JRC Scientific and Technical Reports

Scientific, Technical and Economic Committee for Fisheries (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2011 Part 3

Advice on Stocks of Interest to the European Community in areas under the jurisdiction of CCAMLR, CECAF, WECAF, ICCAT, IOTC, IAATC, GFCM, NAFO, and stocks in the North East Atlantic assessed by ICES.

Prepared in draft by the STECF-SG- RST-10-03, Cádiz, Spain 11 – 15 October 2010.

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EUR 24627 EN - 2010

JRC EUROPEAN COMMISSION

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JRC61942
EUR 24627 EN
ISBN 978-92-79-18741-4
ISSN 1831-9424
doi:10.2788/53892

Luxembourg: Publications Office of the European Union

Printed in Italy

SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2011 – part 3

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

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REVIEW OF SCIENTIFIC ADVICE FOR 2011 PART 3

General request to STECF

The STECF is requested to review and comment on the scientific advice released in 2009 – 2010 in particular for the stocks specified below. The text of previous STECF reviews of stocks for which no updated advice is available shall be retained in the report in order to facilitate easy reference and consultation.

STECF is requested, in particular, to highlight any inconsistencies between the assessment results and the advice delivered by scientific advisory committees of ICES and RFMOs.

In addition, when reviewing the scientific advice from ICES, and any associated management recommendations, STECF is requested to take into account Harvest Control Rules adopted in any type of multi-annual management plans and Harvest Control Rules suggested in the Communication from the Commission on fishing opportunities for 2011 (COM(2010)*241*-FINAL – see supporting documentation. STECF is therefore requested to advise on the TACs corresponding to the implementation of Annex III (pages 17-18) of COM(2010)*241*-FINAL. When interpreting such rules, references to reductions by one-quarter should be taken to mean reductions corresponding to reducing fishing mortalities by equal decrements over the four years from 2011 to 2014, F_{msy} being implemented in 2015.

In addition, for those stocks, excluding naturally short-lived species, where it will not be possible to provide advice based on a catch forecast in relation to precautionary limits, STECF is requested to advise on a TAC corresponding to the application of the following rule for category 6 to 9 stocks of the Commission communication on fishing opportunities for 2011 (COM(2010)*241*-FINAL):

1. Where there is evidence that a stock is overfished with respect to the fishing mortality that will deliver maximum sustainable yield (or is depleted to a low level compared with historic levels), a reduction in TAC as needed to reach Fmsy, but no greater than 15% would apply.
2. Where there is evidence that a stock is under fished with respect to the fishing mortality that will deliver maximum sustainable yield, an increase as needed to reach Fmsy, but no greater than 15%, would apply.
3. The considerations in paragraphs 1 and 2 override subsequent paragraphs.
4. Where abundance information either indicates no change in stock abundance, is not available or does not adequately reflect changes in stock abundance, an unchanged TAC would apply.
5. Where ICES considers that representative stock abundance information exists, the following rule applies:

If the average estimated abundance in the last two years exceeds the average estimated abundance in the three preceding years by 20% or more, a 15% increase in TAC applies.

If the average estimated abundance in the last two years is 20% or more lower than the average estimated abundance in the three preceding years, a 15% decrease in TAC applies.

Where TACs have not been restrictive, and a reduction is required according to paragraph 1 or paragraph 5.b, STECF shall advise on an appropriate level of TAC reduction necessary to achieve the intended reduction in catches. STECF shall decide on an appropriate Fmsy proxy in each case.

Introduction to the STECF Review of Advice for 2011, Part 3

Background

This report represents the STECF review of advice for stocks of interest to the European Community in areas under the jurisdiction of CCAMLR, CECAF, WECAF, ICCAT, IOTC, IAATC, GFCM, NAFO, and stocks in the North East Atlantic assessed by ICES and was endorsed by the STECF at its 35th Plenary meeting held in Brussels from 8-12 November 2010.

The review was drafted by the STECF-SGRST 10-03 Working group during its meeting held in Cádiz, Spain, from 11-15 October 2010.

The STECF review of advice for 2011 Part 1 included the latest assessments and advice for stocks in the Baltic sea and was publishes in June 2010. Part 2 contained the review of assessments and advice released by ICES up to 28 June 2010. Parts 1, 2 and 3 will be combined and published in the STECF Consolidated review of advice for 2011, which will be available in November 2011

Format of the STECF Review of advice

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.

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. For stocks assessed by ICES, stock status is summarised in a "traffic light" table utilising four separate symbols to indicate status in relation to different reference points. The key to the symbols is as follows:

- indicates an undesirable situation e.g. F is above the relevant reference point or SSB is below the relevant reference point

- indicates a desirable situation e.g. F is below the relevant reference point or SSB is above the relevant reference point

- indicates that the status is unknown e.g the reference point is undefined or unknown, or F or SSB is unknown relative to a defined reference point

- indicates that status lies between the precautionary (pa) and limit (lim) reference points

RECENT MANAGEMENT ADVICE: summary of most recent advice.

STECF COMMENTS: The classification and associated TAC derived using the rules prescribed in the European Commission's Policy Statement on Fishing Opportunities for 2011 (COM(2010) 241 FINAL). Any comments STECF thinks worthy of mention, including errors, omissions or disagreement with assessments or advice.

Changes in the ICES Advice in 2010

STECF notes that ICES has changed the format of its advice in 2010. The advice for 2011 is given for three management approaches:

6. Transition to Maximum Sustainable Yield (MSY). ICES advises either:
   - the predicted landings in 2011 consistent with a constant fishing mortality at F_{msy} (or adivised proxy) or;
   - the predicted landings consistent with a reduction in fishing mortality using a 5-step transition scheme designed to achieve F_{msy} (or advised proxy) in 2015.

A detailed description of the basis for ICES MSY advice is given in Annex 1

7. Precautionary Approach: ICES advises on the predicted landings consistent with the most restrictive of either:
   - the predicted landings in 2011 consistent with fishing at a rate that is predicted to allow the SSB to be above Bpa in 2012 or;
   - the predicted landings consistent with fishing at F_{pa} .

8. Harvest control rules defined in agreed management plans. ICES advises on the predicted landings consistent with the provisions of agreed management plans.

In addition, in the section on the outlook for 2011, ICES provides the category and TACs consistent with COM(2010) 241 FINAL.

STECF Comments on the ICES approach to advice

STECF has reviewed ICES advice and where considered appropriate, has made additional comments on such advice. STECF is in general agreement with the ICES approach of providing advice on fishing opportunities consistent with annual restrictions on fishing mortality in the context of the frameworks of MSY, precautionary approach and agreed management plans and/or policies. However, STECF notes that such an approach only provides stock-specific catch options at assumed rates of fishing mortality consistent with prescribed harvest rules and in mixed species fisheries, there is no guarantee that setting TACs consistent with such catch options will achieve MSY by 2015. Furthermore, there is a real danger that the incorporation of stock-specific MSY based catch options will prolong short-term management decision-making and compromise future management of fisheries through the development of integrated long-term management plans.

Transition to F_{msy}

STECF notes that in the context of the MSY transition framework, ICES has for some stocks provided catch options for 2011 based on two different transition schemes in an attempt to achieve F_{msy} by 2015. These are referred to as follows:

1. A transition scheme (referred to by ICES as the EU transition scheme) which prescribes a rule for calculating the TACs for 2011 – 2015 based on considerations of stepwise reductions in fishing mortality only.
2. The ICES transitions scheme which prescribes a rule for calculating the TAC for 2011-2015 based on considerations of stepwise reductions in fishing mortality and SSB in relation to $B_{trigger}$. STECF notes that in the context of the MSY framework, where F in 2010 is estimated to at or below F_{msy} but SSB in 2010 is estimated to be below $B_{trigger}$ the ICES harvest rule prescribes a target fishing mortality rate for 2011 that is below F_{msy}.

The ICES transition scheme aims to provide additional protection to the stock when SSB is less than $B_{trigger}$ and is the basis of the ICES advice when this is the case. In cases where the most recent assessment indicates that the stock is above $B_{trigger}$, the landings consistent with the fishing mortalities derived using either transition scheme are the same.

In undertaking the stock review, STECF has generally opted to give advice on the landings consistent with the fishing mortality in 2011 derived from the ICES transition scheme, because it aims to provide additional protection to stocks where there is a risk that recruitment will be impaired ($SSB<B_{trigger}$).

F_{msy} estimates

STECF notes that in the absence of an estimate of F_{msy}, the basis for many of the F_{msy}-proxy values used by ICES is not clear. As a general rule, STECF considers that in the absence of a reliable estimate of F_{msy}, the appropriate proxy for FMSY is F0.1, unless there is convincing evidence to choose an alternative value. STECF recognises that for some stocks, F0.1 may not be the most appropriate FMSY proxy and that ICES will have considered all the information available to make such a judgement, even though the rationale for choosing an alternative is not documented in its advisory report.

In addition to summarising the ICES advice in this report, and in accordance with the Commission's request to STECF, this report provides TACs for 2011 consistent with the rules laid down in ANNEXES III and IV of the Communication from the Commission on a consultation on fishing opportunities for 2011 COM(2010) 241-FINAL. STECF wishes to stress that the resulting TACs constitute a direct application of the rules laid down in ANNEXES III and IV of COM(2010) 241-FINAL and unless explicitly stated, should not be interpreted as STECF recommendations for fishing opportunities for 2011.

In responding to the Commission's request to advise on the TACs corresponding to the rules in COM(2010) 241-FINAL, STECF notes that in some instances the resulting TACs conflict with the advice from ICES on the predicted landings arising from the ICES MSY framework. In general, STECF concurs with the catch options

advised by ICES. Where STECF does not concur with ICES, this is explicitly stated in the STECF comments on each stock.

STECF comments on the application of the rules for calculating TAC according to COM(2010) 241 FINAL.

STECF has noted the following:

1. The TAC resulting from the application of Annex IV, rule 4 is inconsistent with the rule prescribed for Category 6 stocks in Annex III. Whereas the rule for category 6 stocks in ANNEX III prescribes a reduction in TAC of up to 15%, Annex IV rule 4 does not permit such a reduction.
2. For stocks falling under category 6 to 9 and for which there are no estimates of F in relation to F_{msy}, there is no option to advise othere than an unchanged TAC (Rule 4) if indicators of abundance do not increase or decrease by 20% or greater (ANNEX IV, Rules 5a and 5b). In such cases, the TAC arising from COM(2010) 241-FINAL may be substantially different to both the landings consistent with the fishing mortality rate advised by STECF and the recent level of landings from the stock.

Consequences for management by TAC: an example for North Sea cod

STECF notes that for many stocks, a reduction in fishing mortality is required to move towards F_{msy} and that the landings consistent with such reductions are translated into TAC proposals. However, setting a TAC at such a level without appropriate controls on the overall catch in many case, especially mixed species fisheries, will not result in the intended reduction in fishing mortality. It will also result in increased discarding over-quota catches. This is a general problem of attemting to manage fishing mortality rates in mixed species fisheries. An example for North Sea cod is provided below to illustrate the problem and highlight potential solutions.

The Cod long-term management plan (Council Regulation (EC) 1342/2008) prescribes a TAC for 2011 based on a 20 % reduction on the 2010 TAC and a 10% reduction in fishing effort.

Assuming the 10% reduction in fishing effort results in a 10% reduction in fishing mortality this implies F = 0.77 in 2011. This is predicted to result in a total catch of 71,400 t of cod. With a TAC of 32,240 t, STECF notes that this is predicted to lead to approximately 39,000 t of discarded cod. This represents a significant increase in discarding compared to the estimated discards of 18,200 t derived from the F implied (F=0.48) by the TAC prescribed in the management plan.

STECF notes that if fully implemented, the provisions of the management plan are likely to result in a decrease in fishing effort for the main fleets that catch cod, but will have the perverse result of leading to increased discarding of cod unless additional measures to avoid catching cod can be introduced. This arises because of the incompatibility of the TAC and effort reductions prescribed by the management plan. STECF notes that there are two main potential means to attempt to eliminate or reduce discards:

1. Effort could be further restricted in an attempt to reduce the overall fishing mortality to the level required to catch the TAC prescribed by the management plan. This would imply a reduction in effort in 2011 in the region of 75% compared to that assumed for 2010. Such a measure would tend to reduce discarding to almost zero. Alternatively, to maintain the proportion of the catch discarded at its current level (36% by weight), implies that effort should be reduced by about 44%. Either of the above suggestions would undoubtedly have severe implications for the viability of most of the fleets exploiting demersal species in the North Sea.

2. In an attempt to eliminate discards, effort could be set according to the provisions of the management plan but the TAC could be set at the level of predicted total catch (all removals) commensurate with the agreed fishing effort level. For a 10% reduction in fishing effort, this implies that a TAC relating to total removals would need to be set at about 71,400 t in 2011. STECF stresses that such a measure would need appropriate monitoring of all catches of cod and that all catches of cod should count against the agreed TAC.

Acknowledgement

The STECF review of scientific advice for 2011 Part 3 was drafted by the STECF-SGRST 10-03 Working Group held in Cádiz, Spain from 11-15 October 2010. The Report was reviewed and adopted by the STECF at its 35th plenary session held in Brussels from 8-12 November 2010.

STECF acknowledges the extensive contribution made by the following participants:

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1. Resources of the North Sea

1.1. 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, which has been exploited. This stock has been exploited mainly 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 2006-2008. 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.

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

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

	UWTV abundance		
	2008	2009	**2010**
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

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 since 2006 no catches have been recorded. Part of the explanation for this development is the low price for shrimp combined with the rather high fuel costs. No monitoring of this stock has taken place, and recent years' drop in landings is at least partly due to a decline demand for these shrimp. However, it cannot be ruled out that the drop also reflects a decline in the stock.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	n/a
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 1400 t and data collection program for fisheries
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

MSY considerations

The available information is inadequate to evaluate stock trends. The state of the stock is therefore unknown and there is no basis for an advice. The stock trend and exploitation level are unknown.

PA considerations

In the absence of information on stock development, ICES recommends that effort should not be allowed to expand to levels above the average for the years prior to the absence of fishing activities (1999–2003),

corresponding to average landings of 1400 t, and that the fishery must be accompanied by mandatory programmes to collect catch and effort data on both target and bycatch species.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241), this stock is classified under category 6 since the state of the stock is unknown but there is quantitative advice for this stock. There is no TAC for this stock.

STECF COMMENTS: STECF agrees with the ICES recommendation
With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Northern shrimp (Pandalus borealis) on Fladen Ground (Division IVa) should be classified as a category 11 stock.

Accordingly STECF notes that for the rules of the above category there is no basis for other than a TAC based on recent catch levels. However, STECF agrees with ICES and recommends that, if fisheries on this stock is resumed, that effort should not be allowed to expand to levels above the average for the years prior to the present absence of fishing activities (1999-2003), corresponding to average landings of 1400 t

1.2. Northern shrimp (*Pandalus borealis*) in Division IIIa and Division IVa East (Skagerrak and Norwegian Deeps)

FISHERIES: *Pandalus borealis* is fished by bottom trawls at 150–400 m depth throughout the year by Danish, Norwegian and Swedish fleets. Total landings have varied between 10,000 and 15,000 t in the period 1985- 2008. Discarding of small shrimp takes place, mainly due to high grading. In 2009 total landings were around 11000 t, a 15% decrease compared to 2008 landings, while estimated catches (including discards) were around 12,000 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 on the stock fluctuations than the fishery.

REFERENCE POINTS: Limit reference points have not been defined for this stock.

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

	UWTV abundance		
	2008	2009	**2010**
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

The state of the stock is unknown, but there are indications that the stock abundance is decreasing. There is no information on the exploitation status. The LPUEs from Denmark and Norway have been fluctuating since the mid-1990s, but in recent years with a downward trend. Also abundance indices from Norwegian survey indicate a decrease in stock abundance since 2007, and recruitment indices (as 1 year old) from the Norwegian survey indicate decreasing recruitment since 2007, which may imply a further decline in biomass in 2011.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	Landings in 2011
Transition to an **MSY approach** with caution at low stock size	Less than 8800 t Reduce discarding and sorting grids should be mandatory.

Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 8800 t Reduce discarding and sorting grids should be mandatory.
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	

No analytical assessment can be presented for this stock. Therefore, fishing possibilities cannot be projected.

The management of this stock should address the discarding of small shrimps, which occurs mainly in the Swedish fleet due to high-grading as a consequence of restrictive TACs. At present (2009) the estimated discards amount to 7% of the total catch. All vessels, including the increasing number of small Norwegian vessels (<11 m), should be required to fill in and deliver logbooks. Additionally, sorting grids should be mandatory in this fishery in all areas to minimize by-catch.

MSY considerations
The state of the stock is unknown but there are indications that the stock abundance is decreasing. There is no information on the exploitation status. Following the ICES MSY framework implies that catches should be reduced from recent level at rate greater than the rate of stock decrease. Biomass indices from survey suffered a 30% decrease from 2009 to 2010. This implies landings of 8800 tonnes in 2011, which correspond to a decrease of at least 30% of the average landings in 2007–2009 (12 500 t).

PA considerations
On the basis of the current declining stock level and very low level of recruitment index, a reduction in landings is required. A reduction of at least 30% of the recent landings would be an appropriate option. This corresponds to landings of 8800 t in 2011.

Policy paper
In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified as a category 6 stock because the state of the stock is unknown but survey indices indicate a decreasing trend in the biomass. This would imply a 15% decrease in TAC for 2011 compared to the 2010 TAC .

STECF COMMENTS: STECF agrees with ICES that the state of the stock is uncertain and that survey indices indicate decline in both recruitment and stock biomass in recent years., STECF notes that there have been large fluctuations since 1990s, both in recruitment and stock size. However, the continuous decline of both indices from 2007 to 2010 give reason for caution. In relation to precautionary considerations STECF therefore agrees with ICES that catches from this stock should be reduced significantly. STECF also agrees with ICES that the management of this stock should address the discarding of small shrimps, due to high-grading as a consequence of restrictive TACs. Furthermore, STECF 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.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Northern shrimp (Pandalus borealis) Division IIIa (West) and Division IVa East falls under Category 6.
Accordingly STECF notes that the rule 5b for the above category would imply a TAC in 2011 of 12373 t, based on a 15% reduction on the 2010 TAC.

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

FISHERY: Catches taken in Divisions IVb,c and VIId 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 2009 was 44,223 tonnes, which represents a 27% increase compared to 2008. 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 VIId, 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.

REFERENCE POINTS: No reference points are set for this stock, as there is insufficient information to estimate reference points.

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	2009
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa}, F_{lim})	?	?	?

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{pa}, B_{lim})	?	?	?

The available information is inadequate to evaluate spawning stock or fishing mortality relative to risk, so the state of the stock is unknown. Since 1998 catches have been substantially higher than in the years prior to 1998 but the sustainability of these recent catches cannot currently be assessed. There is no obvious indication from these data that recent catches have been detrimental the stock. However, the status of the stock cannot be accurately determined because the available data are inadequate to estimate either the current population size or the intensity of fishing. Recent recruitments (2006–2008) may be weak.

MANAGEMENT AGREEMENTS: Since 2010, EU TAC for North Sea area includes Divisions IVb,c and VIId. In the past Division VIId was not considered in the North Sea TAC regulation area. The assessment area of North Sea horse mackerel also includes catches from Division IVa during the two first quarters of the year. TAC of Division IVa is included in a different management area together with Divisions IIa, VIIa-c, VIIe-k, VIIIa, VIIIb, VIIId, VIIIe, Sub-area VI, and EU and international waters of Division Vb and international waters of XII and XIV. There is no TAC for Division IIIa.

In June 2009, an agreement was concluded between contracting parties to the Coastal States on mackerel banning highgrading, discarding, and slipping from pelagic fisheries targeting mackerel, horse mackerel, and herring beginning in January 2010.

RECENT MANAGEMENT ADVICE: The ICES advice is that the state of the stock is unknown and there is no basis for an advice.

PA approach

Since 1998 catches have been substantially higher than in the years prior to 1998 but the sustainability of these recent catches cannot currently be assessed. However, indications from the fishery are that these catches have not resulted in a truncation of the age structure in the stock but recent recruitments (2006–2008) may be weak. This information is not sufficient to provide a basis for advice.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 11.

STECF COMMENTS: STECF notes that the state of the stock is not known precisely.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that horse mackerel in the North Sea falls under Category 11. Due to the changes of TAC areas in 2010 for this stock, the historical TAC cannot be used as basis for the TAC advice under category 11. Recent average catches (2007-2009) for Division IIIa, Divisions IVb,c and VIId comprise 28,514 tonnes (landings) and 292

tonnes (discards). Accordingly STECF notes that the rules for the above category imply a TAC in 2011 at 28,514 tonnes.

STECF notes that a catch at age matrix is available for the period since 1995, which could have been used for e.g. catch curve analysis or similar simple analyses.

1.4. 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. Landings in 2008 and 2009 were 36,100 t and 54,500 t respectively. Due to the very high 2009 recruitment landings is expected to exceed 100,000 t in 2010.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The analytical seasonal XSA assessment model fitted for this stock is based on time-series of catch-at-age, four quarterly commercial cpue series, and four research survey series.

The stock is assessed twice a year. The spring assessment provides stock status up to 1st of April of the current year. The autumn assessment provides stock status for the current year and a forecast of fishing possibilities in the next year.

MANAGEMENT OBJECTIVES: No management objectives have been set for this stock. Due to the short-lived nature of this species a preliminary TAC is set every year, which is updated on the basis of in year advice.

ICES has evaluated and commented on three management strategies, following requests from managers – fixed fishing mortality (0.35), fixed TAC (50 000 t), and a variable TAC escapement strategy. The evaluation shows that all three management strategies are capable of generating stock trends that stay away from B_{lim} with a high probability in the long-term and are therefore considered to be in accordance with the precautionary approach.

REFERENCE POINTS:

	Type	Value	Technical basis
MSY Approach	MSY $B_{escapement}$	150 000 t	= B_{pa}
	F_{msy}	Undefined	None advised
Precautionary approach	B_{lim}	90 000 t	B_{lim} = B_{loss}, the lowest observed biomass in the 1980s
	B_{pa}	150 000 t	= B_{lim} $e^{0.3*1.65}$
	F_{lim}	Undefined	None advised
	F_{pa}	Undefined	None advised

STOCK STATUS:

F (Fishing Mortality)	2007	2008	2009
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

SSB (Spawning Stock Biomass)	2008	2009	2010
MSY ($B_{escapement}$)	−	+	+
Precautionary approach (B_{pa},B_{lim})	o	+	+

The stock size has increased recently and is considered to be above MSY $B_{escapement}$ in 2010 and 2011. Fishing mortality has generally been lower than the natural mortality for this stock and has decreased in recent years well below the long term average F (0.6). Recruitment was well above average in 2009, but is estimated to be very low in 2010.

RECENT MANAGEMENT ADVICE:

Advice for 2011

Management Objective (s)	**Landings in 2011**
MSY approach with caution at low stock size	No directed Norway pout fishery (0 t)
Cautiously avoid impaired recruitment (**Precautionary Approach**)	No directed Norway pout fishery (0 t)
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

With the objective of maintaining the spawning stock biomass above a reference level of MSY $B_{escapement}$ by 1st of January 2012, no catch of Norway pout can be taken according to the MSY approach in 2011. This is because the SSB is expected to fall below MSY $B_{escapement}$ due to the very low 2010 recruitment and the high natural mortality of the stock.

PA approach

The PA approach (to maintain SSB(2012) above Bpa= MSY $B_{escapement}$) is similar to the MSY approach for this species.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 5 since this is a short lived species. The resulting TAC for directed Norway pout fishery for 2011 would be 0 t.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stock and the advice for 2011.

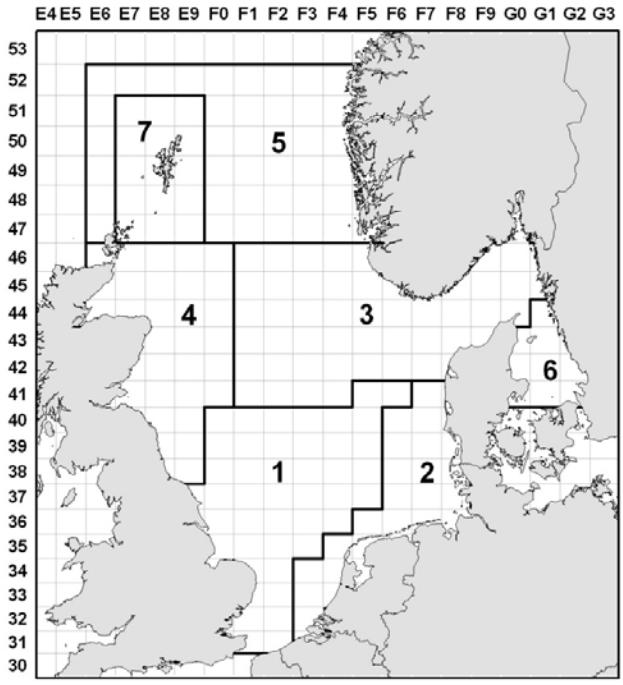
With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Norway pout in Divisions IIa, IIIa and Subarea IV falls under Category 5. Accordingly STECF notes that the rules specify that a provisional TAC is set and will be changed when new information is available during the year. STECF advises that with the objective to maintain the spawning stock biomass above a reference level of MSY $B_{escapement}$ by 1st of January 2012, no catches can be taken in 2011. This advice will be changed when new ICES advice becomes available in June 2011.

1.5. Sandeel (*Ammodytidae*) in the North Sea (IV), Skagerrak and Kattegat (IIIa)

Prior to 2010, ICES presented advice for this area in three units: North Sea excluding Shetland area, the Shetland area and Skagerrak-Kattegat. Based on the results from a benchmark assessment, September 2019, ICES will present advice for the North Sea sandeel divided into 7 areas from 2010 onwards (see text table below). This change was made to better reflect the stock structure of sandeel in the North Sea and to enable management to direct action avoiding local depletions, as has been repeatedly advised in recent years. The level of information available per area differs and the level of detail per advice will differ accordingly.

Section	Sandeel Area (SA)	Name	Rectangles
1.5.1	1	Dogger Bank area	31-34 E9-F2; 35 E9- F3; 36 E9-F4; 37 E9-F5; 38-40 F0-F5; 41 F5-F6
1.5.2	2	South Eastern North Sea	31-34 F3-F4; 35 F4-F6; 36 F5-F8; 37-40 F6-F8; 41 F7-

			F8
1.5.3	3	Central Eastern North Sea	41 F1-F4; 42-43 F1-F9; 44 F1-G0; 45-46 F1-G1; 47 G0
1.5.4	4	Central Western North Sea	38-40 E7-E9; 41-46 E6-F0
1.5.5	5	Viking and Bergen Bank area	47-51 E6 + F0-F5; 52 E6-F5
1.5.6	6	Division IIIa East (Kattegat)	41-43 G0-G3; 44 G1
1.5.7	7	Shetland area	47-51 E7-E9



Map of Sandeel Areas (SA)

For areas 1, 2 and 3, an analytical assessment of the stock is available in October. ICES provides a preliminary forecast in October based on assumptions on recruitment. ICES will provide a forecast for areas 1, 2 and 3 in February of the TAC year based on a dredge surveys in December for recruitment estimate. In Area 3, the dredge survey may not yet be sufficient to use as the basis for advice, and real time monitoring may be needed to estimate appropriate catch levels. In the other areas, the information level is low.

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 consists of *Ammodytes marinus*, but other sandeel species are caught as well. By-catch of other species is low. Sandeels 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 t and 1,200,000 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. Catches in 2010 amount to 395,000 t. Catch possibilities are largely dependent on the size of the recruiting year-class.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. Analytical assessments are available for sandeel in Area 1-3. Catches in the remaining areas have been less than 1% of the total since 2005, but considerably higer before 2005. The assessment of the North Sea sandeel is based on a seasonal age-based assessment using total commercial effort and fisheries independent data from dredge surveys.

MANAGEMENT OBJECTIVES: No management objectives have been set for this stock. Two management systems are in operation for the sandeel in the North Sea, Skagerrak and Kattegat. The EU management system covers the sandeel fisheries in EU waters and the Norwegian system covers the fisheries in Norwegian waters.

Due to the short-lived nature of sandeel a preliminary TAC for sandeel can be set on the basis of the ICES autumn advice, and updated in February on the basis of the recruitment strength estimated from dredge surveys in December. Additional real time monitoring in the beginning of the fishing season (April) might be necessary to provide catch options for sandeel in Area 3 due to the relatively low quality of the dredge survey in this area.

RECENT MANAGEMENT ADVICE:

For short-lived species such as sandeel, the ICES interpretation of the MSY concept uses Bpa estimates as the default value for MSY $B_{escapement}$. Advice is based upon the stock being at least MSY $B_{escapement}$ in the year after the advised fishery has taken place. The escapement strategy should allow for sufficient stock to remain for successful recruitment whilst providing adequate resource for predators of sandeel. ICES provides advice separately for the 7 areas.

STECF COMMENTS:

STECF notes the improvements made by ICES on the area based stock assessment of sandeel in the North Sea by applying the new statistical assessment model which makes use total international fishing effort and fishery independent data from dredge surveys.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that sandeel in all areas fall under Category 5, because sandeel is short-lived. For Area-1, Area-2, Area-3 and probably also Area-4 sandeel the "Action to take in setting TAC" states that "A provisional TAC is set and will be changed when new information is available during the year". For Area 1-4 sandeel new information becomes available when the results from the Danish and Scottish dredge survey in December 2010 are compiled.

Because STECF is unable to provide specific advice for management of Area 5-7 sandeel, these stocks may also be classified under Category 11. STECF notes that the rules for Category 11 prescribe that TACs should be adjusted towards recent real catch levels but should not be changed by more than 15% per year or Member States should develop an implementation plan to provide advice within a short time. Furthermore, where appropriate, there should be no increase in fishing effort. STECF notes that the recent catch levels have been zero (Area 5, Viking Bank; Area 7, Shetland) or low (Area 6, Kattegat; average (since the stock collapse in 2003)=423 t). There is no separate TAC by these areas. STECF therefore notes that a way of implementing the rules for category 11 could be "No increase in effort". Such effort limitation would allow higher landings from Area 6 in case of higher recruitment.

STECF notes that the forecast options for 2011 provided by ICES is provisional and may be subject to revision pending the outcome of the dredge surveys in December. However, a preliminary TAC could be set such that there is high likelihood that the target escapement will be achieved or exceeded (e.g. assumed recruitment at 20-40% of long term average). This TAC should then be adjusted when information on the recruitment strength becomes available in February. STECF notes that this approach is in accordance with the rules specified for Category 5 stocks.

STECF notes that a management plan needs to be developed for sandeel to take into account that sandeel in the North Sea area consist of several sub-stocks. With the 7 sandeel sub-stocks the present aggregated management approach (overall TAC for the North Sea) runs the risk of unbalanced effort distribution. Adoption of management initiatives to ensure that effort can be appropriately controlled in stock areas within the overall TAC area is recommended.

Furthermore, STECF notes the ICES approach for MSY based management of a short-lived species as sandeel is the escapement strategy, i.e. to maintain SSB above MSY $B_{escapement}$ after the fishery has taken place. For some areas the ICES preliminary outlook table indicates that the escapement strategy would imply a several-fold increase in F in 2011 if recruitment (age 0) in 2010 is of average strength. However, taking the historical F and stock development into account, STECF agrees with the ICES recommendation for the development of F reference points (F ceiling).

1.5.1. Sandeel (*Ammodytidae*) in Area-1 (The Dogger bank area)

REFERENCE POINTS:

Type	*Value*	*Technical basis*

MSY Approach	MSY $B_{escapement}$	215 000 t	= B_{pa}
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	160 000 t	Median SSB in the years (2000-2006) of lowest SSB and no impaired recruitment (WKSAN, 2010)
	B_{pa}	215 000 t	$B_{pa}=B_{lim}*exp^{(\sigma*1.645)}$ with σ=0.18 estimated from assessment uncertainty in the terminal year (WKSAN, 2010)
	F_{lim}	Not defined	
	F_{pa}	Not defined	

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS:

F (Fishing Mortality)			
	2008	2008	**2010**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

SSB (Spawning Stock Biomass)			
	2009	2010	**2011**
MSY ($B_{escapement}$)	+	+	+
Precautionary approach (B_{pa},B_{lim})	+	+	+

The stock at the start of 2011 is expected to be at full reproductive capacity owing to the large recruitment in 2009. Fishing mortality decreased in 2005 from a high level and has since fluctuated without trend.

RECENT MANAGEMENT ADVICE: Advice will be provided in February 2011 when the recruitment strength is known from dredge survey in December.

MSY approach

Due to the large 2009 year class, the preliminary outlook for 2012 shows that a TAC of 210 000 t in 2011 is possible even assuming a total recruitment failure in 2010. This would result in an SSB in 2012 at the level of MSY $B_{escapement}$= 215 000 t.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 5, because this is a short-lived species. ICES notes that the TAC and the stock assessment areas do not match.

Additional considerations

Statistics show that the dredge survey is sufficiently robust to provide an estimate of the incoming 1-group such that the fishing opportunities for the coming year can be established in February. Although this relationship appears to be robust it may be prudent to continue with some level of real-time monitoring in years where the dredge survey result is outside the bounds of the current observations particularly at the lower bound. Data for such evaluation will be available. Recording of catch and effort is almost at real time. There will be regular biological samples passed to DTU-Aqua as part of the standard monitoring process every year, but the requirement for real-time monitoring would only occur when the dredge survey is beyond historically observed bounds.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock.

See the general STCEF notes on sandeel in the introduction section to sandeel (section 1.5).

1.5.2. Sandeel (*Ammodytidae*) in Area-2 (South Eastern North Sea)

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{escapement}$	100 000 t	= B_{pa}
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	70 000 t	Median SSB in the years (2000-2006) of lowest SSB and no impaired recruitment (WKSAN, 2010)
	B_{pa}	100 000 t	$B_{pa}=B_{lim}*exp^{(\sigma*1.645)}$ with σ=0.23 estimated from assessment uncertainty in the terminal year (WKSAN, 2010)
	F_{lim}	Not defined	
	F_{pa}	Not defined	

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS:

	F (Fishing Mortality)		
	2008	2008	**2010**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

	SSB (Spawning Stock Biomass)		
	2009	2010	**2011**
MSY ($B_{escapement}$)	+	+	+
Precautionary approach (B_{pa},B_{lim})	+	+	+

Due to low value of F (around 0.1) since 2007 and the strong 2009 year class, SSB in 2011 is estimated more than twice as high as B_{pa}.

RECENT MANAGEMENT ADVICE: Advice will be provided in February 2011 when the recruitment is known from dredge survey in December.

MSY approach

Due to the large 2009 year class, the preliminary outlook for 2011 shows that a TAC of just over 50 000 t in 2011 is possible even assuming a total recruitment failure in 2010. This would result in an SSB in 2012 at the level of MSY $B_{escapement}$ of 100 000 t.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 5, because this is a short-lived species. ICES notes that the TAC and the stock assessment areas do not match.

Additional considerations

There appears to be a sufficiently robust relationship between the recruitments in Areas 1 and 2 to be able to use the same data sources and procedures from Area 1 for the estimation of the incoming year class. However, the sampling coverage for the dredge survey in December should be increased within area 2.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock.

See the general STCEF notes on sandeel in the introduction section to sandeel (section 1.5).

1.5.3. Sandeel (*Ammodytidae*) in Area-3 (Central Eastern North Sea)

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{escapement}$	195 000 t	= B_{pa}
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	100 000 t	The highest SSB (in 2001) in the period (2001-2007) with the lowest SSB and low recruitment (WKSAN, 2010)
	B_{pa}	195 000 t	$B_{pa}=B_{lim}*exp^{(\sigma*1.645)}$ with σ=0.40 estimated from assessment uncertainty in the terminal year (WKSAN, 2010)
	F_{lim}	Not defined	
	F_{pa}	Not defined	

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS:

F (Fishing Mortality)			
	2008	2008	**2010**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

SSB (Spawning Stock Biomass)			
	2009	2010	**2011**
MSY ($B_{escapement}$)	−	+	−
Precautionary approach (B_{pa},B_{lim})	o	+	o

The stock has increased from the record low SSB in 2004 at half of Blim to above Bpa in 2010. SSB in 2011 is estimated to be below B_{pa}. Recruitment was above the long term mean in 2001 and has been below since. F has been below the long term mean since 2004, however highly variable between years.

RECENT MANAGEMENT ADVICE: Advice will be provided in February 2011 when the recruitment is known from dredge survey in December.

MSY approach

Because SSB is below Bpa in 2011 in combination with a below average recruitment in 2009, SSB in 2012 will only be above MSY $B_{escapement}$ (195 000 t) if the recruitment in 2010 is more than 60% of the long term recruitment. In case of low recruitment in 2010 there can be no fishery in 2011.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 5, because this is a short-lived species. ICES notes that the TAC and the stock assessment areas do not match.

Additional considerations

Pre-season estimates of the incoming year class appear less robust for this area and it is therefore appropriate that in-season monitoring (e.g. acoustic monitoring and age-based commercial cpue) to continue in Area 3. The quality (internal and external consistency) of the acoustic survey is yet unknown and the consistency of dredge data is less in Area 3 than in the other areas.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock.

See the general STCEF notes on sandeel in the introduction section to sandeel (section 1.5).

1.5.4. Sandeel (*Ammodytidae*) in Area-4 (Central Western North Sea)

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

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS:

	F (Fishing Mortality)		
	2008	2008	**2010**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

	SSB (Spawning Stock Biomass)		
	2009	2010	**2011**
MSY ($B_{escapement}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

Landing data area are not sufficient for a traditional age-based assessment, however the very limited effort applied in the area indicates a very low fishing mortality. The results from the dredge survey show a high recruitment in 2009 as observed in Areas 1 and 2. This is expected to lead to a considerable increase in SSB for 2011.

RECENT MANAGEMENT ADVICE: Based on the dredge survey results in December 2009, the recruitment in 2009 was high. No forecast can be presented for this stock because catch and survey data area not sufficient for a traditional age-based assessment.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 5, because this is a short-lived species. ICES notes that the TAC and the stock assessment areas do not match.

Additional considerations

In the light of studies linking low sandeel availability to poor breeding success of kittiwake, all commercial fishing in the Firth of Forth area has been prohibited since 2000, except for a short-term fishery in May and June of each year for stock monitoring purposes. This closure includes most of the fishing banks in Area 4 and provides therefore a low risk of overfishing in Area 4.

A few banks (e.g. Turbo bank) outside the closed area have historically provided large landings. There was almost no sandeel fishery in Area 4 in 2010, probably due to very high catch rates on other banks closer to the landing sites in Denmark and Norway.

Whilst it is important to continue Scottish dredge survey the overlap between this and the commercial time series is too short to provide robust estimates of incoming 1-group strength. There has been little or no information for this area from the in-year monitoring system in recent years due to the low commercial effort level expended in the area. Until there is sufficient overlap in the time series of dredge survey and commercial data there will be no scientific basis to propose a catch advice.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock.

STECF notes that fishery independent data indicates that the stock is increasing. However data are not sufficient for a traditional age-based assessment and no forecast can be presented for this stock even when new data (dredge survey) becomes available in February. STECF notes that average catches from Area-4 after the closure of Firth of Forth in 2000 have been at 15,600 t, however at a much lower level after 2003.

See the general STCEF notes on sandeel in the introduction section to sandeel (section 1.5).

1.5.5. Sandeel (*Ammodytidae*) in Area-5 (Viking and Bergen Bank area)

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

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS:

	F (Fishing Mortality)		
	2008	2008	**2010**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

	SSB (Spawning Stock Biomass)		
	2009	2010	**2011**
MSY ($B_{escapement}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

Only catch statistics are available for this stock. The available information is inadequate to evaluate stock status or trends. The state of the stock is therefore unknown.

RECENT MANAGEMENT ADVICE: There is no basis for an advice.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock assessment area is classified under category 11 because there is no advice for this area. ICES notes that the TAC and the stock assessment areas do not match.

STECF COMMENTS: STECF agrees with the ICES assessment that the state of the stock is unknown.

See the general STCEF notes on sandeel in the introduction section to sandeel (section 1.5).

1.5.6. Sandeel (*Ammodytidae*) in Area-6 (Division IIIa East (Kattegat))

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

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS:

	F (Fishing Mortality)		
	2008	2008	**2010**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

	SSB (Spawning Stock Biomass)		
	2009	2010	**2011**

MSY ($B_{escapement}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

Only catch statistics are available for this stock. The available information is inadequate to evaluate stock status or trends. The state of the stock is therefore unknown.

RECENT MANAGEMENT ADVICE: There is no basis for an advice.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock assessment area is classified under category 11 because there is no advice for this area. ICES notes that the TAC and the stock assessment areas do not match.

STECF COMMENTS: STECF agrees with the ICES assessment that the state of the stock is unknown.

See the general STCEF notes on sandeel in the introduction section to sandeel (section 1.5).

1.5.7. Sandeel (*Ammodytidae*) in Area-7 (Shetland area)

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

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS:

	F (Fishing Mortality)		
	2008	2008	**2010**
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	?	?	?

	SSB (Spawning Stock Biomass)		
	2009	2010	**2011**
MSY ($B_{escapement}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

Only catch statistics are available for this stock. The available information is inadequate to evaluate stock status or trends. The state of the stock is therefore unknown.

RECENT MANAGEMENT ADVICE: There is no basis for an advice.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock assessment area is classified under category 11 because there is no advice for this area. ICES notes that the TAC and the stock assessment areas do not match.

STECF COMMENTS: STECF agrees with the ICES assessment that the state of the stock is unknown.

See the general STCEF notes on sandeel in the introduction section to sandeel (section 1.5).

1.6. Sprat (*Sprattus sprattus*) in ICES Division IIIa

FISHERIES: The fisheries in IIIa are carried out by Denmark and Sweden using trawlers and along the Swedish coast by small purse seiners. Catches of sprat in Division IIIa averaged about 70,000 t in the 1970s, but since 1982 have typically been below 20,000 t. ICES estimates the catch in 2009 to be 9,000 t. 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.

REFERENCE POINTS: No 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.

MANAGEMENT OBJECTIVES: 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. 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.

RECENT MANAGEMENT ADVICE: ICES gives no advice for this stock.

STECF COMMEMTS: STECF agrees with the ICES assessment that the state of the stock is unknown.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that sprat in Division IIIa falls under Category 5. Accordingly STECF notes that the rules for the above category imply that a provisional TAC be set.

However, because STECF is unable to provide specific advice for management, sprat in Division IIIa may also be is classified under Category 11. STECF notes that the rules for category 11 prescribe that TACs should be adjusted towards recent real catch levels but should not be changed by more than 15% per year or Member States should develop an implementation plan to provide advice within a short time. Furthermore, where appropriate, there should be no increase in fishing effort. STECF notes that the recent catch levels (average 2007-2009) were 11.333 t. adjusting the 2011 TAC in line with recent catch levels would represent a 78% change on the 2010 TAC. STECF therefore notes that the rules for category 11 prescribe a TAC for sprat in Division IIIa in 2011 of 44,200 t, representing a 15% decrease on the 2010 TAC.

1.7. Sprat (Sprattus sprattus) in the North Sea (Subarea IV)

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. In the last 10 years landings have been at or below 200,000 t. Estimated total landings in 2008 and 2009 were around 61,000 t and 133,000 t respectively.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is based on indicators derived from three research vessel surveys.

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

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

STOCK STATUS: The state of the stock is unknown.

RECENT MANAGEMENT ADVICE: ICES gives no advice for this stock. ICES notes that the sprat stock in the North Sea is short-lived and the catch is dominated by young fish. The stock size is mostly driven by the recruiting year class. Thus, the fishery in a given year is dependent on that year's incoming year class.

STECF COMMENTS: STECF agrees with the ICES assessment that the state of the stock is unknown.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF considers that because sprat is a short-lived species it should be assigned to category 5. Accordingly STECF notes that the rules for category 5 prescribe that a provisional TAC is set and will be changed when new information is available during the year. No new information was available from ICES in October 2010 on the status of the sprat stock.

However, because STECF is unable to provide specific advice for management, sprat in the North Sea may also be is classified under Category 11. STECF notes that the rules for category 11 prescribe that TACs should be adjusted towards recent real catch levels but should not be changed by more than 15% per year or Member States should develop an implementation plan to provide advice within a short time. Furthermore, where appropriate, there should be no increase in fishing effort. STECF notes that the recent catch levels (average 2007-2009) were 92,667 t. adjusting the 2011 TAC in line with recent catch levels would represent a 45% change on the 2010 TAC. STECF therefore notes that the rules for category 11 prescribe a TAC for sprat in the North Sea in 2011 of 144,500 t, representing a 15% decrease on the 2010 TAC.

1.8. 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 (1957-2007). The landings in 2008 and 2009 are around 14 100 t and 14 000 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.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	35 000 t	Default to value of B_{pa}
	F_{msy}	0.22	Provisional estimate, median of stochastic MSY analysis assuming Ricker Stock-Recruit relationship (range 0.13-0.39)
Precautionary Approach	B_{lim}	25 000 t	B_{loss}
	B_{pa}	35 000 t	B_{pa}1.4*B_{lim}
	F_{lim}	Not defined	
	F_{pa}	0.4	F_{pa} = 0.4 implies $B_{eq} > B_{pa}$ and $P(SSB_{MT} < B_{pa}) < 10\%$

MANAGEMENT AGREEMENTS: A multiannual 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:

F (Fishing Mortality)			
	2007	2008	**2009**
MSY (F_{msy})	⊖	⊖	⊖
Precautionary approach (F_{pa},F_{lim})	⊖	⊕	⊕

SSB (Spawning Stock Biomass)			
	2008	2009	**2010**
MSY ($B_{trigger}$)	⊕	⊖	⊖
Precautionary approach (B_{pa},B_{lim})	⊕	o	o

SSB has fluctuated around the precautionary reference points for the last decade. Fishing mortality has shown a declining trend since 1995 and is estimated to be below F_{pa} in 2008 and 2009.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 13 800 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 15 500 t
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	13 600 t

ICES has developed a generic approach to evaluate whether new survey information that becomes available in September forms a basis to update the advice. If this is the case, ICES will publish new advice in November 2010.

MSY approach: Following the ICES MSY framework based on a Ricker stock-recruit relationship implies fishing mortality to be reduced to 0.22 (because SSB 2011 > MSY $B_{trigger}$), resulting in landings of less than 9.650.t in 2011. This is expected to lead to an SSB of 40 500 t in 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced to ((0.36*0.8) + (0.22 *0.2)) = 0.33 (higher than F_{msy}), resulting in landings of less than13 800 t in 2011. This is expected to lead to an SSB of 36 600 t in 2012

PA approach: F could be increased by up to 6% and SSB would likely be above B_{pa} in 2012. This corresponds to landings of less than 15 500 t in 2011.

Management plan: Following the EU management plan implies a 10% reduction of F (TAC of 13 600 t in 2011, implying a 10% reduction in fishing effort), this is expected to lead to an SSB of 36 900 t in 2012. This leads to a TAC reduction of 4%, being within the 15% bounds of the management plan TAC change constraints.

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 agrees with the ICES assessment of the state of the stock. However, in the light of revised recruitment estimates derived from surveys undertaken in September/October 2010, STECF notes that the landings advised by ICES corresponding to the provisions of the multi-annual management plan are underestimated.

STECF notes that the value for F_{msy} for sole in the North Sea is provisional and may be subject to revision pending the outcome of further investigations by ICES.

STECF notes that since the advice from ICES on North Sea sole was released in June 2010, new information on recruitment has become available from surveys carried out in September 2010. These surveys indicate the presence of a higher number of 1 year old fish and a lower number of 2 year old fish than was assumed for the advice. In order to test whether these differences are significant, RCT3 analyses were run including only the survey in question. These test RCT3 analyses come up with a number of 192 100 age-1 fish (assumed in advice:

94 000) and 64 200 age-2 fish (assumed in advice: 91 400), giving rise to D-values of 2.40 and -1.21 for the 1-year old and 2-year old fish respectively (D = (log(new) – log(old))/internal standard error). Both D-values thus fall outside 1 standard error and therefore indicate that the differences are significant for both ages. If, therefore, the new index values are used in RCT3 analyses with all surveys included to arrive at new estimates, a number of 148 935 results for the 1-year old and a number of 75 082 for the 2-year old fish.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that sole in Division IV falls under Category 4. Taking into account the revised recruitment estimates for North Sea sole, STECF notes that in accordance with the multi-annual management plan landings in 2011 should be 14,100 t. (This figure is calculated on the basis of a 10% reduction of F in 2011 compared to F in 2010, being within the 15% bounds of the management plan TAC change constraints).

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

FISHERIES: Total landings from Farn increased in 2009: from 1218 t in 2008 to 2711 t in 2008 an increase of around 100% reaching the level of 2007 but still far below the level in 2006. 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. The assessment is based UWTV surveys of absolute abundance. At the ICES Benchmark Workshop on *Nephrops* in 2009 major sources of bias were quantified for the TV surveys and an overall bias correction factor derived which, when applied to the estimates of abundance from the UWTV surveys, allows them to be treated as absolute abundance levels.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	958 million	Bias-corrected UWTV survey index at start of current decline (2007)
	F_{msy}	Harvest ratio 12.9%	Equivalent to $F_{35\%SpR}$ combined sex in 2010
Precautionary Approach	$F_{0.1}$	Not Agreed	
	F_{max}	Not Agreed	

STOCK STATUS: The UWTV survey, fishery data and length frequency data all point to the stock continuing to be at a low level.

F (Fishing Mortality)			
	2007	2008	**2009**
MSY (F_{msy})	⊖	⊕	⊖
Precautionary approach (F_{pa},F_{lim})	?	?	?

UWTV abundance			
	2008	2009	**2010**
MSY ($B_{trigger}$)	⊖	⊖	⊖
Precautionary approach (B_{pa},B_{lim})	?	?	?

The UWTV survey, fishery data and length frequency data all point to the stock continuing to be at a low level.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 1 900 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	n/a
Cautiously avoid impaired recruitment and achieve other objective(s) of	n/a

a **management plan** (e.g., catch stability)	

MSY approach

Following the ICES MSY framework implies Harvest Ratio to be reduced to 10.3 % (20% lower than F_{MSY} because SSB is 20% below Btrigger), resulting in landings of 1 400 t in 2011.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced to $(0.8*F_{2010} + 0.2*F_{MSY}*SSB_{2011}/MSYB_{trigger}) = 13.5\%$ resulting in landings of 1900 t in 2011.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified as a category 6 stock. Annex IV.1 would apply as the stock is overfished with respect to F_{msy}. ICES notes that the TAC area and the stock assessment area do not match.

To protect the stock in this Functional Unit, management should be implemented at the Functional Unit level.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advised forecast catch options for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that FU6 *Nephrops* falls under Category 6. Accordingly STECF notes that the rule IV.1 for the above category would imply a TAC in 2011 of 2086 t if managed by a separate TAC. This is based on a 15% reduction on the 2010 partial TAC of 2454 t for this FU (See Section 1.1). However, STECF considers that application of Rule IV.1 to be inappropriate given that this FU is considered to be in poor condition. Therefore STECF propose to replace the resulting value from the rule IV.1 (2086) with 1,900 t (the advice).

STECF **recommends** that the various *Nephrops* FUs are managed separately.

1.10. Cod (*Gadus morhua*), in the North Sea (IIa, IIIa Skagerrak, IV and VIId)

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, seine nets, gill nets, long-lines and beam trawl. The stock is managed by TAC through joint negotiation between the EU and Norway, technical 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 24,400 t in 2007. Reported landings for 2008 and 2009 were about 26 800 t and 30 800t respectively. The assessment area for this stock includes ICES Divisions IIIa (Skagerrak), VIId 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 VIId, 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, 2008 and 2009 Scottish, Danish, German, and England & Wales discard estimates were combined and used to raise landings-at-age for remaining nations in Subarea IV. Discards in Division IIIa were based on observer estimates. For 2006-2009, Danish and Swedish discard estimates were combined to raise landings-at-age from the remaining nations in Division IIIa.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	150 000 t	The default option of $\mathbf{B}_{pa}$
	F_{msy}	0.19	Provisional proxy is F_{max} 2010, within the range of Fishing mortalities

			consistent with F_{msy} (0.16 - 0.42)
Precautionary approach	B_{lim}	70 000 t	**B_{loss} (~1995)**
	B_{pa}	150 000 t	**B_{pa}** = Previous MBAL and signs of impaired recruitment below 150 000 t.
	F_{lim}	0.86	**F_{lim}** = **F_{loss}** (~1995)
	F_{pa}	0.65	**F_{pa}** = Approx. 5th percentile of **F_{loss}**, implying an equilibrium biomass > **B_{pa}**.

MANAGEMENT AGREEMENT: In 2005 the EU and Norway revised their initial agreement from 1999 and agreed to implement a long-term management plan for the cod stock. This plan was again updated in December 2008 and entered into force on 1 January 2009. The plan aims to be consistent with the precautionary approach and is intended to provide for sustainable fisheries and high yield leading to a target fishing mortality to 0.4. The main changes between the 2009 and 2005 plans is a phasing (transitional and long-term phase) and the inclusion of an F reduction fraction. That is:

Transitional arrangement:
F will be reduced as follows: 75 % of F in 2008 for the TACs in 2009, 65 % of F in 2008 for the TACs in 2010, and applying successive decrements of 10 % for the following years.
The transitional phase ends as from the first year in which the long-term management arrangement leads to a higher TAC than the transitional arrangement.

F reduction fraction
If the size of the stock on 1 January of the year prior to the year of application of the TACs is:

- Above the precautionary spawning biomass level, the TACs shall correspond to a fishing mortality rate of 0.4 on appropriate age groups;
- Between the minimum spawning biomass level and the precautionary spawning biomass level, the TACs shall not exceed a level corresponding to a fishing mortality rate on appropriate age groups equal to the following formula:
- 0.4 - (0.2 * (Precautionary spawning biomass level - spawning biomass) / (Precautionary spawning biomass level - minimum spawning biomass level))
- At or below the limit spawning biomass level, the TAC shall not exceed a level corresponding to a fishing mortality rate of 0.2 on appropriate age groups.

The plan shall be subject to triennial review, the first of which will take place before 31 December 2011.

The EU has adopted a long-term plan for this stock with the same aims as the EU-Norway plan (Council Regulation (EC) 1342/2008).

ICES has evaluated the EU management plan in 2009 and considers it to be in accordance with the precautionary approach if it is implemented and enforced adequately. Discarding in excess of the assumptions under the management plan will affect the effectiveness of the plan. The evaluation is most sensitive to assumptions about implementation error (i.e. TAC and effort overshoot and the consequent increase in discards).

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY (F_{msy})	⛔	⛔	⛔
Precautionary approach (F_{pa},F_{lim})	⚠	⚠	⚠

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)	⛔	⛔	⛔
Precautionary approach (B_{pa},B_{lim})	⛔	⛔	⛔

SSB has increased since its historical low in 2006, but remains below B_{lim}. Fishing mortality declined after 2000, and although its most recent trajectory is considered uncertain, it is estimated to be well above the long-

term objectives of maximum yield, and likely above Fpa. Recruitment since 2000 is poor. The assessment this year is considered more uncertain than the assessment conducted last year.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	5700 t to 40 900 t for transition to the MSY framework by 2011 to 2015, respectively.
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Zero
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	32 240 t

MSY approach: Following the ICES MSY framework implies fishing mortality to be reduced to 0.07 (lower than F_{MSY} because SSB 2011 < MSY $B_{trigger}$), resulting in landings *including unallocated removals* of less than 5700 t in 2011. This is expected to lead to an SSB of 93 400 t in 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced to ((0.8*0.85) + (0.2*(0.19*0.33))) = 0.69, but as this is higher than F_{pa}, this is maximised at 0.65. This results in landings *including unallocated removals* of less than 40 900 t in 2011. This is expected to lead to an SSB of 53 900 t in 2012.

The stock is below B_{lim} and recruitment is poor. Therefore, a more rapid transition to the MSY framework may be necessary to rectify the situation. ICES highlights catch options for transition periods ranging from 1–5 years (2011 to 2015, respectively).

PA approach: Even a zero catch in 2011 is not expected to result in SSB reaching B_{pa} in 2012.

Management plan: The EU–Norway agreement management plan as updated in December 2008 aims to be consistent with the precautionary approach and is intended to provide for sustainable fisheries and high yield leading to a target fishing mortality to 0.4.

The EU has adopted a long-term plan for this stock with the same aims (Council Regulation (EC) 1342/2008). In addition to the EU-Norway agreement the EU plan also includes effort restrictions reducing kw-days available to community vessels in the main metiers catching cod in direct proportion to reductions in fishing mortality until the target F of 0.4 has been reached. This implies a 13.3% reduction in effort in 2010.

In both plans fishing mortality should be reduced to levels corresponding to 75% of F2008 in 2009 and 65% of F2008 in 2010. As long as the long-term phase of the management plans is not reached, in subsequent years further successive reductions of 10% have to be applied leading to a F in 2011 equal to 55% of F2008. This would lead to a TAC reduction of more than 20%. The management plans limits annual TAC variation to 20%. According to these rules, landings should be 32 240 tonnes in total for Subarea IV and Divisions IIIa West and VIId in 2011.

In spite of uncertainty in the assessment, all models and scenarios suggest that the management objectives in terms of reduction of fishing mortality specified in the LTMP cannot be achieved in 2011 unless catches are reduced beyond the 20% limit on inter-annual variability.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advised forecast catch options for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that cod in the North Sea (IIa, IIIa Skagerrak, IV and VIId) falls under Category 4. STECF notes that in accordance with the long-term management plan, the TAC for 2011 for IIa, IIIa Skagerrak, IV and VIId combined should be 32,240 t (20% reduction in TAC compared to 2010).

STECF notes that the estimated increase in F between 2008 and 2009 in the ICES assessment is primarily driven by the results of the IBTS tuning series and is not supported by effort and catch (landings and discard) information. The effort and catch information reported by member States to the STECF-SGMOS 10-05 WG,

indicates that fishing mortality is likely to have remained stable over the period 2008-2009. Furthermore, STECF also notes that there is no evidence of a decline in fishing effort for the main fleets exploiting cod since 2008.

STECF notes that Article 12 (4a) of the long-term plan for North Sea cod (Council Regulation (EC) 1342/2008) prescribes that the maximum allowable fishing effort in 2011 for aggregated effort groups where the percentage cumulative catch of cod is equal to or exceeds 20 % of the total catch should be adjusted applying the same relative change as predicted for fishing mortality. The fishing mortality in 2010 is predicted by ICES to be F=0.85 and the fishing mortality in 2011 consistent with a reduction in the TAC by 20% (TAC advice consistent with the management plan) is predicted to be F=0.48. This corresponds to a 44% reduction in fishing mortality and would if accepted imply a similar reduction in the maximum permitted effort.

However, as explained above there are indications that fishing mortality may have remained stable over recent years and the implied reduction in fishing mortality from 2010 to 2011 derived from the ICES assessment may be an overestimate. STECF notes that if fishing mortality has remained stable since 2008 this implies F in 2009 and 2010 will have been F= 0.71. Accepting that the fishing mortality in 2011 consistent with the 20% reduction in TAC is equal to 0.48 as advised by ICES, the implied reduction in fishing effort from 2010 to 2011 should be 33%. However, this value of 33% may be an underestimate of the reduction in F (and effort) from 2010 to 2011 required to take the 2011 TAC prescribed by the management plan. If fishing mortality has in reality, remained stable since 2008, the stock size estimated by ICES for 2010 is likely to be an underestimate of the true stock size. This is because fishing mortality in 2009 and 2010 will have been less than the fishing mortality rates derived from the ICES assessment and will have resulted fewer cod being caught leading to more survivors in 2010 and 2011. A larger stock in 2010 and 2011 would therefore imply, that the fishing mortality required to take a TAC in 2011 of 32,240 t would be less than F=0.48 as predicted by ICES. Under such circumstances, the provisions of the long-term plan for North Sea cod (Council Regulation (EC) 1342/2008) would prescribe a reduction in fishing effort from 2010 to 2011 greater than 33%.

For the reasons outlined above, STECF is not in the position to advise on the precise adjustment to the maximum fishing effort for 2011 prescribed by the long-term plan for North Sea cod (Council Regulation (EC) 1342/2008).

Other considerations

STECF notes that the advised value for F_{msy} for cod in the North Sea (IIa, IIIa Skagerrak, IV and VIId) is provisional and may be subject to revision pending the outcome of further investigations by ICES.

1.11. 3.6.1 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, two acoustic indices and a larvae survey index.

REFERENCE POINTS:

	Type	Value	Technical basis
MSY approach	MSY $B_{trigger}$	110 000 t	Provisional value, based on management plan development and the lowest observed SSB in the 2008 assessment
	F_{MSY}	0.25	Management plan evaluations (WKHMP report ICES 2008/ACOM:27)
Precautionary approach	B_{lim}	-	Not defined
	B_{pa}	-	Not defined
	F_{lim}	-	Not defined
	F_{pa}	-	Not defined

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	2009
MSY (F_{MSY})	⊖	⊖	⊖
Precautionary approach (F_{pa},F_{lim})	?	?	?

	SSB (Spawning Stock Biomass)		
	2008	2009	2010
MSY ($B_{trigger}$)	⊕	⊕	⊖
Precautionary approach (B_{pa},B_{lim})	?	?	?

Since 2006 (when SSB was 182 000 t), SSB has continuously declined and reached a record-low of 76 000 t in 2010. Recruitment has markedly declined, and all recent year classes except the 2009 year class are at record low levels. Fishing mortality has been increasing since 2005 and F in 2009 was among the highest in the time series (and more than twice the F_{MSY} proxy of 0.25). Clearly, the stock is now outside of safe biological limits, and there is concern that the stock is now in a state where there is a high probability of continued recruitment failure.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	Catches in 2011
Transition to an **MSY approach** with caution at low stock size	26 500 t to 53 600 t for transition to the MSY framework by 2011 to 2015, respectively. Additional conservation measure: catches of WBSS herring in the North Sea should not be allowed to increase
Cautiously avoid impaired recruitment (**Precautionary Approach**)	n/a
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.17 (31% lower than F_{MSY} because SSB_{2011} is 31% below Btrigger), resulting in landings of 26 500 t in 2011. This is expected to lead to an SSB of 113 700 t in 2012. The estimation of SSB in 2011 is dependent on the advised F_{MSY} for 2011 and both have thus been estimated iteratively.

For a transition to the ICES MSY framework by 2015, the fishing mortality in 2011 is $(0.8*F_{(2010)} + 0.2*(F_{MSY} *0.69))$ [where 0.69 is the ratio of the 2011 biomass to MSY $B_{trigger}$] = 0.38. This results in a catch of 53 600 t in 2011, which will give an SSB of 92 800 t in 2012.

Since 2006 (when SSB was 182 000 t), SSB has continuously declined and reached a record-low of 76 000 t in 2010. Recruitment has also markedly declined, and all recent year classes are the lowest on record (except for

the average 2009 cohort). Fishing mortality has been increasing since 2005 and F in 2009 was among the highest in the time series (and more than twice the F_{MSY} proxy of 0.25). Clearly, the stock is now outside of safe biological limits, and there is concern that the stock is now in a state where there is a high probability of continued recruitment failure. Therefore, the catch emanating from a transition to the MSY framework by 2015 may not be adequate to rectify this situation. Considering the stock is outside safe biological limits and high uncertainty about future recruitment, a more rapid transition to the MSY framework may be necessary. ICES highlights catch options transition periods ranging from 1-5 years (2011 to 2015, respectively).

In addition, in this case there are mixed stock concerns and therefore an additional conservation measure is required. To conserve mature adults, catches of WBSS herring in the North Sea should not be allowed to increase.

Policy paper
In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 3 because although the state of the stock cannot be evaluated in the absence of precautionary reference points the stock is at record low SSB in 2010 and being fished considerably above F_{MSY}. The policy paper in this instance implies a 30% reduction of $F_{(2010)}$ since the resulting TAC change is lower than 30%. This leads to $F_{(2010)}$* 0.7=0.30 which results in catches of 43,600 t in 2011 and an SSB of 100,400 t in 2012.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advised forecast catch options for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that herring in Division IIIa and Sub-divisions 22 to 24 falls under Category 3. Accordingly STECF notes that the rules for the above category imply a catch limit in 2011 of 43,600 t.

STECF notes that the above advised catch limits includes a predicted catch of Western Baltic/ IIIa spring spawners of 3,900 t in the eastern part of Division IVa. This means that the catch of Western Baltic/IIIa spring spawners in Division IIIa and Western Baltic should be limited to 39,700 t. Pending on how the catch limit is allocated to the two management areas and the fleets involved in the fishery it is likely to result in a reduction in the TACs of more that 30 % (the constraint on reduction in TACs for category 3 stocks). STECF therefore advises that using the rules for category 3 imply the following TAC for herring in Division IIIa and Subdivisiosn 22 – 24:

Management unit	TAC 2011	Basis
Herring Division IIIa (fleet C)	23699 t	30 % reduction of 2010 TAC
Herring by-catches Division IIIa (fleet D)	5303 t	30 % reduction of 2010 TAC
Herring Subdivisions 22 to 24	15884 t	30 % reduction of 2010 TAC

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 the TAC given in the above table is predicted to result in a total catch of WesternBaltic/IIIa spring spawners of 42,600 t in Division IIIa and western Batic and 2,200 t of North Sea autumn spawners in Division IIIa. Adding the predicted catch of 3,900 t of spring spawners in the North Sea gives a total predicted catch of Western Baltic/IIIa spring spawners of 46,500 t. This reflects a fishing mortality in the order of 0.34.

2. Resources West of Scotland and West of Ireland

2.1. Haddock (*Melanogrammus aeglefinus*) in Division VIa (West of Scotland)

FISHERIES: Haddock to the West of Scotland are taken as part of a mixed demersal fishery, with the biggest landings reported by UK (mainly Scottish) trawlers (2,380 tonnes in 2009 representing 88% of the landings);

Irish trawlers (297 tonnes in 2009 representing 11% of the landings); and with smaller landings reported by other nations including France, Germany and Norway. Landings by non-EU fleets have not exceeding 100 tonnes over the reported period (1988 – 2009).

In 2006, landings of 5,700 tonnes were reported for this stock, representing an 80% increase on the (previous) record low landings of 3,148 tonnes reported in 2005. Subsequently reported landings fell to 3,700 tonnes in 2007 and 2,800 tonnes in 2008 and 2009.

Recruitment to this stock has varied greatly over the entire time series, however. in recent years recruitment has shown a general and dramatic decline from >450 million in 2000 (the largest on record) to an estimated recruitment of approximately 8 million in 2008 and 2009.

Haddock in Division VIa are mainly caught by trawlers, however these fisheries have declined recently with increasing focus on the corresponding Division VIb (Rockall) fishery and the neighbouring *Nephrops* fishery in Division IVa. There has also been a shift from twin trawls to single trawls, and an increase in the use of pair trawls and seines. These changes were driven by a combination of increased fuel costs during 2008 (driving the shift to more fuel efficient gear) and lack of quota and restrictive day allocations related to the cod recovery plan in Division VIa.

In Scotland the 'Conservation Credits Scheme' (CCS) was implemented at the beginning of February 2008. The two central themes of CCS are aimed at reducing the amount of cod caught by (i) avoiding areas with elevated abundances of cod and (ii) the use of more species-selective gears. Within the scheme, efforts are also being made to reduce discards generally. Although the scheme is intended to reduce cod mortality, it may also affect the mortality of haddock, in either a positive or negative manner.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. In recent years 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 and the model estimated total catch from the fishery without the ability to distinguish between landings and discards. In 2009 catch data was included for the years 2006-2009.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	30 000 t	Bpa
	F_{msy}	0.3	Provisional proxy by analogy with North Sea haddock. Fishing mortalities in the range 0.19 – 0.41are consistent with F_{msy}
Precautionary Approach	B_{lim}	22 000 t	B_{lim} = B_{loss}, the lowest observed spawning stock estimated when reference point was established in 1998
	B_{pa}	30 000 t	B_{pa} = B_{lim} *1.4. This is considered to be the minimum SSB required to obtain a high probability of maintaining SSB above Blim, taking into account the uncertainty of assessments
	F_{lim}	Not defined	
	F_{pa}	0.5	The F below which there is a high probability of avoiding SSB < B_{pa}

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY (F_{msy})	⊖	⊖	⊖
Precautionary approach (F_{pa},F_{lim})	⊕	⊕	⊕

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)	⊖	⊖	⊖
Precautionary approach (B_{pa},B_{lim})	○	⊖	⊖

The very strong 1999 year class caused SSB to increase from a level near the historic low in 2000 to a peak in 2003, although SSB has declined since that time. F has been above F_{pa} in most years since 1987 and has been below F_{pa} since 2007. The 2006 to 2009 year classes are estimated to be below the long term average.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 2 800 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Zero catch and management plan
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	940 t

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 55% below F_{MSY} because current SSB is 55% below MSY $B_{trigger}$, to 0.14. This implies removals from the stock of 2400 tonnes in 2011. At current rates of landings, discards and unallocated removals this implies landings of 1 300 tonnes in 2011. This is expected to lead to an SSB of around 24 100 t in 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced to ((0.8*0.38)+(0.2 *(0.3*0.45))) = 0.33. This results in removals from the stock of 5 400 tonnes and Human consumption landings of 2 800 tonnes in 2011. This is expected to lead to an SSB of 20 700 t in 2012.

The (EC) transition scheme without extra reduction on account of low SSB implies a target F of 0.36. This results in removals from the stock of 5800 tonnes and Human consumption landings of 3100 tonnes in 2011. This is expected to lead to an SSB of 20 200 t in 2012.

PA approach

Fishing mortality is estimated to be below F_{pa}. However, SSB is estimated to be below B_{lim}.

The fishing mortality that would be expected to bring SSB above B_{lim} in 2012 would be 0.25. This would imply removals of 4200 tonnes and Human Consumption landings of 2200 tonnes.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 3. The stock is outside safe biological limits because SSB is estimated to be below B_{pa}. This implies removals from the stock following a 22% reduction in F_{2010} to 0.3 (=F_{msy}), with a maximum TAC change of 30%. This results in removals from the stock of 4900 tonnes and Human consumption landings of 2600 tonnes in 2011. This is expected to lead to an SSB of 21 200 t in 2012.

However, in light of the precautionary advice for this stock, the stock can also be classified under category 10 because the advice on this basis would be zero catch. This implies a TAC reduction of 25%.

Management plan

A management plan is under development by the EC (See annex). This works on the following boundaries:

The result for a TAC and SSB in the following year is calculated for F = 0.3.

Rule no	**SSB result for F = 0.3:**	**F for TAC year**	**Maximum TAC variation**
2	SSB > 30 000 t	0.3	15%
3	22 000 t < SSB < 30 000 t	(0.3-0.2)*((B_{pa}-SSB)/B_{pa}-B_{lim}))	No maximum
4	SSB < 22 000 t	0.1	No maximum

Following these rules, the TAC would be set on the basis of F = 0.3. However, this leads to an SSB in 2012 lower than 22 000 t (B_{lim}). Therefore the TAC should be set on the basis of paragraph 4, with a target F of 0.1. There is no maximum in inter-annual TAC variation. This results in removals from the stock of 1800 tonnes and Human consumption landings of 940 tonnes in 2011. This is expected to lead to an SSB of 24 700 t in 2012. ICES evaluated this plan and found it to be in accordance with the precautionary approach.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stock and the advised catch options for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that haddock in Division VIa falls under Category 3 (because there is no agreed management plan). Accordingly STECF notes that the rules for the above category imply removals from the stock following a 22% reduction in F_{2010} to 0.3 (=F_{msy}), with a maximum TAC change of 30%. This results in removals from the stock of 4900 t and a TAC (Human consumption landings) of 2600 t in 2011.

STECF notes however that at present the ICES statement that there is no maximum inter-annual TAC variation is correct since there is no agreed management plan in place. However, in the proposed management plan for haddock in VIa, a maximum inter-annual TAC variation of 25% is specified. The implications for the TAC for haddock in VIa under the proposed management plan are given below.

STECF also notes that the proposed management plan for west of Scotland haddock, although not yet implemented is considered precautionary by ICES. The predicted landings in 2011 according to the proposed management plan are 940 t. STECF considers that the values derived from the proposed management plan are more appropriate for the management of exploitation on haddock in 2011.

Special request on haddock in VIa (West of Scotland)

STECF is asked to consider the TAC resulting from application of the rules applied in the management plan for haddock in the North Sea, using the precautionary and limit spawning biomass appropriate for this stock but limiting inter-annual TAC variation to no more than 25%. Such a consideration was conducted by ICES but without the TAC constraint. The resulting TAC represented a 65% reduction in TAC.

STECF response

STECF advises that restricting TAC change to 25% would imply a TAC in 2011 of 2003 t.

2.2. Sandeel (*Ammodytes spp.* & *Gymnammodytes spp.*) in Division VIa

FISHERIES: In the past the stocks were exploited exclusively by Scottish vessels. Recorded landings were between 15,000 t and 25,000 t from 1987 to 1990. Landings of between 5,000 t and 13,000 t were taken between 1991 and 2000 (except for 2,600 t in 1999). From 2001 landings fell sharply. The last recorded landings by Scotland were in 2004. Recorded landings have been zero in 2003, 2005 and 2006. In 2007 57 t were reported landed by the Faroe Islands, the first time this country has reported landings of sandeel from VIa.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The only recent data available, however, are official landings statistics which have been highly variable and do not provide an adequate basis for scientific advice. The stock was last assessed in 1996. ICES has not provided advice for 2011.

REFERENCE POINTS: none.

STOCK STATUS: The available information is inadequate to evaluate stock trends relative to risk, so the state of the stock is unknown.

RECENT MANAGEMENT ADVICE: none.

STECF COMMENTS: STECF notes there is no assessment for this stock. With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that sandeel in Division VIa falls under Category 11. Accordingly STECF notes that the rules for the above category imply a TAC in 2011 of 0 t, (the 2010 TAC is zero and recent landings have been zero).

STECF notes that work to better understand potential trends in natural mortality on cod in division VIa by modelling seal predation has been hampered because the level and trend in sandeel biomass available to the seal population west of Scotland is not known. As such, a lack of knowledge about this stock is potentially adversely affecting assessment of stocks of high commercial importance in the area.

2.3. Norway pout (Trisopterus esmarki) in Division VIa (West of Scotland)

FISHERIES: Total landings are available for this stock for the years 1987 – 2008. Landings during this period have varied considerable, from a high in 1987 of some 38,000 tonnes to less than 50 tonnes every year since 2005. Historically the majority of landings have been taken by Danish fleets with lesser catches by UK, Netherlands and Germany.

There are currently no dedicated fisheries for Norway Pout in Division VIa (West of Scotland).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. ICES has not provided advice for 2011

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

STOCK STATUS: No assessment is conducted for this stock.

RECENT MANAGEMENT ADVICE: The only data available are official landings statistics which have been highly variable and do not provide an adequate basis for scientific advice.

STECF COMMENTS: STECF notes there is no assessment for this stock. With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Norway pout in Division VIa falls under Category 11. In the absence of any data on catches of Norway pout from VIa in recent years, STECF is unable to provide a TAC according to the rules for category 11.

3. Resources in the Celtic and Irish Seas

3.1. 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 2007, 2008 and 2009 were 490 t, 330 t and 320 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.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	3100 t	Default to value of B_{pa}
	F_{msy}	0.16	Provisional proxy based on stochastic simulations assuming a Ricker S/R relationship (range 0.1–0.25)
Precautionary Approach	B_{lim}	2200 t	$B_{lim} = B_{loss}$ The lowest observed spawning stock, followed by an increase in SSB.
	B_{pa}	3100 t	$B_{pa} \sim B_{lim} * 1.4$. The minimum SSB required ensuring a high probability of maintaining SSB above its lowest observed value, taking into account the uncertainty of assessments.
	F_{lim}	0.40	$F_{lim} = F_{loss.}$ Although poorly defined, there is evidence that fishing mortality in excess of 0.4 has led to a general stock decline and is only sustainable during periods of above-average recruitment.
	F_{pa}	0.30	This F is considered to have a high probability of avoiding F_{lim}.

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	2009
MSY (F_{msy})	⊖	⊖	⊖
Precautionary approach (F_{pa},F_{lim})	o	o	⊕

	SSB (Spawning Stock Biomass)		
	2008	2009	2010
MSY ($B_{trigger}$)	⊖	⊖	⊖
Precautionary approach (B_{pa},B_{lim})	⊖	⊖	⊖

SSB has continuously declined since 2001 to low levels and reached its lowest level in 2008. The large reduction of F in recent years reflects the reduction in fishing effort. Recent recruitment levels have been lower than earlier in the time-series, with the last five years of recruitment being the lowest in this series.

RECENT MANAGEMENT ADVICE:

Advice summary for 2011

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 390 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Zero and a management plan should be developed
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Outlook for 2011

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.09 (45% lower than F_{MSY} because SSB is 45% below MSY $B_{trigger}$), resulting in landings of less than 150 t in 2011. This is expected to lead SSB of 2430 t in 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality of $(0.8*F_{(2010)}) + (0.2*(F_{MSY}*0.55) = 0.24$ for 2011. This results in landings of 390 t in 2011. This is expected to lead to an SSB of 2200 in 2012.

The EU transition scheme without extra reduction on account of low SSB implies a target F of 0.26. This results in landings of 410 t in 2011. This is expected to lead to an SSB of 2180 t in 2012.

PA approach

Given the low SSB and low recruitment since 2000, it is not possible to identify any non-zero catch which would be compatible with the precautionary approach. ICES **recommends** a closure of the fishery in 2011 and a recovery plan should be developed and implemented as a prerequisite to reopening the fishery.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 3 because the stock is outside safe biological limits. The resulting TAC is derived from a 30% reduction from the assumed fishing mortality in 2010. The resulting TAC would be 320 t.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advised catch options for 2011, though noting a small labelling error in the forecast table where "$F_{(2010)}$*0.7" should read "$F_{(2010)}$*0.75".

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that sole in Division VIIa falls under Category 10. Accordingly STECF notes that the rules for the above category imply a TAC in 2011 of 302 t, based on a 25% reduction of the 2010 TAC.

3.2. 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 VIIfg 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. 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 2009 were 460 t slightly above the TAC.

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 assessment 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.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	1800 t	Default Bpa
	F_{msy}	0.19	Provisional proxy as the stochastic simulations including Beverton&Holt stock recruit relation.
Precautionary Approach	B_{lim}	1100 t	B_{lim}=$B_{loss,}$ the lowest observed spawning-stock biomass.
	B_{pa}	1800 t	B_{pa}= B_{lim} * 1.64. Biomass above this affords a high probability of maintaining SSB above B_{lim}, taking into account the uncertainty of assessments.
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

F (Fishing Mortality)			
	2007	2008	2009
MSY (F_{msy})	⛔	⛔	⛔
Precautionary	?	?	?

approach (F_{pa},F_{lim})			

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)	⛔	⛔	⛔
Precautionary approach (B_{pa},B_{lim})	⛔	⛔	⛔

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 estimates have declined since 2004, but are likely to be underestimates. Recruitment was relatively high in most years during the 1980s, but has been lower since then.

RECENT MANAGEMENT ADVICE:

Outlook for 2011

Advice Summary for 2011

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 500 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 150 t
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.14 (25% lower than F_{MSY} because SSB is 25% below $B_{trigger}$), resulting in landings of 210 t in 2011. This is expected to lead to an SSB of 1700 t in 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced to ((0.8*0.44)+(0.2*0.19*0.25)) = 0.38, resulting in landings of less than 500 t in 2011. This is expected to lead to an SSB of 1500 t in 2012.

PA approach

Fishing mortality in 2011 should be no more than 0.10 corresponding to landings of less than 150 t in 2011. This is expected to bring SSB above B_{pa} in 2012.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 3: Stock is outside safe biological limits. The category requires the highest landings from (a) fishing at F_{msy} (0.19; 270 t) or (b) the largest reduction in F from 0.7 F_{sq} (0.31; 410 t) or (0.25 * (F_{sq} - F_{msy}) (0.31; 410 t). Consequently fishing mortality should be reduced to 0.31 resulting in landings of 410 t in 2011.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advised forecast catch options for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that plaice in Division VIIf,g falls under Category 3. Accordingly STECF notes that the rules for the above category imply a TAC in 2011 of 410 t based on a 30% reduction in fishing mortality in 2011 compared to 2010.

STECF notes that the high level of discarding indicated in this mixed fishery would suggest a mis-match between the mesh size employed and the size of the fish landed. Increases in the mesh size of the gear should

result in fewer discards and, ultimately, in increased yield from the fishery. The use of larger mesh gear should be encouraged in this fishery in instances where mixed fishery issues allow for it.

3.3. Plaice (*Pleuronectes platessa*) in Divisions VIIe (Western English Channel)

FISHERIES: The fisheries taking plaice in the Western Channel mainly involve vessels from the bordering countries: the total landings (2008) are split among UK vessels (80%), France (12%), and Belgium (8%). 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. Landings have continued to decrease in recent years to a similar low level as in the late-1970s. 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. WKFLAT 2010 indicated that in addition to the landings in VIIe the stock suffers considerable fishing mortality in the first quarter in division VIId during their annual spawning migration.

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.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	2500 t	Bpa
	F_{msy}	0.19	Provisional proxy by analogy with plaice in the Celtic Sea. Fishing mortalities in the range 0.14 – 0.31are consistent with F_{msy}
Precautionary Approach	B_{lim}	1300 t	B_{lim}=B_{loss}. The lowest observed spawning stock biomass.
	B_{pa}	2500 t	MBAL, biomass above this affords a high probability of maintaining SSB above B_{lim}, taking into account the uncertainty in assessments.
	F_{lim}	Not defined.	
	F_{pa}	0.45	This F affords low probability that (SSB_{MT}< B_{pa}).

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	2009
MSY (F_{msy})	⊖	⊖	⊖
Precautionary approach (F_{pa},F_{lim})	⊖	⊖	o

	SSB (Spawning Stock Biomass)		
	2008	2009	2010
MSY ($B_{trigger}$)	⊖	⊖	⊖
Precautionary approach (B_{pa},B_{lim})	o	o	o

The large reduction of F in 2009 reflects the reduction in fishing effort. SSB is around the lowest observed values in the time series. Current recruitment levels are lower than those observed in the 1980s.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 950 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 980 t

Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Outlook for 2011

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.18 (6% lower than F_{MSY} because SSB is 6% below MSY $B_{trigger}$), resulting in landings of 480 t in 2011. This is expected to lead to an SSB of 2980 t 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced following (0.8*F(2010)+0.2F_{MSY}*SSB(2011)*MSY $B_{trigger}$) corresponding to F of 0.39 for 2011. This results in landings of 950 t in 2011. This is expected to lead to an SSB of 2 530 t in 2012.

PA approach

The fishing mortality in 2011 should be no more than 0.4 corresponding to landings of less than 980 t in 2011. This is expected to bring SSB above B_{pa} in 2012.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 3: The stock is outside safe biological limits. This implies a 30% reduction if F in 2011 which results in a TAC of 780 t producing an SSB of 2690 t in 2012. It is not possible to determine the associated change in TAC with any of the scenarios provided in the options table, as the TAC is set for the combined VIId and VIIe stocks.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advised forecast catch options for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that plaice in Division VIIe falls under Category 3. Accordingly STECF notes that the rules for the above category imply a TAC in 2011 of 780 t for the VIIe component of the VII e,d combined TAC (See also section 1.26 for the VIId TAC component). This is based on a 30% reduction in F in 2011 compared to 2010.

Special request on plaice in VIId,e

Background

Advice provided for plaice in VIIe and for plaice in VIId for 2010 are substantially different, concomitant with the advice that these two stocks are biologically distinct. At present, these two stocks are managed under a single TAC which makes it impossible to independently manage each stock towards precautionary criteria or towards maximum sustainable yield. The Commission is considering proposing the separation of the VIId,e TAC into two separate TACs in order that separate biological objectives can be reached.

Request to STECF

STECF is requested to advise whether such an approach is appropriate to attempt to achieve stock-specific biological objectives and if not, to advise (given current knowledge of stock identities and migrations) on an alternative approach to attaining the same goal.

STECF is requested to deliver its advice in July in the course of its review of ICES advice.

STECF response

STECF notes that benchmark assessments were undertaken for the plaice stocks in VIId and VIIe by the ICES WKFLAT in 2010. WKFLAT examined available data and information on tagging studies to investigate the degree of migration of plaice between VIId, VIIe and sub-area IV.

