JRC Scientific and Technical Reports

Scientific, Technical and Economic Committee for Fisheries (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2012 Part 3 (STECF 11-15)

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-EWG 11-17, Ancona, Italy October 2011.

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2012 – 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 2012 PART 3

Introduction to the STECF Review of Advice for 2012, 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 38th Plenary meeting held in Brussels from 7-11 November 2011.

The review was drafted by the STECF-EWG 11-17 Working group during its meeting held in Ancona, Italy from 17-21 October 2011.

The STECF review of advice for 2012 Part 1 included the latest assessments and advice for stocks in the Baltic Sea and was published in June 2011. Part 2 contained the review of assessments and advice released by ICES up to the end of June 2011. Parts 1, 2 and 3 will be combined and published in the STECF Consolidated review of advice for 2012, which will be available in early November 2011.

General request to STECF

The STECF is requested to review and comment as adequate scientific advice released in 2010 – 2011 in particular for the stocks specified below. Stocks reviewed in previous STECF reports, and for which no updated advices have been delivered meanwhile, shall be maintained in the report; this is to facilitate easy reference and consultation.

STECF is requested, in particular, to pinpoint possible inconsistencies, if any, between the available assessments and the ICES advice or advice delivered by scientific committees of 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 the approach suggested in the Communication from the Commission concerning a consultation on fishing opportunities (COM(2011)*298*-FINAL – see supporting documentation. STECF is therefore requested to review ICES advice on the TACs corresponding to the implementation of chapter 6 (pages 6) of COM(2011)*981*-FINAL. When interpreting the therein mentioned MSY-framework, 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.

Stocks for which there is no catch forecast

For those stocks where it is not possible to provide an analytical advice based on a catch forecast in relation to precautionary limits, the STECF is requested to (i) pin point the data deficiencies and (ii) to advise on which stocks belong to one or more of the following cases:

- Stocks being assessed for the first time or for which there is a short data time-series;
- Stocks for which there are low levels of catches and for economic reasons the relevant biological data are not available;
- Stocks in relation to which exploratory data/assessment suggest increasing stock trends and/or no overfishing;
- Stocks in relation to which exploratory data/assessment suggest decreasing stock trends and/or overfishing or belonging to long-lived/slow-growing/late-maturing species vulnerable to exploitation;
- Stocks for which there is no advice at all;
- Stocks subject to mixed-fishery and discards effects (to be described in detail);

– Stocks in relation to which information on comparable stocks or eco-region is available and can potentially be used to give indications on stock trends (to be described in detail);

Naturally short-lived stocks .

In attempting to respond to this request, STECF has drawn up a table classifying each of the stocks according to the above criteria. However, the task requires considerable time and resources and could not be completed during the STECF-EWG 11-17. Nevertheless STECF was able to partially address the request during this plenary meeting.

There are a number of issues that still must be clarified in order that the information in the table is accurate and useful. Without such clarification, STECF considers that the classifications for some stocks could be misleading. For example, the criteria vulnerable and economic value, both require further clarification and elaboration.

Nevertheless the form of the table is included below to illustrate its potential as a tool to summarise the status of those stocks for which a catch forecast cannot be made available.

The Commission is invited to review the proposed format for its utility for future use.

Example of the proposed summary Table of information for stocks for which no catch forecast can be provided.

Stock	1st assessment	short TS	low catch (000t)	low economic	Stock trend	Overfishing	Vulnerable	Advice	Category	Mixed fisheries	Discards effects	Similar stocks ?	short lived	Key to shading
Resources of the (INSERT NAME) ecoregion														
A	No	78-08	~0	Yes			No	Yes	11	Yes	Yes		No ?	Good/Yes
B	No	70-10	10-15		Dec (LPUE)		No	Yes	6	Yes	Yes		No ?	Uncertain
C	No	82-10	22-44		Stable	No	No	No	11	Yes	Yes		No	Bad/No
D	No	83-10	0-1.4		Dec (I) Inc (CPUE)		No	Yes	5	No			Yes	Unknown
E	No	83-10	~0				No	No	11	No			Yes	
F	No	83-10	0.13-0.66				No	No	11	No			Yes	
G	No	83-10	~0				No	No	11	No			Yes	
H	No	96-10	9.1-15.7				No	No	5,11	Yes	Yes		Yes	
I	No	96-10	61.1-143.5				No	No	5	Yes	Yes		Yes	
J														
K	No	71-09	0-0.03				No	No	11	Yes	Yes		Yes	
L	No	72-09	0-0.06				No	No	11	No			Yes	
Resources of the (INSERT NAME) ecoregion														
M	No	91-10	23.4-26.6		Dec	No	No	Yes	6	Yes	Yes		No	
N	No	~86-09	~0.7				No	Yes	11	Yes	Yes		No	
O	No						No	Yes	11	Yes	Yes		No	
P	No	80-10	1.1-1.2		Dec (LPUE)		No	Yes	11	Yes	Yes		No	

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:

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

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

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

 **- indicates that the status is either unknown because there is no quantitative assessment, or undefined when there is an analytical assessment but reference points are not defined**

 **- indicates that the absolute level is unknown, but increasing**

 **- indicates that the absolute level is unknown, but unchanged**

 **- indicates that the absolute level is unknown, but decreasing**

RECENT MANAGEMENT ADVICE/MEASURES: summary of most recent advice and/or management measures implemented.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final: The TACs prescribed by the rules in Chapter 6 of COM(2011) 298-Final

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

Form of the ICES Advice for 2012

STECF notes that ICES has changed the format of its advice in 2011. Its advice is now expressed as one of the four following options listed in priority order:

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

2. The ICES Maximum Sustainable Yield (MSY) framework. ICES advises either:
   - the predicted landings in 2012 consistent with a constant fishing mortality at F_{MSY} (or advised 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.

3. Precautionary Approach: ICES advises on the predicted landings consistent with the most restrictive of either:
   - the predicted landings in 2012 consistent with fishing at a rate that is predicted to allow the SSB to be above B_{pa} in 2013 or;
   - the predicted landings consistent with fishing at F_{pa} .

4. In the absence of an analytical assessment, a qualitative evaluation of the stock based on available indicators of temporal trends in the stock e.g. from RV surveys.

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 ICES MSY framework, 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.

F_{msy} and Transition to F_{msy}

The ICES $\mathbf{F}_{msy}$ advice and the advice based on the transitions scheme to $\mathbf{F}_{msy}$, which prescribes a rule for calculating the TAC for 2011-2015 based on considerations of stepwise reductions in fishing mortality, both take into account SSB in relation to $B_{trigger}$. STECF notes that in the context of the MSY framework, where F in 2011 is estimated to at or below F_{msy} but SSB in 2012 is estimated to be below $B_{trigger}$ the ICES harvest rule prescribes a target fishing mortality rate for 2012 that is below F_{msy}. In cases where the most recent assessment indicates that the stock is above $B_{trigger}$, no additional reduction in fishing mortality is prescribed.

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 F_{MSY} is $F_{0.1}$, unless there is convincing evidence to choose an alternative value. STECF recognises that for some stocks, $F_{0.1}$ may not be the most appropriate F_{MSY} 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 2012 on a stock by stock basis, consistent with the rules laid down in paragraphs 1 and 2 of Chapter 6 in the Communication from the Commission on a consultation on fishing opportunities for 2012 (COM(2011) 298-FINAL) and are referred to as Category 1 and Category 2 stocks respectively. Stocks which are not listed as category 1 or Category 2 stocks, are listed as Category 3 stocks, for which no proposed TAC is given. STECF wishes to stress that the resulting TACs constitute a direct application of those rules and unless explicitly stated, they should not be interpreted as STECF recommendations for fishing opportunities for 2012.

Acknowledgement

The STECF review of scientific advice for 2012 Part 3 was drafted by the STECF-EWG 11-17 Working Group held in Ancona, Italy from 17-21 October 2011. The Report was reviewed and adopted by the STECF at its 38th plenary session held in Brussels from 7-11 November 2011.

STECF acknowledges the extensive contribution made by the following participants:

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Contact details of participants are given in Annex I.

1. Eco-region 1: Resources of the North Sea

The majority of the advice on stocks in the North Sea ecoregion was summarised in the STECF Review of advice for 2012 Part 2. This section contains summaries for those stocks for which the most recent advice was published after June 2011.

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 2006-2010. 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)		
	2008–2010	
Qualitative evaluation	?	Insufficient information
SSB (Spawning-Stock Biomass)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

The available information is inadequate to evaluate stock trends. The state of the stock is therefore unknown. The stock has not been exploited since 2005.

RECENT MANAGEMENT ADVICE: There is insufficient information to evaluate the status of the stock. Therefore, based on precautionary considerations, ICES advises that no increase of the catch should take place unless there is evidence that this will be sustainable.

Additional considerations

The available information is inadequate to evaluate stock trends. The state of the stock is therefore unknown and fishing possibilities cannot be projected.

PA considerations

There is insufficient information to evaluate the status of the stock. Therefore, based on precautionary considerations, ICES advises that no increase of the catch should take place unless there is evidence that this will be sustainable.

Other considerations

No fishery has existed from 2006 onwards. No new data are available on the stock.

If the landings of this fishery return to substantial levels, a data collection programme should be implemented.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES advice.
STECF also advices 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.

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. Northern shrimps are mainly caught by 35–45 mm single- and twin-trawl nets (minimum legal mesh size is 35 mm). A larger number of vessels use sorting grids on a voluntary basis. The number of Danish trawlers has declined over the last 20 years, whereas the Norwegian fleet of <11 m vessels has expanded. No significant changes took place in the Swedish fishery during the last decade except for an increase in the use of twin trawls in the last two years. Because of this development (and the accompanying increase in the size of the trawls), the efficiency of the fisheries has increased.
Total landings have varied between 10,000 and 15,000 t in the period 1985- 2009. Discarding of small shrimp takes place, mainly due to high grading. In 2010 total landings were around 7,700 t, a 30% decrease compared to 2009 landings, while estimated catches (including discards) were around 8,300 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. This year's advice is based on the Danish and Norwegian lpue data, and Norwegian survey biomass and recruitment indices (1 group abundance index) from 2006 onwards.

REFERENCE POINTS: No reference points have not been defined for this stock.

STOCK STATUS:

F (Fishing Mortality)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-Stock Biomass)		
	2008–2010	
Qualitative evaluation	↘	Decrease

The state of the stock is unknown. Landing per unit effort (lpue) indices, which fluctuated without trend from the mid-1990s through the mid-2000s, have declined from 2008 onward. Survey biomass indices have also declined since 2007. Recruitment indices in 2008–2010 are lower than those in 2006 and 2007. The 2011 recruitment index, although higher than that in 2010, is low.

RECENT MANAGEMENT ADVICE: ICES advises based on precautionary considerations, that catches in 2012 should be reduced. Additionally, measures should be taken to address discarding.

Additional considerations

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

PA considerations

Given the recent declines in survey biomass indices and the very low recruitment indices, a reduction in landing is warranted.

The management of this stock should address the discarding of small shrimps, which occurs mainly in the Swedish fleet due to highgrading as a consequence of restrictive TACs. In 2010, estimated discards amounted to 8% of the total catch (weight). All vessels, including the increasing number of small Norwegian vessels (<11 m), should be required to complete and provide logbooks. Additionally, sorting grids should be mandatory in all areas to minimize bycatch.

Other considerations

Survey biomass indices declined 15% from 2010 to 2011. A reduction of at least 15% of the recent landings (2010) could therefore be appropriate. This corresponds to landings in 2012 of less than 6 500 t.

Highgrading, due to TAC constraints, occurs in several fleets.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

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 and a further decline in the biomass index in 2011, give reason for caution. In relation to precautionary considerations STECF therefore agrees with ICES that catches from this stock should be reduced. STECF notes that the survey biomass index shows a 15% decline between 2010 and 2011 and a similar reduction may be an appropriate basis for limiting catches in 2012. Such a reduction would imply that catches in 2012 should be no greater than 6 500 t.

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.

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 2010 was 22,255 tonnes, which represents a 50% decrease compared to 2009. 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)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

The available information is insufficient to evaluate stock trends and exploitation status. Therefore, the state of the horse mackerel in the North Sea is unknown.

MANAGEMENT AGREEMENTS: Since 2010, the EU TAC for the North Sea area has included 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 first two quarters of the year. The TAC for Division IVa is included in a different management area together with Divisions IIa, VIIa–c, VIIe–k, VIIIa, VIIIb, VIIId, VIIIe, Subarea VI, EU and international waters of Division Vb, and international waters of Subareas 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 high grading, discarding, and slipping from pelagic fisheries targeting mackerel, horse mackerel, and herring beginning in January 2010.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the precautionary considerations to reduce catch.

Additional considerations

Precautionary considerations

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. Given that the exploitation status is unknown and there is no reliable information on stock trends, the advice for 2012 is to reduce catch.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES advice for 2012.

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 in 2010 amounted to 125,955 t. The fishery was again closed in the first half of 2011. Historically, the fisheries have resulted in bycatches of other species, particularly whiting, haddock, saithe, and herring. Bycatches of these species have been low in the recent decade

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 specific management objectives are known to ICES 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 advice in the first half of the year (using the escapement management strategy 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)	2008	2009	2010	
MSY (F_{MSY})	?	?	?	Undefined
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined
Qualitative evaluation	↗	↗	↗	Below average

SSB (Spawning-Stock Biomass)	2009	2010	2011	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

The stock size has increased since 2004 and is above $MSY_{Bescapement}$. Recruitment was well above average in 2009, but very low in 2010 and 2011 and this is expected to bring SSB below the $MSY_{Bescapement}$ in 2012. Fishing mortality has been lower than the natural mortality for this stock and has decreased in recent years to well below the long-term average F (F=0.6). The status of the stock is mainly determined by natural processes and recruitment.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the MSY approach that there should be no catches of Norway pout in 2012 according to the escapement strategy.

Additional considerations

Management plans

ICES has evaluated and commented on three management strategies, although these have not yet been decided on. When combining a fixed F-management-strategy (F around 0.35 in 2012) with a fixed TAC strategy (a TAC of 50 000 t in 2012) the SSB is expected to decline below B_{pa} and MSY $B_{escapement}$ by 1 January 2013.

MSY approach

To maintain the spawning-stock biomass above a reference level of MSY $B_{escapement}$ by 1 January 2013, no catch of Norway pout can be taken according to the MSY approach in 2012. This is because the SSB is expected to fall below MSY $B_{escapement}$ due to the very low 2010 and 2011 recruitment and the high natural mortality of the stock.

PA approach

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

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 2. The rules for category 2 prescribe that for 2012, no catch of Norway pout can be taken in IIa, IIIa and the North Sea in 2012.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

1.5. Striped red mullet (*Mullus surmelutus*) in the North Sea

There is no advice relating specifically to striped red mullet in the North Sea. Advice from ICES on striped red mullet is provided at the NE Atlantic regional level and is given in Section 4.5 of this report.

1.6. Red gurnard (*Aspitrigla cuculus*)in the North Sea

There is no advice relating specifically to red gurnard in the North Sea. Advice from ICES on red gurnard is provided at the NE Atlantic regional level and is given in Section 4.6 of this report.

1.7. Grey gurnard (*Eutrigla gurnardus*) in the North Sea

There is no advice relating specifically to grey gurnard in the North Sea. Advice from ICES on grey gurnard is provided at the NE Atlantic regional level and is given in Section 4.7 of this report.

1.8. European Seabass (*Dicentrachus labrax*) in the North Sea

There is no advice relating specifically to European seabass in the North Sea. Advice from ICES on European seabass is provided at the NE Atlantic regional level and is given in Section 4.8 of this report.

1.9. Whiting (*Merlangius merlangus*) in Subarea IV (North Sea) and Division VIId (Eastern Channel)

FISHERIES: Whiting are taken as part of a mixed fishery, as well as a by-catch in fisheries for *Nephrops* and industrial species. Substantial quantities are discarded. Historically total catches have varied considerably ranging between 25 000 and 153 000 t. In 2010, the Working Group estimated that about 31 550 t were caught. The human consumption landings in the North Sea were 12 281 t with a TAC for 2010 of 14 832 t. The landings in the Eastern Channel amounted to 5 939 t. The Human Consumption TAC for this stock has been restrictive since 2000.

Whiting are caught in mixed demersal roundfish fisheries, fisheries targeting flatfish, the *Nephrops* fisheries, and the Norway pout fishery. The current minimum mesh-size in the targeted demersal roundfish fishery in the northern North Sea has resulted in reduced discards from that sector compared with the historical discard rates. Mortality has increased on younger ages due to increased discarding in the recent year as a result of recent changes in fleet dynamics of *Nephrops* fleets and small mesh fisheries in the southern North Sea. The by-catch of whiting in the Norway pout and sandeel fisheries is dependent on activity in that fishery, which has recently declined after strong reductions in the fisheries. These are low values based on the assumption of a similar by-catch rate to that observed in previous years, when the industrial fisheries were at a low level. A larger catch allocation for by-catch may be required if industrial effort increases.

Catches of whiting in the North Sea are also likely to be affected by the effort reduction seen in the targeted demersal roundfish and flatfish fisheries, although this will in part be offset by increases in the number of vessels switching to small mesh fisheries.

Recent measures to improve survival of young cod, such as the Scottish Credit Conservation Scheme, and increased uptake of more selective gear in the North Sea and Skagerrak, should be encouraged for whiting.

The minimum mesh size increased to 120 mm in the northern area in 2002 and this may have contributed to the substantial decrease in reported landings. Landings compositions from the northern area, in 2006 and 2007, indicate improved survival of older ages. In addition, the total number of fish discarded appears to have been significantly reduced since 2003, from around 60% in 2003 to around 28% in 2009. The corresponding value for 2010 is 37%.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. The stock assessment is based on an XSA assessment, calibrated with two survey indices. Commercial catch-at-age data were disaggregated into human consumption, discards, and industrial by-catch components.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
Management Plan	SSB_{MP}	Undefined.	
	F_{MP}	0.3	
MSY Approach	MSY $B_{trigger}$	Undefined.	
	F_{MSY}	Undefined.	
Precautionary approach	B_{lim}	Undefined.	
	B_{pa}	Undefined.	
	F_{lim}	Undefined.	
	F_{pa}	Undefined.	

STOCK STATUS:

F (Fishing Mortality)				
	2008	2009	**2010**	
MSY (F_{MSY})	?	?	?	Undefined
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined
Qualitative evaluation	→	→	→	Stable

SSB (Spawning-Stock Biomass)				
	2009	2010	**2011**	
MSY ($B_{trigger}$)	?	?	?	Undefined

Precautionary approach (B_{pa},B_{lim})	?	?	?	Undefined
Qualitative evaluation	↗	↗	↗	At recent average

SSB in 2010 is slightly higher than in 2009 and is around the long-term average. Fishing mortality has been stable since 2003. Recruitment has been very low between 2003 and 2007, with above-average recruitments estimated in 2008 and 2009. Whiting is no longer considered to be in a period of impaired recruitment.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the EU–Norway interim management plan TAC of 21 300 t (human consumption for the combined area) in 2012.

Additional considerations

Management plan

The response to the Joint EU–Norway request on the management of whiting in Subarea IV (North Sea) and Division VIId (Eastern Channel) from ICES in September 2010 stated that "maintaining fishing mortality at its current level of 0.3 would be consistent with long-term stability if recruitment is not poor". Consequently the EU and Norway have agreed to interim management of whiting at this level of total fishing mortality for 2011, conditional on a 15% TAC constraint. ICES are in the process of developing and evaluating the management plan.

Following the management plan for 2011 in 2012 as well implies a TAC of 21 300 in 2012, which corresponds to a 15% increase in TAC and an effort decrease of 17% in 2012. The implied TACs for Subarea IV and Division VIId would be 17 100 t and 4 200 t.

MSY approach

There are no reference points to enable MSY advice.

PA considerations

There are no reference points to enable precautionary advice.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1.The rules for category 1 prescribe that for 2012, a TAC for whiting in Subarea IV and Division VIId of 21 300t should be proposed.

STECF COMMENTS:
STECF agrees with the ICES assessment of the state of the stock and that based on the EU–Norway interim management plan the TAC (human consumption for the combined area) in 2012 should be set at 21 300 t.

The STECF has performed annual monitoring of effort trends since 2004. Overall effort (kW-days) by demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (around −35% between 2004 and 2010; STECF, 2011). Following the introduction of days-at-sea regulations in 2003, there was a substantial switch from the larger mesh (>100 mm, TR1) gear to the smaller mesh (70–99, TR2) gear. Subsequently, effort by TR1 has been relatively stable, whereas effort in TR2 (70–99 mm trawl) and beam trawl (80–120 mm, BT2) have shown continuous declines (−34% and -39% respectively in between 2004 and 2010).

1.10. 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, 2009 and 2010 are around 14 100 t, 14 000 t and 12 600 t.

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

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
Management Plan	SSB_{MP}	35 000 t	Stage one: Article 2.
	F_{MP}	0.4 0.2	Stage one: Article 2; Stage two: Article 4.
MSY Approach	MSY $B_{trigger}$	35 000 t	Default to value of B_{pa}.
	F_{MSY}	0.22	Median of stochastic MSY analysis assuming Ricker Stock-Recruit relationship (range of 0.2-0.25).
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)	2008	2009	**2010**	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Harvested sustainably
Management plan (F_{MP})	✓	✓	✓	Below target

SSB (Spawning-Stock Biomass)	2009	2010	**2011**	
MSY ($B_{trigger}$)	✗	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	○	✓	✓	Full reproductive capacity
Management plan (SSB_{MP})	✗	✓	✓	Above target

SSB has fluctuated around the precautionary reference points for the last decade and is estimated to be above Bpa in 2010. Fishing mortality has shown a declining trend since 1995 and is estimated to be below Fpa since 2008.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the first stage of the EU management plan (Council Regulation No. 676/2007) that landings in 2012 should be no more than 15 700 t. ICES notes that according to the management plan, transitional arrangements to the second stage of the plan should be established since both North Sea sole and plaice have now been within safe biological limits for two consecutive years.

Additional considerations

Management plan

Both the North Sea sole and plaice stocks have been within safe biological limits in the last two years. According to the management plan (Article 3.2), this signals the end of stage one. Transitional arrangements for

stage two (Article 5) should amend the objectives and the procedures for setting TACs and effort limitations, but these have not been decided on yet. Therefore, ICES advice is limited to the procedures defined for stage one.

Following the first stage of the EU management plan would imply a 10% reduction of F to 0.31, resulting in a TAC of 15 700 t in 2012 and implying a 10% reduction in fishing effort. This is expected to lead to an SSB of 45 600 t in 2013. The TAC increase of 11% is within the 15% bounds of the management plan TAC change constraints.

Following the second stage of the EU management plan would imply decreasing F to 0.2 (Article 4), resulting in a TAC of 11 000 t in 2012. This is expected to lead to an SSB of 50 100 t in 2013.

ICES has evaluated this management plan and considers it can be accepted as precautionary.

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.22 (F_{MSY}, as SSB 2012 > MSY $B_{trigger}$), resulting in landings of less than 11 800 t in 2012. This is expected to lead to an SSB of 49 300 t in 2013.

Following the transition scheme towards the ICES MSY framework implies fishing mortality to be reduced to ((0.34*0.6) + (0.22 *0.4)) = 0.29, which will result in landings of less than 15 100 t in 2012. This is expected to lead to an SSB of 46 200 t in 2013.

PA approach

The precautionary F_{pa} for North Sea sole is 0.4. This would lead to landings of 19 700 t in 2012 (a 40% increase in TAC) and an SSB of 41 700 t in 2013.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1. Taking into account the revised recruitment estimates for North Sea sole, STECF notes that in accordance with the multi-annual management plan, the rules for category 1 prescribe that for 2012, a TAC for sole in Subarea IV of 16 200 t should be proposed. (This figure is calculated on the basis of a 10% reduction of F in 2012 compared to F in 2011, being within the 15% bounds of the management plan TAC change constraints).

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 2011, STECF notes that the landings advised by ICES corresponding to the provisions of the multi-annual management plan are underestimated.

STECF notes that since the advice from ICES on North Sea sole was released in June 2011, new information on recruitment has become available from surveys carried out in September 2011. These surveys indicate the presence of a higher number of 1 year and 2 old year 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 171 969 age-1 fish (assumed in advice: 94 000) and 142 759 age-2 fish (assumed in advice: 138 158), giving rise to D-values of 1.49 and 0.47 for the 1-year old and 2-year old fish respectively (D = (log(new) – log(old))/internal standard error). The D-values for age-1 fish thus fall outside 1 standard error and therefore indicate that the difference is significant for age 1. The D-values for age-2 fish is inside 1 standard error and therefore indicate that the difference is not significant for age 2. If, therefore, the new index values are used in RCT3 analyses with all surveys included to arrive at new estimates, a number of 138 093 results for the 1-year old fish. This implies that according to the provisions of the management plan a TAC for 2012 for sole in Subarea IV of 16,200 t should be proposed.

The STECF has performed annual monitoring of effort trends since 2004. Overall effort (kW-days) by demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (around −35% between 2004 and 2010; STECF, 2011). Effort by beam trawl in both small mesh size (80–120 mm, BT2) and large mesh size (BT1) has shown a continuous decline (−39% and −69%, respectively, between 2004 and 2010).

1.11. Saithe (*Pollachius virens*) in Divisions IIa (EU zone), IIIa, Subareas IV (North Sea) and VI (West of Scotland).

FISHERIES: In the various areas over which this stock is distributed, saithe are primarily taken in a direct trawl fishery in deep water along the Northern Shelf edge and the Norwegian Trench. In the first quarter of the year the fisheries are directed towards spawning aggregations, while smaller fish are targeted during the rest of the year. Gill-nets are also used, and there is still a small purse seine fishery in Norwegian coastal waters. Norway has introduced 120 mm mesh size in trawls, but in EU waters 110 mm may still be used by the EU fleets. Saithe is also taken as part of the mixed roundfish fishery. The stock is exploited by nations including Norway, France, Germany, the UK, Ireland, Spain and Denmark. Between 1967-2006, ICES Working Group reported landings have varied between 88,326t and 343,967t and have been relatively stable over the last 21 years (mostly just over 100,000 t). In 2010 landings were 102,543t. The stock is managed by TAC. Separate TACs are set for Saithe in IIa (EU zone), IIIa, North Sea combined (Sub-area IV) and Sub-area VI.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on an age-based assessment (XSA) calibrated using data from three commercial cpue series and indices from three surveys. There are no discard estimates for the majority of this fishery. Discarding of saithe occurs in the non-targeted fisheries, but the level of discard is considered to be small compared to the total catch of saithe.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
Management Plan	SSB_{MP}	200 000 t	B_{pa}
	F_{MP}	0.3	Or lower depending on SSB in relation to SSB target.
MSY Approach	MSY $B_{trigger}$	200 000 t	Default value B_{pa}
	F_{MSY}	0.3	Stochastic simulation using hockey-stick stock–recruitment.
Precautionary approach	B_{lim}	106 000 t	B_{loss} = 106 000 t (estimated in 1998).
	B_{pa}	200 000 t	Affords a high probability of maintaining SSB above B_{lim}.
	F_{lim}	0.6	F_{loss} the fishing mortality estimated to lead to stock falling below B_{lim} in th term.
	F_{pa}	0.4	Implies that $B_{eq} > B_{pa}$ and $P(SSB_{MT} < B_{pa}) < 10\%$.

STOCK STATUS:

F (Fishing Mortality)	2008	2009	2010	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	✓	○	✓	Harvested sustainably
Management plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-Stock Biomass)	2009	2010	2011	
MSY ($B_{trigger}$)	✓	✓	✗	Below trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	○	Increased risk
Management plan (SSB_{MP})	✓	✓	✗	Below trigger

The status of the stock has deteriorated in the last few years. Recruitment in 2006, 2008, and 2009 was among the lowest on record. SSB was above Bpa during 2001–2008 but has since declined to below Bpa. Fishing mortality has generally increased since 2004 and is currently just below Fpa.

MANAGEMENT AGREEMENT:

In 2008 EU and Norway renewed the existing agreement on *"a long-term plan for the saithe stock in the Skagerrak, the North Sea and west of Scotland, which is consistent with a precautionary approach and designed to provide for sustainable fisheries and high yields. The plan shall consist of the following elements.*

1. *Every effort shall be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 106,000 tonnes (Blim).*

2. *Where the SSB is estimated to be above 200,000 tonnes the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality rate of no more than 0.30 for appropriate age groups.*
3. *Where the SSB is estimated to be below 200,000 tonnes but above 106,000 tonnes, the TAC shall not exceed a level which, on the basis of a scientific evaluation by ICES, will result in a fishing mortality rate equal to 0.30-0.20*(200,000-SSB)/94,000.*
4. *Where the SSB is estimated by the ICES to be below the minimum level of SSB of 106,000 tonnes the TAC shall be set at a level corresponding to a fishing mortality rate of no more than 0.1.*
5. *Where the rules in paragraphs 2 and 3 would lead to a TAC which deviates by more than 15 % from the TAC of the preceding year the Parties shall fix a TAC that is no more than 15 % greater or 15 % less than the TAC of the preceding year.*
6. *Notwithstanding paragraph 5 the Parties may where considered appropriate reduce the TAC by more than 15 % compared to the TAC of the preceding year.*
7. *A review of this arrangement shall take place no later than 31 December 2012.*
8. *This arrangement enters into force on 1 January 2009."*

RECENT MANAGEMENT ADVICE:

ICES concluded that the results of the 2011 summer surveys for saithe warranted updating the advice provided in June. ICES advises on the basis of the EU–Norway management plan that landings in 2012 should be no more than 87 550 t for the whole assessment area.

Additional considerations

Management plan

The EU–Norway agreement management plan does not clearly state whether the SSB in the intermediate year or the SSB at the beginning or end of the TAC year should be used to determine the status of the stock. ICES interprets this as being the SSB at the beginning of the intermediate year (2011). Since SSB at the beginning of 2011 (169 000 t) is above Blim, (106 000 t) but below Bpa (200 000 t), §3 of the harvest control rule applies. This would result in an F of 0.23 and a TAC change of more than 15%. The 15% TAC constraint (§5) is therefore imposed, resulting in a TAC of 87 550 t and an SSB in 2013 of 183 000 t. The advice given in June to enact clause 6 of the Management Plan (i.e. go beyond a 15% TAC reduction) is no longer considered appropriate because with the 2011 summer survey information SSB in 2013 is now estimated to be higher than estimated in June.

The EU–Norway agreement management plan was evaluated by ICES in 2008 to be precautionary in the short term (< 5 years). However, the HCRs in the management plan are not clear enough when the stock falls below the SSB of 200 000 t. The change in fishery distribution and stock productivity (lower growth and recruitment) imply that a re-evaluation of the management plan is needed.

MSY approach

Following the ICES MSY framework implies a fishing mortality of F_{MSY}*SSB_{2012}/MSY $B_{trigger}$ = 0.25. This would result in landings less than 71 000 t in 2012 and an SSB in 2013 of 196 000 t.

PA approach

In order to increase SSB to B_{pa} by 2013, total landings should be less than 67 000 t in 2012.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1.The rules for category 1 prescribe that for 2012, a TAC for saithe in Divisions IIa (EU zone), IIIa, Subareas IV (North Sea) and VI (West of Scotland) of 87 550 t should be proposed.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

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

The fishery in Subarea VI consists largely of a directed deep-water fishery operating on the shelf edge but includes a mixed fishery operating on the shelf. Therefore STECF considers the management advice for saithe in area VI must take into account the management adopted for area VI cod (catches in 2012 should be reduced to the lowest possible level)

2. Eco-region 2: Resources Celtic Sea and West of Scotland

The majority of the advice on stocks in the Celtic Sea and West of Scotland ecoregion was summarised in the STECF Review of advice for 2012 Part 2. This section contains summaries for those stocks for which the most recent advice was published after June 2011.

3. Eco-region 3: Resources of the bay of Biscay and Iberian Waters

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

FISHERY: Horse mackerel is caught in mixed fisheries. Changes in the availability of other species caught in the same fisheries could affect the targeting of 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.

Catches decreased from the early 1960s but have been relatively stable since the early 1990s at 20 000 t – 25 000 t. Total catches in 2010 reached 26 600 t, while the average during the last five years (2006-2010) was around 24 600 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. Last advice was made in the ICES Working Group on Anchovy, Sardine and Horse Mackerel Assessments (WGANSA), held in Vigo (Spain),from 24 to 28 June 2011(ICES CM 2011/ACOM:16). An analytical model (AMISH) was used for assessment, using survey indices (combined PT and SP-IBTS-Q4) as input data.

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

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

STOCK STATUS:

F (Fishing Mortality)				
	2008	2009	**2010**	
MSY (F_{MSY})	?	?	?	Undefined
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined
Qualitative evaluation	→	↗	→	Stable
SSB (Spawning Stock Biomass)				
	2009	2010	**2011**	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	?	Undefined
Qualitative evaluation	→	→	→	Stable

Catches and fishing mortality have been relatively stable since 1999. Biomass has been stable during the assessment period. Recruitment is variable with occasional large peaks, like the latest in 2010.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of precautionary considerations that landings in 2012 should be no more than 30 800 t.

Additional considerations

PA approach

In absence of precautionary reference points the stock status cannot be evaluated in reference to those. The current fishing mortality does not seem to be detrimental to the stock.

The wide confidence intervals indicate high uncertainty in the assessment estimates and particularly in the current trends of the stock. Therefore, based on precautionary considerations, ICES recommends that fishing mortality should not be allowed to increase from the present level. This would imply landings of less than 30 800 t.

Other considerations

The catch-at-age data is considered to be reliable. Retrospective analysis show an underestimation of SSB and recruitment, and an overestimation of F. Confidence intervals for the assessment estimates are very wide, indicating a high uncertainty in F, SSB, and recruitment in the most recent years.

The traditional fishery across fleets has for a long time targeted juvenile age classes. This exploitation pattern combined with at a moderate exploitation rate does not seem to have been detrimental to the dynamics of the stock. However, both artisanal fleets and the Spanish bottom-trawl fleet target adult fish, especially above 6 years old. There is a migratory pattern with old fish mostly present in the waters of Galicia and northern Portugal. Therefore, a high fishing mortality in those areas may deplete the spawning stock faster than if the fish were homogeneously distributed, which would reduce the reproductive capacity of the stock.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

3.2. 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: No comments

3.3. 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: No comments

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

Horse mackerel in Subarea X is almost exclusively *Trachurus picturatus* and the review of advice is given in Section 3.7 of this report.

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

FISHERIES: The fisheries for anchovy are targeted by trawlers and purse-seiners. The Spanish and French fleets fishing for anchovy in Subarea VIII are spatially and temporally well separated. The Spanish fleet operates mainly in Divisions VIIIc and VIIIb in spring, while the French fleets operate in Division VIIIa in summer and autumn and in Division VIIIb in winter and summer. Since 2003 the fleets of both countries have been reduced.

After 5 years of closure, the anchovy fishery was re-opened in 2010. Catches in 2010 were around 10 000 t. In 2011, 9 600 t were already caught until the end of May.

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

REFERENCE POINTS:

	Type	Value	Technical basis
MSY Approach	MSY $B_{escapement}$	33 000 t	Provisional value based on B_{pa}.
	F_{MSY}	Not defined.	
Precautionary approach	B_{lim}	21 000 t	B_{lim}: B_{loss} = 21 000 t (1989 SSB).
	B_{pa}	33 000 t	$B_{pa} = B_{loss} \times \exp(1.645\sigma)$.
	F_{lim}	-	Not defined.
	F_{pa}	1.0–1.2	F_{pa}: = F for 50% spawning potential ratio, i.e. the F at which the SSB/R is half of what it would have been in the absence of fishing.

(unchanged since 2010)

STOCK STATUS:

F (Fishing Mortality)	2008	2009	2010
MSY (F_{MSY})	?	?	? Undefined

SSB (Spawning-Stock Biomass)	2009	2010	2011
MSY ($B_{trigger}$)	✗	✓	✓ Above trigger
Precautionary approach (B_{pa},B_{lim})	○	✓	✓ Full reproductive capacity

The median SSB in 2011 is estimated at 98 450 t which is above B_{lim} with a 100% probability. This is the fourth highest SSB since 1987, indicating a recovery from low SSBs between 2002 and 2009. Recruitment in 2011 is the highest since 2001. The harvest rate in 2010 was about 0.19, well below the average (0.45) of the historical series from 1987 to 2004 (2005–2009 were excluded due to fishery closures).

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the precautionary approach that catches from 1 July 2011 to 30 June 2012 should be no more than 47 000 t.

Additional considerations

Management plan

Following the management plan proposed by the European Commission, the TAC for the fishing season running from 1 July 2011 to 30 June 2012 should be established at 29 700 tonnes (as stated in Annex 1 of the proposal for an SSB in the range 98 001–99 000 t).

MSY approach

If the objective is to maintain the spawning-stock biomass above the provisional MSY Bescapement in 2012, a catch of less than 91 000 t can be taken in the period 1 July 2011 to 30 June 2012. However, such a catch is not considered precautionary as it leads to a 34% probability of SSB being less than B_{lim} by 2012.

PA approach

To reduce the risk to less than 5% of the SSB in 2012 falling below Blim, catches in the period 1 July 2011–30 June 2012 should be less than 47 000 t .

Other considerations

In the past, a TAC was set independently of the state of the stock in the range of 30 000–33 000 t, and the TAC had limited impact on regulating catches in the fishery.

Recent developments in management have been moving towards an in-year monitoring regime, as recommended previously by ICES. The assessment of anchovy is based on the survey results in the spring and

catch data. Hence, the most up-to-date assessment can be obtained in June as done in this assessment. TACs may be set for the whole period July–June.

Harvest control rules (HCR) for anchovy have been tested outside ICES, for the EC proposal of a long-term management plan for this fishery. A draft management plan has been proposed by the EC in cooperation between STECF and the South Western RAC. This plan has not yet been formally adopted by the EU. The plan is based on a constant harvest rate (30%), and sets a TAC as a percentage of the point estimate of the SSB as assessed at the start of the TAC period which runs from 1st July to 30th June, but with an upper bound on the TAC (of 33 000 t), and with a minimum TAC level (of 7000 t) applicable at SSB estimates between 24 000 t and 33 000 t. ICES notes that the criterion for accepting the HCR as precautionary would include rules that imply a low risk of reducing the SSB to a level which may imply further reduction in recruitment. Supplementary measures (area closures, minimum landing size) may be considered in addition to TACs.

This year ICES emphasized the possibility of revising the June advice if the JUVENA 2011 survey indicates a new low incoming recruitment. In any case, if managers decide on a revision of the advice for 2012, this could be done once results from the autumn acoustic survey are available.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1. The rules for category 1 prescribe that for 2012, a TAC for anchovy in Division VIII of 29,700 t should be proposed.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock but notes that the ICES advice is not consistent with the provisions of the proposed management plan. In June 2008 STECF endorsed the approach and findings of the evaluation of the management plan presented in the report of the SGBRE-08-01 Working Group.STECF notes that the proposed management plan has been applied to derive annual TACs for the past 2 years (2009-10 and 2010-11). Therefore STECF advises that the managent plan should be followed in setting a TAC of 29 700 tonnes for the period 1 July 2011 to 30 June 2012.

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

FISHERIES: Fisheries for anchovy take place mainly by purse-seiners in Division IXa South. Contribution from other fleets in the recent fishery is almost negligible. The fleets in the northern part of Division IXa, which target sardine, occasionally target anchovy when abundant, as occurred in 1995. Total catch in 2010 were 3,200 t (99% purse-seiners, 1% other gear typea)

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

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

STOCK STATUS:

F (Fishing Mortality)			
	2008	2009	**2010**
Qualitative evaluation	?	?	? Insufficient information

SSB (Spawning-Stock Biomass)			
	2009	2010	**2011**
Qualitative evaluation	↘	↘	? Conflicting survey trends in South, 10 fold increase in North,

Survey results demonstrate independent dynamics of the anchovy in the northwestern part of Division IXa from the dynamics of the population in Division IXa South. For anchovy in Division IXa South (where the main part of the catch is taken), survey biomass indices show a decline up to 2010. The situation in 2011 is uncertain, as the acoustic abundance and the egg abundance indices show opposing trends. For anchovy in Division IXa North the biomass index shows a more than ten-fold increase, with an acoustic estimate of 27 000 t.

RECENT MANAGEMENT ADVICE: ICES advises based on precautionary considerations that catches in 2012 should be reduced. A steep increase in biomass was observed in spring 2011 in the northern part of Division IXa, but the effect on the population for 2012 cannot be predicted.

Additional considerations

Precautionary considerations

The available information for anchovy in this area shows different trends by region:

- The stock trend for anchovy in the southern area is considered uncertain but has decreased until recently, while the exploitation status is unknown.
- The biomass of anchovy in the northern area has increased considerably in 2011, but the effect on the population for 2012 cannot be predicted. The exploitation status is unknown.

Therefore, the available information is inadequate to conclude on stock trends and exploitation status for anchovy in the whole of Division IXa. This implies that catches in 2012 should be reduced.

Other considerations:

The data for the stock used for the assessment cover Division IXa South (Algarve (Portuguese waters) and Gulf of Cádiz (Spanish waters)), where the main population in this division is found. This was previously considered sufficient to describe the total stock, assuming that the stock distribution of the last decade stays the same. However, such an assumption is not applicable to the stock in 2011 given the distribution of anchovy populations throughout the division as derived from the most recent survey.

Survey results demonstrate that the dynamics of the anchovy in the northwestern part of Division IXa are independent of the dynamics of the population in Division IXa South (for example in the period 1995/96 and in 2011). Therefore, one management advice for the anchovy in the whole of Division IXa may be inadequate, since both the fishery and the exploited populations are spatially separated and have independent dynamics. This fact reinforces the need to assess the trends of the biomass indexes and fisheries for the population in Division IXa South separately from the remaining subdivisions.

It is important that surveys are continued, both acoustic surveys and the recently initiated DEPM survey. It has not been possible to provide a reliable analytic assessment for this stock as a basis for management. A better alternative would be to consider management rules based directly on survey observations.

New information on stock abundance in Division IXa South may be obtained from the 2011 Spanish DEPM survey, to be conducted in late July 2011.

As this stock experiences high natural mortality and is highly dependent upon recruitment, an in-season management or alternative management measures could be considered. Such measures should, however, take into account the data limitations on that stock and the need for a reliable index of recruitment strength.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

3.7. Blue jack mackerel (*Trachurus picturatus*) in Subdivision Xa2 (Azores)

FISHERY: The blue jack mackerel (*Trachurus picturatus*) is the only *Trachurus* species around the Azores Islands. It has traditionally been one of the favourite species for human consumption in the Azores and is targeted by an artisanal fleet using seine nets close to the coast of the Azorean islands. The blue jack mackerel is also the main species used as live bait by the local bait boat fleet, which targets tuna species. The demersal fleet also catches blue jack mackerel, usually large specimens, in the multispecies fishery for deep-water species, where several types of hooks and lines gears are used. Those gears vary from handlines, using one to several hundred hooks, to the bottom longlines.

ICES has reported that landings of *T. picturatus* have been around 3000 t between 1986 and 1990. From 1991 onwards, they followed a general decreasing trend to minimum values around 650 t in 1999-2000. A new increasing trend was registered in the last decade, with an average landing value for the last five years (2006-2010) of 1100 t. However, landings may not represent the actual catches because discards or fish used for bait are not accounted for. A TAC in the subarea X for 2010 was set to 3,072 t, which is taken exclusively by Portugal.

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

REFERENCE POINTS: No reference points have been defined.

STOCK STATUS: No assessment can be presented for this species in the waters of the Azores.

F (Fishing Mortality)	2008–2010
Qualitative evaluation	Insufficient information

SSB (Spawning-Stock Biomass)	2008–2010
Qualitative evaluation	Increase

The available information shows an increasing trend in abundance indices over the last ten years. However, landings per unit effort should be interpreted with caution, as discards or fish used for bait are not accounted for.

RECENT MANAGEMENT ADVICE: This is the first time that ICES analyses data for *T. picturatus* in the waters of the Azores. The lpue index shows an increasing trend during the last decade. However, the exploitation status is unknown as there is insufficient information to assess it. Therefore on the basis of precautionary considerations, ICES advices that catch should not be allowed to increase in 2012.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

3.8. Sardine (*Sardina pilchardus*) in VIIIc and IXa

FISHERIES: Most sardine landings are taken by purse-seiners. In Spain, boats target anchovy, mackerel, sardine and horse-mackerel but in summer part of the fleet switches to tuna fishing. Sardine catches are highest in summer and autumn and concentrate in southern Galician and western Cantabrian waters. In Portugal, sardine is the main target species and chub mackerel, horse mackerel and anchovy are also landed as by-catch. Discards and slippage are uncertain, with slipping estimates only available for the Portuguese fleet but with a limited coverage in time and extent. Total catch in 2010 was 89 600 t (99% from purse seine and 1% from other gear-types)

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

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

STOCK STATUS:

F (Fishing Mortality)	2008	2009	**2010**
MSY (F_{MSY})	?	?	? Undefined
Precautionary approach (F_{pa},F_{lim})	?	?	? Undefined
Qualitative evaluation	↗	↗	✗ Above long-term average

SSB (Spawning-Stock Biomass)	2009	2010	**2011**
MSY ($B_{trigger}$)	?	?	? Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	? Undefined
Qualitative evaluation	↘	↘	✗ Far below long-term average

SSB has declined since 2006 due to the lack of strong recruitments in recent years. SSB in 2011 was 67% below the long-term average. Fishing mortality in 2010 was at 28% higher than in 2009 and double the historical average. The 2010 year class is estimated as the lowest of the historical time-series

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of precautionary considerations that landings in 2012 should be no more than 36,000 t.

Additional considerations

MSY approach

The MSY reference points have not been established so far.

PA considerations

Fishing mortality has increased and SSB has decreased in the most recent years despite the advice of not increasing F since 2002. F should be brought back to where it was before the start of this increase, i.e. the 2002 - 2007 average, which is 0.21. This corresponds to landings of less than 36 000 t in 2012.

Other considerations

Candidate reference points have been outlined this year. The stock–recruitment relationship for this stock is poorly defined and thus very sensitive to which data points are used to fit an S–R model. As a consequence, F_{MSY} calculated by combining an S–R model with the YPR curve is very unstable. Because of the uncertainties surrounding the form and parameters of the S–R relationship, reference points based on the spawner-per-recruit analysis (%SPR) were considered more appropriate as proxies of F_{MSY} as indicated by Clark (1991, 1993).

The main uncertainties in the assessment relate to the contradictory signals about the stock trends provided by the DEPM and acoustic surveys in recent years. Uncertainty regarding the extent of sardine movement across the northern stock boundary, and the estimation of survey catchability and fishery selection pattern for the older age groups still applies.

There are no management objectives for these fisheries and there is no international TAC. Almost all catches are taken by Spanish and Portuguese purse-seiners in a directed human consumption fishery. The fisheries is managed by Portugal and Spain through minimum landing size, maximum daily catch, days fishing limitations, and closed areas. A catch limit of 55 000 t was set for the Portuguese fishery for 2010 by the Portuguese authorities.

A long-term plan should take into account the spatial distribution of the stock and poor relationship between stock biomass and future recruitment. A long-term management plan would be useful if stability of catches is desired. Such a strategy should be sufficiently flexible with respect to catch limitation to protect the stock under periods of poor recruitment, but also avoid unnecessary fluctuations in the catches when the stock biomass is higher.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

4. Widely distributed and migratory stocks

4.1. 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 above one million tonnes for most years after 2000 (except 2009 and 2010) with 2003 and 2004 having recorded the highest catches (>2,300,000 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 2010 with the exception of 2004 when 85,000 t were recorded and in 2007 when landings were less than 18 000 t. 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 1981–2010 and three acoustic surveys (Norwegian spawning ground survey 1993–2003, international ecosystem survey in the Nordic Seas 2000–2011, and the international blue whiting spawning ground survey 2003–2011). The international blue whiting spawning ground survey is the only survey that covers almost the entire distribution area of the spawning stock.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
Management plan	SSB_{MP}	2.25 million t	B_{pa}
	F_{MP}	0.18	Management strategy evaluation conducted in 2008 (Anon, 2008; ICES, 2008).
MSY Approach	MSY $B_{trigger}$	2.25 million t	B_{pa}
	F_{MSY}	0.18	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).

(unchanged since: 2010)

MANAGEMENT AGREEMENT: A management plan was agreed by Norway, the EU, the Faroe Islands, and Iceland, and subsequently endorsed by NEAFC in 2008. The plan uses i) a target fishing mortality (F = 0.18) if SSB is above B_{pa}, ii) a linear reduction to F = 0.05 if SSB is between B_{pa} and B_{lim}, and iii) F = 0.05 if SSB is below B_{lim}. ICES has evaluated the plan in 2008 and concluded that it is in accordance with the precautionary approach.

