007.

**FISHERIES:** The shrimp fishery in Div. 3M began in 1993. Initial catch rates were favourable and, shortly thereafter, vessels from several nations joined. Between 1993 and 2004 the number of vessels ranged from 40-110. In 2005 there were approximately 17 vessels fishing shrimp in Div. 3M compared to 50 in 2004. In 2006 there were even fewer vessels taking part due to economic reasons. 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 32 000 tons and 11 000 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. This stock is now under effort regulation.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. Catch, effort and biological data were available from some Contracting Parties. Survey data, including female and recruitment indices, were available from EU research surveys (1988-2006) and were the main basis for assessment. A standardized CPUE index was not considered reliable, as there were concerns that suspected misreporting of some catches in 2006, and possibly in earlier year (Div. 3L catches reported in Div. 3M). Recruitment abundance and female CPUE based on a standardized CPUE are therefore not presented. Time series of size and sex composition data were available from a few countries and these were considered to be reliable.

No analytical assessment was available. Evaluation of stock status was based upon interpretation of research survey data.

**PRECAUTIONARY REFERENCE POINTS:** Scientific Council considers that the point at which a valid index of stock size has declined by 85% from the maximum observed index level provides a proxy for  $B_{lim}$  for northern shrimp in Div. 3M. The  $B_{lim}$  reference point is 2 600 t based on the female biomass index from the EU survey for shrimp in 3M. Currently, the biomass is estimated to be well above  $B_{lim}$ .

**STOCK STATUS:** The indices of biomass are at relatively high levels but there are indications of a decline in recruitment, which may affect the 2008 fishery. The stock appears to have sustained an average annual catch of about 46 000 tons since 1998 – 2005 with no detectable effect on stock biomass.

**RECENT MANAGEMENT ADVICE:** The previously recommended annual catch of 48 000 t may not be sustainable over the next few years due to the prospect of poor recruitment of the 2003 and 2004 year-classes. SC is not in a position to recommend a specific TAC for 2008 until the summer 2007 survey has been completed. However, it is tentatively advised that the exploitation level for 2008 should not exceed the 2005-6 levels.

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

## 7.10. Redfish (*Sebastes spp.*) in Divisions 3L and 3N

Information on this stock is updated from NAFO Scientific Council Reports, 2008.

There are two species of redfish, *Sebastes mentella* and *Sebastes fasciatus*, which occur in Div. 3LN and are managed together. 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. 3O and Div. 3LN suggests that it would be prudent to keep Div. 3LN as a separate management unit.

**FISHERIES:** The average reported catch from Div. 3LN from 1959 to 1985 was about 22 000 t ranging between 10 000 t and 45 000 t. Catches increased sharply from about 21 000 t in 1985, peaked at an historical high of 79 000 t in 1987 then declined steadily to about 450 t in 1996. Catch increased from 900 t in 1998, the first year under a moratorium on directed fishing, to 3 100 t in 2000. Catches declined from 2001 until 2006, with an historic low of 496 t, but recorded over a three time fold increase in 2007 with a catch estimate of 1 660 t. Since 1998 catches were taken as by-catch primarily in Greenland halibut fisheries by EU-Portugal, EU-Spain and Russia.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. Catches from 1959-2007, a 1959-94 CPUE series from STATLANT data (as derived in the 1997 assessment), and most of the stratified-random bottom trawl surveys conducted by Canada and Russia in various years and seasons in Div. 3L and Div. 3N, from 1978 onwards.

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

**STOCK STATUS:** The available Div. 3LN survey indices indicate an increase in stock in recent years broadly to level seen in the first half of the 1980s. However the considerable inter-annual variability of the survey indices makes the measurement of the magnitude of the stock increase difficult to quantify. In addition stock length structure has been improving from small to medium size fish, confirming the survival of recent year-classes regardless of their low sizes and the lack of good recruitment for more than a decade.

**RECENT MANAGEMENT ADVICE:** Scientific Council recommends that the total catch of Div. 3LN redfish in 2009 not exceed 3,500 t. This total catch should include any directed catches and all by-catches of Div. 3LN redfish taken in other fisheries. Before making a recommendation for 2010, Scientific Council will review this in 2009, when the catch in 2008 is known.

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

## 7.11. Redfish (*Sebastes spp.*) in Division 3M

Multi-year Advice for 2008-2009 was provided for this stock in 2007.

There are three species of redfish that are commercially fished on Flemish Cap; deep-sea redfish (*Sebastes mentella*), golden redfish (*Sebastes marinus*) and Acadian redfish (*Sebastes fasciatus*). The term beaked redfish is used for *S. mentella* and *S. fasciatus* combined. Because of difficulties with identification and separation, all three species are reported together as 'redfish' in the commercial fishery.

**FISHERIES:** The majority of the commercial bottom trawl catches are composed of beaked redfish (*Sebastes mentella*) 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.

A new fishery directed for golden redfish prosecuted by Portugal and Russia has occurred in the last couple of years. TAC was overshot in November 2005 (6 550 tons) and 2006 (7 156 tons), with an estimated catch of beaked redfish of 3 784 t and 4 430 t respectively. No information on the pursuing of this golden redfish fishery is available for 2007 and so, for the time being, STACFIS assumes the whole 2007 catch is of beaked redfish.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on catch-at-age data from 1989-2006 including by-catch information from the shrimp fishery (not available for 2006).

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.

**STOCK STATUS:** Scientific Council concluded that the stock biomass and spawning biomass are increasing. Nonetheless the spawning stock is currently still at a low level compared to the earlier period in the time series. At the low fishing mortalities of the most recent years and with growth of the relatively strong recent year-classes, spawning biomass should continue to increase.

**RECENT MANAGEMENT ADVICE:** In order to maintain low fishing mortalities so as to promote female spawning stock recovery, Scientific Council **recommended** that *catch for Div. 3M redfish in year 2008 and 2009 should not exceed 5 000 tons.*

This stock will next be assessed in 2009.

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

## **7.12. Redfish (*Sebastes* spp.) in Sub-area 1**

Denmark, on behalf of Greenland, requested the Scientific Council to: *provide advice on the scientific basis for the management of Redfish (*Sebastes* spp.) and other finfish in Subarea 0+1 for 2009-2011.*

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 from 2004 to 2007 are 500 t per year. However, this must be considered an underestimation.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The advice is based on EU-German groundfish surveys (1982-2007), Greenland-Japan and Greenland deep-sea surveys (1987-95 and 2000), and Greenland bottom trawl surveys (1988-2007).

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

**STOCK STATUS:** The stock of golden redfish (*S. marinus*) in Subarea 1 remains severely depleted, although some signs of rebuilding are observed.

The spawning stock of deep-sea redfish (*S. mentella*) in Subarea 1 remains severely depleted, and an increase is unlikely in the short-term.

**RECENT MANAGEMENT ADVICE:** No directed fishery should occur on demersal redfish in Subarea 1 in 2009, 2010 and 2011. By-catches in the shrimp trawl fishery should be kept at the lowest possible level.

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

### **7.13. Redfish (*Sebastes* spp.) in Division 3O**

Multi-year Advice for 2008-2010 was provided for this stock in 2007.

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. Catches in 2005 and 2006 were higher at about 11000 tons and 13 000 tons respectively. Total catch of redfish in 3O was estimated to be 5 200 t in 2007.

**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.

**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 2006, a period of 47 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. Scientific Council is unable to advise on an appropriate TAC for redfish in Div. 3O in 2008, 2009 and 2010.

The next full assessment of this stock is planned to be in 2010.

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

### **7.14. Roughhead grenadier (*Macrourus berglax*) in Sub-areas 2 and 3**

The NAFO Scientific Council reviewed the status of this stock (interim monitor) at this June 2008 meeting. Based on overall indices for the current year, Scientific Council found no significant change in the status of this stock. The next full assessment of this stock is planned to be in 2010.

Roughhead grenadier is distributed throughout Subareas 2 and 3 in depths between 300 and 2,000 m. This is not a regulated species.

**FISHERIES:** There is no directed fishery for roughhead grenadier and most of the catches are taken as by-catches in the Greenland halibut fishery in Subareas 2 and 3. Roughhead grenadier is taken mainly in Div. 3LMN Regulatory Area. From 1993 to 1997 the level of the catches was around 4 000 tons. The highest level of observed catches (7 231 tons) was reached in 1998. From then until 2004 catches were around 3 000 tons. In 2005 and 2006, catches declined further to 1500 tons. A total catch of 664 t was estimated for 2007.

**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:** Current fishing mortality is the lowest of the available series and although the strong 2001 year-class seems to be weaker than expected, the assessment results showed that current estimates of biomass are the highest of the time series.

**RECENT MANAGEMENT ADVICE:** In 2007, an analytical assessment was presented but it was not accepted due to the uncertainty in the results. NAFO advised that it is not possible to provide any advice for roughhead grenadier in Sub-areas 2 and 3.

The next assessment will be held in 2010.

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

### **7.15. Roundnose Grenadier (*Coryphaenoides rupestris*) in Sub-areas 0+1**

Denmark, on behalf of Greenland, requested the Scientific Council to: *provide advice on the scientific basis for the management of Roundnose grenadier in Subarea 0+1 for 2009-2011.*

**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*).

**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 1CD in 1997-2007 and Div. 0B in 2000-2001. No analytical assessment could be performed.

**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 MANAGEMENT ADVICE:** There should be no directed fishing for roundnose grenadier in Subareas 0 and 1 in 2009-2011. Catches should be restricted to by-catches in fisheries targeting other species.

**STECF COMMENTS:** STECF agrees with the advice from NAFO

### **7.16. Northern Shortfin Squid (*Illex illecebrosus*) in Subareas 3 and 4**

STECF notes that a full assessment of Northern shortfin squid was requested by the NAFO Fisheries Commission. However, the expertise needed to complete this task was not available during the Scientific Council meeting.

Information on this stock is updated from NAFO Scientific Council Reports, 2008.

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. Catches in Subareas 3+4 in 2007 (230 t) was substantially lower than in 2006 (6 900 t).

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 2000-2007.

**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:** During 2006, indices of relative abundance and biomass were the fourth highest on record in the Div. 4VWX July survey. The values of the index in 2004 and 2006 were the highest two observed since the onset of the low productivity period beginning in 1982.

**RECENT MANAGEMENT ADVICE:** The Scientific Council's monitoring report indicates no significant change in the status of this stock and therefore Scientific Council advises that the TAC for 2009 be set between 19 000 and 34 000 t.

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

### **7.17. 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 mixture of skate species. However, thorny skate represents about 95% of the skates taken in the catches. Thus, the skate fishery on the Grand Banks can be considered as a directed fishery for thorny skate.

The main participants in this fishery are EU-Spain, Canada, Russia and EU-Portugal. Catches peaked at about 31,500 tons in 1991, and averaged 8 600 t from 1992-1995. Catch levels as estimated by STACFIS on Div. 3LNOPs averaged 9 050 t during the period 2000-2007. This species came under quota regulation in 2004, when the Fisheries Commission set a TAC of 13 500 tons for 2005-2007 in Div. 3LNO and Canada set a TAC of 1 050 t for Subdivision 3Ps.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is NAFO. The Canadian spring survey biomass indices fluctuated without trend prior to the mid-1980s then declined rapidly until the early-1990s. The biomass has been stable during the 1996 to 2004 period. During recent years the biomass appears to be increasing.

**PRECAUTIONARY REFERENCE POINTS:** Reference points are not available for thorny skate at this time.

**STOCK STATUS:** The current state of the stock is unclear compared to the historic (pre-1980s) period. The biomass has been relatively stable from 1996 to 2004 but at a lower level than in the mid-1980s. During 1995-2004, average catch as estimated by STACFIS was about 11 900 tons. Recent catches from 2005-2007 averaged 5 580 t during a period when biomass indices increased slightly.

**RECENT MANAGEMENT ADVICE:** To promote recovery of thorny skate, Scientific Council recommended that *catches in 2009 and 2010 should not exceed 6 000 t (the average catch during the past three years) in NAFO Divisions 3LNOPs.*

**STECF COMMENTS:** STECF agrees with the advice from NAFO

### **7.18. White hake (*Urophycis tenuis*) in Divisions 3N, 3O and Subdivision 3Ps.**

Multi-year Advice for 2008-2009 was provided for this stock in 2007.

The stock area is defined by Scientific Council as Div. 3NOPs, and is mainly concentrated in southern Subdivision 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 1985 at 8,100 tons, and then declined from 1988 to 1994 (2,090-ton average). Average catch was at its lowest between 1995 and 2001 (464 tons); then increased to 6,700 tons in 2002 and 4,800 tons in 2003, with a steady decline afterwards. From 2004-2007, the average catch was 949 t.

**SOURCE OF MANAGEMENT ADVICE:** Length frequency data from the Canadian fishery (1994-2006), and from the catches of EU-Spanish (2002, 2004), EU-Portugal (2003-2004, 2006), and Russian trawlers (2000-2006) were available. Biomass and abundance indices were available from annual Canadian spring in Div. 3LNOPs (1972-2007), autumn in Div. 3LNO (1990-2007) bottom trawl surveys and Spanish spring surveys in the NAFO Regulatory Area of Div. 3NO (2001-2007).

**PRECAUTIONARY REFERENCE POINTS:** The Scientific Council was unable to define reference points for this stock.

**STOCK STATUS:** Following the dominance of 1999 fish in 2000, a progression of this year-class is observed through subsequent years leading to increased catches in the white hake fishery in 2002-2003, when fish reached harvestable sizes, followed by a reduction in catches since. Both catches and survey biomass indices were much reduced in 2004-2005 relative to 2000-2001.

**RECENT MANAGEMENT ADVICE:** Given the recent declines in stock biomass indices and the current low recruitment, Scientific Council advises that catch of white hake in Div. 3NO, at the current TAC of 8 500 tons, is unrealistic and should not exceed their current level.

The next assessment of this stock will be in 2009.

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

### **7.19. Witch Flounder (*Glyptocephalus cynoglossus*) in Divisions 2J, 3K and 3L**

Multi-year Advice for 2008-2010 was provided for this stock in 2007.

Historically, the stock occurred mainly in Div. 3K although recently the proportion of the stock in Div. 3L is greater. In the past, the stock had been fished mainly in winter and springtime on spawning concentrations but is now only a by-catch of other fisheries.

**FISHERIES:** During the late-1970s and early-1980s witch flounder were widely distributed around the fishing banks, primarily in Division 3K. During 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. The catches during 1995-2004 ranged between 300 and 1 400 tons including unreported catches. The 2005 catch declined to 155 tons and the 2006 catch was only 84 tons. The catches in 2007 were 53 t, the lowest catch in the time series.

**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 (1977-2007). 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,  $B_{lim}$  was calculated as 15% of the highest observed biomass estimate ( $B_{lim} = 9\ 800$  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,  $B_{lim}$  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.

The next full assessment of this stock is scheduled for 2010.

**RECENT MANAGEMENT ADVICE:** In 2007, NAFO advised that there should be no directed fishing on witch flounder in 2008, 2009 and 2010 in Div. 2J, 3KL to allow for stock rebuilding. By-catches of witch flounder in fisheries targeting other species should be kept at the lowest possible level.

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

### **7.20. Witch Flounder (*Glyptocephalus cynoglossus*) in Divisions 3N and 3O**

Information on this stock is updated from NAFO Scientific Council Reports, 2008.

The stock mainly occurs in Div. 3O along the southwestern slopes of the Grand Bank. Traditionally, the fishery took place on spawning concentrations in the winter and spring.

**FISHERIES:** Catches exceeded the TAC by large margins during the mid-1980s. The catches from 1995-2002 ranged between 300-800 t including unreported catches. Catch for 2003 was estimated to be between 844 and 2 239 t. Catches in 2006 and 2007 were 481 t and 222 t respectively.

**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 1984-2007 and autumn surveys during 1990-2007. Biomass data is available from the Spanish Div. 3NO spring surveys during 1995-2001 in Pedreira units and 2001-2007 in Campelen units.

**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 2009, 2010 and 2011 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.

## 7.21. Yellowtail Flounder (*Limanda ferruginea*) in Divisions 3L, 3N and 3O

Information on this stock is updated from NAFO Scientific Council Reports, 2008.

**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.

There was a moratorium on directed fishing from 1994 to 1997, and small catches were taken as by-catch in other fisheries. The fishery was re-opened in 1998 and catches increased from 4 400 t in 1998 to 13 900 t in 2005. TACs were exceeded each year from 1985 to 1993, and 1998- 2001, but not since 2002. In 2006 and 2007 catches were much lower than the TACs.

**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, and 2007. For 2007, length frequency data from the Canadian fishery and from by-catches of Spanish (2007), Portuguese and Russian (2006 and 2007) trawlers were available. Abundance and biomass indices from annual Canadian spring (1971-82; 1984-2007) and autumn (1990-2007) bottom trawl surveys; annual USSR/Russian spring surveys (1972-1991); and, Spanish surveys in the NAFO Regulatory Area of Div. 3NO (1995-2007) are also used.

An analytical assessment using a stock production model was accepted to estimate stock status in 2008. Since the moratorium (1994-1997), the catches have been low enough each year to allow the stock to grow.

**PRECAUTIONARY REFERENCE POINTS:** By definition in the Scientific Council Precautionary Approach Framework, the limit reference point for fishing mortality ( $F_{lim}$ ) should be no higher than  $F_{MSY}$ . Scientific Council recommended that  $B_{lim}$  be set at 30%  $B_{MSY}$ , following the recommendation of the Limit Reference Point Study Group. Currently the biomass is estimated to be above  $B_{lim}$  and  $F$  below  $F_{lim}$ , 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 is currently estimated to be 1.7 times  $B_{MSY}$ , well above the level of the mid-1980s.

**RECENT MANAGEMENT ADVICE:** Scientific Council noted that this stock is well above  $B_{MSY}$ , and recommended any TAC option up to 85%  $F_{MSY}$  for 2009 (24 800 t) and 2010 (22 800 t).

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

## 8. Resources in the area of CECAF

STECF was unable to update the stock status and advice for any of the stocks in the area of CECAF. Consequently, the text of this Section reflects the stock status as described in the STECF Review of Stocks for 2008

Section 8 contains the most recent information for those stocks in the area of CECAF that are currently exploited by fleets from the EU. Formerly, information and advice on the status of resources in the region not exploited by EU fleets were also included in this section of the report.

The CECAF (Committee for the Eastern Central Atlantic Fisheries) region covers the FAO area 34, which extends from the Gibraltar Strait (36°N) down to the mouth of the Congo river (6°S) including the archipelagos of Madeira, the Canaries, Cape Vert and Sao Tomé e Príncipe. Recently, in 2006, Angola has joined the CECAF, broadening to the south the jurisdictional area of the organization down to the border with Namibia (around 18°S).

European fisheries in the CECAF region are conducted under fishing agreements between the European Union and most of the coastal countries. These agreements refer to a wide range of resources including crustaceans (shrimps, prawns and crabs), cephalopods (octopus, cuttlefish and squid), small pelagics (sardine, sardinellas, horse mackerels, mackerel and anchovy), demersal finfish (hakes, sea breams, groupers, croakers, etc.) and tuna fish. The latter group of resources is of the responsibility of the ICCAT (International Commission for the Conservation of the Atlantic Tuna) and assessments on the state of these stocks are presented in Section 14 of this report.

Fishing agreements have evolved along the time. In 1999, finished that negotiated with Morocco and subsequently two other important agreements such those of Angola and Senegal came also to an end in 2004 and 2005, respectively. A new fishing agreement was reached between the European Union and Mauritania in 2006 for a period of six years, reviewable every two years. More recently, in 2007, a new fisheries partnership agreement has been signed with Morocco, but it only allows for exploiting a limited number of finfish resources expressly prohibiting any catch of crustaceans or cephalopods.

This section of the report refers to the state of the stocks currently exploited by European fleets in the CECAF region. The stocks referred to in the new fisheries partnership agreement with Morocco are presently excluded because sufficient information is not yet available.

The latest assessments and advice provided in this report are based on the results of the CECAF Working Group on the Assessment of Small Pelagics off Northwest Africa held in Agadir (Morocco) from the 17 to the 26 April 2007 and on those of the Working Group on demersal resources in the northern zone which met in Banjul (The Gambia) from 6 to 14 November 2007. The results from the assessments have not yet been formally published and therefore the information provided in this section of the report is to be regarded as preliminary and may be subject to change.

For some stocks, there is no updated advice and the text of the stock sections remains unchanged from the STECF Review of advice for 2007.

### **8.1. Sardine (*Sardina pilchardus*) off Morocco, Western Sahara (under Moroccan administration), Mauritania and Senegal**

**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.

The new fisheries partnership agreement between Morocco and the EU entered into force in 2007 permits vessels from Europe to fish for small pelagics, including sardine, using pelagic trawls in zone C. To date no boat has made a request for a licence under this provision.

In 2005 and 2006, the sardine catch from zone A was 25 000 and 26 000 tonnes respectively. Catch in this zone has seen some recovery since the sharp decrease in 1996. The specific composition of the sardine fleet landings in this zone has experienced a significant change over the last few years. Sardine, which was the predominant species in the catch, has declined, giving way to mackerel, which is essentially caught off the Bay of Agadir.

The northern zone has also shown relative stability in catch, increasing from around 17 000 tonnes to almost 18 000 tonnes. On the other hand, catch of sardine in Zone B fell drastically, registering around 360 000 tonnes after a catch of nearly 530 000 tonnes in 2005. This decrease is probably due to a decline in sardine availability.

Zone C registered an increase in total sardine catch from around 125 000 tonnes in 2005 to more than 210 000 tonnes in 2006. This zone has been exploited by a heterogeneous fleet working within the framework of different access regimes. In addition to traditional coastal purse seiners and Moroccan RSW vessels, the fleets operating in this area also includes pelagic trawlers operating under a fishing agreement between Morocco and the Russian Federation and boats (purse seiners, RSW and freezer trawlers) chartered by Moroccan operators. The number of active vessels and the number of fishing days in this zone increased in 2006 compared to 2005.

The sardine catch in the Mauritanian zone also saw an increase, climbing from almost 65 000 tonnes in 2005 to a catch of more than 73 000 tonnes in 2006. Catches are carried out on a seasonal basis by pelagic trawlers from the European Union (EU) and the Russian Federation.

Catch in the Senegalese zone was estimated at 12 000 tonnes in 2006, having registered more than 14 000 tonnes in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). Assessment Working Groups 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 Agadir (Morocco) from the 17 to the 26 April 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points were defined in the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa that was held in Banjul (Gambia) in 2006.  $B_{MSY}$  and  $F_{MSY}$  were adopted as Limit Reference Points, while  $B_{0.1}$  and  $F_{0.1}$  were chosen for Target Reference Points.

**STOCK STATUS:** The Schaefer logistical dynamic production model was used to assess the two stocks, A+B and C. Forecasting of catch abundance for the following five years was based on different management scenarios using the same model.

The results for Zone A+B show that the estimated biomass in 2006 is well below that producing maximum sustainable yield. The level of exploitation is above that which is necessary for the stock to continue to increase. The  $B_{cur}/B_{0.1}$  ratio shows that the stock is overexploited.

For Zone C, the results indicate that the biomass of the present stock is close to but above the biomass that would produce the maximum sustainable yield ( $B_{MSY}$ ). The  $B_{cur}/B_{0.1}$  ratio shows that the stock is not fully exploited. However the sardine biomass estimated by the R/V DR. FRIDTJOF NANSEN in the Northwest African region saw a decrease of over 57 percent at the end of 2006 when compared to 2005. The same situation was observed by the Moroccan vessel R/V AL AMIR MOULAY ABDALLAH. The biomass index estimate by the Russian vessel R/V ATLANTIDA in 2006 also shows a decrease.

#### **RECENT MANAGEMENT ADVICE:**

**Central stock:** The results of the model show that stock A+B is overexploited. Due to the fluctuations that the stock has seen and the preoccupying situation in 2006, sardine catch in this zone should not be in excess of 350 000 tonnes in 2008.

**Southern stock:** The results of the model indicate that the stock is not fully exploited. But given the instability of stock, particularly evident from the drop in 1997 and the decrease in biomass of 2006 observed by the R/V DR. FRIDTJOF NANSEN and other research vessels, the possibility of increasing catch should be considered very carefully. Continuous follow up of the structure and abundance of the stock should be guaranteed by scientific surveys, independently of commercial catch data, to detect unforeseen changes which could require urgent management measures.

**STECF COMMENTS:** STECF has no comments

## **8.2. Anchovy (*Engraulis encrasicolus*) off Morocco and Mauritania**

**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 belong to the same stock that occurs in ICES division IXa (Gulf of Cádiz). In the region the anchovy is also fished in Mauritania. Anchovy is not the main target of the fishery in the area, but large quantities are caught as by-catch by industrial pelagic trawlers fishing for sardinella, horse mackerel or mackerel.

The fisheries partnership agreements between EU-Morocco and EU-Mauritania have allowed for fishing possibilities for purse seiners and pelagic trawlers, targeting anchovy in the northern zone of Morocco and in Mauritania respectively. Under the 2007 EU-Morocco agreement, a fleet of 11 boats from the south of Spain commenced fishing from June 2007. So far no data are available on this activity. No European pelagic trawlers have requested a licence to fish for anchovy in Mauritania.

Total anchovy catches in the region increased steadily between 1996 and 2003, increasing from 20,000 tonnes to around 180,000 tonnes. In 2004 and 2005 the total anchovy catch dropped by 46 percent compared to 2003. In 2006, catches saw an increase of nearly 43 percent with respect to 2005. This increase was registered for the most part in Mauritania.

Since 1995, Mauritania's share of the total catch has increased steadily. It has risen from 8 percent of total anchovy catch in 1995 to 92 percent in 2006 whereas that of Morocco has followed the inverse trend over the same period. This inverse distribution of catch in the two countries could be explained by the closure of the fisheries in zone C in the year 2000.

It should be noted that 92 percent of total anchovy catch in the region is caught in Mauritania and that Russian and Ukrainian fleets, which account for about 70 percent of the Mauritanian total, play an important role. In 2006, the increase in catch by this fleets can be explained by the resolution of technical and financial problems of previous years. Recent integration into the European Union of countries such as Latvia (previously counted in the group of other industrial fisheries) has increased the catch of anchovy by the EU from only 167 tonnes in 2005 to more than 35,000 tonnes in 2006.

It is therefore possible to conclude that the increase in total anchovy catch in the region in 2006 can be explained partly by the high increase in European, Russian and Ukrainian effort in Mauritania, and, to a lesser extent, by that of the Moroccan fleet in zone B.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). Anchovy is assessed by the Working Group on the Assessment of Small Pelagics off Northwest Africa. This Working Group met in Agadir (Morocco) from the 17 to the 26 April 2007.

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

**STOCK STATUS:** An exploratory LCA analysis was conducted in 2007 to identify the most targeted length classes in the Moroccan zone. Results were promising but due to the lack of data and the uncertainty on the stock identity it was decided not to consider them to formulate management advice.

A series of acoustic surveys was carried out in 2006 by different vessels in the region. Estimates of anchovy biomass are summarised in the following table:

	<b>Northern zone</b> <b>R/V AL</b> <b>AMIR</b>	<b>Zone C</b> <b>R/V AL</b> <b>AMIR</b>	<b>Zone C</b> <b>R/V DR.</b> <b>FRIDTJOF</b> <b>NANSEN</b>	<b>Mauritania</b> <b>R/V DR.</b> <b>FRIDTJOF</b> <b>NANSEN</b>	<b>Mauritania</b> <b>R/V AL</b> <b>AWAM</b>
Biomass estimates (tonnes)	13 000	25 000	11 992	34 000	28 000
Survey season	autumn 2006	autumn 2006	autumn 2006	autumn 2006	autumn 2006

**RECENT MANAGEMENT ADVICE:** As a precautionary measure, it was recommended not to increase catches above the average of the last three years (115000 tonnes) in the whole region.

**STECF COMMENTS:** STECF has no comments

### 8.3. 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 off Western Sahara, Mauritania and Senegal where the Spanish longline and gillnet fleets mainly exploit Senegalese hake. Black hake was also exploited by a specialized fleet of Spanish trawlers targeting both species. This fleet formerly operated on the shelf of all three countries, depending on the seasonal abundance of hake in the different areas. The interruption of the fishing agreements with Morocco and Senegal stopped this practice and for some time, the fishery was restricted to Mauritanian waters. Following the new (2007) agreement with Morocco, in 2007, fishing for black hake by Spanish fleets has extended to the Western Sahara (under Moroccan administration) and Mauritania.

The combined catch of black hake in the whole CECAF region varied between 7,253 t and 22,244 t over the period 1983-2006. Most of the catches of these species are made in Mauritania where they have observed a cyclical but general increasing trend from 1983 to 2001 when a maximum historic value of 16,104 t was attained. Since then, catches have experienced a sharp steady decline, reaching a minimum of 7253 t in 2006. The Spanish trawler fleet accounted for almost 100% of the catches made between 1983 and 1991. In subsequent years other fleets started fishing for black hake in Mauritania and the importance of the Spanish trawlers catches decreased to an average of around 65% with minimums slightly higher than 50% in 2005 and 2006. Other important fleet components in this fishery are Spanish longliners and Mauritanian trawlers.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). *Merluccius senegalensis* and *Merluccius polli* are regularly assessed by the Working Group on demersal resources in the northern zone. The most recent meeting took place in Banjul (The Gambia) from 6 to 14 November 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points defined for small pelagics in the FAO Working Group held in Banjul (Gambia) in 2006 were also adopted for the black hake stock. These are  $B_{MSY}$  and  $F_{MSY}$  for Limit Reference Points and  $B_{0.1}$  and  $F_{0.1}$  for Target Reference Points.

**STOCK STATUS:** The Schaefer logistical dynamic production model was used to assess the stock. For Mauritania, the current abundance of black hake is well below that required to produce maximum sustainable yield ( $B_{cur}/B_{MSY} = 45\%$ ). Current fishing effort is 26% higher than that corresponding to  $F_{0.1}$  but lower than that required to keep the stock biomass at the current level ( $F_{cur}/F_{SYcur} = 73\%$ ). These results clearly show that the stock is overexploited although there is a chance for recovery if no increase in fishing effort is allowed.

**RECENT MANAGEMENT ADVICE:** 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 black hake and to fleets that target other demersal species, as these have large by-catches of black hake. Further recommendation is to keep catches at a maximum level of 7000 t.

**STECF COMMENTS:** STECF has no comments.

### 8.4. Octopus (*Octopus vulgaris*) off 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 other nationalities, and a substantial artisanal fleet of around 900 canoes fishing with pots (poupiers), continue to fish the cephalopods in Mauritania. Since 1995 Spanish vessels have returned to the fishery after several decades of absence, with around 25 freezer trawlers currently involved in the fishery. Octopus (*Octopus vulgaris*) is the target species in this fishery followed in importance by cuttlefish (mainly *Sepia hierredda*), squid (*Loligo vulgaris*) and a miscellaneous group of many different finfish species.

Overall catches of octopus in the period 1990-2006 have ranged from a minimum of 17,400 t in 1998 and a maximum of 44,600 t in 1992. Production of Spanish trawlers has steadily increased from 1995 until 2000 when it peaked at a value of 12,265 t. Catches then decreased until 2003 (6402 t) and increased slightly in 2004 (7321 t) and 2005 (9306 t). In 2006, the Spanish catch of octopus was again smaller than in preceding years attaining a value of 6482 t. Catches of Mauritanian trawlers represent around 40% of the total production of octopus. The

artisanal fleet fishing for octopus has very much evolved in recent years contributing around 22% to the total catch of the species in 2006.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). *Octopus vulgaris* is regularly assessed by the Working Group on demersal resources in the northern zone. The most recent meeting was in Banjul (The Gambia) from 6 to 14 November 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points defined for small pelagics in the FAO Working Group held in Banjul (Gambia) in 2006 were also adopted for the octopus stock. These are  $B_{MSY}$  and  $F_{MSY}$  for Limit Reference Points and  $B_{0.1}$  and  $F_{0.1}$  for Target Reference Points.

**STOCK STATUS:** The Schaefer dynamic production model was used to assess the stock. Results showed that current biomass is half of that producing the target biomass ( $B_{cur}/B_{0.1} = 51\%$ ) and that fishing mortality is higher than that needed to reach the target  $F_{0.1}$  ( $F_{cur}/F_{0.1} = 143\%$ ). The Mauritanian octopus stock is therefore overexploited.

**RECENT MANAGEMENT ADVICE:** Taking into account the assessment results it was recommended a general reduction in fishing effort for all fleets involved in the fishery.

**STECF COMMENTS:** STECF has no comments.

## 8.5. Cuttlefish (*Sepia hierredda*) off Mauritania

**FISHERIES:** Cuttlefish species are taken as a by-catch in the same cephalopod fishery as octopus. The cuttlefish catch can be composed of several different species among which *Sepia hierredda* is the most abundant one. Production of that species in Mauritania has varied between 2373 t (2006) and 7722 t (1993) over the period 1984-2002. General trend of catches is decreasing with periodic maximums located in years 1993 (2373 t), 2001 (6555 t) and 2005 (4025 t). Most of these catches are taken by Mauritanian trawlers, which contribute an average of more than 80% to the total production of the species.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). The cuttlefish is regularly assessed by the Working Group on demersal resources in the northern zone. The most recent meeting was in Banjul (The Gambia) from 6 to 14 November 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points adopted for this species are the same than those of most species in the region. These are  $B_{MSY}$  and  $F_{MSY}$  for Limit Reference Points and  $B_{0.1}$  and  $F_{0.1}$  for Target Reference Points.

**STOCK STATUS:** The Schaefer dynamic production model was applied to assess the stock. The fitting of the model to the available observed data was not satisfactory and the CECAF Working Group was unable to interpret the results. Nevertheless, abundance indices from annual research cruises conducted in Mauritania show a decreasing trend of cuttlefish biomass indicating a state of overexploitation of the stock.

**RECENT MANAGEMENT ADVICE:** Taking into account the uncertainties surrounding the assessment results and the indications of progressive decline on biomass of the stock as from the research cruises, the CECAF Working Group decided to recommend a reduction in fishing effort.

**STECF COMMENTS:** STECF has no comments.

## 8.6. Coastal prawn (*Farfantepenaeus notialis*) 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 (*Farfantepenaeus notialis* and *Penaeus kerathurus*), the crab (*Chaceon maritae*) and the deep-water shrimp (*Aristeus varidens*). Catches of *Farfantepenaeus notialis* made by these boats have varied between 405 t (1993) and 2400 t (1999) over the period 1987-2006. Spanish catches in recent years show an increasing trend since 2003 (815 t) until 2006 (1791 t). There are other fleet segments composed of freezer trawlers from Mauritania and from other foreign origins. Catches by Mauritanian freezer trawlers has increased from very low levels in 1992 (8 t) to a maximum of 807 t in 2002 followed by a more or less stable

period with catches of around 700 t per year. Catches of other foreign freezer trawlers are much more fluctuating ranging from 31 t in 1996 to 929 t in 2005.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF) and *Farfantepenaeus notialis* is assessed by the Working Group on demersal resources in the northern zone. The most recent meeting was in Banjul (The Gambia) from 6 to 14 November 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points adopted for this species are  $B_{MSY}$  and  $F_{MSY}$  for Limit Reference Points and  $B_{0.1}$  and  $F_{0.1}$  for Target Reference Points.

**STOCK STATUS:** The Schaefer dynamic production model was applied to assess the stock. The fitting of the model is rather good indicating that the Mauritanian stock of *Farfantepenaeus notialis* appears to be fully exploited. The current biomass is very close to the target biomass  $B_{0.1}$ .

**RECENT MANAGEMENT ADVICE:** It was recommended to reduce fishing effort from the level observed in 2006.

**STECF COMMENTS:** STECF has no comments.

### **8.7. Deepwater shrimp (*Parapenaeus longirostris*) off Mauritania**

**FISHERIES:** This species is fished in the same fishery than that of *Farfantepenaeus notialis*. *Parapenaeus longirostris* is the main target species in the fishery accounting for more than 50% to the total production. Total catches of this species have ranged from 497 t to 4269 t between years 1987 and 2006. On average, the Spanish freezer trawler fleet accounts for more than 80% of the catches.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF) and *Parapenaeus longirostris* is assessed by the Working Group on demersal resources in the northern zone. The most recent meeting was in Banjul (The Gambia) from 6 to 14 November 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points adopted for this species are  $B_{MSY}$  and  $F_{MSY}$  for Limit Reference Points and  $B_{0.1}$  and  $F_{0.1}$  for Target Reference Points.

**STOCK STATUS:** The Schaefer dynamic production model was applied to assess the stock. In Mauritania the stock appears to be fully exploited. The biomass is close to  $B_{0.1}$  and the fishing mortality in 2006 is also close to the target reference point.

**RECENT MANAGEMENT ADVICE:** The CECAF Working Group recommended no increase in fishing effort.

**STECF COMMENTS:** STECF has no comments.

### **8.8. Atlantic horse mackerel (*Trachurus trachurus*) and Cunene horse mackerel (*Trachurus trecae*) off Mauritania and other countries in the northern CECAF region.**

**FISHERIES:** Under the framework of the new fishing agreement with Mauritania, the number of European vessels authorised to fish for small pelagics at the same time is fixed at 22 units. With respect to the previous agreement (2001–2006), where the number of vessels was fixed at 15, this is an important increase. A ceiling of 440,000 tonnes per year has been placed on total authorised catches, covering all species (sardinellas, horse mackerel, etc.). The current agreement includes new member states of the EU (Baltic States, Cyprus), which were already present in the Mauritanian zone. These fleets generally target horse mackerel.

The Atlantic horse mackerel is distributed off Western Sahara (under Moroccan administration) and Mauritania, while the cunene horse mackerel is mainly found in Mauritanian and Senegalese 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. Exploitation of horse mackerel is carried out by vessels of varying size, from the local artisanal canoes to the large pelagic trawlers.

The two horse mackerel species (*Trachurus trachurus* and *Trachurus trecae*) occupy neighbouring ecological niches and represented almost 95 percent of the total horse mackerel catch in 2005, but only 88 percent in 2006

(*Caranx rhonchus* making up the remainder). *Trachurus trachurus* is mainly fished to the north of Cape Blanc and *Trachurus trecae* to the south. The artisanal fishery catches account for only a small proportion of the overall catch, in the order of 2.8 percent in 2005 and 2 percent in 2006.

Even though total catches of the two horse mackerel species together have increased successively over the period 2003 – 2005 (around 200,000 tonnes in that year, 394,000 tonnes in 2004, 414,000 tonnes in 2005), in 2006 landings decreased by 5 percent reaching a total of 392,000 tonnes.

The cunene horse mackerel (*Trachurus trecae*) is the most important species. Nevertheless, catch of this species decreased by 6 percent from 270,000 tonnes in 2005 to around 250,000 tonnes in 2006. The majority of the catch of this species is taken in the Mauritanian zone (80 percent). Catches of the Atlantic horse mackerel (*Trachurus trachurus*) were around 90,000 tonnes in 2006 as compared to 120,000 tonnes in 2005, whereas catches of false scad (*Caranx rhonchus*) were 45,000 tonnes in 2006 compared to 20,000 tonnes in 2005, representing an increase of around 125 percent.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). *Trachurus trachurus* and *Trachurus trecae* are assessed by the Working Group on the Assessment of Small Pelagics off Northwest Africa. This Working Group met in Agadir (Morocco) from the 17 to the 26 April 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points were defined in the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa that was held in Banjul (Gambia) in 2006. The indices  $B_{MSY}$  and  $F_{MSY}$  were adopted as Limit Reference Points, while the indices  $B_{0.1}$  and  $F_{0.1}$  were chosen for Target Reference Points.

**STOCK STATUS:** Stock assessment of the two horse mackerel species was carried out using a surplus production model.

Regarding *Trachurus trachurus* the application of the model using the abundance index series from acoustic surveys showed that the current estimated biomass is around a third of the  $B_{0.1}$  biomass and fishing effort is greatly in excess of that required to maintain the stock in equilibrium. Current effort is four times greater than that required for maximum sustainable yield. These results indicate that the stock is overexploited.

For *Trachurus trecae* two different abundance index series were used to fit the model. Both gave similar results indicating that the 2006 biomass is above  $B_{0.1}$  and that fishing mortality is at the level of  $F_{0.1}$ . It therefore appears that the stock is fully exploited.

**RECENT MANAGEMENT ADVICE:** For *Trachurus trachurus*, the current level of fishing mortality greatly surpasses the  $F_{0.1}$  target level. The stock situation therefore appears critical and a 20 percent reduction in fishing effort will not be sufficient to re-establish it over the next five years (2007–2011).

For *Trachurus trecae*, the results appear to indicate the biomass is close to the  $B_{0.1}$  level. The stock appears to be fully exploited.

Given the multi-specific nature of the horse mackerel fisheries and the high level of exploitation of *Trachurus trachurus*, the CECAF Working Group recommended a reduction in fishing effort of at least 20 percent, which corresponds to a catch level in 2007 for both species combined equivalent to that recommended for 2006 (260,000 tonnes).

**STECF COMMENTS:** STECF has no comments.

## **8.9. Mackerel (*Scomber japonicus*) off Mauritania and other countries in the northern CECAF region.**

**FISHERIES:** Two chub mackerel stocks have been identified in the Northwest Africa region. The northern stock is found between Cape Bojador (Western Sahara under Moroccan administration) and the north of Morocco, and the southern stock is situated between Cape Bojador and the south of Senegal.

In the northern zone (Tangiers–Cape Bojador), the chub mackerel fishery is exploited solely by the Moroccan fleet. This fleet is composed of coastal purse seiners, which mainly target sardine but also fish chub mackerel depending on availability. The zone between Cape Bojador and Cape Blanc is exploited, in addition to the Moroccan coastal purse seiners, by pelagic trawlers operating under the Morocco–Russian Federation fishing agreement, and by vessels chartered by Moroccan operators. In the zone to the south of Cape Blanc, several

pelagic trawlers from different countries (Russian Federation, Ukraine, European Union and others) operate, but only targeting chub mackerel seasonally. In Senegal and The Gambia, chub mackerel is considered as by-catch by the Senegalese artisanal fleet.

Since 1991, total chub mackerel catch over the whole region has seen an increasing trend, reaching a maximum of more than 200,000 tonnes in 1997, after which catches fluctuate around an average value of 176,000 tonnes. Since 2002, an increase has been noted with a record catch of over 224,000 tonnes registered in 2004 and a catch of 210,000 tonnes in 2006.

To the south of Cape Blanc where the European fleet operates, total chub mackerel catch increased over the period 1990–1996, reaching around 100,000 tonnes. It then decreased to reach the low level of around 20,000 tonnes in 1999. Catch then progressively increased until 2003 when a record of 133,000 tonnes was recorded. Since then catches have heavily declined with 38,000 tonnes recorded in 2005 and 33,000 tonnes in 2006.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). *Scomber japonicus* is assessed by the Working Group on the Assessment of Small Pelagics off Northwest Africa. This Working Group met in Agadir (Morocco) from the 17 to the 26 April 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points were defined in the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa that was held in Banjul (Gambia) in 2006. The indices  $B_{MSY}$  and  $F_{MSY}$  were adopted as Limit Reference Points, while the indices  $B_{0.1}$  and  $F_{0.1}$  were chosen for Target Reference Points.

**STOCK STATUS:** Assessments were carried out by applying a Schaefer dynamic surplus production model and ICA. Both models were considered inconclusive due to bad fitting of the observed data.

**RECENT MANAGEMENT ADVICE:** It was recommended, as a precautionary measure, that catches do not exceed the current level of 20,000 tonnes for the whole southern stock.

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

## **8.10. Sardinella (*Sardinella aurita* and *Sardinella maderensis*) off Mauritania and other countries in the northern CECAF region.**

**FISHERIES:** Two species of sardinella (*Sardinella aurita* and *Sardinella maderensis*) occur in the region. The greatest exploitation of sardinella takes place in Mauritania and Senegal. This is carried out by the industrial fishery in Mauritania (EU and Russian fleets and a fleet of other vessels from Eastern Europe) and by the artisanal fishery in Senegal, most notably purse seines and the surrounding gillnets.

Total catches of both species in the region have varied between 219,000 t (1994) and 592,000 t (1998) in the period from 1990 to 2006. Senegal provided a new data series from its artisanal fishery following a restructuring and analysis of its database. This modification of the data has brought about a change in the catch trend of *Sardinella aurita* in the region over the last few years. Whereas in 2006 a continued decrease was noted, the new figures show that since 2003 catches have been relatively stable around an average of 330,000 tonnes. For *Sardinella maderensis*, the catches show a long-term increasing trend, despite falls in 2004 and 2005. In 2006, catches increased by 20,000 tonnes to reach a level of 156,000 tonnes.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). *Sardinella aurita* and *Sardinella maderensis* are assessed by the Working Group on the Assessment of Small Pelagics off Northwest Africa. This Working Group met in Agadir (Morocco) from the 17 to the 26 April 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points were defined in the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa that was held in Banjul (Gambia) in 2006. The indices  $B_{MSY}$  and  $F_{MSY}$  were adopted as Limit Reference Points, while the indices  $B_{0.1}$  and  $F_{0.1}$  were chosen for Target Reference Points.

**STOCK STATUS:** The stocks of sardinella were assessed by applying the Schaefer dynamic surplus production models. Results from the analyses led to the same situation as that observed in 2006, namely a current biomass less than MSY biomass. This can be more clearly seen for round sardinella, which remains the target species for the industrial fishery in Mauritania and the artisanal fishery in Senegal.

There are also large inter-annual fluctuations in abundance as measured by the acoustic surveys. Nevertheless, the decreasing trend in abundance over the entire time-series, combined with the decrease in length of the round sardinella and the reduction in yields of round sardinella by all fisheries in 2006, suggests a critical situation for sardinella and in particular for the round sardinella (*Sardinella aurita*).