The results of the investigation indicate that there is significant migration of mature plaice from VIIe and IV into VIId in the first quarter of the year when spawning takes place. Mature plaice undertake a return migration to their original area by the second quarter of the year. There is no information to indicate that there is migration of mature plaice between divisions at other times of the year.

STECF notes that assessment and advice are provided separately for VIId and VIIe and that because of the different stock status in the two areas, the biological objectives for advice are also different. It would seem logical to conclude that in order to independently control the exploitation rate on both stocks, each area should be subject to different management measures including separate TACs. However, STECF notes that because a proportion of the fishing mortality on the VIIe stock occurs in VIId during the spawning season, the setting of separate TACs alone will not necessarily limit the fishing mortality on VIIe plaice to the intended level. At the same time, fishing mortality on plaice in VIId is likely to be less than intended, since removals from VIId in the 1st quarter will consist of a significant proportion of fish from VIIe and IV.

STECF therefore advises that while it would be appropriate to limit the fishing mortality on the stock of plaice in VIId and VIIe independently, measures in addition to separate TACs would be required. Such measures should be designed to restrict the catch of plaice originating from VIIe and IV but caught in Q1 in VIId.

Allocation of TACs for plaice in 2011 to Divisions VIId and VIIe separately

Candidate procedures designed to calculate separate TACs for subarea VIId and VIIe plaice for 2011 while attempting to ensure that the removals from each stock component are consistent with the advised fishing mortality as proposed below:

1. Allocation of TACs to VIIe and VIId separately based on the advised fishing mortality rates for each stock component and in an attempt to ensure that there is no catch of plaice that migrate into VIId from VIIe and IV, Division VIId could be closed in Q1 to all gears likely to catch plaice.

2. Allocation of TACs to VIIe and VIId separately based on the advised fishing mortality rates for each stock component and adjusting the TAC according to the following method:

Based on the assumption that a ***fixed*** percentage of 15% of the quarter 1 (Q1) catches (landings) taken in VIId are actually removed from the VIIe stock and not from the VIId stock since some VIIe fish temporarily residence in VIId area during Q1.

Calculating the respective TACs, as catches (landings) to be removed from the respective stocks based on the intended fishing mortality and assessed stock numbers are referred to as $TAC_{stock}d$ (3400 t = advice VIId)and $TAC_{stock}e$ (950 t = advice VIIe) for stocks VIId and VIIe respectively.

The aim is to arrive at adjusted TACs, representing the allowed catches (landings) to be taken from areas VIId and VIIe respectively, which will be referred to as $TAC_{area}d$ and $TAC_{area}e$.

a. The $TAC_{area}e$ should be a certain amount lower than the $TAC_{stock}e$, to account for the fact that additional catches will be removed from the VIIe stock caught elsewhere than in area VIIe (namely in area VIId).
b. An equivalent amount should be added to the $TAC_{stock}d$ to arrive at an adjusted $TAC_{area}d$, accounting for the fact that, although these catches will be taken in area VIId they will not actually be removed from stock VIId (but instead from stock VIIe).

The amount to be added to the $TAC_{stock}d$ and subtracted from the $TAC_{stock}e$ should be calculated as follows:

a. Whatever amount X caught in Q1 in area VIId, is assumed to consist for 85% of VIId fish and for 15% of VIIe fish.

b. Assuming that catches are always distributed equally over the 4 quarters, X is the amount taken from area VIId in Q1. Therefore, the total amount taken from area VIId for the whole year equals to 4 X.

c. The above assumptions can be expressed as:
    i. $TAC_{area}d = TAC_{stock}d + 0.15\ X$
    ii. $TAC_{area}d = 4\ X$

d. It follows that $TAC_{stock}d = 3.85$ X, and from that X = $TAC_{stock}d$ / 3.85.

e. Substitution in (ii) gives: $TAC_{area}d = (4/3.85) * TAC_{stock}d$

Therefore 3.9% (132 t) of the $TAC_{stock}d$ (3400 t) is the amount that should be added to the $TAC_{stock}d$, and subtracted from $TAC_{stock}e$, to arrive at the adjusted values for $TAC_{area}d$ (3532 t) and $TAC_{area}e$ (818 t) respectively.

With the $TAC_{area}d$ (3532 t) and $TAC_{area}e$ (818 t) set for areas VIId and VIIe respectively, and assuming that the 15% is fixed and that catches are distributed equally over the 4 quarters, the actual removals from the respective stocks VIId and VIIe are expected to be equal to the $TAC_{stock}d$ (3400 t) and $TAC_{stock}e$ (950 t) respectively calculated based on intended F and assessed stock numbers.

Implications for plaice in subarea IV (North Sea)

STECF notes that ICES has estimated from tagging data that approximately 50% the catches from VIId in Q1 also comprises fish from VIId. Hence, following the same rational on the assumption that also a ***fixed*** percentage of 50% of the quarter 1 (Q1) catches (landings) taken in VIId are actually removed from the area IV stock and not from the VIId stock, the extra amount that should be added to the $TAC_{stock}d$, and subtracted from $TAC_{stock}IV$ is 486 t, resulting in a North Sea plaice TAC of 72,914 t (73,400 t – 486 t). The resulting overall adjusted $TAC_{area}d$ for subdivision VIId should therefore be 4018 t (3400 t + 132 t + 486 t).

Using the above procedure to set the TACs for 2011, the adjusted TACs for VIIe, VIId and Subarea IV would be as follows:

	Plaice VIIe	Plaice VIId	Plaice IV
Landings corresponding to STECF advice (stock landings)	950	3,400	73,400
Adjusted landings(area landings)	818	4,018	72,914

4. Resources of the bay of Biscay and Iberian Waters

4.1. Horse mackerel (*Trachurus trachurus*) in ICES division IXa

FISHERY: Catches decreased from the early 1960s but have been relatively stable since the early 1990s at 20,000t – 25,000 t. The fleets fishing for horse mackerel are also fishing for other species (e.g. sardine) and changes in the availability of those other species could affect the targeting on horse mackerel. Traditionally, horse mackerel catches show a large proportion of juveniles. Recently the importance of the Spanish bottom trawl fleet, targeting mainly adult fish, is increasing.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on a survey trend assessment.

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

MANAGEMENT AGREEMENTS: No specific management objectives are known to ICES.

STOCK STATUS: Catches have been relatively stable since 2004. The combined spawning biomass index of the Portuguese and Spanish IBTS survey is variable. Abundance in the survey was lower between 1998 and 2003 compared to the periods before and after.

RECENT MANAGEMENT ADVICE:

Advice for 2011

Management Objective (s)	Landings in 2011

Transition to an **MSY approach** with caution at low stock size	na
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 25 000 tonnes
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	na

No reliable assessment is available for this stock. Therefore, fishing possibilities cannot be projected.

PA approach
Based on the age composition of catches, and the data from the Portuguese and Spanish IBTS-4Q survey, the recent level of catches does not seem to have been detrimental to the stock. ICES, therefore, recommends that catches in 2011 should be no more than 25 000 tonnes (2000–2004; 2003 is excluded because of the reduced effort following the Prestige oil spill). The basis for this year's advice remains as previously given by ICES.

Policy paper
In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 6. Abundance information indicates a decrease in the average estimated abundance in the last two years of more than 20% lower than the average estimated abundance in the three preceding years, therefore a 15% decrease in TAC should be applied, resulting in catches of 26,471 tonnes.

Other considerations:
Since 2010 management area and advice area are the same.

STECF COMMENTS: STECF agrees with the advice from ICES.

STECF notes that other species of horse mackerel are caught together with *T. trachurus* in Division IXa, in particular *Trachurus picturatus* of which 300–800 t have been caught annually since 2000. The advice for southern horse mackerel applies to the southern stock of *Trachurus trachurus* only.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that horse mackerel (*Trachurus trachurus*) in Division IXa falls under Category 6. Abundance information indicates a decrease in the average estimated abundance in the last two years of more than 20% lower than the average estimated abundance in the three preceding years; therefore a 15% decrease in TAC should be applied resulting in catches of 26,471 tonnes.

4.2. Horse mackerel (*Trachurus spp*) in CECAF areas (Madeira Island)

ICES has reported that catches of horse mackerel 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 TAC in area X for 2010 was set to 1,229 t and is taken exclusively by Portugal

STECF COMMENTS*:* With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that this stock falls under Category 11. Accordingly STECF notes that the rules for the above category imply a TAC in 2011 of 1,045 t based on a 15% reduction on the2010 TAC.

4.3. Horse mackerel (*Trachurus spp*) in CECAF areas (Canary Islands)

STECF did not have access to any stock assessment information on horse mackerel in this area.
A TAC in area X for 2010 was set at 1,229 t. It is taken exclusively by Spain.

STECF COMMENTS: With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that this stock falls under Category 11. Accordingly STECF notes that the rules for the above category imply a TAC in 2011 of 1,045 t based on a 15% reduction on the 2010 TAC.

4.4. Horse mackerel (*Trachurus spp*) in ICES Subarea X (Azores Islands

ICES has reported that 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 TAC in area X for 2010 was set to 3,072 t and is taken exclusively by Portugal.

STECF COMMENTS: With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that this stock falls under Category 11. Accordingly STECF notes that the rules for the above category imply a TAC in 2011 of 2,611 t based on a 15% reduction on the 2010 TAC.

5. Widely distributed and migratory stocks

5.1. 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 mixed fisheries together with megrim, anglerfish and *Nephrops*. Discards of juvenile hake can be substantial in some areas and fleets. An important increase in landings has occurred in the northern part of the distribution area (Division IIIa, and Subareas IV and VI) in recent years. Since the introduction of the high vertical opening trawls in the mid-1990s, no significant changes in fishing technology have been introduced.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on a length-based assessment using commercial catch data and survey data. This stock was benchmarked in 2010. This year assessment presents major revisions in relation to last year: (i) new assessment model, (ii) incorporation of discards, (iii) faster growth rate. The assessment is indicative of trends only.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	0.24	$F_{30\%SPR}$
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

The new stock perception makes previous PA reference point inappropriate.

MANAGEMENT AGREEMENT: A recovery plan has been agreed by EU in 2004 (EC Reg. No. 811/2004). The aim of the plan is to increase the SSB to above 140 000 t with a fishing mortality (Fmgt) of 0.25, constrained by a year-to-year change in TAC of 15% when SSB is above 100 000 t. ICES did not evaluate the plan.

A proposal for a long-term plan has been put forward by the EU in 2009 (COM(2009) 122 final). The aim of the proposal is to reach maximum sustainable yield. ICES has evaluated the F_{MSY} candidate value proposed for this plan, and found the candidate to be inappropriate.

STOCK STATUS:

F (Fishing Mortality)			
	2007	2008	2009
MSY (F_{msy})	?	?	?
Precautionary	?	?	?

approach (F_{pa},F_{lim})			

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

The assessment is indicative of trends only. The spawning biomass has been increasing in recent years. There are also indications that fishing mortality has been decreasing in recent years. Recruitment has been relatively stable over the last two decades.

RECENT MANAGEMENT ADVICE:

Management Objective(s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 44 800 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 44 800 t
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g. catch stability)	n/a

No reliable assessment can be presented for this stock. The main cause is uncertainty in recent years' estimates of SSB and F. Therefore, fishing possibilities cannot be projected.

MSY approach

According to ICES MSY approach, catches should be maintained at recent levels, corresponding to landings of 44 800 t (average of 2006–2008). The stock trend is increasing and the exploitation status is unknown.

PA approach

There is no sign of impaired recruitment throughout the assessed period. Therefore, according to the PA approach catches should not exceed recent levels, corresponding to landings of 44 800 t (2006–2008).

Management plan(s)

The TAC corresponding to the current recovery plan (EC Reg. No. 811/2004) cannot be determined as the assessment is only accepted as indicative of trends.

EU Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 8. State of stock is unknown but trends based assessment indicates an increase in SSB. The resulting TAC increase should not exceed 15%.

Additional considerations

Discards of juvenile hake can be substantial in some areas and fleets. The spawning biomass and the long-term yield can be substantially improved by reducing mortality of small fish. This could be achieved by measures that reduce unwanted bycatch through shifting the selection pattern towards larger fish.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and agrees with the TAC advice for 2011.

STECF notes that ICES uses the period 2006-2008 as basis for the calculation of recent landings, as landings data from France were not considered reliable for 2009. STECF notes that updates of the French landings

statistics have become available after the ICES advice was given in June 2010. These updates have not been taken into account by ICES in the calculation of recent landings.

STECF notes that the use of the updated French landings in setting the 2011 TAC would require an update of the assessment as well, as these updates may change the perception of the stock.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes that Northern Hake falls under Category 8. Accordingly STECF notes that the rules for the above category imply a TAC increase by up to 15%, which corresponds to a TAC no greater than 63,365 t in 2011. STECF notes that TACs have not been restrictive in the period 2006-2008, such that a rule based on an increase of recent TAC might not be appropriate.

STECF agrees with ICES that effective measures to reduce discarding are also needed, given the substantial discards of juvenile hake in some areas and fleets.

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

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 t in the latter part of the decade. Catches have been aboveone million tonnes for most years after 2000 (except 2009) with 2003 and 2004 having recorded the highest catches (>2,200,000 t). In the southern areas (Subarea VIII, IX, Divisions VIId,e and g-k) catches have been stable around 30,000 t between 1987 and 2009 with the exception of 2004 when 85,000 t were recorded. In Division IXa blue whiting is mainly taken as bycatch in mixed trawl fisheries.

Total landings over all areas decreased from 1.25 million t in 2008 to 0.64 million t in 2009.

SOURCE OF MANAGEMENT ADVICE: The main body for management advice is ICES. The assessment uses catch-at-age data from commercial catches from 1981–2009 and three acoustic surveys (Norwegian spawning ground survey 1993–2003, international ecosystem survey in the Nordic Seas 2000–2010, and the international blue whiting spawning ground survey 2003–2010). The international blue whiting spawning ground survey is the only survey that covers almost the entire distribution area of the spawning stock. This survey estimated a 50% reduction in stock size from 2009 to 2010, which resulted in a steep downward revision of the stock size.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	2.25 million t	B_{pa}
	F_{MSY}	0.18	$F_{0.1}$ tested in management strategy evaluation conducted in 2008 (Anon, 2008; ICES, 2008)
Precautionary Approach	B_{lim}	1.50 million t	B_{loss}
	B_{pa}	2.25 million t	B_{lim} exp(1.645*σ), with σ = 0.25.
	F_{lim}	0.51	F_{loss}
	F_{pa}	0.32	F_{med} (1998).

MANAGEMENT AGREEMENT: A management plan has been agreed by Norway, EU, the Faroe Islands and Iceland, and NEAFC in 2008 which uses a target F at 0.18 if SSB is above B_{pa}, and a linear reduction to F=0.05 for SSB between B_{pa} and B_{lim} and F=0.05 for SSB below B_{lim}. ICES has evaluated the plan in 2008 and concludes that it is in accordance with the precautionary approach.

STOCK STATUS:

F (Fishing Mortality)

	2007	2008	2009
MSY (F_{msy})	−	−	−
Precautionary approach (F_{pa},F_{lim})	o	o	o

	SSB (Spawning Stock Biomass)		
	2008	2009	2010
MSY ($B_{trigger}$)	+	−	−
Precautionary approach (B_{pa},B_{lim})	+	o	−

Year classes since 2005 are estimated to be among the lowest. Due to recent poor recruitment, SSB declined from a peak of 6.8 million tonnes in 2003 to 1.3 million tonnes (below B_{lim}) at the beginning of 2010.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	50 700 to 223 000 tonnes for transition to the MSY framework by 2011 and 2015, respectively
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Zero landings
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	40 100 tonnes

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.06 (35% of F_{MSY} because SSB in 2011 is 35% of MSY $B_{trigger}$), resulting in landings of 50 700 tonnes in 2011. This is expected to lead to an SSB of 790 000 tonnes in 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality be limited by F_{pa} (0.32), and corresponding to landing of 223 000 tonnes. This is expected to lead to an SSB of 621 000 tonnes.

PA approach

This would imply zero catch in 2011 as SSB in 2012 will remain below B_{pa} with any fishery in 2011.

Management plan(s)

Following the management plan agreed by Norway, EU, the Faroe Islands, Iceland, and NEAFC in November 2008 (see Appendix 9.4.4.1) implies a TAC of 40 100 tonnes in 2011, which is a reduction of 93% compared to the TAC in 2010.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, (COM(2010) 241) this stock is classified under category 4.

Additional considerations

The large reduction in catch options for 2011 is based on an uncertain estimate of the stock status. However, all available information shows that the recruitment (age 1 fish) has been at a historical low level since 2006 and that spawning stock biomass has declined sharply since 2003. The remaining stock consist mainly of older fish, so there is no immediate sources for rebuilding the stock in short-term and the decline is expected to continue if recruitment remains at the recent low level, even with small catches.

The management plan is particularly sensitive to fluctuation to absolute stocks abundance. This information could be taken into account in the management plan by adopting wide constraints on TAC changes; i.e. limiting inter-annual variability in TAC. At present, this has not been agreed (see Article 7 of the management plan).

Recent work on stock identification suggests that there is likely to be more than one single stock in the Northeast Atlantic but this has yet to be confirmed.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and agrees with the TAC advice for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that blue whiting, combined stock falls under Category 4. STECF notes that in accordance with the long-term management plan, TAC in 2011 should be 40,100 t.

5.2.1. 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 5.2.

5.2.2. 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 5.2.

5.2.3. Blue whiting (*Micromesistius poutassou* L.) in Sub -areas VIIIabd

Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 5.2.

5.2.4. Blue whiting (*Micromesistius poutassou* L.) in Sub -areas VIIIe

Blue Whiting in these sub-areas is assessed together with all other areas as a single stock. See section 5.2.

5.2.5. 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 5.2.

5.3. Horse mackerel (*Trachurus trachurus*) in ICES Divisions IIa, IVa, Vb, VIa, VIIa-c,e-k and VIIIa-e (western stock)

FISHERIES: 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 midaged fish mostly for the Japanese market), and older fish either for human consumption purposes (mostly for the African market) or for industrial purposes. The proportion of catches (in weight) in the areas where juveniles are distributed increased gradually from about 40% in 1997 to about 65% in 2003, but declined to 40% in 2005. Since 2005, there have been no obvious changes in fishing patterns. Overall catch levels increased from 1123,000 t in 2007 to 177,000 t in 2009.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. There is uncertainty in the absolute estimates of SSB. The only fishery-independent information for this stock is a measure of egg production from surveys conducted every three years. The assessment assumes that fecundity is constant from year to year. If this assumption is incorrect then the assessment results may be biased. The 2010 egg survey results used in this year's assessment are provisional.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	0.13	$F_{0.1}$ from YPR
Precautionary Approach	B_{lim}	Not defined[1)]	
	B_{pa}	Not defined[1)]	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

[1)] Previous PA biomass reference points were considered not consistent with the perceived state of the stock, the exploitation rate and the evaluation of MSY reference points.

MANAGEMENT AGREEMENT: In 2007, a management plan based on the triennial egg survey was proposed by the Pelagic RAC and was used to set the TAC since 2008. The management plan was evaluated by ICES in 2007 and was found to be precautionary only in the short-term because some relevant scenarios were not evaluated. It is understood that the plan will be re-evaluated by 2014. This management plan has yet to be formally adopted. However, the realignment of the stock and management areas has been included in the TAC regulations for 2010.

STOCK STATUS:

F (Fishing Mortality)			
	2007	2008	**2009**
MSY (F_{msy})	⊕	⊕	⊕
Precautionary approach (F_{pa},F_{lim})	?	?	?

SSB (Spawning Stock Biomass)

	2008	2009	2010
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{pa},B_{lim})	?	?	?

SSB in 2010 is estimated to be 2.01 million tonnes, and varied between 1.42 and 2.36 million tonnes during 1995-2009. Fishing mortality has been increasing since 2006 but remains low (F_{2009} mean for ages 1-10 = 0.087). There is no evidence of strong recruitment since the 2001 year class.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
MSY approach with caution at low stock size	Less than 229 000 tonnes
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Na
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	181 000 tonnes

MSY approach

Following the ICES MSY framework implies an increase in fishing mortality to 0.13 in 2011, resulting in landings of 229 thousand tonnes in 2011. This is expected to lead to an SSB of 1.65 million tonnes in 2012. F_{2010} is below F_{MSY}, therefore the transition scheme towards the ICES MSY framework does not apply.

PA approach

There are no PA reference points defined for this stock.

Management plan(s)

Following the proposed plan from the Pelagic RAC implies a TAC of 181 thousand tonnes in 2011 which is expected to lead to an SSB of 1.69 million tonnes in 2012.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 4. The resulting TAC would be 181 thousand tonnes.

Additional considerations

The TAC should apply to all areas where Western horse mackerel is caught including the Norwegian EEZ.

The advice for horse mackerel assumes that all catches are counted against the TAC for each stock separately. ICES advises that the management areas correspond to the distribution areas which include all EU and Norwegian and Faroese waters where horse mackerel are caught. The management areas for North Sea and Western Horse mackerel were changed in 2010 to more appropriately reflect the stock distributions. The Western Horse mackerel TAC is now divided in 2 parts: one for Division VIIIc and another for EU waters of IIa, IVa, VI, VIIa-c, VIIe-k, VIIIabde, EU and international waters of Vb, XII and XIV. The North Sea horse mackerel management area is Divisions IVb, IVc and VIId.

Western horse mackerel are taken in a variety of fisheries for the human consumption with juvenile fish directed mostly for the Japanese market, and large fish for the African market. The fishing mortality on age groups 1-3 in 2009 (F=0.104) was a record-high, and much higher than most age 1-3 fishing mortality values in the assessment times series, which range from 0.002 (in 1986) to 0.084 (in 1994). Since 2003, the average F (1-3) has been higher than the average F (4-8) and indicates greater reliance in the fishery on incoming recruitment which is poor.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock.

STECF notes that ICES has used a TAC in 2010 at 180,000 t as basis for the calculation of the TAC 2011-2013 from the management plan for Western horse mackerel proposed by the Pelagic RAC. The actual TAC in 2010 is 183,924 t. If this number is used for the TAC 2011-2013 the TAC will be 183,924 t (and not the 181,000 t estimated by ICES).

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Western horse mackerel stock falls under Category 4. STECF notes that in accordance with the management plan proposed by the Pelagic RAC, TAC for the next three years, 2011-2013, should be 183,924 t.

STECF notes that the management areas for North Sea and Western Horse mackerel were changed in 2010 to more appropriately reflect the stock distributions. STECF agrees with the ICES advises that the management areas correspond to the distribution areas which include all EU and Norwegian and Faroese waters where horse mackerel are caught.

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. It is understood that the plan will be re-evaluated by 2014.

5.4. Mackerel (*Scomber scombrus*) in the Norteast Atlantic (Southern, Western and North Sea spawning components)

FISHERIES AND STOCK: ICES currently uses the term "Mackerel in Northeast Atlantic" 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. Catches cannot be allocated specifically to spawning area components on biological grounds but by convention, catches from the Southern and Western components are separated according to the areas in which these are taken.

To keep track of the development of spawning biomass in the different spawning areas, mackerel in the Northeast Atlantic stock are 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 VIII a,b,d,e). This component currently accounts for 78% the entire Northeast 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, ICES considers that the North Sea Component still exists as a discrete unit. This component spawns in the North Sea and Skagerrak (ICES Subarea IV and Division IIIa). Current knowledge of the state of the spawning components is summarised below.

Although the North Sea component has been at an extremely low level since the early 1970s, ACOM 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.

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%.

Southern Component: Mackerel is a target species for the hand line fleet during the spawning season in Division VIIIc, during which about one-third of the total catches are taken. It is taken as a bycatch in other fleets. The highest catches (87%) from the Southern Component are taken in the first half of the year, mainly from Division VIIIc, and consist of adult fish. In the second half of the year catches consist of juveniles and are mainly taken in Division IXa. Catches from the Southern Component increased from about 20 000 t in the early 1990s to 44 000 t in 1998, and were close to 50 000 t in 2002. Estimates of the spawning-stock biomass, derived from egg surveys, 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 1972–2009 and triennial egg survey estimates of SSB from 1992 to 2010. Some sampling for discards has been carried out since 2000 and a formal requirement was initiated in the EU in 2002. Estimating proportions of catch discarded and slipped is problematic in pelagic fisheries due to high variability in discard and slipping practices. In some fleets no sampling for discards is carried out. 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.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY	MSY $B_{trigger}$	2.2 million t	SSB associated with high long term yield and low probability of stock depletion based on management strategy evaluation (ICES, 2008)
Approach	F_{MSY}	0.22	F associated with above
Precautionary Approach	B_{lim}	1.67 million t	B_{loss} of the 2007 assessment for combined stock (Western, Southern and North Sea components
	B_{pa}	2.3 million t	$\mathbf{B}_{loss}$ of the in Western component in 1998 assessment raised by 15% to account for the southern component
	F_{lim}	0.42	F_{loss}
	F_{pa}	0.23	F_{lim} * 0.55 (CV 36%)

MANAGEMENT AGREEMENT: A management plan was agreed by Norway, Faroe Islands and the EU in October 2008. ICES has evaluated the plan and concluded that the plan is precautionary under the assumption that the TAC equals the total removals from the stock.

1. *For the purpose of this long-term management plan, "SSB" means the estimate according to ICES of the spawning stock biomass at spawning time in the year in which the TAC applies, taking account of the expected catch.*
2. *When the SSB is above 2,200,000 tonnes, the TAC shall be fixed according to the expected landings, as advised by ICES, on fishing the stock consistent with a fishing mortality rate in the range of 0.20 to 0.22 for appropriate age groups as defined by ICES.*
3. *When the SSB is lower than 2,200,000 tonnes, the TAC shall be fixed according to the expected landings as advised by ICES, on fishing the stock at a fishing mortality rate determined by the following:*

   Fishing mortality F = 0.22 SSB/ 2,200,000*
4. *Notwithstanding paragraph 2, the TAC shall not be changed by more than 20% from one year to the next, including from 2009 to 2010.*
5. *In the event that the ICES estimate of SSB is less than 1,670,000 tonnes, the Parties shall decide on a TAC which is less than that arising from the application of paragraphs 2 to 4.*
6. *The Parties may decide on a TAC that is lower than that determined by paragraphs 2 to 4.*
7. *The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES*

STOCK STATUS:

F (Fishing Mortality)			
	2007	2008	2009
MSY (F_{msy})	⊖	⊖	⊖
Precautionary approach (F_{pa},F_{lim})	o	o	o

SSB (Spawning Stock Biomass)			
	2008	2009	2010
MSY ($B_{trigger}$)	⊕	⊕	⊕
Precautionary approach (B_{pa},B_{lim})	⊕	⊕	⊕

Fishing mortality was high during the 1990s, but has recently declined is estimated to be at F_{pa} in 2009. SSB has increased considerably since 2002 and is estimated to be approximately 3 million tonnes in 2009, above B_{pa}. The 2002 year class is currently the highest on record although the 2005 and 2006 year classes are also strong. The 2007 year class is about average. There is insufficient information to confirm the sizes of the 2008 and 2009 year classes.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Total catch in 2011**
Transition to an **MSY approach** with caution at low stock size	Less than 672 000 tonnes
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 672 000 tonnes
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	Between 592 000 and 646 000 tonnes

ICES advises that the existing measures to protect the North Sea spawning component should 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.

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.22 (F_{MSY}), resulting in a total catch of 646 000 tonnes in 2011. This is expected to lead to an SSB of 2.75 million tonnes in 2012.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced to 0.23 (F_{pa}), resulting in a total catch of 672 000 tonnes in 2011. This is expected to lead to an SSB of 2.72 million tonnes in 2012.

PA approach

The fishing mortality in 2011 should be no more than F_{pa} corresponding to total catches of 672 000 tonnes in 2011. This is expected to maintain SSB above B_{pa} in 2012.

Management plan(s)

Following the management plan (agreed by EU, Norway and Faroese in 2008) implies a TAC between 592 000 and 646 000 tonnes in 2011 which would lead to a catch reduction of between 31% and 36% compared to the estimated catch in 2010.

Policy paper

In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 4.

Additional considerations

Some data suggests that the distribution of the spawning and feeding areas may have expanded in recent years. Further analyses will be required to describe the extent of this possible expansion. Mackerel has recently been commercially fished in areas where it was previously not fished, particularly in the Icelandic EEZ.

Catches since 2007 have been considerably in excess of the ICES advice which was based on the management plan. This situation is expected to continue in 2010. The absence of effective international agreements on the exploitation of the stock (between all nations involved in the fishery) is a cause of continued concern and prevents control of the exploitation rate. Because the management plan (agreed October 2008 by EU, Norway and Faroes) has not been followed in recent years, an estimation of the expected 2010 catch was conducted. The estimation of the catch in the intermediate year (2010) is composed of the declared quotas, inter-annual transfer of quotas not fished in 2009 to 2010, discards, estimated overshoot of catches, and quota payback. The total estimated catch in 2010 (930,002 t) results in an estimated fishing mortality of 0.31, which is above that stipulated in the management plan.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and agrees with the TAC advice for 2011.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Norteast Atlantic mackerel stock falls under Category 4. STECF notes that in accordance with the management plan TAC in 2011 should be between 592,000 and 646,000 tonnes.

STECF notes that Iceland and the Faroe Islands set autonomous quotas for 2009 and 2010 resulting in catches far greater than those advised by ICES. However ICES also estimates overfishing in 2010 (50,683 t) by other countries.

6. Elasmobranchs in the North East Atlantic

6.1. 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.

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 (eg. deep-water squalids, spotted dogs, smoothhound

and tope). Though not complete, the landings data for spurdogs show a marked decline since the mid-1980s. In earlier times, up to 60,000t 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. Assessment is an age-length and sex structured model.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

F (Fishing Mortality)			
	2007	2008	**2009**
F_{msy}		⊕	
F_{pa} / F_{lim}		?	

SSB (Spawning Stock Biomass)			
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

The assessment is considered uncertain. The assessment suggests that total stock biomass has declined substantially over time and has stabilised somewhat in the recent decade. The exploitation of the stock has reduced substantially in recent years. A failure of recruitment has taken place progressively since the 1960s.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
Transition to an **MSY approach** with caution at low stock size	n/a
Cautiously avoid impaired recruitment	Zero catch

(**Precautionary Approach**)	
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Outlook for 2011

The assessment conducted in 2010 is not put forward as a basis for a forecast. This is partly because there is need to explore the model assumptions further and also because interim year catch estimates are required.

MSY considerations

There is insufficient information upon which to apply the MSY framework. The stock appears stable at a low level in the recent period, but this is a short period compared to the longevity of the species. Given the longevity of the species, the failure of recruitment and the likelihood that recovery will be slow, the MSY framework cannot be applied.

PA considerations

There is no additional information to change the perception of the stock, consequently ICES reiterates its advice for 2007-2010, that the stock is depleted and may be in danger of collapse. Targeted fisheries should not be permitted to continue, and bycatch 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.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 10. This implies a 25% cut in TAC. Recovery measures should be implemented including effort reductions and introduction of more selective fishing gear. However given that the TAC is currently set at zero, this implies TAC=0.

Additional considerations

An EC TAC covering the entire stock range, was introduced in 2007 and was progressively reduced, and in 2010 TAC=0. There is a small (10% of the 2009 quotas per country) provision for by-catch. In 2009, a maximum landings length (100 cm) has been introduced. There are no estimates of discard survival.

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Spurdog in the Northeast Atlantic falls under Category 10. This implies a 25% cut in TAC. However given that the TAC is currently set at zero, this implies TAC=0.

STECF agrees with ICES that recovery measures should be implemented including effort reductions and introduction of more selective fishing gear.

6.2. 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 1633t 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.

6.2.1. North Sea

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

Scyliorhinus canicula (Lesser-spotted dogfish)

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

In the absence of formal stock assessments and defined reference points for *Scyliorhinus canicula* in this eco-region, the following provides a qualitative evaluation of the status of individual species/stocks, based on surveys and landings.

Species	**Area**	**State of stock**
Scyliorhinus canicula (lesser spotted dogfish)	IVa,b,c, VIId	Increasing

RECENT MANAGEMENT ADVICE:
Advice Summary for 2011-2012

Scyliorhinus canicula (Lesser-spotted dogfish)

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	Maintain catch at recent level
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Maintain catch at recent level
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

There is no TAC in place for *Scyliorhinus canicula*.

Advice for 2011 and 2012 by individual stocks

Species	Area	Advice
Scyliorhinus canicula (lesser spotted dogfish)	IVa,b,c, VIId	Status quo catch

Outlook for 2011-2012

No reliable assessments can be presented for these stocks. The main cause of this is the lack of species specific landings data. If fishers do not change their practices this must either lead to an increase of discarding and/or to misreporting.

MSY transition scheme

An estimate of fishing mortality is not available. Demersal elasmobranchs are long-lived stocks, and no population estimates are available. Further information is required on each of these stocks before MSY reference points can be identified.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks of *Scyliorhinus canicula* are classified under Rule 8. Annex IV Rule 4 would apply.

Species	Area	Policy Category
Scyliorhinus canicula (lesser spotted dogfish)	IVa,b,c, VIId	No TAC is in place, but Annex III, Rule 8. Annex IV Rule 4 would apply.

STECF COMMENTS: STECF agrees with the ICES advice.

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks of *Scyliorhinus canicula* are classified under Rule 8. Annex IV Rule 4 would apply.

6.2.2. Celtic Seas

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

F_{MSY} is not currently definable for these stocks, unless further information is available, including a better assessment of the species composition of the landings. Reference points cannot be defined.

STOCK STATUS:

F (Fishing Mortality)

	2007	2008	2009
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	2010
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

In the absence of formal stock assessments and defined reference points for *Scyliorhinus spp.* in this eco-region, the following provides a qualitative evaluation of the general status of the major species, based on surveys and landings.

Species	Area	State of stock
S. canicula (lesser spotted dogfish)	VI and VII	Stable/increasing in all areas.
S. stellaris (greater spotted dogfish)	VIIa,e,f	Locally common. Survey catches appear to be increasing in VIIa, but there is a poor signal in other areas due to low catches.

RECENT MANAGEMENT ADVICE:

Scyliorhinus canicula (Lesser-spotted dogfish)

Management Objective (s)	Landings in 2011 and 2012
Transition to an **MSY approach** with caution at low stock size	Maintain catch at recent level
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Maintain catch at recent level
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

There is no TAC in place for *Scyliorhinus canicula.*

Advice for 2011 and 2012 by individual stocks

Species	Area	Advice
S. canicula (lesser spotted dogfish)	VI and VII	Status quo catch
S. stellaris (greater spotted dogfish)	VIIa,e,f	No advice

Outlook for 2011-2012

No analytical assessment or forecast can be presented for these stocks. The main cause of this is the lack of a time-series of species specific landings data.

MSY approach

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2011 and 2012.

Policy paper

In terms of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks of *Scyliorhinus spp.* are classified under a range of categories.

Species	Area	Policy Category
S. canicula (lesser spotted dogfish)	VI and VII	No TAC is in place, but Annex III, Rule 8, Annex IV Rule 4 would apply.
S. stellaris (greater spotted dogfish)	VIIa,e,f	No TAC is in place , but Annex III, Category 11 would apply

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks of *Scyliorhinus spp.* in VI and VII are classified under a number of categories.

6.2.3. Bay of Biscay and Western Iberian Seas

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

In the absence of defined reference points, the status of the stocks of S*cyliorhinus canicula* cannot be evaluated. The following provides a qualitative summary of the general status of the stocks based on surveys and landings:

Species	Area	State of stock
Scyliorhinus canicula (lesser spotted dogfish)	VIIIabd	Increasing
Scyliorhinus canicula (lesser spotted dogfish)	VIIIc	Stable /increasing
Scyliorhinus canicula (lesser spotted dogfish)	IXa	Stable

RECENT MANAGEMENT ADVICE:

Scyliorhinus canicula (Lesser-spotted dogfish)

Management Objective (s)	Landings in 2011 and 2012
Transition to an **MSY approach** with caution at low stock size	Less than 1.7 thousand t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 1.7 thousand t
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

There is no TAC in place for *Scyliorhinus canicula.*

Advice for 2011-2012 by individual stocks

Species	Area	Advice
Scyliorhinus canicula (lesser spotted dogfish)	VIIIabd	Maintain the catches at recent level
Scyliorhinus canicula (lesser spotted dogfish)	VIIIc	Maintain the catches at recent level
Scyliorhinus canicula (lesser spotted dogfish)	IXa	Maintain the catches at recent level

Outlook for 2011 and 2012

No analytical assessment or forecast can be presented for these stocks. The main cause of this is the lack of a time-series of species specific landings data.

MSY transition scheme

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2011 and 2012. The rate of exploitation of these stocks relative to F_{MSY} is not currently known.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks of *Scyliorhinus canicula* are classified under a range of categories.

Species	Area	Policy Category
Scyliorhinus canicula (lesser spotted dogfish)	VIIIabd	No TAC is in place, but Annex III, Rule 8 would apply.
Scyliorhinus canicula (lesser spotted dogfish)	VIIIc	No TAC is in place, but Annex III, Rule 6, Annex IV Rule 4 would apply.
Scyliorhinus canicula (lesser spotted dogfish)	IXa	No TAC is in place, but Annex III, Rule 6, Annex IV Rule 4 would apply.

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks of *Scyliorhinus canicula* in VIII and IX are classified under a number of categories.

6.3. 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. 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, transhipping 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.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

(unchanged since: 2010)

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

No population estimate or fishery-independent survey information are available.
Reference points cannot be defined.

Available landings and anecdotal information suggest that the stock is severely depleted.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	TAC = 0. Retain on prohibited species list.
Cautiously avoid impaired recruitment (**Precautionary Approach**)	TAC = 0
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Outlook for 2011-2012

No reliable assessment can be presented for this stock. This is because of lack of data.

MSY approach

Given the international conservation status of this species, MSY is not considered to be a suitable target.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 10. The resulting TAC would be 0 t.

STECF COMMENTS: STECF agrees with the ICES advice.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Basking shark in the Northeast Atlantic falls under Category 10. This implies at least a 25% cut in TAC. However given that the TAC is currently set at zero, this implies TAC=0.

6.4. Tope (*Galeorhinus galeus*) in the north-east Atlantic

FISHERIES: There are no currently no targeted commercial fisheries for tope in the north-eastern Atlantic, though they are taken as a 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 is 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 mis-reporting 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.

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 north-western 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 north-eastern 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.

6.5. Rays and Skates in the Northeast Atlantic

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} = 75cm) that lives in shallow to moderate depths from 20 m down to about 150 m in the north-west sector of the North Sea. Thornback ray (*R. clavata*) has a more coastal distribution, being found in water depths down to 60 m. It occurs in a number of local concentrations in the North Sea, between which there appears to be a regular exchange of individuals.

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.

The common skate complex has been subject to recent taxonomic evaluation and what was previously referred to as *Dipturus batis* is now known to comprise two distinct species. The proposed scientific names for these species are *Dipterus intermedia* and *D. flossada*.
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 .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 .

FISHERIES: Rays and skates are taken as target and by-catches in most demersal fisheries in the ICES area. 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 t in 2006. For 2007, the landings estimated to be 1,100 t (preliminary data). In Celtic Seas, landings from 19,000 t in 2006 decreased to 10,000 t in 2006.

SOURCE OF MANAGEMENT ADVICE: The main advisory body is ICES. The assessment is based on survey and landing trends.

6.5.1. North Sea

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

In the absence of formal stock assessments and defined reference points for the species and stocks of skates (members of the family Rajidae) in this eco-region, the following provides a qualitative evaluation of the status of individual species/stocks, based on surveys and landings.

Species	**Area**	**State of stock**
Common skate complex	IVa (likely merging with	Depleted

	VI & IIa)	
R. clavata (thornback ray)	IVc, VIId	Stable/increasing
	IVa,b	Uncertain
R. montagui (spotted ray).	IVb,c	Stable/increasing
A. radiata (starry ray).	IVa,b, IIa	Stable
L. naevus (cuckoo ray)	IVa,b (may extend into VI)	Stable
R. brachyura (blonde ray)	IVc, VIId (patchy occurrence)	Uncertain
R. undulata (undulate ray)	VIId, merges with VIIe	Uncertain. Locally common in discrete areas

RECENT MANAGEMENT ADVICE:

Advice Summary for 2011-2012

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	Less than 2.7 kt for the main species
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 2.7 kt for the main species No targeted fishery for *Raja undulata* (undulate ray)
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Advice for 2011 and 2012 by individual stocks

Species	**Area**	**Advice**
Common skate (*Dipturus batis*) complex	IVa (likely merging with VI & IIa)	Zero catch. Retain on prohibited species list
R. clavata (thornback ray)	IVc, VIId	Status quo catch
	IVa,b	Reduce catch from recent level
R. montagui (spotted ray).	IVb,c	Status quo catch
A. radiata (starry ray).	IVa,b, IIa	Status quo catch
L. naevus (cuckoo ray)	IVa,b (may extend into VI)	Status quo catch
R. brachyura (blonde ray)	IVc, VIId (patchy occurrence)	No advice
R. undulata (undulate ray)	VIId, merges with VIIe	No targeted fishery

Outlook for 2011-2012

No reliable assessments can be presented for these stocks. The main cause of this is the lack of species specific landings data. No targeted fishing should be permitted for *Raja undulata* and the *Dipturus batis* complex.

Since 1999 there is a TAC for rays and skates in the North Sea. For 2009 and 2010 there were separate TACs for IIa and IV, for IIIa and for VIId. Since 1999 the TAC has gradually been reduced and since 2006 the TAC is believed to have become restrictive. If fishers do not change their practices this must either lead to an increase of discarding and/or to misreporting.

MSY transition scheme

An estimate of fishing mortality is not available. Demersal elasmobranchs are long-lived stocks, and no population estimates are available. Further information is required on each of these stocks before MSY reference points can be identified.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks in this multispecies complex are classified under a range of categories. Some of the main commercial stocks are classified under categories 6-9, Annex IV, Rule 4. This implies an unchanged TAC.

Species	**Area**	**Policy Category**
Common skate complex	IVa (likely merging with VI & IIa)	Annex III, Rule 10
R. clavata (thornback ray)	IVc, VIId	Annex III, Rule 8. Annex IV Rule 4 applies.
	IVa,b	Annex III, Rule 6. Annex IV Rule 4 applies.
R. montagui (spotted ray).	IVb,c	Annex III, Rule 8. Annex IV Rule 4 applies.
A. radiata (starry ray).	IVa,b, IIa	Annex III, Rule 6. Annex IV Rule 4 applies.
L. naevus (cuckoo ray)	IVa,b (may extend into VI)	Annex III, Rule 6. Annex IV Rule 4 applies.
R. brachyura (blonde ray)	IVc, VIId (patchy occurrence)	Annex III, Rule 6. Annex IV Rule 4 applies.
R. undulata (undulate ray)	VIId, merges with VIIe	Annex III, Rule 10

However, the status of some other skate stocks is unknown, which following Annex III would suggest an adjustment in the TAC to recent catch levels. Since the recent landings are around the current TAC level, this should not be changed.

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks in this multispecies complex are classified under a range of categories. Some of the main commercial stocks are classified under categories 6-9, Annex IV, Rule 4. This implies an unchanged TAC.

6.5.2. Celtic Seas

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

F_{MSY} is not currently definable for these stocks, unless further information is available, including a better assessment of the species composition of the landings. Reference points cannot be defined.

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**

MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

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:

Species	**Area**	**State of stock**
Common skate complex	VI	Depleted. The stock likely extends into IIa and IVa
	VII	Depleted. Near extirpated from the Irish Sea (VIIa)
R.. clavata (thornback ray)	VI	Stable/increasing.
	VIIa,f,g	Stable/increasing.
	VIIe	Uncertain
R.. montagui (spotted ray).	VI	Stable/increasing.
	VIIa,f,g	Stable/increasing.
	VIIe	Uncertain
L. naevus (cuckoo ray)	VI	Uncertain. The stock area is not known, and may merge with sub-areas IV and VII. Survey catches in VIa are increasing.
	VII	Uncertain. The stock area is not known, and may merge with sub-areas VI and VIII. French LPUE in the Celtic Sea has declined. Survey catches appear stable
R. brachyura (blonde ray)	VIa	Uncertain. No trends are apparent from surveys.
	VIIa	Uncertain. No trends are apparent from surveys.
	VIIe	Uncertain
	VIIf	Uncertain. No trends are apparent from surveys.
R.. undulata (undulate ray)	VIIj	Uncertain. Locally common in discrete areas.
	VIId,e	Uncertain. Locally common in discrete areas.
R. microocellata (small-eyed ray)	VIIf	Stable/increasing.
L. circularis (sandy ray)	VI	Uncertain.
	VIIbc,h-k	Uncertain – stable/increasing in VIIj
R. fullonica (shagreen ray)	VI	Uncertain. There is a poor signal from surveys for this species.
	VIIbc,g-k	Uncertain. There is a poor signal from surveys for this species.
Dipturus oxyrinchus (long-nose skate)	VI-VII	Uncertain
Dipturus nidarosiensis (Norwegian skate)	VI	Uncertain

Stock trends from fishery-independent trawl surveys are available in most cases, however, for most stocks, it is not possible to identify whether overfishing takes place.

Landings of skates and rays in the Celtic Seas have generally declined, and this is associated with changes in species composition and relative abundance.
There is not enough information to assess the status of any species in the Rockall area. The assessments below refer to the other divisions within this eco-region.

RECENT MANAGEMENT ADVICE:

Advice Summary for 2011-2012

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	Less than 9.9 thousand t for the main species

Cautiously avoid impaired recruitment (**Precautionary Approach**)	No target fishery on *Raja undulata* and *Dipturus batis* complex
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Advice for 2011 and 2012 by individual stocks

Species	**Area**	**Advice**
Common skate complex (= *D. batis*, which has recently been differentiated into *D. flossasda* and *D. intermedia*, see Additional Considerations)	VI	No targeted fishery
	VII	No targeted fishery
R.. clavata (thornback ray)	VI	Status quo catch
	VIIa,f,g	Status quo catch
	VIIe	Status quo catch
R.. montagui (spotted ray).	VI	Status quo catch
	VIIa,f,g	Status quo catch
	VIIe	Status quo catch
L. naevus (cuckoo ray)	VI	Reduce from recent catch level
	VII	Reduce from recent catch level
R. brachyura (blonde ray)	VIa	No advice
	VIIa	No advice
	VIIe	No advice
	VIIf	No advice
R.. undulata (undulate ray)	VIIj	No targeted fishery
	VIId,e	No targeted fishery
R. microocellata (small-eyed ray)	VIIf	Status quo catch
L. circularis (sandy ray)	VI	No advice
	VIIbc,h-k	No advice
R. fullonica (shagreen ray)	VI	No advice
	VIIbc,g-k	No advice
Dipturus oxyrinchus (long-nose skate)	VI-VII	No advice
Dipturus nidarosiensis (Norwegian skate)	VI	No advice
Rostroraja alba (White skate)	VII	Retain on prohibited species list

Outlook for 2011-2012

No analytical assessment or forecast can be presented for these stocks. The main cause of this is the lack of a time-series of species specific landings data.

No targeted fishing should be permitted for *Raja undulata* and the *Dipturus batis* complex.

MSY approach

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2011 and 2012. Given the stable, possibly increasing stock trend for the main commercial skate species, as indicated by fishery-independent trawl surveys, but that the exploitation status is unknown, the catch should be maintained at recent levels.

Advice is provided based on an examination of the stock status of each of the different stocks in the divisions within the ecoregion, with the advice for the majority of the stocks provided.

Policy paper

In terms of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks in this multispecies complex are classified under a range of categories. The main commercial stocks are classified under categories 6-9, Annex IV, Rule 4. This implies an unchanged TAC.

However, the status of some other skate stocks is unknown, which following category 11 would suggest an adjustment in the TAC to recent catch levels, but by no more than 15%. This would imply a maximum reduction in TAC to 11, 379 tonnes in 2011. TACs for individual species within the demersal elasmobranch assemblage are not appropriate, with the exception of a zero TAC for those stocks known to be severely depleted (i.e., *D. batis, R. undulata, S. squatina,* and *R. alba*).

Species	**Area**	**Policy Category**
Common skate complex	VI	Annex III, Category 10
	VII	Annex III, Category 10
R.. clavata (thornback ray)	VI	Annex III, Category 8. Annex IV Rule 4 applies
	VIIa,f,g	Annex III, Category 8. Annex IV Rule 4 applies
	VIIe	Annex III, Category 6, Annex IV, Rule 4 applies
R.. montagui (spotted ray).	VI	Annex III, Category 8. Annex IV Rule 4 applies
	VIIa,f,g	Annex III, Category 8. Annex IV Rule 4 applies
	VIIe	Annex III, Category 6, Annex IV, Rule 4 applies
L. naevus (cuckoo ray)	VI	Annex III, Category 9 Annex IV, Rule 4 applies
	VII	Annex III, Category 9 Annex IV, Rule 4 applies
R. brachyura (blonde ray)	VIa	Annex III, Category 11
	VIIa	Annex III, Category 11
	VIIe	Annex III, Category 11
	VIIf	Annex III, Category 11
R.. undulata (undulate ray)	VIIj	Annex III, Category 10
	VIId,e	Annex III, Category 10
R. microocellata (small-eyed ray)	VIIf	Annex III, Category 6, Annex IV, Rule 4 applies
L. circularis (sandy ray)	VI	Annex III, Category 11
	VIIbc,h-k	Annex III, Category 11
R. fullonica (shagreen ray)	VI	Annex III, Category 11
	VIIbc,g-k	Annex III, Category 11
Dipturus oxyrinchus (long-nose skate)	VI-VII	Annex III, Category 11
Dipturus nidarosiensis (Norwegian skate)	VI	Annex III, Category 11
Rostroraja alba (White skate)	VII	Annex III, Category 10

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks in this multispecies complex are classified under a range of categories. Some of the main commercial stocks are classified under categories 6-9, Annex IV, Rule 4. This implies an unchanged TAC.

However, the status of some other skate stocks is unknown, which following category 11 would suggest an adjustment in the TAC to recent catch levels, but by no more than 15%. This would imply a maximum reduction in TAC to 11, 379 tonnes in 2011. TACs for individual species within the demersal elasmobranch assemblage are not appropriate, with the exception of a zero TAC for those stocks known to be severely depleted (i.e., *D. batis, R. undulata, S. squatina,* and *R. alba*).

6.5.3. Bay of Biscay and Western Iberian Seas

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	

	F_{pa}	Not defined	

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

Status of individual stocks is given in the table below.

Species	**Area**	**State of stock**
Raja clavata (thornback ray)	VIIIabd	Stable /increasing
Leucoraja naevus (cuckoo ray)	VIIIabd	Stable /increasing
other species	VIIIabd	Uncertain
Raja clavata (thornback ray)	VIIIc	Uncertain
Leucoraja naevus (cuckoo ray)	VIIIc	Uncertain
other species	VIIIc	Uncertain
Raja clavata (thornback ray)	IXa	Stable
Leucoraja naevus (cuckoo ray)	IXa	Uncertain
other species	IXa	Uncertain
Dipturus batis (Common skate) complex	All areas	Depleted

RECENT MANAGEMENT ADVICE:

Advice Summary for 2011-2012

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	Less than 4.2 thousand t for the main species
Cautiously avoid impaired recruitment (**Precautionary Approach**)	No target fishery on *Raja undulata* and *Dipturus batis* complex
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Advice for 2011-2012 by individual stocks

Species	**Area**	**Advice**
Raja clavata (thornback ray)	VIIIabd	Maintain the catches at recent level
Leucoraja naevus (cuckoo ray)	VIIIabd	Maintain the catches at recent level
Other species	VIIIabd	No advice
Raja clavata (thornback ray)	VIIIc	No advice
Leucoraja naevus (cuckoo ray)	VIIIc	No advice
Other species	VIIIc	No advice
Raja clavata (thornback ray)	IXa	Maintain the catches at recent level
Leucoraja naevus (cuckoo ray)	IXa	No advice
Other species	IXa	No advice
Raja alba	All areas	Retain on prohibited species list
Dipturus batis (Common skate) complex	All areas	Retain on prohibited species list

Outlook for 2011 and 2012

No analytical assessment or forecast can be presented for these stocks. The main cause of this is the lack of a time-series of species specific landings data. No targeted fishing should be permitted for *Raja undulata* and the *Dipturus batis* complex.

MSY transition scheme

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2011 and 2012. The rate of exploitation of these stocks relative to F_{MSY} is not currently known. Advice is provided based on an examination of the stock status of each of the different stocks in the divisions within the ecoregion, with the most appropriate advice for the majority of the stocks provided.

PA approach

White skate (Rostroraja alba) – No reliable recent records. The status is uncertain, although it is considered near-extirpated from parts of its former range.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks in this multispecies complex are classified under a range of categories. Some of the main commercial stocks are classified under categories 6-9, Annex IV, Rule 4. This implies an unchanged TAC.

Species	Area	Policy Category
Raja clavata (thornback ray)	VIIIabd	Annex III, Rule 6. Annex IV Rule 4 applies.
Leucoraja naevus (cuckoo ray)	VIIIabd	Annex III, Rule 6. Annex IV Rule 4 applies.
Other species	VIIIabd	Annex III, Rule 6. Annex IV Rule 4 applies.
Raja clavata (thornback ray)	VIIIc	Annex III, Rule 6. Annex IV Rule 4 applies.
Leucoraja naevus (cuckoo ray)	VIIIc	Annex III, Rule 6. Annex IV Rule 4 applies.
Other species	VIIIc	Annex III, Rule 6.
Raja clavata (thornback ray)	IXa	Annex III, Rule 6. Annex IV Rule 4 applies.
Leucoraja naevus (cuckoo ray)	IXa	Annex III, Rule 6. Annex IV Rule 4 applies.
Other species	IXa	Annex III, Rule 6.
Raja alba	All areas	Annex III, Rule 10
Dipturus batis (Common skate) complex	Areas	Annex III, Rule 10

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks in this multispecies complex are classified under a range of categories. Some of the main commercial stocks are classified under categories 6-9, Annex IV, Rule 4. This implies an unchanged TAC.

6.6. Porbeagle in the north-east Atlantic

FISHERIES: Porbeagle is a highly migratory and schooling species. Sporadic targeted fisheries develop on these schools. Porbeagle fisheries have been 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 source 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. ICCAT is responsible for the management of this species in the tuna fisheries.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

(unchanged since: 2010)

STOCK STATUS:

F (Fishing Mortality)			
	2007	2008	**2009**
F_{msy}	?	?	?
F_{pa} / F_{lim}		?	

SSB (Spawning Stock Biomass)			
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

The fisheries in the Northern part of the stock area have ceased and have not resumed. Before quotas were put in place, if porbeagle were present in sufficient numbers to support a fishery, a fishery would have developed. That no fishery developed can be considered as a sign that the stock had not recovered from its previous low numbers. However, in the absence of any quantitative data to demonstrate stock recovery, and in regard of this species' low reproductive capacity, the stock is probably still depleted.

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:

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	TAC = 0
Cautiously avoid impaired recruitment (**Precautionary Approach**)	TAC = 0
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

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.

Outlook for 2011-2012
Exploratory assessments conducted in 2009 and 2010 were not considered a basis for advice.

MSY approach
There is no assessment available to alter the perception of the depleted nature of the stock. Therefore there is no non-zero catch option that is compatible with the ICES MSY framework.

PA approach
ICES reiterates the precautionary advice it gave in 2008, for 2009 and for 2010 that "given the state of the stock, no targeted fishing for porbeagle should be permitted and bycatch should be limited and landings of porbeagle should not be allowed."

Policy paper
In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 6. This implies a TAC=0 in 2011 and in 2012.

STECF COMMENTS: STECF agrees with the ICES advice.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes that Porbeagle in the Northeast Atlantic falls under Category 10. The TAC should be reduced by at least 25%. This implies a TAC=0 in 2011 and 2012. Recovery measures should be implemented.

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.

STECF notes that ICCAT is officialy responsible for the management of the species in the tuna fisheries.

STECF also notes that the data used by ICES and ICCAT are not identical and therefore may lead to slightly different perceptions of the stock status. STECF stresses that compiling the datasets for the various fisheries separately is essential to provide the best possible assessment of the state of the stock.

6.7. Thresher shark in the north-east Atlantic

Two species of thresher shark occur in the ICES areas: common thresher *Alopias vulpinus* and bigeye thresher *A. superciliosus.* Of these, *A. vulpinus* is the dominant species taken in the continental shelf fisheries of the ICES area. There is little information on the stock identity of these circumglobal sharks, and WGEF assumes there to be a single NE Atlantic and Mediterranean stock of *A. vulpinus*. This stock probably ex-tends into the CECAF area. The presence of a nursery ground in the Alboran Sea provides the rationale for including the Mediterranean Sea within the stock area.

There are no target fisheries for thresher sharks in the NE Atlantic; although they are taken as a bycatch in longline and driftnet fisheries. Both species are caught mainly in longline fisheries for tunas and swordfish, although they may also be taken in drift-net and gillnet fisheries. The fisheries data for the ICES area are scarce, and they are unreliable, because it is likely that the two species (*Alopias vulpinus* and *A. superciliosus*) are mixed in the records.

ICCAT is responsible for the management of this species in the tuna fisheries.

ICES have never provided advice for this stock.

STECF COMMENTS: STECF has no comments.

6.8. Blue shark in the north-east Atlantic

The DELASS project and the ICCAT Shark Assessment Working Group consider there to be one stock of blue shark *Prionace glauca* in the North Atlantic. Thus the ICES area is only part of the stock. ICCAT, 2008 considered that the 5°N parallel was the most appropriate division between North and South Atlantic stocks of blue shark.

In recent years, more information has become available about fisheries taking blue shark in the North Atlantic. Although the available data are limited, it offers some information on the situation in fisheries and trends. Although there are no large-scale directed fisheries for this species, it is a major bycatch in many fisheries for tunas and billfish, where it can comprise up to 70% of the total catches and thereby exceed the actual catch of targeted species.

ACOM has never provided advice for blue shark in the ICES area. ICCAT is the responsible agency for assessment of this species. No specific management advice has been provided by ICCAT for this stock, to date.

Regarding the stock assessment of blue shark of the North and South Atlantic carried out in 2008, ICCAT estimated that the biomass is above that which permits MSY. As in the 2004 stock assessment, many runs of the model (using surplus production models, age-structured models and models without catches), the state of the stock seems to be close to the levels of unexploited biomass and the fishing mortality rates seem to be considerably below the level to attain MSY. Although the results of all the models used are conditional on the assumptions considered (for example, historical estimates of the catches and effort, the relationship between catch rates and abundance, the initial status of the stock in the 1950s and the various life cycle parameters), the majority of the models predicted, from a coherent mode, that the blue shark stocks are not over-exploited and that over-fishing is not occurring.

There are no measures regulating the catches of blue shark in the North Atlantic. EC Regulation No. 1185/2003 prohibits the removal of shark fins of this species, and subsequent discarding of the body. This regulation is binding on EC vessels in all waters and non-EC vessels in Community waters.

ICCAT is responsible for the management of this species in the tuna fisheries.

6.9. Other Demersal Elasmobranchs in the Northeast Atlantic

FISHERIES: Historically the increase of commercial fisheries directed at elasmobranch species, and their economic value, rank them low among marine commercial fisheries (Bonfil 1994). In the Northeast Atlantic, although some elasmobranchs are taken in directed fisheries, the majority are landed as bycatch from fisheries targeting commercial teleost species. Recreational fisheries, including charter angling, may be an important component of the tourist industry in some areas.

SOURCE OF MANAGEMENT ADVICE: The main advisory body is ICES. The assessment is based on survey and landing trends.

6.9.1. North Sea

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

In the absence of formal stock assessments and defined reference points for *Mustelus* and *Squatina* in this eco-region, the following provides a qualitative evaluation of the general status of the major species, based on surveys and landings.

Species	Area	State of stock
Mustelus spp. (smooth hounds)	IVa,b,c, VIId	Increasing
Squatina squatina (angel shark)	IVa,b,c, VIId	Presumed extirpated in this ecoregion

RECENT MANAGEMENT ADVICE:

Advice for 2011 and 2012 by individual stocks

Species	Area	Advice
Mustelus spp. (smooth hounds)	IVa,b,c, VIId	Status quo catch
Squatina squatina (angel shark)	IVa,b,c, VIId	Zero catch. Retain on prohibited species list

Outlook for 2011-2012
No reliable assessments can be presented for these stocks. The main cause of this is the lack of species specific landings data. If fishers do not change their practices this must either lead to an increase of discarding and/or to misreporting.

MSY transition scheme
An estimate of fishing mortality is not available. Demersal elasmobranchs are long-lived stocks, and no population estimates are available. Further information is required on each of these stocks before MSY reference points can be identified.

Policy paper
In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks of these species are classified under a range of categories.

Species	Area	Policy Category
Mustelus spp. (smooth hounds)	IVa,b,c, VIId	No TAC is in place, but Annex III, Rule 8. Annex IV Rule 4 would apply.
Squatina squatina (angel shark)	IVa,b,c, VIId	Annex III, Rule 10

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks of *Mustelus* and *Squatina* in IV and VIId are classified under a number of categories.

6.9.2. Celtic Seas

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

F_{MSY} is not currently definable for these stocks, unless further information is available, including a better assessment of the species composition of the landings. Reference points cannot be defined.

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY (F_{msy})		?	
Precautionary approach (F_{pa},F_{lim})		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)		?	
Precautionary approach (B_{pa},B_{lim})		?	

In the absence of formal stock assessments and defined reference points for *Mustelus* and *Squatina* in this eco-region, the following provides a qualitative evaluation of the general status of the major species, based on surveys and landings.

Species	Area	State of stock
Mustelus spp. (smooth-hounds)	VII	The stock area is not known, but may merge with sub-areas IV, VI and VIII. Increasing in most surveys.
Squatina squatina (Angel shark)	VI,VII	Rare in this ecoregion, and near extirpated from parts of its former range

RECENT MANAGEMENT ADVICE:

Advice for 2011 and 2012 by individual stocks

Species	Area	Advice
Mustelus spp. (smooth-hounds)	VII	Status quo catch
Squatina squatina (Angel shark)	VI,VII	Retain on prohibited species list

There is not enough information to assess the status of any species in the Rockall area.

Outlook for 2011-2012

No analytical assessment or forecast can be presented for these stocks. The main cause of this is the lack of a time-series of species specific landings data.

MSY approach

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2011 and 2012.

Policy paper

In terms of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks of these species are classified under a range of categories.

Species	Area	Policy Category
Mustelus spp. (smooth-hounds)	VII	No TAC is in place, but Annex III, Rule 8, Annex IV Rule 4 would apply.
Squatina squatina (Angel shark)	VI,VII	Annex III, Category 10

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks of *Mustelus* and *Squatina* in VI and VII are classified under a range of categories.

6.9.3. Bay of Biscay and Western Iberian Seas

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY (F_{msy})		?	
Precautionary approach (F_{pa},F_{lim})		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)		?	
Precautionary approach (B_{pa},B_{lim})		?	

In the absence of formal stock assessments and defined reference points for *Mustelus* and *Squatina* in this eco-region, the following provides a qualitative evaluation of the general status of the major species, based on surveys and landings.

Species	**Area**	**State of stock**
Mustelus spp	VIIIabd	Increasing
Mustelus spp	VIIIc	Uncertain
Mustelus spp	IXa	Uncertain
Squatina squatina	VIIIabd	Depleted
Squatina squatina	VIIIc	Depleted
Squatina squatina	IXa	Uncertain

RECENT MANAGEMENT ADVICE:

Advice for 2011-2012 by individual stocks

Species	**Area**	**Advice**
Mustelus spp	VIIIabd	No advice
Mustelus spp	VIIIc	No advice
Mustelus spp	IXa	No advice
Squatina squatina	VIIIabd	Retain on prohibited species list
Squatina squatina	VIIIc	Retain on prohibited species list
Squatina squatina	IXa	Retain on prohibited species list

Outlook for 2011 and 2012

No analytical assessment or forecast can be presented for these stocks. The main cause of this is the lack of a time-series of species specific landings data.

MSY transition scheme
Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2011 and 2012.

PA approach
Angel shark (Squatina squatina) – Landings of this species have almost ceased, with only occasional individuals landed. It is an inshore species, distinctive, and may have a relatively good discard survivorship. Given the concern over *S. squatina* in this and adjacent ecoregions, and that it is not subject to any conservation legislation, a zero TAC for Subareas VII–VIII, or listing this species as a prohibited species would benefit this species.

Landings of Mustelus spp. come mainly from Divison VII that is outside Bay of Biscay and Western Iberian Seas.

Policy paper
In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) the stocks of these species are classified under a range of categories.

Species	Area	Policy Category
Mustelus spp	VIIIabd	No TAC, but Annex III, Rule 8 would apply
Mustelus spp	VIIIc	No TAC, but Annex III, Rule 11 would apply
Mustelus spp	IXa	No TAC, but Annex III, Rule 11 would apply
Squatina squatina	VIIIabd	Annex III, Rule 10
Squatina squatina	VIIIc	Annex III, Rule 10
Squatina squatina	IXa	Annex III, Rule 10

STECF COMMENTS: STECF agrees with the ICES advice

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF notes the stocks of *Mustelus* and *Squatina* in VIII and IX are classified under a range of categories.

7. Deep Sea resources

7.1. 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 is 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 2010. 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.

REFERENCE POINTS:

Reference points

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

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:

F (Fishing Mortality)			
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

SSB (Spawning Stock Biomass)			
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

Abundance indices from Scottish surveys (2000-2010) indicate a decline since 2000.

Historical commercial CPUE (2000-2006) in Subareas V, VI, and VII suggested this species was severely depleted.

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:

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	TAC = 0
Cautiously avoid impaired recruitment (**Precautionary Approach**)	TAC = 0
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

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.

Outlook for 2011-2012

No reliable assessment can be presented for these stocks and fishing possibilities cannot be projected.

MSY transition scheme

An estimate of fishing mortality is not available. Portuguese dogfish are long-lived stocks, and no population estimates are available. Therefore a transition to F_{MSY} by 2015 is not currently possible.

Only survey data are available for the two most recent years. These data do not change the perception of these stocks and of the advice for the fishery given in 2008 *"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 deep-water 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."*

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 10, Annex IV, Rule 1.

STECF COMMENTS: STECF agrees with the ICES advice for Portuguese dogfish.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Portuguese dogfish in the Northeast Atlantic falls under category 10, Annex IV, Rule 1.

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)

7.2. 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. An update assessment was carried out in 2010.

REFERENCE POINTS

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

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:

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

Kitefin is a demersal elasmobranch considered as a long-lived stock.

Advice is provided based on an examination of the stock status of each of the stock in the divisions within the ecoregion.

Reference points cannot be defined.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	TAC = 0
Cautiously avoid impaired recruitment (**Precautionary Approach**)	TAC = 0
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Outlook for 2011-2012

No reliable assessment can be presented, or expected on the next years, for this stock. The main reason is the lack of information from fisheries or surveys. There are no target fisheries and discards are expected to increase due to regulation effects.

MSY transition scheme

An estimate of fishing mortality is not available. Demersal elasmobranchs are long-lived stocks, and no population estimates are available. Therefore a transition to F_{MSY} by 2015 is not currently possible.

Policy paper

In the light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified under category 10.

STECF COMMENTS: STECF agrees with the ICES advice for kitefin shark.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Kitefin shark in the Northeast Atlantic falls under category 10.

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)

7.3. 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 is 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 2010. 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.

REFERENCE POINTS:

Reference points

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY}	Not defined	
Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

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:

	F (Fishing Mortality)		
	2007	2008	**2009**
F_{msy}		?	
F_{pa} / F_{lim}		?	

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$		?	
B_{pa} / B_{lim}		?	

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:

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach** with caution at low stock size	TAC = 0
Cautiously avoid impaired recruitment (**Precautionary Approach**)	TAC = 0
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

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.

Outlook for 2011-2012

No reliable assessment can be presented for these stocks and fishing possibilities cannot be projected.

MSY transition scheme

An estimate of fishing mortality is not available. Leafscale gulper sharks are long-lived stocks, and no population estimates are available. Therefore a transition to F_{MSY} by 2015 is not currently possible.

Only survey data are available for the two most recent years. These data do not change the perception of these stocks and of the advice for the fishery given in 2008 *"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 deep-water 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 Leafscale gulper shark.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Leaf-scale gulper shark in the Northeast Atlantic falls under category 10, Annex IV, Rule 1.

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)

8. Resources in the Iceland and Greenland Seas

8.1. Cod (*Gadus morhua*) in ICES Subarea XII

STECF does not have access to any information on cod in ICES Subarea XII

8.2. Icelandic summer-spawning herring (*Clupea harengus,* Division Va)

FISHERIES: Icelandic summer-spawning herring are caught with purse seines and mid-water trawls. The catches increased rapidly in the early 1960s due to the development of the purse-seine fishery off the southern coast of Iceland. This resulted in a rapidly increasing exploitation rate until the stock collapsed in the late 1960s. A fishing ban was enforced during 1972-1975. The catches have since increased gradually to over 100,000 t. Formerly, the fleet consisted of multi-purpose vessels, mostly under 300 GRT, operating purse-seines and driftnets. In recent years, larger vessels (up to 1500 GRT) have entered the fishery. These are a combination of purse-seiners and pelagic trawlers operating in the herring, capelin, and blue whiting fisheries. Since the 1997/1998 fishing season, there has been a fishery for herring both to the west and east of Iceland, which is unusual compared to earlier years when the fishable stock was only found south and east of Iceland. Pelagic trawl fisheries were introduced in 1997/98 and have since then contributed with approximately 20-60% of the catches, but with much less contribution in recent two years (<5%). By-catch in the herring fishery is normally insignificant as the fishing season is during the over-wintering period when the herring is in large dense schools. Until the autumn 1990, the herring fishery took place during the last three months of the calendar year. During 1990-2008, the autumn fishery continued until January or early February of the following year, and has started in September/October since 1994. In 2003, the season was further extended to the end of April, and in the summers of 2002 and 2003, an experimental fishery for spawning herring with a catch of about 5,000 t each year was conducted at the south coast. The number of vessels participating in the fishery has shown a decreasing trend in the 2000s from around 30 down to 20 in 2007.

SOURCE OF MANAGEMENT ADVICE: The data used in the assessment are catch-at-age (from 1990 onwards) and one age-structured acoustic survey index, based on a survey conducted since 1974 in October-December and/or January. In addition to the acoustic survey aimed at the fishable part of the stock, there have been occasionally acoustic surveys off the NW, N, and NE coast of Iceland aimed to estimate the year-class strength of the juveniles. This survey has not taken place since 2003, but was partly resurrected in January 2009. The results of these measurements were normally not used in the assessment directly even if the year-class indices derived from the survey have shown a significant relationship to recruitment of the stock.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	Plans to determine it in the benchmark 2011
	F_{MSY}	Not defined	Plans to determine it in the benchmark 2011
Precautionary Approach	B_{lim}	200 000 t	SSB with a high probability of impaired recruitment.
	B_{pa}	300 000 t	$B_{pa} = B_{lim}\, e^{1.645\sigma}$, where $\sigma = 0.25$.
	F_{lim}	Not defined	
	F_{pa}	0.22	$F_{pa} = F_{0.1} = 0.22$ (based on a weighted average).

(unchanged since: 2010)

STOCK STATUS:

F (Fishing Mortality)	2007	2008	2009
MSY (F_{msy})	?	?	?
Precautionary approach (F_{pa},F_{lim})	−	−	+

SSB (Spawning Stock Biomass)	2008	2009	2010
MSY ($B_{trigger}$)	?	?	?
Precautionary approach (B_{lim})	+	+	o

The spawning stock biomass has been declining the past 3–4 years and is now below B_{pa}. A high *Ichthyophonus* infection was observed in the stock in the winter 2008/2009 and again 2009/2010 causing an additional natural mortality. Fishing mortality is currently below Fpa. Recruitment in the last decade has been at or above the long-term average, with occurrence of strong year classes in 1999, 2000 and 2002.

MANAGEMENT AGREEMENTS: The practice has been to manage fisheries on this stock at F = F0.1 (= 0.22 = F_{pa}) for more than 20 years. However, no formal management strategy has been adopted. The Icelandic TACs for herring apply from 1 September to 1 May the following year. The catch is normally taken from September to February.

RECENT MANAGEMENT ADVICE:

Because of the *Ichthyophonus* infection a forecast is not provided. In early autumn 2010 new information on *Ichthyophonus* infection and the stock size will be available from survey monitoring and ICES recommends that no TAC be set until this information is available.

PA approach

An advice based on the PA approach will be given following a survey early in the autumn 2010, which will give the status on the infection in the stock and stock size.

STECF COMMENTS: STECF agrees with the ICES advice.

9. Resources in the Barents and Norwegian Seas

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

FISHERIES: The fisheries for Northern shrimp in Sub-areas I & II (Barents Sea & Svalbard area) are among the largest shrimp fisheries in the North east Atlantic. Norway and Russia take the majority of the landings. In the early 1980s total landings were above 100,000 t, but have since declined.

Reported landings for all countries increased between 1995 (25,000 t) and 2000 (83,000 t), but have since decreased: 60,000 t in 2002, around 40 000 t in 2003-2005, around 26 000 t in 2008 and 23,000 t in 2009.

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

REFERENCE POINTS:

	Type	Value	Technical basis
MSY Approach	MSY $B_{trigger}$	0.5	50% of B_{MSY} (10^{th} percentile of the B_{MSY} estimate); relative value
	F_{MSY}	1	Relative value
Precautionary approach	B_{lim}	0.3	30% of B_{MSY} (production reduced to 50% MSY); relative value
	B_{pa}	Not defined	Not needed: Risk of transgressing limits are directly estimated
	F_{lim}	1.7	$1.7F_{MSY}$ (the F that drives the stock to B_{lim}); relative value
	F_{pa}	Not defined	Not needed: Risk of transgressing limits are directly estimated

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY (F_{msy})	⊕	⊕	⊕
Precautionary approach (F_{pa},F_{lim})	⊕	⊕	⊕

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY ($B_{trigger}$)	⊕	⊕	⊕
Precautionary approach (B_{pa},B_{lim})	⊕	⊕	⊕

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 levels relative to Bmsy, but no absolute estimates. The effect of predation by the Barents Sea cod stock has not been included in the model. According to this model the biomass levels have fluctuated above Bmsy since the late 1980s. Biomass level at the end of 2010 is estimated to be well above Bmsy and fishing mortality well below Fmsy.

RECENT MANAGEMENT ADVICE:

Management Objective (s)	**Landings in 2011**
MSY approach with caution at low stock size	Less than 60 000 t
Cautiously avoid impaired recruitment (**Precautionary Approach**)	n/a
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

MSY approach

The stock is well above MSY Btrigger and F is well below FMSY. Catch options of up to 60 000 t for 2011 have a low risk (<5%) of exceeding FMSY and are likely to maintain the stock near its current high level. However, the stock may likely sustain catches higher than that.

PA approach

There is a low risk of the stock falling below Blim or the fishery exceeding the exploitation rate PA limit reference point.

STECF COMMENTS: STECF agrees with the ICES advice.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Northern shrimp (Pandalus borealis) in Sub-areas I (Barents Sea) and & IIb (Svalbard Waters) falls under Category 1. Accordingly STECF notes that the rules for the above category would imply a TAC in 2011 of 60 000 t, based on a low risk (<5%) of exceeding Fmsy and the likelihood to maintain the stock near its current high level.

STECF notes that there is no TAC set for Pandalus Borealis in this area.

9.2. Herring (*Clupea harengus*) in Div. I and II. (Norwegian Spring Spawners)

FISHERIES: The total catches in 2009 were 1.687 million t., mainly taken by Norway (1017000 t), Russia (210000 t), Iceland (265000 t), EU (106000 t), and Faroe Islands (85000 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. Due to limitations for some countries to enter the EEZs of other countries in 2008, the fisheries do not necessarily depict the distribution of herring in the Norwegian Sea. A special feature of the summer fishery in 2005 and 2006 was the prolonged fishery in the Faroese and Icelandic zone. In 2007 and 2008 a clean herring fishery was hampered by mixture of mackerel schools in the area. This was especially the case for the Faroese fleet, which usually targets mackerel later in the year (October–November).

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, three of which have not been continued in recent years, (acoustic surveys of adults and juveniles, larval survey, and 0-group survey). The present assessment is an updated assessment, using the models, configurations and procedures agreed at the benchmark assessment in 2008.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	5.0 million t	B_{pa}
	F_{MSY}	0.15	F_{MSY} using a Beverton & Holt S/R relationship with data from 1950 to 2009
Precautionary Approach	B_{lim}	2.5 million t	MBAL (accepted in 1998)
	B_{pa}	5.0 million t	B_{lim} * exp(0.4*1.645)
	F_{lim}	not defined	-
	F_{pa}	0.15	Based on medium-term simulations

(unchanged since: 2010)

STOCK STATUS:

	F (Fishing Mortality)		
	2007	2008	**2009**
MSY F_{msy}	⊕	⊕	⊕
F_{pa} / F_{lim}	⊕	⊕	⊕

	SSB (Spawning Stock Biomass)		
	2008	2009	**2010**
MSY $B_{trigger}$	⊕	⊕	⊕
B_{pa} / B_{lim}	⊕	⊕	⊕

SSB in 2010 is well above B_{pa}. The stock development shows a number of good year classes: in the last 12 years, five large year classes have recruited into the stock (1998, 1999, 2002, 2003 and 2004). However, the available information indicates that year classes produced after 2004 have been small. Fishing mortality in 2008 and 2009 is estimated to be at F_{pa} (=F_{MSY}).

RECENT MANAGEMENT ADVICE:

Advice for 2011

Management Objective (s)	**Landings in 2011**
MSY approach with caution at low stock size	Less than 1.17 million tonnes
Cautiously avoid impaired recruitment (**Precautionary Approach**)	Less than 1.17 million tonnes
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	Less than 0.988 million tonnes

MSY approach
Following the ICES MSY framework implies that fishing mortality be reduced to 0.15, resulting in landings of 1.17 million tonnes in 2011. This is expected to lead to an SSB of 6.60 million tonnes in 2012.

Fishing mortality is at F_{MSY}, therefore the transition scheme towards the ICES MSY framework is not appropriate.

PA approach
The fishing mortality in 2011 should be no more than F_{pa} corresponding to landings of less than 1.17 million tonnes in 2011. This is expected to maintain SSB above B_{pa} in 2012.

Management plan
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.

ICES have evaluated the plan and conclude that it is in accordance with the precautionary approach. The management plan implies maximum catches of 0.988 million t in 2011, which is expected to lead to an SSB of 6.77 million t in 2012.

Policy Paper
In light of the EU policy paper on fisheries management (17 May 2010, COM(2010) 241) this stock is classified as category 4.

STECF COMMENTS: STECF agrees with the advice from ICES.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Herring in Subareas I and II falls under category 4. STECF notes that according to the management plan the TAC in 2011 should be 988 000 tonnes.

9.3. Barents Sea Capelin (*Mallotus villosus*) in Sub-areas I and II excluding Division IIa west of 5°W.

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 since 1987, catches have been very close to the advice, varying between 100,000 t and 650,000 t. The fishery was closed from 2004-2008.

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 from the 2009 joint Russian-Norwegian meeting to assess the Barents Sea capelin stock, Kirkenes, October 3-4 2009. Report of the Arctic Fisheries Working Group, 21-27 April 2009. ICES CM 2009/ACOM: 02.).

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Undefined	
	F_{MSY}	Undefined	
Precautionary Approach	B_{lim}	200 000 t	Above SSB_{1989}, the lowest SSB that has produced a good year class.
	B_{pa}	Undefined	
	F_{lim}	Undefined	
	F_{pa}	Undefined	

(unchanged since: 2010)

STOCK STATUS:

F (Fishing Mortality)	2007	2008	2009
F_{msy}	?	?	?
F_{pa} / F_{lim}	?	?	?

SSB (Spawning Stock Biomass)	2008	2009	2010
MSY $B_{trigger}$	?	?	?
B_{lim}*	⊖	⊕	⊕

*Above/below here refers to whether probability for SSB to be above B_{lim} if no fishing takes place, was above/below 95%.

The maturing component in autumn 2010 was estimated to be 2.05 million tonnes. The spawning stock in 2011 will consist of fish from the 2007 and 2008 year classes. The survey estimate at age 1 of the 2009 year class is above the long-term mean, while 0-group observations during the joint Russian-Norwegian ecosystem survey in August-September 2010 indicated that the 2010 year class is close to the long-term mean.

MANAGEMENT OBJECTIVES:

The fishery is managed according to a target escapement strategy taking into account the predation by cod. The harvest control rule is designed to ensure that at the close of the fishery, the SSB remains above the proposed $\mathbf{B}_{lim}$ of 200 000 t (with 95% probability). ICES consider the management plan to be consistent with the precautionary approach.

A basis for the management plan is that all catch is taken on prespawning capelin.

RECENT MANAGEMENT ADVICE:

An update assessment was carried out. Following the agreed management plan would imply catches of 380 000 tonnes in spring 2011. Only catches of mature fish have been considered.

STECF COMMENTS: STECF agrees with the ICES advice.

STECF notes that this international agreement has been evaluated to be consistent with the precautionary approach.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that Capelin in Subareas I and II falls under category 4. STECF notes that according to the management plan landings in 2011 should be 380 000 tonnes.

10. Stocks of the North West Atlantic (NAFO)

10.1. Cod (*Gadus morhua*) in Division 2J, 3K and 3L.

FISHERIES: Total catch in 2009 is uncertain. Accurate catch information is needed to evaluate the impact of future fishery removals on stock growth. Reported landings in 2009 were 3,098 t. This included 2,832 t in the stewardship fishery, 216 t in the sentinel surveys, and 50 t taken as by-catch, but excludes recreational fishery removals. There are no direct estimates of recreational landings for 2009. However, analysis of tag returns suggests that removals from recreational fisheries during 2009 could be 64% of the stewardship fishery removals.

SOURCE OF MANAGEMENT ADVICE: Previously the NAFO Scientific Council was requested by the Coastal State of Canada to provide management recommendations or advice on the status of this stock. This is no longer the case. The management advisory body for this stock is the Canadian Science Advisory Secretariat and any management decision is completely undertaken by Canada.

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

STOCK STATUS: Current levels of removals have resulted in low exploitation rates and probably have had little impact on recent stock dynamics. In general, the 2003-2005 year-classes are weaker than those from 1999-2002. Consequently, even with no fishing, the recent (2004-2008) high rate of growth in SSB is unlikely to continue in 2010. Current levels of removals will not greatly affect the rate of change in SSB in 2010.

RECENT MANAGEMENT ADVICE: Although a specific limit reference point has not been established, the stock is clearly below any reasonable value. The application of the precautionary approach would require catches in 2010 to be at the lowest possible level. This would include no directed fishing and measures to reduce cod by-catch in other fisheries.

STECF COMMENTS: STECF agrees with the advice from the Canadian Science Advisory Secretariat.

10.2. Cod (*Gadus morhua*) in Divisions 3N and 3O

Multi-year advice for 2011-2013 from NAFO Scientific Council Report, 2010.

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 from 170 t in 1995, peaked at about 4 800 t in 2003 then declined to 600 t in 2006. Since 2006 catches have increased steadily to 1, 100 t in 2009.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. Length and age composition were available from the 2007-2009 trawler fisheries to update catch at age. Canadian spring (1984-2009), autumn (1990-2009), and juvenile (1989-1994) surveys; and EU-Spain Div. 3NO May-June surveys provided abundance, biomass and size structure information.

REFERENCE POINTS: The current best estimate of Blim is 60 000 t.

STOCK STATUS: The 2010 total biomass and spawning biomass remain low but are estimated to be at their highest levels since 1992. Fishing Mortality has been declining since 2006. Estimates for ages 4-6 in 2008 and 2009 are less than 0.06 and are amongst the lowest estimated during the moratorium. Recruitment remains low but has been improving in recent years with current estimates of the 2005-2007 year classes comparable to those from the mid- late 1980s. State of the Stock remains relatively low but has improved in recent years to levels just prior to the moratorium. Nevertheless, SSB is still well below Blim. SSB in 2010 is estimated to be 12 700 t which is 21% of Blim.

RECENT MANAGEMENT ADVICE: Simulations were carried out to examine the trajectory of the stock under two scenarios of fishing mortality: F=0, F=0.07 (the average F on ages 4-6 from 2007-2009). At F=0 spawning stock biomass is estimated to increase and there is an 88% probability that SSB will remain under Blim by 2013. At F=0.07 the population is estimated to grow more slowly. If the fishing mortality in 2010-2012 remains at the average estimated in 2007-2009 then yield is estimated to increase over the 3-year time period.