STOCK STATUS:

F (Fishing Mortality)	2008	2009	**2010**
MSY (F_{MSY})	✗	✗	✓ At target
Precautionary approach (F_{pa}, F_{lim})	○	✓	✓ Harvested sustainably
Management plan (F_{MP})	✗	✗	✓ At target

SSB (Spawning Stock Biomass)	2009	2010	**2011**
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓ Full reproductive capacity
Management plan (SSB_{MP})	✓	✓	✓ Above trigger

All year classes from 2005 onward are estimated to be poor. SSB declined from a peak of 7.0 million tonnes in 2003 to 2.4 million tonnes (just above B_{pa}) at the beginning of 2011. Fishing mortality declined from a high of F = 0.58 in 2004 to a low of F = 0.18 (= F_{MSY} = F_{MP}) in 2010.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the management plan agreed by Norway, the EU, the Faroe Islands, and Iceland and endorsed by NEAFC, that catches in 2012 should be no more than 391 000 tonnes. Because of poor recruitment, SBB is forecasted to continue to decline in the future and will likely fall below B_{pa} in 2013.

Additional considerations

MSY approach

Following the ICES MSY framework implies fishing mortality to be at F_{MSY} = 0.18, corresponding to catches of 391 000 tonnes in 2012. This is expected to lead to a decline in SSB in 2013 to 2.18 million tonnes, which is below MSY $B_{trigger}$.

PA approach

To maintain SSB above B_{pa} in 2013, in accordance with the ICES precautionary approach (PA), catches in 2012 would have to be lower than 315 000 tonnes.

Other considerations

All available information suggests that recruitment has been very low since 2006. The stock currently consists mainly of older fish, so rebuilding the stock in the short term will not occur and the decline is expected to continue, unless catches are limited to about 100 000 tonnes. There are indications in both surveys and catches that year classes since 2009 might be slightly larger than the recent low recruitment.

The management plan reacts directly to fluctuation in the estimate of the stock biomass and does not include constraints on annual TAC changes. This reaction of the management plan is amplified in terms of yield when the SSB estimate from the assessment fluctuates from below 1.5 million tonnes to above 2.25 million tonnes. Although a provision for a TAC constraint has been made in the management plan, it 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. At present the primary blue whiting fisheries occur in areas that possibly have a high degree of mixing of these potential stocks.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1. The rules for category 1 prescribe that for 2012 a TAC for blue whiting in the Northeast Atlantic of 391 000 tonnes should be proposed.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock but notes that while the ICES advice is consistent with the provisions of the agreed management plan, STECF is concerned that SSB is predicted to continue to decline below B_{pa} (= $B_{trigger}$) in 2013 and beyond. STECF advises that if managers wish to maintain SSB above B_{pa} (= $B_{trigger}$) in 2013, catches in 2012 should be less than 315,000 t.

Special request on Blue whiting

The STECF response to the special request on blue whiting received in November 2011 can be found in Section 8.5 of the report of the 38th meeting of the STECF (https://stecf.jrc.ec.europa.eu/reports/plenary).

4.1.1. 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 4.1.

4.1.2. 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 4.1.

4.1.3. 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 4.1.

4.1.4. 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 4.1.

4.1.5. 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 4.1.

4.2. 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 123 000 t in 2007 to 204 000 t in 2010.

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 at size is constant from year to year. If this assumption is incorrect then the assessment results may be biased.

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	

(unchanged since: 2010)

[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 has been used since 2008 to set the EU TAC. 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. However, the management plan has not been approved by all parties and has not been formally adopted. Therefore, not used as basis for advice. It is understood that the plan will be re-evaluated. The realignment of the stock and management areas, as outlined in the plan, has been included in the TAC regulations for 2010.

STOCK STATUS:

F (Fishing Mortality)	2008	2009	**2010**
MSY (F_{MSY})	✓	✓	✓ At target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined

SSB (Spawning-stock Biomass)	2009	2010	**2011**
MSY ($B_{trigger}$)	?	?	? Undefined
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

SSB in 2011 is estimated to be 1.85 million tonnes, and varied between 1.28 and 2.70 million tonnes during 1995–2010. Fishing mortality has been increasing since 2006 and is now at F_{MSY} (F_{2010} = 0.13). Recruitment has been low from 2004 onwards.

RECENT MANAGEMENT ADVICE: ICES advise on the basis of the MSY approach that catches in 2012 should be no more than 211 000 t.

Additional considerations

MSY approach

Following the ICES MSY framework implies a fishing mortality of 0.13 in 2012, corresponding to catches in 2012 of 211 000 tonnes. This is expected to lead to a decline in SSB in 2013 to 1.44 million tonnes. F_{2010} is at 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 plans

Following the proposed plan from the Pelagic RAC implies a catch in 2012 of 183 000 tonnes. This is expected to lead to a decline in SSB in 2013 to 1.47 million tonnes. The calculation has been revised using the finalised egg survey estimates for 2007 and 2010 shown in Table 9.4.3.7.

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. However, the management plan has not been approved by all parties and has not been formally adopted. Therefore, not used as basis for advice.

Other 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 advise 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.

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. Since 2003, the fishery has been more directed toward younger fish (ages 1–3) than fish of ages 4 to 8. In 2010, fishing mortality on younger ages reached a record-high level. This indicates that the fishery now relies more on recent year classes which are generally poor.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1.
The rules for category 1 prescribe that for 2012 a TAC for horse mackerel in the Northeast Atlantic of 183,000 t should be proposed.

STECF COMMENTS:

STECF agrees with the ICES assessment but considers that advice for 2012 should be based on the provisions of the management plan.

STECF considers that the management plan provides a better estimate of MSY for this stock than the MSY proxi suggested by ICES. The management plan F takes acount of the uncertainty in estimating the state of the stock, which was not included in the estimate of the MSY proxi. The management strategy evaluations carried out included evaluations of higher Fs including values close to the proposed MSY proxi and concluded that they carried risks that exceeded precautionary levels.

STECF therefore advises that according to the provisions of the management plan, the TAC for western horse mackerel in 2012 should be set at 183,000 t.

4.3. Mackerel (*Scomber scombrus*) in the Northeast 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.

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, west of Scotland and in the Norwegian Sea. A separate assessment for this stock component has not been conducted in recent years 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, indicates an increase from 2.47 million t in 2004 to 3.43 million t in 2010.

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 ten years have been assumed to be about 10,000 t. Estimates of the SSB of the North Sea component derived from the North Sea egg survey indicate a decrease from 0.22 million t in 2005 to 0.17 million t in 2011.

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 contain a high proportion 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 about 40,000 tonnes in the early 2000s before reaching a peak at 108,000 tonnes in 2009 and decreasing to 63,000 tonnes in 2010. Estimates of the spawning-stock biomass derived from egg surveys indicate an increase from 0.28 million t in 2004 to 0.85 million t in 2011.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICES. This assessment is based on catch numbers-at-age for the period 1972–2010 and triennial egg survey estimates of SSB from 1992 to 2010. For the 2011 assessment the egg survey SSB estimates in 2007 and 2010 were revised upwards by 12% and 4% respectively following a revision to the previous year's survey calculation (2007 and 2010) due to the expanding spawning area of the surveys and finalisation of fecundity analysis. 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. The discards included in the catch in the assessment are an underestimate. 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***
Management plan	$SSB_{trigger}$	2.2 million t	Medium-term simulations conducted in 2008.
	F_{target}	0.20–0.22	Medium-term simulations conducted in 2008.
MSY Approach	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).
	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	B_{loss} of the 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%).

(unchanged since: 2010)

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. However, since 2009, the management plan has not been followed and there was no international agreement on TACs for 2010 and 2011.

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)	2008	2009	2010	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa}, F_{lim})	○	○	○	Increased risk
Management Plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-stock Biomass)	2009	2010	2011	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓	Full reproductive capacity
Management Plan (SSB_{MP})	✓	✓	✓	Above trigger

Fishing mortality in 2010 is estimated to be 0.26, above F_{MSY} and F_{pa}. Fishing mortality was high during the 2000s, then declined strongly and has been at a relatively stable level since 2006. SSB has increased considerably since 2002 and currently remains high, above B_{pa} and MSY $B_{trigger}$. The 2005 and 2006 year classes are the highest on record. The 2007 and 2008 year classes are about average. There is insufficient information to confirm the sizes of the 2008 and 2009 year classes.

RECENT MANAGEMENT ADVICE: ICES advise on the basis of the Norway, Faroe Islands and EU management plan that catches in 2012 should be between 586 000 and 639 000 tonnes.

ICES advise 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.

Additional considerations

MSY approach

Following the ICES MSY framework implies fishing mortality to be reduced to 0.22 (F_{MSY}), resulting in a total catch of 639 000 tonnes in 2012. This would lead to an estimated SSB of 2.70 million tonnes in 2013.

Following the transition scheme towards the ICES MSY Harvest Control Rule implies that fishing mortality should be reduced to 0.23 (F_{pa}), resulting in a total catch of 665 000 tonnes in 2012. This is expected to lead to an SSB of 2.67 million tonnes in 2013.

PA approach

The fishing mortality in 2012 should be no more than F_{pa} (F=0.23) corresponding to total catches of 665 000 tonnes in 2012. This is expected to maintain SSB above B_{pa} in 2013.

Management plans

Following the management plan (agreed by EU, Norway and Faroese in 2008) implies a TAC between 586 000 and 639 000 tonnes in 2012 which would lead to a catch reduction of between 31% and 37% compared to the estimated catches in 2011.

Other considerations

Distribution and timing of migrations and spawning in recent years have resulted in the development of new fisheries and have also impacted the operations of well established fisheries. Information on variability in mackerel behaviour and distribution will be further examined at an ICES Workshop that will be convened in 2012.

The TAC should apply to all areas where mackerel are caught. Catches since 2008 have been considerably in excess of the ICES advice which was based on the management plan. This situation is expected to continue in 2011. The absence of comprehensive international agreements on the exploitation of the stock (between all nations involved in the fishery) remains a critical concern and prevents control of the exploitation rate. Because the management plan has not been followed the expected 2011 catch was estimated (see table below). The estimation procedure took account of the declared quotas, inter-annual transfer of quotas not fished in 2010, estimated quantities to not be fished in 2011, discards, estimated overshoot in catches, and quota payback. The total estimated catch in 2011 (927 245 tonnes) used for projections, corresponds to a fishing mortality of 0.31, which is above that stipulated in the management plan. If this level of catch is maintained in 2012 and 2013, the SSB in 2013 could decline to B_{pa}. ICES notes that inter-annual transfers occur and that their consistency with the PA has not been evaluated.

ICES estimation of the 2011 catch	Tonnes	Reference
EU quota and Swedish quota	403 594	European Council Regulation 2011/683
Interannual quota transfer 2010→2011 (EU)	595	European Council Regulation 2011/683
UK–Ireland payback	-18 222	European Council Regulation 2012/147
Spanish payback	-4500	European Council Regulation 2011/165
Norwegian quota	183 069	EU–Norway agreement 10 Jan. 2010
Interannual quota transfer 2010→2011 (NO)	14 500	EU–Norway agreement 10 Jan. 2010
Russian quota	49 243	NEAFC
Discards	6863	Previous year's estimate
Icelandic quota	146 818	Ministry of Fish. and Agri.: Press release 20 Dec. 2010
Interannual quota transfer 2010→2011 (IC)	8007	Icelandic regulation 233/2011
Expected undershoot of 2011Icelandic quota	-20 000	WGWIDE estimate
Faroese quota	150 000	Ministry of Foreign Affairs : Press release 14 Mar 2011
Interannual quota transfer 2010→2011 (FI)	3000	WGWIDE estimate
Expected over-catch	4278	Based on 2010 over-catch percentage

Total expected catch (incl. discard)	927 245

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1.The rules for category 1 prescribe that for 2012 a TAC for mackerel in the Northeast Atlantic of between 586,000 and 639,000 tonnes should be proposed.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and that on the basis of the Norway, Faroe Islands and EU management plan that catches in 2012 should be between 586,000 and 639,000 tonnes.

STECF notes that Iceland and the Faroe Islands set autonomous quotas for 2009, 2010 and 2011 resulting in catches far greater than those advised by ICES. If catches in 2012 exceed those prescribed by the management plan to the extent recently experienced, the SSB in 2013 is predicted to decline by about 9% compared to 2011.

4.4. Striped Red Mullet (*Mullus surmuletus*) in the Northeast Atlantic

FISHERIES AND STOCK: Striped red mullet (*Mullus surmuletus*) is a benthic species. Young fish are distributed in coastal areas, while adults have a more offshore distribution. Recent stock identification studies in European waters show that striped red mullet can be geographically divided into two or three units. Fishery information suggests that the Bay of Biscay could be combined with the Celtic Sea in one unit while the western Channel, eastern English Channel, and the North Sea could form another unit. However, based on otolith shapes, three different units were identified: (i) the Bay of Biscay (north and south); (ii) a mixing zone composed of the Celtic Sea and the western Channel; and (iii) a northern zone comprising the eastern English Channel and the North Sea.

Most of the catch is taken by the French fleet. Other fleets from the Netherlands and the United Kingdom target the English Channel (Divisions VIId, e) and the southern North Sea (Subarea IVb, c). The north of the Bay of Biscay (Divisions VIIIa, b) is exploited by France and Spain. The southern part of the Cantabrian Sea (Division VIIIc) is only exploited by Spain. Other countries with small catches are Germany, Denmark, and Ireland.

SOURCE OF MANAGEMENT ADVICE: The main body for management advice is ICES.

REFERENCE POINTS:

No reference points have been defined for this stock.

MANAGEMENT AGREEMENT:

There are no current management agreements. There is no TAC for this species.

STOCK STATUS:

F (Fishing Mortality)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

The available information is inadequate to evaluate stock trends. The available information on stock identity of this species suggests there is more than one stock in the ICES area.

RECENT MANAGEMENT ADVICE: This is the first time that ICES has provided advice for striped red mullet. Currently there is no TAC for this species and preliminary data on stock identity suggests there is more than one stock in the ICES area. There is insufficient information to evaluate the status of the striped red mullet in the Northeast Atlantic. Therefore, based on precautionary considerations, ICES advises that catches should not be allowed to increase in 2012.

Additional considerations

Precautionary considerations

This is the first time that ICES has provided advice for striped red mullet. There is insufficient information to evaluate the status of striped red mullet in the Northeast Atlantic. Therefore, based on precautionary considerations, ICES advises that catches should not be allowed to increase in 2012.

Other considerations:

Currently, only France has a targeted fishery for striped red mullet (> 90% of landings). This fishery is conducted by bottom trawlers using a mesh size of 70–99 mm in the eastern English Channel and in the south of the North Sea. The eastern English Channel and south of North Sea areas are fished by trawlers of various types, and the western English Channel is fished using various gears including gillnets. Striped red mullet is a bycatch in all of these fisheries.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES advice for 2012.

4.5. Red Gurnard (*Aspitrigla cuculus*) in the Northeast Atlantic

FISHERIES AND STOCK: Red gurnard (*Aspitrigla cuculus*) is a benthic species widely distributed in the northeast Atlantic from South Norway and north of the British Isles to Mauritania, on grounds between 20 and 250 m. This benthic species is abundant in the Channel and on the shelf west of Brittany. Data are not available to determine stock identity for red gurnard.

Red gurnard are mainly caught by demersal trawlers in mixed fisheries, mostly in Divisions VIId–k, VIIIa,b, and also in Division IVc. There are no technical measures specifically dedicated to red gurnard or other gurnard species.

SOURCE OF MANAGEMENT ADVICE: The main body for management advice is ICES.

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

MANAGEMENT AGREEMENT:

There are no current management agreements. There is no TAC for this species.

STOCK STATUS:

F (Fishing Mortality)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

The available information is insufficient to evaluate stock trends and exploitation status. The stock definition is not clear, and assessments for possible stocks in the Northeast Atlantic are not possible. Official landings (1985–2008, 1999 not reliable) in the main fishing area (Divisions VIId–k) show an increasing trend from 1985 to 2002 and a slight decrease since then.

RECENT MANAGEMENT ADVICE:

This is the first time that ICES analysed data for red gurnard. Currently there is no TAC for this species in the ICES area and it is not clear whether there should be one or several management units. There is insufficient information to evaluate the status of red gurnard. Therefore, based on precautionary considerations, ICES advises that catches should not be allowed to increase in 2012.

Additional considerations

Precautionary considerations

This is the first time that ICES analysed data for red gurnard. There is insufficient information to evaluate the status of red gurnard. Therefore, based on precautionary considerations, ICES advises that catches should not be allowed to increase in 2012.

Other considerations:

The exploitation of red gurnard is submitted to the general regulation in the areas where they are caught. There is no minimum landing size.

Landing statistics of gurnards are not always disaggregated to species.

Survey information from Division VIIe is needed.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: *STECF agrees with the ICES advice for 2012.*

4.6. Grey Gurnard (*Eutrigla gurnardus*) in the Northeast Atlantic

FISHERIES AND STOCK: Grey gurnard occurs in the eastern Atlantic from Iceland, Norway, southern Baltic, and North Sea to southern Morocco, and Madeira Islands. It is also found in the Mediterranean and Black Seas. In the North Sea and in Skagerrak/Kattegat, grey gurnard is an abundant demersal species. However the species is less abundant in the English Channel, the Celtic Sea, and in the Bay of Biscay.

Currently grey gurnard is a bycatch species in demersal fisheries. Catches are largely discarded.

SOURCE OF MANAGEMENT ADVICE: The main body for management advice is ICES.

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

MANAGEMENT AGREEMENT: There are no current management agreements. There is no TAC for this species.

STOCK STATUS:

F (Fishing Mortality)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

The available information is inadequate to evaluate overall biomass or abundance trends. IBTS-Q1 survey abundance indices from Subarea IV and Division IIIa show an increase in abundance since the late 1980s. However, this species is widely distributed beyond these two areas and there is no information on the stock structure.

RECENT MANAGEMENT ADVICE: This is the first time that ICES has provided advice for grey gurnard. Currently there is no TAC for this species and the stock structure of the species is unknown. There is insufficient information to evaluate the status of the grey gurnard in the Northeast Atlantic. Therefore, based on precautionary considerations, ICES advises that catches should not be allowed to increase in 2012.

Additional considerations

Precautionary considerations

This is the first time that ICES has provided advice for grey gurnard. There is no information on the stock identity of this species. Based on precautionary considerations, ICES advises that catches should not be allowed to increase in 2012.

Other considerations:

For management purposes, information is required on landings, stock structure, appropriate management units, and basic biological parameters. Data on discards, considered the majority of the catch, are available and need to be analysed.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES advice for 2012.

4.7. Seabass (*Dicentrarchus labrax*) in the Northeast Atlantic

FISHERIES: Commercial bass fisheries developed in the late 1970s and 1980s, due to the high price commanded by the species. Although seabass may be the main species for some commercial fisheries, most seabass are caught in a mixed species (4–6 different species) fisheries. Commercial seabass fisheries comprise inshore and offshore components. Inshore, small boats operate daily trips, using a variety of fishing methods (e.g. trawl, Danish seine, handline, gillnets, longline, nets, rod, and line) with relatively little activity in winter. Offshore, pre-spawning and spawning bass are targeted by French mid-water pair-trawlers and by British vessels, between November and April. Landings by Dutch vessels have increased notably in the last 10 years.

Seabass is the most important marine recreational angling species in the UK, Ireland, and France. In France, catches of bass from the recreational fishery are of the same order as those from the commercial fishery (around 5000 t estimated in 2006–2008). The official minimum landing size is 36 cm (EC regulation 850/98), but locally it is higher. Discarding is likely low.

SOURCE OF MANAGEMENT ADVICE: The main body for management advice is ICES.

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

MANAGEMENT AGREEMENT: There are no current management agreements. There is no TAC for this species.

STOCK STATUS:

F (Fishing Mortality)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2008–2010	
Qualitative evaluation	?	Insufficient information

The stock definition is not clear, and attempts to run assessments for possible stocks in the Atlantic are considered preliminary. Estimates of commercial landings, including unallocated fish, increased until 2006, mainly in the southern North Sea, the western English Channel, and the Bay of Biscay. From 2007 onwards, commercial landings have declined but do not include estimates of unallocated catches.

RECENT MANAGEMENT ADVICE:

Currently there is no TAC for this species and it is not clear whether there should be one or several management units. There is insufficient information to evaluate the status of the European seabass in the Northeast Atlantic area. Therefore, based on precautionary considerations, ICES advises that catches should not be allowed to increase in 2012.

ICES reiterates its previous recommendation that *implementation of 'input' controls (preferably through technical measures aimed at protecting juvenile fish, in conjunction with entry limitations into the offshore fishery in particular) should be promoted* (ICES, 2004).

Additional considerations

Precautionary considerations

This is the first time that ICES has provided advice for seabass since 2004 and currently it is not clear whether there should be one or several management units. There is insufficient information to evaluate the status of the species. Therefore, based on precautionary considerations, ICES advises that overall catches should not be allowed to increase in 2012.

Other considerations:

The stock structure of this species is currently unknown. Although there are many regional fishing regulations in place for seabass, the appropriateness of these measures with regard to stock impacts cannot be evaluated until the issue of stock structure is resolved.

Fishing effort is reported by some countries (France, UK) to have increased in the last decade. In France, a decrease in lpue has been observed for most of the gears in Divisions VIIIa,b and VIIe,h, but this decrease is specially experienced by coastal *metiers* (particularly longliners and handliners). It is not clear if this is due to a decrease in abundance or to a change in the spatial distribution / availability.

Bass is important to inshore artisanal fishers, offshore fisheries, and recreational anglers, and has a high socio-economic value. Considerations of the management and regulation of seabass fisheries must take this into account.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES advice for 2012.

4.8. Boarfish (*Capros aper*) in the Northeast Atlantic

FISHERIES: Fisheries for boarfish are conducted with pelagic trawls, and the catches are used for reduction to fish meal and oil. Most landings (~88%) come from Division VIIj. The recent expansion of the fishery was enabled by developments in the pumping technology for boarfish catches. These changes made it easier to pump boarfish ashore. The number of vessels in the fishery has been increasing, although the recent introduction of a TAC is expected to limit further effort expansion.

SOURCE OF MANAGEMENT ADVICE: The main body for management advice is ICES.

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

MANAGEMENT AGREEMENT: There are no current management agreements.

STOCK STATUS:

F (Fishing Mortality)	
	2008–2010
Qualitative evaluation	 No overfishing

SSB (Spawning-stock Biomass)	
	2008–2010
Qualitative evaluation	 Insufficient information

No analytical assessment is currently possible. Preliminary analyses suggest that fishing mortality is less than natural mortality, and that the stock is relatively large and widely distributed. Survey data suggests that recruitment has increased since 2005.

RECENT MANAGEMENT ADVICE: This is the first time that ICES has provided advice for boarfish. Based on precautionary considerations, ICES advises that catches in 2012 should not be allowed to increase.

Additional considerations

Precautionary considerations

Based on precautionary considerations, ICES advises that catches in 2012 should not be allowed to increase.

Other considerations:

Management considerations

During the period 2008–2010 boarfish do not appear to have been overfished. However, landings have increased rapidly during these years, reaching almost 140 000 tonnes in 2010. As information on the exploitation of boarfish is preliminary, it would be cautious for catches not to increase above the average of landings (82 000 t) recorded during that period.

In 2010 an interim management plan, proposed by Ireland, included a number of measures to mitigate potential bycatch of other TAC species in the boarfish fishery. A closed season from 15 March to 31 August was proposed, as anecdotal evidence suggested that mackerel and boarfish are caught in mixed aggregations during this period. A closed season was proposed in Division VIIg from 1 September to 31 October to prevent catches of Celtic Sea herring, known to form feeding aggregations in this region at these times. If catches of a species other than boarfish but covered by TAC, totaled more than 5% of the total catch, by day and by ICES statistical rectangle, then fishing must cease in that rectangle.

The precautionary 2011 TAC of 33 000 t for boarfish covered ICES Subareas VI, VII, and VIII. Bottom trawl survey data suggests a continuity of distribution spanning ICES Subareas V, VI, VII, and VIII. Isolated small occurrences appear in the North Sea (ICES Subarea IV) in some years. An examination of Portuguese groundfish survey data indicated that boarfish are mostly distributed in the southwest of Portugal, with only rare occurrences in the northern parts. This suggests a potential discontinuity of the distribution of the species between ICES Division VIIIc and the southern part of Division IXa. Based on these results, a single stock is considered to exist in ICES Subareas IV, V, VI, VII, and VIII, a broader area than that covered by the current EU TAC.

Regulations and their effects

In 2010, the European Commission notified member states that the mesh sizes of less than 100 mm were illegal and that fisheries for boarfish should not be prosecuted with mesh sizes of less than 100 mm. However, in 2011, the European Parliament voted to change Regulation 850/1998 to allow fishing for boarfish using mesh sizes ranging from 32 to 54 mm.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and notes that there is at present no objective means of determining an appropriate catch level. ICES has advised that catches should not be allowed to increase and in its management considerations has suggested that it would be cautious for catches not to increase above the average of landings (82,000 t) recorded during the period 2008-2010. STECF notes that because the TAC for 2011 (33,000 t) is below this proposed threshold a further reduction in the TAC in 2012 would seem to be unnecessary for a newly developed fishery showing no signs of impaired recruitment.

5. Elasmobranchs in the North East Atlantic

5.1. Spurdog (*Squalus acanthias*) in the North East Atlantic

FISHERIES: Spurdog is a relatively small (<120 cm TL), widely distributed species occurring throughout the ICES area, and also widespread in the NW Atlantic, SW Atlantic and parts of the Pacific (although there is evidence that populations in the NE Pacific are a separate species). 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, gillnet 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). Spurdog is 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 North East Atlantic stock, which is considered to be separate from the North West Atlantic stock.

Currently, spurdog is caught primarily by trawlers, gillnetters and (seasonally) by inshore longliners. The larger autoliners that previously targeted spurdog no longer longline for spurdog. Most spurdog are now taken as by-catch in otter trawls, seines and gillnets targeting whitefish, although some inshore fisheries may have had small-scale, local and seasonal directed fisheries for this species prior to the zero TAC.

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 from the Irish Sea. About 45% of the Scottish landings originate from demersal trawl fisheries and less than 30% of the Irish landings come 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 squaloids, spotted dogfish, smooth-hounds and tope). The landings of spurdog, although not complete, show a marked decline since the mid-1980s. 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 at about 3000t, the lowest observed on record.

A TAC was introduced for the EU waters of Subarea IV and Division IIa in 1999. This TAC was reduced from 8870t in 2001 to 1051t in 2006. A by-catch quota of 841t was set in 2007 for IIa (EC) and IV, and at this time spurdog should not have comprised more than 5 % by live weight of the catch retained on board. A TAC (of 2828 t) for I, IIIa, V, VI, VII, VIII, XII and XIV was set for the first time in 2007 , 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. The TAC for 2010 was set at zero, but with an allowance for bycatches of up to 10% of the 2009 quotas to be landed, as long as the maximum landing length of 100 cm (total length) was respected, and that bycatch comprised less than 10% of the total weight of marine organisms on board the fishing vessel. The bycatch allowance was removed in 2011, and this has resulted in increased discarding of spurdog, of which an unknown proportion is dead.

Norway has a 70-cm minimum landing size, but this measure would not faciltate reducing the exploitation of mature females.In 2007 Norway also 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 gears in inshore, territorial waters (within the 4 nm). Spurdog caught as by-catch in other fisheries have to be landed and the Norwegian Fiskeridirektoratet is allowed to stop the fishery when catches reach the last year's level. In 2004, Germany proposed to the EU that spurdog should 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 recently added spurdog to their national Red List and since April 2011 landings of spurdog are not allowed for either the commercial or recreational fisheries.

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.	
	MSY exploitation ratio	0.029	Catch as a proportion of the total biomass, assuming average selection over the last three years, reflecting a non-target selection pattern.
Precautionary Approach	B_{lim}	Not defined.	
	B_{pa}	Not defined.	
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

STOCK STATUS:

F (Fishing Mortality)			
	2008 2009	**2010**	
MSY Exploitation Ratio	✓ ✓	✓	Below target

Precautionary approach (F_{pa},F_{lim})	?	?	? Undefined
SSB (Spawning-stock Biomass)			
	2009	2010	**2011**
MSY ($B_{trigger}$)	?	?	? Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	? Undefined
Qualitative evaluation	→	→	✗ Below poss. reference points

The stock has suffered a historical high fishing mortality for more than four decades. The spawning biomass and recruitment have declined substantially over the past decades and are currently the lowest observed while exploitation is estimated to be below the MSY exploitation ratio.

RECENT MANAGEMENT ADVICE:

ICES advise on the basis of the precautionary approach that there should be no targeted fishery and that catches in mixed fisheries should be reduced to the lowest possible level. A rebuilding plan should be developed for this stock.

Additional considerations

Outlook for 2012

No short-term forecast is presented for this stock.

Management plans

No management plans are currently in place.

MSY considerations

Fishing mortality appears to have reduced below the MSY exploitation ratio in recent years. However, given the very low spawning biomass, recruitment, and productivity of the species it is not possible to identify any non-zero catch which would be compatible with the MSY approach.

PA considerations

Given that Spurdog spawning biomass and recruitment are currently the lowest observed and that Spurdog is a long-lived, slow-growing, and late-maturing species and therefore particularly vulnerable to fishing mortality, ICES advises on the basis of the precautionary approach that there should be no targeted fishery in 2012 and that catches in mixed fisheries should be reduced to the lowest possible level.

The stock currently appears stable at a low level, but the recent period of stability is short compared to the longevity of the species. Given this longevity, stock recovery will be slow.

Other considerations:

Historically Spurdog were subjected to large targeted fisheries but were also taken as a bycatch in mixed trawl fisheries. An EC TAC covering the entire stock range, was introduced in 2007 and was progressively reduced, and in 2011 TAC=0. Discarding of Spurdog has increased with increasingly restrictive TACs.

In 2009, a maximum landings length of 100 cm was introduced. There are no estimates of discard survival. However some individuals do survive although the proportion surviving varies considerably depending on a number of factors (e.g. size of catch, catching method, time on deck, etc.).

A rebuilding plan is needed for this stock. Rebuilding measures should incorporate biomass targets and rebuilding timelines.

Because of the number of assumptions made within the assessment model uncertainty is likely to be underestimated. Estimates of total landings of Northeast Atlantic Spurdog have been used, together with UK length-frequency distributions. However there are still concerns over the quality of the data as a consequence of (a) uncertainty in the historical level of catches because of misreporting and generic landing categories, (b) lack of commercial length-frequency information for countries other than the UK, and (c) lack of discard information. In addition survey data examined should be extended to cover the whole stock. Future assessments

require updated and validated growth parameters (particularly for larger individuals) and better estimates of natural mortality.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final:

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 3.

STECF COMMENTS: STECF agrees with the ICES advice and notes that any rebuilding plan will require that there is no resumption of a target fishery, and that bycatch is restricted to close to zero for a number of years. Given the longevity and productivity of spurdog, any rebuilding plan will require several decades.

STECF further notes that setting a zero TAC will inevitably result in discards of incidental catches of spurdog, a proportion of which will be discarded dead. Nevertheless, STECF considers that a zero TAC is likely to deter any directed fishery for spurdog and is likely to reduce the exploitation rate on this species.

6. Deep Sea resources

The most recent advice for Deep Sea resources can be found in the STECF Review of Advice for 2012 part 2.

7. Eco-region 4: Resources in Icelandic and East Greenland waters

The most recent advice for Deep Sea resources can be found in the STECF Review of Advice for 2012 part 2.

8. Eco-region 5: Resources in the Barents and Norwegian Seas

8.1. 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. Norwegian and Russian vessels exploit the stock over the entire resource area, while vessels from other nations are restricted to the Svalbard fishery zone. No overall TAC has been established for this stock, and the fishery is partly regulated by effort control, licensing, and a partial TAC (Russian zone only). Bycatch is constrained by mandatory sorting grids and by temporary closures of areas where high bycatch occurs of juvenile cod, haddock, Greenland halibut, redfish, or small shrimp (<15 mm). The minimum mesh size is 35 mm. Norway and Russia have taken the majority of the landings in the past. 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 21,000 t in 2010. There are no reported Russian landings in 2006 and since 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 of B_{MSY*}	50% of B_{MSY} (10^{th} percentile of the B_{MSY} estimate); relative value
	F_{MSY}	*	Resulting from the production model.
Precautionary approach	B_{lim}	0.3 of B_{MSY*}	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 of F_{MSY*}	$1.7F_{MSY}$ (the F that drives the stock to B_{lim}); relative value

	F_{pa}	Not defined	Not needed: Risk of transgressing limits are directly estimated

* Fishing mortality is estimated in relation to F_{MSY} and total stock biomass is estimated in relation to B_{MSY}.

STOCK STATUS:

F (Fishing Mortality)	2008	2009	2010
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{lim})	✓	✓	✓ Harvested sustainably
SSB (Spawning-Stock Biomass)	**2009**	**2010**	**2011**
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger
Precautionary approach (B_{lim})	✓	✓	✓ Full reproductive capacity

The assessment is considered indicative of stock trends, and provides relative measures of stock status rather than absolute. Throughout the history of the fishery, estimates of stock biomass have been above B_{MSY} and fishing mortality below F_{MSY}. The estimated risk of exceeding $B_{trigger}$, B_{lim}, or F_{MSY} in 2012 is less than 1%. Recruitment indices declined from 2004 to 2008, but have since been higher.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the MSY approach that catches in 2012 should be no more than 60 000 t.

Additional considerations

MSY considerations

The stock is well above MSY $B_{trigger}$ and F is well below F_{MSY}. Catch options of up to 60 000 t for 2012 have a low risk (<5%) of exceeding F_{MSY} and are likely to maintain the stock near its current high level.

PA considerations

There is a low risk in the near-term of the stock falling below B_{lim} or the fishing mortality rate exceeding F_{lim}.

Other considerations

Ten-year projections of stock development assuming annual catches of 30 to 90 kt indicate that for all catch options the probability of the stock falling below B_{MSY} in the short to medium term (1–5 years) is below 10%, and less than 5% of declining below $B_{trigger}$. For catches higher than 60 kt the probability of exceeding F_{MSY} is above 5%.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 2. The rules for category 2 prescribe that for 2012, a TAC for Northern shrimp in Subareas I (Barent Sea) and IIb (Svalbard Waters) of 60 000t should be proposed.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

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

8.2. Herring (*Clupea harengus*) in ICES subareas I & II (Norwegian Spring spawners)

FISHERIES: The total catches in 2010 were 1.457 million t., mainly taken by Norway (871 000 t), Russia (199 000 t), Iceland (206 000 t), EU (100 000 t), and Faroe Islands (80 000 t). The fishery in general follows the migration of the stock closely as it moves from the wintering and spawning grounds along the Norwegian coast to the summer feeding grounds in the Faroese, Icelandic, Jan Mayen, Svalbard, and international areas. 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. From 2010 onwards, new maturity-at-age information was used for the whole time-series. This revision contributes to the change in perception of estimated SSB in the 2010 assessment.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
Management plan	SSB_{MP}	5.0 million t	Medium-term simulations conducted in 2001.
	F_{MP}	0.125	Medium-term simulations conducted in 2001.
MSY Approach	MSY $B_{trigger}$	5.0 million t	B_{pa}
	F_{MSY}	0.15	Stochastic equilibrium analysis 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)	2008	2009	2010	
MSY (F_{MSY})	✓	✓	✓	At target
Precautionary approach (F_{pa},)	✓	✓	✓	Harvested sustainably[1)]
Management plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-stock Biomass)	2009	2010	2011	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity
Management plan (SSB_{MP})	✓	✓	✓	Above trigger

[1)] The nominal value for F_{2010} is slightly higher than F_{pa} but is considered to be not different.

SSB in 2011 is well above B_{pa}. The stock is composed of a number of good year classes: in the last 13 years, five large year classes have recruited into the stock (1998, 1999, 2002, 2003, and 2004). However, all cohorts from 2005 onward have been small. Fishing mortality during 2008–2010 has been at F_{pa} (= F_{MSY}).

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the EU, Faroe Islands, Iceland, Norway, and Russia management plan that landings in 2012 should be no more than 833 000 t.

Additional considerations

Management plans

A long-term management plan was agreed by the EU, Faroe Islands, Iceland, Norway, and Russia in 1999. The management plan aims to constrain harvesting within safe biological limits and is designed to provide

sustainable fisheries in the long term. ICES has evaluated the plan and concluded that it is consistent with the precautionary approach.

Following the long-term management plan agreed by the EU, Faroe Islands, Iceland, Norway, and Russia implies a TAC of 833 000 tonnes in 2012. This is expected to lead to an SSB in 2013 of 5.9 million tonnes.

MSY approach

Following the ICES MSY framework implies a fishing mortality of 0.15, resulting in landings of 989 000 tonnes in 2012. This will generate a small decline in SSB in 2013 to 5.7 million tonnes.

Fishing mortality in 2010 is at F_{MSY}, therefore the transition scheme towards the ICES MSY framework does not apply.

PA approach

Following the precautionary approach implies a fishing mortality in 2012 no higher than F_{pa} (F =0.15), corresponding to landings of less than 989 000 tonnes in 2012. This is expected to maintain SSB above B_{pa} in 2013.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1.The rules for category 1 prescribe that for 2012, a TAC for Herring in ICES subareas I & II (Norwegian Spring spawners) of 833 000t should be proposed.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

8.3. 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. In 2009 and 2010 landings amounted to 306 000 t and 323 000 t respectively. The landing over the winter period at the start of 2011 are 354 000 t.

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)		
2008	2009	**2010**

MSY (F_{MSY})	-	-	-	Not relevant
Precautionary approach (F_{pa},F_{lim})	-	-	-	Not relevant

SSB (Spawning-Stock Biomass)				
	2009	2010	**2011**	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{lim})	✓	✓	✓	Above limit reference point

The maturing component in autumn 2011 was estimated to be 2.1 million tonnes. The spawning stock in 2012 will consist of fish from the 2008 and 2009 year classes. The survey estimate of the 2010 year class is above the long-term average and 0-group observations during the joint Russian–Norwegian ecosystem survey in August–September 2011 also indicated that the 2011 year class also is above the long-term average.

MANAGEMENT OBJECTIVES: In 2002, the Joint Norwegian–Russian Fisheries Commission (JNRFC) agreed to adopt a management strategy in which the fishery is managed according to a target escapement strategy that takes the predation by cod into account. A basis for the management plan is that all catches are taken on pre-spawning capelin. The harvest control rule is designed to ensure that when the fishery is closed, the SSB remains above the proposed B_{lim} of 200 000 tonnes (with 95% probability). ICES considers the management plan to be consistent with the precautionary approach.

In 2010, the JNRFC decided that the management strategy should not be changed for the following 5 years.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the management plan agreed by the Joint Norwegian–Russian Fisheries Commission (JNRFC) that catches in 2012 should be no more than 320 000 tonnes.

FISHING OPPORTUNITIES FOR 2012 according to COM(2011) 298-Final.

STECF notes that with reference to COM(2011) 298-final this stock is classified under category 1.The rules for category 1 prescribe that for 2012, a TAC for Barents Sea Capelin in Sub-areas I and II excluding Division IIa west of 5°W of 320 000t should be proposed.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2012.

9. 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).

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 initiated its work in four thematic sub-groups (crustaceans, hake, mullets and other species). The Working Group on small pelagic species focused on sardine and anchovy according the SAC proposal.

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 was applied for 2010 with the STECF-SGMED-10-02 meeting in Heraklion (Greece) in early June and STECF-SGMED-10-03 meeting held in Sicily (Italy) in December.

Such approach continued in 2011 with the STECF-EWG-11-05 held in Ponza in May and STECF-EWG-11-12 held in Larnaca (Cyprus) in September. The STECF-EWG-11-20 is planned to be held in Madrid in January 2012. Both reports were considered in the update review in the present report.

The most recent GFCM Working Groups on the Demersal Stocks and on the Small Pelagic Stocks were held at Chania in Crete, Greece, 24-29 October 2011. Their reports were not available for review.

Therefore, the update of the Mediterranean stocks considered the findings of the GFCM SAC meeting 2011 which took place in Marseille (France) in February 2011.

STECF recognises the efforts made by GFCM and STECF-SGMED/STECF-EWG 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 advises 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. Annual assessments are considered informative to monitor the effects of the various multi-annual management plans.

In summary, STECF and GFCM SAC reviewed 80 stock assessments of 21 species. 48 stock reviews consider analytically assessed exploitation rates which were evaluated with regard to proposed management reference points (F_{MSY}). Consistent advice for 2 pelagic species (anchovy and sardine in 5 Geographical Sub-areas) and 12 demersal species (striped red mullet, red mullet, European hake, common sole, monkfish, common dentex, blackspot seabream, common Pandora, bogue, blackmouth catshark, picarel, Norway lobster, blue and red shrimp, giant red shrimp , pink shrimp and spottail mantis shrimp in 16 Geograhical Sub-areas) is provided. STECF notes that none of the reviewed assessments provided precautionary management reference points of stock size due to data deficiencies or shortage of data series.

STECF did provide advice when the stock data and the analytical results of the assessment cover the period 2009-2010, as earlier data and results may not necessarily represent the present stock status.

Overall, 44 (92%) out of the 48 analytically assessed and reviewed stocks in the Mediterranean are classified as being subject to overfishing. Tables 9.1 and 9.2 summarize the findings in detail for the various stocks (species by Geographical Subareas).

Table 9.1. Stock status according to the exploitation rate.

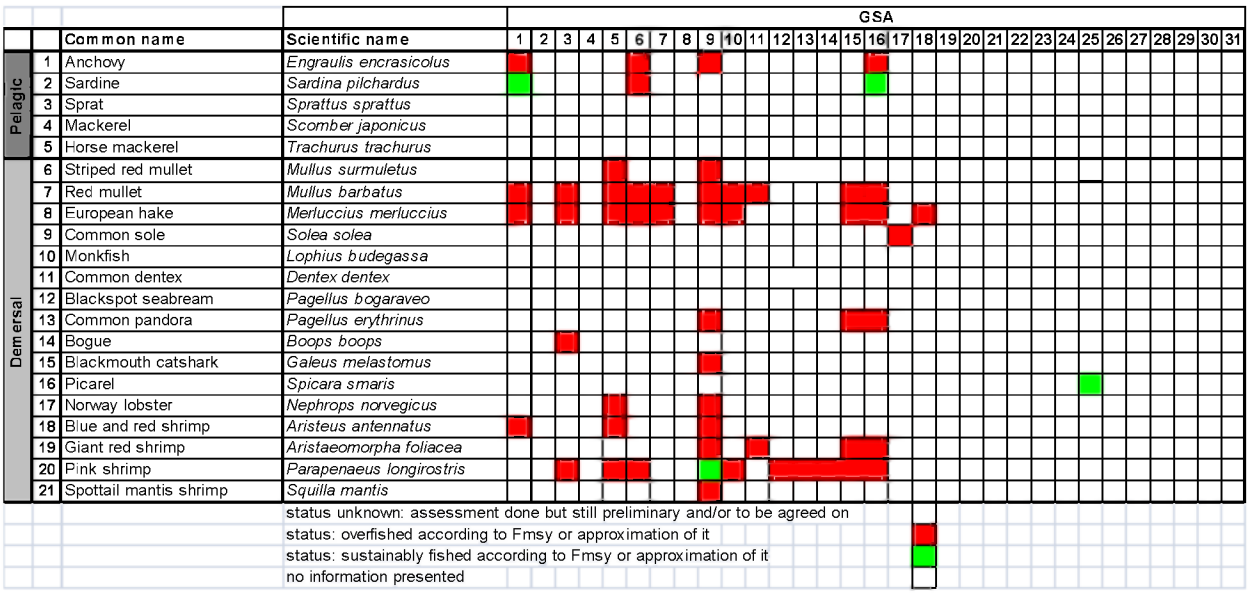

Table 9.2. Summary overview

Scientific advice about the state of the stock exploitation	no.	%
Stocks classified according to criteria	48	60.0
Other stocks not included for very poor data	32	40.0
Stocks taken into account	80	100
Classified stocks:		
The stock is overfished (above Fmsy)	44	91.7
The stock is fished at or below the Fmsy	4	8.3
Total stocks (21 species)	48	100

STECF approach to advice for Mediterranean fisheries

Fisheries and stock specific advice can be found in the relevant stock sections. Stock status assessments and fisheries management advice as provided by GFCM SAC in 2011, STECF-SGMED-10-02, STECF-SGMED-10-03 Working Group, the STECF-EWG-11-05 and the STECF-EWG-11-12 working groups, 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 reference points consistent with high long term yields and low risk of through fishing effort reductions. This advice reflects the fact that Mediterranean demersal fisheries are characterized by a pronounced multi-species/stocks catch profile, while each of the species/stocks has different management and conservation requirements. It is further noted that most of the demersal fisheries exploit mainly early life stages and/or small growing species.

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 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 as follows:
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 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 advises 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 have been undertaken during the STECF-SGMED-10-03 meeting (13-17 December 2010) and are planned to be updated during the upcoming STECF-EWG meeting 11-20 (16-20 January 2012). Such quantitative considerations take into account different management options with a view to evaluate the consequences for fishing effort/mortality changes on equivalent time scale.

9.1. European anchovy (*Engraulis encrasicolus*) 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 2011 (STECF 2010, EUR 24660 EN).

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. GFCM-SAC WG in 2010 performed an assessment but considered the XSA analysis as provisional and found it unacceptable as basis for advice. The main shortcoming of the analysis is the lack of reliable tuning data.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:

E_{msy} (F/Z, F age range 0-3) ≤ 0.4.

GFCM SAC has not proposed any management reference points.

STOCK STATUS: Based on the report of the STECF-SGMED 10-02, STECF concludes that overfishing (E_{2009} = 0.64-1.17 > 0.4) is currently occurring.

RECENT MANAGEMENT ADVICE: GFCM-SAC recommended not to increase the fishing effort and to consider the multispecies effect of this fishery. STECF advised to reduce the exploitation rate below or at the proposed level, in order to avoid future loss in stock productivity and landings. STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

STECF COMMENTS: STECF has no additional comments.

9.2. 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 2011 (STECF 2010, EUR 24660 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.

9.3. European anchovy (*Engraulis encrasicolus*) 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 2011 (STECF 2010, EUR 24660 EN).

FISHERIES: The most updated fleet information corresponds to GFCM-SCSA WG 2010, containing data up to 2009. Anchovy in GSA06 is exploited by purse seiners. Three fleet segments, distinguished by vessel size are recorded. The catch (landings) is not split by Fleet segments. It comprises 9814 tonnes in 2009 for the three Operational Units. The exploitation is based on the first age classes 0, 1 and 2. Purse seine fleet mainly target on anchovy and sardine but other species with lower commercial value as horse mackerel, mackerel and gilt sardine are also caught. The number of vessels in the fleet has declined slightly over time, but has been stable at 132 vessels since 2007. Discards are negligible and no effort data were reported to STECF-SGMED-10-02 through the DCF data call for Spain. Official landings time series 2002-2009 is available from all fishery ports in GSA01. In the commercial landings, length distribution and biological sampling are available from 2003 to 2009 from IEO sampling network and Spanish National Data Collection. For 2002, length distributions estimated in 2003 were applied. Length distributions were converted to age using a combined ALK 2003-2009, for all the years. Biological sampling 2003-2009 was used or Maturity at age and Weight-Length relationships. Acoustic surveys have been performed, but they apparently only cover the youngest age. The natural mortality vector (M) was derived from PROBIOM (Caddy and Abella, 1999).

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 and GFCM-SAC WG are based on acoustic surveys (ECOMED and MEDIAS), commercial landings and CPUEs. In 2010 GFCM-SAC performed an assessment but considered the XSA analysis as provisional and found it unacceptable as basis for advice. The main shortcoming of the analysis is the lack of reliable tuning data.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:

E_{msy} (F/Z, F age range 0-3) ≤ 0.4.

GFCM SAC has not proposed any management reference points.

STOCK STATUS: Based on the report of the STECF-SGMED 10-02, STECF concludes that overfishing (E2009 = 0.6 > 0.4) is currently occurring. According to the GFCM-SAC stock status evaluation the abundance is low while the exploitation rate is uncertain.

RECENT MANAGEMENT ADVICE: Based on the report of the STECF SGMED 10-02, STECF advises that the exploitation rate should be reduced to E = 0.4 or below, in order to avoid future loss in stock productivity and landings. STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

STECF COMMENTS: STECF has no additional comments.

9.4. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 7. Gulf of Lions

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 2011 (STECF 2010, EUR 24660 EN).

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 catches went down from 8000 tonnes in 1998 to 2249 tonnes in 2005, and has fluctuated around 2500 to 4000 tonnes since then. The catch in 2009 was 2460 tonnes.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF-SGMED. In 2010 assessment was provided by GFCM-SAC. The data sources were time series of acoustic surveys, landings and CPUE (1998-2009).