**RECENT MANAGEMENT ADVICE:** The assessment results indicated that the sardinella stocks tend to be overexploited (particularly round sardinella). Catches of both species combined were 456,000 tonnes in 2006 and were slightly higher than the catch level recommended in 2005 (400,000 tonnes).

Given the overexploitation of round sardinella, it was strongly recommended that catches be reduced to 220,000 tonnes. Management measures aimed at reducing catches in 2007 are unlikely to be enforced and it was highlighted the necessity of reducing fishing effort targeting the round sardinella.

As the pelagic fishery is multi-specific, it was urged that management measures be adopted in the form of a regulation that takes into consideration the cross-border distribution of the stocks. Above all it was considered necessary to: i) organize the division of catch or total allowable effort allowed between the different countries, ii) divide pelagic licences into two categories (clupeids, carangids and others), and iii) encourage a reduction in selected fishing gears where round sardinella are concerned (mainly for the artisanal fishery).

**STECF COMMENTS:** STECF has no comments.

## 8.11. Other demersal finfish in Mauritanian waters

**FISHERIES:** This group is composed of around 100 different species that can be taken either in targeted fisheries or as by-catch in other fisheries. The targeted 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 most of these species in Mauritania is unknown. Nevertheless, the CECAF Working Group was able to estimate annual series of production from four sea breams (family Sparidae): *Pagellus bellottii*, *Pagellus acarne*, *Dentex macrophthalmus* and *Sparus caeruleostictus*, and one grouper (family Serranidae): *Epinephelus aeneus*.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). Demersal finfish are assessed by the Working Group on demersal resources in the northern zone, which met in Banjul (The Gambia) from 6 to 14 November 2007.

**PRECAUTIONARY REFERENCE POINTS:** Reference points adopted for these species are:  $B_{MSY}$  and  $F_{MSY}$  as Limit Reference Points, and  $B_{0.1}$  and  $F_{0.1}$  as Target Reference Points.

**STOCK STATUS:** Assessments conducted by application of dynamic surplus production models and abundance indices derived from research surveys concluded that all the four seabream stocks are overexploited and that the grouper stock is close to depletion.

**RECENT MANAGEMENT ADVICE:** To avoid any increase in fishing mortality while more precise assessments are made available.

**STECF COMMENTS:** STECF has no comments.

## 8.12. Deepwater shrimps off Guinea Bissau

**FISHERIES:** Crustacean resources in Guinea Bissau are mainly made of shrimps (*Parapenaeus longirostris* and *Aristeus varidens*), prawn (*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 1943 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 were respectively 12.9 t, 18 t, 42.5 t and 29.7 t for *Parapenaeus longirostris*, and 7.2 t, 9.7 t, 55.3 t and 14.8 t for *Farfantepenaeus*

*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) in 2005 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.

### **8.13. 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 6,000 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 Cotonou (Benin) in 2005 but results are still unpublished.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for cuttlefish in Guinea Conakry.

**STOCK STATUS:** Assessments were carried out using dynamic production models. Results of fitting the model were not satisfactory due to an extremely high catch in 1996. Removing this catch from the data series 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 CECAF Working Group recommended a reduction in fishing effort.

**STECF COMMENTS:** STECF has no comments

## **9. 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 this Section reflects the stock status as described in the STECF Review of Stocks for 2008

### **9.1. 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 1980s. 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.

**STECF COMMENTS:** STECF agrees with the advice given by IFREMER

## 9.2. 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.

## 10. Resources in the South-East Atlantic

STECF did not have up-to-date information on advice for stocks in the SE Atlantic. Consequently, the text of this Section reflects the stock status as described in the STECF Review of Stocks for 2008.

### 10.1. Deep water 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: 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 no 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 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 ( $F_{cur}/F_{ScurB} = 62\%$ ).

**RECENT MANAGEMENT ADVICE:** Angola manages the fishery by means of mesh size restrictions, closed seasons, TACs and effort regulations. The 1999 Workshop recommended a reduction in the overall fishing effort.

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

## 10.2. Deep water rose shrimp (*Parapenaeus longirostris*), Angola

**FISHERIES:** The deep water rose shrimp (*Parapenaeus longirostris*) is the most abundant species of the deepwater shrimps off Angola (see Section 10.1 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 no 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 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.

## 10.3. 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.

#### **10.4. 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. South African flagged vessels mainly exploit the resource. 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 an 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.

## **11. Resources in the South-west Atlantic**

Section 11 contains updated reviews of advice for stocks in Falkland Islands' waters, as well as first results of stocks status on the High Seas of the SW Atlantic from a research cruise carried out by IEO in March-April 2008. Landings information for Argentinean fleets is also included.

In October 2007, the Instituto Español de Oceanografía (IEO, Spanish Institute of Oceanography) started a series of five research cruises on the High Seas of the SW Atlantic on board the Spanish R/V Miguel Oliver, with the aim of studying Vulnerable Marine Ecosystems (VMEs) in the area between coastal states' EEZs and the 1500 m depth contour. The last of these 5 cruises which ended in mid-April 2008, has a primary aim of initiating a time series of research vessel survey data for use in resource assessments. To date, the swept area biomass estimates for each of the commercially exploited resources in international waters of the Southwest Atlantic are the only estimates available. The results from the initial survey are therefore reported in the appropriate stock sections. A further series of campaigns in the same zone, with same objectives, i.e. study of VMEs, cartography, benthos, geomorphology, sediment and stock assessment, started on the 16<sup>th</sup> October 2008 and is expected to last until mid-April 2009. The objective of the research surveys is to present to the Spanish Administration, a report on the location and features of candidate VMEs in the area and identify any potential interactions with fishing activities.

### **11.1. Hoki (*Macruronus magellanicus*), Falkland Islands**

**FISHERIES:** Hoki is mainly caught in the western part of the Falkland Islands Interim Conservation and Management Zone (FICZ) and is targeted mainly by various European and Falkland Islands registered finfish trawlers, but also forms a by-catch in the *Loligo* fishery and by surimi vessels. Catches increased from about 10,000 t in early 1990s when they were mainly taken as a by-catch to between 16,670-26,970 t since 1998 by a targeted trawl fishery.

The lowest recent catch was in 2005 (16,672 t), and catches increased again in 2006 to 19,768 t and have since declined to 12,195 t in 2007. The total catch in January – September 2008 was 9,472 t. Hoki is mainly targeted in two seasons, from February-May and from July-October.

**SOURCE OF MANAGEMENT ADVICE:** The management body is the Falkland Islands Fisheries Department (FIFD) with 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 at present, however, historically, catches of hoki were quite variable and there is some concern that the current high catches may not be sustainable in the long-term. Catches from 2005 to September 2007 have tended to be lower than catches in the previous years (2002-2004), but it is not clear this is indicative of a declining resource. However, there are indications that effort directed to Hoki has declined due to an increase of licences granted to vessels participating in the hake fishery. The stock assessment for hoki in Falkland Islands' waters is problematic because of its migratory behaviour and only a small percentage of the stock is caught in the FICZ.

**RECENT MANAGEMENT ADVICE:** The advice is to hold the overall level of fishing effort in the Falkland Zone constant.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organisation.

### **11.2. Patagonian grenadier (*Macrourus carinatus*, *Macrourus holotrachys*), Falkland Islands**

**FISHERIES:** *Macrourus holotrachys* (Günther, 1878) and *M. carinatus* (Günther, 1878) are two species, inhabiting deep seas of the Southwest Atlantic. *M. carinatus* is known to be distributed on the slopes of South America and other areas between 300 and 1100 m. *M. holotrachys* occurs around South America, Falkland Islands and Shag Rocks between 150 and 1750 m depth. In Falkland Islands' waters both species are taken as a by-catch in the longline fishery targeting Patagonian toothfish (*Dissostichus eleginoides*) at depths of 650–2000 m and occasionally by trawlers at 300–350 m depth. In 2007, grenadiers were taken as a by-catch by longliners and trawlers throughout the year. Total longline by-catch was 67 tonnes, while the trawlers took 162 tonnes of fish. Dense commercial aggregations of *Macrourus carinatus* (CPUEs >15 tonnes per day) were revealed on the southern Falkland slope, mostly between 700 and 900 m.

**SOURCE OF MANAGEMENT ADVICE:** Falkland Island Fisheries Department (FIFD) with 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: 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 through a regional fisheries organisation.

### **11.3. Southern blue-whiting (*Micromesistius australis*), Falkland Islands**

**FISHERIES:** Since 1992 Southern blue-whiting has been mainly targeted by surimi vessels in Falkland Islands' waters. The targeted fishery mainly occurs in the Southwest of the Falkland Island Interim

Conservation and Management Zone (FICZ). Southern blue whiting is also taken as an occasional by-catch by finfish trawlers.

In 2005-2006, surimi vessels operated only in the austral summer between October and March. In 2007 and 2008, the surimi vessels commenced operations at the beginning of October and in 2007 continued until the beginning of December. During this period, vessels fished for aggregations of post-spawning fish, which were still feeding in the Falkland waters before dispersing further south.

The total catch between January and September 2008 was only 4,304 t, which was much lower than in 2007 (9,872 t), and 2006 (7,846 t). This decrease mainly corresponded with a decline in the unit price for southern blue whiting.

**SOURCE OF MANAGEMENT ADVICE:** The management body is the Falkland Islands Fisheries Department (FIFD) together with advice from the Renewable Resources Assessment Group (RRAG), Imperial College.

**PRECAUTIONARY REFERENCE POINTS:** The total catch of Southern blue whiting should be limited to 50,000 t in the Southwest Atlantic

**STOCK STATUS:** The most recent stock assessment of Southern blue whiting in the Southwest Atlantic performed by FIFD in October 2007 indicates that the spawning stock biomass (SSB) decreased strongly between the early 1990s (1,200,000 t) and 2003 446,600 t representing about a 60% drop over that period. Since 2003 the stock has increased to an estimated 715,000 t of spawning stock biomass at the end of 2006.

**RECENT MANAGEMENT ADVICE:** Fishing in the southern region of FICZ (south of 52°S) was banned for surimi vessels from 1 August until 15 October 2008 to allow the fish to spawn undisturbed. **STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization.

#### **11.4. 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, Spanish trawlers target red cod in spring (September-October) on its spawning grounds to the southwest of the Islands. Catches of red cod decreased from between 4,649 – 9,313 t in 1996-2000 to between 2,285-2,781 t in 2003-2005. In 2006, the annual catch increased up to 3,500 t, with the further increasing trend in 2007 (4,200 t). The total catch in January – September 2008 was 3,145 t, coincident with a decrease in fishing effort **SOURCE OF MANAGEMENT ADVICE:** The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

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

**STOCK STATUS:** Stock abundance has increased in recent years, probably due to high recruitment in the last two years.

**RECENT MANAGEMENT ADVICE:** The Falkland Islands' Fisheries Department has proposed to ban fishing red cod in their spawning grounds in September-October to allow the stock to recover. **STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization.

#### **11.5. Argentine hake, Austral hake (*Merluccius hubbsi*, *Merluccius australis*), Falkland Islands**

**FISHERIES:** Hakes are mainly caught in the western part of the FICZ. 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 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. Common hake (*M. hubbsi*) are targeted

mainly in winter during their migrations to the Falkland waters from the Patagonian shelf. Austral hake are targeted almost exclusively in the southwest of the Islands in September-November after their spawning in the around the Southern tip of South America. Catches of hakes have remained at a high level for the last three years, peaking at about 12,000 t in 2007. Catches decreased in 2008, possibly due to a strong negative anomaly in water temperature observed during their peak feeding season in winter. The total catch of hakes between January and September 2008 was ~7,900 t.

**SOURCE OF MANAGEMENT ADVICE:** The Falkland Islands Government is responsible for management of hakes' resources.

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

**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. The stock was in poor condition in 1991-1999. However, after strong recruitments in 2001-2002 when the juvenile abundance increased 5-10 times compared to the period 1996-2000, the fishable stock has increased and in 2006 and 2007 catches were exceptional

**RECENT MANAGEMENT ADVICE:** The advice is to hold fishing effort in Falkland Islands Zone constant. It was also agreed to restrict the total catch of *M. australis* in the Falkland Islands' 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 through a regional fisheries organization.

### **11.6. 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. *Illex* is targeted by the 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 northwestern parts of the FICZ/FOCZ (north of 52°S). Fishing effort was relatively stable during 2000-2004 (80-120 jigging vessels). However due to very low abundance of *Illex* in 2004-2005, fishing effort decreased to 43 vessels in 2006 as the *Illex* stocks were not expected to recover in the short-term. Contrary to expectations, in 2006 *Illex* was extremely abundant and the annual catch for 2006 reached 85,619 t. CPUEs of jiggers were similar to those observed in the most successful *Illex* year of 1999 (40-50 t per vessel). In 2007, more vessel owners were attracted to operate in the *Illex* fishery, with 57 jiggers working in FICZ/FOCZ. Since 13 March until 15 June, the vessels had stable high catches of > 35 t per night that resulted in the total catch of 161,458 t. In 2008, many Taiwanese vessels preferred to catch *Illex* on the High Seas for the whole season, and the total amount of licensed jiggers in the Falkland Islands' zone decreased to 44 vessels. Squid appeared in the FICZ two weeks later than in 2007, at the end of March, coincident with a negative water temperature anomaly. Since then, catches have been good and stable, indicating another successful fishery for *Illex* in 2008 with the total of 106,181 t. Despite the smaller catch (albeit caught by smaller number of vessels), the *Illex* fishing season 2008 appeared to be one of the best seasons in terms of squid abundance.

**SOURCE OF MANAGEMENT ADVICE:** The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

**PRECAUTIONARY REFERENCE POINTS:** A precautionary minimum spawning stock biomass of 40,000 t has been agreed between the UK and Argentina. If SSB is likely to fall below this level, the UK and Argentina have agreed to take appropriate management 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 - 2008, the winter-spawning stock 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 for management as there is no regulation at present. 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 through a regional fisheries organization.

## 11.7. Patagonian squid (*Loligo gahi*), Falkland Islands

**FISHERIES:** Patagonian squid is the second major fishery resources in the FICZ, and a domestic resource for the Falkland Islands. *Loligo* is targeted almost exclusively by the Falkland-registered trawlers in the southern and eastern parts of the Falkland Shelf (so-called 'Loligo box'). Fishing effort is stable (16 trawlers). In 2008, the abundance of squid was similar to the 2006-2007 estimates. In 2008, squid arrived later to the feeding grounds in both seasons, but again in dense aggregations perhaps as a result of cold seawater temperatures. The first season yielded 24,883 t, and the second season 26,958 t. During both seasons, especially in the second season, catches were volatile due to several arrivals of abundance waves to the fishing grounds. Both seasons were finished as planned, and with spawning stock biomass much higher than the minimum. **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 each season.

**STOCK STATUS:** Stocks of both cohorts of *Loligo* (autumn- and spring-spawning cohorts) are in good condition.

**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 through a regional fisheries organization.

## 11.8. Patagonian toothfish (*Dissostichus eleginoides*), Falkland Islands

**FISHERIES:** *Dissostichus eleginoides* is the most valuable and highly priced resource in the Falkland Zones. Only one Falkland company (CFL) holds exclusive rights to fish for toothfish deeper than 600 m in the Falkland Zones. In 2007-2008, TAC was decreased to 1,200 t per annum due to poorer abundance of age groups that usually make up the bulk of the catch. This fact led to decrease in fishing effort. In 2008, only 1 longliner operated for the whole season, and the second was sold. An additional longliner was chartered for a limited period in an attempt to catch the quota.

**SOURCE OF MANAGEMENT ADVICE:** The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

**PRECAUTIONARY REFERENCE POINTS:** An annual TAC of 1,200 t has been assigned.

**STOCK STATUS:** The fishery data for 2007 indicated a decline in toothfish stock abundance.

**RECENT MANAGEMENT ADVICE:** Given the decrease in toothfish abundance within FICZ/FOCZ in 2007, it was recommended that the TAC for 2008 remain at 1,200 t.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock through a regional fisheries organization. It is unclear if this is a separate stock from Patagonian toothfish in Argentine or Falkland Islands' waters, so efforts to improve stock identification are desirable.

## 11.9. Hoki (*Macruronus magellanicus*), Argentina<sup>3</sup>

**FISHERIES:** Hoki is the second main Argentinean finfish species in terms of catches. It is caught inside Argentinean waters by bottom freezer trawlers and by artisanal and fresh. Data from the Argentinean under Secretariat for Fisheries reported 98,643t of hoki landed in 2007, 20.7 % less than landings in 2006 (124,374 t) and 84,308 t until the 16<sup>th</sup> October 2008.

**SOURCE OF MANAGEMENT ADVICE:** The Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP, National Institute for Research and Fisheries Development) is the organisation 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.

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<sup>3</sup>Information for sections 10.8-10.16 was collected through the Internet from several official organisations such as SAGP&A, DNPYA, CFP, INIDEP, etc, as well from specialized fisheries magazines (FIS and Pesca).

**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 through a regional fisheries organization. It is not clear if hoki in the Argentinean EEZ constitutes a separate stock from hoki in the Falkland Islands' zone and/or in International waters. Efforts to improve stock identification are desirable.

### **11.10. Patagonian grenadier (*Macrourus carinatus*, *Macrourus holotrachys*), Argentina**

**FISHERIES:** STECF did not have access to any information on fisheries for Patagonian grenadier in Argentinian waters.

**SOURCE OF MANAGEMENT ADVICE:** The Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP, National Institute for Research and Fisheries Development) is the organisation 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: RECENT MANAGEMENT ADVICE:** STECF did not have access to any stock assessment in this area.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

### **11.11. 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. After 1989 catches increased in a steady way to stabilize at near 100,000 t annually. At present, the Argentine surimi fleet catches accounts for about 95% of the national fisheries yield and over 70% of the total yield reported for all fish species from the Southwest Atlantic. Southern blue whiting fishing area extends from south of 45°S up to 56°S. The largest catches come from a small sector located between 52° - 55° S and 63° - 64° W. Southern blue whiting represents almost 90% of the catches of the surimi fleet, whereas for traditional factory vessels, southern blue whiting catches represent only about 14%. The total effort directed to southern blue whiting showed a general increase 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 in 2005, after having been stable prior to 2001 and increasing since that time. As of 2001, annual catches average around 45,000 t, but in 2005, the landings of this species totalled 34,735 t. The same declining situation seems to be continued in 2006, according to official statistics. The SAGP&A figures indicate that between January and December 2007, 18,982t of southern blue whiting were landed, 39.3 % less than in 2006 (31,286 t). Between 1<sup>st</sup> January and 16<sup>th</sup> October 2008, 11,951 t of southern blue whiting were landed according to SAGP&A statistics.

**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 in 2001 as biological reference points for southern blue whiting.

**STOCK STATUS:** Mean annual CPUE values for the Argentinean surimi fleet between 1992-2007 indicated a declining trend in abundance throughout the whole period. For the period 1987-2007, biomass declined up to 2002 and has remained relatively stable in recent years. Total biomass at the beginning of 2007 was estimated at

around 560,000 t and SSB at a level of 468,000 t. The actual exploitation rate was estimated at  $F=0.51$ , similar to that of the 2006 and in accordance with also similar catches.

**RECENT MANAGEMENT ADVICE:** A TAC between 41,500-48,000 t was recommended by INIDEP for 2008.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization. It is not clear if southern blue whiting in Argentinean waters constitutes a separate stock from those fish in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

### **11.12. Red cod (*Salilota australis*), Argentina**

**FISHERIES:** Red cod is caught inside Argentinean waters by bottom trawlers and probably by artisanal fleets. Red cod landings, increased from 1990, reaching 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 to the SW of the islands during the spawning season (September-October).

According to data from SAGP&A, total landings of red cod by all fleets (artisanal, bottom trawlers, longliners, etc) in Argentinean ports in 2007 amounted to 4,611 t, representing almost twice the reported landings in 2006 (2,427 t). From the 1<sup>st</sup> of January until the 16<sup>th</sup> of October 2008, a total of 5,484 t of red cod were landed, continuing the increasing trend in landings.

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the main advisory body.

**PRECAUTIONARY REFERENCE POINTS:** Unknown

**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. 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.

**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 through a regional fisheries organization. It is not clear if red cod in Argentinean waters constitutes a separate stock from those fish in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

STECF notes that the most recent information for this stock relates to the year 2003.

### **11.13. 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.

Data from the Argentinean under Secretariat for Fisheries reported 299,605 t of Argentine hake landed in 2007, 15.2 % less than in 2006 (353,423 t) and 208,729 t between the first of January and the 16<sup>th</sup> of October 2008. Of total landings of hake in 2008, 159,159 tons t related to Southern stock and 49,571t to Northern stock.

Between 1<sup>st</sup> January and 25th September 2008, 192,855 tonnes of hake were landed in Argentine maritime ports (SAGP&A). Of the total landed, 47,047 t were caught north of parallel 41°, while 145,808 tonnes were caught south of the same parallel. Fresh fish vessels landed 124,040 tonnes of hake through 25 September, whilst the trawler fleet and coastal vessels landed 46,827 t and 13,415 t respectively.

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the main advisory body.

**PRECAUTIONARY REFERENCE POINTS:** A SSB of 130,000 t for 2008 was proposed by INIDEP for the hake stock north of 41° S<sup>4</sup>. Due to the high decrease of the population abundance and to the low recruitments in recent years indicating the possibility of a recruitment overfishing, it was advised that catches in 2008 ranged from 41,000 t to 48,000 t with the aim of achieving recovery of SSB to levels between 130,000 t - 200,000 t in the short-medium term according to the following table:

Objective	SSB > 130.000 t		SSB > 200.000 t	
	F	TAC 2008 (t)	F	TAC 2008 (t)
<i>Short-term</i>	0,336	40.939	0,121	15.915
<i>Medium term</i>	0,525	59.332	0,407	48.119

**STOCK STATUS:** Assessment of the status of the stock north of 41° S between 1986 and 2007, made by INIDEP in 2008<sup>5</sup> revealed a higher presence of age-group 2 since 2002. In 2005 70% of the catch was composed of age group 2, whilst in 2006 and 2007 most of the catch was due to age group 3, followed by age groups 2 and 4. Recruitments in 2005 and 2006 were the lowest of the historical series. SSB is estimated to be well below of the precautionary reference point for this stock (130,000 t).

**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 41° S respectively.

The permanently banned area of argentine hake has recently been extended to include the northern half of the 4160, 4260, 4261 and 4262 quadrants, announced the Secretariat of Agriculture, Livestock, Fisheries, and Food (SAGP&A). The measure had been recommended in April by the National Institute for Fisheries Research and Development (INIDEP), after evaluating hake juvenile numbers in the area. The goal is to strengthen non-adult hake conservation measures, including recent spawners and one year-olds.

The estimated abundance of mature hake in 2008 was the lowest observed for the period 2005- 2008, (INIDEP Technical Report 18/08 (precursor to 243/08)).

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization. It is not clear if hake in Argentinean waters constitutes a separate stock from those fish in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

## 11.14. Argentine short-finned squid (*Illex argentinus*), Argentina

**FISHERIES:** *Illex argentinus* is the major Argentine cephalopod fishery resource. Artisanal vessels have exploited the species in Argentinean waters since 1946. Up to 1977 were by-catches 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 under secretariat for Fisheries reported 233,068 t of *Illex* squid landed in 2007 against the 291,916 t landed in 2006, representing a reduction of about 20%. Between 1<sup>st</sup> January and 16<sup>th</sup> October 2008, 254,222 tonnes of *Illex* were landed in Argentine maritime ports (SAGP&A), an increase compared to 2007

**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 (CTMFEM) for the Common Fishing Zone of Argentina and Uruguay (north management area) and the South Atlantic Fisheries Commission (SAFC) for the south management area.

**MANAGEMENT MEASURES:** Since 1995 two management areas and fishing seasons were established to the north and south of 44° 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 44° S during February-June. The remaining, Bonaerensis-north Patagonian Stock (BNPS) and Spring Spawning Stock (SpSS), are

<sup>4</sup> Inf. Téc. INIDEP N° 32.

<sup>5</sup> Op. Cit.

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 45° S and 51° 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 37° and 43° 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.

**PRECAUTIONARY REFERENCE POINTS:** A reference point for biomass equating to 40% of spawning biomass relative escapement rate has been agreed. 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/nm<sup>2</sup>) was higher than the observed in 2004 (1.15/nm<sup>2</sup>). Observed mean density south of 48° S (0.90/nm<sup>2</sup>) was also higher than in 2004 (0.19/nm<sup>2</sup>). Mean density north of 48° S was 3.77/nm<sup>2</sup>. 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 Patagonian 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 in 2004 (70,000 t).

#### Stocks South of 44° S

##### **South Patagonian 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.

##### **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.

A report by INIDEP<sup>6</sup> on the status of the fishery for 2008 (in press) indicates recruitment estimations of 683,838 t for the SPS stock at the start of the fishery (week 1) and an escape of 22.95 % (183,303 t) for week 24. Recruitment estimations for the BNPS stock at the start of the fishery (week 19) were 171,201 t and an escape of 34.12 % (25,797 t) for week 36.

##### **RECENT MANAGEMENT ADVICE:**

A ban on squid (*Illex argentinus*) fishing for all types of vessels for the area south of parallel 44° 30' south was decided upon by the Argentine Under secretariat 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

<sup>6</sup> *Illex argentinus*. Pesquería 2008 (in press)

(*Illex argentinus*) fishery south of parallel 42° 15' S as of 28 May 2005. Another ban north of 39° 40' S was decided by CFP to be enforced as of 27 June 2005.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization. It is not clear if *Illex argentinus* in Argentinean waters constitutes a separate stock from *A. argentinus* in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

### **11.15. 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 were 238 t during 2007 and 155 t until 16<sup>th</sup> October 2008.

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the organisation 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:** 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 through a regional fisheries organization. It is not clear if *Loligo gahii* in Argentinean waters constitutes a separate stock from those fish in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

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.

### **11.16. Patagonian toothfish (*Dissostichus eleginoides*), Argentina**

**FISHERIES:** Patagonian toothfish in Argentine waters is fished by trawlers and longliners. SAGP&A figures for 2007 indicate that 1,846 t of Patagonian toothfish were landed, whereas in 2006, landings were 1,412 t. Up to 16<sup>th</sup> of October 2008, landings of toothfish by Argentinean vessels was 1,661 t.

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the organisation responsible to give the necessary scientific support for the rational exploitation of the resources and to avoid over fishing

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed or are unknown.

**STOCK STATUS:** A recent report by INIDEP <sup>7</sup> concluded that the state of the fishery for Patagonian toothfish in the Argentinean waters continues its trend toward a more favourable situation due to the strategies implemented by management, particularly since 2003.

**RECENT MANAGEMENT ADVICE:** A TAC of 2,500 t was set by the Federal Fisheries Council (CFP) for 2008. 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 through a regional fisheries organization. . It is not clear if Patagonian toothfish in Argentinean waters constitutes a separate stock from those fish in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

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<sup>7</sup> INIDEP Inf. Téc. INIDEP N° 4. 27-12-07. 9 pp.

### 11.17. 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). In 2007 47,623 t of shrimp were landed into Argentinean ports, a similar figure to that for 2006 (44,410 t). 41,111 t were landed between 1<sup>st</sup> of January and 16<sup>th</sup> October 2008.

As usually, most of the catches are taken by the freezer trawler fleet ( 37,000 in 2008 representing 92% of the total catch).

#### Patagonian shrimp catches (1989-2008)

Year	Tons	Year	Tons
1989	11,353	1999	15,988
1990	9,648	2000	37,150
1991	8,337	2001	78,798
1992	24,495	2002	51,389
1993	19,271	2003	52,896
1994	16,670	2004	27,030
1995	6,203	2005	7,470
1996	9,874	2006	44,410
1997	6,482	2007	47,623*
1998	23,333	2008	41,111*

\* Provisional data

**SOURCE OF MANAGEMENT ADVICE:** INIDEP is the organisation 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:** Unknown.

**RECENT MANAGEMENT ADVICE:** A closure of the fishery was put in force by mid October 2008 in the area comprised between parallels 42°-47° S and meridian 62° W and the line of national jurisdiction.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organization.

### 11.18. 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 between 42° and 48°S. In winter, schools disperse over the whole range of distribution. The Argentine kingclip fishery started developing in 1986 when catches surpassed 15,000 t/year. Landings have been stable in recent years at around 23,000 t/year up to 2005. Landings in 2006 and 2007 were 20,551 t and 20,581 t respectively. Preliminary data on landings by SAGP&A reported 14,752 t between 1<sup>st</sup> January and 16<sup>th</sup> October 2008. 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 organisation 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:** Not precisely known

**RECENT MANAGEMENT ADVICE:**

A TAC of 16,000 t of kingclip was established by the Federal Fisheries Council of Argentina (CFP) for 2008.

**STECF COMMENT:** STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic through a regional fisheries organisation.

### **11.19. Hoki (*Macruronus magellanicus*), International waters**

Information on biomass of the species presented in sections 11.19 to 11.25 was extracted from the report of the research cruise for assessment of fishery resources on the High Seas of the SW Atlantic carried out by IEO between 10<sup>th</sup> of March and 18<sup>th</sup> April 2008. It is expected that the historical series of fisheries research cruises started by IEO in 2008 and to be continued in the following years could provide useful information on the stock status in the next future.

**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:** The only estimate of stock biomass is derived from the research survey undertaken by the IEO in March April 2008. The swept area biomass estimate for this stock in 2008 is 13,792 t. Biomass is greatest at depths between 401 and 700 m.

**RECENT MANAGEMENT ADVICE:** No management advice is available for this stock.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock through a regional fisheries organization. It is unclear if this is a separate stock from hoki in Argentine or Falkland Islands waters, so effort should be made to improve stock identification.

### **11.20. Patagonian grenadier (*Macrourus carinatus*, *Macrourus holotrachys*), International waters**

**FISHERIES:** Catches of *Macrourus carinatus* and *Macrourus holotrachys* are negligible in international waters. Results from a research survey carried out by IEO indicate that despite being the most abundant species in the study area, Patagonian grenadier (*Macrourus carinatus*) is mainly distributed between 500-1000 m depth, far beyond the depth range in which the fleet operates (98% of the commercial hauls at less than 300 m depth). Similarly *Macrourus holotrachys* has its highest densities between 1001-1500 m depth.

**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:** The only estimate of stock biomass is derived from the research survey undertaken by the IEO in March April 2008. *Macrourus carinatus* was the most abundant species during the research cruise with an estimated swept area biomass of 116,679 t, distributing between 200 and 1500 m, but with higher catches between 501 and 1000 m depth. *Macrourus holotrachys* was the seventh among the 12 commercial assessed species, with an estimated biomass of 4,178 t and higher catches between 1001-1500 m depth.

**RECENT MANAGEMENT ADVICE:** No management advice is available for these stocks.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock through a regional fisheries organization. It is unclear if this is a separate stock from Patagonian grenadier in Argentine or Falklands waters, so efforts to improve stock identification are desirable.

### **11.21. 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:** The only estimate of stock biomass is derived from the research survey undertaken by the IEO in March April 2008. Results from the research cruise gave a biomass of 858 t of southern blue whiting, distributing between 300 and 700 m, but with most of the catches obtained at 501-700 m depth.

**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 through a regional fisheries organization. It is unclear if this is a separate stock from southern blue whiting in Argentine or Falkland Islands waters, so efforts to improve stock identification are desirable.

### **11.22. 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. A biomass of 118 t of red cod was estimated during the cruise.

**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:** The only estimate of stock biomass is derived from the research survey undertaken by the IEO in March April 2008. A biomass of 118 t of red cod was estimated during the cruise.

**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 through a regional fisheries organization. It is unclear if this is a separate stock from red cod in Argentine or Falkland Islands waters, so efforts to improve stock identification are desirable.

### **11.23. Argentine hake, Austral hake (*Merluccius hubbsi*, *Merluccius australis*), International waters**

**FISHERIES:** Argentine hake is targeted by bottom trawlers from several countries, mostly 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 low catches of Austral hake have been reported in this area.

The maximum effort in International waters and Falkland Islands by Spanish vessels (n° of boats) was also reported in 1990, decreasing since then, mainly due to the development of new fisheries in other areas (i.e. the North West Atlantic, NAFO fisheries).

**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:** The only estimate of stock biomass is derived from the research survey undertaken by the IEO in March April 2008. The swept area biomass estimate for Argentine hake from the survey was 15,877 t, with highest biomass below 200 m depth. No any catch of Argentine hake was taken at depths higher than 300 m depth. Austral hake was the least abundant commercial species, with an estimated swept area biomass of only 48 t.

**RECENT MANAGEMENT ADVICE:** No management advice has been given for these stocks.

**STECF COMMENTS:** STECF notes the need for a multilateral approach for the assessment and management of this stock through a regional fisheries organization. It is unclear if hakes in international waters constitute separate stocks from those in Argentine or Falkland Islands' waters, so efforts to improve stock identification are desirable.

## 11.24. Argentine short-finned squid (*Illex argentinus*), International waters

**FISHERIES:** The Argentine short-finned squid (*Illex argentinus*) is a common neritic species occurring in waters off Brazil, Uruguay, Argentina, and 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 44-47° S.

Concentrations of short-finned squid are found 45-46° 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 short-finned 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:** The only estimate of stock biomass is derived from the research survey undertaken by the IEO in March April 2008. The swept area biomass estimate for Argentine short-finned squid from the survey was 45,073 t. **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 through a regional fisheries organization. It is unclear if this is a separate stock from *Illex argentinus* in Argentine or Falkland Islands' waters stocks, so efforts to improve stock identification are desirable.

## 11.25. 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 42° 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:** The only estimate of stock biomass is derived from the research survey undertaken by the IEO in March April 2008. The swept area biomass estimate for *L. gahi* was 2,108 t with higher estimates below 200 m depth and south of parallel 46° S.

**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 through 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.

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## 12. 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-Committees on Stock Assessment (SCSA) gives advice on stock status. The latest meeting of SCSA was held at Antalia (Turkey) from 13 to 17 October 2008.

This review is based partly on the assessments presented by the working groups of the SCSA and the SGMED.

The state of the Mediterranean stocks is not assessed on a regular basis and assessments are only carried out locally. For example, for red mullet and hake, which are very important species throughout the Mediterranean, there are only three assessments (GSAs 3, 5 and 6) for red mullet and five (GSAs 5, 6, 7, 9, 15 and 16) hake in the report of the 2008 SCSA.

During the 2008 meeting of SCSA working groups thirteen assessments of small pelagic stocks (sardine and anchovy stocks) were presented (fourteen in 2007), covering seven Geographical Sub-Areas (GSA). Four assessments referred to shared stocks and only one assessment was presented by a non-EU country (Morocco).

The assessments of demersal fish increased from thirteen in 2007 to nineteen in 2008, covering nine GSAs (seven in 2007) and ten species (seven in 2007). Two of these assessments regarded shared stocks and two were presented by Morocco.

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 regulations 1639/2001 and 1581/2004 for each GFCM sub-area under European Community jurisdiction.

STECF notes that the collaboration between Member States and GFCM should be significantly improved in order to provide annual assessment of all stocks listed in the regulations 1639/2001 and 1581/2004, taking into account that national programmes for data collection are in force. As in 2006, also during the last GFCM meeting a few Member States did not provide any updated assessment of stocks included in the EU regulation.

### 12.1. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 1. Northern Alboran Sea

**FISHERIES:** The purse seine fleet operating in GSA 01 Northern Alboran Sea is composed by 136 units, characterised by small vessels. 22% of them are smaller than 12 m, 78% between 12 and 24 m. The fleet has been continuously decreasing since eighties, from more than 230 vessels in 1980 to 136 in 2007.

Anchovy and Sardine (*Sardina pilchardus*) are the main target species of the purse seine fleet in Northern Alboran GSA01, but other species with lower economical importance are also captured, sometimes representing a high percentage of the capture: horse mackerel (*Trachurus spp.*), mackerel (*Scomber spp.*) and gilt sardine (*Sardinella aurita*).

Anchovy is the species with the highest economical value. The annual landings of anchovy for the last eighteen years ranged between 200 and 3000 tons. During the period from 1990-2007, the catches of anchovy stock in the Alborán Sea showed marked fluctuations. A successful recruitment, estimated by echo-acoustic tracking, was observed during 2001 in the Alborán Sea producing a strong increment of landings in 2002. Nevertheless, the catch dropped in 2003, continuing at low level to 2007. Málaga Bay is the most important recruitment and fishery area. Only this area, which represents 85% of total landings, has been considered.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Biomass estimation comes from acoustic surveys and from commercial landings and CPUEs. Nevertheless, no acoustic survey was performed in 2007, so management advice was based on landings and CPUEs.

From 2008 advice is provide also by SGMED.

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

**STOCK STATUS:** GFCM-SAC estimated low levels of biomass, recruitment and catch from 2003 to 2006. Low catches in 2007. However, there is some uncertainty about the status of the stock.

SGMED estimated that both total biomass in 2007 (TB=633 t) and Spawning Stock Biomass in 2007 (SSB=378 t) are the lowest of the series 2002-2007, continuing with the decreasing trend observed since 2004. Recruitment levels in 2006 and 2007 are the lowest of the time series ( $R_{06}=48$  millions and  $R_{07}=54$  millions). Since 2002 fishing mortality ( $F_{0.2}$ ) has varied between 3.9 and 0.6. The maximum was observed in 2002, then falling down to the minimum in 2003. Since then, F shows an increasing trend ( $F_{07}=1.82$ ).

**RECENT MANAGEMENT ADVICE:** Fishing effort should be reduced, unless there is an increase in recruitment evident from the 2008 autumn acoustic survey. It should be noted that small pelagic fishery in GSA 01 is multispecies and effort on sardine and anchovy should be considered together. According to SGMED recent assessment (2008) fishing mortality should be reduced in order to allow future recruitment contributing to stock recovery. This requires consideration of the mixed fisheries nature of the fleets.

**STECF COMMENTS:** STECF agrees with the advice of the GFCM-SAC Sub-Committee on Stock Assessment (SCSA) and with SGMED. STECF recommends to carry out acoustic survey each year and to examine the introduction of closed areas and/or seasons in order to protect recruits or spawning stock.

## **12.2. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 3. Southern Alboran Sea**

**FISHERIES:** The purse seine fleet operating in GSA 03 Southern Alboran Sea is composed of about 150 boats distributed in seven Mediterranean ports.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Data sources were acoustic surveys and landings.

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

**STOCK STATUS:** No assessment has been presented to SAC-GFCM Sub-Committee in 2008.

The biomass estimate obtained by the acoustic survey performed in May 2006 is 3700 tons.

**RECENT MANAGEMENT ADVICE:** No specific advice is given by the GFCM-SAC 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 GFCM-SAC Sub Committee on Stock Assessment (SCSA) to provide the basis for management advice.

### **12.3. European anchovy (*Engraulis encrasicolus*) in Geographical Sub area 6. Northern Spain**

**FISHERIES:** The purse seine fleet operating in GSA 06 Northern Spain is composed by 132 units: 4% are smaller than 12 m in length, 87% between 12 and 24 m and 9% bigger than 24 m. The fleet continuously decreased in the last twelve years, from more than 222 vessels in 1995 to 132 in 2007. This stronger reduction (41%) is possibly related to a decreasing in anchovy catches.

Anchovy and Sardine (*Sardina pilchardus*) are the main target species of the purse seine fleet in Northern Spain GSA06, but other species with lower economical importance are also captured, sometimes representing a high percentage of the capture: horse mackerel (*Trachurus spp.*), mackerel (*Scomber spp.*), and gilt sardine (*Sardinella aurita*).

Anchovy is the species with the highest economical value. The annual landings of anchovy in the Northern Spain for the last seventeen years ranged between 2000 and 23000 tons. The minimum values were recorded during 2007.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. This assessment is based on acoustic surveys, commercial landings and CPUEs. A DEPM evaluation was carried out in June 2007.

From 2008 advice is provide also by SGMED.

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

**STOCK STATUS:** GFCM-SAC estimated very low level of biomass. Anchovy biomass in year 2007 was the lowest for the past 8 years, 4906 tons, 40% lower than in year 2006. The recruitment has been low, the population consists almost exclusively of the recruits and has practically disappeared between southern Rosas Bay and Tarragona (North Ebro River Delta).

SGMED estimated that both total biomass (TB=7,860 t) and Spawning Stock Biomass in 2007 (SSB=5,480 t) continues the sharp decrease, apparent from the beginning of the time series. The lowest observed SSB is the most recent estimate from 2007 (Bloss=5,480 t). Recruitment in 2007 (R=244 millions) decreases from that of 2006 (361 millions). WG highlighted that the fishery is highly dependent of the recruitment strength. Fishing mortality has been fluctuating around 1.15, without a clear trend.  $F_{0.2}$  in 2007 =1.17.

**RECENT MANAGEMENT ADVICE:** According to GFCM-SAC fishing effort should be reduced. It should be noted that small pelagic fishery in GSA 06 is multispecies and effort on sardine and anchovy should be considered together. According to SGMED recent assessment (2008) fishing mortality should be reduced in order to allow future recruitment contributing to stock recovery. This requires consideration of the mixed fisheries nature of the fleets.

**STECF COMMENTS:** STECF agrees with the advice of the GFCM-SAC Sub-Committee on Stock Assessment (SCSA) and with SGMED. Because the stock is shared between the GSA 06 (Northern Spain) and the GSA 07 (Gulf of Lions), STECF recommends joint acoustic surveys covering both GSAs.

### **12.4. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 7. Gulf of Lions**

**FISHERIES:** In the Gulf of Lions, pelagic fisheries are targeting anchovy and sardine (*Sardina pilchardus*) A mean of 50 trawlers are targeting these pelagic species during the last years. There are also 14 purse seiners operating in the south of the Gulf of Lions that catch these species. Some purse seine boats from Spain come in the area to fish mainly sardine. Fishing effort depends on market fluctuations.

The annual landings of anchovy in the last years are between 2000 and 7000 t (3000 t in 2007).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. The data sources were time series of acoustic surveys, landings and CPUE. The acoustic surveys are performed at daytime in July. The acoustic assessment results are completed by an analysis of catches and fishing effort to improve the fisheries diagnoses.

The anchovy stock has also been evaluated by the DEPM in 2007 in the area corresponding to Gulf of Lions and North Catalan Sea.

From 2008 advice is provide also by SGMED.

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

**STOCK STATUS:** GFCM-SAC indicate that the anchovy biomass estimate in GSA 07 with acoustic survey shows a decrease from 26000 t in 2006 to 18500 t in 2007. The DEPM spawning biomass estimate for the Gulf of Lions – North Catalan Sea was 21000 t in 2007.

SGMED is unable to precisely estimate the absolute levels of stock abundance and biomass. Survey indices indicate that recent stock biomass (2005-2007) remains at the lowest level observed since 1993. The acoustic method applied results in an estimate of 18,473 t of total biomass in 2007. Recruitment since 2004 is estimated to be low in relation to the time series available.

**RECENT MANAGEMENT ADVICE:** It is recommended not to increase the fishing effort.

**STECF COMMENTS:** STECF agrees with the advice of the GFCM-SAC 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 recommends joint acoustic surveys covering both GSAs.

## **12.5. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 16. Strait of Sicily**

**FISHERIES:** The fishing fleet is mainly located in the port of Sciacca. Seventeen purse seiners with total length ranging between 12-24 meters and 15 couples of pelagic pair trawlers are presently active in this port. They produce about 2/3 of total small pelagic landings of the GSA 16. The average landings of anchovy of the last decade were about 1500 tons, with large inter-annual fluctuations.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Biomass estimation comes from acoustic surveys. Biological sampling and the collection of catch and effort data are also performed. 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. Time series of acoustic biomass estimates cover the period 1998 – 2007.

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

**STOCK STATUS:** Low abundance; high fishing mortality. Acoustic estimates of anchovy biomass ranged from a minimum of 6300 tons in 2006 to a maximum of 32000 tons in 2005. The acoustic survey biomass estimate for 2007 is 6700 t, quite similar to 2006.

**RECENT MANAGEMENT ADVICE:** Because the biomass was very low for the last two years, fishing effort should be reduced. A warning on the fishing of larval stages (locally named *bianchetto*) is relevant, if derogation of the fishing ban, normally imposed in wintertime, would be postponed after the start of the spawning season.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). STECF is unable to determine whether the advice regarding derogations to the fishing ban would have any beneficial outcome for the anchovy stock.

## **12.6. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic**

**FISHERIES:** Anchovy, together with sardine, is one of the most important commercial species of the Adriatic Sea. The stock of anchovy living in the northern and central Adriatic Sea (GFCM-GSA 17) is shared between

Italy, Slovenia and Croatia. The Adriatic small pelagic fleet is targeting both anchovy and sardine. The Italian fleet is composed of about 130 (65 pairs) pelagic trawlers (*volante*) mainly operating from Trieste to Ancona (average GRT 43, average engine power 290 kW) and about 45 *lampara* vessels (purse seiners with light), operating in the Gulf of Trieste (24 small *lampara*, average GRT 9, average engine power 110 kW) and in the Central Adriatic (21 big *lampara*, average GRT 97, average engine power 390 kW). The Slovenian fleet is composed of 2 pelagic trawlers (1 pair) and 7 purse seiners. Croatian purse seine fleet is composed by 134 units with LOA greater than 15 meters. No data are available for purse seine boats with LOA lower/equal than 15 meters.