There should be no directed fishing for cod in Div. 3N and Div. 3O in 2011-2013. Bycatches of cod should be kept to the lowest possible level and restricted to unavoidable bycatch in fisheries directed for other species.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.3. Cod (*Gadus morhua*) in Division 3M (Flemish Cap)

Multi-year advice for 2011-2013 from NAFO Scientific Council Report, 2010.

FISHERIES: The cod fishery on Flemish Cap has traditionally been a directed fishery by Portuguese trawlers and gillnetters, Spanish pair-trawlers and Faroese longliners. Cod has also been taken as bycatch in the directed redfish fishery by Portuguese trawlers. Estimated bycatch in shrimp fisheries is low. Large numbers of small fish were caught by the trawl fishery in the past, particularly during 1992-1994. Catches since 1996 were very small compared with previous years. From 1963 to 1979, the mean reported catch was 32 000 t, showing high variations between years. Reported catches declined after 1980, when a TAC of 13 000 t was established, but Scientific Council regularly expressed its concern about the reliability of some catches reported in the period since 1963, particularly those since 1980. Alternative estimates of the annual total catch since 1988 were made available in 1995, including non-reported catches and catches from non-Contracting Parties. Catches exceeded the TAC from 1988 to 1994, but were below the TAC from 1995 to 1998. In 1999 the direct fishery was closed

and catches were estimated in that year as 353 t, most of them taken by non-Contracting Parties based on Canadian Surveillance reports. Those fleets were not observed since 2000, and the current reduced catches are mainly obtained as bycatch of the redfish fishery. Yearly bycatches between 2000 and 2005 were below 60 t, rising to 339 and 345 t in 2006 and 2007, respectively. In 2008 and 2009 catches increased to 889 and 1161 t, respectively. The fishery has been reopened in 2010 with a TAC of 5 500 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. An analytical assessment based on an age-structured model was accepted to estimate the state of the stock.

REFERENCE POINTS: A spawning biomass of 14 000 t has been identified as *Blim* for this stock. SSB is well above *Blim* in 2010.

STOCK STATUS: There has been a significant increase in spawning biomass, reaching much higher levels than at the start of the assessment (1988-1995), although total biomass and abundance are still lower that those years. 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. While recruitment has been better during 2005-2009, it is below levels in the earlier period.

RECENT MANAGEMENT ADVICE: Stochastic projections of the stock dynamics over a 3 year period (2011-2013) have been performed. (Scenario 1) Fbar=F0.1 (median value = 0.130). (Scenario 2) Fbar=Fmax (median value = 0.230) and (Scenario 3) Fbar=F2009. (median value = 0.033). All scenarios assumed that the Yield for 2010 is the established TAC (5500 t). The results indicate that fishing at any of the considered values of Fbar, total biomass and SSB during the next 3 years have a very high probability of reaching levels higher than all of the 1988-2010 estimates, although the increase in SSB is higher than in total biomass. However, the huge increase predicted for SSB does not have a counterpart in terms of population abundances, which are projected to remain at levels below those of the late 1980s. If these conditions do not persist, projection results will be overly optimistic. The removals associated with these Fbar levels are lower than those in the period before 1995.

Considering the relatively low number of mature individuals currently in the stock, Scientific Council advises that a TAC lower than 10 000 t (approximate catch at F0.1), appears not to be damaging the SSB that is currently well above Blim.

Taking into account that the stock is changing rapidly and this could lead to considerable change in the maturity ogive, STACFIS recommended that the maturity ogives be updated to include data for the years 2007-2009.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.4. Witch Flounder (*Glyptocephalus cynoglossus*) in Divisions 2J, 3K and 3L

Multi-year Advice for 2011-2013 was provided for this stock in 2010.

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 bycatch 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 the next few years 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. Although a moratorium on directed fishing was implemented in 1995, the catches in 1995 and 1996 were estimated to be about 780 and 1 370 t, respectively. However, it is believed that these catches could be overestimated by 15-20% because of misreported Greenland halibut. The catches during 1995-2004 ranged between 300 and 1 400 t including unreported catches. The 2005 catch declined to 155 t and the 2006 catch was only 84 t. Since 2005, catch averaged less than 100 t and in 2009 was 57 t.

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 (1977-2009). 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.

REFERENCE POINTS: In a previous assessment for this stock, a proxy for Blim was calculated as 15% of the highest observed survey biomass estimate because no analytical assessment was available (Blim = 9 800 t). Since this estimate is in the early part of the time series when the survey did not cover the entire stock area, Blim was likely underestimated using this method. An analysis of the amount of biomass in index strata (those strata covered in 1984, the highest biomass estimate in the series) suggested that the survey biomass estimates in the early part of the time series may have been underestimated by about 48% -the average of the biomass outside of the index strata in 1996-2009. The estimates of total survey biomass from 1996-2009 show a strong positive correlation with the biomass estimates in the index strata. The proxy for Blim, adjusted for less extensive coverage in the survey, is calculated to be 14 500 t (Blim=15% of B1984*1.48). In 2009, the biomass index remains below this reference point

STOCK STATUS: Recruitment was above the 1996-2009 average from 2000-2002. There has been an increase in the survey biomass index since 2003. Nevertheless, the overall stock remains at a very low level.

The next full assessment of this stock is scheduled for 2013.

RECENT MANAGEMENT ADVICE: No directed fishing on witch flounder is recommended in the years 2011 to 2013 in Div. 2J, 3K and 3L to allow for stock rebuilding. Bycatches 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

10.5. Witch Flounder (*Glyptocephalus cynoglossus*) in Divisions 3N and 3O

Multi-year Advice for 2009-2011 was provided for this stock in 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: Reported catches in the period 1972-84 ranged from a low of about 2 400 t in 1980 and 1981 to a high of about 9 200 t in 1972. With increased bycatch in other fisheries, catches rose rapidly to 8 800 and 9 100 t in 1985 and 1986. The increased effort was concentrated mainly in the NAFO Regulatory Area (NRA) of Div. 3N. From 1987 to 1993 catches ranged between about 3 700 and 7 500 t and then declined in 1994 to less than 1200 t when it was agreed there would be no directed fishing on the stock. Since then, catches have averaged about 500 t; in 2009 the catch was 375 t, taken mainly in the NRA of Div. 3O

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 1984-2009 and autumn surveys during 1990-2009. Biomass data is available from the Spanish Div. 3NO spring surveys during 1995-2001 in Pedreira units and 2001-2009 in Campelen units.

REFERENCE POINTS: The reference points for this stock are not determined.

STOCK STATUS: Stock remains at a low level.

RECENT MANAGEMENT ADVICE: The most recent advice given by NAFO Scientific Council was in 2009 and was as follows: No directed fishing on witch flounder in 2009, 2010 and 2011 in Div. 3N and 3O to allow for stock rebuilding. Bycatches in fisheries targeting other species should be kept at the lowest possible level.

Special Comments: The next Scientific Council assessment of this stock will be in 2011.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.6. American plaice (*Hippoglossoides platessoides*) in Divisions 3L, 3N and 3O

FISHERIES: Historically, American plaice in Div. 3LNO, has comprised the largest flatfish fishery in the Northwest Atlantic. In most years the majority of the catch has been taken by offshore otter trawlers. 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 2009 was 3 515 t, mainly taken in the Regulatory Area.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. The advice is based on biomass and abundance data from several surveys as well as on age sampling from Canadian by-catch and length, sampling from Russia, EU-Spain and EU-Portugal. An analytical assessment using the ADAPTive framework tuned to the Canadian spring and autumn surveys and Spanish Div. 3NO survey was used.

REFERENCE POINTS: An examination of the stock recruit scatter shows that good recruitment has rarely been observed in this stock at SSB below 50 000 t, with the possible exception of the 2003 year class, and this is currently the best estimate of Blim . In 2009 STACFIS adopted an Flim of 0.4 consistent with stock history and dynamics for this stock. The stock is currently below Blim and current fishing mortality is below Flim.

STOCK STATUS: The stock remains low compared to historic levels and, although SSB is increasing, it is still estimated to be below Blim. STACFIS notes that SSB was projected in the last assessment to surpass Blim in 2010.

However, in this assessment recent estimates of SSB were revised downward as a result of relatively low survey indices in 2009, as well as slight revisions to input data from previous years. In addition, stock weights and maturities now appear to be reduced compared to values used in the projections in the last assessment.

RECENT MANAGEMENT ADVICE: Simulations were carried out to examine the trajectory of the stock under 3 scenarios of fishing mortality: F = 0, F=F2009 (0.13), and F0.1 (0.2). At F = 0 spawning stock biomass is estimated to increase and there is a 50% probability that SSB will surpass Blim by 2012. Under Fcurrent and F0.1 the population is estimated to grow more slowly and there is a less than 50% probability that SSB will read Blim by 2015. Yield is estimated to increase over the 5-year time period under Fcurrent and F0.1.

There should be no directed fishing on American plaice in Div. 3LNO in 2011. Bycatches of American plaice should be kept to the lowest possible level and restricted to unavoidable bycatch in fisheries directing for other species.

Special Comment:The next full assessment of this stock will be conducted in 2011.

STECF COMMENTS: STECF agrees with the advice from NAFO remarking that the level of catches is too high for a stock under moratorium.

10.7. American plaice (*Hippoglossoides platessoides*) in Divisions 3M (Flemish Cap)

Multi-year Advice for 2009-2011 was provided for this stock in 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 of less than 1,100 tons in 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. A total catch of 70 t was estimated for 2009.

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**.**

REFERENCE POINTS: Based on the 18 years data available from the XSA to examine a stock/recruitment relationship, a proxy for Blim will be 5 000 tons of SSB.

STOCK STATUS: STACFIS noted that this stock continues to be in very poor condition, with only poor year-classes expected to recruit to the SSB (50% of age 5 and 100% of age 6 plus) in 2010. Level of catches and fishing mortality since 1992 appear to be relatively low and survey data indicate that the stock biomass and the

SSB remained at a very low level. Although there are signs of improved recruitment, there is no major change to the perception of the stock status.

The next full assessment is expected to be in 2011.

RECENT MANAGEMENT ADVICE: The most recent advice given by NAFO Scientific Council was in 2009 and was as follows: There should be no directed fishery on American plaice in Div. 3M in 2009, 2010 and 2011. Bycatch should be kept at the lowest possible level.

Special Comments: The apparent good recruitment of the 2006 year class remains to be confirmed in the next years. Because the value estimated by the XSA for the age 1 in 2007 is determined by one point from the EU-survey, the strength of the 2006 year class should be considered preliminary.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.8. Northern Shortfin Squid (*Illex illecebrosus*) in Subareas 3 and 4

The northern short-finned squid (*Illex illecebrosus*) is an annual species (1-year life cycle) and is considered to comprise a unit stock throughout its range in the Northwest Atlantic Ocean, from Newfoundland to Florida including NAFO Sub-areas 3-6.

FISHERIES: Fisheries for northern shortfin squid in Subareas 3 and 4 consist of a Canadian inshore jig fishery in Subarea 3, and prior to 2000, an international bottom trawl fishery for silver hake, squid and argentine in Subarea 4. A USA bottom trawl fishery also occurs in Subareas 5+6. Historically, international bottom trawl and mid-water fleets participated in directed squid fisheries in Subareas 3, 4 and 5+6. Occasionally, very low catches are taken in Subarea 2. In Subareas 3+4, a TAC of 150 000 t was in place during 1980-1998. It was set at 75 000 t for 1999 and at 34 000 t since then. Subareas 3+4 catches declined sharply from 162 100 t in 1979 to 100 t in 1986, then subsequently increased to 11 000 t in 1990. During 1991-1995, catches in Subareas 3+4 ranged between about 1 000 t and 6 000 t, and in 1997, increased to 15 600 t; the highest level since 1981. After 1997, catches ranged between 100 t in 2001 and 7 000 t in 2006. Catches in Subareas 3+4 totalled 700 t in 2009. Since this annual species is considered to constitute a single stock throughout Subareas 2 to 6 (SCR Doc. 98/59), trends in Subareas 3+4 must be considered in relation to those in Subareas 5+6. Subarea 5+6 catches ranged between 2 000 t and 24 900 t during 1970-1997. During 1998-2003, catches in Subareas 5+6 declined from 23 600 t to 6 400 t. Catches increased sharply in 2004 to the highest catch on record (26 100 t), but then declined to 9 000 t in 2007. Thereafter, catches in Subareas 5+6 increased to 18 400 t in 2009.

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 2000-2010.

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

REFERENCE POINTS: No reference points have been proposed for short finned squid in Sub-areas 3+4.

STOCK STATUS: In 2009, the relative biomass index and mean body weight of squid from the Div. 4VWX July survey were near their 1982-2008 averages for the low productivity period. In addition, the relative fishing mortality index was the lowest on record in 2009. These stock status indicators suggest that the Subareas 3+4 stock component remained in a state of low productivity during 2009 and that relative fishing mortality indices were also very low.

The next full assessment of this stock is planned for 2013.

RECENT MANAGEMENT ADVICE:

Based on available information, including an analysis of the upper range of yields that might be expected under the present low productivity regime (19 000-34 000 t), the Council advises that the TAC for 2011 to 2013 be set between 19 000 and 34 000 t. The advised TAC range is applicable only during periods of low productivity. During periods of high productivity, higher catches and TAC levels are appropriate.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.9. Yellowtail Flounder (*Limanda ferruginea*) in Divisions 3L, 3N and 3O

FISHERIES: The stock is mainly concentrated on the southern Grand Bank and is recruited from the Southeast Shoal area nursery ground, where the juvenile and adult components overlap in their distribution.

There was a moratorium on directed fishing from 1994 to 1997, and small catches were taken as bycatch in other fisheries. Since the fishery re-opened in 1998, catches increased from 4 400 t to 14 100 t in 2001.Catches from 2001 to 2008 ranged from 11 000 to 14 000 t, except in 2006 and 2007, when catches were well below the TACs due to corporate restructuring and a labour dispute in the Canadian fishing industry. In 2009, there was a reduction in effort in the Canadian fishery due to market conditions, and only 6 200 t of the 17 000 t TAC was taken.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. Abundance and biomass indices were available from: annual Canadian spring (1971-82; 1984-2009) and autumn (1990-2009) bottom trawl surveys; annual USSR/Russian spring surveys (1972-91); and Spanish surveys in the NAFO Regulatory Area of Div. 3NO (1995-2009).An analytical assessment using a stock production model was accepted to estimate stock status in 2009

REFERENCE POINTS: Scientific Council considered that 30% Bmsy is a suitable limit reference point (Blim) for this stock and that the limit reference point for fishing mortality (Flim) should be no higher than Fmsy.

STOCK STATUS: Although the Canadian spring and autumn survey indices declined in 2009, this may be within the variation of the series. Overall, there is nothing to indicate a change in the status of the stock. In its 2009 report, the Scientific Council of NAFO stated that the stock size has steadily increased since 1994 and is currently estimated to be 1.6 times B_{MSY}. Currently the biomass is estimated to be above Blim and F, below Flim, so the stock is in the safe zone as defined in the NAFO Precautionary Approach Framework.

RECENT MANAGEMENT ADVICE: The most recent advice given by NAFO Scientific Council was in 2009 and was as follows: Although biomass is well above Bmsy, Scientific Council does not consider it prudent to fish above 85% Fmsy because of the uncertainty in the estimation of Fmsy. Scientific The Council therefore recommends any TAC option up to 85% Fmsy for 2010 (25 500 t) and 2011 (23 500).
Special Comment: Scientific Council noted that the yellowtail flounder fishery takes cod and American plaice as bycatch. Hence, in establishing the TAC for yellowtail flounder, the impacts on Div. 3NO cod and Div. 3LNO American plaice of any increase in yellowtail flounder TAC should be considered. The next Scientific Council assessment of this stock will be in 2011.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.10. Capelin (*Mallotus villosus*) in Divison 3N and 3O.

Multi-year Advice for 2010-2012 was provided for this stock in 2009.

FISHERIES: The fishery for capelin started in 1971 and catches reached a peak in mid-1970s with the highest catch of 132 000 t in 1975. The directed fishery was closed in 1992 and the closure has continued through 2009 (Fig. 14.1). No catches have been reported for this stock since 1993.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. Capelin catches from Canadian bottom trawl surveys conducted in 1990-2009, as well as historical data sets from Russian and Canadian trawl acoustic surveys directed to capelin.

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

STOCK STATUS: It is not clear how the data reflects the real stock distribution and stock status. Nevertheless, STACFIS considered that the stock is still at low level relative to that of the late 1980s

RECENT MANAGEMENT ADVICE: The most recent advice given by NAFO Scientific Council was in 2009 and was as follows: 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 2010-2012.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.11. Shrimp (*Pandalus borealis)* in Division 3LNO

FISHERIES: Most of this stock is located in Div. 3L and exploratory fishing began there in 1993. The stock came under TAC regulation in 2000, and fishing has been restricted to Div. 3L. Several countries participated in the fishery in 2010. The use of a sorting grid to reduce bycatches of fish is mandatory for all fleets in the fishery. Catches have fluctuated around 25 000t in recent years.

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

Catch data were available from the commercial fishery. Biomass (total, fishable and female spawning stock) indices were available from research surveys conducted in Div. 3LNO during spring (1999 to 2010) and autumn (1996 to 2009). The Canadian survey in autumn 2004 was incomplete. Analytical assessment methods have not been established for this stock. Evaluation of the status of the stock is based upon interpretation of commercial fishery and research survey data.

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 Blim (approximately 19 000 t of female SSB). There is no target exploitation rate established for this stock, and no PA reference points based on fishing mortality

STOCK STATUS: Biomass levels peaked in 2007, then decreased substantially by 2009 and remained at this lower level in 2010. Female biomass index has been low over the past three surveys and is currently above Blim, although its position relative to the safe zone is unknown. The average fishable biomass of the four most recent surveys is calculated to be 120,200 t.

RECENT MANAGEMENT ADVICE:

Based on the average fishable biomass, the following table shows exploitation rates at various catch levels in 2011, including the last three catch options requested by Fisheries Commission:

Catch options (t)	12,000	17,000	24,000	27,000	30,000
Exploitation rates	10%	14%	20%	22.5%	25%

At TACs of 24 000 t and above, the exploitation rate is estimated to be 20% or higher, which is well beyond the range of previous exploitation rates in this fishery. Given recent declines in stock biomass, catches at this level are likely to result in further declines.

Exploitation rates over the period 2006-2008 have been near 14% and were followed by stock decline. Scientific Council considers TAC options at 14% exploitation rate or higher to be associated with a relatively high risk of continued stock decline. TACs lower than that will tend to reduce this risk in proportion to the reduction in the exploitation rate. Scientific Council is not able to quantify the absolute magnitude of the risk associated with alternative TAC options.

Special Comment: Scientific Council notes that the weighted average of the four most recent survey biomass estimates includes one point (autumn 2008) which is close to double the level of the three most recent survey points in 2009 and 2010. Based upon the last three surveys, the average fishable biomass is 100 000 t.

Scientific Council expressed some concerns over using the 2008 point in the average and recommended that the issue of basing TAC calculations on a weighted average of a number of surveys be examined.

From an ecosystem perspective, Scientific Council also notes that positive signs observed in some fish stocks on the Newfoundland Shelf could translate into increased natural mortality levels for shrimp given its role as a forage species in this ecosystem. In this context, a particularly cautious approach to setting the TAC is to be encouraged.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.12. Shrimp (*Pandalus borealis)* in Division 3M (Flemish Cap)

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 2006 there were approximately 20 vessels fishing shrimp in Div. 3M. The number of vessels participating in the fishery has decreased by more than 60% since 2004 to 13 vessels in 2009.

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. The effort allocations were reduced to 50% in 2010. 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 to13 000 tons in 2008 and 5 000 tons in 2009. Catches are expected to decline in 2010.

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

Catch, effort and biological data were available from several Contracting Parties. Time series of size and sex composition data were available mainly from two countries between 1993 and 2005 and survey indices were available from EU research surveys (1988-2010). Only provisional catch data were available for 2010.

No analytical assessment was available. Evaluation of stock status was based upon interpretation of commercial fishery and research survey data.

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 Blim, for Div. 3M shrimp, 2 600 t of female survey biomass. The female biomass index was below Blim in 2009, and it is slightly above it in 2010. It is not possible to calculate a limit reference point for fishing mortality.

STOCK STATUS: The indices of biomass decreased sharply in 2009 to below Blim although exploitation levels have been low since 2005. The indices of biomass in the July 2010 survey were slightly higher and the stock size was just above Blim.

RECENT MANAGEMENT ADVICE: The 2009-2010 survey biomass index indicates the stock is around the Blim proxy and remains in a state of impaired recruitment. To favour future recruitment, Scientific Council reiterates its October 2009 recommendation for 2011 that the fishing mortality be set as close to zero as possible.

STECF COMMENTS: STECF agrees with the advice from NAFO on the basis of single stock management

10.13. Greenland Halibut (*Reinhardtius hippoglossoides*) in Sub-area 2 and Divisions 3KLMNO

FISHERIES: TACs prior to 1995 were set autonomously by Canada; subsequent TACs have been established by Fisheries Commission. Catches increased sharply in 1990 due to a developing fishery in the NAFO Regulatory Area in Div. 3LMNO and continued at high levels during 1991-94. The catch was only 15 000 to 20 000 t 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 t, the highest since 1994. The estimated catch for 2002 was 34 000 t. The 2003 catch could not be precisely estimated, but was believed to be within the range of 32 000 t to 38 500 t. In 2003, a fifteen year rebuilding plan was implemented by Fisheries Commission for this stock. The STACFIS estimate of catch for 2009 is 23 160 t. Since the inception of the FC rebuilding plan, estimated catches for 2004-2009 have exceeded the TACs considerably, with the catch over-run ranging from 22-45%. The 2007, 2008 and 2009 catch was estimated to be 23 000 tons, 21 000 tons and 23 000 tons respectively.

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

Standardized estimates of CPUE were available from fisheries conducted by Canada, EU-Spain and EU-Portugal and unstandardized CPUE was available from Russia. Abundance and biomass indices were available from research vessel surveys by Canada in Div. 2+3KLMNO (1978-2009), EU in Div. 3M (1988-2009) and EU-Spain in Div. 3NO (1995-2009). Commercial catch-at-age data were available from 1975-2009.

Extended Survivors Analysis (XSA) tuned to the Canadian spring (Div. 3LNO; 1996-2009), and autumn (Div. 2J, 3K; 1996-2009) and the EU (Div. 3M; 0-700 m in 1995-2003; 0-1 400 m in 2004-2009) 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.

REFERENCE POINTS: Limit reference points could not be determined for this stock. Fmax is computed to be 0.39 and F0.1 is 0.21, assuming weights at age and a partial recruitment equal to the average of each of these

quantities over the past 3 years. A plot of these reference levels of fishing mortality in relation to stock trajectory indicates that the current average fishing mortality (0.255) is near the F0.1 level.

STOCK STATUS: Biomass increased over 2004-2008 with decreases in fishing mortality. However, it has shown decreases over 2008-2010, as weaker year-classes have recruited to the biomass. The level of recent estimates is higher than reported in previous assessments, as a result of including the new deepwater information from the EU survey, as well as a reduction in the amount of F-shrinkage required. The 10+ biomass peaked in 1991 and although it remains well below that peak, it has tripled over 2006-2010. Average fishing mortality (over ages 5-10) has been decreasing since 2003. Recent recruitment has been far below average.

In order to evaluate the population trends in the near term, stochastic projections from 2010 to 2014 were conducted assuming average exploitation pattern and weights-at-age from 2007 to 2009, and with natural mortality fixed at 0.2. Assuming the catch in 2010 remains at the 2009 level (23 150 t), the following projection scenarios were considered:
i) constant fishing mortality at F0.1 (0.21)
ii) constant fishing mortality at F2009 (0.26)
iii) constant landings at 16 000 t, and
iv) constant landings at 23 150 t.
An additional projection was undertaken assuming that the catches in 2010 will match the TAC of 16 000 t and remain constant at this level in 2011-2013.

The NAFO Scientific Council notes that projected yield under F0.1 is close to 16 000 t over 2011-2013. Thus under both the F0.1 and 16 000 t constant catch options, total biomass is projected to increase by approximately 10%. In the case for which the 2010 catches are assumed to be 16 000 t in both 2010 and also in the projection period, total biomass is projected to increase by 20% by 2014.
Total biomass remains stable under yields corresponding to F2009 fishing mortality, but is projected to decrease by 15% if catches remain at 23 200 t through 2013. Fishing at F2009 for the period 2011-2013 would correspond to a reduction in catch from 17 600 t in 2011 to 16 000 t in 2012 and 2013.
If catches are maintained at the current TAC level, total biomass is projected to be 80% of the 140 000 t, with five years remaining in the recovery plan. The potential of recovery to 140 000 t by 2014 is strongly dependent on future recruitment to the exploitable biomass, and recruitment has been very low in recent years.

RECENT MANAGEMENT ADVICE: Scientific Council noted that all year-classes which will recruit to the exploitable biomass in the short-term are weak. Projections at the F0.1 level indicate about 10% growth in exploitable biomass over 2010-2014. Therefore, Scientific Council recommends that fishing mortality in 2011 be no higher than the F0.1 level (median catch of 14 600 t in 2011). Consideration should be given to reducing fishing mortality below the F0.1 level to increase the probability of stock growth.

Special Comments: Scientific Council notes that XSA diagnostics continue to indicate serious problems in model fit. This assessment was accepted noting that careful attention will continue to be paid to model diagnostics in future assessments. 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. Scientific Council noted that the prospects of rebuilding this stock have been compromised by catches that have exceeded the Rebuilding Plan TACs. 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. However, further investigation of CPUE standardizations has been recommended 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.

10.14. Skates & Rays (Rajidae) in areas 3LNO

NAFO only provides information on Thorny Skate (*Amblyraja radiata*) in Divisions 3L, 3N and 3O and Subdivision 3Ps

FISHERIES: Commercial catches of skates comprise a mix 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 directed for thorny skate.

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.

Catches for NAFO Div. 3LNO increased in the mid-1980s with the commencement of a directed fishery for thorny skate. The main participants in this new fishery were EU-Spain, EU-Portugal, Russia, and Canada. Catches by all countries in Div. 3LNOPs over 1985-1991 averaged 18 066 t; with a peak of 29 048 t in 1991. From 1992-1995, catches of Thorny Skate declined to an average of 7 554 t, however there are substantial uncertainties concerning reported skate catches prior to 1996. Total catch, as estimated by STACFIS, in Div. 3LNOPs, averaged 9 000 t during the period 2000 to 2009. Average STACFIS catch in Div. 3LNO for 2005-2009 was 5 000 t. Thorny skate came under quota regulation in September 2004, when the NAFO Fisheries Commission set a Total Allowable Catch (TAC) of 13 500 t for 2005-2007 in Div. 3LNO, and Canada set a TAC of 1 050 t for Subdivision 3Ps. Catch estimates for 2007, 2008 and 2009 are 3 600t, 7 400 t and 4 500t for Div. 3LNO respectively. The catches for Subdivision 3Ps are 1 800 t, 1 400 t and 700 t respectively.

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

Abundance and biomass indices were available from: annual Canadian spring (1971-1982; 1983-1995; 1996-2009) and autumn (1990-1994, 1995-2009) surveys. EU-Spain survey indices were available in the NAFO Regulatory Area of Div. 3NO (1997-2009). EU-Spain survey indices in the NRA of Div. 3L are available for 2006-2009 but are not considered due to the short time series. Commercial length frequencies were available for EU-Spain (1985-1991, 1997-2009), EU-Portugal (2002-2004, 2006-2009), Canada (1994-2008), and Russia (1998-2009).

No analytical assessment could be performed.

REFERENCE POINTS: There are presently no biological reference points for thorny skate in Div. 3LNOPs.

STOCK STATUS: Although the state of the stock is unclear, the survey biomass has been relatively stable from 1996 to 2009 at low levels.

RECENT MANAGEMENT ADVICE: To promote recovery of thorny skate, Scientific Council recommends that catches in 2011 and 2012 should not exceed 5 000 t (the average catch during the past three years) in NAFO Div. 3LNO.

STECF COMMENTS: STECF agrees with the advice from NAFO

10.15. Redfish (*Sebastes spp.*) in Divisions 3L and 3N

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: Reported catches oscillated around an average level of 21 000 t from 1965-1985, rise to an average about 40 000 t from 1986-1993, and drop to a low level observed from 1995 onwards within a range of 450-3 000 t. The estimated catch in 2009 was of 1051 t. From 1998-2009 a moratorium on direct fishing was in place. Since 1998 catches were taken as bycatch primarily in Greenland halibut fishery by EU-Portugal and EU-Spain.

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

Catches from 1959-2009 (conditioned on a 1959-1994 CPUE series from STATLANT data), and data from most of the stratified-random bottom trawl surveys conducted by Canada and Russia and EU Spain in various years and seasons in Div. 3L and Div. 3N, from 1978 onwards were available. Length frequencies were available for both commercial catch and surveys.

REFERENCE POINTS: The NAFO SC Study Group recommendations from the meeting in Lorient in 2004, as regards Limit Reference Points for stocks evaluated with surplus production models, considered Flim at Fmsy and Ftarget at 2/3 Fmsy. The Study Group also considered that the biomass giving production of 50% MSY was a suitable Blim. With the Schaeffer model used in the present ASPIC assessment this limit corresponds in this stock to (roughly) 30% Bmsy. The stock was at (or below) Blim between 1993 and 1996, prior to the implementation of the moratorium on this fishery in 1998.

STOCK STATUS: The biomass of redfish in Div. 3LN is above Bmsy, while fishing mortality is below Fmsy.

RECENT MANAGEMENT ADVICE: Redfish in Div. 3LN has been under moratorium from 1998 to 2009. A stepwise approach to direct fishery should start by a low exploitation regime in order to have a high probability that the stock biomass is kept within its present safe zone. Therefore Scientific Council recommends that an appropriate TAC for 2011-2012 could be around 1/6 of Fmsy corresponding to a catch level of 6 000 t.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.16. Redfish (*Sebastes spp.*) in Division 3M

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 present assessment evaluates the status of the Div. 3M beaked redfish stock, regarded as a management unit composed of two populations from two very similar species (Sebastes mentella and Sebastes fasciatus). The reason for this approach is that evidence indicates this is the dominant redfish group on Flemish Cap.

FISHERIES: The redfish fishery in Div. 3M increased from 20 000 tons in 1985 to 81 000 tons in 1990, falling continuously since then until 1998 1999, when a minimum catch around 1 100 tons was recorded mostly as by-catch of the Greenland halibut fishery. An increase of the fishing effort directed to Div. 3M redfish is observed during the first years of the present decade, pursued by EU-Portugal and Russia fleets. A new golden redfish fishery occurred on the Flemish Cap bank from September 2005 onwards on shallower depths above 300m, basically pursued by Portuguese bottom trawl and Russia pelagic trawl. This new reality implied a revision of catch estimates, in order to split recent commercial catch from the major fleets on Div. 3M into golden and beaked redfish catches. In 2001-2003 the redfish by-catch in numbers from the Flemish Cap shrimp fishery was 78% of the total catch numbers, declining to 44% in 2004 and 15% in 2005. In order to estimate a proxy of the beaked redfish catch by fleet, a 2005-2008 review of the logbooks from the monitored vessels has been carried out last year by the national sampling programmes of Portugal, Spain and Russia. This exercise has been updated at present for 2009.The estimated level of beaked redfish catch remained stable on 2008-2009, though with a slight increase from 3 200 t to 3 800 t. The redfish bycatch in the Div. 3M shrimp fishery (once an important part of fishing mortality on the earlier ages, from 1993 until 2003) declined since 2004, but remains unknown for 2006-2009.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. The advice is based on catch-at-age data from an EU bottom trawl survey on Flemish Cap (1989-2009) including by-catch information from the shrimp fishery.

REFERENCE POINTS: No updated information on biological reference points is available.

STOCK STATUS: The perception of the stock status given by the EU survey has been maintained in 2009. Therefore, the most recent stock status given by NAFO Scientific Council in 2009 is still valid and was as follows: 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: : The most recent advice given by NAFO Scientific Council was in 2009 and was as follows: Low fishing mortalities should be maintained so as to promote female spawning stock recovery. Scientific Council recommends that catch for all redfish in Div. 3M in 2010 and 2011 should not exceed 8 500 tons which is in the range of catches in recent years.

This stock will next be assessed in 2011.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.17. Redfish (*Sebastes* spp.) in Division 3O

There are two species of redfish that have been commercially fished in Div. 3O; the deepsea redfish (Sebastes mentella) and the Acadian redfish (Sebastes fasciatus). The external characteristics are very similar, making them difficult to distinguish, and as a consequence they are reported collectively as "redfish" in the commercial fishery 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 t and 35 000 t since 1960. Catches averaged 13 000 t up to 1986 and then increased to 27 000 t in 1987 and 35 000 t in 1988. Catches declined to 13 000 t in 1989, increased gradually to about 16 000 t in 1993 and declined further to about 3 000 t in 1995, partly due to reductions in foreign allocations within the Canadian fishery zone since 1993. Catches increased to 20 000 t by 2001, and have generally declined since that time, with 2009 catches of 6 431 t.

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 2005-2010. This TAC applies to the entire area of Div. 3O.

The advice is based on abundance and biomass data, as well as mean numbers and weights (kg) per tow, from Canadian spring and autumn surveys for 1991-2009. Length frequencies were available from Canada, Portugal and Spain in 2009.

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

STOCK STATUS: No analytical assessment was performed.

Surveys indicate the stock has increased since the early 2000s.

RECENT MANAGEMENT ADVICE:

Catches have averaged about 13 000 t 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 2009, a period of 50 years, catches have surpassed 20 000 t 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 2011, 2012 and 2013.

Special Comments: Length frequencies suggest that the Div. 3O redfish fishery targets predominantly immature fish.

The next assessment will be in 2013.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.18. Redfish (*Sebastes* spp.) in Sub-area 2 and Divisions 1F and 3K

Pelagic redfish (Sebastes mentella) in NAFO SA1 and SA2, and adjacent ICES areas V, VI and XIV, is not assessed by the NAFO Scientific Council. ICES receives a request from NEAFC each year to undertake an assessment and it is in the ICES North-Western Working Group (NWWG) that the assessment is made. NWWG met during 27 April -4 May 2010 (ICES CM 2010/ACOM:07).

The "Workshop on Redfish Stock Structure" (WKREDS, 22-23 January 2009, Copenhagen, Denmark; ICES 2009) reviewed the stock structure of Sebastes mentella in the Irminger Sea and adjacent waters. ICES ACOM concluded, based on the outcome of the WKREDS meeting, that there are three biological stocks of S. mentella in the Irminger Sea and adjacent waters:

- a “Deep Pelagic stock (NAFO 1-2, ICES V, XII, XIV >500 m) - primarily pelagic habitats, and including demersal habitats west of the Faeroe Islands;

- a “Shallow Pelagic stock (NAFO 1-2, ICES V, XII, XIV <500 m) - extends to ICES I and II, but primarily pelagic habitats, and includes demersal habitats east of the Faeroe Islands;

- an “Icelandic Slope stock (ICES Va, XIV) - primarily demersal habitats.

Adult demersal S. mentella on the Greenland continental slopes (ICES XIV) is treated as a newly defined stock unit, however, stock structure is presently unknown and could be composed of various stock components.

FISHERIES: Catch data as collated by NWWG for 2008 indicate, that for the deep pelagic stock of S. mentella catches of 30 000 t were entirely taken outside the NAFO Regulatory Area. For the shallow pelagic stock catches of 1 580 t were taken inside NAFO Subareas 1-2, whereas 428 t were taken outside NAFO Subareas. In 2009, NWWG data indicate no catches of pelagic redfish inside the NAFO Regulatory Area for either stock.

SOURCE OF MANAGEMENT ADVICE: In 2010 NAFO Scientific Council reviewed at its June meeting the ICES 2010 Advice to NEAFC for 2011 and supported the conclusion and advice. The Scientific Council recognizes that the catches in the NAFO area will be taken from the shallow pelagic stock, for which no directed fisheries have been advised.

REFERENCE POINTS: No reference points have been proposed for these stock units.

STOCK STATUS: See Recent Management Advice

RECENT MANAGEMENT ADVICE:

For the shallow pelagic stock, ICES advised on the basis of precautionary considerations that no directed fishery should be conducted and bycatch of this stock in non-directed fisheries should be kept as low as possible since the stock is at a very low state. A recovery plan should be developed.
For the deep pelagic stock, ICES advised, that given the reduced abundance of this stock in recent years, a total catch limit of no greater than 20 000 t should be implemented in 2010, irrespective of whether a management plan has been developed by that time or not.
For the deep pelagic stock, ICES advised for the fisheries in 2011 on the basis of precautionary considerations that the fishery be reduced below the 2008 level to 20 000 t and that a management plan be developed and implemented. ICES suggests that catches of Deep Pelagic S. mentella are set at 20 000 t as a starting point for the adaptive part of the management plan.
STECF COMMENTS: STECF agrees with the advice from ICES/NAFO.

10.19. White hake (*Urophycis tenuis*) in Divisions 3N, 3Oand Subdivision 3Ps.

The advice requested by Fisheries Commission is for NAFO Div. 3NO. Previous studies indicated that white hake constitute a single unit within Div. 3NOPs and that fish younger than 1 year, 2+ juveniles, and mature adults distribute at different locations within Div. 3NO and Subdiv. 3Ps. This movement of fish of different stages between areas must be considered when assessing the status of white hake in Div. 3NO. Therefore, an assessment of Div. 3NO white hake is conducted with information on Subdiv. 3Ps included.

FISHERIES: Canada commenced a directed fishery for white hake in 1988 in Div. 3NO and Subdiv. 3Ps. All Canadian landings prior to 1988 were as bycatch in various groundfish fisheries. EU-Spain and EU-Portugal commenced a directed fishery in 2002, and Russia in 2003, in the NRA of Div. 3NO; resulting in the 2003-2004 peak. There were no directed fisheries by EU-Spain in 2004 or by EU-Spain, EU-Portugal, or Russia in 2005-2009. In 2003-2004, 14% of the total catch of white hake in Div. 3NO and Subdiv. 3Ps were taken by Canada, but increased to 93% by 2006; primarily due to the absence of a directed fishery for white hake by other countries. A TAC for white hake was implemented by Fisheries Commission in 2005.

In 1970-2009, white hake commercial catches in Div. 3NO fluctuated; averaging approximately 2 000 t, and exceeding 5 000 t in only three years during that period. Catches peaked in 1985 at approximately 8 100 t then declined; averaging 2 090 t in 1988-1994 (Fig. 17.1). Average catch was at its lowest in 1995-2001 (464 t), but increased to 6 752 t in 2002 and 4 841 t in 2003; following recruitment of the large 1999 year-class. NAFO-reported catches (STATLANT 21A) from 2005-2008 averaged 944 t, and totaled 414 t in 2009.

Commercial catches of white hake in NAFO Subdiv. 3Ps were less variable; averaging 1 114 t in 1985-93, and then decreasing to an average of 668 t in 1994-2003 (Fig. 17.1). Subsequently, catches increased to an average of 1 138 t in 2004-2008, and totaled 365 t in 2009.

SOURCE OF MANAGEMENT ADVICE: Length frequency data from the Canadian fishery (1994-2009), and from the catches of EU-Spain (2002, 2004), EU-Portugal (2003-2004, 2006-2009), and Russia (2000-2006) were available. Biomass and abundance indices were available from annual Canadian spring in Div. 3LNOPs (1972-2009), autumn in Div. 3LNO (1990-2009) bottom trawl surveys and Spanish spring surveys in the NAFO Regulatory Area of Div. 3NO (2001-2009).

REFERENCE POINTS: The Scientific Council was unable to define reference points for this stock.

STOCK STATUS: Based on current information there is no change in status of this stock.

The most recent stock status given by NAFO Scientific Council was in 2009 and was as follows:The biomass of this stock increased in 2000 with the large 1999 year-class. Subsequently, the biomass index has decreased and remains at levels comparable to the beginning of the Canadian Campelen time series in 1996-1998.

RECENT MANAGEMENT ADVICE: Given the current level of recruitment, Scientific Council advises that catch of white hake in Div. 3NO, at the current TAC of 6000 t (corrected from "8500 t"), is unrealistic. Catches in Div. 3NO for 2010 and 2011 should not exceed the 2006-2008 average annual catch level of 850 t. Catches in Subdiv. 3Ps for 2010 and 2011 should not exceed the 2006-2008 average annual catch level of 1 050 t.

STECF COMMENTS: STECF agrees with the advice from NAFO.

11. Resources in the area of CECAF

This section 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 (36ºN) down to the mouth of the Congo river (6ºS), including the archipelagos of Madeira, the Canaries, Cape Vert and Sao Tomé e Principe, and since the incorporation of Angola in 2006, part of FAO area 47, down to the border of Angola with Namibia (around 18ºS).

European fisheries in the CECAF region are conducted under fishing agreements between the European Union and the coastal countries. These agreements refer to a wide range of resources including crustaceans (shrimps and prawns), cephalopods (octopus, cuttlefishes and squids), small pelagics (sardines, sadinellas, horse mackerels, mackerels and anchovies), demersal finfish (hakes, seabreams, 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 17 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 with Angola and Senegal came also to an end in 2004 and 2006, respectively. The European (mainly Spanish) shrimp fishery in Guinean waters was closed in 2008, at the end of the Fisheries Partnership Agreement between the European Community and the Republic of Guinea for the period 2004-2008. Last fishery agreement, signed in 2009, does not include fisheries of deep-water shrimps and cephalopod, which were included in the previous report. Therefore, they have been excluded in the present one. On the other hand, a new fishing agreement was signed between the European Union and Mauritania in 2006 for a period of six years, reviewable every two years. The latest fishing agreement between the European Union and Guinea-Bissau was signed in 2007 for a period of four years, extendable for identical periods. Furthermore, 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.

It is worth noting the general increase of catches of small pelagics detected from 1994 to 2009 in the North Region of CECAF (Morocco, Mauritania and Senegal-Gambia). This can be attributed to an important increasing trend in the effort exerted in Mauritanian waters during the last years, primarily carried out by vessels

operating under flags of convenience (mainly Belize flagged), as the EU fleet has kept a relatively stable effort in number of vessels during the last three years. However, it has also been detected an improvement of the Russian vessels fishing capacity and an increment of its engines power.

The latest assessments and advice provided in this report are based on the results of the FAO/CECAF Working Group on the Assessment of Small Pelagic Fish off Northwest Africa held in Banjul, The Gambia from 17 to 24 May 2010, on those of the Working Group on Demersal Resources in the Northern Zone which met in Agadir (Morocco) from 8 to 17 February 2010, and on those of the WG on Demersal Resources in the Southern Zone (in Freetown, Sierra Leona, from the 8 to the 18 October 2008). The evolution and expansion of the fisheries in the area, together with the difficulties in most of the coastal countries to undertake research activities, led to a serious lack of basic information not allowing the application of state-of-the-art assessment methods currently in use in other fisheries. Therefore, a standard methodology has been used in the CECAF Working Groups during last years, which is based on the application of a dynamic production model Biodyn (Barros, 2007, a), concretely the Schaefer logistic model. This model uses catch and abundance indices to calculate biological reference points (limit and target reference points), used to give management advice, and projections of future yields and stock abundance (Barros, 2007, b), 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 2010 (STECF review of scientific advice 2009).

11.1. Sardine (*Sardina pilchardus*) off Morocco, Western Sahara (under Moroccaadministration), 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 33ºN and 36ºN), central stock including zone A (between 29ºN and 32ºN) and zone B (between 26ºN and 29ºN), and southern stock or zone C (between 22ºN and 26ºN). Currently, Zone North is exploited by a reduced number of small purse seiners from the north of Morocco and by a maximum number of 20 vessels belonging to an Andalusian purse-seine fleet based in the Port of Barbate (Cádiz, SW Spain). This fleet is allowed to fish sardine under licences category number 1 of the protocol (Small-scale fishing/north: pelagic species), although it mainly targets anchovy, and sardines are captured as by-catch. 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 17 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. Sardine, with 33% of the total catches, is the dominant small pelagic species in the sub-region (Morocco, Sahara, Mauritania and Senegal). It has been an increase of 13% in catches from 2007 to 2008. A total of 0.76 millions of tonnes has been reported in 2008. Sardine constituted about 67% of the total small pelagic catches in Moroccan waters, with a total of 570,000 t in 2007. This value increased 19% in 2009 (815,400 t). The average catches of sardine over the last five years (2005 to 2009) were about 678,000 t.

In Mauritania, sardine catches are carried out on a seasonal basis by pelagic trawlers from the European Union (EU) and the Russian Federation. Values were around 80,000-85,000 t during 2007 and 2008, increasing to around 105,000 t in 2009.

Compared to the earlier years of the series, sardine catches in Senegal have become important since 2005 and represented 4 % of the total catch in 2007 (12,000 t). However, in 2009 sardine catches decreased 68%.

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 Moroccan 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 Banjul (The Gambia), from 17 to 24 May 2010.

The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (The 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: Biomass estimations from acoustic surveys carried out in the area amounted up to 5.88 million tonnes in 2007, followed by a decrease to 4.42 million tonnes in 2008, the 2009 biomass remaining around the same level (4.47 million tonnes). The Schaefer logistical dynamic production model was used to assess the two stocks, the central stock A+B (Cape Cantin-Cape Bojador) and the southern stock C (Cape Bojador-Cape Blanc) using the BioDyn model (FAO, 2006). Forecasting of catch abundance for the following five years was based on different management scenarios using the same model. It has been a certain improvement of the central stock in 2009, after the decrease occurred in 2008. The reference points indicate that the estimated biomass in 2009 was slightly greater than the target biomass and that the fishing mortality level is lower than the $F_{0.1}$ level. The stock is considered to be fully exploited. For Zone C, the results indicate that the estimated biomass in 2009 was greater than $B_{0.1}$ in a 60% and that fishing mortality was much lower than $F_{0.1}$ ($F_{cur}/F_{0.1}$= 15%). Sardine in Zone C does not show signs of overexploitation.

RECENT MANAGEMENT ADVICE: The situation for the Central stock of sardine (Zone A+B) seems to have improved since 2006 and this stock is now considered fully exploited. As a precautionary measure, and taking into consideration the fluctuations observed in this stock, the working groups maintains the 2008 and 2009 recommendation that catches should not exceed 400,000 t. The results of the model indicated that the southern stock was not fully exploited in 2009. The total catch level may be temporarily increased, but should be adjusted to natural changes in the stock. It was recommended that the stock structure and abundance should be closely monitored by fishery independent methods.

STECF COMMENTS: STECF has no comments.

11.2. Anchovy (*Engraulis encrasicolus*) off Morocco and Mauritania

FISHERIES: Anchovy is mainly exploited in the northern region of the Moroccan coast by purse seiners from Morocco, and in a lesser extent, from Spain. Under the 2007 EU-Morocco agreement, a maximum of 20 boats are allowed to operate in north-Moroccan waters with licences of the fishing category number 1 of the protocol (Small-scale fishing/north: pelagic species). These vessels belong to a purse seiner fleet based on the Andalusian Port of Barbate (Cádiz, South of Spain). 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. 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 and Mauritania have allowed for fishing possibilities for 17 EU pelagic trawlers.

Total declared anchovy catches in the region reached near 122,000 t in 2008, with a decrease of 12% in relation to 2007. Catches averaged around 121,000 t during the last five reported years (2004-2008) Anchovy catches in Moroccan waters decreased from 19,800 t (in 2007) to 17,200 t in 2009. However, it should be noted that around 85% of total anchovy catch in the region is caught in Mauritania and that Russian and Ukrainian fleets, which account for about 70% of the Mauritanian total, play an important role. In 2006, the increase in catch by these 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. Since 1995, Mauritania's share of the total catch has increased steadily. It has risen from 8% of total anchovy catch in 1995 to 84% in 2008. It is therefore possible to conclude that the increase in total anchovy catch in the region since 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 Banjul (The Gambia), from 17 to 24 May 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (The 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: Available data for anchovy in the sub-region did not allow the use of a global model. A Length Cohort Analysis (LCA) was applied in order to estimate the current F-level and the relative exploitation pattern on the fishery over the last few years. A length-based Yield per Recruit Analysis was then run on these estimates, to estimate the Biological Reference Points F_{MAX} and $F_{0.1}$. The length frequency series used for the analysis came from the Moroccan fishery in Zone North (A+B). The LCA results indicated that the fishing mortality level in 2009 was slightly lower than the target level ($F_{cur}/F_{0.1}$ = 97%) and the stock was considered to be fully exploited.

RECENT MANAGEMENT ADVICE: While obtaining better information related to the identification of the anchovy stocks in the region as well as more reliable fishery statistics, it was recommended, as a precautionary measure that effort and catch should not exceed current levels.

STECF COMMENTS: Biological studies aiming the stocks identification of *Engraulis encrasicolu*s in the area should be carried out in order to reach better assessments. It is worth noting the difficulty of the assessment in the Mauritanian area due to the lack of information on foreign and non EU fleets.

11.3. 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 they are targeted by a specialized fleet of Spanish trawlers, among other fleets. In a lesser extent, a Spanish longline fleet used to exploit these resources, but this fishery ceased its activity in 2009. These fleets formerly operated on the shelf of the three countries, depending on the hake seasonal abundance in the different areas. The end of the fishing agreements with Morocco (1999) and Senegal (2006) restricted the hake fishery to Mauritanian waters. After the renewal of the agreement with Morocco in 2007, the black hake fishery by the Spanish fleets has extended to the Western Sahara (under Moroccan administration). However, the use of licenses in Moroccan waters has been very limited and therefore, currently Mauritania is the main fishing ground for the Spanish fleet.

The combined catch of black hake in the whole CECAF region (Sahara, Mauritania and Senegal) made by all the fleets operating in the area varied between 8,300 t and 22,600 t over the period 1983-2008. Most of the catches of these species are made in Mauritania where they have observed a cyclical but general increasing trend from 1983 to 2002, when a maximum historic value of 15,900 t was attained. Since then, catches have experienced a sharp steady decline, reaching a minimum of 6,700 t in 2008. 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 67% with minimums slightly higher than 49% in 2002. However, during 2008 and 2009 the Spanish fleet increased its relative importance in Mauritanian waters and around 75% of hake catches are made by Spanish trawlers. Other important fleet components in this fishery are 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 last Working Group met in Agadir (Morocco) from 8 to18 February 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

REFERENCE POINTS: Reference points defined for small pelagics in the FAO Working Group held in Banjul (Gambia) in 2006 (FAO, 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 (FAO, 2006). For Mauritanian stock, limit reference points were B_{MSY} = 11,123, F_{MSY} = 1.97 and target reference points were $B_{0.1}$ = 12,236 and $F_{0.1}$ = 1.77. For Senegalese stock, limit reference points were B_{MSY} = 15,600, F_{MSY} = 0.29 and target reference points were $B_{0.1}$ = 17,161 and $F_{0.1}$ = 0.26.

STOCK STATUS: The Schaefer logistical dynamic production model was used to assess the black hake stocks. Due to the fact that both species (*M. polli* and *M. senegalensis*) are fished and commercialized as the same (black hake), they were assessed as a one single stock (*Merluccius spp*.) For Mauritania and Senegal stocks, current black hake biomass resulted to be over the biomass required to produce maximum sustainable yield and over the target biomass. Current fishing effort was lower than that corresponding to the target effort and to the MSY. These results show that the stock is not fully exploited. Moroccan stock could not be assessed due to the lack of available data.

RECENT MANAGEMENT ADVICE: For the Mauritanian and Senegalese stock, it was recommended not to increase the fishing effort.

STECF COMMENTS: It is well known that there is an important by-catch of black hakes made by other fleets not targeting this resource (industrial/artisanal national and foreign demersal and pelagic trawlers). It is worth noting the lack of fishing statistics from certain fleets operating in the area, which compromises the reliability to the assessments. In order to improve data on catches and catch composition. STECF recommends that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

11.4. 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 (poulpiers), 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 1990-2008 have ranged from a minimum of 17,400 t in 1998 and a maximum of 44,600 t in 1992. Mauritanian catches have stabilized around 10,000 t during the last years. European (mainly Spanish) fleets have showed a continuous decreasing trend since year 2000, with a fall of 60% in catches during a period around 10 years. In the case of Spanish trawlers, catches had steadily increased from 1995 to 2000, when they peaked at a value of 12,300 t. Catches then decreased until 2003 (6,400 t) and slightly increased in 2004 (7,300 t) and 2005 (9,300 t). However, from 2005 onwards, captures continually decreased until 2008. In that year, vessels only operated during five months (from June to August, November and December) attaining a value of 3,757 t of octopus. Catches increased to 5,610 t in 2009.

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 which met in Agadir (Morocco) from 8 to18 February 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (FAO, 2006). Limit reference points were B_{MSY} = 27,500 and F_{MSY} = 1.0 . Target reference points were $B_{0.1}$ = 30,240 and $F_{0.1}$ = 0.9.

STOCK STATUS: The Schaefer dynamic production model was used to assess the Cape Blanc (Mauritanian) stock. Results showed that biomass in 2008 was below that producing the target biomass ($B_{cur}/B_{0.1}$= 86%) and that fishing mortality is higher than that needed to reach the target $F_{0.1}$ ($F_{cur}/F_{0.1}$= 150%). The Mauritanian Cape

Blanc octopus stock is therefore overexploited. These results are the same as those from previous recent assessments, despite the reduction in fishing effort and the improvement of the stock situation detected in scientific surveys since 2006.

RECENT MANAGEMENT ADVICE: Taking into account the assessment results it was recommend a general reduction in fishing effort for all fleets involved in the fishery and a strengthening of the management measures.

STECF COMMENTS: In order to improve data on catches and catch composition STECF recommends that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

11.5. Cuttlefish (*Sepia hierredda* and *Sepia officinalis*) off Mauritania

FISHERIES: Cuttlefish species are taken as a by-catch in the same cephalopod fishery than the 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 2,373 t (2006) and 7,722 t (1993) over the period 1984-2008. A general decreasing trend was observed from year 2000 onwards, both for the Mauritanian and the European fleet, that may be attributed to the ban of the fishery in waters below 20 m depth. Periodic catch peaks in years 1993 (2,373 t), 2001 (6,555 t) and 2005 (4,025 t) were detected. In 2008, most of these catches were taken by Mauritanian trawlers which contribute an average of more than 75% to the total production of the species. Cuttlefish catches made by the Spanish trawlers were 606 t in 2009.

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 which met in Agadir (Morocco) from 8 to18 February 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (FAO, 2006). However, as the assessment was rejected the values corresponding to the adopted reference points are currently not available.

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: In order to improve data on catches and catch composition STECF recommends that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

11.6. Coastal prawn (*Farfantepenaeus notialis*) off Mauritania

FISHERIES: The crustaceans of commercial importance in Mauritanian waters are in order of importance, the shrimp (*Parapenaeus longirostris*), the prawn (*Farfantepenaeus notialis*) and the deep water shrimp (*Aristeus varidens*). The exploitation of shrimps in Mauritanian waters started at the decade of the 1960s, with the incorporation of a Spanish industrial fleet, which progressively increased in the area to reach maximum effort values at the end of the eighties. During the recent period, a Mauritanian fleet has developed at the same time than other foreign fleets. Therefore, the fishing effort that had diminished at the beginning of the '90s has newly increased during the last years. However, the shrimp fishing activity has decreased in a 50% from 2007 to 2008. This is attributed to several causes including the instauration of a second close season by the Mauritanian authorities in May and June and to the transformation of most of the Mauritanian shrimpers to cephalopod trawlers. In 2008, the shrimper fleet was compounded of 39 vessels, 31 belonging to the EU fleet (mainly Spanish) and 8 to Mauritania.

F. notialis catches made by the all the industrial fleets operating in the area showed important fluctuations between 1993 and 2009, varying between 405 t (1993) and 2,747 t (2005) over the period 1987-2008 and with three main peaks occurring in 1999, 2002 and 2005-2006. After the 2006 peak, catches dropped in 2008 to 800 t. Coastal prawn catches are mainly made by the Spanish shrimper fleet, the Mauritanian fleet and other foreign fleets. The contribution of the last two fleet segments to *F. notialis* catches is higher than their contribution to deep shrimps catches. Since 2008, *F. notialis* catches are mainly made by the European shrimper fleet (Spanish and Italian vessels). The Italian fleet mainly targets coastal shrimps as *F. notialis*, this constituting 84% of its total catches.
Spanish catch series of *F. notialis* is the longer available. It shows large fluctuations between 1987 and 2008. After a peak registered in 2006 (around 1,800 t), Spanish catches greatly decreased the last two years of the series, with only 555 t in 2008. Catches by Mauritanian freezer trawlers 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 until 2006. However, after 2006, catches showed a decreasing trend with only 180 t in 2008. 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 which met in Agadir (Morocco) from 8 to 18 February 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (FAO, 2006). Limit reference points were $B_{MSY} = 4{,}107$ and $F_{MSY} = 0.51$. Target reference points were $B_{0.1} = 4{,}518$ and $F_{0.1} = 0.46$.

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 overexploited in terms of biomass. The current biomass is below the target biomass level ($B_{cur}/B_{0.1}$= 71%) but the current fishing mortality F_{cur} is half that needed to reach the target $F_{0.1}$ ($F_{cur}/F_{0.1}$= 55%).

RECENT MANAGEMENT ADVICE: It was recommended not to exceed the fishing effort from the level observed in 2008, to achieve a sustainable catch level permitting recovery the biomass of the stock.

STECF COMMENTS: In order to improve data on catches and catch composition STECF recommends that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

11.7. Deepwater shrimp (*Parapenaeus longirostris*) off Mauritania

FISHERIES: The exploitation of shrimps in Mauritanian waters started at the decade of the 1960s, with the incorporation of a Spanish industrial fleet, which progressively increased in the area to reach maximum effort values at the end of the eighties. During the recent period, a Mauritanian fleet has developed at the same time than other foreign fleets. Therefore, the fishing effort that had diminished at the beginning of the '90s has newly increased during the last years. However, the shrimp fishing activity has decreased 50% from 2007 to 2008. This is attributed to several causes including the instauration of a second close season by the Mauritanian authorities in May and June and to the transformation of most of the Mauritanian shrimpers to cephalopod trawlers. In 2008, the shrimper fleet was compounded of 39 vessels, 31 belonging to the EU fleet (mainly Spanish) and 8 to Mauritania.
P. longirostris is the main target species in the fishery accounting for more than 50% to the total production.
Total catches of deep water rose shrimp made by all the fleets operating in the area have oscillated from 497 t (1992) to 5,807 t (2009). Main catches are made by the Spanish fleet with a small contribution of the other mentioned fleets. On average, the Spanish freezer trawler fleet accounts for more than 80% of the total catches of *P. longirostris* in the area. Spanish catches reached a maximum historical value of 4,900 t in 2007, followed by a sharp decreased to 2,867 t in 2008.
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, which met in Agadir (Morocco) from 8 to18 February 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (FAO, 2006). Limit reference points were B_{MSY} = 8,715 and F_{MSY} =0.41. Target reference points were $B_{0.1}$ = 9,586 and $F_{0.1}$ = 0.37.

STOCK STATUS: The Schaefer dynamic production model was applied to assess the stock. Mauritanian stock resulted to be not fully exploited. The current biomass is over the target biomass $B_{0.1}$ ($B_{cur}/B_{0.1}$=121%) and the fishing mortality in 2008 was below the target reference point ($F_{cur}/F_{0.1}$=77%).

RECENT MANAGEMENT ADVICE: The CECAF Working Group recommended that the fishing effort should not exceed the level of 2008.

STECF COMMENTS: In order to improve data on catches and catch composition STECF recommends that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

11.8. 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 latest fishing agreement with Mauritania signed in 2008, the number of European vessels authorised to fish for small pelagics at the same time was fixed at 17 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 250,000 t per year has been placed on total authorised catches, covering all species (sardines, sardinellas, horse mackerels, mackerels, etc.). The current agreement includes new member states of the EU (Baltic States), which were already present in the Mauritanian zone. These fleets generally target horse mackerel. Currently, vessels from Netherland, Lithuania and Latvia are operating with pelagic trawlers in the area.

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 Cunene horse mackerel (*Trachurus trecae*) is the most important species of horse mackerel, constituting about 14% (approximately 347,000 t) of the total catch of the main small pelagic species in 2008.This species, together with the round sardinella (*S. aurita*) dominated catches of the main small pelagic fish in Mauritania in 2009.
The average annual catch of the Cunene horse mackerel over the last five years was estimated at about 308,000 t. The catch of this species has fluctuated over the time series with an overall increasing trend in recent years. About 120,000 t of Atlantic horse mackerel (*Trachurus trachurus*) were landed in 2009. This represents 5% of the main small pelagic fish in 2009. The average catch of Atlantic horse mackerel over the last five years was 107,000 t. The third species in this group, the false scad (*Caranx rhonchus*), showed an increase in total catch from 2008 to 2009, with total catch of around 30,000 t and 46,000 t respectively.

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 Banjul (The Gambia) from the 17 to the 23 Mayo 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (The 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: The acoustic estimations of biomass of the main horse mackerel species (*T. trecae* and *T. trachurus*) have shown great fluctuations over the time series. The Cunene horse mackerel *T. trecae* has been the dominant species in the acoustic estimations in the area, with a biomass ranging from 180,000 to 1.8 millions tonnes during the period from 1995 to 2006. In 2008 the biomass of *T. trecae* decreased to around 700,000 tonnes, constituting a decrease of around 29% compared to 2007. In 2009, the biomass estimate for *T. trecae* increased to 910,000 tonnes.. The Atlantic horse mackerel *T. trachurus* showed an increasing biomass

trend from 2001 to 2003, when the estimation was in 320,000 t. Since then the biomass of *T. trachurus* decreased to 40,000 tonnes in 2006, the lowest biomass estimate since the start of the data series. In 2007 the estimated biomass of this species increased to 450,000 tonnes, followed by a decrease to 330 000 tonnes in 2008 and a further decrease to 150 000 tonnes in 2009. Stock assessment of the two horse mackerel species was carried out using a surplus production model. Regarding *T. trachurus* the application of the model used the abundance index series from regional acoustic surveys. The results showed that the estimated biomass in 2009 was lower than $B_{0.1}$ and that the fishing mortality was 64% greater than $F_{0.1}$. This stock is currently considered fully exploited and it seems to have improved in 2008, due probably to a good recruitment in 2007. For *T. trecae*, results indicated that the 2009 biomass was lower than the target biomass $B_{0.1}$ (53%) and fishing effort was almost double than optimum effort ($F_{cur}/F_{0.1}$=197%). The stock is, therefore, overexploited.

RECENT MANAGEMENT ADVICE: As a precautionary measure and taking into account that both species are captured in a mixed fishery, it is recommended to decrease the effort of 2009 by 20%. Total catches of both species should not exceed 330,000 t in 2010 and 2011.

STECF COMMENTS: STECF has no comments.

11.9. 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 262,000 t in 2008. South of Cape Blanc, where the European fleet operates, total chub mackerel catch increased over the period 1990–1996, reaching around 100,000 t. It then decreased to reach the low level of around 20,000 t in 1999. Catch then progressively increased until 2003 when 133,000 t were recorded. Since then catches have heavily declined to 38,000 t in 2005 and 33,000 t in 2006, and after increased to values around 80,000 t and 60,000 t in 2007 and 2008, respectively. Catch of chub mackerel (*Scomber japonicus*) over the last five years has shown a general increasing trend from around 180,000 t in 2003 to an estimated 245,000 t in 2009, the highest catch of the time series. The average catch for this period was estimated at around 231,000 t.

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. The last Working Group was held in Banjul (The Gambia) from the 17 to the 23 Mayo 2010. The results from the assessments have not yet been formally published and therefore the information provided should be considered as preliminary.

REFERENCE POINTS: 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: Acoustic biomass estimations increased from 100,000 t in 2000, to 550,000 t in 2003. In 2005, there was a drop to 239,000 t followed by a stabilisation around 610,000 tonnes in 2007 and 2008. Fishery based assessments were carried out by applying a Schaefer dynamic surplus production model. Furthermore, analytical models (XSA and ICA) were applied. Results of the Schaefer dynamic surplus production and ICA models agreed that the stock is fully exploited. In both cases, the 2009 biomass was higher than the target biomass $B_{0.1}$ and the fishing effort in 2009 was lower than optimum effort.

RECENT MANAGEMENT ADVICE: It was recommended, as a precautionary measure, the catch level should not exceed the mean of the lat 5 years (2005-2009) i.e. 230,000 t.

STECF COMMENTS: STECF has no comment.

11.10. 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.*Sardinella* spp constituted 26 % of total catch of small pelagic fish off Northwest Africa in 2009, with 21% for round sardinella (*Sardinella aurita*) and 5% for flat sardinella (*Sardinella maderensis*). The round sardinella is the second most important species in terms of catch. Total catches of *S. aurita* in the region have varied between 162,000 t (1994) and 563,000 t (2008) in the period from 1990 to 2008. Over the last five years, total catch of round sardinella (*Sardinella aurita*) has been fluctuating around an average level of about 457,000 t. For *Sardinella maderensis*, the catches show a long term increasing trend from 1997 (113,000 t) to 2003 (190,000 t). From 2003 onwards, catches decreased to a level of 113,000 t in 2009. The average catch of this species for the last five years was 124,000 t.

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 Banjul (The Gambia) from the 17 to the 23 Mayo 2010**.** The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (The 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: Acoustic surveys carried out in the area shown a decreasing trend in *S. aurita* biomass estimated in Mauritanian waters, since 2.1 million t in 1999 to around 0.8 million t in 2005. After a stabilization period during 2006 and 2007, the 2008 estimation indicated a biomass increase to 2 million t. For *S. maderensis*, biomass estimations fluctuated between 0.8 and 1.5 million t during the period 1995-2002. This was followed by an increment to 2.5 million t in 2003 and 2004, being the highest estimation in the acoustic series. After this peak, there was a decreasing biomass trend to values around 0.55 million t in 2008. Furthermore, the stocks of sardinella where assessed by applying the Schaefer dynamic surplus production models. The sum total of catches of the two sardinellas by the different fleets operating in the region and the abundance indices of the coordinated regional acoustic surveys were used for the assessment of the stocks of *S. aurita* and *Sardinella* spp. From the output of the model, the Working Group concluded that the stock was overexploited, at a level below the one producing maximum sustainable yield. Total catches of this species in the region in 2008 were more than twice the estimated natural production from the stock, indicating that fishing mortality largely exceeded the sustainable level. Current catches are not sustainable and they have to be reduced in order to avoid a future depletion of the stock.

RECENT MANAGEMENT ADVICE:

The Working Group maintains the 2008 and 2009 recommendations that catches should not exceed 220,000 t for *S. aurita* in 2010 and 2011 and a reduction of fishing effort on both species of sardinella combined.

STECF COMMENTS: STECF has no comments.

11.11. 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,

including the EU fleets, 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 seabreams (family Sparidae): *Pagellus bellottii*, *Pagellus acarne*, *Dentex macrophthalmus* and *Pagrus 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 Agadir (Morocco) from 8 to18 February 2010. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary.

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 (FAO, 2006). The species specific values if estimated were not available to STECF.

STOCK STATUS: Assessments conducted by application of dynamic surplus production models and abundance indices derived from research surveys concluded the following situations: the Mauritanian stocks of red pandora (*Pagellus bellotti*) and seabream (*Pagrus caeruleostictus*) are overexploited,. Grouper (*Epinephelus aeneus*) continues to be severely over exploited and close to depletion. Although the models did not provide reliable results for *Dentex macrophtalmus*, other information from the fishery and scientific surveys indicated that they are fully exploited.

RECENT MANAGEMENT ADVICE: The Working Group recommends not exceeding the current level of fishing effort for *P. bellottii* and *D. macrophtalmus,* as well as reducing the current effort for *P. caeruleostictus.* It is strongly recommended to stop targeting *E. aeneus* and to decrease the fishing effort in the artisanal fisheries.

STECF COMMENTS: The presence of observers onboard should be recommended in order to obtain real estimations of total catches of the above mentioned (retained and discarded) produced by the industrial fleet operating in the area.

11.12. Deepwater shrimps off Guinea-Bissau

FISHERIES: The deep water rose shrimp (*Parapenaeus longirostris)* and the striped red shrimp *Aristeus varidens*) constitutes the main deep water shrimp resources in Guinea Bissau. These species are exploited in a fishery conducted by European trawlers that operate into the framework of fishing agreements between the EU and the Republic of Guinea-Bissau and by other foreign fleets, mainly from China, Angola, Belize, Gabon and Senegal. The Spanish fleet, which increased from 12 vessels in 2007 to 21 vessels in 2010, is the bigger communitarian fleet in the area, followed by the Portuguese fleet (5 vessels). This fleet increase in Guinea-Bissauan waters may be related to the closure of the shrimp fishery in neighbouring fishing grounds such as Senegal (in 2006) and Guinea (2009). The deep water rose shrimp *P. longirostris* is the main target species of the Spanish fleet, constituting around the 65% of its total annual catches. In the last CECAF Working Group only Spanish fishery data were provided. Spanish catches of *P. longirostris* oscillated between 39 t (1998) and 662 t (2005) in the period after the civil war in Guinea Bissau (1998-2007). During the last five years of the series, average catches oscillated around 450 t.

SOURCE OF MANAGEMENT ADVICE: CECAF is the advisory body for this area. The last assessment working group on demersal resources from the southern area of the CECAF region was held in Freetown (Sierra Leona) in 2008. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary. The last published report of CECAF assessment working group on demersal resources, including crustaceans, was in 2003 (FAO/CECAF, 2006).

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 (The 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: *A. varidens* is not assessed in the CECAF Working Group. For *P. longirostris*, the Working Group has considered Guinea-Bissau and Guinea as the same stock. No information from Guinea-Bissau was available. The assessment was not accepted and the working group recommended the countries involved in this

fishery to review and complete the catch and effort data series. However, it was noted that CPUE series show a general declining trend.

RECENT MANAGEMENT ADVICE: The Working Group recommended not to increase the fishing effort and to keep the total catch below the average of the last three years.

STECF COMMENTS: STECF agrees with the assessment and advice from the CECAF Working group. Financial problems did not allow the Working Groups to meet with the recommended frequency. Therefore, assessments can not be updated on an annual basis and management advice is based on scientific advice made years ago. Research on biological studies focussed on the identification of stocks should be undertaken in the region. The lack of information of other countries targeting the same resource in the area does not make possible reliable assessments of the stocks. Furthermore, the presence of observers onboard should be recommended in order to obtain real estimations of total catches (retained and discarded) produced by the fleets operating in the area.

11.13. Octopus (*Octopus vulgaris*) off Guinea-Bissau

FISHERIES: The cephalopod fishery in waters off Guinea-Bissau was developed by Spanish trawlers. Access restrictions to Moroccan fishing grounds forced the Spanish cephalopod fleet to extend the scope of fishing agreements to other countries, first to Mauritania, from where it extended progressively to southern latitudes (Senegal, Guinea-Bissau and Guinea). The end of the fishery agreements, first with Senegal (2006) and later with Guinea (2008), restricted the fishing area of the EU cephalopod trawlers to waters off Mauritania and Guinea-Bissau. Originally, the fleet used to target cuttlefish (*Sepia officinalis* and *S. hierredda*), although the important increase of octopus catches during the last years led to a change in the target species.

Cephalopod fishery in Guinea-Bissau is currently developed by industrial trawlers mainly from the EU (Spain and Portugal) and China, being the Chinese fleet the one with greater effort in the area, followed by the Spanish fleet. The Spanish statistical series is the longer available. Spanish catches of octopus has oscillated between very low values after the civil war years in Guinea-Bissau to a maximum value of 1,157 t in 2007, when the higher effort was exerted by the Spanish fleet in these waters.

SOURCE OF MANAGEMENT ADVICE: CECAF is the advisory body for this area. The last assessment working group on demersal resources from the southern area of the CECAF region was held in Freetown (Sierra Leona) in 2008. The results from the assessments have not yet been formally published and therefore the information provided may be considered as preliminary. The last published report of CECAF assessment working group on demersal resources, including crustaceans, was in 2003 (FAO/CECAF, 2006).

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 (The 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: No information from Guinea-Bissau was provided to the CECAF WG. The assessment, was not accepted and the working group recommended the countries involved in this fishery should review and complete the catch and effort data series.

STECF COMMENTS: Financial problems did not allow the Working Groups to meet with the recommended frequency. Therefore, assessments can not be updated on an annual basis and management advice is based on scientific advice made years ago. The lack of information of other countries targeting the same resource in the area does not make possible reliable assessments of the stocks. Furthermore, the presence of observers onboard should be recommended in order to obtain real estimations of total catches (retained and discarded) produced by the fleets operating in the area.

11.14. Cuttlefish (*Sepia spp.*) off Guinea-Bissau

FISHERIES: The cephalopod fishery in waters off Guinea-Bissau was developed by Spanish trawlers. Access restrictions to Moroccan fishing grounds forced the Spanish cephalopod fleet to extend the scope of fishing agreements to other countries, first to Mauritania, from where it extended progressively to southern latitudes (Senegal, Guinea-Bissau and Guinea). The end of the fishery agreements, first with Senegal (2006) and later

with Guinea (2008), restricted the fishing area of the EU cephalopod trawlers to waters off Mauritania and Guinea-Bissau. Originally, the fleet used to target cuttlefish (*Sepia officinalis* and *S. hierredda*), although the important increase of octopus catches during the last years led to a change in the target species.

Cephalopod fishery in Guinea-Bissau is currently developed by industrial trawlers from mainly from the EU (Spain and Portugal) and China, being the Chinese fleet the one with greater effort n the area, followed by the Spanish fleet. The Spanish statistical series is the longer available. Spanish catches of cuttlefish has oscillated between very low values after the civil war years in Guinea-Bissau to a maximum value of 634 t in 2007, when the higher effort was exerted by the Spanish fleet in these waters.

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 (The 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 (FAO, 2006). STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: No information from Guinea-Bissau was provided to the WG. The assessment was not accepted and the working group recommended that the countries involved in this fishery should review and complete the catch and effort data series.

STECF COMMENTS: Financial problems did not allow the Working Groups to meet with the recommended frequency, therefore, assessments can not be updated on an annual basis and management advice is based on scientific advice made years ago. The lack of information of other countries targeting the same resource in the area does not make possible reliable assessments of the stocks. STECF recommends that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

REFERENCES:

Barros, P., 2007a. Biomass dynamic model with environmental effects. User instructions. *In*: Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. *FAO Fisheries Report* No. 849: 213-224.

Barros, P., 2007b. Projections of future yields and stock abundance using dynamic surplus production models: general concepts. And implementation as excel spreadsheets. *In*: Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. *FAO Fisheries Report* No. 849: 225-238.

FAO/CECAF, 2006. Report of the FAO/CECAF Working Group on the Assessment of Demersal resources. Conakry, Guinea, 19-29 September 2003/Rapport du Groupe de travail FAO/COPACE sur l'évaluation des ressources démersaux. Conakry, Guinée, 19-29 septembre 2003. CECAF/ECAF Series 06/67. FAO. Rome, 2006. 357 pp.

12. Resources in the area of WECAF

12.1. Shrimp (*Penaeus subtilis*), French Guyana

No new information is available on the resource status or management advice for shrimp in French Guyana in 2010. Latest information available comes from a FAO report from year 2000[*].

FISHERIES: Shrimp in the French Guyana EEZ, are now exclusively taken by shrimp trawlers exclusively from the EU (all French). The main shrimp species exploited on the continental shelf is *P. subtilis*, with its landings representing nearly 95% of the total shrimp landings of the area. The other species landed is *P. brasiliensis*, which is not separated in landings, but its proportion is estimated from market samples. Due to the recent fluctuations on the international market, a decrease in the demand was observed, resulting in a reduction in effort of the French fleets from 22500 days at sea in 1989 to 15700 in 1994. This was confirmed in 1997 and

[*] FAO, 2000. FAO Fisheries Report No. 628 FIPP/R628. Western Central Atlantic Fishery Commission Report of the third Workshop on the Assessment of Shrimp and Groundfish fisheries on the Brazil-Guianas shelf. Belém, Brazil, 24 May - 10 June 1999. ISSN 0429-9337. FAO (Rome), 2000.

in 1998. 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).

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

STOCK STATUS: The stock was considered to be fully exploited in the last assessment available. The LPUE's series of the shrimp fleet shows seasonal trends, fluctuating around 200 kg/day. Over the period 1990-1999 there was a strong increase in average yield per day, probably due to a change fishing strategy as the fleet re-directed effort towards smallest individuals in shallower waters. Production modelling indicates an increase in the stock biomass over the last few years, coincident with a decrease in fishing effort since the early 1980's. The average biomass over 1996-1999 has been estimated at about 10,000 t, close to 2/3 of the estimated virgin biomass of 15,000 t -16,000 t. The estimated catch at 90% of MSY is close to 4,000 t, which is consistent with the present TAC of 4,108 metric tons established for the fishery.

Estimated LPUE at 90% of MSY is around 250 kg per fishing day, close to the actual catch rates in the fishery. LPUE is directly affected by the level of recruitment. Cohort analysis shows that statistically, there is no relationship between effort and fishing mortality.

RECENT MANAGEMENT ADVICE: The trawl fishery has been controlled by a total allowable catch (TAC) system implemented by the European Union (EU) and since 1992, by a local licence system fixing the maximum number of trawlers allowed to exploit the stock. A precautionary TAC of 4,108 t decided by European Union covers all species of penaeid shrimps *(Penaeus subtilis* or brown shrimp*, P. brasiliensis* or pink shrimp*, P. notialis, P.schmitti* and *Xiphopenaeus kroyeri* or seabob) caught in the EEZ of French Guiana, of which 4 000t are for the EU and 108t for ACP countries

STECF COMMENTS: STECF recommends the compilation of more recent information.

12.2. Red snappers (*Lutjanus* spp.) waters of French Guyana

No information is available on the resource status or management advice for red snappers in French Guyana in 2010. Latest information available comes from a FAO report from year 2000[*].

FISHERIES: The potential surface of the fishery for red snappers is approximately of 26,000 km^2, from the isobaths of 50-120m. It has been harvested on the rocky grounds by a Venezuelan fleet of 41 licensed hand liners. The licences are nominative and free and assigned by the EU. Under the licence agreement, the skippers have to land and sell 75% of their catches to two processors in French Guyana with whom they have a production contract. A new fishery exploited by fishermen from La Martinique and La Guadeloupe was initiated in 1996. They operate with pots mainly on muddy grounds. That fishery is also targeting vermilion snapper (*Rhomboplites aurorubens*) and lane snapper (*Lutjanus synagris*). The activity of shrimp trawlers is an important source of mortality for young red snappers.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the IFREMER Centre in Cayenne.

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

[*] FAO, 2000. FAO Fisheries Report No. 628 FIPP/R628. Western Central Atlantic Fishery Commission Report of the third Workshop on the Assessment of Shrimp and Groundfish fisheries on the Brazil-Guianas shelf. Belém, Brazil, 24 May - 10 June 1999. ISSN 0429-9337. FAO (Rome), 2000.

STOCK STATUS: The above mentioned report from FAO explained that growth parameters remained one of the main sources of uncertainty in these assessments. Other sources of uncertainty were related to the estimation of fishing effort and the annual length compositions of the catches by shrimp trawlers. Fishing effort should also be investigated. Finally, the analysis would be enhanced with information of all catches (including discards), which are most likely taken from this stock. The main problem with the assessment, is the interpretation of the positive relationship between F and recruitment estimated from the VPA. In general, the numbers of young fish has been increasing in the landings. The VPA has interpreted this as increased recruitment, but may also be due to increased availability of young fish in the fishing grounds.

RECENT MANAGEMENT ADVICE: Given the uncertainty of the results, last advice recommended to avoid any further increases in effort without improvements in the assessment.

STECF COMMENTS: STECF recommends the compilation of more recent information.

13. Resources in the southeast Atlantic (SEAFO)

STECF was unable to update section 13 relating to stocks in the region of SEAFO. The text below remains unchanged from the Consolidated STECF review of advice for 2010. The most recent status and advice on stocks in the SEAFO region will be incorporated in the Consolidated STECF review of advice for 2011, which will be available at the end of November 2010.

13.1. Orange roughy (*Hoplostethus atlanticus*), SEAFO CA

FISHERIES: the current status of the fishery is unknown.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the SEAFO. Precautionary approach.

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

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: Zero catch limit for orange roughy in Sub-Division B1 for 2010 and 2011.Catch limit of 50 t in the remaining area.

STECF COMMENTS: STECF notes that the data available for assessment of this stock are inadequate.

13.2. Patagonian toothfish (*Dissostichus eleginoides*), SEAFO CA

FISHERIES: The fishery is localized in Division D, between 40ºS and 50ºS. Three fishing grounds are in the area: Meteor Seamounts (Sub-Division D1), Discovery Seamounts (closed area) and western part of Division D seamounts. The fishery takes place as part of vessels' trips between fishing grounds on the Patagonian slope, CCAMLR fishing grounds and the Indian Ocean and a maximum of four vessels have participated in the fishery in any one year. Catches in 2008 were 160 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the SEAFO. SEAFO decided to use the CCAMLR catch limit in Subarea 48.6 (north 60ºS) adjacent to SEAFO Division D.

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

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: Catch limit of 200 t in the whole area.

STECF COMMENTS: STECF notes that the data available for assessment of this stock are inadequate.

13.3. Alfonsino (*Beryx* spp.), SEAFO CA

FISHERIES: the current status of the fishery is unknown.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the SEAFO.

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

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: Catch limit of 200 t in the whole area.

STECF COMMENTS: STECF notes that the data available for assessment of this stock are inadequate.

13.4. Deep-sea red crab (*Chaceon* spp.), SEAFO CA

FISHERIES: The fishery is mainly located at Valdivia Bank (Sub-Division B1) and the main targeted species is *Chaceon erytheiae* although others *chaceon* species are also distributed in the SEAFO CA. The fishery usually takes place during approximately three months per year and is carried out by one or two vessels. Landings in 2009 were 170 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the SEAFO. The assessment is based on catch level in 2005 and 2006.

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

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: Catch limit of 200 t in Sub-Division B1 and 200 t in the remainder of the SEAFO CA area.

STECF COMMENTS: STECF notes that the data available for assessment of this stock are inadequate.

14. Resources in the South-west Atlantic

The south-west Atlantic (SW Atlantic), corresponding to FAO Statistical Area 41, includes a total continental shelf area of approximately 1.96 million km^2 of which a large portion lies off the coast of Argentina – the Patagonian Shelf – and extends beyond Exclusive Economic Zones (EEZs) in the region, making up an integral part of the Southeast South American Shelf Large Marine Ecosystem (SSASLME). Currently, there is no multilateral management regime in force for the high seas bottom (HS) fisheries in the SW Atlantic, this region being the only significant area for HS fisheries not covered by any Regional Fisheries Management Organisation (RFMO).

This section 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 new research cruise carried out by IEO in March 2010. 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 multidisciplinary 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. Until now, thirteen cruises have been conducted aiming the study of VMEs and the possible impact of fishing activities on them. Research activities included cartography, benthos, geomorphology, sediment, fishing and hydrography. Three of these cruises were devoted to biomass estimates of the main commercial stocks in the referred area and the creation of a time series 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 available estimates. Results of the three fishing surveys are therefore reported in the appropriate stock sections.

The objective of the research surveys is to present a report on the location and features of candidate VMEs in the area, identifying any potential interactions with fishing activities. An intermediate report on the results of the cruises conducted between 2007 and 2009 was elaborated in December 2009, and a final report is intended to be presented to the United Nations General Assembly (UNGA) before the end of December 2010, including a map

with a proposal for Marine Protected Areas (MPAs) in international waters of the Southwest Atlantic, as well as several management recommendations on reducing the impact of fishing activities on VMEs.

RESOURCES IN FALKLAND ISLANDS' WATERS

14.1. Patagonian 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 bycatch 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 bycatch to 16,670-26,970 t since 1998 in targeted trawls.

The lowest recent catch was obtained in 2005, and then it was increased again in 2006-2008. The total catch in January – September 2010 was 12,972 t, which is in line with recent trends (mean January – September catch in 2005-2009 was 13,123 t). Hoki is mainly targeted in two seasons, from February-May and from July-October.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

REFERENCE POINTS: No 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 to 2004 and the current year, which is developing very similar to 2002. However, there are indications that the stock is underexploited due to increased effort in 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: Fishing effort in the Falkland Zone is being held constant.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organisation.

14.2. 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 bycatch 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 bycatch by longliners and trawlers throughout the year. Total longline bycatch 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).

REFERENCE POINTS: No 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 into a regional fisheries organisation.