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 is low regarding the total series of acoustic biomass available. The biomass decreased after a peak in 2001, and has been stable at the lowest level in the series since 2005. The stock seems to be highly unbalanced in 2009 and 2010, with a very low abundance of commercial-sized anchovy (groups 2+). Even if total biomass was not very much lower than the average level of the last six years (20,000 – 30,000 T), most of the recorded biomass consisted of 1-group anchovy, and even these showed a mean size and condition factors appreciably below the values usually found for this stock. These signs indicate that the production capacity of the stock, and its potential to sustain an economic activity, is severely hampered, and it is essential to allow it to recover, by preventing the addition of additional sources of mortality to this already depleted population.

RECENT MANAGEMENT ADVICE: GFCM-SAC recommends to reduce fishing effort on anchovy in the Gulf of Lion, such as the case already applied by the fishery in an adaptive behaviour in the first six month of 2010. Moreover, GFCM-SAC recommends to respect the European regulation on minimum length size of catch (> 9 cm, UE 1976/2006) to protect age 1, until there is evidence of a balanced stock balanced stock, and significant anchovy biomass in age 2+ (by growth and/or immigration). Finally, GFCM-SAC evidenced that Gulf of Lion small pelagic fisheries are multispecies and effort on anchovy cannot be separated from effort on sardine, so that most of the management decisions have to be taken, considering both species.

STECF COMMENTS: STECF notes that in the absence of reference points, no advice on the stock status can be provided. STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for

small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

9.5. 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). Favourable 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 annual pseudo-cohorts from catch data in 2006-2008. STECF notes that an update assessment was conducted during the meeting of STECF-EWG-11-12 (26-30 September 2011).

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:

Emsy (F/Z, F age range 0-3) ≤ 0.4.

GFCM SAC has not proposed any management reference points.

STOCK STATUS: Based on the report of the STECF-EWG-11-12, STECF concludes that overfishing (E_{2010} = 1.0 > 0.4) is currently occurring.

RECENT MANAGEMENT ADVICE: STECF advises to reduce the exploitation rate to E = 0.4 or below, in order to avoid future loss in stock productivity and landings. STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

STECF COMMENTS: STECF has no additional comments.

9.6. European anchovy (*Engraulis encrasicolus*) 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 in Sciacca port over the period 1998-2010 were about 1,400 metric tons, with a general decreasing trend. The catches dramatically decreased in 2010 (-70%).

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 – 2009. STECF notes that an update assessment was conducted during the meeting of STECF-EWG-11-12 (26-30 September 2011). STECF notes that no age-structured production model was used at this stage. However, a logistic (Schaefer) non-equilibrium general production modeling approach was adopted for the evaluation of stock status.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:

Emsy (F/Z, F age range 0-3) ≤ 0.4.

GFCM SAC proposed the same management reference points.

STOCK STATUS: Based on the report of the STECF-EWG-11-12, STECF concludes that overfishing ($E_{2007-2010} = 0.5 > 0.4$) is currently occurring.

RECENT MANAGEMENT ADVICE: STECF advised to reduce the exploitation rate to E = 0.4 or below, in order to avoid future loss in stock productivity and landings. STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

Results of the adopted modelling approach suggest that the environmental factors can be very important in explaining the variability in yearly biomass levels (mostly due to recruitment success) and indicate that the stock status was well below the BMSY during the considered period.

STECF COMMENTS: STECF has no additional comments.

9.7. European anchovy (*Engraulis encrasicolus*) 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 2011 (STECF 2010, EUR 24660 EN).

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 excess of 40,000 t. 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 (VPA; Laurec-Sheppard tuning; 1975-2009), during the GFCM-SAC WG on small pelagic in 2010,. 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 2010 proposed the following reference point as a basis for management advice:

Emsy (F/Z, F age range 0-3) ≤ 0.4.

STOCK STATUS: The GFCM-SAC 2010 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.

During the SGMED-10-03 meeting the stock assessments of anchovy in GSA 17 presented at GFCM-SAC meeting (Mazara del Vallo, 1-6 November 2010) was reviewed. Significant improvements in the new assessments in relation to previous assessments were noted and acknowledged by SGMED-10-03 WG. However, detailed information on assessment diagnostics are missing in the report. SGMED notes that the important catch input data used in the most recent assessment largely differ from the DCF data called from Member States. The DCF data indicated significantly higher annual landings in the period 2004-2007, the differences ranging from 10% to 40%.

STECF COMMENTS: While STECF agrees with the reference point of an exploitation rate E≤0.4 proposed by the GFCM SAC, STECF notes the uncertainty regarding the estimated recent exploitation rates and resulting stock sizes. STECF is unable to support the conclusion from GFCM-SAC that the stock is exploited sustainably.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

9.8. 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 2011 (STECF 2010, EUR 24660 EN).

FISHERIES: Purse seiners are the main fishing vessels targeting anchovy (and sardine) in GSA 18. During spring and summer season 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 are 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 considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

9.9. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 20. Eastern 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 2011 (STECF 2010, EUR 24660 EN).

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 stock was also assessed by 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 agrees with the STECF-SGMED-10-02 WG proposal for E (F/Z, F age range 1-3)$\leq$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 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.

RECENT MANAGEMENT ADVICE: STECF advises that to promote stock recovery and avoid future loss in stock productivity and landings, fishing mortality should be reduced to F/Z= 0.4.

STECF notes that in the absence of any management reference points, the exploitation status cannot be evaluated. STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with sardine fisheries.

STECF COMMENTS: STECF advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.10. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 22. Aegean 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 2011 (STECF 2010, EUR 24660 EN).

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 has also been provided also by the STECF. The most recent (2009) assessment carried out by the STECF-SGMED-09-02 WG, 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) covering 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)$\leq$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 time series, the STECF 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.

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 proposes an 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. 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. STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take 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 advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.11. Sardine (*Sardina pilchardus*) 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 2011 (STECF 2010, EUR 24660 EN).

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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. 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 during GFCM SAC 2010 WG. 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. The GFCM-SAC 2010 WG considers the XSA analysis as provisional and found it unacceptable as basis for advice. The main shortcoming of the analysis is the lack of reliable tuning data. The GFCM-SAC 2010 WG also would recommend that further consideration is given to the assumptions about natural mortality.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:

Emsy (F/Z, F age range 0-3) ≤ 0.4.

GFCM SAC has not proposed any management reference points.

STOCK STATUS: Based on the report of the STECF EWG 10-02, concludes that overfishing (E2009 = 0.3 < 0.4) is not currently occurring. The GFCM-SAC 2010 classifies this stock as fully-exploited and sustainable fishery.

RECENT MANAGEMENT ADVICE: Based on the report of the STECF SEGMED 10-02, STECF advises that in order to avoid future loss in stock productivity and landings the exploitation rate should be maintained at or below the proposed reference level of Emsy (F/Z, F age range 0-3) ≤ 0.4.

GFCM-SAC WG in 2010 advice is not to increase the fishing effort, but considers the analytical assessment as provisional.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF has no additional comments.

9.12. Sardine (*Sardina pilchardus*) in Geographical Sub Area 3. Southern Alboran Sea

FISHERIES: The fisheries of small pelagic are an important component of inshore fishing on the Moroccan Mediterranean coast. For these fisheries, the activity of fishing is executed only by Moroccan seiners targeting mainly sardine, anchovy and horse mackerel. Bogue and sardinella are also caught. For several decades, the sardine constituted between 50 and 70% of the total landings of small pelagic of the Moroccan Mediterranean. However, the production of sardine declined during the last years, because of the increase in the fishing effort exerted by the sardine fleet on this resource. The landings of sardine in the Moroccan Mediterranean varies between 10.000 and 25.000 tonnes/year. In the years 2000 to 2009, the annual average landings of sardine were approximately 14.020 tons.

The fishing of small pelagic is by a fleet of approximately 140 units, that is to say 20% of the operational coastal fleet in the Moroccan Mediterranean. The sardine boats of the Mediterranean are based mainly with Me diq (35%), Nador (27%) et al. Hoceima (25%). It should be noted that these units can carry out displacements towards the ports of the Atlantic, in particular the port of Larache. The sardine and the anchovy constitute the target species towards which the fishing effort of the sardine boats is directed; the sardine for its remarkable abundance compared to the other species and anchovy for its high commercial value. The time series of the captures of sardine since the year 2000 has important fluctuations, but with a stable general tendency. The evolution of the captures shows a reduction of the captures between 2000 and 2003, followed by an increase between 2004 and 2006 and then a new reduction in 2007 and 2008 and an increase in 2009.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is the GFCM-SAC. By means of the Software LIVES (Lleonart and Salat, 2000), an analysis of pseudo-cohort was made on the average of the frequencies of sizes of sardine balanced at the whole zone of the Moroccan Mediterranean during the three last years to know 2007 to 2009.

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice:

$F_{current} = 0.6$; $F_{0.1}/F_{current} = 0.62$; $F_{max}/F_{current} = 1.86$

STOCK STATUS: The yield-per-recruit analysis indicates that the sardine stock in the Moroccan Mediterranean is currently being fully exploited.

RECENT MANAGEMENT ADVICE: Taking into account the likely state of the stock and in order to ensure a rational and durable exploitation of Moroccan Mediterranean sardine, the GFCM-SAC recommended the following:

- To maintain the current fishing effort;

- To reduce the mortality of fishing on the spawning fish, it is recommended to introduce seasonal closure during January which coincides with the peak of the spawning;

- To prohibit fishing during May near Short-nap cloth Kebdana to preserve the stock of the young fish.

STECF COMMENTS: STECF is unable to confirm the utility of the reference points proposed by the GFCM SAC WG because the analysis is not documented. Consequently, STECF is unable to advise on the stock status or the appropriate level of catch.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

9.13. Sardine (*Sardina pilchardus*) 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 2011 (STECF 2010, EUR 24660 EN).

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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. GFCM-SAC WG 2010 performed an assessment but considered the XSA analysis as provisional and found it unacceptable as basis for advice. The main shortcoming of the analysis is the lack of reliable tuning data.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:

E_{msy} (F/Z, F age range 0-2) ≤ 0.4.

GFCM SAC has not proposed any management reference points.

STOCK STATUS: Based on the report of the STECF EWG 10-02, STECF concludes that overfishing (E2009 = 0.78 > 0.4) is currently occurring.

Although no reference points were defined GFCM-SAC 2010 classifies this stock as overexploited at low abundance.

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.

Based on the report of the STECF EWG 10-02, STECF advised to reduce exploitation rate below or at the proposed reference level, in order to avoid future loss in stock productivity and landings.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different

stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF has no additional comments.

9.14. Sardine (*Sardina pilchardus*) in Geographical Sub Area 7. Gulf of Lions

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 2011 (STECF 2010, EUR 24660 EN).

FISHERIES: The fishery is mostly by trawlers, targeting anchovy and sardine. Some catches are also taken by a smaller purse seine fleet. Since 2002, the number of trawlers targeting sardine (and anchovy) has gone down from 56 to 20. The number of vessels in the whole trawler fleet remains stable at around 100 vessels. Since 1998, the catches have fluctuated around 6,000 to 11,000 tonnes. In 2008, the catches went down to 5,740 tonnes and in 2009 to 2,720 tonnes.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Data sources were time series of acoustic surveys, landings and CPUE (1198-2009). 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 WG classifies this stock as moderately exploited at an intermediate stock size.

RECENT MANAGEMENT ADVICE: Due to the likely effect on small pelagics of environmental factor, in case of low biomass at sea the GFCM-SAC recommended to avoid to report judgement of exploitation status of the stock (moderately exploited). It also advised to maintain the recent level of fishing effort induced by the very low abundance of adults in the stock until indication of a better status of the stock and endorsed the assessment.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF notes that in the absence of reference points the stock status cannot be fully evaluated.

9.15. Sardine (*Sardina pilchardus*) in Geographical Sub Area 16. Strait of Sicily

FISHERIES: In the port of Sciacca, 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 (1997-2009) were about 1,400 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. 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. STECF

notes that an update assessment was conducted during the meeting of STECF-EWG-11-12 (26-30 September 2011).

REFERENCE POINTS: Both GFCM-SAC and the STECF propose the following reference points as a basis for management advice:

Emsy (F/Z, F age range 0-3) ≤ 0.4.

STOCK STATUS: Based on the report of the STECF EWG 11-12, STECF concludes that overfishing (E= 0.16 < 0.4) is not currently occurring.

GFCM-SAC 2010 classifies the stock status as moderately exploited at low/intermediate stock abundance.

RECENT MANAGEMENT ADVICE: GFCM-SAC advice is not to increase the fishing effort suggesting that the stock is able to tolerate the current level of exploitation. Moreover GFCM-SAC suggest to assess the impact of fry fishery.

STECF advises to keep the exploitation rate below the proposed reference point of E≤ 0.4.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF has no additional comments.

9.16. Sardine (*Sardina pilchardus*) 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 2011 (STECF 2010, EUR 24660 EN).

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.

The assessment of this stock was carried out by means of Virtual Population Analysis (VPA; Laurec-Sheppard tuning; 1975-2009)during the GFCM-SAC WG on small pelagic in 2010, 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: The GFCM-SAC 2010 proposed the following reference point as a basis for management advice:

Emsy (F/Z, F age range 0-3) ≤ 0.4.

STOCK STATUS: According to GFCM-SAC 2010 assessment, the stock was moderately exploited.

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended that fishing effort should not be allowed to increase. Technical interactions regarding the fisheries targeting the anchovy stock in GSA 17 need to be taken into account when managing the sardine fisheries.

During the SGMED-10-03 meeting the stock assessments of sardine in GSA 17 presented at GFCM-SAC 2010 (Mazara del Vallo, 1-6 November 2010) was reviewed. Significant improvements in the new assessments in relation to previous assessments were noted and acknowledged by STECF. However, detailed information on assessment diagnostics are missing in the report. Furthermore STECF notes that the important catch input data indicate a drastic change in selection at age with a significant underrepresentation of age groups 1 and 2 towards older fish for the most recent years (2005-2009). STECF notes that such recently changed selectivity has a major impact on the estimated exploitation rates and stock numbers at age.
STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: While STECF agrees with the reference point of an exploitation rate E≤0.4 proposed by the GFCM SAC, STECF notes the uncertainty regarding the estimated recent exploitation rates and resulting stock sizes. STECF is unable to support the conclusion from GFCM-SAC that the stock is exploited sustainably.

9.17. 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 2011 (STECF 2010, EUR 24660 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.

9.18. Sardine (*Sardina pilchardus*) in Geographical Sub Area 20. Eastern 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 2011 (STECF 2010, EUR 24660 EN).

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. 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 is unable to fully evaluate the state of the stock and provide scientific advice with 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 is unable to estimate most recent (2009) stock parameters. Based on available information and assuming status quo exploitation in 2009, the STECF advises 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 considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.19. Sardine (*Sardina pilchardus*) in Geographical Sub Area 22. Aegean 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 2011 (STECF 2010, EUR 24660 EN).

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 pelagic 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 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 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 for small pelagics. Taking into account the uncertainty in the estimate, the STECF- considers the stock as being harvested sustainably.

RECENT MANAGEMENT ADVICE: GFCM-SAC advised not to increase the fishing effort.
The STECF advises that increased fishing is not expected to result in increased landings in the long term.
STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

STECF COMMENTS: STECF advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.20. 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 2011 (STECF 2010, EUR 24660 EN).

FISHERIES: Sprat is 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.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

9.21. Mackerel (*Scomber japonicus*) 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 2011 (STECF 2010, EUR 24660 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.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

9.22. 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 2011 (STECF 2010, EUR 24660 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.

STECF considers that management of the fisheries targeting small pelagic stocks through effort control alone may not lead to control of the exploitation rate. Such fisheries have the ability to selectively target different stocks in response to a variety of factors such as availability and price. The majority of their effort may therefore be directed to one of the available stocks resulting in a higher than desirable exploitation rate. STECF suggests that consideration be given to introducing landing restrictions as a more effective management tool for small pelagic in the Mediterranean. STECF also proposes that a multi-annual management plan for small pelagic fisheries is devised and implemented. Such a management plan should take into account mixed-fisheries effects, in particular the technical relation with anchovy fisheries.

9.23. Striped red mullet (*Mullus surmuletus*) 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 2011 (STECF 2010, EUR 24660 EN).

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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most updated assessment of the stock of *Mullus surmuletus* in the GSA 05 was provided by the GFCM WG on Demersal Fish in October 2010 on the time data series 2000-2009.

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice:
$F_{0.1}$=0.38.

STOCK STATUS: Based on the report of the GFCM WG on Demersal Fish the stock striped red mullet in GSA 05 is assessed as overfished as current F (0.60) is above the proposed $F_{0.1}$ reference point (0.38). 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: Based on the report of the GFCM WG on Demersal Fish, the GFCM-SAC recommended to reduce fishing mortality on striped red mullet in GSA 5 by 30% to 50% through reducing the effort activity and improving the selection pattern of the fishery.

STECF advises reducing fishing mortality towards the proposed reference point. This can be achieved by reducing fishing effort of the relevant fisheries. As striped red mullet is mainly caught by different gears and in mixed fisheries, the measures adopted to reduce fishing mortality require multi-annual management plans that take into account mixed-fisheries considerations to be developed and fully implemented.

STECF COMMENTS: STECF agrees with the advice from the GFCM SAC.

9.24. Striped red mullet (*Mullus surmuletus*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: The species is exploited by different types of gears. The annual landing for 2009 was due for 30% to bottom trawl (75 tons), for 31% to gillnet (76 tons) and for 39% to trammel net (96 tons). In 2010 the highest landing was due to trammel net (57%, 159 tons), while bottom trawl and gillnet contributed for 18% and 25% respectively. About 200 bottom trawlers exploit this resource all year round in the coastal area frequently using specific devices to exploit hard bottoms where the species is more abundant. Striped red mullet is caught as a part of a species mix that constitutes the target of the trawlers operating near shore. The main species caught in GSA09 are *Squilla mantis*, *Sepia officinalis*, *Trigla lucerna*, *Merluccius merluccius*, *Mullus barbatus*, *Zeus faber*. The length of first capture of the striped red mullet is of about 10 cm. Trawl catch is mainly composed by age 0+ and 1 individuals while the older age classes are poorly represented in the catch. As concerns artisanal fisheries, *M. surmuletus* represents the target species in some period of the year (end of spring-summer) and it is caught by is caught by gillnet and trammel net. Part of the fleet uses a small mesh size trammel net to catch this species on rocky bottoms near the shore. The catch is mainly composed by individuals at ages 0+ and 1. The landing showed a clear decreasing trend in the period 2005-2008, with maximum value in 2005 (404 tons) and minimum in 2008 (224 tons). A slightly increase is observed in the last two years. It is difficult to correlate this trend with the reduction in fishing effort as it is not possible to quantify the real effort exerted by the fleet on this resource. However, the LPUEs calculated on the entire fleet show considerable fluctuations with a decreasing trend for gillnet and bottom trawl; for trammel net a high peak is observed in the last year.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most updated assessment of the stock of *Mullus surmuletus* in the GSA 05 was provided by the STECF EWG 11-12.

REFERENCE POINTS: STECF proposes a reference point of
F_{msy}=0.31 ($F_{0.1}$).

STOCK STATUS: F=0.71 in 2009 and F=0.56 in 2010 are above the reference point, which indicates that striped red mullet in GSA 09 is subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises reducing fishing mortality towards the proposed reference point. This can be achieved by reducing fishing effort of the relevant fisheries. As striped red mullet is mainly caught by different gears and in mixed fisheries, the measures adopted to reduce fishing mortality require multi-annual management plans that take into account mixed-fisheries considerations to be developed and fully implemented.

STECF COMMENTS: STECF has no additional comments.

9.25. 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 2011 (STECF 2010, EUR 24660 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 advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.26. Striped red mullet (*Mullus surmuletus*) in Geographical Sub Area 26. South Levant. Egypt

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 2011 (STECF 2010, EUR 24660 EN).

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.

9.27. Red mullet (*Mullus barbatus*) in Geographical Sub Area 1. Northern Alboran Sea

FISHERIES: Red mullets are of the most important target species for the trawl fisheries but are also caught with set gears, in particular trammel-nets and gillnets. From official data, the total trawl fleet of the geographical sub-area 01 (Northern 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.

Landings data were reported to STECF EWG11-12 through the Data collection regulation (OTB and GTR). Otter trawl landings represent around the 87% of the catches. Total landings increased from 95 t in 2002 to 225 t in 2009 and decreased in 2010 to 200 t. Discards are considered negligible and range at or below one ton.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent assessment and advice are provided by STECF-EWG-11-12 (26-30 September 2011).

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
F_{msy}=0.3 (basis $F_{0.1}$)

STOCK STATUS: Based on the assessment results (Fcurr=1.79), STECF concludes that the stock of red mullet in GSA01 is currently subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries effort to be reduced until fishing mortality is below or at the proposed level Fmsy, 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 has no additional comments.

9.28. Red mullet (*Mullus barbatus*) in Geographical Sub Area 3. Southern Alboran Sea. Morocco.

FISHERIES: The trawler fleet targeting red mullet in GSA 3 consists of 120 trawlers. Trawlers' catches are mainly landed in three harbours: Nador (62.6%), Al Hoceima (23.2%) and M'diq (14.2%). Over the years 2000-2009 the landings of *M. barbatus* showed a tendency to stabilize around 350 tons with a pick in 2005 (795 tons). The average landing per year amounts at around 405 tons.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The assessment was performed in the GFCM WG on Demersal Fish which took place in October 2010. The length-frequency data were derived from the landings of trawl fleets of Nador and Al-Hoceima harbours over the years 2004-2009. VIT was used to perform VPA and yield per recruit (Y/R) analysis.

REFERENCE POINTS: The GFCM SAC 2011 proposed the following reference points as a basis for management advice:
$F_{0.1}$= 0.55
F_{max} = 0.56

STOCK STATUS: Based on the report of the GFCM WG on Demersal Fish, GFCM SAC 2011 assessed the stock to be subject to overfishing as fishing mortality (F=0.68) exceeds the proposed values of $F_{0.1}$ and F_{max}. The fishing mortality, mainly applied in the 4 last years, and the abundance index indicate that the stock is progressively decreasing.

RECENT MANAGEMENT ADVICE: GFCM-SAC 2011 recommended to reduce the fishing mortality and to control the trawling ban in coastal waters.

STECF advises the relevant fisheries effort to be reduced until fishing mortality is below or at the proposed level Fmsy, 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 agrees with the recommendations of the GCFM SAC.

9.29. 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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most updated assessment of the stock of *Mullus barbatus* in GSA 5 was provided by GFCM WG on Demersal Fish in October 2010 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: GFCM SAC proposes the following reference points as a basis for management advice:
$F_{0.1}$=0.33
Fmax = 0.53
SB = 50.3 tons
SSB = 30,2 tons

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 (SB = 34 tons; SSB = 22 tons). Both values are lower that the respective reference points given by GFCM SAC. 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 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 affects age groups 2 and 3 and while there is no exploitation of the recruits (age 0). The current F_{ref} given by the GFM SAC ($F_{ref\ 0\text{-}4}$ = 0.82) exeeds the proposed $F_{0.1}$ and Fmax reference points, indicating that red mullet in GSA 5 is subject to overfishing.

RECENT MANAGEMENT ADVICE: Based on the report of the GFCM WG on Demersal Fish, GFCM SAC advised to reduce the fishing effort by 40% to 60% through reducing the effort activity and improving the selection pattern of the fishery.

STECF advises the relevant fisheries effort to be reduced until fishing mortality is below or at the proposed level Fmsy, 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 agrees the advice of the GFCM SAC.

9.30. 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 723 vessels in GSA 06 with an average of 47 TRB, 58 GT and 297 HP. 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. According to the analysis carried out with data submitted in 2011, trawl accounts for the majority (98%) of the total landings of red mullet. The remaining 2% is taken by the gillnetters (small-scale or artisanal fisheries). The largest proportion of the total red mullet catch is taken by trawlers in the fourth quarter, coinciding with the recruitment of this species to the fishing grounds. The exploitation of small individuals (recruitment fishery) by trawlers in autumn occurs since decades (stated already by Demestre et al, 1997; Sánchez et al., 1995; Martín et al., 1999; Lloret and Lleonart, 2002). Since 2002 annual landings fluctuated around 1,000 t and were by individuals of age 1+ (adults). 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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. A recent assessment was undertaken at the GFCM WG on Demersal Fish in October 2010. The assessment was performed over the period 1998-2009 using official landings and data from trawl surveys. STECF notes that an updated assessment was conducted during the meeting of STECF-EWG-11-12 (26-30 September 2011)

REFERENCE POINTS: GFCM SAC 2011 proposed the following reference points as a basis for management advice:
$F_{0.1} = 0.39$.
STECF proposes the management reference point
$F_{msy} = 0.38$ ($F_{0.1}$ basis).

STOCK STATUS: Based on the report of the GFCM WG on Demersal Fish, GFCM SAC assessed the stock to be overfished being the estimated current value of F (F = 0.76) higher that the $F_{0.1}$ reference point. STECF estimates the F_{curr} at 1.90 and concludes that the stock is being subject to overfishing.

RECENT MANAGEMENT ADVICE: The GFCM-SAC 2011 advises to decrease the fishing mortality by 70%. GFCM-SAC also advises a more effective control in shelf areas above 50 m depth to reduce the catch of small individuals under the minimum legal size. GFCM-SAC also highlighted that the use of 40 mm square mesh in the cod-end should improve trawl exploitation pattern and Y/R by 24%.

STECF advises the relevant fisheries effort to be reduced until fishing mortality is below or at the proposed level Fmsy, 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 agrees with the advice from the GFCM-SAC.

9.31. 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 140 boats are involved in this fishery: 78% (109) of them belong to the French fleet and the remaining 22% (31) to the Spanish one. The average landing over the years 2004-2009 amounted to 176 tons, 84% of which were reported by the French vessels and 16% by the Spanish ones. In French landings, the modal length is 12 cm and the length at first capture is about 7 cm. In Spanish landings, the modal length is 15 cm and the length at first capture is 5 cm.

Catches are mainly composed by individuals of age 1 while the oldest age class (3-4 groups) are poorly represented. French catch rates tended to decrease from 2004 to 2009 along with a reduction of about 30 % of the French vessels.
French and Spanish trawl fisheries developed along the continental shelf of the Gulf of Lions are multi-specific fisheries. In addition to *M. barbatus*, the following species can be considered as important in landings: *Mullus surmuletus*, *Merluccius merluccius, Pagellus acarne, Pagellus erythrinus, Trachurus* spp, *Scyliorhinus canicula, Trachinus* spp, *Triglidae, Scorpaena* spp, *Octopus vulgaris, Eledone* spp, *Lophius* spp.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most updated assesement was provided by the GFCM WG on demersal fish in October 2010 using size composition of catches and landing data of both fleets over the

years 2004-2009. Because of the time series is short, LCA and Y/R analysis were performed using the VIT software.

REFERENCE POINTS: The GFCM SAC proposes the following reference points as a basis for management advice:
$F_{0.1}$ = 0.4
Fmax = 0.5

STOCK STATUS: Based on the report of the GFCM WG on Demersal Fish, GFCM SAC assessed the stock to be subject to overfishing with the estimated current value of F (F = 0.7) in excess of the proposed $F_{0.1}$ (0.4) and Fmax (0.5) reference points. . Sensitive analysis showed that changings of K and F by 20% +/- have impact on the Y/R, B and SSB, especially with an higher K. Transition analysis didn't show any significant change on the Y/R when reducing the current F. This is due to the fact that the Y/R max (14.06) is not very far from the current Y/R (13.58).

RECENT MANAGEMENT ADVICE: The GFCM SAC 2011 advised to reduce the current F by 30-40% to reach the proposed $F_{0.1}$ (0.4).

STECF advises the relevant fisheries effort to be reduced until fishing mortality is below or at the proposed level Fmsy, 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 notes that the assessment is consistent with its own evaluation in 2010 and agrees with the 2011 advice from the GFCM SAC.

9.32. 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 mainly exploited by bottom trawlers, being the catches derived from artisanal fisheries negligible. *Mullus barbatus* catch rates are much higher in late summer-autumn. About 200 trawlers and a relatively small but variable number of artisanal vessels exploit the species in the GSA9. Annual landings, mostly proceeding from trawling, ranged from 500 to 1100 tons in the years 2004-2009. The landings in 2010 were reported to amount to 787 tons. The length of first capture is about 7 cm. The catch is mainly composed by age 0+ individuals while the older age classes are poorly represented.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008 the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. STECF notes that an updated assessment was conducted during the meeting of STECF-EWG-11-12 (26-30 September 2011).

REFERENCE POINTS: STECF proposed the following reference points as a basis for management advice:
F_{MSY} = 0.47

STOCK STATUS: As the current fishing mortality F2010 of 0.54 exceeds the proposed reference point STECF considers the stock as being subject to overfishing. STECF notes that the size of first capture is too low (growth overfishing) and an increase in yield can be expected in the case a reduction of fishing effort do occur and/or more selective gears are used.

RECENT MANAGEMENT ADVICE: STECF advises that relevant fisheries' effort to be reduced until fishing mortality is at or below the proposed F_{MSY} (F= 0.47) reference point 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: No additional comments

9.33. Red mullet (*Mullus barbatus*) in Geographical Sub Area 10. Southern and central Tyrrhenian

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 2011 (STECF 2010, EUR 24660 EN).

FISHERIES: *Mullus barbatus* red mullet, is an important species in the GSA 10, targeted by trawlers and small-scale fisheries using mainly gillnet and trammel nets. Fishing grounds are located along the coasts of the whole GSA within the continental shelves. Available landing data collected under the DCF framework range from 524 tons in 2004 to 278 tons in 2009, 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 s(GNS) and trammel nets (GTR). In 2009 the catches of both métier decreased.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most updated assessment was provided by the STECF-SGMED-10-03. 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. The stock was assessed by a VPA (VIT) using the pseudocohort approach for each year (2006, 2007, 2008, 2009). Management reference points were estimated by an YPR analysis.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice: $F_{0.1} \leq 0.42$ (F_{MSY} proxy)

STOCK STATUS: Based on the report of the STECF-SGMED-10-03 STECF assessed the stock to be overfished during 2006-2009 as the estimated F values (F 2006=1.11, F 2007=0.78, F 2008=0.9; F 2009=0.57) are higher than the proposed $F_{0.1}$ (0.42). In the absence of proposed and agreed precautionary management reference points STECF-SGMED-10-03 was unable to fully evaluate the state of the SSB. However, survey indices indicate a variable pattern of biomass with the recent values amongst the lowest observed, except for 2007. As regards the state of the juvenile (recruits), the MEDITS surveys indicated abundant recruits in 2007 and 2009.

RECENT MANAGEMENT ADVICE:

Basing on the above results, STECF advises that fishing mortality should be reduced to the proposed reference point F_{MSY}.

Medium term prediction from 2010 to 2030, were performed considering either a constant reduction of F of around 6% each year from 2010 to 2015 and a constant reduction of the F_{stq} of around 3% each year from 2010 to 2020. In both the scenarios the decreasing of fishing mortality results in an increase of the SSB and an increase of the catches in the medium term.

STECF advised 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 effort reductions of the relevant fisheries by means of a multi-annual management plan taking into account mixed-fisheries effects.

STECF COMMENTS: No additional comments

9.34. 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 come from a mixed fishery, as 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. For the entire GSA a decrease of 20% for the smaller boats (<30 GRT), which principally exploit this species, was also observed. In the latest years the effort showed a peak in 2005, then continuously decreased and a dropped in 2008 and 2009. Since 2004 the total annual landings varied between 225 and 354 t, with a consistent drop (-22% of the 6 years mean) in 2009. The landings were mainly from demersal otter trawls (catches from other gears are less than 5% of the total).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most updated assessment was provided by the STECF-SGMED-10-03. 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 proposes the following reference points as a basis for management advice: $F_{0.1}$ (1-3) $\leq$0.47 (F_{MSY} proxy)

STOCK STATUS: Based on the report of the STECF-SGMED-10-03, STECF concludes that the stock of *M. barbatus* in the GSA 11 was subject to overfishing over the period 2006-2009 as the estimated F values (F2006 = 1.50; F2007 = 1.57; F2008= 1.69; F2009= 1.34) are above the proposed $F_{0.1}$ reference point (0.47).

The STECF-SGMED-10-03 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-10-03 was unable to fully evaluate the status of the SSB in the absence of precautionary management reference points.

RECENT MANAGEMENT ADVICE: Based on the report of the STECF-SGMED-10-03 STECF advised the relevant fisheries' 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.

STECF COMMENTS: No additional comments

9.35. Red mullet (*Mullus barbatus*) in Geographical Sub Areas 15 and 16. Malta Island and South of Sicily

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.

Red mullet (*M. barbatus*) is one of the main demersal resources of the coastal areas in the Mediterranean, fished by otter trawl and trammel and gill-net, together with several other species (Voliani, 1999). Red mullet is caught together with other important species such as *Mullus surmuletus, Merluccius merluccius, Pagellus sp., Uranoscopus scaber, Raja sp., Trachinus sp., Octopus vulgaris, Sepia officinalis, Eledone sp.* and *Lophius sp.* In GSA 15 and 16 red mullet is caught almost exclusively by inshore trawlers operating on shelf fishing-grounds of GSA 16 and 15.

Italian landings dominate the landings in GSA 15 and 16 by far. International annual landings decreased from 1409 tons in 2005 to 770 tons in 2010.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Assessments by structural models were performed using length frequencies data from 2005.
STECF notes that an updated assessment for *M. barbatus* in GSAs 15 and 16 was conducted during the meeting of STECF-EWG-11-12 (26-30 September 2011).

REFERENCE POINTS: STECF proposes $F_{0.1}$ (F=0.45) as a proxy for F_{MSY}.

STOCK STATUS: Based on the results of the -EWG-11-12, STECF concludes that the stock is currently subject to overfishing (F=0.8).

RECENT MANAGEMENT ADVICE: STECF advised the relevant fisheries' 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 the multi-species effects of the fisheries.

STECF COMMENTS: STECF has no additional comments.

9.36. 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 2011 (STECF 2010, EUR 24660 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 notes that the first and last assessment of this stock was undertaken in 2008. This assessment considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.37. Red mullet (*Mullus barbatus*) 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 2011 (STECF 2010, EUR 24660 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 this assessment considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.38. Red mullet (*Mullus barbatus*) in Geographical Sub Area 25. Cyprus

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 2011 (STECF 2010, EUR 24660 EN).

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 update 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.
STECF-advises the relevant fisheries' 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.

STECF COMMENTS: STECF notes that this assessment considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.39. European hake (*Merluccius merluccius*) in Geographical Sub Area 1. Northern Alboran Sea

FISHERIES: European Hake is a demersal species with important landings in the GSA 01. The species is targeted by bottom trawl, gillnet, trammel net and longline. Discards in weight are very low or nil. Over the period 2003-2010 annual landings oscillated between around 300 and 600 tonnes (by far, most of the landings are caught by bottom trawls).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. No new assessment was presented to subgroups of this committee in 2010. 2011 advice is provided by the STECF-EWG 11-12.

REFERENCE POINTS: Based on the findings of the STECF EWG 11-12, STECF proposes the following reference points as a basis for management advice:
$F_{msy} \leq 0.21$ ($F_{0.1}$ basis)

STOCK STATUS: STECF notes that the EWG 11-12 estimate of F=1.37 exceeds the proposed reference point and thus concludes that the stock is subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed sustainable level, in order to avoid future loss in stock productivity and landings. Multi-annual management plan taking into account mixed-fisheries effects shall be defined and implemented.

STECF COMMENTS: STECF has no additional comments.

9.40. Euroean 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 2009 the overall trawl fleet of Morocco consisted of 121 vessels. In the period 1999-2009 the hake catches ranged from 30 to 596 tons, with an increasing trend until 2005-2006 and a decrease in the subsequent years. In 2009 they amounted to 198 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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The data used in this assessment is obtained by biological sampling for length frequencies of *Merluccius merluccius* landed during 2000-2009, in the GSA 03 corresponding to the Moroccan Mediterranean waters at the level of the ports of Nador and Al hoceima. The length cohort analysis approach within VIT was applied.

REFERENCE POINTS: GFCM SAC 2010 proposes estimated F parameters:

$F_{0.1}$ = 0.61
F_{max} = 0.75
$F_{CURRENT}$ = 0.90

STOCK STATUS: Based on the report of the GFCM 2010 the stock was considered overexploited.

RECENT MANAGEMENT ADVICE: The GFCM SAC 2010 recommended to reduce the fishing mortality and control the illegal trawl into the coastal waters and reducing and limiting the moving of trawlers from Atlantic to the Mediterranean.

STECF advises the relevant fisheries effort to be reduced until fishing mortality is below or at the proposed level Fmsy, 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 agrees with the advice from the GFCM SAC.

9.41. European 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 (34 trawlers).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent STECF assessment is provided by in 2010 by SGMED 10-02.

REFERENCE POINTS: GFCM SAC 2011 proposes the following reference points as a basis for management advice:

$F_{0.1}$ = 0.20, as limit management reference point consistent with high long term yields.
F_{MAX} = 0.31
$F_{CURRENT}$ = 0.85

STECF proposes the Fmsy=0.21 ($F_{0.1}$ basis).

STOCK STATUS: The current F_{ref} (0.84) exceeds the proposed management reference point and STECF concludes that hake in GSA 05 is subject to overfishing, fully consistent with GFCM SAC.

RECENT MANAGEMENT ADVICE: The GFCM SAC 2011 advised the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed sustainable level, 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. 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.

STECF COMMENTS: STECF agrees with the advice from the GFCM SAC.

9.42. European 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 4,000 tons in the whole GSA 06 (3,278 tons in 2010).

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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. STECF notes that an updated assessment was conducted during the meeting of STECF-EWG-11-12 (26-30 September 2011).

REFERENCE POINTS: GFCM SAC 2011 proposes the following reference points as a basis for management advice:

$F_{0.1}$ = 0.60
$F_{CURRENT}$ = 1.70

STECF proposes Fmsy=0.11 (F0.1 basis) as management reference point.

STOCK STATUS: Based on the report of the GFCM SAC 2011 exploitation is based on very young age classes, mainly 0 and 1 year old individuals, with immature fraction dominating the landings. On observe a decreasing trend, both in landings and yields along the studied period, with a small recovery since 2007. Total biomass of the stock decreases slowly, being fluctuating at around the 7 300 t. The SSB represents only a 16 % of the total biomass in average, showing a decreasing trend along the period. Recruitments are declining since 1996 onwards, meanwhile F increasing in the last three years especially for the 2- 4 age classes. The GFCM SAC 2011 advised that the resource is over-exploited (growth over-fishing), with a risk of recruitment over-exploitation because of the low levels observed in the Spawning Stock Biomass and low levels and declining trend in recruitment.

STECF concludes that the stock of European hake in GSA 06 is currently subject to overfishing, given that the current F=1.3 exceeds the proposed reference point.

RECENT MANAGEMENT ADVICE: GFCM SAC advises that the use of 40 mm square mesh in the cod-end could improve yields and the state of the stock. The resource should be considered object of a special surveillance. Changes in cod end mesh geometry, result more effective than effort reductions.

STECF COMMENTS: While STECF does not agree with the GFCM SAC assessment and advice, STECF revises the proposed reference point for sustainable exploitation as given above and advises that the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed level F_{msy}, 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 notes that the increase of the gillnet and long lining effort over the period 2002-2010 may decline the spawning biomass even further considering that a major part of the spawners are caught by these passive fishing gears.

9.43. European 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). French trawlers are dominating (49 % of the boats and 70% of the catch respectively), followed by French gillnetters (~32% of the boats and 15% of the catch respectively). Over the past 10 years fishing capacity in GSA 07 has progressively declined especially for the French trawl fleet which declined by about 30% in numbers.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent STECF assessment was provided by its expert working group in 2010 (SGMED 10-02).

REFERENCE POINTS: GFCM SAC 2011 proposes the following reference points as a basis for management advice:

$F_{MSY} = F_{0.1} =$ 0.20
F_{MAX} 0.29
$F_{CURRENT} =$ 0.87

STECF proposes F_{MSY}=0.27 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: Based on the report of the GFCM SAC 2011 assessed the stock is characterized by growth overexploitation and by periodically good recruitments (1998, 2002 and 2008) which ensure the sustainability of the exploitation. The trend of the SSB does not show any risk of stock depletion or collapse.

STECF assessed the stock as being subject to overfishing, given that the current F=0.92 exceeds the reference management point.

RECENT MANAGEMENT ADVICE: GFCM SAC 2011 advises to reduce fishing mortality by 60% to 70% to reach the Fmsy proxy F0.1, to reduce growth overfishing by improving the fishing pattern of the trawl; close nursery areas at least temporally, reduce the effort of trawl, from reducing time at sea, number of fishing boats, engine power, bollard pull and/or trawl size, and to avoid recruitment overfishing by reduction the effort of longline and gillnets in order to increase (or at least maintain) the SSB and finally to establish temporal closures for longline and gillnet during the period of maximum spawning.

STECF advises that the relevant fisheries' 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.

STECF COMMENTS: STECF has no additional comments.

9.44. European hake (*Merluccius merluccius*) in Geographical Sub area 9. Northern Tyrrhenian

FISHERIES: Hake is the demersal species providing the highest landings and incomes in the GSA 09. About 60% of hake landings are due to bottom trawl vessels; the remaining fraction is caught by artisanal vessels using set nets, in particular gillnets. The trawl fleet of GSA 09 at the end of 2009 accounted for 339 vessels. The main trawl fleets of GSA 09 are present in the following continental harbours: Viareggio, Livorno, Porto Santo Stefano (Tuscany), Fiumicino, Terracina, Gaeta (Latium). The artisanal fleets, according to the 2009 data,

accounted for 1,296 vessels that operate in several harbours along the continental and insular coasts. A fleet of about 50 vessels, exploits hake using gillnets. The fishing capacity of the GSA 09 has shown in these last 20 years a progressive decrease; from 1996 to 2010 the number of bottom trawlers of GSA9 decreased of about 30%. Consequently also fishing effort is presumably decreased in this period. In the last five years the total landings of hake of GSA 09 fluctuated between 1100 (2004) to about 2300 tons, with 1484 tons in 2010. Trawl landings are traditionally dominated by small sized specimens; they are basically composed by age groups 0 and 1. Gillnet fishery lands mostly age 2 -5 fish. High quantities of small size hake are routinely discarded, especially in summer and on fishing grounds located near the main nursery areas of the species. About 690 tons of hake discards were estimated in 2009, and 130 tons in 2010 for the trawl fishery in GSA 09 depending on the dimension of the annual recruitment. Due to the introduction of the EU Regulations on minimum sizes, a progressive increase of the size at which 50% of the specimens caught was discarded has been observed in the last ten years.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG 10-03 and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The STECF EWG 11-12 has provided the most recent advice.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = 0.2$ ($F_{0.1}$ basis) as a management reference point.

STOCK STATUS: Based on the report of the STECF EWG-11-12 STECF classified the stock as being subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed level Fmsy, 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 has no additional comments.

9.45. European 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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The assessment was performed during the SGMED 03-10. 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 (2004-2009). The analyses of population and reference point estimates were conducted using Aladym, LFDA, SURBA, VIT and Yield models in a complementary way.
A similar assessment for the period 1994-2009 was also presented at the GFCM-SAC in 2010.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} \leq$ 0.2 as limit management reference point consistent with high long term yields.
No precautionary biomass reference points have been proposed for the SSB of this stock.

STOCK STATUS: Based on the report of the STECF EWG 10-03 STECF and due to data availability SGMED-10-03 survey indices indicate a variable pattern of abundance (n/h) and biomass (kg/h) without a clear trend. Given the results of the present analysis, the stock appeared to be overexploited in 2006-2008. Regardless of the growth pattern a considerable reduction 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 However, recent values are among the highest observed since 1994. The Aladym model showed instead that the SSB was continuously decreasing. As a result, SGMED-10-03 was unable to fully evaluate the status of the stock with

respect to biomass. Recent recruitment since 2005 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 changing from 0.83 in 2007 to 0.61 in 2009 (fast growth scenario). The stock appeared to be overexploited in 2006-2009.

RECENT MANAGEMENT ADVICE: Based on the report of the STECF EWG 10-03, STECF advises that the relevant fisheries' effort 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. GFCM-SAC 2010 also recommended the reduction of the fishing effort and highlighted the necessity of a long term management plan.

STECF COMMENTS: STECF has no further comments.

9.46. European hake (*Merluccius merluccius*) in Geographical Sub Area 11. Sardinian Sea

FISHERIES: Hake is one of the most important commercial species in the Sardinian seas. In this area, the biology and population dynamics have been studied intensively in the past fifteen years. Although hake is not a target of a specific fishery, such as for example red shrimp, it is the third species in terms of biomass landed in GSA 11 (Murenu M., pers. com.). In the GSA 11 hake is caught exclusively by a mixed bottom trawl fishery at depth between 50 and 600 m. No gillnet or longline fleets target this species. Although different nets are used in shallow, mid and deep water ("terra" mainly targeting Mullus spp., "mezzo fondo" targeting fish and "fondale" net targeting deep shrimp) the main trawl used is an "Italian trawl net" type with a low vertical opening (max up to 1.5 m). Important by catch species are horned octopus, squids, poor cod, shortnose greeneye, greater forkbeard and pink shrimp.

From 1994 to 2004, the trawl fleet showed remarkable changes in GSA 11. Those mostly consisted of a general increase in the number of vessels and by the replacement of the old, low tonnage wooden boats by larger steel boats. For the entire GSA an increase of 85% for boats >70 tons class occurred. A decrease of 20% for the smaller boats (<30 GRT) was also observed.

Landings decreased from 866 t (2005) to 268 t in 2009. In 2010 the landing are still low (324 t). Landings of hake are mostly taken by the demersal trawl fisheries (OTB) that in average account for about the 89% of the total.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most update assessment was undertaken by STECF EWG 11-12.

REFERENCE POINTS: STECF is unable to propose management reference points due to the preliminary status of the assessment.

STOCK STATUS: Stock status remains unknown.

RECENT MANAGEMENT ADVICE: No advice available .

STECF COMMENTS: STECF has no additional comments.

9.47. European hake (*Merluccius merluccius*) in Geographical Sub Area 15 and 16. Malta Island and Strait of Sicily.

FISHERIES: Although hake is not a target of a specific fishery such as deep water pink shrimp and striped 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 2004-2009, 97% of declared catches were caught by demersal otter board trawlers, which is the fleet segment the current assessment is based on. 1% of catches were obtained using long lines, and 2% 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. On the basis of 2007 data, 93% of the combined Sicilian and Maltese landings are due to trawling. In 2008 as well as 2009, this percentage increased to 98%.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission (STECF SGMED-10-03). Data were derived both from indirect (fisheries monitoring) and direct (scientific surveys) sources. Stock status was assessed by using VIT, SURBA and non-equilibrium surplus production model. 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.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice: $F_{MSY} = 0.15$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: STECF concludes that the stock is subject to overfishing, as the F=1.12 in 2009 exceeds the proposed management reference point.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' 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.

STECF COMMENTS: STECF has no additional comments.

9.48. European hake (*Merluccius merluccius*) 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 2011 (STECF 2010, EUR 24660 EN).

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 ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. STECF SGMED-10-02: 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: STECF proposes the following reference point as a basis for management advice: $F_{MSY} = F_{0.1} =$ 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: Based on the report of the STECF EWG 10-02 and due to constraints in data availability STECF was unable to estimate most recent (2009) stock parameters. SSB estimated by VPA in four scenarios ranged from 1,200 to 5,800 tons. F in 2006-2008 ranged from 0.55 to 0.84, thus the stock of hake in GSA17 can be considered overexploited in 2006-2008.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' 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.

STECF COMMENTS: STECF notes that this assessment considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.49. European 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 2011 (STECF 2010, EUR 24660 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 tonnes could be estimated for the last decades. Demersal species catches are landed on the western side (Italian coast) and the eastern side (Albanian coast), with an approximate percentage of 97% and 3%, respectively. Trawling is the most important fishery activity on the whole area (≅ 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 (10-12% of the total production), but these gears are utilised by a low number of boats (less than 5% of the whole South-western Adriatic fleet).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The assessment for this stock was performed during the GFCM SAC 2011. The data used in the analyses were from the trawl surveys conducted in the whole GSA (time series of MEDITS from 1996 to 2009 for Italian and Albanian coasts and 2008 only for Montenegro) and from the 2009 structure of landings of the west side (data from Data Collection Framework, DCF). Applied a suite of models and methods to face the uncertainty in the estimation process, hence the assessment was conducted using SURBA, ALADYM and VIT (2007-2009) models in a complementary way. Two scenarios of growth rate were tested. A simulation was also performed to forecast the possible effects of the newly enforced mesh size regulation on stock biomass, catches, average length of catches, and other relevant population indicators in the medium-term.

