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Scientific, Technical and Economic Committee for Fisheries (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2013

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PART 3 (STECF-12-17)

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2013 – part 3 (STECF-12-17)

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 2013 PART 3

Introduction to the STECF Review of Advice for 2013

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 41st pPlenary meeting held in Brussels from 5-9 November 2012.

The review was drafted by the STECF-EWG 12-17 Expert Working group during its meeting held in Santa Cruz de Tenerife, Spain from 8-12 October 2012.

The STECF review of advice for 2013 Part 1 included the latest assessments and advice for stocks in the Baltic Sea and was published in June 2012. Part 2 contained the review of assessments and advice released by ICES up to the end of June 2012. Parts 1, 2 and 3 will be combined and published in the STECF Consolidated review of advice for 2013, which will be available in mid-November 2012.

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, the stock status is summarised in a "traffic light" table utilising various symbols to indicate status in relation to different reference points. The key to the symbols is as follows:

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

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

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

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

- 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: summary of most recent advice.

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

Commission Communication to the Council concerning a consultation on Fishing Opportunities for 2013 and general context of ICES advice

STECF is requested to take into account Harvest Control Rules adopted in any type of multi-annual management plan and rules and principles for the setting of TACs as specified in the Commission Communication to the Council concerning a consultation on Fishing Opportunities for 2013 (COM(2012) 278 final). STECF notes that in its 2012 advice, for most stocks, ICES provides catch options corresponding to the principles outlined in the working method for proposing TACs in Section 6 of COM(212) 278 final.

Furthermore, ICES has now provided quantitative advice on catch options for many stocks for which data are limited. The basis for such advice is given in the general context of ICES advice (ICES Advice 2012, Book 1). While agreeing with the general approach, there are a number of instances where STECF was able to draw attention to additional information which either supplemented or in some cases, resulted in STECF providing advice that differed to that from ICES. This is clearly indicated in the relevant sections of this report.
The ICES framework for data limited stocks provides a means of calculating a value for future catches. The framework has been applied in cases where stocks do not have population estimates from which catch options can be derived using the existing MSY framework. The principles underlying the framework for data limited stocks are that all available information should be used and that a precautionary approach should be followed with an increasing margin of precaution being adopted as information becomes increasingly more limited. ICES has classified data-limited stocks into 5 categories depending on availability of data and information and has devised different harvest control rules for each of the categories.

With the exception of stocks for which stock status relative to candidate reference points for stock size or exploitation is unknown, ICES has applied a change limit of + 20% to its catch advice. The change limit is relative to the reference on which it is based e.g. recent average catches or projection of a trend.

For stocks for which stock status relative to candidate reference points for stock size or exploitation is unknown, ICES has adopted a precautionary margin of -20%. In practice, for many stocks, this results in advice from ICES for a 20% reduction in catches relative to a recent value, usually the average of the most recent 3 years of available catch or landings data. In cases where ICES has advised that based on the average landings over a specific period, catches should be reduced by x%, STECF considers that it is more appropriate to express the resulting figure in terms of landings rather than catches.

In the absence of clear management objectives, STECF has in most cases agreed with the ICES advice on data limited stocks.

While recognising that the ICES approach is an attempt to move in the direction of sustainable exploitation, the choice of 20% both as a change limit and a precautionary margin is somewhat arbitrary and the risks associated with applying such rules have not been evaluated with respect to management objectives or the precautionary approach. Hence, STECF considers it important to point out that the advised catches corresponding to the harvest rules proposed by ICES provides a means of calculating a value for future catches but there is no guarantee, that setting TACs in line with that value will achieve management objectives. Hence when setting TACs, managers may wish to consider whether the catches corresponding to the advice from ICES and STECF on data limited stocks is in line with their objectives.

Advice on demersal and small pelagic fish stocks in the Mediterranean and Black Seas

Assessments and advice for demersal and small pelagic fish stocks in the Mediterranean and Black Seas are available from two main sources:

- The Scientific Advisory Committee of the General Fisheries Commission for the Meditteranean (GFCM-SAC);
- The STECF.

Where appropriate, this report aims to document the most recent advice from both bodies together with any appropriate opinions of the STECF on such advice. In cases where the results of stock assessments and subsequent advice differ, the STECF provides its considere opinion on the most appropriate advice undert the heading STECF comments.

Terms of Reference

The STECF is requested to review and comment on the scientific advice released in 2011 – 2012 in particular for the stocks specified below. The text of previous STECF reviews of stocks for which no updated advice is available shall be retained in the report in order to facilitate easy reference and consultation.

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

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 plan and rules and principles for the setting of TACs as specified in the Commission Communication to the Council concerning a consultation on Fishing Opportunities for 2013 (COM(2012) 278 final.

Participants

Acknowledgement

The STECF review of scientific advice for 2012 Part 3 was drafted by the STECF-EWG 12-17 held in Santa Cruz de Tenerife, Spain, from 8-12 October 2012. The Report was reviewed and adopted by the STECF at its 41st plenary session held in Brussels from 5-9 November 2012.

STECF acknowledges the extensive contribution made by the following participants:

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Contact details of Participants are presented in Section 19.

1. Resources of the North Sea

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

FISHERIES: In the EU zone of the North Sea, *Pandalus* on the Fladen Ground (Div. IVa) is the main shrimp stock exploited, which has been exploited. This stock has been exploited mainly by Danish and UK trawlers with the majority of landings taken by the Danish fleet. Historically, large fluctuations in this fishery have been frequent, for instance between 1990 and 2000 annual landings ranged between 500 t and 6000 t. However since 2000 a continuous declining trend is evident, and in 2004 and 2005 recorded landings dropped to below 25 t. No catches were recorded in 2006-2011. 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)		
	2009–2011	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-Stock Biomass)		
	2009–2011	
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. ICES advises on the basis of the approach for data limited stocks that catches should not increase, unless there is evidence that this will be sustainable. This corresponds to zero catches.

This is the first year ICES is providing quantitative advice for data-limited stocks (see Quality considerations).

Other considerations

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

ICES approach to data-limited stocks

For data-limited stocks without information on abundance or exploitation ICES considers that a precautionary reduction of catches should be implemented, unless there is ancillary information clearly indicating that the current level of exploitation is appropriate for the stock.

For this stock, since the current landings are around zero, ICES advises that catches should not increase, unless there is evidence that this will be sustainable. This corresponds to zero catches.

Additional 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.

STECF COMMENTS: STECF agrees with the ICES advice.

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, landings increased to 8,300 t in 2011 while estimated catches (including discards) were around 9,000 t.
SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES.
In recent years several assessment models, including both cohort based and stock production models, have been applied for this stock. A major problem has been (and still is) to obtain realistic data for the predation mortality on this stock, which is believed to have stronger influence on the stock fluctuations than the fishery. This year's advice is based on the Danish, Swedish and Norwegian lpue data, and Norwegian survey biomass and recruitment indices (1 group abundance index) from 2006 onwards.

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

STOCK STATUS:

F (Fishing Mortality)		
		2009–2011
Qualitative evaluation	?	Insufficient information
SSB (Spawning-Stock Biomass)		
		2008–2012
Qualitative evaluation	↘	Decrease

The state of the stock is unknown. Landings per unit effort (lpue) indices, which fluctuated without trend from the mid-1990s through the mid-2000s, have declined after 2007. Survey biomass indices have also declined since 2007. The average biomass index in the last two years (2011–2012) is 50% lower than the average of the three previous years (2008–2010). The recruitment index decreased from 2007 to 2010, but increased in 2011 and further in 2012.

RECENT MANAGEMENT ADVICE: Based on ICES approach to data-limited stocks, ICES advises that landings should be no more than 5800 tonnes. Additionally, measures should be taken to address discarding.

This is the first year ICES is providing quantitative advice for data-limited stocks.

Other considerations

No analytical assessment is available for this stock. Therefore, detailed management options cannot be presented.

ICES approach to data- limited stocks

For data-limited stocks for which an abundance index is available, ICES uses as harvest control rule an index-adjusted *status quo* catch. The advice is based on a comparison of the two most recent index values with the three preceding values, combined with recent catch or landings data. Knowledge about the exploitation status also influences the advised catch.

For this stock the abundance is estimated to have decreased by more than 20% between 2008 and 2010 (average of 14 830 t) and 2011–2012 (average of 7435 t). This implies a decrease of 20% in relation to the average of the last three years' landings, corresponding to landings of no more than 7200 t.

Additionally, considering that exploitation is unknown, ICES advises that landings should decrease by a further 20% as a precautionary buffer. This results in landings of no more than 5800 t in 2013.

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 a restrictive quota. In 2011, estimated discards amounted to 10% of the total catch (862 t). All vessels, including Norwegian vessels < 15 m that are not currently using electronic logbooks, should be required to provide logbooks. Additionally, sorting grids should be mandatory in all areas to minimize bycatch.

STECF COMMENTS: STECF agrees with ICES that the state of the stock is uncertain and that survey indices indicate a decline in 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 biomass indices from 2007 to 2011 and a further decline in the biomass index in 2012, give reason for caution. In relation to precautionary considerations STECF therefore agrees with ICES that catches from this stock should be reduced.

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

The most recent advice for this stock was provided by ICES in October 2012.

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. Norway pout itself has been a by-catch in the fisheries for shrimp on the North Sea.

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.
Norway pout is a short-lived species and most likely a one-time spawner. The population dynamics of Norway pout are very dependent on changes caused by recruitment variation and variation in predation (or other natural) mortality, and less by the fishery. Recruitment is highly variable and influences SSB and TSB rapidly because of the short life span of the species. 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 following 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)				
	2009	2010	**2011**	
MSY (F_{MSY})	?	?	?	Undefined
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined
Qualitative evaluation	↗	↗	↘	Below average
SSB (Spawning-Stock Biomass)				
	2010	2011	**2012**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

The stock size decreased significantly in 2011 due to very low recruitment in 2010 and 2011. However, 2012 recruitment has been very high and stock size is estimated to be above above $MSY_{Bescapement}$ in September 2012. This is expected to maintain SSB above $MSY_{Bescapement}$ in 2013. 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 (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 according to the escapement strategy that catches of Norway pout in 2012 should not exceed 101 000 t. With this catch in 2012, catches in 2013 should not exceed 393 000 t. If no catch is taken in 2012, then catches in 2013 should not exceed 458 000 t.

Other considerations

Management plans

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).

Long term management strategies for the stock were evaluated by ICES in September 2012 based on a joint EU-Norway request, and considered to be consistent with the precautionary approach under certain constraints (ICES 2012b).

.Advice for 2012 (in-year):

MSY approach

To maintain the spawning-stock biomass above MSY $B_{escapement}$ by January 1 2013, catches of no more than 101 000 t can be taken in 2012. This corresponds to F=0.67 in 2012.

PA approach

The precautionary approach corresponds to maintaining SSB above B_{pa} = MSY $B_{escapement}$ on January 1, 2013. Therefore, it is similar to the MSY approach for this species.

Advice for 2013:

MSY approach

Two catch options are provided for 2013, depending on the assumed catch for 2012.
If Catch(2012)=0: To maintain the spawning-stock biomass above MSY Bescapement by January 1 2014, catches of no more than 458 000 t can be taken in 2013. This corresponds to F=1.82 in 2013.

If Catch(2012)=101 kt: To maintain the spawning-stock biomass above MSY Bescapement by January 1 2014, catches of no more than 393 000 t can be taken in 2013. This corresponds to F=1.70 in 2013.

PA approach

The precautionary approach corresponds to maintaining SSB above Bpa = MSY Bescapement on January 1, 2014. Therefore, it is similar to the MSY approach for this species.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the revised advice for 2012 and advice for 2013.

1.4. Plaice (*Pleuronectes platessa*) in Kattegat and Skagerrak (Division IIIa)

ICES has revised the stock definition for plaice in the Kattegat and the Skagerrak Plaice in the Skagerrak is now assessed as a separate stock while plaice in the Kattegat is assessed together with plaice in subdivisions 24 to 32 and one in the Kattegat and subdivisions 22 and 23.

STECFs review of ICES advice for Kattegat and subdivisions 22 and 23 is given in section 4.7.1 of the STECF review of advice for 2013 Part 1 on stocks in the Baltic Sea.

1.4.1. Plaice (*Pleuronectes platessa*) in the Skagerrak

FISHERIES: Plaice is caught all year round with predominance from spring to autumn. The plaice catches in this area are taken in fisheries using seine, trawl and gill nets targeting mixed species for human consumption. Plaice is an important by-catch in a mixed cod-plaice fishery. Denmark and Sweden and Norway account for the majority of the landings while only minor landings are taken the German and, occasionally, vessels from Belgium and the Netherlands. Since the late seventies landings fluctuated between 6000 and 14 000 t. Landings in 2009, 2010 and 2011 are estimated to be 6 000 t, 9 200 t and 8 300 respectively.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is an age-based analytical assessment of the Skagerrak and North Sea combined and is based on an updated version of indices of local adult aggregation during spawning as a monitoring of local abundance.

MANAGEMENT AGREEMENT: There are no specific management agreements for plaice in the Skagerrak.

REFERENCE POINTS: No reference points have been defined.

STOCK STATUS:

F (Fishing Mortality)		
		2009–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown

SSB (Spawning-Stock Biomass)		
		2007–2011
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	West East	West: increasing East: decreasing at historical low

Plaice in Skagerrak is considered to have two components: Eastern and Western, the latter of which is closely related to the North Sea stock. Catches in the Western component normally constitute at least 90–95% of the total catches. A combined assessment of the Skagerrak with the North Sea stock show an upward scaling of the total biomass by about 15%. The two local components in the Skagerrak show different trends in spawning-stock biomass. The average of the SSB index in the last two years (2010–2011) compared to the average of the three previous years (2007–2009) indicates a 17% increase in the Western and a 70% decrease in the Eastern component. The Eastern component index is around the lowest in the time-series. Fishing mortality is unknown, but effort has reduced.

RECENT MANAGEMENT ADVICE: This is the first time ICES advises on plaice in Skagerrak separately. Plaice is Skagerrak is considered to be closely associated with plaice in the North Sea, although local

components are present in the area. Based on the ICES approach for data-limited stocks, ICES advises that catches should be no more than 8400 tonnes. In the depleted Eastern Skagerrak, no directed fisheries should occur and bycatch and discards should be minimized.

This is the first year ICES is providing quantitative advice for data-limited stocks.

Other considerations

No analytical assessment is available for the Skagerrak alone. Therefore, detailed management options cannot be presented.

ICES approach to data-limited stocks

For data-limited stocks for which an abundance index is available, ICES uses as harvest control rule an index-adjusted *status quo* catch. The advice is based on a comparison of the two most recent index values with the three preceding values, combined with recent catch or landings data. Knowledge about the exploitation status also influences the advised catch.

A spatially-disaggregated abundance index from IBTS Quarter 1 is used as the basis of advice. This index measures the density of adult aggregation during spawning and is used as an indicator of abundance of local components outside of migration periods.

For this stock the abundance is estimated to have locally increased in the Western component by 7% in 2007–2009 (average of the three years) and 2010–2011 (average of the two years). Considering that effort has decreased recently, no additional reductions to reduce exploitation rate are deemed necessary in this area.

However, in the Eastern component abundance is deemed to have decreased by 66% in 2007–2009 (average of the three years) and 2010–2011 (average of the two years) and the component is considered depleted. Catches in the area are low, but exploitation rate may be high due to the reduced stock status.

On these considerations, ICES advises that catches in Skagerrak could increase by 7% compared to the recent average catch of the last 3 years, corresponding to catches of no more than 8400 t. In the depleted Eastern Skagerrak, no directed fisheries should occur and bycatch and discards should be minimized.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for the Eastern Skaggerak that no directed fisheries should occur and bycatch and discards should be minimized. STECF advises that this advice should be interpreted to mean that in 2013, catches of plaice from the Eastern Skagerrak should be reduced to the lowest possible level.

The value of 8400 t advised by ICES for Skagerrak represents a increase of 7% on the average reported landings over the period 2009-2011. STECF therefore considers it more appropriate to express the advice for 2013 in terms of landings instead of catches. Adopting such an approach implies landings of plaice from the Skagerrak of no more than 8400 t in 2013.

STECF notes that fisheries for plaice in Division IIIa are linked to those exploiting sole and that this linkage should be taken into account when implementing management rules for either stock.

With regards to the introduction of a discard ban in the Skagerrak STECF notes that a discard ban on plaice will first enter into force in 2015.

1.4.2. Plaice (*Pleuronectes platessa*) in the Kattegat

The advised landings of plaice in 2013 for Kattegat and subdivisions 22 and 23 is as outlined in sections 4.7.1 (1,800 tonnes) of the STECF review of advice for 2013 Part 1 on stocks in the Baltic Sea.

The predicted landings in the Kattegat under the above advised scenarios depends on the distribution of the landings between the Kattegat and subdivisions 22 and 23. The relative proportion of landings from subdivisions 22 and 23 has shown an increasing trend over the latest teen years as shown in the table below.

Assuming 25% of the landings in 2013 to be taken in the Kattegat will give a predicted landing of plaice in 2013 in the Kattegat of 450 tonnes.

Year	Landings in tonnes		Relative distribution of landings by area	
	Kattegat	sd 22 and 23	Kattegat	sd 22 and 23
2002	2030	1847	52%	48%
2003	2296	1085	68%	32%
2004	1609	1006	62%	38%
2005	1251	1139	52%	48%
2006	1550	851	65%	35%
2007	1380	1219	53%	47%
2008	1008	1003	50%	50%
2009	659	1008	40%	60%
2010	497	1043	32%	68%
2011	368	1218	23%	77%

1.5. Rays and skates in the North Sea

The most recent advice for this stock was provided by ICES in 2012. This advice is valid for 2013 and 2014

FISHERIES: Rays and skates are taken as target and by-catches in most demersal fisheries in the ICES area, including the North Sea and with the exception of the Baltic. Most ray and skate landings are by-catches in trawl and seine fisheries. There are, however, a number of small-scale fisheries using large meshed tangle nets directed at thornback ray, and there have been directed longline fisheries for common skate

Ray fisheries occur in coastal waters and tend to be seasonal, and size selection in towed gears is minimal owing to the shape of rays, though selection on board has occurred to comply with the market's preference for larger fish.

Prior to the introduction of a generic TAC for all skate and rays species in North Sea in 1999 there has been no obligation for fishermen to record catches in the logbooks. As a consequence, there is a lack of information on the fisheries for rays. Statistical information by species is also limited because few European countries differentiate between species in landings statistics and they are collectively recorded as skates and rays.

At present ray and skate fisheries are managed by means of a generic, multi-species TAC, along with prohibitions for severely depleted species.

Skates and rays fisheries are currently managed under a common TAC, although this complex comprises species that may have different vulnerabilities to exploitation. TAC advice is based on the status of the main commercial species, with species-specific advice also provided on an individual basis.

Overall landing figures for Rays and Skates in the North Sea have decreased in the last 15 years from more than 6,000 t in the mid 90ties to about 2,500 t in 2011.

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

REFERENCE POINTS: There are no agreed reference points for rays and skates in the North Sea.

STOCK STATUS:

No reliable assessments can be presented for these stocks. The main cause of this is the lack of species specific landings data. In the absence of formal stock assessments and defined reference points for the species and stocks of skates (members of the family Rajidae) a qualitative evaluation of the status of individual species/stocks is provided, based on surveys and landings.

Three commercial skate species (thornback ray, spotted ray, and cuckoo ray) show increasing trends in relative abundance in fishery-independent trawl surveys. There is evidence of a long-term decline to depleted levels in the distribution and relative abundance of one commercial species (*Dipturus batis* complex). Trends in the relative abundance of two other commercial species (blonde ray, undulate ray) are unclear. Starry ray is an abundant non-commercial species and is almost exclusively discarded, and stock trends are decreasing. Discard survivorship is not known.

The advice is based on the stock status of the main commercial species in the ecoregion, with species-specific advice provided below. Landings of skates and rays in the North Sea have generally declined, and this is associated with changes in species composition and relative abundance.

RECENT MANAGEMENT ADVICE: The most recent advice for this stock was provided by ICES in 2012 and covers 2013 and 2014.

The previous advice was given for 2011 and 2012. The basis of this advice was the precautionary approach. This year, individual advice is given for each of the main species, on the basis of ICES approach to data-limited stocks.

ICES provides advice on the overall exploitation (landings and discards) of the ray and skates species assemblage, and also on individual species. ICES does not advise that individual TACs be established for each species, at present. This is because the catch statistics for individual species are not reliable. ICES considers the generic TAC, at best, as an ineffective measure, regulating overall outtake from the assemblage. ICES advises that a suite of species- and fishery-specific measures be developed to manage the fisheries on commercial species and achieve recovery of the depleted species. Such measures should be developed by managers involving all stakeholders; ICES is willing to assist in the process.

ICES does not advise a precautionary decrease in TAC, because it is considered that this would lead to increased regulatory discarding and further reduce the quality of the catch data. ICES does not view the TAC as the main means to manage the fishery, but rather as an upper boundary on the outtake. Therefore, further reductions to the TAC are not considered to be the best approach to allow recovery of depleted species at present.

Management measures should be framed in a mixed-fisheries context, considering the overall behaviour of demersal fleets, and the drivers for such behaviour. Because these species are mainly caught in mixed fisheries, when the TAC is exhausted, catches continue to take place, but are discarded. In order to achieve optimal harvesting of the commercial species, and to assist recovery of the depleted species, a suite of measures should be put in place.

Closure to fishing of spawning and/or nursery grounds, and measures to protect the spawning component of the population (e.g. maximum landing size) are powerful tools to protect rays and skates. In some cases, single-species TACs may be appropriate, especially for easily identified species, and/or discrete stocks in limited distribution areas.

Given that the European Community intends to introduce a ban on discards, minimum or maximum landing sizes should be carefully considered before they are introduced, because they could lead to increased discards. Size limits may best be applied if discard (escapee) survival can be shown to be high.

Resume of ICES advice for 2013 and 2014 is provided in the table below.

Species	Area	State of stock	Advice
Common skate *Dipturus batis* complex	IVa (likely merging with VI & IIa) IV, VIId, IIIa	Depleted	Zero catch. Retain on prohibited species list
Thornback ray *Raja clavata*	IV, VIId, IIIa	increasing	+ 20%
Spotted ray *Raja montagui*	IV, VIId, IIIa	Stable/increasing	+ 20%
Starry ray *Amblyraja radiate*	IV, VIId, IIIa	Decreasing	- 36%
Cuckoo ray *Leucoraja naevus*	IV, VIId, IIIa	Increase	+ 20%
Blonde ray *Raja brachyuran*	VIIde	Uncertain	- 20%
Undulate ray *Raja undulate*	VIId, VIIe	Low and highly variable	No target fishery
Other species	IV, VIId, IIIa	Uncertain	- 20%

MSY approach
An estimate of fishing mortality is not available. Demersal elasmobranchs are long-lived stocks, and no population estimates are available. Further information is required on each of these stocks before MSY reference points can be identified. Rays and skates offer a unique opportunity to institute spatial, seasonal, and technical measures that can be used to improve stock status and regulate fishing mortality. This is because they have defined spatially discrete life history stages, and because stock–recruitment relationships are believed to be very strong.

PA approach
The previous advice was given for 2011 and 2012. The basis of this advice was ICES precautionary approach. This year, individual advice is given for each of the main stocks, on the basis of ICES approach to data-limited stocks. An overall TAC advice is also provided using ICES approach to data-limited stocks.

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

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stocks and the advice for 2013 and 2014.

1.6. Spurdog (*Squalus acanthias*) in the North Sea

Spurdog in the North Sea is assessed as part of the spurdog stock in the North East Atlantic and the stock summary and advice is given in Section 4.8.

1.7. Catsharks and Nursehounds (*Scyiliorhinus canicula* and S*cyliorhinus stellaris*) in Subareas IIa, IV and VIId

This is the first advice for this stock provided by ICES in 2012. The advice is valid for 2013 and 2014. Assessment was conducted separately for IIa, IV and VIId based on Survey- and landings trends from UK (BTS–Q3; Divisions IVc and VIId) and IBTS–Q1 North Sea.

FISHERIES: Lesser-spotted dogfish *Scyliorhinus canicula* are mainly bycaught in mixed demersal fisheries. They are generally of low commercial value and discard rates are high. Discard survivorship is considered to be high. Fisheries for lesser-spotted dogfish may take place for use as bait in pot fisheries, but this is unquantified.

In the North Sea waters landings of *Scyliorhinus* canicula are available for division IIa IV and VIId, landings have increased since 2000 from 1758t to 2546t in 2011.

Lesser-spotted dogfish is a small, productive, egg-laying shark. It is one of the most common small sharks in this ecoregion. It has a high discard survival rate.

Some demersal sharks, including lesser-spotted dogfish, may benefit from scavenging on trawl-damaged organisms and discards.

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

REFERENCE POINTS:

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

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

SSB (Spawning-Stock Biomass)		
	2005–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

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

Species	Area	State of stock
Scyliorhinus canicula (lesser spotted dogfish)	IIa, IV VIId	Increasing

The stock is estimated to be increasing. Survey catch rates are increasing throughout the ecoregion. The average of beam trawl survey (BTS-Q3), assumed as stock size indicator, in the last two years (2010-2011) is 35% higher than the average of the five previous years (2005-2009). The average of the international bottom trawl surveys in the North Sea (IBTS-Q1), assumed as a stock size indicator, in the last two years (2010-2011) is 26% higher than the average of the five previous years (2005-2009).Catches are stable or increasing, though data are not complete. Given the increase in abundance, and stable/increasing catches, it can be inferred that exploitation (fishing mortality) is stable or decreasing.

RECENT MANAGEMENT ADVICE:

Scyliorhinus canicula (Lesser-spotted dogfish)

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

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

Advice for 2013-2014 by individual stocks

Species	Area	Advice
Scyliorhinus canicula (lesser spotted dogfish)	IIIa, IV and VIId	Maximum catches increase of 20% No invidual TAC

Based on ICES approach to data-limited stocks, ICES advises that catches could be increased by a maximum of 20%. Because the data for catches of lesser-spotted dogfish are not fully documented, ICES is not in a position to quantify the result. ICES does not advise that an individual TAC be set for this stock, at present.

Given that there is a consistent increase in stock size over an extended period of time, no additional precautionary buffer is needed.

Outlook for 2013 and 2014

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

MSY transition scheme

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2013 and 2014. The rate of exploitation of these stocks relative to F_{MSY} is not currently known.

Additional information

As there is no obligation to report lesser-spotted dogfish at the species level, they are often included in generic categories such as "dogfish and hounds". Therefore, landings data are not considered reliable. High levels of discarding take place.

Fishery-independent trawl surveys provide the longest time-series of species-specific information.

The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated. The harvest control rules are expected to stabilize stock size, but they may not be suitable if the stock size is low and/or overfished.

STECF COMMENTS: STECF agrees with the ICES advice.

1.8. Other Demersal elasmobranchs in the North Sea, Skagerrak and Eastern channel

The most recent advice for this stock was provided by ICES in 2012. 2012 ICES advises are given under precautionary approach, and will be valid for 2013 and 2014.

Angel sharks and South Hounds in the North Sea are assessed as part of their stocks in the North East Atlantic and the stock summary and advice for 2013 is given in Sections 4.17 and 4.18.

1.9. 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 2011 was 29,344 tonnes, which represents a 32% increase compared to 2010. 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)		
	2009–2011	
Qualitative evaluation	?	**Insufficient information**

SSB (Spawning-stock Biomass)		
	2010–2012	
Qualitative evaluation	?	**Insufficient information**

The available information, while broadly informative, is insufficient to evaluate recent stock trends and exploitation status. Therefore, the state of the horse mackerel in the North Sea is unknown. The IBTS index for adult horse mackerel suggests that the stock has been declining since the early 2000s and has remained at low abundance since 2005.

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: Based on ICES approach to data-limited stocks, ICES advises that catches of horse mackerel in Divisions IIIa, IVb,c, and VIId (North Sea stock) should be no more than 25 500 t.

This is the first year ICES is providing quantitative advice for data-limited stocks.

Other considerations

ICES approach to data limited stocks

For data-limited stocks without information on abundance or exploitation ICES considers that a precautionary reduction of catches should be implemented, unless there is ancillary information clearly indicating that the current exploitation is appropriate for the stock. As there is no accepted indication of the value of F relative to proxies of F_{MSY} and no marked positive trends in stock indicators, the advice is set as the previous catch, with a precautionary buffer applied.

The previous catch for this stock can be defined as the average of the last three years, as there is no clear trend in the catch. The average for the period 2009–2011 is 31 940 t. A precautionary buffer of 20% is applied to this, leading to an advised maximum catch of 25 500 t.

As the precautionary buffer is applied in the catch advice, this advice should apply for at least three years (i.e. 2013–2015) unless new information or analyses indicate a new situation (e.g. a clearly marked increase in stock indicators).

Precautionary considerations

Since 1998 catches have been substantially higher than in earlier years, but the sustainability of these catches cannot be assessed. The IBTS index for adult horse mackerel suggests that the stock has been fluctuating at low abundance since the early 2000s. Given that the exploitation status is unknown and taking into account the trends shown by the IBTS index, the advice for 2013 is to reduce catch.

STECF COMMENTS: STECF agrees with the ICES advice for 2013.

1.10. Mackerel (*Scomber scombrus*) - North Sea spawning component

The stock summary and advice for mackerel in in the North Sea is given in Section 4.3 (Combined Southern, Western and North Sea spawning components).

1.11. Red mullet (*Mullus barbartus and Mullus surmelutuss*) 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 4.4 of this report.

1.12. 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 4.5 of this report.

1.13. Sea bass (*Dicentrarchus 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 4.6 of this report.

2. Resources of the Celtic Sea and West of Scotland

2.1. Norway lobster (*Nephrops norvegicus*) in ICES Div. Vb and Sub-area VI, (West of Scotland) and waters west of Ireland

Below is an update on the ICES advice for Norway lobster (*Nephrops norvegicus*) in FU 16 (Porcupine Bank), FU 17, Aran Grounds (Division VIIb) and Norway lobster (Nephrops norvegicus) in FU 20-22, Celtic Sea (Divisions VIIf, g, h) from the REVIEW OF SCIENTIFIC ADVICE FOR 2013 - PART 2 (STECF-12-08). The introduction text for Norway lobster (Nephrops norvegicus) in ICES Div. Vb and Sub-area VI, (West of Scotland) and waters west of Ireland can be found in the that report.

2.1.1. Norway lobster (*Nephrops norvegicus*) in FU 16, Porcupine Bank, Divisions VIIb,c,j,k

FISHERIES: Reported total landings for this FU have decreased significantly in recent years from 2186 t in 2007 to only 917 t in 2010. In 2011 landings increased to 1187 t (including estimated unallocated landings). The majority of landings are taken by Irish, Spanish and to a lesser extent, UK vessels. There are concerns about the accuracy of the landings statistics for some fleets. The fishery takes place throughout the year with a peak between April and July. A seasonal closure between May-July that covers much of the stock distribution area has been in effect since 2010. Most vessels are relatively large (between 20 and 35 m in total length) multi-purpose otter trawlers using single or twin rigs. Freezing of catches at sea has become increasingly prevalent since 2006. Fishing effort directed at *Nephrops* will also have bycatches of hake, megrim, and anglerfish in mixed fisheries.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is based on indicators similar to last year's, with the addition of catch advice based on a 2012 UWTV survey. The basis for this year's advice is the ICES MSY approach.