14.3. Southern blue-whiting (*Micromesistius australis*), Falkland Islands

FISHERIES: Since 1992 Southern blue-whiting (SBW) 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 have been operating only in the austral summer between October and March. Since 2007 the surimi vessels started to operate in the beginning of October and carried on 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 – September 2010 was 2,639 t only, less than in 2009 (3,881 t), and much lower than in 2007 (9,872 t) and 2006 (7,846 t). This decrease in the total catch is not a reflection of biomass decrease, but the fishing ban in southern blue whiting spawning area in September 2010, the month when traditionally this fish has been fished by the finfish fleet.

Fishing in the southern region of FICZ in the spawning grounds was banned for surimi vessels from 1 August until 15 October 2009 to allow the fish to spawn undisturbed. This restriction is carried over for the same period 2010. Moreover, the fishing ban was also imposed for the whole spawning area to the southwest of the Falkland Islands for the spawning period (1 September – 15 October).

SOURCE OF MANAGEMENT ADVICE: Falkland Islands Fisheries Department (FIFD) together with advice from the Renewable Resources Assessment Group (RRAG), Imperial College.

REFERENCE POINTS: No reference points have been defined.

STOCK STATUS: Latest independent stock assessments of Southern blue whiting in the Southwest Atlantic performed by FIFD and RRAG in June 2009 suggested that the spawning stock biomass (SSB) decreased strongly since the early 90's (1,500,000 t) and reached a level of ~321,000 t at the end of 2009. This is approximately 21% of the spawning stock biomass in the early 1990s.

RECENT MANAGEMENT ADVICE: The total catch of SBW should be limited to 50,000 t or even lower in the Southwest Atlantic. A restriction the total catch of M. australis in the Falkland Islands' Conservation Zones to 13,000 t (6,000 for pelagic and 7,000 for finfish fleet) as agreed for 2010.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

14.4. Red cod (*Salilota australis)*, Falkland Islands

FISHERIES: Red cod is fished in the western part of the FICZ, mainly as a by-catch of the hoki and hake fisheries. Additionally, Spanish trawlers target red cod in spring (September-October) on their spawning grounds to the southwest of the Islands. Catches of red cod decreased from 4,649 – 9,313 t in 1996-2000 to 2,285-2,781 t in 2003-2005. In 2006, the annual catch increased up to 3,469 t, with the further increasing trend in 2007 (5,195 t). This then decreased to 4,074 t in 2008 and then increased slightly to 5,079 t in 2009. The total catch in January – September 2010 (2,375 t) was lower than for the same period in 2009 mainly due to the fishing ban in September in the area to the southwest of the Falkland Islands (southern blue whiting spawning area).

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government and has carried out stock assessments in 2008 and in 2009.

REFERENCE POINTS: No reference points have been proposed.

STOCK STATUS: The stocks have had a decreasing trend in their abundance due to fishing pressure on spawning aggregations during October. Stock assessments conducted in 2008 and 2009 indicate that SSB is at 26% of SSB_0.

RECENT MANAGEMENT ADVICE: A management plan has been set in place which bans fishing red cod on their spawning grounds in October 2010 (spawning period) 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 into a regional fisheries organization.

14.5. 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 Interim/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 (*M. australis*) are targeted almost exclusively in the southwest of the Islands in September-November after their spawning in the area around the Southern tip of South America. Catches of hakes increased dramatically in the last four years, peaking up to ~12,000 t per year in 2007. In 2010, cumulative annual catch of hakes up to 30th September achieved 12,553 t that represented the highest cumulative hake catch through September since 1991. Hakes were caught by unrestricted finfish fleet mostly north of the Falkland Islands, in water depths between 170 and 220 m. The cause of such an increase in abundance of hakes in Falkland waters in recent years is not entirely clear. Migrations of larger abundances of common hakes to FICZ/FOCZ might be caused by increased abundance of their main prey – Patagonian rock cod *Patagonotothen ramsayi*.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Government is responsible for management of hake resources.

REFERENCE POINTS: No 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 relatively small proportion of the stock migrating 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 respect to the period 1996-2000, this stock is evidently improved, given exceptional catches of hakes in the last three years.

RECENT MANAGEMENT ADVICE: Fishing effort in Falkland Zones for hakes is being held constant.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

14.6. 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 is situated in the northern and north-western parts of the FICZ/FOCZ (north of 51-52°S). Fishing effort was relatively stable during 2000-2004 (80-120 jigging vessels). However due to very low abundance of *Illex* in 2004-2005, it gradually decreased to 35-44 vessels in 2008-2009. After three years of high abundance (2006-2008), *Illex* stocks decreased dramatically in 2009 (similar to situation 2004-2005) with virtually no fishery in Falkland waters as the whole fleet fished on the High Seas. Results of the High Seas fishery in 2010 did not result in much optimism. Compared to previous seasons, the SPS squid showed a low abundance with average monthly CPUE being only 12.7 t per day. These catches were about only a third of that usually observed in a normal *Illex* year. Migrations of squid further south were further aggravated by cold environmental conditions of the Patagonian Shelf, where the sea surface temperatures had negative anomalies up to 2.5°C.

Nevertheless, a substantial jigging fleet applied for Falkland licenses to fish for *Illex* in a season that starts on 15th February. Their number gradually increased to 74 vessels by the end of March. During the first week of the month the catches were reasonable ranging from 10 to 19 t per night. Then they decreased to only 2.7-7.5 t per night. In April, negative SST anomalies were observed in Falkland waters and the whole jigging fleet worked mainly in the northern part of FICZ during the first two weeks of the month. Daily CPUEs ranged only between 2 and 3.5 t per night. During the third week, CPUEs declined to 0.5-1 t per night, and the vessels started to leave the Falkland waters. The last three jiggers left Falkland Conservation Zones on 27th April, all having zero catches in the previous night. The *Illex* season of 2010 brought a total catch of 12,105 t. This is the fourth lowest catch of this squid since the beginning of the Falkland fishery in 1987. Overall, the commercial situation in the

Illex fishery in 2010 was quite similar to that observed in 2002, when the South Patagonian Stock of *Illex* had low abundance and their migration to the southern parts of their species range on the Patagonian Shelf was restricted by unfavourably low water temperatures.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

REFERENCE POINTS: In the event that the spawning stock biomass is likely to decline below the Precautionary Reference Point of a minimum of 40,000 t, the fishery should be closed.

STOCK STATUS: The status of the stock is changing every year due to the short life cycle of the squid (1 year). In 2010, the winter-spawning stock had a very low abundance and obviously did not recover from the last year poor 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 into a regional fisheries organization.

14.7. Patagonian squid (*Loligo gahi*), Falkland Islands

FISHERIES: 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 2010, the abundance of both cohorts of *Loligo* was high. The first season yielded 28,682 t, and the second season 36,961 t. In-season stock assessment of the escapement biomass (SSB) during the first season was estimated to be 16,500 t, much above the 10,000 t escapement limit. During the second season, only one very abundant wave of abundance was observed in July and the first half of August, and then it was gradually depleted by the fishing fleet. The fishing season was closed as planned on 30th September. Taking into account the data for the whole fishing season and assuming it has been one large recruitment into the fishery, the escapement biomass by the end of the season was preliminary estimated to be at 24,700 t. Leaving this amount of squid to spawn should contribute to higher recruitment abundance of the second cohort of *Loligo* for next year. To carry on fishing after 30th September would not be feasible as a vast majority of squid started to migrate to their spawning ground to spawn.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

REFERENCE POINTS: A minimum spawning stock biomass of 10,000 t at the end of each fishing season.

STOCK STATUS: Stocks of both cohorts of Loligo (autumn- and spring-spawning cohorts) are in good condition.

RECENT MANAGEMENT ADVICE: Due to the high *Loligo* abundance in 2010, both seasons have been closed as planned.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

14.8. Patagonian toothfish (*Dissostichus eleginoides*), Falkland Islands

FISHERIES: *Dissostichus eleginoides* is the most valuable and highly priced resource in the Falkland Zones. One Falkland Company holds exclusive rights to fish for toothfish deeper than 600 m. The total catch in trawl and longline fisheries in January – September 2010 was 1,220 t that was greater than for the same period in 2009 (1,197 t).

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

REFERENCE POINTS: An annual TAC of 1,200 t has been assigned.

STOCK STATUS: The fishery data for 2010 indicated a stabilised toothfish stock abundance at between 44 – 53% SSB_0. Stock assessment recommended that a TAC of 1,200 remain for 2011. Encouraging levels of recruitment of juvenile fish in shelf waters in 2006, 2007 and 2008 will start to become available to the longline fishery in ~ 3yrs time.

RECENT MANAGEMENT ADVICE: Stock assessments indicated that the TAC should remain at 1,200 t for 2011 as was the advice for 2008, 2009 and 2010. The spawning grounds, on the Burdwood Bank, were closed between 1st July and 31st August from 2007 in order help the stock rebuild by enhancing potential recruitment. This continued through 2008, 2009 and 2010. It is recommended that this continue through 2011 as a conservation measure.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so efforts should be made to improve stock identification.

RESOURCES IN ARGENTINIAN WATERS

14.9. Hoki (Macruronus magellanicus), Argentina1

No new information was made available on the resource status or management advice for hoki in Argentinean waters in 2010.

FISHERIES: Hoki is the second main Argentinean finfish species in terms of catches, after Argentine hake (*Merluccius hubbsi*). It is caught by trawlers that process catches on board, and the highest volume is found south of 45ºS. The Federal Fisheries Council (CFP) established a total TAC of 150,000 t for 2010 following advice from INIDEP, whereas 170,000 t was permitted to be fished in 2009. Data from the Argentinean Under-Secretariat for Fisheries (SAGP&A) reported 54,037 t of hoki landed between 1st January and 30th September 2010, 38.9 % less than in the same period in the previous year.

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 over fishing.

REFERENCE POINTS: No information on reference points has been available.

STOCK STATUS: total estimated biomass made by the Argentinean National Institute for Fisheries research and development (INIDEP) was of 1.2 million t at the beginning of 2008. No new information was made available for recent years.

RECENT MANAGEMENT ADVICE: STECF did not have access to management advice for this stock.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if 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.

14.10. Patagonian grenadier (Macrourus carinatus, Macrourus holotrachys), Argentina

No new information was made available on the resource status or management advice for Patagonian grenadier in Argentinean waters in 2010.

FISHERIES: Data from SAGP&A reported 3,533 of grenadier landed between 1st January and 30th September 2010, whereas 4,711 t were landed in the same period 2009.**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 over fishing.

REFERENCE POINTS: No information on reference points was made available.

[1]Information for Section 6 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 Pescare).

STOCK STATUS: STECF did not have access to any stock assessment in this area.

RECENT MANAGEMENT ADVICE: STECF did not have access to management advice for this stock.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if 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.

14.11. Southern blue-whiting (Micromesistius australis australis), Argentina

No new information was made available on the resource status of southern blue whiting in Argentinean waters in 2010.

FISHERIES: The abundance of southern blue whiting in Argentine waters declined in 2005, after having been stable prior to 2001 and increasing since that time. Since 2001, annual catches have been on average around 45,000 t, but in 2005, the landings of this species totalled 34,735 t. The same declining situation seems to have continued in 2006, according to official statistics. The SAGP&A figures indicate that 18,982 t of southern blue whiting were landed in 2007, 39.3 % less than in 2006 (31,286 t). 19,841t and 21,670 t of southern blue whiting were landed respectively in 2008 and 2009, whereas 4,622 t were landed during the first nine months of 2010, 72 % less than in the same period in the previous year.

SOURCE OF MANAGEMENT ADVICE: INIDEP is the main advisory body.

REFERENCE POINTS: No recent information on reference points was made available for STECF.

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 down until 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 was estimated to be 468,000 t. No information on current exploitation rates was made available.

RECENT MANAGEMENT ADVICE: A TAC of 45,000 t was set for 2010 by the Federal Fisheries Council (CFP) , following advice from INIDEP.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if 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.

14.12. Red cod (Salilota australis), Argentina

No new information was made available on the resource status or management advice for red cod in Argentinean waters in 2010.

ISHERIES: Red cod is caught inside Argentinean waters by bottom trawlers and by artisanal fleets. According to data from SAGP&A, total landings of red cod by all fleets (artisanal, bottom trawlers, longliners, etc) in Argentinean ports in 2008 amounted to 8,010 t, representing almost twice the reported landings in 2007 (4,611 t) and almost four times the reported landings in 2006 (2,427 t). However, landings in recent years have shown a declining trend with 6,921 and 4,774 t landed in 2009 and in the nine first months of 2010 respectively.

SOURCE OF MANAGEMENT ADVICE: INIDEP is the main advisory body.

REFERENCE POINTS: Unknown.

STOCK STATUS: Stock status is unknown.

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. No updated information was made available on this subject.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if 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.

14.13. 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 280,621 t of Argentine hake landed in 2009, against 263,323 in 2008, 299,605 t in 2007 and 353,423 in 2006. Between the first of January and the 30th of September 2010, 192,389 t were landed, 3.5 % less than in the same period in the previous year.

SOURCE OF MANAGEMENT ADVICE: INIDEP is the main advisory body.

REFERENCE POINTS: A SSB of 130,000 t for 2008 was proposed by INIDEP for the hake stock north of 41º S[2]. Due to the large decrease in population abundance and to low recruitments in recent years indicating the possibility of 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)
Short term	0,336	40.939	0,121	15.915
Medium term	0,525	59.332	0,407	48.119

No updated data was made available for the present report.

STOCK STATUS: Assessment of the status of the stock north of 41º S between 1986 and 2007, made by INIDEP in 2008[3] revealed a higher presence of age-group 2 since 2002. In 2005 70% of the catch was composed by 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 the precautionary reference point for this stock (130,000 t). 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).

The results of the juvenile common hake survey carried out in January by the National Institute for Fisheries Research and Development (INIDEP) show that the three-year decline registered from 2005 to 2008 within the north Patagonian breeding ground has reversed somewhat. CPUE, as much in weight as in number of fish, has doubled since last year. Nonetheless, both figures are still well below those observed in 2005, thus the general state of the resource is still critical.

A technical report authored by the INIDEP in 2010 stated that the abundance index of juveniles fell 60% on average over the last year. As it is referred in this report, "the value of the index for the group age 2 (24 -32 centimetres) in 2010 registered a fall of 69% with respect to 2009, remaining at a level similar to that of 2008".

RECENT MANAGEMENT ADVICE: A TAC of 48,000 t north of parallel 41ºS and 290,000 t south of parallel 41ºS was set by the Federal Fisheries Council (CFP) for 2010, following advice from INIDEP. The CFP established the compulsory use of selectivity devices that prevent over-fishing of juvenile fish in the hake fishery, both in the hake and shrimp (*Pleoticus muelleri*) fisheries. The CFP and scientists from the INIDEP are studying different alternatives to revert the biological declivity that affects common hake (*Merluccius hubbsi*) juveniles. In addition to the measures announced for operations in San Jorge gulf, the resource's breeding and reproduction area, fishery authorities plan to extend the standing ban zone or implement mobile restrictions in external quadrants. A system of individual transferable quotas (ITQs) came into effect in January 2010 and will be in place for 15 years.

[2] Inf. Téc. INIDEP N° 32.
[3] Op. Cit.

The Argentine Fisheries and Aquaculture Subsecretariat (SSP&A) allowed fishing to take place in an area located inside the permanent closed hake zone, after a weaker presence of juveniles was detected in the zone. Under a precautionary approach, INIDEP also recommended the preventative closure of the statistical quadrant located between parallels 47° and 48°S and meridians 64° and 65°W. The initiative follows a similar one that took place in March 2009, when CFP determined that it was convenient to open north statistical quadrant 4160 and close southern quadrant 4764.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if 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.

14.14. Argentine short-finned squid (Illex argentinus), Argentina

No new information was made available on the resource status of Argentine short-finned squid in Argentinean waters in 2010.

ISHERIES: *Illex argentinus* is the major Argentine cephalopod fishery resource. Artisanal vessels have exploited the species in Argentinean waters since 1946. Up to 1977 catches were taken as by-catch in the 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. Total catches ranged between 377,150 t in 1997 and 127,386 t in 2003. In the whole period, total number of jigging boats varied between 65 and 150.

Landings of *Illex* during the first 9 months of 2010 totalized 71,132 t, 7.2 % above than in the same period in the previous year, a year which closed with one of the worst registries in the history. Official statistics by SAGP&A reveal that 71,414 t of Argentine short-finned squid were landed in 2009, a fall of 72% in relation to the 255,531 t landed in 2008.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the INIDEP, together with input from Comisión Técnica Mixta del Frente Marítimo (CTMFM) for the Common Fishing Zone of Argentina and Uruguay (north management area). The South Atlantic Fisheries Commission (SAFC), which formerly collaborated in the advice for the south management area, is not operative since 2005.

MANAGEMENT MEASURES: Prior to 1995 management measures were agreed between the UK and Argentinean authorities. However, talks broke down in 2005 and since that time, there have been no jointly agreed management decisions.

With the introduction of the 25 year licensing system introduced in 2005, the previously agreed management measure of allowing 40% SSB escapement is also no longer in place.

REFERENCE POINTS: STECF is unaware of any currently agreed reference points for the management of the stock in Argentinean waters.

STOCK STATUS: A report by INIDEP[4] on the status of the fishery for 2008 indicated recruitment estimations of 683,838 t for the SPS stock at the start of the fishery (week 1) and a escapement 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. Current stock status is unknown to STECF.

MANAGEMENT MEASURES: The CFP decided the closure of the squid (*Illex argentinus*) fishing season north of latitude 44° by 18 September 2010, following advice from INIDEP. According to the latest technical report by INIDEP, the spring spawning stock (SSS) just north of latitude 44ºS was allocated two fishing periods: the first one was between weeks 14 and 21 (April-May), which achieved low catches of North-Patagonian Buenos Aires stock (NPBS) on the continental slope and the second between weeks 26 and 36 (July-September) on the intermediate platform that affected the SSS.

RECENT MANAGEMENT ADVICE: INIDEP advice suggests that the spring spawning stock would include 433 million specimens (80,163 t) up until week 26 and the escape at week 36 of 41% (20,398 t).

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if *Illex argentinus* in

[4] Illex argentinus. Pesquería 2008

Argentinean waters constitutes a separate stock from *I. argentinus* in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

14.15. Patagonian squid (Loligo gahi), Argentina

No new information was made available on the resource status or management advice for Patagonian squid in Argentinean waters in 2010.

FISHERIES: *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, 234 t in 2008, 252 t in 2009 and 167 t up to 30th September 2010.

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.

REFERENCE POINTS: STECF is unaware of any currently agreed reference points for the management of the *Loligo* stock in Argentinean waters..

STOCK STATUS: STECF did not have access to any stock assessment in this area.

RECENT MANAGEMENT ADVICE: Unknown.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if *Loligo gahii* in Argentinian waters constitutes a separate stock from those fish in Falklands' and/or International waters, so efforts to improve stock identification are desirable.

14.16. Patagonian toothfish (Dissostichus eleginoides), Argentina

No new information was made available on the resource status of Patagonian toothfish in Argentinean waters in 2010.

FISHERIES: Patagonian toothfish in Argentine waters is fished by trawlers and longliners. SAGP&A figures for Patagonian toothfish landings indicate 2,171 t in 2008, 2,434 t in 2009 and 1,463 t up to 30th September 2010, 2.6 % above than in the same period in the previous year.

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

REFERENCE POINTS: STECF is unaware of any currently agreed reference points for the management of the Patagonian toothfish stock in Argentinean waters. .

STOCK STATUS: A report by INIDEP (2007)[5] 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. In 2009, the CFP indicated that fishery of Patagonian toothfish "shows a trend towards stability and the existence of some positive signs, like the low portion of juvenile specimens present in the catch." No updated information was made available.

RECENT MANAGEMENT ADVICE: A TAC of 3,250 t was set by the CFP for 2010 following advice from INIDEP, 23% above than in 2009. The TAC established is based on criteria for prevention, and was agreed on after evaluating the technical report drafted by the National Institute of Fisheries Research and Development (INIDEP) on the state of the resource.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. It is not clear if 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.

[5] INIDEP Inf. Téc. INIDEP N° 4. 27-12-07. 9 pp.

14.17. Patagonian shrimp (Pleoticus muelleri), Argentina

No new information was made available on the resource status of Patagonian shrimp in Argentinean waters in 2010.

FISHERIES: Patagonian shrimp is fished by beam trawlers operating in the Gulf of San Jorge waters under a license regime by the CFP. In 2007 47,623 t of shrimp were landed into Argentinean ports, a similar figure to that for 2006 (44,410 t). According to official statistics b SAGP&A, shrimp landings in 2008 and 2009 were 47,406 and 53,578 t respectively, whereas 55,935 t were landed up to 30th September 2010, 24.5 % more in the same period 2009. It is important to note the increasing trend of landings since 2005.

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 (1989-2010)

Year	Tons	Year	*Tons*
1989	11,353	2000	37,150
1990	9,648	2001	78,798
1991	8,337	2002	51,389
1992	24,495	2003	52,896
1993	19,271	2004	27,030
1994	16,670	2005	7,470
1995	6,203	2006	44,410
1996	9,874	2007	47,623
1997	6,482	2008	47,406
1998	23,333	2009	43,437
1999	15,988	2010	55,935*

* Provisional data (01/01/2010-30/09/2010)

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 overfishing.

REFERENCE POINTS: STECF is unaware of any currently agreed reference points for the management of the Patagonian toothfish stock in Argentinean waters. **STOCK STATUS:** Unknown.

RECENT MANAGEMENT ADVICE: A closure of the fishery was put in force by mid October 2008 in the area contained by the parallels 42º-47º S, the meridian 62º W and the line of national jurisdiction. The CFP decided to close the zone located between parallels 44º and 45°, in national jurisdictional waters. The measure, which entered into force on the 17th October 2009, obeys the fact that the breeding of common hake (*Merluccius hubbsi*), a species that is usually captured incidentally, begins in that zone at this time of year. No updated information of management advice is available for STECF..

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization.

14.18. Kingclip (Genypterus blacodes), Argentina

No new information was made available on the resource status of kingclip in Argentinean waters in 2010.

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, 2007, 2008 and 2009 were 20,551 t, 20,581 t, 17,559 t and 15,383 t respectively. Preliminary data on landings by SAGP&A reported 13,132 t between 1st January and 30th September 2010, 5.7% less than in the same period 2009. Approximately 50% of the total catch of kingclip is caught as by-catch by bottom trawlers that direct their effort to hake (*Merluccius hubbsi*).

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.

REFERENCE POINTS: STECF is unaware of any currently agreed reference points for the management of the Patagonian toothfish stock in Argentinean waters.

STOCK STATUS: Not precisely known.

RECENT MANAGEMENT ADVICE: A TAC of 18,000 t of kingclip was established by the Federal Fisheries Council of Argentina (CFP) for 2010, following scientific advice from INIDEP.

STECF COMMENT: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organisation.

RESOURCES IN INTERNATIONAL WATERS

Information on biomass estimations of the main commercial species presented in sections 14.19 to 14.25 was extracted from the reports of the three research cruises for assessment of fishery resources on the High Seas of the SW Atlantic carried out by the IEO between 10th of March - 18th April 2008, 24th of February - 1st April 2009 and 6th of March – 7th April 2010 (del Río *et al*., 2008, 2009 and 2010). It is expected that the historical series of fisheries research cruises started by IEO in 2008 could provide useful information on the stock status in the coming years.

Biomass estimation in 2010 cannot be compared to those in 2008 and 2009 due to a change in the survey methodology in 2010, halving the number of trawls in deeper strata (> 500 m) in order to reduce the pressure on the VMEs described in these strata during previous cruises.

14.19. Hoki (*Macruronus magellanicus*), International waters

FISHERIES: Hoki is fished as a by catch during *Illex* and hake fisheries by bottom trawlers from several countries, mainly Spain.

SOURCE OF MANAGEMENT ADVICE: No management advisory body exists for International waters of the Patagonian Shelf.

REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: The swept area biomass estimates for this stock in 2008, 2009 and 2010 were 13,792, 8,497 and 5,947 t respectively, biomass estimate in 2009 representing a decline of 39% compared to the previous year. Biomass was observed to be highest at depths between 401 and 700 m in both years. As aforementioned, biomass estimation for this species in 2010 cannot be compared to these in 2008 and 2009.

RECENT MANAGEMENT ADVICE: At present there is no management of the fisheries exploiting hoki in International waters of the Southwest Atlantic.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from hoki in Argentine or Falkland Islands waters, so effort should be made to improve stock identification.

14.20. Patagonian grenadier (*Macrourus carinatus*, *Macrourus holotrachys*), International waters

FISHERIES: Commercial catches of *Macrourus carinatus and Macrourus holotrachys* are negligible in the area where the fisheries take place in international waters (<300 m depth). Results from the three mentioned research surveys 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.

REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: The only estimates of stock biomass are those derived from the two first research surveys undertaken by the IEO in March-April 2008 and February-March 2009, as results of the 2010 cruise cannot be used due to a change in the methodology. *Macrourus carinatus* was found to be the most abundant species during both research cruises with an estimated swept area biomass of 116,679 t in 2008 and 212,768 t in 2009, this representing an increase of about 82% in 2009 with respect to 2008. Estimated biomass in 2010 was 98,486 t. *Macrourus carinatus* is distributed between 200 and 1500 m, but with the highest catches between 501 and 1000 m depth. In terms of abundance, *Macrourus holotrachys* was the seventh largest stock among the 12 assessed commercial species, with an estimated biomass of 4,178 t and 5,479 t in 2008 and 2009 respectively. The highest catches were taken between 1001-1500 m depth in both years. Estimated biomass in 2010 was 2,627 t.

RECENT MANAGEMENT ADVICE: At present there is no management of the fisheries exploiting grenadiers in International waters of the Southwest Atlantic.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Patagonian grenadier in Argentine or Falklands waters, so efforts to improve stock identification are desirable.

14.21. Southern blue-whiting (*Micromesistius australis*), International waters

FISHERIES: Southern blue whiting is fished as 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.

REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: biomass estimations from the two first IEO surveys resulted in 858 t and 710 t of southern blue whiting for 2008 and 2009, distributed between 300 and 700 m, but with most of the catches obtained at 501-700 m depth. Estimated biomass in 2010 was 611 t.

RECENT MANAGEMENT ADVICE: At present there is no management of the fisheries exploiting southern blue whiting in International waters of the Southwest Atlantic.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from southern blue whiting in Argentine or Falkland Islands waters, so efforts to improve stock identification are desirable.

14.22. Red cod (*Salilota australis)*, International waters

FISHERIES: Red cod is caught as by-catch in hake and *Illex* squid fisheries by bottom trawlers from several countries, mainly from Spain.

SOURCE OF MANAGEMENT ADVICE: No management advisory body exists for International waters of the Patagonian Shelf.

REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: A biomass of 118 t and 163 t of red cod was estimated during the IEO cruises in 2008 and 2009 respectively. Estimated biomass in 2010 was 57 t.

RECENT MANAGEMENT ADVICE: At present there is no management of the fisheries exploiting red cod in International waters of the Southwest Atlantic.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from red cod in Argentine or Falkland Islands waters, so efforts to improve stock identification are desirable.

14.23. 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 for *M. hubbsi* are located between parallels 44-48º S. Relatively low catches of the order of 50 t annually of *M. australis* have been reported from this area.

The maximum effort in terms of numbers of vessels in International waters and Falkland Islands by Spanish vessels was reported in 1990 (c. 100 vessels) and has decreased since then, mainly due to the development of new fisheries in other areas (i.e the North West Atlantic, NAFO fisheries). Currently, the number of fishing units flagged to Spain operating in this area is around 27 vessels.

SOURCE OF MANAGEMENT ADVICE: No management advisory body exists for International waters of the Patagonian Shelf.

REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: The swept area biomass estimates for Argentine hake from both surveys were 15,877 t (2008) and 18,512 t (2009), with highest biomass below 200 m depth. No specimens of *M. hubbsi* were taken at depths greater than 300 m. The bathymetric distribution of this species was very similar during both cruises. Estimated biomass in 2010 was 17,273 t. STECF notes that the reduced coverage in the Spanish bottom trawl survey in 2010 is likely to be comparable to the surveys undertaken in the previous two years since Argentine hake is primarily distributed at depths less than 200 m.

Austral hake was the least abundant commercial species in the cruises of 2008 and 2009, with an estimated swept area biomass of 48 t. and 206 t respectively. Estimated biomass in 2010 was 79 t.

RECENT MANAGEMENT ADVICE: At present there is no management of the fisheries exploiting hakes in International waters of the Southwest Atlantic.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if hakes in international waters constitute separate stocks from those in Argentine or Falkland Islands' waters, so efforts to improve stock identification are desirable.

14.24. 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, 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 the target of major fisheries using both trawlers and jigging vessels during the first half of the year. Bottom trawlers are mainly from Spain, whereas jiggers belong to several Asian countries such as Japan, Korea and Taiwan. The main fishing area on the High Seas is between parallels 44-47º S.

Concentrations of short-finned squid are found 45-46º S in January or February and the animals gradually migrate southward towards the Falkland Islands while growing rapidly. Peak concentrations are found around the Falkland Islands between March and May. Towards the end of this period, animals start migrating northward to spawn and die around July or August.

Since the early 1980s, Argentine short-finned squid have been caught by Spanish bottom trawlers as by-catch in the hake fishery. Currently, 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.

REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: The swept area biomass estimates for Argentine short-finned squid from the IEO surveys was 45,073 t in 2008 and 22,149 t in 2009 (around 50% less in the second cruise). Estimated biomass in 2010

was 7,941 t. STECF notes that the reduced coverage in the Spanish bottom trawl survey in 2010 is likely to be comparable to the surveys undertaken in the previous two years since Argentine short-finned squid is primarily distributed at depths less than 300 m.

RECENT MANAGEMENT ADVICE: At present there is no management of the fisheries exploiting *Illex* squid in International waters of the Southwest Atlantic.

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.

14.25. Patagonian squid (*Loligo gahi*), International waters

FISHERIES: *Loligo gahi* is caught in relatively small quantities as by-catch by bottom trawlers during hake and *Illex* fisheries. The main fishing area is around parallel 42º S, where big catches of mainly juvenile Patagonian squid have been reported in different years by observers on board of Spanish vessels.

SOURCE OF MANAGEMENT ADVICE: No management advisory body exists for International waters of the Patagonian Shelf.

REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: The swept area biomass estimates for *L. gahi* in 2008 and 2009 were 2,108 t and 1,867 t respectively. Spatial distribution of this species was similar in both cruises, with the highest estimates at depths less than 200 m and south of parallel 46º S. Estimated biomass in 2010 was 42 t.

RECENT MANAGEMENT ADVICE: At present there is no management of the fisheries exploiting *Loligo* squid in International waters of the Southwest Atlantic.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock into a regional fisheries organization. It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification.

15. Resources in the Mediterranean Sea (GFCM)

The Management advisory body is the Scientific Advisory Committee (SAC) of the General Fisheries Commission for the Mediterranean (GFCM). The SAC is organized in Sub-Committees. The Sub-Committee on Stock Assessment (SCSA) gives advice on stock status.

One of the objectives of the GFCM SCSA, is to enhance joint practical stock assessment involving the participation of scientists from all the Mediterranean countries of the different Geographical Sub-Areas (GSAs) who provide their data and share them with their colleagues, using standard methodologies and analyzing together the results and options for fisheries management. The process, based on undertaking joint practical session to assess in particular the stocks of hake and associated species, was launched in 2008, during the SCSA Working Group on Demersal species (Turkey, September 2008). The assessments were carried out using both commercial catches and trawl survey data.

During its thirty-third session, the Commission endorsed the proposal of the Scientific Advisory Committee (SAC) aimed to reconsider the functioning of the Workings Groups on Stock Assessment of demersal and small pelagic species. Under this new vision, in 2009 the SCSA Working Group on demersal species carried out its work into four thematic sub-groups (crustaceans, hake, mullets and other species). The Working Group on small pelagic species carried out its work on sardine and anchovy according the SAC proposal. In both cases the work dealt exclusively with practical stock assessments using standard methodologies.

The outcome of the assessments already undertaken by national experts within national programmes, FAO Regional projects and/or other international initiatives should be presented directly to the SCSA meeting for review rather than asking the relevant working groups to revisit the assessments.

With the aim of establishing the scientific evidence required to support development of long-term management plans for selected fisheries in the Mediterranean, consistent with the objectives of the Common Fisheries Policy, and to strengthen the Community's scientific input to the work of GFCM, the Commission made a number of requests to STECF. In order to meet these requests, a series of STECF Working Groups on the Mediterranean

were initiated in 2008 (STECF-SGMED Working Group). In 2009 STECF-SGMED-09-02 Working Group on the Mediterranean Part I took place at Villasimius, Sardinia, (Italy) in June 2009. The STECF-SGMED-09-03 Assessment of Mediterranean stocks – Part II was be held in December 2009 at Barza d'Ispra (Italy). The latter meeting produced short and medium term projections regarding the assessments discussed in the previous meeting. The strategy of two assessment working groups, the first focused on the assessment of historic stock parameters and the second on projections of stock parameters into the short and medium term future is applied for 2010 with the STECF-SGMED-10-02 meeting in Heraklion (Greece) in early June and STECF-SGMED-10-03 meeting planned to be held in Sicily (Italy) in December.
The GFCM Working Groups on the Demersal Stocks and on the Small Pelagic Stocks were held at Ancona (Italy) in October 2009, from 19 to 23 and from 26 to 30 respectively, immediately after the STECF SGECA RST 09-03. The GFCM SCSA took place at Malaga in November. Consequently, the update of the Mediterranean stocks was done on the basis of the assessments presented at the STECF-SGMED 09 02 Working Group. 2010 GFCM SCSA meetings will be held at Malta at the end of November.
STECF recognises the efforts made by GFCM and STECF-SGMED in the recent years to harmonize the assessment of the most important stocks among the different Mediterranean countries but notes that, in spite of this, most of the Mediterranean stocks are not yet assessed on a regular basis in all GSAs.
STECF recommends that the cooperation between Member States, GFCM and STECF-SGMED Working Groups should be further improved in order to provide annual assessment of all stocks listed in the regulations Coun. Reg. 1542/2000, Coun. Reg. 1343/2007, and Coun Reg. 199/2008 based on the national programs for data collection.
STECF notes that STECF-SGMED-10-02 in 2010 presents historic and recent trends in stock parameters (stock size, recruitment and exploitation) and fisheries management advice based on appropriate management reference points. STECF-SGMED-10-02 has undertaken 69 stock assessments: European hake (*Merluccius merluccius*, 14 stocks), red mullet (*Mullus barbatus*, 15 stocks), striped mullet (*Mullus surmuletus*, 2 stocks), common Pandora (*Pagellus erythrinus*, 1 stock), common sole (*Solea solea*, 1 stock), anchovy (*Engraulis encrasicolus*, 6 stocks), sardine (*Sardina pilchardus*, 5 stocks), pink shrimp (*Parapenaeus longirostris*, 10 stocks), blue and red shrimp (*Aristeus antennatus*, 4 stocks), giant red shrimp (*Aristaeomorpha foliacea*, 4 stocks), and Norway lobster (*Nephrops norvegicus*, 7 stocks). STECF notes that the STECF-SGMED-10-02 report covers additional stocks and species (striped mullet and common pandora) compared to last year's (2009) deliverables (STECF-SGMED-09-02). GFCM stock assessments were also considered and discrepancies were highlighted where they existed.

For 38 of the 69 stock assessments undertaken by STECF-SGMED-10-02 analytical assessments of exploitation rates or coefficients of exploitation rates (fishing mortality) were provided and for 36 stocks fisheries management advice consistent with high long term yields conditional of proposed reference points were also provided. Overall, the recent (in 2008 or 2009) status of 32 out of 36 stocks was assessed as overfished (89%), while only 4 stocks were considered sustainably exploited consistent with high long term yields. All demersal fish stocks (100% of 18 stocks) were assessed as overexploited. Among the 9 crustacean stocks assessed, 7 were overexploited (78%) with 2 stocks of unknown status. For stocks of small pelagic species, 4 (36%) were assessed as being sustainably exploited, and 7 (64%) were assessed as overexploited.

The stock status classifications of GFCM SAC and STECF-SGMED-10-02 are combined in the following overview tables.

Overview tables on stock status and exploitation status by stocks as assessed by GFCM-SAC and by STECF.

Stock status according to the stock size (SSB).

Stock status according to the exploitation rate.

Summary overview

STECF approach to advice for Mediterranean fisheries

Fisheries and stock specific recommendations can be found in the relevant stock sections. Stock status assessments and fisheries management advice as provided by GFCM SAC and STECF-SGMED-10-02 were

reviewed and inconsistencies were highlighted. The management advice for fisheries exploiting the assessed demersal fish and crustacean stocks, focuses on the need for a consistent approach to establishing multi-annual management plans (COUNCIL REGULATION (EC) No 1967/2006) to reduce fishing mortality towards the proposed limit management reference points consistent with high long term yields through fishing effort reductions.
The management advice for fisheries exploiting the assessed stocks of small pelagics focuses on the need for a consistent approach to establishing multi-annual management plans to keep fishing mortality at or below the proposed limit management reference points consistent with high long term yields or to reduce fishing mortality towards such limits. STECF notes that management of fisheries targeting stocks of small pelagics through effort management alone, runs the risk of not achieving the desired management objectives. The reason for this is:
Fleets exploiting small pelagic species in the Mediterranean have the ability to target more than one stock and a restriction on overall fleet effort does not ensure a reduction in effort on the stock of concern. For example a fleet currently exploiting stock A which is more valuable than stock B, could choose to direct all of it's effort to stock A if it's effort is restricted since the revenue gained would be greater.
STECF agrees with STECF-SGMED 10-02 that landing restriction is a more appropriate management tool to control the exploitation rate on small pelagics in the Mediterranean. Taking into account the above arguments, STECF recommends that consideration be given to introduce landing restrictions as a more effective means to achieve desired exploitation rates on small pelagic species in the Mediterranean. The species of concern are primarily anchovy and sardine. .

STECF emphasizes that to assess the effectiveness of multi-annual management plans implies that evaluations are undertaken at appropriately-prescribed intervals and that the plans are adapted in the light of the results of the evaluations. The plans need to be supported by effective control and enforcement measures together with collection of fisheries-related data. STECF notes that not all Member States have fully implemented the Data Collection Regulation and notes that full implementation of the provisions of the data collection regulation is a prerequisite to effective scientific monitoring and management of the stocks and fisheries.

STECF notes that short and medium term predictions of stock size and catches (landings) under various management options as well as provision of associated scientific advice is foreseen during the forthcoming STECF-SGMED-10-03 meeting (13-17 December 2010). Such quantitative considerations will consider the recent mesh size changes as defined in the Corrigendum to Council Regulation (EC) No 1967/2006 of 21 December 2006. STECF notes that the lack of 2009 fisheries data will impede such short term forecasts for many stocks and fisheries in GSAs bordering the Italian, Greek and Cyprian coasts.

15.1. European anchovy (*Engraulis encrasicolus)* in Geographical Sub Area 1. Northern Alboran Sea

FISHERIES: The current fleet in GSA 01 the Northern Alborán Sea is composed by 131 units, characterised by small vessels. 21% of them are smaller than 12 m and 79% between 12 and 24 m. The purse seine fleet has been continuously decreasing in the last two decades, from more than 230 vessels in 1980 to 131 in 2009. Sardine (*Sardina pilchardus*) and anchovy (*Engraulis encrasicolus*) are the main target species of the purse seine fleet in Northern Alboran GSA 01, but other species with lower economical mackerel (*Trachurus spp.*), mackerel (*Scomber spp.)* and gilt sardine (*Sardinella aurita*). The annual landings of anchovy in the Northern Alborán Sea show annual fluctuations and ranged between 3,268 and 178 tons. Landings increased in 2009 reaching up 292 t. Anchovy discards in GSA 01 are negligible.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Biomass estimation comes from acoustic surveys and from commercial landings and CPUEs. The stock is assessed by means of an XSA. Since 2008 advice is also provided by STECF-SGMED.

REFERENCE POINTS: STECF proposes an exploitation rate E_{msy} (F/Z, F age range 0-3) ≤0.4. GFCM SAC has not proposed any management reference points.

STOCK STATUS:
State of the adult abundance and biomass: Results of the Extended Survivor Analysis (XSA) analysis indicated a slight increase from the lowest levels observed in 2008. However the anchovy SSB remains at low levels also in 2009. The state of the spawning biomass in relation to precautionary limits cannot be evaluated since there are no precautionary reference points derived due to the short series of data available. It should be considered that this assessment is based on a short time series of data and not suitable to suggest reference points of Bpa

and Blim. Moreover, anchovy is a short lived species characterized by high fluctuations in abundance and recruitment strongly depends also on environmental conditions. No reference points were proposed for biomass levels, and hence STECF cannot comment on the state of the stock with this respect.
State of the juvenile (recruits): XSA model estimates had shown an increase in the number of recruits in 2009, well above the recruitments observed in the last four years (2005-2008) and similar to the recruitments occurred in 2003 and 2004. The trend of the recruitments is important as stocks of small pelagics and fisheries are highly dependent of the recruitment strength. the STECF-SGMED-10-02 WG is unable to provide any scientific advice of the state of the recruitment given the short time series available.
State of exploitation: the STECF-SGMED-09-02 WG recommended the exploitation rate E≤0.4 as target management reference point. The high and increasing yearly exploitation rates, as estimated by the ratio between total landings and biomass, indicates high fishing mortality levels. If this estimate of exploitation rate can be considered as equivalent to F/Z estimate obtained from the fitting of standard stock assessment models, the current exploitation (0.64) is higher than the suggested reference point. The fishing mortality level corresponding to F/Z=0.64 is F=1.17, if M=0.66 is estimated with Pauly's (1980) empirical equation. Thus, the stock is considered to be overexploited.

RECENT MANAGEMENT ADVICE: the STECF SGMED-10-02 recommends the exploitation rate to be reduced to below or at the proposed level, in order to avoid future loss in stock productivity and landings. Catches consistent with the reductions in exploitation rate should be estimated. STECF-SGMED notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to their schooling behavior and the multi-species character of their fisheries (changing target species as available and appropriate). STECF-SGMED rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. STECF-SGMED recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.
GFCM-SAC recommended not to increase the fishing effort.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above). STECF notes that this stock assessment is consistent with the most recent assessment of GFCM while the scientific advice differs. STECF notes that short and medium term forecasts of stock size and catches will be conducted during the forthcoming meeting of STECF-SGMED-10-03 (13-17 December 2010).

15.2. European anchovy *(Engraulis encrasicolus)* in Geographical Sub Area 3. Southern Alboran Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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.

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

STOCK STATUS: No assessment has been presented to SAC-GFCMSCSA since 2008. The biomass estimate obtained by the acoustic survey performed in May 2006 is 3,700 tons.

RECENT MANAGEMENT ADVICE: No specific advice is given by the GFCM-SAC- 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.

15.3. European anchovy (*Engraulis encrasicolus)* in Geographical Sub area 6. Northern Spain

FISHERIES: The most updated fleet information corresponds to GFCM-SCSA WG 2009, containing data up to 2008. The purse seine fleet operating in GSA 06 Northern Spain is composed by 130 units: 4% are smaller than12 m in length, 87% between 12 and 24 m and 9% bigger than 24 m. The fleet continuously decreased in the last decade, from more than 222 vessels in 1995 to 130 in 2008. This strong reduction (59%) is possibly

linked to a continous decreasing in small pelagic catches. Anchovy (*Engraulis encrasicolus*) and sardine (*Sardina pilchardus*) are the main target species of the purse seine fleet in Northern Spain GSA 06, 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 anchovy (*Engraulis encrasicolus*) in the Northern Spain for the last seven years ranged between 14,338 and 2,570 t. This species is the most valuable one in pelagic fisheries off GSA 06. Discards are negliglible and no effort data were reported to STECF-SGMED-10-02 through the DCF data call for Spain. Landings in 2009 were 9,814 t, showing a huge increase from 2008 (2,558 t). Apart from this recent 2009 increase, the time series shows a very sharp decrease from the beginning of the times series in 2002. The lowest values of the assessed time series were reported in 2008.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is provide also by STECF-SGMED. The XSA assessment by the STECF-SGMED-10-02 WG is based on acoustic surveys (ECOMED and MEDIAS), commercial landings and CPUEs.

REFERENCE POINTS: the STECF-SGMED-10-02 WG proposed the exploitation rate E_{msy} (F/Z, F age range 0-3)= ≤0.4 as management reference point consistent with high long term yield for small pelagics. No precautionary reference points have been proposed for this stock by GFCM.

STOCK STATUS:
State of the adult abundance and biomass: Both total biomass (38,830 t) and spawning stock biomass in 2009 (26,480 t) increased from the lowest value observed in 2006. No precautionary management reference points were proposed for biomass levels, and hence the STECF-SGMED-10-02 WG cannot comment on the state of the stock.
State of the juvenile (recruits): Recruitment in 2009 (1380 millions) decreases compared to 2008 (2030 millions) and generally seems to follow the trend in SSB. The STECF-SGMED-10-02 WG highlighted that the stock and the fishery is highly dependent on the recruitment strength.
State of exploitation: Fishing mortality has generally decreased during the time series. However, F in 2009 was slightly larger than 2008. F0-2 in 2009 was 0.89. The exploitation rate during the last five years (E=0.6, with the exception of 2008) is above the exploitation reference points (E≤0.4). Based on this assessment, the stock is considered overexploited. However, the STECF-SGMED-10-02 WG stresses that the use of the exploitation rate is very sensitive to M values. It is important to stress that the fishery for small pelagics in GSA 06 is a multispecies fisheries and effort on anchovy and sardine should be considered together.
These results as provided by STECF-SGMED are similar to the most recent assessment by GFCM.

RECENT MANAGEMENT ADVICE: According to GFCM-SAC fishing effort should not be increased.

The STECF SGMED-10-02 WG, recommends that management should aim to reduce the exploitation rate to F0.1 or below, in order to avoid future loss in stock productivity and landings. Catches consistent with the reductions in exploitation rate should be estimated. STECF-SGMED notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to their schooling behavior and the multi-species character of their fisheries (changing target species as available and appropriate). The STECF SGMED-10-02 WG rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

STECF notes that this stock assessment is consistent with the most recent assessment of GFCM while the scientific advice differs. STECF also notes that short and medium term forecasts of stock size and catches will be conducted during the forthcoming meeting of STECF-SGMED-10-03 (13-17 December 2010).

15.4. 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*) An average of 50 trawlers have targeted these pelagic species in recent 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 2,000 and 7,000 t (4,000 t in 2008).

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF-SGMED. 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.

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

STOCK STATUS: GFCM-SAC indicates that the anchovy biomass estimate in GSA 07 with acoustic survey decreased to a low level. Estimated annual catch/biomass ratios varied without a clear trend.
STECF-SGMED did not update this assessment and, in 2008 was unable to precisely estimate the absolute levels of stock abundance and biomass.

RECENT MANAGEMENT ADVICE: GFCM-SAC recommends not to increase the fishing effort.

STECF COMMENTS: STECF notes that in the absence of reference points no advice on the stock status can be provided STECF notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. STECF rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. STECF recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

15.5. European anchovy *(Engraulis encrasicolus)* in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: In the GSA 09, anchovy is mainly exploited by purse seiners attracting fish with light. Due to the high economic value, anchovy represents the target species for this fleet in the area; sardine (*Sardina pilchardus*) is the other important species exploited by this fishery. The fishing season starts in spring (March) and ends in autumn (October). Favorable weather conditions and abundance in the catches can extend the fishing activity to the end of November. However, the maximum activity of the fleet is normally observed in summer. Some vessels coming from the south of Italy (mainly from GSA 10) join the local fleet for the exploitation of this resource. Studies carried out in the framework of the DCF in 2005 demonstrated that discards of anchovy for the Italian fleet can be considered as negligible. Anchovy is also a by-catch in the bottom trawl fishery; however, the landing done by this metier is negligible in comparison to that of purse seine (less than 5%). Pelagic trawling is not present in the GSA 09. Annual landings decreased from about 7,000 t in 2002 to 1,400 t in 2004 and remained at such low level until 2008.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. The stock status was assessed by the STECF-SGMED-10-02 WG including data up to 2008. The assessment was performed using an LCA (VIT software, Lleonart and Salat 1997) on an annual pseudo-cohorts from catch data in 2006-2008.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposed the exploitation rate E_{msy} (F/Z, F age range 0-3)= ≤0.4 as management reference point consistent with high long term yield for small pelagics. No precautionary reference points have been proposed for this stock by GFCM.

STOCK STATUS: the STECF-SGMED-10-02 WG concluded the following results:
State of the adult abundance and biomass: in the absence of proposed or agreed precautionary management reference points the STECF-SGMED-10-02 WG is unable to fully evaluate the state of biomass. The analyses carried out on the data referred to the period 2006-2008 do not allow to obtain information on the spawning stock biomass. However, both landings and survey indices indicate the stock being at a low level recently (2004-2008).
State of the juvenile (recruits): the analyses carried out on the data referred to the period 2006-2008 do not allow to obtain information on the state of recruitment.
State of exploitation: the current exploitation rate is estimated to exceed the reference point proposed. Applying the exploitation rate as a reference point, this stock must be considered as overexploited and F needs a consistent reduction from the current value towards the candidate reference points to achieve long term sustainability.

RECENT MANAGEMENT ADVICE: Due to constraints in data availability STECF-SGMED-10-02 was unable to estimate most recent (2009) stock parameters. Based on available information and assuming status quo exploitation in 2009, the STECF-SGMED-10-02 WG recommends the exploitation rate to be reduced to below or at the proposed level, in order to avoid future loss in stock productivity and landings. Catches consistent with the reductions in exploitation rate should be estimated. STECF-SGMED notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to their schooling behavior and the multi-species character of their fisheries (changing target species as available and appropriate). The STECF-SGMED-10-02 WG rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF-SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.
The results obtained from the assessments performed for the period 2006-2008, associated to the heavy reduction of the landing observed in the last twenty years suggest the adoption of a plan for the recovery of this important resource as a matter of urgency. All the management options need to take into account the effect on sardine, the other important resource exploited by this fishery. However, this is the first attempt to assess anchovy in the GSA 9 and, taking into account the short data series available for the evaluation, further analyses should be carried out. The purse seine fleet operating in the GSA 9 contemporary exploit anchovy and sardine. This aspect should taken into account for the management options that will be implemented in the future.
In the absence of updated catch information and assessments the STECF-SGMED-10-032 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.6. European anchovy (*Engraulis encrasicolus)* in Geographical Sub Area 16. Strait of Sicily

Due to data constraints STECF-SGMED-10-02 WG did not update the stock assessment conducted in 2009 by STECF-SGMED-09-02. This section reiterates the findings in 2009 in order to facilitate regional overviews of stocks and fisheries' status and contributes to improved consistency regarding the scientific advice.

FISHERIES: In Sciacca port, the most important base port for the landings of small pelagic fish species along the southern Sicilian coast (GSA16), accounting for about 2/3 of total landings in GSA 16, two operational units (OU) are presently active, purse seiners and pelagic pair trawlers. The fleet in GSA16 is composed by about 50 units (17 purse seiners and 30 pelagic pair trawlers were counted up in a census carried out in December 2006). In both OUs, anchovy represents the main target species due to the higher market price.
Average anchovy landings over the last decade (1997-2008) were about 1,600 metric tons, with large inter-annual fluctuations. Total effort was slightly increasing over the same period. It is worth noting that, though trend in biomass is clearly decreasing over recent years, landings levels over the same period were relatively high, indicating an increased vulnerability of the resource. Discards are estimated to be less than 5% of total catch for both the pelagic pair trawl and the purse seine fisheries. Effort data for pelagic trawling and purse seine are available for the port of Sciacca since 1998.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF-SGMED. Census data for catch and effort data were obtained from census information (on deck interviews) in Sciacca port. Acoustic data were used for fish biomass evaluations. Biological sampling and the collection of catch and effort data were 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 – 2008.

REFERENCE POINTS: STECF-SGMED-09-02 proposed E_{msy} (F/Z, F age range 0-3) ≤ 0.4 as a proxy reference point for F_{msy}. GFCM has not proposed any reference points but hints towards the low stock biomass be considered.

STOCK STATUS: Acoustic estimates of anchovy biomass ranged from a minimum of 6,300 tons in 2006 to a maximum of 32,000 tons in 2005. The acoustic survey biomass estimate for 2007 is 6,700 tons, quite similar to 2006. Biomass estimates of total population obtained by hydro-acoustic surveys for anchovy in GSA 16 show a decreasing trend over recent years. The most recent estimate (2008) is the lowest value of the series and represents approximately just one-tenth of the maximum recorded value. However, in the absence of proposed

or agreed biomass reference points, the STECF-SGMED-09-02 WG was unable to fully evaluate the state of the stock with respect to biomass.
The high and increasing annual exploitation rates, as estimated by the ratio between total landings and biomass, indicates high fishing mortality levels. If this estimate of exploitation rate can be considered as equivalent to F/Z estimate obtained from the fitting of standard stock assessment models, the current exploitation (0.64) is higher than the reference point suggested by Patterson (1992) and STECF-SGMED 09-02. The fishing mortality level corresponding to F/Z=0.64 corresponding to a fishing mortality of F=1.17 assuming a natural mortality of M=0.66 as estimated using Pauly's (1980) empirical equation. Using the above assumptions and the proposed reference point of F/Z = 0.4, the stock appears to be overexploited.
GFCM consistently concluded on recent high exploitation and low stock abundance.

RECENT MANAGEMENT ADVICE: Given the very low biomass for three consecutive years (2006, 2007 and 2008) and the current high exploitation rates, the STECF-SGMED-09-02 advised that fishing mortality should be reduced towards F/Z≤0.4 in order to promote stock recovery and avoid future loss in stock productivity and landings. GFCM recommends that fishing effort should not be increased.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-09-02 WG (See recent management advice above). STECF notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. STECF rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. STECF recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with sardine fisheries. STECF reiterates its previous recommendation that further research be undertaken to evaluate the impact of targeted fishing of larval stages of sardine (*bianchetto*) on the juvenile anchovy population.

15.7. European anchovy *(Engraulis encrasicolus)* in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

STECF notes that, due to data constraints the STECF-SGMED-10-02 WG did not update the stock assessment conducted in 2009 by the STECF-SGMED-09-02 WG. This section represents the most recent findings by the GFCM-SAC accompanied with a review by the STECF-SGMED-10-02 WG in accordance with the specific Terms of Reference.

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 stocks are exploited by mid-water trawlers and purse seiners. In 2007, the Italian fleet was 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 purse seiners attracting fish with light (*lampara*), 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). In 2007, the Slovenian fleet was composed of 1 pelagic trawler 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 m.
The main fraction of the total catch has been usually taken by the Italian fleet but, in recent years, the fraction relative to the fleets of the eastern part of the GSA17 has increased. 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.
Recent anchovy landings for the whole area are in exceed 40,00t. The assessment is based on data time series up to 2008.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF-SGMED. 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. The input data to the stock assessment models applied in 2009 appear significantly revised as compared to 2009. The STECF-SGMED-10-02 WG acknowledged the improved data used for the latest assessment.

REFERENCE POINTS: The GFCM-SAC applied a precautionary reference point based on the exploitation rate F/(F+M) not to exceed 0.4 for this stock.

STOCK STATUS: The GFCM-SAC concluded that the stock is moderately exploited and there are indications of a recent recovery of the stock size from a low level.

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended that fishing effort should not be allowed to increase. Technical interactions regarding the fisheries targeting the sardine stock in GSA 17 need to be taken into account when managing the anchovy fisheries.
The STECF-SGMED-10-02 WG, based on its review, acknowledged the efforts made within FAO AdriaMed Project framework and the improvement of the assessment of anchovy and sardine in GSA17 made at the GFCM-SAC-SCSA meeting in 2009 (Malaga, 2009). However, STECF-SGMED considers that, in absence of detailed information on input data as number and weight at age by each fleet and country, diagnostics of the assessments models and the fact that the use of growth parameters are not in line with previous STECF-SGMED WG recommendations, the STECF-SGMED-10-02 WG is not in the position to endorse the results of these assessments.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above) and recommends the assessment of the stock of anchovy in GSA 17 being further improved and transparently presented. STECF notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. STECF rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. STECF recommends a multi-annual management plan being implemented and agrees with GFCM that mixed-fisheries effects need to be taken into account, in particular the technical relation with sardine fisheries.

15.8. European anchovy *(Engraulis encrasicolus)* in Geographical Sub Area 18. Southern Adriatic

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN). As there were no management reference points proposed, STECF revises its comments as stated below.

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.

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

STOCK STATUS: The GFCM-SAC classifies this stock as showing an intermediate level of abundance.

RECENT MANAGEMENT ADVICE: Not to increase fishing effort.

STECF COMMENTS: 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 the GFCM-SAC SCSA in 2008 and no other information was available to STECF for this stock.
STECF notes that the exploitation cannot be evaluated in the absence of any management reference points. STECF further notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. STECF rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. STECF recommends a multi-annual management plan being implemented and agrees with GFCM-SAC that mixed-fisheries effects need to be taken into account, in particular the technical relation with sardine fisheries.

15.9. European anchovy *(Engraulis encrasicolus)* in Geographical Sub Area 20. Eastern Ionian Sea

FISHERIES: In GSA 20 (Greek part) anchovy is almost exclusively exploited by the purse seine fleet. Pelagic trawls are banned and benthic trawls are allowed to fish small pelagics in percentages less than 5% of their total catch. 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, GT. There is a minimum landing size at 9 cm. Anchovy landings have been highly variable, showing maximum values in 2003 decreasing up to 2007 and then increasing to 1326 tons in 2008. Information regarding the age and length distribution of anchovy landings prior to 2003 is based on the Hellenic Centre of Marine Research data collection system. Data of the fishing effort (Days at Sea) and the landings per vessel class indicate that small vessels (12-24 m) are entirely responsible for anchovy catches. Discards values are less than 1%, reaching approximately 0.06% data for GSA 20. Annual landings taken by vessels varying in length from 12 to 24 m (Greek purse seine fleet) varied from about 110 t to 1,950 t without any clear trend. In 2008, this fleet landed 1,326 t.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. The sock is assessed by the the STECF-SGMED-10-02 WG. This assessment is based on fishery independent surveys information as well as on Extended Survivor Analysis (XSA) model. XSA assessment method uses virtual population analysis (VPA) with weighted tuning indices (CPUE estimates). The applied method of the estimation of the natural mortality is consistent with the methodology used in GSAs 5, 6 and 17 for small pelagics. Discards were also included within this assessment representing however only 0.3 % of total landings. Y/R analyses were performed but were not considered reliable due to its flat-topped shape.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposes the exploitation rate E (F/Z, F age range 1-3)≤0.4 as limit management reference point consistent with high long term yield.

STOCK STATUS:
State of the adult abundance and biomass: Estimates of XSA stock assessment model for anchovy in GSA 20 indicated a decrease in SSB was observed since 2002 but with a slight increase since 2006 to 2008 reaching 1,200 t in 2008. In the absence of proposed or agreed precautionary reference points, STECF-SGMED-10-02 is unable to fully evaluate the state of the stock in respect to biomass reference points. It should be considered that this assessment is based on a short time series of data and not suitable to suggest reference points of B_{lim}. Moreover, anchovy is a short lived species characterized by high fluctuations in abundance and recruitment strongly depends on environmental conditions.
State of the juvenile (recruits): XSA model results for anchovy stock in GSA 20 indicated the highest values of recruitment in 2001 and 2006, decreasing however towards 2008.
Based on XSA results, the mean fishing mortality (averaged over ages 1 to 3) is highly variable fluctuating around 0.4. However, since XSA was tuned with unstandardised CPUE of the purse seine fleet, exploitation rates might be underestimated. The purse seine fleet showed a sharp increase concerning its capacity since 2005 that might bias the model estimates, resulting into underestimation of the exploitation rate. The mean F/Z concerning the anchovy stock in GSA 20 was on average above (mean value of the entire time series equals 0.41) the empirical level of sustainability (E<0.4, Patterson 1992) for small pelagics. Taking into account that this value could be an underestimation of the actual situation, the STECF-SGMED recommends a reduction in fishing mortality in order to reach the F/Z= 0.4, promote stock recovery and avoid future loss in stock productivity and landings.

RECENT MANAGEMENT ADVICE: Due to constraints in data availability the STECF-SGMED-10-02 WG is unable to estimate most recent (2009) stock parameters. Based on available information and assuming status quo exploitation in 2009, STECF-SGMED-10-02 WG recommends that exploitation should be reduced towards F/Z= 0.4 in order to promote stock recovery and avoid future loss in stock productivity and landings. Catches consistent with the reductions in exploitation rate should be estimated. The STECF-SGMED-10-02 WG notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. The STECF-SGMED-10-02 WG rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF-SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

In the absence of updated catch information and assessments the STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.10. European anchovy *(Engraulis encrasicolus)* in Geographical Sub Area 22. Aegean Sea

Due to data constraints the STECF-SGMED-10-02 WG did not update the stock assessment conducted in 2009 by the STECF-SGMED-09-02 WG. This section reiterates the findings in 2009 in order to facilitate regional overviews of stocks and fisheries' status and contributes to improved consistency regarding the scientific advice.

FISHERIES: In GSA 22 (Greek part) anchovy is almost exclusively exploited by the purse seine fleet. Pelagic trawls are banned and benthic trawls are allowed to fish small pelagics in percentages less than 5% of their total catch. 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, GT. There is a minimum landing size at 9 cm. Discards values are less than 1%, reaching approximately 0.06% data for GSA 22.
Annual landings (t) in GSA 22 of the purse seiners above 12m length increased 14,000t in 2003 to 24,500 t in 2008. Since there was no Data Collection Program in Greece in 2007, data concerning this year are estimations of the Hellenic Centre for Marine Research based on data from other research projects that were held in GSA 22.
Discards are less than 1%. The size of the Greek fleet in the Aegean Sea (GSA 22) ranged between 149 and 160 fishing vessels from 2000 to 2006. The main fishing ground for anchovy in GSA 22 is northern Aegean Sea.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is provided also by STECF-SGMED. The last assessment made by the STECF-SGMED-09-02 is based on fishery independent surveys information as well as on Integrated Catch at Age (ICA) analysis model. Specifically, acoustic surveys estimations were used for Total Biomass estimates and DEPM surveys for the estimation of SSB. The application of ICA was based on commercial catch data (2000-2008). Biomass estimates from acoustic surveys and the Daily Egg Production Method (DEPM) estimates over the period 2003-2008 were used as tuning indices.

REFERENCE POINTS: No precautionary reference points were proposed by GFCM-SAC for this stock. The STECF-SGMED-09-02 WG proposed the exploitation rate E_{lim} (F/Z, age range 1-3)≤0.4 as limit management reference point consistent with high long term yield

STOCK STATUS:
State of the adult abundance and biomass: Given the short length of the time series, the STECF-SGMED WG 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 increased since 2005 to 2008. Precautionary biomass reference points have not been estimated for this stock, and hence advice relative to these cannot be provided by STECF-SGMED in respect to those.
State of the juvenile (recruits): ICA model estimates suggest an increase in recruitment since 2004, with a pronounced increase in 2008. However the model predicts a decrease in the population abundance at age 0 for 2009 to the 2006 abundance level.
State of exploitation: the STECF-SGMED WG recommends the application of the proposed exploitation rate E ≤ 0.4 as management target for stocks of anchovy and sardine in the Mediterranean Sea. This value might be revised in the future when more information becomes available. Based on ICA results, the mean E=F/Z (F averaged over ages 1 to 3) has fluctuated around 0.36 and since 2004 has been below the empirical level of sustainability suggested as target exploitation level for this stock. Thus, the stock is considered to be exploited in a sustainable way until 2008.
GFCM-SAC has classified the stock status as being fully exploited.

RECENT MANAGEMENT ADVICE: GFCM advised not to increase fishing effort. The STECF-SGMED-10-02 WG notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to their schooling behavior and the multi-species character of their fisheries (changing target species as available and appropriate). The STECF-SGMED-10-02 WG rather recommends the consideration of landing

restrictions as a more effective management tool for small pelagics. The STECF-SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.
For precautionary reasons the possibility of changing the closed period should be examined. Since the purse seine fishery is a multispecies fishery targeting both anchovy and sardine, a shift of the closed period (present: 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) could be suggested. This approach has the potential to improve the selectivity of the fishery, and thus provide higher potential catch in the long term.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

STECF notes that in the absence of updated catch information and assessments the STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

15.11. Sardine (*Sardina pilchardus)* in Geographical Sub Area 1. Northern Alboran Sea

FISHERIES: The current fleet in GSA 01 the Northern Alborán Sea is composed by 131 units, characterised by small vessels. 21% of them are smaller than 12 m and 79% between 12 and 24 m. The purse seine fleet has been continuously decreasing in the last two decades, from more than 230 vessels in 1980 to 131 in 2009.
Sardine (*Sardina pilchardus*) and anchovy (*Engraulis encrasicolus*) are the main target species of the purse seine fleet in Northern Alboran GSA 01, but other species with lower economical mackerel (*Trachurus spp.*), mackerel (*Scomber spp*.) and gilt sardine (*Sardinella aurita*) are also caught. The annual landings of sardine in the Northern Alborán Sea show annual fluctuations ranged between 3,960 and 10,000 tons. In 2009, landings amounted to about 6,000 t. Sardine discards in GSA 01 are negligible.

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. Since 2008 advice is provided also by STECF-SGMED. The assessment of this stock was carried out by means of VPA Extended Survivor Analysis (XSA) using catch data collected by the Spanish National Data Collection. The XSA tuning was performed using abundance index series derived from echo-surveys carried out in the GSA 01 but no tuning data was available for GSA 01 in 2009.

REFERENCE POINTS: No precautionary reference points have been proposed for this stock by GFCM. STECF-SGMED proposes an exploitation rate of E=(F/Z, F age range 1-3)≤0.4 as an appropriate limit management reference point consistent with high long term yields for small pelagics.

STOCK STATUS: The GFCM-SAC classifies this stock as over-exploited at low abundance without a reference points defined. The STECF-SGMED-10-02 WG classifies the stock as:
State of the adult abundance and biomass: Results of the Extended Survivor Analysis (XSA) analysis indicated a slight decrease from the highest levels observed in 2005. However the sardine SSB remains at medium-high levels also in 2009. The state of the spawning biomass in relation to precautionary limits cannot be evaluated since there are no precautionary reference points proposed or agreed due to the short series of data available. It should be considered that this assessment is based on a short time series of data and not suitable to suggest reference points of B_{lim}. Moreover, sardine is a short lived species characterized by high fluctuations in abundance and recruitment strongly depends on environmental conditions.
State of the juvenile (recruits): XSA model estimates had shown an increase in the number of recruits in the last two years (2008-2009). In 2009 recruitment was well above the minimum recruitment level observed in 2007. The trend of the recruitments is important as stocks of small pelagics and fisheries are highly dependent of the recruitment strength.
State of exploitation: Based on XSA results, the mean F (for ages 1 to 3) followed a decreasing trend along the time series (2000-2009) and remains at low levels in 2009. The exploitation rate during the last eight years is below the exploitation reference points (E=0.4) proposed by Patterson (1992) and suggested by the STECF-SGMED-10-02 WG as an appropriate limit management reference point consistent with high long term yields for small pelagics. Based on this assessment results the stock is considered sustainably exploited. However, the STECF-SGMED-10-02 WG stresses that the use of the exploitation rate is very sensitive to M values.

RECENT MANAGEMENT ADVICE: GFCM-SAC advice is not to increase the fishing effort. The STECF-SGMED-10-02 WG recommends the exploitation rate being kept below or at the proposed reference level, in

order to avoid future loss in stock productivity and landings. Catches consistent with that exploitation level consistent with high long term yields should be estimated. The STECF-SGMED-10-02 WG notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the multi-species character of their fisheries which change target species as available and appropriate. The STECF-SGMED-10-02 WG rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF-SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).
STECF notes that this stock assessment is consistent with the most recent assessment of GFCM while the stock status classification and the scientific advice differ. STECF notes that short and medium term forecasts of stock size and catches will be conducted during the forthcoming meeting of the STECF-SGMED-10-03 WG (13-17 December 2010).

15.12. Sardine (*Sardina pilchardus*) in Geographical Sub Area 3. Southern Alboran Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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.

REFERENCE POINTS: No 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 notes that the information presented on this stock and fishery is poor. STECF notes that in the absence of any reference points the status of the resource or its exploitation rate cannot be fully evaluated. Consequently, STECF is unable to advise on stock status of this stock and appropriate catches. STECF notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. STECF rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics.

15.13. Sardine (*Sardina pilchardus*) in Geographical Sub Area 6. Northern Spain

FISHERIES: The purse seine fleet operate in GSA 06 Northern Spain is composed by 130 units: 4% are smaller than12 m in length, 87% between 12 and 24 m and 9% bigger than 24 m. The fleet continuously decreased in the last decade, from more than 222 vessels in 1995 to 130 in 2008. This strong reduction (59%) is possibly linked to a continuous decreasing in small pelagic catches. Sardine (*Sardina pilchardus*) and anchovy (*Engraulis encrasicolus*) are the main target species of the purse seine fleet in Northern Spain GSA 06, 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 (*Sardina pilchardus*) in the Northern Spain for the whole time series ranged between 52,440 and 7,900 t. Landings in 2009 were 7,900 t. This is the lowest values of the assessed time series, halving the catch from 2008 (14,120 t) which is the second lowest value of the time series. The highest value of the time series corresponds to the first year analysed (1994 with 52,440 t). Hence, the time series shows a continuous and very sharp decrease from the beginning of the times series. Discards are negliglible and no effort data were reported to STECF-SGMED-10-02 through the DCF data call for Spain.

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. Since 2008 advice is provide also by STECF-SGMED.

REFERENCE POINTS: GFCM-SAC has not proposed reference points for this stock. The STECF-SGMED-10-02 WG proposes the exploitation rate E≤0.4 (ages 0-2) as limit management reference point consistent with high long term yields.

STOCK STATUS: Although no reference points were defined GFCM-SAC classifies this stock as overexploited at low abundance. The STECF-SGMED-10-02 WG assessed the status as:
State of the adult abundance and biomass: SSB is has largely declined, reaching its minimum values in the recent years. Spawning Stock Biomass in 2009 (SSB=25,720 t) is practically the same of 2008 (SSB=25,450 t), the lowest observed SSB values in the time series. No precautionaray reference points were proposed for biomass levels, and hence the STECF-SGMED-10-02 WG cannot comment on the state of the stock with this respect.
State of the juvenile (recruits): Recruitment in 2009 (R09=2250 millions) increases compared to 2008 (1160 millions), the minimum of the time series considered. The trend of the recruitments is so important as they can affect seriously to the stock health. The STECF-SGMED-10-02 WG emphasizes that the stock and the fishery is highly dependent on the recruitment strength.
State of exploitation: Fishing mortality has decreased since the beginning of the time series till 2005 (F_{0-2} in 2005 =0.70), with the exception of a peak in 2001. Since 2005, F increased, reaching its maximum in 2008 (F_{0-2} in 2008 =2.55). The exploitation rate during the last five years (E=0.8) is estimated to exceed the exploitation reference points (E=0.4) proposed by Patterson (1992) and suggested by the STECF-SGMED-10-02 WG as an appropriate reference point for small pelagics. Based on this assessment results the stock is considered overexploited. However, the STECF-SGMED-10-02 WG stresses that the use of the exploitation rate is very sensitive to M values. It is important to stress that small pelagic fishery in GSA 06 is a multispecies fisheries and effort on anchovy and sardine should be considered together.

RECENT MANAGEMENT ADVICE: GFCM-SAC advised not to increase the fishing effort and noted that small pelagic fishery in GSA 06 is multispecies and effort on sardine and anchovy should be considered together.
The STECF-SGMED-10-02 WG recommends the exploitation rate being reduced to below or at the proposed reference level, in order to avoid future loss in stock productivity and landings. Catches consistent with that exploitation level consistent with high long term yields should be estimated. STECF-SGMED-10-02 WG notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. STECF-SGMED-10-02 WG rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF-SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above). STECF notes that this stock assessment is consistent with the most recent assessment of the GFCM-SCA while the stock status classification and the scientific advice differ. STECF notes that short and medium term forecasts of stock size and catches will be conducted during the forthcoming meeting of the STECF-SGMED-10-03 (13-17 December 2010).

15.14. 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 13,000 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.

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

STOCK STATUS: GFCM-SAC classifies this stock as moderately exploited at an intermediate stock size.

RECENT MANAGEMENT ADVICE: GFCM-SAC recommended not to increase the fishing effort.

STECF COMMENTS: STECF notes that by September 2010 no stock assessment was documented by GFCM-SAC. In the absence of the assessment documents STECF cannot evaluate the assessment of the GFCM-SAC-SCSA. STECF further notes that the stock status cannot be evaluated in the absence of reference points and that no scientific advice can be provided. STECF classifies the stock status as unknown.

15.15. Sardine (*Sardina pilchardus)* in Geographical Sub Area 16. Strait of Sicily

FISHERIES: In Sciacca port, the most important base port for the landings of small pelagic fish species along the southern Sicilian coast (GSA16), accounting for about 2/3 of total landings in GSA 16, two operational units (OU) are presently active, purse seiners and pelagic pair trawlers. The fleet in GSA16 is composed by about 50 units (17 purse seiners and 30 pelagic pair trawlers were counted up in a census carried out in December 2006). In both OUs, anchovy represents the main target species due to the higher market price.

Average sardine landings over the last decade (1997-2008) were about 1,500 metric tons, with a general decreasing trend. Total effort was slightly increasing over the same period.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 management advice is given by the STECF-SGMED. Census data for catch and effort data were obtained from census information (on deck interviews) in Sciacca port. Acoustic data were used for fish biomass evaluations. Due to data constraints the STECF-SGMED-10-02 WG did not update the stock assessment conducted in 2009 by the STECF-SGMED-09-02 WG.

REFERENCE POINTS: GFCM-SAC has not proposed reference points have been proposed for this stock. The STECF-SGMED proposed the exploitation rate E (F/Z, F age range 0-3)≤0.4 as reference point for this stock.

STOCK STATUS: GFCM classifies the stock status as moderately exploited at intermediate stock size. STECF-SGMED concluded:
State of the adult abundance and biomass: Biomass estimates of the total population obtained by hydro-acoustic surveys for sardine in GSA 16 show that the recent stock level is well below the average value over the last decade. However, in the absence of proposed or agreed references, STECF-SGMED-10-02 is unable to fully evaluate the state of the stock and provide any scientific advice in relation to them.
State of the juvenile (recruits): Data not available.
State of exploitation: STECF-SGMED recommends the application of the proposed exploitation rate $E \leq 0.4$ as management target for stocks of anchovy and sardine in the Mediterranean Sea. This value might be revised in the future when more information becomes available. Annual exploitation rates, as estimated by the ratio between total landings and biomass, indicates relatively low fishing mortality during the last decade. If this estimate of exploitation rate can be considered as equivalent to F/Z estimate obtained from the fitting of standard stock assessment models, the current exploitation rate (0.22) and even all the previous available estimates are lower than the reference point suggested by Patterson (1992). The fishing mortality level corresponding to F/Z=0.22 is F=0.14, if M=0.51, estimated with Pauly (1980) empirical equation, is assumed. Using the exploitation rate as a target reference point, the stock of sardine in GSA 16 is considered as being exploited in a sustainable way.

RECENT MANAGEMENT ADVICE: GFCM-SAC advice is not to increase the fishing effort.
The STECF-SGMED recommends the relevant fleet effort should not be allowed to increase in order to avoid future loss in stock productivity and landings. The STECF-SGMEDnotes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. The STECF-SGMEDrather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF-SGMED recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries. In addition, due to the low level of the anchovy stock, measures should be taken to prevent a shift of effort from anchovy to sardine.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-09-02 WG (See recent management advice above) and of GFCM-SAC not to increase the fishing effort in order to avoid future loss in stock productivity and landings. STECF reiterates its previous recommendation that further research be undertaken to evaluate the impact of (*bianchetto*) fishery of sardine population.

15.16. Sardine (*Sardina pilchardus)* in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

STECF notes that, due to data constraints STECF-SGMED-10-02 WG did not update the stock assessment conducted in 2009 by the STECF-SGMED-09-02. This section represents the most recent findings by GFCM-SAC accompanied with a review by the STECF-SGMED-10-02 WG in accordance with the specific Terms of Reference.

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.
In 2007, the Italian fleet was composed of about 130 (65 pairs) pelagic trawlers (*volante*) mainly operating from Trieste to Ancona and about 45 purse seiners attracting fish with light (*lampara*), operating in the Gulf of Trieste and in the Central Adriatic. In 2007, the Slovenian fleet was composed of 1 pelagic trawler pair and 7 purse seiners. In 2008, the Croatian purse seine fleet was 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 fry 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.
No new landings data were provided to STECF-SGMED-10-02 WG. Sardine landings for the whole area were about 17,000 t per year (average of the last three years), with an increase in 2007. GFCM-SAC reports that landings in 2008 exceeded 20,000 t. Due to low market price for sardine in Italy, discards of sardine at sea may occur. Between 1987 and 1999, discard estimates averaged about 2,000 t per year. No information on discards was 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. Since 2008 advice has been also provided by STECF-SGMED.
The assessment of this stock was carried out by means of Virtual Population Analysis (VPA), using catch data collected for Italy, Slovenia and Croatia. VPA was performed using an abundance index series derived from echo-surveys carried out in the western part of the GSA17. In 2009, VPA was also carried out using vectors of natural mortality rate at age, i.e. not constant over age as in the stock assessment of 2008. They were derived from Probiom software and Gislason's method, according to the first STECF-SGMED meeting of 2009). The input data to the stock assessment models applied in 2009 appear significantly revised as compared to 2009. STECF-SGMED-10-02 acknowledged the improved data used for the latest assessment.

REFERENCE POINTS: GFCM-SAC 2009 and the STECF-SGMED-10-02 WG proposed the exploitation rate of $E \leq 0.4$ as reference point for this stock.

STOCK STATUS: According to GFCM-SAC 2009 assessment, the stock was fully exploited.

RECENT MANAGEMENT ADVICE: Given the significant changes in input data and assessment results, GFCM-SAC 2009 was unable to provide management advice.
STECF-SGMED-10-02 WG, based on its review, acknowledged the efforts made within FAO AdriaMed Project framework and the improvement of the assessment of anchovy and sardine in GSA17 made at the GFCM-SAC-SCSA meeting in 2009 (Malaga, 2009). However, the STECF-SGMED-10-02 WG considers that, in absence of detailed information on input data as number and weight at age by each fleet and country, diagnostics of the assessments models and the fact that the use of growth parameters are not in line with previous STECF-SGMED-10-02 WG recommendations, STECF-SGMED-10-02 WG is not in the position to endorse the results of these assessments.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

STECF recommends the assessment of the stock of sardine in GSA 17 being further improved and transparently presented. Given these STECF disagrees with the GFCM-SAC conclusion on stock status and re-assesses the stock status as unknown. STECF notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the partivular character of their fisheries which change target species as available and appropriate. STECF rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. STECF recommends a multi-annual management plan being implemented and agrees with GFCM that mixed-fisheries effects need to be taken into account, in particular the technical relation with sardine fisheries.

15.17. Sardine *(Sardina pilchardus)* in Geographical Sub Area 18. Southern Adriatic

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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.

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

STOCK STATUS: Unknown.

RECENT MANAGEMENT ADVICE: GFCM-SAC has not provided advice on this stock.

STECF COMMENTS: STECF has no comments.

15.18. Sardine (*Sardina pilchardus)* in Geographical Sub Area 20. Eastern Ionian Sea

FISHERIES: In GSA 20 sardine is almost exclusively exploited by the purse seine fleet. Pelagic trawls are banned and benthic trawls are allowed to fish small pelagics in percentages less than 5% of their total catch. 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, GT. There is a minimum landing size at 11 cm. Sardine landings showed high variability with highest values in 2005 (1,900 ton) and in 2008 (2,900 ton). Data of the fishing effort (Days at Sea) and the landings per vessel class indicate that small vessels (12-24 m) are entirely responsible for sardine catches. The purse seine fishery is considered a mixed fishery, where sardine, anchovy and other species are caught. Discards were also included within this assessment representing however only 0.3 % of total landings.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC, but this stock was not considered recently. Since 2009 advice has been also provided by STECF-SGMED. This assessment is based on fishery independent surveys information as well as on Extended Survivor Analysis (XSA) model.

REFERENCE POINTS: No precautionary reference points were proposed by GFCM-SAC for this stock. The STECF-SGMED-10-02 WG proposes the exploitation rate $E \leq 0.4$ as limit management reference point consistent with high long term yield.

STOCK STATUS: The STECF-SGMED-10-02 WG concluded the following:

State of the adult abundance and biomass: Estimates of XSA stock assessment model for sardine in GSA 20 indicated an increase since 2004 reaching 5,600 t in 2008. In the absence of proposed or agreed references, the STECF-SGMED-10-02 WG is unable to fully evaluate the state of the stock and provide scientific advice in respect to precautionary biomass reference points.

State of the juvenile (recruits): XSA model estimates had showed an increase in the number of recruits towards 2007 but a decrease was estimated by the stock assessment model in 2008.

State of exploitation: Based on XSA results, the mean fishing mortality (averaged over ages 1 to 3) is highly variable, being below 1.0 in all years and decreasing since 2005 but approximating 0.68 in 2008. However, since XSA was tuned with unstandardised CPUE of the purse seine fleet, exploitation rates might be underestimated. The purse seine fleet showed a sharp increase concerning its capacity since 2005 that might bias the model estimates, resulting into underestimation of the exploitation rate. The exploitation rate below the

empirical level for stock decline (E<0.4, Patterson 1992) was suggested by the STECF-SGMED-10-02 WG as reference point for small pelagics. Therefore, the mean F/Z concerning the sardine stock in GSA 20 was on average above (mean value of the entire time series equals 0.46) the empirical level of sustainability (E<0.4, Patterson 1992) for small pelagics. Taking into account that this value could be an underestimation of the actual situation, the STECF-SGMED-10-02 WG recommends a reduction in fishing mortality in order to reach the F/Z= 0.4, promote stock recovery and avoid future loss in stock productivity and landings. Therefore, taking the empirical level as a reference point for sustainable exploitation, the stock is considered to be overexploited. Fishing mortality should be reduced in order to allow future recruitment contributing to stock productivity. This requires also consideration of the mixed fisheries nature of the fleets.

RECENT MANAGEMENT ADVICE: Due to constraints in data availability the STECF-SGMED-10-02 WG is unable to estimate most recent (2009) stock parameters. Based on available information and assuming status quo exploitation in 2009, the STECF-SGMED-10-02 WG recommends that exploitation should be reduced towards F/Z= 0.4 in order to promote stock recovery and avoid future loss in stock productivity and landings. Catches consistent with the reductions in exploitation rate should be estimated. STECF-SGMED notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. The STECF-SGMED-10-02 WG rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF-SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF notes that GFCM-SAC has not assessed the stock and not provided advice. STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).
STECF further notes that in the absence of updated catch information and assessments the STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

15.19. Sardine (*Sardina pilchardus)* in Geographical Sub Area 22. Aegean Sea

Due to data constraints the STECF-SGMED-10-02 WG did not update the stock assessment conducted in 2009 by the STECF-GMED-09-02. This section reiterates the findings in 2009 in order to facilitate regional overviews of stocks and fisheries' status and contributes to improved consistency regarding the scientific advice.

FISHERIES: In GSA 22 (Greek part) sardine is almost exclusively exploited by the purse seine fleet. Pelagic trawls are banned and benthic trawls are allowed to fish small pelagics in percentages less than 5% of their total catch. Enforced regulations include a closed period from mid December till the end of February, and technical measures such as minimum distance from shore and gear restrictions. There is a minimum landing size of 11 cm.
Sardine landings showed high variability indicating a decreasing trend between 2005 and 2008, comprising approximately 9,700 tons in 2008. The purse seine fishery is considered a mixed fishery, where sardine, anchovy and other species are caught. Discards are <1% of the catches.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice has been also provided by STECF-SGMED. The latest STECF-SGMED assessment was based on fishery independent surveys information as well as on Integrated Catch at Age (ICA) analysis model. Acoustic surveys estimations were used for Total Biomass estimates. The application of ICA was based on commercial catch data (2000-2008). Biomass estimates from acoustic surveys over the period 2003-2008 were used as tuning indices. Sardine data were comprised of annual sardine landings, annual sardine catch at age data (2000-2008), mean weights at age, maturity at age at age and the results of acoustic surveys.