REFERENCE POINTS: GFCM 2011 proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1}$ = 0.2 as limit reference point consistent with high long term yield.
F_{MAX} = 0.3
$F_{CURRENT}$ = 0.57-0.58

STOCK STATUS: Based on the report of the GFCM SAC 2010, STECF concludes that the stock to be overexploited with respect to the F_{MSY} proxy. In the absence of suitable biomass reference points, STECF is unable to provide any advice spawning stock status. The trends in abundance indices indicate a decrease from 1996 to 2003, while a slight increase was reported for 2004 and 2005. After the exceptional peak of recruitment observed in 2005, the recruit abundance reached comparable levels as in the years before 2005. However, given the results of the present analysis, the stock of hake appears to be subject to overfishing since the current fishing mortality calculated on the years 2007-2009 (F=0.95) is higher than F0.1 and F_{max}. STECF advises that fishing mortality should be reduced in order to avoid future loss in stock productivity and landings.

RECENT MANAGEMENT ADVICE: Based on the report of the STECF EWG 10-03, STECF recommends the relevant fisheries' 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. Catches consistent with the effort reductions should be estimated.

STECF COMMENTS: STECF has no additional comments.

9.50. European 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 2011 (STECF 2010, EUR 24660 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 scientific advisory body to the GFCM is the GFCM-SAC.

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 advises that the 2006 assessment results are unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.51. European hake (*Merluccius merluccius*) in Geographical Sub Area 26. South Levant. Egypt.

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 2011 (STECF 2010, EUR 24660 EN).

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: The scientific advisory body to the GFCM is the GFCM-SAC. 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: GFCM 2009: Position of reference points relative to current F (2006-2007): $F_{0.1}$=0.49; Fmax=0.78.

STOCK STATUS: Based on the report of the GFCM SAC 2010, the length converted catch curve analysis estimated F~0.66. GFCM-SAC 2010 identified the stock status as overexploited.

RECENT MANAGEMENT ADVICE: Based on the report of the GFCM 2010 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 advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.52. Common Sole (*Solea solea*) in Geographical Sub Area 17. Northern and Middle Adriatic

FISHERIES: 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 of GSA 17 in the Adriatic Sea. Sole is an accessory species for otter trawling. More than 90% of catches come from the Italian side. Landings fluctuated between 1,000 and 2,300 tons in the period 1996-2010 (data source: FAO-FishStat; ISMEA-SISTAN and 2011 official data call). The fishing effort applied by the Italian *rapido* trawlers gradually increased from 1996 to 2005, and slightly decreased in the last years.

Exploitation is based on 1 and 2 year old individuals. In the last years, the annual landings of this species were around 2000 tons in the overall GSAs. Otter and *rapido* trawlers carry out their activity all year round, with the only exception of the fishing ban (end of July – beginning of September), while set netters show a seasonal activity (spring-fall). 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.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent stock assessments available to STECF were carried out at STECF EWG 11-12 WG.

REFERENCE POINTS: STECF and GFCM SAC proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 26$.

STOCK STATUS: STECF classified the stock status as being subject to overfishing ($F_{2010} = 1.2$).

RECENT MANAGEMENT ADVICE: STECF advises reducing fishing mortality towards the proposed reference point F_{MSY}. A change in the exploitation pattern is also reccomended, taking into account that the exploitation is mainly orientated towards juveniles. Moreover, information provided by VMS will be useful in order to quantify the fishing effort of rapido trawlers (i.e the main fleet fishing sole) in different areas and period. Specific studies on rapido trawl selectivity are necessary. In fact, it is not sure that the adoption of a larger mesh size would correspond to a decrease in juvenile catches. The same uncertainty regards the adoption of square mesh.

STECF COMMENTS: STECF has no additional comments.

9.53. Common sole (*Solea solea*) in GSA 26. South Levant

FISHERIES: Egyptian Mediterranean coast (GFCM-GSA 26) is about 1100 km extending from El-Salloum in the West to El-Arish in the East. The mean annual fish production from this area was about 55 thousand ton (1990-2008). 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 1990 to 2007. The mean annual landing of trawl fishery is around 18 thousand tons accounting for approximately 33% of total catches in Egyptian Mediterranean.
The most dominant fish species in the catch are red mullet; bream; soles; European hake; the picarels; lizardfishes; elasmobranchs. Invertebrates are represented by shrimp, cuttlefish, squid, crab and bivalves. Family Soleidae, contributes about 4% of the total trawl catch in the Egyptian Mediterranean with a mean annual catch of 800 ton composed mainly of common sole (*S. solea*) and Egyptian sole (*S. aegyptiaca*).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The assessment for common sole in GSA 26 was carried out for the first time by the GFCM SCSA in 2010 and endorsed by the GFCM SAC. Monthly samples were collected from the commercial catch of trawl fishery

during three years (2006-2008). The samples were collected from Port Said, Demmietta and Alexandria landing sites along the Egyptian Mediterranean coast, where the majority of Sole catch is landed. A yield per recruit (Y/R) analysis was performed using VIT software and the total mortality coefficient (Z) was estimated using a length converted catch curve.

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.41$ and $F_{max} = 0.81$

STOCK STATUS Based on the report of the GFCM SAC, overfishing was occurring in 2007 ($F_{2007} = 0.66 > 0.41$).

RECENT MANAGEMENT ADVICE: GFCM SAC advises that the relevant fleets' effort to be reduced by about 40-60% until fishing mortality is below or at the proposed level F_{MSY}, in order to avoid future loss in stock productivity and landings. Moreover the trawl selectivity should be improved and nursery grounds should be identified and protected.

STECF COMMENTS: STECF notes data deficiencies in the 2006-2008 length compositions. STECF advises that the assessment provided is considered unlikely to reflect the current exploitation rate and should not be used as a basis for management advice.

9.54. 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 2011 (STECF 2010, EUR 24660 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: The scientific advisory body to the GFCM is the GFCM-SAC.
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) by GFCM SCSA. 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 advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.55. Common Dentex (*Dentex dentex*) in Geographical Sub Areas 12, 13. Northern Tunisia and Gulf of Hammamet.

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 2011 (STECF 2010, EUR 24660 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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The latest assessment was conducted by GFCM SCSA 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 advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.56. Blackspot seabream (*Pagellus bogaraveo*) in Geographical Sub Area 1 and 3. North and South 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 2011 (STECF 2010, EUR 24660 EN).

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 for the Moroccan fleet, and from 330 in 2005 to 362 tons in 2007 for the Spanish fleet.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The most recent available assessment was provided by GFCM-SCSA in 2010. 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. Spanish data was derived from commercial sampling under the EU DCF. The model of stock assessment used is the standard VPA and the LCA pseudocohort analysis as well as the yield per recruits analysis by the software VIT.

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.2$

STOCK STATUS: Based on the report of the GFCM SAC, overfishing was occurring in 2005-2007 ($F_{2005-2007} = 0.4 > 0.2$). An estimate of overfishing status is not available for 2009-2010.

RECENT MANAGEMENT ADVICE: The joint assessment of blackspot seabream in GSA 1 and 3 showed a stock which 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. As a result GFCM-SAC recommended that the fishing effort should be decreased, and that the same management measures should be adopted for both GSA 1 and GSA 3. Further recommendations were improved standardisation of sampling efforts and to maintain joint assessments in the future.

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 advises that the assessment provided is considered unlikely to reflect the current stock status or exploitation rate and should not be used as a basis for management advice.

9.57. Common pandora (*Pagellus erythrinus*) in Geographical Sub Area 9. Northern Tyrrhenian

FISHERIES: The species is mainly caught as a part of a species mix that constitutes the target of the trawlers operating near shore. A small fraction of the catches proceed from artisanal fisheries. The main commercial species in this bottom multi-species trawl fishery in GSA 09 are *Squilla mantis, Sepia officinalis, Trigla lucerna, Merluccius merluccius, Mullus barbatus, Gobius niger.* Fishing effort have shown a moderate decling in the analyzed period 1994-2010.

Since 2006 annual landings varied below 300 tons. 171 tons of landings are reported for 2010.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The most recent available assessment was performed during the STECF-EWG-11-12.

REFERENCE POINTS: STECF proposed the following reference points as a basis for management advice: F_{MSY} = 0.48. ($F_{0.1}$ basis)

STOCK STATUS: The current fishing mortality was estimated as F=0.63 and exceeds this reference level. The STECF classifies the stock status as being subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises to reduce fishing mortality towards the proposed reference point F_{MSY}, in order to avoid future loss in stock productivity and landings.This can be done by reducing fishing effort of the relevant fisheries.

STECF COMMENTS: STECF has no additional comments.

9.58. Common pandora (*Pagellus erythrinus*) in Geographical Sub Areas 15 and 16. Malta Island and South Sicily

FISHERIES: Common Pandora is an important demersal fishery resource through the Mediterranean, including in the Strait of Sicily (Gancitano et al. 2010b). Trawling is carried out on the continental shelf of the Central Mediterranean throughout the year, and catches include common Pandora (*Pagellus erythrinus*), pink shrimp (*Parapenaeus longirostris*), Norway lobster (*Nephrops norvegicus*), giant red shrimp (*Aristaeomorpha foliacea*), violet shrimp hake (*Merluccius merluccius*), violet shrimp (*Aristeus antennatus*), scorpionfish (*Helicolenus dactylopterus*), grater forkbeard (*Phicys blennioides*), red Pandora (*Pagellus bogaraveo)* and monkfish (*Lophius piscatorius*). In addition to trawling, common Pandora is targeted by several artisanal gears, including set gillnets, trammel nets, pots and traps and set longlines.

Since 2006 annual landings decreased from 918 tons to 319 tons of landings in 2010.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The most recent available assessment was performed during the STECF-EWG-11-12.

REFERENCE POINTS: STECF proposed the following reference points as a basis for management advice: F_{MSY} = 0.3 ($F_{0.1}$ basis).

STOCK STATUS: The recent fishing mortality ranged between 0.5 and 0.7 and exceeds this reference level. The STECF classifies the stock status as being subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises to reduce fishing mortality towards the proposed reference point F_{MSY}, in order to avoid future loss in stock productivity and landings. STECF advises that this can be done by reducing fishing effort and improved selection patterns as part of a management plan taking account of mixed fisheries effects.

STECF COMMENTS: STECF has no additional comments.

9.59. Common pandora (*Pagellus erythrinus*) in GSA 26. South Levant

FISHERIES: Egyptian Mediterranean coast (GFCM-GSA 26) is about 1100 km extending from El-Salloum in the West to El-Arish in the East. The mean annual fish production from this area was about 55 thousand ton (1990-2008). 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 1997 to 2008. 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 which represented by about 10 species. 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 engine. 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 17 thousand tons accounting for approximately 33% of total catches in Egyptian Mediterranean.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The assessment for common pandora in GSA 26 was carried out for the first time by the GFCM SCSA in 2010 and endorsed by the GFCM SAC. The assessment is based on 2007-2008 catch length frequency distributions, which were analysed by LCA pseudocohort analysis in VIT and using a yield per recruit approach. The mean length-frequency data of two combined years (2007-2008) raised to the mean total catch of those two years was used.

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.34$ and $F_{max} = 0.57$

STOCK STATUS Based on the report of the GFCM SAC, overfishing was occurring in 2008 ($F_{2008} = 0.65 > 0.34$).

RECENT MANAGEMENT ADVICE: GFCM SAC advises that the relevant fleets' effort to be reduced by about 40-60% until fishing mortality is below or at the proposed level F_{MSY}, in order to avoid future loss in stock productivity and landings. Moreover nursery grounds should be identified and protected.

STECF COMMENTS: STECF advises that the assessment provided is considered unlikely to reflect the current exploitation rate and should not be used as a basis for management advice.

9.60. 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. Catches increased from 2959 tons in 2000 to 4086 in 2009.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The most recent available assessment was performed by the GFCM-SCSA 2010. The data used in this assessment is obtined by biological sampling for length frequencies of *Boops boops* landed during 2000-2009, in the GSA 03 corresponding to the morrocan Mediterranean waters at the level of the ports of Nador and Al hoceima.Length frequencies for the years 2000-2009 were thus used as the basis of this analysis; the length cohort analysis approach within VIT was used.

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.61$ and $F_{max} = 0.75$

STOCK STATUS: Based on the report of the GFCM SAC, overfishing was occurring in 2000-2009 ($F_{2000\text{-}2009} = 0.9 > 0.61$).

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended a reduction in the current fishing mortality, to limit the movement of trawlers from the Atlantic to the Mediterranean, and to control the existing trawling ban in coastal waters.

STECF COMMENTS: STECF notes that the proposed reference points differ markedly from those assessed by the preliminary GFCM SCSA in 2009 ($F_{0.1}$=0.13, F_{max}=0.22). STECF agrees with the stock assessment results and advises that a management plan being implemented taking account of mixed fisheries effects.

9.61. Bogue (*Boops boops*) in Geographical Sub area 26. South Levant Egypt

FISHERIES: In the Egyptian Mediterranean (GFCM-GSA26), Bogue (*Boops boops*) is exploited by bottom trawlers. About 1200 fishing boats are operated in this fishery. The catch of Bogue fluctuated between 1222 and 3980 ton for the period 1997-2008 with a mean value of 2000 tons. The trawl fishery in GSA 26 is a multi-specific fishery targeting a number of commercial important species like red mullet, breams, soles, shrimps, crabs and cephalopods.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. GFCM SAC 2010 based its advice on monthly fish samples collected from landing sites and local market, the stock assessment (2007-2008) LCA-Pseudo cohort analysis (VIT) and Y/R.

REFERENCE POINTS: GFCM SAC 2010 proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1}$ = 0.59
F_{MAX} 0.94
F current = 1.09
STOCK STATUS: GFCM SAC 2010 assessed the stock to be subject to overfishing.

RECENT MANAGEMENT ADVICE: GFCM SAC 2010 advised to reduce the fishing mortality by 40-60%.

STECF COMMENTS: STECF advises that the assessment provided is considered unlikely to reflect the current exploitation rate and should not be used as a basis for management advice.

9.62. Blackmouth catshark (*Galeus melastomus*) in Geographical Sub area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: The blackmouth catshark *Galeus melastomus* is a deep sea species, mainly distributed in the depth range 200-1000m. The species has a rather low commercial value. Blackmouth catshark is exclusively caught with bottom trawl nets, mainly as a by-catch of the Norway lobster fishery, by vessels operating within the 250-500m depth range and in red shrimps fisheries in deeper waters (up to 800m). Official landings in 2009 did not exceed 10 tons. Only relatively big-sized individuals are landed. Other species caught in the same fishery are *Phycis blennoides, Micromesistius potassou, Lepidopus caudatus, Trachurus trachurus, Conger conger, Macrouridae, Etmopterus spinax, Gadiculus argenteus* and *Parapenaeus longirostris.*

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent available assessment was performed during the STECF-EWG-11-12.

REFERENCE POINTS: The STECF proposes F_{MSY}=0.13 ($F_{0.1}$ basis) as reference point.

STOCK STATUS: Considering the 2010 estimate of fishing mortality rate of F=0.35 the STECF classifies the stock status as being subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises reducing fishing mortality towards the proposed reference point F_{MSY}. This can be done by reducing fishing effort of the relevant fisheries. As blackmouth catshark is mainly caught by different gears and in mixed fisheries, the measures adopted to reduce fishing mortality require multi-annual management plans being developed and fully implemented that take into account mixed-fisheries considerations.

STECF COMMENTS: STECF has no additional comments.

9.63. Picarel (*Spicara smaris*) in Geographical Sub area 25. Cyprus Island

FISHERIES: The Cyprus bottom trawl and the small scale inshore fishery target a mix of demersal species, as it is the case in all Mediterranean demersal fisheries. The exploited stocks are not shared with other countries' fleets. Landings of both fisheries are mainly composed by *Spicara* spp. (*Spicara smaris* and *Spicara maena*), *Boops boops*, *Mullus barbatus*, *M surmuletus*, *Pagellus erythrinus* and cephalopods. The inshore fishery catches also relatively large quantities of *Diplodus* spp., *Sparisoma cretense* and *Siganus* spp.

The Cypriot fleets exploit picarel with otter trawl and set nets (gill nets and trammel nets), while only occasionally purse seine has been utilized. Picarel is an accessory species for gill netters, and in the last years around 80% of catches come from OTB, for this fleet picarel represent in weight more than 60% of the total landing. OTB exploits mainly 0 and 1 year old individuals, while older age classes of the population are exploited by the gill netters.

Since 1985, when landings were estimated to range around 500 tons, both offshore and inshore landings decreased with some inter-annual variation to about 300 tons in 2008. Discards may be significant as no reliable data are available.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent available assessment was performed during the STECF-EWG-11-12.

REFERENCE POINTS: The STECF proposes F_{MSY}=0.31 ($F_{0.1}$ basis) as reference point.

STOCK STATUS: Considering the the estimated values of current F (0.06 and 0.08), STECF classifies the stock's exploitation status as sustainable.

RECENT MANAGEMENT ADVICE: STECF advises future fisheries shall be maintained at a sustainable level. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries effects.

STECF COMMENTS: STECF has no additional comments.

9.64. Norway Lobster (*Nephrops norvegicus*) in GSA 05 - Balearic Island

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 2011 (STECF 2010, EUR 24660 EN).

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.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The most recent assessment for Norway lobster in GSA 5 was performed by STECF-SGMED-10-02. LCA analysis was performed using VIT program using as input data the mean pseudo-cohort for the period 2002-2009 to provide a general overview of the current state of exploitation of Norway lobster in GSA 05. This analysis was followed by three other LCAs for three different years, one at the beginning of the data series (2002), one in the middle (2005) and the last one at the end (2009) and a yield per recruit analysis. GFCM-SCSA carried out a LCA pseudocohort analysis using VIT and a yield per recruit analysis for the period 2002-2008.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.42$.

STOCK STATUS: Based on the report of the STECF-SGMED-10-02, overfishing was occurring 2009 ($F_{2009} = 0.62 > 0.42$).

RECENT MANAGEMENT ADVICE: STECF advises that the relevant ffisheries' 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 has no additional comments.

9.65. Norway lobster (*Nephrops norvegicus*) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian

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. The trawl fleet of GSA 09 at the end of 2007 accounted for 360 trawlers. To date about 80-100 trawlers are involved in this fishery. During 2005-2009 the total landings of Norway lobster of GSA 09 fluctuated between 2890 tons (2005) and 228 tons (2008). In 2010, the landings decreased to 162 tons. The catch is mainly composed by adult individuals over the size-at-maturity while discarding of specimens under MLS (20 mm CL) is negligible.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent available assessment for Norway lobster in GSA 9 was performed by STECF EWG 11-12.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice: $F_{MSY} = 0.21$ ($F_{0.1}$ basis).

STOCK STATUS: STECF classified the stock status as being subject to overfishing as current F in 2010 equals 0.34.

RECENT MANAGEMENT ADVICE: STECF advises the fisheries effort to be reduced until fishing mortality is below or at the proposed management reference level, in order to avoid future loss in stock productivity and landings. This should be achieved by reducing fishing effort of the relevant fleets by means of a multi-annual management plan taking into account mixed-fisheries effects.

STECF COMMENTS: STECF has no additional comments.

9.66. Blue and red shrimp (*Aristeus antennatus*) in Geographical Sub Area 1. Northern Alboran Sea

FISHERIES: Since 2002, landings fluctuated between 150 and 422 t, with an average of 290 t, with a continuous decreasing trend. Landings in 2009 were reported to amount to 184 tons. This species is known to have no significant discards. STECF (stock review part II in 2007) noted that in the GSA 01 there are 140 trawlers, considering shelf and slope activity, and landings are around 400 tonnes by year.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent available assessment was done by STECF EWG 11-05.

REFERENCE POINTS: STECF proposed the reference points $F_{MSY} = 0.29$ ($F_{0.1}$ basis).

STOCK STATUS: STECF advised that overfishing was occurring in 2009 ($F_{2009} = 1.32$).

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed level F_{MSY}, 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 has no additional comments.

9.67. Blue and red shrimp (*Aristeus antennatus*) in Geographical Sub Area 5. Balearic Islands

FISHERIES: The red shrimp is one of the most important resources for bottom trawling in the Balearic Islands. It is fished on the slope between 400 and 800 m depth. In biomass, it represents an average of 5% of the overall catches, but its economic value is 30% of the total earnings of the fishery. Updated information on landings and effort collected on annual basis (1992-2007) show that throughout the late 1990s, landings decreased to a minimum value of 100 t. During early 1990s and from 2000s they fluctuated between 200 and 250 t. Females dominate in the landings, nearly 70-80% of the total.The present trawl fleet includes 46 vessels, about 50% of the fleet fish regularly on the slope. Total discards was estimated to 33% of reported landings in 2005 (DCR discards data assessment). Discards for the target species (red shrimp) are considered null (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 scientific advisory body to the GFCM is the GFCM-SAC. The most recent available assessment was done by GFCM SCSA in 2010. An extended survivor analysis (XSA) and a yield per recruit analysis were carried out based on total catch, effort, catch length frequency distributions and fisheries independent trawl survey data. Data from 1992 to 2009 were considered in the assessment.

REFERENCE POINTS: GFCM-SAC proposed the reference points $F_{MSY} = F_{0.1} \leq 0.33$ and $F_{max} = 0.76$.

STOCK STATUS: Based on the report of the GFCM-SAC, overfishing was occurring 2009 ($F_{2009} = 0.62 > 0.33$).

RECENT MANAGEMENT ADVICE: The GFCM- SAC recommends to decrease fishing mortality by 30-50% by reducing effort and by improving the selection pattern of the fishery. Implementing area closures for fishing in the nursery areas during the recruitment period is also recommended.

STECF COMMENTS: STECF agrees with the advice from the GFCM-SAC.

9.68. Blue and 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 2011 (STECF 2010, EUR 24660 EN).

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 scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most update assessment was provided by SGMED 10-02. 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: STECF notes that the stock status is unknown. 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 had no basis to provide specific management advice.

STECF COMMENTS: STECF has no further comments.

9.69. Blue and red shrimp (*Aristeus antennatus*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: The blue and red shrimp is one of the most valuable demersal resources for the trawling fleet operating on the muddy bottoms of the upper and middle slope up to 750-800m depth. More than 95% of GSA09 annual landings were observed in the northern part of the area and there were no discards. Annual landings depict a clear growing trend from 2007 to 2010. Nominal effort (kW*days) decreased from 2005 until 2009, reflecting an increasing in LPUE in the last 2 years. Annual landings increased from 93 tons in 2006 to 186 tons in 2010.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent available assessment is provided by STECF EWG 11-12.

REFERENCE POINTS: STECF proposed the reference point $F_{MSY} = 0.32$ ($F_{0.1}$ basis).

STOCK STATUS: STECF considers the stock to be subject to overfishing as the F in 2010 was assessed to amount to F=0.62.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed F_{MSY} level, 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 has no additional comments.

9.70. Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: *Aristaeomorpha foliacea* is one of the most valuable demersal resources for the trawling fleet in GSA09. More than 95% of GSA09 annual landings were observed in the northern part of the area and there were no discards. Annual landings depict a clear growing trend from 2008 to 2010. Landings in 2010 amounted to 55 tons. Nominal effort (kW*days) decreased remarkably from 2007 onwards.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent stock assessment was provided by STECF EWG 11-12.

REFERENCE POINTS: STECF proposes $F_{msy} \leq 0.50$ as management reference point ($F_{0.1}$ basis).

STOCK STATUS: According to the F estimates obtained using Length Cohort Analysis, the estimated F in 2010 amounts to F=1.05. STECF classifies the stock as being subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed level F_{MSY}, 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 has no additional comments.

9.71. Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 11. Sardinian Sea

FISHERIES: The giant red shrimp is a relevant target species in Sardinian waters. Fishing grounds are typical muddy bottoms from 150 to 570 m depth, but the occurrence of the species is mainly between 200 and 450 meter of depth. It is caught exclusively by otter trawl on the slope ground during all year round, with peaks in landings observed in summer. Giant red shrimps are frequently caught together with Norway lobster (*Nephrops norvegicus*), blue and red shrimp (*Aristeus antennatus*), catshark (*Galeus melastomus*), *Phycis blennoides*, *Etmopterus spinax*, Macrouridae as well as large hake (*Merluccius merluccius*).

Landings in GSA 11 showed a decrease in the period 2005-2008, falling from about 170 to 67 tons. Annual landings increased in 2009 and 2010 to the level of about 110 tons. No discards were observed.
Nominal effort (kw·days) in GSA 11 has gradually decreased from 2004 to 2008; since then it remained rather constant.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most recent assessment was provided by STECF EWG 11-12.

REFERENCE POINTS: STECF proposes $F_{MSY} \leq 0.49$ as management reference point ($F_{0.1}$ basis).

STOCK STATUS: Based on the assessment results, the estimated F (average F_{1-4} = 0.98) exceeded the proposed reference value. STECF classifies the stock being subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises the trawl fisheries' effort to be reduced until fishing mortality is below or at the proposed level F_{MSY}, 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 has no additional comments.

9.72. Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Areas 15 and 16. Malta Island and South of Sicily

FISHERIES: The giant red shrimps is a relevant target species of the Sicilian and Maltese trawlers and is caught on the slope ground during all year round, but landing peaks are observed in summer. *A. foliacea* is fished exclusively by otter trawl, mainly in the central–eastern side of the Strait of Sicily, whereas in the western side it is substituted by the violet shrimp, *Aristeus antennatus*. Giant red shrimps are frequently caught together with Norway lobster (*Nephrops norvegicus*), large sized deep water pink shrimp (*Parapenaeus longirostris*), the more rare violet shrimp (*Aristeus antennatus*) as well as large hake (*Merluccius merluccius*).

Yield of both the Italian and Maltese trawlers peaked in 2009 with a total of 1951 t, compared to an average of 1400 t in 2005-2008. At 1340 t landings in 2010 were slightly below the 2005-2008 average.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
In 2011, the state of exploitation of the female component of the stock was assessed by the STECF EWG-11-12.

REFERENCE POINTS: STECF proposes F_{MSY}=0.4 ($F_{0.1}$ basis) as management reference point of the female part of the stock. The female giant red shrimp stock in the Northern sector of the Strait of Sicily is considered to be subject of overfishing since the current fishing mortality F=1.09 exceeds this reference point.

STOCK STATUS: STECF classifies the female giant red shrimp stock in the Northern sector of the Strait of Sicily to be subject of overfishing since the current fishing mortality F=1.09 exceeds the proposed reference point.

RECENT MANAGEMENT ADVICE: STECF advises to continuously reduce current F through consistent effort reductions and an improvement in current exploitation patterns.

STECF advised relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed reference level, 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 advises future assessments should take into account both the female and the male fractions of the giant red shrimp stock.

9.73. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 3. Southern Alboran. Morocco.

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 2011 (STECF 2010, EUR 24660 EN).

FISHERIES: In GSA 03 hake is caught by trawlers which exploit a mixed-species fish assemblage. In 2009 the overall trawl fleet of Morocco consisted of 121 vessels. Catches declined from 2000 (1049 tonnes) to 2006 (466 tonnes), before rising slightly in 2006 to 2009 (594 tonnes). In 2009 pink shrimp catches represented 5.5% of total demersal catches. Other important species in the catches are *Pagellus acarne*, *Merluccius merluccius*, *Mullus spp.*, *Boops boops*, *Gadus poutassou*, *Octopus vulgaris*, and *Sepia* spp.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The assessment was provided by the GFCM-SCSA in 2010. Catch per unit effort information for the coastal fishery was used as the basis of a Schaefer production model run. Catch per unit effort decreased from 111 kg/fishing trip in 2000 to 22 kg/fishing trip in 2006, followed by a slight increase to 47 kg/fishing trip in 2009. In order to give a better assessment of MSY, B_{MSY} and F_{MSY}, the model calculate the reference points B_{ratio} = (the ratio between the biomass estimated for the last year of the data and B_{MSY}), and F_{ratio} = (the ratio between the fishing mortality for the last year and the fishing mortality which should produce a sustainable catch for the same year).

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice: $B_{0.1}$ = 1627. $B/B_{0.1}$ = 17%, $F_{cur}/F_{0.1}$ = 392% and F_{cur}/F_{MSYcur} = 353%, i.e. the current biomass represents only 17% of the target biomass $B_{0.1}$. The current fishing effort is 392% higher than the target fishing mortality $F_{0.1}$ and 353% higher than the current sustainable fishing mortality.

STOCK STATUS: Based on the report of the GFCM SAC, overfishing was occurring in 2000-2009 ($B/B_{0.1}$ = 17%, $F_{cur}/F_{0.1}$ = 392%).

RECENT MANAGEMENT ADVICE: GFCM-SAC recommends a reduction in fishing mortality by 60-80%. GFCM SCSA proposes that in future years the assessment should be extended to include data from other, adjacent areas (Spain, Algeria).

STECF advises relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed reference level, 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 agrees with the assessment and advice from the GFCM-SAC.

9.74. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 5. Balearic Island

FISHERIES: In the Balearic Islands (GSA 05), 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. The pink shrimp is caught as a by-catch in the upper slope. Annual landings decreased from 36 tons in 2002 to 1 ton in 2006. The landings remained low and increased in to 6 tons in 2009.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The state of exploitation was assessed by STECF SGMED 10-02 and GFCM SCSA in 2010 for the period 2001-2009 for the GFCM geographical sub-area Northern Spain (GSA-06).

REFERENCE POINTS: STECF and GFCM-SAC propose the following reference point as a basis for management advice: F_{MSY} 0.3 ($F_{0.1}$ basis).

STOCK STATUS: Based on their assessments STECF and GFCM-SAC considers that overfishing was occurring in 2009 (F_{2009} = 1.37 > 0.3).

RECENT MANAGEMENT ADVICE: GFCM-SAC recommends to reduce growth overfishing. This could be achieved by reducing trawling efforts by 70%, and by improving the fishing pattern of the trawl fishery. STECF advised relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed reference level,

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 agrees with the advice from the GFCM-SAC.

9.75. Pink 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 de period 2005-2010 landings stabilized to an average of 115 tons.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The state of exploitation was assessed by GFCM SCSA in 2010 for the period 2001-2009 for the GFCM geographical sub-area Northern Spain (GSA-06). The most updated assessment is provided by STECF EGW 11-02.

REFERENCE POINTS: The STECF proposes F_{MSY} = 0.25 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: STECF notes that fishing mortality over ages 0-5 displays a high variation around an average value of 1.0. STECF EWG 11-12 concludes that the resource is subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed level F_{msy}, in order to avoid future loss in stock productivity and landings, and a recovery plan to be established for this stock which takes into account the mixed species nature of the fishery.

STECF COMMENTS: STECF has no additional comments.

9.76. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian

FISHERIES: The deep sea pink shrimp is one of the most important species exploited commercially by the trawl fleet (361 vessels) in the GSA9. The fishing grounds are distributed from 150 to 400 m depth, where the main target species are hake, *Merluccius merluccius*, horned octopus, *Eledone cirrhosa* and Norway lobster, *Nephrops norvegicus*, at greater depths. The stock is more abundant in the southern part (central northern Tyrrhenian Sea) than in the northern part (Ligurian Sea). The species is exploited by trawl fleet mostly on muddy bottoms from 150 to 500 m depth. Annual trawl landings increased from 161 tons in 2002 to 462 tons in 2006, decreasing to 217 tons in 2007; the peak was reached at 463 tons in 2010.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. STECF EWG 11-12 provided the most updated stock assessment.

REFERENCE POINTS: STECF proposes F_{MSY}=0.7 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The F estimates by means of XSA display a decreasing trend during the investigated period (2006-2010). In 2010, the F_{1-3} is well below the estimated reference value of $F_{0.1}$=0.7. STECF considers the stock has been harvested sustainably.

RECENT MANAGEMENT ADVICE: STECF EWG 11-12 advises a sustainable fishery in 2012. The projection of stock size and catch in 2012 under status quo fishing and other management options will be accomplished by the follow up meeting during 16-20 January 2012. Such advice shall be considered when multi-annual management plan taking into account mixed-fisheries effects will be designed.

STECF COMMENTS: STECF has no additional comments.

9.77. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 10. Southern and Central Tyrrhenian.

FISHERIES. Pink shrimp in GSA 10 is only targeted by trawlers and fishing grounds are located on the soft bottoms of continental shelves and the continental slope along the coasts 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 1,089 tons were recorded and then declined to 379 tons in 2009, a value lower than in 2004 (552 tons).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The assessment was provided by the STECF-SGMED-10-03.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice: $F_{MSY} = 0.58$ ($F_{0.1}$ basis).

STOCK STATUS: STECF considers that overfishing was occurring in 2006-2009 ($F_{2006\text{-}2009} = 1.33 > 0.58$).

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' effort to be reduced to reach the proposed reference level, 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 has no additional comments.

9.78. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 12-16. Strait of Sicily

FISHERIES: Trawling for pink shrimp *Parapenaeus longirostris* is carried out on the continental shelf of the Central Mediterranean throughout the year, and catches often include Norway lobster (*Nephrops norvegicus*), giant red shrimp (*Aristaeomorpha foliacea*), hake (*Merluccius merluccius*), violet shrimp (*Aristeus antennatus*), scorpionfish (*Helicolenus dactylopterus*), grater forkbeard (*Phycis blennoides*), red Pandora (*Pagellus bogaraveo),* common Pandora (*Pagellus erythrinus*) and monkfish (*Lophius piscatorius*). Scientific data available indicates that exploitation by the fishing fleets of Tunisia, Malta, Libya and Italy is targeting a single shared stock of pink shrimp. Sicilian trawlers between 12 and 24 m vessel length targeting deep water pink shrimp are based in seven harbours along the southern coasts of Sicily. These trawlers operate mainly on a short-distance trawl fishery basis, with trips from 1 to 2 days at sea, and fishing taking place on the outer shelf and upper slope of GSA 15 and 16. With 250 registered vessels, this is the largest fleet component targeting pink shrimp in 2009. Sicilian trawlers which measure over 24 m vessel length are employed longer fishing trips, which may have a duration of up to 4 weeks. These vessels operate offshore, in both Italian and international waters of the Strait of Sicily. In 2009 140 such vessels were active. In the Maltese Islands small vessels measuring 12 to 24 m in length target pink shrimp at depths of about 600 m. Catches are primarily destined for the local market. The number of trawlers targeting pink shrimp increased from 7 in 2005 to 12 in 2009.Tunisian trawl vessels which target pink shrimp measure over 24 m in length, and operate primarily in Northern Tunisia where 90% of the country's total *P. longirostris* catches originate. The great majority of these catches are landed in the town of Bizerte. The number of Tunisian trawlers targeting pink shrimp has increased from 40 in 1996 to around 70 in 2009.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission.
The assessment was performed at 2010 GFCM SCSA, endorsed by GFCM-SAC and presented at STECF-SGMED 10-03, resulting in an endorsement by STECF.

REFERENCE POINTS: GFCM-SAC and STECF proposed the following reference points as a basis for management advice: $F_{MSY} = 0.9$ ($F_{0.1}$ basis).

STOCK STATUS: STECF concluded that overfishing was occurring in 2009 ($F_{2009} = 1.38 > 0.9$).

RECENT MANAGEMENT ADVICE: STECF advises the relevant fisheries' effort to be reduced until fishing mortality is at the proposed reference level 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 findings by GFCM-SAC.

9.79. 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 2011 (STECF 2010, EUR 24660 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 scientific advisory body to the GFCM is the 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 classifies the stock status as unknown.

9.80. Spottail mantis shrimp (*Squilla mantis*) in GSA 9

FISHERIES: Although the species is exploited by different types of gears, the majority of the landings come from trawling. The annual landings for 2009 were due for 95% to bottom trawl (381 tons), for 2.25% to Gillnet (9 tons) and for 2.25% to trammel net (9 tons). Discards represented in 2009 more than the 20% of the trawling total catch (86 tons), and more than the 10% in 2010 (49 tons). About 200 bottom trawlers operate in the area but it is not possible to quantify the fraction of this part of the fleet that exploit Spottail mantis shrimp in the coastal area. Spottail mantis shrimp is a coastal species, which is caught as a part of a species mix that constitutes the target of the trawlers operating near shore. The main species caught in GSA09 are *Sepia officinalis, Trigla lucerna, Merluccius merluccius, Mullus barbatus, O. vulgaris.* Trawl catch is mainly composed by age 1 and 2 individuals while the older age classes are poorly represented in the catch. For artisanal fisheries, *S. mantis* is a by-catch of gillnets and trammel nets targeting other species in the coastal area.

The total landings showed a decreasing trend in the period 2004-2010, with a maximum value in 2005 (590 tons) and minimum in 2008 (394 tons). The species is mainly landed by the trawl fleet fishing on the continental shelf and on the upper part of the continental slope. A fluctuating trend in the landing of OTB is observed, with lower values in the last two years. This trend seems to be mainly due to the reduction in fishing effort observed for this type of gear, while the LPUEs remained quite constant during the period analysed. The decreasing trend in the landings is more evident for artisanal gears. In 2010, the landings of gillnets and trammel nets were 14 tons, representing only the 4% of the total landings (382 tons) of the species. The LPUEs for these two gears shown a significant reduction, particularly in the case of gillnets.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most update assessment for spottail mantis shrimp in GSA 9 was carried out by the STECF-EWG-11-12.

REFERENCE POINTS: STECF proposes the following reference point as a basis for management advice: $F_{MSY} = 0.54$ ($F_{0.1}$ basis).

STOCK STATUS: STECF considers overfishing is occurring ($F_{2010}= 1.24 > 0.64$).

RECENT MANAGEMENT ADVICE: STECF advises to reduce fishing mortality towards the proposed reference point F_{MSY} in order to avoid future losses in stock productivity and landings. This should be achieved by reducing fishing effort of the relevant fisheries by means of a multi-annual management plan taking into account mixed-fisheries effects.

STECF COMMENTS: STECF has no additional comments

10. 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 elasmobranchs 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 elasmobranchs are clearly more seriously threatened inside the Mediterranean than they are globally.

A feature of concern is the large number of gaps in the time series for elasmobranch species for the Mediterranean and poor identification of species in the landings. For example, the collective groups "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 rays stocks (Raja clavata and Raja asterias) in one GSA (9) were recently presented at the GFCM Subcommittee on Stock Assessment in 2008. In 2011, STECF EWG 11-05 performed assessment for Blackmouth catshark (Galeus melastomus) in GSA9 and Thornback ray (Raja clavata) for GSA15 and 16.

GENERAL STECF COMMENTS: STECF notes that some updates have been added to the present report for a few species. 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 elasmobranchs, 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 elasmobranchs stocks and hence recommends:

- To investigate further which of the elasmobranchs 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).
- To consider excluding elasmobrances from the exception 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).
- 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 elasmobranchs stocks.

- Considering that the major threat for Mediterranean elasmobranchs is by-catch, and according the 1985 FAO Code of Conduct for Responsible Fisheries who encourages to minimize the waste and the capture of non-target species; STECF suggests to promote the improvement of documentation on by-catch and encourage development of measures to reduce or eliminate by catches of sharks in fisheries directed to other species.

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.

10.1. 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. SAC-GFCM 13 report that aggregations of basking shark Cetorhinus maximus, have been observed in the northern Balearic region, the Northern Adriatic and the Tyrrhenian Sea.

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 elasmobranchs in the western Mediterranean.

Documented fisheries in several regions have usually been characterized by rapidly declining local populations as a result of short-term fisheries exploitation, followed by very slow or no recorded population recovery. There is likely potential for similar population declines to occur in the future from directed and by-catch fisheries, driven at least in part by the demand for fins in international trade. This species is considered extremely vulnerable to overfishing, perhaps more than most sharks, ascribed to its slow growth rate, lengthy maturation time, long gestation period, probably low fecundity and probable small size of existing population.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM.

REFERENCE POINTS: None.

STOCK STATUS: No assessment was undertaken, due to insufficient data.

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).

Malta Environment and Planning Authority listed in 2006 Basking shark as "Animal and plant species of national interest in need of strict protection" (Flora, Fauna and Natural Habitats Regulations 311/2006). "Strict protection" is also request for Basking shark in Slovenia (Decree on Protected Wild Fauna, Official Bulletin 46/2004) issued by the Ministry of Environment and Physical Planning, Turkey (Circulars on Fisheries related to Fisheries Law: 1380 issued by the Ministry of Agriculture and Rural Affairs) and Croatia (OG n°7/2006, issued by Nature Protection Directorate, Ministry of Culture).

Basking shark is listed in Annex I, Highly Migratory Species (UNCLOS).

STECF COMMENTS: STECF notes the lack of available data and advises that in order to assess the possible impacts of fisheries on basking shark; there is a need to improve the reporting of catches of Basking shark for all concerned fisheries.

10.2. Thresher shark (*Alopias vulpinus*)

FISHERIES: This pelagic species may occupy all the Mediterranean Sea. It was observed in Syria, the Ionian Sea and Levantine basin, It 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 by-catch 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. Recent observations show that thresher sharks are caught in tuna traps fisheries, in the trap of Sidi Daoud, north of Tunisia, the large sharks are 2.3% in biomass of total catch (combine data for A. vulpinus, Carcharodon carcharias and Isurus oxyrhincus). 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 elasmobranchs 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).

Malta Environment and Planning Authority listed in 2006 thresher shark as "Animal and plant species of national interest whose taking in the wild and exploitation may be subject to management measures" (Flora, Fauna and Natural Habitats Regulations 311/2006).

thresher shark is listed as Annex I, Highly Migratory Species (UNCLOS).

RECENT MANAGEMENT ADVICE: None

STECF COMMENTS: STECF notes the lack of available data and advises that in order to assess the possible impacts of fisheries on thresher shark, there is a need to improve the reporting of catches of thresher shark for all concerned fisheries.

10.3. 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 elasmobranchs 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: To improve future assessments and a better understanding of the current situation of tope shark in the Mediteranian, STECF notes that additional fisheries-depndent data by management area is required and should be encouraged.

10.4. 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 specimensof 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 elasmobranchs 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).

Smooth hammerhead is listed as Annex I, Highly Migratory Species on (UNCLOS).

RECENT MANAGEMENT ADVICE: None.

STECF COMMENTS: To improve future assessments and a better understanding of the current situation of smooth hammerhead in the Mediteranian, STECF notes that additional fisheries-depndent data by management area and by EU Member States is required and should be encouraged.

10.5. *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 by-catch 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 in 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. C plumbeus benefits a strict protection in Turkey (Circulars on Fisheries related to Fisheries Law: 1380 issued by the Ministry of Agriculture and Rural Affairs).

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: To improve future assessments and a better understanding of the current situation of the different *Carcharhinus* species in the Mediteranian, STECF notes that additional fisheries-depndent data by management area is required and should be encouraged.

10.6. 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: Malta Environment and Planning Authority listed in 2006 Sixgill shark as "Animal and plant species of national interest whose taking in the wild and exploitation may be subject to management measures" (Flora, Fauna and Natural Habitats Regulations 311/2006).

Sixgill shark is listed as Annex I, Highly Migratory Species on (UNCLOS).

STECF COMMENTS: STECF notes that no new catch data are available. To improve future assessments and a better understanding of the current situation of the Sixgill shark in the Mediteranian, STECF notes that additional fisheries-depndent data by management area is required and should be encouraged. 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.

10.7. 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 elasmobranchs 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: To improve future assessments and a better understanding of the current situation of spurdog in the Mediteranian, STECF notes that additional fisheries-depndent data by management area is required and should be encouraged. 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.

10.8. 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 elasmobranchs reported in the western Mediterranean basin.

Studies conducted during the MEDITS project (1994-1999) showed a high frequency of occurrence (>5% of the hauls) and abundance (>10 kg/km^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. To improve future assessments and a better understanding of the current situation of the Small-spotted catshark in the Mediteranian, STECF notes that additional fisheries-dependent data by management area is required and should be encouraged. 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.

10.9. Blackmouth catshark (*Galeus melastomus*) in Geographical Sub-Area 9.Northern Tyrrhenian

FISHERIES: This deep sea species is mainly distributed in the depth range 200-1000m. It has a low commercial interest. Only relatively big-sized individuals are landed. It is caught as by-catch mainly in the Norway lobster and Red shrimps fisheries, by vessels operating within the depth range 250-500m and 500-800m respectively . Other involved species of the fishery are Phycis blennoides, Micromesistius potassou, Lepidopus caudatus, Trachurus trachurus, Conger conger, Macrouridae, Etmopterus spinax, Gadiculus argenteus, Parapenaeus longirostris.

Annual landings are very low (<10 t in 2009) and show a high seasonal variability, with peaks in the 2nd and 3rd trimesters. High discard rates are likely.

Nursery areas characterized by the presence of young individuals densely concentrated are found in the depth range 200-400m of the northern portion of the GSA9.

In the last 15 years, a general decrease in the number of fishing fleets operating in the GSA9 targeting demersal species was observed. This general reduction did not occurred for the vessels targeting *Nephrops norvegicus* for which an increase in the number has been detected, at least in some ports, following an increasing trend of the abundance of the fishery's target species.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. In 2011, the STECF-EWG 11-05 performed an assessments of the blackmouth catshark in the GSA9 based on data from the International survey MEDITS.

REFERENCE POINTS: STECF proposed the following reference points as a basis for management advice: $F(0.1) \leq 0.12$

STOCK STATUS: There is not any available definition of unit stocks neither based on genetics, bio-chemistry, fishery-based nor on any alternative method based on somatic features. Under a management point of view, in the frame of GFCM, it has been decided, when the lack of any evidence does not allow suggesting an alternative

hypothesis that inside each one of the GSAs boundaries inhabits a single, homogeneous stock that behaves as a single well-mixed and self-perpetuating population. The same assumption applies for SGMED.

MEDITS survey indices show a variable pattern of stock size without a clear trend. Since no precautionary level for the stock of blackmouth catshark in GSA 09 was proposed, EWG 11-05 cannot evaluate the stock status in relation to the precautionary approach.

Given the quality of data and results, EWG 11-05 cannot conclude on the state of recruitment.

Based on the report of the STECF-SGMED-10-03 WG STECF assessed the stock to be overfished being the F (0,4)

The size of first capture is too small (growth overfishing) and an increase in yield and a more safe situation for the stock as regards the possibility of self-renewal can be expected in the case a reduction of fishing effort do occur and/or more selective gears are used. MEDITS survey indices show a variable pattern of stock size without a clear trend.

RECENT MANAGEMENT ADVICE:

Based on the report of the STECF EWG 11-05 , STECF recommends reducing fishing mortality towards the proposed reference point F(0.1) (0,12). This can be done by reducing fishing effort of the relevant fleets and a review of appropriate technical measures and a full implementation of these.

As Blackmouth catshark is mainly caught by different gears and in mixed fisheries, STECF suggests that measures adopted to reduce fishing mortality are included in multi-annual management plans being developed and fully implemented.

STECF also notes that short and medium term predictions of stock biomass and catches will be accomplished during the two follow-up meetings (26-30 September 2011 and 16-20 January 2012, respectively) depending on data availability.

STECF COMMENTS: No additional comments

10.10. Pelagic 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.

A study to estimate gear parameters in capture rate of pelagic stingray was carried out with nine longline vessels in the Strait of Sicily, between 2005 and 2007. Results showed that the larger the J hook, the lower the stingray capture rate. Moreover, 16/0 circle hooks had a significantly lower number of stingrays captured per 1000 hooks than J hooks, up to 80%. These results suggest that the adoption of large circle hooks by commercial and artisanal swordfish longlining may be a measure to reduce their environmental footprint.

RECENT MANAGEMENT ADVICE: None.

STECF COMMENTS: STECF notes the lack of recent data. To improve future assessments and a better understanding of the current situation of the pelagic stingray in the Mediteranian, STECF notes that additional fisheries-dependent data by management area and by EU Member States is required and should be encouraged.

STECF suggests that the Mediterranean longline fleets be encouraged to adopt the use of large circle hooks in pelagic longline fisheries to mitigate Pelagic stingray by-catches.

10.11. Skates (*Rajiformes*)

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 spotted ray, *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. *R. 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. Malta Environment and Planning Authority listed in 2006 Rostroraja alba as "Animal and plant species of national interest whose taking in the wild and exploitation may be subject to management measures" (Flora, Fauna and Natural Habitats Regulations 311/2006).

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: To improve future assessments and a better understanding of the current situation of skates in the Mediteranian, STECF notes that additional fisheries-dependent data by management area and by EU Member States is required and should be encouraged.

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.

10.12. Starry skate (*Raja asterias*) in Geographic Sub Area 9. Ligurian and Northern Tyrrhenian

The last assessment of this species in GSA 9 was carried out in to 2008. The text below remains unchanged from the STECF review of Advice for 2011.

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: F_{max}: 0.33 and $F_{0.1}$: 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 in 2011 by the GFCM-SCSA.

STECF COMMENTS: To improve future assessments and a better understanding of the current situation of *Raja asterias* in the Mediteranian, STECF notes that additional fisheries-dependent data by management area and by EU Member States is required and should be encouraged.

11. Resources in the Black Sea

11.1. Sprat (*Sprattus sprattus*) in GSA 29

FISHERIES: Sprat is one of the most important fish species, being fished and consumed traditionally in the Black Sea countries. It is most abundant small pelagic fish species in the region, together with anchovy and horse mackerel and accounts for most of the landings in the north-western part of the Black Sea. Whiting is also taken as a by-catch in the sprat fishery, although there is no targeted fishery beyond this (Raykov, 2006) except for Turkish waters. Sprat fishing takes place on the continental shelf on 15-110 m of depth (Shlyakhov, Shlyakhova, 2011). The harvesting of the Black Sea sprat is conducted during the day time when its aggregations become denser and are successfully fished with trawls. The main fishing gears are mid-water otter trawl, pelagic pair trawls and uncovered pound nets.