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

STOCK STATUS:

	F (Fishing Mortality)	
	2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Undefined
Qualitative evaluation	✓	Below possible reference points
	SSB (Spawning-Stock Biomass)	
	2011	
MSY ($B_{trigger}$)	?	Undefined
Precautionary approach (B_{pa},B_{lim})	?	Undefined
Qualitative evaluation	↗	Increasing, from low abundance

The exploitation proxy indicates that the exploitation rates increased during the 2000s but declined significantly in 2011. Survey and commercial lpue and cpue show declining trends up to the late 2000s. Survey cpue increased significantly in 2010 and this has been linked to a stronger recruitment first observed in the survey in 2009. The first UWTV survey for FU 16 was carried out in June 2012; this provides an abundance estimate for this stock for the first time.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach that landings in 2013 should be no more than 1800 tonnes.

To protect the stock in this functional unit, management should be implemented at the functional unit level.

Other considerations:

MSY approach

No MSY $B_{trigger}$ has been defined for this FU. The recent stock size is known to be relatively high compared to that in the late 2000s. Hence the ICES MSY approach has been applied only in relation to F_{MSY}. This implies a harvest ratio of 5.0%, resulting in landings of 1800 t in 2013.

Additional considerations

The advice has been updated in November 2012 to take into account a new UWTV survey. It has been possible to use the results of this survey and the assessment and catch advice framework previously developed by ICES for use with UWTV surveys for the first time in this FU. The catch advice issued in June (1100 t) was based on the ICES approach to data-limited stocks.

A seasonal closed area (1 May–31 July) has been in place since 2010. The closure has been respected by the fleet and has therefore afforded some protection to the majority of the stock area (~75%). For this part of the stock area fishing effort and mortality has been reduced at a time of peak female emergence and typically high lpue and landings. The closure will also have inadvertently concentrated effort and fishing mortality in ~25% of the stock area not currently covered by the closure. Survey information indicates that abundance was 2.5 times higher inside the closed area than outside.

Discarding by the *Nephrops* trawl fishery is around 50% of the total catch by weight. The main species that are discarded by weight are blue-mouth redfish, blue whiting, and argentines. Discarding of *Nephrops* in the fishery has been negligible up to 2011.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013.

STECF notes that the catches and landings are uncertain. The unallocated catches include an estimate of Spanish landings.

STECF considers that management of fishing mortality on Nephrops stocks would best be achieved if measures, including catch restrictions, were implemented at the level of the functional unit.

2.1.2. Norway lobster (*Nephrops norvegicus*) in FU 17, Aran Grounds (Division VIIb)

FISHERIES: Reported landings (almost entirely by Irish vessels) from this FU were around 1000 t in 2010, but decreased to 600 t in 2011. In the Aran Grounds landings and effort by twin rig vessels have increased to constitute more than 90 % of the fishery. Effort decreased in 2009 due to decommissioning of several vessels that actively participated in the fishery but effort in 2010 increased again. In recent years several newer vessels specialising in *Nephrops* fishing have participated in this fishery. These vessels target *Nephrops* on several other grounds within the TAC area and move around to optimise catch rates. Since the introduction of effort management associated with the cod long term plan (EC 1342/2008) there have been concerns that effort could be displaced towards the Aran and other *Nephrops* grounds where effort control has not been put in place.

The *Nephrops* trawl fishery takes bycatches of other species, especially plaice, but also, whiting, cod, hake, megrim and monkfish.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is based on an UWTV surveys. The F_{MSY} proxies were derived from Separable Cohort Analysis (SCA) and yield per recruit analysis based on 2008 and 2009 sampling. However, the fit to the SCA model was problematic so F_{MSY} proxies are likely to be uncertain.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{msy}	HR 10.5%	Equivalent to $F_{35\%\ SPR}$ for combined sex in 2010
Precautionary Approach			No reference points are defined

Harvest ratio reference points (2010):

	Male	Female	Combined
F_{max}	9.8%	13.0%	11.1 %
$F_{0.1}$	6.4%	9.1%	7.2 %
$F_{35\%SpR}$	8.4%	12.8%	10.5 %

STOCK STATUS:

F (Fishing Mortality)	2009	2010	**2011**	
MSY (F_{MSY})	✓	✓	✓	Below target
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined

SSB (Spawning-Stock Biomass)	2010	2011	**2012**	
Qualitative evaluation	↗	↘	↘	Lowest in the time series

The UWTV surveys conducted since 2002 give estimates of abundance that have fluctuated widely. The 2012 abundance estimate is the lowest in the eleven year time series. . The generally low harvest rate appears to have little impact on observed stock fluctuations and is below F_{MSY}.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach that landings in 2013 should be no more than 590 tonnes.

To protect the stock in this functional unit, management should be implemented at the functional unit level.

Other considerations:

MSY approach

No MSY Btrigger has been identified for this FU. Hence the ICES MSY approach has been applied only in relation to FMSY. This implies harvest ratio of 10.5 %, resulting in landings of 590 t in 2013.

Additional considerations:

The advice has been updated in November 2012 to take into account the most recent UWTV survey results which show a significant decline in stock abundance. The landings advice issued in June (890 t) was also based on the MSY approach, but used the results from the survey in 2011.

Discarding by the *Nephrops* trawl fleet is around 47% of the total catch by weight. The main discards are small *Nephrops*. The main fish species discarded are dogfish, haddock, whiting and megrim.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013.

STECF considers that management of fishing mortality on Nephrops stocks would best be achieved if measures, including catch restrictions, were implemented at the level of the functional unit.

STECF notes that the landings corresponding to ICES advice for 2013 imply a 36% increase on the status quo harvest ratio (and 37% more in landings) from this functional unit.

STECF notes that in recent years several newer vessels specialising in Nephrops fishing have participated in this fishery. These vessels target Nephrops on several other grounds within the TAC area and move around to optimise catch rates. Since the introduction of effort management associated with the cod long term plan (EC 1342/2008) there have been concerns that effort could be displaced towards the Aran and other Nephrops grounds where effort control has not been put in place.

2.1.3. Norway lobster (*Nephrops norvegicus*) in FU 20-22, Celtic Sea (Divisions VIIf, g, h)

FISHERIES: There are three Functional Units in the Celtic Sea area but FU 20 and 21 are treated together. Landings from these Functional Units are reported by France, the Republic of Ireland and the UK, the main contributors being France and Ireland. In 2008 total reported landings from all 3 FUs amounted to more than 6000 t, but have since decreased, and in 2011 total landings were around 2850 t of which 1240 were taken in FU 20-21. There has been a considerable decrease in French landings and effort (due to decommissioning) whilst Irish landings have increased. There has also been increasing effort by Irish vessels targeting *Nephrops* in the Celtic Sea in recent years. Discarding and high-grading takes place, but varies between fleets and areas

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. For FUs 20 and 21, The advice is based on a calculation of potential landing options and harvest rates given the known surface area of Nephrops habitat and assumed potential densities of the functional unit.. For FU 22 the assessment and advice is based on UWTV abundance estimates and indicators of mean size

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	Not defined	
	F_{MSY} (whole FU20-22) harvest rate	Not defined	
	F_{MSY} (FU22) harvest rate	10.9%	*MSY under SCA model*
Precautionary Approach		Not defined	

STOCK STATUS:

FU 20-21

F (Fishing Mortality)		
	2009–2011	
Qualitative evaluation		Decreasing

SSB (Spawning Stock Biomass)		
	2009–2011	
Qualitative evaluation		Unknown

FU 22

F (Fishing Mortality)				
	2009	2010	**2011**	
MSY (F_{MSY})				Appropriate
Precautionary approach (F_{pa},F_{lim})				Unknown

SSB (Spawning-Stock Biomass)				
	2010	2011	**2012**	
Qualitative evaluation				Increasing

For the FU 20-21 stock component, for a long period, the stock was considered to be stable based on long term indicators (lpue, mean size, discard rates). There have been indications of strong recruitment in recent years (e.g. 2006) resulting in an increase in commercial lpue for Irish and for French trawlers in 2008 and 2009. Lpue decreased in the last two years suggesting a decline in abundance since the peak in 2008–2009. Landings in

2010 and 2011 have declined substantially (potentially explained by a decreased targeting of Nephrops by the French fleet).

The FU 22 stock component is considered to be stable based on indicators (lpue, mean size) and recent UWTV survey data. Harvest rates have decreased since 2007 and are below FMSY.

RECENT MANAGEMENT ADVICE:

FU 20-21

Based on the ICES approach for data limited stocks, ICES advises that landings should be no more than 2500 tonnes. This is the first year that ICES is providing quantitative advice for data limited stocks.
To protect the stock in this functional unit, management should be implemented at the functional unit level.

FU 22

ICES advises on the basis of the MSY approach that landings from FU22 in 2013 should be no more than 3100 t.

To protect the stock in this functional unit, management should be implemented at the functional unit level.

Other considerations

FU 20-21

ICES approach to data limited stocks
For this stock, the last 10 years average landings correspond to a Harvest Rate below the range of MSY harvest rates calculated for other Nephrops FUs (between 7.5–17%) provided that the Nephrops density is at least 0.35. The most recent density estimate (from 2006) is 0.4 Nephrops per m2. Even though this density estimate is six years old, the stock development since then (as indicated by commercial effort and lpue trends) does not give reason for concern that the burrow density may have declined significantly. Therefore, ICES advises that landings should not increase in relation to the ten year average landings, which corresponds to landings of no more than 2500 tonnes.

FU 22

MSY approach:

No MSY Btrigger has been identified for FU 22. Hence the ICES MSY approach has been applied only in relation to FMSY. This implies the harvest ratio for the Smalls FU22 to be less than 10.9 %, resulting in landings of less than 3100 t in 2013.

Additional considerations

The advice has been updated in November 2012 to take into account the most recent UWTV survey results which show a significant increase in stock abundance. The landings advice issued in June (2600 t) was also based on the MSY approach, but used the results from the survey in 2011.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the FU 20-21 stock and the advice basis for 2013 and 2014. In addition, STECF agrees with the advice for 2013 for FU 22.

STECF considers that management of fishing mortality on Nephrops stocks would best be achieved if measures, including catch restrictions, were implemented at the level of the functional unit.

STECF notes that the landings corresponding to ICES advice for 2013 imply a 106% increase on the status quo harvest ratio (and 107% more in landings) from the functional unit 22.

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

FISHERIES: Haddock to the West of Scotland are taken as part of a mixed demersal fishery, with the biggest landings reported by UK (mainly Scottish) trawlers (2,407 tonnes in 2010 representing 83% of the landings); Irish trawlers (396 tonnes in 2010 representing 14% of the landings); and with smaller landings reported by other

nations including France, Germany and Norway. Landings by non-EU fleets have not exceeding 50 tonnes over the reported period (2001 – 2011). Catches are widely distributed and are concentrated in several areas, e.g. Butt of Lewis and on the shelf west of the Outer Hebrides.

In 2006, landings of 5,833 tonnes were reported for this stock, representing an 80% increase on the (previous) record low landings of 2,561 tonnes reported in 2005. Subsequently reported landings fell to 3,773 tonnes in 2007 and varied between 2,850 to 2,900 tonnes between 2008 and 2010. The total catch for haddock in 2011 is estimated to be 3227 tonnes; 46% of these are discards. Splitting discards by fleet shows that Nephrops vessels (TR2) are responsible for ~80% of all discards while landing only 80 tonnes, less than 5% of the total landings (1742 tonnes).

Recruitment to this stock has varied greatly over the entire time series, however. in recent years recruitment has shown a general and dramatic decline from >480 million in 2000 (the largest on record) to an estimated recruitment of approximately 8 million in 2008. Recent recruitment (2010 and 2011) are estimated to be around 50 million.

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

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. In recent years a catch-at-age model using catch data up to 1994 tuned by survey data and utilizing survey information alone from 1995 onward was used to evaluate trends in spawning-stock biomass and recruitment and the model estimated total catch from the fishery without the ability to distinguish between landings and discards. In 2010 fishery landings and catch-at-age data from 2006 onwards were re-introduced in the assessment, based on the perception of improved accuracy of landings statistics.

REFERENCE POINTS:

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

STOCK STATUS:

F (Fishing Mortality)				
	2009	2010	**2011**	
MSY (F_{MSY})	✓	✗	✓	Below target
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Harvested sustainably

SSB (Spawning-Stock Biomass)				
	2010	2011	**2012**	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa},B_{lim})	✗	✗	○	Increased risk

The 2009 year class is above the average in the recent period, but is below the long-term average. Nevertheless, this year class is the main contributor to the increase of the SSB in 2012 to above Blim. F has been above Fpa in most years since 1987 and has been declining since 1999. F is now below FMSY.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY framework that landings in 2013 should be no more than 3100 t. Effective technical measures should be implemented to reduce high discard rates in the Nephrops fleet (TR2).

Other Considerations

Management plan

An EU management plan proposal has been evaluated by ICES and is considered to be precautionary. The aim of this plan is to keep the SSB above 30 000 tonnes with a fishing mortality of no more than 0.3. The main elements in the plan are a 25% constraint on TAC change between years and lower fishing mortality rates whenever the SSB is lower than 30,000 t.

ICES evaluated the EU management plan proposal and considered it to be precautionary. Following the plan would result in a 25% TAC decrease. This would result in removals from the stock of 8100 tonnes, and landings of 4500 tonnes in 2013. This is expected to lead to an SSB of 21 700 tonnes in 2014.

MSY approach

Following the ICES MSY framework requires fishing mortality to be reduced to 0.25 (lower than FMSY because SSB2013 < MSY Btrigger), resulting in landings of 3100 tonnes in 2013. This is expected to lead to an SSB of 24 500 tonnes in 2014.

Since F is below FMSY in 2011, the transition to MSY option is not relevant.

PA approach

A fishing mortality of 0.04 is needed to increase SSB to around Bpa in 2014. This corresponds to landings no more than 520 tonnes in 2013.

STECF COMMENTS:

STECF agrees with the revised ICES forecast and status for this stock.

STECF notes that the revision made to the 2012 forecast (based on the 2011 assessment) leads, on the basis of the ICES MSY framework, to a substantial decrease in predicted landings for 2012 : from 10,200 tonnes to 5,618 tonnes. STECF notes however that the revised prediction for 2012 is close to the agreed TAC for 2012 (6,015 tonnes).

STECF notes that landings in 2013 based on the ICES MSY framework implies a fishing mortality of F=0.25, resulting in landings of 3,100 tonnes in 2013.

Applying the harvest rules in the management plan proposed for this stock would imply that the TAC for 2013 should be set at 4,510 t corresponding to a 25% decrease in the TAC compared to 2012.

STECF notes that both of the above options are predicted to result in a decrease in SSB in 2014 compared to 2013, still remaining below $MSY_{Btrigger}$ (30,000 t)

STECF notes that discarding of haddock remained a problem in 2011 (46% by weight discarded) and that vessels targeting Nephrops (TR2) are responsible for ~80% of all discards while landing only 80 tonnes, less than 5 % of the total landings (1,742 tonnes). STECF reiterates its previous recommendations that for the TR2 fleet operating in VIa, the most appropriate method to reduce unwanted catches of VIa haddock is to introduce a species selection grid and that to further reduce the capture of juvenile (<MLS) haddock that pass through the grid, consideration should be given to improving the size selection. This could be achieved by simultaneously increasing the cod-end mesh size, reducing the maximum number of meshes in circumference to 100 and moving the 120 mm square-mesh panel to 6 – 9 m from the codline.

A large variety of measures and regulations have been implemented as part of the long-term plan for cod stocks and emergency measures introduced under EC regulation 43/2009 (Annex III). They include *inter alia* TAC regulation, area closures, technical measures, and effort restrictions. Each of these measures and regulations may have had an impact (positive or negative) on the haddock stock, however, it is not possible for STECF to quantify it.

STECF notes that, although the ICES revised forecast has resulted in a downward revision in both predicted landings and SSB, haddock in VIa abundance is still estimated to increase in the short term. STECF notes that given this estimated increase in abundance, a catch composition rule is likely to lead to an increase in regulatory-induced discards and as a consequence, considers that haddock should be kept outside the catch composition rules under the cod management plan. However, STECF is unable to quantitatively assess what the impact on fishing mortality and discard levels this may have.

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

FISHERIES A directed industrial fishery existed in the past but at present there are no directed fisheries for Norway Pout in Division VIa. Total landings for the years 1971 – 2009 varied considerably, from a high in 1987 of some 38,000 tonnes to less than 50 tonnes every year since 2005 and zero tonnes since 2007. Historically the majority of landings have been taken by Danish fleets with lesser catches by UK, Netherlands and Germany. If industrial fisheries resumes in this area they may take a bycatch of juvenile herring and other species.

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

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

STOCK STATUS: The available information is inadequate to evaluate stock trends relative to risk, so the state of the stock is unknown. The only data available are official landings statistics which have been very low and do not provide an adequate basis for scientific advice.

RECENT MANAGEMENT ADVICE: There is insufficient information to evaluate the status of this stock. Therefore, based on the ICES approach to data limited stocks, and taking into account the absence of landings in recent years, ICES advises for 2013 and 2014 that no increase of the catches should take place unless there is evidence that this will be sustainable.

STECF COMMENTS: STECF agrees with the ICES advice that as there is insufficient information to evaluate the status of stock, based on precautionary considerations, no increase of the catches should take place unless there is evidence that this will be sustainable.

2.4. Rays and skates in ICES Subareas VI and VII

The most recent advice for this stock was provided by ICES in 2012. The advice is valid for 2013 and 2014.

FISHERIES: Rays and skates are taken as target and by-catches in most demersal fisheries in the ICES area. There are some directed fisheries, for example, in VIIa, but most ray and skate landings are by-catches in trawl and in seine fisheries. A generic TAC introduced for all skate and rays species In North Sea in 1999 but not yet for Celtic Seas. Prior there has been no obligation for fishermen to record catches in the logbooks used for monitoring quota uptake of TAC species. As a consequence, there is a lack of information on the fisheries for rays. Statistical information by species is also limited because few European countries differentiate between species in landings statistics and they are collectively recorded as skates and rays. The main exception is France, for which the cuckoo ray and the thornback ray are the most important species of skates and rays landed.

Fisheries on skates are currently managed under a common TAC, although this complex comprises species that may have different vulnerabilities to exploitation. TAC advice is based on the status of the main commercial species, with species-specific advice for other species also provided where relevant.
Demersal elasmobranchs in this region are caught in mixed target and non-target fisheries. TACs alone may not adequately protect these species as restrictive TACs may lead to high discarding.

At present fisheries on rays and skates are managed by means of a generic, multi-species TAC, along with prohibitions for severely depleted species.

Management measures such as closed areas/seasons or effort restrictions may better protect demersal elasmobranchs. In particular, measures to protect spawning/nursery grounds would be beneficial. ICES could provide advice on such measures.

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

REFERENCE POINTS:

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

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

STOCK STATUS: Of the six main commercial skate species, two species (*Raja clavata* and *R. montagui*) show increasing trends in relative abundance. There is evidence of declining abundance of *Leucoraja naevus*, and a slight decreasing trend in recent years for *R. microocellata.* The stock status of two species (*L. fullonica* and *R. brachyura*) are unclear. There is not enough information to assess the status of any species in the Rockall area.

F_{MSY} is not currently defined for these species and may be of limited use until further information is available, including a better assessment of the species composition of the landings. Biomass reference points have not been set at the present time, but could be developed for survey indices.

Landings of skates and rays in the Celtic Sea ecoregion have generally declined, and this is associated with changes in species composition and relative abundance. Species-specific landings are available from 2011.

The following provides a qualitative summary of the general status of the major species based on surveys and landings:

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

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

Landings of skates and rays in the Celtic Seas have generally declined, and this is associated with changes in species composition and relative abundance.

There is not enough information to assess the status of any species in the Rockall area. The assessments below refer to the other divisions within this eco-region.

RECENT MANAGEMENT ADVICE: ICES provides advice on the overall exploitation (landings and discards) of the ray and skates species assemblage, and also individual species (Table 5.4.43.1). ICES does not advise that species-specific TACs be established, at present. This is because a TAC is not considered the most effective means to regulate fishing mortality in these, mostly bycatch, species.

ICES advises that a suite of species- and fishery-specific measures be developed to manage the fisheries on the commercial species and achieve recovery of the depleted species. Such measures should be developed by management authorities involving all stakeholders; ICES could assist in this process.

Management measures should be framed in a mixed-fisheries context, considering the overall behaviour of demersal fleets, and the drivers for such behaviour. These species are mainly caught in mixed fisheries. When the TAC is exhausted, catches continue to take place, but are discarded. In order to achieve optimal harvesting of the commercial species, and to assist recovery of the depleted species, a suite of measures should be put in place.

Closure to fishing of spawning and/or nursery grounds, and measures to protect the spawning component of the population (e.g. maximum landing size) are powerful tools to protect rays and skates. In some cases, single-species TACs may be appropriate, but their effects should be carefully evaluated for each specific case before implementation.

Given that the European Community intends to introduce a ban on discards, minimum or maximum landing sizes should be carefully considered before they are introduced, because they could lead to increased discards.

ICES advises that white skate (*Rostroraja alba*) remains on the Prohibited Species List, as it appears to be depleted in the Celtic Sea ecoregion

Advice for 2013 and 2014 by individual stocks

Species	Area	Stock Status	Advice
Common skate complex (= *D. batis*, which has recently been differentiated into *D. flossasda* and *D. intermedia*, see Additional Considerations)	VI	Depleted	Depleted stock, no targeted fishery, minimize bycatch
	VII a-c, e-j	Depleted	Depleted stock, no targeted fishery, minimize bycatch
R.. clavata (thornback ray)	VI	Increasing	+20%
	VIIa,f,g	Increasing	+20%
	VIIe	Stock to be determine (should refer to North Sea Divisions)	
R.. montagui (spotted ray).	VI	Descreasing	-23%
	VIIa,f,g	Increasing	+20%
	~~VIIe~~		
L. naevus (cuckoo ray)	VI	Decreasing	-36%
	VIIa-c, e-j	Decreasing	-36%
R. brachyura (blonde ray)	VIa	Uncertain	- 20%
	VIIafg	Uncertain	- 20%
	~~VIIe~~	Stock to be determine (should refer to North Sea Divisions)	~~No advice~~
	~~VIIf~~		~~No advice~~
R.. undulata (undulate ray)	VIIj	Depleted	No targeted fishery, minimize bycatch
	~~VIIj~~		
	VIId,e		No advice
R. microocellata (small-eyed ray)	VIIfg	Decreasing	- 36%
L. circularis (sandy ray)	VI, VII	Uncertain	-20%
	~~VIIbc,h-k~~		~~No advice~~
R. fullonica (shagreen ray)	VI, VII	Uncertain	-20%
	~~VIIbc,g-k~~		~~No advice~~
Dipturus oxyrinchus (long-nose skate)	VI-VII		No advice
Dipturus nidarosiensis (Norwegian skate)	VI		No advice
Rostroraja alba (White skate)	VII		Retain on prohibited species list

ICES provides advice on the overall exploitation (landings and discards) of the ray and skates species assemblage, and also individual species. ICES does not advise that species-specific TACs be established, at

present. This is because a TAC is not considered the most effective means to regulate fishing mortality in these, mostly bycatch, species.

ICES advises that a suite of species- and fishery-specific measures be developed to manage the fisheries on the commercial species and achieve recovery of the depleted species. Such measures should be developed by management authorities involving all stakeholders; ICES could assist in this process.

Management measures should be framed in a mixed-fisheries context, considering the overall behaviour of demersal fleets, and the drivers for such behaviour. These species are mainly caught in mixed fisheries. When the TAC is exhausted, catches continue to take place, but are discarded. In order to achieve optimal harvesting of the commercial species, and to assist recovery of the depleted species, a suite of measures should be put in place.

Closure to fishing of spawning and/or nursery grounds, and measures to protect the spawning component of the population (e.g. maximum landing size) are powerful tools to protect rays and skates. In some cases, single-species TACs may be appropriate, but their effects should be carefully evaluated for each specific case before implementation.

Given that the European Community intends to introduce a ban on discards, minimum or maximum landing sizes should be carefully considered before they are introduced, because they could lead to increased discards.

ICES advises that white skate (*Rostroraja alba*) remains on the Prohibited Species List, as it appears to be depleted in the Celtic Sea ecoregion

Outlook for 2011-2012
No analytical assessment or forecast can be presented for these stocks. The main cause of this is the lack of a time-series of species specific landings data.

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

MSY approach
Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2013 and 2014. Given the stable, possibly increasing stock trend for the main commercial skate species, as indicated by fishery-independent trawl surveys, but that the exploitation status is unknown, the catch should be maintained at recent levels.

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

STECF COMMENTS: STECF agrees with the ICES advice.

TACs for individual species within the demersal elasmobranch assemblage are not appropriate, with the exception of a zero TAC for those stocks known to be severely depleted (i.e., *D. batis, R. undulata, S. squatina,* and *R. alba*).

2.5. Catsharks and Nursehounds (*Sciyliorhinus canicula* and *Sciyliorhinus stellaris*) in Subareas VI and VII

2.5.1. Lesser-spotted dogfish (*Scyliorhinus canicula*) in Subarea VI and Divisions VIIa–c, e–j (Celtic Sea and west of Scotland)

The most recent advice for this stock was provided by ICES in 2012. The advice is valid for 2013 and 2014.

FISHERIES: This species is taken primarily as a by-catch in demersal fisheries targeting other species and a large proportion of the catch is discarded, although in some coastal areas there are seasonal small-scale directed fisheries

Some demersal sharks, including lesser-spotted dogfish, may benefit from scavenging on trawl-damaged organisms and discards.

Lesser-spotted dogfish is a small, productive, oviparous shark. It is one of the most common small sharks in this ecoregion. It has a high discard survival rate.

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

REFERENCE POINTS:

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

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

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing
SSB (Spawning-Stock Biomass)		
	2005–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

The stock is estimated to be increasing. Survey catch rates are increasing throughout the ecoregion. The average of beam trawl survey (BTS-Q3), assumed as stock size indicator, in the last two years (2010-2011) is 35% higher than the average of the five previous years (2005-2009). The average of the international bottom trawl surveys in the North Sea (IBTS-Q1), assumed as a stock size indicator, in the last two years (2010-2011) is 26% higher than the average of the five previous years (2005-2009).Catches are stable or increasing, though data are not complete. Given the increase in abundance, and stable/increasing catches, it can be inferred that exploitation (fishing mortality) is stable or decreasing.

Species	**Area**	**State of stock**
S. canicula (lesser spotted dogfish)	VI and VII a-c, e-j	increasing in all areas.

RECENT MANAGEMENT ADVICE:

Scyliorhinus canicula (Lesser-spotted dogfish)

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

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

Advice for 2013 and 2014 by individual stocks

Species	**Area**	**Advice**
S. canicula (lesser spotted dogfish)	VI and VII	Maximum catch increase of 20%

Outlook for 2013-2014
No reliable quantitative assessment can be presented for this stock. Therefore, no catch projections are available.

MSY approach
Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2013 and 2014.

Other consideration
Landings are not considered to be reliable as this species can be landed using generic categories such as "dogfish and hounds". High levels of discarding take place. As there is no TAC for lesser-spotted dogfish, there is no obligation to report these at species level.

Fishery-independent trawl surveys provide the longest time-series of species-specific information.

The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated

STECF COMMENTS: STECF agrees with the ICES advice for 2013 and 2014.

2.5.2. Greater-spotted dogfish (*Scyliorhinus stellaris*) in Subarea VI and VII

The most recent advice for this stock was provided by ICES in 2011. Hence, the text below reflects that advice.

FISHERIES: This species is taken primarily as a by-catch in demersal fisheries targeting other species and a large proportion of the catch is discarded, although in some coastal areas there are seasonal small-scale directed fisheries.

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

REFERENCE POINTS:

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

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

STOCK STATUS:

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

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

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

Species	**Area**	**State of stock**
S. stellaris (greater spotted dogfish)	VIIa,e,f	Locally common. Survey catches appear to be increasing in VIIa, but there is a poor signal in other

		areas due to low catches.

RECENT MANAGEMENT ADVICE:

Advice for 2011 and 2012 by individual stocks

Species	Area	Advice
S. stellaris (greater spotted dogfish)	VIIa,e,f	No advice

Outlook for 2012-2013

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

MSY approach

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

Additional information

The UK (England and Wales) westerly IBTS survey also had stations along the west coast of Wales. Although they are captured regularly in this survey, catches com- prised few individuals. These UK surveys have tagged and released a number of greater-spotted dogfish in recent years, which will hopefully provide further information to aid in stock identification.

STECF COMMENTS: STECF agrees with the ICES advice.

2.6. Tope (*Galleorhinus galeus*) in ICES Subareas VI and VII

Previous stock summaries and advice for tope has been provided at the NE Atlantic regional level and at present, STECF is unable to provide additional information and advice for subareas VI and VII separately. The advice for tope at the NE Atlantic regional level is given in Section 4.10 of this report.

2.7. Other Demersal elasmobranches in western waters

Advice from ICES for Angel sharks (*Squatina squatina*) and Smooth Hounds (*Mustellus spp*) is provided at the NE Atlantic regional level and is given in Sections 4.17 and 4.18 this report.

2.8. Red Gurnard (*Aspitrigla cuculus*) in western waters

STECF did not have access to any recent stock assessment information on red gurnard in western waters. Advice from ICES on red gurnard is provided at the NE Atlantic regional level and is given in Section 4.5 of this report.

2.9. Red mullet (*Mullus barbartus and Mullus surmelutuss*) in western waters

STECF did not have access to any recent stock assessment information on red mullet in western waters. Advice from ICES on red gurnard is provided at the NE Atlantic regional level and is given in Section 4.4 of this report.

2.10. Sea bass (*Dicentrarchus labrax*) in western waters

STECF did not have access to any recent stock assessment information on sea bass in western waters. Advice from ICES on red gurnard is provided at the NE Atlantic regional level and is given in Section 4.6 of this report.

2.11. Other Demersal elasmobranches in the Celtic Sea

Advice from ICES for Angel sharks (*Squatina squatina*) and Smooth Hounds (*Mustellus spp*) is provided at the NE Atlantic regional level and is given in Sections 4.17 and 4.18 this report.

3. Resources of the Bay of Biscay and Iberian Waters

3.1. Rays and skates in ICES Subareas VIII and IX

The most recent advice for these stocks was provided by ICES in 2012. The advice is valid for 2013 and 2014

FISHERIES: Most catches of elasmobranchs in the Bay of Biscay are from trawler fleets operating in Divisions VIIIa, b, d and IXa (Spain). Elasmobranch catches from western Iberian waters (ICES Division IXa) are mainly from the Portuguese polyvalent fleet and in particular from the métiers using nets or trammel nets.