REFERENCE POINTS: No reference points were proposed by GFCM-SAC for this stock. STECF-SGMED proposes the exploitation rate E_{lim} (F/Z, age range 1-3)<=0.4 as management point consistent with high long term yield.

STOCK STATUS: The GFCM-SAC 2009 classified this stock as fully exploited.
STECF-SGMED concludes that:
State of the adult abundance and biomass: the results of the short time series of data do not allow concluding on reference points of B_{lim} or B_{pa}. In the absence of proposed or agreed references, the STECF-SGMED is unable

to fully evaluate the state of the stock and provide scientific advice. Results of the Integrated Catch at Age analysis indicated an increasing trend in total biomass and SSB showing a slight recovery of SSB to 20,000 t in 2008 from the low 2003-2004 estimates of 7,000 t.
State of the juvenile (recruits): ICA model estimates showed above average recruitment since 2007, with a very high peak in 2008.
State of exploitation: based on ICA results, the mean fishing mortality (averaged over ages 1 to 3) is highly variable but showed a clear decreasing trend since 2006, amounting approximating 0.64 in 2008. The mean F/Z has declined from 2003 reaching the value of 0.41 which approximates the exploitation reference points (E<0.4, Patterson 1992) suggested by STECF-SGMED for small pelagics. Taking into account the uncertainty in the estimate, the STECF-SGMED considers the stock as being harvested sustainably.

RECENT MANAGEMENT ADVICE: GFCM-SAC advised not to increase the fishing effort.
The STECF-SGMED-10-02 WG advised that increased fishing is not expected to result in increased landings in the long term. The STECF-SGMED-10-02 WG notes that mere effort management of fisheries targeting stocks of small pelagics implies a high risk due to the particular character of their fisheries which change target species as available and appropriate. The STECF-SGMED-10-02 WG rather recommends the consideration of landing restrictions as a more effective management tool for small pelagics. The STECF-SGMED-10-02 WG recommends a multi-annual management plan being implemented taking into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.
For precautionary reasons the possibility of changing the closed period should be examined. Since the purse seine fishery is a multispecies fishery targeting both anchovy and sardine, a shift of the closed period (present: 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) could be suggested. This approach has the potential to improve the selectivity of the fishery, and thus provide higher potential catch in the long term.

STECF COMMENTS: STECF endorses the assessment results of both GFCM-SAC and STECF-SGMED-09-02. STECF also endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).
STECF notes that in the absence of updated catch information and assessments the STECF-SGMED-10-03WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

15.20. Sprat (*Sprattus sprattus)* in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 GFCM-SAC. Biomass estimation is based on acoustic survey. No assessment has been presented to the GFCM-SAC-SCSA in 2008 and no other information was available to STECF for this stock.

REFERENCE POINTS: No 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 GFCM-SAC-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.

15.21. Mackerel *(Scomber japonicus)* in Geographical Sub Area 3. Southern Alboran Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 GFCM-SAC. Data sources were acoustic surveys and landings. No assessment has been presented to GFCM-SAC Sub-Committee in 2008 and no other information was available to STECF for this stock.

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 GFCM-SAC-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.

15.22. Horse mackerel *(Trachurus trachurus)* in Geographical Sub Area 3. Southern Alboran Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 GFCM-SAC. Data sources were acoustic surveys and landings. No assessment has been presented to GFCM-SAC Sub-Committee in 2008 and no other information was available to STECF for this stock.

REFERENCE POINTS: No 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 GFCM-SAC-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.

15.23. Striped red 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, GSA 05). 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 management advisory body is GFCM-SAC. Advice is provided also by STECF-SGMED. In 2010 the stock of *Mullus surmuletus* of the GSA 05 has been assessed bythe STECF-SGMED-10-02 WG using data from both the trawl and the small-scale fishery on a time series covering ten years (2000-2009). The assessment has been carried out applying tuned VPA (Extended Survivor Analysis, XSA). XSA tuning were performed using abundance indices from MEDITS surveys (N/km^2) developed during 2001–2009 around the Balearic Islands and CPUEs of daily landings from the trawling fleet of one port (Santanyí). The landings of this port represented 12–30% of the total catch of Mallorca during the assessed period. Abundance indices from surveys were calculated considering different bathymetric strata.

REFERENCE POINTS: STECF-SGMED-10-02 WG recommended $F_{0.1}$=0.288 as limit management reference point consistent with high long term yield.

STOCK STATUS: The F_{ref} (0.759) in 2009 is above the Y/R $F_{0.1}$ reference point (0.288), which indicates that striped red mullet in GSA 05 is overexploited. SSB and stock biomass consistently declined over the time series since 2000 to the lowest value of the time series in 2009.

RECENT MANAGEMENT ADVICE: the STECF-SGMED-10-02 WG recommends the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level F0.1, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
GFCM-SAC recommended not to increase the fishing effort

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.24. Striped red mullet (*Mullus surmuletus)* in Geographical Sub Areas 12, 13, 14. Northern Tunisia, Gulf of Hammamet, Gulf of Gabès

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

FISHERIES: Striped red mullet is one of the two principal species of Mullidae exploited in Tunisia. The mean catches are over 1950 tons, representing 45% of the landings of this family and 3.6% of the production of demersal fishery. Striped red 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.

REFERENCE POINTS: No 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 the GFCM-SAC Sub-Committee in 2009. The previous recommendation was not to increase the fishing effort.

STECF COMMENTS: STECF has no comments since there is not an updated assessment.

15.25. Striped red mullet (*Mullus surmuletus)* in Geographical Sub Area 26. South Levant. Egypt

FISHERIES: The Egyptian Mediterranean coast is about 1100 km extending from El-Salloum in the West to Taba city in the East. The mean annual fish production from this area is about 50 thousand ton (GAFRD; 1991-2007). The main fishing gears operated in this region are trawling, purse-seining and lining, especially long and hand lining.
The fishing grounds along the Egyptian Mediterranean coast are divided into four regions, namely: Western region (Alexandria and El-Mex, Abu-Qir, Rashid, El-Maadya and Mersa Matrouh); Eastern region (Port Said and El-Arish); Demietta region; and Nile Delta region. Red mullets are among the most valuable and highly priced fish species in Egypt, though widely distributed along the entire coast of Mediterranean, their major fisheries are located on the area from Alexandria to Port Said. Red mullet are mainly exploited by the trawl fishery and contributed about 10% of the total trawl landings in the Egyptian Mediterranean (GAFRD annual reports). The catch of Red mullet is composed mainly of two species: *Mullus surmuletus* and *M. barbatus*, while some species of Red Sea origin have been recorded in the eastern Mediterranean. The striped red mullet, *Mullus surmuletus* is the most common species in the catch and constituted about 65% of red mullet landings. The number of trawl vessels which operated in the Egyptian Mediterranean ranged between 1100 and 1500 during 1991-2007. The vessel length varies between 18 and 22 m and width from 4 to 6 m.

SOURCE OF MANAGEMENT ADVICE: Analyses were based upon monthly length frequency distributions from trawl catches for the year June 2007 - April 2008 sampled from the Egyptian ports Alexandria, Demietta and Port Said (except for May and the first half of June 2007, the period when all fishing operations are

prohibited). These data (raised to the landings and combined to approximate equilibrium conditions for the pseudocohort analysis) formed the basis of the assessment.
Sagittal otoliths were used for age determination. Growth parameters were estimated using the von Bertalanffy equation (see Mehanna, 2009). The natural mortality coefficient (M) was estimated using the method of Djabali et al. (1993). The size at first capture (Lc) was estimated through the catch curve analysis. The length at first sexual maturity Lm50 was estimated by fitting the maturation curve between the observed points of mid-class interval and the percentage maturity of fish corresponding to each length interval. The analysis of pseudo-cohort method (VIT) was used.

REFERENCE POINTS:. Proposed Reference points: $F_{0.1}$=0.37; F_{max}=0.53.

STOCK STATUS: The current F was 0.73. GFCM-SAC 2010 recognised that the stock was overexploited.

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended as a precautionary measure not to increase the fishing effort in the area and to reduce the fishing mortality by 63%. Due to the one year of data collection the assessment was considered as a preliminary.

STECF COMMENTS: STECF considers that, given the short data series, the stock status has to be considered as unknown.

15.26. Red mullet (*Mullus barbatus)* in Geographical Sub Area 1. Northern Alboran Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 Alborán 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 decapods 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 GFCM-SAC. 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 has been carried out using the VIT program. The analysis was performed using monthly size composition of catches, official landings and the growth parameters according the STECF-SGMED-08-03 WG meeting. The vector of natural mortality by age was calculated from Caddy´s (1991) formula.

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

STOCK STATUS: In the Alborán 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 Bnow being 21% of Bvirgin. The results from the pseudocohort analysis show that the current stock biomass represents 21% of the virgin stock biomass (STECF-SG-MED-08-03 WG). 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 notes that in the absence of reference points the stock status cannot be fully evaluated and no advice can be provided. STECF notes that no updated assessment was provided in 2009 and 2010. STEFC considers the stock status as unknown.

15.27. Red mullet (*Mullus barbatus)* in Geographical Sub Area 3. Southern Alboran Sea. Morocco.

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 GFCM-SAC. Assessments by structural models were performed using length frequencies data for 2009. Include in the assessment also artisanal fishery data.

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

STOCK STATUS: The stock of red mullet is qualified as overexploited with a fishing mortality which exceeds the optimum of about 30%.

RECENT MANAGEMENT ADVICE: GFCM-SAC 2010 recommended to reduce the fishing mortality by 76%. A long term management plan is required.

STECF COMMENTS: STECF notes that in the absence of reference points the stock status cannot be fully evaluated and no advice can be provided. STECF notes that no updated assessment was provided in 2009 and 2010. STEFC considers the stock status as unknown.

15.28. 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 GSA 5. 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 2000-2009 period, the landings of *M. barbatus* from Mallorca have ranged between 10.5 and 27.8 tons.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. Advice is also provided by STECF-SGMED-10-02. In 2010, the stock of *Mullus barbatus* was assessed by STECF-SGMED-10-02 WG using data from both the trawl and the small-scale fishery on a time series covering ten years (2000-2009), from all fishing ports of Mallorca island. The assessment has been carried out applying tuned VPA (Extended Survivor Analysis, XSA). XSA tuning were performed using abundance indices from MEDITS surveys (N/km^2) during 2001–2009 around the Balearic Islands.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposed $F_{0.1}$=0.31 as limit management reference point consistent with high long term yields.

STOCK STATUS: Both SB and SSB showed a clear decrease from 2000 to 2003; SB decreased from 75 to 45 tons and SSB from 45 to 25 tons. Subsequently, both parameters remained rather constant or even increased slightly until 2007. However, SB showed a marked decreasing trend between 2007 and 2009, which was also followed by SSB; in both cases the lowest historical values were obtained in the last assessed year. In spite of this, SSB remained constant between 55 and 65% of the SB throughout the entire time series.
With the exception of 2001, recruitment remained rather constant between 1.3 and $1.5 \cdot 10^6$ during 2002-2006. Since then, however, the number of recruits has decreased progressively to the point that the lowest historical values were reached during 2008-2009.
Fishing mortality has ranged between 0.7 and 1.7 during the entire series and it is noticeable the abrupt decrease in 2003 coinciding with the lowest historical landings. Although fishing mortality has decreased progressively from 2004 to 2007, it has increased during the last two years. The vector of fishing mortality by age depictures a typical selection curve and shows that the highest fishing exploitation is suffered by individuals between 2 and 3 years old and also that there is no exploitation of the recruits (age 0). The current F_{ref} (1.0805) is above the Y/R $F_{0.1}$ reference point (0.31), which indicates that red mullet in GSA 5 is subject to overfishing.

RECENT MANAGEMENT ADVICE: The STECF-SGMED-10-02 WG recommends the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in

stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.29. Red mullet (*Mullus barbatus)* in Geographical Sub area 6. Northern Spain

FISHERIES: Red mullet is one of the main target species for the trawl fisheries carried out by around 647 vessels in GSA 06 with an average of 47 TRB, 58 GT and 297 HP (Based on STECF Stock Review part II). Some of these units (smaller vessels) operate almost exclusively on the continental shelf (targeting among other species red mullet), whilst others (bigger vessels) operate almost exclusively on the continental slope (targeting decapods) and the rest can operate indistinctly on the continental shelf and slope, depending on the season, the weather conditions and also the economic factors (e.g. landings price). The percentage of these trawl fleet segments has been estimated around 30, 40 and 30% of the boats, respectively. According to Spanish DCF, landings of red mullet increased considerably between the 70s and 1982, and from then a decreasing trend has been observed. In 2009, landings attained the lowest value of the last 8 years (743 tons). From 2002 to 2005, landings were dominated by individuals of age 0 (mostly juveniles) whereas from 2006 till present (2009) landings have been dominated by ages 1+ (adults).
The exploitation of red mullet small individuals (recruitment fishery) occurs since decades. Spawning takes place in late spring and recruitment to the fishery occurs in early autumn, when juveniles are heavily exploited by trawlers.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. From 2008 advice has been also provided o by STECF-SGMED. All data used in the assessment were collected through DCF and provided during the meeting. MEDITS surveys and official landings and biological data collected within the DCF framework covered the period 2002-2009.
The state of exploitation was assessed by means of a XSA analysis, tuned with standardized CPUE from abundance indices from trawl survey (MEDITS). Tuning is however limited by the fact that MEDITS and landings are poorly correlated. Analysis was carried out applying the Extended Survivor Analysis (XSA) method over the period 2002-2009. In addition, a yield-per-recruit (Y/R) analysis was applied to the data to estimate $F_{0.1}$ and F_{max}. Input data were the age composition of trawl catches provided by the DCF. Numbers by age for 2009 were missing in the DCF and therefore the annual length distributions of landings in 2009 were transformed to ages using L2Age4.exe (estimated using the numbers by size and the growth parameters). The tuning parameters (MEDITS) were calculated by transforming the MEDITS length distributions to ages using L2Age4.exe.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposed $F_{0.1}$ =0.74 for ages 1-3 to be used as a management limit of exploitation.

STOCK STATUS: GFCM-SAC 2009 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.
Based on stock assessment by STECF-SGMED-10-02 WG, SSB (age 1+) has been declining since 2006 and reached the lowest value of the time series in 2009.With the F_{ref} being estimated at 1.08, STECF-SGMED-10-02 WG 2010 concludes the stock being subject to overfishing. These results support the status of overexploitation already stated in a previous (2008) assessment conducted in GSA 06 by GFCM (www.gfcm.org; reviewed by STECF-SGMED-08-04). Recruitment (age 0) has been declining since 2005 and reached in 2009 the lowest value of the time series.
A positive aspect in GSA 06 is that albeit the enforcement of the minimum landing size regulation appeared poorly implemented in the beginning of the 2000s, it has much improved during the last few years (in 2009, only 6% of the specimens were undersized). This aspect should even ameliorate since 1st June 2010, when square-meshed nets of 40 mm at the cod-end or diamond meshed nets of 50 mm will be used. Previous studies already analyzed the positive impact on the stock of a change in the configuration from diamond- to square-mesh on size selectivity of red mullet as well as on other demersal species in the Mediterranean. The STECF-SGMED-08-04 WG already noted (transition analysis) that an increase in Y/R between 20 and 30% were expected with a change to the square mesh in the cod-end. Therefore the enforcement of this change in the gear selectivity should have a short term negative impact on landings (under the status quo fishing effort) but should benefit the stock productivity in the near future.

RECENT MANAGEMENT ADVICE: The GFCM-SAC 2008 (there are not updated information for 2009) recommendations were (a) to improve trawl exploitation pattern by enforcing as soon as possible the current legislation (Council EC Regulation Nº 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.
STECF-SGMED-10-02 WG recommends a reduction in fishing effort of the trawl fleet, particularly during the spawning season (late spring) and/or the recruitment season (early autumn) in the context of a multi-annual management plan taking into account the multi-species landings of the trawl. STECF-SGMED-10-02 WG is unable to precisely quantify the effort reduction required.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.30. Red mullet (Mullus barbatus) in Geographical Sub Area 7. Gulf of Lion. France

FISHERIES: Red mullet (*Mullus barbatus*) is exploited in the Gulf of Lions (GFCM-GSA07) both by French and Spanish trawlers. Around 120 boats are involved in this fishery. According to official statistics, total annual landings for the period 2004-2009 have oscillated around a mean value of 193 tons. Most boats and catches correspond to the French trawling fleet (77% and 86% respectively), for Spanish trawling fleets it is respectively of 23 % and 14 %. In French and Spanish landings, modal lengths are 13 and 14 cm, respectively. Length at first capture is about 7 cm. Catch is mainly composed by individuals of age 0 and 1 while the oldest age class (5+ group) is poorly represented. Catch rates decreased a little along the analysed period. The number of French boats decreased also of about 30 % on the period.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. From 2008 advice is provided also by STECF-SGMED. In terms of data quality and availability, no problem was identified during this STECF-SGMED-10-02 WG. Because of the time series is short, we performed a LCA using the VIT software. The STECF-SGMED-10-02 WG recommended performing both an LCA (VIT) for each individual year (2004-2009) together with a mean pseudo-cohort on the entire period. Ft was estimated using F_{leda} (F_t=0.526). Yield per recruit analysis was used for the estimation of F_{max} and $F_{0.1}$.

REFERENCE POINTS: STECF-SGMED proposed $F_{0.1} \leq 0.5$ for age range to be used as a management limit of exploitation.

STOCK STATUS: STECF-SGMED-10-02 WG proposes $F_{0.1}$=0.5 as limit management reference point for exploitation consistent with high long term yield (F_{msy} proxy). Accordingly STECF-SGMED-10-02 WG concludes that the stock of red mullet in GSA 07 is subject to overfishing. The 2009 estimate of fishing mortality suggests an effort reduction of around 20% for all fleets to achieve this management goal.
Variation in SSB appears without any praticular trend. However, the recent survey abundance and biomass indices since 2007 appear high but are subject to high uncertainty.
Short, medium and long term scenarios will be conducted and delivered by the STECF-SGMED-10-03 (13-17 December 2010).The GFCM-SAC changed the stock status from fully exploited to overexploited.

RECENT MANAGEMENT ADVICE: The STECF-SGMED-10-02 WG recommends the relevant fleet's effort to be reduced until fishing mortality is below or at $F_{0.1}$ in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Based on the biological reference points calculated using VIT results on the mean pseudocohort, fishing mortality should be reduced by 30 and 50% to reach maximum biomass production and $F_{0.1}$ target levels respectively.
GFCM-SAC recommended a reduction the fishing effort.

STECF COMMENTS: STECF notes that GFCM-SAC changed the status of this stock from fully exploited to overexploited. STECF endorses the recommendations of the STECF-SGMED-10-02 WG and from GFCM-SAC (See recent management advice above).

15.31. Red mullet (Mullus barbatus) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian Sea

FISHERIES: *Mullus barbatus is* among the most commercially valuable species in GSA9. The species is caught as a part of a species mix that constitutes the target of the trawlers operating near shore. 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. Length of first capture is of about 7 cm. Catch is mainly composed by age 0 individuals while the older age classes are poorly represented in the catch. Illegal (undersized) catches of juveniles do occur.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. From 2008 advice is provided also by STECF-SGMED. Data used derive from trawl surveys on size composition and abundance indices, and on landings by size/age and direct fishing effort from commercial catch assessment surveys. Landings from 2009 were not submitted by the Italian authorities. The stock is assessed by a stock production model.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposes F_{MSY}=0.64 as limit management reference point for exploitation consistent with high long term yields.

STOCK STATUS: The estimate of the current fishing mortality F_{2009} of 0.73 (derived from ASPIC) is higher than the value considered as limit reference point (F_{MSY}=0.64) and to the value derived from the yield-per-recruit analysis ($F_{0.1}$ =0.49). The STECF-SGMED-10-02 WG classifies the stock of red mullet in GSA 09 as subject to overfishing.
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, which approximates a spawning stock biomass index (i.e. mostly mature fish), does not show any trend from 1994 to 2009. Wide fluctuations are observed. Recruitment has slightly increased.

RECENT MANAGEMENT ADVICE: GFCM 2010 considered stock status as overexploited and proposed to reduce the fishing mortality by 30%
Due to constraints in data availability the STECF-SGMED-10-02 WG is unable to estimate most recent (2009) stock parameters. STECF-SGMED recommends to reduce fishing effort of all fleets by about 12% to reach the management reference point. The size of first capture is too low and an increase in yield can be expected in the case of a reduction of fishing effort and through the use of more selective gears. It is advisable to avoid illegal fishing within the 3 miles as well as the landing of undersized individuals in order to reduce fishing pressure on juveniles. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments the STECF-SGMED-10-03 will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.32. Red mullet (*Mullus barbatus*) in Geographical Sub Area 10. Southern and central Tyrrhenian

FISHERIES: *Mullus barbatus* red mullet, is an important species in the area, targeted by trawlers and small scale fisheries using mainly gillnet and trammel nets. Fishing grounds are located along the coasts of the whole GSA 10, offshore around 50 m depth or 3 miles from the coast. Available landing data collected under the DCF framework range from 524 tons of 2004 to 314 tons in 2008, the latter being the lowest value registered. Most part of the landings of Red mullet were from trawlers up to 2006, while since 2007 the level of catches of trawlers is similar to that of the other métier grouped together, to which the maximum contribution is given by gillnet (GNS) and trammel net (GTR). In 2008 the catches of both métier are decreasing.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. The data used in the analyses were from trawl surveys (time series of MEDITS and GRUND surveys from 1994 to 2009 and from 1994 to 2006 respectively) and from fisheries. Landings from 2009 were not submitted by the Italian authorities. Due to lack of numbers-at-age or numbers-at-length from the landings the update of the VIT

assessment in 2009 was therefore not carried out. The most updated series from trawl survey was up to 2009. A check of the hauls allocation between GSA 9 and 10 is needed before the calculation of indices from the JRC MEDITS database. All other data available at STECF-SGMED-10-02 WG have been used. Information from GRUND surveys and studies on nursery in the GSA have also been included. Management reference points were estimated by a YpR analysis.
The stock is assessed by a VPA (VIT) using the pseudohort approach for each year (2006, 2007, 2008). A sex combined analysis was carried out. Regarding growth parameters the set L_∞=26 cm k=0.42 t_0= -0.4 was re-parameterized to the following equivalent set: L_∞=28 cm k=0.4 t_0= -0.4, given the presence of individuals with length higher than 26 cm. The length-weight relationship parameters were: a=0.0103; b=3.0246. A constant natural mortality M (Alagaraja) = 0.61 was adopted, because this value was close to 0.70, an estimate reported for a very slightly exploited area in the Castellammare Gulf (northern Sicily coasts) within the GSA. The setting of the proportion of mature females was 0.16 at age 0, 0.92 at age 1 and 1 at age 2. Management reference points were estimated by a Y/R analysis.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposed $F_{0.1} \leq 0.4$ as limit management reference point consistent with high long term yields.

STOCK STATUS:. Given the results of the analysis, the stock appeared to have been subject to overfishing during 2006-2008. Assuming status quo in 2009 and given the 2008 situation. Survey indices indicate a variable pattern of biomass with the recent values amongst the lowest observed, except for 2007. This advice will be updated at the next STECF-SGMED WG using the data of 2009.

RECENT MANAGEMENT ADVICE: Due to constraints in data availability STECF-SGMED-10-02 WG is unable to estimate most recent (2009) stock parameters. Based on available information and assuming status quo exploitation in 2009 the STECF-SGMED-10-02 WG recommends the relevant fleets' effort to be reduced of about 40% also by means of closing areas until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments the STECF-SGMED-10-03 will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

STECF notes that there is no advice provided by GFCM-SAC.

15.33. Red mullet (*Mullus barbatus)* in Geographical Sub Area 11. Sardinian Sea

FISHERIES: *Mullus barbatus,* Red mullet, is exploited in all trawlable areas around Sardinia and is one of the most important target species showing the highest landings on shelf bottoms, together with the cephalopod *Octopus vulgaris*. Landings come both from bottom trawl vessels and small artisanal fishery. Small and adults catches coming from a mixed fishery, then in the GSA11 there is not a specific fishery target on red mullet. At the end of 2006 the trawl fleet of GSA 11 accounted for 157 vessels (11.7% of the overall Sardinian fishery fleet). From 1994 to 2004 a general increase in the number of vessels. In the latest years the effort shows a peak in 2005. In the last five years the total landings of red mullet of GSA 11 fluctuated between 262 to about 354 tons, with a consistent drop (-25% of the 5 years mean) in the last year.

SOURCE OF MANAGEMENT ADVICE: Landings data from 2009 were not submitted by the Italian authorities. The lacking of a good and long time series of landings and the absence of landing data by length/age data for the small scale fishery make difficult to perform reliable assessments using the traditional methods. Moreover is clear that DCR DCF data report underestimated landings by the artisanal fishery (LLS, GNS and GTR) because the magnitude of effort is 5 time more than the effort of OTB, while catches are less than 5% of the total. The update of some approaches was not possible because landings from 2009 were not submitted for evaluation. All this highlight the lack of checking procedure of the official data as well as the need to improve the sampling design or the survey collection of commercial catches.
The present assessment was derived by both indirect and surveys data (MEDITS, GRUND). By using VIT and SURBA the status stock was assessed considering the same set of parameters reported below. Vectors of natural

mortality calculated from ProdBiom were used. Yield per Recruit (Y/R) Analysis was performed by means of the Yield software.

REFERENCE POINTS: STECF-SGMED proposed $F_{0.1}$ (1-3) ≤0.32 as limit management reference point consistent with high long term yields.

STOCK STATUS: 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.
The results of analysis indicated that the stock of red mullet in GSA 11 was overexploited until 2008.
STECF-SGMED could not estimate the absolute levels of stock abundance. MEDITS survey abundance (n/km²) and biomass (kg/km²) indices which should be considered as a proxy of the spawning stock biomass, show high variability throughout the time series. Two peaks of SSB are detected in 1999 and 2007. STECF-SGMED is unable to fully evaluate the status of the SSB in the absence of precautionary management reference points.

RECENT MANAGEMENT ADVICE: Due to constraints in data availability STECF-SGMED-10-02 WG was unable to estimate most recent (2009) stock parameters. Based on available information and assuming status quo exploitation in 2009 STECF-SGMED-10-02 WG recommends the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.34. Red mullet (*Mullus barbatus)* in Geographical Sub Area 15. Malta

FISHERIES: The fisheries resources in GSA 15 are shared by three main member countries, namely Malta, Italy and Cyprus. 21 Maltese trawlers operate within this GSA. Only 12 of them are allowed to fish inside the Maltese 25 nautical mile Fisheries Management Zone. Five of these target red mullet on the continental shelf throughout the year, while the rest target pink and red shrimps on the continental slope. Apart from the Maltese trawling fleet a number of Sicilian trawlers fish outside the 25 nautical mile zone targeting red mullet, red shrimp and pink shrimp. 3 Cypriot vessels also fish outside the 25 nautical mile zone which target exclusively red mullet on the continental shelf.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Assessments by structural models were performed using length frequencies data from 2005.
Three different groups of data were used in separate analyses: The stock of *Mullus barbatus* was assessed using length frequency distributions for the years 2005-2008 from trawlers operating within the area (from Malta, Cyprus and Italy). The biological parameters used were those reported by SAMED (2002), except for the length weight relationship that was estimated using the MEDITS data. A value of 0.43 of natural mortality was used as reported by Andaloro et al. (1985). These data were used to estimate trends in total mortality over time using the approach of Beverton and Holt.
Another approach using the SURBA, and VPA was also tested to estimate the trend in F, using data from the MEDITS Trawl survey on a time series covering 7 years from 2002-2008. The annual length frequency distribution was converted to age by the age slicing procedure in the LFDA 5 software. A vector of natural mortality by age was calculated using the PROBIOM Excel spreadsheet. SURBA was then used to estimate mean fishing mortality by year.

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

STOCK STATUS: GFCM-SAC considered this stock as overexploited.

RECENT MANAGEMENT ADVICE: GFCM-SAC recommended to: reduce fishing mortality. Current F is between $F_{0.1}$ and F_{max}. To achieve $F_{0.1}$, a reduction of 30% would be required. It should be noted that this does not imply that the reduction be achieved in one year. A management plan to achieve this reduction over time would be recommended.

SURBA outputs were uncertain, giving variable and high mean F estimates. SURBA model diagnostics showed that the model did not fit the data properly. This is probably due to the relatively short time series of data available (7 years) and the short lifespan of the species.

STECF COMMENTS: In the absence of management reference points the stock status cannot be evaluated. STECF interprets the advice given by GFCM-SAC as provisional and classifies the stock status as unknown.

15.35. Red mullet (*Mullus barbatus)* in Geographical Sub Area 17. Adriatic Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 mulled 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 has been also provided by STECF-SGMED.

REFERENCE POINTS: STECF-SGMED proposed $F_{0.1}$ (1-3) ≤0.50 as limit management reference point consistent with high long term yields.

STOCK STATUS: The STECF-SGMED-08-04 WG 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 overexploited. 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, the STECF-SGMED-08-04 WG 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 endorses the recommendations of the STECF-SGMED-08-04 WG (See recent management advice above).

STECF notes that no advice was provided by GFCM-SAC.

15.36. Red mullet (*Mullus barbatus)* in Geographical Sub Area 19. Western Ionian Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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.

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 in the absence of proposed reference points the status of the stock cannot be evaluated and classifies the stock status as unknown considers the stock status as unknown.

15.37. Red mullet (*Mullus barbatus)* in Geographical Sub Area 25. Cyprus

FISHERIES: *Mullus barbatus* Red mullet in GSA 25 is exploited with other demersal species by the bottom otter trawlers and the artisanal fleet using trammel nets. The main species caught with *M. barbatus* are: *Spicara* spp. (mostly *S. smaris*), *Boops boops*, *M. surmuletus*, *Pagellus erythrinus* and cephalopods (*Octopus vulgaris*, *Loligo vulgaris* and *Sepia officinalis*). The artisanal (inshore) fishery catches also relatively large quantities of *Diplodus* spp, *Sparisoma cretense* and *Siganus* spp. The average percentage of *M. barbatus* in the overall landings (2007 <40 T) of the bottom trawl (4 vessels) and artisanal fishery, for the period 2005-2008, was 7% and 2% respectively.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC.
The last assessment (STECF-SGMED-09-02 WG) was performed by means of VPA analysis, using a mean pseudo-cohort from catch-at-age data for the period of 2005-2008. A Yield per Recruit (Y/R) Analysis was also performed for the estimation of F_{max} and $F_{0.1}$. The VIT software was used for both analyses. Catch-at-age data derived from landings for each fishing gear exploiting the stock (bottom otter trawl and trammel net), and discards data from bottom otter trawl.
An M vector was used as estimated by PROBIOM. The biological data used were collected within the framework of the Cyprus National Data Collection Programme and submitted under the 2009 Spring Official EC Data Call. No fisheries data for 2009 were submitted by Cyprus through the official DCF data call in 2010.

REFERENCE POINTS: STECF-SGMED-09-02 WG recommends $F_{0.1}$ of ages 1-3=0.22 as an approximation of F_{msy} and thus as the limit management reference of exploitation consistent with high long term yields.

STOCK STATUS: Due to data constraints STECF-SGMED-10-02 WG did not updated the stock assessment conducted in 2009 by STECF-SGMED-09-02. In the current stock assessment no trend in the spawning stock biomass is evident. The estimated reference points compared with the estimated value of $F_{bar\ (1-3)}$ (0.84) sugggest an overexploitation state of the stock in the years 2005- 2008.

RECENT MANAGEMENT ADVICE: GFCM-SAC 2010 considers a reduction of the fishing mortality by 51%. A long term management plan is required.
Based on available information and assuming status quo exploitation in 2009, STECF-SGMED-10-02 WG also recommends the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG and of the GFCM-SAC (See recent management advice above).

15.38. Hake (*Merluccius merluccius)* in Geographical Sub Area 1. Northern Alboran Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 tons 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 has been also provided by STECF-SGMED.

REFERENCE POINTS: No 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 $B_{0.}$
STECF-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. STECF-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. STECF-SGMED could not estimate recent or historic exploitation rates. No proposed or agreed reference points were available to STECF-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, STECF-SGMED noted that the survey gear is not specifically designed to sample larger older fish.

RECENT MANAGEMENT ADVICE: The 2004 GFCM-SCSA 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.

STECF COMMENTS: STECF notes that in the absence of any reference point the stock status cannot be evaluated. STECF classifies the stock status as unknown.

15.39. Hake (*Merluccius merluccius)* in Geographical Sub Area 3. Southern Alboran Sea

FISHERIES. In GSA 03 hake is caught by trawlers which exploit a mixed-species fish assemblage. In 2008 the overall trawl fleet of Marocco consisted of 114 vessels. In the period 1998-2008 the hake catches ranged from 30 to 596 tons, with an increasing trend until 2005 and a decrease in the subsequent years. In 2008 they amounted to 210 tons. Other important species in the catches are *Pagellus acarne*, *Mullus spp.*, *Boops boops*, *Gadus poutassou*, *Octopus vulgaris*, and *Sepia* spp.

SOURCE OF MANAGEMENT ADVICE: The assessment was provided by GFCM-SCSA in 2009. Length frequencies for the year 2008 from trawlers' landings of the port of M'diq (12% of the total fleet) were used as the basis of the assessment. Due to the limited length range available from local samples coming from trawlers fishing in near shore waters, hence targeting small size groups, the 'fast' growth parameters developed for Spanish waters (GSA 01; Garcia Rodriguez et al., 2002) were used in place of those developed using more local data. The length cohort analysis approach within VIT was applied.

REFERENCE POINTS: This is a preliminary stock assessment based only on one year of data. Estimated F parameters were: $F_{0.1}$=0.74, Fmax=0.931.9,

STOCK STATUS: Estimated F was 1.9 (mean F). As the estimated F value was around double of Fmax, the stock was considered overexploited.

RECENT MANAGEMENT ADVICE: To achieve $F_{0.1}$, a reduction of fishing mortality of 62% would be required. A management plan to achieve this reduction over time would be recommended. However, GFCM-SAC noted that, due to the availability of only one year of data, the assessment had to be considered as preliminary.

STECF COMMENTS: STECF notes that one year of data is not sufficient to identify the status of the stock. STECF classifies the stock status as unknown.

15.40. Hake (*Merluccius merluccius)* in Geographical Sub Area 5. Balearic Islands

FISHERIES: In the Balearic Islands (GSA 5), commercial trawlers employ up to four different fishing tactics (Palmer et al. 2009), which are associated with the shallow and deep continental shelf, and the upper and middle continental slope (Guijarro & Massutí 2006; Ordines et al. 2006). Vessels mainly target striped red mullet (*Mullus sumuletus*) and European hake (*Merluccius merluccius*) on the shallow and deep shelf respectively. However, these two target species are caught along with a large variety of fish and cephalopod species. The Norway lobster *(Nephrops norvegicus*) and the red shrimp (*Aristeus antennatus*) are the main target species on the upper and middle slope respectively. The Norway lobster is caught at the same time as a large number of other fish and crustacean species, but the red shrimp fishery is the only Mediterranean fishery that could be considered monospecific. Recent annual landings of hake are in the order of 70 tons.

SOURCE OF MANAGEMENT ADVICE: Landings time series from 1980 to 2009 from the bottom trawl fleet of Mallorca. Length frequency distributions from monthly on board or on port samplings developed between 1980 and 2009. The biological parameters used for the assessment, obtained in the framework of the Spanish Data Collection Program, were used. Natural mortality at age was calculated using the PROBIOM spreadsheet. Stock parameters were estimated by means of XSA. YpR analysis was applied to estimate management reference points.
GFCM SCSA made the assessment in 2009. The advice for 2011 was provided by the STECF-SGMED-10-02 WG.

REFERENCE POINTS: Reference points for the state of the adults and juveniles were not proposed. The STECF-SGMED-10-02 WG proposed $F_{0.1}$=0.22 as limit management reference point consistent with high long term yields.

STOCK STATUS:
In the absence of proposed and agreed precautionary management reference points the STECF-SGMED-10-02 WG was unable to fully evaluate the state of the SSB. SSB showed important oscillations during the data series, with maximum values in the middle of the series (1990s) and with a slight decreasing trend during the last years. Although recruitment also showed important oscillations, the high values (around 8.5 millions) found in the 1980s and 1990s were not been repeated since then. Mean fishing mortality over ages 0 to 4 years showed oscillations during the entire data series, although it has been quite stable during the last 5 years. The vector of fishing mortality over age displayed a typical selection curve and showed that the highest fishing exploitation was estimated for 1 and 2-year-old individuals and that the exploitation of the recruits (age 0) is very low. The current Fref (0.84) is above the Y/R $F_{0.1}$reference point (0.22), indicating that hake in GSA 05 is overexploited.

RECENT MANAGEMENT ADVICE: STECF-SGMED-10-02 WG recommended the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level F0.1, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated. A part of the catches is under the minimum landing size. In this sense, the improvement of the trawl exploitation patterns imply further increases in potential landings.
Short and medium term scenarios will be conducted and delivered by the STECF-SGMED-10-03 WG (13-17 December 2010).

STECF COMMENTS: STECF notes that the status of the stock was changed from fully exploited to overexploited and endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

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.

15.41. Hake (*Merluccius merluccius)* in Geographical Sub Area 6. Northern Spain

FISHERIES: Exploitation is based on very young age classes, mainly 0 and 1 year old individuals, with immature fish dominating the landings. During last years, the annual landings of this species were around 3,500 tons in the whole GSA 06 (3,754 tons in 2009).
In 2009 the trawl fleet consisted of 603 vessels, according to the statistics of the Autonomous Governments of Valence (305 in southern GSA06) and Catalonia (298 in northern GSA 06). Some of these units (smaller vessels) operate almost exclusively on the continental shelf targeting red mullet, octopus, hake, and sea breams, while others (bigger vessels) operate almost exclusively on the continental slope targeting decapod crustaceans, and the rest can operate indistinctly on the continental shelf and slope fishing grounds, depending on the season, the weather conditions, and also economic factors (e.g. landings price). The percentages of these trawl fleet segments have been estimated around 30, 40 and 30% of the boats, respectively.

SOURCE OF MANAGEMENT ADVICE: The state of exploitation was assessed by STECF-SGMED-10-02 WG for the period 2002-2009 applying the Extended Survivor Analysis (XSA) method calibrated with fishery independent survey abundance indices (MEDITS). In addition, a yield-per-recruit (Y/R) analysis was carried out. Both methods were performed from the size composition of trawl landings, transforming length data to ages by slicing (L2AGE program). The set of parameters used in this assessment is different from that used in the previous analysis of this stock (STECF-SGMED 09-02 WG), which corresponded to a fast growth of the species. Due to a lack of information about the structure of hake population in the western Mediterranean, this stock was assumed to be confined within the GSA 06 boundaries. A similar assessment for the period 2000-2008 was presented to the GFCM-SCSA in 2009.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposed the following reference points: B_{lim}= 2,200 t, B_{pa}= 4,000 t, $F_{0.1} \leq 0.2$.

STOCK STATUS: The results obtained by the STECF-SGMED-10-02 WG indicated that during 2002-2004 SSB oscillated between 600 and 750 t. SSB peaked in 2007 (1,670 tons) and in 2009 was estimated to be around 1,300 tons. This value of SSB is significantly below the proposed B_{lim} and B_{pa}. Recruitment has been low in recent years and has decreased to the lowest level observed in 2009. Comparing the F_{bar02} = 0.99 in 2009 with the proposed $F_{0.1}$, it can be concluded that the resource is overexploited, with future catches being highly dependent on incoming recruitment. The continued low abundance of adult fish in the surveyed population and landings indicate a very high exploitation pattern far in excess of those achieving high yields and low risk of fisheries collapse.
The assessment given to the GFCM-SCSA also indicated that the exploitation of this stock is based on the recruits and that the stock is overexploited.

RECENT MANAGEMENT ADVICE: Both GFCM-SCSA (this stock assessment has not been reported in the GFCM-SAC report) and the STECF-SGMED-10-02 WG recommend the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
Although the stock is overexploited, it is important to remark that the oscillations found for this species are in agreement with other Mediterranean areas and probably caused not only by the fishing effort but also by environmental changes. For this reason, it is important to follow the evolution of this stock, especially because it seems it has started to recover during the last two years.
Short and medium term scenarios will be conducted and delivered by the STECF-SGMED-10-03 WG (13-17 December 2010).

STECF COMMENTS: STECF recognizes that the hake stock in GSA 6 is overexploited and endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above) and of the GFCM-SCSA to reduce fishing mortality to allow the stock to rebuild.

15.42. Hake (*Merluccius merluccius)* in Geographical Sub Area 7. Gulf of Lions

FISHERIES: Hake *(Merluccius merluccius*) is one of the most important demersal target species of the commercial fisheries in the Gulf of Lions (GFCM-GSA07). In this area, hake is exploited by French trawlers, French gillnetters, Spanish trawlers and Spanish long-liners. Around 230 boats are involved in this fishery and, according to official statistics, total annual landings for the period 1998-2009 have oscillated around a mean value of 2160 tons (2260 tons in 2009). No significant discards for this species were reported in 2009 (8 tons from the small pelagic fisheries). Most fleets and catches correspond to French trawlers (49 and 70%, respectively), followed by French gillnetters (~32 and 15% respectively). The fishing capacity of the GSA 07 has shown in these last 10 years a progressive decrease considering the French trawlers, whose number decreased of about 30% on the period.
Hake trawlers fishery also exploits a highly diversified species assemblage. *Mullus barbatus, Mullus surmuletus, Lophius piscatorius, Lophius budegassa, Conger conger, Trisopterus minutus capelanus, Lepidorhombus boscii, Solea spp., Eledone cirrhosa, Illex coindetii, Sparus aurata, Dicentrarchus labrax, Pagellus spp., Micromesistius poutassou, and Chelidonichty lucerna* are among the most important accompanying species.

SOURCE OF MANAGEMENT ADVICE: Assessment was performed by the STECF-SGMED-10-02 WG for the period 1998-2009. No Spanish data for GSA 7 were provided from the official data call but directly by the expert. No French effort data for GSA 07 were provided for 2009., landing data coming from DCF were used to perform the XSA. The VPA was tuned using only MEDITS indices (1998-2009). STECF-SGMED-10-02 was recommended not to use the other tuning data (French and Spanish trawlers, Spanish long lines) because they were not standardized.
The state of exploitation was also assessed in 2009 by the GFCM-SCSA for the period 1998-2008 using XSA and VIT.

REFERENCE POINTS: No precautionary reference points were proposed by GFCM-SCSA for this stock. STECF-SGMED-10-02 proposed the reference point $F_{0.1}$= 0.27 as a proxy for F_{msy}.

STOCK STATUS: In the absence of proposed and agreed precautionary management reference points STECF-SGMED-10-02 was unable to fully evaluate the status of the SSB. A slight increase of the total biomass was observed in the recent years (2005-2009). The spawning stock showed no particular trend since 1998. Since 1998, 3 recruitments appear to be above average (1998, 2002 and 2007-2008). As the current F_{ref} (0.92) is above the proposed $F_{0.1}$, the STECF-SGMED-10-02 WG considered that the stock is overexploited and recommended fishing mortality be reduced to the proposed reference point.
Due to the high fishing mortality and low abundance, GFCM-SAC also considered that the stock is overexploited.

RECENT MANAGEMENT ADVICE: GFCM-SAC and the STECF-SGMED-10-02 WG recommended the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
GFCM-SAC and STECF-SGMED-10-02 WG also highlighted the necessity of improving the national statistics on catches and effort for small scale-fisheries, especially for French gill netters.
Short and medium term scenarios will be conducted and delivered bySTECF-SGMED-10-03 (13-17 December 2010).

STECF COMMENTS: STECF recognizes that the hake stock in GSA 7 is overexploited and STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above) and of the GFCM-SCA to reduce fishing mortality through the adoption of a multi-annual management plan. STECF also agrees on the necessity of improving the national statistics on catches and effort.

15.43. Hake (*Merluccius merluccius)* in Geographical Sub Area 9. Northern Tyrrhenian

FISHERIES: Hake is among the most important component of bottom trawlers targeting a multi-species assemblage and is the demersal species providing the highest landings and incomes for the GSA 09. The

available information suggest that about 90% of hake landings are obtained by bottom trawl vessels; the remaining fraction is provided by artisanal vessels using set nets, in particular gillnets. Most bottom trawlers of GSA 09 operate daily fishing trips with only some vessels staying out for two-three days, especially in summer. Hake fishing grounds comprise all the soft bottoms of the continental shelf and the upper part of continental slope. Fishing pressure shows some geographical differences inside the GSA 09 according to the consistency of the fleets and the characteristics of the bottoms. According to the last official data (end of 2006), the artisanal fleets accounted for 1309 vessels operating in several harbors along the continental and insular coasts. Of these, about 50 vessels utilize gillnets and target medium and large-sized hakes (larger than 25 cm TL) especially from winter to summer.

SOURCE OF MANAGEMENT ADVICE: The assessment for this stock was performed during the STECF-SGMED-10-02 WG. MEDITS survey data were available from 1994. Landing data for 2009 were not available during STECF-SGMED-10-02 WG, while effort data seemed not consistent with previous estimates for the GSA. Due to lack of numbers-at-age or numbers-at-length from the landings the update of the VIT assessment in 2009 was not carried out. Stock parameters are estimated by means of LPUE, SURBA and VIT.

REFERENCE POINTS: STECF-SGMED-10-02 WG recommended $F_{0.1}$=0.2 as limit management reference point consistent with high long term yields

STOCK STATUS: In the absence of proposed and agreed precautionary management reference points STECF-SGMED-10-02 WG was unable to fully evaluate the state of the SSB. From the analyses carried out SSB in 2009 was likely to amount to 5-10% of the SSB at $F_{0.1}$. STECF-SGMED-10-02 WG underlined that this conclusion could be influenced by the observed exploitation patterns in the surveys and fisheries, which almost exclusively represent the juvenile part of the stock. In recent years recruitment has varied without a clear trend.
Due to constraints in data availability STECF-SGMED-10-02 WG was unable to estimate most recent (2009) stock parameters. However, the stock appeared heavily overexploited in 2008 and F needs of a consistent reduction from the current value towards the $F_{0.1}$ proposed for long term sustainability. However, considering the high productivity in terms of incoming year classes, this stock has the potential to recover quickly if F is reduced towards $F_{0.1}$. The continued lack of older fish in the surveyed population indicates exploitation rates far beyond those considered consistent with high yields and low risk.

RECENT MANAGEMENT ADVICE: Based on available information and assuming a status quo exploitation in 2009, STECF-SGMED-10-02 WG recommended the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

STECF also recommends that updated landing and catch data are made available.

15.44. Hake (*Merluccius merluccius)* in Geographical Sub Area 10. Southern and Central Tyrrhenian Sea

FISHERIES: European hake is mostly targeted by trawlers, but also by small scale fisheries using set nets and bottom long-lines. Fishing grounds are located along the coasts of the whole GSA, offshore 50 m depth or 3 nautical miles from the coast. Catches from trawlers are from a depth range between 50-60 and 500 m and hake occurs with other important commercial species as *Illex coindetii*, *M. barbatus*, *P. longirostris*, *Eledone* spp., *Todaropsis eblanae*, *Lophius* spp., *Pagellus* spp., *P. blennoides*, *N. norvegicus*.

SOURCE OF MANAGEMENT ADVICE: The assessment was performed during the STECF-SGMED-10-02 WG. The data used were derived from trawl surveys (time series of MEDITS and GRUND surveys from 1994 to 2009 and from 1994 to 2006 respectively), from fisheries, and from the monitoring of effort and landing within the EU DCF. No landings data for 2009 were available from Italian authorities. The analyses of population and reference point estimates were conducted using Aladym, LFDA, Surba, and Yield models in a complementary way.
A similar assessment for the period 1904-2008 was also presented at the GFCM-SCSA in 2009.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposed $F_{0.1} \leq 0.2$ as limit management reference point consistent with high long term yields. GFCM-SCSA proposed an $F_{0.1}=0.24$ and an $F_{max} = 0.42$. No precautionary biomass reference points have been proposed for the SSB of this stock.

STOCK STATUS: Due to constraints in data availability STECF-SGMED-10-02 WG was unable to estimate most recent (2009) stock parameters. Survey indices indicate a variable pattern of abundance (n/h) and biomass (kg/h) without a clear trend. However, recent values are among the highest observed since 1994. The Aladym model showed instead that the SSB was continuously decreasing. As a result, STECF-SGMED-10-02 WG was unable to fully evaluate the status of the stock with respect to biomass.
Recent recruitment since 2006 appears to be above average, as derived directly from the trawl survey estimates considering as recruits the age 0 group and from the SURBA model analysis.
F value for 2008 estimated with VIT amounted to 0.8 (slow growth scenario). The stock appeared to be overexploited in 2006-2008.

RECENT MANAGEMENT ADVICE: Based on available information and assuming a status quo exploitation in 2009, a considerable reduction of F is necessary to approach the $F_{0.1}$ reference point (Factor; ~70-80% of the current F value, depending on the year) which can be considered in the range 0.16-0.20. STECF-SGMED-10-02 WG recommended the relevant fleets' effort to be reduced also by means of closing areas until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. GFCM-SAC also recommended the reduction of the fishing effort and highlighted the necessity of a long term management plan. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above) and of the GFCM-SAC to reduce F towards $F_{0.1}$. STECF also recommends that updated landing and catch data are made available.

15.45. Hake (*Merluccius merluccius)* in Geographical Sub Area 11. Sardinian Sea

FISHERIES: Hake is exploited in all trawlable areas around Sardinia and is one of the most important target species showing the highest landings. According to the scientists' knowledge of the GSA 11 landings of hake come almost entirely from bottom trawl vessels whereas catches from trammel nets or long lines are negligible. At the end of 2006 the trawl fleet of GSA 11 accounted for 157 vessels (11.7% of the overall Sardinian fishery fleet). Small hakes are commonly caught from about 50 m to 300 m depth, whereas adults reach the maximum depths exploited (800 m). Both small and adult catches come from a mixed fishery. The most important by-catch species are: (*Eledone cirrhosa*, *Illex coindetii*, *Trisopterus minutus capelanus*) at depths less than 350 m, and *Chlorophthalmus* agassizii, *Phycis blennoides*, and *Parapenaeus longirostris* at greater depth. In the last five years the total landings of hake of GSA 11 fluctuated between 592 to about 768 tons, with a consistent drop (-25% of the mean) in the last year (2008).

SOURCE OF MANAGEMENT ADVICE: Assessment was performed by STECF-SGMED-10-02 WG. MEDITS survey data were available from 1994 with minor error for 2009 in JRC database that needs to be checked, while landing and effort data quality and availability were not satisfying. Moreover, different and contradictory versions of the same archive increase the perception of poor quality of reported data.
The SURBA software program was used to analyze the MEDITS time series and to estimate relative SSB and F. Data coming from DCF (size distribution of landings for trawl) for the period 2006-2007 were used to run stock analyses.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposed $F_{0.1} \leq 0.19$ as limit management reference point consistent with high long term yields. No precautionary biomass reference points have been proposed for this stock.

STOCK STATUS: Due to the lack of validated landings information, STECF-SGMED-10-02 WG was not in the position to estimate the absolute levels of stock abundance. Survey abundance (n/km²) and biomass (kg/km²) indices did not indicate a significant trend. The SSB was variable over the last decade. As a result, STECF-SGMED-10-02 WG was unable to fully evaluate the status of the stock with respect to biomass.

Due to the lack of validated landings information, the STECF-SGMED-10-02 WG was not in the position to estimate the absolute levels of recruitment. Relative indices estimated by SURBA indicated very high fluctuations of recruitment in the period 1994-2009, with a clear decreasing trend in the last five years.
The average fishing mortality over ages 1 to 3 derived from MEDITS surveys ranged from 1.5 to 3.1, with the highest value observed in the last year. STECF-SGMED-10-02 noted that the current F is far in excess of the proposed target reference point $F_{0.1}$. Assuming a similar selection patters of the survey and the commercial fishery, STECF-SGMED-10-02 concluded that the hake stock in GSA 11 is heavily overexploited.

RECENT MANAGEMENT ADVICE: The STECF-SGMED-10-02 WG recommended the fishing effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be provided. Given the data constraints the STECF-SGMED-10-03 WG (13-17 December 2010) will be unable to accomplish short and medium term predictions of stock biomass and catches for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.46. Hake (*Merluccius merluccius)* in Geographical Sub Area 15 -16. Strait of Sicily

FISHERIES: Although hake is not a target of a specific fishery such as deep water pink shrimp and striped red mullet, it is the third species in terms of biomass of Italian yield in GSA 16. Hake is caught by trawlers in a wide depth range (50-500 m) 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. In 2004-2008, 98.5% of declared catches were caught by demersal otter board trawlers, which is the fleet segment the current assessment is based on. 1.1% of catches were obtained using long lines, and 1.8% using trammel nets. Italian trawling, based in the harbours along the southern coasts of Sicily, operate both in GSA 16 and 15 with exclusion of the Maltese Fishing Management Zone (FMZ). Italian trawlers get more than 90% 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 (31% in weight of total catch) than the inshore trawlers (1-2 days trips) (9% in weight). More recent data showed that discarded fraction of undersized hakes by Sicilian trawlers decreased (3.4% in weight in 2008), amounting to about 46 tons in 2008. Overall landings decreased for demersal trawlers measuring >24m in length, but remained stable for trawlers measuring 12-24m in length. The trends in fishing effort of the bottom otter trawl fleet increased from 2004 to 2007 by 32%, but declined again by 25% from 2007 to 2008.

SOURCE OF MANAGEMENT ADVICE: In 2010 advice was provided by the STECF-SGMED-10-02 WG. Data were derived both from indirect (fisheries monitoring) and direct (scientific surveys) sources. Stock status was assessed by using VIT, SURBA (Needle 2003) and non-equilibrium surplus production model.. In terms of data quality and availability, the STECF-SGMED-10-02 WG noted that data from GSA 15 was submitted late. Whilst data from commercial catches declared in GSA 16 are considered representative for the entire area, the lack of scientific survey data from GSA 15 impacted the overall quality of the assessment since the Central Mediterranean hake population is distributed throughout GSA 15 and GSA 16. The STECF-SGMED-10-02 WG further noted the absence of GSA 16 landings data for 2009, which meant assessments based on commercial catches could only be carried out for years 2006, 2007 and 2008. Finally, an error in the GSA 16 effort data in terms of KW * Days was noted for otter board trawlers measuring > 24m in length.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposes $F_{0.1}$=0.3 as limit management reference point consistent with high long term yields. No management points were proposed for the SSB.

STOCK STATUS: Due to constraints in data availability the STECF-SGMED-10-02 WG is unable to estimate most recent (2009) stock parameters. Similarly, in the absence of proposed and agreed precautionary management reference points the STECF-SGMED-10-02 WG was unable to fully evaluate the state of the spawning stock. MEDITS results indicated that levels of recruitment peaked in 2005-2007, followed by a decline in 2008 and 2009. Results of analyses performed on fisheries dependent as well as fisheries independent data using different modeling approaches indicated that fishing mortality is far in excess of sustainable levels, and that the hake stock in GSA 16 was overexploited during the years 2006-2008. The continued low abundance

of adult fish in the surveyed population as well as commercial catches similarly indicate very high exploitation patterns far in excess of fishing mortalities consistent with sustainable high yields.

RECENT MANAGEMENT ADVICE: Based on available information and assuming status quo exploitation in 2009, the STECF-SGMED-10-02 WG recommends the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments the STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

STECF recommends that updated landing and catch data are made available.

15.47. Hake (*Merluccius merluccius)* in Geographical Sub Area 17 Adriatic sea

FISHERIES: The hake fishery is one of the most important in GSA 17. The species is mainly fished with bottom trawl nets, but long-lines and trammel-net are also used. An overall decreasing trend in effort of the major bottom otter trawl fleets occurred in the recent years. Fishing grounds mostly correspond to the distribution of the stock (SEC (2002) 1374). On the basis of the Italian data collected through DCF from 2004 to 2008, landings of bottom otter trawlers account for over 95% of the total. The hake total catch peaked in 2006 (4,339 tons) and decreased in the subsequent years. In 2008 it amounted to 3,177 tons. No effort and catch data were provided in 2009 by the Italian authorities

SOURCE OF MANAGEMENT: In 2010 the assessment was performed by the STECF-SGMED-10-02 WG. VPA analysis was performed using VIT program using as input catch data the landings at age for the period 2006-2008 from bottom trawl, as no information on the age distribution were available for the others gears. Since there were not data available on length or age-frequency distributions of the discards in GSA 17, discards were not included in the assessment. Growth parameters used were those from EC XIV/298/96-EN, (1996). Length-weight relationship data came from the official data call. For the input of maturity at age, data from GSA 18 were used. M Vector by age was estimated using PROBIOM. The terminal F used (0.31) was estimated by Medits data through a Catch Curve analyses of the oldest class ages.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposed $F_{0.1}$=0.33 as proxy for Fmsy and as limit management reference point consistent with high long term yields. No management reference points were proposed for the SSB.

STOCK STATUS: Due to constraints in data availability the STECF-SGMED-10-02 WG was unable to estimate most recent (2009) stock parameters. SSB estimated by VPA in four scenarios ranged from 1,200 to 5,800 tons. Without any precautionary biomass reference proposed or agreed, the STECF-SGMED-10-02 WG was unable to fully evalute the state of the stock size. The average number of recruits estimated by VPA in the four scenarios ranged from 65 to 200 millions of specimens. The STECF-SGMED-10-02 WG was unable to provide any scientific advice of the state of the recruitment given the preliminary state of the data and analyses. Current F ranged from 0.55 to 0.84, thus the stock of hake in GSA17 can be considered overexploited in 2006-2008. Moreover, according to Rochet and Trenkel (2003), it would be safe to avoid F/Z higher than 0.50: F/Z based on the current F in all scenarios ranged from 0.62 to 0.74. 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: Based on available information and assuming a status quo exploitation in 2009, the STECF-SGMED-10-02 WG recommended the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments the STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

STECF recommends that updated landing and catch data are made available.

15.48. Hake (*Merluccius merluccius)* in Geographical Sub Area 18. Southern Adriatic Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 tons could be estimated for the last decades. Demersal species catches are landed on the western side (Italian coast) and the eastern side (Albanian coast), with an approximate percentage of 97% and 3%, respectively. Trawling is the most important fishery activity on the whole area (≅ n° 900 boats, 60% of total number of fishing vessels; 85% of gross tonnage). The Mediterranean hake is also caught by off-shore bottom long-lines, but these gears are utilized 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 GFCM-SAC. Data sources were trawl-surveys (national and MEDITS programs) as well as Catch Assessment Surveys that included data collection of size structure of the catches.

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 GFCM-SAC since 2006. STECF also notes that in the absence of proposed reference points the status of the stock has to be considered as unknown.

15.49. Hake (*Merluccius merluccius)* in Geographical Sub Area 19. Western Ionian Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 Crotone. The fishing pressure varies between fisheries and fishing grounds.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. 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.

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: STECF points out that no new assessment has been presented to the GFCM-SAC since 2006. STECF also notes that in the absence of proposed reference points the status of the stock has to be considered as unknown.

15.50. Hake (*Merluccius merluccius)* in Geographical Sub Area 26. South Levant. Egypt.

FISHERIES: The Egyptian Mediterranean coast is about 1100 km extending from El-Salloum in the West to Taba city in the East. The mean annual fish production from this area is about 50000 tons (GAFRD; 1991-2007). The main fishing gears operated in this region are trawling, purse-seining and lining, especially long and hand lining.
The number of licensed trawl vessels ranged between 1100 and 1500 during the period from 1991 to 2007. The vessel length varies between 18 and 22 m and width from 4 to 6 m. This fleet targets many species such as red mullet *Mullus surmuletus* and *M. barbatus*; the sparids *Sparus aurata*, *Pagellus* spp., *Boops boops*, *Lithognathus mormyrus*, *Diplodus* spp.; the soles *Solea* spp.; the European hake *Merluccius merluccius*; the picarels *Spicara* spp.; the lizardfishes *Synodus saurus*; the cephalopods *Sepia* spp., *Loligo* spp. and *Octopus* spp.; crabs *Portunus pelagicus* and shrimp (about 10 species).
European hake contributed about 3% of the total trawl landings in the Egyptian Mediterranean waters. The vessel length varied between 18 and 22 m and its width varied from 4 to 6 m. Each vessel is powered by main engine of 150 to 600 hp but the majority of 250 hp engines. The fishing trip is about 7 to 10 days and the number of crew is about 6 to 15 persons. The mean annual landing of trawl fishery is around 16000 tons accounting for approximately 33% of total catches in Egyptian Mediterranean area.

SOURCE OF MANAGEMENT ADVICE: Assessment was performed by GFCM-SAC-SCSA 2009. Analyses were based upon monthly length frequency distributions from trawl catches for the year June 2007 - April 2008 sampled from the Egyptian ports Alexandria, Demietta and Port Said (except for May and the first half of June 2007, the period when all fishing operations are prohibited). These data (raised to the landings and combined to approximate equilibrium conditions for the pseudocohort analysis) formed the basis of the assessment.
Sagittal otoliths were used for age determination. Growth parameters were estimated using the von Bertalanffy equation. The natural mortality coefficient (M) was estimated using the method of Djabali et al. (1993). The size at first capture (Lc) was estimated through the catch curve analysis. The length at first sexual maturity Lm50 was estimated by fitting the maturation curve between the observed points of mid-class interval and the percentage maturity of fish corresponding to each length interval. The analysis of pseudo-cohort method (VIT) was used, and FiSAT to Length-convert.
The VIT model did not fit well to data from 2008. Therefore the analysis was re-done with data from 2006-2007; the results presented only reflect the status over that period.

REFERENCE POINTS: Position of reference points relative to current F (2006-2007): $F_{0.1}$=0.49; Fmax=0.78.

STOCK STATUS: The length converted catch curve analysis estimated F~0.66. GFCM-SAC 2010 identified the stock status as overexploited.

RECENT MANAGEMENT ADVICE: The GFCM-SAC 2010 recommended to reduce the fishing mortality. To achieve $F_{0.1}$, a reduction of 51% would be required. It should be noted that this does not imply that the reduction be achieved in one year. A management plan to achieve this reduction over time would be recommended.

STECF COMMENTS: STECF endorses the GFCM-SAC 2010 advice.

15.51. 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. The overall Italian fleet exploiting sole in the GSA 17 is made up by around 1,300 vessels. There is a 30-day seasonal closure for otter and rapido trawlers during August. The fishing grounds exploited by rapido trawlers extend from 5.5 km from the shoreline to 50-60 m depth, while otter trawlers carry out their activity in the overall area, except for the Croatian waters. Set netters operate in the shallower waters usually close to the fishing harbors.
Landings fluctuated between 1,000 and 2,300 t in the period 1996-2009 (2135 t in 2009). The fishing effort applied by the Italian rapido trawlers gradually increased from 1996 to 2005, slightly decreased in the last years between 2005 and 2007, and increased again the last two years.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM. From 2009 advice is provided also by STECF-SGMED. The STECF-SGMED-10-02 WG has updated the assessment carried out during the STECF-SGMED-09-02 WG with 2009 catch data. This assessment is based on VPA (XSA) methods. A separable VPA was also run as exploratory analysis for this stock. In addition, a yield-per-recruit (Y/R) analysis was carried out. The stock was also assessed by SURBA method. Both XSA and SURBA gave the same perception of the state of the stock.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposed $F_{0.1}$ (ages 0-4) $\leq$ 0.26 as a management reference point for sustainable exploitation related to high long term yield.

STOCK STATUS: According to the XSA and SURBA analyses the SSB was practically constant in the period considered, while recruitment greatly fluctuated. Exploitation decreased from 2005 to 2006, was constant in 2006-2007 and increased in 2008-2009. Based on the XSA estimates of the fishing mortality in 2009 (F_{0-4}=1.36), which by far exceeds $F_{0.1}$, the STECF-SGMED-10-02 WG concluded that the resource is subject to overfishing.

RECENT MANAGEMENT ADVICE: the STECF-SGMED-10-02 WG recommended the fishing effort (especially of *rapido* trawlers) to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects.
A reduction of *rapido* trawling fishing pressure would be especially recommended, taking into account that the catches of this gear are mainly based on juveniles. Recruitment success appears to be highly related to environmental conditions in the Adriatic and fishing effort by the Rapido trawl fishery compromises recruitment success particularly in years when environmental conditions are unfavourable. An additional two–months closure for *rapido* trawling inside 11km offshore along the Italian coast, after the fishing ban of August, would be also advisable to reduce the portion of 0-group sole in the catches. For the same reason, specific studies on *rapido* trawl selectivity are necessary. In fact, there is some evidence that the adoption of a larger mesh size would not result in an increase in the selectivity of this gear for sole. The effect of square mesh on the selectivity on in the Adriatic for Rapido trawlers is unknown.
STECF-SGMED considers that preventing future exploitation of common sole in its main spawning area (that has been identified by the *rapido* trawl survey) might be crucial for the sustainability of the Adriatic sole stock.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above) and agrees with the advice provided by GFCM-SAC. STECF supports the recommendation that fishing effort is reduced and that the impact of rapido trawlers on juvenile sole be taken into account in the development of the Italian management plan. Since the rapido trawling is considered a mixed fishery, other species-specific measures will also need to be considered.

15.52. Monkfish (*Lophius budegassa*) in Geographical Sub Area 6. Northern Spain

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 (GSA 06, 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).

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 GFCM-SAC 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 notes that in the absence of reference points the exploitation status of the stock cannot be fully evaluated and no advice can be provided. STECF also notes that no new assessment has been presented since 2007.

15.53. Common Dentex (*Dentex dentex*) in Geographical Sub Areas 12, 13. Tunisian coasts.

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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.

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 GFCM-SAC 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 notes that in the absence of reference points the exploitation status of the stock cannot be fully evaluated and no advice can be provided. STECF also notes that no new assessment has been presented since 2007 (based on 2004 data).

15.54. Blackspot seabream (*Pagellus bogaraveo)* in Geographical Sub Area 3. Southern Alboran Sea

FISHERIES. The long liners fishery along the Moroccan coast is the major activity in the Strait of Gibraltar. This fleet is mainly based in Tangier port where 200 boats are based. They represent 85% of the total long liners in the whole Mediterranean. The vessels belonging to this fishery have an average GRT of about 20 tons, a power average about 160 CW and an average age of 7 years. Long liners target primarily swordfish, small tunas, red seabream, the grouper *Helecolenus dactylopterus*, and *Lepidopus caudatus*. The catches of *Pagellus boragaveo* increased from around 20 tons in 2001 up to around 80 tons in 2007.

SOURCE OF MANAGEMENT ADVICE: The assessment was provided by GFCM-SCSA in 2009. The length frequency data used were derived from biological sampling of *Pagellus bogaraveo* landed in port of

Tangier in the years 2005-2007 and the statistics data used were the official statistics of ONP and DPM. The model of stock assessment used is the standard VPA and the yield par recruits turn by the software VIT.

REFERENCE POINTS: $F_{0.1}$=0.2 was proposed as limit management reference point consistent with high long term yields. This value might be positively biased. No management points were proposed for the SSB.

STOCK STATUS: SSB was estimated at 1797.2 tons. Estimated F was 0.20 (mean F). As the F value was equal to the proposed $F_{0.1}$, the stock was considered moderately exploited. The fact that long liners tend to exploit larger individuals within the population, and that these individuals are close to the assumed maximum size (taken from Fishbase for Spain, and hence open to some uncertainty), supports the general opinion on stock status

RECENT MANAGEMENT ADVICE: Maintain fishing mortality at the current level in order to maintain a sustainable exploitation. However, given the depletion status of this species in the Spanish coastal area and the uncertainty of the stock in the Alboran Sea, the GFCM-SAC recommended that a joint assessment is performed in GSAs 1 and 3.

STECF COMMENTS: STECF agrees with the assessment and advice of the GFCM-SAC. STECF identified the stock status as sustainable exploited.

15.55. Common pandora (*Pagellus erythrinus*) in Geographical Sub Area 9. Northern Tyrrhenian

FISHERIES: In GSA 9 *Pagellus erythrinus* is caught as a part of a species mix that targetd by trawlers operating near shore. The main commercial species in this mix are *Squilla mantis, Sepia officinalis, Trigla lucerna, Merluccius merluccius, Mullus barbatus, Gobius niger.* Fishing effort has shown a moderate decline in the period 1985-2009. The species is mainly caught in late summer-beginnings of autumn. Catch is mainly composed by age 0 and 1 individuals. Set nets catch modest quantitatives of relatively large individuals. The exerted fishing pressure on this species in different zones of GSA 9 is quite variable as it is affected by the composition of that part of the fleet operating close to their respective ports, by the characteristics of the seabed, and by differences in the target species of the fisheries among fleets and zones. Landings gradually decreased from 412 to 216 tons in the years 2004-2008. No 2009 landing data were submitted by the Italian authorities. No discard data were available to STECF-SGMED-10-02.

SOURCE OF MANAGEMENT ADVICE: Assessment was performed during the STECF-SGMED-10-02 WG. SEINE software (Survival Estimation in non-equilibrium situations) was used for the estimation of Z, using weighted information of mean size of catch, size of full capture and growth parameters. The transitional behaviour of the mean length statistic is derived for use in non-equilibrium conditions. This new non-equilibrium estimator allows a change in mortality to be characterized reliably several years faster than would occur with the use of the Beverton–Holt estimator. A traditional Beverton & Holt Y/R analysis was performed with the "Yield" software.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposed $F_{0.1}$=0.13 as limit management reference point of exploitation consistent with high long term yields.

STOCK STATUS: In the absence of proposed and agreed precautionary management reference points the STECF-SGMED-10-02 WG was unable to fully evaluate the state of the SSB. The index of stock abundance from MEDITS survey showed high variability throughout the time series, but no statistical significant trend is observed. Recruitment did not show any particular trend in the years 1994-2009, with a peak in 2005. The available data are likely affected by an underestimate of the numbers per km^2 as many juveniles are concentrated in very shallow waters poorly covered by the surveys. Considering the current F=0.36, the species can be considered overexploited when compared with the reference point $F_{0.1}$. In relation to historic values, the abundance of the species is stable, as demonstrated by the analysis of commercial LPUE's of the landings in the main ports of the area and by trawl surveys abundance indices. Available data were limited and did not allow a more detailed and precise assessment of the stock status.

RECENT MANAGEMENT ADVICE: Due to constraints in data availability the STECF-SGMED-10-02 WG was unable to estimate most recent (2009) stock parameters. Based on available information and assuming a status quo exploitation in 2009 the STECF-SGMED-10-02 WG recommended the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock

productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.
In the absence of updated catch information and assessments the STECF-SGMED-10-03 will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.56. Bogue (*Boops boops)* in Geographical Sub Area 3. Southern Alboran Sea

FISHERIES Exploitation of the stocks of *Boops boops* is carried out by trawlers from Moroccan Mediterranean ports. Fishing is focussed between the coastal region of Tangier from the port of Saidia in the east. 70% of landings occur within the ports of Nador and Al hoceima.

SOURCE OF MANAGEMENT ADVICE: Assessmente was performed by the GFCM-SCSA 2009. Length frequencies for the years 2005-2007 from trawlers' landings within the ports of Nador and Al hoceima (were used as the basis of this analysis. The length cohort analysis approach within VIT was used

REFERENCE POINTS:. The estimated reference points were: F0.1=0.13, Fmax=0.22.

STOCK STATUS: Estimated F= 0.36 (mean F). This is a preliminary stock assessment. The stock was considered overexploited

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended to reduce the fishing mortality by 64%, and a long term management plan is required.

STECF COMMENTS: STECF agrees with the advice of the GFCM-SAC.

15.57. Norway Lobster (*Nephrops norvegicus*) in GSA 05 - Balearic Island

FISHERIES: Norway lobster catches from the Balearic fleet come exclusively from bottom trawl fisheries. The species is mostly caught in the upper slope (350-600 m depth). Annual landings vary between 15 and 33 t. Other species caught on the upper slope are *Merluccius merluccius, Lepidorhombus spp., Lophius spp. and Micromesistius poutassou*. Discards on the upper slope have been estimated to be up to 18% (autumn) and 45% (spring) of captured biomass and comprise a large number of elasmobranchs, teleosts, crustaceans and cephalopods, amongst others.

REFERENCE POINTS: The STECF-SGMED-10-02 WG recommends $F_{0.1}$=0.42 as limit management reference point consistent with high long term yields.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC.

STOCK STATUS: SSB increased over the years 2002, 2005 and 2009, from the beginning of the data series (around 7 t) to the most recent years (around 12 t). In the absence of proposed and agreed biomass reference points STECF is unable to fully evaluate the state of the stock. The F_{ref} (0.62) exceeds the Y/R $F_{0.1}$ reference point (0.42), which indicates that Norway lobster in GSA 05 is overexploited in the long term.

RECENT MANAGEMENT ADVICE: STECF recommends that the relevant fleet's effort be reduced until fishing mortality is at or below $F_{0.1}$ in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi- annual management plan taking into account mixed-fisheries effects.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.58. Norway lobster (*Nephrops norvegicus*) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian

Due to constraints on data availability no assessment of this stock has been conducted in 2010.

FISHERIES: Norway lobster is one of the most important commercial species in the GSA as total annual landing value. All the landing is due to bottom trawl vessels exploiting slope muddy bottoms mainly between 300 and 500 m depth. Catch of vessels targeting Norway lobster is composed of a mix of both commercial

(hake, deep- sea pink shrimp, horned octopus (Eledone cirrhosa), squids (Todaropsis eblanae)), and non-commercial species. To date about 80-100 trawlers are involved in this fishery. In the last three years the total landings of Norway lobster of GSA 09 fluctuated between 228 (2008) to 260 tons (2007). The catch is mainly composed by adult individuals over the size-at-maturity. Discarding of specimens under MLS (20 mm CL) is negligible.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2009, advice has been also provided by STECF-SGMED. Medits survey data were available from 1994. A check of hauls allocation between GSA 09 and 10 needs to be done before calculation of indices from JRC MEDITS database. Landings data for 2009 were not available during the STECF-SGMED-10-02 WG, while effort data seem not consistent with previous estimates for the GSA. Due to lack of numbers-at-age or numbers-at-length from the landings the update of the assessment in 2009 was therefore not carried out.

REFERENCE POINTS: The reference points, $F_{0.1}$ and F_{max}, estimated for this species using the Yield software were 0.21 and 0.36 (median values), respectively.

STOCK STATUS: Relative spawning stock biomass (SSB) indices derived from MEDITS (1994-2009) and GRUND (1994-2006) showed fluctuations without a particular trend in the spawning stock biomass (SSB). However, both indices of abundance and biomass in 2009 represent the maximum values since 1994. The status of SSB cannot be fully evaluated due to a lack of biomass management reference points. Recent values of F3-7 obtained from commercial data with LCA (VIT) and using SURBA indicate that the stock is currently overexploited.

RECENT MANAGEMENT ADVICE: The STECF-SGMED-10-02 WG recommended to reduce the fishing effort until fishing mortality is below or at the proposed $F_{0.1}$ level (0.21). This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.59. Red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 5. Balearic Islands

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN) and from GFCM 34_2010_4.

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 was estimated to 33% of reported landings in 2005 (DCR discards data assessment). Discards for the target species (red shrimp) are considered nul (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 GFCM-SAC-. A VPA based assessment was conducted using catch information, length frequency data for landings, information on fishing effort and survey data.

REFERENCE POINTS: No 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. GFCM-SCSA considers this stock to be overexploited.

RECENT MANAGEMENT ADVICE: The GFCM- AC recommends not to increase the fishing effort.

STECF COMMENTS: STECF notes that in the absence of reference points the exploitation status of the stock cannot be fully evaluated. STECF classifies the status of this stock as unknown.

15.60. Red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 6. Northern Spain

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN) and from GFCM 34_2010_4.

FISHERIES: Red shrimp (*Aristeus antennatus*) is one of the most important crustacean species for the trawl fisheries developed along the GFCM geographical sub-area Northern Spain (GSA 06). It is an important component of commercial landings in some Mediterranean ports, and is a target species of a specific trawl fleet. Between 2002 and 2008 landings have fluctuated between 300 and 650 tonnes, with an average of c.a. 500 tons. Females comprise nearly 80% of the total landings. Discards of the red shrimp are null. The number of harbors with red shrimp fleets is 14 for the whole area. Exploitation is based on very young age classes, mainly 1 and 0 year old individuals, indicating a dependence on recruitments. Fishing effort has reduced from 20,000 days in 2002 to 9,000 in 2006, with a increase thereafter, reaching the 23,000 in 2008.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. From 2009 advice was also provided by STECF-SGMED. The state of exploitation was assessed for the period 2002-2008 by means of a VPA, tuned with standardized CPUE from commercial fleet and abundance indices from trawl surveys. A yield-per-recruit (Y/R) analysis (VIT program) was also applied.

REFERENCE POINTS: No reference points have been proposed.

STOCK STATUS: The state of the spawning stock relative to management reference points could not be determined, as these have not been proposed or defined. SSB, with an average for the period 2002 to 2008 of 637 mt, declined rapidly from 2002 to 2004 reaching the lowest value (384 t) observed. This represents 25% of that observed in 2002. Thereafter, SSB is estimated to have increased until 2008 almost to the level seen in the beginning of the assessed time period.

RECENT MANAGEMENT ADVICE: STECF-SGMED-10-02 WG had no basis to provide specific management advice.

STECF COMMENTS: STECF notes that in the absence of reference points the exploitation status of the stock cannot be fully evaluated. STECF classifies the status of this stock as unknown. STECF also notes that no advice was provided by GFCM-SAC.

15.61. Giant Red Shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 11. Sardinian Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 GFCM-SAC. 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)

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-SAC did not provide any advice for this stock.

STECF COMMENTS: STECF notes that in the absence of reference points the exploitation status of the stock cannot be fully evaluated. STECF classifies the status of this stock as unknown.

15.62. Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Areas 15 and 16 – Strait of Sicily

FISHERIES: The giant red shrimp is a relevant target species of the Sicilian and Maltese trawlers. It is mainly caught on the slope ground in the central–eastern side of the Strait of Sicily all year round, but landing peaks occur in summer. In 2006-2008 the yield of the Italian trawlers ranged from 1,260 to 1540 t, with the low value in 2008. In the same period the catches of the Maltese trawlers were between 26 t in 2006 and 34 t in 2007. Females represented more than 60% of the landings in weight. Due to catch reduction, since 2004 some Sicilian trawlers have moved to the eastern Mediterranean (Aegean and Levant Seas) to fish red shrimps.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2009 advice is also provided by STECF-SGMED. In 2009, the state of exploitation was assessed by the STECF-SGMED-10-02 WG by means of a VPA tuned with abundance indices from trawl surveys (2002-2008) and standardized CPUEs from the Sicilian commercial fleet (2006-2008). The SURBA software was also used to analyze the MEDITS time series. The assessment was not updated in 2010 due to constraints in data availability.

REFERENCE POINTS: The management reference points proposed for the stock by the STECF-SGMED-10-02 WG are: $F_{0.1}$ (1-3) = 0.35 and F_{max} (1-3) = 0.50.

STOCK STATUS: The stock abundance estimated on the length structure of the Sicilian trawlers for the years 2006-2008 ranged between 1,721 t (2008) and 1,883 t (2006), the SSB representing about 75% of the total stock biomass. Data from trawl surveys combining the two GSAs indicated the stock to vary without any evident trend over the period 2002-2008, with the highest SSB value in 2008. Due to the lack of precautionary management references the STECF-SGMED-10-02 WG was unable to fully evaluate the state of SSB.
The recruitment (18-22 mm CL) estimated with VIT ranged between 63 (2008) and 95 (2007) millions of recruits. A low variability in recruitment indices derived from SURBA was observed when combining the data of the two GSAs from 2002 to 2007, with the exception of a sudden fall in recruit density observed in 2006 in both GSAs 15 and 16.
As recent F (F_{2008} = 0.77) was estimated to be significantly higher than both $F_{0.1}$ and F_{max}, the STECF-SGMED-10-02 WG concluded that the stock of giant red shrimp in the GSAs 15 and 16 is overexploited.
In the absence of updated catch information and assessments the STECF-SGMED-10-03 WG will be unable to accomplish short term predictions of catch and stock biomass for 2010 and 2011.

RECENT MANAGEMENT ADVICE: STECF-SGMED recommended the fishing effort to be reduced until fishing mortality is below or at the proposed $F_{0.1}$ level and recommended a 50% reduction in fishing mortality in order to avoid significant long term loss in potential yield. GFCM-SAC recommended (in 2009) a 30% reduction of fishing mortality. This should be achieved by means of a multi-annual management plan. STECF-SGMED-09-02 noted that the Italian government is adopting a management plan, in which a reduction of fishing mortality of 25% is planned within 2013.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above) and of the GFCM-SAC.

15.63. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 3. Southern Alboran. Morocco.

FISHERIES. In GSA 03 hake is caught by trawlers which exploit a mixed-species fish assemblage. In 2008 the overall trawl fleet of Morocco consisted of 114 vessels. In the period 1998-2008 the hake catches ranged from 30 to 596 tons, with an increasing trend until 2005 and a decrease in the subsequent years. In 2008 they amounted to 210 tons. Other important species in the catches are *Pagellus acarne*, *Mullus spp.*, *Boops boops*, *Gadus poutassou*, *Octopus vulgaris*, and *Sepia* spp.

SOURCE OF MANAGEMENT ADVICE: The assessment was provided by the GFCM-SCSA in 2009. Length frequencies for the year 2008 from trawlers' landings of the port of M'diq (12% of the total fleet) were used as the basis of the assessment. Due to the limited length range available from local samples coming from trawlers fishing in near shore waters, hence targeting small size groups, the 'fast' growth parameters developed

for Spanish waters (GSA 01; Garcia Rodriguez et al., 2002) were used in place of those developed using more local data. The length cohort analysis approach within VIT was applied.

REFERENCE POINTS: No reference points were proposed.

STOCK STATUS: This is a preliminary stock assessment based only on one year of data. The stock was considered as overexploited.

RECENT MANAGEMENT ADVICE: Reduce the fishing mortality by 30-66 % (depending on the model). A management plan to achieve this reduction over time would be recommended. However, GFCM-SAC noted that, due to the availability of only one year of data, the assessment had to be considered as preliminary.

STECF COMMENTS: STECF notes that in the absence of reference points the exploitation status of the stock cannot be fully evaluated. STECF classifies the status of this stock as unknown.

15.64. ink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 6. Northern Spain

FISHERIES: Deep-water pink shrimp (*Parapenaeus longirostris*) is one of the most important crustacean species for the trawl fisheries developed along the GFCM geographical sub-area Northern Spain (GSA 06). This resource is an important component of commercial landings in some ports of the Mediterranean Northern Spain and occasionally target species of the trawl fleet, composed by around 600 vessels, and especially by 260 vessels which operate on the upper slope. During the last years, a sharp increase in landings was observed, starting in 1998 and reaching the maximum value in 2000, followed by a decreasing trend during the period 2001-2008. In 2008 the annual landings of this species amounts 33 tons in the whole area, which it has been the lowest value of the historical series. Fishing effort has reduced from 50,000 days in 2000 to 13,000 in 2006, with a slight increase in 2007 and 2008 to 18,000. STECF-SGMED notes that the fishing effort only includes vessels that have landed pink shrimp in the given years.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice has been also provided by STECF-SGMED. The state of exploitation was assessed for the period 2002-2009 by means of a VPA tuned with standardised CPUE from commercial fleet and abundance indices from trawl surveys.

REFERENCE POINTS: No reference points were proposed and or agreed.

STOCK STATUS: Since 2002, SSB, with an average for the whole period of 342 tons, declined rapidly and continuously to the lowest value observed in 2008 (111 mt) which represents only 8% of that observed in 2002. The STECF-SGMED-10-02 WG 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 2002-2008 period. However, the 2009 indices of stock size reveal a significant increase. The STECF-SGMED-10-02 WG cannot evaluate the state of the spawning stock relative to management reference points, as these have not been proposed or defined. Recruits (aged 0 individuals) were estimated to have declined from 2002 to 2005 in the same pattern as SSB and continued to be very low in 2006-2007. However, in 2008, recruitment increased significantly and appears to be at the level of the 2003 value.

RECENT MANAGEMENT ADVICE: Assuming a status quo fishing in 2009 the STECF-SGMED-10-02 WG reiterates its recommendation to keep F and effort at a low level to allow any strong future recruitments to rebuild the stock. The STECF-SGMED-10-02 WG recommends a recovery plan to be established for this stock that takes into account the mixed species nature of the fishery. Catches consistent with the effort reductions should be estimated.