The sprat fishery is taking place in the Black Sea (GFCM Fishing Sub-area 37.4 (Division 37.4.2) and Geographical Sub-area (GSA) 29). The opportunities of marine fishing are limited by the specific characteristics of the Black Sea. The exploitation of the fish recourses is limited in the shelf area. The water below 100-150 m is anoxic and contains hydrogen sulphide. In Bulgarian, Romanian, Russian and Ukrainian waters the most intensive fisheries of Black Sea sprat is conducted in April till October with mid-water trawls on vessels 15- 40 m long and a small number vessels >40m. Beyond the 12-mile zone a special permission is needed for fishing. Harvesting of Black Sea sprat is conducted during the day, when the sprat aggregations become denser and are successfully fished with mid-water trawls. The highest sprat catches are taken by Turkey and Ukraine.
The significance of the sprat fishery in Turkey in the last three years has increased and the landings reached 57 023 t in 2010. The main gears used for sprat fishery in Turkey (fishing area is constrained in front of the city of Samsun) are pelagic pair trawls working in spring at 20-40m depth and in autumn - in deeper water: 40-80m depths.

SOURCE OF MANAGEMENT ADVICE: STECF Expert Working Group 11-16.

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF EWG 11-16

E (mean)	≤ 0.4

Table of limit and precautionary management reference points agreed by fisheries managers

F_{msy} (age range)=	none
B_{pa} (B_{lim}, spawning stock)=	none

STOCK STATUS:

- State of the adult abundance and biomass (SSB):

According to the present assessment the SSB ranges at medium to high levels: in the range of 300 - 400 000 t in recent years. Under a constant recruitment scenario and status quo F, SSB is expected to stay at the approximate same level by 2013. Since no precautionary level for the stock size of sprat in GSA 29 was proposed, EWG 11-16 cannot fully evaluate the stock status in relation to the precautionary approach. However, the stock appeared to increase recently.

- State of the juveniles (recruits):

Recruitment estimates since 2007 are estimated to range at a high level as compared with a long term trend. Such estimates are considered rather imprecise due to the lack of survey data.

- State of exploitation:

EWG 11-16 proposes the exploitation rate $E \leq 0.4$ ($=F \leq 0.64$) as limit management reference point consistent with high long term yields (F_{MSY} proxy). Over the last few years the fishing mortality has piqued in 2005 and 2009 at a level of about F=0.59. This equals an exploitation rate of about E=0.38 (natural mortality M=0.95). The EWG considers the stock of sprat in the Black Sea as sustainably exploited.

- Source of data and methods:

International landings data at age were constructed and the Integrated Catch Analyses (ICA) is applied. Discards are believed to be low. Short term prediction is provided based on a short term geometric average recruitment.

RECENT MANAGEMENT ADVICE:

STECF classifies the stock as being sustainably exploited close to the biological reference point of $E \leq 0.4$ consistent with high long term yields. STECF advises a sustainable status quo exploitation for 2012 which implies catches of 100 000 t not to be exceeded in 2012. In the absence of an allocation key for the international sprat catches, STECF is unable to advise on a specific EU TAC for sprat in the Black Sea.

Additional considerations

A short term prediction of stock size and catches assuming a sustainable status quo fishing scenario has been provided together with a range of management options. Considering the short life span of sprat in the Black Sea and the high variation in estimated recruitment, STECF emphasises that the short term projections based on a geometric mean recruitment and the resulting catch advice are subject to high uncertainty. The poor knowledge about the recruitment dynamics prevented the formulation of medium term projections.

STECF COMMENTS: STECF suggest that in order to improve the quality of the stock assessment and scientific advice to management and provide a source of fisheries independent information an international hydro-acoustic survey should be conducted to monitor the sprat across all national waters of the Black Sea, including Bulgaria, Romania, Georgia, Russia, Turkey and Ukraine.

11.2. Turbot (*Scophthalmus maximus*) in GSA 29

FISHERIES: 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. Annual landings during last 5 years range between 730 and 1035 t. Missreporting and illegal catches also occur. However, the overall landings of turbot in the Black Sea declined in the last 4 years from 1035 t in 2007 to 622 t in 2010.

Both for Bulgaria and Romania quotas of 43.2 t in 2011 for each country were permitted.
Prohibition of fishing activity during reproduction period for turbot was in force from 15 April to 15 June in European Community waters of the Black Sea. The minimum legal mesh size for bottom-set nets used to catch turbot should be 400 mm.

In Ukraine Turbot fisheries is conducted with bottom (turbot) gill nets with minimum 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 fishing 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: STECF Expert Working Group 11-16

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF EWG 11-16

Fmsy	≤ 0.18

Table of limit and precautionary management reference points agreed by fisheries managers

F_{msy} (age range)=	none
B_{pa} (B_{lim}, spawning stock)=	none

STOCK STATUS:

- State of the adult abundance and biomass (SSB):

Relative stock size indices from surveys and two XSA estimations indicate that the stock is at a historic low which significantly increases the risk of fisheries collapse. Since no precautionary level for the stock size of sprat in GSA 29 was proposed, EWG 11-16 cannot fully evaluate the stock status in relation to the precautionary approach.

- State of the juveniles (recruits):

Recruitment has increased since 2003 but this has not yet materialized in a significant increase in SSB.

- State of exploitation:

The STECF EWG 11-16 has proposed Fmsy$\leq$0.18 as limit reference point consistent with high long term yields and low risk of fisheries collapses. Both assessment approaches, with and without estimated illegal catches, result in recent high F in the range of 0.6-0.8. The EWG classifies the stock of turbot in the Black Sea as being subject to overfishing.

- Source of data and methods:

International landings data at age are believed to be underestimated due to illegal catches, discards are considered negligible. XSA analyses tuned by short bottom trawl survey with a very restricted area coverage is applied. No short term prediction is provided due to uncertain catch figures.

RECENT MANAGEMENT ADVICE:

STECF advices that the catches being reduced to the lowest possible level. STECF notes that despite the recently low TACs in the European EEZs of Bulgaria and Romania the fishing mortality remains at a high level (above three times the sustainable level) with no signal of reduction.

Additional considerations

Uncertainty about catch figures prevented a precise stock assessment which could provide the basis for short and medium term projections of stock size and catches.

STECF COMMENTS: STECF suggest that in order to improve the quality of the stock assessment and scientific advice to management and provide a source of fisheries independent information, an international bottom trawl survey should be conducted to monitor the turbot across all national waters of the Black Sea including Bulgaria, Romania, Georgia, Russia, Turkey and Ukraine.

11.3. Anchovy (*Engraulis encrasicolus*) in GSA 29

FISHERIES: Anchovy is an object of both artisanal (with coastal trap nets and beach seines), and commercial purse-seines fishery on the wintering grounds. Majority of the production is obtained by Turkey by purse seine vessels. The catch of the Black Sea countries increased until 1985-1986 after which a sharp decline occurred. For instance, the Turkish catch of anchovy in 1990-1991 fell to 13-15% of the 1985-1986 level. Heavy fishing on small pelagic fish predominantly by the Soviet Union, and later also by Turkey, was carried out in a

competitive framework without any agreement between the countries on limits to fishing. The total anchovy catch was progressively increasing since 1980 to 1988 when maximum yield was obtained (606,401t) then decreasing up to a minimum of 102,904 t in 1990 (excepting 1988), 90% from this quantity being obtained by Turkey.

In spite of improving the fishing effort by the continuous increase of fishing vessels number, at the end of the 1980's when the outbreak of the alien jellyfish occurred, catches dramatically declined up to three times. The state of the anchovy stock has improved after the collapse in 1990s, and in 2000-2005 the catches reached levels of about 300,000 t. In 2006 the Turkish anchovy catches dropped to 119 thousand t. In this year, by catch of bonito reached the maximum amount over the last 50 years (63896 tons) and most of the purse seiners preferred to catch bonito considering the high market value of that fish. On the other hand, the possible causes of the drop may be attributed to the climate effects (raised water temperature may cause a dispersal of fish schools making them less accessible to the fishing gears), abundant predators (bonito) or overfishing. In 2006 the catch increased again to 212 thousand t. In 2010, total Black Sea catch has reached to 208192 tons and the major part is harvested by Turkey as 203026 tons.

SOURCE OF MANAGEMENT ADVICE: STECF expert Working Group 11-16

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF EWG 11-16

E=0.4 equals Fmsy(1-3)	≤ 0.41

Table of limit and precautionary management reference points agreed by fisheries managers

F_{msy} (age range)=	none
B_{pa} (B_{lim}, spawning stock)=	none

STOCK STATUS:

- Adult abundance and biomass (SSB):

Following some drastic changes in stock size, the SSB is indicated to have remained rather stable around 800 000 t since 2007. Since no precautionary level for the stock size of anchovy in GSA 29 was proposed, EWG 11-16 cannot fully evaluate the stock status in relation to the precautionary approach.

- Juveniles (recruits):

During the period 2002 to 2009 the recruitment has varied without a clear trend.

- Exploitation status:

STECF EWG-11-16 proposes E≤0.4 as limit reference point consistent with high long term yield and low risk of fisheries collapses. The EWG classifies the stock as being subject to overfishing as the estimated $F_{(1-3)}$=0.62 exceeds such exploitation rate E≤0.4, which equals $Fmsy_{(1-3)}$=0.41, assuming an $M_{(1-3)}$=0.62.
The EWG-11-16 recommends the exploitation of anchovy to be sustainable and the catch in 2012 not to exceed 200 000 t.

- Source of data and methods:

International landings at data at age were constructed while discards are considered negligible. XSA analyses tuned by a single commercial CPUE of the major Turkish purse seiner fishery is applied. Short term prediction is provided based on short term geometric mean recruitment.

RECENT MANAGEMENT ADVICE:

STECF advices that the exploitation of anchovy to be sustainable and the catch in 2012 not to exceed 200 000 t. Considering the short life span of anchovy in the Black Sea and the high variation in estimated recruitment, STECF also emphasises that the short term projections based on a geometric mean recruitment are subject to high uncertainty. In the absence of an allocation key for the international anchovy catches, STECF is unable to advice on a specific EU TAC for anchovy in the Black Sea.

Additional considerations

A short term prediction of stock size and catches assuming a sustainable status quo fishing scenario has been provided together with a range of management options. Considering the short life span of anchovy in the Black Sea and the high variation in estimated recruitment, STECF emphasises that the short term projections based on

geometric mean recruitment and the resulting catch advice are subject to high uncertainty. The poor knowledge about the recruitment dynamics prevented the formulation of medium term projections.

STECF COMMENTS: STECF suggest that in order to improve the quality of the stock assessment and scientific advice to management and provide a source of fisheries independent information, an international hydro-acoustic survey should be conducted to monitor the turbot across all national waters of the Black Sea including Bulgaria, Romania, Georgia, Russia, Turkey and Ukraine.

11.4. Whiting (*Merlangius merlangus*) in GSA 29

FISHERIES: The whiting fishery in the Black Sea is almost solely conducted by Turkey. Landings have fluctuated between 2 500 t and 28 000 t. In the last 5 years, landings have incresed from 6 600 t to 15 900 t. In the eastern part of the basin the whiting is subject to a specialised fishery, while in its western part it is fished primarily as a by-catch in trawl sprat catches and by trap nets. It should be noted that fishing in Turkey is conducted without limitation of annual catch or the fishing efforts.

.**SOURCE OF MANAGEMENT ADVICE:** STECF Expert Working Group 11-16

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF EWG 11-16

Fmsy(1-3) proxy derived from F0.1	≤ 0.40

Table of limit and precautionary management reference points agreed by fisheries managers

F_{msy} (age range)=	none
B_{pa} (B_{lim}, spawning stock)=	none

STOCK STATUS:

- State of the adult abundance and biomass (SSB):

Since 1994 the SSB has varied without a trend. In the absence of biological reference points the EWG 11-16 is unable to fully evaluate the stock status with regard to the precautionary approach.

- State of the juveniles (recruits):

Since 1994 the recruitment has varied without a trend. There is no fishery indepent recruitment index (survey) available as none of the surveys cover the entire stock area.

- State of exploitation:

The EWG 11-16 proposes Fmsy(1-4)≤0.4 (approximation based on F0.1 estimate) as limit reference point consistent with high long term yields and low risk of fisheries collapse. As the estimated F(1-4)=0.59 exceeds such reference point and thus the EWG 11-16 classifies the stock of whiting in the Black Sea as being subject to overfishing.

- Source of data and methods:

International landings at data at age were constructed while discards are considered negligible. XSA analyses tuned by a short (3 years) single survey (Romanian bottom trawl) with a limited area coverage is applied. Short term prediction is provided based on short term geometric mean recruitment.

RECENT MANAGEMENT ADVICE:

STECF advices that the exploitation of whiting to be sustainable and the catch in 2012 not to exceed 8500 t. In the absence of an allocation key for the international whiting catches, STECF is unable to advice on a specific EU TAC for whiting in the Black Sea.

Additional considerations

A short term prediction of stock size and catches assuming a sustainable status quo fishing scenario in 2011 has been provided together with a range of management options. Considering the short life span of whiting in the Black Sea and the high variation in estimated recruitment, STECF emphasises that the short term projections based on geometric mean recruitment and the resulting catch advice are subject to high uncertainty. The poor knowledge about the recruitment dynamics and lack of discard estimates in the catch statistics prevented the formulation of medium term projections.

STECF COMMENTS: STECF suggest that, in order to improve the quality of the stock assessment and scientific advice to management and provide a source of fisheries independent information, an international hydro-acoustic survey should be conducted to monitor the whiting across all national waters of the Black Sea including Bulgaria, Romania, Georgia, Russia, Turkey and Ukraine, in particular to provide a representative recruitment index. STECF notes that the assessment does not include discards and thus might be biased.

12. Stocks of the northwest Atlantic (NAFO)

12.1. 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. 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. Yearly bycatches between 2000 and 2005 were below 60 t, rising to 339 and 345 t in 2006 and 2007, respectively. In year 2008 and 2009 catches were increasing until 889 and 1161 t, respectively. The fishery has been reopened in 2010 with 5 500 t TAC and a catch of 9 192 t was estimated by STACFIS. A 10 000 t TAC was established for 2011.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is NAFO. A Bayesian 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 spawning biomass increase, with levels much above Blim, although abundance remains still lower than in the beginning of the time series. As a result of changes noted in weight and maturity, it is unclear whether the meaning of spawning biomass as an indicator of stock status is the same as in the earlier period. Whereas recruitment has been better during 2005-2010, it is below levels in the beginning of the assessment period.

RECENT MANAGEMENT ADVICE: Stochastic projections have been performed for 2012-2014 under three fishing mortality scenarios: (1) Fbar=F0.1 (median=0.130); (2) Fbar=Fmax (median=0.210); (3) Fbar=F2010 (median=0.280). All scenarios assumed that the Yield for 2011 is the established TAC (10 000 t).

Under all scenarios, total biomass and SSB have a very high probability of reaching levels higher than all of the 1988-2011 estimates. However, this increase does not have a counterpart in terms of population abundances, which are projected to remain at levels below those of the late 80's. That is because the weights and maturities used in the projections were drawn from those of the last three years (much higher than those assumed in the earlier period). If these conditions do not persist, projection results will be overly optimistic.

Scientific Council advises that catches in 2012 should not exceed the level of F0.1 (9 280 t).

STECF COMMENTS: STECF agrees with the advice from the NAFO SC and notes that the NAFO Fisheries Commission set a TAC for 2012 of 9280 t in line with that advice.

12.2. 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 25 000 t 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: The most recent assessment was undertaken in 2010 and the following advice from the NAFO SC was given in its 2010 report:

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 notes that at its September 2011 Annual Meeting, the NAFO Fisheries Commission has set TACs for Northern shrimp in Divisions 3LNO for 2012 and 2013 of 12,000 t and 9350 t respectively. The 2013 TAC is subject to revision pending further advice from the Scientific Council in 2012.

12.3. 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 to 13 000 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 most recent assessment was undertaken in 2010 and the following advice from the NAFO SC was given in its 2010 report:

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. STECF notes that at its September 2011 Annual Meeting, the NAFO Fisheries Commission agreed that there should be no directed fishery for Northern shrimp in Divisions 3M in 2012.

12.4. 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 the 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 the Fisheries Commission for this stock. 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 tonnes, 21 000 t. and 23 000 t. respectively. In 2010, the catches were estimated to be around 26 000 tonnes.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the NAFO Scientific Council.

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 1975-2010.

Extended Survivors Analysis (XSA) tuned to the Canadian spring (Div. 3LNO; 1996-2010), and autumn (Div. 2J, 3K; 1996-2010) and the EU (Div. 3M; 0-700 m in 1995-2003; 0-1 400 m in 2004-2010) surveys were 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 0.41 and F0.1 is 0.22, 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 (0.37) is above $_{F0.1}$ level and approaching F_{MAX}.

STOCK STATUS: Biomass increased over 2004-2008 with decreases in fishing mortality. However, it has shown decreases over 2008-20110, as weaker year-classes have recruited to the biomass. The 2011 5+ biomass is estimated to be about 84 000 t. The 10+ biomass peaked in 1991 and although it remains well below that peak, it has tripled over 2006-2011 and is presently about 25% of the total 5+ biomass. Average fishing mortality (over ages 5-10) has been decreasing since 2003 but has increased in 2010 (F_{5-10} = 0.37). Recent recruitment has been far below average; however, recruitment estimates for 2009 and 2010 are considerable improved but will not recruit to the fishery for at least another 3 years.

In 2010 and 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 $F_{0.1}$ (0.21)
ii) constant fishing mortality at F_{2009} (0.26)
iii) constant landings at 16 000 t (TAC in 2009), and
iv) constant landings at 23 150 t (estimated catches in 2009).

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 noted that projected yield under $F_{0.1}$ is close to 16 000 t over 2011-2013. Thus under both the $F_{0.1}$ 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 F_{2009} fishing mortality, but is projected to decrease by 15% if catches remain at 23 200 t through 2013. Fishing at F_{2009} 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: Based on 2010 assessment the following advice from the NAFO SC was given in its 2010 report:

Scientific Council noted that all year-classes which will recruit to the exploitable biomass in the short-term are weak. Projections at the $F_{0.1}$ 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 $F_{0.1}$ level (median catch of 14 500 t in 2011). Consideration should be given to reducing fishing mortality below the $F_{0.1}$ 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.

However, NAFO Fishery Commission, in its 2010 September meeting, agreed to implement a Management Strategy with a simple Harvest Control Rules (HCR) based on survey results following the NAFO Working Group on Management Strategy Evaluation simulation testing and conclusions. The agreed HCR will adjust the total allowable catch (TAC) from year (y) to year (y+1) according to:

$$TAC_{y+1} = TAC_y (1 + \lambda \times slope)$$

where :

slope = measure of the recent trend in survey biomass. The TAC is subject to constraints on a percentage change from one year to the next (maximum 5 %).

The management strategies based on the HCR identified above agreed by Fisheries Commission was:

	Management Strategy 2
Starting TAC Control Parameter	17, 500 t
λ if slope is negative	2.00
λ if slope is positive	1.00
Constraint on the rule-generated TAC change	± 5%

In 2010 average survey slopes over the most recent five years (2005-2009) for the Canadian Autumn Div. 2J3K index ("F2J3K"), the Canadian Spring Div. 3LNO index ("S3LNO"), and the EU Flemish Cap index covering depths from 0-1400m ("EU1400") yields slope= -0.009. Therefore, the agreed TAC for 2011 was set at 17,185 tonnes (TAC 2011 = 17500 * (1+ (2* -0.09)).

In 2011, NAFO SC computed survey slopes over the most recent five years (2006-2010). The data series included in the HCR computation are the Canadian Autumn Div. 2J3K index ("F2J3K"), the Canadian Spring Div. 3LNO index ("S3LNO"), and the EU Flemish Cap index covering depths from 0-1400m ("EU1400"). Averaging the individual survey slopes yields *slope*= -0.1130. Therefore, the estimated TAC for 2012 will be 13301 t (17185*[1+2*(-0.1130)] = 13 301 t.). However, as this change exceeds 5%, the HCR constraint is activated and TAC was set in 16,326 t. (0.95*17185=16 326 t).

The NAFO SC also noted in 2011 that the assumed catches in 2010 applied in all simulation testing during WGMSE were based on the TAC over-runs over the period 2004-2009 and ranged from 19.5 Kt to 23.2 Kt, with a median simulated catch 2010 of 20.7 Kt. However, the STACFIS estimate of catch for 2010 is 26.2 Kt, which is 26% higher than the median catch applied in simulation testing. Scientific Council notes that the estimated catch for 2010 exceeds the range included in WGMSE evaluations, and the degree of difference between MSE assumptions and current catch estimates may constitute an Exceptional Circumstance. In addition, WGMSE evaluations assumed that in all years subsequent to 2010, removals would exactly equal the TAC generated from the HCR. That is, there is no allowance for TAC over-runs. Continued catch over-runs would increase the probability that updated assessments will differ from the distribution of results from the set of OMs considered during WGMSE.

STECF COMMENTS: STECF agrees with the advice given by the NAFO Scientific Council in 2010 as the best option to assure the rebuilding of this stock to the agreed level of biomass in the Rebuilding Plan.

STECF also notes that the NAFO Fisheries Commission agreed a TAC for Greenland halibut in Division 3LMNO for 2011 of 17,185 t and at its September 2011 annual meeting set a TAC of 16,326 t for 2012 on the basis of an agreed HCR

STECF further notes that the catches in excess of Rebuilding Plan TACs as well as catches in excess of the ones used in the simulation testing of MSE will compromise the prospects of rebuilding of this stock by the agreed timeline.

12.5. Skates & Rays (*Rajidae*) in areas 3LNO

Thorny skate on the Grand Banks was first assessed by Canada for the stock unit 3LNOPs. Subsequent Canadian assessments also provided advice for Div. 3LNOPs. However, Subdivision 3Ps is presently managed as a separate unit by Canada, and Div. 3LNO is managed by the NAFO.

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.

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 2005-2009 in Div. 3LNO, and Canada set a TAC of 1 050 t for Subdivision 3Ps. For 2010 and 2011, the TAC for Div. 3LNO has been reduced to 12 000 t. Catch estimates for 2008, 2009 and 2010 are 7 400 t, 4 500 t, and 3 100 t. for Div. 3LNO respectively. The catches for Subdivision 3Ps are 1 400 t, and 600 t. and 300 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; 1996-2010) and autumn (1990-1994, 1995-2010) surveys. EU-Spain survey indices were available in the NAFO Regulatory Area of Div. 3NO (1997-2010). EU-Spain survey indices in the NRA of Div. 3L are available for 2006-2010 but are not considered due to the short time series. Commercial length frequencies were available for EU-Spain (1985-1991, 1997-2010), EU-Portugal (2002-2004, 2006-2010), Canada (1994-2008), and Russia (1998-2010).

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 2010 at low levels.

RECENT MANAGEMENT ADVICE: The most recent management advice was given based on 2010 assessment.
NAFO Scientific Council, to promote recovery of thorny skate, 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. STECF also notes that at the September 2011 NAFO Annual Meeting, the NAFO Fisheries Commission agreed a TAC for thorny skate in Divisions 3LMNO of 8,500 t for 2012 to be more in accordance with the management advice recommendation given by NAFO SC. STECF notes that the current TAC agreed is still 70 % higher than the recommended total catch but also that the current catches are lower than the recommended catch of 5,000 t. and the agreed TAC.

12.6. 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 suggest 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, rose to an average about 40 000 t from 1986-1993, and have dropped 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 the NAFO Scientific Council.

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: The most recent assessment was undertaken in 2010 and the following advice from the NAFO SC was given in its 2010 report:

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. STECF also notes that at the September 2011 NAFO Annual Meeting, the NAFO Fisheries Commission agreed a TAC for redfish in Divisions 3LN of 6,000 t for 2012.

12.7. Redfish (*Sebastes spp.*) in Division 3M

There are three species of redfish that are commercially fished on Flemish Cap; the deep-sea redfish (*Sebastes mentella*), the golden redfish (*Sebastes marinus*) and the 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 (*S. mentella and S. 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 300 m, basically pursued by Portuguese bottom trawl and Russia pelagic trawl. Furthermore, the reopening of the Flemish Cap cod fishery in 2010 also contributed to the actual level of redfish catch of 8 500 t. This new reality implied a revision of catch estimates, in order to split 2005-2010 redfish catch from the major fleets on Div. 3M into golden and beaked redfish catches.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the NAFO Scientific Council.

REFERENCE POINTS: No updated information on biological reference points is available.

STOCK STATUS: Scientific Council concluded that the declines of stock abundance and biomass, observed since 2008, were extended to the survey female spawning component in 2009-2010. These declines could not be explained by a commercial catch that has been chronically small for more than a decade. The assessment results can only reflect the declines foreseen by the EU survey if natural mortality is allowed to suffer an important increase since 2006.

RECENT MANAGEMENT ADVICE: In order to sustain the female spawning stock biomass on the short term, fishing mortality should be kept at its present low level. This would correspond to an expected average 2012-2013 beaked redfish catch under F status quo of 3 087 t. Catch for all redfish species combined in Div. 3M in 2012 and 2013 should not exceed 6 500 t.

STECF COMMENTS: STECF agrees with the advice from the NAFO Scientific Council and notes that at the September 2011 NAFO Annual Meeting the NAFO Fisheries Commission agreed a annual TACs of 5,500 t for redfish in Division 3M for 2012 and 2013 in line with Scientific Council advice.

12.8. 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: The redfish fishery within the Canadian portion of Div. 3O has been under TAC regulation since 1974 and a minimum size limit of 22 cm since 1995, while catch in the NRA portion of Div. 3O during that same time was regulated only by mesh size. A TAC was adopted by NAFO in September 2004. The TAC has been 20 000 t from 2005-2010 and applies to the entire area of Div. 3O. 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 totalling 6 431 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the NAFO Scientific Council.

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: The most recent assessment was undertaken in 2010 and the following advice from the NAFO SC was given in its 2010 report:

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 notes that at the September 2010 NAFO Annual Meeting the NAFO Fisheries Commission agreed a annual TACs of 20,000 t for redfish in Division 3O for each of the years 2011, 2012 and 2013.

12.9. White hake (*Urophycis tenuis*) in Divisions 3N, 3O and Subdivision 3Ps.

The advice requested by Fisheries Commission is for NAFO Div. 3NO. Previous studies indicated that white hake constitutes 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: Catches in Div. 3NO peaked in 1985 at 8 100 t, then declined from 1988 to 1994 (2,090 t average). Average catch was low in 1995- 2001 (464 t), then increased to 6 718 t and 4 823 t in 2002 and 2003, respectively, following recruitment of the large 1999 year class. Total catch decreased to an average of 767 t in 2005-2009, and was 226 t in 2010.

Catches of white hake in Subdiv. 3Ps were at their highest in 1985-1993, averaging 1 114 t, decreasing to an average of 668 t in 1994-2003. Subsequently, catches in Subdiv. 3Ps averaged 1 440 t in 2004-2007, and 443 t average in 2008-2010.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the NAFO Scientific Council.

REFERENCE POINTS: The Scientific Council was unable to define reference points for this stock.

STOCK STATUS: The biomass increased in 2000 with the large 1999 year-class. Subsequently, the

biomass index has decreased and remains at levels comparable to the period 1996-1999.

RECENT MANAGEMENT ADVICE: Given the current low level of recruitment, the Scientific Council advises that the current TAC of 6 000 t is unrealistic and that catches of white hake in Div. 3NO in 2012 and 2013 should not exceed their current levels.

STECF COMMENTS: STECF agrees with the advice from NAFO and notes that at the September 2011 NAFO Annual Meeting the NAFO Fisheries Commission agreed a annual TAC of 5,000 t for white hake in Divisions 3N, 3Oand Subdivision 3Ps for 2012.

13. 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. 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, sardinellas, 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 5.1 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, has not included fishering possibilities for deep-water shrimps and cephalopods,. Therefore, they have been excluded in the reports since 2010.. 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 was 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 2010 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). In addition, fishing effort by the EU fleet increased by 22% in 2010, due to the return of vessels that had been working in the southern Pacific for the previous three years. .

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 Casablanca, Morocco, from 14 to 28 May 2011, 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 recent 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 2011.

13.1. Sardine (*Sardina pilchardus*) off Morocco, Western Sahara (under Moroccan administration), Mauritania and Senegal

FISHERIES: Sardine is exploited along the Moroccan and the Western Sahara shelves in four different fishing grounds referred to as north stock (between 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.. Sardine, is the dominant small pelagic species in the total catch of the sub-region (Morocco, Sahara, Mauritania and Senegal).. A total of 0.93 million tonnes has been reported in 2010, 87% of them having been registered in the Moroccan zone, while the resting 13% corresponded to the Mauritanian zone.

Sardine constituted about 75% of the total small pelagic catches in Moroccan waters, with catches around 805 900 t in 2010, at similar levels than in 2009. . The average catches of sardine over the last five years (2006 to 2010) were around 700 000 t. In Mauritania, sardine exploitation in 2010 was carried out by a homogeneous fleet composed of freezer pelagic trawlers, mainly operating into the framework of either international fishing agreements (EU-Mauritania or Russian Federation-Mauritania) or private agreements. . Values were around 81 000 t in 2008, increasing to 100 000-125 000 in 2009-2010.

Sardine catches in Senegal are negligible in comparison to those in the rest of the area.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the FAO small pelagics working group (North) of the 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 Casablanca (Morocco), from 14 to 28 May 2011. 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). Limit reference points for the stock C of *S. pilchardus* were B_{MSY} = 1 612 229 and F_{MSY} = 0,53, while target reference points were $B_{0.1}$ = 1 773 451 and $F_{0.1}$ = 0.48.

STOCK STATUS: Biomass estimations from acoustic surveys carried out in the area amounted up to 4.42-4.47 million tonnes in 2008-2009, the 2010 biomass decreasing in 48% to 2.34 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. The model fit was not satisfactory for the central stock (A+B), . Therefore, the exploitation status of this stock was diagnosed through the analysis on the main abundance indicators in this zone. An important change attributed to an environmental anomaly detected since summer 2009, affected the distribution of small pelagic in the central area during 2010. This change resulted in a significant decrease in sardine biomass, displaying the lowest figure of the series with a population structure dominated by small sizes (mode between 12cm to 16 cm). The environmental conditions, together with a continuous fishing effort, led the central stock to an overexploitation status.

For Zone C, the assessment results indicate that the estimated biomass in 2010 was lower than the target biomass ($B_{cur}/B_{0.1}$= 62%),and that fishing mortality was lower than $F_{0.1}$ ($F_{cur}/F_{0.1}$= 79%), in spite of the catch increase during the last years. Therefore, the stock C is not fully exploited. However, this stock showed in 2010 the lowest biomass level registered in the whole time series.

RECENT MANAGEMENT ADVICE:. For the central stock of sardine (A+B), as a precautionary measure, and taking into consideration the lowest biomass index estimated by acoustic methods in 2010, the working group maintains the same suggestion of the last three years that catches should not exceed 400 000 t in 2011.

The fishing effort exerted on stock C is the most intense in all the area. The Working Group suggested that the total catch level should be adjusted to the natural fluctuations in the stock, which are mainly due to environmental factors. Therefore, the stock structure and abundance should be closely monitored by fishery independent methods in order to establish management measures necessary to ensure sustainable exploitation of this fishery in time.

STECF COMMENTS: STECF agrees with the advice from the small pelagics working group (North) of the Committee for the Eastern Central Atlantic Fisheries (CECAF).

13.2. 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 149 000 t in 2010, which involves an increase of 30% in relation to 2009.. Catches averaged around 129 300 t during the last five reported years (2006-2010). This increase was mainly registered in Moroccan waters, with a total catch of 36 000 t in 2010, that represented an increase of 110% in relation to 2009, However, it should be noted that around 76% of total anchovy catch in the region is caught in Mauritania and that Russian and Ukrainian fleets, which account for about 71% of the Mauritanian total, play an important role, while catches from the EU account for 29% in this country.. A great increase in total anchovy catch has been experimented in the region since 2006, which is partly explained 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 small pelagic working group (North) of the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). This Working Group met in Casablanca (Morocco), from 14 to 28 May, in 2011. 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. F_{MAX} and $F_{0.1}$ were chosen as Biological Reference Points. STECF did not have access to the specific values for the adopted reference points.

STOCK STATUS: The acoustic surveys developed in the region have shown an important increase in the overall anchovy biomass in 2010 in relation to 2009, which was mainly registered for Moroccan waters. Available data for anchovy in the sub-region in 2010 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) in 2009 and 2010. The LCA results indicated that the fishing mortality level in 2010 was at the same level than the fishing mortality corresponding to $F_{0.1}$.The results showed that the anchovy stock in the region was fully exploited.
The WG noted the qualitative and quantitative insufficiency of anchovy data from the different fishing zones, especially from Mauritania and from the Zone C. In spite of the fact that anchovy in Mauritania could constitute and important part in the total catch of the region, biological and effort data are not available for whole the analyzed period. In Morocco, data are only available in the North zone A+B. Furthermore, there are uncertainties about the stocks identity in the region. In addition, the abundance indexes from acoustic surveys show important fluctuations that are not reflected in the model used. All these factors, together with abundance dependency on the recruitment in this short living species, make that the consideration of full exploitation for this stock should be considered with caution.

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 suggested, as a precautionary measure that effort should not exceed the current level.
STECF COMMENTS: STECF agrees with the advice from the small pelagics working group (North) of the Committee for the Eastern Central Atlantic Fisheries (CECAF).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.

13.3. Black hake (*Merluccius senegalensis* and *Merluccius polli*) off Western Sahara (under Moroccan administration), Mauritania and Senegal

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the STECF Review of advice for 2011.

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 suggests that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

13.4. Octopus (*Octopus vulgaris*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the STECF Review of advice for 2011.

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 suggests that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

13.5. Cuttlefish (*Sepia hierredda* and *Sepia officinalis*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the STECF Review of advice for 2011.

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 suggests that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

13.6. Coastal prawn (*Farfantepenaeus notialis*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the STECF Review of advice for 2011.

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 suggests that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

13.7. Deepwater shrimp (*Parapenaeus longirostris*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the STECF Review of advice for 2011.

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 suggests that consideration be given to implementing an on-board observer scheme to obtain representative samples from all fleets participating in the fishery.

13.8. 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 13% (approximately 352 400 t) of the total catch of the main small pelagic species in 2010.This species, together with the round sardinella (*S. aurita*) dominated catches of the main small pelagic fish in Mauritania in 2010. The catch of this species has fluctuated over the time series with an overall increasing trend in recent years. The average annual catch of the Cunene horse mackerel over the last five years (2006-2010) was estimated at about 324 000 t. . About 110 500 t of Atlantic horse mackerel (*Trachurus trachurus*) were landed in 2010. This represents around 4% of the main small pelagic fish in this year. The average catch of Atlantic horse mackerel over the last five years was 105 400 t. The third species in this group, the false scad (*Caranx rhonchus*), showed an increase in total catch from 2009 to 2010, with total catch of around 42 700 t and 62 000 t respectively.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the small pelagic working group (North) of the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). This Working Group met in Casablanca (Morocco), from 14 to 28 May, in 2011. 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). For *T. trachurus*, limit reference points were B_{MSY} = 228 108 and F_{MSY} =0.40, while target reference points were $B_{0.1}$ = 250 919 and $F_{0.1}$ = 0.36. Reference points for *T. trecae* were B_{MSY} = 750 000 and F_{MSY} =0.36 (limit) and $B_{0.1}$ = 825 000 and $F_{0.1}$ = 0.33 (target).

STOCK STATUS: The Working Group considers one stock for each Trachurus species in the whole region. . Stock assessment of the two horse mackerel species was carried out using a surplus production model. Abundance index form acoustic surveys and CPUE of the Russian fleets were used as abundance indices for the assessments of *T. trachurus* and *T. trecae*, respectively. Results of the assessments showed that the estimated biomass of both stocks in 2010 was near half the value of the target biomass $B_{0.1}$ and that the fishing mortality exceeded the $F_{0.1}$level in 157% (*T. trachurus*) and 191% (*T. trecae*). Therefore, the fishing effort is greatly higher than the one that would keep the stocks at sustainable levels. These results evidence an overexploitation of the two horse mackerel stocks.

RECENT MANAGEMENT ADVICE: As a precautionary measure and taking into account the mixed nature if this fishery, it was suggested to decrease the effort of 2010 by 30%. The Working Group reiterated its recommendations of previous years (2010 and 2011) and suggested that 2012 total catches of the two species should not exceed330 000 t

STECF COMMENTS: STECF agrees with the advice from the small pelagic working group (North) of the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF).

13.9. 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 A+B (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. A purse seiners Spanish fleet has been operating in the North Zone into the framework of the EU-Morocco fishing agreement since 2007, although chub mackerel catch by this fleet is negligible. 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, by vessels chartered by Moroccan operators and by trawlers operating into the framework of the EU-Morocco fishing agreement. In the Mauritanian area, several pelagic trawlers from Russia and Ukraine operate, but only targeting chub mackerel following a seasonal pattern. On the other hand, the EU vessels, that target other small pelagic species, only capture chub mackerel as by-catch. 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 270 000 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 a minimum of 33000 t in 2006, followed to up and down periods. A total of 75 300 t were registered in 2010, which represents an increase of 69% in relation to the previous year, , The average catch for the last five years (2006-2010) was estimated at around 60 300 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the small pelagic working group (North) of the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). The last Working Group was held in Casablanca (Morocco), from 14 to 28 May, in 2011. 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). For the mackerel stock, limit reference points were $B_{MSY} = 610$, $F_{MSY} = 0.44$ and target reference points were $B_{0.1} = 671$ and $F_{0.1} = 0.44$.

STOCK STATUS: Acoustic biomass estimations increased from 100 000 t in 2000, to 850 000 t in 2005. During the following years, biomass has fluctuated to suffer a great decrease in 2010, when 285 000 t were registered, value that suppose a reduction of 62% in relation to the previous year. . A percentage of 54% of the estimated mackerel was located in the zone A+B, while 47% was between Cape Bojador and Cape Blanc. However, no mackerel was detected in Mauritanian waters during the 2010 acoustic surveys. 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 model showed that the current biomass (in 2010) was 36% lower than the target biomass $B_{0.1}$, while the fishing mortality Fcur was 31% higher than the target level $F_{0.1}$. The results of both the ICA and XSA analysis showed that the level of fishing effort deployed was slightly below the target effort. Although catches decreased during 2010 in relation to 2009, the biomass estimated by the model increased. Considering the results of the global model in relation to the biomass and fishing effort and taking into account the effort and catch reduction between 2009 and 2010, together with exceptional environmental conditions that led to an important biomass reduction, the working group decided to consider the stock fully exploited.

RECENT MANAGEMENT ADVICE: Based on the results obtained in the assessments, both by global and analytical models, and taking into account the fishing effort reduction together with a biomass decrease, which is mainly attributed to environmental conditions, the Working Group suggested that catches in 2012 should not exceed a maximum value of 200 000 t.

STECF COMMENTS: STECF agrees with the advice from the small pelagic working group (North) of the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF).

13.10. Sardinella *(Sardinella aurita* and *Sardinella maderensis)* off Mauritania and other countries in the northern CECAF region.

FISHERIES: Two species of sardinella occur in the region: the round sardinella (*Sardinella aurita*) and the flat sardinella (*Sardinella maderensis*). Each of the two species is consider constituting a separate stock, covering the area from the south of Senegal to Morocco. In zone C to the north of Cap Blanc, the sardinellas are exploited by a fleet of Moroccan purse seiners and by industrial trawlers from the Russian Federation, the EU, Ukraine and other countries. However, the greatest exploitation of takes place in Mauritania and Senegal. In Mauritania, the sardinellas are exploited by long-distance trawlers from the EU and other countries, by some small purse seiners, and by an artisanal fleet of canoes that originate not only from Mauritania but also from Senegal. The industrial fleet in Mauritanian waters can be divided in two segments: the EU fleet (Netherlands, France, England and Germany) and the other fleets. This division is based on the fact that the EU trawlers specifically target sardinellas, while the other trawlers mainly target horse mackerel, catching sardinellas as by-catch. In Senegal, sardinellas are exploited by the artisanal fleet and, to a much lesser extent, by the industrial fleet.

Sardinella spp constituted 26% of total catch of small pelagic fish off Northwest Africa in 2010, with 20% for round sardinella *S. a aurita* and 5% for flat sardinella *S.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 539 800 t (2010) in the period from 1990 to 2010. Over the last five years, total catch of *S. aurita* has been fluctuating around an average level of about 471 000 t. For *S. maderensis*, the catches show a long term increasing trend from 1997 (113 000 t) to 2003 (205 600 t). From 2003 onwards, catches generally decreased. However, an increase was observed from 130 000 t in 2009 to 158 900 t in 2010. The average catch of this species for the last five years (2006-2010) was 132 400 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the small pelagic working group (North) of the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF). Stocks of *S. aurita* and *Sardinella spp.* are assessed by the Working Group on the Assessment of Small Pelagics off Northwest Africa. This Working Group met in Casablanca (Morocco), from 14 to 28 May, in 2011. 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). Limit reference points for *S. aurita* were $B_{MSY} = 875$, $F_{MSY} = 0.33$ and target reference points for the same stock were $B_{0.1} = 963$ and $F_{0.1} = 0.29$. Limit and target reference points for the sardinella stock, considering the two species combined were, respectively, $B_{MSY} = 914$, $F_{MSY} = 0.45$ and $B_{0.1} = 1006$ and $F_{0.1} = 0.41$.

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 2010 estimation indicated a general increase to 1.7 million t, 1,3 t corresponding to *S. aurita* and 0.4 t to *S. maderensis*. The biomass of *S. aurita* declined by 52% from 2009 to 2010. At the same time, the stock showed an exceptional extension towards the north. In the same way, the biomass of *S. maderensis* decreased by 40% compared to 2009. . The stocks of sardinella where assessed by applying the Schaefer dynamic surplus production models. The abundance indices of the coordinated regional acoustic surveys were used in previous years for the assessment of the stocks of *S. aurita* and *Sardinella* spp. However, considering certain major gaps in sampling coverage in recent years, the working group decided that the quality of the acoustic index series had become insufficient to be used for tuning the production model. As an alternative, the CPUE series of the EU vessels in Mauritania was used as abundance index. The EU vessels target sardinella during the season when the stock is concentrated in Mauritanian waters. Although there are well-known drawbacks to the use of CPUE data as an abundance index for pelagic fish, the Working Group decided to use this series as there were no other alternatives available. It should be noted that catches by the EU fleet in Mauritania are composed for at least 90% of *S. aurita*. The CPUE in this fleet will therefore mainly reflect the abundance of this species. In addition, a positive environmental effect was applied in the model in those years when good recruitment occurred (2005 and 2007).

Both assessments (*S, aurita* stock and *Sardinella spp*. stock) indicate that the stocks are severely overexploited, despite the occurrence of good year-classes in 2005 and 2007. Current biomass (in 2010) was about half the target biomass, and current fishing mortality was three times higher than the target fishing mortality in both cases. At present, fishing effort and fishing mortality are at such a high level that even a strong year-class would be depleted in two years. The fishery has been able to continue the high catch levels in recent years only because of the strong recruitments. If no new strong year-classes appeared in 2011 and subsequent years, the stock will rapidly decline.

RECENT MANAGEMENT ADVICE:

The Working Group suggested a reduction of the fishing effort in 2012. It decided not to make any recommendation based on catch limitations, due to the inability to predict recruitments.

STECF COMMENTS: STECF agrees with the advice from the small pelagic working group (North) of the FAO Committee for the Eastern Central Atlantic Fisheries (CECAF).

13.11. Other demersal finfish in Mauritanian waters

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the STECF Review of advice for 2011.

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.

13.12. Deepwater shrimps off Guinea-Bissau

The results from the most recent assessment and advice for this stock were released in 2008. The text below remains unchanged from the STECF Review of advice for 2011.

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.

13.13. Octopus (*Octopus vulgaris*) off Guinea-Bissau

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the STECF Review of advice for 2011.

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.

13.14. Cuttlefish (*Sepia spp.*) off Guinea-Bissau

The results from the most recent assessment and advice for this stock were released in 2008. The text below remains unchanged from the STECF Review of advice for 2011.

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 cannot 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.

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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.

14. Resources in the area of WECAF

14.1. Shrimp (*Penaeus subtilis*), French Guyana

No information was available to STECF on the resource status or management advice for red snappers in French Guyana in 2011. Latest information available comes from a FAO report from year 2000[*]. The text below remains unchanged from the STECF Review of Advice for 2011.

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 in 1998. Over the historical time period of the fishery (1968-1999), catches have fluctuated between 1,500 t 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.

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.

14.2. Red snappers (*Lutjanus* spp.) waters of French Guyana

No information was available to STECF on the resource status or management advice for red snappers in French Guyana in 2011. Latest information available comes from a FAO report from year 2000*. The text below remains unchanged from the STECF Review of Advice for 2011.

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.

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),

* 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.

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.

15. Resources in the southeast Atlantic Ocean (SEAFO)

The most recent status and advice on stocks in the SEAFO region for Orange roughy, alfonsino, Patagonian toothfish and deep sea red crab was provided by the SEAFO Scientific Committee in its 2010 report which gave advice on TACs for 2011 and 2012. The advice below on pelagic armourhead relates to the 2011 report of the SEAFO SC.

15.1. Orange roughy (*Hoplostethus atlanticus*), SEAFO CA

FISHERIES: Since 1995, landings of orange roughy from the SEAFO convention area have been reported by Namibia, Norway and South Africa. Between 1995 and 2005, reported annual landings have fluctuated without trend from less than 1 t to 94 t. There has been no fishing for orange roughy and no reported landings since 1995.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the SEAFO.

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

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: The most recent advice is given in the 2010 report of the SEAFP Scientific Committee and reproduced below.

In 2009 SC commented as follows: Experience from other orange roughy fisheries around the world (New Zealand, west of Ireland etc) suggests that sustainable catches are of order of 2-3% of virgin biomass. Annual landings from the Namibian orange roughy in Sub-Division B1 peaked in 2001 at around 90 t and strongly declined thereafter to very low levels (for clarity presented again in this year's SSC report – Figure 9), which is reflected by available LPUE data. Additionally there is currently a moratorium on fishing for orange roughy in the Namibian EEZ adjacent to Sub-Division B1. The connectivity between the populations supporting these fisheries is unknown, but it is possible that these are from the same stock. Given this, SC recommends a zero catch limit for orange roughy in Sub-Division B1 for 2010 and 2011. In view of the unknown size of any orange roughy population that may exist in the remainder of the SEAFO CA, SC recommends a precautionary annual catch limit for 2010 and 2011 of 50 tonnes (i.e. around 50% of the maximum annual landings observed in the Sub-division B1 fishery) until such time as when additional information becomes available to identify sustainable fishing levels. This catch limit would prevent a strong increase in activity but permit exploratory fishing.

SC considers that the rationale described above is unchanged. There is no new information available for this species. SC therefore recommends the maintenance of a zero TAC for Sub-division B1 and a TAC of 50 t for the remainder of the SEAFO CA.

STECF COMMENTS: STECF notes that the SEAFO FC has set annual TACs for 2011 and 2012 in line with the SC advice as follows: a zero TAC for Sub-division B1 and a TAC of 50 t for the remainder of the SEAFO CA. A revised assessment and advice is scheduled to be provided by the SEAFO SC in 2012.

15.2. Patagonian toothfish (*Dissostichus eleginoides*), SEAFO CA

FISHERIES: Since 2002, landings of toothfish from the SEAFO convention area have been reported by EU (Spain), Japan, Korea and South Africa. The fishery is localized in Division D, between 40°S and 50°S. Three fishing grounds are in the area: Meteor Seamounts (Sub-Division D1), Discovery Seamounts (closed area) and

the 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. Reported landings and fishing effort have fluctuated without trend between 18 t and 393 t over the period 2002 – 2010. Provisionally reported landings for 2011 are 208 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 60°S) adjacent to SEAFO Division D.

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

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: In considering the TAC for toothfish in the SEAFO CA, SC took account of the precautionary approach and specifically the precautionary TAC in the northern component of CCAMLR sub-area 48.6. The current CCAMLR TAC for this area is 200 tonnes and in the absence of reliable information on stock status and the level of fishing mortality, if FC is minded to apply the precautionary approach, SC recommends that a precautionary catch limit of 200 tonnes be maintained in the SEAFO CA for 2011 and 2012.

STECF COMMENTS: STECF notes that the SEAFO Fishery Commission has set annual TACs for toothfish in the SEAFO convention area of 230 t for 2011 and 2012. A revised assessment and advice is scheduled to be provided by the SEAFO SC in 2012.