Skates and rays fisheries are currently managed under a common TAC, although this complex comprises species that have different vulnerabilities to exploitation. TAC advice is based on the status of the main commercial species, with species-specific advice for other species also provided where relevant.

Demersal elasmobranchs in this region are caught in mixed target and non-target fisheries. TACs alone cannot adequately manage these stocks as catches may still be taken in mixed fisheries and discarded, even after the TAC is exhausted.

Management measures such as closed areas/seasons or effort restrictions may better protect demersal elasmobranchs. In particular, measures to protect spawning/nursery grounds would be beneficial. ICES could provide advice on such measures.

At present rays and skates fisheries are managed by means of a generic, multi-species TAC, along with prohibitions for severely depleted species.

There are few records of the *Dipturus* complex in this ecoregion. Most records are from the northern part of the ecoregion. It is likely that both *D.* cf. *intermedia* and *D.* cf. *flossada* occur in this area. Without further information on stock structure and distribution, it is not possible to provide separate advice for these two species in this ecoregion.

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

REFERENCE POINTS:

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

STOCK STATUS:

Three commercial skate species (thornback ray, spotted ray, and cuckoo ray) show increasing trends in relative abundance in fishery-independent trawl surveys. There is evidence of a long-term decline to depleted levels in the distribution and relative abundance of one commercial species (*Dipturus batis* complex). Trends in the relative abundance of two other commercial species (blonde ray, undulate ray) are unclear. Starry ray is an abundant non-commercial species and is almost exclusively discarded, and stock trends are decreasing. Discard survivorship is not known.

The advice is based on the stock status of the main commercial species in the ecoregion, with species-specific advice provided below. Landings of skates and rays in the North Sea have generally declined, and this is associated with changes in species composition and relative abundance.

Status of individual stocks is given in the table below.

Species	**Area**	**State of stock**
Raja clavata (thornback ray)	VIII IXa	Stable /increasing Stable
Leucoraja naevus (cuckoo ray)	VIIIabd XIa	⁄Increasing Uncentain

Leucoraja naevus (cuckoo ray)	VIII IXa	Uncertain Uncertain
other species	VIII IXa	Uncertain Uncertain
Dipturus batis (Common skate) complex	All areas	Depleted
Raja montagui (Spotted Ray)	VII and IXa	Uncertain

RECENT MANAGEMENT ADVICE: The previous advice was given for 2011 and 2012. The basis of this advice was the precautionary approach. This year, individual advice is given for each of the main species, on the basis of ICES approach to data-limited stocks.

Advice Summary for 2013-2014

ICES provides advice on the overall exploitation (landings and discards) of the ray and skates species assemblage, and also individual species (Table 7.4.24.1). ICES does not advise that general or species-specific TACs be established for each species, at present. This is because a TAC is not considered the most effective means to regulate fishing mortality in these bycatch species.

ICES advises that a suite of species- and fishery-specific measures be developed to manage the commercial fisheries and achieve recovery of the depleted species. Such measures should be developed by management authorities involving all stakeholders; ICES could assist in this process.

Management measures should be framed in a mixed-fisheries context, considering the overall behaviour of demersal fleets, and the drivers for such behaviour. When the TAC is exhausted, catches may continue to take place, but are discarded. In order to achieve optimal harvesting of the commercial species, and to assist recovery of the depleted species, a suite of measures should be put in place.

Closure to fishing of spawning and/or nursery grounds, and measures to protect the spawning component of the population (e.g. maximum landing size) are powerful tools to manage rays and skates. In some cases, single-species TACs may be appropriate, especially for easily identified species and/or discrete stocks in limited distribution areas.

Given that the European Community intends to introduce a ban on discards, minimum or maximum landing sizes should be carefully considered before they are introduced, because they could lead to increased discards. Size limits may best be applied in target fisheries, if discard (escapee) survival can be shown to be high.

ICES advises that white skate (*Rostroraja alba*) should remain on the Prohibited species list, as it appears to be depleted in this area.

Advice for 2013-2014 by individual stocks

Species	Area	Advice
Raja clavata (thornback ray)	VIII IXa	0% -20%
Leucoraja naevus (cuckoo ray)	VIII IXa	+6% -20%
Other species	VIII IXa	-20% -20%
Other species	IXa	-20%
Raja alba (White skate)	All areas	Remain on prohibited species list
Dipturus batis (Common skate) complex	All areas	No targed fisheries, minimize by-catch
Raja montagui (Spotted Ray)	VIII and IXa	-20%
Raja brachyuran (Blonde ray)	IXa	-20%

Outlook for 2011 and 2012

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

MSY transition scheme

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2013 and 2014. The rate of

exploitation of these stocks relative to F_{MSY} is not currently known. Advice is provided based on an examination of the stock status of each of the different stocks in the divisions within the ecoregion, with the most appropriate advice for the majority of the stocks provided.

PA approach

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

STECF COMMENTS: STECF agrees with the ICES advice.

3.2. Catsharks and Nursehounds (*Scyiliorhinus canicula* and *Scyliorhinus stellaris*) in Subareas VIII, IX and X

3.2.1. Catsharks in VIIIc and IXa

The most recent advice for these stocks was provided by ICES in 2012. The advice is valid for 2013 and 2014.

FISHERIES: Lesser spotted dogfish *Scyliorhinus canicula* is taken primarily as a by-catch in mixed demersal fisheries targeting other species and a large proportion of the catch is discarded with survivorship considered to be high, although in some coastal areas there are seasonal small-scale directed fisheries (especially for use as bait in pot fisheries, but this is unquantified). In the Bay of Biscay and Iberian waters landings of *Scyliorhinus* spp. have recorded since the mid 1990s. For division VIIc and IXa and landings have fluctuated between 305t and 1374t reaching 904t in 2011.

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

REFERENCE POINTS:

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

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown
SSB (Spawning-Stock Biomass)		
	2005–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

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

Species	**Area**	**State of stock**
Scyliorhinus canicula (lesser spotted dogfish)	VIIIabd	Increasing

Scyliorhinus canicula (lesser spotted dogfish)	VIIIc	Stable /increasing
Scyliorhinus canicula (lesser spotted dogfish)	IXa	Stable

Species-specific landings of lesser-spotted dogfish are stable though data are not complete. The average of the stock size indicator (kg per 30 minutes) in the last two years (2010-2011) is 9% lower than the average of the five previous years (2005-2009).

RECENT MANAGEMENT ADVICE:

Scyliorhinus canicula (Lesser-spotted dogfish)

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

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

Advice for 2013-2014 by individual stocks

Species	**Area**	**Advice**
Scyliorhinus canicula (lesser spotted dogfish)	VIIIc, IXa	Decrease in catches of 9% No individual TAC

For this stock the abundance is estimated to have decreased by 9% between 2005 and 2009 (average of the five years) and 2010–2011 (average of the two years). This implies a 9% decrease in catches in relation to the last three years' average. Because the data for catches of lesser-spotted dogfish are not fully documented (due to the historical use of generic landings categories), ICES is not in a position to quantify the result.

Given that there is a consistent increase in stock size over an extended period of time, no additional precautionary buffer is needed.

ICES does not advise that an individual TAC be set for this stock, at present.

Outlook for 2013 and 2014

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

MSY transition scheme

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2013 and 2014. The rate of exploitation of these stocks relative to F_{MSY} is not currently known.

STECF COMMENTS: STECF agrees with the ICES advice.

3.2.2. Catsharks in VIIIabd

The most recent advice for these stocks was provided by ICES in 2012. The advice is valid for 2013 and 2014.

FISHERIES: Lesser spotted dogfish *Scyliorhinus canicula* is taken primarily as a by-catch in demersal fisheries targeting other species and a large proportion of the catch is discarded, although in some coastal areas there are seasonal small-scale directed fisheries. In the Bay of Biscay and Iberian waters landings of *Scyliorhinus* spp. have recorded since the mid 1990s. For divisions VIIIabd landings have fluctuated from 833t to 1727t with an incresing global trend, in 2011 Lesser spotted dogfish landing were 1459t.

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

REFERENCE POINTS:

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

Precautionary Approach	B_{lim}	Not defined	
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})		Unknown
Precautionary approach (F_{pa},F_{lim})		Unknown
Qualitative evaluation		Decreasing
SSB (Spawning-Stock Biomass)		
	2005–2011	
MSY ($B_{trigger}$)		Unknown
Precautionary approach (B_{pa},B_{lim})		Unknown
Qualitative evaluation		Increasing

Species-specific landings of lesser-spotted dogfish are stable, though data are not complete. The stock is estimated to be increasing because commercial and survey catch rates are increasing. Given increased abundance and reduced catches, it can be inferred that exploitation rate (fishing mortality) has declined. The average of the stock size indicator (kg day-1) in the last two years (2010-2011) is 39% higher than the average of the five previous years (2005-2009).

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

Species	**Area**	**State of stock**
Scyliorhinus canicula (lesser spotted dogfish)	VIIIabd	Increasing

RECENT MANAGEMENT ADVICE:
Scyliorhinus canicula (Lesser-spotted dogfish)

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

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

Advice for 2013-2014 by individual stocks

Species	**Area**	**Advice**
Scyliorhinus canicula (lesser spotted dogfish)	VIIIabd	Maximum increase of 20% No individual TAC

Outlook for 2013 and 2014

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

MSY transition scheme

Advice by species/stock is provided in the table above. This advice is based on an application of the MSY approach for stocks without population size estimates. This advice applies to 2012 and 2014. The rate of exploitation of these stocks relative to F_{MSY} is not currently known.

STECF COMMENTS: STECF agrees with the ICES advice.

3.3. Rays and skates in ICES Subareas X, XII, and XIV (Azores and Mid-Atlantic Ridge).

FISHERIES: There are at least seven species of skate (Rajidae) in the shallower parts of the Azores and Mid-Atlantic Ridge, with other deep-water species also occurring in the area. Thornback ray is the dominant ray species in this area. Stock boundaries are not known for the species in this area, neither are the potential movements of species that also occur on the continental shelf of mainland Europe. The deep-water species at Azores and the Mid-Atlantic Ridge may have relatively wide geographic distributions. The connectivity between shallower water species around the Azores with mainland Europe is unclear, and these species may form discrete stocks. This area is mainly a natural deep-water environment exploited by small-scale fisheries in the Portuguese EEZ in the Azores and industrial deep-sea fisheries in international waters. Landings from the Mid-Atlantic Ridge remain very small and variable, or even absent, and few vessels find the Mid-Atlantic Ridge fisheries profitable. Demersal elasmobranchs are caught in the Portuguese EEZ in the Azores by a multispecies demersal fishery, using handlines and bottom longlines, and by the black scabbardfish fishery using bottom longlines. The most commercially important elasmobranchs caught and landed from these fisheries are *Raja clavata* and *Galeorhinus galeus.* Rays and skates (mainly thornback ray) at the Azores and Mid-Atlantic Ridge (ICES Divisions X, XII, and XIV are predominantly an Portuguese fishery. Landings increased from around 50 tonnes in the late 80's and early 90's to about 100 tonnes in the late 90's and early 2000's. Recently landings have increased from 60 tonnes in 2009 to 91 tonnes in 2011.

SOURCE OF MANAGEMENT ADVICE: The main recent source of information is ICES. However no species specific management advice is given.

REFERENCE POINTS: No precautionary reference points have been agreed for tope in the Northeast Atlantic.

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	↗,	Increasing

SSB (Spawning-Stock Biomass)		
	2005–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

Landings have fluctuated over time, but have been higher since the mid-1990s. Existing survey data are limited for nearly all species. The dominant species in catches at Azores and the Mid-Atlantic Ridge is thornback ray; for this species the average of the stock size indicator (in number) in the last two years (2010–2011) is lower by more than 50% compared to the three previous years with data (2005, 2007, and 2008).

RECENT MANAGEMENT ADVICE:

Advice for 2013-2014

As thornback ray is the dominant ray species at Azores and the Mid-Atlantic Ridge, the advice for skates and rays is based on the status of this species. Based on ICES approach to data-limited stocks, ICES advises that catches should be decreased by 36%. Because the data for catches are not fully documented and not reliable, ICES is not in a position to quantify the result.

ICES does not advise that general or species-specific TACs be established at present. This is because a TAC is not the most effective means to regulate fishing mortality in these bycatch species. ICES advises that a suite of species- and fishery-specific measures be developed to manage the commercial fisheries on these species and achieve recovery of the depleted species. Such measures should be developed in collaboration between

management authorities and all stakeholders. ICES could assist in this process. Species- and fishery-specific measures may include seasonal and/or area closures, technical measures, and tailored measures for target fisheries.

This is the first year ICES is providing quantitative advice for data-limited stocks.

Other considerations

ICES approach to data-limited stocks

As thornback ray is the dominant ray species at Azores and the Mid-Atlantic Ridge, advice for skates and rays is based on the status of this species.

For data-limited stocks for which an abundance index is available, ICES uses as harvest control rule an index-adjusted *status quo* catch. The advice is based on a comparison of the two most recent index values with the five preceding values, combined with recent catch or landings data. Knowledge about the exploitation status also influences the advised catch.

For thornback ray the abundance is estimated to have decrease by more than 20% between 2005 and 2009 (average of the three years with data) and 2010–2011 (average of the two years). This implies a decrease of catches of 20% in relation to the last three years' average catch.

Additionally, considering that exploitation is unknown, ICES advises that catches should decrease by a further 20% as a precautionary buffer, corresponding to a total catch reduction of 36%. Because the data for catches are not fully documented and considered unreliable, ICES is not in a position to quantify the result.

ICES does not advise that general or species-specific TACs be established at present. This is because a TAC is not the most effective means to regulate fishing mortality in these bycatch species. ICES advises that a suite of species- and fishery-specific measures be developed to manage the commercial fisheries for these species and achieve recovery of the depleted species. Such measures should be developed in collaboration between management authorities and all stakeholders. ICES could assist in this process. Species- and fishery-specific measures may include seasonal and/or area closures, technical measures, and tailored measures for target fisheries.

Additional considerations

There is no TAC for skates in this region. Landings of skates and rays have fluctuated between 60 and 90 t per year since 2001. Restrictive quotas on other deep-water species may affect the catch of skates and rays due to restrictions in effort.

Management measures such as closed areas/seasons or effort restrictions may be preferable to manage fisheries and protect rays and skates, rather than a TAC. In particular, measures to protect spawning/nursery grounds would be beneficial. ICES could provide advice on such measures.

Fisheries are restricted in certain areas of the Mid-Atlantic ridge to protect coral and other vulnerable ecosystems.

Fishing below 200 m using gillnets and other forms of tangle netting is banned to prevent damage to vulnerable habitats.

Management of deep-water fisheries by NEAFC contains measures that affect fisheries where these species are caught. These include effort limitations, area and gear restrictions (http://www.neafc.org/measures). The recommendations that are relevant to elasmobranchs in this region include:

- Recommendation III (2006): Since 2006 NEAFC has prohibited fisheries with gillnets, entangling nets, and trammelnets at depths below 200 m and has introduced measures to remove and dispose of unmarked or illegal fixed gear and retrieve lost gear to minimize ghost fishing;
- Recommendations IX (2007) and IX (2008): Bottom fishing (bottom trawling and fishing with static gear, including bottom-set gillnets and longlines) was forbidden in some areas of Hatton Bank and Rockall Bank;
- Recommendation XVI (2008): The access to the new bottom fishing areas (considered as other areas not mapped as actual existing bottom fishing areas) was limited;
- Recommendation VII (2009) and REC VI (2010): Since 2009 effort was limited and set at 65% of the highest level put into deep-sea fishing in previous years for the relevant species;

- Recommendation XIV (2009): During 2009 five areas (including three seamounts) on the Mid-Atlantic Ridge in the high seas in the Northeast Atlantic, were closed temporarily to bottom fisheries (fishing gears that are likely to contact the seabed) under its policy for area management.

STECF COMMENTS: STECF agrees with the ICES advice for 2013 and 2014.

3.4. Tope (*Galleorhinus galeus*) in ICES Subareas VIII, IX and X

Previous stock summaries and advice for tope has been provided at the NE Atlantic regional level and at present, STECF is unable to provide additional information and advice for subareas VIII, IX and X separately. Advice from ICES on tope is provided at the NE Atlantic regional level and is given in Section 4.10 of this report.

3.5. Other Demersal elasmobranches in the Bay of Biscay and Iberia

The most recent advice for these stocks was provided by ICES in 2012 and will be valid for 2013 and 2014.

Advice from ICES for Angel sharks (*Squatina squatina*) and Smooth Hounds (*Mustellus spp*) is provided at the NE Atlantic regional level and is given in Sections 4.17 and 4.18 this report.

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

STECF did not have access to any recent stock assessment information on *Trachurus spp* in this area.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. A TAC in area ICES X for 2010 was set to 1,229 t and was taken exclusively by Portugal. No TAC has been set since 2010.

STECF COMMENTS: No comments

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

STECF did not have access to any recent stock assessment information on horse mackerel in this area.
A TAC in area ICES X for 2010 was set at 1,229 t and was taken exclusively by Spain. No TAC has been set since 2010.

STECF COMMENTS: No comments

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

STECF did not have access to any recent stock assessment information on *Trachurus spp* in ICES X. Therefore, there is no updated advice and the text of this section remains unchanged from the STECF Review of advice for 2012.

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.

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

3.9. Red Gurnard (*Aspitrigla cuculus*) in the Bay of Biscay and Iberian waters

STECF did not have access to any recent stock assessment information on red gurnard in the Bay of Biscay and Iberian waters. Advice from ICES on red gurnard is provided at the NE Atlantic regional level and is given in Section 4.5 of this report.

3.10. Red mullet (*Mullus surmuletus and Mullus barbartus*) in the Bay of Biscay and Iberian waters

STECF did not have access to any recent stock assessment information on red mullet in the Bay of Biscay and Iberian waters. Advice from ICES on red mullet is provided at the NE Atlantic regional level and is given in Section 4.4 of this report.

3.11. Sea bass (*Dicentrarchus labrax*) in the Bay of Biscay and Iberian waters

STECF did not have access to any recent stock assessment information on sea bass in the Bay of Biscay and Iberian waters. Advice from ICES on sea bass is provided at the NE Atlantic regional level and is given in Section 4.6 of this report.

4. Widely distributed and migratory stocks

4.1. Blue whiting (*Micromesistius poutassou*) in ICES subareas I-IX, XII & 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, 2010 and 2011) 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 2011 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 drastically from 1.25 million t in 2008 to 104 thousand t in 2011.

SOURCE OF MANAGEMENT ADVICE: The main body for management advice is ICES. The assessment is based on catch-at-age data from commercial catches in 1981–2011 and one international blue whiting spawning stock survey (IBWSS) 2004–2012. The IBWSS survey is the only survey that covers almost the entire distributional area of the spawning stock.

Due to the large uncertainties in the 2010 survey data the IBWSS index has been excluded from the assessment since 2011, because the survey in 2010 is believed to have missed significant concentrations, making it not comparable with the remainder of the time-series.

Limited information was available on discarding and discards were therefore not included in the assessment. However, discarding is considered to be minor.

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}	Undefined.	Previous estimates are not considered valid (ICES, 2012b).
	F_{pa}	Undefined.	Previous estimates are not considered valid (ICES, 2012b).

(unchanged since: 2012)

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. Work is underway to evaluate a NEAFC request concerning an alternative management plan. ICES will issue advice in advance of WGWIDE 2013.

For assessment purposes ICES considers blue whiting in ICES Subareas I–IX, XII, and XIV as a single stock.

STOCK STATUS:

F (Fishing Mortality)	2009	2010	**2011**	
MSY (F_{MSY})	✗	✗	✓	At target
Precautionary approach (F_{pa},F_{lim})	?	?	?	undefined
Management plan (F_{MP})	✗	✗	✓	At target

SSB (Spawning-Stock Biomass)	2010	2011	**2012**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

Management plan (SSB_{MP})	✓	✓	✓	Above trigger

Historical low landings and fishing mortality at 0.04 in 2011, in combination with an increase in recruitment since 2010, have stopped the steep decline in SSB since 2004. SSB has increased by one million tonnes from 2011 to 2012 (3.8 million tonnes) and is above Bpa at the beginning of 2012. An increase in recruitment has been observed for the last two years, but the absolute recruitment strength is uncertain.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the management plan agreed by Norway, the EU, the Faroe Islands, and Iceland, that catches in 2013 should be no more than 643 000 tonnes.

Other considerations

Management plan

The management plan agreed by Norway, EU, the Faroe Islands, and Iceland November 2008 implies a TAC of 643 000 tonnes in 2013, compared to 391 000 tonnes in 2012. This is expected to lead to an increase in SSB in 2014 to 5.67 million tonnes, which is above SSBMP.

MSY approach

Following the ICES MSY framework implies fishing mortality to be at F_{MSY} = 0.18, corresponding to catches of 643 000 tonnes in 2013. This is expected to lead to an increase in SSB in 2014 to 5.67 million tonnes, which is above MSY $B_{trigger}$.

PA approach

No PA F-reference points are available for this stock. Even with an F twice the size of F in 2012 SSB will be above Bpa in 2014.

Additional considerations

Recruitment (age 1) is estimated significantly higher in 2011 than in the years 2007–2009 with the historically low recruitments. Information from surveys and the fishery indicates a steep increase in recruitment in the two most recent years. Also, indices suggest that recruitment (age 1) in 2012 is at a similar or higher level.

ICES (2012b) evaluated available evidence on sub-stock structure and came to the conclusion that there is no scientific evidence in support of multiple stocks with distinct spawning locations or timings. The emerging picture is one of a single stock whose large-scale spatial spread varies as a function of hydrographic conditions and total abundance; this is commonly described as an abundance–occupancy relationship. Further, there seem to be a number of core nursery and feeding areas with marginal areas being occupied at times of high stock abundance. As a result, ICES considers blue whiting in ICES Subareas I–IX, XII, and XIV as a single stock for assessment purposes.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013.

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 218 000 t in 2010. The estimated catches for 2011 amount to 200 000 t.

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 the yield-per-recruit analysis
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. ICES reviewed the plan again in 2012 and could not unequivocally conclude that the original or modified HCR is consistent with the precautionary approach in the long term. ICES further advises that the plan should be subjected to a complete review. ICES does not advise on the basis of the management plan because Norway objected to the use of the plan for advice; in addition ICES considers that the plan needs to be re-evaluated according to its original provisions (a three-year re-evaluation period). The realignment of the stock and management areas, as outlined in the plan, has been included in the TAC regulations since 2010.

STOCK STATUS:

F (Fishing Mortality)				
	2009	2010	**2011**	
MSY (F_{MSY})	✓	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined
SSB (Spawning-stock Biomass)				
	2010	2011	**2012**	

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

The SSB, which has varied between 1.16 and 2.69 million tonnes during 1995–2011, is estimated to be at 1.66 million tonnes in 2012. Fishing mortality has been increasing since 2007 and is now above F_{MSY} (F_{2011} = 0.18). Recruitment has been low from 2004 onwards.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach that catches in 2013 should be no more than 126 000 t.

Other considerations

MSY approach

Following the ICES MSY framework implies a fishing mortality of 0.13 in 2013, corresponding to catches in 2013 of 126 000 tonnes. This is expected to lead to a decline in SSB in 2014 to 1.20 million tonnes. Applying the transition rule will imply a catch that is not much different from the F_{MSY} catch in 2013.

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 2013 of 183 000 tonnes. This is expected to lead to a decline in SSB in 2014 to 1.14 million tonnes.

Additional considerations

Note that the TAC advice based on the MSY approach results in an SSB in 2014 that is approaching the lowest SSB in the time-series. Although the low SSB does not necessarily equate to reduced recruitment, it should be noted that the buffer against increased fishing pressure has been reduced.

The TAC should apply to all areas where Western horse mackerel is caught.

The advice for horse mackerel assumes that all catches are counted against the TAC for each stock separately. ICES advises that the management areas correspond to the distribution areas which include all EU, Norwegian, and Faroese waters where horse mackerel are caught. The management areas for the 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 human consumption with juvenile fish directed mostly at the Japanese market, and large fish at 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 2011, 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.

STECF COMMENTS: STECF agrees with the ICES assessment and the advice. STECF further notes that even with an $F_{0.1}$ of 0.13 as proxy for Fmsy, SSB is still predicted to decline in 2014.

4.3. Northeast Atlantic Mackerel (*Scomber scombrus*) - combined 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.

Traditionally, the fishing areas with higher catches of mackerel have been in the northern North Sea (along the border of Divisions IVa and IIa), around the Shetland Isles, and off the west coast of Scotland and Ireland. The southern fishery off Spain's northern coast has also accounted for significant catches. In recent years significant catches have also been taken in Icelandic and Faroese waters, areas where almost no catches were reported prior to 2008. In 2011, catches in this area constituted approximately 32% of the total reported landings. In 2011 Greenland has reported catches for the first time. In the Icelandic and Faroese fisheries, in the north-western part of the distribution area, mackerel have been partly taken together with herring. In the southern part of the distribution area, Atlantic mackerel (*Scomber scombrus*) can be caught together with Spanish mackerel (*Scomber colias*). Catches of both species are reported separately.

Western Component: The catches of this component were low in the 1960s, but increased since. 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 in this component are taken in a mixture of purse-seine, demersal trawl, line, and gillnet fisheries. 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, the catches are mainly taken in Division IXa and contain a high proportion of juveniles. Catches from the Southern component increased from about 20 000 t in the early 1990s to about 40 000 tonnes in the early 2000s, reaching a peak at 108 000 tonnes in 2009 and decreasing to 19 000 tonnes in 2011. The 2011 decline was due to pay-back of 18 000 tonnes and tighter regulations. Estimates of the SSB of the Southern component derived from egg surveys indicate an increase from 0.28 million tonnes in 2004 to 0.85 million tonnes in 2010.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICES. This assessment is based on catch numbers-at-age for the period 1972–2011 and triennial egg survey estimates of SSB from 1992 to 2010. Some sampling for discards has been carried out since 2000 and a formal requirement was initiated in the EU in 2002. Estimating proportions of catch discarded and slipped is problematic in pelagic fisheries due to high variability in discard and slipping practices. In some fleets no sampling for discards is carried out. 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, 2011 and 2012.

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)	2009	2010	**2011**	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	o	o	o	Increased risk
Management Plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-stock Biomass)	2010	2011	**2012**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity
Management Plan (SSB_{MP})	✓	✓	✓	Above trigger

Fishing mortality in 2011 is estimated to be 0.31, above F_{MSY} and F_{pa}. Fishing mortality was above F_{lim} during the early 2000s. SSB has increased considerably since 2002 and remains high, above B_{pa} and MSY $B_{trigger}$, but is currently declining. The 2005 and 2006 year classes are the strongest year classes in the time-series. There is insufficient information to reliably estimate the size of the 2009–2011 year classes.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the Norway, Faroe Islands, and EU management plan that catches in 2013 should be between 497 000 tonnes and 542 000 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.

Other considerations

Management plans

Following the management plan (agreed by the EU, Norway, and Faroes in 2008) implies a TAC between 497 and 542 thousand tonnes in 2013, corresponding to a catch reduction between 47% and 42% compared to the estimated catches in 2012. This would lead to an estimated SSB in 2014 between 2.61 and 2.56 million tonnes.

MSY approach

Following the ICES MSY framework implies that fishing mortality should be reduced to 0.22 (F_{MSY}), resulting in a total catch of 542 thousand tonnes in 2012. This would lead to an estimated SSB in 2014 of 2.56 million tonnes.

Following the transition scheme towards the ICES MSY Harvest Control Rule implies that fishing mortality should be reduced to F_{pa} (= 0.23), resulting in a total catch of 564 thousand tonnes in 2013. This would lead to an estimated SSB in 2014 of 2.53 million tonnes.

PA approach

Following the precautionary approach (PA) implies that fishing mortality in 2012 should be no higher than F_{pa} (F = 0.23), corresponding to a total catch of 564 thousand tonnes in 2013. This is expected to maintain SSB above B_{pa} in 2014.

Additional 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 was examined at an ICES Workshop in 2012. The workshop concluded that a temporal shift to an earlier spawning migration of NEA mackerel, from March–April to February, is indicated in the southern area (Cantabrian Sea) in 2012, suggesting very early spawning. Spawning distribution has expanded towards the north and northwest, but most of the eggs are still produced in the historical core spawning area located from the west of the Celtic Sea to the west of Ireland. The expansion seems to be less related to changes in the environmental conditions, than to the increase in stock size. This has led to part of the stock spawning in previously unused areas.

The TAC should apply to all areas where mackerel are caught. Catches since 2008 have been considerably in excess of ICES advice, which was based on the management plan. This situation continued 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 total exploitation rate. Because the management plan has not been followed, the expected 2012 catch needed to be estimated (see table below). The estimation procedure took account of the declared quotas, interannual transfer of quotas not fished in 2011, an estimate of the part of the quotas that are not expected to be fished in 2012, discards, estimated overshoot in catches, and quota payback. The total estimated catch in 2012 (930 135 tonnes) used for projections corresponds to a fishing mortality of 0.36, which is well above F_{MSY} and the stipulated range in the management plan for this stock. Maintaining such a catch in 2013 and 2014 would result in a decrease of the stock size in the short term. ICES notes that interannual transfers occur and that their consistency with the PA has not been evaluated.

ICES Estimation of 2012 catch	Tonnes	Reference
EU quota and Swedish quota	398 575	European Council Regulation COM (2012) 0182
EU deduction (DE+LT+PL+UK overcatch in 2011)	−6 907	European Commission press release 1 Aug 2012
UK–Ireland payback	−18 222	European Council Regulation 2012/147
Spanish payback	−5 500	European Council Regulation 2011/165
Norwegian quota	181 095	European Council Regulation COM (2012) 0182
Russian quota	62 072	NEAFC HOD 12/27
Discards	9 012	Previous years estimate
Icelandic quota	145 000	Ministry of Fisheries and Agriculture: Press release 17 Feb. 2012
Interannual quota transfer 2011→2012 (Iceland)	5 811	http://www.fiskistofa.is
Faroese quota	148 375	Ministry of Foreign Affairs : Press release 29 Feb 2012

Interannual quota transfer 2011→2012 (Faroe Islands)	3 000	WGWIDE estimate
Greenland quota	5 410	Greenland Fisheries License Control Authority 24 Aug 2012
Expected overcatch	2 414	Based on 2011 overcatch percentage
Total expected catch (incl. discards)	930 135	

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 497 000 tonnes and 542 000 tonnes.

STECF notes that Iceland and the Faroe Islands set autonomous quotas for 2009, 2010, 2011 and 2012 resulting in catches far greater than those advised by ICES. If catches in 2013 exceed those prescribed by the management plan to the extent recently experienced, the SSB in 2014 is predicted to decline by about 11% compared to 2013.