Fisheries by boat seines 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 25/30 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 43000 t per year (average of the last three years), with an increase in 2007.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. The present assessment of this stock has been carried out by means of VPA, tuned with echo-survey data. Catch and fishing effort data were collected for the period 1975-2007 along with biological data. Length frequency and age length data were combined to obtain annual catch-at-age series from 1975 onwards, which represented the basic input of VPA.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:**

GFCM-SAC proposed a precautionary reference point based on the ratio  $F/(F+M)$  not higher then 0.4 for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (age range)=	
$F_{max}$ (age range)=	
$F_{MSY}$ (age range)=	
$F_{pa}$ ( $F_{lim}$ ) (age range)=	
$B_{MSY}$ (spawning stock)=	
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	
$E_{lim}$ ( $F/Z$ , $F$ age range 0-3)	0.4

**STOCK STATUS:** GFCM-SAC estimated that the stock is fully exploited. The values of the exploitation rate in recent year are lower than 0.4, which is a precautionary reference point. The mean ratio of the last three years between catch and estimated biomass is 0.2. The estimated stock biomass is about 210000 t (average of the period 2005-2007). The biomass dropped at very low level in 1987 and is recovering although with a fluctuation pattern until now.

SGMED estimated that the average stock biomass estimated by VPA was 120,000 tonnes in 1976-2007 and 210,000 tonnes in 2005-2007. Average recruitment during the period 2005-2007 was 1.6 times the average over the period 1976-2007. The mean ratio between total catch and stock biomass was 0.2 in 2005-2007; also, in the same period, the average exploitation rate  $F/Z$  was 0.28 and thus, lower than the threshold value 0.4 suggested as a reference point for small pelagics by Patterson (1992).

**RECENT MANAGEMENT ADVICE:** GFCM-SAC recommends that fishing effort should not be allowed to increase. It should be noted that small pelagic fishery in GSA 17 is multispecies and effort on sardine and anchovy should be considered together. SGMED recommends that fishing mortality should not be increased.

**STECF COMMENTS:** STECF agrees with the advice of the GFCM-SAC Sub-Committee on Stock Assessment (SCSA) and SGMED.

## 12.7. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 18. Southern Adriatic

**FISHERIES:** Purse seiners are the main fishing vessels targeting anchovy (and sardine) in GSA 18. During spring and summer seasons fishing is concentrated in the Central Adriatic where the highest catches can be obtained.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Stock biomass estimates are based on an acoustic survey carried out in the western part of GSA 18.

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

**STOCK STATUS:** The GFCM-SAC classifies this stock as having Intermediate level of abundance.

**RECENT MANAGEMENT ADVICE:** Not to increase fishing effort.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). STECF notes that the data and information provided to the GFCM on anchovy in GSA 18 is very poor. STECF recommends that the area covered by the acoustic survey be extended to include the eastern part of GSA 18.

No assessment has been presented to GFCM-SAC Sub-Committee in 2008 and no other information was available to STECF for this stock.

## 12.8. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 22. Aegean Sea

**FISHERIES:** In NW part of GSA 22, the Greek anchovy fishery is almost exclusively practised by the purse seine fleet. The size of the Greek fleet in the Aegean Sea (GSA 22) ranges from 149 to 160 fishing vessels from 2000 to 2006. Pelagic trawls are banned and benthic trawls are allowed to fish small pelagics in percentages less than 5% of their total catch. The main fishing ground for anchovy in GSA 22 is northern Aegean Sea. Anchovy reported landings have showed an increasing trend since 2000, comprising 22311 t in 2006. Regarding the regulations enforced they concern a closed period from the mid December till the end of February and technical measures such as minimum distance from shore, gear and mesh size, engine, GRT restrictions, etc. There is also a minimum landing size at 9 cm.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Integrated Catch at Age (ICA) analysis was applied. This method uses separable VPA with weighted tuning indices. The application of ICA was based on commercial catch data (2000-2006) and as tuning indices were used the biomass estimates from acoustic surveys and the DEPM estimates over the period 2003-2006.

Anchovy data were comprised of annual anchovy landings, annual anchovy catch at age data (2000-2006), mean weights at age, maturity at age and the results of acoustic and DEPM surveys. Since, acoustics and DEPM are being applied at the same time and with the same research vessel in Aegean Sea, acoustic estimates were used as an index for the numbers at age of the population and DEPM estimates as stock spawning biomass estimates.

Natural mortality was set constant for all ages and years at value of 0.7 based on the acoustics surveys results. Reference age for the fishery was age group 2, as fully exploited and fully recruited. The age groups 0, 4 and 5 were down weighted in the analysis based on their percentage in the catch. Age 1 was also down weighted in the acoustic surveys (0.5). Catchability for the DEPM index is assumed as absolute indicator of biomass, linear catchability relationship assumed for the acoustic surveys.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

F <sub>0.1</sub> (age range)= ages 1-3	n.a.
F <sub>max</sub> (age range)= ages 1-3	n.a.

$F_{MSY}$ (age range)=	
$E_{lim}$ (F/Z, age range 1-3)	0.4
$B_{MSY}$ (spawning stock)=	
$B_{lim}$ (spawning stock)=	

**STOCK STATUS:** The GFCM-SAC classifies this stock as having Intermediate abundance. The stock is fully exploited. Observed values of the fishing mortality were ranked ranking between moderate and high.

Given the short length of the time series, SGMED is unable to precisely estimate the absolute levels of stock abundance and biomass. Survey indices and VPA analyses indicate that average total biomass and SSB has increased in 2006. SSB in 2006 estimated from the ICA model is around 30,000 t. ICA model estimates suggest an exceptionally high recruitment in 2006. Based on ICA results, the mean F/Z (F averaged over ages 1 to 3) has fluctuated around 0.32 and has been below the empirical level of sustainability ( $E < 0.4$ , Patterson 1992) for small pelagics since 2004.

**RECENT MANAGEMENT ADVICE:** The advice from the GFCM-SAC relates to an assessment undertaken in 2008 using data up to and including 2006. The GFCM-SAC advised that fishing effort in 2009 should not be allowed to increase beyond the current levels. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion.

Since the fishery is considered a multispecies fishery targeting both anchovy and sardine, a shift of the present closed period (mid December to end of February) towards the recruitment period of anchovy (e.g. October to December) / or the recruitment period of sardine (e.g. February to April) is recommended, that would allow more individuals of anchovy and sardine to enter the fishery at an older age.

SGMED is not in a position to provide any advice for that stock.

#### **STECF COMMENTS:**

STECF notes that the same fleet exploits both anchovy and sardine in GSA 22. The alternative suggestions for a closed period will have different outcomes for each species and STECF highlights the need for further research concerning the definition of the closed period

### **12.9. Sardine (*Sardina pilchardus*) in Geographical Sub Area 1. Northern Alboran Sea**

**FISHERIES:** The purse seine fleet operating in GSA 01 Northern Alboran Sea is composed by 136 units, characterised by small vessels. 22% of them are smaller than 12 m, 78% between 12 and 24 m. The fleet has been continuously decreasing since eighties, from more than 230 vessels in 1980 to 136 in 2007.

Sardine and anchovy (*Engraulis encrasicolus*) are the main target species of the purse seine fleet in Northern Spain GSA01, but other species with lower economical importance are also captured, sometimes representing a high percentage of the capture: horse mackerel (*Trachurus* spp.), mackerel (*Scomber* spp.) and gilt sardine (*Sardinella aurita*).

The annual landings of sardine in the Northern Alborán Sea show a strong annual fluctuation for the last eighteen years ranged between 4000 and 11000 tons. Landings increase in 2007, reaching up 6770 t. Although the economical value of this species is lower than anchovy the high volume of catches makes it a valuable fishery.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. This assessment is based on both on VPA (XSA) methods and acoustic methods. In 2007 acoustic survey was not performed.

From 2008 advice is provide also by SGMED.

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

**STOCK STATUS:** The GFCM-SAC classifies this stock as having intermediate abundance. The stock is fully exploited. A moderate fishing mortality has been observed.

SGMED estimated that both Total biomass in 2007 (TB=32,300 t) and Spawning Stock Biomass in 2007 (SSB=28,800 t) decreased since 2005, although the levels are still over the lowest SSB in the time series (in 2000). Recruitment levels in

2006 and 2007 are low relative to the rest of the time series (R=228 millions). Since 2000 fishing mortality ( $F_{1-3}$ ) has varied between 0.2 and 0.4, without any consistent trend (F=0.26).

**RECENT MANAGEMENT ADVICE:** Not to increase the fishing effort beyond the current levels. It should be noted that small pelagic fishery in GSA 01 is multispecies and effort on sardine and anchovy should be considered together.

SGMED recommends that fishing mortality should not be increased.

**STECF COMMENTS:** STECF agrees with the advice of the GFCM-SAC Sub-Committee on Stock Assessment (SCSA) and SGMED.

## **12.10. Sardine (*Sardina pilchardus*) in Geographical Sub Area 3. Southern Alboran Sea**

**FISHERIES:** The purse seine fleet operating in GSA 03 Southern Alboran Sea is composed of about 150 boats distributed in seven Mediterranean ports.

Sardine is the most important pelagic fish in the Mediterranean Moroccan waters with a mean yearly landing of 14,000 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is the GFCM-SAC. The evaluation of the state of the stock was based on LCA using VIT software. Data collected in 2007 were used.

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

**STOCK STATUS:** Yield per recruit analysis indicates that the stock is fully exploited. Based on a preliminary assessment, considerable values of fishing mortality were observed for small individuals. Fishing effort is exercised mainly on adult individuals (17-19 cm).

**RECENT MANAGEMENT ADVICE:** Not to increase the current level of fishing effort.

**STECF COMMENTS:** STECF agrees with the advice of the GFCM-SAC Sub-Committee on Stock assessment (SCSA).

## **12.11. Sardine (*Sardina pilchardus*) in Geographical Sub Area 6. Northern Spain**

**FISHERIES:** The purse seine fleet operate in GSA 06 Northern Spain is composed by 132 units: 4% are smaller than 12 m in length, 87% between 12 and 24 m and 9% bigger than 24 m. The fleet continuously decreased in the last twelve years, from more than 222 vessels in 1995 to 132 in 2007. This stronger reduction (41%) is possibly linked to a decreasing in anchovy catches.

Sardine and anchovy (*Engraulis encrasicolus*) are the main target species of the purse seine fleet in Northern Spain GSA06, but other species with lower economical importance are also captured, sometimes representing a high percentage of the capture: horse mackerel (*Trachurus spp.*), mackerel (*Scomber spp.*), and gilt sardine (*Sardinella aurita*).

The annual landings of sardine in the Northern Spain for the last eighteen years ranged between 19000 and 53000 tons. This species is the most fished one in GSA 06, both for pelagic and demersal species. Although its economical value is lower than anchovy the high volume of catches makes it a valuable fishery.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. This assessment is based on both on VPA (XSA) methods and acoustic methods. Both XSA and acoustics methods have the same perception of the state of the stock.

From 2008 advice is provide also by SGMED.

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

**STOCK STATUS:** The GFCM-SAC classifies this stock as having intermediate abundance. The stock is fully exploited. A high fishing mortality has been observed.

SGMED estimated that SSB has decreased from 1994 to 2002 from about 80,000 t to about 40,000 t, and has subsequently increased to around 50,000 t in 2007. Recent recruitment in 2006 and 2007 has been estimated to be below average. Fishing mortality has declined from a high level in 1994 and 2001, to 2003, and has subsequently fluctuated around the 2003 level.  $F_{1-3}$  in 2007 = 0.83.

**RECENT MANAGEMENT ADVICE:** Not to increase the fishing effort beyond the current levels. It should be noted that small pelagic fishery in GSA 06 is multispecies and effort on sardine and anchovy should be considered together.

SGMED is not in a position to provide any advice for that stock.

**STECF COMMENTS:** STECF agrees with the advice of the GFCM-SAC 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 recommends joint acoustic surveys covering both GSAs.

## **12.12. Sardine (*Sardina pilchardus*) in Geographical Sub Area 7. Gulf of Lions**

**FISHERIES:** In the Gulf of Lions, pelagic fisheries are targeting sardine and anchovy (*Engraulis encrasicolus*). A mean of 50 trawlers are targeting these pelagic species during the last years. There are also 14 purse seiners operating in the south of the Gulf of Lions that catch these species. Some purse seine boats from Spain come in the area to fish mainly sardine. Fishing effort depends on market fluctuations.

Landed catches in 2007 were 13000 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Data sources were time series of acoustic surveys, landings and CPUE. The acoustic surveys are performed at daytime in July. The acoustic assessment results are completed by an analysis of catches and fishing effort to improve the fisheries diagnoses.

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

**STOCK STATUS:** The GFCM-SAC classifies this stock as having intermediate abundance. The biomass estimate shows a decrease from 83000 t in 2006 to 56000 t in 2007. First results of 2008 acoustic survey show a strong recruitment for sardine.

**RECENT MANAGEMENT ADVICE:** It is recommended not to increase the fishing effort, even if it appears a strong recruitment of sardine in 2008.

**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 recommends joint acoustic surveys covering both GSAs.

## **12.13. Sardine (*Sardina pilchardus*) in Geographical Sub Area 16. Strait of Sicily**

**FISHERIES:** The fishing fleet is mainly located in the port of Sciacca. Seventeen purse seiners with total length ranging between 12-24 meters and 15 couples of pelagic pair trawlers are presently active in this port. They produce about 2/3 of total small pelagic landings of the GSA 16. The average landings of sardine of the last decade were about 1400 t, with large inter-annual fluctuations.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Biomass estimation comes from acoustic surveys. Biological sampling and the collection of catch and effort data are also performed. 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. Time series of acoustic biomass estimates cover the period 1998 – 2007.

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

**STOCK STATUS:** Low abundance; moderate fishing mortality. The biomass estimated in 2007 is about 10000 t quite similar to 2006. Sardine biomass ranged from a minimum of 6000 tons in 2002 to a maximum of 39000 tons in 2005.

**RECENT MANAGEMENT ADVICE:** Not to increase the fishing effort; A warning on the fishing of larval stages (*bianchetto*) is advisable, taking into account that derogation of the fishing ban which was normally imposed in wintertime during the spawning season.

**STECF COMMENTS:** STECF advises that in order to reduce fishing mortality on larval sardine, fishing effort should be reduced. STECF is unable to determine whether the advice regarding derogations to the fishing ban would have any beneficial outcome for the sardine stock.

## 12.14. Sardine (*Sardina pilchardus*) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

**FISHERIES:** Sardine, together with anchovy, is one of the most important commercial species of the Adriatic Sea. The stock of sardine living in the northern and central Adriatic Sea (GFCM-GSA 17) is shared between Italy, Slovenia and Croatia. The Adriatic small pelagic fleet is targeting both sardine and anchovy. The Italian fleet is composed of about 130 (65 pairs) pelagic trawlers (*volante*) mainly operating from Trieste to Ancona (average GRT 43, average engine power 290 kW) and about 45 *lampara* vessels (purse seiners with light), operating in the Gulf of Trieste (24 small *lampara*, average GRT 9, average engine power 110 kW) and in the Central Adriatic (21 big *lampara*, average GRT 97, average engine power 390 kW). The Slovenian fleet is composed of 2 pelagic trawlers (1 pair) and 7 purse seiners. Croatian purse seine fleet is composed by 134 units with LOA greater than 15 meters. No data are available for purse seine boats with LOA lower/equal than 15 meters.

Fisheries by boat seines 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 25/30 days between July and September. This closed season does not apply to purse seiners. Fishing activity is suspended during the weekend.

Sardine landings for the whole area are about 17000 t per year (average of the last three years), with an increase in 2007. Due to low market price for sardine in Italy, discards of sardine at sea may occur. Between 1987 and 1999, discard estimates averaged about 2000 t per year. No information on discards is available in the recent years, but it is reasonable to consider discards negligible, because of the decrease of catches.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. The present assessment of this stock has been carried out by means of VPA, tuned with echo-survey data. Catch and fishing effort data were collected for the period 1975-2007 along with biological data. Length frequency and age length data were combined to obtain annual catch-at-age series from 1975 onwards, which represented the basic input of VPA.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** GFCM-SAC proposed a precautionary reference point based on the ratio  $F/(F+M)$  not higher then 0.4 for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (age range)=	
$F_{max}$ (age range)=	
$F_{MSY}$ (age range)=	
$F_{pa}$ ( $F_{lim}$ ) (age range)=	
$B_{MSY}$ (spawning stock)=	
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	
$E_{lim}$ (F/Z, F age range 0-5)	0.4

**STOCK STATUS:** GFCM-SAC estimated the stock to be over-exploited. The biomass estimated is about 90000 t (average of the period 2005-2007) with a slight increase in 2007. The exploitation rate ( $F/(F+M)$ ) is higher than 0.4 in the most recent years, while in 2007, it was estimated at 0.46, above the limit of 0.4 (precautionary reference point). The mean catch-biomass ratio of the last three years is 0.19, which is within in the historically observed range (0.19-0.25). A low level of spawning biomass has been observed since 1999.

SGMED estimated that the average stock biomass estimated by VPA was 440,000 tonnes in 1975-2007 and 90,000 tonnes in 2005-2007. Spawning stock biomass showed the lowest levels just in recent years. The average number of recruits between 2005-2007 was 30% of the average recruits between 1975-2007. Recruitment showed the lowest levels just in recent years. The mean ratio between total catch and stock biomass was 0.2 in 2005-2007; however, in the same period, the average exploitation rate  $F/Z$  was 0.48. This value is higher than the threshold value 0.4 suggested as reference point for small pelagics by Patterson (1992).

**RECENT MANAGEMENT ADVICE:** The advice from the GFCM-SAC is that fishing effort should not increase. It should be noted that small pelagic fishery in GSA 17 is multispecies and effort on sardine and anchovy should be considered together. SGMED recommends that fishing mortality should be reduced in order to allow future recruitment contributing to stock recovery. This requires consideration of the mixed fisheries nature of the fleets.

**STECF COMMENTS:** STECF agrees with SGMED that fishing mortality should be reduced in order to allow future recruitment contributing to stock recovery. STECF also recommends that fry fishing should be reduced because of the low level of the observed spawning biomass.

### **12.15. Sardine (*Sardina pilchardus*) in Geographical Sub Area 18. Southern Adriatic**

**FISHERIES:** Purse seiners are the main fishing vessels targeting sardine (and anchovy) in GSA 18. During spring and summer seasons fishing is concentrated in the Central Adriatic where the highest catches can be obtained.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Stock biomass estimates are based on an acoustic survey carried out in the western part of GSA 18.

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

**STOCK STATUS:** The GFCM-SAC classifies this stock as having a Low level of abundance.

**RECENT MANAGEMENT ADVICE:** Not to increase fishing effort.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM Sub-Committee on Stock Assessment (SCSA). STECF notes that the data and information provided to the GFCM on anchovy in GSA 18 is very poor. STECF recommends that the area covered by the acoustic survey be extended to include the eastern part of GSA 18. No assessment has been presented to GFCM-SAC Sub-Committee in 2008 and no other information was available to STECF for this stock.

### **12.16. Sardine (*Sardina pilchardus*) in Geographical Sub Area 22. Aegean Sea**

**FISHERIES:** In the NW part of GSA 22, the Greek sardine fishery is almost exclusively carried out by the purse seine fleet. The size of the Greek fleet in the Aegean Sea (GSA 22) ranges from 149 to 160 fishing vessels from 2000 to 2006. Pelagic trawls are banned and benthic trawls are allowed to fish small pelagics in percentages less than 5% of their total catch. Sardine reported landings have showed a decreasing trend from 2000 till 2003 and a slight increase since 2004 reaching 12784 t in 2006. Regarding the regulations enforced they concern a closed period from the mid December till the end of February and technical measures such as minimum distance from shore, gear and mesh size, engine, GRT restrictions, etc. There is also a minimum landing size at 11 cm.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC. Integrated Catch at Age (ICA) analysis was applied. This method uses separable VPA with weighted tuning indices. The application of ICA was based on commercial catch data (2000-2006) and as tuning indices were used the biomass estimates from acoustic surveys over the period 2003-2006. Sardine data were comprised of annual sardine landings, annual sardine catch at age data (2000-2006), mean weights at age, maturity at age and the results of acoustic surveys.

Natural mortality was set constant for all ages and years at value of 0.8 based on the acoustic surveys results. Reference age for the fishery was age group 2, as fully exploited and fully recruited. The age groups 0, 4 and 5

were underweighted in the analysis based on their percentage in the catch. Age 1 was also underweighted in the acoustic surveys (0.5). Linear catchability relationship assumed for the acoustic surveys.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

F <sub>0.1</sub> (age range)=	n.a.
F <sub>max</sub> (age range)=	n.a.
F <sub>MSY</sub> (age range)=	
E <sub>lim</sub> (F/Z, age range 1-3)	0.4
B <sub>MSY</sub> (spawning stock)=	
B <sub>lim</sub> (spawning stock)=	

**STOCK STATUS:** The GFCM-SAC classifies this stock as having intermediate level of abundance. There is uncertainty in order to consider the stock fully or over-exploited. High fishing mortality has been observed.

SGMED considered that, given the short length of the time series, SGMED is unable to precisely estimate the absolute levels of stock abundance and biomass. Survey indices and VPA analyses indicate that average total biomass and SSB has increased in 2006. SSB in 2006 estimated from the ICA model is just below 20,000 t. ICA model estimates suggest recruitments are low in 2006.

Based on ICA results, the mean fishing mortality (averaged over ages 1 to 3) showed a clear decreasing trend, and has remained below 0.75 since 2004. The mean F/Z has declined from 2003 but remains above the empirical level of sustainability (E<0.4, Patterson 1992) for small pelagics.

**RECENT MANAGEMENT ADVICE:** The advice from the GFCM-SAC relates to an assessment undertaken in 2008 using data up to and including 2006. The GFCM-SAC advised that fishing effort in 2009 should not be allowed to increase beyond the current levels. However this has to be confirmed in the following years and the sardine stock should be monitored in an annual basis with direct assessment surveys.

Since the fishery is considered a multispecies fishery targeting both anchovy and sardine, a shift of the present closed period (mid December to end of February) towards the recruitment period of anchovy (e.g. October to December) / or the recruitment period of sardine (e.g. February to April) is recommended, that would allow more individuals of anchovy and sardine to enter the fishery at an older age.

SGMED recommends that given current estimated fishing mortality is above the exploitation rate 0.4, effort should be decreased so that the exploitation rate falls below this level. This requires consideration of the mixed fisheries nature of the fleets.

**STECF COMMENTS:** STECF agrees with SGMED. STECF also notes that the same fleet exploits both anchovy and sardine in GSA 22. The alternative suggestions for a closed period will have different outcomes for each species and STECF highlights the need for further research concerning the definition of the closed period.

## 12.17. Sprat (*Sprattus sprattus*) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

**FISHERIES:** Sprat 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.

No assessment has been presented to SAC-GFCM Sub-Committee in 2008 and no other information was available to STECF for this stock.

### **12.18. 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.

No assessment has been presented to SAC-GFCM Sub-Committee in 2008 and no other information was available to STECF for this stock.

### **12.19. Horse mackerel (*Trachurus trachurus*) 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 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.

No assessment has been presented to SAC-GFCM Sub-Committee in 2008 and no other information was available to STECF for this stock.

## 12.20. Striped mullet (*Mullus surmuletus*) in Geographical Sub Area 5. Balearic Islands

**FISHERIES:** Striped red mullet (*Mullus surmuletus*) is one of the most important target species in the trawl fishery developed by around 40 vessels off Mallorca (Balearic Islands, GFCM-GSA05). A fraction of the small-scale fleet (~100 boats) also directs to this species during the second semester of the year, using both trammel nets and gillnets. During the last decade, the annual landings of this species have oscillated between 73-117 and 17-29 tons in the trawl and small-scale fishery, respectively.

**SOURCE OF MANAGEMENT ADVICE:** The stock of *Mullus surmuletus* of the GFCM-GSA05 has been assessed using data from both the trawl and the small-scale fishery on a time series covering eight years (2000-2007). The assessment has been carried out applying tuned VPA (Extended Survivor Analysis, XSA) on the cohorts present during 2000-2007 and both VPA and Y/R analysis on a mean pseudo-cohort from that period. These approaches were performed using monthly size composition of catches, official landings and the biological parameters estimated within the framework of the Data Collection Programme (2003-2004).

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

**STOCK STATUS:** The results indicate that the resource is fully exploited in the Balearic Islands. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion. Moderate fishing mortality and intermediate abundance were estimated. Current Y/R is very close to the maximum and  $B_{\text{now}}$  is about 33.5% of  $B_{\text{virgin}}$ .

**RECENT MANAGEMENT ADVICE:** No increase the fishing effort. In addition, the 2007 advice was to improve the trawl selectivity should be improved with the implementation of the 40 mm square mesh.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM SCSA. The STECF SGMED-08-04 report should be considered.

## 12.21. Striped mullet (*Mullus surmuletus*) in Geographical Sub Areas 12, 13, 14. Northern Tunisia, Gulf of Hammamet, Gulf of Gabès

**FISHERIES:** Striped mullet is one of the two principal species of Mullidae exploited in Tunisia. The mean catches are over the 1950 t, representing 45% of the landings of this family and 3.6% of the production of demersal fishery. Striped mullet is fished all along the Tunisian coast, where many types of fleets (métiers) operate; the principal two are artisanal fishery and bottom trawl.

**SOURCE OF MANAGEMENT ADVICE:** Two independent stocks of red mullet in Tunisia were identified: one relative to the Northern and Eastern (GSAs 12 and 13) and the other to the Southern part (GSA 14). The two stocks were treated separately. Demographic analysis of *Mullus surmuletus* in Tunisia was made by means of length composition of capture applied to the inshore trawl fishing from 2003 to 2005. The analysis of pseudo-cohort method is used.

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

**STOCK STATUS:** The global fishing mortality rates of the northern and eastern stocks are low; while for the southern stocks, they are moderate. The exploitation profile of north and east trawler and coastal fleet is orientated to mature fish; however, the southern trawlers catch mainly an important fraction of juveniles.

**RECENT MANAGEMENT ADVICE:** No assessment has been presented to SAC-GFCM Sub-Committee in 2008. The previous recommendation was not to increase the fishing effort.

**STECF COMMENTS:** STECF has no comments since there is not an updated assessment.

## 12.22. Red mullet (*Mullus barbatus*) in Geographical Sub Area 1. Northern Alboran Sea

**FISHERIES:** Red mullets are of the most important target species for the trawl fisheries but are also caught with set gears, in particular trammel-nets and gillnets. From official data, the total trawl fleet of the geographical sub-area 01 (Northern Alboran Sea region) is composed by about 170 boats: on average, 42 TRB, 60 GT and 197 HP (in 2007). Smaller vessels operate almost exclusively on the continental shelf (targeted to red mullets,

octopuses, hake and sea breams), bigger vessels operate almost exclusively on the continental slope (targeted to decapod crustaceans) and the rest can operate indistinctly on the continental shelf and slope fishing grounds. Red mullet is intensively exploited during its recruitment from August to November.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The stock has been assessed using data from the trawl fishery on a time series covering three years (2005-2007). A VPA and a Y/R analysis on a mean pseudo-cohort from that period were carried out using the VIT program (Leonart and Salat, 1997). The analysis was performed using monthly size composition of catches, official landings and the growth parameters according in the SGMED-08-03 meeting. The vector of natural mortality by age was calculated from Caddy's (1991) formula.

**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. Moderately exploited: low level of fishing effort. Believed to have some limited potential for expansion in total production. Moderate fishing mortality and intermediate abundance were estimated in GFCM-SAC 2008. Current Y/R very close to the maximum and  $B_{\text{now}}$  being 21% of  $B_{\text{virgin}}$ . The results from the pseudocohort analysis show that the current stock biomass represents 21% of the virgin stock biomass (SG-MED 08 03). During STECF SGMED 08-04, the results of using SURBA analysis, didn't present good fitness for assessment.

**RECENT MANAGEMENT ADVICE:** The GFCM-SAC 2008 recommended not increasing the fishing effort. In addition GFCM SAC in 2007, advised:

- A more effective control in closed coastal areas in order to protect recruitment.
- Seasonal closures.
- A more strict control of the legal mesh size.
- To improve the selectivity by the use of 40 mm square mesh size in the cod-end.

**STECF COMMENTS:** STECF agrees with the GFCM SAC 2008 advice.

### **12.23. Red mullet (*Mullus barbatus*) in Geographical Sub Area 3. Southern Alboran sea**

**FISHERIES:** The trawler fleet targeting red mullet in GSA 3 consists of 120 trawlers. Trawler catches are landed mainly in three harbours: Nador (62.6%), Al Hoceima (23.2%) and M'diq (14.2%).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Assessments by structural models were performed using length frequencies data for 2007.

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

**STOCK STATUS:** The stock of red mullet is qualified as overexploited with a fishing mortality that exceeds the optimum of about 30%.

**RECENT MANAGEMENT ADVICE:** The assessment was considered as preliminary and the GFCM-SAC 2008 didn't give any specific advice.

**STECF COMMENTS:** STECF has no comments.

### **12.24. Red mullet (*Mullus barbatus*) in Geographical Sub area 5. Balearic Island, Spain**

**FISHERIES:** The two species of red mullet inhabiting the Mediterranean, *Mullus surmuletus* and *M. barbatus*, are present in the Balearic Sea. However, *M. surmuletus* predominates in this area where the species is targeted by both the artisanal and trawl fleet working along the continental shelf. On the contrary, *M. barbatus* is caught as a by-catch species by trawlers operating mainly on the deep shelf. In the Balearic Islands, *M. surmuletus* and *M. barbatus* represent about 80% and 20% of the total red mullet catches respectively. During the 2000-2007 period, the landings of *M. barbatus* from Mallorca have ranged between 10.5 and 27.8 tons.

**SOURCE OF MANAGEMENT ADVICE:** The stock of *Mullus barbatus* of the GSA05 has been assessed using data from the trawl fishery on a time series covering eight years (2000-2007). The assessment has been carried out applying tuned VPA (Extended Survivor Analysis, XSA) on the cohorts present during 2000-2007 and both VPA and Y/R analysis on a mean pseudo-cohort from that period. These approaches were performed

using monthly size composition of catches, official landings and the growth parameters accorded in the SGMED-08-03 meeting. Other biological parameters (length-weight relationships, oogive of maturity) were obtained within the framework of the Spanish Data Collection Programme. The VPA was tuned with CPUE from bottom trawl surveys, carried out around the Balearic Sea during 2001–2007.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** The Current Y/R is very close to the maximum and  $B_{\text{now}}$  being 25% of  $B_{\text{virgin}}$ . XSA gave a more optimistic view on the stock. Fully exploited. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion. Fishing mortality is classified as moderate.

**RECENT MANAGEMENT ADVICE:** SAC-GFCM Sub-Committee 2008:

Not to increase the fishing effort.

**STECF COMMENTS:** STECF agrees with GFCM-SAC.

## 12.25. Red mullet (*Mullus barbatus*) in Geographical Sub area 6. Northern Spain

**FISHERIES:** Red mullet in GSA 6 (Northern Spain) is exploited by trawl and artisanal fisheries, although small gears (trammel nets and gillnets) account only for 5% of the total landings of these species. Landings of *M. barbatus* increased continuously from the earliest 1970s until 1998. From this year until 2006 a general decreasing trend with some fluctuations is observed. In the period 1998-2004 landings of this species averaged 1315 t per year. Estimated landings for the year 2007 are the highest in the data series. An important fraction (30% of individuals) of *M. barbatus* is under the minimum legal size.

The trawl fleet operating in this area is composed by 647 boats averaging 47 TRB, 58 GT and 297 HP. Trawl fisheries developed along the continental shelf and upper slope are multi-specific. Small vessels operate almost exclusively on the continental shelf targeting on red mullets, octopus, cuttlefish and sea breams. Medium and large vessels usually operates on the slope areas, but some of these units can also operate on the continental shelf (e.g. red mullet is more intensively exploited from September to November).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The stock of *Mullus barbatus* in GSA06 has been assessed using data from the trawl fishery on a time series covering ten years (1998-2007). The assessment has been carried out applying tuned VPA (XSA) and Y/R analysis on the pseudo-cohort 1998-2007. The VPA was tuned with CPUE data from MEDITS and LEDER bottom trawl surveys and standardised fleet CPUE by applying GLM model. Size composition of trawl catches from IEO, and the Spanish national Data Collection program and official landings and fleet from fishermen association and Regional Governments.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{\text{max}}$ (Ages 1-3)=	0.24
$F_{0.1}$ (Ages 1-3)=	0.16

**STOCK STATUS:** GFCM-SAC estimated the stock to be overexploited. The fishery is being exploited at above a level, which is believed to be sustainable in the long-term, with no potential room for further expansion and a higher risk of stock depletion/collapse. High fishing mortality and low abundance were observed.

SGMED estimated that since 1998 spawning stock biomass has been estimated to fluctuate around 600 tons. However, there is an estimated increase observed since 2006 with the highest value of 1200 tons in 2007. Recruitments in the last three years are just above the mean recruitment for the period 1998-2004. The fishing mortality for ages 0-2 has fluctuated without any obvious trend since 1998, around 0.9.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee 2008 recommendations were (a) to improve trawl exploitation pattern by enforcing as soon as possible the current legislation (Council EC Regulation N° 1967/2006) regarding the use of the 40 mm square mesh in the cod-end and by more effective control in shelf areas above 50 m depth, and (b) to reduce the effective fishing effort, by reducing time at sea, from 5 to 4 days per week.

SGMED recommends the relevant fleet efforts to be reduced until fishing mortality is in the range of  $F_{0.1}$ - $F_{max}$ , in order to obtain high long-term sustainable yields.

**STECF COMMENTS:** STECF agrees with SGMED and recommends the relevant fleet efforts to be reduced until fishing mortality is in the range of  $F_{0.1}$ - $F_{max}$ , in order to obtain high long-term sustainable yields. STECF also agrees with the GFCM-SAC 2008 concerning proposed technical measures. Alternative scenarios (closed areas and/or seasons) for improving yield should have been evaluated.

## 12.26. Red mullet (*Mullus barbatus*) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian

**FISHERIES:** *Mullus barbatus* is among the most commercially valuable species in the area. It is caught mainly with three different variants of the bottom trawl net. *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.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (age 1-3) = 0.42	From Y/R
$F_{max}$ (age 1-3) = 0.63	From Y/R
$F_{MSY}$ (all exploited ages) = 0.59	From catch and effort with ASPIC
$F_{pa}$ ( $F_{lim}$ ) (age range)=	
$B_{MSY}$ (spawning stock)=	n.a.
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	
$F_{MBP}$ (all exploited ages) = 0.59	From trawl surveys series of Z and $Kg/km^2$

**STOCK STATUS:** GFCM-SAC estimated that 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.

According to SGMED assessment, the index of stock abundance from GRUND survey shows high variability throughout the time series, but no trend is observed. The index of abundance from MEDITS surveys, that approximates a spawning stock biomass index (mostly represented by mature fish), suggests a positive trend from 1994 to 2006. Wide fluctuations are observed from 2002 to 2006. Index of abundance of juveniles shows a high variability, with highest values in 2000-2003 and with recent levels similar to those of 1994-95. The stock status as regards the proposed reference points  $F_{0.1}$  (0.42) and  $F_{MSY}$  (0.66) can be defined as overfished.

**RECENT MANAGEMENT ADVICE:** SAC-GFCM consider that 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,  $Z_{mbp}$  and  $Z_{ssb/ssb0}$  values suggest the necessity of a reduction of the current  $Z$  that can be obtained through the reduction of fishing effort or fleet capacity.

SGMED recommends fishing mortality to be reduced to the range between  $F_{0.1}$  and  $F_{MSY}$  through effort reductions of the relevant fleets. This requires consideration of the mixed fisheries nature of such fleets.

**STECF COMMENTS:** STECF agrees with SGMED.

## 12.27. Red mullet (*Mullus barbatus*) in Geographical Sub Area 10. Southern and central Tyrrhenian

**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.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (0-3 years)=	0.37-0.59
$F_{max}$ (age range)=	Not well defined dome shaped curves
$F_{MSY}$ (age range)=	
$F_{pa}$ ( $F_{lim}$ ) (age range)=	
$B_{MSY}$ (spawning stock)=	
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	

**STOCK STATUS:** GFCM-SAC estimated the stock to be fully exploited and growth overfishing can be assumed for the species. There are no significant trends in biomass abundance estimates.

SGMED considered that in the absence of proposed or agreed references SGMED is unable to fully evaluate the state of the stock. Survey indices indicate a decreasing pattern of biomass from 1999 onwards. In the recent years (especially in 2007) a rising of stock number and biomass was observed but subject to high variation (uncertainty). The Aladym model shows that, except in the last two years, the SSB was at lower level compared to the beginning of the time series. A similar pattern shows also the spawning potential ratio that was varying around 10% between 1998 and 2005. Long-term scenario was also simulated. The recruitment of recent years since 2003 is indicated to be below average. Considering the level of  $F$  in 2006 i.e. 0.7, a reduction of 47% would be necessary to reach  $F_{0.1}$  (0.37). In 2007 the situation seems changed. Despite the value of status quo  $F$  (0.65) is close to that of 2007, the exploitation pattern was different and thus a reduction of about 10% would be needed to reach  $F_{0.1}$  (0.59). Given the results of the present analysis, the stock appears to be subject to overfishing.

**RECENT MANAGEMENT ADVICE:** SAC-GFCM consider that 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).

SGMED recommends fishing mortality to be reduced to the range between  $F_{0.1}$  and  $F_{MSY}$  through effort reductions of the relevant fleets. This requires consideration of the mixed fisheries nature of such fleets.

**STECF COMMENTS:** STECF agrees with SGMED.

## 12.28. Red mullet (*Mullus barbatus*) in Geographical Sub Area 11. Sardinian Sea

**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  $F_{max}$  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  $F_{max}$  only in some of the years analysed.

**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:** STECF notes that no new assessment has been done since 2006 in GFCM-SAC.

## 12.29. Red mullet (*Mullus barbatus*) in Geographical Sub Area 17. Adriatic Sea

**FISHERIES:** The fishery for red mullet is one of the most important in the GSA 17. Fishing grounds correspond to the distribution of the stock particularly within 100 m depth. The allocation of fishing effort depends on the different life cycles of this species and the different concentration and distribution in GSA 17.

The Italian catch of red mullet in GSA 17 is obtained mostly by demersal otter trawl, but other gears are participating at the fishery for a very minor fraction of the catch. Demersal trawl landings ranged between 77% to 98.6% in the years 2002-2007.

Catches in recent years were reported at a level of 3,098 t in 2002; 3,111 t in 2003; 3,884 in 2004; 3,696 in 2005 and 3,226 in 2006. In 2007, red mullet catches accounted for 3,425 t.

**SOURCE OF MANAGEMENT ADVICE:** From 2008 advice is provided by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1} = 0.50$	Average for the time interval 2006-2007, calculated using F not weighted on abundance for the length interval 9-20+ cm (age from 0 to 3+).
$F_{max}$ (age range)=	
$F_{MSY}$ (age range)=	
$F_{pa}$ ( $F_{lim}$ ) (age range)=	
$B_{MSY}$ (spawning stock)=	
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	

**STOCK STATUS:** SGMED estimated that the average stock biomass in 2006-2007 was around 4000 tonnes. There is no information available on recruitment. The average F not weighted on abundance was 1.08 while the weighted average F was 0.62. The corresponding exploitation rates were 0.63 and 0.50, respectively. Given the values of F and F/Z (the latter one equal to or higher than 0.50) the stock can be considered to be sustainably exploited with some risk of overexploitation.

According to Rochet and Trenkel (2003), it would be safe to avoid F/Z higher than 0.50. Also, the seasonality fishing mortality of red mullet (from September to November) has to be taken into account.

**RECENT MANAGEMENT ADVICE:** In order to reduce the risk of overfishing, SGMED recommends fishing mortality to be reduced through effort reductions of the relevant fleets. This requires consideration of the mixed fisheries nature of such fleets.

**STECF COMMENTS:** STECF agrees with SGMED

### **12.30. 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:** STECF notes that no new assessment has been done since 2006 in GFCM-SAC.

### **12.31. Hake (*Merluccius merluccius*) in Geographical Sub Area 1. Northern Alboran Sea**

**FISHERIES:** Hake (*Merluccius merluccius*) is one of the most important target species for the trawl fisheries. In the GSA 1 there are 140 trawlers landing around 400 tonnes by year, mainly composed by juveniles living on the continental shelf.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is GFCM-SAC but no new assessment was presented to subgroups of this committee in 2008.

From 2008 advice is provide also by SGMED.

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

**STOCK STATUS:** SGMED reported that 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 measure. The stock status was considered under a growth overexploitation. Current level of B is very low compared to  $B_0$ .

SGMED could not estimate the absolute levels of stock abundance. Survey indices indicate the stock to vary without an overall trend, and in 2008 the stock SSB appears to be at an average level compared with the last 13 years. SGMED could not estimate the absolute levels of recruitment. Survey indices in 2008 indicate the recruitment level to be above the average of the available time series. SGMED cannot estimate recent or historic exploitation rates. No proposed or agreed reference points were available to SGMED to identify stock status.

The continued lack of older fish in the surveyed population indicates exploitation rates far beyond those considered consistent with high yields and low risk of fisheries collapse. However, SGMED note that the survey gear is not specifically designed to sample larger older fish.

**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 was heavily overexploited and that the biomass was very low in comparison with the virgin one, highlighted the necessity of both improving the selectivity and reducing the fishing effort.

No new assessment has been presented in SAC-GFCM Sub-Committee on Stock Assessment (SCSA) in 2008. The first approach with SURBA analysis (MEDITS historical data base 1994-2007) has been developed and the assessment rejected. The results indicated that further investigation into the age structure estimated from the survey data is needed, as the model appears unable to fit to the data at present.

Given information available, SGMED could not provide projections of future stock status and catch possibilities.

**STECF COMMENTS:** STECF agrees with GFCM-SAC.

## **12.32. Hake (*Merluccius merluccius*) in Geographical Sub Area 5. Balearic Islands**

**FISHERIES:** The trawl fishery off Mallorca (Balearic Islands; GSA05) is operated by around 40 vessels, which total annual landings are approximately 1400 tons. The European hake (*Merluccius merluccius*) is a target species for this fishery, mainly exploited on the deep shelf and upper slope, with annual landings oscillating between 50 and 190 tons during the last decades.

**SOURCE OF MANAGEMENT ADVICE:** The information used for the assessment of the stock consisted in annual size composition of catches, official landings biological parameters estimated from 2003-2007. The vector of natural mortality by age was calculated from Caddy's formula. The methodology applied was: (i) a tuned virtual population analysis (VPA), applying XSA method on the period 1980-2007 and considering catch per unit effort (CPUE) from commercial trawl fleet (2000-2007) and bottom trawl surveys (2001-2007) as tuning fleets; (ii) a surplus production model for the period 1940-2004, considering annual landings and engine power (HP) to estimate CPUE; and, (iii) a VPA and yield per recruit (Y/R) analysis on a mean pseudocohort from the periods 1980-89, 1990-99 and 2000-07.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this stock. The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recommended preparing a list of reference points and indicators for the next WG.

**STOCK STATUS:** SAC-GFCM considered that the hake stock in GSA 05 is fully exploited. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion. The fishing mortality was moderate and the abundance intermediate.

SGMED reviewed the assessment results, and considered them incompatible with true population dynamics.

SGMED therefore noted that the hake 'population' of GSA 05 is unlikely to be independent from that of the adjacent GSA 06. SGMED therefore recommends exploring the alternative of merging data from GSA 05 and GSA 06 and performing a single assessment for both GSAs together.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee 2008 on Stock Assessment (SCSA) recommended not to increase the fishing effort and to enforce as soon as possible the replacement of 40 mm diamond mesh in the bottom trawl cod-end by 40 square mesh. It could improve the exploitation pattern of this species and reduce the discards.

SGMED was unable to provide management advice for this stock.

**STECF COMMENTS:** Based on its evaluation of the report of the STECF SGMED-08-04 Working Group, STECF considers that the 2008 assessment results are incompatible with true population dynamics.

STECF notes that the hake ‘population’ of GSA 05 is unlikely to be independent from that of the adjacent GSA 06 and recommends that a combined assessment for hake for GSA 05 and GSA 06 be explored.

### 12.33. Hake (*Merluccius merluccius*) in Geographical Sub Area 6. Northern Spain

**FISHERIES:** Hake (*Merluccius merluccius*) is one of the most important target species for the trawl fisheries developed by around 647 vessels in GSA-06. Over the last years, the average of the annual landings of this species, which are mainly composed by juveniles living on the continental shelf, were situated around 3800 tons in the whole area. Annual hake landings along the Catalan Coast since 2000 were estimated at around 2000 tonnes deriving from a total effort of around 60.000 fishing days\*vessel (number of days\*vessel with hake landing). Hake is sequentially exploited by bottom trawl, gillnet and longline, each fishing gear targeting a given length range. Highest landings, both in weight and in numbers, correspond to bottom trawling. Recruits (class 0) are the main component of the overall landings. The peaks of gillnet and longline hake landings, in late spring (June), occurs when hake trawl landings during the year are lower. Landings in 2007 were the lowest for the period 2000-2007. The observed decrease in 2007 hake landings is attributed to lower bottom trawl landings.

**SOURCE OF MANAGEMENT ADVICE:** The state of exploitation was assessed for the period 1992-2007 by means of a VPA Separable, tuned with standardised CPUE from commercial fleet and abundance indices from two trawl surveys. Analysis was carried out applying the Extended Survivor Analysis (XSA) method over the period 1992-2007. In addition, a yield-per-recruit (Y/R) analysis was applied on the mean pseudo-cohort 1992-2007 geographical GSA-06. 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 (L2AGE program). Transition analysis was also made to simulate different management strategies for the improvement of the state of this resource. In this assessment, a new set of parameters (fast growth hypothesis) was considered and a natural mortality vector (PROBIOM, Caddy and Abella, 1999) was applied. In the assessment for the south area, the annual length distributions, by fishing gear, were obtained from monthly samplings of the landings. Standard biological parameters have been used, also taking into account two growth (slow and fast) approaches. LCA and Y/R have been applied using VIT software.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for

$F_{0.1}$ (age range)= 0.192	Sex combined, age groups
$F_{MSY}$ (age range)= 0.276	Sex combined, age groups
$F_{mean}$ (age range)= 0.73	Sex combined, age groups (0-4)
$Z_{MSY}$ (age range)= 0.781	Sex combined, age groups
$Z_{mean}$ (age range)= 1.41	Sex combined, age groups (0-4)

this stock.