15.3. Alfonsino (*Beryx* spp.), SEAFO CA

FISHERIES: Since 1976, landings of alfonsino from the SEAFO convention area have been reported by Namibia, Norway, Russia, EU (Portugal), Ukraine and Korea and between 1976 and 2006 have fluctuated annually from less than 1 t and 4236 t. Between 1976 and 1982 reported landings averaged about 1130 t annually whereas between 1983 and 2006 average annually reported landings were about 67 t. There has been no fishing for alfonsino and no reported landings since 1995.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the SEAFO.

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

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: The most recent advice is given in the 2010 Report of the SEAFO SC and relates to 2011 and 2012 as follows: Alfonsino is not a long-lived, slowing growing species but is vulnerable to fishing because fisheries mostly target aggregations. Experience in the NAFO region suggests that, as with orange roughy, fishing often takes the form of short-term "mining" which can lead to sequential depletion of populations which even for alfonsino may take 15-20 years to recover.

In 2010 the total TAC has been taken by a single mid-water trawler but the only information available is a single length frequency distribution of sampled alfonsino from this vessel and spatial catch positions.

SC recommends a precautionary annual catch limit of 200 t for alfonsino in the SEAFO CA for 2011 and 2012 or until additional information becomes available to identify sustainable fishing levels.

STECF COMMENTS: STECF notes that the SEAFO Fishery Commission has set annual TACs for alfonsino in the SEAFO convention area of 200 t for 2011 and 2012. A revised assessment and advice is scheduled to be provided by the SEAFO SC in 2012.

15.4. Deep-sea red crab (*Chaceon* spp.), SEAFO CA

FISHERIES: The fishery for deep-sea red crab 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. Since 2001 reported annual landings have varied from less than 1 t in 2001 and a peak of approximately 800 t in 2007. Vessels from Japan, Namibia, EU (Spain) and EU (Portugal) have all participated in the fishery for deep-sea red crabs. Reported landings in 2010 were 200 t and provisional landings for 2011 are 160 t.

Currently, the fishery usually takes place during approximately three months per year and is carried out by one or two vessels.

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 reference points have been proposed for this stock.

STOCK STATUS: The status of the stock is unknown.

RECENT MANAGEMENT ADVICE: This year, SC remains in the position where there is an absence of information on the status of stock(s) and the level of fishing mortality. This species is recognized by the SEAFO to be relatively slow-growing, sporadically aggregating and to have a high vulnerability to fishing (Table 11 in SSC Report). A further concern is the lack of important biological information on the proportion of spawning females in catches as an indicator of whether fisheries are targeting spawning aggregations.

SC therefore recommends continued practice of using precautionary TACs. The average of the last three years' catches (2008-2010) gives 145 tonnes. However, as in previous years the averaging procedure has included data for the current year which is incomplete. If this year is excluded the average catch over the three recent years (2007-2009) is 348 tonnes.

SC recommends an annual catch limit of 200 tonnes for Sub-division B1 and 200 tonnes for the remainder of the SEAFO Convention Area for 2011 and 2012. SC notes that the Sub-division B1 has limited landings at the TAC level. In recent years there has been no fishing for deep-sea red crab in the remainder of the SEAFO CA.

STECF COMMENTS: STECF notes that the SEAFO Fishery Commission has set annual TACs for deep- sea red crab in the SEAFO convention area of 200 t for 2011 and 2012. A revised assessment and advice is scheduled to be provided by the SEAFO SC in 2012.

15.5. Pelagic armourhead (*Pseudopentaceros richardsoni*)

FISHERIES: Pelagic armourhead has an oceanic distribution, primarily in the vicinity of seamounts at depths ranging from 200 m – 500 m and are caught in the bottom and mid-water trawl fisheries directed to orange roughy and alfonsino in SEAFO regions A, C and B1. Between 1976 and 1982 reported landings varied between 53 t and 1435 t. Between 1983 ¿and 2005???? reported annual landings varied from zero and 25 t. No landings have been reported for the years 2005-2008 and no fishing of pelagic armourhead is reported to have taken place in 2009, 2010 or 2011.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the Scientific Committee of the SEAFO.

REFERENCE POINTS: No precautionary reference points have been proposed for pelagic armourhead in the SEAFO convention area.

STOCK STATUS: The status of the stock(s) of pelagic armourhead in the SEAFO convention area is unknown. The time series of abundance data is insufficient to evaluate any changes in stock status.

RECENT MANAGEMENT ADVICE: The SEAFO SC could not arrive at a consensus as to the content of management measures (precautionary TACs) for this species. Two opinions were expressed and these are given below.

OPINION A:-
In 2010 high landings of pelagic armourhead were recorded in the SEAFO area B1 and fishing activities have continued in 2011. This fishery occurs in a localized area of a single seamount and may therefore be vulnerable to rapid depletion. A further concern is that spawning aggregations of similar species of the same genus have been fished in the North Pacific to the extent where the reproductive viability of the remaining SSB has been compromised (Boehlert & Sasaki, 1988). Currently there are no management measures regulating catches of armourhead in the SEAFO CA. It is proposed that a precautionary TAC be applied to prevent the potential overexploitation of this stock. It is possible that similar fisheries may quickly develop on other seamount areas in the SEAFO area and any management measures introduced should also take this into account.

OPINION B:-

In the SEAFO CA, mid-water fisheries catching armourhead newly started by only one vessel in 2010, after 11 years (1998-2009) of almost no fishing . Two vessels are operating in 2011. Under such situation, it is scientifically very premature to establish the precautionary TAC. There have been important fisheries targeting armourhead in other waters, such as the Emperor Sea Mount in the Pacific, developed by many fishing vessels. . As they caught large amounts of pelagic armourhead, a long term moratoria was established in the past (e.g., 15 years in the Four Emperor Sea Mount). Thus, the situation in the SEAFO CA is far different from those in other waters. Therefore it is essential to wait until a few more years catch statistics are available to evaluate if TAC needs to be established.

STECF COMMENTS: STECF notes that currently there are no management measures to regulate the catches of pelagic armourhead in the SEAFO convention area. However given the vulnerability of aggregations to fishing and risk of rapid and possibly sequential depletion, STECF advises that it would seem prudent to introduce measures to limit catches of pelagic armourhead and to restrict any potential expansion of fisheries that exploit this species in the SEAFO convention area

16. Resources in the southwest Atlantic Ocean

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 (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 scientific advice from the Instituto Español de Oceanografía (IEO, Spanish Institute of Oceanography) based on the results of 13 multidisciplinary research cruises carried out in international waters of the SW Atlantic between October 2007 and April 2011. The core of this advice, consisting in the proposal of nine candidate areas for closure along the Patagonian Shelf and slope, due to identified presence of Vulnerable Marine Ecosystems (VMEs) or sensitive habitats and/or organisms. Accordingly to this advice, the Spanish Administration implemented on 1st July 2011 a fishing ban in the proposed areas for the Spanish bottom trawling fleets operating in the high seas of the SW Atlantic.

In October 2007, the IEO 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. The study, comprising a total of 13 cruises, finished in April 2010 and included the analysis of bottom trawling activities on VMEs. Research activities involved 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 were therefore incorporated in the appropriate stock sections of the Review of Scientific Advice for 2011.

The research undertaken and its main findings led to the delineating of nine areas to be protected, according to biological, geological and mix (biological and geological) criteria adopted for the quantitative, qualitative and geographic description of the areas with the presence of organisms, habitats and ecosystems classified as vulnerable (figure 1).

The final report of the study with the location and features of candidate VMEs in the area, identifying any potential interactions with fishing activities was presented to the Spanish Administration[1] and also its main conclusions were discussed in a workshop held in Lisbon[2] in May 2011 to consider the United Nations General Assembly (UNGA) resolutions on high seas bottom fisheries: what progress has been made and what the outstanding issues are.

[1] Informe sobre Ecosistemas Marinos Vulnerables en aguas internacionales del Atlántico Sudoccidental y de las posibles interacciones con las actividades pesqueras

[2] The impact of deep-sea fisheries and implementation of the UNGA Resolutions 61/105 and 64/72

Finally, also the main conclusions of the study were presented in a workshop organised by the UNGA[3] to discuss implementation of paragraphs 80 and 83 to 87 of resolution 61/105 and paragraphs 117 and 119 to 127 of resolution 64/72 on sustainable fisheries, addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep sea fish stocks (New York, 15 - 16 September 2011).

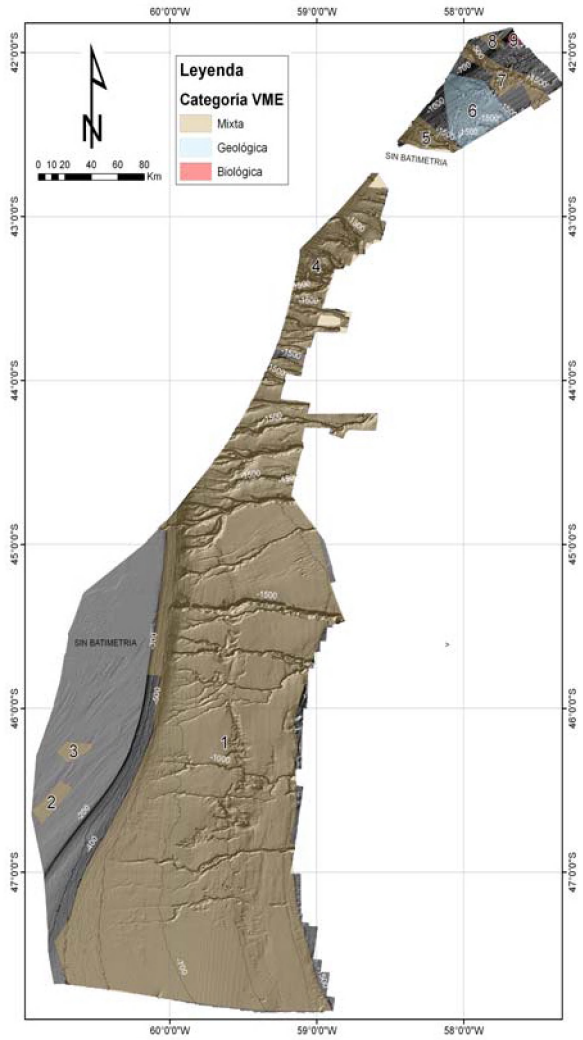


Figure 1. Candidate sites for protected areas in the HS of SW Atlantic. Only candidate areas 2 and 3 are on the continental shelf at depths less than 200 m.

RESOURCES IN FALKLAND ISLANDS WATERS

16.1. 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 2011 was 18 755 t, an increase compared to recent years. Hoki is mainly targeted in two seasons, from February-May and from July-October.

[3] Workshop to discuss implementation of paragraphs 80 and 83 to 87 of resolution 61/105 and paragraphs 117 and 119 to 127 of resolution 64/72 on sustainable fisheries, addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep sea fish stocks

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.

16.2. 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 200–350 m depth.

In the years 2006-2011 dense commercial aggregations (CPUEs >15 tonnes per day) of grenadiers were explored in the eastern and southern Falkland slopes, mostly between 700 and 900 m depth. Total catches of these grenadiers were 932 t in 2008, 958 t in 2009, 450 t in 2010, and 1,974 t by the end of September 2011. Total longline bycatch in January – September 2011 was 85 t, the rest being taken by trawlers. The minimum biomass of grenadiers in the Falkland waters was estimated as 184 000 t, that on the high seas, 40 000 t.

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.

16.3. 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 Islands 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 2011 was 1 749 t only, the lowest catch on record. This decrease in the total catch is a reflection of the rapid biomass decrease in the Falkland Islands' waters.

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: The total catch of SBW should be limited to 50 000 t or even lower in the Southwest Atlantic.

STOCK STATUS: The latest stock assessments of Southern blue whiting in the Southwest Atlantic performed by FIFD in April 2011 suggested that the spawning stock biomass (SSB) decreased rapidly since the early 90's (1 500 000 t) and reached a level of ~321 000 t at the end of 2010. This is approximately 13% of the spawning stock biomass in the early 1990s.

RECENT MANAGEMENT MEASURES: It was agreed to restrict the total catch of SBW in the Falkland Islands' Conservation Zones to 13 000 t (6 000 for pelagic and 7 000 for finfish fleet).Fishing in the southern region of FICZ in the spawning grounds was banned for surimi and finfish vessels from 1 September until 15 October 2011 to allow the fish to spawn undisturbed.

STECF COMMENTS:

STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic into a regional fisheries organization. This is an example of the demises of a once lucrative fishery due to over fishing.

16.4. 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 5 119 t in 2009. The total catch in January – September 2011 (3 275 t) was higher than for the same period in 2010. Both 2011 and 2010 were lower than 2009 mainly due to the fishing ban on their spawning grounds October in the area to the southwest of the Falkland Islands. The closure of the southern blue whiting spawning grounds in September may have also had an impact on catches.

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 MEASURES: 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. This closure continued through 2011 and will be enforce during 2012.

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.

16.5. 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 at ~13 300 t in 2010. In 2011, cumulative annual catch of hakes up to 30th September achieved 8 711 t which represented the 3rd 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 Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

REFERENCE POINTS: No reference points have been proposed 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 2001-2002 when the juvenile abundance increased 5-10 times compared to the period 1996-2000. The stock appears to have improved since effort has been held constant and catches have increased.

RECENT MANAGEMENT MEASURES: 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.

16.6. 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). Comparing with the previous season of 2010, the South Patagonian Stock had higher abundance that resulted in a total catch of 79 361 t of *Illex* taken within the Falkland Conservation Zones. The oceanographic situation in March 2011 was characterized by strong positive anomalies of sea surface temperatures (1-1.5°C). The month was much warmer than March 2010 and slightly warmer than March 2009 when positive anomalies were moderate. Sixty two jigging vessels fished for *Illex* on the 1st of March, with their numbers gradually increasing to 88 vessels by the 8th of March and 90 vessels by the 28th of March. Daily CPUEs were at moderate level (mean monthly CPUE of 22 t per night) and variable. In the same grid square, some vessels could have 40 t of squid per night, and some only 4-5 t per night. Maximum CPUEs (125-130 t per night) were reported in the second half of the month. Most of the yield was taken on the boundary of a warm inflow of shelf waters to the north of East Falkland. In the first week of April, catches were generally good with average daily CPUEs of 15-25 t per night (maximum 96 t per night). Then squid of the early South Patagonian stock (ESPS) began their northward pre-spawning migrations that resulted in gradual decrease in catches to 4-10 t per night (maximum 63 t per night). Aggregations of ESPS virtually disappeared from FICZ in the second half of April. Jigger catches dropped down to 1-2 t per night (maximum 10 t per night), and vessels started to leave the fishery. By the end of the month squid of the late SPS did not appear in Falkland waters, and the fishery was virtually finished by the second week of May

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 2011, the winter-spawning South Patagonian Stock had a medium 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.

16.7. 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 2011, the abundance of both cohorts of Loligo was quite low.

The first season yielded 15 437 t, and the second season 19 129 t with the total annual catch of 34 566 t. The fishery in the first season was quite unstable, with several relatively small peaks in abundance both in the northern and southern parts of the *Loligo* box. Overall, the total in-season immigration of *Loligo* into the fishing area was estimated at 10 415 ± 6 892 t. Combined with the pre-season estimate of 16 095 ± 8 263 t, a total of 26 510 ± 10 760 t of *Loligo* were present in the *Loligo* box during the first season of 2011. The final total biomass of *Loligo* remaining in the Box at the end of the first season was estimated to be 9 115 t, with 95% confidence intervals of 5 735 t to 16 026 t. The risk of *Loligo* escapement biomass at the end of the season being less than 10 000 t was estimated at 53.5%.

During the second season, only one significant peak in *Loligo* biomass was observed at the end of July-beginning of August. Then, quite unusual environmental conditions with rare westerly winds did not favour aggregations of *Loligo*. The stocks were dispersed, causing rather low mean daily CPUEs of the fleet, 9-11 t per day. On September 22nd, *Loligo* biomass remaining in the fishing area was estimated at 20 660 t. Projection of the depletion model forward to September 30th estimated 20 064 t. Effectively, the depletion model had reached a 'flat-line' state, at which the consistent but low catches were not introducing any further signal to the model. This diminished the stability of the model and the predictability of the biomass, motivating the decision to close the fishery a week early.

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: The status of the stock is changing every year due to the short life cycle of the squid (1 year).

RECENT MANAGEMENT MEASURES: Due to the low *Loligo* abundance in 2011, the second season was finished a week earlier than planned on 22 September 2011.

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.

16.8. 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. Stock assessments indicated that the TAC should remain at 1 200 t for 2011 as was the advice for 2008, 2009 and 2010. The total catch in trawl and longline fisheries in January – September 2011 was 1 338 t which was greater than for the same period in 2010 (1 220 t).

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 fishery data for 2010 indicated a stabilised toothfish stock abundance at 56% SSB_0. Stock assessment recommended that a TAC of 1 200 remain for 2011. There have been encouraging levels of recruitment of juvenile fish in shelf waters since 2006 with 2010 seeing the second largest abundance on the shelf since records began. This portion of the population will start to become available to the longline fishery in ~ 1 – 2 years time.

RECENT MANAGEMENT ADVICE: Stock assessments indicated that the TAC should remain at 1,200 t for 2012 as was the advice for 2008, 2009, 2010 and 2011. 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. The closure was continued through 2008, 2009, 2010 and 2011. It is recommended that it also continue through 2012 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 INTERNATIONAL WATERS

No more surveys for biomass estimations have been made since 2010. Hence, sections 16.9 to 16.15 remain largely unchanged from the STECF review of advice for 2011.

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.

Based on the results of the study carried out by the IEO, including 13 multidisciplinary surveys, nine large areas on the high seas along the Patagonian Shelf and slope were proposed to be designated as VMEs and closed to bottom trawling. Seven of the areas cover most of the slope between 300 and 1,500 metres, while the remaining two cover areas along the shelf at depths shallower than 200 metres. These areas are located between 42º and 48ºS, an area where a fleet of approximately 27 Spanish bottom trawlers fish, primarily for hake and squid. The closure is a condition of the permit to fish in the region issued by the Government of Spain, pursuant to EC regulation 734/2008.

Assessments of this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains unchanged from the STECF review of advice for 2011.

16.9. Hoki (*Macruronus magellanicus*), International waters

Assessments for this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains unchanged from the STECF review of advice for 2011.

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 MEASURES: Since 1st July 2011 and following scientific advice by the IEO, a fishing ban was put in force by the Spanish Administration in certain areas of the international waters for the Spanish bottom trawling fleets operating there.

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.

16.10. Patagonian grenadier (*Macrourus carinatus*, *Macrourus holotrachys*), International waters

Assessments of this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains unchanged from the STECF review of advice for 2011.

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 MEASURES: Since 1st July 2011 and following scientific advice by the IEO, a fishing ban was put in force by the Spanish Administration in certain areas of the international waters for the Spanish bottom trawling fleets operating there.

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.

16.11. Southern blue-whiting (*Micromesistius australis*), International waters

Assessments of this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains unchanged from the STECF review of advice for 2011.

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 MEASURES: Since 1st July 2011 and following scientific advice by the IEO, a fishing ban was put in force by the Spanish Administration in certain areas of the international waters for the Spanish bottom trawling fleets operating there.

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.

16.12. Red cod (*Salilota australis*), International waters

Assessments of this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains unchanged from the STECF review of advice for 2011.

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 MEASURES: Since 1st July 2011 and following scientific advice by the IEO, a fishing ban was put in force by the Spanish Administration in certain areas of the international waters for the Spanish bottom trawling fleets operating there.

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.

16.13. Argentine hake, Austral hake (*Merluccius hubbsi, Merluccius australis*), International waters

Assessments of this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains unchanged from the STECF review of advice for 2011.

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°-48°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 MEASURES: Since 1st July 2011 and following scientific advice by the IEO, a fishing ban was put in force by the Spanish Administration in certain areas of the international waters for the Spanish bottom trawling fleets operating there.

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.

16.14. Argentine short-finned squid (*Illex argentinus*), International waters

Assessments of this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains unchanged from the STECF review of advice for 2011.

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°-47°S.

Concentrations of short-finned squid are found 45°-46°S in January or February and the animals gradually migrate southward towards the Falkland Islands while growing rapidly. Peak concentrations are found around

the Falkland Islands between March and May. Towards the end of this period, animals start migrating northward to spawn and die around July or August.

Since the early 1980s, Argentine short-finned squid have been caught by Spanish bottom trawlers as 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 MEASURES: Since 1st July 2011 and following scientific advice by the IEO, a fishing ban was put in force by the Spanish Administration in certain areas of the international waters for the Spanish bottom trawling fleets operating there.

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.

16.15. 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 42ºS, 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 46ºS. Estimated biomass in 2010 was 42 t.

RECENT MANAGEMENT MEASURES: Since 1st July 2011 and following scientific advice by the IEO, a fishing ban was put in force by the Spanish Administration in certain areas of the international waters for the Spanish bottom trawling fleets operating there.

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.

17. Highly migratory fish (Atlantic Ocean and Mediterranean Sea)

17.1. Bluefin (*Thunnus thynnus*), Eastern Atlantic and Mediterranean

The stock status for bluefin tuna in the East Atlantic and Mediterranean was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011

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.

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 European Commission's 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.

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. STECF suggest, therefore, that although a $F_{0.1}$ strategy starting in 2011 would not allow the rebuilding of the stock to $SSB_{F0.1}$ by 2022; the current agreed TAC of 12,900 t for 2011 and thereafter would imply that the probability of reaching $F_{0.1}$ in 2015 is in excess of 90% (Table 17.1).

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.

17.2. Bluefin (*Thunnus thynnus*), Western Atlantic

The stock status for bluefin tuna in the Western Atlantic was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011

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 declining since then to 1,830 t in 2010. 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: B in relation to Bmsy and F in relation to Fmsy.

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 analyss is 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. ICCAT (Rec 10-3) set the quota for this stock to 1,750 t for 2011 and 2012.

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.

17.3. Albacore (*Thunnus alalunga*), North Atlantic Ocean

The stock status for Albacore in the North Atlantic Ocean was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 15,369 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 and the surface fisheries accounted for the bulk of the total catch with 12,911 t (81%). Preliminary data for 2010 indicate an increase in catch last year to 16,554 t.

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 since 2008 catches were lower than 28,000 t. SCRS recommends to maintain the same TAC for 2012.

STECF COMMENTS: STECF agrees with the advice from ICCAT that catches below 28,000 t will achieve the ICCAT conservation objective of achieving BMSY by 2018. 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. No such assessment is currently available and the advice continues to be based on the 2009 assessment. Changes in the above text reflect only the availability of more recent catch data.

17.4. 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. Reported landings for 2010 were 18,900 t a decrease of about 19 % from 2009 catches.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT. The management is based on the 2011 assessment based on the results of 4 ASPIC and 4 BSP assessments with alternate settings as well as projections based on those models (Kobe 2 strategy matrix integrating the uncertainty from).

REFERENCE POINTS: The latest advice is based on the integration of uncertainty across several models and settings and, thus, ICCAT provides a range of plausible values of MSY between 23,630 and 98,371 with a median value of 27,390 t.

STOCK STATUS:
Most scenarios examined in the 2011 assessment indicate that the south Atlantic albacore stock is both overfished and suffering overfishing. Projections showed that harvesting at the current TAC level (29,900 t) would further decline the stock. However, if catches continue at the level of those experienced in the last few years, there is more than 50% probability to recover the stock in 5 years, and more than a 60% probability to do so in 10 years. Thus, it is recommended not to increase catches beyond 20,000 t. Further reductions in catches would increase the probability of recovery in those timeframes.

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 2007-2010 (20,274, 18,576, 22,828 t and 18,900 t respectively) were well below this TAC.

In 2011, ICCAT – SCRS recommended not to increase catches beyond 20,000 t.

STECF COMMENTS: STECF agrees with the advice from ICCAT-SCRS but notes that recent catches have been around the 20,000 t level recommended as the appropriate level of TAC likely to recover the stock by 2017/2022.

17.5. 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 relate 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. Management advice is based on the first assessment of Mediterranean Sea Albacore in 2011.

REFERENCE POINTS: No precautionary reference points have been proposed for this stock, but ICCAT proposed an 'assumed M' as a provisional proxy for F_{MSY} in light of considerable uncertainty in growth and true M and the known sensitivities of reference points to variability in these life history parameters, until additional information becomes available to develop more robust estimates.

STOCK STATUS: The available information on Mediterranean albacore stock status indicates a relatively stable pattern for albacore biomass over the recent past. Unfortunately, very little quantitative information is available to SCRS for use in conducting a robust quantitative characterization on biomass status relative to Convention Objectives. While additional data to address this issue might exist at CPC levels, our ability to provide quantitative management advice will be seriously impeded until such data become available either through recovery of historical data or institution of adequate fishery monitoring data collection programs.

RECENT MANAGEMENT ADVICE: Recent fishing mortality levels appear to have been reduced from those of the early 2000's, which were likely in excess of FMSY, and might now be at about or lower than that level. However, there is considerable uncertainty about this and for this reason, the Commission should institute management measures designed to limit increases in catch and effort directed at Mediterranean albacore.

STECF COMMENTS: STECF notes that data collection for this species is mandatory within the EC data collection framework. STECF has in the past strongly supported the previous recommendation of the ICCAT/SCRS concerning the collation of historical data. Some of this work has been carried out towards the 2011 assessment, but according to ICCAT this work needs to continue. In addition, STECF has commented in the past that there has been considerable illegal fishing in the recent past and it is not clear from the ICCAT report whether attempts have been made to incorporate this information in the most recently available datasets. STECF advises caution in the use of the proposed proxy for FMSY as a basis for management decisions because of the circularity of fixing an assumed value for natural mortality and at the same time using the same value as a proxy for a management reference point.

17.6. 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. Total recorded catches in 2010 have been 108,343 t similar to catch levels since 2005 with the exception of 2007 when catches were 10% less.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the ICCAT-SCRS. The current advice is based on the 2011 assessment of the stock.

REFERENCE POINTS: The estimate MSY for this stock is 144,600 t. with a range between 114,200 and 155,100 t.. The B_{2010}/B_{MSY} was estimated around 0.85 (0.61-1.12) and F_{2010}/F_{MSY} 0.87 (0.68-1.40). When the uncertainty around the point estimates from various models options is taken into account, there was only an estimated 26% chance that the stock was not overfished and overfishing was not occurring in 2010.

STOCK STATUS:
A full stock assessment was conducted for yellowfin tuna in 2011, applying both an age-structured model and a non-equilibrium production model to the available catch data through 2010. As has been done in previous stock assessments, stock status was evaluated using both production and age-structured models. Models used were similar in structure to those used in the previous assessment, however, other alternative model structures of the production model and the VPA were explored in sensitivity runs. These runs confirmed that some of the estimated benchmarks obtained from production models are somewhat sensitive to the assumption used that MSY is obtained at half of the virgin biomass. This assumption was used in the production models that contributed to benchmark estimates found in this report.

The estimate of MSY (~144,600 t) may be below what was achieved in past decades because overall selectivity has shifted to smaller fish the impact of this change in selectivity on estimates of MSY is clearly seen in the results from age structured models. When the uncertainty around the point estimates from both models is taken into account, there was only an estimated 26% chance that the stock was neither overfished nor was overfishing occurring in 2010.

In summary, 2010 catches are estimated to be well below MSY levels, stock biomass is estimated to most likely be about 15% below the Convention Objective and fishing mortality rates most likely about 13% below FMSY. The recent trends through 2010 are uncertain, with the age-structured models indicating increasing fishing mortality rates and decline in stock levels over the last several years, and the production models indicating the opposite trends.

RECENT MANAGEMENT ADVICE:
The Atlantic yellowfin tuna stock was estimated to be overfished in 2010. Continuation of current catch levels (110,000 t) is expected to lead to a biomass somewhat above BMSY by 2016 with a 60% probability. Catches approaching 140,000 t or more would reduce the chances of meeting Convention Objectives below 50%, even after 15 years (2025). In addition, the Commission should be aware that increased harvest of yellowfin on FADs could have negative consequences for bigeye tuna in particular, as well as other by-catch species. Should the Commission wish to increase long-term sustainable yield, the Committee continues to recommend that effective measures be found to reduce FAD-related and other fishing mortality of small yellowfin.

If the provisional estimates of unreported purse seine catches are considered, estimates of current stock status and projections would be more pessimistic. It is especially important to implement effective full monitoring of the fleet for which the Committee has provisionally estimated unreported catch.

STECF COMMENTS: STECF agrees with the ICCAT advice, but notes that the current procedure of using median or maximum likelihood values of exploitation or biomass based on the potentially multi-modal bootstrap probability profiles summed over a number of assessments may be inappropriate or at least unhelpful when trying to ascertain the most likely state of the stock. As a result the uncertainty in the assessment results may be greater than that indicated by the probabilities ascribed to the estimates of F/F_{MSY} and SSB/SSB_{MSY} given above.

17.7. Bigeye (*Thunnus obesus*), Atlantic Ocean

The stock status for Bigeye in the Atlantic Ocean was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 2010 of Bigeye tuna in the Atlantic are currently estimated around 76,000 t a considerable decrease from 2008 (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 to 81,813011 t in 2009. The provisional catch was 75833 t. in 2010.

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. The last stock assessment was carried out in 2010, with the same methodology of the previous one in 2007.

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

STOCK STATUS: 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 78,100 t to 101,600 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. 10-01]. Catches made by other fleets not affected by ICCAT Rec. 10-01 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 10-1 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.

17.8. Swordfish (*Xiphias gladius*), North Atlantic

The stock status for swordfish in the North Atlantic was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 2010 (12,566) represents a 40% decrease since the 1987 peak in North Atlantic landings (20,236 t) and since 2003 the catch has been maintained around 12,000 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 F_{MSY} since 2005. The results suggest that there is greater than 50% probability that the stock is at or above B_{MSY}, and thus the ICCAT rebuilding objective has been achieved. In summary, the stock is estimated to be not overfishing (B> B.) and overfishing is not occurring ($F<F_{MSY}$).

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 B_{MSY} while maintaining F at or below F_{MSY}, 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.

17.9. Swordfish (Xiphias gladius), South Atlantic

The stock status for swordfish in the South Atlantic was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 2010, the preliminary reported catches were 12566 t about 44% lower than the 1995 reported level and catches have been at this level following a significant decline in 2008.

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 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 (F_{2008}/F_{MSY}) was 0.75 indicating that the stock is not suffering overfishing. Estimated relative biomass (B_{2009}/B_{MSY}) 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.

17.10. Swordfish (Xiphias gladius), Mediterranean Sea

The stock status for swordfish in the Mediterranean Sea was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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. Catches in 2008 and 2009 were around 12,000 t, but preliminary results for 2010 indicate and increase to 13,430t. 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. The current management advice is based on the most recent (2010) stock assessment.

REFERENCE POINTS: MSY is estimated to be around 14,600 t given the current exploitation pattern.

STOCK STATUS: 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 B_{MSY} 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.

ICCAT agreed recommendation [09-04] where a ban on swordfish, both as a targeted fishery and as by-catch, is implemented in the Mediterranean during the period from 1 October to 30 November each year, until a long-term management plan is decided by ICCAT.

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.

17.11. Skipjack (*Katsuwonus pelamis*), Eastern Atlantic

The stock status for skipjack in the Eastern Atlantic was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

FISHERIES: The preliminary estimates of catches made in 2010 in the East Atlantic amounted to 164 000 t, that is, an increase of around 35% compared to the average of 2005-2009.However, tt is possible that the catches of a segment of the Ghanaian purse seine fleet, transshipped at sea on carriers, skip the collection process of fishery statistics.

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 30°W 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. Management advice is based on the most recent stock assessment conducted in 2008.

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 30°W longitude, the SCRS decided to maintain the hypothesis in favor of two distinct stock units, based on available scientific studies. However, taking into account the biological characteristics of the species and the geographic distances between the various fishing areas, the use of smaller stock units continues to be the envisaged hypothesis.

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 specific management recommendations in this respect, they adviced that 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, but notes that if 2010 landings are confirmed at the levels currently estimated (164,000 t) this would imply that catches have increased at the higher range limit of MSY.

17.12. Skipjack (*Katsuwonus pelamis*), Western Atlantic

The stock status for skipjack in the Western Atlantic was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 and the provisional catches were only 18,140 t in 2010, however the complete submission of Brazil's Task I data should bring this amount towards the average catch observed for recent years. 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. The 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 and 36,000 t. It must be stressed that all of these analyses correspond to the current geographic coverage of this fishery (i.e., relatively coastal fishing grounds due to the deepening of the thermocline and of the oxycline to the East).

For the western Atlantic stock, in the light of the information provided by the trajectories of B/B_{MSY} and F/F_{MSY}, 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: STECF agrees with the advice from ICCAT/SCRS and notes that recent year catches are lower than MSY levels.

17.13. Marlins (*Makaira nigricans* and *Tetrapturus albidus*), Atlantic Ocean

The stock status for white marlin was not updated by ICCAT SCRS in 2011. The majority of the text pertaining to this stock therefore remains largely unchanged from the STECF Review of Advice for 2011. For Blue Marlin a 2011 assessment forms the basis of advice and the relevant sections have been updated.

FISHERIES: 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, 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.

During the 2011 blue marlin assessment it was noted that catches continued to decline through 2009, while catches of white marlin seemed to be stabilizing. Over the last 20 years, Antillean artisanal fleets have increased the use of Moored Fish Aggregating Devices (MFADs) to capture pelagic fish. Catches of blue marlin caught around MFADs are known to be significant and increasing in some areas, however reports to ICCAT on these catches are incomplete. Even though catches from the Antillean artisanal fleets were included in the stock assessment, additional documentation of past and present catches from these fisheries is required. Recent reports from purse seine fleets in West Africa suggest that blue marlin are more commonly caught with tuna schools associated with FADs than with free tuna schools. Catches of blue marlin in 2010 were 3,160 t, compared to 3,240 t reported for 2009. Catches of white marlin in 2009 and 2010 were 644 t and 372 t, respectively. Catches of white marlin and blue marlin for 2010 are preliminary. Due to the work conducted by the Committee and improved reporting by CPCs the amount of unclassified billfish has been minimized.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT. Blue marlin advice is based on the 2011 assessment while white marlin advice is based on the earlier 2006 assessment.

REFERENCE POINTS: F_{MSY} reference points have been proposed. MSY is estimated as follows:

blue marlin MSY = 2,837 t (range 2,343t – 3,331 t)

white marlin MSY – range = 600 t – 1,320 t

STOCK STATUS:

BLUE MARLIN: Unlike the partial assessment of 2006, the Committee conducted a full assessment in 2011, which included estimations of management benchmarks. The results of the 2011 assessment indicated that the stock remains overfished and undergoing overfishing. This is in contrast to the results of the 2006 assessment which indicated that even though the stock was likely overfished, the declining trend had partially stabilized. However, the Committee recognizes the high uncertainty with regard to data and the productivity of the stock. The current blue marlin stock assessment indicates that the stock is below BMSY and the fishing mortality above FMSY (2009).

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:

BLUE MARLIN: The current blue marlin stock assessment indicates that the stock is below B_{MSY} and the fishing mortality above F_{MSY} (2009). Unless the current catch levels (3,431 t, 2010) are substantially reduced, the stock will likely continue to decline. The Commission should adopt a rebuilding plan for the stock of Atlantic blue marlin. The Commission should implement management measures to immediately reduce fishing mortality on blue marlin stock by adopting a TAC that allow the stock to increase (2000 t or less, including dead discards)

1. To facilitate the implementation of the TAC, the commission may consider the adoption of measures such as, but not limited to:
   a) Total prohibition of landings of blue marlin from pelagic longline and purse seine fisheries to improve the effectiveness of current management measures.
   b) Encouraging the use of alternative gear configurations that reduce the likelihood of deep hooking therefore increasing the post-release survival (for example, circle hooks).
   c) Broader application of time-area closures.
   d) Consider adopting measures to reduce fishing mortality of blue marlin from small-scale fisheries.
2. Noting the misidentification problems between white marlin and spearfishes, the Group recommended that management recommendations combine these species as a mixed stock until more accurate species identification and differentiation of species catches are available.
3. The Commission should require the reporting of catches of white marlin and roundscale spearfish separated.

WHITE MARLIN: 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-SCRS. Furthermore, STECF stresses the need for correct identification and reporting of billfish species in all EU fisheries in accordance with to the DCF.

17.14. Sailfish, *Istiophorus platypteus*, Atlantic Ocean

The stock status for sailfish in the Atlantic Ocean was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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. In 2010, catches for east and west, respectively, were 2,771 and 625 t. 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. The advice is based on the most recent (2009) assessment.

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 of 1,750 t. Moreover, ICCAT-SCRS repite the recommendation again in 201 as catches increased to level of 2,771 t. in 2010. 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.

STECF notes that although ICCAT in 2009, suggested that landings of the eastern stock should not be allowed to increase from 1,750, 2010 landings indicate that highest level of catches in the time series with the a sharp decline in the landings from the western stock being apparent.

17.15. Spearfish, Atlantic Ocean

The stock status for spearfish in the Atlantic Ocean was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 two SCRS reports and that data on catches 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.

17.16. Mediterranean Spearfish (*Tetrapturus belone*)

The stock status for Mediterranean spearfish was not updated by ICCAT SCRS in 2011. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 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. STECF remarks that this management unit has been apparently forgotten in the last SCRS report.

17.17. 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. A preliminary estimate of the total nominal landings of small tunas in 2010 is 72,195 t, of which: 1,609 t of Blackfin tuna; 19,899 t of Bonito; 15,819 t of Little tunny; 4,359 t of Frigate tuna; 4,359 t of King mackerel; 5,974 t of Atlantic Spanish mackerel; 3,006 t of Serra Spanish mackerel; 1,770 t of Wahoo, 9,307 t of Bullet tuna, 289 of Plain bonito, and 337 t of West-African Spanish mackerel. The Small Tunas Species Group pointed out the relative importance of small tuna fisheries in the Mediterranean and the Black Sea, which account for about 28% of the total reported catch in the ICCAT area for the period 1980-2010. Despite the recent improvements in the statistical information provided to ICCAT by several countries, the Committee also noted that uncertainties remain regarding the accuracy and completeness of reported landings in all areas. There is a general lack of information on the mortality of these species as by-catch, exacerbated by the confusion regarding species identification.

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.

17.18. 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: STECF comments that this species is not on the GFCM priority list so that no advice is likely to be provided by this body in the near future.

17.19. Shortfin Mako (*Isurus oxyrinchus*), North Atlantic Ocean and Mediterranean.

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.20. Shortfin Mako (*Isurus oxyrinchus*), South Atlantic Ocean.

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.21. *Porbeagle* (*Lamna nasus*) in the North-East Atlantic

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.22. Porbeagle (*Lamna nasus*) in the North-West Atlantic

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.23. Porbeagle (*Lamna nasus*) in the South-West Atlantic

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.24. Porbeagle (*Lamna nasus*) in South-East Atlantic

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.25. Porbeagle (*Lamna nasus*) in the Mediterranean Sea

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.26. Blue shark (*Prionace glauca*) in the North Atlantic

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.27. Blue shark (*Prionace glauca*) in South Atlantic

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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 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.

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.

17.28. Blue shark (*Prionace glauca*) in the Mediterranean Sea

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.29. Thresher shark (*Alopias vulpinus*) in the Atlantic Ocean and the Mediterranean

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.30. Bigeye thresher shark (*Alopias superciliosus*) in the Atlantic Ocean and the Mediterranean

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.31. Smooth hammerhead (*Sphyrna zygaena*) in the Atlantic Ocean and the Mediterranean Sea

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.32. Other Hammerhead sharks (*Sphyrnidae*) in the Atlantic Ocean and the Mediterranean Sea

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.33. *Carcharhinus* spp.

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.34. Blue stingray (*Pteroplatytrygon violacea*)

The stock status of this stock was not updated by ICCAT SCRS in 2011. The text below therefore remains largely unchanged from the STECF Review of Advice for 2011.

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.

17.35. 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.

18. Highly migratory fish (Indian Ocean)

All the highly migratory species in the Indian Ocean are managed by the Indian Ocean Tuna Commission (IOTC), an FAO body. The IOTC is supported by a Scientific Committee (SC), composed of representatives from each Commission member. The Scientific Committee is responsible for all scientific work and provides scientific advice on management measures; the last meeting of the committee was December 2010.

About 24 percent of the world production of tuna is from the Indian Ocean, making this the second largest region for tuna fishing after the western and Central Pacific Ocean. Catches of skipjack, yellowfin, bigeye and albacore in 2010 were 825,000 tonnes, a 4% decline from 2009. There has been a general tendency for the total catch of those species to decline since 2005, when a record 1.2 million tonnes were caught.

Average catches for the period 2006-2010 provide an indication of the recent performance of the fisheries: Skipjack accounts for 50% of the catches in weight, followed by yellowfin (35%), bigeye (10%), and albacore (5%). In recent years, purse-seine vessels take about 35% of the total catch, followed by gillnet (30 %), longline (7%), and pole-and-line (10%).

The problem of piracy in the Indian Ocean, especially in the vicinity of Somalia, has had an important impact: the fishing capacity of the EU purse seine fleet has decreased by 25% from the 2005-2008 average due to vessels leaving to fish in other regions. Similarly, vessels from Japan, Taiwan and Korea have shifted their areas of operation and a number of local fleets from Kenya and Seychelles have been affected.

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.

18.1. 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 Scientific Committee (December 2010) noted the paucity of information available on sharks and that the situation is not expected to improve in the short to medium term. There is no quantitative stock assessment and few basic fishery indicators currently available for any shark species in the Indian Ocean. While stocks status are highly uncertain, they are likely to be poor.
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.

Blue sharks

- In 2005, seven countries reported catches of blue sharks in the IOTC region. Blue sharks are commonly taken by a range of fisheries in the Indian Ocean and in some areas they are fished in their nursery grounds. Because of their life history characteristics – they are relatively long lived (16-20 years), mature at 4-6 years, and have relativity few offspring (25-50 pups every two years), the blue shark is vulnerable to overfishing. Apparently, as other shark stocks have declined fewer blue sharks are being

discarded. There is little information on blue shark biology from the Indian Ocean and no information is available on stock structure. No quantitative stock assessment has been undertaken by the IOTC. While the blue shark stocks status is highly uncertain, it is likely to be poor.

- Australia, EU (Spain, Portugal and United Kingdom), South Africa, and Sri-Lanka have reported detailed data on blue shark while nine others have reported partial data or data aggregated for all species.
- Australia, Spain, Portugal, United Kingdom and South Africa report longline data by species: 74% of the catch of sharks by longliners, all targeting swordfish, were blue sharks.

Silky shark

- The silky shark is one of the most abundant large sharks inhabiting warm tropical and subtropical waters throughout the world. Essentially pelagic, the silky shark is distributed from slopes to the open ocean. It also ranges to inshore areas and near the edges of continental shelves and over deepwater reefs. It also demonstrates strong fidelity to seamounts and natural or man-made objects like FADs.
- Silky sharks often form mixed-sex schools containing similar sized individuals. Maximum age is estimated at 20+ years for males and 22+ years for females and maximum size is over 3 m long.
- Silky sharks are often targeted by some semi-industrial, artisanal and recreational fisheries and are a bycatch of industrial fisheries (pelagic longline tuna and swordfish fisheries and purse seine fishery). Sri Lanka has had a large fishery for silky shark for over 40 years.
- There is little information on the fisheries prior to the early 1970's, and some countries continue not to collect shark data while others do collect it but do not report it to IOTC. It appears that significant catches of sharks have gone unrecorded in several countries. Furthermore, many catch records probably under-represent the actual catches of sharks because they do not account for discards (i.e. do not record catches of sharks for which only the fins are kept or of sharks).
- There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. There is no quantitative stock assessment and few basic fishery indicators currently available for silky shark in the Indian Ocean. While the silky shark stock status is highly uncertain, it is likely to be poor.
- Silky sharks are commonly taken by a range of fisheries in the Indian Ocean and in some areas they are fished in their nursery grounds. Because of their life history characteristics – they are relatively long lived (over 20 years), mature at 6-12 years, and have relativity few offspring (<20 pups every two years), the silky shark is vulnerable to overfishing.
- Despite the lack of data, it is clear from the information that is available that silky shark abundance has declined significantly over recent decades. Options for management should be formulated.
- Four CPCs have reported detailed data on sharks (*i.e.* Australia, EU (Spain, Portugal and United Kingdom), South Africa, and Sri-Lanka while nine CPCs have reported partial data or data aggregated for all species (*i.e.* Belize, China, Japan, Korea, Malaysia, Oman, Seychelles, Mauritius, UK-territories).
- For CPCs reporting longline data by species (*i.e.* Australia, Spain, Portugal, United Kingdom and South Africa), 1.5% of the catch of sharks by longliners, all targeting swordfish, were silky sharks, and for CPCs reporting gillnet data by species (*i.e.* Sri Lanka), 22% of the catches of shark were silky sharks.

Oceanic Whitetip sharks (*Carcharhinus longimanus*)

- The oceanic whitetip shark is one of the most common large sharks in warm oceanic waters.
- Oceanic whitetip sharks are relatively large sharks and grow to up to 4 m. Females grow larger than males. The maximum weight reported for this species is 167.4 kg.
- Oceanic whitetip sharks are often targeted by some semi-industrial, artisanal and recreational fisheries and are a bycatch of industrial fisheries (pelagic longline tuna and swordfish fisheries and purse seine fishery).
- There is little information on the fisheries prior to the early 1970's, and some countries continue not to collect shark data while others do collect it but do not report it to IOTC. It appears that significant catches of sharks have gone unrecorded in several countries. Furthermore, many catch records probably under-represent the actual catches of sharks because they do not account for discards (*i.e.* do not record catches of sharks for which only the fins are kept or of sharks usually discarded because of their size or condition) or they reflect dressed weights instead of live weights.
- There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. There is no quantitative stock assessment and few basic fishery indicators

currently available for silky shark in the Indian Ocean. While the silky shark stock status is highly uncertain, it is likely to be poor.

- Oceanic whitetip sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived, mature at 4-5 years, and have relativity few offspring (<20 pups every two years), the oceanic whitetip shark is vulnerable to overfishing.
- Despite the lack of data, it is apparent from the information that is available that oceanic whitetip shark abundance has declined significantly over recent decades. Options for management should be considered based on research and potential mitigations measures (*e.g.* wire trace…).
- Four CPCs have reported detailed data on sharks (*i.e.* Australia, EU (Spain, Portugal and United Kingdom), South Africa, and Sri-Lanka while nine CPCs have reported partial data or data aggregated for all species (*i.e.* Belize, China, Japan, Korea, Malaysia, Oman, Seychelles, , Mauritius, UK-territories).
- For CPCs reporting longline data by species *(i.e.* Australia, Spain, Portugal, United Kingdom and South Africa), 0.6% of the catch of sharks by longliners, all targeting swordfish, were oceanic whitetip sharks, and for CPCs reporting gillnet data by species (*i.e.* Sri Lanka), 7% of the catches of shark were oceanic whitetip sharks.

Shortfin Mako sharks (*Isurus oxyrinchus*)

- The shortfin mako shark is a large and active shark and one of the fastest swimming shark species. It is known to leap out of the water when hooked and is often found in the same waters as swordfish. This species is at the top of the food chain, feeding on other sharks and fast-moving fishes such as swordfish and tunas.
- Shortfin mako sharks are often targeted by some semi-industrial, artisanal and recreational fisheries and are a bycatch of industrial fisheries (pelagic longline tuna and swordfish fisheries and anecdotally by the purse seine fishery). In other Oceans, due to its energetic displays and edibility, the shortfin mako is considered one of the great gamefish of the world.
- There is little information on the fisheries prior to the early 1970's, and some countries continue not to collect shark data while others do collect it but do not report it to IOTC. It appears that significant catches of sharks have gone unrecorded in several countries. Furthermore, many catch records probably under-represent the actual catches of sharks because they do not account for discards (*i.e.* do not record catches of sharks for which only the fins are kept or of sharks usually discarded because of their size or condition) or they reflect dressed weights instead of live weights.
- There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. There is no quantitative stock assessment and few basic fishery indicators currently available for shortfin mako shark in the Indian Ocean. While the shortfin mako stock status is highly uncertain, it is likely to be poor.
- Shortfin mako sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived (over 24 years), mature at 7-8 years, and have relativity few offspring (<30 pups every three years), the shortfin mako sharks is vulnerable to overfishing.
- Four CPCs have reported detailed data on sharks (*i.e.* Australia, EU (Spain, Portugal and United Kingdom), South Africa, and Sri-Lanka while nine CPCs have reported partial data or data aggregated for all species (*i.e.* Belize, China, Japan, Korea, Malaysia, Oman, Seychelles, Mauritius, UK-territories).
- For CPCs reporting longline data by species *(i.e.* Australia, Spain, Portugal, United Kingdom and South Africa), 12% of the catch of sharks by longliners, all targeting swordfish, were shortfin mako sharks.