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 exploited by Spain and Portugal. Other countries with small catches are Belgium and Ireland. Total landings have fluctuated between 2000 and 3000 tonnes in the last 8 years. In 2010, 60% of the landings originated from Subarea VIII. Most of the catch is taken by the French and Spanish bottom trawler fleets. In the Bay of Biscay a fly-shooting fisheries has developed recently. Observer information indicates that there is very little discarding (no minimum landing size has been determined).

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)		
	2009–2011	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2010–2012	
Qualitative evaluation	?	Insufficient information

There is limited information to evaluate stock trends. The landings have shown an increase since the mid-1990s and they are now stable and above average (essentially in Subarea VIII). Recruitment indices fluctuate without trend although there is some indication of several large year classes in the early 2000s

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the approach to data-limited stocks that catches should be no more than 2000 tonnes for 2013 and 2014. This is the first year ICES is providing quantitative advice for data-limited stocks.

Other considerations

ICES approach to data-limited stocks

For data-limited stocks without information on abundance or exploitation ICES considers that a precautionary reduction of catches should be implemented, unless there is ancillary information clearly indicating that the current exploitation is appropriate for the stock.

For this stock, ICES advises that catches should decrease by 20% in relation to the average catch of the last three years (2008–2010), corresponding to catches of no more than 2000 t in 2013.

STECF COMMENTS: STECF agrees with the ICES advice for 2013 and 2014.

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 gurnards are mainly caught by demersal trawlers in mixed fisheries, mostly in Divisions VIId–k and VIIIa,b and in Division IVc. A preliminary analysis has shown that discarding is above 50% of the catch in the English Channel. 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)		
	2009–2011	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2010–2012	
Qualitative evaluation	→	Stable

In the area with the highest abundance (Celtic Sea) the abundance index has fluctuated without a trend since 2002. In the Bay of Biscay the abundance index has also fluctuated without trend, but the 2011 estimate is the highest in the time-series.

Landings data are not available for this species because the landings were reported as one generic category of "gurnards" until 2010. Furthermore, landings data are considered only marginally informative because catches are mainly discarded.

RECENT MANAGEMENT ADVICE: Based on ICES approach to data-limited stocks, ICES advises that catches should be reduced by 20%. Because the data for catches of red gurnard are considered highly unreliable, ICES is not in a position to quantify the result.

This is the first year ICES is providing quantitative advice for data-limited stocks

Other considerations

ICES approach to data-limited stocks

For data-limited stocks without information on abundance or exploitation ICES considers that a precautionary reduction of catches should be implemented, unless there is ancillary information clearly indicating that the current exploitation is appropriate for the stock.

For this stock, the ICES approach to data-limited stocks implies that catches should decrease by 20% in relation to the average catch of the last three years. Because the data for catches of red gurnard are considered highly unreliable, ICES is not in a position to quantify the result.

Additional considerations:

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 no minimum landing size.

Higher occurrences of red gurnard with patchy distribution have been observed along the western coast of Ireland and Scotland from the Shetland Islands to the Celtic Sea and the English. The distribution seems continuous from the Celtic Sea into the North Sea and into the Bay of Biscay. Therefore it was decided not to split this species over the different ecoregions.

The biomass indicator from IBTS-Q1 has shown an increased abundance at the northern border of the North Sea, following an expansion of the stock area from west of Scotland. In the Eastern Channel, the CGFS-Q4 indicator has shown a wide fluctuation and a declining tendency since 2009. In western Iberian waters, the PGFS-Q4 indicator fluctuates at a low level.

STECF COMMENTS: STECF agrees with the ICES advice for 2013 and 2014.

4.6. 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. In Ireland, commercial fisheries for bass have been banned since 1990. Seabass is an important marine recreational angling species in the UK, Ireland, France, and the Netherlands. 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 low except for some small-mesh trawl fleets operating inshore. Bass in ICES Divisions VIIIc and IXa are mainly caught by Spanish (Basque) trawlers and artisanal Portuguese fleets using lines and gillnets.

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)		
	2009–2011	
Qualitative evaluation	?	Insufficient information

SSB (Spawning-stock Biomass)		
	2010–2012	
Qualitative evaluation	?	Insufficient information

Commercial fishery catches of all gear types exhibit a broad age range, and fish of over 20 years of age are recorded in most years, suggesting relatively low mortality rates historically. Catches are strongly influenced by intermittent strong year classes and periods of poor recruitment. The 1989 year class is very strong in all data sets and contributed to the landings in the 1990s. The increase in landings since the mid-1990s coincided with a

northward expansion of the stock and establishment of fisheries in the North Sea during a period of above-average sea temperatures.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the approach to data-limited stocks that commercial catches should be no more than 6000 tonnes. ICES recommends that implementation of 'input' controls should be promoted. This is the first year ICES is providing quantitative advice for data-limited stocks.

Other considerations

ICES approach to data-limited stocks

For data-limited stocks without information on abundance or exploitation ICES considers that a precautionary reduction of catches should be implemented, unless there is ancillary information clearly indicating that the current exploitation is appropriate for the stock.

For this stock, ICES advises that total catches should decrease by 20% in relation to the last three years (2008–2010) average catch, corresponding to commercial catches of no more than 6000 t in 2013.

Additional considerations:

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). Any consideration of catch limitation (output control) would need to take into account that seabass are a bycatch in mixed fisheries to a various extent, depending on gear and country; this incites discarding and should be avoided.

Management of seabass fisheries needs to take into account the distinctive characteristics and economic value of the different fisheries. Seabass is of high social and economic value to the large inshore artisanal fleets and to sea angling and other recreational fishing that contribute substantially to local economies.

It is currently not clear how management units should be defined in Subareas IV, VII and VIII in relation to stock structure. As bass is, at present, a non-TAC species, there is potential for displacement of fishing effort from other species with limiting quotas.

It is not yet clear whether the populations in the North Sea and Celtic Sea ecoregions can be treated as separate stocks for management purposes. There is insufficient information to evaluate the stock status of the European seabass in the Northeast Atlantic area.

STECF COMMENTS: STECF agrees with the ICES advice for 2013.

4.7. 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)	
	2009-2011
Qualitative evaluation	✓ Below possible ref. pts.

SSB (Spawning Stock Biomass)	
	2009-2011
Qualitative evaluation	✓ Above possible ref. pts

Qualitative information suggests that boarfish are not over-exploited. The age composition of the commercial catch is not truncated and contains a full range of ages.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach that catches in 2013 should be no more than 82 000 t.

Other considerations

MSY approach

$F_{0.1}$ is used as a proxy for F_{MSY}. The $F_{0.1}$ estimate converted to a harvest rate (12.2%) was applied to total biomass estimated (673,047 t) from the 2012 acoustic survey. On this basis, ICES advises that catches in 2013 should not be more than 82 000 t.

Additional considerations:

Management considerations

The stock appears to be large, widely distributed, and not over-exploited. The FAO gives guidelines on how new and developing fisheries should be dealt with. It is recommended that expansion should only take place in a cautious manner. The overall objective in managing such a new fishery should be to prevent the development of the fleet's capacity outpacing the ability of management to understand the effect of existing fishing effort. In view of the rapid development of the fishery in recent years, a cautious approach is warranted in exploiting boarfish.

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. This proposed closed season has been followed by participating vessels on a voluntary basis in 2011 and 2012. A closed season was also proposed in Division VIIg to prevent catches of Celtic Sea herring, known to form feeding aggregations in this region at these times. If catches of a single species other than boarfish totals more than 5% of the total catch in the boarfish fishery, by day and by ICES statistical rectangle, and this species is covered by a TAC, then boarfish fishery must cease in that rectangle. In 2012, a management plan has been proposed by the Pelagic RAC. This includes a nested set of harvest control rules that are designed to deal with whatever level of information is available to assess stock status. This plan has yet to be evaluated.

Bottom trawl survey data suggest 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 (Cardador and Chaves, 2010). 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.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013.

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

The most recent advice for this stock was provided by ICES in 2012,

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 facilitate 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. WGEF has attempted various analytic assessments of NE Atlantic spurdog using a number of different approaches. Although these models have not proved entirely satisfactory (as a consequence of the quality of the assessment input data), these exploratory assessments and survey data all indicate a decline in spurdog.

REFERENCE POINTS:

	Type	**Value**	**Technical basis**
MSY	MSY $B_{trigger}$	Not defined.	

Approach	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)				
	2010	2011	**2012**	
MSY Exploitation Ratio	✓	✓	✓	Below target
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined

SSB (Spawning-stock Biomass)				
	2010	2011	**2012**	
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.

Other considerations

Outlook for 2013 and 2014

No short-term forecast is provided for this stock. The updated assessment does not alter the perception of the stock as being depleted.

Management plans

There is a generic EC Action Plan for the Conservation and Management of Sharks, but no specific management objectives are known.

MSY considerations

Exploitation status is below Fprop,MSY, as estimated from the results of the assessment. However, biomass has declined to record low level in recent years and therefore to allow the stock to rebuild, catches should be reduced to the lowest possible level in 2013 and 2014. 2011 projections assuming status quo Fprop (linked to total assumed catch of 540 t in 2011) suggest that the stock will rebuild by 9–15% of its 2011 level by 2015.

Although MSY $B_{trigger}$ has not been identified for this stock, it is highly likely that SSB is below any candidate MSY $B_{trigger}$.

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 2013 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.

A rebuilding plan should be developed for this stock, noting that the time for recovery will be over a decadal time frame.

Additional considerations:

Analyses of microsatellite data conducted by Verisimmo et al. (2010, a WD submitted to WGEF) found genetic homogeneity between east and west Atlantic spurdog, but the authors suggested this could be accomplished by transatlantic migrations of a very limited number of individuals.

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 extend in 2012. Reports suggest that the zero TAC in 2011 and 2012 have increased the discards of spurdogs in mixed fisheries.

In 2009, a maximum landing length (100 cm) was introduced in EC waters, and this deterred many of the fisheries targeting spurdog. In theory, the maximum landing length of 100 cm will restrict fisheries targeting mature females, but will not impede females being discarded if they are harvested together with smaller individuals (< 100 cm). As the mortality rate of discarded spurdogs is unknown, the maximum landing length alone does not afford complete protection of mature females. Norway has a minimum catch size of 70 cm (first introduced in 1964), and from 2011 no directed fishery.

A rebuilding plan is needed for this stock. Rebuilding measures should incorporate biomass targets and rebuilding timelines. Enhanced data collection schemes should be developed in the form of science–industry collaborations.

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.

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.

4.9. Basking shark (*Cetorhinus maximus*) in the North East Atlantic

The most recent advice for basking shark in the North East Atlantic was provided by ICES in 2012.

FISHERIES: According to WGEF, a single stock of basking sharks *Cetorhinus maximus* exists in the ICES area. The stock structure is unknown. In the absence of such information, the basking shark population in the Northeast Atlantic is presumed to be a single stock. There are indications that this stock has connectivity with the western and southern Atlantic.. A genetics study underway in the UK aims to differentiate distinct stocks globally. They are known to congregate in areas with a high zooplankton biomass (e.g. fronts) and, therefore, may be locally important, but the locations of these areas are variable.
Biological data are limited, although all lamniform sharks have a very low fecundity and late age at maturity and they are likely to be sensitive to fishing mortality.

There have been directed fisheries for this species by Ireland, the UK, and Norway. The last directed fishery was that of Norway, and was prosecuted in II, IV, VI and VII. The Norwegian fleet has prosecuted local fisheries from the Barents Sea to the Kattegat, as well as more distant fisheries ranging across the North Sea and as far as the south and west of Ireland, Iceland and Faeroe. The geographical and temporal distribution of the

Norwegian domestic basking shark fishery changes markedly from year to year. Recent studies have highlighted the important role that oceanographic conditions can play in affecting basking shark distribution.

Since the mid-1940s, catches have varied considerably. In the late 1970s catches were about 10000t, in early 1980s about 4000t and in recent years a serious decline has been registered with catches ranging between 77t and 293t in the last eight years. Catches in 2005 were 221t and in 2006 16t (Norwegian by-catch) which was considerably less than in 2005. It is not known whether this decrease is related to marked price reductions, or that the release of live specimens has increased, or because actual abundance has declined. 2011 landings

Limited quantitative information exists on basking shark discarding in non-directed fisheries. However, anecdotal information is available indicating that this species is caught in gillnet and trawl fisheries in most parts of the ICES area. Most of this by-catch takes place in the summer months as the species moves inshore. The total extent of these catches is unknown. Out of 15 reported instances of incidental bycatch in French fisheries (2009-2011), four were released alive. From Norway, there were 11 records of incidental bycatch (2006-2012), of which two were released alive and two were landed. Other sources of mortality (e,g, ship strikes) are unknown Other sources of mortality (e,g, ship strikes) are unknown.. The requirement for EU fleets to discard all basking sharks caught as by-catch means that information cannot be obtained on these catches. A better protocol for recording and obtaining scientific data from by-catches is necessary for assessing the status of the stock.

Since 2006, there is no targeted fishery for basking sharks in Norway, UK or Ireland. Based on ICES advice, Norway banned all directed fisheries for basking shark in 2006, but dead or dying by-catch specimens can be landed and sold as before. The basking shark has been protected from killing, taking, disturbance, possession and sale in UK territorial waters since 1998. In Sweden it is forbidden to fish for or to land basking shark. Since 2002, there has a complete ban on the landings of basking shark from within the EU waters of ICES Sub-areas IV, VI and VII (Annex ID of Council Regulation (EC) 2555/2001). Since 2007, the EU has prohibited fishing for, retaining on board, transhipping or landing basking sharks by any vessel in EU waters or EU vessels fishing anywhere (Council regulation (EC) No 41/2006).

Basking shark was listed on Appendix II of the Convention on International Trade in Endangered Species (CITES) in 2002, on Appendices I and II of the Convention on the Conservation of Migratory Species (CMS) in 2005, on Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea (UNCLOS) and on the OSPAR (Convention on the protection of the marine environment of the north-east Atlantic) list of threatened and/or declining species in 2004.

SOURCE OF MANAGEMENT ADVICE: The main advisory body is ICES. There is no assessment of this stock. The evaluation is based on landings data and anecdotal information.

REFERENCE POINTS:

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

(unchanged since: 2010)

STOCK STATUS:

F (Fishing Mortality)		
		2009–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown

SSB (Spawning-Stock Biomass)		
		2010–2012
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown

Qualitative evaluation		Likely below poss. reference points

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

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

Outlook for 2013

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

Additional considerations

MSY approach

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

STECF COMMENTS: STECF agrees with the ICES advice.

4.10. Tope (*Galleorhinus galeus*) in the North East Atlantic

The most recent advice for tope in the North East Atlantic was provided by ICES in 2012.

FISHERIES: There are no currently no targeted commercial fisheries for tope in the North East Atlantic, though they are taken as a by-catch in trawl, gillnet and longline fisheries, including demersal and pelagic set gears. Though tope are discarded in some fisheries, due to their low market value, other fisheries land this species as by-catch. Tope is also an important target species in recreational sea angling and charter boat fishing in several areas, with most anglers and angling clubs following catch and release protocols. Landings data are limited, as landings data are often included as "dogfishes and hounds" (DGH). Nevertheless, England and France have some species-specific landings data, and there are also limited data from Denmark, Ireland, Portugal and Spain in recent years. Many of the reported landings are from the English Channel, Celtic Sea and northern Bay of Biscay. Tope is also caught in Spanish fisheries in the western Cantabrian Sea (Galicia), where about 80% of the landings are from longline vessels, with the remainder from trawl and small gillnets. Tope is also reported in the catches off mainland Portugal, and are an important component of Azorean bottom long line fisheries. Tope are also caught in offshore long-line fisheries in this area. There were no major changes in the fishery noted since 2006. It has been suggested that there may be a greater retention of tope in some UK inshore fisheries operating in ICES Division IVc, as a result of by-catch limits on skates and rays, although no data are currently available to verify it.

Landings were increased since 1992 until 2002 (from 427t to 798t), then dropped to 371t in 2005. Since then reported landings fluctuated between 300t and 500 t. Reported landings in 2011 are estimated at 301t. The degree of possible mis-reporting or under-reporting is not known. Landings indicate that France is one of the main nations landing tope. The United Kingdom also land tope, though species-specific data are not available prior to 1989. Since 2001, Ireland, Portugal and Spain have also declared species-specific landings, though recent data were not available for Spanish fisheries. Though some discards information is available from various nations, data are limited for most nations and fisheries. The available data (England and Wales) indicated that juvenile tope tend to be discarded in demersal trawl fisheries, though larger individuals are usually retained, with tope caught in drift and fixed net fisheries usually retained.

SOURCE OF MANAGEMENT ADVICE: The main recent source of information is ICES. However no species specific management advice is given.

REFERENCE POINTS: No precautionary reference points have been agreed for tope in the Northeast Atlantic.

STOCK STATUS:

	F (Fishing Mortality)	
	2010–2011	
MSY (F_{MSY})		Unknown
Precautionary approach (F_{pa},F_{lim})		Unknown

Qualitative evaluation	?	Unknown

SSB (Spawning-Stock Biomass)		
	2010–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	?	Decreasing

The state of the stock is unknown. Landings of tope have been relatively stable during the last two decades, albeit lower than in the late 1970s and early 1980s. Tope is not encountered in surveys in sufficient numbers to determine trends. No assessment was undertaken, due to insufficient data. WGEF considers that there is a single stock of tope in the ICES area, with the centre of the distribution ranging from Scotland and southern Norway southwards to the coast of north-western Africa and Mediterranean Sea. Hence, the North East Atlantic tope stock covers the ICES Area (II–X), Mediterranean Sea (Subareas I–III) and northern part of the CECAF area, and any future assessment of the Northeast Atlantic tope stock may need to be undertaken in conjunction with the General Fisheries Commission for the Mediterranean (GFCM) and Fishery Committee for the Eastern Central Atlantic (CECAF). The stock unit identified by WGEF was based on published tagging studies which clearly indicate that tagged fish move widely throughout the North East Atlantic. Tope is listed in the UK Biodiversity priority list and is classified as Vulnerable in the IUCN Red data List.

RECENT MANAGEMENT ADVICE: Based on ICES approach to data-limited stocks, ICES advises that catches should be reduced by 20%. Because the data for catches of tope are not fully documented and considered unreliable (due to the historical use of generic landings categories), ICES is not in a position to quantify the result. Measures to identify pupping areas should be taken.

Other considerations

ICES approach to data-limited stocks

For data-limited stocks without information on abundance or exploitation ICES considers that a precautionary reduction of catches should be implemented, unless there is ancillary information clearly indicating that the current level of exploitation is appropriate for the stock.

For this stock, ICES advises that catches should decrease by 20% in relation to the average of the last three years. However, as species-specific landings data are not complete, it is not possible to quantify the current catch.

Additional measures should be identified that can regulate exploitation of this stock. Such measures may include seasonal and/or area closures, technical measures, and tailored measures for any target fisheries. Such measures should be developed by stakeholder consultations, considering the overall mixed fisheries context.

Additional considerations

There is limited information on the distribution of tope pups, though they have been reported to occur in certain inshore areas (e.g. southern North Sea and the Bristol Channel). The current lack of more precise data on the location of pupping and nursery grounds, and their importance to the stock, precludes spatial management of the fisheries at the moment. Nevertheless, protecting pupping and nursery habitats has been considered an important tool for the Australian stock, where seasonal closures and gear restrictions have been used to protect pregnant females when they migrate to pupping grounds.

Occasional records of pups are recorded in UK surveys are from the southern North Sea (IVc), though they have also been recorded in the northern Bristol Channel (VIIf). The lack of more precise data on the location of pupping and nursery grounds, and their importance to the stock, precludes spatial management for this species at the present time.

A genetic study (Chabot and Allen, 2009) on the eastern Pacific population including comparisons with samples from Australia, South and North America and UK, shows that there is little to no gene flow between these populations, meaning an apparent lack of migration.

STECF COMMENTS: STECF agrees with the ICES advice for 2013 and 2014.

4.11. Porbeagle *(Lamna nasus)* in the North East Atlantic

The most recent advice for porbeagle in the North East Atlantic was provided by ICES in 2012.

FISHERIES: Porbeagle is a highly migratory and schooling species. Sporadic targeted fisheries developed on these schools. Porbeagle has been exploited commercially since the early 1800s, principally by Scandinavian fishers; however, the "boom" period for this fishery in the Northeast Atlantic began in the 1930s. Porbeagle fisheries have been highly profitable. The main countries catching or having caught porbeagles are Spain and France. However in the past, important fisheries were prosecuted by Norway, Denmark and the Faeroe Islands.

By the beginning of the 1960s, the Norwegian fishery extended briefly to the Orkney–Shetland area and the Faroes before moving to the Northwest Atlantic waters. The Danish fishery operated in the North Sea where the catches decreased in the middle of the 1960s. However, a seasonal and profitable French longline fishery began in the 1970s in the Celtic Sea and Bay of Biscay. It lasted until the TAC was reduced to zero. Prior to the closure of the fishery, the French fleet was composed of about five boats based at Yeu Island (Atlantic coast of France).
There is a by-catch by demersal trawlers and gillnets from many countries, including Ireland, UK, Danemark, France and Spain in the North Sea, west of Ireland and Biscay.

An unquantified amount of discarding now takes place in mixed demersal trawl and gillnet fisheries operating in EC waters. Discard mortality is unknown.

SOURCE OF MANAGEMENT ADVICE: The main recent source of information and advice on porbeagle in the Northeast Atlantic is ICES. There is no fishery-independent information on this stock. Landings data for porbeagle may be reported as porbeagle, or as 'various sharks nei' in the official statistics. This means that the reported landings of porbeagle are likely to be an underestimation of the total landing of the species from the NE Atlantic. ICCAT is responsible for the management of this species in the tuna fisheries.

REFERENCE POINTS:

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

(unchanged since: 2010)

STOCK STATUS:

F (Fishing Mortality)		
		2008–2011
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
		2008–2011
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	✗	Depleted

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

Porbeagle is subject to the UN agreement on highly Migratory Stocks and the UK Biodiversity priority list. In IUCN, porbeagle is classified as Vulnerable for the depleted unmanaged population in the northeast Atlantic,

and Lower Risk (conservation dependent) for the northwest Atlantic, in recognition of the introduction of the US and Canadian Fisheries Management Plans (IUCN 2000).

RECENT MANAGEMENT ADVICE:

Given the state of the stock, no targeted fishing for porbeagle should be permitted and by-catch should be limited. Landings of porbeagle should not be allowed.

Porbeagles are particularly vulnerable to fishing mortality, because the population productivity is low (long-lived, slow growing, high age-at-maturity, low fecundity, and a protracted gestation period) and they have an aggregating behaviour. In the light of this, risk of depletion of reproductive potential is high. It is recommended that exploitation of this species should only be allowed when indicators and reference points for stock status and future harvest have been identified and a management strategy, including appropriate monitoring requirements has been decided upon and is implemented.

Outlook for 2012-2013

Exploratory assessments conducted in 2009 and 2010 were not considered a basis for advice.

Other considerations

Based on the catch trend, the stock is estimated to be well below its historical high levels of the 1930s–1950s. This is demonstrated by the observation that the Northern fisheries have ceased and have not been resumed.

No new information has been provided since 2009 regarding the catches except an analysis of the French cpue (1972–2008), which underlines the important local variations of porbeagle abundance and hence the difficulties in assessing the state of the stock without a long cpue time-series and for the whole distribution area of the stock.

The catch time-series has been improved since 2009, notably by the report of the estimated bycatch of the Spanish swordfish longline fishery. However, catch data are considered to be underestimated because some countries have incomplete recordings of porbeagle (or they have been reported as generic sharks).

APEX Tagging program results was presented during the ICCAT 2012 : 1960 porbeagle tagged off the northest coast of USA since 1961, 360 recaptures were registered in 2011 with a maximum of 10 year at liberty (average 41% < year at liberty) suggesting few intrusion in the central Atlantic.

UK electronic tagging studies (14 sharks and 2062 days of data) were conducted recently around the British Isles. The furthest confirmed distance recorded by a porbeagle shark from the British Isles, was from a shark which moved to the west central Atlantic after being tagged in north-west Ireland during the summer.

A recent genetic study suggests that the stock is genetically robust, although further confirmation is required.

The history of the fishery is not well documented, and reports often emphasized or omitted some aspects (economic drivers, Danish participation, results of the 1958–62 Norway prospecting) that may alter the perception of the fishery dynamics.

MSY approach

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

PA approach

There is no new information to alter the perception of the depleted nature of the stock. In view of the low reproductive capacity of porbeagle, a zero fishing mortality appears the only option that can allow a recovery of the stock. There should be no fishery, and landings of porbeagle should not be allowed." A rebuilding plan should be developed for this stock, noting that the time for recovery will exceed a decadal time frame.

STECF COMMENTS: STECF agrees with the ICES advice.

STECF also agrees with ICES that it should be a requirement for all countries to document all incidental by-catches of this species and that regarding the large distribution of this species and its aggregative behaviour, some international collaborative survey could be a way fill the lack of information requested for an assessment.

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

Porbeagle has been recently listed to the CITES Appendix III (2012/044) by Belgium, Cyprus, Denmark11, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland. Appendix III is a list of wildlife and plant species identified by particular CITES Party countries as being in need of international trade controls.

4.12. Thresher sharks *(Alopius vulpinus and Alopius superciliosus)* in the North East Atlantic

The most recent advice on thresher sharks was issued by ICCAT in 2012.

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

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

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

Article 19 of EC Regulation No. 44/2012 prohibits the retention, transshipment or landing any part or whole carcass of bigeye thresher shark *Alopias superciliosus* in any fishery, and also prohibits any directed fishery for thresher sharks Alopias spp. in the ICCAT area.

Additional considerations

Some Van Bertalanffy growth parameters for the bigeye thresher shark of the tropical northeastern Altantic estimated on 117 specimens ranging from 176 o 407 cm TL as well as maturity information on the bigeye thresher shark from the Atlantic were provided by Fernandez-Carvalho et al. (2011 and 2012). Significant differences were found in the size distribution of the species and the sex ratios between the North and South Atlantic. Sizes at first maturity (L50) were estimated at 206.09 cm FL for females and 159.74 cm FL for males.

Ecological risk assessments were undertaken by ICCAT for 11 pelagic sharks (ICCAT, 2011). These analyses demonstrated that the bigeye thresher has the lowest productivity and highest vulnerability with a productivity rate of 0.010, and that the common thresher is 10^{th} in rank with a productivity rate of 0.141

One *A. supersillosus* were electronically tagged in Gulf of Mexico in 2008 by Carlson & Gulak. After 120 days at sea the bigeye thresher shark moved from 51 km, spending most of his time between 25 and 50 m depth in waters between 20 and 22 °C. Compare to previous studies by Weng & Block (2004) this individual exhibit very light diurnal movement pattern that may be caused by the deep of the tagging location.

STECF COMMENTS: STECF suggest that in view of the wide distribution of the species and the lack of information on stocks identity, catches by all nations should be reported to the relvant RFMO in an attempt to improve the fishery-dependent data on thresher sharks.

4.13. Blue shark (*Prionace glauca*) in the North East Atlantic

The most recent advice on blue shark was issued by ICES in 2012

The DELASS project and the ICCAT Shark Assessment Working Group consider there to be one stock of blue shark *Prionace glauca* in the North Atlantic. Thus the ICES area is only part of the stock. ICCAT, 2008

considered that the 5°N parallel was the most appropriate division between North and South Atlantic stocks of blue shark.

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

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

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

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

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

STECF COMMENTS: STECF has no comments.

4.14. Portuguese dogfish (*Centroscymnus coelolepis*) in the north-east Atlantic

The most recent advice for this stock was provided by ICES in 2012.

FISHERIES: Portuguese dogfish are caught in virtually all deep-water fisheries in the NE Atlantic although catch data is patchy and incomplete. French trawlers, UK and German longliners and gillnetters in VI and VII are the fleets targeting this species. These fisheries began in 1991 and before that the species was not exploited. There are also directed longline fisheries in VIII and IX and some by-catches from XII. Landings of this species have been routinely grouped together with Leafscale gulper shark and reported as siki. Unless suitable data can be found to enable splitting of the catch data, historical catch levels will remain uncertain. Combined siki landings began in 1988 (although an unknown quantity is likely to have been discarded prior to this) and increased rapidly to over 8000 tonnes in 1997. Since 1997 landings have fluctuated with an overall upward trend, reaching a maximum of over 10,000 tonnes in 2003. Since 2003, reported landings have declined due to stock depletion and the introduction and gradual reduction in EU TACs and quotas is response to ICES advice, which in recent years has been for a zero TAC. Portuguese dogfish is an unavoidable bycatch taken in several mixed trawl fisheries and mixed longline fisheries. It is also taken as a bycatch in other fisheries, for example the anglerfish gillnet fishery. Fishing effort has declined since restrictions on deep-water fishing were put in place in 2007 (STECF, 2011). Fishery-independent data are derived from surveys that take place in a restricted part of the whole distribution area considered for each of the two stocks.

SOURCE OF MANAGEMENT ADVICE: The main advisory body is ICES. No analytical assessment was carried out in 2012. The assessment is based on commercial CPUE trends. Landings data on these species remain very problematical and, in many cases, reliable data are only available for combined siki sharks. Many countries continue to report landings in amalgamated categories such as various sharks N.E.I. Retrospective splitting of the data into species categories and reconstruction of historic data from mixed categories is based on limited information and is problematic.

REFERENCE POINTS:

Reference points

No reference points have been defined for this stock.

Trends in relative abundance estimates show that Portuguese dogfish abundance has declined to levels below any candidate reference point. Landings have declined in response to reduced abundance and restrictive management measures (e.g. TAC = 0 from 2010 onwards).

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
	2009–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	✗	Below any candidate reference point

There is insufficient information to separate the landings of Portuguese dogfish *Centroscymnus coelolepis* and leafscale gulper shark *Centrophorus squamosus*. Total international landings of the combined species have steadily increased to around 11 000 t in 2003 and have rapidly declined after 2003 to the lowest levels since the fishery started. Substantial declines in cpue series for the two species in Subareas V, VI, and VII suggest that both species are severely depleted and that they have been exploited at unsustainable levels. In Division IXa, lpue series are stable for leafscale gulper shark and declining for Portuguese dogfish.

There is no information to alter the perception of this stock as being depleted since the 2006 catch per unit effort estimates (ICES, 2006). Due to its very low productivity, Portuguese dogfish can only sustain very low rates of exploitation.

RECENT MANAGEMENT ADVICE: ICES advice for 2013 and 2014, on the basis of the precautionary approach, was that there should be no catches of Portuguese dogfish.

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

Due to its very low productivity, Portuguese dogfish can only sustain very low rates of exploitation. The rates of exploitation and stock sizes of deepwater sharks cannot be quantified. Given their very poor state, ICES recommends a zero catch of Portuguese dogfish.

This is the first time ICES has given separate advice for this species. Until now, advice has been given for this species and leafscale gulper shark combined. No new assessment was performed in 2012. However, there is no information to alter the perception of the stock as being depleted. The advice is the same as was provided for 2011 and 2012.

Other considerations

Outlook for 2013-2014

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

Management considerations

TACs only regulate the landings, and a low TAC on a low-value bycatch species could induce more discards. Because this species is caught as a bycatch in demersal fisheries, it would benefit from a reduction in the overall demersal fishing effort.