STECF COMMENTS: In the absence of proposed reference points, STECF identifies the status of this stock as unknown.

15.65. Pink 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 bottom trawl fishery in GSA 9. The fishing grounds are located on muddy bottoms from 150 to 500 m depth. Annual trawl landings increased from 160 t in 2002 up to 450 t in 2006, decreasing to 220 and 254 t in 2007 and 2008 respectively.

Discard of *P. longirostris* is scarce, ranging from 0.3 to 1.2% of the total catch of the species, and occurs mainly on the fishing grounds located at depth less than 200 m, where juveniles are more abundant.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. From 2008 advice has been also provided by STECF-SGMED. The state of exploitation was assessed for the period 1994-2008 by means of SURBA and VIT analysis.

REFERENCE POINTS: STECF-SGMED-10-02 WG proposed F≤0.7 as management reference point (basis $F_{0.1}$(0-3)).

STOCK STATUS: the STECF-SGMED-10-02 WG was unable to estimate the absolute stock size. Since 1998, SSB has been showing great fluctuations without a clear trend. Recent recruitment (2004-2006) is above the average for the time series of recruitment index (1994-2006) in the years 2004-2006. F_{1-3} was 0.5-0.6 in the period 2006-2008. Based on F estimates, the STECF-SGMED-10-02 WG considers the stock being harvested in a sustainable manner.

RECENT MANAGEMENT ADVICE: The STECF-SGMED-10-02 WG recommends not to increase the fishing effort and highlights that any management measure should consider the mixed nature of the fisheries exploiting the pink shrimp stock.

STECF COMMENTS: STECF considers this stock as been exploited in a sustainable way. No management advice was provided by GFCM-SAC.

15.66. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 10. Southern and Central Tyrrhenian.

FISHERIES. The pink shrimp is only targeted by trawlers and fishing grounds are located offshore 50 m depth, on the continental shelf and slope of the whole GSA. The pink shrimp occurs mainly with *M. merluccius*, *M. barbatus*, *Eledone cirrhosa*, *Illex coindetii* and *Todaropsis eblanae, N. norvegicus*, *P. blennoides*, depending on depth and area.
The catches of the species raised from 2004 to 2006 when 1089 tons were recorded and then declined to 400 tons in 2008, lower than in 2004 (552 tons).

SOURCE OF MANAGEMENT ADVICE: The assessment was provided by the STECF-SGMED-10-02 WG. Landings from 2009 were not submitted by the Italian authorities. Due to lack of numbers-at-age or numbers-at-length from the landings the update of the VIT assessment in 2009 was therefore not carried out. The analyses were conducted using VIT and YIELD software.
The following growth parameters were used to split the LFD for the VIT age-class analyses; females: CL_∞ = 4.6 cm, K= 0.575, t_0= -0.2; males: CL_∞ = 4 cm, K= 0.68, t_0= -0.25. Since YIELD software uses only specimens total lengths data for the analyses, growth parameters and length-weight relationship coefficients were converted to the following equation: TL_∞ = 20.77 cm, K= 0.575, t_0= -0.23, a= 0.0178, b= 2.5423. Constant natural mortality M (Alagaraja) = 0.9 and a constant recruitment of 182 million individuals were assumed (average recruitment estimated by VIT during 2006-2008) to parameterize YIELD software. Management reference points were estimated by an YpR analysis.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposed $F_{0.1}$ (age range) ≤0.65.

STOCK STATUS: The estimated current F was much higher that the proposed reference point. Given the results of the analysis, the stock is considered overexploited over the period 2006-2008. Recruitment estimates from GRUND surveys showed a decrease in abundance from 2005 to 2006 after a rising phase from 2002 to 2005.

RECENT MANAGEMENT ADVICE: Due to constraints in data availability, the STECF-SGMED-10-02 WG is unable to estimate most recent (2009) stock parameters. Based on available information and assuming status quo exploitation in 2009 the STECF-SGMED-10-02 WG recommends the relevant fleets' effort to be reduced also by means of closing areas until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches consistent with the effort reductions should be estimated.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

No management advice was provided by GFCM-SAC.

15.67. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 15-16. Strait of Sicily

FISHERIES: Italian trawlers exert the most of fishing effort and yield more than 90% of deep water pink shrimp catches in GSA 15-16. Sicilian trawlers between 12 and 24m vessel length are based in seven harbours along the southern coasts of Sicily, and operate mainly on a short-distance trawl fishery with trips from 1 to 2 days at sea. Larger trawlers measuring over 24m in length based at Mazara del Vallo carry out long fishing trips (3 – 4 weeks) in offshore waters, both national and international, of the Strait of Sicily. In 2004, larger trawlers also started fishing in the international water of the Aegean and Levant Seas. Deep water pink shrimp are the main target species of Sicilian trawlers and the species is caught both on the shelf and the upper shelf slope throughout the year. Landings peak from March to July. In the past total yields have peaked at around 8500 t per year in 2005 / 2006, but decreased to about 6000 tonnes in 2007 / 2008. The discarded fraction of pink shrimps by Sicilian trawlers in the last years ranged between 18 (2008) and 25 tons (2006). *P. longirostris* is fished exclusively by otter trawling, together with other species (*Nephrops norvegicus*, *Merluccius merluccius*, *Eledone sp*., *Illex coindetii*, *Todaropsis eblanae, Lophius sp., Mullus sp., Pagellus sp., Zeus faber* and *Raja sp*.).

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 (Fmax, $F_{0.1}$ and $F_{SPR0.3}$) were assessed with Y & B per R approaches.

REFERENCE POINTS: The STECF-SGMED-10-02 WG proposes $F_{0.1}$ ranging between 0.62 (median of VIT analyses) and 0.72 (Yield and Beverton and Holt estimator) as limit management reference point for exploitation consistent with high long term yield

STOCK STATUS: In the absence of proposed and agreed precautionary management reference points the STECF-SGMED-10-02 WG is unable to fully evaluate the state of the SSB. According to VIT analysis, absolute estimations of SSB (combined sex) were 3,223 t in 2006, 1,920 t in 2007 and 1,580 t in 2008. Recent MEDITS indices in 2009 indicate a significant stock recovery in both GSAs 15 and 16. Current F significantly exceeds the proposed reference point. Consequently the stoch was considered as overexploited.

RECENT MANAGEMENT ADVICE: The GFCM -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). The GFCM-SCSA also suggested to complete and improve the vessel monitoring system (VMS) to have data on spatial distribution of fishing effort.
In order to achieve the required reductions of fishing mortality, the STECF-SGMED-10-02 WG recommends reduction of fishing effort of the relevant fleet considering the mixed nature of the fisheries.

STECF COMMENTS: STECF endorses the recommendations of the STECF-SGMED-10-02 WG (See recent management advice above).

15.68. Pink Shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 18. Southern Adriatic Sea

In the absence of any updates assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2009 (STECF, 2009, EUR 23630 EN).

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 GFCM-SAC. 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)

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: STECF notes that in the absence of reference points the exploitation status of the stock cannot be fully evaluated and identifies the stock status as unknown.

16. Elasmobranch Resources in the Mediterranean Sea

A long list of elasmobranch species has been reported to occur in the Mediterranean with 71 different species reported to be taken by Mediterranean fisheries. According to the official statistics provided by FAO-GFCM capture fisheries production dataset (Fishstat, 1970-2008), the nominal landings of elasmobranches from the Mediterranean and Black Sea reached the highest values in the 1980s and 1990s, mainly reported in the Ionian Sea, with peaks of >23,000 tonnes in 1984, 1985, and 1994. From 1994, landings gradually declined, reaching a minimum of 8,732 tonnes in 2004. In the following years reported landings slightly increased. In 2008 the total nominal landing in the Mediterranean was 11,155 t.

According to IUCN (based on assessments conducted in 2003), 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 elasmobranches 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 “Shark, rays, skates etc” and “Rays, stingrays, mantas” accounted for 60% of the total landings in 2008. 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 on average during the three previous years or represent less than 10% of total Community landings (Commission Decision, 2008/949/EC, 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.

GENERAL STECF COMMENTS: STECF notes that several updates, mainly regarding the landings and the stock status, have been added to 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 advice for these stocks. Stock and fishery related data are not currently collected in the framework of the DCF for most of elasmobranches, which makes stock assessment difficult for most species. In view of the reported or assumed declines in most stocks and the threatened status (according to IUCN) of 30 species of Mediterranean chondrichthyans, STECF notes the need to increase the available information on elasmobranches stocks and hence recommends:

1. To investigate further which of the elasmobranches species is practically feasible to be included in Appendix VII of the Commission Decision 2008/949/EC (currently there are three taxa: *Raja clavata*, *Raja miraletus*, and Shark-like Selachii).

2. To consider excluding elasmobrances from the exemption of Chapter III, subchapter B2, paragraph 5 of Commission Decision 2008/949/EC (The national programme of a Member State in the Mediterranean Sea may exclude the estimation of the stock related variables for stocks of species corresponding to less than 10 % of the total Community landings from the Mediterranean Sea, or to less than 200 tonnes, except for Bluefin tuna).
3. In the absence of official historical statistical data, STECF recommends that effort is made in the Mediterranean for the collection of past anecdotal information such as 'grey' literature or old unreported data sources (e.g., from fish-market sale slips), enhanced with any other possible source of information (e.g., collection of personal logbooks, questionnaires to old fishermen) and appropriate methods are developed to process such data, in order to gain insight on the status and historical trends of the Mediterranean elasmobranches stocks.

STECF suggests that consideration be given to issuing a call to tender to undertake this work which will require multinational cooperation to obtain comprehensive information from all countries exploiting elasmobranchs in the Mediterranean.

16.1. 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, 1970-2008), landings for this species are only reported by Spain. The yearly landings ranged from 0 to 6 tonnes in the period 1996-2008, with a peak of 10 t in 2004, and represented from 0.1% to 0.7% of the total catch of elasmobranches 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.

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; assessed in 2003) and globally (VU A2ad+3d; assessed in 2005) in the IUCN Red List. Since 2009 it has been prohibited for Community vessels to fish for, to retain on board, to tranship and to land basking sharks in all Community and non-Community waters (Council Regulation 43/2009).

STECF COMMENTS: STECF recommends a better reporting of the Basking shark catches or by-catches from all the fisheries involved, with the purpose to assess the possible impacts of fisheries to the status of the stock.

16.2. 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. Adults and juveniles of the Thresher shark are regularly caught as bycatch in longline, purse seine and mid-water fisheries throughout the Mediterranean Sea, as well as in recreational fisheries. 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. Surface long-line fisheries,

that target tuna and swordfish, also catch *A. vulpinus*. A number of specimens of this species may be also taken in large driftnet fisheries, even though this fishery has been prohibited in the Mediterranean for several years. The species has some important parturition and nursery areas in this region, for example the Alboran sea, where aggregations of pregnant females have been observed. Recent investigations show that pelagic sharks, including this species, are being increasingly targeted in the Alboran Sea by the Moroccan illegal swordfish driftnet fleet. Data from this fishery suggest that both annual catches and mean weights of the Thresher shark have fallen as a result of fishing mortality.

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, 1970-2008), landings for this species in the Mediterranean are reported by Spain, Portugal, Italy and France. The catches ranged from 3 to 21 tonnes in the period 1996-2008, representing from 0.1% to 1% of the annual total catch of elasmobranches reported for the western Mediterranean. The annual mean catch was around 15 t between 1999 and 2007 but declined to 10 t in 2008.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM, but this species is also under the ICCAT responsibility.

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 both in the Mediterranean (VU A3bd; assessed in 2007) and globally (VU A2bd+3bd+4bd).

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.

16.3. 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. A target fishery used to be practiced two decades ago in the central Aegean Sea, with steel-wired longlines. 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, 1970-2008), landings for this species are only reported by Spain (2004-2008), ranging between 15 and 36 t (32 t in 2008), representing about 1% of the total catch of elasmobranches in the western Mediterranean.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM.

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; assessed in 2003) and globally (VU A2bd + 3d + 4bd; assessed in 2006).

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.

16.4. Smooth hammerhead (*Sphyrna zygaena*)

FISHERIES: In the Mediterranean Sea this species is mainly caught by longlines and gillnets, particularly as bycatch in tuna and swordfish fisheries. A number of specimens of this species may be also taken in large driftnet fisheries, even though this fishery has been prohibited in the Mediterranean for several years. Recent investigations show that pelagic sharks, including this species, are being increasingly targeted in the Alboran Sea by illegal swordfish driftnet fleet. The impact of these fisheries 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, 1970-2008), 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. Zero catches were reported in 2007 and 2008. 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.

REFERENCE POINTS: None

STOCK STATUS: In the IUCN Red List, it is listed as Vulnerable both in the Mediterranean (VU A4bd; assessed in 2003) and globally (VU A2bd+3bd+4bd; assessed in 2005).

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.

16.5. *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 in the Mediterranean. In Libya and Tunisia they can sometimes be considered as target species. Management units are suggested for all species known to occur in the Mediterranean.

The landings of most of these species are usually included by FAO (Fishstat, 1979-2008) in the large group of sharks, rays, skates, etc., and they are not included in the ICCAT SCRS report.

Carcharhinus plumbeus is caught with surface and bottom longlines, gillnets and occasionally trawls in the Mediterranean Sea, including in the Sicilian Channel, off Tunisia, Libya and Egypt, Spain, Morocco and Algeria and infrequently elsewhere. There are also anecdotal reports of bycatch of this species in fixed tuna traps (Tonnara) in Sicily. Both coastal and pelagic fishing pressure is high throughout much of the Mediterranean Sea. This species was common until the 1980s along all the Levantine coasts but catches have substantially declined the recent years. The Gulf of Gabès, Tunisia, and an area off Turkey appear to be important nursery grounds for this species. This species was previously regularly seen on fish markets of southern Sicily and in the Adriatic Sea but has not been observed on the same markets in recent years. In Tunisia, the species is regularly landed and observed in fish markets. In the Gulf of Gabès, juvenile *C. plumbeus* are caught with longlines and trawls and adult females are targeted using specially-designed gillnets (locally known as "kallabia") during spring and early summer, when they move inshore to pup.

C. altimus is known to be important bycatch of the pelagic longline fishery operating from eastern Algerian ports. *C. brachyurus* is widespread in the Mediterranean but only sporadically reported possibly due to misidentification and lower abundance relative to other large sharks. *C. obscurus* is caught sporadically in longlines, gillnets and sometimes by tuna trap ("Tonnara") fisheries, principally off North African and rather less frequently by surface longlines, artisanal setlines and possibly trawlers in the Sicilian Channel.

SOURCE OF MANAGEMENT ADVICE: The advisory body for these species are SAC-GFCM and ICCAT.

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; assessed in 2003) and Vulnerable globally (VU A2bd+4bd; assessed in 2007).

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; assessed

in 2003) according to the IUCN. Globally they are listed as Near Threatened (NT; assessed in 2005) 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 (DD; assessed in 2003) in the Mediterranean according to IUCN. Globally, *C. brachyurus* is listed as Near Threatened (NT; assessed in 2003), *C. obscurus* is listed as Vulnerable (VU; assessed in 2007), and *C. altimus* as Data Deficient (DD; assessed in 2008) in the IUCN Red List.

Silky shark *C. falciformis* is an oceanic species that is occasionally reported from the Mediterranean and off Spain. This species should be managed as a North Atlantic population, which includes the Mediterranean. Globally, it is listed as Near Threatened (NT; assessed in 2007) in the IUCN Red List.

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.

16.6. Sixgill shark (*Hexanchus griseus*)

FISHERIES: This large demersal species is occasionally caught by several fishing gears, as by-catch, and sometimes retained on board and sold on the market. Target fisheries (long lines or bottom gillnets) exist in some parts of the Mediterranean (e.g., in the Greek seas). 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.

REFERENCE POINTS: None.

STOCK STATUS: Due to the little information available, the stock should be managed for the whole Mediterranean. It is listed as Near Threatend (NT) in the IUCN Red List both in the Mediterranean and globally (assessed in 2003 and 2005 respectively).

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. The MEDITS time series (1994-2010) of catches is an important source of data and should be analyzed to find recent trends in the abundance and/or occurrence of the species.

16.7. 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 (e.g., Greece) and poor in others, according to the various statistical systems adopted. The species is easily confused with *Squalus blainvillei*, also present in the Mediterranean. On the basis of the most recent data reported in the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2008), landings of this species in the Mediterranean and Black Sea were reported by France, Malta, Slovenia, Spain, Bulgaria, Romania and Ukraine and ranged from 86 to 1789 tonnes in the period 1970-2008, representing from 0.6% to 7.8% of the total catches of elasmobranches reported in the Mediterranean and Black Sea. The catches peaked in 1988 at 1789 t and then gradually declined to levels around 100 t (131 t in 2008). Most of the catches were reported from the Black Sea.

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.

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 evaluated. 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; assessed in 2006), while globally the species is listed as Vulnerable (A2bd + 3bd + 4bd; assessed in 2006).

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. The MEDITS time series (1994-2010) of catches is an important source of data and should be analyzed to find recent trends in the abundance and/or occurrence of the species.

16.8. 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 and poor in others, according to the various statistical systems adopted. Although it is widespread over the Mediterranean, landings for this species are reported only by France (Fishstat, 1970-2008) and they amounted to around 30 tonnes/year in the period 2000-2008 (28 t in 2008), representing from 1.2% to 2.3% of the total catches of elasmobranches 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^2 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^2) were located around Corsica and Sardinia Islands, but significant densities (30-50 kg/km^2) 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.

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). Indications at the present time are that 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. The MEDITS time series (1994-2010) of catches is an important source of data and should be analyzed to find recent trends in the abundance and/or occurrence of the species.

16.9. 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, 1970-2008), landings for this species are only reported by Spain. The yearly landings ranged from 49 to 90 tonnes in the period 2002-2008 (81 t in 2008), with an average value at around 60 tonnes/year, and represented from 2% to 6% of the total catches of elasmobranches in the western Mediterranean.

The species showed a high occurrence and abundance (>5% of the hauls and >10 kg/km^2 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^2. 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 Morocco, Spain, France and around Crete Island 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.

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. The MEDITS time series (1994-2009) of catches is an important source of data and should be analyzed to find recent trends in the abundance and/or occurrence of the species.

16.10. Blue stingray (*Pteroplatytrygon violacea*)

FISHERIES: This species is very commonly caught by pelagic gears 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, although 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.

REFERENCE POINTS: None.

STOCK STATUS: There are no reliable quantitative estimates of stock status. According to the IUCN Red List, the species is listed as Near Threatened (NT; assessed in 2003) in the Mediterranean and as Least Concern (LC; assessed in 2007) globally.

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.

16.11. 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 1970-2008. Good catch rates of *R. clavata* occurred in the Gulf of Lions, Corsica, Sardinia and Greek waters. It is worth noting that up to 64% of the total Mediterranean biomass is located in the Aegean Sea, where trawling deeper than 400 m is practically inexistent.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM.

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, *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). *R. clavata* is listed as Near Threatened both in Mediterranean and globally (NT; assessed in 2003 and 2005 respectively).

Raja asterias is considered as an endemic species of the Mediterranean. In the MEDITS 2007 report, *R. asterias* population exhibited no trend in abundance in 4 subareas, increasing trend in 1 subarea (Corsica) and decreasing trend in 1 subarea (Aegean Sea). It is listed as a species of Least Concern (LC; assessed in 2007) in the IUCN Red List.

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 (assessed in 2003 and 2006 respectively).

The sharpnose skate, *Dipturus oxyrinchus* was previously found throughout the Mediterranean Sea. However, it now appears to be absent from the Gulf of Lions and Eastern Mediterranean. Comparative trawl surveys indicate *D. oxyrinchus* was historically present in both shelf and slope trawl surveys and is now absent from comparable surveys. The sharpnose skate is the second most abundant skate in the Mediterranean and was recorded in 3% (301) of the hauls of the MEDITS survey. The total standing stock biomass has been estimated as 1,899 t using a swept area method, assuming full catchability. Assuming an average individual weight of either 10 or 5 kg this would represent approximately 189,900 to 379,800 individuals. It is listed as Near Threatened (NT; assessed in 2007) according to the IUCN Red List.

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; assessed in 2006) 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 (assessed

in 2007), 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; assessed in 2003) in the Mediterranean and Endangered (EN A2cd + 4cd; assessed in 2006) globally. It is also listed in Appendix III of the Bern Convention and Annex III of the Barcelona Convention.

The sandy skate, *Leucoraja circularis*, is listed as Endangered (EN A2bcd + 3bcd +4bcd; assessed in 2003) in the Mediterranean and Vulnerable (VU A2bcd+3bcd+4bcd; assessed in 2008) globally, according to IUCN. The speckled skate, *Raja polystigma*, is considered endemic in the Mediterranean Sea and is listed as Near Threatened (NT; assessed in 2003) according to the IUCN Red List.

The cuckoo skate *Leucoraja naevus* is considered as Near Threatened (NT; assessed in 2003) in the Mediterranean and Least Concern (LC; assessed in 2008) globally, according to the IUCN Red List. It is relatively rare in the Mediterranean, however it does not appear to have been previously common in the area. The twineye skate, *Raja miraletus,* appears to be stable in most parts of the Mediterranean and is currently assessed as Least Concerned (LC; assessed in 2003) by IUCN.

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; assessed in 2003) species in the Mediterranean, while they have been assessed respectively as Near Threatened (NT; assessed in 2006), Near Threatened (NT; assessed in 2008), Data Deficient (DD; assessed in 2006), and Endangered (EN A2bd+3d+4bd) globally.

RECENT MANAGEMENT ADVICE: None

STECF COMMENTS: STECF recommends the collect on 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. The MEDITS time series (1994-2010) of catches is an important source of data and should be analyzed to find recent trends in the abundance and/or occurrence of skates in the Mediterranean.

16.12. 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.

REFERENCE POINTS: The reference points proposed for this stock are: Fmax: 0.092 and F0.1: 0.064.

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

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 Near Threatened (NT; assessed in 2005) 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 stock in GSA 9.

16.13. 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.

REFERENCE POINTS: The reference points proposed for this stock are: Fmax: 0.33 and F0.1: 0.23.

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
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 stock in GSA 9.

17. Resources in the Black Sea

17.1. Turbot (*Psetta maximus*) in Black Sea

FISHERIES: The STECF SG-RST 10-03 noted that the Turbot (*Psetta maxima*) is the one of the most important demersal fish species in the Black Sea with high market demand and prices. Main fishing gear for all coastal states are gillnets, but in Turkey, the bottom trawling is also permitted. The turbot is often caught as a by-catch of sprat fishery, long lines and purse seiners fishery. Turbot catches are higher in spring and autumn periods: March – April and October – November for Bulgaria and Romania; May – June for Ukraine, March - April and September – October for Turkey. STECF estimates that International annual landings of turbot during last 5 years have averaged 858 t and ranged between 730 t and 1035 t. Misreporting and illegal catches also occur.

Prohibition of fishing activity for turbot was in force from 15 April to 15 June in European Community waters of the Black Sea in relation to pick reproduction period of turbot. The minimum legal mesh size for bottom-set nets used to catch turbot is 400 mm. Other technical measures like minimum landing size and by-catch rules are defined.

In Ukraine turbot fisheries are conducted with bottom (turbot) gill nets with mesh size 180 - 200 mm. The use of bottom trawls has been prohibited. Turbot exploitation in Ukraine has been regulated by TACs since 1996.

In Turkey turbot target fisheries is conducted with bottom (turbot) gill nets with minimum mesh size 160 – 200 mm (Tonay, Öztürk, 2003) and with bottom trawls with minimum mesh size 40 mm. The minimum admissible landing size in Turkey is 40 cm total length. In Turkey – no TAC regulation of turbot catches. Seasonal fishing closures in Turkey are: for bottom trawls from 1st September – 15th April and for gillnets – from 1th May up to 30th June.

SOURCE OF MANAGEMENT ADVICE: The management advice is provided by STECF based on assessments performed by its Black Sea Assessment WG. SG Black Sea has applied XSA to assess the stock of turbot, but because of uncertainties about actual catch the assessment is interpreted only in relative terms, i.e. it is considered indicative of trends only.

MANAGEMENT AGREEMENT: The TACs for turbot catches in 2010 and quota allocations are defined in Council Regulation (EC) No 1287/2009. Both for Bulgaria and Romania quotas of each 48 t for each country were permitted (96 t in total). The size of TAC is not based on an analytical procedure but on precautious basis. No management agreement exists with other Black Sea countries. Also mesh size of gillnets is regulated.

REFERENCE POINTS: Currently precautionary reference points are not applied. STECF, based on the results of its subgroup, proposes $F_{0.1}$=0.15 as limit reference point (Fmsy proxy) of exploitation consistent with high long term yields.

STOCK STATUS: SG Black Sea has applied XSA to assess the stock of turbot, but because of uncertainties about actual catch the assessment is interpreted only in relative terms, i.e. it is considered indicative of trends only. Current biomass of turbot is much lower compared to historical levels. The drop in abundance is consistent with the decreases in CPUE and landings. Recruitment has increased since 2003 but this has not materialized in a significant increase in SSB. Despite the recently low TACs the fishing mortality remains at a level certainly higher than the proposed reference point with no signal of reduction.

MANAGEMENT OBJECTIVES: No multi-annual management plan for the European turbot fisheries in the Black Sea exist. Such a plan and its objectives would need to be coordinated between EU and non-EU countries.

RECENT MANAGEMENT ADVICE: STECF considers that the results of the most recent assessment conducted during the STECF-SGRST Working Group in Cadiz in September 2010 are not sufficiently reliable to use as the basis for quantitative management advice on fishing opportunities for 2011. Therefore, in line with its previous advice STECF reiterates that the exploitation of turbot in the Black Sea should be kept at the lowest possible level in order to allow the stock to recover.

STECF COMMENTS: STECF endorses the assessment as conducted by its subgroup on Black Sea fisheries and stock assessments. The quality of such assessments will only impove if reliable catch statistics from all countries are available.

STECF notes that that recent management measures do not appear to have resulted in a reduction in exploitation rates. Furthermore, survey indices do not show any trend in stock biomass.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that turbot in the Black Sea falls under Category 10. Accordingly STECF notes the above category 10 implies a TAC in 2011 of 35 t for each Bulgaria and Romania (70 t in total) based on a 25% reduction in TAC compared to 2010

17.2. Sprat (*Sprattus sprattus*) in Black Sea

FISHERIES: The fishing grounds of Black Sea sprat are in the shelf area (up to 100-120m in depth). Sprat fishing with mid-water trawls in EU waters and pair-trawls in Ukraine and in Turkey is undertaken with large fishing vessels (>12m) at mainly at depths between 30 and 60 m. During summer months (July-August) sprat inhabits deeper water below the thermocline (usually under 10.5 C at 20 m depth),. There is substantial warming up of waters during summer and above the thermocline water temperatures reach 25-27 C°. The sprat fishery is carried out year round, with the highest yields in May-October. In Turkey, the main fishing season is spring (April) and late autumn (November). In 2009, catches increased significantly to about 91,000t mainly due to developing Turkish fisheries.

SOURCE OF MANAGEMENT ADVICE: The management advice is provided by STECF based on assessments performed by its Black Sea Assessment WG. Ukraine and Russian Federation also apply TAC management in their national waters.

MANAGEMENT AGREEMENT: TAC and quota allocations are applied in EU waters of the Black Sea for Bulgaria and Romania. No fishery management agreement exists among Black Sea countries. In the European Black Sea waters a precautious TAC 12 750 t was set for 2010 (Council Reg. No 1287/2009.

REFERENCE POINTS: Currently precautionary reference points are not applied. STECF, based on the results of its subgroup, proposes the exploitation rate of E=0.4 as limit reference point of exploitation consistent with high long term yields (Fmsy proxy). Due to the short life span of sprat resulting in a high natural mortality the yield per recruit analysis and age based production models are not applicable

STOCK STATUS: The analyse of the main population parameters reveals that the sprat stock has recovered from the depression in the 1990s due to good recruitment in 1999-2001 and the biomass and catches have gradually increased over the 1990s and early 2000s. The historic stock estimates, however, confirm the cyclic nature the sprat population dynamics.

Since 2000 SSB has varied without a clear trend at an average level of the past 4 decades.

Fishing mortalities (F_{1-3}) also varied without trend since the 1995 at between 0.4 and 0.6. There is a recent increase estimated in 2009 to F=0.62. This equals to an exploitation rate of about E=0.39 (natural mortality M=0.95). STECF considers thus the stock of sprat in the Black Sea as sustainably exploited.

MANAGEMENT OBJECTIVES: No multi-annual management plan for the European turbot fisheries in the Black Sea exist. Such a plan and its objectives would need to be coordinated between EU and non-EU countries.

RECENT MANAGEMENT ADVICE: STECF recommends a status quo exploitation being applied in 2011. This results in an overall TAC for the sprat in all the Black Sea of 52 100 t. In the absence of an allocation key for the international sprat catches, STECF is unable to advice on a specific EU TAC for sprat in the Black Sea.

STECF COMMENTS: STECF endorses the assessment as conducted by its subgroup on Black Sea fisheries and stock assessments.

With reference to the Communication from the Commission (COM (2010) 241 FINAL), STECF advises that sprat in the Black Sea falls under Category 1. Accordingly, STECF notes the above category 1 rule implies a TAC in 2011 of 52 100 t for the sprat for the entire Black Sea. In the absence of an allocation key for the international sprat catches, STECF is unable to advice on a specific EU TAC for sprat in the Black Sea. STECF notes that a precautionary EU TAC was set at 12 750 t for 2010. STECF notes that the category 1 TAC rule stipulates a maximum annual TAC variation of 25 %.

17.3. Other Black Sea stocks

STECF is presently unable to advise on the state of resources or on fishing opportunities for 2011 for other stocks in the Black Sea.

18. Highly migratory fish (Atlantic and Mediterranean)

ICCAT is the RFMO directly responsible for the management of tuna and tuna-like species in the Atlantic Ocean, the Mediterranean Sea and the Black Sea. Along with these species, ICCAT is also responsible for all the other species taken as a by-catch in the tuna fisheries. Hence, this section includes not only the tuna and tuna-like species, but also the pelagic elasmobranch species that have been considered by the ICCAT-SCRS report in 2010.

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.

18.1. Bluefin (*Thunnus thynnus*), Eastern Atlantic and Mediterranean

FISHERIES: East Atlantic bluefin tuna is under a quota regime since 1998. 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 2008 and 2009, declared catches were about 23,849 and 19,701 t (in total for the East Atlantic and Mediterranean together) respectively. Preliminary and incomplete catch data for 2010 report a much lower total, due to the strict enforcement of the 13,500 t. quota in most of the areas. Available information, however, indicates that landings have been seriously under-reported in the past 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, taking into account fishing capacity, but recent estimates taking account of capacity are lower than the reported catch (18,308 estimated catches in 2009, against 19,701 declared catches).

Available indicators from fisheries exploiting juvenile bluefin in the Bay of Biscay since the mid 1970s do not show any clear trends. This result is not particularly surprising because of strong inter-annual variation in year class strength. ICCAT-SCRS reports that qualitative information from eastern Atlantic fisheries since 2007, together with the results of aerial surveys in 2009 give consistent indications of higher abundance or higher concentration of small bluefin tuna in the north-western Mediterranean than found in surveys conducted in 2000-2003. This could reflect a positive outcome from the recent increase in the minimum legal size, implemented under ICCAT Rec. 06-05 and/or recruitment success since 2003, not reflected by the declared catches due to the minimum size regulation. Catch rate indicators from longliners and traps targeting large fish (spawners) in the Eastern Atlantic and the Mediterranean Sea also displayed a recent increase in cpue and mean size after a general decline since the mid-1970s. This increasing trend in CPUE and mean size is confirmed by the preliminary 2010 data, while all trap data in the current year showed high catches and several thousands of bluefin tuna were released at sea.

Bluefin tuna fisheries have been very active in the Mediterranean Sea and in the Black Sea since ancient times. The latest reported catches of bluefin tuna from the Black Sea are from the beginning of 1960's, but a few specimens were reported to have been caught there again since 2007, after more than 40 years of absence, while large bluefin tuna schools have been recently reported moving towards the Marmara Sea. The eastern bluefin stock is taken by a variety of vessels and types of fishing gears, with many landing sites located in many countries. The main gears are longline, trap and baitboat for the east Atlantic, and purse-seine, longline and traps for the Mediterranean. For EU Member States, driftnet fishing for tuna has been banned since January 1st 2002, while the ban entered into force in 2004 for all the other Contracting Parties to ICCAT, as well as the GFCM Member States, but a driftnet fishing activity is still officially permitted in Morocco. Recreational fishing is also a relevant but unquantifiable source of fishing mortality on juvenile bluefin.

The rapid development of tuna farming in the Mediterranean Sea has induced further pressure on this stock and compounds the serious and well known problem of obtaining accurate catch data. Length compositions of the

catches is affected by under-reported or over-quota components but also by technical problems in detecting the size of farmed tuna when they enter into the cages. 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. The lack of reliable data on juvenile catches has also compromised the ICCAT-SCRS assessments and advice for many years, particularly on recruitment.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT.

REFERENCE POINTS: STECF notes that precautionary reference points have not been proposed for this stock and that biological reference points derived from the recent assessment are still poorly defined. The short-term sustainable yield (ICCAT Rec. 09-06) is estimated to be 13,500 t or less. ICCAT has also estimated a long-term potential yield of about 50,000 t (approximated as the average long-term yield at F0.1 calculated over a broad range of scenarios including contrasting recruitment levels and different selectivity patterns).

STOCK STATUS: ICCAT-SCRS stated in all its reports during the past 10 years that bluefin tuna data were unreliable and in 2009 indicated that without a significant and sustained effort at improving data, it is unlikely that the ICCAT-SCRS could improve, in the near future, its scientific diagnosis and management advice. Nevertheless, the ICCAT-SCRS assessed the stock in 2010, as requested by the ICCAT, on the basis of 2009 data. The 2010 assessment results indicate that the recent SSB tendency has shown signs of increase/stabilization in some runs while it continues to decline for others, depending on the models specifications and data used. Trend in fishing mortality (F) displayed a continuous increase over the time period for the younger ages (ages 2-5) while for oldest fish (ages 10+) it had been decreasing during the first 2 decades and then rapidly increased during the 1990s. Fishing mortalities have declined on the oldest fish in recent years, but these for younger (ages 2-5) are more uncertain and display higher variability. General trends in F or N were not strongly affected by the historical catches assumptions (i.e. reported *versus* inflated), except in recent years. These analyses indicated that recent (2007-2009) SSB is about 57% of the highest estimated SSB levels (1957-1959). Recent recruitment levels remain very uncertain due to the lack of information about incoming year class strength and high variability in the indicators used to track recruitment and the low recent catches of fish less than the minimum size. The absolute values estimated for F and SSB remained sensitive to the assumptions of the analysis and could lead to a different perception in the whole trend in SSB. .

Estimates of current stock status relative to MSY benchmarks are uncertain, but lead to the conclusion that although the recent Fs have probably declined, these values remain too high and recent SSB too low to be consistent with the Convention Objectives. Depending on different assumed levels of resource productivity current F show signs of decline - reflecting recent catch reductions- but remained larger than that which would result in MSY. SSB appears to be about 35% (from 19% to 51% depending on the recruitment levels) of 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. Historically the ICCAT Rec. 08-05 established decreasing TACs: 29,500 t in 2007, 28,500 t in 2008, 22,000 t in 2009, 19,950 in 2010 and 18,500 t in 2011. More recently, ICCAT Rec. 09.06 set the quota for 2010 at 13,500. However, Libya, Morocco and Tunisia were authorized to carry over into 2009 and 2010, their previous quota allocations that were not taken and Libya and Turkey disagreed with the allocation key accepted by other Contracting Parties to ICCAT and declared autonomous fishing quotas higher than their ICCAT allocation.

Even considering uncertainties in the analyses, the outlook derived from the 2010 assessment has improved in comparison to previous assessments, as *F* for older fish seem to have significantly declined during the last two years. However, estimates in the last years are known to be more uncertain and this decline (as the Fs for younger ages which remains more variable) needs to be confirmed in future analyses. Nonetheless, *F2009* still remains largely above the reference target $F_{0.1}$ (a reference point more robust to uncertainties than F_{MAX}, as used in the past) while SSB is only about 35% of the biomass that is expected under a MSY strategy.

The SCRS also evaluated the potential effects of ICCAT Rec. 09-06. Acknowledging that there is insufficient scientific information to determine precisely the productivity of the stock (i.e. the steepness of the stock/recruitment relationship), the SCRS performed the projections with three recruitment levels while taking into account for year-to-year variations. These levels correspond to the 'low' and 'high' scenarios as defined in the 2008 assessment plus a 'Medium' scenario that corresponds to the geometric mean of the recruitment over the 1950-2006 years. For the projections, the group investigated 24 scenarios. The results indicated that the stock is increasing in all the cases, but the probability to achieve $SSB_{F0.1}$ (i.e. the equilibrium SSB resulting in

fishing at $F_{0.1}$) by the end of 2022 depends on the scenarios. Overall, the SSB would be equal or greater than $SSB_{F0.1}$ by the end of 2022 for a catch = 0 to 13,500 t. It is finally worth noting that a $F_{0.1}$ strategy starting in 2011 would not allow the rebuilding of the stock to $SSB_{F0.1}$ by 2022.

Projections are known to be impaired by various sources of uncertainties that have not yet been quantified. Although the situation has improved regarding recent catch, there are still uncertainties about stock status in 2009, population structure and migratory rates as well as a lack of knowledge about the level of IUU catch and key modeling parameters on BFT productivity. Acknowledging these limitations, the overall evaluation of ICCAT Rec. 09-06 indicated that the rebuilding of BFTE at $SSB_{F0.1}$ level with a probability of at least 60% could be achieved by 2019 with zero catch and by 2022 with catch equal to current TAC (i.e. 13,500 t). However, this 60% probability level is unlikely to be attained by the end of 2022 with a catch greater than 14,000 t. Finally, it should be noted that the incorporation of additional uncertainties into the overall analysis could change the estimates of rebuilding probability.

ICCAT SCRS believes that the substantial decrease in the catch occurred in the Eastern Atlantic and Mediterranean Sea is the result of the implementation of the rebuilding plan and monitoring and enforcement controls. While current controls appear sufficient to constrain the fleet to harvests at or below TAC, should it not be the case, the SCRS remains concerned about substantial excess capacity remains which could harvest catch volumes well in excess of the rebuilding strategy adopted by ICCAT.

SCRS suggests the ICCAT might consider a probability of rebuilding standard different from that envisaged in ICCAT Rec. 09-06, considering the unquantified uncertainties. However, the SCRS notes that maintaining catches at the current TAC (13,500 mt) under the current management scheme, for 2011-2013, will likely allow the stock to increase during that period and is consistent with the goal of achieving F_{MSY} and B_{MSY} through 2022 with at least 60% of probability, given the quantified uncertainties.

The request to include the Atlantic bluefin tuna in the Appendix 1 of the CITES list was rejected by the Conference of Parties in Doha in 2010.

STECF COMMENTS: STECF note the ICCAT-SCRS advice, and notes that the results from simulation runs with alternative input assumptions indicate that SSB is expected to reach $SSB_{F0.1}$ (ICCAT objective: paragraph 3 of ICCAT Rec. 09-06) by 2022 with an average probability of 60% provided that annual catches do not exceed 13,500t. STECF also notes that $SSB_{F0.1}$ could be achieved by 2019 with a probability of at least 60% if the annual catch is zero t.

STECF notes that the provisions of paragraph 3 of ICCAT REC 09-06 are not consistent with the objectives of the Johannesburg declaration in achieving MSY by 2015. STECF also notes that the target to achieve $SSB_{F0.1}$ may be unrealistic for the following reasons.

1. The SSB required to deliver MSY if far higher than the SSB observed in the past.

2. SSB targets are output variables that cannot be controlled by management measures alone.

STECF suggest that an alternative and potentially achievable objective would be to aim to achieve F_{msy} in line with the Commission Policy as outlined in COM (2006) 360 FINAL, Section 6, which calls for long-term plans to be the prime instrument to implement the MSY approach. More specifically such plans should define a target rate of fishing, and a means to reach that target gradually – and not seek to manage biomass levels. Implementation of such an approach could be guided by the provisions of COM (2010) 241 Final.

STECF suggests that given the uncertainty surrounding the status of the eastern Atlantic and Mediterranean bluefin stock and its exploitation rate STECF has no basis to recommend an appropriate catch level for 2011 different from the level suggested by SCRS (13,500 t). However noting that current estimates for F are of the order of three times $F_{0.1}$, STECF considers that a reduction in fishing mortality should be the main objective for management.

In relation to candidate fishing mortality targets, Table 17.1 indicates the year and probability of achieving F0.1 for a range of TACs for Eastern Atlantic and Mediterranean bluefin.

Table 17.1 Year and probability of fishing mortality being less than F0.1 for a range of TACs.

Probability of $F<F_{0.1}$

TAC	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	0.00	0.00	0.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2000	0.00	0.00	0.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4000	0.00	0.00	0.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6000	0.00	0.00	0.48	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8000	0.00	0.00	0.48	0.97	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10000	0.00	0.00	0.48	0.89	0.94	0.96	0.98	0.98	0.99	0.99	0.99	1.00	1.00	1.00	1.00
12000	0.00	0.00	0.48	0.77	0.86	0.91	0.93	0.95	0.97	0.98	0.98	0.99	0.99	0.99	0.99
14000	0.00	0.00	0.48	0.61	0.73	0.81	0.85	0.89	0.92	0.94	0.95	0.96	0.97	0.98	0.98
16000	0.00	0.00	0.48	0.42	0.58	0.68	0.74	0.79	0.84	0.87	0.89	0.91	0.93	0.94	0.95
18000	0.00	0.00	0.48	0.26	0.41	0.53	0.62	0.67	0.72	0.77	0.80	0.83	0.86	0.87	0.89
20000	0.00	0.00	0.48	0.14	0.26	0.39	0.48	0.54	0.60	0.65	0.69	0.72	0.75	0.78	0.80
13500	0.00	0.00	0.48	0.65	0.77	0.83	0.88	0.91	0.93	0.95	0.96	0.97	0.98	0.98	0.98

The shaded areas in table 17.1 indicate the year and TAC where F is expected to be at or below the target of $F_{0.1}$ with 50 % (light green) 90% probability (dark green).

STECF notes that the SCRS assessments have not made use of the long historical series of catch data from traps but that the series may provide useful information for assessment purposes if an acceptable standardization methodology can be identified.

STECF further notes that prior to 2008, poor or incomplete enforcement of adopted management plans has probably contributed to the poor status of this stock, while the more stringent measures adopted by ICCAT Rec.08-05 and Rec. 09-06, were fully implemented and enforced in 2009 and 2010. STECF recommends that efforts be taken to ensure that management measures are fully implemented and enforced in all the bluefin tuna fisheries concerned.

STECF agrees with the ICCAT-SCRS 2009 advice that a sensible minimum catch size would be 25 kg instead of the present 30 kg, in order to avoid misreporting and/or discarding of unavoidable catches of mature fish between 25 kg and 30 kg.

STECF reiterates its support for methodologies able to explore the correlations between oceanographic and environmental factors and bluefin tuna distribution and concentration.

18.2. 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. In 2008, catches increased again to 2,015 t, reaching 1,935 t in 2009. Most of the catches are taken by vessels from the USA, Canada and Japan. The average weight is increasing since 1970. There are very high uncertainties about the year of first maturation for the western bluefin tuna and the data have been recently discussed; the huge discrepancy in the first maturation between the eastern and the western stock is considered unrealistic and possibly due to a very limited research within the spawning area of this species.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT. The latest stock assessment is from 2008.

REFERENCE POINTS: None.

STOCK STATUS: The 2010 assessment showed some differences with all the previous assessments, because of a different growth curve. This assumption resulted in lower fishing mortality rates and higher SSB, but also in less potential in terms of the MSY. The trend analysis are consistent with previous analyses in that spawning stock biomass (SSB) declined steadily between the early 1970s and 1992. Since then, SSB has fluctuated between 21% and 29% of the 1970 level and the increase was more evident for the last 6 years. The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets. Fishing mortality on spawners (ages 8 and older) declined markedly between 2002 and 2007. Estimates of recruitment were very high in the early 1970s, and additional analyses involving longer catch and index series suggested that recruitment was also high during the 1960s. Since 1977, recruitment has varied from year to year without trend, with the exception of a strong year class in 2003, but SCRS noted that year classes following

2003 are the lowest on record. The SCRS noted that a key factor in estimating MSY-related benchmarks is the highest level of recruitment that can be achieved in the long term. Assuming that average recruitment cannot reach the high levels from the early 1970s, recent F (2006-2008) is about 70% higher than the MSY level and SSB_{2009} is about 10% higher of the MSY level. Estimates of stock status are more pessimistic if a high recruitment scenario is considered (F/FMSY=1,88, B/BMSY=0.15). The 2008 assessment results are similar to those from previous assessments.

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 until 2009. Two plausible explanations for the shortfall were put forward previously by the SCRS: (1) that availability of fish to the United States fishery has been abnormally low, and/or (2) the overall size of the population in the Western Atlantic declined substantially from the level of recent years. While there is no overwhelming evidence to favour either explanation over the other, the base case assessment implicitly favours the first hypothesis (regional changes in availability) by virtue the estimated increase in SSB. Nevertheless, the SCRS notes that there remains substantial uncertainty on this issue and more research needs to be done.

The SCRS cautions that the conclusions of the 2010 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 of the two stocks with mixing. 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. Another important source of uncertainty is recruitment, both in terms of recent levels (which are estimated with low precision in the assessment), and potential future levels (the "low" vs "high" recruitment hypotheses which affect management benchmarks). Finally, the growth curve assumed in the analyses may be revised based on new information that has been collected.

RECENT MANAGEMENT ADVICE:

A medium-term (10-year) outlook evaluation of changes in spawning stock size and yield over the remaining rebuilding period under various management options was conducted. Future recruitment was assumed to fluctuate around two alternative scenarios: (i) average levels observed for 1976-2006 (85,000 recruits, the low recruitment scenario) and (ii) levels that increase as the stock rebuilds (MSY level of 270,000 recruits, the high recruitment scenario). The SCRS has no strong evidence to favor either scenario over the other and notes that both are reasonable (but not extreme) lower and upper bounds on rebuilding potential.

The outlook for bluefin tuna in the West Atlantic with the low recruitment scenario is more optimistic with respect to current stock status than that from the 2008 assessment (owing to

the use of improved information on the growth of bluefin tuna). A total catch of 2,500 t is predicted to have at least a 50% chance of achieving the convention objectives of preventing overfishing and maintaining the stock above the MSY level. The outlook under the high recruitment scenario is more pessimistic than the low recruitment scenario since the rebuilding target would be higher; a total catch of less than 1,250 t is predicted to maintain F below FMSY, but the stock would not be expected to rebuild by 2019 even with no fishing.

The low recruitment scenario suggests the stock is above the MSY level with greater than 60% probability and catches of 2,500 t or lower will maintain it above the MSY level. If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1,100 t or less are predicted to have a 60% chance to immediately end overfishing and initiate rebuilding. The SCRS notes that considerable uncertainties remain for the outlook of the western stock,including the effects of mixing and management measures on the eastern stockIn 1998, the ICCAT initiated a 20-year rebuilding plan designed to achieve BMSY with at least 50% probability. In response to recent assessments, in 2008 the Commission Future stock productivity, as with prior assessments, is based upon two hypotheses about future recruitment: a ‘high recruitment scenario” in which future recruitment has the potential to achieve levels that occurred in the early 1970’s and a “low recruitment scenario” in which future recruitment is expected to remain near present levels. Results in previous assessments have shown that long term implications of future biomass are different between the two hypotheses and this research question remains unresolved. However, the current (2010) assessment is also based on new information on western bluefin growth rates that has modified the Committee’s perception of the ages at which spawning and maturity occur. Maturity schedules remain very uncertain, and, thus, the

application of the new information in the current (2010) assessment accentuates the differences between the two recruitment hypotheses.

Probabilities of achieving BMSY within the Commission rebuilding period were projected for

alternative catch levels. The "low recruitment scenario" suggests that biomass is currently sufficient to produce MSY, whereas the "high recruitment scenario" suggests that BMSY has a very low probability of being achieved within the rebuilding period. Despite this large uncertainty about the long term future productivity of the stock, under either recruitment scenario current catches (1,800 t) should allow the biomass to continue to increase. Also, catches in excess of 2,500 t will prevent the possibility of the 2003 year class elevating the productivity potential of the stock in the future.

The SCRS notes that the 2010 assessment is the first time that this strong 2003 year-class has been clearly demonstrated, likely as a result of age assignment refinements resulting from the growth curve and additional years of data; more observations from the fishery are required to confirm its relative strength. A further concern is that subsequent year-classes, although even less well estimated, are the lowest observed values in the time series. The ICCAT may wish to protect the 2003 year class until it reaches maturity and can contribute to spawning. Maintaining catch at current levels (1,800 t) may offer some protection.

As noted previously by the SCRS, both the productivity of western Atlantic bluefin and western Atlantic bluefin fisheries are linked to the eastern Atlantic and Mediterranean stock. Therefore, management actions taken in the eastern Atlantic and Mediterranean are likely to influence the recovery in the western Atlantic, because even small rates of mixing from East to West can have significant effects on the West due to the fact that Eastern plus Mediterranean resource is much larger than that of the West.a total allowable catch (TAC) of 1,900 t in 2009 and 1,800 t in 2010 (ICCAT Rec. 08-04). The current (2010) assessment indicates similar historical trends in abundance as in previous assessments. The strong 2003 year class has contributed to stock productivity such that biomass has been increasing in recent years.

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.

STECF notes that it may seem counterintuitive, that a model with lower recruitment manages to achieve Bmsy , whilst higher recruitment on the basis of a stock recruitment relationship does not reach Bmsy by the time frame required by the Kobe II matrix. STECF notes that changing some basic assumptions, like the growth curve, it is not easy to compare the previous assessment with the 2010 one.STECF, even for the western bluefin tuna stock, notes the high uncertainty of the assessment, along with the urgent need to revise some fundamental biological and ethological parameters used as inputs for the model.

18.3. 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.

Landings of Northern Albacore remained relatively stable at around 35,000 t/year between 1984 to 2000. Catches decreased to a low of 22,741 t in 2002 (primarily due to a decrease in catches in the surface fishery) and increased again thereafter, reaching a peak of 36,199 t in 2006. The total catch in 2009 was 15,364 t, representing a decrease of 25% compared to the 2008 yield and a larger decrease from the 2006 peak catch (36,989 t). The catch in 2009 was the lowest recorded in the time series since 1950.The surface fisheries accounted for the bulk of the total catch with 12,911 t reported in 2009 (81%).

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT. The most recent assessment for North Atlantic albacore was undertaken in 2009.

REFERENCE POINTS: None.

STOCK STATUS: Based on the 2009 assessment (which includes catch and effort since the 1930s and size frequency since 1959), ICCAT-SCRS consider that spawning stock has declined and is currently about one third 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 2007. The

most recent recruitment is estimated to be the lowest for all the years of the evaluation although the magnitude of this year-class is highly uncertain in the latest year. The 2009 assessment indicates that the stock has remained below BMSY (current SSB2007 is approximately 62% of SSB at MSY) since the late 1960's. Corresponding fishing mortality rates have been above FMSY (current ratio F2007/FMSY is 1.05 which is only slightly higher than FMSY).

The trajectory of fishing mortality and spawning stock biomass relative to MSY reference points, indicate the northern albacore stock may have been overfished (SSB/SSBMSY <1) since the mid-1980s.

RECENT MANAGEMENT ADVICE: In 1998 ICCAT limited fishing capacity (number of vessels) in this fishery to the average of 1993-1995; this recommendation remains in force. In 2001 ICCAT established a total allowable catch of 34,500 t for this stock: in 2003 this was extended to 2007. However reported catches for 2005 and 2006 (35,318 and 36,989 respectively) exceeded the TAC whereas the 2007 catch (21,863) were well below the TAC.

In 2007, ICCAT established a new TAC for 2008 and 2009 of 30,200 t. Reported catch for 2008 (20,225) is well below the TAC.

The 2009 ICCAT/SCRS assessment indicates that constant catches above 28,000 t will not result in stock rebuilding to MSY by 2020. In view of the 2009 assessment, and in order to achieve the ICCAT management objective by 2020, a level of catch of no more than 28,000 t is advised. The ICCAT recommended the establishment of a Total Allowable Catch (TAC) of 28,000 t for 2010 and 2011 (ICCAT Rec. 09-05).SCRS notes that in 2008 and 2009 catches were lower than 28,000 t.

STECF COMMENTS: STECF interprets the advice from ICCAT to imply that constant catches below 28,000 t will achieve the ICCAT conservation objective of achieving BMSY by 2020. The fact that recent catches are well below 28,000 t suggests that a new assessment should be very useful to better define the stock status.

18.4. Albacore (*Thunnus alalunga*), South Atlantic Ocean

FISHERIES: Recent South Atlantic albacore landings can largely be attributed to four fisheries; surface baitboat fleets from South Africa and Namibia, and longline fleets of Brazil and Taiwan.

The surface fleets 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 the northeast coast off Brazil. The Taiwanese longline fleet operates over a larger area and throughout the year, and consists of vessels that target albacore and vessels that take albacore as by-catch, in bigeye directed fishing operations. On average, the longline vessels catch larger albacore (60-120 cm) than the surface fleets.

Total reported albacore landings for 2009 were 22,856 t an increase of about 21% from 2008 catch. The Chinese Taipei catch in 2009 was 8,678 t, a decrease of 1,288 t as compared to that of 2008. This decrease mainly stemmed from a decrease in fishing effort targeting albacore.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT. The management is based on assessments of stock status using catch rates effort and size.

REFERENCE POINTS: Replacement yield is set at about 28,800 t (25,800-29,300 t), with a maximum sustainable yield estimated at 33,300 t (29,900-36,700 t).

STOCK STATUS: Based on the 2007 assessment which considers catch, size and effort since the 1950s and till 2005, 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. ICCAT concluded that it is likely that the stock was below the maximum sustainable yield (MSY): 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.

The outlook for the stock, based on the current assessment, is for SSB to increase from the levels estimated in 2005 over the next few years. This outlook assumes catches remain below the estimated replacement yield of 29,000 t

RECENT MANAGEMENT ADVICE: The first TAC for this stock was established by ICCAT in 1999 and for 2001 – 2003 the TAC was set at 29,200 t. In 2007, ICCAT recommended [Rec. 07-03] a catch limit of 29,900 t (the lowest estimate of MSY) until 2011. Catches in 2007 and 2008 (20,274 and 18,576 respectively) were well below this TAC.

The 2005 assessment indicates that this stock was overfished but that catches in the order of those seen in 2006 (24,452 t), would recover the stock. TheSCRS noted that reported catches in 2008 and 2009 were well below the TAC, the 2006 catch, and the replacement yield (28,800 t).

STECF COMMENTS: STECF agrees with the advice from ICCAT but nothes that recent catches are well below 29,000 t, suggesting the need to update the assessment to better define the stock status.

The stock status and advice for albacore in the South Atlantic was not updated by ICCAT SCRS in 2010. The text above therefore remains unchanged from the STECF Review of Advice fro 2010

18.5. 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 (France has a sporadic fishery entirely dependent upon the presence of the albacore in the Liguro-Provencal basin). ICCAT statistics, however, are considered quite incomplete since many years, 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. 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 account only for 3,529 t, reaching 5,947 t in 2006. In 2007, the reported catches accounted for 6,546 t, dropping to 2970 t in 2008 and increasing again in 2009 with 4,021 t, and they were obtained mainly by long-lines (3,175t), other surface gears (820 t) and purse seines (25 t). STECF believes that even catches reported as "purse-seines" might realte to other surface gears, including gillnets. EC-Italy has the highest catch in this fishery (2,724 t in 2009). 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 1st 2002 in the EC countries and from 2004 in all the ICCAT Mediterranean countries, but it is known that illegal fishing activity still occurs in some areas.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT and FAO/GFCM, through the ICCAT/GFCM expert consultation.

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 is still preventing 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. A Mediterranean Albacore Data Preparatory Meeting was held in 2010, following the 2009 recommendations of the Albacore Species Group. However, no assessment was conducted.

RECENT MANAGEMENT ADVICE: There are no ICCAT regulations directly aimed at managing the Mediterranean albacore stock.

STECF COMMENTS: STECF notes that data collection for this species is mandatory within the EC data collection framework. 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 removals at that time and in some cases no estimates are available for various countries. STECF notes that even a preliminary analysis of the data to examine trends for those fisheries having sufficient data series would potentially be useful.

18.6. Yellowfin (*Thunnus albacares*), Atlantic Ocean

FISHERIES: Yellowfin tuna are caught between 45°N and 40°S by surface (purse seine, baitboat, troll and handline) and sub-surface gears (longline). In contrast to the increasing catches of yellowfin tuna in other oceans worldwide, there has been a steady decline in overall Atlantic catches, of 63% between 2001-2007. This

was followed by a small increase of ~8% in 2008 (relative to 2007). Total recorded landings of YFT in 2008 were 109,097 t and 118,871 t in 2009. The purse seine fishery is the major contributor to total catches of this species. Landings from baitboats and purse seiners generally declined between 2001-2009, but purse-seine catches are showing a moderate increase in 2009, in the eastern Atlantic. Landings from other surface gears remained relatively stable. Landings from longliners fluctuated but remained relatively stable overall in this period. Of the total landings in 2009 the purse seine fisheries contributed 77,757 t (65,4%), long line catches were 22,800 t (19,2%), bait boat catches were 12,280 t (10,3%) and other gears were 5,660 t (4,8%). Baitboat catches declined markedly between 2001 and 2009, largely because of reduced catches by Ghana baitboats, which resulted from a combination of reduced days fishing, a lower number of operational vessels, and the observance of the moratorium on fishing using floating objects. In the western Atlantic, 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 spillover of Indian Ocean fish caught just inside the Atlantic boundary.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT.

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

STOCK STATUS: The Atlantic YFT stock was assessed in 2008, at which time catch and effort data up to and including 2006 were available. Methods used were cohort analyses (VPA) and production models (ASPIC). The estimated MSY derived from the VPA was 130,600 tonnes and 146,000 tonnes from ASPIC, although both models had associated an amount of uncertainty around point estimates. Results from VPA gave an (F_{2006}/F_{MAX}) of 0.84, and a relative biomass (B_{2006}/B_{MAX}) 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 2009 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 given the period of reduced catches and fishing effort. Currently, stock biomass is estimated to be near the Convention Objective and recent fishing mortality rates somewhat below F_{MSY}. Effort increases of 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. However, this would lead to a 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: STECF notes that catches increased in 2009, which may represent the reversal of the previous period of declining catches. If catch rates continue to increase this reduces confidence that biomass will be somewhat above B_{MSY}.

ICCAT-SCRS noted that catch levels in recent years have been held in check, despite increasing efficiencies of individual vessels, by a continued decline in the number of purse seine vessels in the eastern Atlantic. STECF agrees that if the recent movement of additional newer vessels from the Indian Ocean into the Atlantic continues, with a corresponding increase in fishing mortality, the situation should be monitored closely to avoid adverse impacts on stock status.

18.7. Bigeye (*Thunnus obesus*), Atlantic Ocean

FISHERIES: Catches have been increasing from the lowest historic level since 1988 of 65,873 t in 2006, reaching 79,597 t in 2007 and decreasing again to 70000 t. in 2008, but still at much lower levels than in the 1990s. Total landings in 2009 of Bigeye tuna in the Atlantic are currently estimated were around 86,000 t. In the Atlantic this stock is exploited by three major gears/fisheries: longline, purse seine and baitboat (live bait). In 2009, the last year of confirmed landings, total landings were distributed by these 3 fisheries as follows: 47,932 t (56%) by long line, 22872 t (27%) by purse seine and 14940 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, but appears to have stabilized at levels around 70,000t since then, increasing again in 2009 (86,011 t provisionally reported).

During the period 2005-2008 an overall TAC for major countries was set at 90,000 t. The TAC was later lowered (ICCAT Rec. 09-01) to 85,000 t. Estimates of catch for 2005-2009 seem to have been always lower than the corresponding TAC.

Significant catches of small bigeye tuna continue to be channeled to local West African markets and sold as "*faux poissons*" in ways that make their monitoring and official reporting challenging. Monitoring of such catches has progressed in some countries but there is still a need for a coordinated approach that will allow ICCAT to properly account for these catches and thus increase the quality of the basic catch data available for assessments.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT.

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

STOCK STATUS: The last stock assessment was carried out in 2010, with the same methodology of the previous one in 2007.

Consistent with previous assessments of Atlantic bigeye, the results from non-equilibrium production models are used to provide the best characterization of the status of the resource. The current MSY estimated using a joint distribution of different runs ranged from around 71,000 t to 101,000 t (80% confidence limits), with a median MSY at 92,000 t.. In addition, these estimates reflect the current relative mixture of fisheries that capture small or large bigeye; MSY can change considerably with changes in the relative fishing effort exerted by surface and longline fisheries.

The biomass at the beginning of 2010 was estimated to be at between 0.72 and 1.34 (80% confidence limits) of the biomass at MSY, with a median value of 1.01, and the 2009 fishing mortality rate was estimated to be between 0.65-1.55 (80% confidence limits) with a median of 0.95.

It is noteworthy that the modeled probabilities of the stock being maintained at levels consistent with the Convention Objective over time are about 60% for a future constant catch of 85,000 t. Higher odds of rebuilding to and maintaining the stock at levels that could produce MSY are associated with lower catches and lower odds of success with higher catches than such constant catch. It needs to be noted that projections made by the Committee assume that future constant catches represent the total removals from the stock, and not just the TAC of 85,000 t established by ICCAT [Rec. 09-01]. Catches made by other fleets not affected by ICCAT Rec. 09-01 need to be added to the 85,000 t for comparisons with the future constant catch scenarios.

RECENT MANAGEMENT ADVICE: Projections indicate that catches reaching 85,000 t or less will promote stock growth and further reduce the chances in the future that the stock will not be at a level that is consistent with the convention objectives. The Commission should be aware that if major countries were to take the entire catch limit set under Recommendations 04-01 and 09-1 and other countries were to maintain recent catch levels, then the total catch could well exceed 100,000 t. The Committee recommends that the Commission sets a TAC at a level that would provide a high probability of maintaining at or rebuilding to stock levels consistent with the Convention objectives. In considering the uncertainty in assessment results, the Committee believes that a future total catch of 85,000 t or less would provide such high probability.

The assessment and subsequent management recommendations are conditional on the reported and estimated history of catch for bigeye tuna in the Atlantic. The Committee reiterates its concern that unreported catches, including those part of the "*faux poisson*" category, from the Atlantic might have been poorly estimated. There is a need to expand current statistical data.

STECF COMMENTS: STECF agrees with the advice from ICCAT/SCRS.

18.8. 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 dead discards) has averaged about 11,332 t per year. The catch in 2008 (12,655) represents a 37% decrease since the 1987 peak in North Atlantic landings (20,236 t). These reduced landings have been attributed to ICCAT regulatory recommendations and shifts in fleet distributions, including the movement of some vessels some years to the South Atlantic or out of the Atlantic. In addition, some fleets, including at least the United States, EC-Spain, EC-Portugal and Canada, have changed operating procedures to opportunistically target tuna and/or sharks, taking advantage of market conditions and higher relative catch rates of these species previously considered as by-catch in some fleets. Recently, socio-economic factors may have also contributed to the decline in catch.

The nominal catch rates by fleets contributing to the production model series have an increasing trend since the late 1990s, but the United States catch rates remained relatively flat. There have been some recent changes in United States regulations which may have impacted catch rates, but these effects remain unknown.

The most frequently occurring ages in the catch include ages 2 and 3. There are reports of increasing average size of the catch in some North Atlantic fisheries, including United States and Canada.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the ICCAT.

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

STOCK STATUS: The estimated relative biomass trend in the base case model shows a consistent increase since 2000. The current results indicate that the stock is at or above BMSY. The relative trend in fishing mortality shows that the level of fishing peaked in 1995, followed by a decrease until 2002, followed by small increase in the 2003-05 period and downward trend since then. Fishing mortality has been below FMSY since 2005. The results suggest that there is greater than 50% probability that the stock is at or above BMSY, and thus the ICCAT rebuilding objective has been achieved.

However, it is important to note that since 2003 the catches have been below the TACs greatly increasing chances of a fast recovery. Overall, the stock was estimated to be somewhat less productive than the previous assessment, with the intrinsic rate of increase, r, estimated at 0.44 compared to 0.49 in 2006.

Other analyses conducted by the ICCAT-SCRS (Bayesian surplus production modeling, and Virtual Population analyses) generally support the results described for the base case surplus production model above.

RECENT MANAGEMENT ADVICE: ICCAT SCRS Advice for 2010: Consistent with the goal of the Commission's swordfish rebuilding plan [Rec. 96-02], in order to maintain the northern Atlantic swordfish stock at a level that could produce MSY with greater than 50% probability, the SCRS recommends reducing catch limits allowed by ICCAT Rec. 06-02 (15,345 t) to no more than 13,700 t. This reflects the current best estimate of maximum yield that could be harvested from the population under existing environmental and fishery conditions. Should the ICCAT wish to have greater assurance that future biomass would be at or above BMSY while maintaining F at or below FMSY, the Commission should select a lower annual TAC, depending on the degree of precaution the Commission chooses to apply in management.

The SCRS noted that allowable catch levels agreed in ICCAT Recs. 06-02 and 08-02 exceeded scientific recommendations. The successful rebuilding of this stock could have been compromised if recent catches had been higher than realized.

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.

18.9. Swordfish (Xiphias gladius), South Atlantic

FISHERIES: The historical trend of catch (landings plus dead 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 21,930 t in 1995, levels that match the peak of North Atlantic harvest (20,236 t). This increase of landings was, in part, due to progressive shifts of fishing effort to the South Atlantic, primarily from the North Atlantic, as well as other waters. Expansion of fishing activities by southern coastal countries, such as Brazil and Uruguay, also contributed to this increase in catches. The reduction in catch following the peak in 1995 resulted from regulations and partly due to a shift to other oceans and target species. In 2008, the 12,448 t reported catches were about 44% lower than the 1995 reported level.

As observed in the 2006 assessment, the CPUE trend from targeted and non-targeted fisheries show different trends and high variability which indicates that at least some are not depicting trends in the abundances of the stock . It was noted that there was little overlap in fishing area and strategies between the by-catch and targeted fleets used for estimating CPUE pattern, and therefore the by-catch and targeted fisheries CPUE trends could be tracking different components of the population.

Since 1991, several fleets have reported dead discards. The volume of Atlantic-wide reported discards since then has ranged from 215 t to 1,139 t. The most recent (2008) reported level of dead discards is 244 t, a reduction of 79% from the peak level reported for 2000.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the ICCAT.

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

STOCK STATUS: The results of the base case production model indicated that there were conflicting signals for several of the indices used. The model estimated overall index was relatively stable until the early 1980s when it started declining until the late 1990's and it reversed that trend about 2003. Estimated relative fishing mortality (F2008/FMSY) was 0.75 indicating that the stock is not being overexploited. Estimated relative biomass (B2009/BMSY) was 1.04, indicating that the stock was not overexploited.

Because of the high level of uncertainty associated with the south Atlantic production models results, the SCRS conducted catch-only modeling analysis, including two explorations using different assumptions concerning the intrinsic rate of population increase. The distribution for MSY was skewed for both runs. The median of MSY estimated for RUN 1 was 18,130 t and for RUN 2 was 17,934 t.

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 SCRS emphasizes that annual catch should not exceed the provisionally estimated MSY (15,000). Considering the unquantified uncertainties and the conflicting indications for the stock, the SCRS recommends a more precautionary Fishery Management approach, to limit catches to the recent average level (~15,000 t), which are expected to maintain the catch rates at about their current level.

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 that new minimum size regulations came into effect in 2007, but their effectiveness cannot be assessed at present.

18.10. 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, which become 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 reported catch is 14,893 t while 20007 reported catch is 14,227 t. Preliminary and incomplete 2008 reported catches are 11,153 t (estimated in 12,164 by SCRS), while

preliminary and very partial reported landing for 2009 account for 10,360 t. The biggest producers of swordfish in the Mediterranean Sea in the recent years are, in the order, EC-Italy, EC-Greece, EC-Spain and Morocco. Also, Algeria, EC-Cyprus, EC-Malta, EC-Portugal, Tunisia and Turkey have fisheries targeting swordfish in the Mediterranean. Incidental catches of swordfish have also been reported by Albania, Croatia, EC-France, Japan, and Libya. There may be additional fleets taking swordfish in the Mediterranean, for example, Egypt, Israel, Lebanon, Monaco and Syria, but the data are not always 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 1st 2002 in EU countries and from 2004 in all ICCAT Mediterranean countries (in Morocco the driftnet fishery is still permitted, within a progressive dismissing plan), 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. A two months closure was adopted for 2009, but only for pelagic longlines directly targeting swordfish (ICCAT Rec.08-03). 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.

Standardised CPUE series from the main longline and gillnet fisheries targeting swordfish, which were presented during the 2010 stock assessment session (Spanish longliners, Italian longliners, Greek longliners and Moroccan gillnetters), did not reveal any trend over time. CPUE series, however, covered only the last 10-20 years and not the full time period of reported landings. Similarly to CPUE, not any trend over the past 20 years was identified regarding the mean fish weight in the catches.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT and GFCM through the joint GFCM/ICCAT working groups.

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. Another assessment was performed in 2007. The most recent assessment was carried out in 2010.

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 and 2010 used two different methods.

Two forms of assessment (production modelling and age-structured analysis - XSA), indicated that current SSB levels are much lower than those in the early 80's, although not any trend appears in the last 15 years. The extent of the decline differ among models, with the production model suggesting a decline of about 30%, while XSA results indicate that current SSB level is about 1/4 of that in the middle 80's. Results indicate that the fishery underwent a rapid expansion in the late 1980s resulting in Fs and catches above those that could support MSY. Estimates of population status from production modeling indicated that current stock level is slightly lower (~5%) to the optimum needed to achieve the ICCAT Convention objective, but these estimates have a high degree of uncertainty (CV~30%). Additionally, it should be noted that production model biomass estimates are very sensitive to the assumption made about the initial stock biomass ratio. In general, the low contrast in the available catch-effort series affects the reliability of biomass estimates, as well as, the predictions of effort changes on future catch levels. Results of yield-per-recruit analyses based on the analytical age-structured assessment in which we have more confidence indicated that the stock is in overfished condition and slight overfishing is taking place. Current (2008) SSB is 46% lower than the value that would maximize yield per-recruit. Current F is slightly higher to the estimated FMSY. Note, however, that these conclusions are based on deterministic analyses of the available data. The level of uncertainty in these estimates has not been evaluated. 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.

The assessment of Mediterranean swordfish indicates that the stock is below the level which can support MSY and that current fishing mortality slightly exceeds FMSY. Overall results suggest that fishing mortality (and near-term catches) needs to be reduced to move the stock toward the Convention objective of biomass levels

which could support MSY and away from levels which could allow a rapid stock decline. A reduction of current F to the F0.1 level would result to a substantial (about 40%) long-term increase in SSB.

Seasonal closure projections based on highly-aggregated data derived from the age-structured assessment and which assume no compensation in effort, no interaction with other management actions in place, and an improvement in recruitment with increasing spawning stock biomass (SSB), are forecast to be beneficial in moving the stock condition closer to the Convention objective, resulting in increased catch levels in the medium term, and reductions in the volume of juvenile catches. Although simulations suggest that the stock can be rebuild to the mid-1980s SSB levels only in the case of six month closures, SSB increases up to the optimum levels suggested by the yield-per-recruit analysis can be achieved within 2-3 generations (8-12 years) even under the current management status (2-month closure), provided that fishing mortality is kept on 2008 levels, which were quite lower than the previous years. Risk analysis, however, indicates that a small probability (<5%) of stock collapse still exists in this case.

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. Given the uncertainties on optimum SSB level estimates and the rapid fishery expansion in the 80's, which resulted in severe stock biomass declines, the SSB levels in the late 80's may be also considered as a good proxy for the stock. These levels, are around to 60000-70000 t, not very far however, from the currently estimated BMSY value (~62000 t). Analysis has suggested that the seasonal closures have beneficial effects and can move the stock condition to the level which will support MSY, but the effect of the recently employed two-month closure could not be evaluated due to incomplete 2009 data.

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 Committee recommends this type of measures be considered as part of a Mediterranean swordfish management plan. Given 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 Commission.

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 all surface longlines able to catch swordfish and eradication of all illegal driftnet fisheries) should apply to the entire Mediterranean area and extend for a minimum of two months. STECF notes that to achieve the ICCAT objectives for swordfish, the closure should be for a period greater than 2 months. STECF also recommends that fishing capacity for swordfish should not be allowed to increase and preferable that it be reduced. STECF also notes that shifting the effort, without an effective monitoring, towards large fish using deep longlines might result in an too high increasing mortality for older classes. STECF also indicates the EU Data Collection framework 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. STECF notes that the identification of the vessels authorized to catch swordfish in the Mediterranean, included in the ICCAT Rec.09-04, which is necessary to define the fishing capacity, was not provided to SCRS and then recommends that the Commission takes all the necessary measures to provide this list.

18.11. Skipjack (*Katsuwonus pelamis*), Eastern Atlantic

FISHERIES: The total catches obtained in 2009 in the eastern Atlantic Ocean were close to 122,470 t which represents the catch averaged 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 baitboat fisheries of Ghana, EC-Spain and EC-France. The estimate of the average discard rate of skipjack tuna

under FADs from data collected since 2001 by observers on-board Spanish purse seiners operating in the East Atlantic has been confirmed by the two new studies conducted on board EU purse seiners (estimated at 42 kg per ton of skipjack landed). Furthermore, the amount of small skipjack (average size 37 cm FL) landed in the local market of Abidjan in Côte d'Ivoire as "*faux-poisson*" is estimated at 235 kg per ton of skipjack landed (i.e. an average of 6,641 t/year between 1988 and 2007). In recent years, the seasonal fishing by European purse seiners on free schools, off Senegal, has decreased sharply and consequently, the proportion of the catches on floating objects has continued to increase, reaching slightly more than 90% of the catches.

Although the fisheries operating in the east have extended towards the west beyond 30ºW longitude, the Committee decided to maintain the hypothesis in favor of two distinct stock units, based on available scientific studies.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT.

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

STOCK STATUS: Stock assessments for eastern Atlantic skipjack wase conducted in 2008 using available catches to 2006. Skipjack had only been assessed previously in 1999. Although the fisheries operating in the east are extending towards the west beyond 30ºW longitude, the SCRS decided to maintain the hypothesis in favor of two distinct stock units, based on available scientific studies. However, taking into account the biological characteristics of the species and the geographic distances between the various fishing areas, the use of smaller stock units continues to be the envisaged hypothesis.

A Bayesian method, using only catch information estimated the MSY (under a Schaefer-type model parameterization) at 143,000-156,000 t, a result which agrees with the estimate obtained by the modified Grainger and Garcia approach: 149,000 t.

In addition, two non-equilibrium surplus biomass production models (a multi-fleets model and a Schaefer-based model) were applied for 8 time series of CPUEs, and for a combined CPUE index weighted by fishing areas. To account for the average increase in catchability of purse seine fisheries, a correction factor of 3% per year was applied to the CPUE series. As for the bayesian model application that only uses catches, different working hypothesis were tested on the distribution of the priors of the two surplus production models (i.e., the growth rate, the carrying capacity, the catchability coefficient of each fleet, etc.). In general, the range of plausible MSY values estimated from these models (155,000-170,000 t) were larger than in the bayesian model based on catches. The Committee stated the difficulty to estimate MSY under the continuous increasing conditions of the exploitation plot of this fishery (one-way of the trajectory to substantially weaker effort values) and which as a result, the potential range distribution of some priors needs to be constrained (e.g., for growth rate, or for the shape parameter of the generalized model).

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

MANAGEMENT MEASURES : The effects of 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 were analysed during the ICCAT Species Group meeting in 2009.

Considering that the new closed area is much smaller in time and surface 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 (the species for which the regulation was applied) by the surface fishery. When the fishing effort for the EC purse seine fleet was at its maximum value (period 1994-1996, i.e., before the implementation of the first moratorium), the skipjack catch from this fleet within the time and area limits defined by Rec. 04-01, was on average 7,180 t (i.e., 7.5% of the total skipjack catch from the EC purse seiners).

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.

STECF COMMENTS: STECF agrees with the advice from ICCAT/SCRS.

18.12. Skipjack (*Katsuwonus pelamis*), Western Atlantic

FISHERIES: In the West Atlantic, the major fishery is the Brazilian baitboat fishery, followed by the Venezuelan purse seine fleet. Catches in 2009 in the West Atlantic amounted to 25,797 t. The catches taken by EU vessels on this stock have been, historically, negligible.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the ICCAT.

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

STOCK STATUS: Stock assessments for western Atlantic skipjack was conducted in 2008 using available catches to 2006. Skipjack had only been assessed previously in 1999.IThe standardised CPUEs of Brazilian baitboats 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). The average weight of skipjack caught in the western Atlantic is higher than in the east (3 to 4.5 kg vs. 2 to 2.5 kg), at least for the Brazilian baitboat fishery.

The assessment 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 converged around 31,000 and36,000 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, in the light of the information provided by the trajectories of B/BMSY and F/FMSY, it is unlikely that the current catch is larger than the current replacement yield .

RECENT MANAGEMENT ADVICE: No management recommendations were proposed by the ICCAT.

STECF COMMENTS: No comment.

18.13. Marlins (*Makaira nigricans* and *Tetrapturus albidus*), 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. It has now been confirmed that white marlin landings reported to ICCAT include roundscale spearfish in significant numbers, so that historical statistics of white marlin include a mixture of two species. Studies where white marlin/roundscale spearfish ratios have been estimated with an overall ratio between 23-27%, which previously was thought to represent only white marlin were carried out. In some areas, however, only one species is present in these samples.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 2006 were 2,182 t, reaching 3,082 t in 2007, 4,138 t in 2008 and dropping to 2,868 t in 2009. Task I catches of white marlin in 2006 and 2007 were 390 t and 418 t, while they were 374 in 2008 and 406 in 2009.. Historical reports of unclassified billfish remain an important issue in the estimation of historical removals from marlin stocks.

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, together with spearfish and sailfish, 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.

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 Freplacement 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.

During the 2010 ICCAT Data Preparatory Meeting, catch rate information was updated by the presentation of five new standardized catch rate indices, and the inclusion of a historical catch rate index from the sport fishery from Venezuela. The 2011 stock assessment, might confirm if these recent apparent changes in trend have continued.

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 F replacement 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.. However, this will require developing a mechanism to separate landings of WHM from roundscale spearfish. All historical indices of abundance of white marlin may inadvertently have included an unknown quantity of roundscale spearfish.

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.

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 DCF. Furthermore, STECF notes that the 2008 ICCAT-SCRS report indicated the potential for the stocks of blue marlin and white marlin to recover to the B_{MSY} level. However, recent increases in catches of blue marlin by artisanal fisheries in both sides of the Atlantic may compromise the effectiveness of the ICCAT plan.

18.14. Sailfish, *Istiophorus platypteus*, Atlantic Ocean

FISHERIES: Sailfish has a pan-tropical distribution. ICCAT has established, based on life history information on migration rates and geographic distribution of catch, that there are two management units for Atlantic sailfish, eastern and western.

Sailfish are targeted by coastal artisanal and recreational fleets and, to a less extent, are caught as by-catch in longline and purse seine fisheries. Historically, catches of sailfish were reported together with spearfish by many longline fleets. In 2009 these catches were separated by the Working Group Historical catches of unclassified billfish continue to be reported to the Committee making the estimation of sailfish catch difficult.

Catch reports from countries that have historically been known to land sailfish continue to suffer from gaps and there is increasing ad-hoc evidence of un-reported landings in some other countries. These considerations provide support to the idea that the historical catch of sailfish has been under-reported, especially in recent times where more and more fleets encounter sailfish as by-catch or target them.

Reports to ICCAT estimate that the Task I catch for 2009 was 1,641 t and 1,421 t, respectively, for the east and west region. Task I catches of sailfish for 2008 are preliminary because they do not include reports from all fleets.

The EU fleets reporting catches are EC-Spain (280 t in East Atlantic and 451 t in West Atlantic in 2008) and EC-Portugal (103 t in East Atlantic and 48 t in West Atlantic in 2008), while EC-United Kingdom and EC-France reports occasional catches in some years.

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 hundred 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.

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

STOCK STATUS: ICCAT recognizes the presence of two stocks of sailfish in the Atlantic, the eastern and western stocks. There is increasing evidence that an alternative stock structure with a north western stock and a south/eastern stock should be considered. Assessments of stocks based on the alternative stock structure option have not been undertaken to date, however, conducting them should be a priority for future assessments. In 2009 ICCAT conducted a full assessment of both Atlantic sailfish stocks through a range of production models and by using different combinations of relative abundance indices. It is clear that there remains considerable uncertainty regarding the stock status of these two stocks, however, many assessment model results present evidence of overfishing and evidence that the stocks are overfished, more so in the east than in the west. Although some of the results suggest a healthy stock in the west, few suggest the same for the east. The eastern stock is also assessed to be more productive than the western stock, and probably able to provide a greater MSY. The eastern stock is likely to be suffering stronger overfishing and most probably has been reduced further below the level that would produce the MSY than the western stock. Reference points obtained with other methods reach similar conclusions. Examination of recent trends in abundance suggests that both the eastern and western stocks suffered their greatest declines in abundance prior to 1990. Since 1990, trends in relative abundance conflict between different indices, with some indices suggesting declines, other increases and others not showing a trend. Examination of available length frequencies for a range of fleets show that average length and length distributions do not show clear trends during the period where there are observations.

Both the eastern and western stocks of sailfish may have been reduced to stock sizes below B_{MSY}. There is considerable uncertainty on the level of reduction, particularly for the west, as various production model fits indicated the biomass ratio $B2007/B_{MSY}$ both above and below 1.0. The results for the eastern stock were more pessimistic than those for the western stock in that more of the results indicated recent stock biomass below BMSY. Therefore there is particular concern over the outlook for the eastern stock.

RECENT MANAGEMENT ADVICE: The ICCAT-SCRS in 2009 recommends that catches for the eastern stock should be reduced from current levels. It should be noted, however, that artisanal fishermen harvest a large part of the sailfish catch along the African coast. The Committee recommends that catches of the western stock of sailfish should not exceed current levels. Any reduction in catch in the West Atlantic is likely to help stock re-growth and reduce the likelihood that the stock is overfished. The SCRS is concerned about the incomplete reporting of sailfish catches, particularly for the most recent years, because it increases uncertainty in stock status determination. The Committee recommends all countries landing or having dead discards of sailfish, report these data to the ICCAT Secretariat.

STECF COMMENTS: STECF agrees with the advice from ICCAT, remarking the high uncertainty of the data and the assessment. Furthermore, STECF stresses the need for correct identification and reporting of billfish species in all EU fisheries in accordance with to the DCF.

18.15. Spearfish, Atlantic Ocean

FISHERIES: The generic common name Spearfish includes several species and, among them, at least Tetrapturus angustirostris (Shortbill spearfish, SSP), Tetrapturus georgii (Roundscale spearfish, RSP) and Tetrapturus pfluegeri (Longbill spearfish, SPF). 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 many important fleets. The last SCRS report does not mention any spearfish, amount is largely incomplete and, then, underestimated.

These species are primarily taken by longline fisheries (including various EU longline fisheries), but also by purse seines (including EU purse seiners), by some artisanal gears (including EU ones in the Antilles) and also by various sport fisheries located in both sides of the Atlantic. The increasing use of anchored FADs by various artisanal and sport fisheries is possibly increasing the vulnerability of these stocks.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT.

REFERENCE POINTS: None.

STOCK STATUS: unknown.

RECENT MANAGEMENT ADVICE: None. In 2008, the SCRS recommended all countries landing or having dead discards of spearfish report these data by species to the ICCAT Secretariat.

STECF COMMENTS: STECF remarks that these species have been apparently forgotten in the last SCRS report and that data on catches in ICCAT Task I appear mixed-up among several species. STECF is concerned about the lack of attention about these species, because they might present the same problems of other billfish species and recommends the Commission to support more attention by ICCAT. STECF recommends that all these species should be accurately monitored, particularly for the EU fleets within the EC data collection framework. In the absence of any official figure at least of the catch by species, STECF is not in the position to provide any management comment.

18.16. 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 largely 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 seems to be affected by the oceanographic situation. EC-Italy reported a total catch of 266 t in 2008, while data for most of the countries are mixed up among billfish species (BIL) in the ICCAT Task1 data. 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.