**STOCK STATUS:** GFCM-SAC considered that the general results are similar to those obtained in previous assessments. Exploitation is based on very young age classes, mainly 0 and 1-year-old individuals, with immature fraction dominating the landings. Both in landings and yields show a decreasing trend throughout the period of observations, although there are indications of a slight recovery since 2003. Total biomass of the stock is decreasing slowly, being stabilised at around the 8 000 t. The SSB represents only a 37% of the total biomass in average. The SSB-R relationship also shows a decreasing trend, with some stability around the  $R_{max}$ , with recruitments showing a slight tendency to increase. Abundance indices show a slight reduction on 2007.

It can be concluded that the resource is over-exploited (growth over-fishing), with a risk of recruitment overexploitation.

SGMED estimated that SSB has increased from historical lows in 1999 towards in 2007 half the peak level seen towards the beginning of the time series (in 1993). Recruitment has varied without trend across the time series, but the 2007 estimate is the second lowest of the time series. Exploitation has fluctuated without trend in the range of 0.5-0.7. The most recent fishing mortality ( $F_{0.5}$ ) is 0.7. However, SGMED notes that the F range chosen appears inappropriate.

The continued low abundance of adult fish in the surveyed population and catches indicate a very high exploitation pattern far in excess of those achieving high yields and low risk of fisheries collapse.

With  $F_{0.1}=0.19$  and  $F_{MSY}=0.28$ , it can be concluded that the resource is over-exploited (growth over-fishing), with a risk of recruitment over-exploitation.

**RECENT MANAGEMENT ADVICE:** SAC-GFCM 2008 Sub-Committee on Stock Assessment (SCSA) recommended:

1) To reduce growth overfishing by:

- Reducing the effort of trawl.
- Improving the fishing pattern of the trawl to raise the minimum length of catches equal the minimum legal landing size. Implement the use of 40 mm square mesh size in the cod end in trawl gears.

2) To avoid the risk of recruitment overfishing it is advisable, as a precautionary measure, not to allow the SSB to go lower than the lowest observed in the time series. This could be obtained by:

- Establishing temporal closures for long line and gillnet during the period of maximum spawning,
- Protecting the spawning grounds through the implementation of MPA

SGMED recommends the relevant fleet efforts to be reduced until fishing mortality is in the range of  $F_{0.1}$ - $F_{MSY}$ , in order to avoid future low stock productivity and landings.

**STECF COMMENTS:** STECF agrees with the advices of SGMED. STECF also agrees the recommendations the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) concerning technical measures

## **12.34. 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 GSA 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 for the period 1998-2007 have oscillated around a mean value of 2135 tons (1704 tons in 2007). Most fleets and catches correspond to French trawl (49 and 70%, respectively). Trawl catches range between 3 and 92 cm total length (TL), with an average size of 17-23 cm TL, followed by French gillnet (~32 and 15% respectively, ranging 13-86 cm TL and average size 38-41 cm TL), Spanish trawl (~12 and 8%, respectively, ranging 5-87 cm TL, and average size 20-29 cm TL), and Spanish long-line (~7 and 7%, respectively, ranging 23-96 cm TL and average size 46-62 cm TL).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The information used for the assessment of the stock consisted in annual size composition of catches (estimated from monthly or quarterly sampling in the main landing ports), official landings and biological parameters estimated by Aldebert and Recasens (1996). The growth coefficient (k) comes from first results of tagging experiments developed by IFREMER in the area. The vector of natural mortality by age was calculated from Caddy's formula. For the period of the study (1998-2007), 2 methodologies were applied. The first one is a tuned virtual population analysis (VPA), applying the Extended Survivor Analysis (XSA) method considering, as tuning fleets, catch per unit effort (CPUE) of commercial fisheries (French trawl, Spanish trawl and Spanish long-line) and French MEDITS survey indices. The second method is a length cohort analysis (LCA) and yield per recruit (Y/R) analysis on a mean pseudo-cohort from the period of study.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (age range) =	0.22
$F_{max}$ (age range) =	n.a.
$F_{MSY}$ (age range)=	0.3
$F_{pa}$ ( $F_{lim}$ ) (age range)=	n.a.
$B_{MSY}$ (spawning stock)=	n.a.
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	n.a.

**STOCK STATUS:** GFCM-SAC estimated that fishing mortality high. There is growth overexploitation with a risk of recruitment overexploitation. A declining trend in recruitment was detected. Decreasing trend in average SSB and recruitment. The analysis shows that an acceptable reference point could be an F value of 0.6 (this means a reduction of 20% of current F value) that would allow the SSB/R to double.

SGMED estimated that since 1998 spawning stock biomass has varied without a trend and is estimated to amount 2300 tons in 2007. In the absence of proposed or agreed references SGMED is unable to fully evaluate the state of the stock. Since 2003 the estimated recruitment is below average. Fishing mortality of ages 0-2 has decreased in 2004 and has been stable around 0.7 since then. This level of fishing mortality exceeds proposed references of  $F_{0.1}$  and  $F_{MSY}$ , and thus SGMED considers the stock being subject to overfishing.

**RECENT MANAGEMENT ADVICE:** The management advice by the SAC-GFCM Sub-Committee 2008 on Stock Assessment (SCSA):

To reduce growth overfishing and reduce the risk of recruitment overfishing,

This objective can be reached by:

- reducing the effort of trawlers, long-liners and gill-netters (reducing time at sea, number of fishing boats, engine power, Bollard pull and/or trawl size...).
- improving the fishing pattern of trawl so as to ensure that the minimum length of catches equal the minimum legal landing size, by: (i) Enforcing as soon as possible at least the 40 mm square mesh cod-end, and (ii) Closing nursery areas, at least temporally (possibly identified by trawl surveys), i.e. protecting spawning by closing areas (identified from VMS data particularly on gill-netters and long-liners), at least temporally during the period of maximum spawning (winter and spring).

SGMED recommends fishing mortality being reduced to the range of  $F_{0.1}$  and  $F_{MSY}$ , through consistent effort reductions. This requires the mixed fisheries nature of the relevant fleets to be considered.

**STECF COMMENTS:** STECF agrees with the advices of SGMED. STECF also agrees the recommendations the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) concerning technical measures.

### **12.35. Hake (*Merluccius merluccius*) in Geographical Sub Area 9. Northern Tyrrhenian**

**FISHERIES:** Hake landings are the highest between the demersal species in GSA9. About 90% of landings of hake are due to bottom trawl vessels; the remaining fraction is provided by artisanal vessels using set nets, in particular gillnets. The trawl fleet of GSA9 at the end of 2006 accounted for 361 vessels. The main trawl fleets of GSA9 are present in the harbours of Viareggio, Livorno, Porto Santo Stefano (Tuscany), Fiumicino, Terracina, Gaeta (Latium). The majority of bottom trawlers of GSA9 perform daily fishing trips; only some vessels can stay out for two-three days, especially in summer. The total fishing days carried out by all the GSA9 trawlers varied from about 65,000 in 2004 to about 63,000 in 2006, a little decrease of the mean number of fishing days/year per vessel was observed in this period, from 187 to 177. Hake fishing grounds consists in soft bottoms of continental shelf and the upper part of continental slope. Fishing pressure shows some geographical differences inside the GSA9 according to the fleets size and bottom characteristics. The artisanal fleets, according to the official data account for 1309 vessels widespread in many harbours along the continental and insular coasts. Of these, about 50 vessels, located in some harbours of the GSA9 (e.g. Marina di Campo, Ponza, Porto Santo Stefano), are working, especially from winter to summer, with gillnets targeting medium and large sized hakes (greater than 25 cm TL).

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. Assessments were performed with both, size structure and catches of commercial data by fishing gear for year 2006 and a time series of data on catch rates and demographic structure derived from trawl surveys conducted between 1985 and 2006. Yield per recruit analysis allowed to define the level of F that is expected to maximize yield per

recruit ( $F_{max}$ ) as well as the precautionary reference points  $F_{0.1}$  and  $F_{30\%SSB}$ .  $F$  for each year was estimated using the software SURBA, assuming different catchability and natural mortality rate by age. With an age-structured production model based on Sissenwine and Shepherd (1987) it was defined  $F_{MSY}$  assuming a hockey stick stock recruitment relationship. There were performed simulations on the changes in yield expected at different levels of fishing mortality considering uncertainty. Finally, trawl surveys data were used for the construction of a dynamic non-equilibrium production model and for the estimation of the reference point ZMBP. Reference points were used for defining the adequacy of the current situation ( $F_{curr}$ ) regarding yields and the possibility of stock self-renewal.

From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (age1-5)=	0.22
$F_{max}$ (age 1-5)=	0.35
$F_{MSY}$ (age range)=	
$B_{MSY}$ (spawning stock)=	
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	

**STOCK STATUS:** GFCM-SAC estimated that the stock is overexploited. The fishery is being exploited at above a level, which is believed to be sustainable in the long-term, with no potential room for further expansion and a higher risk of stock depletion/collapse. High fishing mortality and low abundance were estimated.

Landings per unit effort show an increasing trend in the last 3-4 years in some ports. It is too early for stressing that this phenomenon is a signal of recovering of the stock that was (or is still) almost depleted. The current SSB is likely to be between 5 and 10% of the SSB at  $F_{MSY}$ . Stock productivity does not appear to be impaired and able to still produce relatively large year-classes.

In relation to the proposed precautionary and target levels, the stock appears to be highly overexploited and  $F$  needs to be reduced in the order of 40-80%. However, considering the high productivity in terms of incoming year-classes, the stock has the potential to recover fast if  $F$  is reduced towards  $F_{MSY}$ .

SGMED could not estimate the absolute levels of stock abundance. SSB may be between 5 and 10% of the SSB at  $F_{MSY}$ . Relative indices derived from scientific MEDITS survey for the period 1994-2006 indicated for the spawning stock biomass (SSB) a slightly decreasing trend, while the GRUND survey data series (1994-2004) shows fluctuations without a clear temporal trend. Relative indices derived from MEDITS and GRUND surveys indicated high fluctuations of recruitment in the period 1994-2006, without a clear temporal trend. Trends in the average fishing mortality over ages 1 to 5 derived from surveys ranged from 1.2 to 1.7, with the highest values observed in the last five years.

**RECENT MANAGEMENT ADVICE:** SAC-GFCM Sub-Committee on Stock Assessment (SCSA) 2008:

All the approaches used for assessment suggested the need of a drastic reduction of the fishing pressure on the species also considering the very early age of first capture.

- A drastic reduction of  $F$  is highly recommended (40-80%).
- Protection of the nursery areas, a) northeast of Capraia island, b) off Livorno (south-eastern Ligurian sea), c) between Elba island and Giglio island d) southward off the Argentario (North Tyrrhenian) and e) along the continental shelf border of the Latium (central Tyrrhenian).

SGMED recommends the relevant fleet efforts to be reduced until fishing mortality is in the range of  $F_{0.1}$ - $F_{max}$ , in order to avoid future low stock productivity and landings.

Considering the high productivity of the stock in terms of incoming year-classes, it seems that hake could have the potential to recover quickly if  $F$  is reduced towards the reference levels.

**STECF COMMENTS:** STECF agrees with the recommendation of SGMED. STECF also agrees the recommendations the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) concerning technical measures.

## 12.36. Hake (*Merluccius merluccius*) in Geographical Sub Area 11. Sardinian Sea

**FISHERIES:** Hake is one of the most important commercial species in the Sardinian seas where the biology and population dynamics have been studied intensively in the past fifteen years. From 1994 to 2004, in GSA 11, the trawl fleet remarkably changed. The change 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 were also analysed. Density and biomass indexes were used. Y/R analysis was performed as a function of F and  $t_c$ .

From 2008 advice is provide also by SGMED.

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

**STOCK STATUS:** GFCM-SAC considered that the population growth rates showed a significant increasing trend. However, the decreasing trend of mean weight and mean length highlighted the increase in fishing mortality. Commercial catch rates and total landings also showed upward trends during the last ten years. The analysis of the yield per recruit demonstrated the condition of overexploitation of the resource, with a value of E higher than  $E_{max}$ .

SGMED could not estimate the absolute levels of stock abundance. Survey indices indicate the stock to be stable. The stock SSB is more variable after 1999, showing an increasing trend in the last 3 years. SGMED could not estimate the absolute levels of recruitment. Relative survey indices indicated very high fluctuations of recruitment in the period 1994-2007, without a clear temporal pattern. SGMED cannot estimate recent or historic exploitation rates

**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 was recommended.

SGMED recommends the relevant fleet efforts to be reduced as a first step to obtain high long-term sustainable yields.

**STECF COMMENTS:** The STECF agrees with SGMED.

## 12.37. Hake (*Merluccius merluccius*) in Geographical Sub Area 15 -16. Strait of Sicily

**FISHERIES:** Although hake is not a target of a specific fishery, it is the third species in terms of biomass of Italian yield in the area. Hake is caught mostly by trawlers in a wide depth range (50-500m) together with other important species such as *Nephrops norvegicus*, *Parapenaeus longirostris*, *Eledone spp.*, *Illex coindetii*, *Todaropsis eblanae*, *Lophius spp.*, *Mullus spp.*, *Pagellus spp.*, *Zeus faber*, *Raja spp* among others. Italian trawlers, based in the harbours along the southern coasts of Sicily, operate both in GSA 15 and 16 with exclusion of Maltese Fishing Management Zone (MFMZ). Italian trawlers exert most of the fishing effort and get more than 99% of hake catches in the entire area.

In the late nineties Sicilian trawlers fishing off-shore (15–25 days of trip) had higher discard rates of hake (86% in number and 31% in weight) than the inshore trawlers (1-2 days trips) (32% in number and 9% in weight). More recent data showed that discarded fraction of undersized hakes by Sicilian trawlers decrease (13% in number and 3% in weight in 2006), amounting to about 54 tons in 2006. The trends in fishing effort of otter trawl fleet increased from 2004 to 2007 by 12%.

Hake is caught by Italian and Maltese fleets, by several gears, including demersal trawls, bottom longlines, polyvalent passive gears and others. Demersal trawlers account for the large majority of the catches, ranging between 91.6% to 98.9% in the years 2002-2007.

Catches of hake in recent years were reported at a level of 1,873 t in 2002; 2,013 t in 2003; 1,949 in 2004; 1,796 in 2005 and 1,632 in 2006. In 2007, hake catches accounted for 1,728 t.

**SOURCE OF MANAGEMENT ADVICE:** From 2008 advice is provided by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (1-4)= 0.16	Females;(TRP)
$F_{max}$ (1-4)= 0.25	Females; (LRP)
$F_{MSY}$ (age range)= not available	
$F_{pa}$ ( $F_{lim}$ ) (age range)= not available	
$B_{MSY}$ (spawning stock)= not available	
$F_{mbp}$ (1-4)=0.39	Sex combined; (LRP)
$Z_{mbp}$ (1-4)= 0.87	Sex combined; (LRP)

**STOCK STATUS:** SGMED estimated that Relative indices derived from scientific surveys indicate a recent decrease in the stock size in both GSAs since 2005. In 2007, the stock spawning stock size in weight (only GSA 16) amounted to 136% as compared to the long-term average (1994-2006). However analytical assessments (Aladym Model) evaluated the spawning stock to be very low when compared with estimated virgin biomass, implying negative effects on stock productivity. Medits results indicate the level of recent recruitment to be increased significantly. The average fishing mortality of hake in GSA 15 and 16 over ages older than 4 could not be precisely assessed. Trends in the average fishing mortality over ages 1 to 4 derived from scientific surveys indicate a recent increase in the exploitation rate since 2003. No relevant differences in F between GSA 15 and 16 are evident. The continued low abundance of adult fish in the surveyed population and catches indicate a very high exploitation pattern far in excess of any fishing mortality consistent with high yields and low risk of fisheries collapse. Considering more in detail the GSA 16, for which both commercial and trawl surveys data are available, all the stock assessments performed during the SGMED suggest quite similar diagnosis of overfishing.

**RECENT MANAGEMENT ADVICE:** SGMED recommends developing and implementing a management plan to continuously reduce current F through consistent effort reductions and catch estimations.

**STECF COMMENTS:** The STECF agrees with SGMED.

## 12.38. Hake (*Merluccius merluccius*) in Geographical Sub Area 17 Adriatic sea

**FISHERIES:** The Italian catch of Hake in GSA 17 is obtained mostly by demersal otter trawl, but other gears are participating at the fishery for a very minor fraction of the catch. Demersal trawlers account for the large majority of the catches, ranging between 88.7% to 95.8% in the years 2002-2007.

Catches of hake in recent years were reported at a level of 2,637 t in 2002; 2,606 t in 2003; 3,045 in 2004; 3,609 in 2005 and 4,395 in 2006. In 2007, hake catches accounted for 3,764 t.

**SOURCE OF MANAGEMENT:** From 2008 advice is provided by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1} = 0.22$	Average for the time interval 2006-2007, calculated using F not weighted on abundance for the length interval 9-39+ cm (age from 0 to 4+).
$F_{max}$ (age range)=	
$F_{MSY}$ (age range)=	
$F_{pa}$ ( $F_{lim}$ ) (age range)=	
$B_{MSY}$ (spawning stock)=	
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	

**STOCK STATUS:** SGMED estimated that the average stock biomass estimated by LCA in 2006-2007 was around 4,000 tonnes. Without any biomass reference proposed or agreed, SGMED is unable to fully evaluate the state of the stock size. There are no information available on recruitment. The recent average F not weighted on abundance was 1.22 while the weighted average F was 0.50. Given the values of F and F/Z (the latter one higher than 0.50), the stock of hake can be considered to be at least fully exploited. According to Mertz and Myers (1998), F/Z = 0.80 represents the maximum value which a demersal stock may endure, and the highest estimated value of F/Z (that based on unweighted F) was just slightly lower than 0.80. According to Rochet and

Trenkel (2003), it would be safe to avoid F/Z higher than 0.50: the estimated value of F/Z based on weighted F was slightly lower than 0.60. Thus, a risk of overexploitation is real for hake in the GSA 17. Finally, a meaningful percentage of caught hake has a length below the values of sexual maturity: this is a further reason for caution in managing this stock.

**RECENT MANAGEMENT ADVICE:** In order to avoid the indicated risk of overexploitation for hake in GSA 17 SGMED recommends effort reductions of the relevant fleets to be considered. Effort reductions would require mixed fisheries considerations.

A significant percentage of caught hake has a length below the values of sexual maturity: this is a further reason for caution in managing this stock.

**STECF COMMENTS:** The STECF agrees with SGMED

### **12.39. 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 tonnes 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 ( $\cong$  n° 900 boats, 60% of total number of fishing vessels; 85% of gross tonnage). The Mediterranean hake is also caught by offshore 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 included data collection of size structure of the catches.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** The trend of abundance indices highlighted a decrease from 1996 to 2003, while a slight increase was 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 Z values has been reported. The decreasing trend of index of relative biomass of the hake appeared mostly related to the adult fraction of the population, while the recruitment consistence seemed 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:** The STECF notes that no new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) since 2006.

### **12.40. Hake (*Merluccius merluccius*) in Geographical Sub Area 19. Western Ionian Sea**

**FISHERIES:** *Merluccius merluccius* is one of the most important species in the GSA 19, considering both the amount of catch and the commercial value. It is fished with different strategies and gears (bottom trawling and long-line). In the year 2004 the landings in the Ionian area were detected around 850 tonnes (IREPA data). The main fisheries operating in GSA 19 are Gallipoli, Taranto, Schiavonea and Crotona. 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 from 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  $F$ . Data series 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 were made up of juveniles, no significant trend of reduction in the catches was observed. Indeed, the trawl net does not catch adequately the adult fraction of the stock, which, instead, is mostly captured by long-line.

**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:** The STECF points out that no new assessment has been presented to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) since 2006.

### **12.41. Common Sole (*Solea solea*) in Geographical Sub Area 17. Northern and Middle Adriatic**

**FISHERIES:** Sole (*Solea solea*) is one of most important target species of rapido trawl and set net fleets in GSA 17. The stock is shared between the Adriatic countries (Italy, Croatia and Slovenia). The Italian fleets exploit this resource with rapido trawl and set nets (gill nets and trammel nets), while only trammel net is used in the countries of the eastern coast. More than 90% of the catches come from the Italian side.

Landings fluctuated between 1,000 and 2,300 t in the period 1996-2006 (data source: FAO-FishStat and IREPA-SISTAN time series). The fishing effort applied by the Italian rapido trawlers gradually increased from 1996 to 2005, and slightly decreased in the last years.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM.

The assessment of sole stock was performed for the period 2005-2007 by means of VPA Separable tuned with CPUEs from commercial fleets and abundant indexes from rapido trawl surveys.

**PRECAUTIONARY REFERENCE POINTS:** Not defined

**STOCK STATUS:** Analytical results and survey indexes showed similar patterns for total biomass, SSB and recruits. The total biomass and SSB remained practically constant from 2005 to 2007, while a low recruitment occurred in 2006. Current biomass is around 20% of virgin stock biomass.

$F$  decreased in the three years reaching the value of 0.52 in 2007. This was due to a reduction in the fishing effort of the Italian rapido trawl fleets in GSA 17, as well as to the switching of rapido trawlers towards other resources (e.g. gastropods and bivalves).

More than 40% of landed soles were below 20 cm. The estimated  $F$  is well above  $F_{max}$  (0.46) and at a level that is not to be considered sustainable in the long-term with no potential room for further expansion and a higher risk of stock depletion/collapse.

**RECENT MANAGEMENT ADVICE:** SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recommended:

- A further reduction of 10% of the fishing pressure applied by rapido trawlers (in terms of number of vessels and/or fishing time) to reach  $F_{max}$  and around 50% to reach  $F_{0.1}$ .
- A two-months closure for rapido trawling inside 6 nm offshore along the Italian coast after the biological fishing stop (August) to reduce the portion of undersized specimens (mainly YOY);

Moreover, SAC-GFCM Sub-SCSA points out the followings:

- The catches usually include a noticeable portion of undersized specimens despite of the mesh size used by the Italian rapido trawlers is larger (48 mm or more) than the legal minimum size. Nevertheless, it is not sure that the adoption of a larger mesh size could lead to a decrease of illegal catches due to the scarce knowledge on rapido trawl selectivity. Therefore, scientific investigations aimed to assess and

increase rapido trawl selectivity considering different technical aspects (mesh size, mesh shape, towing speed, etc.) are recommended.

- The safeguard of spawning areas (both in spatial and temporal terms) to prevent a possible future exploitation might be crucial for the sustainability of the Adriatic sole stock.
- The establishment of a set of specific rules for rapido trawl fishery would be advisable (e.g.: size and number of gears, mesh size, towing speed).

**STECF COMMENTS:** STECF agrees with the SCSA and recommends that fishing effort of the rapido trawlers be reduced by at least 10 % compared to present effort level.

## **12.42. Monkfish (*Lophius budegassa*) in Geographical Sub Area 6. Northern Spain**

**FISHERIES:** The monkfish *Lophius budegassa* is one of the two species of anglerfish captured as by-catch by the Mediterranean trawl fleets exploiting from the coast to the continental shelf edge. In spite of the fact that catches are scarce, this species is very important for its economic value. The small size individuals are usually included in the "mixed" commercial categories, so making difficult to collect data to obtain a realistic knowledge of the current exploitation level of this species.

**SOURCE OF MANAGEMENT ADVICE:** A preliminary stock assessment of monkfish was carried out in 2007 based on landings data (1996-2006) of trawl fishery on the Southwest of the Mediterranean Sea (GSA06, Santa Pola port). The assessment is an improvement of the previous one as data on mixed-species categories in landings were available. Natural mortality vector was estimated by PROBIOM Excel spreadsheet (Caddy and Abella, 1999).

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

**STOCK STATUS:** The natural mortality is estimated to be slightly higher than the Fishing mortality. The highest fishing mortality is on the oldest age classes. The stock is considered to be fully exploited at a precautionary level.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) made no specific comments regarding this preliminary stock assessment of monkfish (*Lophius budegassa*), but pointed out that these results must be considered with caution, because the data come from a year and one port, and the smaller individuals are still slightly underestimated.

**STECF COMMENTS:** STECF agrees with the SCSA comment and recommends continuing the assessment in the future.

## **12.43. Common Dentex (*Dentex dentex*) in Geographical Sub Areas 12, 13. Tunisian coasts.**

**FISHERIES:** *Dentex dentex* is exploited in the Tunisian coasts by artisanal gears, especially the long-lines and the trammel-nets. Two separate stocks are assessed according to regions: the Northern and the Eastern coasts.

**SOURCE OF MANAGEMENT ADVICE:** The latest assessments were conducted in 2007 on data collected in 2004.

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

**STOCK STATUS:** In the North (GSA 12), the yield by recruit value is below the optimal level; the stock seems to be underexploited. The exploitation profile in the eastern region (GSA 13) is in optimal conditions.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recommended as a precautionary measure not to increase the fishing effort in both areas. In the future, a more detailed description of the fishery should be provided to facilitate the management advice.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM SCSA

#### **12.44. Norway Lobster (*Nephrops norvegicus*) in GSA 05 - Balearic Island**

**FISHERIES:** This species is one of the target species of the bottom trawl fishery developed off Mallorca by a fleet of around 40 vessels, being captured on the upper slope, between 350 and 600 m depth, jointly with other by-catch species such as *Merluccius merluccius*, *Lepidorhombus* spp., *Micromesistius poutassou* and *Lophius* spp. Annual landings from 1986 to 2007 fluctuated between 3 and 20 t. In the years 2002-2007 the average annual catch was 9.4 tons (3.3 t of females and 6.1 t of males).

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for this species in the Mediterranean Sea.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. A preliminary assessment of this stock has been carried out by means of VPA and yield-per-recruit (Y/R).

**STOCK STATUS:** Although the species seems to be "moderately exploited" and it could have some limited potential for expansion in total production, as a precautionary measure it should be considered as fully exploited. The fishery is operating at or close to an optimal yield level, with no expected room for further expansion.

**RECENT MANAGEMENT ADVICE:** Although this is only a preliminary stock assessment, SAC-GFCM Sub-Committee on Stock Assessment (SCSA) advises to not increase the fishing effort and to enforce the replacement of 40-mm diamond mesh in the bottom trawl cod-end by 40-mm square mesh.

**STECF COMMENTS:** STECF agrees with the SCSA advices.

#### **12.45. 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 the entire 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.

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

**STOCK STATUS:** STECF has insufficient information with which to provide an assessment of stock status. The biomass index from GRUND surveys, abundance index from MEDITS and LPUE have generally increased during the last five years.

**RECENT MANAGEMENT ADVICE:** No recent advice available.

**STECF COMMENTS:** – Given the paucity of data available for this stock and that *Nephrops* is a priority species for the GFCM-SAC, STECF suggests that the Commission requests that the GFCM arrange for an assessment for *Nephrops* in the Mediterranean to be undertaken.

#### **12.46. Blue and Red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 5. Balearic Islands**

**FISHERIES:** The red shrimp is one of the most important resources for 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 (1992-2007) 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.

The present trawl fleet includes 46 vessels, about 50% of the fleet fish regularly on the slope. Total discards were estimated to 33% of reported landings in 2005 (DCR discards data assessment). Discards for the target species (red shrimp) are negligible (below 0.001%).

The number of red shrimp vessels for the whole GSA 05 has been decreased steadily from the early 1990s.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. A VPA based assessment was conducted using catch information, length frequency data for landings, information on fishing effort and survey data.

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

**STOCK STATUS:** Recruitment has fluctuated without any trend since from 1992 to 2004. For the recent years (2004-2007) recruitment has shown a decreasing trend.

F has fluctuated between 0.8 and 0.3 from the whole time series, with a decreasing trend until 2004, after which it remained fairly stable around 0.4-0.5.

Total Biomass (TB) has fluctuated with peaks in the beginning of the time series, in the early 2000s and in 2005. The present average biomass represents 52% of the virgin biomass.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recommends not increasing fishing effort.

**STECF COMMENTS:** STECF agrees with the SAC GFCM SCSA advice.

## **12.47. 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 Sub Area 6. It is fished on the slope between depths of 400 to 800 m. Landings have since 2001 fluctuated between 300 and 400 t, Females predominate in the landings, nearly 80% of the total. No discards are observed. The LPUEs fluctuated around long-term average of 30 Kg/day. Effort data indices (Landings/CPUE) remain fairly stable.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The state of exploitation was assessed for the period 1992-2006 by means of a VPA Separable, tuned with standardised CPUE from commercial fleet and abundance indices from MEDITS trawl survey. No new assessment was presented at SCSA in 2008.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for red shrimps in the Mediterranean.

**STOCK STATUS:** Total biomass of the stock has fluctuated around 800 t, (SSB around 500 t. Abundance indices show a slight recovery on 2006. Forecast at status quo shows no changes in SSB and yields. The resource was considered over exploited, with some indications of growth overexploitation, and with B and SSB below the mean values.

**RECENT MANAGEMENT ADVICE:** According to the SAC-GFCM Sub-Committee on Stock Assessment (SCSA) it is compulsory not to increase the fishing effort from the level reported in the assessment forms (8942 fishing days for a fleet of 130 vessels). A reduction of 10% is recommended to recover SSB of red shrimp (*Aristeus antennatus*) exploited by the Spanish trawl fishery in GSA 06. Considering that a substantial part of the catches are immature individuals an improvement of the selectivity (use of 40mm square mesh) could be efficient.

**STECF COMMENTS:** STECF agrees with the advice of the SAC-GFCM SCSA and points out that.

## **12.48. 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. The shrimp 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.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** STECF has insufficient information with which to provide an assessment of stock status.

**RECENT MANAGEMENT ADVICE:** No recent management advice.

**STECF COMMENTS:** No comments.

## **12.49. Red Shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 11. Sardinian Sea**

**FISHERIES:** *Aristaeomorpha foliacea* is one of the most important species in the Geographical Sub Area 11. The number of vessels has increased from 1994 to 2004 and old, low tonnage wooden boats have been replaced by larger steel boats. For the entire GSA an increase of 85% in number of boats >70 t has occurred.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. No formal assessment of this stock is available, however, information on stock status is available from national research programs (GRUND) and international trawl surveys (MEDITS), as well as Catch Assessment Surveys (CAMPBIOL)

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been proposed for this stock.

**STOCK STATUS:** The available information indicates an increasing trend in fishing mortality, however, it is not possible to evaluate if the fishery on the stock is sustainable.

**RECENT MANAGEMENT ADVICE:** GFCM-SCSA did not provide any advice for this stock.

**STECF COMMENTS:** STECF recommends that information from surveys on this stock should be made available to SCSA.

## **12.50. Deep water rose shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 6. Northern Spain**

**FISHERIES:** The deep-water rose shrimp (*Parapenaeus longirostris*) is one of the most important crustacean species for the trawl fisheries in the GFCM GSA 6 (Northern Spain). A sharp increase in landings was observed, starting in 1998 and reaching the maximum value in 2000, followed by a decreasing trend in 2001-2007. In 2007 the annual landings of this species amounts at 43 t in the whole area, which is the lowest observed.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. The state of exploitation was assessed for the period 2001-2007 for the GSA 06. A VPA tuned with standardised CPUE from commercial fleet and abundance indices from two trawl surveys, was carried out. From 2008 advice is provide also by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points have been proposed for the rose shrimp in the Mediterranean.

**STOCK STATUS:** GFCM-SAC considered the stock to be depleted. Catches are well below historical levels, irrespective of the amount of fishing effort exerted. The results show a decreasing trend, both in landings and total biomass of the stock,. Exploitation is on young age classes, mainly 2- and 1-year individuals, indicating a dependence on recruitments. Fishing mortality shows a decreasing trend, but it has increased in the latest year. The stock seems to be near collapse or collapsed and only a significant recruitment, followed by a reduction in effort, can help it to recover.

SGMED estimated that since 2001 SSB declined rapidly and continuously to the lowest value observed in 2007, which represents only 10% of that observed in 2001. SGMED notes that the MEDITS survey abundance index shows a very high peak in abundance in the 1999-2001 period, which represents the start of the assessment period. Prior to 1999, abundance levels were comparable to those seen in the 2002-2007 period. SGMED cannot evaluate the state of the spawning stock relative to reference points, as these have not been proposed or defined. Given the short-term decline by 90% from 2001 values, SGMED considers the stock status to be far below any sustainable levels. Recruits were estimated to have declined from 2001 to 2006 in the same pattern as SSB (90% to 2006). However, the most recent recruitment estimate in 2007 appears to be at the 50% level of the initial 2001 value.

Fishing mortality over ages 1-3, was estimated to have declined from 2001 to 2005, from 0.9 to 0.2, and remained low since then. The estimated level of exploitation should be considered to be sustainable under normal conditions, although no reference points have been estimated.

**RECENT MANAGEMENT ADVICE:** The SAC-GFCM Sub-Committee on Stock Assessment (SCSA) expressed its concern for the status of the stock of *P. longirostris* in GSA 06. SCSA also noticed that a fishing effort reduction seems to be not effective on SSB recovery and that, as this species is not a target species but rather a by-catch of demersal trawling, a complete closure of the fishery is not advisable. Only an improved recruitment can recover the stock. Because of both factors, the high inter-annual variability in landings on long-term and the current indicators of the resource status, that shows the lowest values of the time series, a special monitoring on the pink shrimp is recommended.

SGMED recommends that F and effort should be kept at a low level to allow any strong future recruitments to rebuild the stock. SGMED also recommends a recovery plan to be established for this stock that takes into account the mixed species nature of the fishery.

**STECF COMMENTS:** STECF agrees with SGMED. STECF also notes the poor status of the deep water rose shrimp in GSA 06 and that it is the only stock classified by the GFCM-SCSA as depleted. The economic consequences of the depleted state of the stock to the fleets exploiting pink shrimp are likely to have been severe. There is a need to better understand the dynamics of this species in the Mediterranean and STECF suggests that the underlying mechanisms that are preventing stock recovery be investigated

### **12.51. Deep water rose shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian**

**FISHERIES:** The deep water rose shrimp is one of the most important target species of the fishery carried out in GSA 9 on the shelf break and upper part of continental slope. The species is exclusively exploited with otter bottom trawling.

The fishing grounds are located on muddy bottoms in the southern part of the GSA 09, to the south of Elba Island (northern and central Tyrrhenian Seas); they are mainly exploited by several trawlers of Porto Santo Stefano, Porto Ercole, Fiumicino, Terracina and Gaeta. *P. longirostris* belongs to a fishing assemblage distributed from 150 to 500 m depth, where the main target species are also *Merluccius merluccius*, *Eledone cirrhosa* and *Nephropus norvegicus*.

The mean number of fishing days/year per vessel fishing days carried out by the GSA 09 trawlers varied from 187 in 2004 to 177 in 2006.

As a matter of fact, discards of *P. longirostris* are scarce, ranging from 0.35 to 1.24% of the total catch of the species and occur mainly on the fishing grounds located at depths of less than 200 m, where juvenile specimens are more abundant.

Landings of deep water rose shrimp in recent years were reported at a level of 161 t in 2002; 323 t in 2003; 376 in 2004; 431 in 2005 and 462 in 2006. In 2007, red mullet catches accounted for 217 t.

**SOURCE OF MANAGEMENT ADVICE:** From 2008 advice is provided by SGMED.

**PRECAUTIONARY REFERENCE POINTS:** Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

F <sub>0.1</sub> (age range)= 1.3	Uncertainty in Yield model parameters produced considerable variations in F <sub>0.1</sub> with an increased probability for values between 1.1
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	and 1.5
$F_{max}$ (age range)=	
$F_{MSY}$ (age range)=	
$F_{pa}$ ( $F_{lim}$ ) (age range)=	
$B_{MSY}$ (spawning stock)=	
$B_{pa}$ ( $B_{lim}$ , spawning stock)=	

**STOCK STATUS:** SGMED was unable to estimate the absolute stock size. Relative indices derived from scientific MEDITS survey for the period 1994-2006 indicated an increasing trend of the spawning stock biomass with two very high peaks in 1999 and 2006. In 2007 the SSB was 53% of the short-term average (2004-2006), but however well above the lowest values observed in 1994-97.

As no precautionary level for the stock of deep-sea pink shrimp in GSA 09 is proposed or agreed, SGMED cannot evaluate the stock status in relation to the precautionary approach. Young of the year (0+) are poorly sampled by the MEDIT survey. Relative indices for age 1+ indicated a general increasing trend since 1994 with two main recruitment peaks in 1999 and 2005. In 2007 recruitment index was 40% of the short-term average (2004-2006). Average mortality ( $F_{2-4}$ ) estimated from SURBA needs to be refined giving both the high uncertainty and variability in the annual estimates.  $F_{2-4}$  estimated through LCA and the survivor rate of annual cohorts were, respectively 0.37-0.41 (LCA) and 0.19-0.39 (survival rate) in the last two years (2006-07).

According to the estimated reference value of  $F_{0.1}=1.3$  this stock could be considered underexploited, even though a better assessment of both  $F_{curr}$  and  $F_{01}$  would be required.

**RECENT MANAGEMENT ADVICE:** No explicit advice was issued for that stock but SGMED notes that any management measure should consider the mixed nature of the fisheries exploiting the stock.

**STECF COMMENTS:** STECF agrees with SGMED

### 12.52. Deep water rose shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 15-16. Strait of Sicily

**FISHERIES:** The deep-water rose shrimp is the main target species of the Sicilian trawlers and is caught both on shelf and upper slope throughout the year, peaking from March to July. The Sicilian trawlers between 12 and 24 LOA operate mainly on a short distance with trips from 1 to 2 days at sea, fishing on outer shelf and upper slope. The distant trawlers of Mazara del Vallo represent the main commercial trawling fleet of the area and one of the most important of the Mediterranean.

**SOURCE OF MANAGEMENT ADVICE:** The current fishing mortality was assessed with Length cohort analysis (LCA) on pseudocohort (2006-2007) and by Beverton & Holt Z estimator on trawl surveys data of MEDITS (2005-2005 and 2007) and GRUND (2005-2006) length frequency distributions. Yield and Biomass per Recruit and BRP ( $F_{max}$ ,  $F_{0.1}$  and  $F_{SPR0.3}$ ) were assessed with Y & B per R approaches.

**PRECAUTIONARY REFERENCE POINTS:** No precautionary reference points were proposed by GFCM-SAC for this stock.

Based on its evaluation of the STECF-SGMED, STECF proposes the following biological reference points for this stock.

$F_{0.1}$ (1-3)= 0.83	Females;(TRP)
$F_{max}$ (1-3)= 1.27	Females; (LRP)
$F_{MSY}$ (age range)= not available	
$F_{pa}$ ( $F_{lim}$ ) (age range)= not available	
$B_{MSY}$ (spawning stock)= not available	

**STOCK STATUS:** Overexploited. The fishery is being exploited at above a level that is believed to be sustainable in the long-term, with no potential room for further expansion and a high risk of stock depletion/collapse.

Fishing mortality is estimated to be lower than  $F_{max}$  but above  $F_{0.1}$ .  $F = 0.87$  is proposed as target reference point for this stock. Adopting  $F=1.27$  as current  $F$  and  $F=0.87$  as TRP, a decrease of 30% of the current fishing mortality is recommended.

**RECENT MANAGEMENT ADVICE:** SAC-GFCM Sub-Committee on Stock Assessment (SCSA) recommended to reduce the fishing mortality by 30% to the proposed target  $F$  of 0.87 by: a) decreasing of fishing capacity and activity; and b) improving the exploitation pattern (adoption of the new 40 mm square mesh opening and protect nurseries). SCSA also suggested completing and improving the vessel monitoring system (VMS) to obtain data on spatial distribution of fishing effort.

In order to achieve the required reductions of fishing mortality, SGMED recommends reduction of fishing effort of the relevant fleet considering the mixed nature of the fisheries.

**STECF COMMENTS:** STECF agrees with SGMED and the technical measures proposed by SAC-GFCM.

### **12.53. Deep water rose Shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 18. Southern Adriatic Sea**

**FISHERIES:** The deep water rose shrimp is 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 with a yearly catch of around 30,000 t.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. No formal assessment of this stock is available, however, information on stock status is available from national research programs (GRUND) and international trawl surveys (MEDITS), as well as Catch Assessment Surveys (CAMPBIOL)

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not 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.

**RECENT MANAGEMENT ADVICE:** No recent management advice is available.

**STECF COMMENTS:** Given that abundance indices showed an increasing trend with a relatively stable annual catch, STECF considered that the rate of removals is sustainable in the short-term.

## **13. Elasmobranchs (Mediterranean)**

A long list of elasmobranch species has been reported to occur in the Mediterranean fisheries (71 different species are taken by the Mediterranean fisheries). According to the official statistics provided by FAO-GFCM capture fisheries production dataset (Fishstat, 1970-2006), the nominal catches of elasmobranchs from the Mediterranean reached the highest values in the 1980s and 1990s, mainly reported in the Ionian division, with peaks of 20,000 tonnes in 1994. They subsequently declined and became stable at around 9,000 t. In 2005 the total nominal landing was 9,579 t.

According to IUCN, forty-two percent (30 species) of Mediterranean chondrichthyan fishes are considered threatened (Critically Endangered, Endangered or Vulnerable) within the region. Of these, 18% (13 species) are Critically Endangered, 11% (8 species) are Endangered and 13% (9 species) are Vulnerable. A further 18% (13 species) of Mediterranean chondrichthyans are assessed as Near Threatened and 14% (10 species) are assessed as Least Concern. Little information is known about 26% (18 species), which have therefore been assessed as Data Deficient. A higher percentage of elasmobranchs are clearly more seriously threatened inside the Mediterranean than they are globally.

A feature of concern is the large number of gaps in the time series for elasmobranch species for the Mediterranean and poor identification of species in the landings. For example, the collective groups “Elasmobranchs” and “Rajiformes” accounted for nearly 50% of the total landings in 2005. In the Mediterranean, the collection of stock related variables is requested by DCR only for *Raja clavata* and *Raja*

*miraletus*, but even for these two species member states may not collect any data if their landings for species are less than 200 tonnes or represent less than 10% of total Community landings (Draft Commission Decision, 2008/XXX/EC, 5/3/2008, adopting a multi annual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy). Consequently it is quite difficult to define and assess the most important stocks. 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. The text reported below provides a summary of the stock and fishery related information available to STECF from FAO-GFCM and ICCAT as well as from MEDITS and GRUND programs at the time of preparing the report. Only two assessments on two stocks (*Raja clavata* and *Raja asterias*) in one GSA (9) were recently presented at the GFCM Subcommittee on Stock Assessment in 2008.

STECF notes that several updates, mainly regarding the landings and the stock status, have been added in the present report for most of the species listed below. However, more detailed data both on landings and on stocks are needed in the future for providing management advises for these stocks. Stock related variables are not collected in the framework of DCR for most of elasmobranchs, which makes stock assessment difficult for most species.

### **13.1. Basking shark (*Cetorhinus maximus*)**

**FISHERIES:** The Basking shark is a by-catch in several fisheries with a very low market interest. Basking shark was mostly taken as a by-catch by driftnets used for swordfish fishery (driftnets have been banned since January 1, 2002 for the EU fleets, and since 2004 in all the Mediterranean according to ICCAT and GFCM Recommendations). It is also caught by several other fishing gears in the Mediterranean, mostly by gill and trammel nets or occasionally in pelagic trawls. This species is not considered as a commercial species in several areas.

On the basis of the most recent data reported by the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006), landings for this species are only reported by Spain. The yearly landings ranged from 2 to 6 tonnes in the period 1996-2006, with a peak of 10 t in 2004, and represented from 0.1% to 0.7% of the total catch of elasmobranchs in the western Mediterranean.

Documented fisheries in several regions have usually been characterized 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.

**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), the Bonn Convention (Appendix 1) and the Bern Convention (Appendix 2), and is also listed in Appendix II of CITES. This species is listed as Vulnerable both in the Mediterranean (VU A2bd) and globally (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.

### **13.2. Shortfin Mako (*Isurus oxyrinchus*)**

**FISHERIES:** This pelagic species is taken by a variety of fishing gears, always as by-catch, but it is rarely discarded, as there is a market demand in the Mediterranean countries. Data on catches are extremely poor. On the basis of the most recent data reported by FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006) and ICCAT, landings for this species in the Mediterranean are only reported by Spain (1997-2006),

Portugal (2001-2006) and Cyprus (2006-2007). The catches ranged from 2 to 8 tonnes in the period 1997-2003, representing from 0.1% to 0.3% of the annual total catch of elasmobranchs reported for the western Mediterranean. A sharp increase occurred in 2004 (33 t) and 2005 (17 t) mostly due to the catches reported by Portugal. In 2006 official catches were reduced to 10 t. Preliminary and incomplete reported catches in 2007 account only to 2 t.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM, but this species is also under the ICCAT responsibility for the whole Convention area.

**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 in order to warrant “Vulnerable” status at the present time. For this reason, the global population is listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List. However, in the Mediterranean it is listed as Critically Endangered (CR A2acd + 3cd +4acd). Most catches are inadequately or non-recorded, so data collected for the Mediterranean were not considered sufficient to conduct quantitative assessments for this species.

**RECENT MANAGEMENT ADVICE:** Data must be collected in the ICCAT area.

**STECF COMMENTS:** STECF recommends a better reporting of the shortfin mako catches from all the fisheries and Member States involved, with the purpose to assess the state of the resource and the possible impacts due to the different fisheries.