MSY transition scheme

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

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

STECF notes that for 2013 a TAC of 0 t has already been agreed for deepwater sharks.

STECF recommends that EU fisheries exploiting deepwater sharks should not proceed until sustainable exploitation rates for deepwater sharks have been determined.

STECF further advises that in order to maximise protection of deep-water sharks, the gill netting ban introduced in 2006 (EC council regulation 51/2006Annex III) in waters deeper than 600m should be maintained. STECF supports the proposal to extend the gill net ban to other areas (Council regulation (EC) 40/2008, Annex III)

4.15. Kitefin shark (*Dalatias licha*) in the north-east Atlantic

The most recent advice for this stock was provided by ICES in 2012.

FISHERIES Kitefin is mainly distributed in the Azorean Islands, but occurs widely at low abundance throughout the ICES area. The population structure is not well understood. Currently there are no targeted commercial fisheries for kitefin shark in the Northeastern Atlantic, though they are taken as a bycatch in trawl and hook-and-line fisheries. The target Azorean fishery stopped in 1998. After that occasional high bycatch values were reported by Portugal from Subarea VI in 2000, 2001, and 2003. Large interannual fluctuations in landings and the decrease in landings after 1991 are believed to have been driven by fluctuations in market prices

SOURCE OF MANAGEMENT ADVICE: The main recent source of information and advice on kitefin shark in the Northeast Atlantic is ICES. An update assessment was carried out in 2012.

REFERENCE POINTS

No reference points have been defined for this assessment unit. No new information is available to alter the perception of a stock that is depleted below any candidate biomass reference point.

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
	2009–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	✗	Below any candidate reference points.

RECENT MANAGEMENT ADVICE:

The advice, and its basis, is the same as was provided for 2011 and 2012. ICES advise for 2013-2014 on the basis of the precautionary approach that no targeted fisheries should be permitted unless there are reliable estimates of current exploitation rates and sufficient data to assess productivity. There should be no fisheries unless there is evidence that this will be sustainable.

The advice is precautionary. The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated.

TACs only regulate the landings, and a low TAC on a low-value bycatch species could induce more discards.

Management Objective (s)	**Landings in 2011 and 2012**
Transition to an **MSY approach**	TAC = 0

with caution at low stock size	
Cautiously avoid impaired recruitment (**Precautionary Approach**)	TAC = 0
Cautiously avoid impaired recruitment and achieve other objective(s) of a **management plan** (e.g., catch stability)	n/a

Other considerations

Stock assessments of kitefin shark from Subarea X were made during the 1980s, using an equilibrium Fox production model (Silva, 1987). The stock was considered intensively exploited with the average observed total catches (809 t) near the estimated maximum sustainable yield (MSY = 933 t). An optimum fishing effort of 281 days bottom net fishing and 359 man trips fishing with handlines were suggested, corresponding approximately to the observed effort. During the DELASS project (Heessen, 2003) a Bayesian stock assessment approach using three cases of the Pella–Tomlinson biomass dynamic model with two fisheries (handline and bottom gillnets) was performed (ICES, 2003, 2006). The stock was considered depleted based on the probability of the biomass 2001 being less than B_{MSY}. These assessment results must be interpreted with caution because the cpue used by the assessment may not reflect abundance trends. No assessments have been performed since because of the lack of information.

There are no current target fisheries and no fishery-independent surveys to monitor the stock. ICES considers that the development of a fishery should not be permitted unless data at the level of sustainable catches are made available.

It could be useful to evaluate the status of the kitefin shark stock in the closed areas around the Azores.

MSY transition scheme

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

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

STECF notes that for 2013 a TAC of 0 t has already been agreed for deepwater sharks.

STECF also considers that EU fisheries exploiting deepwater sharks should not proceed until sustainable exploitation rates for deepwater sharks have been determined.

STECF further advises that in order to maximise protection of deep-water sharks, the gill netting ban introduced in 2006 (EC council regulation 51/2006Annex III) in waters deeper than 600m should be maintained. STECF supports the proposal to extend the gill net ban to other areas (Council regulation (EC) 40/2008, Annex III)

4.16. Leaf-scale gulper shark (*Centrophorus squamosus*) in the north-east Atlantic

The most recent advice for this stock was provided by ICES in 2012.

FISHERIES: Leaf-scale gulper shark are caught in virtually all deep-water fisheries in the NE Atlantic. Catch data is patchy and incomplete. French trawlers in VI and VII target this species. Gill-net vessels registered in the UK (England and Wales), UK (Scotland) and Germany, target this and other deepwater species since the mid-1990s and takes place mainly west of the British Isles (Sub-areas VI and VII). There are also directed longline fisheries in VIII and IX and some by-catches from XII. Landings of this species have been routinely grouped together with Portuguese dogfish and reported as siki. Combined siki landings began in 1988 (although an unknown quantity is likely to have been discarded prior to this) and increased rapidly to over 8000 tonnes in 1997. Since 1997 landings have fluctuated with an overall upward trend, reaching a maximum of over 10 000 tonnes in 2003. Since 2003, reported landings have declined due to stock depletion and the introduction and gradual reduction in EU TACs and quotas is response to ICES advice, which in recent years has been for a zero TAC. Leafscale gulper shark is both taken as unavoidable bycatch in several mixed trawl fisheries and mixed longline fisheries. They are taken as a bycatch in other fisheries, for example the anglerfish gillnet fishery. Fishing effort has declined since restrictions on deep-water fishing were put in place in 2007 (STECF, 2011).

SOURCE OF MANAGEMENT ADVICE: The main advisory body is ICES. No analytical assessment was carried out in 2012. The assessment is based on commercial CPUE trends. Landings data on these species remain very problematical and, in many cases, reliable data are only available for combined siki sharks. Retrospective splitting of the data into species categories and reconstruction of historic data from mixed

categories is based on limited information and is problematic. Unless suitable data can be found to enable splitting of catch data, historical catch levels will remain uncertain.

REFERENCE POINTS: No reference points have been defined for this stock. Trends in relative abundance estimates show that leafscale gulper shark abundance has declined to levels below any candidate reference point.

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
	2009–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	✗	Below any candidate reference points.

There is insufficient information to separate the landings of Portuguese dogfish *Centroscymnus coelolepis* and Leafscale gulper shark *Centrophorus squamosus*. Total international landings of the combined species have steadily increased to around 11 000 t in 2003 and have rapidly declined after 2003 to the lowest levels since the fishery started. Substantial declines in cpue series for the two species in Subareas V, VI, and VII suggest that both species are severely depleted and that they have been exploited at unsustainable levels. In Division IXa, lpue series are stable for Leafscale gulper shark and declining for Portuguese dogfish.

RECENT MANAGEMENT ADVICE: This is the first time ICES has given separate advice for this species. Until now, advice was given for this species and Portuguese dogfish combined. No new assessment was performed in 2012. However, there is no information to alter the perception of the stock as being depleted. The advice is the same as was provided for 2011 and 2012. ICES advises on the basis of the precautionary approach that there should be no catches of leafscale gulper shark for 2013 and 2014. Due to its very low productivity, leafscale gulper shark can only sustain very low rates of exploitation. The rates of exploitation cannot be quantified. However, based on the cpue information, Portuguese dogfish and Leafscale gulper shark are considered to be depleted. Given their very poor state, ICES recommends a zero catch of Portuguese dogfish and Leafscale gulper shark.

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

TACs only regulate the landings, and a low TAC on a low-value bycatch species could induce more discards. Because the elasmobranch species are caught as a bycatch in demersal fisheries, they would benefit from a reduction in the overall demersal fishing effort.

Other considerations

Outlook for 2013-2014

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

MSY transition scheme

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

STECF COMMENTS: STECF agrees with the ICES advice for Leafscale gulper shark.

STECF notes that for 2012 a TAC of 0 t has already been agreed for deepwater sharks.

STECF also considers that EU fisheries exploiting deepwater sharks should not proceed until sustainable exploitation rates for deepwater sharks have been determined.

STECF further advises that in order to maximise protection of deep-water sharks, the gill netting ban introduced in 2006 (EC council regulation 51/2006Annex III) in waters deeper than 600m should be maintained. STECF supports the proposal to extend the gill net ban to other areas (Council regulation (EC) 40/2008, Annex III).

4.17. Angel shark (*Squatina squatina*) in the north-east Atlantic

FISHERIES: Angel shark was rarely reported in landings data prior to it being listed as a prohibited species. It is believed that the peak in UK landings in 1997 from Divisions VIIj–k were either misreported anglerfish (also called monkfish) or hake, as angel shark is more of a coastal species. These figures have been removed from the landings data. French landings have declined from >20 t per year in the 1970s to less than 1 t per year prior to the prohibition on landings. Angel shark landings in Subarea VIII have always been very low.

SOURCE OF MANAGEMENT ADVICE: Advice on angel shark is provided by ICES**.**

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

STOCK STATUS:

F (Fishing Mortality)		
	2009–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
	2009–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	✗	Depleted

There are few recent records of captures of angel shark and it may be extirpated from areas of former habitat. Small local populations do exist, particularly in the Celtic seas ecoregion (Cardigan Bay, Division VIIa, and Tralee Bay, Division VIIj), although numbers here may also be in decline. It is considered to be extirpated in the North Sea, although it may still occur in Division VIId.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the precautionary approach that there should be no catches of angel shark, and that it should remain a species prohibited from being fished. Measures should be taken to minimize bycatch.

MANAGEMENT PLANS: Angel shark is currently on the EU prohibited species list.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013 and 2014.

4.18. Smoothhounds (*Mustellus* spp) in the north-east Atlantic

FISHERIES: Smooth-hounds are taken as a bycatch in mixed demersal and gillnet fisheries. Smooth-hounds are important species for recreational fisheries in some areas. Although landings data are preliminary and

underestimate true landings, it is clear that catches have increased in recent years. This increase may reflect the increased abundance and/or improved marketing opportunities for the species (given the zero TAC for spurdog).

SOURCE OF MANAGEMENT ADVICE: Advice on smoothounds is provided by ICES**.**

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

STOCK STATUS:

F (Fishing Mortality)		
	2005–2011	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
SSB (Spawning-Stock Biomass)		
	2005–2011	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

The relative abundance of smooth-hounds in trawl surveys in Subareas IV, VII, and VIII have increased in recent years. The average of the stock size indicator (number hr−1) in the last two years (2010–2011) is 42% higher than the average of the five previous years (2005–2009) in the Celtic Sea, and 45% higher for the southern North Sea and eastern English Channel. There has been a general increase in smooth-hound abundance since the early 1990s.

Commercial landings have increased in recent years, although landings data are considered unreliable, due to the widespread use of generic landings categories (e.g. dogfish and hounds). The quality of landings data is improving for the genus. Species-specific data are considered unreliable and ICES can currently only provide advice at the genus level.

RECENT MANAGEMENT ADVICE: Based on ICES approach to data-limited stocks, ICES advises that catches should be reduced by 4%. Because the data for catches of smooth-hounds are not fully documented and considered highly unreliable (due to the historical use of generic landings categories), ICES is not in a position to quantify the result.

MANAGEMENT PLANS: There is a generic EC Action Plan for the Conservation and Management of Sharks, but no specific management objectives are known to ICES.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013 and 2014.

5. Resources in the Barents and Norwegian Seas

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

FISHERIES: The f*isheries for Nort*hern shrimp in Sub-areas I & II (Barents Sea & Svalbard are**a**) 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 25 000 t in 2010 and 30,000 t in 2011. 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)				
	2009	2010	**2011**	
MSY (F_{MSY})	✓	✓	✓	Below target
Precautionary approach (F_{lim})	✓	✓	✓	Harvested sustainably
SSB (Spawning-Stock Biomass)				
	2010	2011	**2012**	
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 $B_{trigger}$ and fishing mortality below FMSY. The estimated risk of falling below Btrigger and Blim or of exceeding FMSY by the end of 2012 is less than 1%. Recruitment indices showed no major changes in the period 2004–2012.

RECENT MANAGEMENT ADVICE: ICES advises that catches of 60 000 tonnes in 2013 will maintain the stock at the current high biomass.

Other considerations

MSY approach

The stock is well above MSY Btrigger and F is well below F_{MSY}. Catches of 60 000 t in 2013 will maintain the stock at current high biomass.

PA approach

There is a low risk in 2013 of the stock falling below Blim or of the fishing mortality rate exceeding F_{lim} at catch options up to 90 000 t.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013.

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

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

FISHERIES: The total catches in 2011 were 993000 t., mainly taken by Norway (573 000 t), Russia (144 000 t), Iceland (151 000 t), EU (68 000 t), and Faroe Islands (53 000 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)				
	2009	2010	2011	
MSY (F_{MSY})	✗	✗	✓	At target
Precautionary approach (F_{pa})	✗	✗	✓	At target
Management plan (F_{MP})	✗	✗	✗	Above target

SSB (Spawning-stock Biomass)				
	2010	2011	2012	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity
Management plan (SSB_{MP})	✓	✓	✓	Above trigger

The SSB is declining but still above Bpa in 2012. Presently three large year classes (2002, 2003, and 2004) dominate the stock. All year classes from 2005 onwards have been small, generally less than half the geometric mean. Fishing mortality in 2011 is estimated below FMSY and Fpa.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the management plan of EU, Faroe Islands, Iceland, Norway, and Russia that landings in 2013 should be no more than 619 000 t.

Other considerations

Management plans

Following the long-term management plan agreed by the EU, Faroe Islands, Iceland, Norway, and Russia implies a TAC of 619 000 tonnes in 2013. This is expected to lead to an SSB in 2014 of 4.3 million tonnes. This is below Btrigger in the management plan. Even without any fishery in 2013 SSB is expected to drop below Btrigger. The short-term prognoses indicate a decline in SSB from 6.1 million tonnes in 2012 to 5.1 and 4.3 million tonnes in 2013 and 2014, respectively; assuming exploitation in 2012 and 2013 is according to the management plan. SSB in 2014 is expected to be below Bpa and Btrigger. In that situation, from 2013 onwards, article 3 of the Management Plan would need to be applied, to set TACs for 2014 and future years. This implies a lower F until the SSB has increased to Btrigger. Given the low recruitment in recent years, it is expected that SSB will decline further even if catches are low.

MSY approach

Following the ICES MSY framework implies a fishing mortality of 0.15, resulting in landings of 734 000 tonnes in 2013. This is expected to lead to a decline in SSB in 2014 to 4.2 million tonnes.

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

PA approach

Following the precautionary approach implies a fishing mortality in 2013 no higher than Fpa (0.15), corresponding to landings of less than 734 000 tonnes in 2013. This is expected to lead to a decline in SSB in 2014 to 4.2 million tonnes.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013.

5.3. Capelin (*Mallotus villosus*) in ICES subareas I and II, excluding Division IIa-west of 5°W (Barents Sea capelin)

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, 2010 and 2011 landings amounted to 307 000 t, 315 000 t and 360 000 t respectively. The landing over the winter period at the start of 2012 are 296 000 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)				
	2010	2011	**2012**	
MSY (F_{MSY})	-	-	-	Not relevant
Precautionary	-	-	-	Not relevant

approach (F_{pa},F_{lim})			
SSB (Spawning-Stock Biomass)			
	2011	2012	**2013**
MSY ($B_{trigger}$)	?	?	? Undefined
Precautionary approach (B_{lim})	✓	✓	✓ Above limit reference point

The maturing component in autumn 2012 was estimated to be 2.0 million tonnes. The spawning stock in 2013 will consist of fish from the 2009 and 2010 year classes. The survey estimate of the 2011 year class at age 1 is slightly below the long-term average and 0-group observations during the joint Russian–Norwegian ecosystem survey in August–September 2012 indicated that the 2012 year class is well 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 20132 should be no more than 200 000 tonnes.

Other considerations

Management plan

Following the management plan agreed by the Joint Norwegian–Russian Fisheries Commission, catches in 2013 should be no more than 200 000 t. The harvest control rule in the management plan is designed to ensure that the SSB remains above the proposed B_{lim} of 200 000 t (with 95% probability).

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2013.

6. 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 2012 with the STECF-EWG-11-20 held in Madrid in January and STECF-EWG-12-11 held in Sete (France) in July. The STECF-EWG-12-19 is planned to be held in Ancona (Italy) in December 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, and reviewed during the 13th session of Sub-Committee on Stock Assessment held in Rome in January 2012 (from the 23th to the 26th) and endorsed during the 14th session of the Scientific Advisory Committee (SAC) held in Sofia in February 2012 (from the 20th to the 24th) -Their reports were considered in the update review in the present report.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 109 stock assessments of 37 species. 60 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 4 Geographical Sub-areas) and 20 demersal species (giant red shrimp, blue and red shrimp, bogue, monkfish, european hake, blue whitihing, red mullet, striped mullet, norway lobster, octopus, common pandora, pink shrimp, common sole picarel, barracuda, poor cod, blackmouth catshark, starry skate, thornback ray, small-spotted catshark in 13 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, except for octopus in GSA 5.

STECF did provide advice when the stock data and the analytical results of the assessment cover the period 2010-2011, as earlier data and results may not necessarily represent the present stock status.

Overall, 57 (95%) out of the 60 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).

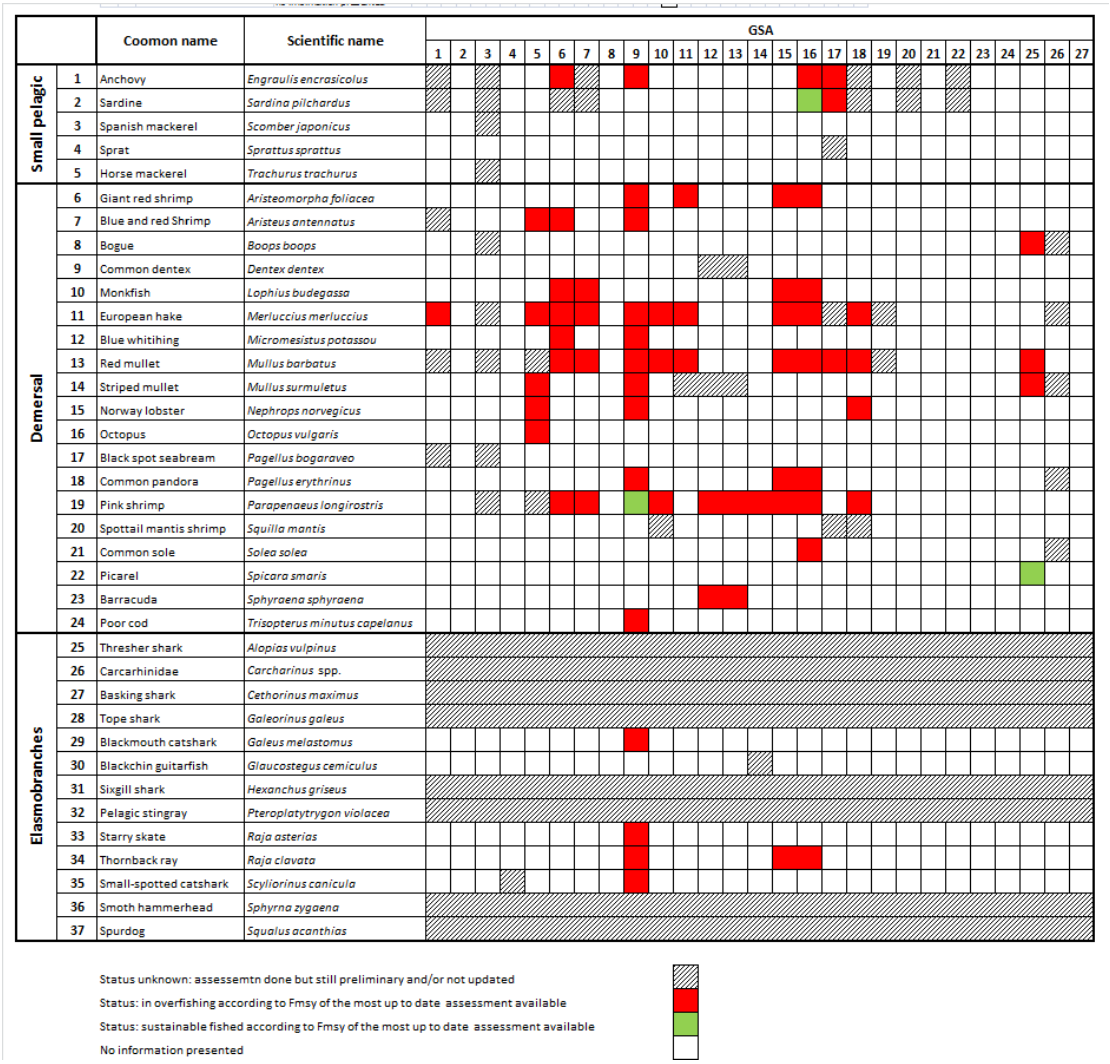

Table 9.1. Stock status according to the exploitation rate.

Scientific advice about the state of the stock exploitation	no	%
Stocks classified according to criteria	60	55
Other stocks not included for very poor data or not updated	49	45
Stocks taken into account	109	100
Classified stocks:		
The stock is overfished (above Fmsy)	57	95
The stock is fished at or below the Fmsy	3	5
Total stocks (22 species)	60	100

Table 9.2. Summary overview

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-11-20, STECF-SGMED-12-10 Working Groups were reviewed and inconsistencies were highlighted.

The management advice for fisheries exploiting the assessed demersal fish, crustacean and mollusc 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-11-20 meeting (16-20 January 2012) and are planned to be updated during the upcoming STECF-EWG meeting 12-19 (10-14 December 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.

6.1. 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 2012 (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.

6.2. 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 2012 (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.

6.3. European anchovy (*Engraulis encrasicolus*) in Geographical Sub area 6. Northern Spain

FISHERIES: The most updated fleet information corresponds to GFCM-SCSA WG 2011, containing data up to 2010. 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 8399tonnes in 2010 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. . In the commercial landings, length distribution and biological sampling are available from 2003 to 2010 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 2003-2010, for all the years. Biological sampling 2003-2010 was used for 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. In

2011 GFCM-WG on small pelagic performed an assessment using XSA and tuning data coming from Echo-surveys, that was endorsed by SAC.

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 stock assessment summary of the GFCM-WG on small pelagis, STECF concludes that overfishing (E_{2010} = 0.6 > 0.4) is currently occurring. According to the GFCM-small pelagic WG stock status evaluation the abundance is low while the exploitation rate is uncertain.

RECENT MANAGEMENT ADVICE: Based on the report of the GFCM-SAC, 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 further comments.

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

FISHERIES: In the Gulf of Lions, pelagic fisheries are targeting anchovy and sardine (*Sardina pilchardus*) An average of 50 trawlers have targeted these pelagic species in recent years. There are also 14 purse seiners operating in the south of the Gulf of Lions that catch these species. Some purse seine boats from Spain come in the area to fish mainly sardine. Fishing effort depends on market fluctuations.

The catches declined from 8000 tonnes in 1998 to 2249 tonnes in 2005, and have fluctuated between about 2500 t and 4000 tonnes since then. The catch in 2010 was 2307 tonnes.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF-SGMED. In 2011 an assessment was undertaken by the GFCM-SAC. The data sources were time series of acoustic surveys, landings and CPUE (1998-2010).

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

STOCK STATUS: Evidence provided by the GFCM-SAC indicates that since 2009, the demographic structure of anchovy has been highly unbalanced with very low abundance of larger individuals (age 2+) in the landings. Age group 1 represents more than 60% of the estimated total biomass. Moreover, an analysis of different biological indicators showed a reduced mean length at age, a distortion of the sex-ratio and a decrease in condition index, reduced growth rate and reduced size-at first maturity. GFCM-SAC concluded that this stock should be considered as fully exploited and not as in a recovery state**.**

RECENT MANAGEMENT ADVICE: GFCM-SAC recommends not to increase fishing effort. 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 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 notes that in the absence of reference points, no advice on the stock status can be provided.

6.5. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian 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 2012 (STECF 2010, EUR 24660 EN).

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) $\leqslant$ 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.

6.6. 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 has also been 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 carried out. The area surveyed extends over the continental shelf from the southern coast of Sicily to a depth of about 200 m. The time-series of acoustic biomass estimates cover the period 1998 – 2010.

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

Emsy (F/Z, F age range 0-3) $\leqslant$ 0.4.

STOCK STATUS: According to the report of the GFCM WG on small pelagics, the fishing mortality is high, stock abundance is intermediate, and the stock is considered to be overexploited. Based on the report of the GFCM WG on small pelagic , STECF concludes that overfishing ($E_{2007\text{-}2010}$ = 0.5 > 0.4) is currently occurring.

RECENT MANAGEMENT ADVICE: The results from the GFCM-SAC assessment suggest that environmental factors can be very important in explaining the variability in yearly biomass levels (mostly based on recruitment success) and indicate that the stockbiomass was below B_{MSY} during the period examined. Although stock biomass increased significantly in 2010 from the low biomass levels experienced during the period 2006-2009, fishing mortality levels over the last years are higher than those required to achieve MSY. Given that the stock is currently overexploited, fishing effort should be reduced by means of a multi-annual management plan until there is evidence for stock recovery. Catch reductions consistent with effort reductions should be determined. However, the mixed fisheries effects, mainly the interaction with sardine, need to be taken into account when managing the anchovy fishery. As the small pelagic fishery is generally multispecies, any management of fishing effort targeting the anchovy stock would also have effects on sardine.

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 pelagics 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 in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to E = 0.4 or below.

6.7. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

FISHERIES: Anchovy, together with sardine, is one of the most important commercial species of the Adriatic Sea. The stock of anchovy living in the northern and central Adriatic Sea (GFCM-GSA 17) is shared between Italy, Slovenia and Croatia. The 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 2010.

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 2011. Catch and fishing effort data were collected for the period 1975-2010 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.

REFERENCE POINTS: The GFCM-SAC 2011 proposed the following reference point as a basis for management advice:

Emsy (F/Z, F age range 0-3) $\leqslant$ 0.4.

STOCK STATUS: The GFCM-SAC 2011 concluded that after the collapse of the stock in 1987 a recovery took place, but fluctuations still occurred, in particular in recent years. The recent exploitation rate F/Z is over the Patterson's threshold 0.4 (Patterson, 1992). However, the picture of F/Z over years is too "negative" due to the effects of some high estimates of F in the oldest ages 2 and 3; this is evident if the corresponding F/Zs weighted on abundance at sea are taken into account: in recent years, these F/Zs are exactly around the threshold 0.4 just because the mentioned effects are smoothed. Also, the ratio between total catch and stock biomass is not particularly high: below 0.3. Thus, anchovy stock can be considered as fully exploited.

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended that fishing mortality should not be allowed to increase, both in terms of fishing effort and catches. Technical interactions regarding the fisheries targeting the sardine stock in GSA 17 need to be taken into account when managing the anchovy fisheries, as well as the possibility to combine the data of GSA 17 with GSA 18 and to explore the relationships between recruitment and environment.

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: While STECF agrees with the reference point of an exploitation rate E≤0.4 proposed by the GFCM SAC. STECF notes the current exploitation rate is sensitive to the method of calculation (weighted or unweighted by population numbers). STECF considers that an unweighted estimate of E is the most appropriate metric for assessing the exploitation rate. Hence, from the available data and information, STECF concludes that the recent exploitation rate is likely to be above E≤0.4.

6.8. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 18. Southern Adriatic

FISHERIES: In Italy anchovy is exploited by pelagic trawl, purse seine and to a lower level by bottom trawl (bycatch of small pelagics). Highest landings in weight are those of pelagic trawling followed by purse seine. Fishing is carried out five days a week. Exploitation is mainly based on age classes 1 and 2. Purse seiners during most of the fishing season operate in GSA 17. From official data, the pelagic trawl and purse seine fleet of the geographical sub-area 18 (South-Western Adriatic Sea) is made up by 41 boats, but not all of them are operating all over the year. In Montenegro, since 2004 there was no commercial catching of small pelagic fishes so it wasn't possible to estimate biomass or MSY from commercial landings data. At present time, there is only one active vessel (purse seine) that is exploiting these resources in Montenegro but the catches are poor, probably because of lack of experience of the crew and some technical problems. Even when catches are accomplished there is a big problem in its sale because of unorganized market. As for the case of sardine, anchovy is targeted mostly by small-scale fisheries. Fishing grounds are located along the coast, and also in the Boka Kotorska Bay. In small-scale fishery almost all types of nets are used (gillnet, purse seines, trammel net etc. and long lines). With this type of fishery, a lot of economically important fishes are caught but there are no precise data about

their amounts. In Albania, at present there are 4 pelagic vessels, which are active for 3 - 5 months during the year. There are three main exploitation areas: Shengjin, Durres and Valona. The catch goes to market or is used by the local conservation industry. There are three conservation industries in Shengjin; most of the product for these industries is imported.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Stock biomass estimates are based on data concerning Italian official commercial landings come from ISTAT (1987-2003) and IREPA (2004-2010). Anchovy biomass was assessed by two direct methods, acoustics and DEPM, in the frameworks of MEDIAS and AdriaMed project in both sides of GSA 18. Survey period was July. Reproductive parameters of adult population were processed directly on board (total length, weight with and without gonads, sex ratio and maturity stages), while relative batch fecundity (Frb) and spawning frequencies (f) were analysed in lab. Biomass estimate is derived from the elaboration of acoustic data logged at three frequencies (38, 120 and 200 kHz) to calculate raw density of small pelagic fish in the study area converted into biomass per species on the base of percentage in weight of the different species and their mean size from the outcome of pelagic trawls made during the survey.

REFERENCE POINTS: The GFCM-SAC 2011 proposed the following reference point as a basis for management advice:

Emsy (F/Z, F age range 0-3) $\leqslant$ 0.4.

STOCK STATUS: Anchovy stock in GSA 18 shows a decrease respect to 2009 in the western side and also respect to 2008 in the eastern side (no survey here in 2009). Due to the fact that the biomass in the western side is at an intermediate level looking at the historical series and that the fishing effort is not entirely directed in GSA 18 the stock could be considered moderately exploited. Moreover the exploitation rate estimated with western side data gave a value of 0.17, well below the Patterson's Reference Point of 0.4. For what concerns the eastern side even if anchovy biomass resulted at a low level the fishing effort is very low, so the stock could be considered moderately exploited.

RECENT MANAGEMENT ADVICE: GFCM-SAC SCSA evidenced the uncertinity of the evaluation and the poor knowledge of the status of the stock and considered the assessment as preliminary. Anyway on the base of the precautionary approach the advice should be not increase the fishing mortality. Moreover the need to merge GSA 17 and 18 was also stressed by the GFCM-SAC SCSA. 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 notes that the data and information provided to the GFCM on anchovy in GSA 18 are very poor and agrees with the GFCM-SAC SCSA that the assessment has to be considered as preliminary and should not be used as a basis for management advice.

6.9. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 20. Eastern Ionian Sea

In the absence of any updated assessment, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (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)≤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.