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, also according to the EC Data collection framework.

18.17. 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 -BLF (Thunnus atlanticus), Bullet tuna - BLT (Auxis rochei), Frigate tuna - FRI (Auxis thazard), Atlantic Bonito - BON (Sarda sarda), Plain bonito - BOP (Orcynopsis unicolor), Serra Spanish mackerel – BRS (Scomberomorus brasiliensis), Cero - CER (Scomberomorus regalis), King mackerel - KGM (Scomberomorus cavalla), Scomberomorus unclassified - KGX (Scomberomorus spp.), Little tunny - LTA (Euthynnus alletteratus), West African Spanish mackerel - MAW (Scomberomorus tritor), Atlantic Spanish mackerel - SSM (Scomberomorus maculatus), Narrow-barred Spanish mackerel - COM (Scomberomorus commerson) and Wahoo WAH (Acanthocybium solandri), plus some vagrant species which includes the Indian mackerel (Rastrelliger kanagurta) and maybe also the Black skipjack – BKJ (Euthynnus lineatus) and Dogtooth tuna – DOT (Gymnosarda unicolor).Only five of these account for about 81% of the total catch by weight each year, according to the official statistics. In the ’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. Declared catches were 79,228 t in 2006 and 74,087 t in 2007. 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 2008 is 55,876 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 underreported data in all areas.

The 2009 preliminary catch amounted to 50,873 t, of which: 943 t of Blackfin tuna; 18,643 t of Bonito; 9.5082 t of Little tunny; 5,729 t of Frigate tuna; 3,512 t of King mackerel; 4,251 t of Atlantic Spanish mackerel; 2,515 of Serra Spanish mackerel; 1,436 t of Wahoo, 3,584 t of Bullet tuna, 449 of Plain bonito, and 305 t of West-African Spanish mackerel. The Small tunas Species Group pointed out the relative importance of small tuna fisheries in theMediterranean and the Black Sea, which account for about 28% of the total reported catch in the ICCAT area for the period 1980-2008.

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, troll lines, 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.

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

STOCK STATUS: There is little information available to determine the stock structure of many small tuna species. The SCRS suggests that countries be requested to submit all available data to ICCAT as soon as possible, in order to be used in future meetings. Assessments of stocks of small tunas are also important because of their position in the trophic chain, where they are the prey of large tunas, marlins and sharks and they are predators of smaller pelagic species. It may therefore be best to approach assessments of small tunas from the ecosystem perspective. Generally, current information does not allow the SCRS to carry out an assessment of stock status of the majority of the species. Some analyses will be possible in future if data availability improves with the same trend of the latest year. 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 South-Eastern 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, in 2010, 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 had 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.

ICCAT-SCRS in 2010 noted that there is an improvement in the availability of catch and biological data for small tuna species particularly in the Mediterranean and the Black Sea. However, biological information, catch and effort statistics for small tunas remain incomplete for many of the coastal and industrial fishing countries. Given that, many of these species are of high importance to coastal fishermen, especially in some developing countries, both economically and often as a primary source of proteins, therefore the SCRS recommends that further studies be conducted on small tuna species due to the limits of information available.

STECF COMMENTS: STECF noted that several small tuna species have been included in the EC data collection framework and that this should possibly result in an improved availability of data in a few years, if properly implemented by the MS concerned. Independently from the small tuna species listed in the DCF, STECF recommends that fisheries and biological data be collected for all small tunas and not only those in the DCF, particularly in the countries in the southern and eastern part of the Mediterranean Sea, in the Black Sea and in the southern Atlantic ocean, where these species have a high socio-economical relevance.

18.18. 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.

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 1st 2002 and from 2004 in all the ICCAT Mediterranean countries could results in a partially positive effect for the stock, even if illegal driftnet fishery is known to still occur in various areas.

RECENT MANAGEMENT ADVICE: GFCM have not provided any kind of management recommendations for this stock.

STECF COMMENTS: No comments.

18.19. Shortfin Mako (*Isurus oxyrinchus*), North Atlantic Ocean and Mediterranean.

FISHERIES: Shortfin mako sharks (SMA) show a wide geographical distribution, most often between 50ºN (60°N in NE Atlantic) and 50ºS latitude, including the Mediterranean Sea.

The ICCAT-SCRS (2009) considered two separate stocks, one in the North Atlantic and one in the South Atlantic. According to the IUCN report in 2007, the shortfin mako in the Mediterranean is not considered as a sub-population and then, for the purpose of this report, it is considered as a part of the North Atlantic stock.

The shortfin mako in the North Atlantic is mostly taken by pelagic longlines, which account for more than 99% of the catches of this species reported to ICCAT in recent years. Catches in ICCAT Task I from North Atlantic range from 785 t in 1990 to a peak of 5,063 t in 2004 (but SCRS estimates about 7,000 t). Reported catches in 2007 are 3,915 t (but SCRS estimates a total of 5,996 t), in 2008 accounted 3,414 t, while preliminary and incomplete catch reports in 2009 account 3,844 t. SCRS estimates were obtained during the 2008 assessment. EC fleets report the large majority of the catches: EC-Spain (1,895 t in 2008, equal to 48.4% of the total catch, but 2,216 in 2009) and EC-Portugal (1,033 t in 2008 and 1,169 in 2009), while lower or occasional catches are reported by EC-France (13 t in 2009) and EC-United Kingdom (1 ton in 2008 and 26 t in 2009),

In the Mediterranean Sea, 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 and largely incomplete, because many countries are not reporting them. 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. 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, decreasing to 2 t in 2007. Preliminary and incomplete reported catches in 2008 account only to 1 t.

A number of standardized CPUE data series for shortfin mako were presented in 2008 as relative indices of abundance. The ICCAT/SCRSe placed emphasis on using the series that pertained to fisheries that operate in oceanic waters over wide areas.

SOURCE OF MANAGEMENT ADVICE: This species is under the ICCAT responsibility for the whole Convention area and for the catches obtained by the large pelagic fisheries. More general management advices can be provided by ICES and SAC-GFCM for all the other fisheries. IUCN also provides an advice on the conservation status.

REFERENCE POINTS: None.

STOCK STATUS: ICCAT- SCRS report in 2008 includes the assessment of the shoprtfin mako in the North Atlantic. For the North Atlantic, most model outcomes indicated stock depletion to about 50% of biomass estimated for the 1950s. Some model outcomes indicated that the stock biomass was near or below the biomass that would support MSY with current harvest levels above FMSY, whereas others estimated considerably lower levels of depletion and no overfishing. In light of the biological information that indicates the point at which BMSY is reached with respect of the carrying capacity which occurs at levels higher than for blue sharks and many teleost stocks. There is a non-negligible probability that the North Atlantic shortfin mako stock could be below the biomass that could support MSY. A similar conclusion was reached by the SCRS in 2004, and recent biological data show decreased productivity for this species.

The IUCN listed the shortfin mako as “Vulnerable” in 2007:

SCRS report in 2009 includes additional comments about the North Atlantic stock of shortfin mako. Ecological risk assessments (ERA) for eleven priority species of sharks (including shortfin mako) caught in ICCAT fisheries demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. Specifically, the analyses indicated that shortfin makos (together with other two species) have the highest vulnerability (and lowest biological productivity) of the shark species examined. All species considered in the ERA are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end. ERAs should be updated with improved information on the productivity and susceptibility of these species.

In the Mediterranean catches are inadequately reported or non-recorded, so data collected for the Mediterranean were not considered sufficient to conduct quantitative assessments for this species. At the same time, SCRS did not include the very low catches from the Mediterranean in its 2008 assessment.

RECENT MANAGEMENT ADVICE: ICCAT SCRS in 2010 did not provide any specific management recommendation for this stock. In general, precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. For example, minimum landing lengths or maximum landing lengths would afford protection to juveniles or the breeding stock, respectively, although other technical measures such as gear modifications, time-area

restrictions, or other approaches, could be alternative means to protecting different life stages, provided they are tested for effectiveness through research projects before they are implemented.

STECF COMMENTS: 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 for GFCM. Even if in the Mediterranean it is listed by the IUCN as "Critically Endangered", the STECF Plenary 02-09 clarified that this status cannot be justified according to the IUCN criteria, because there is no knowledge of a separate sub-population. As a consequence, the IUCN status to be considered is "Vulnerable", which covers the Atlantic and the Mediterranean areas.

Due to the poor data available, STECF recommends 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.

18.20. Shortfin Mako (*Isurus oxyrinchus*), South Atlantic Ocean.

FISHERIES: Shortfin mako sharks show a wide geographical distribution, most often between 50ºN and 50ºS latitude. The shortfin mako in the South Atlantic is mostly taken by pelagic longlines, which account for about 99% of the catches of this species reported to ICCAT in recent years. Catches in ICCAT Task I from South Atlantic range from 262 t in 1987 to a peak of 3,426 t in 2003 (but SCRS estimates about 5,900 t in 2000). Reported catches in 2007 are 2,716 t (but SCRS estimates a total of about 4,600 t), 1,894 t in 2008 while preliminary and incomplete catch reports in 2009 account 1,937 t. SCRS estimates were obtained during the 2008 assessment. EC fleets report the large majority of the catches: EC-Spain (628 t in 2008, equal to 37,2% of the total catch, but 939 t in 2009) and EC-Portugal (321 t in 2008 and 503 t in 2009), while occasional catches are reported by EC-United Kingdom (12 t in 2009),

SOURCE OF MANAGEMENT ADVICE: This species is under the ICCAT responsibility for the whole Convention area for the large pelagic fisheries. IUCN also provides an advice on the conservation status.

REFERENCE POINTS: None.

STOCK STATUS: Only one modeling approach could be applied to the South Atlantic shortfin mako stock, which resulted in an estimate of unfished biomass which was biologically implausible, and thus the Committee can draw no conclusions about the status of the South stock.

The IUCN listed the shortfin mako as "Vulnerable" in 2007:

RECENT MANAGEMENT ADVICE: ICCAT SCRS in 2009 did not provided any specific management recommendation for this stock. In general, precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. For example, minimum landing lengths or maximum landing lengths would afford protection to juveniles or the breeding stock, respectively, although other technical measures such as gear modifications, time-area restrictions, or other approaches, could be alternative means to protecting different life stages, provided they are tested for effectiveness through research projects before they are implemented.

STECF COMMENTS: Due to the poor data available, 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 stock and the possible impacts due to the different fisheries.

18.21. *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. Besides the pelagic fisheries, there is a by-catch by demersal trawlers from many countries, including Ireland, UK, France and Spain.

Existing EC management measures in the NE Atlantic include a TAC. Reported landings in 2008 were less than the TAC. A maximum landing length (210 cm fork length) was introduced in 2009 to deter fisheries targeting mature females.

According to the ICCAT catch table for the North Atlantic (including both NW and NE Atlantic), the portbeagle fishery ranged from a minimum of 427 t in 2009 to a maximum of 2,588 t in 1992. Recent catches for EU fleets are dominated by France (311 t in 2008 and 228 t in 2009), followed by Spain (4 t in 2008 and 27 in 2009), Ireland (7 t in 2008 and 3 t in 2009), Portugal (3 t in 2008 and 17 t in 2009) and United Kingdom (15 t in 2008 and 12 t in 2009), while Denmark, Germany, Netherlands and Sweden have only some occasional catch in the past. In the NE Atlantic there is a TAC of 436 t. Unclassified Lamnidae are reported by Spain (24 t in 2008) and France (4 t in 2009).

Given that catch reports to ICCAT are incomplete, the Committee attempted to develop a more accurate estimate of shark mortality and capture related to the Atlantic tuna fleets on the basis of the expected proportions among tunas and sharks and in the landings of these fleets as well as using shark fin trade data. These information sets were used to reconstruct plausible estimates of historic catches used in porbeagle assessment in 2009. According to this estimate, ICCAT considered that catches in NE Atlantic were in the order of 287 t in 2008.

SOURCE OF MANAGEMENT ADVICE: The main recent source of information and advice on porbeagle in the Northeast Atlantic is usually 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. Recently, due to the relevance of large pelagic catches, the management advice was provided by ICCAT/SCRS, after a joint ICCAT/ICES assessment.

REFERENCE POINTS: No precautionary reference points have been agreed for porbeagle in the Northeast Atlantic.

STOCK STATUS: The ICCAT-ICES sub-group in 2009 considered that there is a single-stock of porbeagle in the NE Atlantic that occupies the entire ICES area (sub-areas I-XIV). This stock extends from the Barents Sea to northwest Africa. For management purposes the southern boundary of the stock is 36°N and the western boundary at 42°W. Given that porbeagle abundance in the central Atlantic appears to be small, ICCAT region BIL94b is a reasonable approximation of NE Atlantic porbeagle stock area. Historic tagging studies and recent satellite tagging studies indicate that few, if any, porbeagles make transatlantic crossings.

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. ICES WG in 2009 stated that there is no evidence of mixing between the NE Atlantic and the Mediterranean.

In 2009, the ICCAT-ICES assessed the Northeast stock (including the Mediterranean). The Northeast Atlantic stock has the longest history of commercial exploitation. A lack of CPUE data for the peak of the fishery adds considerable uncertainty in identifying the current status relative to virgin biomass. Exploratory assessments indicate that current biomass is below BMSY and that recent fishing mortality is near or above F_{MSY}. Recovery of this stock to B_{MSY} under no fishing mortality is estimated to take ca.15-34 years. The current EC TAC of 436 t in effect for the Northeast Atlantic may allow the stock to remain stable, at its current depleted biomass level, under most credible model scenarios. Catches close to the current TAC (e.g. 400 t) could allow rebuilding to B_{MSY} under some model scenarios, but with a high degree of uncertainty and on a time scale of 60 (40-124) years. No new assessment was carried out in 2010

Porbeagle is subject to the UN agreement on highly Migratory Stocks and the UK Biodiversity priority list. In IUCN, porbeagle is now classified as Critically Endangered for the depleted unmanaged population in the northeast Atlantic off Europe.

RECENT MANAGEMENT ADVICE: ICES (2008) recommended that, given the state of the stock, no targeted fishing for porbeagle should be permitted and bycatch 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, slowgrowing, high age-at-maturity, low fecundity, and a protracted gestation period) and they have an aggregating behavior. 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.

ICCAT-SCRS (2009) recommended that precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. Management measures should ideally be species-specific whenever possible. For example, minimum landing lengths or maximum landing lengths would afford protection to juveniles or the breeding stock, respectively, although other technical measures such as gear modifications, time-area restrictions, or other approaches, could be alternative means to protecting different life stages, provided they are tested for effectiveness through research projects before they are implemented. Both porbeagle stocks in the NW and NE Atlantic are estimated to be overfished, with the northeastern stock being more depleted. The main source of fishing mortality on these stocks is from non-ICCAT, directed porbeagle fisheries that are being managed by most of the relevant Contracting Parties through quotas and other measures.

The ICCAT-SCRS recommended that countries initiate research projects to investigate means to minimize by-catch and discard mortality of sharks, with a particular view to recommending to the ICCAT complementary measures to minimize porbeagle by-catch in fisheries for tuna and tuna-like species.

For porbeagle sharks, the SCRS recommends that the ICCAT work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs to ensure recovery of North Atlantic porbeagle stocks. In particular, porbeagle fishing mortality should be kept to levels in line with scientific advice and with catches not exceeding current level. New targeted porbeagle fisheries should be prevented, porbeagles retrieved alive should be released alive, and all catches should be reported. Management measures and data collection should be harmonized among all relevant RFMOs, and ICCAT should facilitate appropriate communication.

STECF COMMENTS: STECF agrees with the ICES advice that no targeted fishing for porbeagle should be permitted. STECF also agrees with ICES and SCRS/ICCAT that it should be a requirement for all countries to document all catches of this species, to better define the situation of this stock.

STECF notes that the minimal amount of catches reported in the Mediterranean does not affect the assessment of the NE Atlantic stock, therefore considers the assessment to be appropriate for the NE Atlantic stock. However, STECF remarks that the situation of the NE Atlantic stock is very confused as concerns the Mediterranean area, because the porbeagles in this latter geographic area are sometimes included or excluded in the NE Atlantic stocks assessments, while the IUCN classification is different in the two areas. In the absence of a clear scientific evidence to support one or the other hypothesis, STECF recommends that this issue should be analysed in detail by the RFMOs concerned or by a specific working group.

18.22. Porbeagle (*Lamna nasus*) in the North-West Atlantic

FISHERIES: Northwest Atlantic porbeagles are largely concentrated in the waters on and adjacent to the continental shelf of North America. Observer data from the Canadian, U.S., Spanish and Icelandic fleets indicate that porbeagles are found throughout the high seas of the North Atlantic north of 35°N, but that the CPUE on the high seas is relatively low. Conventional tagging data (~200 recaptures from three separate studies) indicate that NW Atlantic porbeagles are highly migratory within their stock area, but do not undertake trans-Atlantic migrations. More recent satellite tagging results reinforce this conclusion. Therefore the ICCAT sub-group concludes that there is a single stock of porbeagle in the NW Atlantic north of 35°N and west of 42°W, corresponding roughly to ICCAT region BIL94b and NAFO areas 0-6.

According to the ICCAT catch table for the North Atlantic (including both NW and NE Atlantic), the portbeagle fishery ranged from a minimum 427 t in 2009 to a maximum of 2,588 t in 1992. Recent catches for EU fleets are dominated by France (311 t in 2008 and 228 t in 2009), followed by Spain (37 t in 2008 and 49 in 2009), Ireland (7 t in 2008 and 3 t in 2009) and Portugal (3 t in 2008 and 17 t in 2009),, while Denmark, Germany, Netherlands and Sweden have only some occasional catch in the past. Canada reports catches in the order of 124 t, all related to the NW Atlantic. Unclassified Lamnidae are reported by Spain (15 t in 2008).

There are two TAC established for the NW Atlantic porbeagle fishery: 185 t for the Canadian EEZ and 11.3 t for the USA.

Given that catch reports to ICCAT are incomplete, the Committee attempted to develop a more accurate estimate of shark mortality and capture related to the Atlantic tuna fleets on the basis of the expected proportions among tunas and sharks and in the landings of these fleets as well as using shark fin trade data. These information sets were used to reconstruct plausible estimates of historic catches used in porbeagle assessment in 2009. According to this estimate, ICCAT considered that catches in NW Atlantic were in the order of 144.3 t in 2008.

SOURCE OF MANAGEMENT ADVICE: The main recent source of information and advice on porbeagle in the Northwest Atlantic is usually ICES. There is no fishery-independent information on this stock, except for the tagging data. 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. Recently, due to the relevance of catches taken by tuna and tuna-like fisheries, the management advice was provided by ICCAT/SCRS, after a joint ICCAT/ICES assessment.

REFERENCE POINTS: No precautionary reference points have been agreed for porbeagle in the Northeast Atlantic.

STOCK STATUS:

In 2009, the ICCAT/SCRS updated the Canadian assessment of the Northwest Atlantic porbeagle stock. The results indicate that biomass is depleted to well below BMSY, but recent fishing mortality is below FMSY and recent biomass appears to be increasing. Additional modelling using a surplus production approach indicated a similar view of stock status, i.e., depletion to levels below B_{MSY} and current fishing mortality rates also below F_{MSY}. The Canadian assessment projected that with no fishing mortality, the stock could rebuild to B_{MSY} level in approximately 20-60 years, whereas surplus-production based projections indicated 20 years would suffice. Under the Canadian strategy of a 4% exploitation rate, the stock is expected to recover in 30 to 100+ years according to the Canadian projections. No new assessment was carried out in 2010

Porbeagle is subject to the UN agreement on highly Migratory Stocks. In IUCN (2004), porbeagle is classified as Endangered for the North West Atlantic.

RECENT MANAGEMENT ADVICE: ICCAT-ICES recommended that the ICCAT should adopt management measures that support the recovery objectives of the Canadian Management Plan. High-seas fisheries should not target porbeagle and all by-catch should be reported. Due to their lower abundance in the high seas, by-catch data collection and reporting would require scientific observer sampling at a high level of coverage.

Areas known to have high abundance of important life-history stages (e.g. mating, pupping and nursery grounds) should be subject to fishing restrictions. Such grounds are not exclusively in the Canadian EEZ. Increased effort on the high seas within the stock area could compromise stock recovery efforts.

ICCAT-SCRS recommended that precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. Management measures should ideally be species-specific whenever possible. For example, minimum landing lengths or maximum landing lengths would afford protection to juveniles or the breeding stock, respectively, although other technical measures such as gear modifications, time-area restrictions, or other approaches, could be alternative means to protecting different life stages, provided they are tested for effectiveness through research projects before they are implemented.

Both porbeagle stocks in the NW and NE Atlantic are estimated to be overfished. The main source of fishing mortality on these stocks is from non-ICCAT, directed porbeagle fisheries that are being managed by most of the relevant Contracting Parties through quotas and other measures. The ICCAT-SCRS recommended that countries initiate research projects to investigate means to minimize by-catch and discard mortality of sharks, with a particular view to recommending to the ICCAT complementary measures to minimize porbeagle by-catch in fisheries for tuna and tuna-like species. For porbeagle sharks, the SCRS recommends that the ICCAT work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs to ensure recovery of North Atlantic porbeagle stocks. In particular, porbeagle fishing mortality should be kept to levels in line with scientific advice and with catches not exceeding current level. New targeted porbeagle fisheries should be prevented, porbeagles retrieved alive should be released alive, and all catches should be

reported. Management measures and data collection should be harmonized among all relevant RFMOs, and ICCAT should facilitate appropriate communication.

STECF COMMENTS: STECF notes that management advices provided by ICCAT/ICES and by ICCAT/SCRS are partly different. STECF agrees with the specific measures indicated by ICCAT/ICES and underline the requirement for all countries to document all incidental by-catches of this species.

18.23. Porbeagle (*Lamna nasus*) in the South-West Atlantic

FISHERIES: Like in other areas, 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.

According to the ICCAT catch table for the South Atlantic (including both SW and SE Atlantic), the portbeagle fishery ranged from a minimum of 0 t in many years to a maximum of 91 t in 2008, while catches in 2009 account for 28 t. The largest portion of the catches are obtained by surface longlines. Recent catches for EU fleets are dominated by Spain (3 t in 2008 and 2 in 2009), while Bulgaria, Netherlands, Poland and Portugal have only some occasional catch in the past. The major catches are reported by Japan (47 t in 2008 but catches are lacking in 2009) and Uruguay (40 t in 2008 and 14 t in 2009), the latter certainly attributed to the SW Atlantic area. Unclassified Lamnidae are reported by Spain (12 t in 2008).

Given that catch reports to ICCAT are incomplete, the Committee attempted to develop a more accurate estimate of shark mortality and capture related to the Atlantic tuna fleets on the basis of the expected proportions among tunas and sharks and in the landings of these fleets as well as using shark fin trade data. These information sets were used to reconstruct plausible estimates of historic catches used in porbeagle assessment in 2009. According to this estimate, ICCAT considered that catches in SW Atlantic were in the order of 164.6 t in 2008.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT, but this species is also under the responsibility of other RFMOs managing different fisheries.

REFERENCE POINTS: None.

STOCK STATUS: The ICCAT-ICES subgroup in 2009 considered the distribution of the porbeagle stock in the SW Atlantic, south of 25°S and west of 20°W. It was suggested that it could apparently comprise waters of the southeast Pacific Ocean but more robust data are required to confirm this fact which would have direct implications on the management of this stock.

ICCAT/SCRS in 2009 stated that, in general, data for southern hemisphere porbeagle are too limited to provide a robust indication on the status of the stocks. For the Southwest stock, limited data indicate a decline in CPUE in the Uruguayan fleet, with models suggesting a potential decline in porbeagle abundance to levels below MSY and fishing mortality rates above those producing MSY. But catch and other data are generally too limited to allow definition of sustainable harvest levels. Catch reconstruction indicates that reported landings grossly underestimate actual landings. No assessment was carried out in 2010.

RECENT MANAGEMENT ADVICE: For porbeagle sharks, the ICCAT/SCRS recommended that the ICCAT work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs to prevent overexploitation of South Atlantic stocks. In particular, porbeagle fishing mortality should be kept to levels in line with scientific advice and with catches not exceeding current level. New targeted porbeagle fisheries should be prevented, porbeagles retrieved alive should be released alive, and all catches should be reported.

STECF COMMENTS: STECF recommends a better reporting of the porbeagle catches from all the fisheries and Member States involved in the SW Atlantic area, with the purpose to provide a reliable assessment of the state of the resource and the possible impacts due to the different fisheries concerned.

18.24. Porbeagle (*Lamna nasus*) in South-East Atlantic

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. Target fisheries were also reported since decades.

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.

According to the ICCAT catch table for the South Atlantic (including both SW and SE Atlantic), the portbeagle fishery ranged from a minimum of 0 t in many years to a maximum of 91 t in 2008 while catches in 2009 account for 28 t. The largest portion of the catches are obtained by surface longlines. Recent catches for EU fleets are dominated by Spain (1 t in 2008 and 2 in 2009), while Bulgaria, Netherlands, Poland and Portugal have only some occasional catch in the past. The major catches are reported by Japan (47 t in 2008 but catches are lacking in 2009) and Uruguay (40 t in 2008 and 14 t in 2009),, the latter certainly non attributed to the SE Atlantic area. Unclassified Lamnidae are reported by Spain (17 t in 2008).

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT, but this species is also under the responsibility of other RFMOs managing different fisheries.

REFERENCE POINTS: None.

STOCK STATUS: The ICCAT-ICES sub-group in 2009 considered the distribution of the porbeagle stock in the SE Atlantic, south of 25°S and east of 20°W. It was suggested that it could apparently comprise waters of the southwest Indian Ocean but more robust data are required to confirm this fact which would have direct implications on the management of this stock. There is belief that catches made in the southwestern Indian Ocean impact the SE Atlantic porbeagle stock which should be taken into consideration into future assessments.

Neither the ICCAT/ICES sub-group in 2009 nor the ICCAT/SCRS 2010 provided any assessment for this stock, possibly because of the lack of sufficient data and information.

RECENT MANAGEMENT ADVICE: The ICCAT/SCRS 2009 recommended that the ICCAT work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs to prevent overexploitation of South Atlantic stocks.

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.

18.25. Porbeagle (*Lamna nasus*) in the Mediterranean Sea

FISHERIES: This pelagic species is sometimes caught by some 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. Finning is not usually carried ou in the Mediterranean.

Data on catches are extremely poor. On the basis of the most recent data reported by FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2008) 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. Reported catches in 2009 account only 1 t. However, even if the total quantity possibly taken annually is low, these catches appear to be underestimated due to the misreporting or not-reporting by some States.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM, but this species is also under the ICCAT responsibility.

REFERENCE POINTS: None.

STOCK STATUS: The Mediterranean was considered as a separate management unit for this species for a number of years, even in the absence of a precise identification of the stock. IUCN (2007) considered the porbeagle in the Mediterranean as a sub-population and the ICES WG in 2009 stated that there is no evidence of mixing between the NE Atlantic and the Mediterranean.

In 2009, the very recent ICCAT/SCRS attempted an assessment of the Northeast Atlantic porbeagle stock, including the Mediterranean.

The porbeagle shark is considered globally as a Vulnerable species and the IUCN (2007) had confirmed this status for the Mediterranean sub-population. In 2009, the UNEP/MAP had proposed to assess the Mediterranan

porbeagle as "Critically Endangered" (CR A2bd). The porbeagle shark in the Mediterranean is listed in the Barcelona Convention (App. III) and in the Bern Convention (App. III).

RECENT MANAGEMENT ADVICE: The ICCAT/SCRS 2009 recommended that the ICCAT work with countries catching porbeagle and relevant RFMOs to prevent overexploitation of porbeagle stocks.

STECF COMMENTS: STECF, in line with its Plenary 09-02 report, recommend that stock or sub-populations should be properly documented on scientific basis before including or excluding them in any specific assessment. For this reason, STECF remarks that the uncertainties created by IUCN, UNEP, ICES and ICCAT about the existence of a discrete Mediterranean stock of porbeagle need to be analysed and clarified if sufficient scientific information is available. Nevertheless, STECF recommends a better reporting of the porbeagle catches from all the fisheries and Member States involved, taking into account that this is a mandatory species within the EC data collection framework.

18.26. Blue shark (*Prionace glauca*) in the North Atlantic

FISHERIES: This species, having a wide distribution, is caught by several gears, but most of the catches are reported by pelagic longlines. It is a major by-catch and accessory species of European large pelagic fisheries. Blue shark accounts for more than 90% of all sharks caught by pelagic longlines. A number of standardized CPUE data series for blue shark were presented to ICCAT/SCRS in 2008 as relative indices of abundance.

Data on catches are partly or under-reported, particularly for some fleets. Historical catches range from 121 t in 1984 to 33,208 t in 2009, the highest record so far. The major catches are reported by EC-Spain, with 24,465 t in 2009 (20,788 t in 2008), usually accounting for more than 60% of the total North Atlantic catches. Relevant catches are reported also by EC-Portugal with 6,249 t in 2009 (6,165 t in 2008) and Japan with 2,686 in 2008 (2,696 t in 2007), but cathes are missing for 2009. Minor or occasional catches are also sometimes reported by several EC countries as France (119 t in 2008 and 83 t in 2009), Denmark, Ireland, Netherlands (1 t in 2009) and United Kingdom (5 t in 2008 and 95 t in 2009).

Given that catch reports to ICCAT are incomplete, the SCRS attempted to develop a more accurate estimate of shark mortality and capture related to the Atlantic tuna fleets on the basis of the expected proportions among tunas and sharks and in the landings of these fleets as well as using shark fin trade data. These information sets were used to reconstruct plausible estimates of historic catches used in blue shark assessment in 2009. According to this estimate, ICCAT considered that catches in North Atlantic were in the order of 61,845 t in 2008.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT, but data on this species is also possibly collected by other RFMOs.

REFERENCE POINTS: None.

STOCK STATUS: Blue shark shows a wide geographical distribution, most often between 50°N and 50°S latitude. A characteristic of this species is usually their tendency to segregate temporally and spatially by size-sex, according to its respective processes of feeding, mating-reproduction, gestation and birth. Numerous aspects of the biology of this species are still poorly understood or completely unknown, particularly for some regions, which contributes to increased uncertainty in quantitative and qualitative assessments.

ICCAT/SCRS (2009) reported that ecological risk assessments for eleven priority species of sharks (including blue shark) caught in ICCAT fisheries demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. All species considered in the ERA are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end. No new trials have been carried out in 2010.

For both North and South Atlantic blue shark stocks, although the results are highly uncertain, biomass is believed to be above the biomass that would support MSY and current harvest levels below FMSY. Results from all models used in the 2008 assessment were conditional on the assumptions made (*e.g.*, estimates of historical catches and effort, the relationship between catch rates and abundance, the initial state of the stock in the 1950s,and various life-history parameters), and a full evaluation of the sensitivity of results to these assumptions was not possible during the assessment. Nonetheless, as for the 2004 stock assessment, the weight

of available evidence does not support hypotheses that fishing has yet resulted in depletion to levels below the Convention objective.

The blue shark is subject to the UN agreement on highly Migratory Stocks. In IUCN (2007), the blue shark is classified as Near Threatened globally.

RECENT MANAGEMENT ADVICE: No specific management advice was provided by ICCAT/SCRS in 2010. Precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. Management measures should ideally be species-specific whenever possible.

STECF COMMENTS: STECF again 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 this species is a mandatory one in the EC Data collection framework and in the EC POA.

18.27. Blue shark (*Prionace glauca*) in South Atlantic

FISHERIES: This species, having a wide distribution, is caught by several gears, but most of the catches are reported by pelagic longlines. It is a major by-catch and accessory species of European large pelagic fisheries. Blue shark accounts for more than 90% of all sharks caught by pelagic longlines. A number of standardized CPUE data series for blue shark were presented to ICCAT/SCRS in 2008 as relative indices of abundance.

Data on catches are partly or under-report with many countries non-reporting any catch. Historical catches range from 0 t in the '80s to 22,439 t in 2009. The major catches are reported by EC-Spain, with 13,099 t in 2009 (9,616 t in 2008), usually accounting for about 40% of the total South Atlantic catches. Relevant catches are reported also by EC-Portugal with 5,358 t in 2009 (4,866 t in 2008), Brazil with 1,274 t in 2009 (1,986 t in 2008), Namibia with 207 t in 2009 (1,829 t in 2008) and Japan with 1,945 t in 2008 (896 t in 2007 but no catches reported in 2009). Minor or occasional catches are also sometimes reported by a few EC countries as Netherlands and United Kingdom (14 t in 2009).

Given that catch reports to ICCAT are incomplete, the SCRS attempted to develop a more accurate estimate of shark mortality and capture related to the Atlantic tuna fleets on the basis of the expected proportions among tunas and sharks and in the landings of these fleets as well as using shark fin trade data. These information sets were used to reconstruct plausible estimates of historic catches used in blue shark assessment in 2009. According to this estimate, ICCAT considered that catches in South Atlantic were in the order of 37,075 t in 2008.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT, but data on this species is also possibly collected by other RFMOs.

REFERENCE POINTS: None.

STOCK STATUS: Blue shark shows a wide geographical distribution, most often between 50ºN and 50ºS latitude. A characteristic of this species is usually their tendency to segregate temporally and spatially by size-sex, according to its respective processes of feeding, mating-reproduction, gestation and birth. Numerous aspects of the biology of this species are still poorly understood or completely unknown, particularly for some regions, which contributes to increased uncertainty in quantitative and qualitative assessments.

ICCAT/SCRS (2009) reported that ecological risk assessments for eleven priority species of sharks (including blue shark) caught in ICCAT fisheries demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. All species considered in the ERA are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end.

For both North and South Atlantic blue shark stocks, although the results are highly uncertain, biomass is believed to be above the biomass that would support MSY and current harvest levels below FMSY. Results from all models used in the 2008 assessment were conditional on the assumptions made (*e.g.*, estimates of historical catches and effort, the relationship between catch rates and abundance, the initial state of the stock in the 1950s,and various life-history parameters), and a full evaluation of the sensitivity of results to these assumptions was not possible during the assessment. Nonetheless, as for the 2004 stock assessment, the weight of available evidence does not support hypotheses that fishing has yet resulted in depletion to levels below the Convention objective. No new trials have been carried out in 2010.

The blue shark is subject to the UN agreement on highly Migratory Stocks. In IUCN (2007), the blue shark is classified as Near Threatened globally.

RECENT MANAGEMENT ADVICE: No specific management advice was provided by ICCAT/SCRS in 2009. Precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. Management measures should ideally be species-specific whenever possible.

STECF COMMENTS: STECF again 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 this species is a mandatory one in the EC Data collection framework and in the EC POA.

18.28. Blue shark (*Prionace glauca*) in the Mediterranean Sea

FISHERIES: This pelagic species (BSH) 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. 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). 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 (in some regions), Spain and in north-African countries and fins sometimes exported to Asia.

Data on catches exist but they are very partial and many countries are not reporting their catches (including Morocco). On the basis of the most recent data reported to ICCAT, landings for this species are reported by Spain, France, Cyprus, Italy, Malta, Japan and Portugal. The yearly landings ranged from 0 to 185 t in the period 1984-2009. In 2009, reported catches reached the historical maximum of 185 t. Reported catches are 51 t in 2007, 80 t in 2008 and 185 in 2009, with a clear increasing trend. The highest catch is reported by EC-Italy, with 176 t in 2009 (75 t in 2008), followed by EC-Spain with 7 t in 2009 (2 t in 2008) and Malta with 2 t in 2008 and 2009, while catches have been reported in the past also by EC-Portugal and EC-Cyprus.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT, but this species is also under the GFCM responsibility.

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 notes that this species is a usual component of the by-chatch in all longline (and gillnet) fisheries targeting large pelagic species. STECF again recommends improving the data collection on the blue shark from all the fisheries and Member States concerned, with the purpose of assessing the status of this stock. STECF notes that this species is a mandatory one in the EC Data collection framework but the understanding of this stock cannot improve if some EC-countries and non-EC countries will continue in non-reporting their catches to ICCAT or GFCM.

18.29. Thresher shark (*Alopias vulpinus*) in the Atlantic Ocean and the Mediterranean

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, in the Mediterranean, gillnets (often set for demersal species) also have a by-catch of *Alopias vulpinus* particularly in the summer. 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 tuna-like species in the Atlantic Ocean and the Mediterranean, also catch *A. vulpinus*.

Data on catches are extremely poor and are suspected to include other species belonging to the same genus.

Data on catches are largely not reported or under-reported, with several countries never reporting them. According to the ICCAT data base (ALV), catches ranged from a minimum of 2 t in 1993 to a maximum of 158 t in 2000, with 70 t reported in 2008 and 148 t in 2009. The highest catch was reported by EC-Portugal with 53 t in 008 and 70 t in 2009, Spain (31 t in 2009) and France (10 t in 2008 and 26 t in 2009), while very minor catches were reported by a number of countries. Landings for this species in the Mediterranean are reported by Spain (1997-2006), Portugal (2001-2006), Italy and France (1999-2009), ranging from 3 to 21 t in the period 1996-2006. Preliminary catch report in 2009 was provided only by Italy(14 t in 2009 and 6 t in 2008), and France (6 t) while no reports are available by any other CPCs, nor in the Atlantic or the Mediterranean.

Reported catches of unclassified thresher shark (*Alopias* spp., THR) ranged from a minimum of 6 t in 1986 to a maximum of 189 t in 1987, with 134 t reported in 2008. In 2008 the highest catch was reported by EC-Spain with 81 t, followed by USA with 48 t. Minor or occasional catches were historically reported also by other EC countries (Ireland, Portugal and United Kingdom). No reports are available by any other CPCs, nor in the Atlantic or the Mediterranean in 2009.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT (for the tuna and tuna-like fisheries) and all the relevant RFMOs (for all the other fisheries).

REFERENCE POINTS: None

STOCK STATUS: There is no mention of separate populations of this species, even if some WGs had considered the specimens living in the Mediterranean as a separate unit in the past. There is no assessment of the Atlantic and Mediterranean stock available, while conservation assessments have been conducted by IUCN in 2003 and 2007, defining this species as globally "Vulnerable", besides the lack of catch data, incomplete knowledge of stock structure, and uncertainty over life history parameters which make 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. From the lack of 2009 data it is evident that several EU Member States are not fulfilling the DCF and ICCAT reporting obligations.

18.30. Bigeye thresher shark (*Alopias superciliosus*) in the Atlantic Ocean and the Mediterranean

FISHERIES: This pelagic species (BTH) 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. This species might be confused in the catch statistics with other thresher sharks.

Data on catches are extremely poor. According to the ICCAT data base, catches ranged from a minimum of 6 t in 1986 to a maximum of 189 t in 1987, with 108 t reported in 2008 and 133 t in 2009. The highest catch in 2008 was reported by EC-Spain with 81 t (59 t in 2009), followed by USA with 48 t, while very minor catches were sometimes reported by some of countries, including EC-Ireland, EC-Portugal (2 t in 2008) and EC-United Kingdom. Catch reports in 2009 are still incomplete.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT (for the tuna and tuna-like fisheries) and all the relevant RFMOs (for all the other fisheries).

REFERENCE POINTS: None

STOCK STATUS: There is no evidence of separate populations of this species, There is no assessment of the Atlantic and Mediterranean stock available, while a conservation assessments was conducted by IUCN in 2007, defining this species as globally "Vulnerable", besides the lack of catch data, incomplete knowledge of stock structure, and uncertainty over life history parameters which make it impossible to determine population size and fluctuations.

RECENT MANAGEMENT ADVICE: ICCAT Rec. 08-07 recommends CPCs shall require vessels flying their flag to promptly release unharmed, to the extent practicable, bigeye thresher sharks (*Alopias superciliosus)* caught in association with fisheries managed by ICCAT which are alive, when brought along side for taking on

board the vessel. CPCs shall also require that incidental catches as well as live releases shall be recorded in accordance with ICCAT data reporting requirements.

STECF COMMENTS: STECF agrees with the ICCAT recommendation and recommends a better reporting of the bigeye thresher shark catches from all the fisheries and Member States concerned, with the purpose of better understanding the current state of the stock. From the lack of 2009 data it is evident that several EU Member States are not fulfilling the DCF and ICCAT reporting obligations.

18.31. Smooth hammerhead (*Sphyrna zygaena*) in the Atlantic Ocean and the Mediterranean Sea

FISHERIES: The Smooth hammerhead (SPZ) is a relatively common and widespread shark, captured in a number of fisheries throughout its range, mostly by gillnet and pelagic 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 considered scarce, suspected to include other species belonging to the same genus and they are largely not reported or under-reported, with several countries never reporting them. According to the ICCAT data base, catches ranged from a minimum of 1 t in 1995 to a maximum of 1,472 t in 2002, with 109 t reported in 2008 (17 t as 2009 preliminary and incomplete catch report). The highest catch in 2008 was reported by Senegal (103 t), followed by Ivory Coast (which usually reports catches in the order of 40 t) and EC-Portugal (6 t in 2008 and 17 t in 2009), while very minor catches were historically reported by a number of countries, including EC-Spain, EC-Italy and EC-Malta.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT (for the tuna and tuna-like fisheries) and all the relevant RFMOs (for all the other fisheries).

REFERENCE POINTS: None

STOCK STATUS: There is no evidence of separate populations of this species, There is no assessment of the Atlantic and Mediterranean stock available, while a conservation assessments was conducted by IUCN in 2008, defining this species as globally "Vulnerable"; IUCN (2007) and UNEP/SPA (2008) had proposed a separate evaluation of this species in the Mediterranean, even in the absence of any evidence of a separate sub-population.

RECENT MANAGEMENT ADVICE: None. UNEP/SPA in 2008 proposed the inclusion of this species in the Annex II of the SPA/BD protocol of the Barcelona Convention.

STECF COMMENTS: STECF reiterates the concerns about the different classification of conservation status in various areas in the absence of any evidence of sub-populations, raised during the STECF Plenary 09-02. STECF recommends the collection of catch data and basic information on this species by the EU Member States to better understand the current situation of the stock. From the lack of 2009 data it is evident that several EU Member States are not fulfilling the DCF and ICCAT reporting obligations.

18.32. Other Hammerhead sharks (*Sphyrnidae*) in the Atlantic Ocean and the Mediterranean Sea

FISHERIES: The hammerhead sharks are widespread species, captured in a number of fisheries throughout its range, mostly by gillnet and pelagic long-line. There might be a significant mortality of these species in large-scale long-line and driftnet fisheries, although the impact on populations is unknown at present.

Data on catches are considered scarce, not well defined by species, and they are largely not reported or under-reported, with several countries never reporting them. According to the ICCAT database, catches by species or category are the followings:

Sphyrna lewini (SPL): reported catches ranged from a minimum of 0 t in 2006/2007 to a maximum of 363 t in 1990, with 56 t reported in 2008 and 62 t in 2009. Historically, catches were reported also by EC-Spain (2 tons in 2009).

Sphyrna tiburo (SPJ): reported catches are available only in 2004 with 77 t reported by USA.

Sphyrna mokarran (SPK): reported catches ranged from a minimum of 0 t in 2004 to a maximum of 19 t in 1992, with only 1 t reported in 2008 and 2009 by St. Lucia. Historically, catches were reported also by EC-Spain. No other catches have been reported in 2009.

Sphyrna spp. (SPN): reported catches ranged from a minimum of 0 t in 1992 to a maximum of 883 t in 1987, with 199 t reported in 2008 and 138 t in 2009 (incomplete report). The highest catch in 2008 was reported by Brazil (122 t), followed by USA (56 t), EC-Portugal (27 t) and Namibia (25 t),. In 2009 catches were reported mostly by EC-Spain (172 t) and EC-Portugal (21 t)..

Sphyrnidae (SPY): reported catches ranged from a minimum of 47 t in 2004 to a maximum of 198 t in 2008. The highest catch in 2008 was reported by EC-Spain (198 t); Uruguay usually reports catches of these undefined sharks. No catches have been reported in 2009.

Catches of these species in the Mediterranean area are incidental.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT (for the tuna and tuna-like fisheries) and all the relevant RFMOs (for all the other fisheries).

REFERENCE POINTS: None

STOCK STATUS: There is no evidence of separate populations of these species. There is no assessment of the Atlantic and Mediterranean stocks available, while a conservation assessments was conducted by IUCN in 2008, defining *Sphyrna lewini* and *Sphyrna mokarran* as globally "Endangered

RECENT MANAGEMENT ADVICE: None. UNEP/SPA in 2008 proposed the inclusion of *Sphyrna mokarran* and *Sphyrna lewini* in the Annex II of the SPA/BD protocol of the Barcelona Convention for the Mediterranean.

STECF COMMENTS: STECF reiterates the concerns about the different classification of IUCN status in various areas in the absence of any evidence of sub-populations, raised during the STECF Plenary 09-02. STECF recommends the collection of catch data and basic information on these species (possibly with a precise identification) by the EU Member States to better understand the current situation of the stocks. From the lack of 2009 data it is evident that several EU Member States are not fulfilling the DCF and ICCAT reporting obligations.

18.33. *Carcharhinus* spp.

FISHERIES: This important group of pelagic species includes at least 17 species in the Atlantic Ocean, while only 8 of them are reported in the Mediterranean Sea. Among those, the ICCAT data base reports catches concerning 14 species in the various areas. These species are often caught as by-catch in surface long-line fisheries targeting tuna and tuna-like species. A number of specimens may also be caught by large driftnet fisheries, even though this fishery is prohibited since years. In some countries there is also a target fishery for some species.

The landings reported to ICCAT are the followings:

Species	code	name	Min catch	Max catch	Latest catch
Carcharhinus plumbeus	CCP	Sandbar shark	<1 t (1990)	468 t (1996)	22 t (2009)
Carcharhinus limbatus	CCL	Blacktip shark	7 t (1990)	565 t (2005)	62 t (2009)
Carcharhinus melapterus	BLR	Blacktip reef shark		<1 t (2007)	<1 t (2007)
Carcharhinus acronotus	CCN	Blacknose shark		49 t (2004)	49 t (2004)
Carcharhinus longimanus	OCS	Oceanic whitetip shark	<1 t (1990)	642 t (2000)	54 t (2009)
Carcharhinus porosus	CCR	Smalltail shark	10 t (2006)	306 (2002)	<1 t (2009)
Carcharhinus obscurus	DUS	Dusky shark	<1 t (2003/4)	270 t (1994)	15 t (2009)
Carcharhinus falciformis	FAL	Silky shark	7 t (2006)	531 t (1996)	70 t (2009)
Carcharhinus leucas	CCE	Bull shark	<0 t	375 t (2003)	10 t (2009)

Carcharhinus brachyurus	BRO	Copper shark	1 t (2001)	7 t (2008)	1 t (2009)
Carcharhinus brevipinna	CCB	Spinner shark	10 t (2006)	306 t (2002)	<1 t (2009)
Carcharhinus signatus	CCS	Night shark	< 1 t	1466 t (2002)	35 t (2009)
Carcharhinus isodon	CCO	Finetooth shark		<1 t (2004)	<1 t (2004)
Carcharhinus altimus	CCA	Bignose shark	<1 t (2003)	43 t (2004)	<1 t (2009)
Charcharhinidae	RSK	Requiem sharks nei	20 t (2004)	861 t (2008)	142 t (2009)
Carcharhiniformes	CVX		127 t (2006)	2279 t (2003)	1262 t (2009)
	PXX	Pelagic sharks nei	15 t (2005)	1011 t (1997)	15 t (2005)

SOURCE OF MANAGEMENT ADVICE: The advisory body for these species is ICCAT for the tuna and tuna-like fisheries, but also the RFMOs concerned by catches obtained by other gears.

REFERENCE POINTS: None

STOCK STATUS: No stock assessment was ever attempted by ICCAT or any other RFMO in the area. IUCN carried out some conservation assessments, including the following species in the Red List:

"Low Concern": *C. falciformis*;

"Near Threatened": C. *limbatus, C. melanopterus, C. obscurus, C. leucas, C. brevipinna, C. plumbeus* (IUCN, in 2007, listed this latter species as "Endangered" for the Mediterranean – see STECF comment);

"Vulnerable": *C. longimanus*.

RECENT MANAGEMENT ADVICE: None.

STECF COMMENTS: STECF reiterates the comments made during its Plenary 09-02, about the adoption of a different conservation status in the Mediterranean in the absence a discrete and well-defined sub-population.

STECF recommends the collection of basic information on the catches of the different *Carcharhinus* species occurring in the Mediterranean and in the Atlantic with the aim of better understanding the current state of these species and assessing the possible impacts of the different fisheries. From the lack of 2009 data it is evident that all EU Member States concerned are not fulfilling the DCF and ICCAT reporting obligations.

18.34. 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 poorly reported and no catches of this species are included in the ICCAT data bank at the moment. This species often represents the most common Chondrichthyes species in the pelagic longline fishery in the Mediterranean, abundant in some areas and seasons.

SOURCE OF MANAGEMENT ADVICE: The advisory body for these species is ICCAT for the tuna and tuna-like fisheries, but also the RFMOs concerned by catches obtained by other gears.

REFERENCE POINTS: None.

RECENT MANAGEMENT ADVICE: None by RFMOs. IUCN (2007) classified this species for the Mediterranean as "Near threatened".

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 in some geographical areas. STECF recommend that catches of this species must be regularly reported to ICCAT. From the lack of 2009 data it is evident that all EU Member States concerned are not fulfilling the DCF and ICCAT reporting obligations.

18.35. Chondrichthyes species n.e.i

Many species of Chondrichthyes, besides of those individually listed above, are usually caught by the various fisheries targeting large pelagic species. The reported catches are sometimes very sporadic. STECF notes that, in agreement with the European Action Plan for Sharks and the ICCAT rules, many species must be recorded, in order to understand their status. ICCAT, in 2009, made a very strong effort and recovered data about many shark species, which are here reported, with the only purpose to provide a general idea about the number of species concerned and the quantity, showing the complexity of this particular segment of the catches, taking into account that several species are still missing from the list.

19. 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, fishery statistics are still not available for some fisheries, particularly for several artisanal fisheries which a very important component of the total catch of most countries in the region. Many smaller tuna and tuna-like species are not currently assessed by the IOTC, although data on these is improving species and some fishery indicators are available.

19.1. Pelagic Sharks

FISHERIES: For the Indian Ocean there is currently little quantitative information available on the fisheries targeting or having significant by-catch of pelagic sharks. The following information was taken from: Status of Pelagic Sharks and Rays Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop Tubney House, University of Oxford, UK, 19–23 February 2007.
The Indian Ocean borders on the top two shark-fishing nations in the world, Indonesia and India, which together have accounted for 22% of the total FAO-reported chondrichthyan global landings since 2000. Landings of these species have been steadily rising in both the Eastern and Western Indian Ocean since the 1950s, although there has been a slight decline since 2004.
Qualitatively, at least 15 species of sharks are caught in open ocean fisheries in the Indian Ocean, with blue (*Prionace glauca*) and silky (*Carcharhinus falciformis*) sharks probably the most prevalent species, but other species, specifically shortfin mako (*Isurus oxyrinchus*) are also taken in significant number.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Committee of the IOTC.

REFERENCE POINTS: None.

STOCK STATUS: unknown

RECENT MANAGEMENT ADVICE: Overall, there is a paucity of information available on sharks and this situation is not expected to improve in the short to medium term. There is no quantitative stock assessment or basic fishery indicators currently available for any of the sharks in the Indian Ocean therefore the stock status for all species is highly uncertain. In general, the life history characteristics of sharks; including that they are relatively long lived, typically take (at least) several years to mature, and have relativity few offspring, means that they are vulnerable to overfishing.

Information in the following four sections is taken from the Report of the Thirteenth Session of the IOTC Scientific Committee Bali, Indonesia, 30th March – 3rd April 2009 and from various scientific papers and assessments presented during the IOTC WPs from 2006 - 2008.

http://www.iotc.org/files/proceedings/2009/s/IOTC-2009-S13-R[E].pdf

STECF COMMENTS: STECF is unaware of any new information on the stock status or advice on the management of fisheries exploiting pelagic sharks in the Indian Ocean. The text above remains unchanged from the STECF Review of scientific advice for 2010 - Consolidated Advice on Stocks of Interest to the European Community see - (http://publications.jrc.ec.europa.eu/repository/handle/111111111/12955)

19.2. Yellowfin tuna (*Thunnus albacares*)

FISHERIES:

Contrary to the situation in other oceans, the artisanal fishery component in the Indian Ocean (mainly using pole and line, driftnet and hand line) is substantial, contributing with 35 % to the total YFT catches during recent years (2000-2008). Total annual catches have increased steadily since the start of the fishery in the late 1950s, reaching the 100,000 t level in 1984, the 200,000 t level in 1989 and peaking at around 400,000 t in 1993. Total annual catches averaged 345,000 t over the period 1993 to 2002. Yellowfin catches in the Indian Ocean during 2003, 2004, 2005 and 2006 were much higher than in previous years (an average catch of 466,000 t) but have returned to a lower level in 2007-2008 (318,000t.). Total catches peaked at 447,700 t in 2003, 511,200 t in 2004 and 490,400 t in 2005. Catches of yellowfin in 2009 were 288,000 tonnes.

This stock is exploited mainly by purse seines, longliners, and artisanal fishereis, taken by bait boat, gillnet, troll, hand line and other gears. The location of the fishery has changed little since 1990. Yellowfin tuna is fished throughout the Indian Ocean, with the majority of the catches being taken in western equatorial waters.

After an initial decline, mean weights in the whole fishery remained quite stable from the 1970s to the late eighties and since 1990 mean weights in the catches have been quite stable. Prior to 2003, although total catch in biomass was stable for several years, catches in numbers increased due to the development of FAD fishery. However, catch in number have been quite stable since 1995 and catches of large fishes increases, as explained above, during the 2003-2006 period. The very recent increases in catches in general is thought to be due to an increase in catchability by surface and longline fleets due to a high level of concentration across a reduced area and depth range.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Committee of the IOTC.

REFERENCE POINTS: MSY is estimated to be 300,000 t.

STOCK STATUS:

Estimates of total and spawning stock (adult) biomass continue to decline, probably accelerated by the high catches of 2003-2006. It appears that overfishing occurred in recent years, and the effect on the standing stock is still noticeable as biomass appears to be decreasing despite catches returning to pre-2003 levels.

The MSY has been estimated to be 300,000 t, if steepness of the stock recruitment relationship is assumed to be 0.8. The preliminary estimate of 2008 catch (318,400 t) is above the current estimate of MSY while annual catches over the period 2003-2006 (averaging 464,000 t) were substantially higher than all estimated values of MSY. The catch estimated in 2009 was 288,000 tonnes.

The most recent estimate of biomass (2007), noting that the 2008 estimate was considered uncertain to base this year's management advice, is above the MSY-related reference value, while fishing mortality levels are estimated to be above those linked to MSY catches. Preliminary estimates for 2008 show the stock could be below the SSB at MSY value and the fishing pressure might be even higher than in 2007.

Various indicators of catch rates for different fleets and areas appear to confirm this downward trend in abundance. Catches in 2008 for longliners operating in the Arabian Sea, for example, are at a historic low.

Stock size is close to or has possibly entered an overfished state recently. Fishing mortality has recently exceeded the MSY-related level therefore some reduction in catch or fishing effort would be required to return exploitation rates to those related to MSY. Currently, the population might not be able to sustain the 1992-2002 level of catches. The preliminary catch estimates for 2008 (318,400 t) is slightly lower than the average catch taken in the 1998-2002 period (336,000 t) i.e. preceding the 2003 to 2006 period when extraordinarily high catches of yellowfin were taken. While there is uncertainty about future catches, recent events in 2008 and 2009 where some vessels have left the fishery, together with fleets avoiding the historically important fishing grounds in the waters adjacent to Somalia for security reasons, may reduce catches in the short-term to below the pre-2003 levels. The SC noted that a return to a normal fishing scenario may result in increased effort levels, leading to catches above MSY.

RECENT MANAGEMENT ADVICE: The SC considers that the stock of yellowfin has recently been overexploited and is probably still being overfished. Management measures should be considered that allow an appropriate control of fishing pressure to be implemented. The current estimate of MSY is 300,000 t, lower than the average catches sustained over the 1992-2002 period of around 343,000 t. The high catches of the 2003-2006 period appears to have accelerated the decline of biomass in the stock, which might be currently unable to sustain the 1992-2002 level of catches. The SC recommended that catches of yellowfin tuna should not exceed the estimated MSY of 300,000 t. The SC recommends that monitoring and data collection be strengthened over the coming year to be able to more closely follow the stock situation.

STECF COMMENTS: STECF agrees with the advice from IOTC and stresses the importance of avoiding any further increase of fishing effort and catches above MSY reference points levels.

19.3. 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. The location of the fishery has changed little since 1990. Bigeye tuna is fished throughout the Indian Ocean, with the majority of the catch being taken in western equatorial waters.

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 121,700 t over the period 2004 to 2008. The catch in 2009 is estimated to be 102,000 t

Over 75% of purse seine bigeye catches are taken in log-schools along with skipjack and yellowfin tuna. Catches increased since the beginning of the fishery, peaked at over 30,000 t from 1997 to 1999 and then stabilized at around 20,000 t.

Much of the bigeye catches 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 the Scientific Committee of the IOTC.

REFERENCE POINTS: MSY = 110,000 t (100,000-115,000).

STOCK STATUS:

The results of the stock assessments conducted in 2009 were broadly similar to previous work. The preliminary estimate of catches in 2008 (107,000 t) is below the current estimate of MSY (110,000 t), catches in the past (1997-1999) have significantly exceeded MSY. Estimated values of fishing mortality and SSB for 2008 are also close to MSY-related values, indicating a fully exploited stock. Recent changes in the areas fished by purse seiners do not appear to have had an effect on mortality for juvenile bigeye, despite the decrease in effort in the Somali basin where fishing on FADs usually caught the majority of juvenile bigeye. $F_{2008}/F_{MSY} = 0.90$ and $SB_{2008}/SB_{MSY} = 1.17$.

RECENT MANAGEMENT ADVICE: The results of the stock assessments conducted in 2009 were broadly similar to previous work. The preliminary estimate of catches in 2008 (107,000 t) is below the current estimate of MSY (110,000 t), catches in the past (1997-1999) have significantly exceeded MSY. The SC recommended that catches of bigeye tuna should not exceed the estimated MSY of 110,000t.

STECF COMMENTS: STECF agrees with the advice from the Scientific Committee of the IOTC and stresses the importance of keeping the total catch and effort under strict control, as well as reducing catches of juveniles.

19.4. Skipjack (*Katsuwonus pelamis*)

FISHERIES: Contrary to the situation in other oceans, the artisanal fishery component in the Indian Ocean (mainly using pole and line, driftnet and hand line) is substantial, taking between 55 and 60 % of the total skipjack catches during recent years (2000-2008).

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 baitboats (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 1990's 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 due to an expansion of the FAD-associated fishery, in particular, and the expansion of gillnet and baitboat 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 612,200 t in 2006, but dropping to 447,100 t in 2007 mainly due to lower catches in the purseine fleet. Catches averaged 499,900t over the period 2004 to 2008. The catch in 2009 was 440,577 t.

In recent years, the proportions of the catch taken by the industrial purse seine fishery and the various artisanal fisheries (baitboat, 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); another 30-40 % in purse seiners and around 20 % in baitboat fishery.

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.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Committee of the IOTC.

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.

The high productivity and life history characteristics of skipjack tuna suggest this species is resilient and not easily prone to overfishing. However, the analysis of some indicators of stock status for recent years suggests that the situation of the stock should be closely monitored in 2010.

RECENT MANAGEMENT ADVICE: Skipjack is a highly productive species. Catches have increased with increasing fishing pressure with no symptoms for concern in the status indicators. Stock size and fishing pressure are considered to be within acceptable limits. There is no need for immediate concern but the situation of the stock should be closely monitored

STECF COMMENTS: STECF notes that given the limited nature of the work carried out by the SC of the IOTC on the skipjack in 2009, no new advice is provided for the stock. 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 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.

19.5. Swordfish (*Xiphias gladius*)

FISHERIES: Swordfish in the Indian Ocean is caught mainly using drifting longlines (95%) and gillnets (5%). Swordfish was mainly a bycatch of industrial longline fisheries before the early 1990's. Catches increased gradually from 1950 to 1990 as the catches of targeted species (such as tropical and temperate tunas) increased. Catches increased markedly after 1990 to peaks of around 35,000 t in 1998 and 36,000 t in 2003 and 2004. Catches averaged 29,900 t over the period 2004-2008 and the catch in 2008 was 22,300 t.The increase in catch is attributed to a change in target species from tunas to swordfish by part of the Taiwanese fleet, the development of longline fisheries in Australia, La Reunion, Seychelles and Mauritius targeting swordfish, and the arrival of longline fleets from the Atlantic Ocean (Portugal, Spain and other fleets operating under various flags) also targeting swordfish.

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 the Scientific Committee of the IOTC.

REFERENCE POINTS: MSY is estimated to be 33,000 t (32,000 t-34,000 t)

STOCK STATUS: The longline Japanese and Taiwanese CPUE series have conflicting trends, with the Japanese (by-catch) fleet suggesting substantial decline in abundance prior to ~2000, and the Taiwanese (targeted) fleet suggesting stable abundance over this period.

The stock status reference points from the range of models vary considerably, but a number of general consistencies were evident. Given the limitations identified for each model, and the uncertainties associated with the data inputs, the SC felt that restricting the management advice to a single model would lead to an understatement of the uncertainty. This summary attempts a qualitative summary across models and data-based indicators.

The annual average sizes of swordfish in the respective Indian Ocean fisheries are variable but show no trend. It was considered encouraging that there are not yet clear signals of declines in the size-based indices, but these indices should be carefully monitored. It was noted that since females mature at a relatively large size, a reduction in the biomass of large animals could potentially have a strong effect on the spawning biomass.

When the current stock status estimates are compared among models, it is evident that there is a large degree of uncertainty. In recognition of the fact that MSY-related reference points are often difficult to quantify reliably, a number of management agencies prefer to use depletion-based biomass stock status indicators. Most approaches suggest that MSY could reasonably be in the range of ~28-34,000 tonnes, though this is the lower end of the range for some models and the upper end of the range for others. Similarly, all approaches suggest that depletion could be in the range of B2007/B0=0.4 – 0.5, though again this may be an upper or lower end of the plausible range depending on the model. Comparison across models suggest that current catches are probably near MSY (and F is probably near FMSY), but could be somewhat above or below.

The apparent fidelity of swordfish to particular areas is a matter for concern as this can lead to localized depletion. The CPUE of the Japanese fleet in the south west IO has the strongest decline of the four areas examined in 2009; furthermore, the La Reunion CPUE series shows a declining trend in this area over the last 10 years. In previous years, localised depletion was inferred on the basis of decreasing CPUEs following fine-scale analyses of the catch and effort data. Therefore the SC cannot discount the possibility that localised depletion is still occurring in some areas. Localised depletion has occurred in other parts of the world where swordfish have been heavily targeted.

In summary, the overall stock size and fishing pressure are estimated to be within acceptable limits, although there is a possibility that certain limit reference points have been marginally exceeded. Also, it cannot be discounted that localised declines took place in some areas.

RECENT MANAGEMENT ADVICE: The most recent advice as given by the Scientific Committee of the IOTC is as follows:

Given the general recent declining trend in all the CPUE series, and the fully exploited status of the stock, the WPB expects that abundance will likely decline further at current effort levels, especially considering that the issue of increases in efficiency has not been fully addressed in the current standardization. When combined with the uncertainty in the assessment, the WPB considers that there is a reasonably high probability that common target and limit reference points (e.g. BMSY, 0.4B0) may be marginally exceeded, and this probability will increase over time if effort remains at current levels or increases further. Precautionary measures such as capacity control or catch limits will reduce the risk of creating an overcapacity problem or increasing the risk of exceeding common biomass limit reference points. The SC recommended that catches of swordfish should not exceed the estimated MSY of 33,000t.

STECF COMMENTS: STECF agrees with the advice from the Scientific Committee of the IOTC.

20. Highly Migratory fish (Northeastern, eastern, southern and western-central Pacific)

As a general remark, the management of highly migratory species in the Pacific Ocean remains complex. The Inter-American Tropical Tuna Commission (IATTC) 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, there is an overlapping area of competence at 150°W and cooperation between these two Commissions is improving. The scientific advice is coming also from science/assessment providers. The Ocean Fisheries Programme of the Secretariat of the Pacific Community (SPC-OFP) provides contracted scientific support to the Commission-WCPFC, through the Commission's Scientific Committee (SC), on southern stocks. On the other hand, the International Scientific Committee (ISC) provides non-contracted research that is supplied to the Commission's Northern Committee (NC) on stocks occurring north of 20° N. SC and NC provide the scientific outcomes for consideration in the WCPFC Commission's annual meeting. 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, fishery statistics 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.

20.1. Pacific Bluefin tuna (*Thunnus orientalis*)

FISHERIES: It is assumed that there is one single stock of Pacific bluefin that spawn in waters between the Philippines and Japan before migrating more than 11,100 kilometres to the Eastern Pacific, only to return to their birth waters to spawn again. Tagging studies have shown that there is exchange of Pacific bluefin between the eastern and western Pacific Ocean. Larval, postlarval, 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.

Pacific bluefin tuna is primarily exploited by Japanese, Korean, Taiwanese, Mexican and US fleets. EU vessels have never exploited this stock.

Most of the catches of bluefin in the EPO are taken by purse seiners with nearly all of the catch made west of Baja California and California, within 100 nautical miles of the coast, between 23°N and 35°N. Ninety percent of the catch is between 60 and 100 cm in length, (age 1 to 3). Aquaculture facilities, established in Mexico in 1999, now attract much of the catch. Lesser amounts of bluefin are caught by recreational, gillnet, and longline gear. Bluefin have been caught during every month of the year, but most are taken during May through October. In the WCPO, bluefin are exploited by various gears from Taiwan to Hokkaido. Age-0 fish (15 to 30 cm) are caught by trolling during July-October south of Shikoku Island and south of Shizuoka Prefecture. During November-April, age-0 fish (35 - 60 cm) are taken by trolling south and west of Kyushu Island. Age-1 and older fish are caught by purse seining, mostly during May-September, between about 30°-42°N and 140°-152°E. Bluefin of various sizes are also caught by traps, gillnets, and other gear, especially in the Sea of Japan. Small amounts of bluefin are caught near the southeastern coast of Japan by longlining. The Chinese Taipei small-scale longline fishery, which has expanded since 1996, takes bluefin tuna over 180 cm in length from late April to June, when they are aggregated for spawning in the waters east of the northern Philippines and Taiwan.

Total catches of bluefin have fluctuated considerably during the last 50 years: the presence of consecutive years of above-average catches (mid-1950s to mid-1960s) and below-average catches (early 1980s to early 1990s) could be due to consecutive years of above-average and below-average recruitment.

The catches of Pacific bluefin in the entire Pacific Ocean, by flag and gear, as reported by the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), and contained in the IATTC Fishery Status Report 2010 show that the total catch of Pacific Bluefin varies considerably and between 1979 and 2007 ranged from 8,653t (in 1990) to 34,641t (in 1981).

Catches in more recent years were 26,712t in 2005, 24,089t in 2006 and 18,393t in 2007 respectively of which 21,857t, 14,261t, and 14,330t were taken in the WPO. Between 1993-2007 the annual retained catch of bluefin from the EPO by purse-seine and pole-and-line vessels averaged 3,700 t (range 600 t to 10 thousand t). The preliminary estimate of the retained catch of bluefin in 2008, 4,200 t, is 500 t greater than the average for 1993-2007.

SOURCE OF MANAGEMENT ADVICE: Bluefin tuna in the north Pacific is co-operatively managed by two regional fisheries management organizations: the 16-member Inter-American Tropical Tuna Commission (IATTC) and the 26-member Western and Central Pacific Fisheries Commission (WCPFC). The Scientific Committee of the Western and Central Pacific Fisheries Commission has performed a comprehensive assessment of this stock in 2009. In addition the international scientific committee for tuna and tuna-like species in the north pacific ocean provides scientific advise.

REFERENCE POINTS: None.

STOCK STATUS: In 2008, the ISC working group conducted a stock assessment of PBF using Stock Synthesis II with fishery data through 2005. Results of that stock assessment were accepted by the ISC Plenary; however, ISC8 requested that the WG investigate the causes of some of the implausible model results (e.g. large B0, low SPR and depletion level. See ISC8 Plenary report).

In 2009, a different natural mortality schedule and Stock Synthesis III were used to reanalyze stock status using data through 2005 (the same as that used in the 2008 assessment). The ISC working group concluded that the results of the 2009 reanalysis were more plausible. In both the 2008 and 2009 analyses, the "current" fishing mortality rate was characterized by a three-year average (2002-2004) with the terminal year of the model results (2005) excluded due to unreliable estimates.

In 2010, the WG conducted an update of the 2009 analysis along with a complete set of sensitivity analyses and stock projections using data through 2007. Data used in the 2010 update were analyzed using the same methods and parameters in the stock assessment model as in 2009.

i. Results indicate that absolute spawning biomass and fishing mortality are sensitive to the assumption of adult M.
ii. The estimate of spawning biomass in 2008 (at the end of the 2007 fishing year) declined from 2006 and is estimated to be in the range of the 40–60 percentile of the historically observed spawning biomasses.
iii. Average Fishing Mortality 2004-2006 (F2004–2006) had increased from F2002–2004 by 6% for age-0, approximately 30% for ages 1-4, and 6% for ages 5+.
iv. 30-year projections predict that at F2004–2006 median spawning biomass is likely to decline to levels around the 25th percentile of historical spawning biomass with approximately 5% of the projections declining to or below the lowest previously observed spawning biomass. At F2002–2004 median spawning biomass is likely to decline in subsequent years but recover to levels near the median of the historically observed levels. In contrast to F2004–2006, F2002–2004 had no projections (0%) declining to the lowest observed spawning biomass. In both projections long-term average yield is expected to be lower than recent levels.
v. It should be noted that even the most recent estimates of fishing mortality do not yet reflect any actions with regard to the fishery management decision for Pacific bluefin taken by WCPFC6 (CMM 2009-07, Dec. 2009). Despite that, the SC remained concerned that the impact of the new measure in reversing trends in spawning stock biomass and fishing mortality of this species, particularly on juvenile age classes (ages 0–3), remains to be seen.

Finally in 2010 IATTC reported that an index of abundance for the predominantly young bluefin in the EPO was calculated. This index was, however, highly variable, but shows a peak in the early 1960s, very low levels for a period in the early 1980s, and some increase since that time.

RECENT MANAGEMENT ADVICE: Noting the uncertainty in the assessments, the International Scientific Committee has provided the following conservation advice:

- If F remains at the current level and environmental conditions remain favourable, the recruitment should be sufficient to maintain current yield well into the future; that a reduction in F in combination with favourable environmental conditions, should lead to greater SPR; and that increases in F above the current level, and/or unfavourable changes in environmental conditions, may result in recruitment levels which are insufficient to sustain the current productivity of the stock.

- Given the conclusions of the May-June 2008 stock assessment with regard to the current level of F relative to potential target and limit reference points, and residual uncertainties associated with key model parameters, it is important that the current level of F is not increased.
- Given the conclusions of the July 2009 PBFWG, the current level of F relative to potential biological reference points, and increasing trend of juvenile F, it is important that the current [level of F is decreased below the 2002-2004 levels on juvenile age classes.

In 2010 ISC's plenary reached consensus on the management advice for Pacific bluefin tuna as follows: given the conclusions of the July 2010 PBFWG workshop, the current (2004–2006) level of F relative to potential biological reference points, and the increasing trend of F, it is important that the level of F is decreased below the 2002–2004 levels, particularly on juvenile age classes.

In December 2009 WCPFC adopted a resolution to ensure that the current level of fishing mortality rate is not increased in the Convention Area: "The Commission Members, Cooperating Non-Members and participating Territories (hereinafter referred to as CCMs) shall take measures necessary to ensure that total fishing effort by their vessels fishing for northern Pacific bluefin tuna in the area north of the 20 degrees north shall not be increased from the 2002-2004 level for 2010, except for artisanal fisheries. In taking such measures, CCMs shall take account of the need to reduce the effort on juvenile (age 0-3) to the 2000-2004 level. The measures in this paragraph shall not be applied to the Korean EEZ".

STECF COMMENTS: STECF agrees with the advise provided by the International Scientific Committee that the current level of F is reduced below the 2002–2004 levels, particularly on juvenile age classes..

20.2. Eastern Pacific Yellowfin (*Thunnus albacares*)

FISHERIES: Yellowfin are distributed across the Pacific Ocean, but the bulk of the catch is made in the eastern and western regions. The purse-seine catches of yellowfin are relatively low in the vicinity of the western boundary of the EPO. The movements of tagged yellowfin are generally over hundreds, rather than thousands, of kilometers, and exchange between the eastern and western Pacific Ocean appears to be limited. This is consistent with the fact that longline catch-per-unit-of-effort (CPUE) trends differ among areas. It is likely that there is a continuous stock throughout the Pacific Ocean, with exchange of individuals at a local level, although there is some genetic evidence for local isolation. Movement rates between the EPO and the western Pacific cannot be estimated with currently-available tagging data.

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 2006 (178,844 t) the lowest since 1984. Catch data for 2008 is 187,797 t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is IATTC.

REFERENCE POINTS: None: the use of a spawning stock - biomass ratio (SBR) proposed.

STOCK STATUS: The most recent stock assessment[6] of yellowfin tuna (*Thunnus albacares*) in the eastern Pacific Ocean (EPO) was undertaken using an integrated statistical age-structured stock assessment model (Stock Synthesis Version 3; Methot, 2005, 2009) based on the assumption that there is a single stock of yellowfin in the EPO. This model differs from that used in previous assessments.

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: ratio of spawning biomass to that of the unfished stock) 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 period 2004-2007.

The two different productivity regimes may support two different MSY levels and associated SBR levels. The SBR at the start of 2009 is estimated to be above the level corresponding to the MSY. The effort levels are estimated to be less than those that would support the MSY (based on the current distribution of effort among the different fisheries), but recent catches are substantially below MSY.

[6] http://www.iattc.org/StockAssessmentReports/StockAssessmentReport10ENG.htm

The MSY calculations indicate that, theoretically, at least, catches could be increased if the fishing effort were directed toward longlines and purse-seine sets on yellowfin associated with dolphins. This would also increase the SBR levels.

The MSY has been stable during the assessment period, which suggests that the overall pattern of selectivity has not varied a great deal through time. However, the overall level of fishing effort has varied with respect to the level corresponding to MSY.[7]

If a stock-recruitment relationship is assumed, the outlook is more pessimistic, and current biomass is estimated to be below the level corresponding to the MSY. The status of the stock is also sensitive to the value of adult natural mortality, the method used to model selectivity, and the assumed length of the largest age.

Key Results from the most recent assessment:

1. The estimates of absolute biomass are lower than those in previous years.
2. The SBR (ratios of spawning biomass to that for the unfished stock) corresponding to MSY is substantially less than those of previous assessments; the reduction is attributed to the new method to model selectivity. At the beginning of 2009 the spawning biomass of yellowfin in the EPO had increased relative to 2006 (probably its lowest level since 1983). In general, the SBR estimates for yellowfin in the EPO are reasonably precise. The spawning biomass at the start of 2009 is estimated to be above the level corresponding to MSY.
3. There is uncertainty about recent and future recruitment and biomass levels, and there are retrospective patterns of overestimating recent recruitment.
4. The recent fishing mortality rates are close to those corresponding to the MSY.
5. Increasing the average weight of the yellowfin caught could increase the MSY.
6. There have been two, and possibly three, different productivity regimes, and the levels of MSY and the biomasses corresponding to the MSY may differ among the regimes. The population may have recently switched from the high to an intermediate productivity regime.
7. The results are more pessimistic if a stock-recruitment relationship is assumed.

RECENT MANAGEMENT ADVICE: The most recent report from IATTC (Stock Assessment Report 10) consists of slightly-modified versions of papers prepared for the 10th Stock Assessment Review Meeting held during May 12-15, 2009.

Under current levels of fishing mortality (2006-2008), the spawning biomass is predicted to slightly decrease, but remain above the level corresponding to MSY. However, the confidence intervals are wide, and there is a moderate probability that the SBR will be substantially above or below this level. It is predicted that the catches will be greater over the near term than in 2008, but will decline slightly in the future.

Fishing at *Fmsy* is predicted to reduce the spawning biomass slightly from that under current effort and produces slightly higher catches.

In 2009, IATTC, whilst noting that catches of yellowfin tunas have decreased, also consider that capacity continues to increase in this fishery; that the yellowfin tuna resource in the EPO supports one of the most important surface fisheries for tunas in the world; and that tuna studies indicate that the spawning stock will likely decline under current levels of fishing mortality;.

In June 2009 IATTC adopted RESOLUTION[8] C-09-01: on a multiannual program for the conservation of tuna in the eastern pacific ocean in 2009-2011. This resolution provides a number of general measures applicable in the years 2009-2011 to all purse-seine vessels of IATTC capacity classes 4 to 6 (more than 182 metric tons carrying capacity), and to all longline vessels over 24 meters length overall, that fish for yellowfin (and bigeye and skipjack) tunas in the EPO. Specific measures in respect of yellowfin tuna include

- All purse-seine vessels covered by the resolution must stop fishing in the EPO for a period of 59 days in 2009, 62 days in 2010, and 73 days in 2011.

[7] Note: the SBR corresponding to MSY decreased substantially from the previous assessment indicating that the results are sensitive to the change in methodology. The change is attributed to the method used to model selectivity. However, the SBR relative to SBR-MSY (i.e. relative to the SBR corresponding to MSY) and the F multiplier are similar to the previous assessment.

[8] http://www.iattc.org/PDFFiles2/C-09-01-Tuna-conservation-2009-2011.pdf

- The fishery for yellowfin tuna by purse-seine vessels within the area of 96º and 110ºW and between 4°N and 3°S be closed from 0000 hours on 29 September to 2400 hours on 29 October, 2009-2011.

STECF COMMENTS: STECF agrees with the advice from IATTC.

20.3. 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 preliminarily suggests landings of 431,814 t. The most likely cause of lesser catches is a decline in recruitment.

The WCPO yellowfin catch for 2009 (433,788 t) was 115,000 t (21%) lower than the record catch taken in 2008 (547,985 t).

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[9].

SOURCE OF MANAGEMENT ADVICE: WCPFC (supported by the Oceanic Fishery Programme - South Pacific Community - and the International Science Committee) provides management advice. The primary assessment tool used to asses the stock is MULTIFAN-CL . The Stock Assessment - Scientific Working Group (SA-SWG) of the South Pacific Community (SPC) revised all available data in 2009.

REFERENCE POINTS: None.

STOCK STATUS: In 2009, the status of the stock of the western and central Pacific yellowfin stock was assessed using MULTIFAN-CL. Four assessment runs were selected to represent the stock status of yellowfin.

The estimated of MSY for the four selected models are found between 552,000 and 637,000 t. Recent catches in 2008 (543,000 t.) are close to the lower range of MSY estimates; however, catches previous to 2007 were below the lower range of MSY.

Current spawning biomass exceeds the estimated spawning biomass at MSY for four of the models selected (Bcurrent/BMSY ranging from 1.46 to 1.88), indicating that the WCPO yellowfin stock is not in an overfished condition.

For all four model runs, $F_{current}/F_{MSY}$ is lower than 1, ranging from 0.58 to 0.68. For a moderate value of steepness (0.75), which can be considered the base case, the $F_{current}/F_{MSY}$ was estimated to be between 0.54 and 0.68.

In summary, based on the last assessment, it can be concluded that overfishing is not occurring in the yellowfin tuna stock and that neither it is overfished.

RECENT MANAGEMENT ADVICE: Although the yellowfin stock status has shown an improvement from the last assessment, the SC also noted that exploitation rates were highest in the western equatorial region, which accounts for ~95% of the total yellowfin tuna catch, and that the spawning biomass in this region is estimated to have declined to about 30% of the unexploited level. Therefore, the SC recommended that there should not be an increase in fishing mortality in the western equatorial region. Then, the Commission adopted the Conservation and Management Measure 08-01, through the implementation of a package of measures over a three-year period commencing in 2009, to ensure there is no increase of fishing mortality from the annual average during the period 2001-2004 or 2004 (maximum days of fishing, area closures, etc…).

[9] Discards for the Spanish catches are reported for all areas together; then, discards in the WCPO were calculated on a proportional base.

STECF COMMENTS: STECF supports the management advice of WCPFC.

20.4. Eastern Pacific Bigeye (*Thunnus obesus*)

FISHERIES: Bigeye are distributed across the Pacific Ocean, but the bulk of the catch is made to the east and to the west of the mid-Pacific. The purse-seine catches of bigeye are substantially lower close to the western boundary (150ºW) of the EPO; the longline catches less sporadic, but at lower levels between 160ºW and 180º. Bigeye are not often caught by purse seiners in the EPO north of 10ºN, but a substantial portion of the longline catches of bigeye in the EPO is made north of that parallel. Bigeye tuna do not move long distances (95% of tagged bigeye showed net movements of less than 1000 nautical miles), and current information indicates little exchange between the eastern and western Pacific Ocean. This is consistent with the fact that longline catch-per-unit-of-effort (CPUE) trends differ among areas. It is likely that there is a continuous stock throughout the Pacific Ocean, with exchange of individuals at local levels. Currently, there are not enough tagging data to provide adequate estimates of movement between the eastern and western Pacific Ocean.

There have been substantial changes in the bigeye tuna fishery in the eastern Pacific Ocean (EPO) over the last 15 years. Initially, the majority of the bigeye catch was taken by longline vessels, but with the expansion of the fishery on fish associated with fish aggregating devices (FADs) since 1993, the purse-seine fishery has taken an increasing proportion of the bigeye catch.

Overall, the catches in both the EPO and WCPO have increased, but with considerable fluctuation. 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 catch in 2000.

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 115,000 t. Catches of bigeye in the WCPO increased significantly in 2004 to 146,000 t. In 2005 and 2006 the catches of bigeye in the WCPO were 132,000 and 114,000 t, respectively. The WCPO bigeye catch for 2009 (118,657 t) was the lowest since 2003, mainly due to a drop in 2009 provisional estimates for the longline fishery.

Prior to 1994, the average annual retained catch of bigeye taken by purse-seine vessels in the EPO was about 8,000 t (range 1,000 to 22,000 t). Following the development of FADs, the annual retained purse-seine catches increased from 35,000 t in 1994 to between 44,000 and 95,000 t during 1995-2000.
A preliminary estimate of the retained catch in the EPO in 2007 is 61,000 t. The average amount of bigeye discarded at sea during 1993-2006 was about 5% of the purse-seine catch of the species (range: 2 to 12%).
Small amounts of bigeye have been caught in some years by pole-and-line vessels. During 1978-1993, prior to the increased use of FADs and the resulting greater catches of bigeye by purse-seine vessels, the longline catches of bigeye in the EPO ranged from 46,000 to 104,000 t (average: 74 thousand t) about 89%, on average, of the retained catches of this species from the EPO. During 1994-2006 the annual retained catches of bigeye by the longline fisheries ranged from about 35 to 74 thousand t (average: 53 thousand t), an average of 45% of the total catch of bigeye in the EPO. The preliminary estimate of the longline catch in the EPO in 2007 is 26 thousand t.

SOURCE OF MANAGEMENT ADVICE: IATTC is the responsible to assess and manage this stock. IATTC conducted an assessment in 2009.

REFERENCE POINTS: Maintaining tuna stocks at levels that produce the MSY is the management objective specified by the IATTC Convention; however IATTC has not adopted any target or limit reference points for this stock.

STOCK STATUS: The most recent stock assessment[10] of bigeye tuna (*Thunnus obesus*) in the eastern Pacific Ocean (EPO) was undertaken using an integrated statistical age-structured stock assessment model (Stock Synthesis Version 3; Methot 2005, 2009.).

At the beginning of 2009, the spawning biomass of bigeye tuna in the EPO was near the historic low level. At that time the spawning biomass ratio (the ratio of the spawning biomass at that time to that of the unfished stock; SBR) was about 0.17, which is about 11% less than the level corresponding to the maximum sustainable yield (MSY). Recent spikes in recruitment are predicted to result in stabilized levels of SBR and increased longline catches for the next few years. However, high levels of fishing mortality are expected to subsequently

[10] http://www.iattc.org/PDFFiles2/SARM-10-06b-BET-assessment-2008.pdf

reduce the SBR and catches. Under current effort levels, the population is unlikely to remain at levels that support MSY unless fishing mortality levels are greatly reduced or recruitment is above average for several consecutive years.