### **13.3. Porbeagle (*Lamna nasus*)**

**FISHERIES:** This pelagic species is sometimes caught by several fishing gears as by-catch, but it is usually retained on board and sold on the market for its good price. The high commercial value (in target and incidental fisheries) of mature and immature age classes makes this species highly vulnerable to over-exploitation and population depletion.

Data on catches are extremely poor. On the basis of the most recent data reported by FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006) and ICCAT, landings of this species in the Mediterranean are only reported by Albania, Spain, Italy and Malta. The total yearly landings were very low, amounting to around 1 t with a peak of 4 tonnes in 2006. However, these catches appear to be underestimated due to the misreporting or no reporting by some States.

**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 porbeagle shark is considered as a vulnerable species, in some areas in a state of extreme depletion, and listed in the Barcelona Convention (App. III) and in the Bern Convention (App. III). It is also considered a high priority species and listed as Critically Endangered (CR A2bd) by IUCN for the Mediterranean Sea, while the global population is listed as Vulnerable (VU A2bd + 3d + 4bd).

**RECENT MANAGEMENT ADVICE:** Data must be collected in the ICCAT area.

**STECF COMMENTS:** STECF recommends a better reporting of the porbeagle catches from all the fisheries and Member States involved, with the purpose to assess the state of the resource and the possible impacts due to the different fisheries.

### **13.4. Blue shark (*Prionace glauca*)**

**FISHERIES:** This pelagic species is often caught by several fishing gears, always as by-catch and sometimes marketed. Catches mainly come from large pelagic long-line fisheries targeting tuna fish and swordfish and small driftnet fisheries. It is a major by-catch and accessory species of European large pelagic fisheries. Blue shark accounts for almost 95% of all sharks caught by drifting longlines. Average catch rate of blue shark in

swordfish longlines is 1.24 fish/1000 hooks. A number of specimens may be also taken in large driftnet fisheries; (these nets have been banned since January 1, 2002 for the EU fleets and since 2004 in all the Mediterranean according to ICCAT and GFCM Recommendations). The driftnet fishery in the Alboran Sea by Moroccan vessels is reported catching large numbers of blue sharks (estimated at more than 26,000 individuals per year). In addition, a local artisanal fishery targeting *Prionace glauca* utilises the so-called “*stese*” (short lines with hooks placed near the surface), mainly in spring, in Calabria and Apulia (Italian southern regions). Recently this species has increased in commercial value and incidental catches are now very rarely discarded in several areas, with the meat marketed in Greece, Italy, Spain and in north-African countries and fins sometimes exported to Asia.

Data on catches exist but they are very partial. On the basis of the most recent data reported in the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006) and ICCAT, landings for this species are reported by Spain, France, Cyprus, Italy, Malta, Japan and Portugal. The yearly landings ranged from 12 to 148 tonnes in the period 1997-2005, representing 0.7% to 8.7% of the total catches of elasmobranchs in the western Mediterranean. In 2006, reported catches reached the historical maximum of 178 t. However, these catches appear to be underestimated due to the misreporting and non-reporting by some States.

**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 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 (Appendix III) and in the Bern Convention (Appendix III). In the Mediterranean it is listed as vulnerable (A3bd + 4bd), while the global population is listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

**RECENT MANAGEMENT ADVICE:** Data must be collected in the ICCAT area.

**STECF COMMENTS:** STECF recommends improving the data collection on the blue shark from all the fisheries and Member States involved, with the purpose of assessing the status of this stock. STECF notes that although blue shark is the most common species of shark taken by pelagic fisheries, it is listed in the IUCN Red list whereas a number of other shark species that are much less common do not appear on the list.

### 13.5. Thresher shark (*Alopias vulpinus*)

**FISHERIES:** This pelagic species is sometimes caught 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 also taken in large driftnet fisheries; even though this fishery is prohibited in the Mediterranean since years. Surface long-line fisheries, that target tuna and swordfish, also catch *A. vulpinus*.

Data on catches are extremely poor and sometimes include another species (*Alopias superciliosus*), much more rare in the Mediterranean. On the basis of the most recent data reported by FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006), landings for this species in the Mediterranean are reported by Spain (1997-2006), Portugal (2001-2006), and France (1999-2006). The catches ranged from 3 to 21 tonnes in the period 1996-2006, representing from 0.1% to 1% of the annual total catch of elasmobranchs reported for the western Mediterranean. The annual mean catch was around 15 t.

**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. In the IUCN Red List, the species is listed as Vulnerable in the Mediterranean (VU A2bd + 3bd). The global population is listed as Data Deficient (DD) due to a lack of catch data, incomplete knowledge of stock structure, and uncertainty over life history parameters, which makes it impossible to determine population size and fluctuations.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF recommends a better reporting of the Thresher shark catches from all the fisheries and Member States involved, with the purpose of better understanding the current state of the stock.

### **13.6. Tope shark (*Galeorhinus galeus*)**

**FISHERIES:** This pelagic species is caught by a variety of fishing gears, always as by-catch, but it is often retained on board and sold on the market. Specimens may be caught in large pelagic long-line fisheries and set nets fisheries. Data on catches are extremely scarce, often mixed with other species. On the basis of the most recent data reported in the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006), landings for this species are only reported by Spain (2004-2006), ranging between 15 and 36 t, representing about 1% of the total catch of elasmobranches in the western Mediterranean

**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. Although there are no target fisheries for *G. galeus* in the Mediterranean, declines are suspected to have occurred, and by-catches are rare. Overfishing, together with habitat degradation caused by intensive bottom trawling, are considered some of the main factors that have produced the suspected decline of the Mediterranean stock. In the IUCN Red List, it is listed as Vulnerable both in the Mediterranean (VU A2bd) and globally (VU A2bd + 3d + 4bd).

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF recommends the collection of basic information on the tope shark catches to better understand the current situation of the stock.

### **13.7. Smooth hammerhead (*Sphyrna zygaena*)**

**FISHERIES:** A relatively common and widespread shark, captured in a number of fisheries throughout its range, mostly by gillnet and long-line. There might be a significant mortality of this species in large-scale long-line and driftnet fisheries, although the impact on populations is unknown at present. Data on catches are extremely scarce. On the basis of the most recent data reported in the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006), landings for this species are only reported by Albania (2000-2006), ranging between 0 and 7 t, corresponding to around 0.3% of the total catch of elasmobranches in the central Mediterranean. However, these catches are clearly underestimated due to the non-reporting by many Mediterranean States.

**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:** In the IUCN Red List, it is listed as Vulnerable in the Mediterranean (VU A4bd) and LR/nt (Lower Risk, near threatened) globally.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF recommends the collection of basic information on the smooth hammerhead catches by the EU Member States to better understand the current situation of the stock.

### **13.8. *Carcharhinus* spp.**

**FISHERIES:** In the Mediterranean waters the genus *Carcharhinus* is represented by 8 taxa (*C. altimus*, *C. brachyurus*, *C. brevipinna*, *C. falciformis*, *C. limbatus*, *C. obscurus*, *C. plumbeus*, and *Carcharhinus* spp.), many of which occur primarily in the western parts, close to the Gibraltar Strait (FAO statistical sub-area 1.1) and North African coasts. These species are often caught as by-catch in surface long-line fisheries targeting tuna and swordfish. A number of specimens may also be caught by large driftnet fisheries, even though this fishery is prohibited since years in the Mediterranean. 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. it entered in the eastern Mediterranean from the Red Sea).

The landings of most of these species are usually included by FAO (Fishstat, 1979-2005) in the large group of sharks, rays, skates, etc., and they are not included in the 2007 ICCAT SCRS report.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body for these species are SAC-GFCM and ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** Sandbar shark (*C. 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). In the IUCN Red List, it is listed as Endangered in the Mediterranean (EN A2bd + 4bd) and LR/nt (Lower Risk, near threatened) globally.

Spinner shark, *C. 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, where their status is Data Deficient (DD) according to the IUCN. Globally they are listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

Bignose shark, *C. altimus*, copper shark, *C. brachyurus*, and dusky shark, *C. obscurus*, are all species occurring 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. All three species are listed as Data Deficient in the Mediterranean according to IUCN. Globally, *C. brachyurus* and *C. obscurus* are listed as LR/nt (Lower Risk, near threatened) in the IUCN Red List.

Silky shark *C. falciiformis* 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 the catches of the different *Carcharhinus* species occurring in the Mediterranean with the aim of better understanding the current state of these species and assessing the possible impacts of the different fisheries.

### 13.9. Sixgill shark (*Hexanchus griseus*)

**FISHERIES:** This large demersal species is occasionally caught 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) assessed the standing stock biomass in the Mediterranean at about 440 tonnes. Deep commercial trawl surveys (1998-99) in the western Italian basins showed yields of about 1.2 kg/hour in average, with a peak of 4.7 kg/h in the Tyrrhenian Sea. 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 both in the Mediterranean and globally.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF notes that no new catch data are available and recommends the collection of basic information on the sixgill shark catches, to better understand the current situation of this long-living species.

### 13.10. Spurdog (*Squalus acanthias*)

**FISHERIES:** This demersal species is commonly caught 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. On the basis of the most recent data reported in the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006), landings for this species were reported by France, Malta, Slovenia and Spain and ranged from 22 to 171 tonnes in the period 1970-2006, representing from 0.2% to 1.6% of the total catches of elasmobranchs reported in the Mediterranean.

Studies conducted during the MEDITS project (1994-1999) assessed the standing stock biomass in the Mediterranean at about 6,682 tonnes. Deep commercial trawl surveys (1998-1999) in the western Italian basins showed yields of about 0.14 kg/h in average, with a peak of 0.64 kg/h in the Sardinian Sea.

**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. In the MEDITS 2007 report, *Squalus acanthias* population exhibited no trend in abundance in 3 GSAs where it was assessed. 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 by the IUCN Red List (EN A2bd+4bd), while globally the species is listed as Vulnerable (A2bd + 3bd + 4bd).

**RECENT MANAGEMENT ADVICE:** The information available indicates that it may be appropriate to establish separate management areas for fisheries exploiting spurdog in the Mediterranean and Black Sea.

**STECF COMMENTS:** STECF recommends the collection of data on catches and fisheries separately by management area.

### **13.11. Small-spotted catshark (*Scyliorhinus canicula*)**

**FISHERIES:** 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). 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 less abundant. Trawlers and set gillnets very commonly catch 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. Although it is widespread over the Mediterranean, landings for this species are available only from France (Fishstat, 1970-2006) and they amounted to around 30 tonnes/year in the period 2000-2006, representing from 1.2% to 2.3% of the total catches of elasmobranchs reported in the western Mediterranean basin.

Studies conducted during the MEDITS project (1994-1999) showed a high frequency of occurrence (>5% of the hauls) and abundance (>10 kg/km<sup>2</sup> 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 elasmobranch species. The highest densities (>100 kg/km<sup>2</sup>) were located around Corsica and Sardinia Islands, but significant densities (30-50 kg/km<sup>2</sup>) were also found in the Gulf of Lion, Catalan and Aegean Seas. The most representative biomass of small-spotted catshark in the Mediterranean (about 2,900 tons) was located on the Greek shelf in the Aegean Sea, likely due both to the large extension of the continental shelf and to under-exploitation. In the western part of the Mediterranean, from France to Morocco, *S. canicula* showed a latitudinal distribution pattern, with both density and biomass dominating in the Catalan Sea and decreasing towards lower latitudes (Morocco).

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** In the MEDITS 2007 report, *Scyliorhinus canicula* population showed no trend in abundance in 9 GSAs, increasing trend in 2 areas (Northern Alboran Sea, South Sicily and Malta), and decreasing trend in one GSA (Gulf of Lions). At the present time the status of this species in the Mediterranean and globally is Least Concern (LC, proposed for the IUCN Red List).

**RECENT MANAGEMENT ADVICE:** The information available indicates that it may be appropriate to establish separate management areas for fisheries exploiting *S. canicula* in the Mediterranean and Black Sea.

**STECF COMMENTS:** STECF notes the lack of recent assessment for this species and recommends the collection of data on catches and basic biological data to better define the stock status and the local populations.

### **13.12. 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 caught as by-catch by trawl nets and bottom long-lines and has not a good commercial value with most captured specimens discarded at sea, especially in the Italian seas.

On the basis of the most recent data reported in the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2006), landings for this species are only reported by Spain. The yearly landings ranged from 49 to 90 tonnes in the period 2002-2006, with an average value at around 60 tonnes/year, and represented from 2% to 6% of the total catches of elasmobranchs in the western Mediterranean.

The species showed a high occurrence and abundance (>5% of the hauls and >10 kg/km<sup>2</sup> or >10% of relative biomass) throughout the surveyed areas. 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/km<sup>2</sup>. The standing stock biomass in the Mediterranean was assessed at about 6,891 tonnes, one of the highest values among all the elasmobranch species. Deep commercial trawl surveys (1998-99) in the western Italian basins showed yields around 1.3 kg/hour in average, with a peak of 2.7 kg/h in the central Tyrrhenian Sea. Along the coasts of Morocco, Spain and France and around Crete, the specimens larger than 30 cm of total length were dominating (78% of the total). The opposite happened around Corsica and Sicily islands, in the Ionian, and south Adriatic and Aegean Seas, where the specimens over 30 cm TL only represented the 23% of the total sampled population. An intermediate situation was observed in the Tyrrhenian Sea, where 44% of the sampled population was below 30 cm TL.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** The time series (1994-2004) of the abundance indicator of blackmouth catshark had an increasing trend in 4 MEDITS GSAs (Northern Spain, Corsica, Ligurian and North Tyrrhenian Sea, South and Central Tyrrhenian) and was stable in 8 GSAs, while the average length was stationary in all areas. In the Mediterranean, this species is of Least Concern (LC, proposed for the IUCN Red List). No decline in abundance was observed in any MEDITS GSA during 1994-2004.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF notes the lack of recent assessment and recommends a better reporting of the blackmouth catshark catches from all the fisheries and Member States involved to better understanding the current state of the stock.

### **13.13. Blue stingray (*Pteroplatytrygon violacea*)**

**FISHERIES:** This species is very commonly caught by pelagic gears (long-lines, driftnets) as by-catch and more rarely by trawlers; it is sometimes retained on board and sold in a few markets. Data on catches are usually extremely poor. This species represented 9.3% in weight of the total catches obtained by swordfish long-lines in 1991 in the Tyrrhenian Sea. A number of specimens may be taken also in large driftnet fisheries, but this fishery is prohibited since years in the Mediterranean. During twenty-two GRUND trawl surveys carried out from 1985 to 1998 in the Italian waters the percentage presence of *P. violacea* was low (6.20%).

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is SAC-GFCM.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** There are no reliable quantitative estimates of stock status. In the Mediterranean, this species is listed as LR/nt (Lower Risk, near threatened) according to the IUCN Red List.

**RECENT MANAGEMENT ADVICE:** None.

**STECF COMMENTS:** STECF notes the lack of recent data and recommends a better reporting of the Blue stingray catches from all the fisheries and Member States involved due to the high number of specimens reported in surface fisheries.

### 13.14. Skates (*Rayformes*)

**FISHERIES:** Fifteen species of skate occur in the Mediterranean Sea (*Dipturus batis*, *D. oxyrinchus*, *Leucoraja circularis*, *L. fullonica*, *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 (*Leucoraja melitensis*) and speckled ray (*Raja polystigma*). All the 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. In FAO statistics all rays, stingrays and mantas are grouped in one category. Total landings for this category in the Mediterranean ranged from 3,160 to 9,418 tonnes during the period 1970-2006. Good catch rates of *R. clavata* are found in the Gulf of Lions and the waters off Corsica, Sardinia and Greece. It is worth noting that up to 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 of this species 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:** Studies conducted during the MEDITS project (1994-1999) based on trawl surveys assess the mean standing stock biomass in the Mediterranean of all these species at 16,744 tonnes in total. The most common species is *Raja clavata*, having a standing stock biomass of 8,151 tonnes. In the MEDITS 2007 report, which covers the period 1994-2004, *Raja asterias* population exhibited no trend in abundance in 4 Subareas, increasing trend in 1 Subarea (Corsica) and decreasing trend in 1 Subarea (Aegean Sea). *R. clavata* population exhibited no trend in abundance in 6 Subareas, increasing trend in 1 Subarea (South of Sicily and Malta) and decreasing trend in 1 Subarea (Corsica). These species were separately assessed in GSA 9.

The common skate, *Dipturus batis*, formerly occupied the shelf and slope areas of the Mediterranean excluding North Africa, west of Morocco, but now appears to be virtually absent from much of this range. It is reported as locally extinct in the Adriatic Sea. It is also presumed absent from Tunisian waters where it has not been recorded since 1971. *Dipturus batis* is listed as Critically Endangered (CR A2bcd + 4bcd) both in the Mediterranean and globally.

The Maltese skate *Leucoraja melitensis* is a Mediterranean endemic that is under imminent threat of extinction. It was previously found over a relatively restricted area (about ¼ of the total area of the Mediterranean Sea) in the depth range where trawl fisheries routinely operate. This species is now extremely rare and its main range now appears to be restricted to the Strait of Sicily. It is also rare off Malta and rare or absent off Tunisia, where it was previously considered moderately common. Although population data are lacking, given the small range of the remaining population, the potential detrimental impact of trawl fisheries is likely to be significant. The Maltese skate, *Leucoraja melitensis*, is assessed as Critically Endangered (CR A2bcd + 3bcd + 4bcd) on the basis of very rapid population decline, which is estimated to exceed 80% in three generations.

In the Mediterranean, the majority of the population of *Raja montagui* appears to exist between 100–500m, although it occurs from the shallows to 600m. Populations of *R. montagui* appear to be stable in most parts of the Mediterranean. *Raja montagui* has been assessed by IUCN as Least Concern in the Mediterranean, although population trends and by-catch levels should be monitored to ensure a stable population is maintained.

The white skate, *Rostroraja alba*, was formerly captured frequently in the NW Mediterranean during the 1960s and off Tunisian and Morocco in the early to mid 1970s. It is now considered rare and is believed to have undergone a significant but currently unquantifiable decline in abundance and extent. The MEDITS survey suggests a substantial reduction in geographic range and the current distribution of occurrence of this species represents a small fraction of its former range. *Rostroraja alba* is listed as Critically Endangered (CR A2cd + 4cd) in the Mediterranean and Endangered (EN A2cd + 4cd) globally.

The sandy skate, *Leucoraja circularis*, is listed as Endangered (EN A2bcd + 3bcd + 4bcd) in the Mediterranean. The speckled skate, *Raja polystigma*, is considered endemic in the Mediterranean Sea. In the Mediterranean, this species is listed as LR/nt (Lower Risk, near threatened) according to the IUCN Red List. The sharpnose skate, *Dipturus oxyrinchus* and the cuckoo skate *Leucoraja naevus*, are considered as LR/nt (Lower Risk, near

threatened) according to the IUCN Red List. The twineye skate, *Raja miraletus*, is currently assessed as Least Concerned (LC) in the Mediterranean, while the shagreen skate, *Leucoraja fullonica*, the blonde skate, *Raja brachyura*, the rough skate, *Raja radula* and the undulate skate, *Raja undulata*, are all Data Deficient (DD) species in the Mediterranean.

**RECENT MANAGEMENT ADVICE:** None

**STECF COMMENTS:** STECF recommends the collection and reporting of basic data on species-specific catches. Research efforts focusing on species for which there is currently little knowledge (DD species) is highly desirable. Reporting in National and FAO statistics should be species specific. Protection measures of coastal and offshore nurseries areas of these species should be enforced.

### **13.15. Thornback skate (*Raja clavata*) in Geographic Sub Area 9. Ligurian and Northern Tyrrhenian**

**FISHERIES:** The assessment was based on the fishery activity in Viareggio (Northern Tyrrhenian Sea), where a fleet of 80 vessels of different sizes and tonnage is based. Most of them target demersal resources and in general utilize bottom trawl nets locally called “volantina”. A reduced number of vessels utilizing the *rapido* (a variant of the beam trawl) and part of the small-scale fleet also targets demersal species, but landings of these fractions of the fleet are of modest entity. Although commercial valued resources are distributed over all the wide continental shelf and slope, considering the characteristics of the fishing vessels and traditions, the Viareggio fleet mainly exploit the coastal resources. The thornback skate is among the abundant species in catches.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. A Y/R analysis, based on bottom trawl data obtained from a sampled fleet in the harbour of Viareggio in the years 1990-2004, was undertaken in 2008.

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

**STOCK STATUS:** The preliminary Y/R assessment provided the following results:

F = 0.25

Current Y/R: 0.257 kg per recruit

Maximum Y/R: 0.39 kg per recruit

Y/R 0.1: 0.38 kg per recruit

F<sub>max</sub>: 0.092

F<sub>0.1</sub>: 0.064

Maximum B/R: 13.68 kg per recruit

B/R: 1.03 kg per recruit

This population was defined as overexploited; however it is likely that the biological characteristics of the species made it more resilient to high levels of fishing activity. Research survey data do not show a decline in the abundance of *R. clavata* that can be interpreted as an index of recruitment overfishing. In fact an increase in catch rates for this species is observed. These findings do not seem to be in agreement with those derived from commercial data, which suggest a negative trend for the species. The thornback skate, *Raja clavata*, in the Mediterranean and globally, is listed as LR/nt (Lower Risk, near threatened) according to the IUCN Red List.

**RECENT MANAGEMENT ADVICE:** The assessment is considered preliminary and no specific management advice has been recommended by the GFCM-SCSA.

**STECF COMMENTS:** STECF notes that the assessment has been performed on data collected by vessels from only one port of the GSA 9, and these results may not be representative of the overall state of the stock in GSA 9. A more extended database is necessary to provide the assessment for the entire GSA.

### 13.16. Starry skate (*Raja asterias*) in Geographic Sub Area 9. Ligurian and Northern Tyrrhenian

**FISHERIES:** The assessment was based on the fishery activity in Viareggio (Northern Tyrrhenian Sea), where a fleet of 80 vessels of different sizes and tonnage is based. Most of them target demersal resources and in general utilize bottom trawl nets locally called “volantina”. A reduced number of vessels utilizing the *rapido* (a variant of the beam trawl) and part of the small-scale fleet also targets demersal species, but landings of these fractions of the fleet are of modest entity. Although commercial valued resources are distributed over all the wide continental shelf and slope, considering the characteristics of the fishing vessels and traditions, the Viareggio fleet mainly exploit the coastal resources. The thornback skate is among the abundant species in catches. For *Raja asterias*, a nursery ground in the Tyrrhenian Sea was reported.

**SOURCE OF MANAGEMENT ADVICE:** The management advisory body is SAC-GFCM. A Y/R analysis based on bottom trawl data obtained from a sampled fleet in the harbour of Viareggio in the years 1990-2004 was undertaken in 2008. ,

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

**STOCK STATUS:** The preliminary assessment provided the following results:

$F = 0.15$

Current Y/R: 0.079 kg per recruit

Maximum Y/R: 0.097 kg per recruit

Y/R 0.1: 0.93 kg per recruit

$F_{max}: 0.33$

$F_{0.1}: 0.23$

Maximum B/R: 1.145 kg per recruit

B/R 0.1: 0.44 kg per recruit

The stock was preliminary assessed as moderately exploited, with a low level of fishing effort. The time series of LPUE shows no trend. Following the general criteria based on life history aspects to define extinction risk in marine fishes, *R. asterias* should be included within the “medium productivity category”. This species is currently assessed as Least Concerned (LC) by the IUCN Red List, but further information on its status in the southern Mediterranean is needed.

**RECENT MANAGEMENT ADVICE:** The assessment is considered preliminary and no specific management advice has been recommended by the GFCM-SCSA.

**STECF COMMENTS:** STECF notes that the assessment has been performed on data collected by vessels from only one port of the GSA 9, and these results may not be representative of the overall state of the stock in GSA 9. A more extended database is necessary to provide the assessment for the entire GSA.

## 14. 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.

### 14.1. Bluefin (*Thunnus thynnus*), Eastern Atlantic and Mediterranean

**FISHERIES:** Declared catches in the East Atlantic and Mediterranean reached a peak of over 50,000 t in 1996 and then decreased substantially after the adoption of TAC. In 2006 and 2007, declared catches were about 30,647 and 32,398 t for the East Atlantic and Mediterranean respectively. Available information, however, indicates that landings have been seriously under-reported and the Standing Committee on Research and Statistics (SCRS) of ICCAT has estimated the total catch in 2006 and 2007 at about 50,000 t and 61,000 t.

Bluefin fisheries have been very active in the Mediterranean Sea and in the Black Sea since ancient times. The most recent reported catches of bluefin tuna from the Black Sea are from the beginning of 1960s, but a few

specimens were reported to have been caught there again in 2007, after more than 40 years of absence. 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 bait boat for the east Atlantic, and purse seine, longline and traps for the Mediterranean. For EU Member States and Contracting Parties to ICCAT, driftnet fishing for tuna has been banned since January 1<sup>st</sup> 2002. Recreational fishing is also relevant.

The rapid development of tuna farming in the Mediterranean Sea induced further pressure on this stock and compounds the serious problem in data collection. Data on juvenile bluefin catches from the Mediterranean have not been available for many years, even though many fisheries targeting the first three age groups occur in many areas. This lack of data also seriously affects the SCRS advice.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT.

**PRECAUTIONARY REFERENCE POINTS:** STECF notes that reference points used in the assessment are not clearly specified in the ICCAT report. However, reference points are essential for STECF to comment on the ICCAT advice for this stock.

**STOCK STATUS:** The 2008 assessment results indicate that the spawning stock biomass has been declining rapidly in the last several years while fishing mortality has been increasing rapidly, especially for large bluefin. The increase in mortality for large bluefin tuna is consistent with an apparent shift in targeting towards larger individuals destined for fattening and/or farming. Analyses indicate that recent (2003-2007) SSB is less than 40% of the highest estimated levels. The decline in SSB appears to be more pronounced during the more recent years. The results are consistent between different types of models and all the analyses indicate a general recent increase in F for large fish and, consequently, a decline in SSB.

Estimates of current stock status relative to MSY benchmarks are uncertain, but current F is most likely at least 3 times that which would result in MSY and SSB is most likely to be about 36% or less than the level needed to support MSY.

**RECENT MANAGEMENT ADVICE:** In 2002, ICCAT fixed the TAC for the East Atlantic and Mediterranean bluefin tuna at 32,000 t per year for the period 2003 to 2006. The most recent ICCAT Rec. 06-05 established decreasing TACs: 29,500 t in 2007, 28,500 t in 2008, and 27,500 t in 2009 and 25,500 t in 2010. However, Libya and Turkey disagreed with the allocation key accepted by other Contracting Parties and declared autonomous fishing quotas, raising the expected TAC by some 3,000 t.

Based on the SCRS analysis, it is apparent that the TAC is not respected and is largely ineffective in controlling overall catch although enforced control seems to have been deployed in 2008 in the Mediterranean Sea. The SCRS believes that unless fishing mortality rates are substantially reduced in the near future, the current management scheme will most probably lead to further reduction in spawning stock biomass with high risk of fisheries and stock collapse.

The SCRS recommends to follow an  $F_{0.1}$  (or another adequate  $F_{MSY}$  proxy, such as  $F_{max}$ ) strategy to rebuild the stock, because such strategies appear much more robust than the current management plan to a wide range of uncertainties about the data, the current status and future productivity. These strategies would imply much lower catches during the next few years (on the order of 15,000 t or less). The SCRS further believes that a time area closure could greatly facilitate the implementation and the monitoring of such rebuilding strategies. The SCRS also believes that it is timely to enhance data collection and to tackle key and recurrent issues concerning bluefin tuna population dynamics. Without such a significant effort, it is unlikely that the scientific diagnosis and management advice can be improved.

Current fishing capacity largely exceeds the current TAC and has even increased over the last four years. SCRS therefore advises management actions are needed to mitigate the impacts of overcapacity as well as to eliminate illegal fishing. Deferring effective management measures will likely result in even more stringent measures being necessary in the future.

**STECF COMMENTS:** STECF recommends that future management plans should ensure a rapid reduction in fishing mortality to levels between  $F_{0.1}$  and  $F_{max}$  (this corresponds to a total catch between 8,500 t and 15,000 t in 2009). In the absence of any documented results from the stochastic catch forecast in the 2008 ICCAT reports, STECF is unable to advise on the level of risk associated with these estimates.

STECF further notes that poor or incomplete enforcement of adopted management plans has probably contributed to the current poor status of this stock. STECF recommends that future management plans that take full account of the scientific advice, are adopted and fully implemented as a matter of urgency.

STECF notes that existing fishing capacity exceeds that required to harvest this stock sustainably. STECF agrees with the SCRS that the minimum catch size should be set at 25 kg.

STECF has noted the high degree of uncertainty surrounding much of the data used in this assessment: this uncertainty has been recognised by SCRS for a number of years. There remains an urgent need to have more reliable and complete size frequency data (particularly for early year-classes, 1 - 3) for the period following the introduction of a TAC in the Mediterranean. Tagging programs, fishery independent surveys and mining of historical data will all contribute to a better understanding of the status of this species and should be encouraged.

## **14.2. Bluefin (*Thunnus thynnus*), Western Atlantic**

**FISHERIES:** Western bluefin fisheries have been managed by TAC since the early eighties and catches were relatively stable around 2,500 t until 2001, increased in 2002 to 3,319 t and have been declining since then, reaching 1,624 t in 2007. Most of the catches are taken by vessels from the USA, Canada and Japan.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT. The latest stock assessment is from 2008.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** The 2008 assessment results are similar to those from previous assessments. They indicate that the spawning stock biomass declined steadily from the early 1970s until 1992. Since then, SSB has fluctuated between 18% and 27% of the 1975 level.

Fishing mortality on spawners (ages 8 and older) declined markedly between 2002 and 2007. One important factor in the recent decline of fishing mortality on large bluefin is that the TAC has not been taken during this time period, due primarily to a shortfall by the United States fisheries that target large bluefin.

Recruitment was very high in the early 1970s. Since 1977, recruitment has varied without trend.

In 1998, the ICCAT initiated a 20-year rebuilding plan designed to achieve  $B_{MSY}$  with at least 50% probability. The current assessment indicates that the stock has not yet rebuilt as projected under the plan. The 2007 SSB is estimated by SCRS to be 7% below the level of the Plan's first year.

SCRS cautions 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. Limited analyses were conducted on the mixing of the two stocks. Depending on the types of data used to estimate mixing (conventional tagging or isotope signature samples) and modelling assumptions made, the estimates of stock status varied considerably. However, these analyses are preliminary and more research needs to be done before mixing models can be used operationally for management advice.

**RECENT MANAGEMENT ADVICE:** ICCAT-SCRS has conducted medium-term (12-year) outlook assuming two alternative recruitment scenarios with associated  $B_{MSY}$  (management target) values: (i) average levels observed for 1976-2004 and a lower value of  $B_{MSY}$  (ii) levels that increase as the stock rebuilds associated with a higher calculated value of  $B_{MSY}$ . The low recruitment scenario suggests that catch levels of 2,400 t will have about a 50% chance of rebuilding the stock by 2019 and catches of 2,000 t or lower will have greater than a 75% chance of rebuilding. If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1,500 t or less are expected to immediately end overfishing (50% chance) and initiate rebuilding.

Based on a strict interpretation of the base case projections and the SCRS estimates that TACs consistent with the Western Atlantic Rebuilding Plan are between zero and 2,400 t depending on the choice of recruitment scenarios and choice of the probability of rebuilding and in light of the uncertainty about recruitment and other uncertainties not taken into account in the projections, the SCRS strongly advises against an increase in TAC.

There is a provision of the rebuilding plan to adopt harvest levels that provide a 50% or greater chance of meeting rebuilding targets. Given this possibility and the lack of progress on rebuilding, the SCRS recommends that the ICCAT adopt more conservative catch levels that will result in a higher probability (for example, 75% chance) that  $B_{MSY}$  is achieved by the beginning of 2019. Under the more optimistic "low recruitment" scenario, this target could be achieved with a TAC of 2,000 t.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT-SCRS, and stresses the relevance of archival tagging and biological investigations, to better understand the stock mixing problem.

### **14.3. Albacore (*Thunnus alalunga*), North Atlantic Ocean**

**FISHERIES:** The northern stock is exploited by surface fisheries targeting mainly immature and longline fisheries targeting immature and adult albacore. The main surface fisheries are carried out by EC fleets (Ireland, France, Portugal and Spain) in the Bay of Biscay, in the adjacent waters of the northeast Atlantic, and in the vicinity of the Canary and Azores Islands in summer and fall. The main longline fleet is the Chinese Taipei fleet, which operates in the central and western North Atlantic year round.

During the last decade landings have remained relatively stable at around 30,000 t/year. Catches decreased to the lowest on record in 2002 (22,685 t) due to a decrease in catches in the surface fishery. Catches increased again reaching a peak of 36,199 t in 2006. Total catch in 2007 was 21,549 t.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT. The most recent assessment for North Atlantic albacore was undertaken in 2007.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** Based on the current assessment which considers catch, size and effort since the 1930s, ICCAT-SCRS view of the northern albacore resource status is that spawning stock size has declined and is currently about one quarter of the peak levels estimated for the late 1940s. Estimates of recruitment to the fishery, although variable, have shown generally higher levels in the 1960s and earlier periods with a declining trend thereafter until 2004. However, the most recent recruitment is estimated to be large albeit uncertain. The current assessment indicates that the stock recently rebuilt to levels near  $B_{MSY}$  (current SSB is approximately 20% below the MSY level, compared to 2000 when it was 50% below). Recent fishing mortality rates have generally been above  $F_{MSY}$  (current F is approximately 50% larger than  $F_{MSY}$ ).

While estimates of MSY varied over time as the relative combination of fisheries taking juvenile and mature albacore varies, which results in different overall selectivity patterns across time, the biomass that supports that MSY has little variation. For the three more recent years, the estimate of MSY is about 30,000 t, but over time the estimates ranged from about 26,000 t to 34,000 t, depending on the relative importance of the surface and longline fisheries' catch levels. If recruitment were at the levels estimated in the 60s then the MSY would be higher. Total annual albacore average catch was 50,000 t during 30 years (1956-1986), which is higher than the current MSY estimated about 30,200 t. The assessment indicated that the spawning stock will decline from the levels estimated in 2005 over the next few years, particularly given the fact that the 2006 catch was higher than the 2005 level. The spawning stock response to different catch levels after the next few years depends upon the real strength of the 2003 year-class, which our assessment indicates could be relatively strong, although we do not have confidence in the overall level.

Since 2001, the ICCAT established a total allowable catch (TAC) of 34,500 t for this stock and, in 2003 extended it up to 2007.

**RECENT MANAGEMENT ADVICE:** The current TAC for the Northern albacore stock is 34,500 t. The ICCAT-SCRS noted that the reported catches for 2005 and 2006 were over the TAC and that the 2007 catches were well below the TAC. Furthermore, stock projections indicated that the northern stock would not recover from the overfished conditions if catch levels remain over 30,000 t. If a strong year-class enters the fishery, which is uncertain but suggested by some CPUE series, the stock would recover faster. In 2007, the ICCAT implemented [Rec. 07-02], which is intended to reduce the TAC to 30,200 t in 2008 and 2009 and allow the rebuilding of the northern albacore stock from its overfished condition. However, it was noted that the fishing opportunities provided in [Rec. 07-02] allow the potential catch to exceed the TAC.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT-SCRS.

#### **14.4. Albacore (*Thunnus alalunga*), South Atlantic Ocean**

**FISHERIES:** The recent total annual South Atlantic albacore landings can largely be attributed to four fisheries, namely the surface bait boat fisheries by South Africa and Namibia, and the longline fisheries by Brazil and Taiwan). The bait boat fisheries are entirely albacore directed and mainly catch juvenile and sub-adult fish (70-90 cm FL). These surface fisheries operate seasonally, from October to May, when albacore are available in coastal waters. Brazilian longliners target albacore during the first and fourth quarters of the year, when an important concentration of adult fish (> 90 cm) is observed off northeast coast off Brazil, between 5° S and 20° S, probably because of favourable environmental conditions for spawning, particularly of sea surface temperature. The Taiwanese longline fleet operates over a larger area throughout the year, and consists of vessels targeting albacore and vessels that take albacore as a by-catch in swordfish- or bigeye-directed fishing operations. On average, the longline vessels catch larger albacore (60-120 cm) than the surface fleets. Total reported albacore landings for 2007 was 20,032 t, a decrease of about 4,500 t compared to the 2006 catch. The Taiwanese catch increased in 2007 to 13,146 t. Regarding Brazilian catches, Taiwanese longliners (including boats flagged Belize and St. Vincent) stopped fishing for Brazil in 2003, which resulted in albacore only being caught as a by-catch in swordfish- and tropical tuna-directed longline fisheries. In 2007, the catch of the Brazilian longline fleet was 535 t, In the most recent 4 years the average landings by this fleet has been only around 500 t, an eight fold decrease compared to an average of around 4,300 t annually for 2000-2003. Decreased availability of albacore in the inshore waters of South Africa and unfavourable foreign currency exchange rates in the last three years has caused a general reduction in the number of active bait boat vessels.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT. The management is based on assessments of stock status using catch rates effort and size.

**PRECAUTIONARY REFERENCE POINTS:** Replacement yield is set at about 28,800 t (25,800-29,300 t with approximately 95% confidence bounds from the base case analysis), with a maximum sustainable yield estimated at 33,300 t (29,900-36,700 t with approximately 95% confidence bounds from the base case analysis).

**STOCK STATUS:** Based on the 2007 assessment which considers catch, size and effort since the 1950s, the view of the status of southern albacore stock is that the spawning stock has declined to about 25% of its unfished level in 2005. The ICCAT concluded that it is likely that the stock was below the maximum sustainable yield (MSY) level as it was estimated to about 90% of  $B_{MSY}$  in 2005, while the 2005 fishing mortality rate was about 60% of  $F_{MSY}$ . MSY was estimated to be around 33,300 t, whereas the replacement yield averaged over the last 10 years, is approximately 29,000 t.

**RECENT MANAGEMENT ADVICE:** For the southern stock, the present TAC is 29,200 t. Recent catches were below the TAC level. The assessment indicated, that the southern stock is overfished; model projections indicated that catches, at about the 2006 level, will recover the stock. The observed 2007 catch was, however, even lower. The Committee considered that the current management regulations are sufficient for the recovery of the southern stock. In 2007, the Commission recommended [Rec. 07-03] adopting a catch limit of 29,900 t (the lowest estimate of MSY) until 2011.

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

#### **14.5. 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 Even though catches of Mediterranean albacore have been increasing for the past few years, there is a lack of general information on this stock. The data from the fisheries are incomplete and biological information of the stock is limited. Reported albacore catches in the Mediterranean since 1982 have fluctuated between 1,235 t in 1983 and 7,894 t in 2003. The 2005 catches accounted for only 3,529 t, reaching 5,947 t in 2006. In 2007, the reported catches account 6,546 t and they were obtained mainly by long-lines (4,113t), other surface gears (1,400 t) and purse seines (1,033 t). STECF believes that even catches reported as “purse-seines” might be referred to other

surface gears, including gillnets. EC-Italy has the highest catch in this fishery (4,017 t in 2007). The annual average catch was 3,555 in the period 1983-2004 and 5,347 t in the period 2005-2007, showing an average increase of 50,4% when compared with the previous 22 year catches. The driftnet fishery for albacore has been banned since January 1<sup>st</sup> 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 any catch for this species, and this fact prevent the assessment. However the Mediterranean stock does not show any general trend. The average size is almost stable. The mixing rate with the Atlantic stock appears to be insignificant.

**RECENT MANAGEMENT ADVICE:** The ICCAT-SCRS was not in a position to provide advice on the status of this stock due to the lack of information.

**STECF COMMENTS:** STECF 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 collation of historical data. STECF notes that catch data before 1995 are not representative of the actual removals catch and in some cases no estimates are available.

## 14.6. Yellowfin (*Thunnus albacares*), Atlantic Ocean

**FISHERIES:** Yellowfin tuna are caught between 45°N and 40°S by surface (purse seine, bait boat, 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, of 63% since 2001. Total recorded landings of YFT in 2007 were 96580 t. The 2007 catch level is only half of the peak level in 1990. The purse seine fishery is the major contributor to total catches of this species although Atlantic surface fishery catches (mainly purse seine fisheries) have shown a declining trend from 2001 to 2007, whereas longline catches have remained more or less stable in recent years. Of the total landings in 2007 the purse seine fisheries contributed 52485 t (54%), long line catches were 25214 t (26%) and bait boat catches were 10183 t (10%). Bait boat catches have declined strongly since 2001, largely because of reduced catches by Ghana bait boats, 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, both purse seine catches and bait boat catches have declined strongly. However both in the east and West Atlantic longline catches have remains more or less stable in recent years. The observed increase in South African catches in the eastern Atlantic during 2005 and 2006 may be the result of a spill over of Indian Ocean fish caught just inside the Atlantic boundary.

**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 Atlantic YFT stock has been assessed (in 2007) by cohort analyses (VPA) as well as by production models (ASPIC). The two models leave a small amount of uncertainty about the stock status. The VPA gave an ( $F_{2006}/F_{MSY}$ ) of 0.84, and a relative biomass ( $B_{2006}/B_{MSY}$ ) of 1.09. The estimates by the ASPIC were ( $F_{2006}/F_{MSY}$ ) = 0.89 and ( $B_{2006}/B_{MSY}$ ) = 0.83. ICCAT states that 2006 catches are estimated to be well below MSY levels, stock biomass is estimated to be near the Convention Objective and recent fishing mortality rates somewhat below  $F_{MSY}$ . The recent trends indicate declining effective effort and some recovery of stock levels. However, when the uncertainty around the point estimates from both models is taken into account, there is still about a 60% chance that stock status is not consistent with Convention objectives.

**RECENT MANAGEMENT ADVICE:** The status of yellowfin has shown some improvement since the last assessment, which is not surprising in that catches and fishing effort have generally declined and there have been small increases in catch rates observed for some longline fisheries over the past few years. Currently, stock

biomass is estimated to be near the Convention Objective and recent fishing mortality rates somewhat below  $F_{MSY}$ . Continuation of current catch levels is expected to lead to a healthy biomass, somewhat above  $B_{MSY}$ , which should provide adequate safeguard against biomass falling below the Convention objective as long as fishing effort does not substantially increase. Effort increases on the order of about 10% above current levels (in order to achieve MSY) would be expected in the long run to increase yield by only about 1-4% over what could be achieved at current effective effort levels, but with substantially increased risk of biomass falling below the Convention objective. In addition, the Commission should be aware that increased harvest of yellowfin could have negative consequences for bigeye tuna in particular, and other species caught together with yellowfin in fishing operations taking more than one species. The Committee also continues to recommend that effective measures be found to reduce fishing mortality of small yellowfin to increase long-term sustainable yield. **STECF COMMENTS:** It is noticed that no new assessment was carried out in 2008, and STECF agrees with the advice from ICCAT.

#### **14.7. Bigeye (*Thunnus obesus*), Atlantic Ocean**

**FISHERIES:** Total landings in 2007 of Bigeye tuna in the Atlantic were around 67000 t, the same level as in 2006, but much lower than in the years of peak catches in the late 1990s. In the Atlantic this stock is exploited by three major gears/fisheries: longline, purse seine and bait boat (live bait). In 2007 these 3 fisheries distributed total landings as follows: 42,037 t (63%) by long line, 13150 t (17%) by purse seine and 11549 t (17%) by bait boats. The decline in total catches since 1999 is mainly due to declines in the long line catches.

The total annual catch increased up to the mid 1970s reaching 60,000 t and fluctuated over the next 15 years. In 1991, catch surpassed 95,000 t and continued to increase, reaching an historic high of about 132,000 t in 1994. Since 1999 reported and estimated catch has been declining and fell below 100,000 t in 2001, and it was 67,000 t in 2007, the lowest recorded level since 1988.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is ICCAT. Although several types of assessment models, including production models, VPA, and a statistical integrated model (Multifan-CL) have been used, the results from non-equilibrium production models seem to me most consistent with previous assessments of Atlantic bigeye, and these models are thus used to provide our best characterization of the status of the resource. The current MSY estimated using two types of production models was around 90,000 t and 93,000 t, although uncertainty in the estimates broadens the range. In addition, these estimates reflect the current relative mixture of fisheries that capture small or large bigeye; The biomass at the beginning of 2006 was estimated to be nearly 92% of the biomass at MSY and the 2005 fishing mortality rate was estimated to be about 13% below the fishing mortality rate at MSY. The replacement yield for the year 2006 was estimated to be slightly below MSY.

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

**STOCK STATUS:** The biomass at the beginning of 2006 was estimated to be nearly 92% of the biomass at MSY and the 2005 fishing mortality rate was estimated to be about 13% below the fishing mortality rate at MSY. The replacement yield for the year 2006 was estimated to be slightly below MSY. While the ICCAT/SCRS feels this characterization best represents the current status of bigeye in the Atlantic, there are other model formulations, which would admit both more optimistic and more pessimistic stock status evaluations.

ICCAT/SCRS conducted stock projections assuming a catch of 71,000 t in 2006 and varying levels of the constant catch thereafter. The projection results suggest that the biomass of the stock would likely decline further with constant catches of 90,000 t or more. Some increase in biomass, leading to rebuilding to  $B_{MSY}$  is expected with catches of less than 85,000 t.

**RECENT MANAGEMENT ADVICE:** Projections indicate that catches of 85,000 t or less will permit the stock to rebuild in the future and the ICCAT/SCRS recommends that the total catch not exceed 85,000 t.