Scalloped hammerhead sharks (Sphyrna lewini)

- The scalloped hammerhead shark (Sphyrna lewini) is widely distributed and common in warm temperate and tropical waters down to 275 m. It is also found in estuarine and inshore waters. In some areas, the scalloped hammerhead shark forms large resident populations. In other areas, large schools of small-sized sharks are known to migrate polewards seasonally.
- Scalloped hammerhead sharks are often targeted by some semi-industrial, artisanal and recreational fisheries and are a bycatch of industrial fisheries (pelagic longline tuna and swordfish fisheries and purse seine fishery).
- There is little information on the fisheries prior to the early 1970's, and some countries continue not to collect shark data while others do collect it but do not report it to IOTC. It appears that significant

catches of sharks have gone unrecorded in several countries. Furthermore, many catch records probably under-represent the actual catches of sharks because they do not account for discards (*i.e.* do not record catches of sharks for which only the fins are kept or of sharks usually discarded because of their size or condition) or they reflect dressed weights instead of live weights.

- There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. There is no quantitative stock assessment and few basic fishery indicators currently available for scalloped hammerhead shark in the Indian Ocean. While the scalloped hammerhead shark stock status is highly uncertain, it is likely to be poor.
- Scalloped hammerhead sharks are commonly taken by a range of fisheries in the Indian Ocean. They are extremely vulnerable to gillnet fisheries. Furthermore, pups occupy shallow coastal nursery grounds, often heavily exploited by inshore fisheries. Because of their life history characteristics – they are relatively long lived (over 30 years), and have relativity few offspring (<31 pups each year), the scalloped hammerhead shark is vulnerable to overfishing.
- Four CPCs have reported detailed data on sharks (*i.e.* Australia, EU (Spain, Portugal and United Kingdom), South Africa, and Sri-Lanka while nine CPCs have reported partial data or data aggregated for all species (*i.e.* Belize, China, Japan, Korea, Malaysia, Oman, Seychelles, Mauritius, UK-territories).

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.

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.

18.2. Yellowfin tuna (*Thunnus albacares*)

FISHERIES: Yellowfin tuna is fished throughout the Indian Ocean, however the majority of catches are taken in western equatorial waters and the location of the fishery has changed little since 1990.

The main fishing gears are purse seines, longliners and the artisanal fisheries using a variety of gear (pole and line, gillnet, driftnet and hand line). Contrary to the situation in other oceans, the artisanal fishery component in the Indian Ocean is substantial, contributing some 35 % to the total catch over the years 2000-2008.

Total annual catches increased steadily from the start of the fishery in the late 1950s, reaching 100,000 t in 1984, 200,000 t in 1989 and 400,000 t in 1993. Catches peaked at 523,000 tonnes in 2004 but since then have fallen. Yellowfin catches in 2010 were about 291,000 tonnes, an 8 % decrease from 2008. The main fishing gears for which catches have declined recently are purse seine and longline. In contrast, catches from pole and line vessels have been relatively stable. Catches by gillnet have become more important in recent years. Overall catches have declined by 45% from the record high in 2004.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Committee of the IOTC.

REFERENCE POINTS: MSY is estimated to be 320,000 t.

STOCK STATUS:

The 2010 updated assessment undertaken by the Scientific Committee (SC13) gave more optimistic results than the previous (2009) assessment.

- Whereas the point estimates from the base case model used by the Scientific Committee suggest that the stock is not overfished and not being overfished, the Scientific Committee considered that the stock is likely to be currently in, or approaching, an overfished state and overfishing has probably been occurring in recent years.

- The ratio of Fcurrent/FMSY is 0.99 (range: 0.85-1.39), indicating that the situation is close to overfishing and that overfishing probably occurred in recent years.
- The stock is approaching or is already in an overfished state as spawning biomass is close to or below the BMSY level (Bcurrent/BMSY = 1.11. Range: 0.93-1.25).
- The median value of MSY is estimated to be 320,000 tonnes (range of 258,000 and 347,000 t.). During the period 2003-2006, catches substantially exceeded this level and the stock experienced a rapid decline.
- If the fishing effort that has been displaced recently due to piracy returns to traditional fishing areas, then catches (and F) will likely increase.
- 30% of the catch is made by gillnets, a gear expected to have high bycatch rates (no mitigation measures are in place and monitoring is extremely deficient).

RECENT MANAGEMENT ADVICE:
The status of this stock has prompted concern as catches in 2003-2006 exceeded the MSY level. Since then however – largely as a result of piracy - catches have decreased considerably, as fishing effort was displaced to zones with lower catch rates or into other oceans.

- The Scientific Committee has expressed concern that catches could increase again if the piracy situation is reversed, and recommended that catches are limited to 300,000 tonnes or less in order to bring the stock to biomass levels that could sustain catches at the MSY level in the long term.
- If recruitment continues to be lower than average, catches below 300,000 t would be needed to maintain stock levels.

The main binding conservation measure established by the IOTC for yellowfin is Resolution 10/01, which affects vessels greater than 24 m as well as smaller vessels fishing on the high seas. This measure calls for a one month closure for purse seiners and longliners in an area 10°x20°. The resolution also established a series of meetings for members of IOTC to agree a quota allocation scheme, with a view to possibly adopting a Total Allowable Catch or similar measures in the future.

- The Scientific Committee considers that management measures that allow an appropriate control of fishing pressure to be implemented should be continued.
- The effect of time-area closures cannot yet be directly translated into management quantities of direct effect on the status of the stock, such as catches or fishing mortality, so their possible effect on the future evolution of the stock cannot be evaluated.

STECF COMMENTS: STECF agrees with the advice from IOTC and stresses the importance of avoiding any future increase of fishing effort and catches above MSY reference point(s) levels.

18.3. Bigeye tuna (*Thunnus obesus*)

FISHERIES: Bigeye tuna is fished throughout the Indian Ocean, with the majority of the catch being taken in western equatorial waters.
Reported catches in the Indian Ocean peaked between 1997 and 1999 at 144 - 150,000 t per year, and total annual catches averaged 121,700 t over the period 2004 to 2008. The catch in 2009 was estimated to be 102,000 t, a 4% decline from 2008, and even lower in 2010 at around 70,000 t. due to the longline effort decrease due to the Somalian piracy.
Bigeye is predominantly caught by industrial fleets using long line and purse seines and occasionally by artisanal fisheries.

- The longline fisheries started to target bigeye in the 1970s and mainly catch adults >80 cm. Large bigeye tuna (above 30 kg) are primarily caught by longlines, and in particular deep longliners. Catches by longline have been declining from a high in 2004.
- 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 less than 80 cm, that is, juveniles (under 10 kg). This results in purse seiners taking a larger numbers of individual fish than longliners. Over 75% of purse seine bigeye catches are taken in log-schools along with skipjack and yellowfin tuna. Catches increased from the beginning of the fishery, peaked at over 30,000 t from 1997 to 1999 and then stabilized at around 20,000 t; catches have been relatively stable since 2000.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Committee of the IOTC.

REFERENCE POINTS: MSY = 114,000 t (95,000-183,000).

STOCK STATUS: The 2010 assessment conducted by the Scientific Committee of IOTC (SC13) gave similar results to the 2009 assessment in terms of average trends. However, the uncertainty in the results was perceived to be greater than before, perhaps as a result of the Scientific Committee having considered a much broader range of model assumptions than before. The updated assessment indicates that the stock is probably not overfished, and overfishing is probably not occurring. However, the stock is probably near full utilization, and the possibility of overfishing cannot be ruled out given the existing uncertainty, and the continuing observed decline in catch rates.

- The ratio of Fcurrent/F_{MSY} is estimated at 0.79 (range of 0.5-1.22), indicating that overfishing is not occurring.
- The ratio of spawning biomass Bcurrent/B_{MSY} is estimated at 1.20 (range of 0.88-1.68). This indicates that that the stock is not in an overfished state.
- The median estimate of MSY is 114,000 tonnes. Given that the mean annual catch for the period 2005-2009 was 114,600 t, it appears that the stock is being exploited at around its maximum level.

RECENT MANAGEMENT ADVICE:
Given the uncertainty on estimated MSY values and the levels of error in the nominal catch data for bigeye, the SC recommended than catches are kept below the catch estimated at the moment of the assessment for 2009, i.e. 102,000 t. This value should give low probability of catches exceeding MSY.

The main binding conservation measure established by the IOTC for bigeye is Resolution 10/01, which affects vessels greater than 24 m as well as smaller vessels fishing on the high seas. This measure calls for a one-month closure for purse seiners and longliners in an area of size 10°x20°. The effect of the closure in Resolution 10/01 on the status of IO tuna stocks cannot be evaluated yet.

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.

18.4. Skipjack (*Katsuwonus pelamis*)

FISHERIES: Skipjack catches in the Indian Ocean in 2009 were about 446,500 tonnes, almost the same as in 2008. The provisional catch in 2010 was 417,000 t. Purse seine (39%) and gillnets (37%) dominate the catches, followed by pole-and-line (17%). The pole-and-line catches have been decreasing since 2005.

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 (pole and line) and gillnets. The 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. Annual total catches exceeded 400,000 t in the late 1990s, and peaked at 618,200t in 2006. Since then, catches have been declining rapidly to 446,000 t in 2009, with an average annual catch for the period from 2005 to 2009 of 504,600t. Preliminary catches for 2010 may have been the lowest reported during the last 10 years.
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. Purse seine, baitboat and gillnets representing 95% of the total skipjack catches. In general, there is low inter-annual variability in the catches taken in the Indian Ocean compared to those taken in other oceans.
The increase of skipjack catches by purse seiners is due to the development of a fishery in association with Fish Aggregating Devices (FADs). In 2009, 94 % (86% on average for the European/Seychelles during the last 10 years) of the skipjack tuna caught by purse-seine was taken in these "Log schools".

The Maldivian fishery has increased its effective fishing effort with the mechanization of its pole-and-line fishery since 1974 and the use of anchored FADs since 1981. However, a strong decline (more than 50%) in the catch has been observed during the last 3 years; from a catch of 136,700t in 2006 to 65,000 t in 2009. The reasons behind this drastic decline of the catch are not yet clear. Little information is available on the gillnet fisheries (mainly from Sri Lanka, Iran, Pakistan, India and Indonesia). However, it is estimated that the gillnet fisheries take around 30 to 40 % of the total catch of skipjack.

The average weight of skipjack caught in the Indian Ocean is around 3.0 kg for purse-seine, 2.8 kg for the Maldivian baitboats and 4-5 kg for the gillnet. For all fisheries combined, it fluctuates between 3.0-3.5 kg; this is larger than in the Atlantic, but smaller than in the Pacific. It was noted that the mean weight for purse seine

catch exhibited a strong decrease since 2006 (3.1) until 2009 (2.4), for both free (3.8kg to 2.4kg) and log schools (3.0kg to 2.4kg).

Industrial purse seine fishery catch rates remained lower in 2007 (157,000t), 2008 (155,400t) and 2009 (170,000t) when compared to the recent period of 1999-2006 during which catches exceeded 200,000t, but are still in the range of the previous period. While the activities of pirates off the coast of Somalia have meant that approximately ten purse-seine vessels have left the Indian Ocean and that the purse-seine fleet has avoided traditional skipjack fishing grounds where catch rates were high, no decline in catch rates has been observed in this fleet similar to that reported from the Maldives. This would indicate that the decline in catch rates in the Maldives fishery could be due to environmental causes such as higher than average sea surface temperatures, market considerations, like the marked increase of the fuel price, or other operational issues such as the availability of live bait.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Committee of the IOTC.

REFERENCE POINTS: None

STOCK STATUS: No formal stock assessment of skipjack has ever been conducted in the Indian Ocean, although one has been planned for 2011. Analyses of tagging data indicate that current exploitation rates are moderate. Given that skipjack are highly productive and that Indian Ocean catches have essentially tracked the progression of fishing effort (catches have continued to increase as effort has increased), the Scientific Committee of IOTC has not been particularly concerned with the status of the stock. Furthermore, the majority of the catch comes from fish that are sexually mature (greater than 40 cm) and therefore likely to have already reproduced.

The Scientific Committee did note however that skipjack catches declined in 2007, 2008 and 2009, and recommended that the causes of this decline should be examined (the reduction of purse seine fishing effort due piracy is probably one of the reasons of the decline of the purse seine catches).

RECENT MANAGEMENT ADVICE: Given the limited nature of the work carried out on the skipjack in 2010, no management advice is provided for the stock.

The Scientific Committee did however note that while there is no scientific basis for urgent concern about the status this stock and recent catches are considered to be sustainable, taking into account (i) the Precautionary Approach for fishery management, (ii) the rapid development of some artisanal and semi-industrial fleets and (iii) that the catches could not be increased continuously,

- that some management options should be considered;
- that recent trends in certain fisheries suggest that the stock should be closely monitored;
- that new attempts are made to assess the status of the stock during 2011.

The Scientific Committee has noted that most tuna fleets operating in the Indian Ocean do not target or catch a single stock or species. The multi-species nature of the fishery, both industrial and artisanal, implies that management measures directed towards a single stock are very likely to have effect on other stocks as well. The direction and magnitude of these secondary effects cannot always be directly inferred given the adaptability of the various fleets.

The main binding conservation measure established by the IOTC for skipjack (indirectly) is IOTC Resolution 10/01, which affects vessels greater than 24 m as well as smaller vessels fishing on the high seas. This measure calls for a one month closure for purse seiners in an area 10°x20°. The effect of the closure in Resolution 10/01 on the status of Indian Ocean tuna stocks cannot be evaluated yet.

STECF COMMENTS: STECF notes that given the limited nature of the work carried out by the SC of the IOTC on the skipjack in 2010, no new advice is provided for the stock.

STECF accepts while there is no scientific basis for urgent concern about the status this stock and recent catches are considered to be sustainable, 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.

18.5. Swordfish (*Xiphias gladius*)

FISHERIES: Swordfish are taken as a target or by-catch of longline fisheries throughout the Indian Ocean and is likely to be a component of the unidentified billfish catch in gillnet fisheries in the central northern Indian Ocean. Exploitation of swordfish in the Indian Ocean was first recorded by the Japanese in the early 1950's as a by-catch in their tuna longline fisheries. Over the next thirty years, catches increased slowly as the level of coastal state and distant water fishing nation longline effort targeted at tunas increased. In the 1990's, exploitation of swordfish, especially in the western Indian Ocean, increased markedly, peaking in 1998 at 35,100 t. By 2002, twenty countries were reporting catches of swordfish. The average annual catch for the period from 2005 to 2009 was 27,100 t and it was 22,300 t in 2008 and 22,100t in 2009. The highest catches are taken in the South West Indian Ocean; however, in recent years the fishery has been extending eastward. Since the early 1990's Taiwan has been the dominant swordfish catching fleet in the Indian Ocean (41-60 % of total catch). Taiwanese longliners, particularly in the south western and equatorial western Indian Ocean, target swordfish using shallow longlines at night. These contrast with the daytime sets used by the Japanese and Taiwanese longline fleets when targeting tunas.
During the 1990's a number of coastal and island states, notably Australia, La Reunion/France, Seychelles and South Africa developed longline fisheries targeting swordfish, using monofilament gear and light sticks set at night. This gear achieves significantly higher catch rates than traditional Japanese and Taiwanese longlines. As a result, coastal and island fisheries have rapidly expanded to take over 10,000 t of swordfish per annum in the late 1990s.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Committee of the IOTC.

REFERENCE POINTS: MSY is estimated to be 29,000 t (19,000 t-46,000 t)

STOCK STATUS: The overall stock size and fishing pressure are estimated to be within acceptable limits and the overall level of reduction in stock size probably does not represent a conservation risk. If the southwestern region is analysed as containing a separate stock, results indicate that a substantive decline took place in that area, although recent declines in catch and effort might have brought fishing pressure to sustainable levels.

A stock assessment for swordfish was undertaken in 2010, including a range of models and stock structure assumptions. The results of the assessment indicate that the stock status reference points from the range of models were generally consistent: $B>B_{MSY}$ and $F<F_{MSY}$ for all models, although there was a large range in the uncertainty estimates.

- All of the models suggest that depletion is moderate, within the range 0.39 – 0.55 (B_{2008}/B_0). MSY estimates varied from 19,000 t to 46,000 t, with many models having point estimates of ~30,000 tonnes
- The annual average sizes of swordfish were variable but did not show a trend. While it was considered encouraging that there are not clear signals of declines in the size-based indices, these indices should be carefully monitored. It was also 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.
- The apparent fidelity of swordfish to particular areas is a potential concern, as this can lead to localised depletion of sub-populations. This seems to be the greatest concern in the south-west region. One of the models used suggested that this sub-population is highly depleted (B_{2008}/B_{MSY} = 0.27-0.88, B_{2008}/B_0 = 0.024- 0.07). However, there are reasons for not being overly alarmist in the interpretation of these preliminary results, *i.e.* stock structure and movement rates are not known; the results may not be consistent with the size composition data; the CPUE series conflict (especially in the last 5 years); and the CPUE series are sensitive to assumptions about spatial/targeting preferences. Furthermore, even if these pessimistic models are correct, then fishing mortality has decreased substantially in recent years, such that the point estimates suggest that overfishing is probably not occurring at present, F_{2008}/F_{MSY} = 0.64 – 0.98. However, until there is further evidence to reduce the uncertainty in the SW assessment (particularly the CPUE series), it would be prudent to proceed under the assumption that this sub-population is heavily depleted, and may not be rebuilding.

RECENT MANAGEMENT ADVICE:

MSY-related reference points are probably not being exceeded for the Indian Ocean population as a whole, and the overall level of depletion probably does not represent a conservation risk. If the recent declines in effort continue, and catch remains substantially below the estimated MSY of 29,000 t, then there is probably no urgent

need to introduce restrictive management actions to the Indian Ocean as a whole. However, continued monitoring is required to manage the uncertainty.

It is recommended that catches in the SW should be maintained at levels at or below those observed in 2008 (6,426 t), until either i) there is clear evidence that substantial rebuilding is occurring (through recruitment or immigration), or ii) further analyses indicate that the current assessment is inappropriate.

STECF COMMENTS: STECF agrees with the advice from the Scientific Committee of the IOTC, and in particular the concern raised in respect of the existence of a sub-population in the south-west that has experienced overfishing for several recent years. STECF agrees that it would be prudent to proceed under the assumption that this sub-population is heavily depleted, and may not be rebuilding.

19. Highly migratory fish (northeastern, eastern, southern and western-central Pacific Ocean)

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 and the Western Central Pacific Fishery Commission (WCPFC) manages stocks in the Western and Central Pacific Ocean, however, there is an overlapping area of competence at 150°W and cooperation between these two Commissions is improving. In the case of WCPFC the scientific advice is coming from science/assessment providers. The Ocean Fisheries Programme of the Secretariat of the Pacific Community (SPC-OFP) provides contracted scientific support to the WCPFC, through the Commission's Scientific Committee (SC), on southern stocks. On the other hand, the International Scientific Committee (ISC), which is a working group consisting of scientists from both the WCP and EPO regions, 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. The IATTC has scientific capacity within the secretariat and so do not require external providers of scientific advice. The commission does, however, receive advice on stocks occurring north of 20° N from the ISC. 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.

Eastern Pacific Ocean (EPO)
About 15 percent of the world production of tuna is from the eastern Pacific Ocean (EPO). Catches of skipjack, yellowfin, bigeye and albacore in 2010 were 491,000 tonnes (including dead discards), a 20% decline from 2009. This decline was particularly marked for skipjack. There has been a general tendency for the total catch to decline since 2003, when a record 831,000 tonnes were caught.

Average catches for the five-year period 2006-2010 provide an indication of the recent performance of the fisheries: Skipjack accounts for 42% of the catches in weight, followed by yellowfin (37%), bigeye (18%), and albacore (4%). Purse-seine vessels take the majority (89%) of the total catch, followed by longline (7%) and a variety of other gears.

Western Pacific Ocean (EPO)

About 53 percent of the world production of tuna is from the western and central Pacific Ocean (WCPO). Catches of skipjack, yellowfin, bigeye and albacore in 2010 were 2,421,000 tonnes, a 3% reduction from 2009. There has been a general tendency for the total catch to increase since 1980. This increase has been particularly pronounced for skipjack tuna.

Average catches for the five year period 2005-2010 provide an indication of the recent performance of the fisheries: Skipjack accounts for 66% of the catches in weight, followed by yellowfin (24%), bigeye (6%), and albacore (5%). Purse-seine vessels take about 74% of the total catch, followed by pole-and-line vessels (8%), longliners (10%), and a variety of other gears (8%).

19.1. Eastern Pacific Yellowfin (*Thunnus albacares*)

FISHERIES: Yellowfin are distributed across the Pacific Ocean, with the bulk of the catch made in the eastern and western regions. While 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) 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. Movement rates between the eastern and the western Pacific cannot be estimated with currently-available tagging data.

In the Eastern Pacific Ocean, the main fishing gear is purse seine, and recent catches by this gear are about 60% of the record high caught in 2002. 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. Catches in 2010 were about 255,000 tonnes, a 4% increase from 2009 and the most recent 5-year average catch (2006 – 2010) is 210 000t

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Advisory Committee (SAC) of IATTC.

REFERENCE POINTS: MSY is estimated to be 263,000 tonnes. $B/B_{MSY} \approx 0.97$, $SSB/SSB_{MSY} \approx 0.73$, $F/F_{MSY} \approx 0.86$

STOCK STATUS:

- The current (2011) ratio of spawning biomass Bcurrent/BMSY is estimated to be 0.73, indicating that the stock is in an overfished state.
- Spawning biomass has decreased since 2009 with a possible increase during the fourth quarter of 2010; it is projected to increase again at the current level of fishing mortality.
- The ratio Fcurrent/F_{MSY} is estimated to be 0.86, indicating that overfishing is not occurring.
- MSY is estimated to be 263,000 tonnes. Increasing the average weight of the yellowfin caught could increase the MSY.
- The assessment of stock status is highly sensitive to the assumed relationship between spawning biomass and recruitment (the base case assessment did not assume one). The results are more pessimistic if a stock recruitment relationship is assumed. The results are also sensitive to the natural mortality assumed for adult yellowfin and the length assumed for the oldest fish.
- Analyses made using the base case assessment results indicate that increasing fishing mortality would change the long-term catches only marginally, while reducing the spawning biomass considerably.

RECENT MANAGEMENT ADVICE:

SSB is currently less than B_{MSY} ($B/B_{MSY} = 0.71$). Spawning biomass is projected to increase rapidly above B_{MSY} at the current level of fishing mortality, but this should be corroborated by the next assessment.
F is currently less than F_{MSY} ($F/F_{MSY} = 0.88$). Although the point estimate of current F is below F_{MSY}, it is highly unlikely that increased fishing effort will result in significantly increased sustained catches, but it will significantly reduce spawning biomass.

The main conservation measure established by IATTC for yellowfin is Resolution C-11-01, which includes an annual fishing closure for purse seine vessels greater than 182 t carrying capacity. This measure calls for:

- A 62 day closure for purse seiners greater than 182 tons capacity in 2011, 2012 and 2013;
- A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;
- A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas during 2011 and 2012.

STECF COMMENTS: STECF agrees with the advice from IATTC. STECF notes that analyses (made using the base case assessment results) indicate that increasing fishing mortality to F_{MSY} would change the long-term catches only marginally, while reducing the spawning biomass slightly from that with current effort. Because of this, and taking into account the more pessimistic estimates of stock status obtained when a stock-recruitment relationship is assumed, STECF believes that fishing mortality for yellowfin tuna in the EPO should not be allowed to increase.

19.2. Western and Central Pacific Yellowfin (*Thunnus albacares*)

FISHERIES: Yellowfin are distributed across the Pacific Ocean, with the bulk of the catch made in the eastern and western regions. While 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) 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. Movement rates between the eastern and the western Pacific cannot be estimated with currently-available tagging data.

Yellowfin catches in the WCPO in 2010 were about 558,800 tonnes, a 4% increase from 2009 but a 13 % decrease from 2008. The main fishing gear is purse seine, which has been generally increasing. Catches are also taken by a number of mixed gears in the Philippines and Indonesia, and by longliners. Recent falling catch rates may be the result of reduced recruitment.

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 364,000 t in 1990, peaked at 505,000 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 453,000 t in 2004, increased again in 2005 to 595,000 t and fell to 525,000 t in 2006.

SOURCE OF MANAGEMENT ADVICE: The Western and Central Pacific Fisheries Commission (WCPFC) is responsible for the management of this stock.

The Secretariat of the Pacific Community's (SPC's) Oceanic Fisheries Programme[4] serves as the Commission's Science Services Provider and Data Manager. As the SPC started collecting fisheries data and conducting biological studies and stock assessments before WCPFC was established, this relationship minimizes duplication of effort between the two organizations. The WCPFC has a Scientific Committee (SC) composed of representatives from each Commission member. The SC reviews the assessment results and related information prepared by SPC and by other SC experts and makes recommendations for management actions based on these assessments.

REFERENCE POINTS: The median value of MSY is estimated to be 538,800 tonnes (480 - 580,000 tonnes. $SSB_{current}/B_{MSY}$ = 1.47 (1.34 – 1.83) and $F_{current}/F_{MSY}$ = 0.77 (0.58 - 0.9) based on the results of the base case scenario agreed by WCPFC with a steepness of the stock recruitment relationship of point 0.8.

STOCK STATUS:

The last yellowfin assessment was conducted in 2011. The results were generally more pessimistcthan those from the previous assessment carried out in 2009 and the base case indicated that:

- The stock is not in an overfished state as spawning biomass is above the SSB_{MSY} level ($SSB_{current}/B_{MSY}$ = = 1.47 (1.34 – 1.83). "Current" refers to the average over the period 2006-2009.
- The median ratio of $F_{current}/F_{MSY}$ is estimated to be 0.77 with a range between 0.58 and 0.90, indicating that overfishing is not occurring.
- The mediam MSY is estimated to be 538,800 tonnes with a range between 480,000 and 580,000 tonnes.

The western equatorial region accounts for the most of the WCPO yellowfin catch. In previous assessments, there were concerns that the stock status in this region (region 3) might differ from the stock status estimated for the entire WCPO. A comparison between the results from the WCPO models and a model encompassing only region 3 in 2009, yielded very similar results particularly with respect to stock status. Nonetheless, there appear

[4] (http://www.spc.int/oceanfish/)

to be differences in the biological characteristics of yellowfin tuna in this region that warrant further investigation.

RECENT MANAGEMENT ADVICE:

WCPFC SC determined that the WCPO yellowfin appears to be capable of producing MSY. The stock is not experiencing overfishing and is not in an overfished state. Projections to 2021 indicate that fishing mortality is projected to remain below F_{MSY} and the spawning biomass will remain above SB.

Moreover, the estimates of *MSY* for the principal model options (480,000–580,000 mt) are comparable to the recent level of (estimated) catch from the fishery (550,000 mt). Further, under equilibrium conditions, the predicted yield estimates are very close to the estimates of *MSY* indicating that current yields are at or above the long-term yields available from the stock. Further, while estimates of current fishing mortality are generally below F, any increase in fishing mortality would most likely occur within region 3 — the region that accounts for most of the catch. This would further increase the levels of depletion that is occurring within that region. The SC recommended that there be no increase in fishing mortality in the western equatorial region.

The main binding conservation measure for WCPO yellowfin established by the WCPFC is CMM 2008/01 which aims to ensure that yellowfin fishing mortality will not exceed the 2001-2004 or 2004 level. The measure calls for:

- A 3-month closure of fishing on FADs in EEZ waters of PNA countries and on the High Seas;
- A limitation in the number of vessel days in PNA EEZs;
- A closure of several high seas pockets;
- A requirement to submit FAD management plans;
- A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;
- 100% Regional observer coverage for all purse seine vessels fishing on the high seas, on the high seas and in waters under the jurisdiction of one or more coastal States, or vessels fishing in waters under the jurisdiction of two or more coastal States;
- A limitation of each Member's fishing capacity not to exceed the 2001-2004 or 2004 level.
- In addition, CMM 2009/02 provides more guidance on some elements of CMM 2008/01 that were ambiguous, particularly on the FAD closure and full retention requirements.

In 2009 and 2010, the WCPFC SC evaluated the efficacy of CMM/2008/01 and concluded that this measure is achieving its objective of limiting fishing mortality on yellowfin to sustainable levels.

STECF COMMENTS: STECF agrees with the management advice of WCPFC.

19.3. Eastern Pacific Bigeye (*Thunnus obesus*)

FISHERIES: Bigeye catches in 2010 were about 81,000 tonnes, a 24% decrease from 2009. Longline fishing dominated the catches in weight until the mid 1990s. Purse seine fishing accounts for the majority of catches in recent years; 2.5 times higher than longlining. Bigeye catches in the EPO by other gears are very minor.

Bigeye are distributed across the Pacific Ocean, with the bulk of the catch made to the east and the west of the mid-Pacific. The purse-seine catches of bigeye are substantially lower close to the western boundary (150°W) of the EPO; the longline catches less sporadic, but at lower levels between 160°W and 180°.
Bigeye are not often caught by purse seiners in the EPO north of 10°N, 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 the EPO 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.

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. 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: 74,000 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 35,000 to 74,000 t (average: 53,000 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 2010 is 81,000 t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Advisory Committee (SAC) of IATTC.

REFERENCE POINTS: MSY is estimated to be 81,000 tonnes, and $SSB/SSB_{MSY} = 1.21$ and $F/F_{MSY} = 1.08$.

STOCK STATUS:

In 2011 IATTC conducted an updated assessment of the Eastern Pacific Bigeye stock. The results of this update indicate the following:

- The current ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated at 1.21. This indicates that that the stock is not in an overfished state. Since 2005, there has been an increasing trend in biomass, subsequent to IATTC management measures initiated in 2004. However, under the current levels of fishing mortality, recent spikes in recruitment are predicted not to sustain this increasing trend.
- The ratio of $F_{current}/F_{MSY}$ is estimated at 1.08, indicating that overfishing was occurring on average in the most recent three years (2008-2010).
- The estimate of MSY is 81,000 tonnes. Because of growth-overfishing MSY has probably been reduced to about half its level in 1993, when the expansion of the floating object fishery began, as the overall selectivity from all fleets combined shifted towards smaller individuals. Since bigeye tuna can grow to be quite large (close to 200 cm), catching them when they are small results in a loss of potential yield, i.e. the catches that could be taken by other gears that target larger individuals, such as longlining.
- As for all stock assessments that use MSY based reference points, the assessment of stock status is highly sensitive to the assumed relationship between spawning biomass and recruitment (the base case assessment did not assume one). The results are more pessimistic if a stock-recruitment relationship is assumed. The results are also more pessimistic if a higher value is assumed for the average size of the older fish, if lower rates of natural mortality are assumed for adult bigeye, and if only the late period of the fishery (1995-2009) is included in the assessment.
- The estimated increase in biomass since 2005 is driven by an increasing trend in the catch rate of Japanese longline vessels. These catch rates appear to have leveled off in 2009 and 2010. In addition, stock projections at the 2008-2010 average level of fishing mortality indicates that the spawning biomass will fall below the MSY level.

RECENT MANAGEMENT ADVICE:

The improved perception of stock status in the 2010 assessment has been corroborated by the 2011 assessment and currently the stock is not overfished ($SSB>SSB_{MSY}$) but overfishing is occurring. Projections indicate that recent recruitments will not sustain the 2008-2010 average level of fishing mortality and the stock is expected to fall below B_{MSY} in a few years.
According to the 2010 assessment, the IATTC management measures in place appeared to be effectively limiting the fishing mortality on the stock (F< less than F_{MSY}). However, F is now above the MSY level and the regulations need to be strengthened.

The main conservation measure established by the IATTC for bigeye is Resolution C/11/01, which includes an annual fishing closure for purse seine vessels greater than 182 t carrying capacity. This measure calls for:

- A 62-day closure for purse seiners greater than 182 tons capacity in 2011, 2012 and 2013;

- A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;
- A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas during 2011 and 2012;
- Bigeye catch limits for the main longline fishing nations

STECF COMMENTS: STECF agrees with the advice from IATTC.

19.4. 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.

Bigeye catches in 2010 were about 125,800 tonnes. The main fishing gear is longline, although catches by this gear have been declining from a high in 2004. In contrast, catches from purse seine vessels have been relatively stable since 2005.

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; from less than 20,000 t up to 1996 and increasing to 55,000 t up to 2001, primarily as a result of increased use of fish aggregation devices (FADs). Since 2001 catches have averaged over 28,000 t annually. The bigeye catch in 2004 (1737,500 t) was the second highest on record (slightly lower than the record catch taken in 19974 – 176,706 t) and have been declining since then.

SOURCE OF MANAGEMENT ADVICE: The Western and Central Pacific Fisheries Commission (WCPFC) is responsible for the management of this stock.

The Secretariat of the Pacific Community's (SPC's) Oceanic Fisheries Programme serves as the Commission's Science Services Provider and Data Manager. As the SPC started collecting fisheries data and conducting biological studies and stock assessments before WCPFC was established, this relationship minimizes duplication of effort between the two organizations. The WCPFC has a Scientific Committee (SC) composed of representatives from each Commission member. The SC reviews the assessment results and related information prepared by SPC and by other SC experts and makes recommendations for management actions based on these assessments.

REFERENCE POINTS: MSY is estimated to be 76,760 tonnes (68,360 – 83,720 t.) for the base case although different scenarios were also investigated. For the base case, $SSB_{current}/ SSB_{MSY}$ = 1.19 (0.86-1.49) and $F_{current}/F_{MSY}$ =1.46 (1.16-2.10).

STOCK STATUS:

The 2011 assessment conducted by SC7 (the 7th meeting of the Scientific Committee) is comparable to the 2010assessments, though there are differences in catch and effort data, size frequency and a few different structural assumptions. The updated assessment indicated the following:

- The ratio of $F_{current}/F_{MSY}$ is estimated at 1.46 in the base case but also in all the sensitivity runs investigated, indicating that overfishing is occurring. In order to reduce fishing mortality to F_{MSY}, a 32% reduction in fishing mortality is required from the 2006–2009 level. Considering historical levels of fishing mortality, a 39% reduction in fishing mortality from 2004 levels is required (consistent with the aim of CMM2008/01), and a 28% reduction from average 2001–2004 levels.
- The ratio of spawning biomass $SSB_{current}/SSB_{MSY}$ is estimated at 1.19 in the base case. However, the structural uncertainty or the results of different model scenarios investigated indicated that there is a 13 % that $SSB_{current} < SSB_{MSY}$. Thus, the bigeye population is not overfished but it is approaching an overfished state.
- The estimate of MSY is 76,760 tonnes. MSY has been reduced to less than half its levels prior to 1970 through harvest of small bigeye. 2010 catches (125,000 tonnes) are higher than MSY level and average catches for the period 2006-2009 (140,000 t.) are approximately double the MSY. Much of this disparity is due to recent recruitment estimates being much higher than the long-term historical average, on which the MSY is based. For the higher level of recruitment estimated for the recent period the MSY is estimated to be 131,400 tonnes.
- As for all stock assessments that use MSY based reference points, the assessment of stock status is highly sensitive to the assumed relationship between spawning biomass and recruitment.

RECENT MANAGEMENT ADVICE:

This stock has been subjected to overfishing for more than a decade, but has not become overfished due to higher than average levels of recruitment in recent years; consequently $B \geq B_{MSY}$.

The Scientific Committee has recommended a minimum of 32% reduction in bigeye tuna fishing mortality from the average levels 2006-2009 with the goal of reducing the fishing mortality rate to F_{MSY}. . This recommended level of reduction is equivalent to a minimum 39% reduction of the 2004 level in fishing mortality, and a 28% reduction of the average 2001–2004 levels which are used as baseline in the WCPFC Conservation and Management Measure 08-01. This Management Measure 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. WCPFC management measures currently in place may be insufficient to end overfishing and $F > F_{MSY}$.

The main binding conservation measure for bigeye established by the WCPFC CMM2008-01 which aims to reduce fishing mortality by 30%. The measure calls for:

- A 3 month closure of fishing on FADs in EEZ waters of the PNA countries and on the High Seas;
- A limitation in the number of vessel days in PNA EEZs and equivalent measures for other EEZs;
- A high seas vessel day limit, allocated by flag;
- A closure of several high seas pockets;
- A requirement to submit FAD management plans, including information on strategies used to implement the closure and other measures for reducing small bigeye mortality;
- A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;
- 100% Regional observer coverage for all purse seine vessels fishing on the high seas, on the high seas and in waters under the jurisdiction of one or more coastal States, or vessels fishing in waters under the jurisdiction of two or more coastal States during the same trip;
- Gradual reductions in the bigeye catch by longliners of Members that caught more than 2,000 tonnes in 2004 (does not apply to Small Island Developing States);
- A limitation of each Member's fishing capacity not to exceed the 2001-2004 or 2004 level.

In addition, CMM 2009/02 provides more guidance on some elements of CMM 2008/01 that were ambiguous, particularly on the FAD closure and full retention requirements. In 2009 and 2010, the WCPFC SC evaluated the efficacy of CMM/2008/01 and concluded that this measure, even if fully implemented, is extremely unlikely to achieve the objective of reducing fishing mortality on bigeye tuna to at least 30% below the level experienced either in 2004 or the annual average of the period 2001–2004. This conclusion was corroborated in subsequent analyses by SPC/OFP (2010b). However, the measure in force was not possible to quantitatively addressed to check whether CMM2008-01 has reduced fishing mortality for bigeye tuna to the levels specified in the CMM.

STECF COMMENTS: STECF agrees with the advice from WCPFC and notes that whereas the stock has not become overfished (due to higher than average levels of recruitment), it has been subjected to overfishing for more than a decade. STECF further notes that WCPFC management measures currently in place may be insufficient to end overfishing and that, at a minimum, a 32% reduction in bigeye tuna fishing mortality (from the average levels 2006-2009) is required to reduce the fishing mortality rate to F_{MSY}.

19.5. Eastern Pacific Skipjack (*Katsuwonus pelamis*)

FISHERIES: Catches of Eastern Pacific Skipjack have varied between 52,000 and 310,000 t over the time series. Between 1990 and 2010 the annual retained catch from the EPO averaged 187,000 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 was 307,500 t, a 41% increase on the 2007 catch. Conversely, catches in 2010 were about 150,000 tonnes, a 37% decrease from 2009. Catches have dropped to one half of the 2008 level. Skipjack catches in the EPO are notoriously variable and a similarly large decline was observed between 1999 and 2001.
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.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Advisory Committee (SAC) of IATTC.

REFERENCE POINTS: MSY n/a. $F/F_{MSY} \leq 1$. $B/B_{MSY} > 1$

STOCK STATUS:

The last full assessment for skipjack tuna was in 2005, although an evaluation of a set of fishery indicators was given in 2011. The 2005 analyses demonstrated a high degree of uncertainty, particularly with respect to the determination of MSY reference points. To provide an alternative to using MSY based reference points, in 2011 IATTC scientists used a simple assessment model to generate indicators for biomass, recruitment, and exploitation rate, which allows comparison of current indicator values with the levels observed historically. The average weight is below its lower reference level, which can be caused by over exploitation of the stock, above average levels of recruitment in recent years, by shifts in the distribution of fishing effort to offshore areas, or by a combination of them.
The continued decline in average weight concerns some scientists and, combined with leveling off of catch rates and a decline in catch, may indicate that the exploitation rate is around the MSY level. 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.
Fishery indicators do not show detrimental effects on the stock to date and it is believed that, currently, B >Bmsy and F $\leq$ Fmsy. There is some concern with the constantly increasing exploitation rate.

A full stock assessment is planned for 2012.

RECENT MANAGEMENT ADVICE: IATTC has given no management advice.

The main conservation measure established by the IATTC that impact skipjack is Resolution C/11/01, which includes an annual fishing closure for purse seine vessels greater than 182 t carrying capacity. This measure calls for:

- A 62-day closure for purse seiners greater than 182 tons capacity in 2011, 2012 and 2013;
- A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;
- A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas during 2011 and 2012.

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 level of exploitation of this stock. However, the lowest average weight may also be a consequence of recent recruitments being greater than in the past, and more detailed analyses are necessary to inform future management measures. Resolution C/11/01 will decrease the effort, and hence catches, directed at skipjack in the eastern Pacific.

19.6. Western and central Pacific skipjack (*Katsuwonus pelamis*)

FISHERIES: The WCPO Skipjack stock supports the largest tuna fishery in the World, accounting for 40% of worldwide tuna landings. Catches in 2009 were the highest on record, about 1,680,000 tonnes, a 10% increase from 2008. The provisional catches in 2010 are estimated around 1,610,000 t. Purse seining, which accounts for 85% of the catches, has been increasing steadily for three decades. In contrast, pole-and-line fishing has been declining steadily.

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 around 65% of the total annual catch of principal tuna species landed from the region.

In 2006, an estimated catch of 1,433,590 t of skipjack was reported, while a total of 1,569,642 t were reported in 2007. About 85% of the 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. The 2009 WCP catch of skipjack (1,679,165 t) was the highest recorded and the provisional catches in 2010 were 1,610,578 t).

SOURCE OF MANAGEMENT ADVICE: The Western and Central Pacific Fisheries Commission (WCPFC) is responsible for the management of this stock.

The Secretariat of the Pacific Community's (SPC's) Oceanic Fisheries Programme[5] serves as the Commission's Science Services Provider and Data Manager. As the SPC started collecting fisheries data and conducting biological studies and stock assessments before WCPFC was established, this relationship minimizes duplication of effort between the two organizations. The WCPFC has a Scientific Committee (SC) composed of representatives from each Commission member. The SC reviews the assessment results and related information prepared by SPC and by other SC experts and makes recommendations for management actions based on these assessments.

REFERENCE POINTS: Base case assessment model estimated the MSY in1,503,600 tonnes (1274000 – 1818000), $F_{current}/F_{MSY}$ = 0.37 (0.22-0.53), and$SSB_{current}/SSB_{MSY}$ = 2.94 (2.45-3.69). **STOCK STATUS**:
The 2011 updated assessment gave similar results to the previous (2008) assessment, and indicated the following:

- The principal conclusions are that skipjack is currently exploited at a moderate level relative to its biological potential. Furthermore, the estimates of SSBcurrent/SSBMSY and Fcurrent/FMSY indicate that overfishing of skipjack is not occurring in the WCPO, nor is the stock in an overfished state. These conclusions appear relatively robust since the different model scenarios investigated gave the same results.
- Although the current (2006-2009) level of exploitation is below that which would provide the maximum sustainable yield, recent catches have increased strongly and the mean catch for 2006-2009 of 1.5 million tonnes is equivalent to the estimated MSY at an assumed steepness of 0.8, but below the median estimate of 1.9 million tonnes from the sensitivity runs investigated. Maintenance of this level of catch would be expected to decrease the spawning stock size towards MSY levels if recruitment remains near its long-term average level.
- Fishing pressure and recruitment variability, influenced by environmental conditions, will continue to be the primary influences on stock size and fishery performance.

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:

Catches in 2010 were aroun 1.6 million mt, the second highest recorded and below the record high catch of 1.68 million mt in 2009. Equilibrium yield at the current F is about 1.14 million mt which is about 76% of the MSY level. The assessment continues to show that the stock is currently only moderately exploited and fishing mortality levels are sustainable. However, there is concern that high catches in the equatorial region could result in range contractions of the stock, thus reducing skipjack availability to higher latitude.

Due to the rapid change of the fishing mortality and biomass indicators relative to MSY in recent years, increases of fishing effort should be monitored. The Commission should consider developing limits on fishing for skipjack to limit the declines in catch rate associated with further declines in biomass.
The main binding conservation measure for WCPO skipjack established by the WCPFC is CMM 2008/01 which is targeted at conserving yellowfin and bigeye. However, the measure also affects skipjack fisheries. The measure calls for:

- A 3month closure of fishing on FADs in EEZ waters of PNA countries and on the High Seas;
- A limitation in the number of vessel days in PNA EEZs;
- A closure of several high seas pockets;
- A requirement to submit FAD management plans;
- A full retention requirement for all purse seine vessels regarding bigeye, **skipjack** and yellowfin tunas;
- 100% Regional observer coverage for all purse seine vessels fishing on the high seas, on the high seas and in waters under the jurisdiction of one or more coastal States, or vessels fishing in waters under the jurisdiction of two or more coastal States;
- A limitation of each Member's fishing capacity not to exceed the 2001-2004 or 2004 level.

[5] (http://www.spc.int/oceanfish/)

In addition, CMM 2009/02 provides more guidance on some elements of CMM 2008/01 that were ambiguous, particularly on the FAD closure and full retention requirements.

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 WCPFC Scientific Committee in relation to limiting the maximum catches of skipjack.

19.7. Northern Pacific Albacore (*Thunnus alalunga*)

FISHERIES: North Pacific albacore extends beyond the WCPFC Convention Area. It is managed jointly by WCPFC and IATTC, and it is assessed by the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC).

Catches in 2009 were about 81,800 tonnes, a 20% increase from 2008. The main fishing gears are longline and pole and line, which together account for accounting for 73% of the catch, followed by troll. Catches by longlining have shown a decreasing trend since 1997.

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 in 1991, and then increased to about 122,000 t in 1999. Catches in 2009 were reported to be around 82,000 t. and provisionally around 72,000 t. in 2010..

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: MSY = n/a, $F/F_{MSY} \leq 1$, $B/B_{MSY} > 1$.

STOCK STATUS:
The most recent assessment of north Pacific albacore was in 2011, using data through 2009 (ISC 2011). The assessment concluded that:

- That overfishing is not occurring and that the stock likely is not in an overfished condition, (e.g., F20-50% < 1.0), although biomass-based reference points have not been established for this stock.

RECENT MANAGEMENT ADVICE:

The ISC in 2011 noted that F2006-2008 is significantly below F2002-2004 and provided the following recommendations on conservation advice:

i. The stock is considered to be healthy at average historical recruitment levels and fishing mortality (F2006-2008).

ii. Sustainability is not threatened by overfishing as the F2006-2008 level (current F) is about 71% of FSSB-ATHL and the stock is expected to fluctuate around the long-term median SSB (~400,000 t) in the short- and long-term future.

iii. If future recruitment declines by about 25% below average historical recruitment levels, then the risk of SSB falling below the SSB-ATHL threshold with 2006-2008 F levels increases to 54% indicating that the impact on the stock is unlikely to be sustainable.

iv. Increasing F beyond F2006-2008 levels (current F) will not result in proportional increases in yield as a result of the population dynamics of this stock.

v. The current assessment results confirm that F has declined relative to the 2006 assessment, which is consistent with the intent of the previous (2006) WG recommendation."

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.

STECF COMMENTS: STECF agrees with the advice of IATTC and WCPFC. STECF further notes that while the current F is below various F_{MSY} proxies, it is highly unlikely that increased fishing effort will result in significantly increased sustained catches. Conversely it is more likely to significantly reduce spawning biomass. STECF notes that IATTC and WCPFC have measures in place to limit fishing effort or fishing capacity targeted on this stock.

19.8. Southern Pacific albacore (*Thunnus alalunga*)

FISHERIES: Catches in 2009 were about 76,000 tonnes, a 25% increase from 2008. The main fishing gear is longline, accounting for 95% of the catch. Relatively minor amounts are taken by other gears including trolls.

The development of this fishery is 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 62,000 t – slightly less than the peak of 65,000 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 61, t. Catches in 2006 in WCPO were about 65,000 t. Total catches for 2009 reached 76,000 t and further increase to 81,000 t. in 2010.

Note: The boundary of this stock was recently moved from 30°S to 25°S.

SOURCE OF MANAGEMENT ADVICE:
South Pacific albacore extends beyond the WCPFC Convention Area. However, the stock is assessed by WCPFC.

REFERENCE POINTS: MSY ≈ 85,200 tonnes. $F_{current}/F_{MSY}$ = 0.26, and SSB/SSB_{MSY} = 2,25.

STOCK STATUS: The current view of the stock is based on the assessment (of albacore tuna in the South Pacific Ocean) conducted in 2011. The results of the 2011 assessment are similar to 2009 assessment results and concluded that overfishing is not occurring (Fcurrent < FMSY) and that the stock is not overfished (SB_{2009} >SSB_{MSY})

RECENT MANAGEMENT ADVICE: The South Pacific albacore stock is currently not overfished nor is overfishing occurring, and current biomass levels are sufficient to support current levels of catch. Any increases in catch or effort are likely to result in catch rate declines, especially relating to longline catches of adult albacore, with associated impacts upon vessel profitability. WECPFC SC further notes that vessel activity must be managed, as per the requirements of CMM 2010-05.

STECF COMMENTS: STECF agrees with the advice of WCPFC; however, it notes that the most recent assessment indicates that increasing effort in areas of albacore concentration can result in a decrease in catch rate. STECF therefore advises that catch rates and fishing effort should be closely monitored.

19.9. 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.

19.10. Pacific bonito (*Sarda sp*

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.