6.10. European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 22. Aegean Sea

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 (2012) assessment carried out by the STECF-SGMED-11-20 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-11-20 WG proposed the exploitation rate E_{lim} (F/Z, age range 1-3)≤0.4 as limit management reference point consistent with high long term yield

STOCK STATUS: State of the adult abundance and biomass: Given the short 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.

6.11. 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 2012 (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) $\leqslant$ 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) $\leqslant$ 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.

6.12. 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. In the years 2007 to 2010, the annual landings of sardine fluctuated between 9,000 and 15,000 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. Fishing of sardine is practiced mainly by approximately 140 purse seiners in seven ports. 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, increase in 2009 and decrease in 2010.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is the GFCM-SAC. By means of the Software VIT , Length Cohort Analysis (LCA) was made on the average of the frequencies of sizes of sardine balanced at the whole zone of the Moroccan Mediterranean during the four last years (2007-2010).

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

$F_{0.1} = 0.99$

STOCK STATUS: The GFCM SAC 2011 report states that the exploitation rate is moderate in east and high in west part of the GSA and the biomass level is lower than previous year. Moreover the results showed that the fishing effort is exercised mainly on adult individuals (between 16.5 and 19.5 cm). The analysis of the yield per recruit indicate a state of full exploitation for stock sardine in the Moroccan Mediterranean sea.

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 working group on small pelagic recommended the following:

- maintain the current fishing effort;
- reduce the mortality of fishing on the spawning fish
- introduce seasonal closure during January which coincides with the peak of the spawning.

The GFCM-SAC reported the comment of Morocco delegate that the management options should be given in a more general way, avoiding of being too specific on defining the management measure. 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: In contrast to the GFCM-SAC WG on small pelagic which proposes F0.1 as an appropriate reference point for fishing mortality, STECF proposes a target reference point of $E \leqslant 0.4$ for the small pelagic in the Mediterranean. However with the information available a value for E cannot be derived. STECF notes that in the summary sheet of sardine in GSA 3 finalized by GFCM SAC WG on small pelagic the value of the current F is unclear.

6.13. Sardine (*Sardina pilchardus*) in Geographical Sub Area 6. Northern Spain

FISHERIES: The purse seine fleet operate in GSA 06 Northern Spain is composed by 130 units: 4% are smaller than12 m in length, 87% between 12 and 24 m and 9% bigger than 24 m. The fleet continuously decreased in the last decade, from more than 222 vessels in 1995 to 130 in 2008. This strong reduction (59%) is possibly linked to a continuous decreasing in small pelagic catches. Sardine (*Sardina pilchardus*) and anchovy (*Engraulis encrasicolus*) are the main target species of the purse seine fleet in Northern Spain GSA 06, but other species with lower economic 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 2011 performed an assessment using eXtended Survivor Analysis (XSA), tuned with acoustic data.

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

E_{msy} (F/Z, F age range 0-2) $\leqslant$ 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 2011 classifies this stock as overexploited at low abundance. The GFCM-SAC 2011 also evidenced the decreasing trend in landing, SSB and recruitment recognizing the risk of stock collapse.

RECENT MANAGEMENT ADVICE: GFCM-SAC advised a reduction of fishing mortality, in order to avoid future loss in stock productivity and decrease the risk of stock collapse.

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 have no further comments.

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

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 2009, the catches went down to 2,720 tonnes and in 2010 to only 600 tonnes.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Data sources were time series of acoustic surveys, landings and CPUE (1998-2010). 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 depleted at a very low level of biomass, close to the collapse.

RECENT MANAGEMENT ADVICE: GFCM-SAC advised not to increase fishing effort until the system stabilise or shows signals of recovery.

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.

6.15. 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 (1997-2010) 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.

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) $\leqslant$ 0.4.

STOCK STATUS: Based on the report of the STECF EWG 11-12 and GFCM SAC 2011, 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 suggests to prevent a possible further shift of effort back from anchovy to sardine.
STECF advises to keep the exploitation rate below the proposed reference point of E$\leqslant$ 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.

6.16. Sardine (*Sardina pilchardus*) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

FISHERIES: Sardine, together with anchovy, is one of the most important commercial species of the Adriatic Sea. The stock of sardine living in the northern and central Adriatic Sea (GFCM-GSA 17) is shared between Italy, Slovenia and Croatia. The Adriatic small pelagic fleet is targeting both sardine and anchovy.

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.

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.

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 2011, 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 2012, VPA was carried out using vectors of natural mortality rate at age, i.e. not constant over age. The vector 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 notes that the assessment was also presented during the meeting of STECF-EWG-11-12.

REFERENCE POINTS: The GFCM-SAC 2011 proposed the following reference point as a basis for management advice:

Emsy (F/Z, F age range 0-3) $\leqslant$ 0.4.

STOCK STATUS: According to GFCM-SAC 2011 assessment, the recent exploitation rate F/Z (E) is slightly under the Patterson's threshold 0.4 and used as EMSY proxy. Besides that, the ratio between total catch and stock biomass remain stable at low level (0.2). Therefore, according to GFCM-SAC 2010 2011 assessment the stock is considered sustainably 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.

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 also noted that spatial distribution of shared stock of sardine is not limited to GSA17 area only, but it is extended in GSA18 area also. Therefore, it is suggested that future assessments take into account combined data from these two GSAs. Moreover, an important nursery area of this stock is located in Gulf of Manfredonia (GSA18) where the sardine stock is exploited by fry fishery.

STECF EWG 11-20 reviewe and accepted the GFCM assessment, and produced short- and medium-term predictions of stock biomass and catches.

STECF COMMENTS: While STECF agrees with the reference point of an exploitation rate E$\leqslant$0.4 proposed by the GFCM SAC, STECF notes the uncertainty regarding the estimated recent exploitation rates. Nevertheless, the data and information indicate that the stock is currently being exploited at a rate (E) that is likely to be higher than 0.4.

6.17. Sardine (*Sardina pilchardus*) in Geographical Sub Area 18. Southern Adriatic

FISHERIES: In Italy sardine is exploited by pelagic trawl, purse seine and to a lower level by bottom trawl (bycatch of small pelagics). Highest landings in weight are those of pelagic trawling followed by purse seine. Fishing is carried out five days a week. Exploitation is mainly based on age classes 1 and 2. Purse seiners during most of the fishing season operate in GSA 17. Pelagic trawlers mainly fishing small individuals (bianchetto) are no more allowed to operate. From official data, the pelagic trawl and purse seine fleet of the geographical sub-area 18 (South-Western Adriatic Sea) is made up by 41 boats, but not all of them are operating all over the year. In Montenegro sardine is targeted mostly by small scale fisheries. Fishing grounds are located along the coast, and also in the Boka Kotorska Bay. In small scale fishery almost all types of nets are used (gillnet, purse seines, trammel net etc. and long lines). With this type of fishery, a lot of economically important fishes are caught but there are no precise data about their amounts. In Albania, at present there are 4 pelagic vessels which are active for 3 - 5 months during the year. There are three main exploitation areas: Shengjin, Durres and Valona. The

catch goes to market or is used by the local conservation industry. There are three conservation industries in Shengjin; most of the product for these industries is imported.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC.

Data used for sardine biomass assessment are from the acoustic surveys made in the western side in the period 1987-2010 and in the eastern side in the period 2002-2010, in both areas some years are missing. For acoustic methodology the analysis was made through echograms interpretation and standard echointegration procedure. Multifrequency comparison and data thresholding were used in order to separate information of small pelagic fish from other unwanted echoes (i.e. plankton echoes). Information on the composition by species of the pelagic biomass and the relative size distributions were derived from pelagic trawls and used to subdivide total pelagic biomass per species. Conversion of raw density into biomass per species was made using specific Conversion Factors derived from ex situ and in situ experiments. IDW interpolator was used in GIS software for mapping.

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

STOCK STATUS: GFCM-SAC 2011 evidenced the uncertainty of the evaluation and the poor knowledge of the status of the stock and considered the assessment as preliminary.

RECENT MANAGEMENT ADVICE: GFCM-SAC 2011, on the base of the precautionary approach the advices to not increase the fishing mortality. Moreover GFCM-SAC 2011 evidenced the need to merge the GSA 17 and 18.

STECF COMMENTS: STECF notes that the data and information provided to the GFCM on sardine in GSA 18 are very poor and agrees with the GFCM-SAC SCSA that the assessment has to be considered as preliminary and it cannot provide management advice..

6.18. 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 2012 (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.

6.19. Sardine (*Sardina pilchardus*) in Geographical Sub Area 22. Aegean Sea

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-11-20 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 11-20 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 as follows:
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.

6.20. 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 2012 (STECF 2010, EUR 24660 EN).

FISHERIES: Sprat is fished by the same fleet targeting anchovy and sardine (see Section 6.17 - 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.

6.21. 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 2012 (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.

6.22. 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 2012 (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.

6.23. Striped red mullet (*Mullus surmuletus*) in Geographical Sub Area 5. Balearic Islands

FISHERIES: Striped red mullet (*Mullus surmuletus*) is one of the most important target species in the trawl fishery developed by around 40 vessels off Mallorca (Balearic Islands, GSA 05). A fraction of the small-scale fleet (~100 boats) also directs to this species during the second semester of the year, using both trammel nets and gillnets. During the last decade, the annual landings of this species have oscillated between 73-117 and 17-29 tons in the trawl and small-scale fishery, respectively.

SOURCE OF MANAGEMENT ADVICE: The 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 assessments of the stock of *Mullus surmuletus* in the GSA 05 were provided by the GFCM WG on Demersal Fish in October 2011 and by STECF EWG 11-20in January 2012 on the time data series 2000-2010.

REFERENCE POINTS: GFCM SAC 2011 and STECF EWG 11-20 propose the following reference point as a basis for management advice:
$F_{0.1}$=0.26.

STOCK STATUS: Based on the report of the GFCM WG on Demersal Fish and STECF EWG 11-20 the stock of striped red mullet in GSA 05 is assessed as in overfishing as current F (0.55) is above the proposed $F_{0.1}$ reference point (0.26). SSB and stock biomass consistently declined over the time series since 2000 to the lowest value of the time series in 2009 and an increase in 2010.

RECENT MANAGEMENT ADVICE: Based on the report of the GFCM WG on Demersal Fish, the GFCM-SAC recommended to reduce fishing mortalities by 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 has no additional comments.

6.24. 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 followed by an increase in 2009-2010, 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 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.

REFERENCE POINTS: GFCM-SAC 2011proposes a reference point of
F_{msy}=0.48 ($F_{0.1}$).

STOCK STATUS: GFCM SAC 2011 evaluated the stock in overfishing; considering that the current F was estimated 0.71 and 0.56 respectively for 2009 and 2010 are higher than the reference value of F0.1=0.48.

RECENT MANAGEMENT ADVICE: GFCM-SAC 2011 advises a reduction of fishing mortality towards the proposed reference point.

STECF advises that the reduction 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 GFCM-SAC advice to reduce fishing mortality.

6.25. 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.

6.26. 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.

6.27. Red mullet (*Mullus barbatus*) 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 2012 (STECF 2010, EUR 24660 EN).

FISHERIES: Red mullets are of the most important target species for the trawl fisheries but are also caught with set gears, in particular trammel-nets and gillnets. From official data, the total trawl fleet of the geographical sub-area 01 (Northern Alborán Sea region) is composed by about 170 boats: on average, 42 TRB, 60 GT and 197 HP (in 2007). Smaller vessels operate almost exclusively on the continental shelf (targeted to red mullets, octopuses, hake and sea breams), bigger vessels operate almost exclusively on the continental slope (targeted to decapods crustaceans) and the rest can operate indistinctly on the continental shelf and slope fishing grounds. Red mullet is intensively exploited during its recruitment from August to November.

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.

6.28. Red mullet (*Mullus barbatus*) in Geographical Sub Area 3. Southern Alboran Sea. 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 2012 (STECF 2010, EUR 24660 EN).

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.

6.29. Red mullet (*Mullus barbatus*) in Geographical Sub area 5. Balearic Island, 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 2012 (STECF 2010, EUR 24660 EN).

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.

6.30. 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 2011. The assessment was performed over the period 1998-2010 using official landings and data from trawl surveys.

REFERENCE POINTS: GFCM SAC 2011 proposed the following reference points as a basis for management advice:
$F_{0.1} = 0.20$.

STOCK STATUS: Based on the report of the GFCM WG on Demersal Fish, GFCM SAC assessed the stock in overfishing being the estimated current value of F (F = 0.72) higher that the $F_{0.1}$ reference point.

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.

6.31. Red mullet (*Mullus barbatus*) in Geographical Sub Area 7. Gulf of Lion. France

FISHERIES: In the Gulf of Lions (GFCM-GSA07), red mullet (*Mullus barbatus*) is exploited by both French and Spanish trawlers. Around 120 boats are involved in this fishery. According to official statistics, total annual landings for the period 2004-2010 have oscillated around a mean value of 157 tons. Most boats and catches correspond to the French trawling fleet (80% and 85% respectively). In French and Spanish landings, modal length is 14 cm. In GSA 7, the trawl fishery is a multi-specific fishery. Length at first capture is about 7 cm. Catch is mainly composed by individuals of age 0 and 1, while the oldest age class (5+ group) is poorly represented. Catch rates showed oscillations, with an increase in the last year (2010).

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 2011 and presented also in STECF EWG 11-20 using data coming from DCF (size distribution of catches for French and Spanish trawlers, landings) for the period 2004-2010. The Extended Survivor Analysis (XSA), method calibrated with MEDITS abundance indices for 2004-2010 was the methodological approach emploied. No discards were included.

REFERENCE POINTS: The GFCM SAC proposes the following reference points as a basis for management advice:
$F_{0.1} = 0.45$
$F_{max} = 1.68$.

The STECF EWG 11-20 proposes the following reference point as a basis for management advice:
$F_{0.1} = 0.51$.

STOCK STATUS: Based on the report of the GFCM WG on Demersal Fish, GFCM SAC assessed the stock to be in overfishing and at intermediate level of abundance (current F = 0.85). The current fishing mortality calculated in the framework of STECF EWG 11-20 is $F_{curr} = 0.93$, higher than F_{MSY}. Thus, STECF EWG 11-20 considered that the stock is in overfishing.

RECENT MANAGEMENT ADVICE: The GFCM SAC 2011 advised to reduce the current F to reach the proposed $F_{0.1}$. STECF EWG 11-20 recommendations were the same as GFCM.

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.

6.32. 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 2004-2010. 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. . A recent assessment was undertaken at the GFCM WG on Demersal Fish in October 2011.

REFERENCE POINTS: GFCM-SAC 2011 proposed the following reference pointsas 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, GFCM-SAC 2011 considers the stock as being subject to overfishing.

RECENT MANAGEMENT ADVICE: GFCM-SAC 2011 advises that the fishing mortality has to be reduced until or below the proposed F_{MSY} (F= 0.47) reference point.

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

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

FISHERIES: Red mullet is an important species in the area, targeted by trawlers and small scale fisheries using mainly gillnet and trammel nets. Fishing grounds are located along the coasts of the whole GSA within the continental shelves. Available landing data collected under the DCF framework range from 513 tons of 2004 to 176 tons in 2010, the latter being the lowest value registered. Most part of the landings of red mullet were from trawlers up to 2006, while since 2007 the level of catches of trawlers is similar to that of the other métier grouped together, to which the maximum contribution is given by gillnet (GNS) and trammel net (GTR). Since 2008 the catches of both métier are decreasing.

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-11-20. The stock is assessed by a VPA (VIT-model) using the pseudocohort approach for each year (2006, 2007, 2008, 2009, 2010). A sex combined analysis was carried out. A constant natural mortality M (Alagaraja) = 0.61 was adopted, because this value was close to 0.70, an estimate reported for a very slightly exploited area in the Castellammare Gulf (northern Sicily coasts) within the GSA. The setting of the proportion of mature females was 0.16 at age 0, 0.92 at age 1 and 1 at age 2. Management reference points were estimated by an Yield per Recruit analysis.

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

$F_{0.1} \leq 0.41$ (F_{MSY} proxy)

STOCK STATUS: Based on the report of the STECF-SGMED-11-20 STECF assessed the stock to be overfished during 2006-2009 as the estimated F values (F 2006=1.3, F 2007=0.76, F 2008=1.38; F 2009=0.98, F 2010=1.01) are higher than the proposed $F_{0.1}$ (0.41). In the absence of proposed and agreed precautionary management reference points STECF-SGMED-11-20 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 and a decrease pattern of biomass indices. As regards the state of the juvenile (recruits), in 2007 and 2009 the MEDITS surveys indicated high indices of recruit abundance, while in 2010 the index was among the lowest observed in the time series..

RECENT MANAGEMENT ADVICE: Basing on the above results, STECF advises that fishing mortality should be reduced to the proposed reference point F_{MSY}, in order to avoid future loss in stock productivity and landings. This should be achieved by effort reductions of the relevant fleets by means of a multi-annual management plan taking into account mixed-fisheries effects. Catch forecasts consistent with the effort reductions shall be estimated.

STECF COMMENTS: No additional comments.

6.34. 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-EWG-11-20. 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-EWG-11-20proposes the following reference point as a basis for management advice: $F_{0.1} \leq 0.47$ (F_{MSY} proxy) and $F \leq 0.68$.

STOCK STATUS: STECF-EWG-11-20 notes that current mean F estimated either by SURBA and LCA (F=1.9 and 1.5) are far in excess of the proposed target reference point $F_{0.1}$ (basis F0.1 as FMSY proxy) and also exceeds Fmax, suggesting that the stock in the GSA 11 is in overfishing. STECF EWG 11-20 could not estimate the absolute levels of stock abundance. MEDITS abundance (n/km²) and biomass (kg/km²) indices do not indicate a significant trend. The stock SSB calculated using SURBA periodically oscillated on the period and has decreased in the last 5 years showed to the low in 2009.

STECF EWG 11-20 could not estimate the absolute levels of recruitment. However, relative indices estimated by SURBA indicated high fluctuations of recruitment.

RECENT MANAGEMENT ADVICE: The STECF EWG 11-20 recommends the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed level $F_{0.1}$, in order to avoid future loss in stock productivity and landings. This should be achieved by means of a multi-annual management plan. Catches consistent with the effort reductions should be estimated. The enforcement of the minimum landing size (fixed at 11 cm TL since 1995) and the recent (June 2010) enforcement of EC Council Regulation No 1967/2006 that changed the gear selectivity might have positive impact on the productivity of the stock in the near future. Finally a big effort in achieving realistic indirect fishing effort information as well as the necessary control policy to avoid misapplication of EC regulation should be included in the management plan.

STECF COMMENTS: No additional comments.

6.35. Red mullet (*Mullus barbatus*) in Geographical Sub Area 17. Adriatic Sea

FISHERIES: The fishery for red mullet is one of the most important in the GSA 17. Fishing grounds correspond to the distribution of the stock particularly within 100 m depth. The allocation of fishing effort depends on the different life cycles of this species and the different concentration and distribution in GSA 17.

The Italian catch of red 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.

Total landings remained above 3,500 tons between 2006-2008, than decreased to 2,000 tons in 2010 and then in 2011 increased again to 2,692 tons. Discard is high, about 20% of the total catches.

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-EWG 12-10 XSA analysis was computed on DCF data of commercial landings (2006-2011), calibrated with fishery independent survey abundance indices (MEDITS). Landings and discard at age data were obtained from the Italian fleet within the DCF. The discard is high and it represents an important percentage on the overall catches. MEDITS abundance indices in number at length were transformed in number at age using age length keys (ALK) obtained from otolith reading of commercial samples.

REFERENCE POINTS: STECF-EWG 12-10 proposed $F_{0.1} \leqslant 0.36$ (Fmsy proxy) as limit management reference point consistent with high long term yields.

STOCK STATUS: Taking into account the results obtained by the XSA analysis (current F around 0.71), the STECF-EWG 12-10 considers the stock exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF EWG 12-10 recommends the relevant fleets catches and/or effort to be reduced 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. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS:STECF notes that the most recent assessment does not include catch data from the Croatian fleet and a such the absolute estimate of stock abundance and biomass is likely to be underestimated. Nevertheless the estimate for $F_{0.1}$ is likely to be relatively robust.

6.36. 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.

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

FISHERIES: *Mullus barbatus* Red mullet in GSA 25 is exploited with other demersal species by the bottom otter trawlers and the artisanal fleet using trammel nets. The main species caught with *M. barbatus* are: *Spicara* spp. (mostly *S. smaris*), *Boops boops*, *M. surmuletus*, *Pagellus erythrinus* and cephalopods (*Octopus vulgaris*, *Loligo vulgaris* and *Sepia officinalis*). The artisanal (inshore) fishery catches also relatively large quantities of *Diplodus* spp, *Sparisoma cretense* and *Siganus* spp. The average percentage of *M. barbatus* in the overall landings (2007 <40 T) of the bottom trawl (4 vessels) and artisanal fishery, for the period 2005-2008, was 7% and 2% respectively. For the assessment period (2005-2010) the average landings by each fleet was around 15-16 tons. The most exploited age classes by both fleets are the age classes 1 and 2.

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 GFCM-SAC WG on demersal in October 2011. Separable VPA for the period 2005–2010 and Y/R analysis were employed.

REFERENCE POINTS: GFCM SACrecommends $F_{0.1}$ of 0.33 as an approximation of F_{msy}.

STOCK STATUS: GFCM-SAC 2010 considers the stock in overfishing state, considering that the current fishing mortality should be reduced by 24% (based on 2010 Y/R analysis) or by 28% (based on 2009 Y/R analysis) for reaching the F0.1 reference point. The stock abundance seems to be in low levels, on the basis of the available time series and considering the decrease in official landings and the LPUE of the stock throughout the years.

RECENT MANAGEMENT ADVICE: Fishing mortality from both fleets should be reduced. This could be achieved with the following measures that have been recently implemented/will be implemented in the near future in Cyprus:

- Reduction on the number of licensed trawlers: From November 2011 the licensed bottom trawlers fishing in territorial waters will be restricted to 2 (50% reduction). This measure has been included in the 2011 Cyprus Management Plan for Bottom Trawlers fishing in territorial waters.
- Reduction on the number of licensed small scale artisanal boats: DFMR is currently evaluating the possibility of reducing the number of licensed vessels in the artisanal fishery.
- Increase of the selectivity of gears targeting the stock: - From June 2010 the 40mm diamond shape trawl net was replaced by a diamond meshed net of 50mm at the cod end, while from November 2011 the diamond meshed net of 50mm will be enforced as minimum mesh size in any part of the net.- From March 2011 the minimum mesh size of all passive nets was increased from 32 mm to 38 mm.
- New measure included in the 2011 Management Plan for trawlers: From November 2011 a restriction of 2 areas from fishing with trawl nets will be applied, on a rotational basis (northwest part of Cyprus from 8 November – 15 February, southeastern part from 16 February – 31 May every year).

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

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

FISHERIES: Hake (*Merluccius merluccius*) is one of the target demersal species of the Mediterranean fishing fleets, largely exploited in GSA01 almost exclusively by trawl (88% landings) on the shelf and slope and by small-scale using gillnets (9%) and long lines (3%).The trawling fleet in the GSA01 area comprised an average of 183 boats, averaging 35 GRT and 176 HP. In 2003–2010 the annual landings of this species averaged 448 tons in the whole area.

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 was carried out in 2011 at the GFCM demersal working group and endorsed by GFCM SAC.

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

$F_{msy} \leq 0.2$ ($F_{0.1}$ basis)

$F_{max} = 0.33$

STOCK STATUS: GFCM SAC considers the stock to be overexploited since current F (1.33) exceeds the $F_{0.1}$ reference point (0.2); the fishery is being exploited at above a level which is believed to be sustainable in the long term, with no potential room for further expansion and a higher risk of stock depletion/collapse.

RECENT MANAGEMENT ADVICE: GFCM SAC advises that to reach F0.1 a reduction of 80% of current F is advisable. GFCM SAC considers that the fishing pattern of the trawl fleet should be improved and that the use of the 40 mm square / 50 mm diamond mesh size in trawl gear cod ends should be carefully monitored.

STECF COMMENTS: STECF agrees with the advice given by GFCM SAC.

6.39. European hake (*Merluccius merluccius*) in Geographical Sub Area 3. Southern Alboran Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 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. 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.

6.40. 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 2011 by SGMED 11-20.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.16
$F_{CURRENT} =$ 1.21

STECF proposes F_{MSY}=0.16 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: STECF concluded that the stock is exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleet's effort to be reduced until fishing mortality is below or at the proposed FMSY 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. Since a part of the catches is under the minimum landing size, the improvement of the trawl exploitation pattern would imply increases in potential landings.

STECF COMMENTS: STECF has no additional comments.

6.41. European hake (*Merluccius merluccius*) in Geographical Sub area 6. Northern Spain

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 F_{msy} = 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.

6.42. 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. The hake trawlers fishery exploits a highly diversified species assemblage. Around 220 boats are involved in this fishery and, according to official statistics, total annual landings for the period 1998-2011 have oscillated around an average value of 2230 tons (1362 tons in 2011). In the past 10 years, the fishing capacity of the French trawlers in GSA 07 has progressively declined. Their number decreased by nearly 30% over the period. Because of the decline of small pelagic fish in the area, since 2009 trawlers fishing small pelagic fish have diverted their effort to demersal resources.

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 2012 (EWG 12-10).

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.24
$F_{CURRENT} =$ 1.43

STECF proposes F_{MSY}=0.24 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: STECF concluded that the stock is exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort or catches 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 considerations.

STECF COMMENTS: STECF has no additional comments.

6.43. 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, which was endorsed by GFCM SAC.

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

F_{MSY} = 0.2 ($F_{0.1}$ basis) as a management reference point.
F_{max} = 0.35

STOCK STATUS: STECF and GFCM SAC classified the stock as being subject to overfishing since current F (1.5-2) exceeds F_{MSY}.

RECENT MANAGEMENT ADVICE: GFCM SAC and STECF advise the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed level F_{msy}. STECF further advises that 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.

6.44. European hake (*Merluccius merluccius*) in Geographical Sub Area 10. Southern and Central Tyrrhenian Sea.

FISHERIES: Hake, red mullet and deep-water pink shrimp are key species of fishing assemblages in the central-southern Tyrrhenian Sea. Fishing grounds are located on the soft bottoms of continental shelves and the upper part of continental slope along the coasts of the whole GSA. 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*. Since 2004, landings of hake increased from 1,338 t to 1,536 t in 2006, then decreased to about 1,091 t in 2009 and increased to about 1300 t in 2010. Most part of the landings of hake is from trawlers and nets (GNS and GTR), but the catches of the demersal long-line fishery are also important.

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 2011 by SGMED 11-20.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
FMSY = F0.1 ≤ 0.2
F CURRENT = 0.63
STECF proposes F_{MSY} = 0.2 (F0.1 basis) as management reference point.

STOCK STATUS: The stock appeared to be subject to overfishing in 2006-2010 and a considerable reduction in fishing mortality is necessary to approach the F_{MSY} reference point (Factor; ~65-70% of the current F value, depending on the year). However, considering the high productivity in terms of incoming year classes, this stock has the potential to recover fast if F is reduced towards F_{MSY}.

RECENT MANAGEMENT ADVICE: 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.

STECF COMMENTS: STECF has no further comments.

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

FISHERIES: Hake is exploited in all trawlable areas around Sardinia and is one of the most important target species showing the highest landings. GSA 11 hake landings come almost entirely from bottom trawl vessels, whereas catches from trammel nets or longlines are negligible and do not belong to a target fishery. Small hakes are commonly caught from shallow waters about 50 m to 300 m depth, whereas adults reach the maximum depths exploited by the fleet (800 m). Both juvenile and adult catches come from a mixed fishery, as in the GSA 11 there is not a specific fishery for hake. The most important by catch species are horned octopus (*Eledone cirrhosa*), squids (*Illex coindetii*), poor cod (*Trisopterus minutus capelanus*) at depths less than 350 m and *Chlorophtalmus agassizii*, greater forkbeard (*Phycis blennoides*) and deep-water pink shrimp (*Parapenaeus longirostris*) caught at greater depth. At the end of 2006 the trawl fleet of GSA 11 was composed by 157 vessels (11.7% of the overall Sardinian fishing fleet). In the last three years effort was almost stable. The total landings of hake of GSA 11 in the last 7 years decreased from 866 t (2005) to 268 t in 2009 and slightly increased in 2011 (389 t).

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 in 2012 by STECF EWG 12-10.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.30
$F_{CURRENT} =$ 1.16

STECF proposes $F_{MSY} = 0.30$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: STECF concluded that the stock is exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort and/or catches 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 considerations.

STECF COMMENTS: STECF has no additional comments.

6.46. 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. In 2004-2009, 97% of declared catches were caught by demersal otter board trawlers, 1% of catches were obtained using long lines, and 2% using trammel nets. Italian trawlers based in the harbours along the southern coasts of Sicily operate throughout the Strait of Sicily, with the exclusion of the Maltese Fishing Management Zone (FMZ). Hake is caught by trawlers in a wide depth range (50-500 m) together with other important species such as *Nephrops norvegicus*, *Parapenaeus longirostris*, *Aristaeomorpha foliacea*, *Eledone* spp., *Illex coindetii*, *Lophius* spp., *Mullus* spp., *Pagellus* spp., *Zeus faber*, *Raja* spp among others. Total landings decreased from 1796t in 2005 to 1592 t in 2009. In 2009 Maltese vessels were only responsible for 0.7% of total hake landings in GSAs 15 and 16.

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 up to date stock assessment for hake in GSA 15-16 was done by STECF SGMED 10-03, however the assessment is based only on Sicilian and Maltese data. A preliminary assessment including 1 year of Tunisian data was done in 2011 under the auspices of the MedSudMed project.

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

$F_{MSY} = F_{0.1} =$ 0.15
$F_{CURRENT} =$ 1.12

STECF proposes $F_{MSY} = 0.15$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: STECF 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 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.

6.47. European hake (*Merluccius merluccius*) in Geographical Sub Area 17 Adriatic Sea.

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 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.

6.48. European hake (*Merluccius merluccius*) in Geographical Sub Area 18. Southern Adriatic Sea

FISHERIES: Hake is one of the most important species in the GSA 18 representing more than 20% of landings from trawlers. Demersal species catches are landed on the western side (Italian coast) and the eastern side (Albanian and Montenegro coasts), trawling being the most important fishery activity on the whole area with an effort of about 70% of the total effort. The production of hake in GSA 18 is split in 14% caught by Italian

longlines, 79% by Italian trawlers, about 1% by Montenegrin trawlers and about 6% by Albania trawlers. In 2010 the landings of hake were about 4020 tons in the west side with the higher production from trawlers (3400 tons) followed by longliners (601 tons) and by gillnets (19 tons). Along the east side the production from trawlers in 2010 was about 276 tons divided by 36 tons from Montenegro and 240 tons from Albania. 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 most recent assessment was performed within the FAO AdriaMed project, presented to and endorsed by the GFCM SAC as well as STECF SGMED 11-20.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} \leq 0.21$
$F_{CURRENT} = 0.86$

STECF proposes $F_{MSY} = 0.2$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably. A considerable reduction is necessary to approach the FMSY reference point (76% of the current F). Simulations below show that this stock has the potential to recover rather quickly if F is reduced towards FMSY.