Considering that the new closed area is much smaller in time and area than the previous moratorium time/area, and is located in an area which historically has lower effort anyway, this regulation is likely to be less effective in reducing the overall catches of small bigeye by the surface fishery. The ICCAT/SCRS stresses that, if

time/area closures are to be effective in reducing small fish harvests and growth overfishing, such a closure should be expanded in time and space and focused in locations with optimal potential benefit. The assessment and subsequent management recommendations are conditional on the reported and estimated history of catch for bigeye in the Atlantic. The ICCAT reiterates its concern that unreported catches from the Atlantic might have been poorly estimated and continues this way, but available statistical data collection mechanisms are insufficient to fully investigate this possibility. Coordination amongst the regional tuna management bodies should be encouraged, in order to reduce the possibilities of 'fish laundering' for bigeye and other species.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT/SCRS.

## **14.8. Swordfish (*Xiphias gladius*), North Atlantic**

**FISHERIES:** Atlantic swordfish has a broad geographical distribution, (from 45°N to 45°S, both coastal and offshore) and is available to a large number of fishing countries. The largest proportion of Atlantic catches are made using surface drifting longlines, mostly by Spain, United States, Canada and Portugal. However, many additional gears are used. Since a 1987 peak in landings there was a decrease in estimated catches in the North Atlantic until 2002. This was in response to ICCAT recommendations but also attributed to shifts in fleet distributions, including movement of some vessels to the South Atlantic and out of the Atlantic.

For the past decade the North Atlantic estimated catch (landings plus discards) has averaged about 11,400 t. The 2007 reported catch (11,938 t) reflects a slight increase compared with 2006 (11,504 t). 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. 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 (2007) reported level of discards is 363 t, a reduction of 68% from the peak level reported for 2000. ICCAT/SCRS has 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.

**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 has improved - possibly due to strong recruitment (in the late 1990s) and reduced catches from the peak in 1987. The estimate of MSY is about 14,100 t and the current biomass (at the beginning of 2006) was estimated to be about 99% of the biomass needed to produce MSY while 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, the stock trajectory shows that the status of the North Atlantic swordfish is close to the Convention objectives. 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  $B_{MSY}$  level under those catch levels.

**RECENT MANAGEMENT ADVICE:** In order to maintain the northern Atlantic swordfish stock close to a level that would produce MSY, 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 notes the concern expressed by ICCAT/SCRS that current regulations may have had a detrimental effect on the availability and consistency of data (catches, sizes, and CPUE indices) from the Atlantic fleet and the possible effects of this on future assessments.

STECF further notes that, because of the poor size-selectivity of longliners, regulating minimum landing size may inadvertently have resulted in under-reporting of juvenile catches. Alternative methods for reducing

juvenile catches, such as time and/or area closures or technological changes in gear deployment, may be more effective and their utility should be further investigated.

#### **14.9. 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. 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. Reductions in catch following the peak in 1995 resulted from regulations and a shift to other oceans and target species. In 2007, the catches (15,416 t) were about 29% lower than the 1995 reported level but 8% higher than the 2006 reported catches (14,277 t). The reported 2007 catch should be considered provisional and is probably an underestimate. Almost all the reported swordfish catches from the South Atlantic are taken by directed longline fisheries, and mostly by Spain, and Brazil, along with catch and by-catch reported by fleets from Japan, Chinese Taipei, Namibia, South Africa, Uruguay, Portugal and other countries. 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 (2007) reported level of discards is 363 t, a reduction of 68% from the peak level reported for 2000.

**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:** The 2006 assessment, which is the latest, indicated that 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 ICCAT/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 CPUE from the targeted fisheries 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  $F_{MSY}$  in the long-term. The estimated MSY (about 17,000 t) is 9% higher than current reported landings.

**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. STECF notes the concern of ICCAT/SCRS that current 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 and the possible effects for future assessments. STECF also notes new minimum size regulations came into effect in 2007 but their effectiveness cannot be assessed until the next assessment of Atlantic swordfish.

#### **14.10. 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 with average annual reported catches similar to those of larger areas such as the North Atlantic. 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 2006 catch is estimated to be around to 14,000 t, while 2007 catch data are incomplete. The biggest producers of swordfish in the Mediterranean Sea in the recent years are EC-Greece, EC-Italy, 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. There may be additional fleets taking swordfish in the Mediterranean, for example, Egypt, Israel, Lebanon, Monaco and Syria, but the data are not reported. 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 1<sup>st</sup> 2002 in EU countries and from 2004 in all ICCAT Mediterranean countries, but illegal fishing is known to still occur in various areas. The use of nets and longlines in sport and recreational fishery was banned from 2004 (ICCAT Rec. 04-12). ICCAT imposed a Mediterranean-wide one-month fishery closure for all gears targeting swordfish in 2008. Additionally several countries have imposed technical measures, such as closed areas and seasons, minimum landing size regulations and license control systems. 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.

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

**STOCK STATUS:** In 2003 the SCRS carried out the first assessment of the Mediterranean stock based on fisheries data from the central and eastern Mediterranean. The most recent assessment was carried out in 2007.

The results from a workshop on stock structure in 2006 demonstrated that Mediterranean swordfish compose a separate stock to swordfish in the Atlantic but further research is needed to clearly define stock boundaries and the degree of any stock mixing. The stock assessment carried out in 2007 used two different methods. These gave a consistent view of declining stock abundance, but differed in the extent of the decline. Estimates of population status from production modelling using a longer time-series of catch and effort (a series for which SCRS has less confidence) indicated a 2005 stock level that was most likely about 13% below that necessary to achieve the ICCAT Convention objective while recent fishing mortality was about 25% above the level that would permit the stock to attain MSY levels. Estimates of stock status from virtual population analysis using a shorter time series of catch and effort data (for which ICCAT has more confidence), indicated about a 40% reduction in spawning stock level but stable recruitment over the past 20 years. That spawning stock level is less than half that necessary to achieve the ICCAT Convention objective and estimates of recent fishing mortality rates from this form of assessment are more than twice that which, if continued without abatement, is expected to drive the spawning biomass to a very low level (about 10% SPR) within a generation. Those low levels are considered to give rise to non-negligible risks of rapid declines in the stock although such a signal has not yet been observed in the Mediterranean swordfish fisheries. While one modelling approach indicates the current stock status is only about 13% below  $B_{MSY}$ , it also indicates that future catches in excess of 12,000 t will not result in improvement in stock status. In contrast, the modelling approach that provides a more pessimistic view of current status (less than half  $B_{MSY}$ ) indicates future catches that allow rebuilding are somewhat higher, up to about 14,000 t, assuming that the current high selectivity for juvenile fish continues and recruitment does not improve. The SCRS again 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 three years old usually represent 50-70% of the total yearly catches in terms of numbers and 20-35% in terms of weight. A reduction of the volume of juvenile catches would improve yield per recruit and spawning biomass per recruit levels.

**RECENT MANAGEMENT ADVICE:** SCRS has recommended that ICCAT should adopt a Mediterranean swordfish fishery management plan with the goal of rebuilding the stock to levels that are consistent with the ICCAT Convention objective. One technical measure the SCRS has thus far evaluated is Mediterranean – wide fishing closures during the recruitment period, which could initiate rebuilding, depending on their duration and timing. A six-month (September through February) closure of the Mediterranean to swordfish fishing is projected to permit the stock to rebuild to about MSY levels within a generation (about 7 years). A four-month closure (October-January) projects some improvement in SSB, to about 65% of  $B_{MSY}$  within a generation. A two-month closure (October-November) projects a much smaller gain in SSB to about 50% of  $B_{MSY}$ . These effects would be diminished if closure were applied in months of low fishing activity (December-January).

Following the results from recent studies, technical modifications of the longline fishing gears as well as the way they are operated can be considered as an additional technical measure in order to reduce the catch of juveniles. The SCRS recommends this type of measures be considered as part of a Mediterranean swordfish management plan. It is evident from the stock status evaluation that the current capacity in the Mediterranean swordfish fishery exceeds that needed to efficiently extract MSY. Management measures aimed at reducing this capacity should also be considered part of a Mediterranean swordfish management plan adopted by the ICCAT. Further, the SCRS recommends that national scientific delegations conduct additional research into technical measures and time-area closures, which could optimise protections of juvenile Mediterranean swordfish. 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.

**STECF COMMENTS:** STECF notes that assessment models used by the ICCAT SCRS give different perceptions of the stock status in relation to  $B_{MSY}$ . While both models indicate that the biomass is below  $B_{MSY}$ , the degree to which the stock is overfished is substantially different in the two models. STECF agrees with the finding that the stock is overfished but is unable to quantify by how much it is overfished. Nevertheless, STECF broadly agrees with the advice from ICCAT regarding fishery closures and recommends that any fishery closure (no fishing with surface longlines and eradication of all illegal driftnet fisheries) should apply to the entire Mediterranean area and extend for a minimum of two months. STECF also recommends that fishing capacity for swordfish should not be allowed to increase and preferable that it be reduced. STECF also indicates the EU Data Collection programme should be adjusted to be consistent with the format used by ICCAT for assessment purposes, with particular attention to CPUE data. STECF again stresses the importance to better define the mixing rate between the Mediterranean and the Atlantic swordfish stock already known to occur in the Atlantic area close to Gibraltar.

#### **14.11. Skipjack (*Katsuwonus pelamis*), Eastern Atlantic**

**FISHERIES:** The total catches obtained in 2007 in the entire Atlantic Ocean were close to 150,850 t, which represents an increase in the order of 4% 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. At present, the major fisheries are the purse fisheries, particularly those of EC-Spain, EC-France, NEI, Cape Verde, Guatemala and Ghana, followed by bait boat fisheries of Ghana, EC-Spain and EC-France. The catches made in 2007 in the East Atlantic amounted to 125,300 t, representing an increase of 5% as compared to the average of 2002-2006. The EU fleets catches in 2007 accounted for 37,789t. SCRS again noted that important catches of skipjack are landed as “false tuna” in Côte d’Ivoire (unreported catches in the order of 6,000 to 8,000 t between 2004 and 2005).

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 favour 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 in the past, 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. A new Bayesian method, using only catch information estimated the MSY (under a Schaefer-type model parameterisation) at 143,000-156,000 t, a result which agrees with the estimate obtained by the modified Grainger and Garcia approach: 149,000 t.

Although some caution is needed as regards to the generalization of the status 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, it is unlikely that skipjack be over exploited in the eastern Atlantic

**RECENT MANAGEMENT ADVICE:** Although ICCAT/SCRS makes no management recommendations in this respect, catches should not be allowed to exceed MSY. The Commission should be aware that increasing harvests and fishing effort for skipjack could lead to involuntary consequences for other species that are harvested in combination with skipjack in certain fisheries. The repealing in 2006 of Recommendation [ICCAT Rec. 05-01] on the 3.2 kg minimum size limit on yellowfin tuna [ICCAT Rec. 72-01] (even though it was still in force in 2005) and the establishment of a time/area closure of the surface fishery [ICCAT Rec. 04-01], which replaces the old strata relative to the moratorium on catches under floating objects, are regulatory measures that are too recent to determine their effects on skipjack catches.

**STECF COMMENTS:** STECF stresses that there is a need to evaluate both the effect of the ICCAT decision to replace the previous moratorium on the use of FADs by a season/area closure.

#### **14.12. Skipjack (*Katsuwonus pelamis*), Western Atlantic**

**FISHERIES:** In the West Atlantic, the major fishery is the Brazilian bait boat fishery, followed by the Venezuelan purse seine fleet. Catches in 2007 in the West Atlantic amounted to 25,400 t, a minor decline of 2% as compared to recent years. The catches taken by EU vessels on this stock have been, historically, negligible and accounted only for 11 t in 2007, obtained by EC-Portugal.

**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 standardised CPUEs of Brazilian bait boats remain stable while that of Venezuelan purse seiners and USA rod and reel 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).

Catch only model estimated MSY at around 30,000 t (similar to the estimate provided by the Grainger and Garcia approach) and the Bayesian surplus model (Schaefer formulation) at 34,000 t. Other analyses using Multifan-CL indicated MSY converges to about 31,000-36,000 t. It must be stressed that all of these analyses correspond to the current geographic coverage of this fishery (i.e., relatively coastal fishing grounds due to the deepening of the thermocline and of the oxycline to the East).

For the western Atlantic stock, it is unlikely that the current catch is larger than the current replacement yield of about 25,000 t as shown by the trajectories of  $B/B_{MSY}$  and  $F/F_{MSY}$  of the different models.

**RECENT MANAGEMENT ADVICE:** No management recommendations were proposed by the ICCAT.

**STECF COMMENTS:** No comment.

#### **14.13. 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. During the 2006 marlin assessment it was noted that catches of blue marlin and white marlin continued to decline through 2004. Task I catches of blue marlin in 20065 were 2,182 t. In 2007 task I catches of blue marlin were 2,303 t. Task I

catches of white marlin in 2006 and 2007 were 387 t and 302 t, respectively. Task I catches of white marlin and blue marlin for 2007 are preliminary because they do not include reports from several important fleets, including some of the eastern Caribbean fleets that have reported large catches of blue marlin in the past. Historical reports of unclassified billfish remain an important issue in the estimation of historical removals from marlin stocks.

Sailfish are targeted by coastal artisanal and recreational fleets and, to a less extent, are caught as by-catch of longliners and purse seiners. Historically, catches of sailfish were reported together with spearfish by many longline fleets. At present it is not possible to appropriately separate the catches of these two species. Large historical catches of unclassified billfish continue to be reported to the Committee making the estimation of sailfish catch difficult. In 2008, a review of Task I data for sailfish was conducted and a number of modifications of these data were made. Preliminary and very incomplete reports to ICCAT suggest that the 2007 Task I catch was 1,605 t and 920 t, respectively, for the east and west region. EC-Portugal and EC-Spain are reporting important catches, while EC-United Kingdom sometimes reports very marginal catches.

These species are primarily taken by longline fisheries (including various EU longline fisheries), but also by purse seines (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 Antilles) 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:** No new information on stock status has been provided since the 2006 assessment. The recent biomass level most likely remains well below the  $B_{MSY}$  estimated in 2000. Current and provisional diagnoses suggest that  $F$  has recently declined and is possibly smaller than replacement  $F$ , but larger than the  $F_{MSY}$  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:** No new information on stock status has been provided since the 2006 assessment. The recent biomass most likely remains well below the  $B_{MSY}$  estimated in the 2002 assessment. Current and provisional diagnoses suggest that  $F$  is probably smaller than replacement  $F$  and probably also larger than the  $F_{MSY}$  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:** No new assessments of the sailfish stocks have been conducted since 2001. Although some updated and new relative abundance indices were recently reported, there is still a need to update sailfish abundance indices for all-important fleets. It is unknown if the western or eastern sailfish stocks are undergoing over-fishing ( $F > F_{MSY}$ ) or if the stocks are currently over-fished.

**RECENT MANAGEMENT ADVICE:** The ICCAT-SCRS in 2008 asked the Commission, at a minimum, to continue the management measures already in place because marlins have not yet recovered. The Commission should take steps to assure that the reliability of the recent fishery information improves in order to provide a basis for verifying possible future rebuilding of the stocks. Improvements are needed in the monitoring of the fate and amount of dead and live releases, with verification from scientific observer programs; verification of current and historical landings from some artisanal and industrial fleets; and complete and updated relative abundance indices from CPUE data for the major fleets. Should the Commission wish to increase the likelihood

of success of the current management measures of the marlin rebuilding plan, further reduction in mortality would be needed, for example by:

- implementing plans to improve compliance of current regulations,
- encouraging the use of alternative gear configurations, including certain types of circle hooks, hook/bait combinations etc., in fisheries where its use has been shown to be beneficial,
- broader application of time/area catch restrictions.

Given the recent importance of the catch from artisanal fisheries, and to increase the likelihood of recovery of marlin stocks, the Commission should consider regulations that control or reduce the fishing mortality generated by these fisheries.

The Commission should encourage continued research on development of methods to incorporate this information into stock assessments in order to provide a basis for increasing the certainty with which management advice can be provided.

Management recommendations for sailfish are the same as those made in 2007. The previous management recommendations indicated that the Commission should consider methods for reducing fishing mortality rates. The current western Atlantic assessment leads the Committee 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 Commission should consider practical and alternative methods to reduce fishing mortality and assure continued improvements of data collection and analysis of fisheries data.

The Committee is concerned about the incomplete reporting of sailfish catches, particularly for the most recent years. The Committee therefore recommends all countries landing or having dead discards of sailfish and spearfish, report these data by species to the ICCAT Secretariat.

**STECF COMMENTS:** STECF agrees with the advice from ICCAT. Furthermore, STECF stresses the need for correct identification and reporting of billfish species in all EU fisheries in accordance with to the DCR. Furthermore STECF notes that in last year's ICCAT-SCRS recommendations mentioned a potential recovering of the stocks of blue marlin and white marlin to the  $B_{MSY}$  level but that recent increases in catches of blue marlin by artisanal fisheries in both sides of the Atlantic may negate the effectiveness of the ICCAT plan that aims to recover this stock.

#### **14.14. Small tunas (Black skipjack, Frigate tuna, Atlantic bonito, Spotted Spanish mackerel, King mackerel and others), Atlantic and Mediterranean**

**FISHERIES:** There are over fourteen species within the ICCAT category of small tunas, which includes Blackfin tuna (*Thunnus atlanticus*), Bullet tuna (*Auxis rochei*), Frigate tuna (*Auxis thazard*), Atlantic Bonito (*Sarda sarda*), Plain bonito (*Orcynopsis unicolor*), Serra Spanish mackerel (*Scomberomorus brasiliensis*), Cero (*Scomberomorus regalis*), King mackerel (*Scomberomorus cavalla*), *Scomberomorus* unclassified (*Scomberomorus* spp.), Little tunny (*Euthynnus alletteratus*), West African Spanish mackerel (*Scomberomorus tritor*), Atlantic Spanish mackerel (*Scomberomorus maculatus*), Narrow-barred Spanish mackerel (*Scomberomorus commerson*) and Wahoo (*Acanthocybium solandri*), plus some vagrant species which includes the Indian mackerel (*Rastrelliger kanagurta*) and maybe also the Black skipjack (*Euthynnus lineatus*) and Dogtooth tuna (*Gymnosarda unicolor*). Only five of these account for 88% of the total catch by weight each year, according to the official statistics. In '80s 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 92,637 t, and since then values have oscillated, with a minimum of 69,895 t in 1993 and a maximum of 123,600 t in 2005. Overall trends in the small tuna catch may mask declining trends for individual species because annual landings are often dominated by the landings of a single species. These fluctuations seem to be partly 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. A preliminary estimate of the total nominal landings of small tunas in 2007 is 70,520 t. The SCRS pointed out the relative importance of small tuna fisheries in the Mediterranean and the Black Sea, which account for 28% of the total reported catch in the 1980-2007. Several countries from the Mediterranean and Black Sea are not reporting catches to ICCAT. It is

commonly believed that catches of small tunas are strongly affected by unreported or under-reported data in all areas.

The 2007 preliminary catch amounted to 70,520 t, of which: 1,548 t of Blackfin tuna; 16,828 t of Bonito; 17,024 t of Little tunny; 4,346 t of Frigate tuna; 17,708 t of King mackerel; 6,102 t of Atlantic Spanish mackerel; 2,341 t of Serra Spanish mackerel; 708 t of Wahoo, 2,692 t of Bullet tuna, 867 of Plain bonito, and 338 t of West-African Spanish mackerel. 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. 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 and trends are now available from the Mediterranean and the Black Sea, thanks to the ICCAT/GFCM joint expert group in 2008. More information, particularly on specific fishing effort, is needed from all areas. The small tuna fishery seems to be quite important for the coastal communities, 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 for the catches in the Mediterranean and the Black Sea.

**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. Nevertheless, few regional assessments have been carried out. The King mackerel in the Gulf of Mexico and South Eastern United States Atlantic, and the Spanish mackerel in the South Eastern US were assessed in 2008. During the period 2004-2007, the CRFM undertook assessments of the Serra Spanish mackerel, King mackerel and Wahoo fisheries operating within the southeastern Caribbean. Further progress in the CRFM assessments requires improvements in statistics and estimation of key biological parameters, as well as close collaboration with neighbouring non-CRFM countries sharing these fisheries within the sub-region.

**RECENT MANAGEMENT ADVICE:** No management recommendations have been presented by ICCAT due to the lack of proper data, historical series and analyses. ICCAT/SCRS reiterated its recommendation to carry out studies to determine the state of these stocks and the adoption of management solutions, with some priority species for the West African area: Atlantic bonito, Little tunny, Bullet tuna and West African Spanish mackerel. 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. GFCM/ICCAT has identified some priority species, namely Bullet tuna, Atlantic bonito, Little tunny and Plain bonito. CRFM analyses of eastern Caribbean stocks have been limited by the quality and quantity of the available data, and in view of this, changes in current management approaches have not yet been recommended.

**STECF COMMENTS:** STECF recommends that the EC Data Collection programme be adjusted to mandatory include at least Bullet tuna (*Auxis rochei*), Little tunny (*Euthynnus alletteratus*) and Atlantic bonito (*Sarda sarda*) in the Atlantic Ocean, CECAF, Mediterranean and Black Sea areas, West African Spanish mackerel (*Scomberomorus tritor*) in the CECAF area and Plain bonito (*Orcynopsis unicolor*) in the Mediterranean Sea. Dolphin fish (*Coryphaena hippurus*) must be also included in the DRC. Catch statistics should be collected by all MS in a much more detailed format, by species.

## **14.15. 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 driftnet fishery, but one of the target species for the traditional harpoon fishery and occasionally in sport fishing activity, also taking into account the high market price. Catches are unofficially known to occur in all the Mediterranean States where driftnet and longline fishing is 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. Other billfish and spearfish species are only very rarely present in most of the Mediterranean Sea, but recent data show that catches could occur with a relative higher frequency in the western and central basins. No additional information is available.

**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 analyse 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. Catches of Mediterranean spearfish must be reported by all MS concerned.

## **14.16. 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 but data are usually not reported. 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 analyse 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 1<sup>st</sup> 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.

## **15. Highly migratory fish (Indian ocean)**

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. The situation is slowly improving in the most recent years.

Information in this section is taken from the Report of the Tenth Session of the IOTC Scientific Committee Victoria, Seychelles, 5-9 November 2007 and from various scientific papers presented during the IOTC WGs in 2008.

[http://www.iotc.org/English/documents/doc\\_proceedings.php?mode=proceed&break=year.group&year%5B%5D=2007&group%5B%5D=2&status=2&offset=10](http://www.iotc.org/English/documents/doc_proceedings.php?mode=proceed&break=year.group&year%5B%5D=2007&group%5B%5D=2&status=2&offset=10)

## 15.1. Albacore (*Thunnus alalunga*)

**FISHERIES:** Catches increased rapidly during the first years of this fishery (early 1950s), quickly exceeding 10,000 t by 1959 and thereafter remained relatively stable until the mid-1980s (12 – 20,000 t but with occasional very high catches, e.g. 30,000 t in 1972 ). There was a further sharp increase in catches from the mid 1980s to 1992 with the introduction of drifting gillnets however catches dropped back to just under 20,000 t in 1993 when the use of driftnets was abandoned.

Catches again increased steadily after 1993 and reached an all time high of 41,000 t in 2001. Since then however catches have declined and the average catch for the period 2002 - 2006 was 24,900. Catches in 2004 - 2006, the last 3 years for which figures are available, were 22,400 t, 20,700 t and 23,500 t respectively.

In recent years Albacore are mainly (98 %) caught using drifting longlines and more than 75% of the total catch is taken by longline fleets from Taiwan, Japan and Indonesia.

In 2006, French purse seiners recorded a catch of 900 t while Spanish purse seiners recorded 438 t. In 2007, EC-Spain reported 246 t.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** The current status of this stock is not well understood, a situation not helped by declining data quality. In 2004 IOTC conducted a series of stock analyses however the results of these were not conclusive. The results of one of the analyses suggested that the stock could be below the level that would produce MSY and that the current fishing mortality is above that required to achieve the MSY, while the remainder failed to produce plausible parameter estimates. The results of this stock assessment were considered unreliable by IOTC.

Maximum Sustainable Yield:	unknown
Preliminary catch in 2006 ( <i>data as of October 2007</i> )	23,500 t
Mean catch over the last 5 years (2002-06)	24,900 t
Catch in 2005	20,700 t
Catch in 2002	33,100 t
Current Replacement Yield	-
Relative Biomass ( $B_{\text{current}}/B_{\text{MSY}}$ )	unknown
Relative Fishing Mortality ( $F_{\text{current}}/F_{\text{MSY}}$ )	unknown

**RECENT MANAGEMENT ADVICE:** Taking into account the absence of a reliable assessment of the status of this stock and the need for a precautionary approach, the IOTC Scientific Committee has recommended that catches and fishing effort should not be allowed increase beyond the levels observed in 2002 until such time as the problems with the assessments have been resolved. Catch in 2002 (all gears) amounted to 33,100 t.

**STECF COMMENTS:** STECF agrees with the advice of IOTC. EC countries concerned should ensure that their albacore catches in the Indian Ocean are included in their respective national Data Collection programmes.

## 15.2. Yellowfin tuna (*Thunnus albacares*)

**FISHERIES:** Recorded catches from this fishery averaged 50,000 tonnes in the years between 1957 and 1983.

From 1984 on, however, the fishery increased sharply, with catches of 111,000 recorded in 1984, 209,000 t in 1989, and almost 400,000 tonnes in 1993. Catches in 2004-2006, the last 3 years for which figures are available, were 504,200 t, 478,900 t and 403,300 t respectively. Much of this increase can be attributed to the arrival of EU purse seiners in the Indian Ocean.

This stock is exploited mainly by purse seines (about 67% of the catch) and longlines. Artisanal catches, taken by bait boat, gillnet, troll, hand line and other gears have increased steadily since the 1980s.

Spain recorded a total purse-seine catch of 70,900 t in 2006, while France recorded 44,300 t. In 2007, EC-Spain reported 37,800 t.

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, 2004 and 2005; 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:** At the most recent assessment of this stock, conducted in 2007, four assessment models were applied. While there were strong uncertainties in each of the assessments conducted the estimates of MSY are similar. Acknowledging the uncertainties in the results, the models indicate that fishing levels have exceeded MSY in recent years.

In interpreting the high catches of yellowfin (2003 to 2006) IOTC noted that if the hypothesis of one or two high recruitments entering the adult stock is correct, the increased catches from these year-classes are unlikely to be detrimental to the stock, but these catches would not be sustainable in the longer term unless supported by continued high recruitments. On the other hand, there could be serious consequences if the *increased catchability* hypothesis is correct: in this case, the very large catches would represent a much higher fishing mortality and would not be sustainable. Furthermore, they could lead to a sudden decline of the existing adult biomass and reduce the stock to below MSY levels.

Considering all the stock indicators and assessments, as well as the recent trends in fishing effort and total catches of yellowfin, IOTC note that:

- 1) Recent yellowfin tuna catches are most likely above the MSY level - although there are still uncertainties on the exact level of this difference. Considering the precautionary principle, catch should be decreased to pre-2003 levels and fishing capacity should not exceed the current level.
- 2) The current fishing pressure on juvenile yellowfin by both purse seiners fishing on floating objects and artisanal fisheries is likely to be detrimental to the stock if it continues, as fish of these sizes are well below the optimum size for maximum yield per recruit estimated in 2002. (Note Juvenile yellowfin tuna are caught in the purse-seine fishery that targets primarily skipjack tuna. Some measures to reduce the catches of juvenile yellowfin tuna in the FAD fishery will be accompanied by a decrease in the catches of skipjack tuna).

Maximum Sustainable Yield (2007):	271,000 t – 360,000 t
Preliminary catch in 2006 ( <i>data as of October 2007</i> )	493,300 t
Catch in 2005	478,900 t
Mean catch (1998 – 2002)	343,400 t
Current Replacement Yield	-
Relative Biomass $B_{current}/B_{MSY}$	uncertain
Relative Fishing Mortality $F_{current}/F_{MSY}$	uncertain

**RECENT MANAGEMENT ADVICE:** At their meeting in November 2007, the Scientific Committee of the IOTC noted that there remained difficulties in finalising this stock assessment. While the most recent assessment (2007) incorporated new tagging information and a new but still provisional growth curve, there remained discrepancies in the interpretation of the results. Additionally while recognising that revised stock estimates on yellowfin lack robustness, the IOTC does note that estimates of MSY are similar (around 300,000 t) and are in the order of magnitude of the long-term levels of yellowfin catch recorded from 1993 to 2002 (average 325 000 t), i.e. before the very high catches recorded from 2003 to 2006.

Therefore it is recommended that fishing effort does not increase further above the 1999-2002 average level. It is further recommended that fishing mortality on juvenile yellowfin tuna caught by purse seines fishing on floating objects (FADs) be reduced.

**STECF COMMENTS:** STECF agrees with the advice from IOTC and stresses the importance of avoiding any further increase of fishing effort and catches above the 1999-2002 level and of reducing the catches of juveniles.

### 15.3. 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 121,800 t over the period 2002 to 2006: catches have decreased each year since 2002 and in 2006 amounted to 105,700 t.

Spain reported 10,000 t from the purse-seine fishery in the area in 2006, while France reported 5,300 t in the same year. In 2007, Spain reported 9,800 t.

Much of the bigeye catch from the purse seine fleets 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 of this stock was conducted in 2006 using 5 models: SS2, ASPM, ASPIC, SP Bayes-Baynesian Pella-Thompson and CASAL. From the resulting range of MSY estimates, a value of 111,200 t (estimated by ASPM) was reported ahead of the estimates from the other methods. Given that the mean annual catch for the period 2002-2006 was 121,800 t and the catch estimate for 2006 is 105,700 t, it appears that the stock is being exploited at around its maximum level. Furthermore, the spawning stock biomass appeared (in 2006) to be above the level that would produce MSY while the fishing mortality in 2004 was below the MSY level. Conversely biomass trajectories indicate that the spawning stock biomass has been declining since the late 1970s while fishing mortality has been increasing steadily since the 1980s

In addition the outlook would revert to a more pessimistic one if, as expected, the exploitation pattern reverted to a pre-2003 one. In this context, by 2005 the fishery was already showing a return to a pre-2003 exploitation pattern with increased catches of bigeye tuna associated with floating objects.

It should be noted that these results are all impaired by a lack of catch-at-size data for various fisheries and various uncertainties: recruitment (which has been assumed independent of the spawning stock biomass), growth, conversion factors and changes in catchability.

Maximum Sustainable Yield:	111,200 t (95,000 – 128,000)
Preliminary catch in 2006 ( <i>data as of October 2007</i> )	105,700 t
Catch in 2005	114,600 t
Mean catch over the last 5 years (2002-2006)	121,800 t
Current Replacement Yield	-
Relative Biomass (SSB <sub>2004</sub> /SSB <sub>MSY</sub> )	1.34 (1.04 – 1.64)
Relative Fishing Mortality (F <sub>2004</sub> /F <sub>MSY</sub> )	0.81 (0.54 – 1.08)

**RECENT MANAGEMENT ADVICE:** It is likely that current catches are currently above MSY and that fishing effort in the last five years has exceeded the effort that would produce MSY. Based on the results of the most recent assessment IOTC has recommended that catches should not exceed the MSY and fishing effort should not increase further from the 2004 levels.

While the results of the most recent assessment (2006) were broadly similar to and, in general, more optimistic than previous ones this outlook becomes more pessimistic if the catch (in numbers of juvenile bigeye tuna) from purse seiners fishing on FADs returns to pre-2003 levels, as these fish are below the optimum size for maximum yield-per-recruit.

IOTC noted that juvenile bigeye tuna are also caught in the purse-seine fishery targeting skipjack on FADs. Consequently measures to reduce the catches of bigeye tuna in this fishery will also result in a decrease in the catches of skipjack tuna.

**STECF COMMENTS:** STECF agrees with IOTC advice and stresses the importance of keeping the total catch and effort under strict control, as well as reducing catches of juveniles.

#### **15.4. Skipjack (*Katsuwonus pelamis*)**

**FISHERIES:** Catches of skipjack increased slowly from the 1950s, reaching around 50,000 t at the end of the 1970s, mainly due to the activities of bait boats (or pole and line) and gillnets. Catches increased rapidly with the arrival of the purse seiners in the early 1980s, and skipjack became one of the most important tuna species in the Indian Ocean. The annual total catches exceeded 400,000 t in the late 1990s and the average annual catch for the period from 2002 to 2006 was 514,100 t (catches in 2006 may have been the highest reported in the history of the fishery 596,200 t). The trend in catches is, in particular, due to an expansion of the FAD-associated fishery. Nor is there any sign that the rate of increase is diminishing in recent years: catches in 2004 were 464,500 t rising to 529,600 t in 2005 and 596,200 t in 2006 (the last year for which data are available). In 2006 Spain reported a purse-seine catch of 118,900 t while France reported 48,100 t also from purse-seiners.

In recent years, the proportions of the catch taken by the industrial purse seine fishery and the various artisanal fisheries (bait boat, gillnets and others) have been fairly consistent, the majority of the catch originating from the western Indian Ocean. IOTC estimates that 30 to 40 % of the total catch of skipjack is taken in gillnet fisheries (mainly from Sri Lanka, Iran, Pakistan, India and Indonesia).

The increase of skipjack catches by purse seiners is due in large part to the development of a fishery in association with Fish Aggregating Devices (FADs). Currently, 80 % of the skipjack tuna caught by purse seine is taken under FADs. In addition catch rates by purse seiners show an increasing trend in two of the three main fishing areas possibly due to an increase in fishing power and to an increase in the number of FADs (and the technology associated with them) in the fishery.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC.

**PRECAUTIONARY REFERENCE POINTS:** None

**STOCK STATUS:** While no quantitative stock assessment is currently available for skipjack tuna in the Indian Ocean, the range of stock indicators available does not currently signal any problems in the fishery. For example, IOTC has noted that catches have continued to increase as effort increased. Furthermore, the majority of the catch comes from fish that are sexually mature (greater than 40 cm) and therefore likely to have already reproduced. Conversely IOTC also notes that, although there might be no reason for immediate concern, it is clear that the catches cannot be increased at the current rate indefinitely. Therefore, it has recommends that skipjack be monitored regularly.

**RECENT MANAGEMENT ADVICE:** The high productivity life history characteristics of skipjack tuna suggest this species is resilient and not prone to overfishing, and the stock status indicators indicate that there is no need for immediate concern about the status of skipjack tuna.

**STECF COMMENTS:** STECF accepts that while there are currently no warring indications coming from the assessment of this stock, it is clear that the catches cannot be increased at the current rate indefinitely. Therefore, it has agrees with the IOTC advice that skipjack be monitored appropriately and regularly. In addition it shares the concerns expressed by IOTC regarding the effect of the extensive and growing 'FAD' fisheries on juveniles of other tuna species. These should be strictly monitored and evaluated.

#### **15.5. Swordfish (*Xiphias gladius*)**

**FISHERIES:** Swordfish in the Indian Ocean is mainly caught by longline and by driftnets. Annual catches were less than 5,000 tons during the 1970s and 1980s. However, in the 1990s 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 while the total catch had decreased to about 31,700 t, with an average of 30,200 t from 2001 to 2005. Preliminary catch estimates for 2006 are about 28,000 t.

In 2006 catches by Taiwanese longliners amounted to 6,800 t (the largest catch of any country) followed by Spain, 5,200 t. France-Reunion and Portugal both reported catches of 900 t.

The largest catches are obtained in the southwestern Indian Ocean. By-catches and discards (mainly sharks and billfish) are important in these fisheries. While the data for this stock are improving with time, major gaps

remain particularly gaps in the time series, under-reporting of discards, lack of size-frequency data as well as problems with aggregation and misidentification.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** While the stock assessment undertaken in 2006 represents a major advance in the assessment of Indian Ocean swordfish, the results remain preliminary and IOTC still relies on a range of information (including indicators of abundance and stock status such as trends in CPUE and size composition) when formulating its technical advice.

Stock indicators suggest that there has been a marked decline in the status of Indian Ocean swordfish stocks since targeting of the species began in the early 1990s. For example, the standardised CPUE of swordfish for the Japanese fleet (Indian Ocean combined) show a variable but continuous decline over time. This result however could be driven by a declining trend in the areas north of the equator (the CPUE trend from the areas south of the equator appears to have stabilised in recent years).

Catch rates following 1990 are markedly lower than those prior to this time (particularly in the southern areas) and this may be due to an apparent regime shift in fishing practices after 1990. This marked decrease in CPUE also follows substantial increases in catches throughout the 1990s, particularly in the western Indian Ocean.

The apparent fidelity of swordfish to particular areas is a matter for concern as this can lead to localised depletion. In previous years, localised depletion was inferred on the basis of decreasing CPUEs following fine scale analyses of the catch effort data. While no fine scale analyses of CPUE were carried out in the 2006 assessment, localised depletion may still be occurring in some areas.

In 2008, a further assessment was carried out using a number of models (Multifan-CL, CASAL, ASPIC and Spatially-Disaggregated Pella Tomlinson surplus production models). The results of the ASPM and SDPT approaches indicate that the stock is not overfished ( $B_{2006}/B_{MSY} > 1$  and  $B_{2006}/B_{virgin} = 42\%$  (46% for ASPM and 39 to 44% for SDPT). Despite the broad agreement on these biomass indicators, the assessments gave quite different results on fishing mortality with the SPDT indicating in five out of six models that overfishing was occurring; while the ASPM was more optimistic, with all models indicating that overfishing was not occurring.

While the Working Party on Billfish (WPB) agreed that the results of the ASPM would be used in its advice on swordfish in 2008, it was recognised that the issue of possible localised depletion occurring in the SW region remains a concern, and this is not reflected in the spatially-aggregated assessment.

Recent catch levels (averaging 31,900 t per year over the five year period (2002-2006) have been around the current estimate of MSY (31,500 t, 80% confidence limits 24,500 t - 34,400 t).

**RECENT MANAGEMENT ADVICE:** IOTC recommends that management measures focussed on controlling and/or reducing effort in the fishery targeting swordfish in the southwest Indian Ocean be implemented. It also notes that similar measures may be needed in the future if reductions in catch rates are detected in other areas of the Indian Ocean.

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

## **15.6. Marlins, spearfish and sailfish (Billfish)**

**FISHERIES:** The total billfish and spearfish catches remain uncertain because of potential under-reporting, particularly from the artisanal and the recreational/sport 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). According to the graphs included in the last IOTC report on billfish, in 2006 blue marlin catches reached about 13,500 t, black marlin about 4,100 t, striped marlin about 3,700 t, and Indo-Pacific sailfish about 27,000 t. 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.

The French longline fleet in 2007 reported catches of 106.5 t of marlins, 27.7 t of sailfish and 9.6 t of spearfish. In the same year, the coastal fleet of *La Reunion* reported catches of 28.4 t of marlins, 0.8 t of sailfish and 0.9 t of spearfish. No other recent data have been made available.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** Meetings on billfish took place in 2004, 2006 and 2008, but no assessment could be carried out because of the critical lack of data. In 2000 IOTC, 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. In 2008, IOTC stated that the situation of the black marlin, the blue marlin, the striped marlin and the Indo-Pacific sailfish are uncertain.

**RECENT MANAGEMENT ADVICE:** IOTC has provided specific management recommendation for these stocks, and has strongly recommended that better estimates of catch and discard rates (by species, gear, size and sex) are needed. It has also recommended that past and future marlin by-catches taken by purse seines are estimated.

**STECF COMMENTS:** STECF agrees with the IOTC recommendations and stresses the importance of providing 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.

### **15.7. Southern bluefin (*Thunnus thynnus maccoyii*)**

**FISHERY:** This circumpolar stock has been exploited in the Indian, Pacific and Atlantic oceans by longliners and purse seiners (primarily from Japan and Australia respectively) for more than 50 years. During this period the Japanese longline fishery (taking older fish) recorded a peak catch of 77,927 tonnes in 1961 while the Australian catches of young fish (taken in a surface fishery) peaked at 21,501 tonnes in 1982. New Zealand, Chinese-Taipei and Indonesia have also exploited southern bluefin tuna while Korea started a fishery in 1991. The proportion of the total catch taken by surface gear peaked in the 1980s at close to 50% of total catch, but declined afterward to 13%. In 2006, the last year for which data are available, the proportion of the catch taken by surface gear once again has reached almost 50% of the total.

On average 73% of the SBT catch has been made in the Indian Ocean, 21% in the Pacific Ocean and 6% in the Atlantic Ocean. The reported Atlantic Ocean catch has varied widely between 300 t and 8,200 t since 1968 and has averaged about 1,000 t over the past two decades. Fishing in the Atlantic occurs primarily off the southern tip of South Africa and much of the observed variation in total Atlantic catch reflects shifts in longline effort between the Atlantic and Indian Oceans.

The reported Indian Ocean catch has declined from about 54,000 t to 11,000 t, averaging about 14,600 t, while the reported Pacific Ocean catch has ranged from about 1,200 t to 19,000 t, averaging about 2,100 t, over the same periods (although farming and market data analyses indicate that these catches may be under-estimated).

The 2005 preliminary total catch was 15,690 tonnes, while the preliminary total catch in 2006 is around 12,000 tonnes

**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 2006 and the stock status indicators were reviewed in 2007. The indicators continue to support previous evidence for poor recruitment in the 2000 and 2001 year-class, and ongoing recruitment below the 1994-1998 levels. As the Operating Model was not updated in 2007, the current conclusions on the state of this stock are based on 2006 results. The scenario evaluation results suggest the spawning biomass is at a low fraction of its original biomass and well below the 1980 level, as well as below the level that could produce maximum sustainable yield. Recruitments in the last decade are estimated to be well below the levels in the period 1950-1980. All scenarios suggest that recruitment in the 1990s fluctuated with no overall trend. Analysis of several independent fishery indicators indicate low recruitments in 2000, 2001 and 2002, and the scenarios suggest low recruitment in 2002 and 2003, although the low estimates of 2003 year-class strength is inconsistent with the Japanese length frequency data from 2006.

The primary implication of the higher catch levels in the scenarios evaluated in 2006 compared to the assumed catch history used in the 2005 assessment, is that estimated total spawning stock size is more than double that assessed at the 2005 meeting. Nonetheless, in the scenarios considered, future total catches of 14,925 t (the total

allocated TAC in 2006) would result, on average, in a short-term decline followed by generally stable but not recovering spawning biomass. Any future catch over 14,925 t poses very serious threats to the stock. Rebuilding the spawning biomass requires catch reductions to below 14,925 t under all the scenarios considered. In 2006 the Commission set a global TAC of 11,810 t per year for the period 2007 – 2009.

**RECENT MANAGEMENT ADVICE:** At its Thirteenth annual meeting the CCSBT agreed a total allowable catch (TAC) for 2007-2009 of 11,810 tonnes, which is a TAC reduction of 3,115 tonnes. The TAC will only be reviewed before 2009 if exceptional circumstances emerge in relation to the stock. The allocation of the TAC amongst Members, Cooperating Non-Members and Observers are

Japan	3,000 tonnes	(fixed to 2011)
Australia	5,265 tonnes	(fixed to 2009)
Republic of Korea	1,140 tonnes	(fixed to 2009)
Fishing Entity of Taiwan	1,140 tonnes	(fixed to 2009)
New Zealand	420 tonnes	(fixed to 2009)
Indonesia	750 tonnes	(set in 2007 for 2007 only)
Philippines	45 tonnes	(set in 2007 for 2007 only)
South Africa	40 tonnes	(set in 2007 for 2007 only)
<b>European Community</b>	<b>10 tonnes</b>	<b>(set in 2007 for 2007 only)</b>

Taiwan and the Republic of Korea will maintain their actual catch below 1,000 tonnes for a minimum of 3 years. This will result in an actual catch level below 11,530 tonnes for a 3-year period.

Trade Information Scheme TIS: requires all members to ensure that all imports of SBT are accompanied by a completed CCSBT TIS Document. Shipments not accompanied by this form must be denied entry.

A list of vessels, which are approved to fish for SBT: Members and cooperating non-members are required to refuse the import of SBT caught by vessels not on the list.

**STECF COMMENTS:** STECF agrees with the advice given by CCSBT.

## 15.8. Narrow-barred Spanish mackerel (*Scomberomorus commerson*)

**FISHERIES:** The narrow-barred Spanish mackerel or king seer (*Scomberomorus commerson*) is a pelagic, top-level predator found throughout tropical marine waters of the Indo-West Pacific. Juveniles inhabit shallow inshore areas whereas adults are found in coastal waters out to the continental shelf. Adults are usually found in small schools but often aggregate at particular locations on reefs and shoals to feed and spawn. Spanish mackerel appear to undertake lengthy migrations. Spanish mackerel feed primarily on small fishes such as anchovies, clupeids, carangids, also squids and shrimps.

Catches in the Indian Ocean increased from around 50,000 t the mid-1970s to 100,000 t by the mid-1990s. The current average annual catch is around 112,200 t (for the period 2002 to 2006), with most of the catch obtained taken from the West Indian Ocean area. The preliminary estimate catch in 2006 is about 117,900 t. This species is primarily taken by artisanal gears in coastal waters and is an important source of proteins for several coastal communities. Narrow-barred Spanish mackerel is not taken by EU vessels in significant quantities, but catch data have not been 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 this stock.

**STOCK STATUS:** Unknown. While some localised, sub-regional assessments have been undertaken, typically by national scientists, no quantitative stock assessment has been undertaken by the IOTC Working Party on Neritics.

**RECENT MANAGEMENT ADVICE:** IOTC

No quantitative stock assessment is currently available for narrow-barred Spanish mackerel in the Indian Ocean. Hence stock status remains uncertain. IOTC has noted that Spanish mackerel is a relatively productive species with high fecundity and this makes it relatively resilient and less prone to overfishing; however, it recommends that this important species be reviewed at the first meeting of the IOTC Working Party on Neritic Tunas.