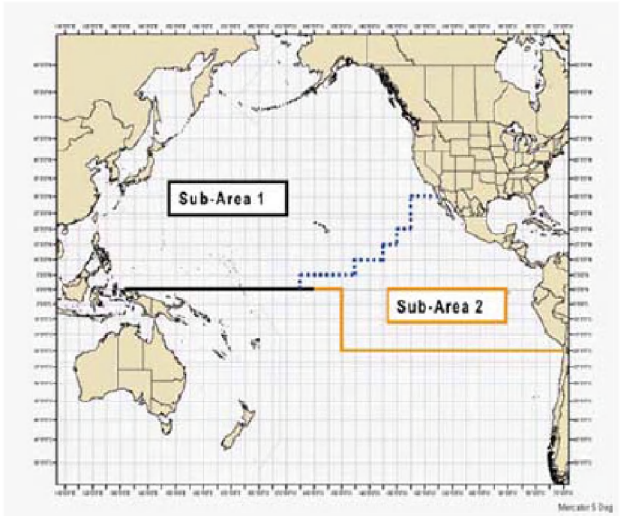
RECENT MANAGEMENT ADVICE: No management advice.

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.

19.11. 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. Recent catches has been around 14,300 t.
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 11 in 2011.

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. MSY = 25,000 t., SSB> SSBmsy and F> Fmsy.

STOCK STATUS: Based on the 2011 stock assessment results, the population is not overfished and overfishing is not occurring.

RECENT MANAGEMENT ADVICE: IATTC has not provided any management recommendations.

STECF COMMENTS: 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.

19.12. 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

19.13. 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.

19.14. Pacific Striped Marlin (*Kajikia audax formerly 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 145°-150°W, 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.

Northeast Pacific Striped Marlin:

The results of the latest IATTC (2009) assessment (Status and trends of striped marlin in the northeast pacific ocean in 2009, Michael G. Hinton and Mark N. Maunder) indicate that the striped marlin stock in the northeast Pacific Ocean is not overfished or being overfished.

- Stock biomass has increased from a low of about 2,600 metric tons (t) in 2003, and was estimated to be about 5,100 t in 2009.
- There has been an increasing trend in the estimated ratio of the observed annual spawning biomasses.

- The results of the assessment indicate that the striped marlin stock in the northeast Pacific Ocean is not overfished or being overfished.
- Stock biomass has increased from a low of about 2,600 metric tons (t) in 2003, and was estimated to be about 5,100 t in 2009.
- There has been an increasing trend in the estimated ratio of the observed annual spawning biomasses

Conversely: The Scientific Committee of the WCPFC whilst noting that no stock assessment was conducted for North Pacific striped marlin in 2011 has recommended an immediate reduction in fishing mortality for this stock.

Southwest Pacific striped marlin: The Scientific Committee of the WCPFC report that no stock assessment was conducted for southwest Pacific striped marlin in 2011,

RECENT MANAGEMENT ADVICE:

South Pacific striped marlin:

The Scientific Committee of WCPFC noted that as no stock assessment was conducted for southwest Pacific striped marlin in 2011 there is no new management advice.

North Pacific striped marlin:

- The results of the latest IATTC (2009) assessment (Status and trends of striped marlin in the northeast pacific ocean in 2009, Michael G. Hinton and Mark N. Maunder) indicate that the striped marlin stock in the northeast Pacific Ocean is not overfished or being overfished.
- The Scientific Committee of the WCPFC whilst noting that no stock assessment was conducted for North Pacific striped marlin in 2011 has recommended an immediate reduction in fishing mortality for this stock.

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.

19.15. 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.

19.16. 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.

19.17. 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.

19.18. 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.

19.19. 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[6] 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.

[6] SPRFMO-III-SWG-16

20. 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 2010/11 fishing season started on 1 December 2010 and will end on 30 November 2011, Members' fishing vessels operated in the fisheries targeting icefish (*Champsocephalus gunnari*), toothfish (*Dissostichus eleginoides* and/or *D.mawsoni*) and krill (*Euphausia superba*); no directed fishing occurred on crabs (*Paralomis* spp.) during the season. The reported data are the totals up to 24 September 2011, but at that time fishing was still in progress in some areas at the time of the meeting. The Secretariat monitored a total of 130 catch limits for target species 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 2011, 16 fishing areas including five fisheries, had been closed by the Secretariat in 2010/11, and all 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 *Dissostichus* spp. in Division 58.4.1 (SSRU E: overrun 6 tonnes, total catch 113% of the limit; whole fishery: overrun 6 tonnes, total catch 103% of the limit), Division 58.4.2 (SSRU E: overrun 96 tonnes, total catch 339% of the limit; whole fishery: overrun 66 tonnes, total catch 194% of the limit), Subarea 88.1 (SSRUs J and L: overrun 54 tonnes, total catch 114% of the limit; whole fishery: overrun 32 tonnes, total catch 101% of the limit), and Subarea 88.2 (SSRUs C, D, F and G, overrun 2 tonnes, total catch 101% of the limit).

20.1. Toothfish (*Dissostichus* spp.)

In 2010/11, 12 Members States fished for toothfish in Subareas 48.2, 48.3, 48.4, 48.6, 88.1, 88.2 and 88.3, and in Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b, 58.4.4b, 58.5.1, 58.5.2, 58.6 and 58.7. The reported total catch to 24 September was 11,254 tonnes.

20.1.1. 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. In 2004, the Commission agreed to subdivide Subarea 48.3 into one area containing the South Georgia–Shag Rocks (SGSR) stock and other areas, to the north and west, that do not include the SGSR stock. Within the SGSR area, the Commission defined three Management Areas (A, B and C) (CM 41-02/A).There has been no significant IUU catch since the 2000/01 season. The catch limits in the 2010/11 season for Management Areas A, B and C were 900 and 2,100 tonnes respectively, with an overall catch limit for SGSR of 3,000 tonnes. The total declared catch was 1,788 tonnes, with catches in Management Areas B and C 571 tonnes and 1,215 tonnes respectively (in addition, 2 tonnes were taken during a research survey). The fishing season in both management areas commenced on 21 April 2011 (CM 41-02) and both areas remained open to fishing during the prescribed season. Tagging of toothfish continued at a rate of 1.3 fish per tonne with a total of 2,910 fish tagged (with 524 recaptures). The catch limit in 2010/11 was 3,000 tonnes and the recorded catch was 1,788 tonnes.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is the CCAMLR. Assessments are carried out biennially. During the 2011 meeting of WG-FSA an assessment has been carried out. Also cetacean depredation on longlines was taken into account, which results in an increase between 2% and 3.6% over the reported figures depending on the year, for the 2003/04 season onwards. The assessment is based on an integrated assessment (CASAL) that uses catch at length, CPUE and tagging data. CASAL two-fleet model structure was used and assumptions are detailed in the WG-FSA Report (2011).

REFERENCE POINTS: $SSB_{t+35years} >= 50\% SSB_0$; probability of SSB dropping below 20% of SSB_0 <0.1.

STOCK STATUS: There is genetic separation between Subarea 48.3 and the Patagonian Shelf (FAO Area 41) (Shaw et al., 2004). The SGSR stock, occurring within management areas A, B and C is genetically separate from fish taken in the extreme north and west of Subarea 48.3. All assessments consider only the SGSR stock. The stock in Subarea 48.3 is considered fully exploited. $SSB_{current} > 50\% SSB_0$

RECENT MANAGEMENT ADVICE: The catch limit is set on 2,600 tonnes, subdivided for the Management Areas: A is 0 tonnes, B is 780 tonnes and C is 1,820 tonnes in each season, for 2011/12 and 2012/13 fishing seasons. By-catch limits and move-on rules are included in the annual conservation measure established for this fishery (CM 41-02).

STECF COMMENTS: STECF has no comments.

20.1.2. Tootfish (*Dissostichus eleginoides* en *D. mawsoni*) in Subarea 48.4, South Sandwich Islands

FISHERIES: The fishery for *Dissostichus eleginoides* in Subarea 48.4 was initiated as a new fishery in 1992/93 following notifications from Chile and the USA, and the adoption of CM 44/XI, which set a precautionary catch limit for *D. eleginoides* of 240 tonnes for that season. Subsequently, the USA withdrew from the fishery and the Chilean longline vessel abandoned fishing after one week of poor catches. In addition, a Bulgarian-flagged longliner fished in November and December 1992 and reported a catch of 39 tonnes of *D. eleginoides*. Haul-by-haul data from the Chilean and Bulgarian vessels were submitted to CCAMLR and on basis of these data the Commission adopted a precautionary catch limit for D. eleginoides of 28 tonnes per season. In addition, the taking of *D. mawsoni* was prohibited, other than for scientific research purposes. These limits remained in force until 2004. In 2004/05, the UK conducted a pilot tagging program using a fishing vessel. This tagging program was carried forward till 2007/08. The experiment resulted in a CASAL assessment of toothfish in the northern part of Subarea 48.4 in 2009. In 2008, the Commission agreed to a continuation of the tagging experiment initiated in 2004/05 and to dividing Subarea 48.4 into a northern area (Subarea 48.4 North) and a southern area (Subarea 48.4 South), with a directed longline fishery on *D. eleginoides* in Subarea 48.4 North and *Dissostichus* spp. in Subarea 48.4 South. The catch limits in 2010/11 for Subarea 48.4 North were 40 tonnes for *D. eleginoides* and the continued prohibition of the taking of *D. mawsoni* other than for scientific research purposes, and for Subarea 48.4 South an experimental precautionary catch limit of 30 tonnes for *D. eleginoides* and *D. mawsoni* combined. The fishing season was from 1 December 2010 to 30 November 2011 and both areas remained opened to fishing during the prescribed season. The reported catch of *Dissostichus* spp. in the Northern Area and Southern Area was 37 tonnes and 17 tonnes respectively.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. For Subarea 48.4 North an updated assessment for *D. eleginoides* was performed using CASAL software. The model incorporated catch-at-length data from 2004/05 to 2010/11, with the exception of 2008/09 for which catch-at-age data was used based on ageing of a random sample of otoliths collected during the 2008/09 season. CASAL model structure and assumptions are detailed in the WG-FSA Report (2011). For Subarea 48.4 South a three-year tagging experiment was completed in 2010/11 in Subarea 48.4 South. No full assessment is currently available. Due to reduced catches and low tag returns realised in the last year of the experiment, the UK proposed to extend the tagging experiment for a fourth year in Subarea 48.4 South in 2011/12, carrying forward the original proposal objectives from 2009.

REFERENCE POINTS: $SSB_{t+35years} >= 50\% SSB_0$; probability of SSB dropping below 20% of SSB_0 <0.1.

STOCK STATUS: For Subarea 48.4 B_0 was estimated at 1550 ton. For Subarea 48.4 Petersen estimates from tag recaptures to date suggest a vulnerable population of approximately 600 tonnes for *D. mawsoni*. Limited tag recaptures of *D. eleginoides* suggest a vulnerable biomass in the region of 150 to 350 tonnes.

RECENT MANAGEMENT ADVICE: For Subarea 48.4 North a catch limit of 48 tonnes for *D. eleginoides* was set, with the continued prohibition of the taking of *D. mawsoni* other than for scientific research purposes and the maintenance of catch limits for by-catch species, with a limit for macrourids of 7.5 tonnes and a limit for rajids of 2.5 tonnes. For Subarea 48.4 South a catch limit of 33 tonnes for *D. eleginoides* and *D. mawsoni* combined and the maintenance of a move-on rule for by-catch species, with a macrourid trigger of 150 kg and a trigger for rajids set at 5% of the catch of *Dissostichus* spp. (CM 41-03).

STECF COMMENTS: STECF has no comments.

20.1.3. Patagonian tootfish (*Dissostichus eleginoides*) in Division 58.5.1., Kerguelen Islands

FISHERIES: The fishery for *Dissostichus eleginoides* operates in the French EEZ around the Kerguelen Islands in Division 58.5.1. The fishery began in 1984/85 as a trawl fishery targeting D. eleginoides, however,

trawling targeting other species between 1979 and 1984 caught small amounts of toothfish as by-catch. Trawling continued to 2000/01; a longline fishery began in 1991/92 and continues to the present. The fishery is active throughout most of the year and only longlining is currently permitted in this fishery. The catch limit of *D. eleginoides* set by France in its EEZ in Division 58.5.1 for 2010/11 was 5,100 tonnes, and this was allocated to seven longliners. The catch for the current season1reported to October 2011 was 2,906 tonnes. The estimated IUU catch for the 2010/11 season was zero inside the French EEZ. Some IUU fishing may have occurred outside the EEZ. The IUU catch of *D. eleginoides* in 2010/11 was not estimated.

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. France informed that the development of a stock assessment model using CASAL is ongoing, and it intends to present the model to a future meeting of WG-FSA. It reviewed a preliminary assessment (CASAL, with catch, CPUE and length-frequency data from the commercial fishery from 1979 onwards).

REFERENCE POINTS: Assessment of appropriate levels of future catch has not been based on the CCAMLR decision rules.

STOCK STATUS: *D. eleginoides* occurs throughout the Kerguelen Islands shelf, from shallow waters (<10 m) to at least 2,000 m depth. As fish grow, they move to deeper waters, and are recruited to the trawl fishery on the slopes of the shelf and subsequently to the longline fishery in deeper waters. A general east–west deep-sea movement of adult fish occurs and spawning is restricted to the westerly zone early in winter each year. Tagging experiments at Heard Island (Division 58.5.2) show long-distance movements of sub-adult/adult fish between zones (Heard to Kerguelen and also Crozet), but the proportion of exchange between stocks is unknown.

RECENT MANAGEMENT ADVICE: The outcome of the preliminary stock assessment could not be used for management advice. The 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 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, remains in force.

STECF COMMENTS: STECF has no comments.

20.1.4. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 58.5.2., Heard and McDonald Islands

FISHERIES: From 1996/97 to 2001/02 the fishery was a trawl fishery, only in recent seasons the fishery has been prosecuted by trawl, longline and pot. The longline fishery was active from April 2011 and the trawl fishery was active throughout the whole season. The catch limit of *Dissostichus eleginoides* in Division 58.5.2 for the 2010/11 season was 2,550 tonnes (CM 41-08) for the period from 1 December 2010 to 30 November 2011. The catch by October 2011 was 1,676 tonnes, of this 1,122 tonnes was taken by longline, 521 tonnes by trawl and 33 tonnes by pot. 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. A preliminary assessment was performed and 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 (2011).

REFERENCE POINTS: $SSB_{t+35years} >= 50\% SSB_0$; probability of SSB dropping below 20% of SSB_0 <0.1

STOCK STATUS: *D. eleginoides* occurs throughout the Heard Island and McDonald Islands Plateau, from shallow depths near Heard Island to at least 1,800 m depth around the periphery of the plateau. Genetic studies have demonstrated that the population at Heard Island and McDonald Islands is distinct from those at distant locations such as South Georgia and Macquarie Island, but that within the Indian Ocean sector there appears to be no distinction between fish at Heard, Kerguelen, Crozet or Marion/Prince Edward Islands. This, combined with results from tagging data which show movement of some fish from Heard Island to Kerguelen and Crozet Islands suggests that a metapopulation of *D. eleginoides* may exist in the Indian Ocean sector. The current stock status at 2011 was estimated at 63% of B_0.

RECENT MANAGEMENT ADVICE: The catch limit for *D. eleginoides* in Division 58.5.2 west of 79°20'E was set at 2,730 tonnes for 2011/12 and 2012/13.

STECF COMMENTS: STECF has no comments.

20.1.5. 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 fishery has been conducted using longlines from 1996/97 to the present. The catch limit set by France in its EEZ in Subarea 58.6 for 2010/11 was 700 tonnes, and this was allocated to seven longliners. The catch for the current season reported to October 2011 was 551 tonnes. Fishing trials with trawlers have not been continued. The fishery was active all year. A high level of depredation on *D. eleginoides* catches from killer whales (*Orcinus orca*) is the main reason why fishers avoid the area. There was no evidence of IUU fishing in 2008/09 and 2009/10. The IUU catch of *D. eleginoides* in 2010/11 was not estimated

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 2011.

REFERENCE POINTS: Assessment of appropriate levels of future catch has not been based on the CCAMLR decision rules.

STOCK STATUS: Tagging has been carried out since 2006, so far 4 353 fish have been tagged from commercial longliners at Crozet. Of the tagged fish, 197 were recaptured; 182 from French tagging and 15 from tagging at Heard Island.

RECENT MANAGEMENT ADVICE: 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. No new information was available on the state of fish stocks in Subarea 58.6 outside areas of national jurisdiction. Therefore the prohibition of directed fishing for *D. eleginoides*, described in CM 32-11, remains in force.

STECF COMMENTS: STECF has no comments.

20.1.6. 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 2010/11 was 440 tonnes for the period 1 December 2010 to 30 November 2011. The catch reported for Subareas 58.6 and 58.7 as of 5 October 2010 was respectively 68 and 108 tonnes (+ 129 tonnes in Area 51), all of which was taken by trotlines. There was no evidence of IUU catch in recent seasons.

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. The assessment was reviewed in 2007. The adoption of the operational management procedure (OMP) as a basis for management is currently being considered by South Africa, but is being hampered by the fact that the fishery has moved from Spanish to trott gear since 2009 and only trot-line gear was used in 2011. A requirement for a portion of the catch to be taken by Spanish longline gear will be implemented in 2012 to enhance CPUE comparisons between these gear types and to continue the historic CPUE series that is based on Spanish longline gear.

REFERENCE POINTS: Assessment of appropriate levels of future catch has not been based on the CCAMLR decision rules.

STOCK STATUS: The South African EEZ around the Prince Edward Islands is mainly in Subarea 58.7, but extends east into Subarea 58.6, south into Division 58.4.4, and north of the Convention Area into Area 51. However, there are currently no fishing grounds in the southern half of the South African EEZ. The majority of

the fishery occurs down to about 1,500 m, but fishing depths in excess of 2,000 m have been recorded. Subarea 58.6 also includes the Crozet Islands to the east of the Prince Edward Islands. The current stock assessments did not consider the possibility that these island groups share the same toothfish stock.

RECENT MANAGEMENT ADVICE: The Commission noted that a revised operational management procedure to form the basis for management advice is under development by national scientists. It was unable to provide management advice for the fishery in the South African EEZ at the Prince Edward Islands. The catch limit of *D. eleginoides* in the South African EEZ for 2011/12 is likely to be 320 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. Therefore, the prohibition of directed fishing for *D. eleginoides*, described in CMs 32-10, 32-11 and 32-12, remains in force.

STECF COMMENTS: STECF has no comments.

20.1.7. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) 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. Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Subarea 48.6 since 2003/04, and the dominant species in the catches in recent seasons was *D. mawsoni*.In 2010/11, 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 fishing season was from 1 December 2010 to 30 November 2011 and the total reported catch was 393 tonnes. In 2010/11, the SSRUs south of 60°S were closed on 7 February 2011 (final reported catch: 197 tonnes). The SSRUs north of 60°S were closed on 19 April 2011 (final reported catch: 196 tonnes). Consequentially the fishery was also closed on 19 April 2011 with a final reported catch of 393 tonnes (catch limit for *Dissostichus* spp.: 400 tonnes), 34 tonnes *D. eleginoides* and 359 tonnes *D. mawsoni*. 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. In 2010, the Commission required each vessel catching more than 2 tonnes of *Dissostichus* spp. in an exploratory fishery to achieve a minimum tag overlap statistic of 50% in 2010/11 and of 60% from 2011/12 onwards (Annex 41-01/C). All vessels fishing in Subarea 48.6 in 2010/11 achieved a tag overlap statistic greater than 50% (range 53 to 95%).

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: 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. The Commission agreed that it could provide no new advice on catch limits for this subarea and noted the recommendations for increasing the research requirements in this fishery. The possibility of obtaining a Peterson estimate of *Dissostichus* spp. biomass from tag recaptures in Subarea 48.6 will be investigated in the intersessional period. The Exploratory Fishery will continue in 2011/12 with the precautionary catch limit for *Dissostichus* spp. of 200 tonnes north of 60°S and 200 tonnes south of 60°S for longline fishery by Japan, Republic of Korea, Norway, Russia and South Africa. No more than one vessel per country shall fish at any one time.

STECF COMMENTS: STECF has no comments.

20.1.8. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fishery Division 58.4.1.

FISHERIES: The exploratory longline fishery for Dissostichus spp. in Division 58.4.1 was first agreed by the Commission in 1998/99 (CM 166/XVII), and licensed longline vessels first operated in this fishery in 2004/05. The target species is *D. mawsoni*. In 2010/11, the exploratory fishery for *Dissostichus* spp. in Division 58.4.1

was limited to Japanese, Korean, New Zealand and Spanish vessels using longlines only (CM 41-11). The precautionary catch limit for *Dissostichus* spp. was 210 tonnes and the follo

wing 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 2010 to 30 November 2011. In 2010/11, three vessels fished in SSRUs C, E and G. SSRU E was closed on 11 February 2011 (final reported catch: 56 tonnes), and SSRU G was closed on 12 February 2011 (final reported catch: 59 tonnes). SSRU C, and consequently the fishery, was closed on 12 March 2011 (final reported catch: 100 tonnes). The final reported catch of the whole fishery was 216 tonnes (catch limit for *Dissostichus* spp.was 210 tonnes): <1 ton *D. eleginoides* and 359 tonnes *D. mawsoni*. IUU fishing in Division 58.4.1 was first detected in 2005/06, and high levels of IUU fishing in 2005/06, 2006/07 and 2009/10 resulted in the total removals being well in excess of the catch limits. The IUU catch of Dissostichus spp. in 2010/11 was not estimated.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. In 2010, the Commission required each vessel catching more than 2 tonnes of *Dissostichus* spp. in an exploratory fishery to achieve a minimum tag overlap statistic of 50% in 2010/11 and of 60% from 2011/12 onwards (Annex 41-01/C). All vessels fishing in Division 58.4.1 in 2010/11 achieved a tag overlap statistic greater than 50% (range 52 to 74%).

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: Unknown.

RECENT MANAGEMENT ADVICE: 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. The precautionary catch limit for *Dissostichus* spp. was 210 tonnes in 2010/11 and exploratory fishing will continue in 2011/12 under the same precautionary catch limit, 100 tonnes in SSRU C, 50 tonnes in SSRU E and 60 tonnes SSRU G (CM 41-11) and shall be limited to longline fishery only by Japan (1 vessel), Republic of Korea (2 vessels), New Zealand (3 vessels), Russia (2 vessels), South Africa (1 vessel) and Spain (1 vessel).

STECF COMMENTS: STECF has no comments.

20.1.9. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) 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 2010/11, the exploratory fishery for *Dissostichus* spp. in Division 58.4.2 was limited to Japanese, Korean, New Zealand, South African and Spanish vessels using longlines only (CM 41-05). The precautionary catch limit for *Dissostichus* spp. was 70 tonnes, of which no more than 30 tonnes could be taken in SSRU A and no more than 40 tonnes could be taken in SSRU E. The other SSRUs (B, C and D) were closed to fishing. The fishing season was from 1 December 2010 to 30 November 2011. In 2010/11, one vessel fished in SSRU E and reported a total catch of 136 tonnes of *D. mawsoni*. SSRU E was closed on 24 February 2011 (final reported catch: 136 tonnes), and consequently the fishery, was closed on 25 February 2011. The IUU catch of *Dissostichus* spp. in 2010/11 was not estimated.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. In 2010, the Commission required each vessel catching more than 2 tonnes of *Dissostichus* spp. in an exploratory fishery to achieve a minimum tag overlap statistic of 50% in 2010/11 and of 60% from 2011/12 onwards (Annex 41-01/C). The vessel fishing in Division 58.4.2 in 2010/11 achieved a tag overlap statistic greater than 50% (64%).

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: Unknown.

RECENT MANAGEMENT ADVICE: 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. No new advice could be provided on catch limits for this division for 2011/12 and 2012/13. The precautionary catch limit for *Dissostichus* spp. in 2011/12 is set at 70 tonnes (CM 41-05), with 30 tonnes in SSRU A, 0 tonnes in SSRUs B-D and 40 tonnes in SSRU E. Catches taken in research fisheries according to CM 24-01 shall be included as part of the precautionary catch

limit. The exploratory fishery shall be conducted by Japan, Rupublic of Korea, New Zealand, South Africa and Spain (one vessel for each country) using longlines only.

STECF COMMENTS: STECF has no comments.

20.1.10. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fishery in Division 58.4.3a, Elan Bank

FISHERIES: In 2001, the boundaries of Division 58.4.3 were rearranged on the basis of ecological considerations, and two new divisions were formed: Division 58.4.3a (Elan Bank) and Division 58.4.3b (BANZARE Bank). The Commission agreed to exploratory fisheries for *Dissostichus* spp. in each of these new divisions, outside areas of national jurisdiction. In 2010/11, the exploratory fishery for *Dissostichus* spp. in Division 58.4.3a was limited to one Japanese vessel using longlines only (CM 41-06). The precautionary catch limit for *Dissostichus* spp. was limited to 86 tonnes. The fishing season was from 1 May to 31 August 2011 and 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. The vessel reported a total catch of 4 tonnes of *D. eleginoides.* The IUU catch of *Dissostichus* spp. in 2010/11 was not estimated.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: 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. No new advice could be provided on catch limits for this division for 2011/12 and 2012/13. The precautionary catch limit for *Dissostichus* spp. is set at 86 tonnes in 2011/12. The exploratory fisheries shall be conducted by one vessel of France, Japan and South Africa, using longlines only.

STECF COMMENTS: STECF has no comments.

20.1.11. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fisheries in Subareas 88.1 and 88.2, Ross Sea

FISHERIES: In 2005 the Subareas 88.1 and 88.2 were split into two areas for the purposes of stock assessment: (i) the Ross Sea (Subarea 88.1 and SSRUs 882A–B), and (ii) SSRU 882E. The catch limits for the Subarea 88.1 and 88.2 SSRUs in the Ross Sea were changed as part of a three-year experiment starting in 2005/06. The SSRUs between 150°E and 170°E (881A, D, E, F) and between 170°W and 150°W (882A–B) were closed to fishing to ensure that effort was retained in the area of the experiment. To assist administration of the SSRUs, the catch limits for SSRUs 881B, C and G were amalgamated into a 'north' region and those for SSRUs 881H, I and K were amalgamated into a 'slope' region. Within Subarea 88.2, SSRU 882E was treated as a separate SSRU with its own catch limit, whilst SSRUs 882C, D, F and G were amalgamated with a single catch limit. However, in each of the closed SSRUs and prior to 2008/09, a nominal catch of up to 10 tonnes of *Dissostichus* spp. remained permissible under the research fishing exemption; these fishing research catch limits were removed in 2008. SSRU J was subdivided into two SSRUs (SSRU J and SSRU M) in 2008, and the catch limits for SSRUs 881J and L were amalgamated to assist administration. In 2010/11, the exploratory fishery for *Dissostichus* spp. in Subarea 88.1 was limited to Japanese, Korean, New Zealand, Russian, Spanish, UK and Uruguayan vessels using longlines only (CM 41-09). The precautionary catch limit for *Dissostichus* spp. was 2,850 tonnes applied as follows: 372 tonnes total could be taken in SSRUs B, C and G; 2 104 tonnes total in SSRUs H, I and K; 374 tonnes in SSRUs J and M. Five SSRUs (A, D, E, F and M) were closed to fishing. The catch limits for by-catch species were defined in CMs 33-03 and 41-09. The fishing season was from 1 December 2010 to 31 August 2011. In Subarea 88.2, the exploratory fishery for *Dissostichus* spp. was limited to 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 2010 to 31 August 2011. In 2010/11, five Members and 16 vessels fished in the exploratory fishery in Subarea 88.1 between December 2010 and January 2011. The fishery was closed on 14 January 2011

and the total reported catch of *Dissostichus* spp. was 2,882 tonnes (101% of the limit) of which 2 tonnes of *D. eleginoides* en 2,880 tonnes of *D. mawsoni*. The following SSRUs were closed during the course of fishing:

- SSRUs B, C and G closed on 10 December 2010, triggered by the catch of *Dissostichus* spp. (total catch 349 tonnes; 94% of the catch limit)
- SSRUs J and L closed on 9 January 2011, triggered by the catch of *Dissostichus* spp. (total catch 428 tonnes; 114% of the catch limit)
- SSRUs H, I and K closed on 14 January 2011, triggered by the catch of *Dissostichus* spp. (total catch 2105 tonnes; 100% of the catch limit).

Five Members and 12 vessels fished in the exploratory fishery in Subarea 88.2 between December 2010 and February 2011. The fishery closed on 8 February 2011 and the total reported catch of *Dissostichus* spp. was 576 tonnes, including 10 tonnes taken during research fishing in SSRU A (100% of the limit). The following SSRUs were closed during the course of fishing:

- SSRUs C, D, F and G closed on 8 February 2011, triggered by the catch of *Dissostichus* spp. (total catch 216 tonnes; 101% of the catch limit)
- SSRU E closed on 8 February 2011, triggered by the catch of *Dissostichus* spp. (total catch 350 tonnes; 97% of the catch limit).

The IUU catch of *Dissostichus* spp. in 2010/11 was not estimated.

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 2011.

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% B_0 (95% CI 75–86%).

STOCK STATUS: The stocks in Subareas 88.1 and 88.2 are considered fully exploited.

RECENT MANAGEMENT ADVICE: The precautionary catch limits for *Dissostichus* spp. in Subarea 88.1 is 3,282 tonnes and that the allocation used to set the 2009/10 catch limits for SSRUs in Subarea 88.1 be continued for 2011/2012, 428 tonnes in the north (SSRUs 881B, C, G), 2,423 tonnes on the slope (SSRUs 881H, I, K) and 431 tonnes on the shelf (SSRUs 881J en L). The exploratory fisheries shall be conducted by Japan (1 vessel), Republic of Korea (6 vessels), New Zealand (4 vessels), Norway (1 vessel), Russia (5 vessels), Spain (1 vessel) and UK (2 vessels) using longlines only. For SSRUs 882C-G a total catch limit of 530 tonnes was set of which 406 tonnes were assigned to the region between 65° and 70°50'S (SSRU 882H) and the remaining 124 tonnes to the region south of 70°50'S (SSRUs 882C-G). The exploratory fisheries shall be conducted by the Republic of Korea (6 vessels), New Zealand (4 vessels), Norway (1 vessel), Russia (5 vessels), Spain (1 vessel) and UK (2 vessels) using longlines only.

STECF COMMENTS: STECF has no comments.

20.1.12. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) closed fishery in Division 58.4.3b, Banzare Bank

FISHERIES: In 2001, the boundaries of Division 58.4.3 were rearranged on the basis of ecological considerations, and two new divisions were formed: Division 58.4.3a (Elan Bank) and Division 58.4.3b (BANZARE Bank). The Commission agreed to exploratory fisheries for *Dissostichus* spp. in each of these new divisions, outside areas of national jurisdiction. In 2007, the division was subdivided into SSRUs A (north of 60°S) and B (south of 60°S). In 2008, SSRU A was further subdivided into SSRUs A, C, D and E. Since 2009/10, operations in this fishery have been limited to research fishing only, in accordance with CM 24-01. In 2010/11, there was limited to research fishing for *Dissostichus* spp. in Division 58.4.3b and was conducted by one Japanese vessel using longlines only, in accordance with CM 24-01 (CM 41-07), and reported a total catch of 11 tonnes of *Dissostichus* spp (2 tonnes of *D. eleginoides* and 9 tonnes of *D. mawsoni*). The IUU catch of *Dissostichus* spp. in 2010/11 was not estimated

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: Precautionary exploitation rate of 0.01, which is consistent with assumption that the current status of this potentially depleted stock is 30% B_0 under the GYM resulting in a precautionary research catch limit of 41 tonnes.

STOCK STATUS: Not available until such time as available data on the current status of the stock on Banzare Bank, historical fishing data, the results of past surveys and current research, and estimates of past and ongoing IUU removals, have been fully analysed and reviewed.

RECENT MANAGEMENT ADVICE: The fishery is currently conducted as part of exploratory fisheries with overall catch limits greater than zero. The Japanese research on BANZARE Bank may proceed in 2011/12, limited to 48 sets in specific locations, with a catch limit of 40 tonnes, subject to the recommendations in the WG-FSA 2011 report.

STECF COMMENTS: STECF has no comments.

20.1.13. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) closed fisheries in Divisions 58.4.4a and 58.4.4b, Ob and Lena Bank

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 2010/11, a Japanese-flagged longliner conducted research fishing in accordance with a research plan submitted under CM 24-01. The vessel caught 35 tonnes of *D. eleginoides*. The IUU catch of Dissostichus spp. in 2010/11 was not estimated.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as part of exploratory fisheries with overall catch limits greater than zero.

STOCK STATUS: Unknown

RECENT MANAGEMENT ADVICE: The Japanese research on BANZARE Bank may proceed in 2011/12, limited to 71 sets in specific locations, with a catch limit of 70 tonnes, subject to the recommendations in the WG-FSA 2011 report.

STECF COMMENTS: STECF has no comments.

20.1.14. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) closed fisheries in Subarea 88.3.

FISHERIES: There is a prohibition of directed fisheries on toothfish (*Dissostichus* spp.) in Subarea 88.3 (CM 32-16), other than for scientific research purposes in accordance with Conservation Measure 24-01, from 1 December 2003 until the fishery is reopened by the Commission based on the advice of the Scientific Committee. In 2010/11, a Russian-flagged longliner conducted research fishing in accordance with a research plan submitted under CM 24-01. The vessel caught 5 tonnes of *D. mawsoni*.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: The fishery is currently conducted as part of exploratory fisheries with overall catch limits greater than zero.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: The Russian research in Subarea 88.3 may proceed in 2011/12, in locations spatially concentrated within the area in which toothfish are most abundant and tag recaptures are most likely. The catch limit is set at 65 tonnes, subject to the recommendations in the WG-FSA 2011 report.

STECF COMMENTS: STECF has no comments.

20.1.15. Patagonian tootfish (*Dissostichus eleginoides*) other closed fisheries

FISHERIES: There is a prohibition of directed fisheries Patagonia toothfish (*Dissostichus eleginoides*) in:

- Subarea 48.5 from 1 December 2010 to 30 November 2011 (CM 32-09).
- Division 58.6 except for waters adjacent to the Prince Edward Islands and the Crozet Islands (CM 32-11), other than for scientific research purposes in accordance with Conservation Measure 24-01, from 1 December 2002 until the fishery is reopened by the Commission based on the advice of the Scientific Committee.
- Division 58.7 except for waters adjacent to the Prince Edward Islands (CM 32-12), other than for scientific research purposes in accordance with Conservation Measure 24-01, from 7 November 1998 until the fishery is reopened by the Commission based on the advice of the Scientific Committee.
- Division 58.5.1 outside areas of national jurisdiction (CM 32-13), other than for scientific research purposes in accordance with Conservation Measure 24-01, from 1 December 2003 until the fishery is reopened by the Commission based on the advice of the Scientific Committee.
- Division 58.5.2 east of 79°20'E and outside the EEZ to the west of 79°20'E (CM 32-14), other than for scientific research purposes in accordance with Conservation Measure 24-01, from 1 December 2003 until the fishery is reopened by the Commission based on the advice of the Scientific Committee.
- Subarea 88.2 north of 65°S (CM 32-15), other than for scientific research (10 tonnes of *Dissostichus* spp. in 2011/12 by Russia) purposes in accordance with Conservation Measure 24-01, from 1 December 2003 until the fishery is reopened by the Commission based on the advice of the Scientific Committee.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: For Subarea For these fish species and subsequent areas there was no new advice.

STECF COMMENTS: STECF has no comments

20.2. Icefish (*Champsocephalus gunnari*)

In 2010/11, two Members fished for icefish by trawling in Subarea 48.3 and Division 58.5.2 and the catch reported to 24 September was 11 tonnes (378 tonnes in 2009/2010 and 1,916 tonnes in 2008/09).

20.2.1. Icefish (*Champsocephalus gunnari*) in Division 58.5.2, Heard and McDonald Islands

FISHERIES: The trawl fishery for *Champsocephalus gunnari* in Division 58.5.2 has caught 1 tonnes from a catch limit of 78 tonnes in 2010/11 to 9 October 2011 (CM 42-02). 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 and 2011. The 2008 to 2011 Australian bottom trawl surveys had sampled a large cohort, which dominated the population structure in 2010 as the 4+ year class, but appears to have declined rapidly over the past year. A new 1+ and 2+ cohort was also detected.

REFERENCE POINTS: $SSB_{t+2years} >= 75\% SSB_{current}$. When the stock assessment indicates a stock biomass (represented by the lower one-sided 95% confidence limit of the survey biomass estimate) of less than 1,000 tonnes, or the decision rules indicated a catch limit of less than 100 tonnes, a commercial catch limit is not set, but a 30 tonnes combined research and by-catch limit applies.

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: As the assessment for catch in 2011/12 indicates a lower one-sided 95% of biomass less than 1,000 tonnes, the advice of the Commission is a catch limit for *C. gunnari* in 2011/12 of 0 tonnes, with a 30 tonne research and by-catch limit pending the results of a planned survey in 2011/12 (CM 42-02).

STECF COMMENTS: STECF has no comments.

20.2.2. 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 2010/11, the fishing season was from 1 December 2010 to 30 November 2011, with a catch limit for *C. gunnari* of 2,305 tonnes (CM 42-01). Limited commercial fishing was conducted by one vessel in February and one vessel in September/October 2011 but with zero catches. A total catch of 10 tonnes was reported from the research survey. There has been no evidence of IUU activity in this fishery.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. No new estimates of standing stock were available from acoustic surveys. Previous acoustic investigations have demonstrated that *C. gunnari* of all sizes/ages spend time in midwater and reinforced the belief that a bottom trawl survey significantly underestimates *C. gunnari* biomass. In January/February 2011, the UK undertook a random stratified bottom trawl survey of the South Georgia and Shag Rocks shelves. The survey employed the same trawl gear and survey design as previous UK surveys in Subarea 48.3. The growth parameters were those used by CCAMLR in previous years, while the length–weight parameters were updated according to the 2011 survey results.

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 49,353 tonnes in January 2011. The one-sided lower 95% CI was 31,373 tonnes.

RECENT MANAGEMENT ADVICE: The catch limit for *C. gunnari* is set at 3,072 tonnes in 2011/12 based on the outcome of the single short-term assessment.

STECF COMMENTS: STECF has no comments.

20.3. Other finfish species in the Convention Area

20.3.1. Other finfish species closed fisheries

FISHERIES: There is a prohibition of directed fisheries on finfish, other than toothfish (*Dissostichus* spp.) and icefish (*Champsocephalus gunnari*):

- for finfish in Subarea 48.1, the Peninsula area (CM 32-02), other than for scientific research purposes, from 7 November 1998 until the fishery is by the Commission based on the advice of the Scientific Committee.

- for finfish in Subarea 48.2, around South Orkneys (CM 32-03), other than for scientific research purposes, from 7 November 1998 until the fishery is reopened by the Commission based on the advice of the Scientific Committee.
- on *Notothenia rossii* in Subarea 48.1, the Peninsula area (CM 32-04), by-catches in fisheries directed to other species shall be kept to the level allowing the optimum recruitment to the stock.
- on *Notothenia rossii* in Subarea 48.2, around South Orkneys (CM 32-05), by-catches in fisheries directed to other species shall be kept to the level allowing the optimum recruitment to the stock.
- on *Notothenia rossii* around Subarea 48.3, South Georgia Islands (32-06), by-catches in fisheries directed to other species shall be kept to the level allowing the optimum recruitment to the stock.
- on *Gobionotothen gibberifrons, Chaenocephalus aceratus, Pseudochaenichthys georgianus, Lepidonotothen squamifrons* and *Patagonotothen guntheri* in Subarea 48.3, South Georgia Islands (CM 32-07) until the fishery is reopened by the Commission based on the advice of the Scientific Committee.
- for *Lepidonotothen squamifrons* in Division 58.4.4, Ob and Lena Banks (CM 32-08), other than for scientific research purposes, from 8 November 1997 until the fishery is reopened by the Commission based on the advice of the Scientific Committee.
- for *Electrona carlsbergi* in Subarea 48.3, South Georgia Islands (CM 32-17), other than for scientific research purposes, from 1 December 2003 until the fishery is reopened by the Commission based on the advice of the Scientific Committee; or a research plan for an exploratory fishery is submitted and approved by the Scientific Committee consistent with Conservation Measure 24-01.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: Not applicable.

STOCK STATUS: Not applicable.

RECENT MANAGEMENT ADVICE: For these fish species and subsequent areas there was no new advice.

STECF COMMENTS: STECF has no comments.

20.4. Elasmobranchs

20.4.1. Skates and Rays (Rajidae) in Subarea 48.3, South Georgia

FISHERIES: No data on bycatch of skates and rays were provided at the Scientific Committee 2011 for the fishing season 2010/11. STATLANT data shows that bycatch of skates and rays in Subarea 48.3 during fishing season was less than 10 tonnes.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. A preliminary assessment of rajid populations in Subarea 48.3 using a surplus production model implemented in a Bayesian framework was presented in 2007. A rajid tagging program has been under way for four years in Subarea 48.3. The Working Group noted that there were currently insufficient data to inform the assessment and that the results were strongly dependent on the informative priors for the two catchability parameters, and the intrinsic rate of increase, r.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: No new advise on skates and rays in Subarea 48.3 due to insufficient information.

STECF COMMENTS: STECF has no comments.

20.4.2. Skates and Rays (Rajidae) in Division 58.5.2, Heard and McDonald Islands

FISHERIES: There was no directed fishing allowed for any species other than *Dissostichus eleginoides* and *Champsocephalus gunnari* in Statistical Division 58.5.2 in the 2010/11 fishing season. No data on bycatch of skates and rays were provided at the Scientific Committee 2011 for the fishing season 2010/11. STATLANT data shows that bycatch of skates and rays in Division 58.5.2 during fishing season 2009/10 was approximately 25 tonnes.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: No new information and no new advise for skates and rays in Division 58.5.2.

STECF COMMENTS: STECF has no comments.

20.4.3. Sharks in the Convention Area

FISHERIES: Directed fishing on shark species in the Convention Area, for purposes other than scientific research, is prohibited (32-18). This prohibition shall apply until such time as the Scientific Committee has investigated and reported on the potential impacts of this fishing activity and the Commission has agreed on the basis of advice from the Scientific Committee that such fishing may occur in the Convention Area. Any by-catch of shark, especially juveniles and gravid females, taken accidentally in other fisheries, shall, as far as possible, be released alive. No data on bycatch of sharks were provided at the Scientific Committee for the fishing season 2010/11. STATLANT data show that bycatch of sharks during 2009/10 was less than 5 tonnes.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: For these fish species and subsequent areas there was no new advice and CM 32-18 is retained until sufficient information is acquired for its revision..

STECF COMMENTS: STECF has no comments.

20.5. Crabs (*Paralomis* spp.)

During the fishing season 2010/11 there were no directed fisheries on crabs within the Convention Area, and no notifications of intention to fish for crabs in 2011/12 have been received by CCAMLR.

20.5.1. Crabs (*Paralomis* spp.) Subarea 48.3

FISHERIES: Crabs were not harvested during 2010/11 in Subarea 48.3, and no notifications of intention to fish for crabs in 2011/12 have been received by CCAMLR.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. The WG-FSA 2011 reviewed the information currently available on the biology and ecology of the lithodid crabs at South Georgia and provided an overview of the development of a management regime for them. Considerable gaps in knowledge of the biology, ecology and demography of the lithodid species at South Georgia are highlighted with uncertainty surrounding estimates of biomass, growth rates and survivorship of discards of the targeted species. The review reported that recent analyses suggest that the current precautionary catch limit of 1,600 tonnes may not be sustainable in the long term if it were reached consistently. It was noted that apart from 2009/10, there has been very little commercial interest in the fishery. Low market value and interest, coupled with the very high level of discarding, are likely to render the fishery commercially unviable.

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

STOCK STATUS: Unknown; unexploited.

RECENT MANAGEMENT ADVICE: Reflecting on the high level of discarding and uncertainty surrounding discard mortality, it was decided that the crab fishery in Subarea 48.3 be closed.

STECF COMMENTS: STECF has no comments.

20.5.2. Crabs (*Paralomis* spp.) exploratory fishery in Subarea 48.2

FISHERIES: An exploratory fishery for crabs in Subarea 48.2 was carried out for the first time 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. Crabs were not harvested during 2010/11 in Subarea 48.2, and no notifications of intention to fish for crabs in 2011/12 have been received by CCAMLR.

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.

20.6. Krill (*Euphausia superba*)

The krill fishery operated only in Area 48 during the 2010/11 season. Different fishing gears are used: conventional trawls and continuously pumped trawls. The reported total catch to 24 September was 179,131 tonnes.

20.6.1. Krill (*Euphausia superba*) Area 48

FISHERIES: In 2010/12, six Members with a total of 13 vessel fished for krill in Area 48 with about 2/3 taken in Subarea 48.2. The reported total catch to 24 September was 179,131 tonnes, 9,158 tonnes from 48.1, 116,552 tonnes from 48.2 and 53,421 tonnes from 48.3.

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 (GYM) projection using survey-derived estimates of current biomass and recruitment variability. An integrated assessment method has been proposed as alternative assessment method.

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, 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 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 the absence of additional information, the advice remains to be consistent with the precautionary approach and to void concentration of the catch as the trigger level is approached, a spatial allocation of the trigger level (620,000 tonnes) by subarea is required. Until new information is available CM 51-01 and CM 51-07 are retained until sufficient information is acquired for their revisions.

STECF COMMENTS: STECF has no comments.

20.6.2. Krill (*Euphausia superba*) Area 58.4.1

FISHERIES: T he total catch limit for *Euphausia superba* in Division 58.4.1 is 440 000 tonnes in any fishing season. The total catch is further subdivided into two subdivisions within Division 58.4.1 as follows: west of

115°E, 277 000 tonnes; and east of 115°E, 163 000 tonnes. There was no directed fishing on krill in Division 58.4.1 in 2010/11.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS:

RECENT MANAGEMENT ADVICE: There was no new advice for *Euphausia superba* in Division 58.4.1 and CM 51-02 is retained until sufficient information is acquired for its revision.

STECF COMMENTS: STECF has no comments.

20.6.3. Krill (*Euphausia superba*) Area 58.4.2

FISHERIES: The total catch limit for *Euphausia superba* in Division 58.4.2 is 2,645 million tonnes in any fishing season. The total catch limit is further subdivided into two subdivisions within Statistical Division 58.4.2 as follows: west of 55°E, 1.448 million tonnes; and east of 55°E, 1.080 million tonnes. Until the Commission has defined an allocation of this total catch limit between smaller management units, as the Scientific Committee may advise, the total catch in Division 58.4.2 is limited to 260,000 tonnes west of 55°E and 192 000 tonnes east of 55°E in any fishing season (CM 51-03). The fishing season begins on 1 December and finishes on 30 November of the following year. There was no directed fishing on krill in Division 58.4.2 in 2010/11.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: An estimate of B_0 for Division 58.4.2 was in 2007 produced using the new simplified SDWBA model for target strength and species identification, being 28.75 million tonnes with a CV of 16.18%. This biomass was subdivided as agreed by the Scientific Committee and precautionary catch limits for the two subdivisions were calculated, Western subdivision (30–55°E) a B0 of 16.17 million tonnes with a CV of 18.36% and a precautionary catch of 1,448 million tonnes, and for the Eastern subdivision (55–80°E) a B0 of 11.61 million tonnes with a CV of 29.82% and a precautionary catch of 1,080 million tonnes. Until the Commission has defined an allocation of this total catch limit between smaller management units, the total catch in Division 58.4.2 shall be limited to 260,000 tonnes west of 55°E and 192,000 tonnes east of 55°E in any fishing season. On that base Conservation Measure 51-03 was re-written to reflect these changes in the precautionary catch limit and its subdivision.

RECENT MANAGEMENT ADVICE: There was no new advice formed for *Euphausia superba* in Division 58.4.2 and CM 51-03 is retained until sufficient information is acquired for its revision.

STECF COMMENTS: STECF has no comments.

20.6.4. Krill (*Euphausia superba*) Area 88

FISHERIES:

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: Catch limits have not been set in Area 88 and the Scientific Committee recommended that the development of krill fishing in Area 88 should be considered exploratory fisheries, since only limited information exists on the distribution and abundance of krill or predators.

RECENT MANAGEMENT ADVICE: There was no new advice formed for *Euphausia superba* in Area 88 and CM 51-04 is retained until sufficient information is acquired for its revision.

STECF COMMENTS: STECF has no comments.

20.7. Squid (*Martialia hyadesi*)

20.7.1. Squid (*Martialia hyadesi*) Subarea 48.3

FISHERIES: No target fishery for squid (*Martialia hyadesi*) was carried out in the last seasons and no new request has been submitted to CCAMLR to continue exploratory fishing in the 2011/12 season.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: The CCAMLR advise is that the existing Conservation Measure 61-01 on *M. hyadesi* should remain in force.

STECF COMMENTS: STECF has no comments.

21. 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 Elasmobranch 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

22. Reference

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Abstract

The STECF review of scientific advice for 2012 Part 3 was drafted by the STECF-EWG 11-17 Working Group held in Ancona, taly from 17-21 October 2011. The Report was reviewed and adopted by the STECF at its 38th plenary session held in Brussels from 7-11November 2011.

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