RECENT MANAGEMENT ADVICE: The target reference point F0.1 can be gradually achieved by multiannual management plans requiring a more sharp reduction in the short term than in the medium term. The objectives of a more sustainable harvest strategy could be achieved with a multiannual plan based on a reduction of fishing mortality through fishing activity limitations and possibly fishing capacity decreasing. It is however necessary to consider that most of the fishing mortality is derived from the Italian bottom trawlers, that represent about 85% of the total F in the GSA, and from the Italian longliners, accounting for about 7-8% (overall 92-93% of F). Montenegrin trawlers account for about 1% of the F exerted on the GSA and Albanian trawlers for about 6.5%.

STECF COMMENTS: STECF has no additional comments.

6.49. European hake (*Merluccius merluccius*) in Geographical Sub Area 19. Western Ionian Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 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.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 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.

6.51. 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 in 2011 at STECF EWG 11-12. The assessment was endorsed by GFCM SAC.

REFERENCE POINTS: STECF and GFCM SAC proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0$ 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.

6.52. Monkfish (*Lophius budegassa*) in Geographical Sub Area 6. Northern Spain

FISHERIES: Black-bellied anglerfish are by catch of commercial importance of bottom trawl fisheries. They are also caught by a variety of static fishing gear (trammel nets, gillnets and baited traps). In GSA 06 the bulk of catches (90% in weight) are from otter trawl, while trammel nets amounts less than 10% of the catches. The largest individuals are caught by trammel nets, but these are not sampled. In all fisheries, discards of anglerfish are negligible. The landings of black-bellied anglerfish have increased over the 2002-2012 period, although there is some uncertainty as to whether the reported landings in the data call represent only *Lophius budegassa* or a mix of the two species of Lophius. In 2002 353 tonnes were landed, in 2009, 2010 and 2011 a total of 563, 747 and 1212 tonnes were landed 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 recent STECF assessment is provided by in 2012 by SGMED 12-10.

REFERENCE POINTS: No STECF proposes the following reference points as a basis for management advice:

$F_{MSY} = F_{0.1} =$ 0.15

$F_{CURRENT} =$ 0.72

STECF proposes $F_{MSY} = 0.15$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort or catches to be reduced until fishing mortality is below or at the proposed FMSY 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 considerations.

STECF COMMENTS: STECF has no additional comments.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 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.

6.54. Blackspot seabream (*Pagellus bogaraveo*) in Geographical Sub Area 1 and 3. North and South Alboran Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 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 ($F_{2005\text{-}2007} = 0.4 > 0.2$). 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.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

6.56. Bogue (*Boops boops*) in Geographical Sub Area 3. Southern Alboran Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 ($F_{2000-2009} = 0.9 > 0.61$).

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.

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

FISHERIES: Norway lobster catches from the Balearic fleet are generated exclusively by the bottom trawlers. The species is mostly caught in the upper slope (350-600 m). The mean annual number of days in which the fleet works in this fishing tactic (alone or in combination with other fishing tactics) is around 1050 days. Other species caught on the upper slope are *Merluccius merluccius*, *Lepidorhombus* spp., *Lophius* spp. and *Micromesistius poutassou* (Guijarro and Massutí, 2006). Discards on the upper slope have been estimated to be up to 18% (autumn) and 45% (spring) of captured biomass and they are composed by a large number of

elasmobranchs, teleosts, crustaceans and cephalopods, among others. In the last 8 years the total landings of *N. norvegicus* in GSA 05 oscillated around 20 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 recent assessment for Norway lobster in GSA 5 was performed in 2012 by STECF-EWG-12-10.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.42
$F_{CURRENT} =$ 0.55

STECF proposes $F_{MSY} = 0.42$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort and/or catches 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 considerations.

STECF COMMENTS: STECF has no additional comments.

6.58. 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. The assessment was endorsed by GFCM SAC.

REFERENCE POINTS: STECF and GFCM SAC propose 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 0.35.

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.

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

FISHERIES: The blue 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. In 1999-2010 landings fluctuated between 90 and 170 t; in 2010 Spanish trawlers landed 164 t. Females dominate

in the landings, nearly 70-80% of the total. The number of red shrimp vessels for the whole GSA 05 has been decreased steadily from the early 1990s, and in 2010 the fleet was made up of 34 vessels. Total discards was estimated to 17% of reported landings in 2010, discards for the target species (red shrimp) are considered null (below 0.001%).

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 2011 and endorsed by GFCM SAC.

REFERENCE POINTS: GFCM-SAC proposed the reference points $F_{MSY} = F_{0.1} = 0.25$ and $F_{max} = 0.41$.

STOCK STATUS: Based on the report of the GFCM-SAC, overfishing was occurring 2010 ($F_{2010} = 1.054$).

RECENT MANAGEMENT ADVICE: GFCM-SAC recommends decreasing fishing mortality. This could be achieved through management measures like temporal fishing time reduction for periods such as the beginning of the reproduction or spawning period and during the recruitment period at the beginning of autumn. An improvement in the selectivity pattern could further improve yields and the mean size of catches.

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

6.60. Blue and red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 6. Northern Spain

FISHERIES: Blue and red shrimp (*Aristeus antennatus*) is one of the most important crustacean species for the trawl fisheries in GSA 06 (Northern Spain). This resource is an important component of the commercial landings in some ports of GSA 06, and it is the target species of a specific trawl fleet. The blue and red shrimp has a wide bathymetric distribution, between 80 and 3300 m depth, and some areas may constitute a refuge for the resource, located distantly from the main fishing ports and below 1000 m depth. Females dominate in the landings, representing nearly 80% of the total. Discards of the blue and red shrimp are very low. The number of harbors with vessels targeting blue and red shrimp is 14 for the whole GSA 06. Exploitation is based on very young age classes, mainly 1 and 0 year old individuals. Landings in GSA 06 over 2002- 2011 fluctuated between 308 t in 2005 and 743 t in 2009, with an average of about 600 tonnes.

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 in 2012 by STECF-EWG-12-10.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.3
$F_{CURRENT} =$ 1.05

STECF proposes $F_{MSY} = 0.3$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort or catches 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 considerations.

STECF COMMENTS: STECF has no further comments.

6.61. Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 11. Sardinian Sea

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

6.62. 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. In 2010 Maltese trawlers landed 2% of the overall total catch of giant red shrimp in GSA 15-16.

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. The assessment was endorsed by the GFCM SAC.

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.

6.63. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 3. Southern Alboran. Morocco.

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 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.

6.64. 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 most updated assessment is provided by STECF EGW 11-02. The assessment was endorsed by GFCM SAC.

REFERENCE POINTS: GFCM SAC and STECF propose 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: GFCM SAC and STECF advise that the relevant fisheries' effort to be reduced until fishing mortality is below or at the proposed level F_{msy}.

STECF COMMENTS: STECF has no additional comments.

6.65. 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. The most recent stock assessments available to STECF were carried out in 2011 at STECF EWG 11-12. The assessment was endorsed by GFCM SAC.

REFERENCE POINTS: GFCM SAC and STECF propose $F_{MSY} = 0.78$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: GFCM SAC and STECF consider the stock to be harvested in a sustainable manner since the 2010 current F (2010 current F = 0.4) was well below the estimated F_{MSY} reference point.

RECENT MANAGEMENT ADVICE: GFCM SAC and STECF advise a sustainable fishery in 2010. STECF advises to establish a multi-annual management plan taking into account mixed-fisheries effects, taking into account projections of stock size and catch in 2012 under status quo fishing and other management options.

STECF COMMENTS: STECF has no additional comments.

6.66. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 10. Southern and Central Tyrrhenian.

FISHERIES: The pink shrimp stock 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 1089 tons were recorded and then declined to 370 tons in 2010 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 most recent STECF assessment is provided by in 2011 by SGMED 11-20.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} \leq$ 0.71
$F_{CURRENT} =$ 1.1

STECF proposes $F_{MSY} = 0.71$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort to be reduced to reach 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. However the dynamics of this species seems also influenced by environmental changes.

STECF COMMENTS: STECF has no additional comments.

6.67. 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. In 2010 16 Maltese, 390 Sicilian and 70 Tunisian trawlers were fishing for pink shrimp in GSAs 12-16, landing a total of 9074 t of pink shrimp. In 2010 the Italian fleet landed 79% of total catches, the Tunisian fleet 21% and the Maltese fleet 0.2%.

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 up to date pink shrimp assessment was carried out as part of the FAO project MedSudMed and endorsed by GFCM-SAC.

REFERENCE POINTS: GFCM-SAC proposed the following reference points as a basis for management advice: F_{MSY} = 0.95 ($F_{0.1}$ basis).

STOCK STATUS: GFCM SAC concluded that overfishing was occurring in 2010 (F_{2010} = 1.21).

RECENT MANAGEMENT ADVICE: GFCM SAC advises that a reduction of about 20% is considered necessary in order to fish the stock at $F_{MSY.}$ GFCM SAC considers that a reduction in fishing capacity should primarily target small trawl vessels (12-24m length), which target juvenile shrimp. In addition the exploitation pattern of the fishery needs to be improved and a protection of key nursery areas in the Strait of Sicily would also improve the status of this fishery.

STECF COMMENTS: STECF endorses the findings by GFCM-SAC.

6.68. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 18. Southern Adriatic Sea

FISHERIES: Pink shrimp is targeted only by trawlers, and fishing grounds are located along the coasts of the whole GSA. Catches from trawlers are from a depth range between 50and 500 m and the species co-occurs with other important commercial species as *M. merluccius*, *Illex coindetii*, *Eledone cirrhosa*, *Lophius* spp., *Lepidorhombus boscii*, *N. norvegicus*. In 2008 a management plan was adopted, that foresaw the reduction of fleet capacity associated with a reduction of the time at sea. Landings are rather stable in the observed years with a slight increase in 2009 (933t) and a small decrease in 2011 (862t), while fishing effort of trawlers is decreasing.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. STECF carried out an assessment in 2012 at the EWG 12-10.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.7
$F_{CURRENT} =$ 1.45

STECF proposes F_{MSY} = 0.7 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort and/or catches 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 considerations.

STECF COMMENTS: STECF has no additional comments.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

6.71. 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 in the Mediterranean, including in the Strait of Sicily. Trawling is carried out on the continental shelf of the Central Mediterranean throughout the year, and catches include also pink shrimp (*Parapenaeus longirostris*), Norway lobster (*Nephrops norvegicus*), giant red shrimp (*Aristaeomorpha foliacea*), hake (*Merluccius merluccius*), violet shrimp (*Aristeus antennatus*), scorpionfish (*Helicolenus dactylopterus*), grater forkbeard (*Phicys blennioides*), blackspot seabream (*Pagellus bogaraveo)* and monkfish (*Lophius spp.*). In addition to trawling, common Pandora is targeted by several artisanal gears, including set gillnets, trammel nets, pots and traps and set longlines. Considering data from both GSAs combined, catches by the OTB fleet have declined in 2006-2011, whilst catches from the artisanal fleet have remained stable since 2008. Trawlers were responsible for 80% of common Pandora landings in 2011. On average the Maltese fleet was responsible only for 3% of total landings in GSAs 15 and 16 in 2006-2011.

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 in 2012 during the STECF-EWG-12-10.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.3
$F_{CURRENT} =$ 0.72

STECF proposes $F_{MSY} = 0.3$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort and/or catches 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 considerations.

STECF COMMENTS: STECF has no additional comments.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

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

FISHERIES Red mullet (*M. barbatus*) is one of the main demersal resources of the coastal areas in the Mediterranean, fished by otter trawl and, in minor quantities, by trammel-nets, together with other several 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 GSAs 15 and 16 red mullet is caught almost exclusively by inshore trawlers operating on shelf fishing-grounds of GSA 15 and 16. Landings data for GSAs 15 and 16 collected within the Data Collection Framework (DCF) showed a decrease from 1,409 t in 2005 to 608.5 t in 2011. More than 95% of the annual landing is due to bottom otter trawlers. The total contribution of the Maltese fleet to total landings in GSA 15 and 16 was 1% in 2005-2011

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 in 2012 during the STECF EWG 12-10.

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

$F_{MSY} = F_{0.1} =$ 0.45
$F_{CURRENT} =$ 1.3

STECF proposes $F_{MSY} = 0.45$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: STECF concludes that the stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort and/or catches 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 considerations.

STECF COMMENTS: STECF has no additional comments.

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

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

6.77. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 5. Balearic Island

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

6.78. Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 11. Sardinia

FISHERIES: The species is only exploited by trawlers, which operate in all seas surrounding the island. 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. *P. longirostris* is generally caught together with other important commercial species such as *Nephrops norvegicus*, *Merluccius merluccius*, *Eledone cirrhosa*, *Illex coindetii*, *Todaropsis eblanae*, *Helicolenus dactylopterus, Phycis blennoides, Micromesistius poutassou*, *Lophius* sp. The discard fraction is composed of species such us Glossanodon leioglossus, Capros aper, Galeus melastomus and Raja spp. The trawl fleet showed remarkable changes from 1994 to 2004, with a general increase in the number of vessels and the replacement of the older ones, low tonnage wooden boats by larger steel boats. Since 2004 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. The landings show an increasing trend, from 43 t in 2009 to 71 t in 2011.

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. An assessment for pink shrimp in GSA 11 was done in 2012 by STECF EWG 12-10.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice:
$F_{MSY} = F_{0.1} =$ 0.49

$F_{CURRENT}$ = 0.69

STECF proposes F_{MSY} = 0.49 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF advises that the relevant fleets' effort or catches 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 considerations.

STECF COMMENTS: STECF has no additional comments.

6.79. Norway Lobster (*Nephrops norvegicus*) in GSA 18 – South Adriatic

FISHERIES: Norway lobster catches from the south Adriatic come exclusively from bottom trawl mixed fisheries carried out in the upper slope (350-600 m depth). Annual landings decreased from 1300 to 865 t in the period 2007-2011. The proportion of the discards is generally low (about 3%). The fishing effort of trawlers (kw*fishing days) decreased of 25% since 2004, from 2.536.454 to 1.900.240 kw*fishing days.

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 available to STECF was carried out in 2012 at STECF EWG 12-10. The DCF data for the period 2010-2011 were used to perform a length cohort analysis (LCA) along with a yield per recruit analysis (YPR) under a steady state assumption, using the VIT software. The analysis was carried out for the western side of the GSA 18 (Italian coasts), given the lack of available fishery data for the eastern side (Albania and Montenegro). A constant value of natural mortality M equal to 0.47 was estimated using Beverton & Holt Invariant method and terminal fishing mortality F_{term}= 0.5 was assumed. The F current has been calculated on the age range between 1 and 7, being these the age classes more represented in the catches.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1}$ = 0.30 as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: Survey indices indicate a variable pattern of abundance (n/h) and biomass (kg/h) of adults. The stock spawning biomass was rather stable from 1997 to 2006; then there was a slight decrease in 2007 followed by a large increase in 2009. After this year the abundance indices decreased to a level similar to the average of the time series. However, in the absence of proposed biomass management reference points, EWG 12-10 was unable to fully evaluate the status of the stock spawning biomass in relation to these.

Recruitment estimates from MEDITS surveys in the GSA 18 showed an increase from 2007 and 2009 and then a decrease until 2011. Based on the report of the STECF-EWG 12-10, overfishing was occurring in 2011 (F =0.54 > 0.30)

RECENT MANAGEMENT ADVICE: EWG 12-10 recommended that the relevant fleets' effort and/or catches 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS: STECF has no additional comments.

6.80. Common octopus (*Octopus vulgaris*) in Geographical Sub Area 5. Balearic Islands

FISHERIES: In GSA 05 the Common octopus is caught both by trawl and artisanal fisheries. However, the main catches are from trawlers, and represent between 80 and 95% of the total octopus landings. This species is mainly taken by trawlers operating on the shallow continental shelf, accounting for between 20 and 37% of total catches from these trawling grounds. Octopus landings showed a large decrease from the beginning of the available time series in 1977 (364 t) to mid-1980s (129 t) followed by a peak in 1992 (262 t). Since then, landings have oscillated between 96 and 179 t. The landing in 2011 was about 135 t. Octopuses are rarely discarded and when discarded they are still alive and returned to sea in good condition.

Three main phases can be distinguished in the evolution of the fishing effort over time: 1) from 1965 to the mid-1970s it increased by a factor of 2.5; 2) from the mid-1970s to 1994 it continued to grow but at a slower rate; and 3) from 1994 to the present it has gradually 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 recent stock assessment available to STECF was carried out in 2012 at STECF EWG 12-10. Data used in the assessment were CPUEs and landings from Mallorca (GSA 05) for the period 1977-2011. The analysis was performed using the ASPIC 5.3 software (A Stock-Production model Incorporating Covariates) assuming a Schaefer model.

REFERENCE POINTS: STECF proposed F_{MSY}=0.32 as the exploitation reference point consistent with high long term yields.

STOCK STATUS: Data on the spawning stock size were not available from production model outputs owing to the inherent characteristics of the model (catch data is used as a whole, not split by sizes or ages). The analysis of the time series from 1977 to 2011 showed that octopus total biomass was larger than B_{MSY} before the 1980s ($B>B_{MSY}$), and has remained lower than B_{MSY} since then. The main output parameters in 2011 for determining the stock status in terms of biomass were: 1) MSY=197 t; 2) B_{MSY}=614 t; 3) B/B_{MSY}=0.506. Relative fishing mortality (F/F_{MSY}) has oscillated between 1 and 2.3 throughout the time series. In 2011, F was 1.48 times F_{MSY}. The main output parameters in 2011 for determining the stock status in terms of exploitation were: 1) F_{MSY}=0.320; 2) F/F_{MSY}=1.481.

RECENT MANAGEMENT ADVICE: STECF recommended the relevant fleets' effort or catches to be reduced until fishing mortality is below or at the proposed F_{MSY} and B_{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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS: STECF has no additional comments.

6.81. Blue whiting (*Micromesistus potassou*) in in Geographical Sub Area 6. Northern Spain

FISHERIES: Blue whiting is a demersal species important locally, especially in the northern part of GSA 06 and it is mainly exploited by the otter trawlers. The majority of landings are reported by otter trawlers (OTB). Landings fluctuated during the period 2002-2011 with a maximum value of 4,723 t in 2006 and a minimum value of 1,276 t in 2003. Discards are reported as negligible (<0.05 t). In 2011 the landing was 1936 t.

The number of vessels and GT days at sea of OTB fleet in GSA 06 showed a decreasing trend from 2006 until 2010 in both number of vessels and GT days at sea in the fleet segment corresponding to small and medium vessels (VL0012 and VL1224). The number of the largest vessels (>24 m) have increased until 2008 and declined thereafter. There was no information about specific effort targeting blue whiting in GSA 06.

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 available to STECF was carried out in 2012 at STECF EWG 12-10. A length cohort analysis (LCA) using VIT was computed using as input the DCF data on landings (2009-2011) along with the size structure of the bottom otter trawl catches. A yield per recruit analysis was carried out for the period 2009-2011.

REFERENCE POINTS: STECF proposed $F_{0.1}$ = 0.32 as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: VIT recruits estimates were as follows: 62.4 $x10^6$ in 2009, 65.7 $x10^6$ in 2010 and 93.8 $x10^6$ in 2011. However, since no recruitment reference point for this stock has been proposed, EWG 12-10 cannot evaluate the stock status in relation to these. Taking into account the results obtained by the VIT analysis (current F is around 1.05) the stock was considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: EWG 12-10 recommended the relevant fleets' effort or catches 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS: STECF has no additional comments.

6.82. Blue whiting (*Micromesistus potassou*) in in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: Blue whiting represents an important resource for the otter trawling fleet operating on the slope over muddy bottoms and the highest biomass is found on epibathyal fishing grounds, which are often called "Norway lobster and blue whiting fishing grounds". Total landings of blue whiting based on DCF remained rather stable in 2009-2011 with a mean value of about 116 t. Seasonal fluctuations are a proper characteristic of the landings of this species, as shown by the landings per unit of effort (LPUE: in kg/boat/day) estimated for the fleet of Santa Margherita Ligure (Ligurian Sea) in the period 1987-1996 and in more recently years (2009-2010 and 2011-2012). The fishing effort (KW* days at sea) of trawlers, in the GSA 9 decreased of about 36% in the period 2004-2011.

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 available to STECF was carried out in 2012 at STECF EWG 12-10. A length cohort analysis (LCA) was performed using DCF landing data and the size structures of pseudocohorts for the period 2009-2011. A yield per recruit analysis was carried out to estimate F_{01} at the equilibrium using the LCA input data (natural mortality vector) and LCA estimates of annual recruitment and fishing selectivity pattern. A SURBA analysis of MEDITS data for the period 1994-2011 was also carried out to reconstruct the stock trend across the last 17 years.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1} = 0.53$ as proxy of F_{MSY} and as the exploitation reference point.

STOCK STATUS: Results obtained did not show a particular trend the stock size. MEDITS survey indices for SSB also indicate a variable pattern without a clear trend. Since no biomass reference point for this stock has been proposed, EWG 12-10 cannot evaluate the stock status in relation to these. Taking into account the results obtained by the VIT analysis (current F is around 1.12) the stock was considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: EWG 12-10 recommended the relevant fleets' effort and/or catches 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS: STECF has no additional comments.

6.83. Monkfish (*Lophius budegassa*) in Geographical Sub Area 7. Gulf of Lions

FISHERIES: In this area, *Lophius budegassa* is exploited by French and Spanish trawlers. Around 127 boats are involved in this fishery and, according to official statistics; total annual landings for the period 2005-2011 have oscillated around an average value of 252 tons (324 tons in 2011). The French trawlers fleet is the largest (77% of the boats) and makes most of the catches (87%). The length in the French trawler catches ranges between 18 and 80 cm total length (TL), with an average size of 32 cm TL. The Spanish trawlers fleet is smaller (23% of the boats and 13% of the catch), the length in the catch is in the range 14-77 cm TL, with an average size of 30 cm TL.

The trawlers fishery exploits a highly diversified species assemblage: Hake (*Merluccius merluccius*), Striped mullet (*Mullus surmuletus*), Red mullet (*Mullus barbatus*), Black-bellied angler (*Lophius piscatorius*), European conger (*Conger conger*), Poor-cod (*Trisopterus minutus capelanus*), Four spotted megrim (*Lepidorhombus boscii*), Soles (*Solea spp*.), Horned octopus (*Eledone cirrhosa*), Squids (*Illex coindetii*), Gilthead seabream (*Sparus aurata*), European seabass (*Dicentrarchus labrax*), Seabreams

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 available to STECF was carried out in 2012 at STECF EWG 12-10. A length cohort analysis (LCA) analysis was performed using the VIT program for the years 2009, 2010 and 2011 to provide an overview of the current state of exploitation for black-bellied anglerfish in GSA 07. This method was used as the results from a preliminary XSA run were not considered to be reliable. Eight age classes were considered, the last one being a plus group. LCA was

computed using DCF data of commercial landings (2009-2011). In the absence of stock specific parameters, the growth and maturity parameters used for the assessment of *Lophius budegassa* in GSA 07 are from GSA 06.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1}$ = 0.29 as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: Results obtained did not show a particular trend in stock size. However, in the absence of proposed biomass management reference points, EWG 12-02 was unable to fully evaluate the status of the stock spawning biomass in relation to these. Taking into account the results obtained by the VIT analysis (current F is around 0.97), the stock is considered exploited unsustainably

RECENT MANAGEMENT ADVICE: EWG 12-10 recommends the relevant fleets' effort and/or catches 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 considerations. Catches and effort consistent with FMSY should be estimated.

STECF COMMENTS: STECF has no additional comments.

6.84. Black-bellied monkfish (*Lophius budegassa*) in Geographical Sub Area 15-16. Malta Island-South of Sicily

FISHERIES: In the Strait of Sicily black-bellied monkfish is a high value commercial species. It is fished almost exclusively by trawlers operating mainly on the outer shelf-upper slope, together with other important species, such as *Mullus spp., Pagellus spp., Merluccius merluccius, Zeus faber, Raja spp, Eledone spp., Illex coindetii, Todaropsis eblanae, Parapenaeus longirostris* and *Nephrops norvegicus*. In the period 2009-2011, the landings of the Italian and Maltese trawl fleets combined ranged between 250 and 285 tons. Catch due to artisanal fisheries could be considered as negligible. The Italian fleet was responsible for more than 98% of the total landings. The segment of the Italian demersal trawlers revealed a 32% decrease in effort for vessels larger than 24 m in the period 2004-2011. The Maltese trawling fleet was responsible for only 1.6% of total trawling effort in GSAs 15 & 16 in 2006-2011; however the nominal effort of Maltese trawlers has increased by 67% in 2006-2011.

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 available to STECF was carried out in 2012 at STECF EWG 12-10. Data coming from DCF for the period 2002-2011 were used to run a SURBA (i.e. MEDITS abundance indices by age for 2002-2011). Age structure of the landings in 2009 to 2010 was used to assess stock status through a pseudocohort analysis using the VIT software.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1}$ = 0.16 as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: According to SURBA estimates, recruitment remained quite stable from 2002 to 2008, followed by an increase in 2009 and 2010, and a large decrease in 2011. Absolute values of recruits at age 1 obtained by VIT in 2009 and 2010 were around 1 million of recruits per year. However, in the absence of proposed management reference points, EWG 12-10 was unable to fully evaluate the status of the recruitment in relation to these. SURBA estimated an SSB increase from 2002 to 2006, followed thereafter by a slight decrease. The first estimates of absolute values of SSB obtained by VIT, ranged between 540 (2010) and 980 t (2009). However, in the absence of proposed biomass management reference points, EWG 12-02 was unable to fully evaluate the status of the stock spawning biomass in relation to these.

Taking into account the results obtained by the VIT analysis (current F_{1-7} is around 0.30) the stock was considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: Based on VIT results, EWG 12-10 recommended the relevant fleets' effort and/or catches 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS: STECF has no additional comments.

6.85. Poor cod (*Trisopterus minutus capelanus*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: Poor cod is a by-catch demersal species in the GSA 09, usually landed by trawlers together with other small-sized species. Almost all the landings of poor cod are from bottom trawl vessels. The remaining fraction is caught by artisanal vessels using set nets, in particular gillnets. Poor cod is one of the by-catch species of demersal trawl fishery targeting a highly diversified species assemblage on deep shelf, including hake (*Merluccius merluccius*), red mullet (*Mullus barbatus*) and horned octopus (*Eledone cirrhosa*). In the last eight years, the total landings of poor cod of GSA 09 fluctuated between a minimum of 91 in 2010 to a maximum of 226 tons in 2004. A clear decline was observed in 2004-2006, and then the landings remained quite constant around 100 tons per year (105 tons in 2011). Juveniles of poor cod are usually completely discarded at sea due to their low commercial value. In 2011, 37.4 tons have been discarded, corresponding to 26.4% of the total catch in GSA 09.

In the last 8 years, the fishing effort by the gears exploiting poor cod in the GSA 09 has shown different patterns; for bottom trawl demersal fishery, the main fleet targeting poor cod, an increasing trend is observed, from a minimum of 252,970 GT*fishing days to 1,270,144 in 2011; on the contrary, fishing effort of the bottom trawl mixed fishery, which exploits poor cod in a less extent, showed an evident decreasing trend in fishing effort in the period considered. However, it was not possible to exactly quantify the specific effort exerted by the demersal fishery fleet on this stock. Fishing effort of set nets (GNS and GTR) remained substantially stable.

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 available to STECF was carried out in 2012 at STECF EWG 12-10. Data used for the assessment included both MEDITS trawl survey and commercial catches (landings and discards) by size and age. The survey-based stock assessment approach SURBA was used on MEDITS (1994-2011) data to estimate trends in F, SSB and recruitment. A pseudocohort analysis (length cohort analysis: LCA) using VIT software on commercial catches for 2011 was performed to estimate F, numbers at age and other stock parameters. A yield per recruit model based on VIT input and LCA output (fishing selectivity pattern) was run to estimate $F_{0.1}$ under the steady state assumption.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1} = 0.74$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: The VIT analysis performed gave SSB estimations of 163 t in 2011. The MEDITS survey data showed fluctuations in stock abundance without a clear trend. However, since no biomass reference point for this stock has been proposed, EWG 12-10 cannot evaluate the stock status in relation to these. Annual recruitment was estimated to be about $3x10^6$ recruits in 2011. The SURBA analysis of MEDITS data for the period 1994-2011 showed a high fluctuation in the recruitment index with a negative trend in the last five years. Taking into account the results obtained by the VIT analysis (current F is around 0.90) the stock was considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: EWG 12-10 recommends the relevant fleets' effort and/or catches 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS: STECF has no additional comments.

6.86. Mantis shrimp (*Squilla mantis*) in GSA 10. South Tyrrhenian Sea.

FISHERIES: In GSA10 the bulk of shrimp catches are produced by otter trawlers, with a low contribution of fixed nets. Landings of trawlers increased from 145 t in 2008 to 297 t in 2011. The discards amounted to 24.5 t in 2011.

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 available to STECF was carried out in 2012 at STECF EWG 12-10. Only one year (2011) of length frequency distributions of landings was analyzed under the steady state assumption, using age classes as pseudocohorts. A VPA based on

pseudocohorts and Y/R analysis was applied using the *VIT4win* software package. Data of number at age were taken from the DCF official 2012 data call. Due to the low and sparse frequency of individuals in ages classes 4 to 7, the analysis was carried out using a class plus for age 3.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1} = 0.41$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: Survey indices indicated a variable pattern of abundance, with the values in the last 3 years among the lowest observed in the period 1994-2011. Taking into account the results obtained by the VIT analysis (current F is around 1.08), the stock is considered exploited unsustainably

RECENT MANAGEMENT ADVICE: EWG 12-10 recommends the relevant fleets' effort and/or catches to be reduced until fishing mortality is below or at the proposed FMSY 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 considerations. Catches and effort consistent with F_{MSY} should be estimated. EWG 12-10 also emphasized the necessity to analyse a longer data series in order to confirm the results obtained for 2011.

STECF COMMENTS: STECF notes that the assessment is likely to benefit from a thorough review of the parameters for growth and natural mortality.

6.87. Mantis shrimp (*Squilla mantis*) in Geographical Sub Area 17. Northern Adriatic

FISHERIES: Although in the Italian landings of GSA 17, *S. mantis* ranks first among the crustacean landed in the Adriatic ports, mantis shrimp is not the target of a specialised fishery, but it is only an important component of local multispecies trawl and gillnet fishery. Only in the Gulf of Trieste it is the target of a small artisanal fishery with creels. In the Italian side of the GSA 17, the species is exploited by different types of gears; the majority of the landing comes from trawling. The Italian annual landing for 2011 was due for 63% to bottom trawl (2,399 tons), 30% to gillnet (1,136 tons) and 7% to "*rapido"* trawl (251 tons). The species is absent from the landings statistic of Croatia (FAO-FISHSTAT J – GFCM Database) and it accounted for 3.5 tons in the Slovenian landings of 2011 (2012 DCF data; not used in the assessment). Moreover *S. mantis* it is not present in the list of shared stock of GFCM.