**STECF COMMENTS:** STECF notes that this species, together with others, is likely to be part of the by-catch of Community vessels fishing for large pelagic species in the Indian Ocean, while no catches are actually reported to IOTC.

### **15.9. Wahoo (*Acanthocybium solandri*)**

**FISHERIES:** The catches of Wahoo in the Indian Ocean increased from around 300 t the 1980s to a peak of 885 t in 1991. The preliminary estimate catch in 2006 is about 300 t. This species is mainly taken by hand line, driftnets and longlines, but it appears also in non-target longline by-catch. In the past the main fishing country was France however France has not reported any catches in 2005 or 2006.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IOTC.

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

**STOCK STATUS:** Unknown. While some localised, sub-regional assessments have been undertaken, typically by national scientists, no quantitative stock assessment has been undertaken by the IOTC.

**RECENT MANAGEMENT ADVICE:** IOTC have not provided management recommendations.

**STECF COMMENTS:** STECF notes that this species is caught by an EC country and this should be reflected in the national Data Collection programme.

## **16. Highly migratory fish (North-Eastern, Eastern, Southern and Western-Central Pacific)**

As a general remark, the management of highly migratory species in the Pacific Ocean remains very unclear. The Inter-American Tropical Tuna Commission (IATTC), an FAO body, has managed stocks in the Eastern Pacific Ocean for many years; the Western Central Pacific Fishery Commission (WCPFC) manages stocks in the Western and Central Pacific Ocean; the Southern Pacific Communities (SPC) also plays a role 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) provides management advice for the migratory tuna and tuna-like species in the Northern Pacific Ocean. Other smaller bodies also 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. Importantly, data reported to FAO Fishstat differ (sometimes significantly) from those reported to the various Commissions; these discrepancies should be addressed as a matter of priority.

Thus, the management of several stocks remains uncertain and/or undefined, without specific boundaries, sometimes with several overlapping competencies and, in some cases, with conflicting data published by different management bodies for the same stock. Many smaller tuna and tuna-like species are not currently monitored or assessed by these Commissions and data on those species are not available.

### **16.1. Pacific Bluefin tuna (*Thunnus orientalis*)**

**FISHERIES:** Pacific bluefin tuna is primarily exploited by Japanese, Korean, Taiwanese, Mexican and US fleets. The total catch has fluctuated between 8,500 t in 1990 and 38,000 t in 1956. Recent catches are relatively higher, and the average for the past five years was 22,300 t. During the same period, Japan's catch accounted for 40–60% of the total catch, followed by Mexico and Korea. Catches by some nations have increased recently, for example by Mexico in its Baja fishery for farming. This fishery takes a wide variety of fish sizes, including relatively small fish, which is a concern with respect to stock status (WCPC 2007).

The total catch between 1976 and 2005 ranged from 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 declining trend since 2000 and in 2007 amounted to 14,329 t. In the WPO Japanese longliners take the major part of the reported catches (83,5% in 2007).

In the EPO the estimated catches for 2007 were 4,259 t, showing a strong decrease (>56%) from 2006. Preliminary estimate catches for 2008 (till August 31) amount to 4,391 t. Almost all of the catches in EPO are taken by purse seines (4,245 t, in 2007 by Mexico alone), but data from the longline fishery are missing in 2007.

Tagging studies have shown that there is exchange of Pacific bluefin between the eastern and western Pacific Ocean. Larval, post larval, and early juvenile bluefin have been caught in the WPO, but not the EPO, so it is likely that there is a single stock of bluefin in the Pacific Ocean. EU vessels have never exploited this stock.

**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) and the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC).

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** The most recent stock assessment was conducted in 2008 by the ISC, but the results are very unclear. However, IATTC has calculated various indices of abundance of bluefin in the EPO, but none of these is entirely satisfactory. 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 and in 2001-'05. The recruitment was estimated to be highly variable, with four or five strong cohorts produced during the 1960-1998 period and in 2001-5. 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 are reduced or eliminated.

The ISC noted that the last Pacific bluefin tuna stock assessment (Jan 2006) estimated an exceptionally strong 2001 year-class, followed by a 2005 strong recruitment. Based largely on the estimated size of this last year-class, the stock projections indicated that the current level of SSB could be maintained at current F. Based on this assessment, the ISC recommended that F should not be increased from the current level.

Preliminary analysis of Japanese catch and size-frequency data for the years 2005-2007 (these data only became available after the last assessment) indicate that the 2001 and 2005 year-classes, while larger than the average year-class, were not as strong as previously thought. More importantly the survivorship of this year-class in 2008 is unclear and cannot be well estimated until the next stock assessment. While the last well-estimated strong year-class (1994) appeared clearly in the Japanese longline size frequency data in 2000 (i.e. at age 6), the 2001 year-class did not appear in the 2007 Japanese data. Consequently, the conclusion of the last stock assessment regarding the likelihood that the 2001 year-class would maintain the bluefin SSB level now appears to have been.

**RECENT MANAGEMENT ADVICE:** Noting the uncertainty in the assessments, the International Scientific Committee agreed (2006) that F should not be increased above recent levels as a precautionary measure.

IATTC [Resolution C-06-02](#) established a closure for purse seiners in the EPO from *either* 1 August 2007 – 11 September 2007 *or* 20 November 2007 – 31 December 2007 (depending on the country).

The WCPFC, noting the uncertainty of the stock assessment, adopted a recommendation to limit the fishing mortality at the recent level and invited MS to voluntary endorse this provision.

**STECF COMMENTS:** STECF notes that catch data for Pacific bluefin tuna reported by Countries to FAO Fishstat amounts to only 7,620 t for the whole Indian and Pacific Ocean in 2006. This is only 35% of the catches reported to IATTC, WCPFC, SPC and ISC combined. This statistical discrepancy needs to be urgently clarified and fixed. Such discrepancies in catch data severely compromise the ability to provide meaningful assessments and advice.

STECF stresses 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 possibility competency conflicts and contradictory advice.

## **16.2. Eastern Pacific Yellowfin (*Thunnus albacares*)**

**FISHERIES:** In term of yield, yellowfin is the most important tuna species in the area and is primarily caught by purse seine (about 98.8% of the total catch in 2007). Catches by longline and live bait boat are generally low.

An important proportion of the yellowfin catch is harvested in association with dolphins (an 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 catch in the EPO during the period 1991-2006 varied from 174,000 to 443,000 t (average 271,000). Catches in 2002 were the highest on record (443,000 t), while those in 2004, 2005 and 2006 decreased substantially with the catch in 2007 (about 173,413 t) the lowest since 1984. Preliminary catch data for 2008 (to August 31) is 144,449 t.

Spain caught 97 t of yellowfin in the EPO in 2007.

The average weights of the yellowfin caught in 2006 were significantly lower than those of the previous five years

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IATTC.

**PRECAUTIONARY REFERENCE POINTS:** None, but the last assessment proposed the use of a spawning stock - biomass ratio (SBR).

**STOCK STATUS:** In 2008 IATTC used an age-structured, catch-at-length analysis (A-SCALA) to assess yellowfin tuna in the EPO in.

Significant levels of fishing mortality, mainly on medium-age-groups have been observed in the yellowfin tuna fishery in the EPO. In the EPO, dolphins are often found in association with the shoals of yellowfin that are targeted by the fishery. However, by-catch of dolphins is thought to be negligible.

It appears that the yellowfin population has experienced two, or possibly three, different recruitment regimes (1975-'82, 1983-2001, and possibly 2002-'06) corresponding to low, high, and intermediate recruitment. The spawning biomass ratio (SBR) was below the level corresponding to the average maximum sustainable yield ( $A_{MSY}$ ) during the lower productivity regime, but above that level during the following years, except for the most recent period 2004-2007. The 1984 increase in the SBR is attributed to a regime change, while the recent decrease may be a reversion to an intermediate recruitment regime.

The spawning stock - biomass ratio is estimated to have been below the level at  $A_{MSY}$  and current effort level to be above the level at  $A_{MSY}$ , except for the most recent period (2005-2007). However as the recent estimates of both SBR and F are uncertain there is a moderate probability that the current SSB is below the level that would support MSY.

While sensitivity analyses suggests that a model with a stock recruitment relationship fits the data slightly better than the base case, this result could also be explained by a regime shift since spawning biomass is low during the period of low recruitment and high during the period of high recruitment. 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. The 2008 analysis is more pessimistic than the previous one, suggesting a fishing effort greater than that corresponding to MSY.

**RECENT MANAGEMENT ADVICE:** Since 1962 IATTC has implemented a TAC, which can, however, 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 a closed season for selected gears might help stock recovery (Res. C-04-09). IATTC [Resolution C-06-02](#) established a closure for purse seiners in the EPO from *either* 1 August 2007 – 11 September 2007 *or* 20 November 2007 – 31 December 2007 depending on the country.

**STECF COMMENTS:** STECF agrees with the IATTC recommendation but notes 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.

### **16.3. Western and Central Pacific Yellowfin (*Thunnus albacares*)**

**FISHERIES:** The development of this fishery is recent in comparison to many other tuna fisheries. Purse seiners harvest about 53% of the total catch, while longline and pole-and-line fleets comprise 16% and 3% respectively.

In the WCPO catches reached 353,000 t in 1990, peaked at 462,000 t in 1998 and remained high through 2003; the low catch rates observed during 2002 in the purse-seine fishery are considered unusual for an *El Nino* event. Catches dropped to 362,431 t in 2004, increased again in 2005 to 435,876 t and fell to 399,828 t in 2006. Data from 2007 report 431,814 t. The most likely cause of lesser catches is a decline in recruitment.

The European purse-seine fleet has been operating in the WCPO since 1999, albeit with sporadic catches. This fleet consists of five large purse-seiners with 100% onboard observer coverage (Agreement on the International Dolphin Conservation Program - AIDCP).

The Spanish surface longline fleet started fishing in WCPFC waters in 2004. In 2007 Spain reported a total retained catch of 4,019 t and 5.3 t of discards<sup>8</sup>.

**SOURCE OF MANAGEMENT ADVICE:** While there is no specific management body for this species, WCPFC does provide management advice, supported by the Oceanic Fishery Programme (South Pacific Community) and the International Science Committee.

The primary assessment tool used to assess the stock is MULTIFAN-CL .

The Stock Assessment - Scientific Working Group (SA-SWG) of the South Pacific Community (SPC) revised all available data in 2007.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** The 2007 stock assessment conclusions differ slightly from the 2006 assessment, particularly in relation to the ratio of the current estimate of fishing mortality compared with the fishing mortality at maximum sustainable yield ( $F/F_{MSY}$ ), with the threshold in the 2007 assessment being slightly more optimistic than that in the 2006 assessment.

While the point estimate of  $F/F_{MSY}$  remains slightly less than 1.0 (0.95), the probability distribution associated with the fishing mortality-based reference point indicates that there is almost an equal probability that the value of  $F/F_{MSY}$  is less than or greater than the reference point. Therefore, the possibility of overfishing is still relatively high (47%).

The reference points that predict the status of the stock under equilibrium conditions are  $B/B_{MSY}$  (1.10) and  $SB/SB_{MSY}$  (1.12), which indicate that the long-term average biomass would remain slightly above the level capable of producing MSY at 2002–2005 average fishing mortality.

Overall, current biomass exceeds the estimated biomass at MSY ( $B/B_{MSY} > 1.0$ ) indicating that the yellowfin stock in the WCPO is not in an overfished state, although there is a small probability (6.2%) that it is in an overfished state.

The change in the estimated MSY in 2007 from that in 2006 may reflect changes in the data structure, fishery designations and levels of uncertainty in the assessment, especially in estimating absolute values, and the change in the scenarios modelled between years.

**RECENT MANAGEMENT ADVICE:** The WCPO yellowfin tuna fishery can be considered to be fully exploited. Both the 2006 and 2007 assessments indicate that there is a high probability that overfishing is occurring (73% for the base case 2006 assessment and 47% for the base case 2007 assessment).

In order to reduce the likelihood of overfishing, and if the Commission wishes to maintain average biomass at levels greater than 5% above  $B_{MSY}$ , reductions in the fishing mortality rate would be required. Overall, current biomass exceeds the estimated biomass at MSY ( $B/B_{MSY} > 1.0$ ) indicating that the yellowfin stock in the WCPO is not in an overfished state, although there is a small probability (6.2%) that it is in an overfished state. Due to uncertainty, the WCPFC has recommended a reduction in fishing mortality from the current level.

**STECF COMMENTS:** STECF supports the management advice of WCPFC.

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 existing overlapping of advice arising from at least two separate stock assessments covering the areas for the separate Commissions involved.

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<sup>8</sup> Discards for the Spanish catches are reported for all areas together; then, discards in the WCPO were calculated on a proportional base.

## 16.4. Pacific Bigeye (*Thunnus obesus*)

**FISHERIES:** Bigeye tuna catches have increased since the mid-1990s due to an expansion in the purse-seine fishery on floating objects. During this period, catches by the longline fleet generally decreased. The catches in the EPO reached 105,000 t in 1986, and have fluctuated between about 73,000 and 148,000 t since then, with the greatest reported catch in 2000. In 2005 and 2006 catches were 114,151 t and 121,263 t, respectively however catches in the EPO dropped to 88,208 t in 2007. Preliminary 2008 catches (to August 31) are 46,994 t (a 29% increase on the same period in 2007).

Since 1990, there has been an increase in the purse seiners catches and a decrease in the longline catches. During 2007 purse seiners reported 71% of the total catch or 61,434 t retained onboard with 1,215 t discarded, while longliners reported 25,560 t (29% of the total).

The catches of the Spanish fleet from 2002 to 2005 ranged from 1,863 t to 8,106 t; no recent data are available for the Spanish fleet.

In the WCPO the catches of bigeye increased to more than 77,000 t during the late 1970s, decreased during the 1980s, and then increased, with lesser fluctuations, until 1999, when the catches reached more than 118,000 t. The greatest reported catch, 163,592 t, occurred in 2005, while catches in 2006 are estimated to be 125,847 t, slightly above the average 2000-2006. Catches in 2007 in the WCPO reached a level of 225,006 t.

Available statistics indicate that during 2007, 82,735 t, (37%) of the WCPO catch was taken by longliners, and 61,434 t by purse seine (27%). The catches of the Spanish fleet that operates in WPCO since 1999 varied between 13,000 t in 2000 and 0 t in 2003. In 2007 Spain reported a catch of 3,262 t, including 47 t of discards. As small bigeye are often taken along with small yellowfin the total catch of each species is uncertain.

**SOURCE OF MANAGEMENT ADVICE:** While there is no specific advisory body for this species, various bodies (IATTC, WCPTC, ISC and SPC) conduct assessments. The Stock Assessment - Scientific Working Group (SA-SWG) of the South Pacific Community (SPC) revised all available data in 2005 and carried out a new stock assessment. IATTC also conducted assessments in 2006 (using A-SCALA) and in 2008 (Stock Synthesis II - SS2).

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

**STOCK STATUS:** The stock structure of bigeye remains unclear but one single Pacific stock is currently assumed. Based on the stock assessment undertaken in 2008 the population in the EPO may be overfished with overfishing continuing.

The total biomass of this stock is estimated to have declined to about half of its initial level by about 1970 and had been fairly stable or subject to slight decline thereafter. This decline was interrupted by strong recruitment during 1995-1998, which produced a peak biomass in 2000, with a sharp decline after 2000. While there are indications of strong recruitment during 2004 and 2005 these are less certain.

Even though the estimated total biomass has remained fairly stable since 1970, it appears to have been sustained only by these above average recruitment events. If recruitment were to return to the average level estimated in this assessment, biomass decline would, most likely, be rapid. In this context if one considers only the adult biomass, all the various analyses have confirmed (with small differences) that this has declined by about 20% over the last decade.

Generally, recruitment of bigeye tuna appears to have increased in the late 1990s, declined, and then increased again recently. It should be noted, however, that a model run incorporating a stock recruitment relationship produces a less optimistic estimate of the current state of this stock. While the estimation of recruitment remains uncertain, future assessments incorporating environmental indicator based models of recruitment may lead to improvements in our understanding of this stock.

In the EPO the biomass of bigeye has been declining since 1987, initially because of the impact of longline fishing. Since 1993 however, the purse seine fleet (and since 1995 the purse-seine fishery on FADs) has had an increasing impact on the population: currently this fleet has the largest impact on this stock. At the beginning of 2008 the SSB in the EPO was recovering from the lowest level previously seen. At that time the spawning biomass ratio (SBR) was estimated to be 10% less than the level corresponding to the average MSY ( $SBR_{AMSY}$ ). Estimates of the average SBR projected for 2006-2011 indicate that SBR is likely to increase to the level corresponding to the average MSY and subsequently continue its decline unless fishing mortality is greatly

reduced (recent fishing mortality levels are nearly 20% greater than those corresponding to the MSY). 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 level of biomass is thought to be somewhere between 28% (based on a six-region model) and 44% (using a seven-region model) of the unexploited level ( $B_{current}/B_{current,F=0} = 0.28$  and 0.44 respectively). Other reference points estimated for this stock are  $B_{Fcurrent}/B_{MSY} = 0.79$  and  $SB_{Fcurrent}/SB_{MSY} = 0.68$ , respectively, indicating that the long-term average biomass would fall below that capable of producing MSY at 2001–2004 average fishing mortality, while the estimate of  $F_{current}/F_{MSY}$  (1.44) reveals that overfishing of bigeye is occurring in the WCPO with high probability.

The estimates of equilibrium yield (55,000 to 75,000 t) are substantially less than recent catches. Stock projections for 2006–2015 (that attempt to simulate the conservation and management measures adopted at WCPFC2) indicate that significant reduction in fishing effort by at least one specific gear type are required to achieve  $F/F_{MSY}$  and larger reductions are required under other hypothesis.

**RECENT MANAGEMENT ADVICE:** IATTC concluded that no drastic management actions are needed for this stock, but that a reduction in fishing effort under floating objects (FADs) of 2 to 3 months would be precautionary.

Subsequently IATTC adopted Resolution [C-06-02](#) which closes the purse-seine fishery in the EPO from either 1 August to 11 September; or from 20 November to 31 December (depending on the country).

In 2008, IATTC stated that the effects of these regulations are insufficient to maintain the stock at levels that will achieve MSY. Consequently specific catch levels have been adopted (by IATTC) for the longline fishery in the Eastern Pacific for China, Japan, Korea and Chinese Taipei, while other parties are required to keep their annual longline catch below their respective 2001 catch level. In addition 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 are, therefore, likely to be necessary in order to maintain the stock at a sustainable level. More urgent management actions are required for the WCPO, where overfishing of bigeye is occurring.

**STECF COMMENTS:** STECF agrees with the findings, conclusions and recommendation of the IATTC, SPC and WCPFC.

Noting that the stock is overfished, STECF considers that the measures adopted to date by the IATTC have been ineffective and more stringent measures are necessary if fishing mortality is to be reduced to safe limits.

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 existing competency overlap in the provision of advice. STECF remarks that not all the data from EU fleets fishing in the Pacific Ocean are available, despite the fact that catch reporting is mandatory under the DCR.

## **16.5. Eastern Pacific Skipjack (*Katsuwonus pelamis*)**

**FISHERIES:** Catches of Eastern Pacific Skipjack have varied between 52,000 and 311,000 t over the time series. Between 1988 and 2006 the annual retained catch from the EPO averaged 168,914 t however fishing zones 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.

The preliminary estimate of the total catch of skipjack in 2007 is 220,665 t (including discards of 8,896 t), 29% lower than the 2006 catch. Preliminary 2008 catch data (to August 31) account for 218,175 t, showing a remarkable increase (58%) compared with the same period in 2007.

Skipjack is primarily caught by purse seiners (99,5% of total skipjack catches in the EPO) from Ecuadorian, Mexican, Panamanian and Venezuelan fleets along with the EU and other South American countries. Spain reported 699 t of retained catches from the WCPO in 2007 along with 8 t of discards<sup>9</sup>.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IATTC.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** This stock has been assessed in 2001, 2002, 2004, 2006 and 2008, but these assessments are still considered preliminary. The results of the 2008 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 the model used: A-SCALA).

New data have been included in 2008 trials, showing that strong cohorts entered the fishery in 2002-2003, increasing both the biomass and the catches in 2003. The results of the 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.

In 2008, trend and yield-per-recruit analyses were performed and showed that the fishing effort reached the highest level since 1991, while the average weight showed a level near to the lowest point, after a continuous decreasing trend since 2000, suggesting high exploration rates. A simple population model fitted to the CPUE and catch data showed that this inconsistency could be explained by increases in both exploitation rates and abundance. Alternatively it is possible that the vulnerability of skipjack to purse seine fishing is increasing.

**RECENT MANAGEMENT ADVICE:** IATTC has given no management advice.

**STECF COMMENTS:** STECF notes that the level of catches, together with the increased fishing effort and decreasing average weight are reasons for concern about the high level of exploitation of this stock. More detailed analyses are necessary to inform future management measures.

## **16.6. Western and central Pacific skipjack (*Katsuwonus pelamis*)**

**FISHERIES:** Catches of western and central Pacific skipjack tuna increased steadily from 1970, and more than doubled during the 1980s. The yields were relatively stable during the 1990s and ranged from 870,000 to 1,300,000 tonnes. A Japanese pole-and-line fleet previously dominated the fishery, however this has now been superseded 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 total annual catch of principal tuna species landed from the region.

In 2006, an estimated catch of 1,538,112 t of skipjack was reported, while a total of 1,726,702 t were reported in 2007 (the highest recorded catch from this stock). About 85% of the 2007 catch was taken by purse seiners, 10% by pole and line, 4% by other gear types and 1% by longlines. The geographic distribution of fishing activities shows some recent changes.

Spain in 2007 reported 12,688 t of retained catches and about 151 t of discards<sup>10</sup> in the WCPO.

**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 2008 (using also MULTIFAN-CL). The Stock Assessment - Scientific Working Group (SA-SWG) of the South Pacific Community (SPC) had revised all the available data.

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

**STOCK STATUS:** The 2008 assessment was conducted at two spatial scales: the entire WCPO stratified into six regions and a model restricted to the two regions encompassing the equatorial WCPO. The major conclusions are essentially unchanged, however, from the last three assessments and display a strong increase in the purse seine catchability, while the catchability of pole-and-line fleet has decreased.

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<sup>9</sup> Discards for the Spanish catches are reported for all areas together; then, discards in the EPO were calculated on a proportional base.

<sup>10</sup> Discards for the Spanish catches are reported for all areas together; then, discards in the WCPO were calculated on a proportional base.

Recruitment to the stock has been high since the mid-1980s and recent recruitment is estimated to be exceptionally high: this appears to be related to the higher frequency of *El Niño* events

Biomass also increased from the mid-1980s in response to recruitment, and current biomass is well above the biomass that would produce MSY.

While fishing mortality is lower for juveniles it had increased for both adults and juveniles up to 1997. Since then it has decreased (due to increases in the stock biomass), reaching a modest level of approximately 0.17-0.26 per year. Fishing mortality for adults varies considerably between regions.

Based on the current assessments MSY is estimated to be about 1,280,000 t in and, overall, the results suggest that current exploitation is modest relative to the biological potential of the stock. Continued catches at the 1,200,000 t level are sustainable but only if there is continued high levels of recruitment. These 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). The key conclusion of the models presented is that overfishing is not occurring and the stock is nowhere near an overfishing state, confirming the results of the previous assessment. According to the 2008 assessment, there is a zero possibility that  $B_{current}/B_{MSY}$  is anywhere close to 1.

**RECENT MANAGEMENT ADVICE:** Any increase in purse seine catches of skipjack may result in a corresponding increase in fishing mortality for yellowfin and bigeye tuna. WCPFC, in 2005, had decided some management measures, including a limitation of the fishing efforts by purse-seiners and longliners to either the 2004 or average 2001-2004 levels; a control of FAD sets; and observers on board on vessels operating between 20°N and 20°S

**STECF COMMENTS:** Although the outlook of this stock seems positive, STECF is concerned 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.

## 16.7. 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 reported fishing on this stock however. 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 127,376 t in 1999. Preliminary catch estimates in EPO in 2007 were 90,551 t, a value 44.8% higher than the catch in 2006 in the same area. Preliminary catch estimates of the northern Pacific albacore in the WCTO in 2007 are about 35,795 t.

**SOURCE OF MANAGEMENT ADVICE:** While there is no well-defined advisory body for this species, both the US National Marine Fisheries Service (NMFS) and IATTC monitor this stock. The most recent North Pacific albacore stock assessment was conducted in 2006 using ISC, and provided conservation advice. The 2006 stock assessment was conducted with the VPA-2BOX model while experimental trials with the Stock Synthesis II (SS2) model were conducted at the 2008 ISC NPAWG meetings. This latter model will be used in the next assessment planned for 2010.

**PRECAUTIONARY REFERENCE POINTS:** None.

**STOCK STATUS:** According to the 2006 assessment, spawning stock biomass shows fluctuations around the modelled time series average (1966–2006) of 100,000 t. The 2006 stock assessment indicated that SSB increased from 73,500 t in 2002 to 153,300 t in 2006 and is projected to increase further to 165,800 t in 2007. The increase is attributable to strong year-classes in 2001 and 2003.

The estimated spawning stock size in 2006 of 153,300 t is approximately 53% above the overall time series average (1966–2005). Projections (2007–2020), using an average productivity of 27.75 million fish and F equal to 0.75, indicate that the SSB will reach equilibrium by 2015 at 92,600 t (90% CI=62,700–129,300). The population is being fished at roughly  $F_{17\%}$  (i.e.,  $F_{2002-2004} = 0.75$ ): this result is similar to the 2004 assessment however  $F_{current}$  (0.75) is high relative to commonly used F reference points.

The stock status revision trials in 2008 indicate increases both in catches and CPUE compared to 2005 values. Results of the updated projections (using 2006 and 2007 catch) indicated the SSB estimates in the near future are greater than those estimated in the 2006 stock assessment. This difference is primarily due to the actual catch (in 2007) being less than that assumed in the projection work done in 2006.  $F_{SSB-Min}$  estimates also became higher due to the larger SSB estimate in the near future.

**RECENT MANAGEMENT ADVICE:** Previous scientific advice, based on the 2004 stock assessment, recommended that current fishing mortality rate (F) should not be increased. It was noted that management objectives for the IATTC and WCPFC are based on maintaining population levels which produce maximum sustainable yield. Due to updating, and improvements and refinements in data and models used in the 2006 stock assessment, it is now recognized that  $F_{current}$  (0.75) is high relative to most of the F reference points. On the other hand, the same analysis indicates that while the current estimate of the SSB is the second highest in history, keeping the current F would gradually reduce the SSB to the long-term average by the mid 2010s. Therefore, the recommendation of not increasing F from current level ( $F_{current(2002-2004)} = 0.75$ ) is still valid. However, with a projection based on the continued current high F, the fishing mortality rate will have to be reduced. The degree to which, when, and how, reductions should occur will depend on which reference points are selected and the desired probability and practicability of success of attaining these reference points in a time frame to be agreed.

**STECF COMMENTS:** STECF notes that fishing mortality has markedly increased in recent 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.

## 16.8. 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 countries have increased in recent years and 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 the driftnet fishery ceased in 1991, most catches came from New Zealand and USA troll fleets south of 30°S and by longline fleets that operated in waters 10°-50° S. The catches reported by WCP in 2005 amounted to 58,188 t. Catches in 2006 in WCPO were about 58,000 t, but they are not clearly reported in the assessment. Total catches for 2007 reached 59,495 t (>75% obtained by longlines).

Note: The boundary of this stock was recently moved from 30°S to 25°S.

**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. The 2008 assessment was performed by the WCPFC.

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

**STOCK STATUS:** The 2008 stock assessment, carried out by using the MFCL model by the Stock Assessment - Scientific Working Group (SA-SWG) of the South Pacific Community (SPC), was based on analytical conditions that differed from those of the 2003 and 2005 assessments, including new fisheries. An estimation of catch trends indicates that total catches were relatively stable over the period 1960 to 1995, with several fluctuations; increased up to historical peaks about 2003, and thereafter dropped again in recent years. Estimated fishing mortality obtained from the model in 2006 reached very high levels, and is considered implausible. 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. The recent estimated trend is a decline from slightly above  $B_0$  to less than half of  $B_0$ . According to the model outputs, this stock appears not overexploited. However, there remains considerable uncertainty about the outputs of the various scenarios and the overall level of stock size. The yield analysis indicates that fishing mortality (effort) could be greatly increased from the 2000-2002 average. The ratio  $F_{2004-2006} / F_{MSY}$  is approximately 0.44. The equilibrium biomass at MSY is estimated at 340,000 t, approximately 49% of the equilibrium unexploited biomass. Total biomass is estimated to be currently depleted by 30%, and spawning biomass by 50% (i.e., spawning biomass reduced by 50% due to the impact of fishing). This represents a moderate level of spawning biomass depletion, above the equivalent equilibrium-based limit reference points ( $B_{MSY}/B_0 = 0.49$  and  $SB_{MSY}/SB_0 = 0.18$ ). The equivalent depletion and impact parameters for the model with less flexible catchability deviates are more optimistic. Estimates of fishery

impacts on biomass have progressively increased from 3% (2003 assessment), 9% (2005 assessment), 10% (2006 assessment), to 30% in the most recent, as model configurations have progressively changed, and the estimated fishing mortality has increased. Correspondingly, estimates of MSY from the respective assessments have declined from > 300,000 t, to 183,000 t, 181,000 t, and now 64,000 t over the same four assessments. Given the uncertainty in the results, the evident sources of potential bias, and the less optimistic implications of the results (compared to previous assessments) further efforts to improve the model should be considered a high priority.

**RECENT MANAGEMENT ADVICE:** At a local scale, very high levels of fishing effort appear to be capable of causing localised 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 Fijian, Samoan and French Polynesian longline fishery is that, on average, catch rates may be reduced by about 20% at high levels of fishing effort. The model estimates that increasing effort to  $F_{MSY}$  would yield only slightly more catch in the long-term (equilibrium yield at current effort 55,000 t; MSY 64,000 t). Higher yields would require more fishing effort, resulting in lower adult biomass and, at the current exploitation pattern of the fishery, a greater decline in the level of longline exploitable biomass. Thus, any consideration of management objectives and performance indicators for the south Pacific albacore fishery needs to also consider the economics of those longline fisheries targeting albacore in the region.

WCPFC, in 2005, adopted management measures, including a limitation on the number of fishing vessels to the current or recent historical (2000-2004) levels.

**STECF COMMENTS:** STECF notes that despite the addition of up-to date information, the status of the stock remains uncertain and poorly understood. However, the latest assessment indicates that increasing effort in areas of albacore concentration results in a sudden drop in catch rate. STECF therefore advises that catch rates and fishing effort should be closely monitored.

STECF notes that the catch data for the EU fleets in the Pacific Ocean are incomplete despite that fact that member States are obliged to report their catches under the DCR.

## **16.9. Black skipjack (*Euthynnus alletteratus*)**

**FISHERIES:** Total catch in the EPO ranged from about 107 to 4,250 t, with the peak in 1993. Preliminary catch estimate for 2007 accounts for about 3,538 t, about 6% less than the previous year, confirming a slight decline since 2005. Almost all the catches (99%) are taken by purse-seiners (2,067 t retained and 1,434 t discarded). Data from other Pacific Ocean areas are not available.

**SOURCE OF MANAGEMENT ADVICE:** It is unclear which management body is responsible for the management of this species in the Pacific Ocean (IATTC provides management advice 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:** STECF notes that data on this species should also be collected by the WCPFC.

## **16.10. Pacific bonito (*Sarda spp.*)**

**FISHERIES:** This genus in the Pacific includes three species (*Sarda australis*, *S. chilensis* and *S. orientalis*), having different distributions and fisheries. Available fishery data however, probably only relate to two of these species and then only for a partial range of their distribution. Historical catch in the EPO ranged from about 26 to 14,227 t, with a previous peak in 1990. Total preliminary catch in 2007 was about 17,610 t, a new historical peak and about 5 times higher than the previous year. The 2007 catches are also 5 times higher than the average catch (3,622 t) in the last 20 years (1987-2006). Almost all the catches (about 93%) are provided by purse-seiners (15,680 t retained and 687 t discarded), however IATTC have noted that this species is also caught by artisanal fisheries and these catches are not reported. Preliminary 2008 catch estimates for the period to August 31 shows a strong reduction (-86%) compared to the same period in 2007.

**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:** STECF notes the need for robust fishery data to support the provision of management advice for bonito in the Pacific and there is a need to collect data on catches from the WCPO and from artisanal fisheries throughout the whole Pacific. There is also a need to investigate and explain the reasons behind the recently observed peak catches reported from the Pacific. STECF considers that the limited distribution of some species of bonito together with the growing demand for bonito for high quality canned products may require that the fishery for bonito in the Pacific is closely monitored.

## **16.11. 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, while lesser amounts are taken by gillnet and harpoon fisheries. They are sometimes also caught by recreational fishermen, and their relevance as a game fish is increasing. 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. The average annual longline catch of swordfish during 1990-2004 was 10,000 t, but during 2001-2004 was about 16,000 t. It is not clear if this is due solely to increasing effort directed toward swordfish. Total swordfish catches in the EPO reached 19,726 t in 2002, decreasing to 18,520 t in 2003, 15,687 t in 2004, 13,290 t in 2005 and 12,712 t in 2006 of which 8,812 t were taken by longlines, 3,985 t by other gear while 5 t was discarded. Preliminary and largely incomplete catch reports in 2007 amount to only 601 t. It is to be noted that Spain alone reported to IATTC swordfish catches of 5,152 t in 2007 and these are clearly not included in the IATTC reported catch in the EPO. 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 (provisional and incomplete by data). It is to be noted that Spain alone reported to WCPFC swordfish catches of 3,107 t in 2007 for the WPO. Catches in the SW and SC Pacific show a peak in 2003 at about 7,500 t, decreasing to about 7,100 t in 2004, 5,800 t in 2005, 6,200 t in 2006 and 6,100 t in 2007. Catches in various Pacific areas are reported only in number of fish.

**SOURCE OF MANAGEMENT ADVICE:** the advisory bodies are IATTC, ISC, WCPFC and SPC, without a clear distinction of competencies.

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

**STOCK STATUS:** According to the WCPFC-SC3 report in 2007, the best available scientific information from genetic and fishery data indicate that the swordfish of the southeastern Pacific Ocean (SEPO, south of 5°S) and the northeastern Pacific Ocean constitute a distinct stock. Also, there may be movement of a northwestern Pacific stock of swordfish into the EPO at various times.

The results of preliminary modelling with MULTIFAN-CL of a North Pacific swordfish stock in the area north of 10°N and west of 140°W indicate that in recent years the biomass level has been stable and well above 50% of the unexploited levels of stock biomass, indicating that these swordfish are not overexploited at current levels of fishing effort. A new stock assessment is planned in 2009.

The standardized catches per unit of effort of the longline fisheries in the northern region of the EPO and trends in relative abundance obtained from them do not indicate declining abundances. Attempts to fit production models to the data failed to produce estimates of management parameters, such as average maximum sustainable yield (AMSY), under reasonable assumptions of natural mortality rates, due to lack of contrast in the trends. This lack of contrast suggests that the fisheries in this region have not been of magnitudes sufficient to cause significant responses in the populations. Based on these considerations, and the long period of relatively

stable catches in the northern region, it appears that swordfish are not overfished in the northern region of the EPO. An assessment of the southern stock of swordfish in the EPO was carried out with Stock Synthesis II (SS2), version 1.23b. The population has undergone considerable changes in biomass, and it is currently at a moderate level of depletion. There is strong evidence of one or two large cohorts entering the fishery recently, but their strengths are uncertain. The trend in spawning biomass ratio (SBR) for this stock is estimated to have been between about 0.5 and 0.9 during the entire period of monitoring (1945-2003), and to have decreased to its lowest levels during the mid-1960s and again during the mid-1990s. The AMSY for the southern EPO swordfish stock is about 13,000–14,000 t, and the SBR at AMSY is about 0.26. The current spawning biomass is estimated to be well above the biomass corresponding to the AMSY. There have been indications of increasing efficiency at targeting of swordfish in the southern EPO, which has resulted in increased harvests of this stock. Some of the increased catch may have resulted from the above-average recruitment noted previously. It is not expected that further increases in the catch levels observed in recent years would be sustainable.

In the WCP the 2006 assessment (limited to the SWP area) showed 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  $F_{MSY}$ . Nevertheless, the results also indicate the possibility that the stock may currently be in an overfished state and that overfishing may be occurring. Another assessment was carried out in 2008, incorporating also the South-Central Pacific area. The results of 2008 assessment are consistent with the previous ones and the uncertainty appears to be substantially reduced. At present there is no compelling evidence to indicate that the SCP swordfish fishery is overexploiting the stock, but data are still insufficient.

**RECENT MANAGEMENT ADVICE:** IATTC has no management recommendations, while ISC remarked on the need to improve the data and incorporate some important biological parameters before the next assessment, with the purpose of providing more 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. The WCPFC adopted CMM-2006-03 limiting the number of vessel to the 2000-2005 levels and prohibiting to shift any additional effort to the area north of 20°N. No new management advice is available for 2007.

**STECF COMMENTS:** STECF is concerned that the growing international markets for swordfish may result in an increase in targeted fishing effort on swordfish in the Pacific. STECF advises that fisheries exploiting for swordfish in the Pacific should be closely monitored and all attempts to undertake more comprehensive assessments should be encouraged by the various Commissions concerned.

## **16.12. 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 and sport 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. The reported total catch in the EPO were 3,937 t in 2004, about 3,676 t in 2005 and 2,093 t in 2006. The preliminary catch estimate in 2007 is only about 136 t. Spain reported catches of 16.7 t in the WCP and 1.1 t in EPO in 2007.

**SOURCE OF MANAGEMENT ADVICE:** The advisory body is IATTC, but WCPFC and ISC also share competence.

**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 average MSY. However, it was determined that blue marlin in the Pacific Ocean are close to fully exploited. The Northern Committee

proposal to separate a northern stock of Pacific Blue Marlin was rejected by WCPFC-SC3 in 2007, due to insufficient data. A new assessment is planned in 2010.

**RECENT MANAGEMENT ADVICE:** No management advice.

**STECF COMMENTS:** STECF notes that quantities of billfish caught in the Pacific Oceans are still reported by species. In addition, and many catches that are known to occur are not reported at all. The lack of reliable catch data is affecting the understanding of this stock and the management advice.

### **16.13. 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 up to 1970, then a decreasing trend in 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; more recent catches are not available. Spain reported 0.27 t of striped marlin caught in the WCPO in 2007.

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 1,645 and 2,235 tons). There ported catches in the EPO in 2005 amount to 1,645 t and about 1,589 t in 2006 among the lowest historical catches in this area. Preliminary catch estimate in 2007 is only about 140 t.

**SOURCE OF MANAGEMENT ADVICE:** Traditionally, the advisory body was IATTC, but currently both ISC and the WCPFC also deal 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 ( $A_{MSY}$ ) 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  $A_{MSY}$ . An analysis, using the Deriso-Schnute delay-difference model, yielded estimates of  $A_{MSY}$  in the range of 8,700 to 9,200 t, with current biomass greater than that needed to produce the  $A_{MSY}$  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  $A_{MSY}$ . The most recent analysis carried out by ISC indicates that the spawning biomass in the North Pacific in 2003 was estimated to be only 14-15% of the 1970 levels. 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  $B_{MSY}$ . A new assessment is planned in late 2008.

**RECENT MANAGEMENT ADVICE:** No management advice has been provided by IATTC (who believe that this stock is probably at or above the average MSY level). On the contrary, ISC has 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 that Commission. The WCPFC in 2008 decided that, for management purposes and with the goal to adopt the necessary conservation measures, the North Pacific striped marlin should be considered in the future as a separate stock and ISC should take care of its assessment. ISC adopted a conservation advice to reduce the fishing mortality from the current levels.

**STECF COMMENTS:** STECF notes that the advice arising from the IATTC and the WCPFC is based on incomplete data and provisional assessment results. STECF notes that quantities of billfish caught in the Pacific Ocean are still not reported by species and many catches known to occur are not reported at all. The lack of reliable catch data is affecting the understanding of this stock and the management advice.

#### **16.14. 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 2006 ranged between 112 t to 621 t; the average catch in the period from 2000 to 2006 was about 185 t. The total catch in the EPO for 2006 is 177 t; a value about 26% higher than the 2005 catch. Preliminary catch estimates for 2007 reports about 91 t. EU-Spain in 2007 reported catches of 2.8 t in the WCPO and 0.2 t in the EPO.

**SOURCE OF MANAGEMENT ADVICE:** Traditionally, the advisory body was IATTC, but WCPFC, ISC and SPC are also competent.

**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 notes that quantities of billfish caught in the Pacific Ocean are still not reported by species and many catches known to occur are not reported at all. The lack of reliable catch data is affecting the understanding of this stock and the management advice.

#### **16.15. 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 in the EPO were growing since 1994, reaching a peak of 304 tons in 2001. Recent catches are showing alternate values (274 t in 2002, 293 t in 2003, 208 t in 2004, 278 t in 2005 and 263 in 2006). Preliminary catch estimate in 2007 is only 2 tons. EU-Spain in 2007 reported very low catches, 0.1 t in the WCPO and <0.01 t in the EPO.

**SOURCE OF MANAGEMENT ADVICE:** The advisory bodies are IATTC, WCPFC, ISC and SPC.

**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 notes that quantities of billfish caught in the Pacific Ocean are still not reported by species and many catches known to occur are not reported at all. The lack of reliable catch data is affecting the understanding of this stock and the management advice.

#### **16.16. Indo-Pacific Sailfish (*Istiophorus platypterus*)**

**FISHERY:** Indo-Pacific sailfish is not uncommon among longline catches in the Pacific Ocean. Reported catches fluctuate considerably, reaching a peak of 2,323 tons in 1993. Between 1997 and 2002 catches in the EPO ranged from 1,241 to 1,848 tons. Recent catches are showing alternate values (1,270 t in 2003, 1,453 t in 2004, 860 t in 2005 and 769 t in 2006). Preliminary catch estimate in 2007 is 173 t.

**SOURCE OF MANAGEMENT ADVICE:** The advisory bodies are IATTC, WCPFC, ISC and SPC.

**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 notes that quantities of billfish and sailfish caught in the Pacific Ocean are still not reported by species and many catches known to occur are not reported at all. The lack of reliable catch data is affecting the understanding of stock status and the management advice.

### **16.17. Indo-Pacific Marlins, Sailfish, Spearfish and Billfish (mixed species)**

**FISHERY:** Billfish, marlins and sailfish species in Indo-Pacific are very often reported together by the various Regional Fishery Commission concerned, without a clear distinction among species, due to the poor statistics available. Reported catches in the EPO were growing up to a peak of 2,491 t in 2002, while recent catches are showing decreasing values (1,398 t in 2003, 1,393 t in 2004, 906 t in 2005 and 506 t in 2006). Preliminary catch estimate in 2007 is only 60 t. All billfish catches combined in the WCPAC are reported to be about 4,713 t in 2004, with an average of 5,816 t in the period 1998-2001. Spain in 2007 reported 0.5 t in the WCPO and 0.02 t in the EPO.

**SOURCE OF MANAGEMENT ADVICE:** The advisory bodies are IATTC, WCPAC, SPC and IOTC.

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

**STOCK STATUS:** Not available

**RECENT MANAGEMENT ADVICE:** No management advice.

**STECF COMMENTS:** STECF remarks that these quantities of billfish, marlins, spearfish and sailfish caught in the Pacific Ocean are still not reported by species and many catches known to occur are not reported at all. The lack of reliable catch data is affecting the understanding of stock status and the management advice.

## **17. Resources in the Antarctic**

Resources in the Antarctic are managed under a convention administered by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). 15 CCAMLR member countries participated in the fisheries during the 2007/08 season<sup>11</sup> (Australia, Chile, France, Japan, Republic of Korea, Namibia, New Zealand, Norway, Poland, Russia, South Africa, Spain, Ukraine, UK and Uruguay). The review of Antarctic resources, below, is based on the document SC-CAMLR-XXVII (Report of the Scientific Committee 2008; [www.ccamlr.org](http://www.ccamlr.org), publications).

### **17.1. Toothfish (*Dissostichus spp.*)**

The total landings of toothfish in the CCAMLR Convention Area during the 2007/08 season were 12,573<sup>12</sup> t, compared to 16,329 t in 2006/7. Catches outside the Convention Area were 10,291 t, compared with 12,682 t in the previous year. The estimated unreported catch for all Subareas and divisions in the Convention Area was 1,169 t, a reduction from 3,615 t the previous year. With the exception of exploratory fisheries, toothfish are exploited under the conservation measures in two main areas: in the Atlantic Ocean Sector (Subareas 48.3 and 48.4), and the Indian Ocean Sector (Subareas 58.6 and 58.7 and Divisions 58.5.1 and 58.5.2).

#### **17.1.1. Patagonian toothfish (*Dissostichus eleginoides*) in Subarea 48.3, South Georgia**

**FISHERIES:** Longline fishing for *Dissostichus eleginoides* began in the early 1990s. Annual catches are in generally in the range 3,000 to 5,000 t. There was significant illegal fishing in the mid to late 1990s, exceeding the catch of the legal fishery in some years. There has been no significant IUU catch since the 2000/01 season. The total catch in the Subarea 48.3 in 2007/08 was 3,856 t.

<sup>11</sup> The CCAMLR fishing season runs from 1 December to 30 November.

<sup>12</sup> Provisional figure subject to update at the end of the fishing season.

**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, CPUE and tagging data. CASAL model structure and assumptions are detailed in the WG-FSA Report (2007). The assessment in 2007 was used to set catch limits for two years; 2007/08 and 2008/09. The assessment will be updated at the 2009 meeting of WG-FSA.