Changes in targeting practices or increasing catchability of bigeye as abundance declines (e.g. density-dependent catchability) could result in differences from the outcomes predicted.

Recent catches are estimated to have been 19% higher than the MSY level. If fishing mortality (F) is proportional to fishing effort, and the current patterns of age-specific selectivity are maintained, the level of fishing effort corresponding to the MSY is about 81% of the current (2006-2008) level of effort. The MSY of bigeye in the EPO could be maximized if the age-specific selectivity pattern were similar to that for the longline fishery that operates south of 15N because it catches larger individuals that are close to the critical weight. Before the expansion of the floating-object fishery that began in 1993, the MSY was greater than the current MSY and the fishing mortality was less than FMSY. The base case stock assessment results indicate that the bigeye stock in the EPO is overfished (S < SMSY) and that overfishing is taking place (F>FMSY)

RECENT MANAGEMENT ADVICE: The most recent report from IATTC (Stock Assessment Report 10) consists of modified versions of papers prepared for the 10th Stock Assessment Review Meeting held during May 12-15, 2009. In 2009, IATTC, whilst noting that catches of bigeye tunas have decreased, also consider that capacity continues to increase and that the stock is below a level that would produce the maximum sustainable yield (MSY).

In June 2009 IATTC adopted RESOLUTION[11] C-09-01: on a multiannual program for the conservation of tuna in the eastern pacific ocean in 2009-2011. This resolution provides a number of general measures applicable in the years 2009-2011 to all purse-seine vessels of IATTC capacity classes 4 to 6 (more than 182 metric tons carrying capacity), and to all longline vessels over 24 meters length overall, that fish for yellowfin, bigeye and skipjack tunas in the EPO. Specific measures in respect of bigeye tuna include

- All purse-seine vessels covered by the resolution must stop fishing in the EPO for a period of 59 days in 2009, 62 days in 2010, and 73 days in 2011.
- The fishery for bigeye tuna by purse-seine vessels within the area of 96º and 110ºW and between 4°N and 3°S be closed from 0000 hours on 29 September to 2400 hours on 29 October, 2009-2011.
- CPC's to take the measures necessary to control the total annual catch of bigeye tuna in the EPO during 2009-2011 by longline tuna vessels fishing under its jurisdiction.
- China, Japan, Korea, and Chinese Taipei to take the measures necessary to ensure that their total annual longline catches of bigeye tuna in the EPO during 2009-2011 do not exceed set levels.
- Other CPCs to take the measures necessary to ensure that their total annual longline catches of bigeye tuna in the EPO during 2009-2010 do not exceed the greater of 500 metric tons or their respective catches of bigeye tuna in 2001.

STECF COMMENTS: STECF agrees with the advice from IATTC.

20.5. Western Pacific Bigeye (*Thunnus obesus*)

FISHERIES: Bigeye tuna are an important component of tuna fisheries throughout the Pacific Ocean and are taken by both surface gears, mostly as juveniles, and longline gear, as valuable adult fish.

The catches of BET in the WCPO increased continuously from 1950 onwards. Longline catches increased continuously reaching a peak of about 84,000 t in 2004 and decreasing afterwards. Since about 1994, there has been a rapid increase in purse-seine catches of bigeye tuna, being less than 20,000 mt until 1996 and increasing to 55,000 mt up to 2001, primarily as a result of increased use of fish aggregation devices (FADs), and since 2001 catches have averaged over 28,000 t annually. The bigeye catch for 2008 (157,054 t) was the second highest on record (slightly lower than the record catch taken in 2004 – 157,173 mt).

SOURCE OF MANAGEMENT ADVICE: WCPFC is the responsible to manage this stock. The Stock Assessment - Scientific Working Group (SA-SWG) of the WCPFC with the advise of South Pacific Community (SPC) revised all available data in 2009 and carried out a new stock assessment.

[11] http://www.iattc.org/PDFFiles2/C-09-01-Tuna-conservation-2009-2011.pdf

REFERENCE POINTS: Maintaining tuna stocks at levels that produce the MSY is the management objective specified by the WCPFC Convention.

STOCK STATUS: In 2009, the status of the stock of the western and central Pacific bigeye stock was assessed using MULTIFAN-CL.

Based on the Multifan-CL assessment results, the MSY was estimated to be 56,880 (52,120 – 67,800) when long-term recruitment is considered and 118,000 t. (110,000 - 146,114 t.) when assuming recent high recruitment. Recent catches in 2008 (134,315 t) are well above the MSY levels estimated regardless the recruitment levels assumed. Catches are still around 20% higher than the re-calculated MSY based on recent high recruitment.
$SSB_{2004-2007}$ exceeds the SSB_{MSY} for five of the six assessment, indicating that the WCPO bigeye stock is not in an overfished state. However, when the most recent SSB_{2008} estimate is considered, then only one of the six runs indicates that the bigeye stock is not in an overfished state.

For all six model runs, $F_{current}/F_{MSY}$ (where the current period considered 2004-2007) is considerably greater than 1 ranging from 1.51 to 2.01. The range of $F_{current}/F_{MSY}$ ratios indicate that a 34–50% reduction in fishing mortality would be required from the 2004–2007 level to reduce fishing mortality to sustainable levels at a steepness of ~0.98.

In summary, based on the last assessment, it can be concluded that overfishing is occurring in the bigeye tuna stock and that the bigeye stock status is in a slightly overfished state, or will be in the near future.

RECENT MANAGEMENT ADVICE: The SC recommended a minimum of 30% reduction in bigeye tuna fishing mortality from the average levels 2004-2007 with the goal of reducing the fishing mortality rate to F_{MSY}. Then, the Commission adopted Conservation and Management Measure 08-01 which indicates that, through the implementation of a package of measures, over a three-year period commencing in 2009, fishing mortality needs to be reduced by a minimum of 30% with respect to the annual average during the period 2001-2004 or 2004.

STECF COMMENTS: STECF agrees with the advice from WCPFC.

20.6. 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 estimate of the total catch of skipjack in 2008 is 305,524 t , a 41% increase on the 2007 catch.
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[12].

SOURCE OF MANAGEMENT ADVICE: The advisory body is IATTC.

REFERENCE POINTS: None.

STOCK STATUS: The most recent report from IATTC (Stock Assessment Report 10) consists of slightly-modified versions of papers prepared for the 10th Stock Assessment Review Meeting held during May 12-15, 2009.

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).
Yield-per-recruit analysis indicates that maximum yields are achieved with infinite fishing mortality because the critical weight (weight at which the gain to the total weight of a cohort due to growth is equal to the weight loss

[12] Discards for the Spanish catches are reported for all areas together; then, discards in the EPO were calculated on a proportional base.

to that cohort due to natural mortality) is less than the average weight at recruitment to the fishery. However, this result is uncertain because of uncertainties in the estimates of natural mortality and growth.
The results of an analysis described in IATTC Stock Assessment Report 7, 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.

The most resent information on this stock, posted in May 2010, concerns updated indicators of stock status. This report notes that Skipjack tuna is a notoriously difficult species to assess. Due to skipjack's high and variable productivity (*i.e.* annual recruitment is a large proportion of total biomass), it is difficult to detect the effect of fishing on the population with standard fisheries data and stock assessment methods. This is particularly true for the stock of the EPO, due to the lack of age-frequency data and the limited tagging data. The continuous recruitment and rapid growth of skipjack mean that the temporal stratification needed to observe modes in length-frequency data make the current sample sizes inadequate. Previous assessments have had difficulty in estimating the absolute levels of biomass and exploitation rates, due to the possibility of a dome-shaped selectivity curve (Maunder 2002; Maunder and Harley 2005), which would mean that there is a cryptic biomass of large skipjack that cannot be estimated. The most recent assessment of skipjack in the EPO (Maunder and Harley 2005) is considered preliminary because it is not known whether the catch per day fished for purse-seine fisheries is proportional to abundance. The results from that assessment are more consistent among sensitivity analyses than the earlier assessment, which suggests that they may be more reliable. However, in addition to the problems listed above, the levels of age-specific natural mortality are uncertain, if not unknown, and current yield-per-recruit (YPR) calculations indicate that the YPR would be maximized by catching the youngest skipjack in the model (Maunder and Harley 2005). Therefore, neither the biomass- nor fishing mortality-based reference points, nor the indicators to which they are compared, are available for skipjack in the EPO.

This report goes on to note that the main concern with the skipjack stock is the constantly increasing exploitation rate. However, the data- and model-based indicators have yet to detect any adverse consequence of this increase. The average weight is near its lower reference level, which can be a consequence of overexploitation, but it can also be caused by recent recruitments being greater than past recruitments.

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. However, the lowest average weight can also be a consequence of recent recruitments being greater than past recruitments.More detailed analyses are necessary to inform future management measures. Although, there is not any regulation in relation to skipjack, current regulation of time/area closure for yellowfin and bigeye applied to Purse seiners will decrease the effort, and hence catches, directed to skipjack in eastern Pacific.

20.7. 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 reported 12,688 t of retained catches in 2007 and about 151 t of discards[13] in the WCPO. The 2009 WCP catch of skipjack (1,789,979 t) was the highest recorded and nearly 120,000 t more than the previous record catch in 2007 (1,672,996 t).

SOURCE OF MANAGEMENT ADVICE: The WCPFC is the management body, supported by the Oceanic Fishery Programme of the Secretariat of the Pacific Community (SPC).

[13] Discards for the Spanish catches are reported for all areas together; then, discards in the WCPO were calculated on a proportional base.

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

STOCK STATUS: The Scientific Committee of WCPFC performed an age and spatially structured stock assessment of this stock in 2010 using MULTIFAN-CL. Catch, effort, size composition, and tagging data used in the model are grouped into 17 fisheries (a change from the 24 fisheries used in the 2008 assessment) and quarterly time periods from 1952 through 2009. The current assessment incorporates a number of changes from the 2008 assessment, including: updated catch and size data; updated Japanese tagging data; a revised standardised effort series for each region; a new 3 region spatial structure which condenses the previous multiple northern regions into a single northern region and introduces two equatorial regions that cover similar areas to the equatorial regions in the bigeye and yellowfin assessments. The main assessment results and conclusions from the assessment are.

- Estimates of natural mortality are strongly age-specific, with higher rates estimated for younger skipjack.
- The model estimates significant seasonal movements between all three regions. The performance of the fishery in the eastern region has been shown by other studies to be strongly influenced by the prevailing environmental conditions with higher stock abundance and/or availability associated with El Niño conditions (Lehodey et al. 1997). This is likely to be at least partly attributable to an eastward displacement of the skipjack biomass due to the prevailing oceanographic conditions.
- Recruitment since 2005 is estimated to have dipped and then recovered, but the most recent years are poorly determined due to limited observations from the fishery
- The model results suggest that recent skipjack population biomass has been lower than previously observed.
- Within the equatorial region, fishing mortality increased throughout the model period and is estimated to be highest in the western region in the most recent years.
- The impact of fishing is predicted to have reduced recent (2005-2008) biomass by about 50% in the western equatorial region and 25% in the northern and eastern regions. For the entire stock, the depletion is estimated to be approximately 40%.
- Based on estimates of $F_{current}/F_{MSY}$ and $B_{current}/B_{MSY}$ from the base model and associated sensitivity grid, it is concluded that overfishing of skipjack is not occurring in the WCPO, nor is the stock in an overfished state.

The Scientific Committee noted that this assessment indicates fishing is now having a significant effect on stock size, especially in the western equatorial region. Although the stock may not be experiencing overfishing or be in an overfished state, it was likely that significant increases in effort would result in only minor increases in catch.

RECENT MANAGEMENT ADVICE: 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 at the very high catch rates in recent years and notes particularly the comments of the Scientific Committee in this regard. Although, there is not any regulation in relation to skipjack, current regulation of time/area closure for yellowfin and bigeye applied to Purse seiners will decrease the effort, and hence catches, directed to skipjack in eastern Pacific.

20.8. Northern Pacific Albacore (*Thunnus alalunga*)

FISHERIES: Albacore are caught by longliners (from Taiwan, Japan and USA) in most of the North Pacific; by trolling gear in the eastern and central North Pacific, and by pole-and-line gear in the western North Pacific. About 60% of the fish are taken in pole-and-line and troll fisheries that catch smaller, younger albacore. EU vessels have never reported fishing on this stock.

The total annual catches of North Pacific albacore peaked in 1976 at about 125,000 t, declined to about 38,000 t in1991, and then increased to about 126,000 t in 1999. Preliminary catch estimates in the EPO in 2007 were 21,735 t, while in the WPO preliminary catch estimates in 2007 were 43,383 t. Reliable figures for 2008 are not currently available.

WCPFC reports that the 2009 WCPO albacore catch (125,479 t) was the second highest on record, with very good catches from the longline fishery.

SOURCE OF MANAGEMENT ADVICE: North Pacific albacore are managed by the Western and Central Pacific Fisheries Commission (WCPFC) west of 150° W longitude, and by the Inter-American Tropical Tuna Commission (IATTC) east of 150° W longitude, and, in both cases, management is based on the scientific advice of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC)

REFERENCE POINTS: None.

STOCK STATUS: The most recent ISC stock assessment for North Pacific albacore was completed in 2006 and a full stock assessment will be conducted by ISC in 2011 and reviewed at ISC11. No formal update of stock status has been conducted since the 2006 assessment. However, at its 12–13 July 2010 meeting, the albacore working group (ALBWG) undertook a qualitative update using available fisheries data from 2006 to 2009 and an index of spawning stock biomass (Japanese longline CPUE age 6–9+). Based on these update, the ALBWG concluded that:

i. A new stock assessment will be necessary to fully understand the implications of the new data available since the last stock assessment;
ii. The 2006 stock assessment estimated that albacore spawning biomass reached an historical high in 2005 and then projected a decline thereafter. The age 6–9+ index shows that SSB has declined from previous high levels and appears to be relatively stable since the last stock assessment;
iii. The ALBWG did not focus on recruitment in its latest qualitative review and is unable to provide insight into recruitment in recent years beyond observations in previous Plenary reports; and
iv. Nominal effort in most fisheries (as measured by the number of vessels) appears to have declined slightly or been stable since 2005. Although catches exhibit more interannual variability than effort, with the largest variation occurring in the Japan pole-and-line fisheries, most fisheries catches have declined or remained relatively stable over the same period. This could mean that F2009 is less than the F2002–2004 (0.75 yr-1) used in the 2006 stock assessment projections. Alternatively, F2009 may be as high as the value used in the stock assessment projections since the level of recruitment after 2005 is not known.

Based on analyses conducted by the ALBWG since ISC9, the following points are highlighted:

i. Both the ISC9 and ISC10 Plenaries note that there is increasing uncertainty concerning the status of North Pacific albacore in the absence of a new stock assessment.
ii. The ISC10 Plenary notes that there is no strong positive or negative signals in the age 6–9+ SSB index since the last stock assessment.
iii. The next stock assessment is expected to be completed in early 2011 and the results will be presented at ISC11.
iv. The ISC9 Plenary reported that the estimated value of FSSB-ATHL is 0.75yr-1 for a 25-year projection period using fishery data through 2008. This value is similar to F2002–2004 = 0.75 yr-1, estimated in the last stock assessment.

RECENT MANAGEMENT ADVICE: Both the IATTC and the WCPFC currently have resolutions on albacore conservation and management stating that the total level of fishing effort should not be increased beyond current levels for North Pacific albacore in the Eastern Pacific Ocean (IATTC) and the Western and Central Pacific Ocean, north of the equator (WCPFC). The two organizations also require member countries to take necessary measures to ensure that the level of fishing effort by their vessels fishing for North Pacific albacore is not increased.

In addition, the 2010 meeting of the ISC provided the following: “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 F2002-2004 (0.75) is high relative to most of the F reference points.

On the other hand, the same analysis indicates that the current [2005] estimate of the SSB is the second highest in history but that 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 (F2002-2004=0.75) is still valid.

However, with the projection based on the continued current high F, the fishing mortality rate will have to be reduced."

STECF COMMENTS: STECF agrees with the advice of IATTC and WCPFC.

20.9. 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.

After an initial period of small-scale fisheries development, annual catches of South Pacific albacore varied considerably and have recently been between about 60,000–70,000 t. The longline fishery harvested most of the catch, about 25,000–30,000 t per year on average, prior to about 1998. The increase in longline catch to approximately 70,000 t in 2005 is largely due to the development of small-scale longline fisheries in Pacific Island countries. Catches from the troll fishery are relatively small, generally less than 10,000 t per year. The driftnet catch reached 22,000 t in 1989, but has since declined to zero following a United Nations moratorium on industrial-scale drift-netting.

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: South Pacific albacore are managed primarily by the Western and Central Pacific Fisheries Commission (WCPFC) as the majority of biomass occurs west of 150° W longitude. IATTC is responsible for the conservation and management of tuna and other marine resources in the eastern (east of 150° W) Pacific Ocean.

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

STOCK STATUS: The current view of the stock is based on the assessment (of albacore tuna in the South Pacific Ocean) conducted at the fifth regular session of the Scientific Committee of WCPFC (WCPFC-SC5-2009/SA-WP-6, August 2009). The 2009 assessment concluded that levels of stock size and MSY appear more realistic than in the 2008 assessment, because many sources of potential bias have been removed. However, uncertainty remains over a moderate range of biomass and fishing mortality levels. Models that down-weight the length frequency data (in order to rely on the index of abundance from the CPUE data), tend to give lower biomass relative to *BMSY*, and higher fishing mortality relative to *FMSY*, throughout the time series. There is considerable uncertainty about the early biomass trend, but this has negligible effect on the management parameters. Estimates of *F*2005-2007/*FMSY* (from 0.1 to 0.5) and *SB*2005-2007 / *SBMSY* (from 1.7 to 4.9) are quite variable between model configurations, but the variation does not include overfishing, above *FMSY*, or an overfished state below SB*MSY*.

Most of the longline albacore catch is taken in a relatively narrow latitudinal band (10–40° S). The highest catch rates for albacore in the subequatorial area are relatively localised and limited to discrete seasonal periods, possibly associated with the northern and/or southern movements of fish during winter and/or summer. These peaks in seasonal catch rates tend to persist for a couple of months and to extend over a 10° latitudinal range. On this basis, it would appear that the main component of the longline exploitable biomass resides in a relatively small area, suggesting a modest stock size.

The results of the 2009 assessment suggest that regional stock depletion has contributed to catch rate declines, but localised depletion may also have contributed. Observed declines in catch rates from significant domestic longline fisheries (e.g. Fiji, French Polynesia, and Samoa) — following periods of relatively high albacore catch (3,000–10,000 t per year) — may indicate localised stock depletion (Langley 2004). Strong relationships may occur between catch rates and removals in the preceding 10 day period (Langley 2006). It is possible that movement rates into and out of EEZ's are lower than peak catch levels, and there is some viscosity (perhaps residency) in the population.

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, in theory, increasing effort to *FMSY* would yield somewhat more catch in the long term (equilibrium yield at current effort 63,000 mt; *MSY* 97,000 mt). However, higher yields at the current exploitation pattern of the fishery would require more fishing effort, resulting in lower adult biomass and lower longline catch rates. 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: In the absence of any new information, STECF notes that the most recent assessment indicates that increasing effort in areas of albacore concentration can result in a sudden drop in catch rate. STECF therefore advises that catch rates and fishing effort should be closely monitored.

20.10. Black skipjack (*Euthynnus alletteratus*)

FISHERIES: Black skipjack are caught incidentally by fishermen who direct their effort toward yellowfin, skipjack, and bigeye tuna. The demand for this species is low, so most of the catches are discarded at sea, but small amounts, mixed with the more desirable species, are sometimes retained.

Total catch in the EPO typically ranged between 1,000 and 3,000 t over the period 1979 – 2004. In the past 5 years, however, the recorded catches of this species have increased significantly: from 2,160t in 2004, to 3,618 in 2005, 3,976t in 2006, 3,935 in 2007 and 6,152t in 2008. Almost all the catches (99%) are taken by purse-seiners (3,585t retained and 2,560 t discarded in 2008). Data from other are Pacific Ocean areas are not available.

SOURCE OF MANAGEMENT ADVICE: IATTC provides management advice for this species in the EPO.

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 significant increases in catches in the past 5 years.

20.11. 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. The catch in 2007 at 16,582 t, was an historic high and almost 5 times higher than the average catch (3,622 t) in the previous 20 years (1987-2006). The 2008 catch, 7,137 t, is a significant decline on that in 2007.

Almost all the catches (about 93%) are provided by purse-seiners (7,063 t retained and 65 t discarded in 2008), however IATTC have noted that this species is also caught by artisanal fisheries and these catches are not reported.

SOURCE OF MANAGEMENT ADVICE: IATTC provides management for this species in the EPO.

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

STOCK STATUS: no data.

RECENT MANAGEMENT ADVICE: No management advice.

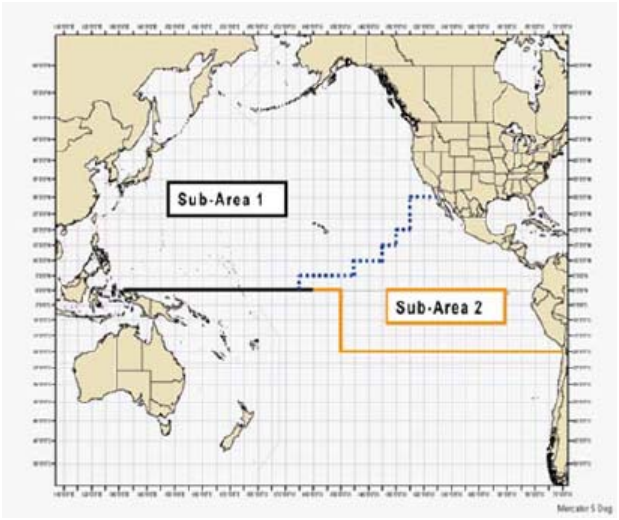
STECF COMMENTS: STECF notes the need for robust fishery data to support the provision of management advice for bonito in the Pacific. There is a need to collect data on catches from the WCPO and from artisanal

fisheries throughout the whole pacific and to investigate and explain the reasons behind the recently observed 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.

20.12. Eastern Pacific swordfish (*Xiphias gladius*)

FISHERIES: Swordfish occur throughout the Pacific Ocean between about 50°N and 50°S. They are caught mostly by longliners with lesser amounts taken in gillnet and harpoon fisheries. Recent catches in the eastern Pacific Ocean (EPO) have been taken by vessels of Spain, Chile, and Japan, which together harvest about 70% of the total catch. While all three nations have fisheries that target swordfish, most of the swordfish taken in the Japanese fishery are incidental catches in a fishery that targets bigeye tuna. Swordfish tend to inhabit deeper water during the day, and are also associated with frontal zones. Several of these occur in the EPO: off California and Baja California, Ecuador, Peru, and Chile.

The best available scientific information (genetic and fishery data) indicate that the swordfish of the northeastern Pacific Ocean and the southeastern Pacific Ocean (south of 5°S) constitute two distinct stocks. Also, there may be movement of a northwestern Pacific stock of swordfish into the EPO at various times.



The average annual catch from this stock during 1993-2000 was about 7,000 t (range ~ 4,800-8,700 t). Since 2000, annual catches have averaged about 13,000 t, with catch in the most recent years on the order of 11,000-12,000 t, which is about the estimated MSY catch. There have been indications of increasing efficiency at targeting of swordfish in the southern EPO, which has resulted in increased catches. However, some of the increased catch may have resulted from above average recruitment. It is not expected that further increases in the catch levels observed in recent years would be sustainable. **NOTE:** IATTC report that the best available scientific information from genetic and fishery data indicate that the swordfish of the northeastern Pacific Ocean and the southeastern Pacific Ocean (south of 5°S) constitute two distinct stocks. ISC Define geographic areas used for the ISC stock assessment of North Pacific swordfish stocks (as shown in figure). For ISC assessments Sub-Area 1 corresponds to the Western and Central North Pacific (WCPO) swordfish stock which was assessed in 2009. Sub-Area 2 corresponds to the Eastern North Pacific (EPO) swordfish stock which had a stock assessment update conducted for ISC 10 in 2010.

SOURCE OF MANAGEMENT ADVICE: Eastern Pacific swordfish are managed by the Inter-American Tropical Tuna Commission (IATTC).

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

STOCK STATUS: Based on the 2009 stock assessment results, the exploitable biomass of the WCPO SWO stock was estimated to be about 75,000 t in 2006 (B2006), roughly 30% above BMSY. The exploitation rate on the WCPO stock in 2006 was estimated to be 14% with a total catch of roughly 9,900 t or roughly 69% of MSY (MSY=14,400 t). There was very high probability that B2006 was above BMSY (93% chance) and a 0% chance that the exploitation rate in 2006 exceeded the rate to produce MSY.

Based on the 2010 stock assessment update results for the EPO stock only, the exploitable biomass of the EPO SWO stock was estimated to be about 69,000 t in 2006, over 200% above BMSY

Exploitation rate on the EPO stock in 2006 was estimated to be 6% with a total catch of roughly 3,900 t or roughly 78% of MSY (MSY=5,000t). There was very high probability that B2006 was above BMSY, a 99 out of 100 chance, and there was a two out of 100 chance that the exploitation rate in 2006 exceeded the rate to produce MSY.

The exploitable biomass of the WCPO SWO stock was 31% above BMSY and the exploitation rate was 46% below FMSY in 2006. Similarly, exploitable biomass of the EPO SWO stock was over two-fold greater than BMSY and the exploitation rate was 62% below FMSY in 2006. Based on results of the updated North Pacific EPO stock assessment and the 2009 North Pacific WCPO stock assessment, the BILLWG proposed that the ISC Plenary maintain the existing conservation advice for this species.

IATTC report the results of preliminary modeling with MULTIFAN-CL of a **North Pacific** swordfish stock in the area north of 10°N and west of 140°W. This assessment indicates 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 more recent analysis for the Pacific Ocean north of the equator, using a sex-specific age-structured assessment method, indicated that, at the current level of fishing effort, there is negligible risk of the spawning biomass decreasing to less than 40% of its unfished level.

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 maximum sustainable yield (MSY), 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: Ver.1.23b) with the following results. The population has undergone considerable changes in biomass, and 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 (the ratio of the spawning biomass of the current stock to that of the unfished stock; 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 MSY for the southern EPO swordfish stock is about 13,000-14,000 t, and the SBR at MSY is about 0.26. The current spawning biomass is estimated to be well above the biomass corresponding to the MSY.

RECENT MANAGEMENT ADVICE: IATTC has not provided any management recommendations.

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.

20.13. Western and central Pacific swordfish (Xyphias gladius) WECAF south of 20S.

FISHERIES: The Southern region of the WCPFC convention area (0-50S; 140E -130W) comprising both the South-West Pacific (SWP) with an eastern bound of 175W and the South-Central Pacific (SCP).
In the South-West Pacific (SWP) swordfish have been taken primarily as by-catch in the Japanese tuna longline fisheries since the 1950s, with reported annual catches fluctuating around 2000 t over the period 1970-1996. Japanese catches declined since the late 1990s, when the targeted Australian and New Zealand longline fisheries rapidly developed, with total annual catches averaging around 4000 t from 1997-2002. Catches have declined from 2002-2007, with total catches in 2006-7 now around the levels observed prior to 1997. Fiji, Papua New Guinea, Vanuatu and New Caledonia have reported the largest catches among the Pacific Island nations. Standardized catch rates declined substantially for all the major fleets during the period from around 1999-2004. Since 2004, there has been a substantial increase in the Australian and New Zealand catch rates, however, the increase is not as evident in the Japanese fleet. Mean size composition has declined in the well-sampled Australian fishery since the mid 1990s. Most of the swordfish catch in the SWP is taken in the region between 20-40S.

The magnitude of the SCP swordfish catches has been comparable to the SWP since around 2000. Unlike the SWP, the majority of the swordfish in the SCP have been taken as by-catch in the equatorial tuna longline fisheries. Japanese SCP swordfish have been primarily a by-catch species since the early 1950s, and Korean

catches began in the mid-1970s. Taiwanese fleets have taken substantial catches since ~2000. Beginning in 2004, the Spanish fleet has rapidly expanded, and this targeted fishery recorded the largest catches of all nations in the SWP-SCP in 2006. French Polynesia, Cook Islands and Vanuatu represent the majority of the SCP Pacific Island catches. There is no compelling evidence for changes in size composition in the SCP catches, however, size data are limited. Swordfish catch rates observed in the SCP suggest that swordfish abundance is stable or increasing in recent years. However, the operational level data available for conducting catch rate standardization analyses are limited, and some conflicting trends suggest that targeting changes are affecting CPUE trends for at least some of the fleets.

SOURCE OF MANAGEMENT ADVICE: WCPFC. Scientific advice is provided by the scientific committee of WCPFC.

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

STOCK STATUS: The Scientific Committee of WCPFC carried out an assessment of the SWP swordfish stock in 2008 using Multifan-CL. Overall, the 2008 SWP assessment yields results that are consistent with the results presented in a previous 2006 assessment. The uncertainty appears to be substantially reduced in 2008, in that the models are much more consistent in their stock status inferences and none of the models yielded results that were near the extremes that were judged to be plausible in 2006.

On the basis of the 2008 assessment, the Scientific Committee concluded that:

1. Relative biomass estimates for recent years are the most reliable reference points: SSB(2007)/SSB(1997) = 0.58 (0.42 – 0.71).
2. The ratio of TSB relative to the biomass estimated to have occurred in the absence of fishing (TSBNF) provides a measure of the fishery impact on the population: SSB(2007) / SSBNF(2007) = 0.43 (0.31 – 0.63).
3. All of the MPD estimates suggest that biomass (total and spawning) is above levels that would sustain MSY, and fishing mortality is below F(MSY):
   - TSB(2007)/TSB(MSY) = 1.57 (1.22 – 2.06)
   - SSB(2007)/SSB(MSY) = 1.98 (1.20 – 3.46)
   - F(2007)/F(MSY) = 0.44 (0.18 – 0.67)
4. Stock projections (assuming deterministic future recruitment from the stock recruitment relationship, and constant catches at 2007 levels), suggest that rebuilding would be likely:
   - SSB(2012) / SSB(2007) = 1.21 (0.91 – 2.07)
   - TSB(2017) / TSB(2007) = 1.24 (1.05 – 1.64)

An attempted assessment on the combined SW and SC Pacific was undertaken, with a similar approach to the SWP, however, none of the results were satisfying. In many cases, the models estimate very low stock recruitment curve steepness (i.e. a linear relationship between spawning biomass and abundance), with the paradoxical suggestion that both biomass and recruitment are increasing over time, despite very low MSY and chronic overfishing relative to MSY. In other cases, the models suggest that recruitment is stable or increasing, biomass is very high and the fishery catch is a negligible proportion of the stock.

It is possible that the SCP is experiencing a long-term change in recruitment productivity, in which case none of these models are very helpful for predicting what will happen in the future. If this is true, it also suggests that the SCP swordfish population is not rapidly mixing with the SWP population, as the general CPUE trends in the two areas are in opposite directions despite a similar magnitude of catch removals. However, another plausible explanation for the increasing CPUE trends is a change in gear deployment practices in the SCP. The Taiwanese fleet in particular seems to have undergone a shift toward targeting swordfish. At present there is no compelling evidence to indicate that the SC Pacific swordfish fishery is over-exploiting the stock, but the Scientific Committee of ISC do not consider the available data to be very convincing.

RECENT MANAGEMENT ADVICE: Scientific Committee of WCPFC: Management Measure 2006-3 (CMM06-3), which prescribes limits to the number of vessels allowed to target swordfish in the convention area south of 20S.

In December 2009, WCPFC adopted a resolution to limit the number of their fishing vessels for swordfish in the Convention Area south of 20°S, to the number in any one year between the period 2000- 2005. In addition to vessel limits CCMs shall exercise restraint through limiting the amount of swordfish caught by fishing vessels

flagged to them in the Convention Area south of 20°S to the amount caught in any one year during the period 2000 – 2006. CCMs shall not shift their fishing effort for swordfish to the area north of 20°S, as a result of this measure.

STECF COMMENTS: STECF aggress with the advice of the SCPFC

20.14. Pacific Blue Marlin (*Makaira nigricans*)

FISHERY: The best knowledge currently available indicates that blue marlin constitutes a single world-wide species, and that there is a single stock of blue marlin in the Pacific Ocean. For this reason, statistics on catches are compiled, and analyses of stock status are made, for the entire Pacific Ocean.

Blue marlin are taken mostly by longline vessels of many nations that fish for tunas and billfishes between about 50°N and 50°S. Lesser amounts are taken by recreational fisheries and by various other commercial fisheries. Small numbers of blue marlin have been tagged, mostly by recreational fishermen, with conventional tags. A few of these fish have been recaptured long distances from the locations of release. In addition, blue marlin has been tagged with electronic tags and their activities monitored for short periods of time. Blue marlin usually inhabit regions where the sea-surface temperatures (SSTs) are greater than 24°C, and they spend about 90% of their time at depths in which the temperatures are within 1° to 2° of the SSTs.

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 t in 2002), with captures in the most recent 5-year period averaging about 10% of the total harvest.
Blue marlin is the most common non-tuna bycatch in Belize‘s long line fishery. Similarly, for Korean catches 2003 – 2008, billfish (swordfish, blue marlin, striped marlin, black marlin and sailfish) comprise 12.6% of the total catch; blue marlin was the dominant billfish species caught, making up 44.5% of the billfish catch.

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.

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

STOCK STATUS: A production model was used to assess the status of the blue marlin stock of the Pacific Ocean. Data for the estimated annual total retained catches for 1951-1997 and standardized catches per unit of effort developed from catch and nominal fishing effort data for the Japanese longline fishery for 1955-1997 were used. It was concluded that the levels of biomass and fishing effort were near those corresponding to the maximum sustainable yield (MSY).

A more recent analysis of data for the same years, but using MULTIFAN-CL, was conducted to assess the status of blue marlin 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 MSY. However, it was determined that blue marlin in the Pacific Ocean are close to fully exploited, i.e. that the population is near the top of the yield curve. It was also found that standardization of effort, using a habitat-based model, allowed estimation of parameters within reasonable bounds and with narrower confidence intervals about the estimates.

A Pacific-wide assessment of blue marlin in collaboration with the Billfish Working Group of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) is planned for completion in 2010. The results of this assessment are not available at this time.

RECENT MANAGEMENT ADVICE: No management advice.
STECF COMMENTS: STECF notes that some quantities of billfish caught in the Pacific Oceans are still not reported by species. In addition, 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.

20.15. 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. The preliminary catch estimate for 2007 is only 140 t.

The principal recreational fisheries for striped marlin in the EPO operate within about 50 to 100 miles of the shores of Mexico. These are generally characterized as catch-and-release for all marlin species. Sport-fishing trips increasing from about 32,500 trips in the early 1990s to about 55,500 trips in recent years, with annual catches of striped marlin increasing from about 13,300 fish to about 30,000 fish over this period. A record high catch of about 58,000 individuals was taken in 2007, the most recent year for which complete data are available, and the preliminary estimate for 2008 is of the same magnitude.

Average release rate for the 1999-2007 period was about 77.4 percent (range: 72.4 to 82.5). Assuming 100 percent mortality of fish released, and the reported annual median weight of fish sampled, then the conservative estimate of average annual mortality resulting from the recreational fishery during 1990-2006 was about 195 t (range: 115 to 310), and the mortality associated with the record high catch in 2007 was about 545 t. At a mortality rate of about 25 percent (Domeier et al., 2003), the mortality in 2007 was 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.

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

STOCK STATUS: The stock structure of striped marlin is uncertain. Analyses of catch rates using generalized additive models suggest that in the north Pacific there appear to be at least two stocks, distributed principally east and west of about 145º-150ºW, with the distribution of the stock in the east extending as far south as 10°-15°S. Genetic studies provide a more detailed picture of stock structure. McDowell and Graves (2008) suggest that there are separate stocks in the northern, north-eastern, and south-eastern, and south-western Pacific. Preliminary reports of more recent genetic studies indicate that the striped marlin in the EPO off Mexico, Central America, and Ecuador are of a single stock and that there may be juveniles from an identified Hawaiian-stock present seasonally in regions of the northern EPO.

Analyses of stock status have been made using a number of population dynamics models. The results from these analyses indicated that striped marlin in the EPO were at or above the level expected to provide landings at the maximum sustainable yield (MSY), estimated at about 3300 to 3800 t, which is substantially greater than the annual catch in recent years and the new record low estimated catch of about 1,400 t in 2007. There is no indication of increasing fishing effort or catches in the EPO stock area. Based on the findings of Hinton and Maunder (2004) it is considered that the striped marlin stocks in the EPO are in good condition, with current and near-term anticipated fishing effort less than FMSY.

Southwest Pacific striped marlin: The Scientific Committee of WCPFC noted that despite a request to add southwest Pacific striped marlin to its work plan as a high priority, the funding was not available in 2010.
North Pacific striped marlin: A 2010 published study refined the ISC2007 assessment by conducting two assessment scenarios to account for different hypotheses about the steepness (0.7 and 1.0) of the stock-recruitment dynamics. The probable status of North Pacific striped marlin indicated that F/ FMSY (2001–2003) was 3.67 under scenario 1 and 1.90 under scenario 2. Corresponding estimates of striped marlin biomass were below SMSY and ranged from 29% of SMSY under scenario 1 to 44% of SMSY under scenario 2. In relation to MSY-based reference points, striped marlin was experiencing overfishing and the stock was considered depleted under each steepness scenario. The ISC reported that a two stock scenario (WCPO and EPO) stock assessment for striped marlin will be completed in 2011.

RECENT MANAGEMENT ADVICE: No management advice has been provided by IATTC. IATTC consider that the striped marlin stocks in the EPO are in good condition, with current and near-term anticipated fishing effort less than FMSY.

South Pacific striped marlin: The Scientific Committee of WCPFC noted that as no stock assessment was conducted for southwest Pacific striped marlin in 2009 there is no new management advice.

North Pacific striped marlin: The Scientific Committee of WCPFC notes in its most recent (2010) report that "if the WCPFC decides to control the fishing mortality rate on North Pacific striped marlin as advised by the ISC, it could do so through limits either on fishing effort or on catch, or through other controls. If it decides to limit catches, it would be helpful to know the levels of catch that correspond to a range of reference fishing mortality rates. Therefore, pending a new striped marlin assessment to be conducted by the ISC, the Science Committee recommends that the WCPFC7 request the ISC to provide estimated catch levels corresponding to average fishing mortality during 2001–2003 and fishing mortality reference points including Fmsy and F at various spawning potential ratios.

In addition, the ISC has provided the following: While further guidance from the management authority is necessary, including guidance on reference points and the desirable degree of reduction, the fishing mortality rate of striped marlin (which can be converted into effort or catch in management) should be reduced from the current level (2001-2003), taking into consideration various factors associated with this species and its fishery. Until appropriate measures in this regard are taken, the fishing mortality rate should not be increased.

STECF COMMENTS: STECF agrees with the advise given by the Scientific Committee of WCPFC, if the WCPFC decides to control the fishing mortality rate on North Pacific striped marlin as advised by the ISC, it could do so through limits either on fishing effort or on catch, or through other controls. If it decides to limit catches, it would be helpful to know the levels of catch that correspond to a range of reference fishing mortality rates.

20.16. 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 end 0.2 t in the EPO.

SOURCE OF MANAGEMENT ADVICE: Traditionally, the advisory body was IATTC, but WCPFC, ISC and SPC are also competent.

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.

20.17. Pacific Shortbill Spearfish (*Tetrapturus angustirostris*)

FISHERY: The shortbill spearfish is occasionally taken as a by-catch in various fisheries or is as a target species in some artisanal or recreational fisheries. Reported catches in the EPO have increased were growing since 1994, reaching a peak of 304 tons in 2001. Recent catches are below this peak showing alternate values (274 t in 2002, 293 t in 2003, 208 t in 2004, 278 t in 2005 and 263 in 2006). The 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. No estimate for 2008 landings exists. Data from 2008 could not be found for Pacific shortbill spearfish in the EPO.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are IATTC, WCPFC, ISC and SPC.

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 published jointly by scientists of the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan and the IATTC in the IATTC Bulletin series 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.

20.18. 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). The preliminary catch estimate in 2007 is 173 t.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are IATTC, WCPFC, ISC and SPC.

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 published jointly by scientists of the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan and the IATTC in the IATTC Bulletin series that show trends in catches, effort, and CPUEs.

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.

20.19. Indo-Pacific Marlins, Sailfish, Spearfish and Billfish (mixed species)

FISHERY: Billfish, marlins and sailfish species in the Indo-Pacific are very often reported together by the various Regional Fishery Commissions 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 estimates in 2007 are 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. Although information relating to landings, stock assessment or advice for 2008 could not be found for these species in the EPO, some information from the Indian Ocean was available from the IOTC Working Party on Billfish 2009 report. This stated that the 2008 catch information from the La Reunion fishery operating in the Indian Ocean was incomplete because of unreturned logbooks. Catches were comprised of 3% marlin, 1% sailfish, 1% spearfish. No significant changes had happened in the fleet since 2007 and the number of vessels operating had remained the same.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are IATTC, WCPAC, SPC, ISC and IOTC.

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

STOCK STATUS: No recent stock assessments have been made for this species, although there are some data published jointly by scientists of the National Research Institute of Far Seas Fisheries (NRIFSF) of Japan and the IATTC in the IATTC Bulletin series that show trends in catches, effort, and CPUEs.

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.

20.20. Pacific jack mackerel (*Trachurus symmetricus*)

FISHERY: The Pacific jack mackerel*, Trachurus symmetricus* (also known as the Californian jack mackerel or simply jack mackerel), is an abundant species of pelagic marine fish in the jack family, Carangidae. The species is distributed along the western coast of North America, ranging from Alaska in the north to the Gulf of California in the south, inhabiting both offshore and inshore environments. The Pacific jack mackerel is a moderately large fish, growing to a maximum recorded length of 81 cm, although commonly seen below 55 cm. It is very similar in appearance to other members of its genus, *Trachurus*, especially *Trachurus murphyi*, which was once thought to be a subspecies of *T. symmetricus*, and inhabits waters further south. Pacific jack mackerel travel in large schools, ranging up to 600 miles offshore and to depths of 400 m, generally moving through the upper part of the water column. Chilean (also known as Peruvian) jack mackerel (*Trachurus symmetricus murphyi*) is widespread throughout the South Pacific, from the shelf adjacent to Ecuador, Peru, and Chile; throughout the oceanic waters along the Subtropical Convergence Zone; in the New Zealand EEZ south of about 34S; and, in south-eastern waters of the Australian EEZ. From genetic studies it has been identified as a distinct species and supports one of the largest single-species fisheries in the world, with annual landings approaching 2.5 million tonnes (FAO, 2004). The fish aggregate in dense schools and layers, exhibit daily vertical migration, and feed on zooplankton associated with the upwelling areas off central-south Chile.

All species can be caught by bottom trawl, midwater trawl, or by purse seine targeting surface schools. Reported catches of Chilean jack mackerel (for FAO area 87) were 1.28 million tonnes in 1980, grew year-on-year to reach a peak of 4.96 million tonnes in 1995 and decreased thereafter to 1.5 million tonnes in 2000. Since then catches have averaged 1.7 million tonnes.

SOURCE OF MANAGEMENT ADVICE: The advisory body for the Chilean jack mackerel is the South Pacific Regional Fisheries Management Organisation.

REFERENCE POINTS: The South Pacific Regional Fisheries Management Organisation[14] has determined that, for the Chilean stock in 2005, a fishing mortality reference point of $F40\%_{BDR}$, F/Fref was 1.25. No precautionary reference points have been proposed for the other stocks.

STOCK STATUS: The Chilean straddling stock is, at present, considered to be fully exploited. Given the moderate productivity of this species, caution with respect to any increases in fishing mortality is needed. For the other stocks, given the absence of current information, is not possible to provide detailed comment. However, given the moderate productivity of this species and the lack of information about current stock biomass levels, due caution is appropriate.

An updated assessment undertaken by the Science Working Group of the South Pacific Regional Fisheries Management Organisation, November, 2009
The high level of fishing mortality and SBR close to 27% (below the 40% reference point that is an adequate management target for a pelagic fish like jack mackerel) indicates that the Chilean jack mackerel is in an overfishing process. The declining trend in the spawning biomass, recruitment, together with the growing trend of the exploitation indexes and the catch gives a prospect of increasing risk for the stock and the fishery, being extremely necessary to reduce the fishing mortality to sustainable levels by setting a catch quota to avoid further stock decline.

RECENT MANAGEMENT ADVICE: No management advice.
In 2007, the South Pacific Regional Fisheries Management Organisation noted that with the exception of Chilean vessels, there are no management measures in place for jack mackerel fisheries in the high seas (New Zealand and Australian vessels that may take this species as an occasional by-catch are regulated by a high seas permitting regime).

Due to the nature of the straddling Chilean stock, the same regulatory controls that apply within the Chilean EEZ also apply on the high seas: these controls include maximum catch limits per vessel owner and size limits.

STECF COMMENTS: STECF agrees with the advice provided by SPRFO.

[14] SPRFMO-III-SWG-16

21. 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). The 2009/10 fishing season started on 1 December 2009 and will end on 30 November 2010, and fishing was still in progress in some areas. Members' fishing vessels operated in the fisheries targeting icefish (*Champsocephalus gunnari*), toothfish (*Dissostichus eleginoides* and/or *D. mawsoni*), krill (*Euphausia superba*) and crab (*Paralomis* spp.). In 2009/10 the Secretariat monitored 153 catch limits for species groups (target and by-catch species) in SSRUs, SSRU groups, management areas, divisions and subareas. This included forecasting fishery closures once the catch of a managed species exceeded 50% of its catch limit. As of 24 September 2010, 12 fishing areas and four fisheries had been closed by the Secretariat and all except one (krill in Subarea 48.1) of these closures were triggered by catches of *Dissostichus* spp. approaching their respective catch limits. Catch limit overruns (i.e. the catch exceeded the catch limit) occurred for *D. eleginoides* in Subarea 48.3 (Management Area B: overrun 3 tonnes, total catch 100.3% of the limit) and *Dissostichus* spp. in Division 58.4.1 (SSRU E: overrun 1 tonne, total catch 103% of the limit), Division 58.4.2 (SSRU A: overrun 23 tonnes, total catch 177% of the limit; whole fishery: overrun 23 tonnes, total catch 133% of the limit), and Subarea 88.1 (SSRUs H, I and K: overrun 38 tonnes; total catch 102% of the limit; whole fishery: overrun 20 tonnes, total catch 101% of the limit).

21.1. Toothfish (*Dissostichus* spp.)

In 2009/10, 11 Members fished for toothfish in Subareas 48.3, 48.4, 48.6, 88.1 and 88.2 and Divisions 58.4.1, 58.4.2, 58.4.3b, 58.5.1 and 58.5.2; Japan also conducted research fishing in Divisions 58.4.4a and 58.4.4b. The reported total catch to 24 September was 11 860 tonnes. In addition, catches reported under the CDS indicated that 9 952 tonnes of Dissostichus spp. were taken outside the Convention Area in 2009/10 (to October 2010) compared with 12 806 tonnes in 2008/09. Catches in both seasons were taken mostly in Areas 41 and 87. 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).

21.1.1. Patagonian tootfish (*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. In the 2009/10 fishing season, five vessels fished within the 5-day early extension (26–30 April). The catch limits in the 2009/10 season for Management Areas A, B and C were 0, 900 and 2 100 tonnes respectively, with an overall catch limit for SGSR of 3 000 tonnes. The total declared catch was 2 522 tonnes. Catches in Management Areas B and C were 903 tonnes and 1 618 tonnes respectively (in addition, <1 tonne was taken during a research survey). Management Area B was closed on 17 August 2010 and Management Area C was closed on the 31 August 2010. The fishing season in both management areas commenced on the 26 April 2010 (CM 41-02). Tagging of toothfish continued at a rate of >1 fish per tonne with a total of 2 968 fish tagged (with 737 recaptures).

SCOURCE 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 (2009). Assessments are carried out biennially. The assessment in 2009 was used to set catch limits for two years; 2009/10 and 2010/11. The assessment will be updated at the 2011 meeting of WG-FSA.

REFERENCE POINTS: $SSB_{t+35years} >= 50\% SSB_0$; 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: There no assessment undertaken for this stock in 2010, therefore CM 41-02 is carried forward in its entirety for the 2010/11 fishing season.

STECF COMMENTS: STECF has no comments.

21.1.2. Patagonian tootfish (*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. For management and research purposes the fishery is divided into two parts: northern and southern (divided along 57°20'S). A tagging program was introduced in the Northern Area in 2004/05 and extended to the Southern Area in 2008/09. The catch limits for *D. eleginoides* and *D. mawsoni* in Subarea 48.4 North in the 2009/10 season were 41 tonnes and 0 tonnes (except for scientific purposes) respectively, with recorded catches of 40 tonnes and 0 tonnes respectively. The northern fishery was closed when the catch limit was reached. The catch limit for *Dissostichus* spp. in Subarea 48.4 South in the 2009/10 season was 75 tonnes, with a recorded catch of 74 tonnes.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is 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 (2009). The assessment in 2009 was used to set catch limits for two years; 2009/10 and 2010/11. A single CASAL assessment model was used for an assessment of *D. eleginoides* in the Northern Area of Subarea 48.4. Long term yield that satisfies the CCAMLR decision rules was 41 tonnes.

REFERENCE POINTS: $SSB_{t+35years} >= 50\% SSB_0$; probability of SSB dropping below 20% of $SSB_0 <0.1$.

STOCK STATUS: New data became available for the assessment of *D. eleginoides* in Subarea 48.4 North. CASAL estimates a higher L_∞ (approximately 160 cm) than that currently assumed for the Subarea 48.3 population. This increased maximum size has flow-on effects to estimated productivity, however yield estimates were quite similar to previous years. L_∞ in this instance is being estimated from length-frequency data, and should be validated using data from aged fish when practical. This would also address the question of whether multiple age classes might be contributing to the strong cohort recruited to the population in the early 1990s. A preliminary stock assessment for the southern area of the South Sandwich Islands based on CPUE depletion analyses, CPUE and area comparisons, and results from a tagging study, suggest a vulnerable population of between 600 and 1 500 tonnes. This is about half the size of the estimate that was made in 2009, after the first season of fishing, which was based only on CPUE/area comparison.

RECENT MANAGEMENT ADVICE: Continuation of the tagging experiment in Subarea 48.4, with a reduced catch limit for *Dissostichus* spp. of 30 tonnes in Subarea 48.4 South and maintenance of a move-on rule for by-catch species, with a macrourid trigger of 150 kg and 16% of the catch of *Dissostichus* spp., and a trigger for rajids set at 5% of the catch of *Dissostichus* spp. For Subarea 48.4 North there is a revised catch limit of *D. eleginoides* of 40 tonnes, with continued prohibition of the taking of *D. mawsoni* other than for scientific research purposes, and maintenance of catch limits for by-catch species, with a limit for macrourids of 6.5 tonnes (16% of the catch limit for *D. eleginoides*) and a limit for rajids of 2 tonnes (5% of the catch limit for *D. eleginoides*).

STECF COMMENTS: STECF has no comments.

21.1.3. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 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. Most fishing in the South African EEZ takes place to the north and the east of the Prince Edward Islands in Subareas 58.6 and 58.7 and Area 51, and this Fishery Report focuses on Subareas 58.6 and 58.7. Up to seven operators have been licensed by South Africa to fish in any one year. However, since 2001/02, only two licensed vessels have fished each season, and only one vessel has been active since 2005/06. A second vessel entered

the fishery late 2010. The catch limit of *D. eleginoides* in the South African EEZ for the 2009/10 season was 450 tonnes for the period from 1 December 2009 to 30 November 2010. The catch reported for Subareas 58.6 and 58.7 as of 5 October 2010 was 84 tonnes, all of which was taken by longlines. There was no evidence of IUU catch in 2009/10.

SCOURCE 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.

REFERENCE POINTS: Assessment of appropriate levels of future catch has 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 2010.

RECENT MANAGEMENT ADVICE: South Africa is considering the adoption of an operational management procedure approach as a basis for provision of management advice, and a catch limit for 2010 has not been set as yet, but it is likely to be in the range of 250–450 tonnes. 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. The prohibition of directed fishing for *D. eleginoides*, described in CMs 32-10, 32-11 and 32-12, remain in force.

STECF COMMENTS: STECF has no comments.

21.1.4. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 58.6, Crozet Islands

FISHERIES: The fishery for *Dissostichus eleginoides* operated in the French EEZ around the Crozet Islands in Subarea 58.6. The catch limit of *D. eleginoides* set by France in its EEZ in Subarea 58.6 for 2009/10 was 1 000 tonnes, and this was allocated to seven longliners. The catch for the current season reported to October 2010 was 512 tonnes. The estimated IUU catch for the 2009/10 season was zero inside Subarea 58.6.

SCOURCE 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 2010.

REFERENCE POINTS: Assessment of appropriate levels of future catch has not been based on the CCAMLR decision rules.

STOCK STATUS: No formal stock assessment has been carried out for Subarea 58.6. The Commission encouraged the estimation of biological parameters for *D. eleginoides* in Subarea 58.6 (French EEZ), in order to develop a stock assessment for this area, and encouraged France to continue its tagging program in Subarea 58.6.

RECENT MANAGEMENT ADVICE: Advice from CCAMLR is that biological parameters should be estimated and a stock assessment should be developed. Areas of high bycatch should be avoided. No new information was available on the state of fish stocks in Subarea 58.6 outside the area of national jurisdiction and remains closed to fishing for *D. eleginoides*.

STECF COMMENTS: STECF has no comments.

21.1.5. Patagonian tootfish (*Dissostichus eleginoides*) in Division 58.5.1., Kerguelen Islands

FISHERIES: The catch limit of *D. eleginoides* set by France in its EEZ in Division 58.5.1 for 2009/10 was 5 100 tonnes, and this was allocated to seven longliners. The catch for the current season reported was 2 977 tonnes. Only longlining is currently permitted in the fishery. The estimated IUU catch for the 2009/10 season was zero inside the French EEZ. Some IUU fishing may occur outside the EEZ.

SCOURCE 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 2009.

REFERENCE POINTS: Assessment of appropriate levels of future catch has not been based on the CCAMLR decision rules.

STOCK STATUS: No formal stock assessment has been carried out for Division 58.5.1.

RECENT MANAGEMENT ADVICE: Advice from CCAMLR is that biological parameters should be estimated, a stock assessment should be developed and areas of high bycatch should be avoided. No update assessment was carried out for *D. eleginoides* fisheries in Division 58.5.1 in 2010. No new information was available on the state of fish stocks in Division 58.5.1 outside areas of national jurisdiction, it was therefore recommended that the prohibition of directed fishing for *D. eleginoides*, described in CM 32-13, remain in force.

STECF COMMENTS: STECF has no comments.

21.1.6. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 58.5.2., Heard and McDonald Islands

FISHERIES: The catch limit of *Dissostichus eleginoides* in Division 58.5.2 for the 2009/10 season was 2 550 tonnes (CM 41-08) for the period from 1 December 2009 to 30 November 2010. The catch of *D. eleginoides* reported for this division by October 2010 was 1 881 tonnes. In Division 58.5.2, the fishery was a trawl fishery from 1996/97 to 2001/02. In recent seasons the fishery has been prosecuted by trawl, longline and pot. The longline fishery was active from April to September 2010 and the trawl fishery was active throughout the whole season. There has been no evidence of IUU fishing in Division 58.5.2 since 2006/07.

SCOURCE 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.

REFERENCE POINTS: $SSB_{t+35years} >= 50\% SSB_0$; 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: Two estimation models were presented for natural mortality (M) from mark-recapture and age data in the Division 58.5.2 *D. eleginoides* fishery, using data from the main trawl ground and the methods. The simulations showed that the CCODE method was more robust than the BODE method, therefore the estimate of $M = 0.155\ y^{-1}$ from the model for *D. eleginoides* in Division 58.5.2 was a credible estimate. Assessments are now carried out biennially. 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). The assessment in 2009 was used to set catch limits for two years; 2009/10 and 2010/11: 2,550 tonnes.

STECF COMMENTS: STECF has no comments.

21.1.7. Patagonian tootfish (*Dissostichus eleginoides*) 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 (CM 114/XV). In 1999, the Commission agreed that high levels of IUU fishing for *Dissostichus* spp. in the Convention Area had rendered it unrealistic to consider this fishery as 'new', and the fishery was re-classified as exploratory. In 2009/10, the exploratory fishery for *Dissostichus* spp. in Subarea 48.6 was limited to Japanese, Korean and South African flagged vessels using longlines only, and no more than one vessel per country was permitted to fish at any one time (CM 41-04). The precautionary catch limit for *Dissostichus* spp. was 200 tonnes north of 60°S (SSRUs A and G1) and 200 tonnes south of 60°S (SSRUs B–F). The catch limits for by-catch species were defined in CM 33-03. The fishing season was from 1 December 2009 to 30 November 2010. Environmental protection in this fishery is regulated by CMs 26-01, 22-06, 22-07 and 22-08. Two Members (Japan and the Republic of Korea) and three vessels fished in Subarea 48.6 SSRUs D and E in 2009/10. The SSRUs south of 60°S were closed on 21 March 2010 with a final reported catch of 197 tonnes. Fishing was still

ongoing by one vessel in the SSRUs north of 60°S with a reported catch of 98 tonnes. There is no information to derive an estimate of the level of IUU fishing in Subarea 48.6.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as a CCAMLR Exploratory Fishery. Catch limits are therefore set at a level not substantially above that necessary to obtain the information specified in the Exploratory Fishery's Data Collection Plan.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: The Exploratory Fishery will continue in 2010/11 under the precautionary catch limit for *Dissostichus* spp. of 200 tonnes north of 60°S and 200 tonnes south of 60°S.

STECF COMMENTS: STECF has no comments.

21.1.8. Patagonian tootfish (*Dissostichus eleginoides*) exploratory fishery 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*. In 2009/10, the exploratory fishery for *Dissostichus* spp. in Division 58.4.1 was limited to Japanese, Korean, New Zealand, Spanish and Uruguayan vessels using longlines only (CM 41-11). The precautionary catch limit for *Dissostichus* spp. was 210 tonnes and the following limits applied to SSRUs: 100 tonnes in SSRU C; 50 tonnes in SSRU E and 60 tonnes in SSRU G. Five other SSRUs (A, B, D, F and H) were closed to fishing. The catch limits for by-catch species were defined in CM 33-03. The fishing season was from 1 December 2009 to 30 November 2010. Environmental protection in this fishery is regulated by CMs 26-01, 22-06, 22-07 and 22-08. SSRU G was closed on 10 January 2010 with a final reported catch of 47 tonnes. SSRU E was closed on 18 January 2010 with a final reported catch of 51 tonnes. SSRU C was closed on 20 February 2010 with a final reported catch of 98 tonnes. The total final reported catch was 196 tonnes for Division 58.4.1. Information on IUU fishing activities in 2009/10 indicated an increase in IUU fishing with approximately 910 tonnes of *Dissostichus* spp. being taken. As a result, the total removals of *Dissostichus* spp. in 2009/10 were estimated at 1 106 tonnes.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as a CCAMLR Exploratory Fishery. Catch limits are therefore set at a level not substantially above that necessary to obtain the information specified in the Exploratory Fishery's Data Collection Plan.

STOCK STATUS: Unknown

RECENT MANAGEMENT ADVICE: The precautionary catch limit for *Dissostichus* spp. was 210 tonnes in 2009/10. Exploratory fishing will continue in 2010/11 under the same precautionary catch limit.

STECF COMMENTS: STECF has no comments.

21.1.9. Patagonian tootfish (*Dissostichus eleginoides*) 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 2009/10, the exploratory fishery for *Dissostichus* spp. in Division 58.4.2 was limited to Japanese, Korean, New Zealand, Spanish and Uruguayan vessels using longlines only. Only one Member (the Republic of Korea) fished in the division and reported a catch of 93 tonnes. SSRU E was closed on 17 February 2010 (SSRU E catch limit for *Dissostichus* spp.: 40 tonnes; final reported catch: 40 tonnes), and SSRU A and consequently the fishery was closed on 24 February 2010 (SSRU A catch limit for *Dissostichus* spp.: 30 tonnes; final reported catch: 53 tonnes). The other SSRUs (B, C, and D) were closed to fishing. The fishery targeted *D. mawsoni* and operated in SSRUs A and E in 2009/10. It was estimated that 432 tonnes of *D. mawsoni* were taken by IUU fishing in 2009/10. The total removal of *Dissostichus* spp. in 2009/10 was estimated at 525 tonnes and well in excess of the catch limit.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as a CCAMLR Exploratory Fishery. Catch limits are therefore set at a level not substantially above that necessary to obtain the information specified in the Exploratory Fishery's Data Collection Plan.

STOCK STATUS: Unknown

RECENT MANAGEMENT ADVICE: No new advice could be provided on catch limits for this division. The precautionary catch limit for *Dissostichus* spp. was 70 tonnes in 2009/10. Exploratory fishing will continue in 2010/11 under the same precautionary catch limit.

STECF COMMENTS: STECF has no comments.

21.1.10. Patagonian tootfish (*Dissostichus eleginoides*) exploratory fishery in Division 58.4.3a.

FISHERIES: In 2009/10, the exploratory fishery for *Dissostichus* spp. in Division 58.4.3a was limited to Japanese and Korean vessels using longlines only (CM 41-06). The precautionary catch limit for *Dissostichus* spp. was limited to 86 tonnes, but no vessel participated in this fishery. The catch limits for by-catch species were defined in CM 33-03. The fishing season was from 1 May to 31 August 2010. Fishing was permitted outside the prescribed season provided that each vessel demonstrated its capacity to comply with the requirements for longline weighting outlined in CM 24-02. Environmental protection in this fishery is regulated by CMs 26-01, 22-06, 22-07 and 22-08. There was no evidence of IUU fishing in 2009/10.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as a CCAMLR Exploratory Fishery. Catch limits are therefore set at a level not substantially above that necessary to obtain the information specified in the Exploratory Fishery's Data Collection Plan.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: No new advice could be provided on catch limits for this division. The catch limit for Division 58.4.3a for the 2009/10 fishing year was 86 tonnes. Exploratory fishing will continue in 2010/11 under the same precautionary catch limit.

STECF COMMENTS: STECF has no comments.

21.1.11. Patagonian tootfish (*Dissostichus eleginoides*) exploratory fishery in Division 58.4.3b.

FISHERIES: In 2009/10, the exploratory fishery for *Dissostichus* spp. in Division 58.4.3b was limited to research fishing conducted by Japanese, Korean, South African and Uruguayan vessels using longlines only, and no more than one vessel per country was permitted to fish at any one time. In November 2007 the division was divided into two SSRUs: A north of 60°S and B south of 60°S. In November 2008 the area north of 60°S was further subdivided into four SSRUs (A, C, D and E). The precautionary catch limit for *Dissostichus* spp. in the fishery was set to zero tonnes in each SSRU. An additional limit of 72 tonnes was set for research fishing between 1 December 2009 and 31 March 2010 within four designated sampling sectors (CM 41-07). The catch limits for by-catch species are defined in CM 33-03. Environmental protection in this fishery is regulated by CMs 26-01, 22-06, 22-07 and 22-08.

In 2009/10, one Member (Japan) and one vessel participated in research fishing. The vessel operated in the southeastern sampling sector and reported a total catch of 14 tonnes of *Dissostichus* spp. (*D. eleginoides*: 2 tonnes, *D. mawsoni*: 12 tonnes). Information on IUU activities indicated that 171 tonnes of toothfish were taken in 2009/10.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as a CCAMLR Exploratory Fishery. Catch limits are therefore set at a level not substantially above that necessary to obtain the information specified in the Exploratory Fishery's Data Collection Plan.

STOCK STATUS: Unknown

RECENT MANAGEMENT ADVICE: The catch limit for Division 58.4.3a for the 2009/10 fishing year was 86 tonnes. Exploratory fishing will continue in 2010/11 under the same precautionary catch limit.

STECF COMMENTS: STECF has no comments.

21.1.12. Patagonian tootfish (*Dissostichus eleginoides*) exploratory fisheries in Subareas 88.1 and 88.2 (Ross Sea)

FISHERIES: Five Members (Argentina, Republic of Korea, New Zealand, Spain and the UK) and 12 vessels fished in the exploratory fishery in Subarea 88.1, using longlines only (CM 41-09). The precautionary catch limit for *Dissostichus* spp. was 2 850 tonnes. The fishery was closed on 9 February 2010 and the total reported catch of *Dissostichus* spp. (excluding research fishing) was 2 870 tonnes (101% of the limit). The following SSRUs were closed during the course of fishing: 1) SSRUs B, C and G closed on 23 December 2009, triggered by the catch of *Dissostichus* spp. (total catch 370 tonnes; 100% of the catch limit); 2) SSRUs J and L closed on 29 January 2010, triggered by the catch of *Dissostichus* spp. (total catch 358 tonnes; 96% of the catch limit); and 3) SSRUs H, I and K closed on 9 February 2010, triggered by the catch of *Dissostichus* spp. (total catch 2 142 tonnes; 102% of the catch limit).

In Subarea 88.2, the exploratory fishery for *Dissostichus* spp. was limited to Argentine, Korean, New Zealand, Russian, Spanish, UK and Uruguayan vessels using longlines only (CM 41-10). The precautionary catch limit for *Dissostichus* spp. was 575 tonnes south of 65°S, applied as follows: 214 tonnes total could be taken in SSRUs C, D and F; and 361 tonnes in SSRU E . Two SSRUs (A and B) were closed to fishing. The catch limits for by-catch species were defined in CMs 33-03 and 41-10. The fishing season was from 1 December 2009 to 31 August 2010. Four Members and five vessels fished in the exploratory fishery in Subarea 88.2 in January and February 2010. The fishery closed on 31 August 2010 and the total reported catch of Dissostichus spp. was 314 tonnes (55% of the limit)

The IUU catch in Subareas 88.1 and 88.2 for the 2009/10 season was estimated to be 0 tonnes.

SCOURCE 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).

REFERENCE POINTS: SSB_t+35years >= 50% SSB_0; probability of SSB dropping below 20% of SSB_0 <0.1. Ross Sea: spawning stock abundance (B_0) were 62 080 tonnes (95% credible interval (CI) 56 020–70 090 tonnes), and current (B_{2009}) biomass was estimated as 80% B0 (95% CI 78–82%). SSRU 882E: spawning stock abundance (B_0) were 7 540 tonnes (95% CI 5 870–10 020 tonnes), and current (B_{2009}) biomass was estimated as 81% B0 (95% CI 75–86%).

STOCK STATUS: The stocks in Subareas 88.1 and 88.2 are considered fully exploited. $SSB_{current}$ > 50% SSB_0

RECENT MANAGEMENT ADVICE: The assessment for Subareas 88.1 and 88.2 was not updated and the management advice on catch limits for Subareas 88.1 and 88.2 from last year are carried forward to 2010/11.

STECF COMMENTS: STECF has no comments.

21.1.13. Patagonian tootfish (*Dissostichus eleginoides*) closed fisheries in Divisions 58.4.4a and 58.4.4b

FISHERIES: The longline fishery for *Dissostichus* spp. in Divisions 58.4.4a and 58.4.4b began as a new fishery in 1997/98 (CM 138/XVI). These divisions were managed as a single area and a catch limit for *Dissostichus* spp. applied to fishing north of 60°S, and in waters outside areas of national jurisdiction. Following the Commission's recognition that high levels of IUU fishing for *Dissostichus* spp. in the Convention Area had rendered it unrealistic to consider this fishery as 'new', the fishery was reclassified as exploratory in 1999. In 1999, the divisions were subdivided into SSRUs A, B, C and D. In 2002, the Commission expressed concern regarding the low levels of stocks of *Dissostichus* spp. in Divisions 58.4.4a and 58.4.4b and the high levels of IUU fishing in that region. Consequently, the Commission prohibited directed fishing for *Dissostichus* spp. in these divisions and the fishery for *Dissostichus* spp. was closed (CM 32-10). In 2007/08 and 2009/10, a Japanese-flagged longliner conducted research fishing in accordance with a research plan submitted under CM 24-01. The vessel caught 77 tonnes of *D. eleginoides* and <1 tonne of *D. mawsoni* in 2007/08, and 59 tonnes of *D. eleginoides* in 2009/10. The estimated IUU catch for 2009/10 was 80 tonnes in Division 58.4.4a.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as a CCAMLR Research Fishery. Catch limits are therefore set at a level not substantially above that necessary to obtain the information.

STOCK STATUS: Unknown

RECENT MANAGEMENT ADVICE: The estimated B_0 value and the current stock biomass were calculated using an alternative method of estimating a precautionary research survey catch for two stock status scenarios. Population status in each case was projected forward using the GYM: 1) Scenario 1 used the estimated total catch history (legal and IUU) and assumed the biomass in 2010 to be 20% of B. An estimate B was then calculated at 7 900 tonnes, representing a precautionary research catch, 0.62% of B is 49 tonnes; 2) Scenario 2 used the same catch history and assumed the status at the end of the bulk of IUU fishing (in 2002) was 20% of B. B was then back-calculated to be 9 200 tonnes. This scenario then assumes some recovery through a forward projection, estimating the biomass in 2010 to be 33% of B. A precautionary catch limit (as for scenario 1) is then 1.05% of B, or 97 tonnes.

STECF COMMENTS: STECF has no comments.

21.2. Icefish (*Champsocephalus gunnari*)

In 2009/10, three Members fished for icefish by trawling in Subarea 48.3 and Division 58.5.2 and the catch reported to 24 September was 378 tonnes (1 916 tonnes in fishing season 2008/09).

21.2.1. Icefish (*Champsocephalus gunnari*) in Subarea Division 58.5.2, Heard and McDonald Islands

FISHERIES: The catch limit of *C. gunnari* in Division 58.5.2 for the 2009/10 season was 1 658 tonnes for the period from 1 December 2009 to 30 November 2010 (CM 42-02). The catch in trawl fishery reported for this division as of 5 October 2010 was 365 tonnes. There has been no evidence of IUU activity in this fishery.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. Advice was based on a single short term (2 year) Generalised Yield Model (GYM) projection of age 2+ using survey-derived estimates of current biomass. New data was available form a *C. gunnari* survey in Division 58.5.2 conducted during 2010. The 2008 to 2010 Australian bottom trawl surveys sampled a large cohort, which now dominates the population structure in 2010 as the 4+ year class. A new 2+ cohort was also detected. New parameters for a von Bertalanffy growth model were proposed, based on additional recent data relating age and length.

REFERENCE POINTS: $SSB_{t+2years} >= 75\% SSB_{current}$

STOCK STATUS: Stock level is highly variable and dependent on recruitment. A responsive management strategy, using a short term (2 year) assessment approach based on the results of groundfish surveys has been used since 2000. There is evidence of cyclic behaviour in adult population size, with a peak in the fishery every three years.

RECENT MANAGEMENT ADVICE: A preliminary assessment was carried out, using both the current and a revised growth model. The density of fish in each age class was estimated using the CMIX procedure and the estimate of yield was obtained using the GYM. A new 2+ cohort was detected and it is expected that the 2010/11 fishery will focus on this cohort. The catch limit for *C. gunnari* in 2010/11 is set at 78 tonnes (66 tonnes in the 2011/12 season) and all other measures in the conservation measure are retained.

STECF COMMENTS: STECF has no comments.

21.2.2. Icefish (*Champsocephalus gunnari*) in Subarea 48.3, South Georgia

FISHERIES: In Subarea 48.3, a pelagic or semi-pelagic trawl fishery targets *Champsocephalus gunnari*. In 2009/10, the fishing season was from 1 December 2009 to 30 November 2010, with a catch limit for *C. gunnari* of 1548 tonnes (CM 42-01). Limited commercial fishing was conducted by two vessels between January and April 2010 and a total catch of 12 tonnes was reported; fishing was ongoing at the time of the meeting, but with zero catches reported. There has been no evidence of IUU activity in this fishery.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. Advice is based on a single short term (2 year) Generalised Yield Model (GYM) projection of age 2+ using survey-derived estimates of current biomass. A new survey (random stratified bottom trawl survey) was undertaken in January 2010. The mean biomass estimated for *C. gunnari* in 2010 increased relative to the 2009 survey estimate; a 3+ cohort remained dominant, but there was also an increase in the proportion of 1+ and 2+ age classes in the population. This increase in biomass was unexpected considering the low availability of krill to *C. gunnari* in the area in 2009 evidenced by dietary analysis. The survey also identified the first evidence since 2003/04 of toothfish recruitment at Shag Rocks, of fish 30–40 cm (putative age 2+ fish).

REFERENCE POINTS: $SSB_{t+2years} >= 75\% SSB_{current}$.

STOCK STATUS: Stock level is highly variable and dependent on recruitment. A responsive management strategy, using a short term (2 year) assessment approach based on the results of groundfish surveys has been used since 2000. An estimate of the one-sided lower 95% CI of biomass was calculated for the assessment, using 10 separate estimates each using 500 000 bootstrap samples, and is tabled below. The estimated mean value of the standing stock was 49 947 tonnes in January 2010. The one-sided lower 95% CI was 23 448 tonnes.

RECENT MANAGEMENT ADVICE: The catch limit for *C. gunnari* is set at 2 305 tonnes in 2010/11 and 1 535 tonnes in 2011/12 based on the outcome of the short-term assessment.

STECF COMMENTS: STECF has no comments.

21.3. Crabs (Paralomis spp.)

21.3.1. Crabs (Paralomis spp.) Subarea 48.3

FISHERIES: Most fishing for crabs in Subarea 48.3 has proven not to be economically viable due to the large numbers of undersized crabs caught. The fishery for crabs in Subarea 48.3 is subject to CM 52-01 with a catch limit of 1 600 tonnes. On entering the fishery, vessels must undertake an experimental harvest regime, including deploying their first 200 000 pot hours fishing in set areas in an attempt to gather data on abundance. In 2009 one vessel notified to fish. However, the vessel only started fishing in August, and stopped fishing only on 15 October. Vessel and observer data have yet to be submitted and could therefore not be analysed in 2010, 22 tonnes were caught.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

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

STOCK STATUS: Unknown; unexploited.

RECENT MANAGEMENT ADVICE: There is no new advice on stock status of crabs or the conduct of the fishery in Subarea 48.3. The catch limit in Subarea 48.3 is 1,600 tonnes.

STECF COMMENTS: STECF has no comments.

21.3.2. Crabs (*Paralomis* spp.) exploratory fishery in Subarea 48.2

FISHERIES: An exploratory fishery for crabs was carried out for the first time in Subarea 48.2 during the 2009/10 season. The fishery was prosecuted in accordance with the requirements of CM 52-02, and a total of 79 140 pot hours and 17 sets were completed. Only three *Paralomis formosa* were captured, and it was concluded that the crab fishery in Subarea 48.2 was not likely to be viable.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

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

STOCK STATUS: Unknown; unexploited.

RECENT MANAGEMENT ADVICE: CM 52-02 stays in force with a catch limit of 250 tonnes.

STECF COMMENTS: STECF has no comments.

21.4. Krill (*Euphausia superba*)

The krill fishery operated only in Area 48 during the 2009/10 season. Different fishing gears are used: conventional trawls and continuously pumped trawls.

21.4.1. Krill (*Euphausia superba*) Area 48

FISHERIES: In 2009/10, six Members fished for krill in Subareas 48.1, 48.2 and 48.3 and most of the catch was taken in Subarea 48.1. The reported total catch to 24 October was 211 180 tonnes (China 1 956 tonnes; Japan 29 919 tonnes; Republic of Korea 43 805 tonnes; Norway 120 429 tonnes; Poland 7 007 tonnes; and Russia 8 065 tonnes). The krill fishery was concentrated around Bransfield Strait in Subarea 48.1 and was closed when the catch reached 99.8% of the trigger level for the subarea (155 000 tonnes). The catch in Subarea 48.1 was the highest ever recorded in that subarea, and this was the first time that a subarea had been closed because catches had reached one of the apportioned trigger levels introduced in 2009 (CM 51-07).

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. Advice on the overall catch limit is 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.

REFERENCE POINTS: The probability of SSB dropping below 20% of SSB_0 **> 0.1** (even in the absence of fishing). This would result in a γ being equal to 0 and hence a modification of this part of the decision rule may be required provided that the objectives in Article II can still be met. Given also the potential impact of climate change on recruitment variability, the Working Group agreed that both the recruitment variability and the specification of the current decision rule relating to the maintenance of stable recruitment should be investigated.

STOCK STATUS: The revised B_0 estimate using the full SDWBA model for Subareas 48.1, 48.2, 48.3 and 48.4 was 60.3 million tonnes with a sampling CV of 12.8%, and this represented the best estimate of krill biomass derived from the CCAMLR-2000 Survey.

RECENT MANAGEMENT ADVICE: In 2010, the Commission agreed to modify CM 23-06 so that the 80% (50% for Subarea 48.1) level in CM 23-06 should apply to the subarea-specific trigger levels, and that once this level had been reached, a five-day reporting interval should be adopted. Under CM 51-01, the revised precautionary catch limit for krill was set at 5.61 million tonnes for Subareas 48.1 to 48.4, with a trigger level of 620 000 tonnes for Subareas 48.1 to 48.4. Notifications for krill fishing in 2010/11 were received from seven Members covering 15 vessels with a notified total predicted catch of 410 000 tonnes; there was no notification for exploratory krill fisheries.

STECF COMMENTS: STECF has no comments.

22. List of Acronyms

ACOM	The Advisiory Committee of ICES
ACFM	The Advisory Committee on Fishery Management
ALADYM	Age-Length Based Dynamic Model
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
CITES	Convention on International Trade on Endangered Species
CNR	National Council of Research (Italy)
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
FISHSTAT	FAO Fisheries Statistics
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)
GSA	Geographical Sub Area
HCMR	Hellenic Centre for Marine Research
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
ISMAR	Institute of Marine Science (Italy)
IUCN	International Union for Conservation of Nature
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	*Nephrops* 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	Secretaria de Agricultura, Ganadería, Pesca y Alimentos (Argentine)
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)
STECF-SGMED	Subgroup on the Mediterranean
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
SURBA	Survey Based Assessment (software)
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

23. Reference

Scientific, Technical and Economic - Committee for Fisheries (STECF) - Review of Scientific Advice for 2009 - Consolidated Advice on Stocks of Interest to the European Community (eds. Casey, Raid, Beare & Doerner). EUR 23630 EN. Luxembourg (Luxembourg): OPOCE; 2008. JRC48991

Druon J. Habitat mapping of the Atlantic bluefin tuna derived from satellite data: its potential as a tool for the sustainable management of pelagic fisheries. MARINE POLICY 34 (2); 2010. p. 293-297.

FAO/CECAF, 2006. Report of the FAO/CECAF Working Group on the Assessment of Demersal resources. Conakry, Guinea, 19-29 September 2003/Rapport du Groupe de travail FAO/COPACE sur l'évaluation des ressources démersaux. Conakry, Guinée, 19-29 septembre 2003. CECAF/ECAF Series 06/67. FAO. Rome, 2006. 357 pp.

García-Isarch, E., Burgos, C., Sobrino, I., Mendes, A., Barri, I., Assau, V., Gomes, R. y Gomes. M.J. Informe de la Campaña de Evaluación de Recursos Demersales de la ZEE de Guinea Bissau a bordo del B/O Vizconde de

Eza “Guinea Bissau 0810”. Instituto Español de Oceanografía y Centro de Investigaçao Pesqueira Aplicada de Guinea Bissau. Febrero 2009. 112 pp + Anexos (I→V).

(STECF, 2009) Scientific, Technical and Economic - Committee for Fisheries (STECF) - Review of Scientific Advice for 2009 - Consolidated Advice on Stocks of Interest to the European Community (eds. Casey, Raid, Beare & Doerner). EUR 23630 EN. Luxembourg (Luxembourg): OPOCE; 2008. JRC48991

del Río, J.L., Portela,J., Sacau, M. and Patrocinio, T., 2008. Informe de la campaña de investigación pesquera ATLANTIS 2008. IEO, 119 pp.

del Río, J.L., Portela,J., Sacau, M. and Patrocinio, T., 2009. Informe de la campaña de investigación pesquera ATLANTIS 2009. IEO, 152 pp.

Irusta, Gabriela; D’Atri, Luciana y Renzi, Marta, 2008. Evaluación del estado del efectivo norte de 41°S de la merluza (*Merluccius hubbsi*) y estimación de la captura biológicamente aceptable para el año 2008. Inf. Téc. INIDEP N° 32. 20-05-08. 34 pp.

Giussi, Analía y Wöhler, Otto, 2008. Estimación de índices de abundancia de polaca (*Micromesistius australis*) a partir de la captura por unidad de esfuerzo de buques surimeros argentinos. Período 1992-2007. Inf. Téc. INIDEP N° 26. 12-06-08. 10 pp.

Giussi, Analía y Wöhler, Otto, 2008. Evaluación de la abundancia de polaca (*Micromesistius australis*) en el Atlántico Sudoccidental. Período 1987-2007. Inf. Téc. INIDEP N° 36. 08-07-08. 18 pp.

V.V. Laptikhovsky, 2005. A trophic ecology of two grenadier species (Macrouridae, Pisces) in deep waters of the Southwest Atlantic. Deep Sea Research Part I: Oceanographic Research Papers. Volume 52, Issue 8, August 2005, Pages 1502-1514.

Martínez, Patricia y Wöhler, Otto, 2007. La pesquería de merluza negra en el Atlántico Sudoccidental. Enero - noviembre del 2007. .Inf. Téc. INIDEP N° 4. 27-12-07. 9 pp.

Norma E. Brunetti, Anibal Aubone, Gabriel Rossi & Martha G. Mc Innes, (2008, in press). Illex argentinus. Pesquería 2008. Evaluación de la Pesquería. Informe final.

Del Río, J.L., Portela, J., Sacau, M. y Patrocinio, T., 2008. Informe de la Campaña de investigación pesquera ATLANTIS 2008. Dpto. Pesquerías Lejanas. Informe Interno Instituto Español de Oceanografía. 118 pp.

Del Río, J.L., Portela, J. y Patrocinio, T., 2009. Informe de la Campaña de investigación pesquera ATLANTIS 2009. Dpto. Pesquerías Lejanas. Informe Interno Instituto Español de Oceanografía. 158 pp.

Del Río et al., 2010. Informe de la Campaña de investigación pesquera ATLANTIS 2010. Dpto. Pesquerías Lejanas. Informe Interno Instituto Español de Oceanografía (in preparation)

FAO Western Central Atlantic Fishery Commission. Report of the Third Meeting of the WECAFC Ad Hoc Flyingfish Working Group of the Eastern Caribbean. Mount Irvine, Tobago, 21-21 July 2008 FAO Fisheries and Aquaculture Reports No. 929 Rome, 2010, 94 pp., A4, PB ISBN 978-92-5-106570-9 I1602/EFAO111025

Scientific, Technical and Economic Committee for Fisheries (STECF) - Review of scientific advice for 2010 - Consolidated Advice on Stocks of Interest to the European Community (eds. Casey J., Vanhee W. & Doerner, H.). 2009. Publications Office of the European Union, Luxembourg, ISBN 978-92-79- 14605-3, JRC56074, 358 pp.
http://publications.jrc.ec.europa.eu/repository/handle/111111111/12955

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25. 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 24627EN – Joint Research Centre – Institute for the Protection and Security of the Citizen
Title: Scientific, Technical and Economic Committee for Fisheries. Review of scientific advice for 2010 - part 2.
Author(s):

STECF members: Casey, J., Abella, J. A., Andersen, J., Bailey, N., Bertignac, M., Cardinale, M., Curtis, H., Daskalov, G., Delaney, A., Di Natale, A., Döring, R., Garcia Rodriguez, M., Gascuel, D., Graham, N., Gustavsson, T., Jennings, S., Kenny, A., Kirkegaard, E., Kraak, S., Kuikka, S., Malvarosa, L., Martin, P., Motova, A., Murua, H., Nowakowski, P., Prelezzo, R., Sala, A., Somarakis, S., Stransky, C., Theret, F., Ulrich, C., Vanhee, W. & Van Oostenbrugge

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Luxembourg: Publications Office of the European Union
2010 – 282 pp. – 21 x 29.7 cm
EUR – Scientific and Technical Research series – ISSN 1831-9424
ISBN 978-92-79-18741-4
doi:10.2788/53892

Abstract

The STECF review of scientific advice for 2011 Part 3 was drafted by the STECF-SGRST 10-03 Working Group held in Cádiz, Spain from 11-15 October 2010. The Report was reviewed and adopted by the STECF at its 35th plenary session held in Brussels from 8-12 November 2010.

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

LB-NA-24627-EN-N

ISBN 978-92-79-18741-4