**PRECAUTIONARY REFERENCE POINTS:**  $SSB_{t+35years} \geq 50\% SSB_0$ ; probability of SSB dropping below 20% of  $SSB_0 < 0.1$

**STOCK STATUS:** The stock in Sub area 48.3 is considered fully exploited.  $SSB_{current} > 50\% SSB_0$

**RECENT MANAGEMENT ADVICE:** Long-term annual yield of 3,920 t.

**STECF COMMENTS:** STECF has no comments.

### **17.1.2. Patagonian toothfish (*Dissostichus eleginoides*) in Subarea 48.4, South Sandwich Islands**

**FISHERIES:** Licensed longline vessels commenced fishing for *D. eleginoides*. in Subarea 48.4 in 1991/92 and 1992/93; fishing was abandoned following poor catches. A tagging program was introduced in 2004/05, and research fishing has continued since that time. The total catch of *Dissostichus eleginoides* in the Subarea 48.4 in 2007/08 was 98 t, taken by longlines.

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

**PRECAUTIONARY REFERENCE POINTS:** A preliminary assessment of *D. eleginoides* in the Northern Area of the Subarea has been undertaken, based on both Peterson mark–recapture and local CPUE depletions, both methods gave similar results with a vulnerable biomass estimated to be between 1 100 and 1 700 tonnes

**STOCK STATUS:** The fishery is subject to an experimental harvest regime.

**RECENT MANAGEMENT ADVICE:** The proposed catch limit for the Northern Area is 75 tonnes. A catch limit of 75 tonnes is also proposed for the Southern Area. Further tagging of fish during the 2008/09 season will contribute to a new assessment of the fishery.

**STECF COMMENTS:** STECF has no comments.

### **17.1.3. Patagonian toothfish (*Dissostichus eleginoides*) in Subareas 58.6 and 58.7 Prince Edward and Marion Islands**

**FISHERIES:** A licensed fishery within the South African EEZ at the Prince Edward Islands started in October 1996. Part of the South African EEZ is outside the CAMLR Convention Area (Area 51) and part falls within Subareas 58.6 and 58.7 and Division 58.4.4. Very large IUU catches, over 7000 tonnes (1996/97) were taken in the late 1990s. The total catch taken in the South African EEZ in 2007/08 season was 61 tonnes, taken by longlines.

**SOURCE OF MANAGEMENT ADVICE:** The fishery in the waters adjacent to Prince Edward and Marion Islands is managed by the Republic of South Africa. Subarea 58.6 also includes the Crozet Islands to the east of the Prince Edward Islands.

**PRECAUTIONARY REFERENCE POINTS:** Assessment of appropriate levels of future catch have not been based on the CCAMLR decision rules.

**STOCK STATUS:** An assessment was reviewed by CCAMLR in 2007. No new assessment was carried out in 2008.

**RECENT MANAGEMENT ADVICE:** Advice from CCAMLR is that an assessment based on CCAMLR decision rules should be developed. No new information was available on the state of fish stocks in Subareas 58.6 and 58.7 and Division 58.4.4 outside areas of national jurisdiction. This area is closed to fishing for *D. eleginoides*.

**STECF COMMENTS:** STECF has no comments.

#### **17.1.4. Patagonian toothfish (*Dissostichus eleginoides*) in Subarea 58.6, Crozet Islands**

**FISHERIES:** A fishery for *Dissostichus eleginoides* operates in the French EEZ around the Crozet Islands in Subarea 58.6. Very large IUU catches, up to nearly 12,000 tonnes (1996/97) were taken in the late 1990s. The total catch of *Dissostichus eleginoides* in 2007/08 in the Subarea 58.6, in the waters adjacent to Crozet Islands was 684 t to October 2008. There was an estimated IUU catch of 153 t.

**SOURCE OF MANAGEMENT ADVICE:** The fishery inside the EEZ of the Crozet Islands is managed by France. CCAMLR provides general management advice, for Subarea 58.6. No new information was available to the CCAMLR Scientific Committee in 2008.

**PRECAUTIONARY REFERENCE POINTS:**

**STOCK STATUS:** No formal stock assessment has been carried out for Subarea 58.6. Tagging has been carried out since 2006.

**RECENT MANAGEMENT ADVICE:** The catch limit of *D. eleginoides* set by France in its EEZ in Subarea 58.6 for the 2007/08 season (defined by France, 1 September 2007 to 31 August 2008) was 960 tonnes. Fishing in Subarea 58.6 in the area outside of national jurisdiction is prohibited.

**STECF COMMENTS:** STECF has no comments.

#### **17.1.5. Patagonian toothfish (*Dissostichus eleginoides*) in Division 58.5.1, Kerguelen Islands**

**FISHERIES:** A fishery for *Dissostichus eleginoides* operates in the French EEZ around the Kerguelen Islands in Division 58.5.1. Very large IUU catches, of over 7,000 tonnes (1997/98) were taken in the late 1990s and early 2000s. The total catch of *Dissostichus eleginoides* in Division 58.5.1 in 2007/08 was 2,853 t (up to 31 August 2008). There was an estimated IUU catch of 489 t.

**SOURCE OF MANAGEMENT ADVICE:** The fishery inside the EEZ of the Kerguelen Islands is managed by France. CCAMLR provides general management advice for Division 58.5.1. No new information was available to the CCAMLR Scientific Committee in 2008.

**PRECAUTIONARY REFERENCE POINTS:**

**STOCK STATUS:** No formal stock assessment has been carried out for Division 58.5.1.

**RECENT MANAGEMENT ADVICE:** The catch limit of *Dissostichus eleginoides* set by France in its EEZ in Division 58.5.1 for the 2007/08 season (defined by France: 1 September 2007 to 31 August 2008) was 5 000 tonnes. Fishing in Division 58.5.1 in the area outside of national jurisdiction is prohibited.

**STECF COMMENTS:** STECF has no comments.

#### **17.1.6. Patagonian toothfish (*Dissostichus eleginoides*) in Subarea 58.5.2, Heard and McDonald Islands**

**FISHERIES:** In Division 58.5.2, the fishery for *Dissostichus eleginoides* was a bottom trawl fishery from the 1996/97 to the 2001/02 season. In recent seasons the fishery has been prosecuted by both trawlers and longliners. The longline fishery was active from May to September 2008 and the bottom trawl fishery was active throughout the whole season. The total catch of *Dissostichus eleginoides* in Subarea 58.5.2 was 1,496 t for the period from Dec. 2007 until Oct. 2008 (the season will be finished on 30 Nov. 2008).

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is CCAMLR. There is also a 200-mile EEZ around Heard and McDonald Islands administered by Australia. The assessment is based on an integrated assessment using CASAL for combined sex, single-area, and a three-season model. CASAL model structure and assumptions are detailed in the WG-FSA Report (2007).

**PRECAUTIONARY REFERENCE POINTS:**  $SSB_{t+35years} \geq 50\% SSB_0$ ; probability of SSB dropping below 20% of  $SSB_0 < 0.1$

**STOCK STATUS:** The stock in Subarea 58.5.2 is considered fully exploited.

**RECENT MANAGEMENT ADVICE:** Long-term annual yield of 2,500 t.

**STECF COMMENTS:** STECF has no comments.

#### **17.1.7. Toothfish (*Dissostichus* spp.) Exploratory Fishery in Subarea 48.6**

**FISHERIES:** The longline fishery for *Dissostichus* spp. in Subarea 48.6 began as a new fishery in 1996/97. Large IUU catches were taken in the late 1990s. Licensed longline vessels have undertaken exploratory fishing for *Dissostichus* spp. since 2003/04. The catch in 2006/07 was 112 t, taken by longlines. There was no catch in the 2007/08 season.

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

**PRECAUTIONARY REFERENCE POINTS:**

**STOCK STATUS:** Unknown

**RECENT MANAGEMENT ADVICE:** The precautionary catch limit for *Dissostichus* spp. was 200 tonnes north of 60°S and 200 tonnes south of 60°S. Exploratory fishing will continue in 2008/09 under a precautionary catch limit.

**STECF COMMENTS:** STECF has no comments.

#### **17.1.8. Toothfish (*Dissostichus* spp.) Exploratory Fishery in Division 58.4.1**

**FISHERIES:** Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Division 58.4.1 since 2004/05, and the target species is *D. mawsoni*. The reported total catch in 2007/08 up to October 2008 was 413 tonnes of *Dissostichus* spp. The IUU catch in 2005/06 and 2006/07 was approximately 600 t. pa.

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

**PRECAUTIONARY REFERENCE POINTS:**

**STOCK STATUS:** Highly uncertain

**RECENT MANAGEMENT ADVICE:** The precautionary catch limit for *Dissostichus* spp. was 600 tonnes in 2007/08. Exploratory fishing will continue in 2008/09 under a precautionary catch limit.

**STECF COMMENTS:** STECF has no comments.

#### **17.1.9. Toothfish (*Dissostichus* spp.) Exploratory Fishery in Division 58.4.2**

**FISHERIES:** Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Division 58.4.2 since 2003/04, and the target species is *D. mawsoni*. In 2007/08, there was a total catch of 217 tonnes of *Dissostichus* spp.; this catch represented 28% of the precautionary catch limit for the fishery. Approximately 799 tonnes of *Dissostichus* spp. have been taken during IUU fishing in Division 58.4.2 between 2002/03 and 2006/07. There was no evidence of IUU fishing in 2007/08.

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

**PRECAUTIONARY REFERENCE POINTS:**

**STOCK STATUS:** Highly uncertain

**RECENT MANAGEMENT ADVICE:** The precautionary catch limit for *Dissostichus* spp. was 780 tonnes in 2007/08. Exploratory fishing will continue in 2008/09 under a precautionary catch limit.

**STECF COMMENTS:** STECF has no comments.

#### 17.1.10. Toothfish (*Dissostichus* spp.) Exploratory Fishery in Division 58.4.3a

**FISHERIES:** Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Division 58.4.3a since 2004/05, and the target species is *D. eleginoides* (Table 1). In 2007/08, the total catch was 9 tonnes of *Dissostichus* spp. (4% of the precautionary catch limit for the fishery). Approximately 98 tonnes of *Dissostichus* spp. were taken during IUU fishing in Division 58.4.3a in 2004/05, and there were no reports of sightings or landings related to IUU fishing in 2005/06, 2006/07 and 2007/08.

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

**PRECAUTIONARY REFERENCE POINTS:**

**STOCK STATUS:** Highly uncertain

**RECENT MANAGEMENT ADVICE:** The catch limit for Division 58.4.3a for the 2007/08 fishing year was 250 tonnes. Exploratory fishing will continue in 2008/09 under a precautionary catch limit.

**STECF COMMENTS:** STECF has no comments.

#### 17.1.11. Toothfish (*Dissostichus* spp.) Exploratory Fishery in Division 58.4.3b

**FISHERIES:** Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Division 58.4.3b since 2003/04, and the target species is *D. mawsoni*. In 2007/08, the total catch was 139 tonnes of *Dissostichus* spp. (93% of the precautionary catch limit for the fishery) and the fishery was closed on 20 February 2008, prior to the start of the notified research survey. The estimated IUU catch of *Dissostichus* spp. exceeded 1 000 tonnes in 2004/05 and in 2005/06, exceeded 2 000 tonnes in 2006/07, and was estimated at approximately 246 tonnes in 2007/08.

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

**PRECAUTIONARY REFERENCE POINTS:**

**STOCK STATUS:** Highly uncertain

**RECENT MANAGEMENT ADVICE:** In 2007/08, the precautionary catch limit for *Dissostichus* spp. was 150 tonnes. Exploratory fishing will continue in 2008/09 under a precautionary catch limit.

**STECF COMMENTS:** STECF has no comments.

#### 17.1.12. Toothfish (*Dissostichus* spp.) Exploratory Fisheries in Subareas 88.1 and 88.2 (Ross Sea)

**FISHERIES:** The Ross Sea fishery saw a steady expansion from 1997/98 to 2000/01, a slight drop in 2001/02, followed by an increase in 2002/03, and an almost three-fold increase in effort in 2003/04. In 2004/05 and 2005/06, overall effort in the Ross Sea dropped, but increased again in 2006/07. In 2006/07, ice conditions resulted in some restrictions on fishing in the southern part of the area. The catch in 2007/08 was 2,259 t in Subarea 88.1 and 416 t in Subarea 88.2. The estimated IUU catch in Subarea 88.1 was 92 tonnes in 2001/02, 240 tonnes in 2003/04, 23 tonnes in 2004/05 and 187 tonnes in 2007/08. IUU catches in Subarea 88.2 have been much less (15 tonnes in 2005/06).

**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 (2007 and 2008).

**PRECAUTIONARY REFERENCE POINTS:**  $SSB_{t+35years} \geq 50\% SSB_0$ ; probability of SSB dropping below 20% of  $SSB_0 < 0.1$

**STOCK STATUS:**  $SSB_{current} > 50\% SSB_0$

**RECENT MANAGEMENT ADVICE:** The catch limits for the 2007/08 season were 2700 t in Subarea 88.1 and 567 t in Subarea 88.2. No new assessment was undertaken in 2008. Exploratory fishing will continue in 2008/09 under the same catch limits.

**STECF COMMENTS:** STECF has no comments.

## **17.2. Antarctic Icefish (*Chamsocephalus gunnari*)**

### **17.2.1. Antarctic icefish (*Chamsocephalus gunnari*), Subarea 48.3, South Georgia**

**FISHERIES:** A pelagic or semi-pelagic trawl fishery targeting *Chamsocephalus gunnari* has operated in Subarea 48.3 since the late 1970s. Historical catches peaked at 179,000 tonnes in 1982/83. There was virtually no fishery during the 1990s. Since 1999 the catch has been in the region of 2000 to 4000 tonnes annually. The catch in 2007/08 was 2,366 t. There has been no evidence of IUU activity in this fishery.

**SOURCE OF MANAGEMENT ADVICE:** The main management advisory body is CCAMLR. Advice is 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:**  $SSB_{t+2years} \geq 75\% SSB_{current}$

**STOCK STATUS:** Stock level is highly variable and dependent on recruitment. A responsive management strategy, using a short-term (2 year) assessment approach has been used since 2000.

**RECENT MANAGEMENT ADVICE:** The catch limit for *C. gunnari* will be set at 3 834 tonnes in 2008/09 and 2 631 tonnes in 2009/10.

**STECF COMMENTS:** STECF has no comments.

### **17.2.2. Antarctic icefish (*Chamsocephalus gunnari*), Division 58.5.2, Heard and McDonald Islands**

**FISHERIES:** A pelagic or semi-pelagic trawl fishery targeting *Chamsocephalus gunnari* has operated in Subarea 48.3 since the late 1970s. Historical catches peaked at 15,200 tonnes in 1976/77. There was virtually no fishery during the early 1990s. Catches fluctuate depending on recruitment. The catch in 2007/08 was 199 t. There has been no evidence of IUU activity in this fishery.

**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:**  $SSB_{t+2years} \geq 75\% SSB_{current}$

**STOCK STATUS:** Stocks are at a lower level than in the 1980s.

**RECENT MANAGEMENT ADVICE:** The catch limit for *C. gunnari* will be set at 102 tonnes in 2008/09.

**STECF COMMENTS:** STECF has no comments.

## **17.3. Lantern fish (*Electrona carlsbergi*), Subarea 48.3, South Georgia**

**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 2007/08.

**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). 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:** STECF has no comments.

#### **17.4. Krill (*Euphausia superba*)**

The krill fishery operated only in Area 48 during the 2007/08 season. Six vessels from five member nations fished. The total catch was 125 063 t. Nine countries have submitted notifications for 18 vessels in the 2008/09 season. A notification for an exploratory krill fishery in Subarea 48.6 was also received.

##### **17.4.1. Krill (*Euphausia superba*) Area 48**

**FISHERIES:** The total catch of krill in the 2007/08 season, was 125 063 t. The catches were taken by Japan, Republic of Korea, Poland and Norway and the Russian Federation.

**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. An integrated assessment method has been proposed as alternative assessment methods.

**PRECAUTIONARY REFERENCE POINTS:**  $SSB_{t+35years} \geq 75\% SSB_0$ ; probability of SSB dropping below 20% of  $SSB_0 < 0.1$ .

**STOCK STATUS:** Revised  $B_0 = 37.29$  million tonnes.

**RECENT MANAGEMENT ADVICE:** Under conservation measure 51-01 (2007) the total catch of krill in Area 48 is limited to 3.47 million t with a trigger level of 620,000t.

**STECF COMMENTS:** STECF has no comments.

##### **17.4.2. Krill (*Euphausia superba*), Division 58.4.1**

**FISHERIES:** There was no catch of krill in this area in 2007/08.

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

**PRECAUTIONARY REFERENCE POINTS:**  $SSB_{t+35years} \geq 75\% SSB_0$ ; probability of SSB dropping below 20% of  $SSB_0 < 0.1$ .

**STOCK STATUS:** A survey in the region (1996) provided a  $B_0$  estimation of 4.83 million t (will be revised using new protocols).

**RECENT MANAGEMENT ADVICE:** The catch limit proposed under Conservation Measure 51-02 (2006) is 440,000 t.

**STECF COMMENTS:** STECF has no comments.

##### **17.4.3. Krill (*Euphausia superba*), Division 58.4.2**

**FISHERIES:** There was no catch of krill in this area in 2007/08.

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

**PRECAUTIONARY REFERENCE POINTS:**  $SSB_{t+35years} \geq 75\% SSB_0$ ; probability of SSB dropping below 20% of  $SSB_0 < 0.1$ .

**STOCK STATUS:** Revised  $B_0 = 12.46$  million tonnes.

**RECENT MANAGEMENT ADVICE:** Under conservation measure 51-03 (2007) the total catch of krill is limited to 1.488 million t with a trigger level of 260,000 t west 55°E and 192,000 t east 55°E.

**STECF COMMENTS:** STECF has no comments.

### **17.5. Antarctic squid (*Martialia hyadesi*), Subarea 48.3, South Georgia**

**FISHERIES:** There has been no fishery for squid (*Martialia hyadesi*) since 2002/03, and no new request has been submitted to CCAMLR to continue exploratory fishing for this species in 2008/09.

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

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

**STOCK STATUS:** No information available.

**RECENT MANAGEMENT ADVICE:** Precautionary catch limit of 2,500 t.

**STECF COMMENTS:** STECF has no comments.

### **17.6. Crabs (*Paralomis spinosissima* and *Paralomis formosa*), Subareas 48.3, 48.2 and 48.4, South Georgia**

**FISHERIES:** Stone crabs (*Paralomis* spp.) were exploited briefly during the 1990s. There has been no fishery since 2002/03. Russia has notified its intention to conduct a fishery for crabs in Subarea 48.3 during the 2008/09 season, including exploratory fishing in Subareas 48.2 and 48.4.

**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:** The catch limit in Subarea 48.3 is 1,600 tonnes. Proposed limits for the exploratory fishery are 250 tonnes for Subarea 48.2 and 10 tonnes for Subarea 48.4. An experimental harvest regime shall apply throughout the fishery.

**STECF COMMENTS:** STECF has no comments

## **18. European eel (*Anguilla anguilla*)**

**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 level 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 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. In 2007, eel was included in CITES Appendix II that deals with species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. The listing will be made effective in March 2009.

**SOURCE OF MANAGEMENT ADVICE:** Management advice has been provided by ICES 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). Recent recruitment varies between areas from 1 to 10% of the recruitment observed in the 1970s and most recent observations do not indicate recovery. Estimated total yield has declined to about 25% of the mid-1960s.

**PRECAUTIONARY REFERENCE POINTS:** Precautionary reference points have not been agreed for eel. 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). There are strong indications that recruitment might be impaired by the low spawning stock, while in the 1970s, recruitment of glass eel was still at historically normal levels. Therefore, an interim recovery level target could be 100% of the pre-1980 average silver eel escapement, which generated higher recruitment.

**MANAGEMENT OBJECTIVES:** A management framework for the recovery of the European eel stock was established in 2007 through an EU regulation (EU 1100/2007). The objective of this Regulation is the protection and sustainable use of the stock. To achieve the

objective, member states will develop eel management plans for their river basin districts, designed to reduce anthropogenic mortalities. According to the EU regulation, eel management plans shall allow, with high probability, an escapement to sea of at least 40% of the biomass of silver eel, defined as the best estimate of the theoretical escapement if the stock had been completely free of anthropogenic influences. The EU regulation does not quantify high probability.

**RECENT MANAGEMENT ADVICE:** *Exploitation boundaries in relation to precautionary considerations:* The recruitment of glass eels to Europe has shown a sharp and continued decline over more than 25 years to historically low levels. These low recruitment levels are an indication that the reproduction might be seriously impaired as a result of the stock being severely depleted. Since recruitment remains in decline and stock recovery is a long-term process for biological reasons, ICES recommends that all exploitation and other anthropogenic impacts on production and escapement of eels should be reduced to as close to zero as possible.

**STECF COMMENTS:** STECF agrees with the advice of ICES and EIFAC and notes the adoption of the EU regulation setting out a management framework for the recovery of the European eel stock. Member States need to develop and implement national plans 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 these national management plans.

## 19. Specific requests to STECF

### 19.1. Fisheries around the Azores, Madeira and the Canary Islands

#### **Background:**

STECF is requested to provide a description of fisheries exploiting local, resident stocks around the Azores, Madeira and the Canary Islands. Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks.

#### **AZORES**

Available data on the fisheries in the Azores relates to 2004.

The Azores Archipelago, an autonomous region of Portugal, comprises nine main islands stretching over 630 km. Fishing is a significant sector of the economy, accounting for 5% of jobs and 40% of exports. Traditional coastal fishing (7,200 tonnes) and tuna fishing (5,200 tonnes) generate the majority of catches. The absence of a continental shelf, a fragile ecosystem and demersal coastal species on the brink of being over-fished are the main concerns.

The main fisheries are as follows: Tuna fishing accounted for approximately 5,200 tonnes of catches (18.2% of total catches). Swordfish, another large pelagic fish, is also caught in limited quantities (140 tonnes). A total of 1,700 tonnes of small pelagic fish are caught each year, of which 1,200 tonnes of horse mackerel, 434 tonnes of Spanish mackerel and 82 tonnes of sardines. Finally, demersal species (red sea bream, blackbelly rosefish, alfonsinos, etc.) account for 3,300 tonnes of catches.

The fishing fleet consists of 1,580 vessels, of which 1,500 are used for traditional coastal fishing. 93% of all vessels are under 12 m long and 25% are non-motorised. Only half of vessels are active full time. The fact that their owners often have another job, the poor condition of the boats and the lack of crewmen are the main reasons why such vessels are not fully utilised. The main equipment used includes handlines, bottom longlines, purse seines and small-scale gillnets. The tuna fleet comprises 21 vessels, most of which belong to processing companies.

STECF was unable to access information on stock status of any of the species exploited around the Azores.

## **MADEIRA**

Available data on the fisheries in Madeira relates to 2004.

The archipelago of Madeira, located in the Atlantic Ocean approximately 600 km off the Moroccan coast, is an autonomous region of Portugal. Madeira's exclusive economic zone covers 377,000 km<sup>2</sup> (500 times its land surface area). There are abyssal floors reaching depths of 5,400 m but no continental shelf. Fishing accounts for less than 1% of jobs and 0.71% of GDP<sup>1</sup> gross domestic product and lags way behind tourism, which is the main industry in the region. By contrast, it represents 36% of the value of goods exported.

Fish production in Madeira has levelled out at approximately 8,000 tonnes (8,072 in 2004) from close on 14,000 tonnes in the mid-1990s. The main fisheries are: Tuna fishing accounts for almost 37% of catches. Catches of tuna have varied considerably. This may be due to oceanic changes of which still little is known. From 8,851 tonnes in 1995, they dropped to under 700 tonnes in 2000 and have climbed back to 3,000 tonnes in 2004. The black scabbardfish fishery, a species found in deep waters, accounts for 46% of all catches, which in 2004 totalled almost 4,000 tonnes. Small pelagic fishery (horse mackerel and Spanish mackerel) is targeted by coastal fishing account for 13% of catches in 2004. Finally, demersal species fishery (red porgy, forkbeard, wreckfish, blacktail comber, red sea bream, etc.) only 3-4%.

To boost the diversity of species present in the island's waters, two artificial reefs have been built with European assistance and two others are in the offing. An impact assessment conducted in the vicinity of the first reef shows that a much larger range of species have become established there since the reef was created in 2000 (in particular, large quantities of seabream, white trevally, goatfish, bogue, saddled bream, greater amberjack and so forth).

In 2005, the Madeira fleet comprised 466 vessels, 90% of which were under 12 m in length. Half of the vessels are still non-motorised or undecked. The smallest boats are used to fish various demersal species using a hook and line. Five fishing boats use a purse seine to fish for small pelagic species. 20 other vessels are used for tuna fishing. They measure between 18 m and 30 m and use pole-and-line fishing. The professional sports fishing fleet has 15 boats.

STECF was unable to access information on stock status of any of the species exploited around Madeira.

## **THE CANARIES**

Available data on the fisheries in the Canaries relates to 2004.

An autonomous Spanish community, the Canaries archipelago is located in the Atlantic Ocean along the Moroccan coast. It comprises seven islands extending from east to west over a distance of 500 km. Despite their 1,300 km of coastline, the Canaries only have a very small continental shelf due to their volcanic origins, which is why local fishing developed around the resources of the Saharan shelf and the African coast. Fishing contributes relatively little to the local economy (0.5% of regional GDP<sup>1</sup> and provides only 0.5% of registered jobs (4,200 full-time equivalents). However, fish products account for 5.5% of the value of the region's exports due to the contribution by independent ports in the Canaries, primarily Las Palmas on Gran Canaria, which are major landing points for fleets fishing the tropical stocks – mainly tuna – of the eastern Atlantic.

There are four main fisheries: First, **Traditional coastal fishing** on all the coasts of the archipelago uses traditional methods to fish for many coastal species. Catches comprise primarily cephalopods (41 tonnes of squid, octopus, etc.), crustaceans (25 tonnes of Nordic shrimp), coastal pelagic fish (9,000 tonnes of sardines, Spanish mackerel, silversides) and demersal species (1,000 tonnes, primarily sparides). These stocks are not evaluated systematically but the fall in catches noticed by the authorities in the Canaries over the past few years is a sign of over-fishing. Second, **Semi-deep sea traditional fishing** off the African coast targets small pelagic

fish and demersal species (shrimp, crab, cephalopods and fish) found on the Saharan shelf and, from May to October, several species of tuna (caught using a rod) which migrate to the region. The failure to renew the fishing agreement with Morocco in November 1999 has hindered this type of traditional fishing since fishermen have no longer been able to operate in a large section of their former fishing ground. However, seasonal tuna fishing has shifted to the waters close to the archipelago along with part of the demersal fleet. Catches from this type of semi-deep sea traditional fishing totalled 1,386 tonnes in 2004 but stocks are showing signs of over-fishing. Once it enters into force, the new Fisheries Partnership Agreement concluded between the European Union and Morocco in July 2005 will permit traditional fishing in Moroccan waters. Third, **Cephalopods are fished** by a specialist fleet of freezer-trawlers operating on the Saharan shelf on trips lasting between 15 days and two months. This kind of fishing has dropped significantly since November 1999 following the failure to renew the fishing agreement with Morocco. However, the fleet has managed to keep going by redeploying to new fishing grounds thanks to partnership agreements between the European Union and other coastal countries of West Africa such as Mauritania, Senegal, Guinea and Guinea Bissau. Total catches of 8,600 tonnes were recorded in 2004, down 70% on 1999 levels. Fourth, **Deep-sea tuna fishing** aims to fish joint stocks of tuna and swordfish migrating into the Atlantic Ocean. Since they are migratory, these are not technically Canaries species; they are fished by fleets from different countries which happen to chance upon the fish migrating via the port of Las Palmas, where total catches of 410,000 tonnes were recorded in 2004. This kind of tuna fishing is managed by the International Commission for the Conservation of Atlantic Tuna (ICCAT), a regional fishing organisation which has adopted several measures to limit catches of yellowfin tuna, the main species targeted.

Concerning the fleet, in 2005, the Canaries' fleet comprised 1,106 boats made up of: 1,013 boats less than 12 m long used for traditional coastal fishing; 26 traditional boats more than 12 m long used for semi-deep sea traditional fishing; 59 freezer-trawlers fishing cephalopods on the African coast; eight freezer longliners fishing deep-sea tuna.

STECF was unable to access information on stock status of any of the species exploited around the Canaries.

## 19.2. Fisheries around the Réunion Island

### Background :

STECF was requested to:

- Provide a description of fisheries exploiting local, resident stocks around Réunion Island.
- Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks

Information relevant to the fishery around the Réunion island are extracted from the 2007 Ifremer report “Mise en place du Système d’Informations Halieutiques à La Réunion, SIHR - Rapport final 2007 –“. This report covered the years 2004-2006. Since then some of the 2006 figures have been updated and this update is available on the Ifremer website at :

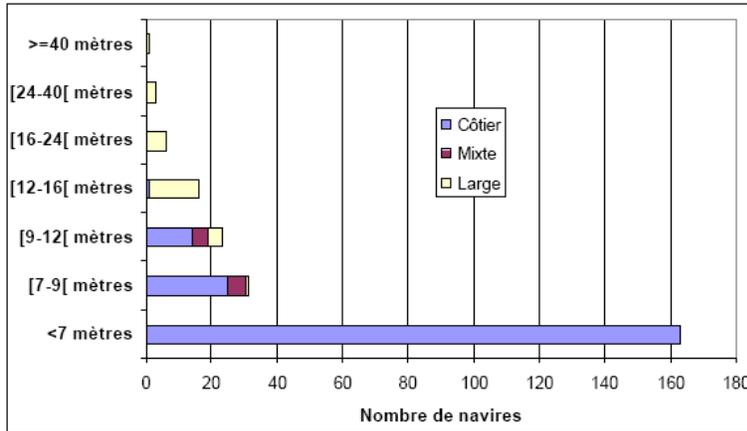
[https://www.ifremer.fr/isih/affichagePageStatique.do?page=/produits/rapports\\_syntheses/activite/activite\\_2006.htm#OM](https://www.ifremer.fr/isih/affichagePageStatique.do?page=/produits/rapports_syntheses/activite/activite_2006.htm#OM)

**The Fleet:** The Réunion fleet is mostly composed of small boats (Table 19.2.1). In 2006 more than 90% of the boats were less than 12 metres (overall length) with only 27 boats greater than 12 metres. The mean age of the boats was 11 years in 2006 with the majority less than 15 years. The fleet is therefore relatively young.

Overall length	2004		2005		2006	
<7 meters	197	70.6%	199	70.8%	201	69.8%
[7-9[ meters	32	11.5%	32	11.4%	35	12.2%
[9-12[ meters	25	9.0%	24	8.5%	25	8.7%
[12-16[ meters	17	6.1%	16	5.7%	16	5.6%
[16-24[ meters	4	1.4%	6	2.1%	7	2.4%
[24-40[ meters	3	1.1%	3	1.1%	3	1.0%
>=40 meters	1	0.4%	1	0.4%	1	0.3%
<b>Total</b>	<b>279</b>		<b>281</b>		<b>288</b>	

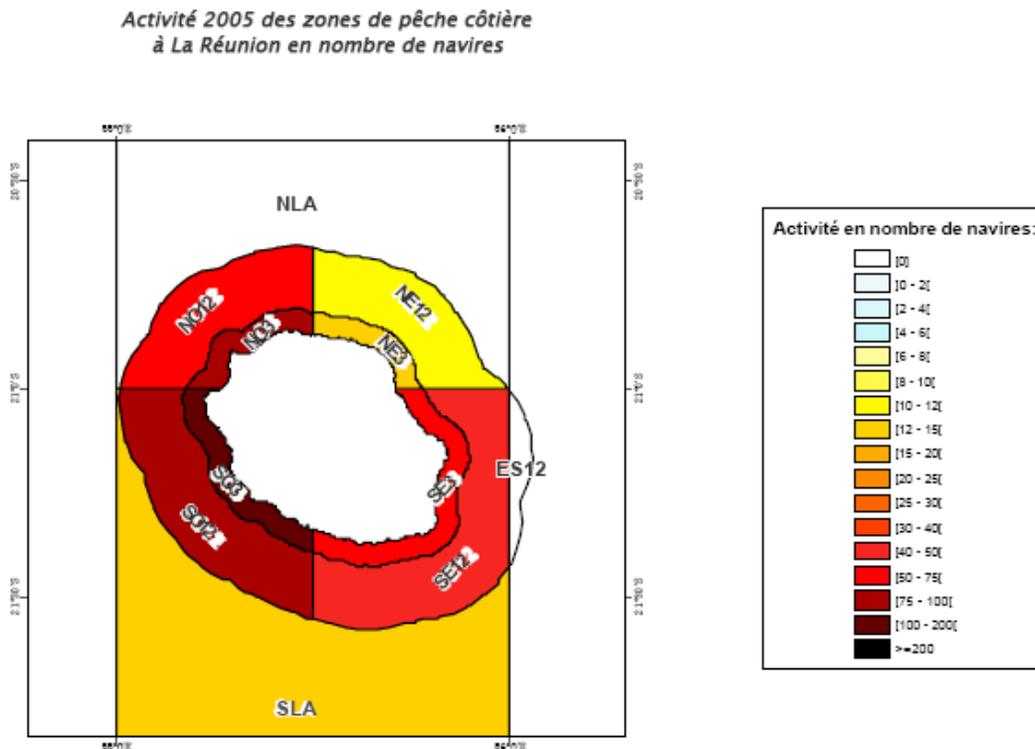
**Table 19.2.1 : Composition of the Réunion fishing fleet by boat size over the period 2004 - 2006**

The fishing activity is mostly coastal, 84 % of the boats spend 75% or more of their activity within 12 miles of the coast (classified as “inshore”) while 12% spend 75 % or more of their fishing time outside the 12 miles limit (“offshore”) The others classed as “intermediate” spread more or less evenly their fishing activity offshore and inshore. Figure 19.2.1 gives the type of fishing activity by boat length category.



**Figure 19.2.1 : Number of boats by length class and type of fishing activity. (“Côtier” : Inshore, “Mixte” : Intermediate, “Large” : Offshore)**

This coastal activity is mostly concentrated in the Southern and Western inshore areas (Fig.19.2.2).



**Figure 19.2.2 : Geographical distribution of the fishing fleet activity in the different coastal areas of La Réunion in 2005 (legend on the right : number of different boats having fished in each area).**

**The Gears:** Three types of gear dominate the fishery in La Réunion. For example, in 2006, hand line was used by 213 boats for a total of 2402 months of activity (45% of the total activity), longline was used by 111 boats and shore gears (beach seine, and Kona crab hoopnets) are presents on 62 boats for a total of 536 month of activity (Table 19.2.2). Swordfish drifting longline was used by 39 boats, other gears are marginally used. The inshore and intermediate fishery is polyvalent as more than half of the boats used 2 different gears or more (Table 19.2.3).

Gear	Total number of active boats	Total number of months of activity	Average number of months of activity per boat
Hand line	213	2400	11.3
Longline	110	1196	10.9
Shore fishing	61	530	8.7
Swordfish drifting longline	39	406	10.4
Nets	7	54	7.7
Traps	4	36	9.0

**Table 19.2.2 : Activity of the La Réunion fishing fleet by gear in 2006**

	Inshore	Intermediate	Offshore	Total
<b>1 gear</b>	66		29	95
<b>2 gears</b>	107	6	1	114
<b>3 gears</b>	30	3		33
<b>4 gears</b>	2	1		3
<b>Total</b>	205	10	30	245

**Table 19.2.3 : Number of boats using different gears by fishing activity in 2006.**

**Main species caught by inshore fishery:**

Catches were estimated through enquiries and market sampling. The annual total catches were estimated for 2006 and 2007 to be around 700-800 t all species combined (Table 19.2.4). The greatest proportion of the catch is made of pelagic species, mainly tunas, swordfish and dolphinfish. Catches of demersal species were less than 100 t.

	2006	2007
Yellowfin tuna	179	158
Swordfish	85	104
Common dolphinfish	111	78
Albacore	79	72
Skipjack tuna	52	29
Wahoo	32	42
Marlins gen sp	31	32
Elasmobranchs	12	3
Bigeye tuna	3	11
Great barracuda	11	1
Dogtooth tuna	3	3
Indo-Pacific sailfish	2	1
Kawakawa	1	1
Other tunas	1	1
<b>Total big pelagic fish</b>	<b>603</b>	<b>536</b>
Bigeye scad	61	18
Mackerel scad	7	21
Bigeye trevally	12	10
Herring, sardines...	1	
Rainbow runner	0	4
Other small pelagics	0	1
<b>Total small pelagic fish</b>	<b>81</b>	<b>54</b>
Red snappers	30	37
Breams	18	14
Red grouper	16	6
Other ground fishes	12	6
Other groupers	7	5
Sky emperor	8	2
Goatfishes	5	0
Cardinalfish	1	4
Green jobfish	2	1
Bigeyes	0	1
<b>Total demersal fish</b>	<b>98</b>	<b>75</b>
Kona crab	3	1
Octopus	1	0
<b>Total others</b>	<b>4</b>	<b>1</b>
<b>Total all species</b>	<b>786</b>	<b>666</b>

**Table 19.2.4 –Catches by species (in metric tons) estimated for 2006 and 2007 for the inshore fishery around La Réunion.**

**Status of local, resident stocks – economical situation of the fleets:**

There is no assessment conducted for coastal exploited fish populations around La Réunion. There is at present no information available on the economical situation of the fleets exploiting the inshore resources.

### **19.3. Fisheries around the French Antilles (Martinique and Guadeloupe) and Guyana**

**Background :**

STECF was requested to:

- Provide a description of fisheries exploiting local, resident stocks around French Guyana, Martinique and Guadeloupe.
- Where possible, provide an assessment of stock status and an evaluation of the economic situation of the fleet exploiting such stocks
- In the case un Guyana, describe and assess separately:
  - • Coastal fisheries exploiting white fish (poissons blancs)
  - • Coastal fisheries (including foreign vessels) exploiting red fish (poissons rouges, especially red snapper) and sharks
  - • Fisheries exploiting Penaeus shrimps

Information relevant to the fishery around the Martinique and Guadeloupe islands are extracted from documentation available on the Ifremer website :

[https://www.ifremer.fr/isih/affichagePageStatique.do?page=/produits/rapports\\_syntheses/activite/activite\\_2006.htm#OM](https://www.ifremer.fr/isih/affichagePageStatique.do?page=/produits/rapports_syntheses/activite/activite_2006.htm#OM)

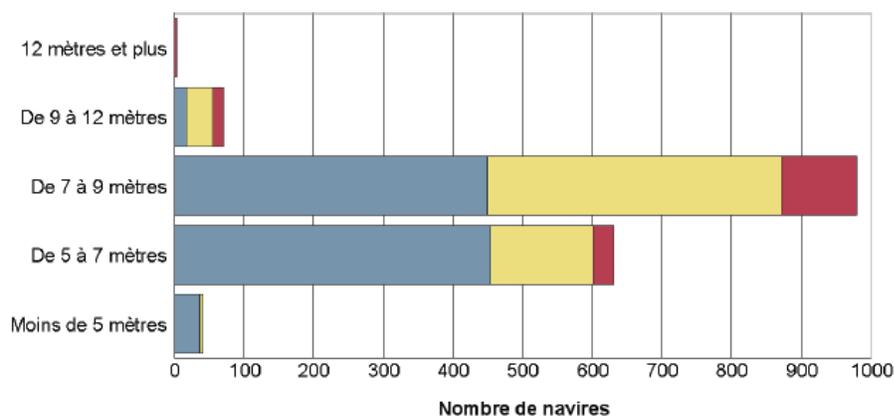
### 19.3.1. Fisheries around the French Antilles (Martinique and Guadeloupe)

**The Fleet:** The Antilles fleet is mostly composed of small boats of less than 9 m (Table 19.3.1). In 2006, 95% of the boats were less than 9 metres, and only 6 boats are greater than 12 metres. Over the 1997 to 2006 period there has been an overall 5% decrease in the total number of boats. The decrease was relatively high in the less than 7 metres and over 12 metres categories while the intermediate 9-12 metres category showed a 53% increase. The mean age of the boats was 13 years in 2006 with 48% less than 10 years.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
< 5 m	89	88	84	68	66	61	61	64	65	54
5 - 7 m	862	819	804	783	757	793	778	785	773	731
7 - 9 m	1086	1064	1041	1032	997	1076	1091	1117	1132	1118
9 - 12 m	64	79	73	69	70	82	88	84	94	98
>12 m	9	10	6	9	9	9	7	7	7	6
<b>Total</b>	<b>2110</b>	<b>2060</b>	<b>2008</b>	<b>1961</b>	<b>1899</b>	<b>2021</b>	<b>2025</b>	<b>2057</b>	<b>2071</b>	<b>2007</b>

**Table 19.3.1 : Composition of the Antilles fishing fleet by boat size (overall length) over the period 1997 - 2006**

The fishing activity is mostly coastal, 55 % of the boats spend 75% or more of their activity within 12 miles of the coast (considered as “inshore”) while 9% spend 75 % or more of their fishing time outside the 12 miles limit (“offshore”) The others classed as “intermediate” spread more or less evenly their fishing activity offshore and inshore (36%). Figure 19.3.1 gives the type of fishing activity by boat length category.



**Figure 19.3.1 : Number of boats by length class and type of fishing activity. (“Côtier” : Inshore, “Mixte” : Intermediate, “Large” : Offshore)**

**The Gears:** There are many different gears used in the Antilles fishery (Table 19.3.2) Trap dominates followed by drifting line and fixed gillnets. The fishery is polyvalent , the mean number of gears used by each boat was 2.2 in 2006 (Table 19.3.3).

<b>Gear</b>	<b>No. Boats</b>	<b>No. month activity</b>	<b>No. month activity/boat</b>
<b>Trap</b>	1 040	11096	10.7
<b>Drifting line</b>	699	4 757	6.8
<b>Fixed gillnet</b>	506	4 797	9.5
<b>Longline</b>	258	2 127	8.2
<b>Trammel net</b>	183	1 586	8.7
<b>Handline</b>	179	1 878	10.5
<b>Beach seine</b>	141	1 461	10.4
<b>Encircling gillnet</b>	106	981	9.3
<b>Diving</b>	93	894	9.6
<b>Drifting gillnet</b>	30	274	9.1
<b>Purse seine</b>	24	242	10.1
<b>Recreational charter fishery</b>	6	65	10.8

**Table 19.3.2 : Activity of the Antilles fishing fleet by gear in 2006**

	<b>Inshore</b>	<b>Intermediate</b>	<b>Offshore</b>	<b>Total</b>
<b>1 gear</b>	466	21	68	<b>555</b>
<b>2 gears</b>	311	170	72	<b>553</b>
<b>3 gears</b>	126	230	17	<b>373</b>
<b>4 gears</b>	42	132	2	<b>176</b>
<b>5 gears</b>	12	60		<b>72</b>
<b>6 gears</b>	1	2		<b>3</b>

**Table 19.3.3 : Number of boats using different gears by fishing activity in 2006.**

**Main species caught by inshore fishery:**

No information was available to STECF.

**Status of local, resident stocks – economical situation of the fleets:**

No information was available to STECF.

**19.3.2. Fisheries around Guyana**

No information was available to STECF.

## **20. List of Acronyms**

ACOM	The Advisory Committee of ICES
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
LPUE	Landings per unit effort
MBAL	Minimum biologically acceptable level
MEDITS	International Bottom Trawl Surveys in the Mediterranean
MEDLAND	Mediterranean Landings
MSY	Maximum sustainable yield
MSVPA	Multi Species VPA
NAFO	Northwest Atlantic Fisheries Organisation
NEA	North East Atlantic
NEI	Not Elsewhere Included
NEMED	<i>Nephrops</i> in Mediterranean Sea
NRIFSF	National Research Institute for Far Seas Fisheries - Japan
PA	Precautionary Approach
PICTs	Pacific Islands Countries and Territories
PO	Pacific Ocean
RRAG	Renewable Resources Assessment Group
SAC	Scientific Advisory Committee (GFCM)
SAFC	South Atlantic Fisheries Commission
SAGP&A	Secretaría de Agricultura, Ganadería, Pesca y Alimentos (Argentina)
SCRS	ICCAT Standing Committee on Research and Statistics
SCSA	Sub-Committee on Stock Assessment (GFCM)
SCTB	Standing Committee on Tuna and Billfish (western and central Pacific Ocean)
SGRST STECF	Subgroup on Resource Status
SPC	Southern Pacific Commission
SSB	Spawning stock biomass
SSB/R	Spawning stock biomass per recruit
STECF	Scientific, Technical and Economic Committee for Fisheries

TAC	Total Allowable Catch
WCPO	Western Central Pacific Organisation
WCPFC	Western Central Pacific Fishery Organisation
WECAF	Committee for Western Central Atlantic Fisheries
WGEF	Working Group on Elasmobranches Fishes
WIO	Western Indian Ocean
WP	IOTC Working Parties
WPB	IOTC Working Parties on Billfish
WPTT	IOTC Working Parties on Tropical Tunas
WPO	Western Pacific Ocean
XSA	Extended survivors analysis
Y/R	Yield per recruit

## 21. Annex I Contact details of Participants

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## 22. Annex II-Expert declarations

Declarations of invited experts are published on the STECF web site on <https://stecf.jrc.ec.europa.eu/home> together with the final report.

European Commission

**EUR 23630 EN – Joint Research Centre – Institute for the Protection and Security of the Citizen**

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**Abstract**

SGECA-SGRST-08-03 was held on 20-24 October 2008 in Fuengirola (Spain). The meeting was the 2nd meeting convened in 2008 focussing on the review of stocks of Community interest. STECF reviewed and the report during its plenary meeting on 3-7 November 2008.

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