About 400 bottom trawlers exploit the stock all year round in the coastal areas. Mantis shrimp is caught as a part of a species mix (e.g. *Sepia officinalis, Trigla lucerna, Merluccius merluccius, Mullus barbatus, Eledone spp.)* which constitutes the target of the trawlers operating on the continental shelf. Trawl catch is mainly composed by age 1 and 2 specimens with a lower contribution of the older age classes. *S. mantis* is also a by catch (only in few cases also target) of gillnetters targeting *Solea solea*, especially during spring-summer seasons in the coastal area.

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 available to STECF was carried out in 2012 at STECF EWG 12-10. The assessment was based only on Italian DCF catch data (landings + discards), because fishery data from the Croatian fleets were missing and for Slovenian the data on the size distribution of catches was not available. However, the contribution of Slovenian catches was negligible, considering that it represents less the 0.1% of the total catches. Considering the absence of specimens collected during SoleMon survey carried out inside the Croatian waters and the low abundance observed in the MEDITS data available from the eastern side of the basin (2002 and 2005), it is possible to assume that the assessment carried out during the EWG 12-10 covers almost completely the stock exploited in GSA 17. A steady state VPA and a yield per recruit analysis was performed with VIT using commercial catches for the year 2011 in order to estimate F of the three fleets exploiting mantis shrimp (OTB, GNS and TBB), along with $F_{0.1}$.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1} = 0.30$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: The analyses performed give a SSB estimation of 2,610 t, since no biomass reference points for this stock has been proposed, EWG 12-10 cannot evaluate the status of the stock in relation to these. The MEDITS and SoleMon surveys indicate a general decreasing trend in stock biomass. The analyses performed gave an estimation of 527×10^6 recruits in 2011. Taking into account the results obtained by the VIT analysis (current F is around 1.00) the stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: EWG 12-10 recommends the relevant fleets' effort and/or catches 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 considerations. Catches and effort consistent with F_{MSY} should be estimated. EWG 12-10 also emphasized the necessity to analyse a longer data series in order to confirm the results obtained for 2011.

STECF COMMENTS: STECF notes that the assessment is likely to benefit from a thorough review of the parameters for growth and natural mortality.

6.88. Mantis shrimp (*Squilla mantis*) in Geographical Sub Area 18. Southern Adriatic Sea.

FISHERIES: *Squilla mantis* does not represent a target species of fisheries of the southern Adriatic Sea, but it is part of the mixed species representing the by-catch of otter trawlers and set netters using gill net and trammel net. The species is absent from the landings statistic of Montenegro and Albania (FAO-FISHSTAT J – GFCM Database) and it is not present in the list of shared stocks of GFCM. According to GFCM statistics, Adriatic landings account for 66 % of the Mediterranean landings of this species (FISHSTAT J – GFCM, 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 recent stock assessment available to STECF was carried out in 2012 at STECF EWG 12-10. Because fishery data from the eastern side of the basin were missing, the assessment was based only on Italian catch data of 2011, assuming that the Italian fleets exploit only the stock inhabiting the western side of GSA 18, which can be considered separated from the stock present in the eastern side of the basin. A steady state VPA analysis and a YPR (yield per recruit) was performed with VIT using commercial catches for the year 2011 in order to estimate F of the four fleets exploiting mantis shrimp (OTB_DEMSP, OTB_MDDWSP, GNS and GTR), along with $F_{0.1}$, numbers at age and other stock parameters.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1} = 0.27$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: The VIT analysis performed gave an SSB estimate in 2011 of 190 t. However, since no biomass reference point for this stock has been proposed, EWG 12-10 cannot evaluate the stock status in relation to these. The VIT analysis performed gave an estimation of $47x10^6$ recruits in 2011. Taking into account the results obtained by the VIT analysis (current F is around 1.04), the stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: EWG 12-10 recommended the relevant fleets' effort and/or catches to be reduced until fishing mortality is below or at the proposed FMSY 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 considerations. Catches and effort consistent with F_{MSY} should be estimated. EWG 12-10 also emphasized the necessity to analyse a longer data series in order to confirm the results obtained for 2011.

STECF COMMENTS: STECF notes that the assessment is likely to benefit from a thorough review of the parameters for growth and natural mortality.

6.89. Red mullet (*Mullus barbatus*) in Geographical Sub Area 18. Southern Adriatic Sea.

FISHERIES: Red mullet is mainly targeted by trawlers (93% of the annual landing) and at much lesser extent by small scale fisheries using gillnets and trammel nets. Fishing grounds are located along the coasts of the whole GSA. Red mullet co-occurs with other important commercial species such as *Pagellus spp., Eledone spp., Octopus spp.* and *M. merluccius*. In 2008 a management plan was adopted, which included the reduction of the fleet capacity associated with a reduction of the time at sea. Available landing data collected under the DCF ranged from 1,680 t in 2007 to 532 t in 2011, the latter being the lowest value registered in the period. The proportion of discards of red mullet in the GSA 18 was generally low (less than 6% of total landing) in 2007-2011 and was not included in the XSA input data.

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 available to STECF was

carried out in 2012 at STECF EWG 12-10. The assessment was based on both trawl surveys data (MEDITS survey from 1996 to 2011) and commercial catches for the period 2007-2011. The analysis was carried out for the western side of the GSA 18 (Italy), given the availability of fishery data only for this side. The stock was assessed by XSA, using as tuning data the MEDITS time series for 2007-2011, and a vector of natural mortality M. Management reference points were estimated by a yield per recruit analysis using the Yield software.

REFERENCE POINTS: EWG 12-10 proposed $F_{0.1} = 0.50$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: The XSA method showed a decreasing pattern in SSB in the period 2007-2011 (from 732 to 365 t). Recruitment showed a decrease between 2007 (150 million) and 2010 (68 million) and an increase in 2011 (130 million). EWG 12-10 was however unable to fully evaluate the status of the stock spawning biomass and recruitment in relation to the absence of proposed biomass management reference points. The fishing mortality shows a decrease in time from 1.94 in 2007 to 1.48 in 2011. Taking into account the results obtained by the XSA the stock was considered exploited unsustainably

RECENT MANAGEMENT ADVICE: EWG 12-10 recommended the relevant fleets' effort and/or catches 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

STECF COMMENTS: STECF has no additional comments.

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

FISHERIES: In the GSA09 the blue and red shrimp (*Aristeus antennatus*) represents with the giant red shrimp (*Aristeomorpha foliacea*) one of the most important demersal resources of deep trawling exploiting fishing grounds over the upper and middle slope between 400 and 800 m depth. The stock is composed mainly of aggregations of large spawners female. More than 95% of the annual landings come from the northern part of the GSA (Ligurian Sea). The annual landing increased in the period 2006-2010 from 90 to 200 t. The discards 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 stock was assessed for the first time by the working group on stock assessment of the GFCM in 2011 and endorsed by the 2011 GFCM SCSA and subsequently adopted by GFCM SAC. The stock was assessed using data on commercial landings for the period 2006-2011. A Length Cohort Analysis (LCA) and a yield per recruit analysis, assuming a steady state situation, were carried out on each year separately using the VIT software.

REFERENCE POINTS: $F_{0.1} = 0.32$ was adopted as reference point for fishing mortality.

STOCK STATUS: The fishing mortality estimated by the LCA ranged between F=0.82 (2009) and F=0.57 (2010) indicating an unsustainable exploitation of the stock in the last years.

RECENT MANAGEMENT ADVICE: A reduction of current F toward F_{01} was recommended.

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

6.91. Barracuda (*Sphyraena sphyraena*) in Geographical Sub Areas 12-13. Northern Tunisia-Gulf of Hammamet

FISHERIES: Barracuda is exploited in Tunisian coastal waters by both artisanal vessels using gillnets (77% of the catch) and purse seiners of 12-24 m LOA (23% of the catch). The annual catch in GSA 12 was about 130 t composed by specimens between 17 and 74 cm TL.

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 stock was assessed for the first time by the working group on stock assessment of the GFCM in 2011 and endorsed by the 2011 GFCM SCSA and subsequently adopted by

GFCM SAC. Annual landings by gear and their length frequency distributions for the period 2007-2010 were used to run a pseudocohort analysis (length cohort analysis: LCA) using the VIT software.

REFERENCE POINTS: The GFCM SAC has proposed $F_{0.1}$ as the reference point for fishing mortality.

STOCK STATUS: Taking into account the results obtained by the VIT analysis, the stock is considered to be exploited, above a level that is believed to be sustainable.

RECENT MANAGEMENT ADVICE: GFCM SAC recommended that F be reduced (40% in GSA 12 and 60% in GSA 13)

STECF COMMENTS: The values of the estimated current F and F_{max} were absent from the GFCM assessment summary sheet however the results from a yield-per-recruit analysis indicate that recent F is above F_{max}. STECF agrees with the Sub Committee on Stock Assessment (SCSA) of the GFCM that F_{max} should be replaced by F_{01} as the reference for fishing mortality and adopted as the proxy for F_{MSY} in the absence of a more appropriate proxy.

6.92. Striped red mullet (*Mullus surmuletus*) in Geographical Sub Area 25. Cyprus Island

FISHERIES: Striped red mullet in GSA 25 is exploited mainly by the artisanal fleet using set nets (basically trammel nets) and by the bottom otter trawlers in a minor extent. In both fisheries the species is exploited with a number of other demersal species. Since 2006 the number of licensed bottom trawlers operating in GSA25 has been reduced by 50% (from 8 to 4). The artisanal vessels are 500. The total annual catch in the period 2009-2010 was about 37 t, of which the 96% was caught by the artisanal fleet. In the period 1985-2010 there have been fluctuations in the landings of stripped red mullet during the first half of the period, with a clear decreasing trend from the middle of the '90's. In 2009-2010 the landings remained at the same levels. The most exploited age classes by the artisanal fleet are the ages 1and 2, while the bottom trawl fishery exploits mainly the age classes 2 and 3.

Discards from the bottom trawl were evaluated for the first time in 2006, through a pilot study under the 2006 Cyprus National Fisheries Data Collection Programme, and are annually estimated from 2008. There are no /negligible discards of the species both in the bottom trawl fishery and artisanal fishery.

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 stock was assessed for the first time by the working group on stock assessment of the GFCM in 2011 and endorsed by the 2011 GFCM SCSA and subsequently adopted by GFCM SAC. The assessment was based on landings data (i.e. total annual landings, age composition) by fleet segments/gear (artisanal vessels using fixed nets and bottom trawlers) and estimated biological parameters for the period 2009-2010. The VIT software was used to run two length cohort analysis (LCA) and yield per recruit (YPR) analysis, under the equilibrium assumption, for the two years separately.

REFERENCE POINTS: $F_{0.1}$ was adopted by GFCM-SAC as the reference for fishing mortality. Two values of F_{01} were provided respectively derived from 2009 and 2010 data: F_{01} (2009) = 0.22; F_{01} (2010) = 0.23 as basis for management advice.

STOCK STATUS: Landings per unit effort (LPUE - kg/day) of stripped red mullet of artisanal vessels show a clear decline since mid ‘80s. LPUE of bottom trawlers, showed a peak in 1993-1994 and 2004. From 2006 there is a decreasing trend, with the lowest values (of the whole period 1985-2010) recorded in 2009-2010 The LCA estimated a recruitment of 1.5-1-6 millions in 2009-2010. The estimated SSB was 51 t in 2009 and 36 t in 2010. The mean F estimated by the LCA was 0.49 in 2010 and 0.42 in 2009. Based on the Y/R analysis of 2010 the current fishing mortality (0.49) was 53% higher than the F0.1 (0.23). Based on the Y/R analysis of 2009 the fishing mortality (0.42) was 48% higher than the F0.1 (0.22).

RECENT MANAGEMENT ADVICE: GFCM SAC recommended that F be reduced, considering that, based on 2009-2010 analysis, the current F was 24-28% over the estimated F_{01}.

STECF COMMENTS: STECF agrees with the advice of the GFCM – SAC. STECF noted that the assessment was based on two different values of F01. Although these values are similar, STECF considers that the estimated value for F0.1 of 0.23 is the most appropriate value to use since it is derived using the exploitation pattern most recently observed in the fishery

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

FISHERIES: Picarel in GSA 25 is exploited mainly by the bottom trawl fleet (67% of the annual catch) and by the artisanal fishery. Since 2006 the number of licensed bottom trawlers operating in GSA25 has been reduced by 50% (from 8 to 4). In 2005-2010 the annual catch of trawlers fluctuated without trend between 97.4 and 168.9 t. The artisanal fleet landed 34.2-79.6 t in the same period. Bottom trawl discards were evaluated to be 15.9 t in 2006, 4.9 t in 2008 and 1.7 t in 2010. Discards from the artisanal fishery are considered 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 stock was assessed by the STECF-EWG-11-12 and the GFCM in 2011.

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

STOCK STATUS: Considering the estimated values of current F (0.06 and 0.08), STECF classifies the stock's exploitation status as sustainable. The assessment carried out by the GFCM WG was endorsed by the SAC-GFCM as preliminary due to some inconsistencies in the results of the analyses on the two sets of data.

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. GFCM-SAC, advised that an approximate reduction of 15% (10- 20%) of the current F could lead to $F_{0.1}$. This could be achieved with the reduction of licensed fishing vessels LOA 6-12m and trawlers LOA 12-24m. The increase of selectivity was also considered an important management objective.

STECF COMMENTS: STECF notes that the stock was assessed in the same year by both the GFCM WG on stock assessment and the STECF EWG 11-12. The two assessments were based on two different analytical approaches (GFCM: length cohort analysis; STECF: XSA) and returned different results in terms of F cur and F_{01} estimates. However, the GFCM – SAC endorsed the assessment produced by its WG as preliminary and recommended to improve the analyses by using an analytical age-based approach (VPA or XSA). STECF agrees that the results from the XSA are the most reliable.

6.94. Bogue (*Boops boops*) in Geographical Sub area 25. Cyprus

FISHERIES: In the Cyprus (GFCM-GSA25), Bogue (*Boops boops*) is exploited by bottom trawlers. About 540 fishing boats are operated in this fishery. The catch of Bogue was around 256 ton in 2010. The bottom trawl fishery (12 boats) in GSA 26 is a multi-specific fishery targeting a number of commercial important species like albacore, picarel (*Spicara smaris*), stripped red mullet, or *Sparisoma cretense*.

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 stock was assessed for the first time by the working group on stock assessment of the GFCM in 2011 and endorsed by the 2011 GFCM SCSA and subsequently adopted by GFCM SAC. GFCM SAC 2011 based its advice on monthly fish samples collected from landing sites and local market, the stock assessment (2005-2010) LCA-Pseudo cohort analysis (VIT) and Y/R (2005-2007 and 2008-2010).

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

$F_{0.1}$ = 0.24

STOCK STATUS: GFCM SAC 2011 assessed the stock to be subject to overfishing in 2008-2010, since the estimated F = 0.37 was higher than $F_{0.1}$.

RECENT MANAGEMENT ADVICE: GFCM SAC 2011 advised to reduce the pressure in the artisanal fisheries. By analysis of transition, reduce about 15% (10 -20%), the pressure current fishing would return to $F_{0.1}$. To achieve this, must reduce fishing boats of 6 to 12 m licensed and increase the gear selectivity.

STECF COMMENTS: STECF agrees with the stock assessment results and advises that a management plan be implemented taking account of mixed fisheries effects. STECF agrees with the GFCM-SAC recommendation to improve the analyses for this stock by using an age-based analytical approach (VPA or XSA).

7. 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 Chondrichthyans 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.

In 2011, the GFCM SAC organized one meeting for a Workshop on Stock Assessment of Selected Species of Elasmobranchs in the GFCM area (DG-MARE, Brussels, December 2011) the group made the following general conclusions:

- **Data deficiencies**: Assessments, in the main, have been hampered by a lack of reliable data. While survey data are available, both at a national level, and from co-ordinated surveys such as MEDITS, commercial data is not available in the same quantities and detail. The lack of length data from the commercial catch composition limits the types of stock assessment that can be carried out. There are three main data issues, two related to official landings statistics, the other to commercial data.
- **Official statistics**: While the availability of official landings statistics is improving, there appears to be an underreporting of landings, as compared to data available from individuals at the meeting. This can be for a number of reasons:
  - i) Fishermen may not take care when completing landings data records, for a variety of reasons;
  - ii) Administrations may not consider that it is important to collect accurate data for these species, or do not have adequate data collection systems in place;
  - iii) Some species could be underreported to avoid highlighting the level of by-catch,
  - iv) Some small inshore vessels may target (or have a by-catch of) certain elasmobranch species and the landings of such inshore vessels may not always be included in official statistics.
- **The use of generic landings categories**: Where landings data are supplied, they are rarely available at species level. Catches are frequently supplied to the GFCM in generic categories such as "dogfish sharks nei", "Raja, rays nei" or even just as "Sharks, rays, and skates etc. nei". The problems associated with this approach have been documented in other regions (ICES 2006, Johnston *et al.* 2005) The use

of generic categories means that accurate species assessments are not possible, as the proportion of individual species within these categories cannot be calculated. Trends in landings or CPUE cannot be seen when landings are declared to these levels.

- **Port sampling data**: Stock assessment models require data on the age or length composition of the commercial catches. Port sampling programmes are required to collect these data. These programmes would have the added benefit of proving additional data that would help separate the generic catches outlined above into their constituent species.

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 and agrees with the recommendations of the GFCM SCSA which were as follows:

- A. Commercial data collection programmes for both targeted and by-catch species and by-products should be developed in a standardized way at regional level with harmonized protocols based on the existing FAO and other guidelines already published.
- B. Elaboration of field practical guides for identification of the species and dissemination of the existing ones.
- C. Enhance capacity building through training workshops to improve knowledge on assessing the age such as the one being organized by the GFCM within the framework of the "medium term research program to improve the knowledge on elasmobranchs" currently in force and that was held from 12 to 16 March 2012 in Antalya, Turkey. Identification training workshops as well as on quantitative analysis are also advisable.
- D. Make use of the existing experience on the work in other areas, to use available methodologies to assess the status in cases of data shortage as for the specific cases of long lived species.
- E. To create a multi-choice table to facilitate the selection of methods to be used, adapted to the data available and to the Mediterranean context (data shortage).
- F. The research institutions from neighbouring countries sharing stocks should strengthen their collaboration.
- G. Collaboration needs to be granted among the organizations dealing with conservation issues (e.g. IUCN, RAC/SPA) so as not to duplicate efforts, base their evaluations on the most sound scientific knowledge, and also improve the consultation process with the GFCM.

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 Sea Areas.

7.1. Basking shark (*Cetorhinus maximus*)

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 trammels 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.

7.2. Thresher shark (*Alopias vulpinus*)

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 oxyrhinchus*). The species has some important parturition and nursery areas in this region, for example the Alborán Sea, where aggregations of pregnant females have been observed. Recent investigations show that pelagic sharks, including this species, are being increasingly targeted in the Alborán 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. STECF suggest that regarding the wide distribution of the species and the lack of information on stocks identity, all bycatches should be reported by the nations and cooperation within the involved RMFO's should help in improving the data.

7.3. Tope shark (*Galeorhinus galeus*)

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 Mediterranean, STECF notes that additional fisheries-dependent data by management area is required and should be encouraged.

7.4. Smooth hammerhead (*Sphyrna zygaena*)

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

FISHERIES: In the Mediterranean Sea this species is mainly caught by longlines and gillnets, particularly as bycatch in tuna and swordfish fisheries. A number of specimens of this species may be also taken in large driftnet fisheries, even though this fishery has been prohibited in the Mediterranean for several years. Recent investigations show that pelagic sharks, including this species, are being increasingly targeted in the Alborán 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 Mediterranean, STECF notes that additional fisheries-dependent data by management area and by EU Member States is required and should be encouraged.

7.5. *Carcharhinus spp.*

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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.

7.6. Sixgill shark (*Hexanchus griseus*)

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 Threatened (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 Mediterranean, 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 analysed to find recent trends in the abundance and/or occurrence of the species.

7.7. Spurdog (*Squalus acanthias*)

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 Mediterranean, 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 analysed to find recent trends in the abundance and/or occurrence of the species.

7.8. Small-spotted catshark (*Scyliorhinus canicula*) in Geographical Sub-Area 9. Ligurian and North Tyrrhenian Sea

The most recent advice for this stock was provided by GFCM-SAC Sub-Committee on Stock Assessment) held at DG-MARE, Brussels on 12-16 December 2011). Assessment was based on direct survey data.

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.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM. The stock in the GSA 9 was assessed for the first time during the Workshop on Stock Assessment of selected species of Elasmobranchs in GFCM area (GFCM-SAC Sub-Committee on Stock Assessment) held at DG-MARE, Brussels on 12-16 December 2011). The Gedamke and Hoening method was used to estimate the total mortality (Z) and obtain an estimate of F using a constant value of natural mortality.

REFERENCE POINTS: $F_{0.1}$ = 0.13 as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: Taking into account the assessment results (current F=0.33), the stock is considered exploited unsustainably. An indication at the present time is 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 GFCM Workshop on Stock Assessment of selected species of Elasmobranchs in GFCM area recommended a reduction of F toward F_{MSY} in order to drive the stock to a more productive and sustainable status.

STECF COMMENTS: STECF agrees with the recommendations of the GFCM Workshop held in 2011 in Brussels. To these aim STECF advices that the relevant fleets' effort and/or catches should 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

7.9. Blackmouth catshark (*Galeus melastomus*) in Geographical Sub-Area 9. Ligurian and North Tyrrhenian Sea

The most recent advice for this stock was provided by GFCM-SAC Sub-Committee on Stock Assessment) held at DG-MARE, Brussels on 12-16 December 2011). Assessment was based on landings and surveys.

FISHERIES: This deep sea species is mainly distributed in the depth range 200-1000 m. *Galeus melastomus* 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 250-500 m and 500-800 m respectively. Other species of the fishery are *Phycis blennoides, Micromesistius poutassou, Lepidopus caudatus, Trachurus trachurus, Conger conger, Macrouridae spp., Etmopterus spinax, Gadiculus argenteus,* and *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. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The stock was assessed in 2011 by the STECF-EWG-11-12 and more recently by the working group on stock assessment of the GFCM. The assessment was endorsed by the 2011 GFCM- SCSA and subsequently adopted by GFCM SAC. The assessment was based on a length cohort analysis using the DCF catch data for 2009-2010.

REFERENCE POINTS: GFCM-SAC proposed the following reference points as a basis for management advice $F_{0.1}$=0.13

STOCK STATUS: Overfishing was occurring in 2009-2010 as F=0.35 > $F_{0.1}$. The size of first capture was 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: GFCM-SAC advised for a reduction of F toward $F_{0.1}$ also through a decreasing of the catch in areas where juveniles concentrated. To this aim, GFCM SAC also advised to produce a map with the spatial distribution of juveniles.

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

7.10. Pelagic stingray (*Pteroplatytrygon violacea*)

In the absence of any updated assessments, the summary and advice given below is reproduced from the STECF Review of advice for stocks of Community interest for 2012 (STECF 2012, EUR 25034 EN).

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 longline 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 Mediterranean, 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.

7.11. Thornback ray (*Raja clavata*) in Geographic Sub Area 9. Ligurian and Northern Tyrrhenian

The most recent advice for this stock was provided by GFCM-SAC Sub-Committee on Stock Assessment) held at DG-MARE, Brussels on 12-16 December 2011)**.** Assessment was based on direct survey data.

FISHERIES: *Raja clavata* is mainly exploited by trawlers. Most of the GSA catches come from the (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. For *Raja clavata*, a nursery ground in the Tyrrhenian Sea was reported.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM. The stock in the GSA 9 was recently assessed during the Workshop on Stock Assessment of selected species of Elasmobranchs in GFCM area (GFCM-SAC Sub-Committee on Stock Assessment) held at DG-MARE, Brussels on 12-16 December 2011). The Gedamke and Hoening method was used to estimate the total mortality (Z) and obtain an estimate of F using a constant value of natural mortality.

REFERENCE POINTS: The reference points proposed for this stock is $F_{0.1} = 0.08$

STOCK STATUS: Taking into account the assessment results (current F=0.33), the stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: The GFCM Workshop on Stock Assessment of selected species of Elasmobranchs in GFCM area recommended a reduction of F toward F_{MSY} in order to drive the stock to a more productive and sustainable status.

STECF COMMENTS: STECF agrees with the recommendations of the GFCM Workshop held in 2011 in Brussels. To this aim STECF advices that the relevant fleets' effort and/or catches should 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 considerations. Catches and effort consistent with F_{MSY} should be estimated.

7.12. Starry skate (*Raja asterias*) in Geographic Sub Area 9. Ligurian and Northern Tyrrhenian

The most recent advice for this stock was provided by GFCM-SAC Sub-Committee on Stock Assessment) held at DG-MARE, Brussels on 12-16 December 2011). Assessment was based on the fisheries data from the Viareggio area.

FISHERIES: In Viareggio (Northern Tyrrhenian Sea are a fleet of 80 vessels of different sizes and tonnage. 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 one of the most abundant species in catches. For *Raja asterias*, a nursery ground in the Tyrrhenian Sea was reported.

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM. The stock in the GSA 9 was assessed for the first time during the Workshop on Stock Assessment of selected species of Elasmobranchs in GFCM area (GFCM-SAC Sub-Committee on Stock Assessment) held at DG-MARE, Brussels on 12-16 December 2011). An estimate the total mortality (Z) was obtained using a length converted catch curve using the commercial data collected in the Viareggio Port (Ligurian Sea) and assuming natural mortality M=0.3. A yield per recruit model was used to estimate fishing mortality reference points.

REFERENCE POINTS: The reference points proposed for this stock were $F_{0.1}$ = 0.2 as proxy for F_{MSY} and F_{MAX} =0.29.

STOCK STATUS: The preliminary assessment provided during the GFCM workshop clearly indicated that an overfishing status of the stock, since the current F=0.49 is higher than the adopted F_{01} value.

RECENT MANAGEMENT ADVICE: The GFCM Workshop on Stock Assessment of selected species of Elasmobranchs in GFCM area recommended a reduction of F toward F_{MSY} in order to drive the stock to a more productive and sustainable status.

STECF COMMENTS: STECF noting that this assessment is based on data that do not cover the entire GSA 9 area advises that while the estimate for F0.1 is likely to relatively robust, the ratio of $F_{current}/F_{0.1}$, may not be representative of the exploitation rate of *R. asterias* throughout the whole of GSA 9.

7.13. Thornback ray (*Raja clavata*) in Geographic Sub Area 15-16. Malta Island and South of Sicily

FISHERIES: *R. clavata* is the most commonly landed species of ray in the Strait of Sicily, it is frequently caught as by catch by otter trawls targeting the deep-water rose shrimp and bottom longlines targeting large sized demersal bony fishes. Almost all of the fishing effort exerted in the two GSAs is performed by the Italian and Maltese fleets. The contribution made by the Maltese fleet to the fishing effort exerted in the northern sector of the Strait of Sicily (GSA 15 & 16) in 2004-2009 was 28% for longline and 1.1% for bottom otter trawlers.

Data and parameters: data was collected within the framework of the GRUND and MEDITS scientific trawl surveys (2002-2009) for GSA 15 and (1994-2010) for GSA 16. All data were assigned to strata based upon the shooting position and average depth (between shooting and hauling depth). The abundance and biomass indices by km^2 were subsequently calculated as stratified means. Standardized length frequency distributions (LFD) were standardised to 100 km^2. Biological parameters (L-W relationship, size at first maturity, age and growth parameters, etc.) were collected from literature.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is SAC-GFCM.

REFERENCE POINTS: The reference points proposed for this stock are: F_{max} = 0.16and $F_{0.1}$ = 0.10. (sexes combined)

STOCK STATUS: The preliminary assessment provided the following results:

The stock was preliminary assessed as overexploited. *R. clavata* 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:

Actually, there are no formal management objectives for thornback ray in the GSA 15-16.

Due to lack of a time series of data from commercial fisheries, the assessment is considered as preliminary and therefore only partially able to provide management advice. SAC-GFCM advises a reduction of F.

STECF COMMENTS: STECF agrees with SAC-GFCM that future assessments should incorporate fishery dependent data from both GSAs with the aim to provide a more robust assessment and management advice.

7.14. Small-spotted catshark (*Scyliorhinus canicula*) in Geographical Sub-Area 4. Algeria.

FISHERIES: The Small-spotted catshark (*Scyliorhinus canicula* Linnaeus, 1758) in the Algerian basin (GSA 4) is exploited mainly by the bottom trawlers. The species is exploited with a number of other demersal species (*Pagellus acarne, Mullus barbatus, Parapenaeus longirostris, Merluccius merluccius*). Length frequency distributions were gathered for the assessment period (2000-2010) from the commercial landings of three region of Algerian coast. The most exploited length classes is the 42-51cm.

Data and parameters: Length frequency distribution of females and males of the western region of the Algerian basin were analyzed by ELEFAN I (Electronic Length Frequency Analysis) program to calculate the growth parameters (L_{inf}, K). Z was estimated by Pauly's model as M by Djabali's method.

West females: $LT = 61.43\ [1 - e^{-0.6*(t-0)}]$

West males: $LT = 58.28\ [1 - e^{-0.6*(t-0)}]$

L-W relationship (females): $WT = 0.0013\ LT^{3.2514}$

L-W relationship (males): $WT = 0.0042\ LT^{2.9136}$

Z, M and F values

Parameters / Gender	L_∞	K	T_0	Z (Pauly, 1984)	M (Djabali *et al.*,1993)	F
Females	61.43	0.6	13	2.11	0.58	1.53
Males	58.28	0.6	13	2.1	0.59	1.51

SOURCE OF MANAGEMENT ADVICE: The advisory body is SAC-GFCM. VPA, and Thomson and Bell production model for females and males, for the period 2000-2010,was utilise using the mixed approach. The results have been compared to the yield per recruit performed (Y/R) by NOAA program with the females data.

REFERENCE POINTS:

Model performance: The last model fitted well with the data, giving he $F_{0.1}$, F_{max}, F at 30% of MSY

Results: for the period 2000-2010 Females Y/R (NOAA program)

$F_{0.1}$: 0.38 Y/R: 61792 SSB per recruit: 116870 Total biomass per recruit: 184666

F_{max}: 1.051 Y/R: 67675 SSB per recruit: 57463 Total biomass per recruit: 121086

$F_{30\%}$ MSY: 0.637 Y/R: 64722 SSB per recruit: 97809 Total biomass per recruit: 164631

Females and males Y (VPA/Thomson & Bell production model, using the mixed approach)

F0.1

F_{max} 1.5

STOCK STATUS: The stock is in overfishing state, considering that the current F (1.5) should be reduced by more than 50% (based on the assessment period)

RECENT MANAGEMENT ADVICE: Reduction of F for *S. canicula* in GSA 4.

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 Mediterranean, 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.

7.15. Blackchin guitarfish (*Glaucostegus cemiculus*) in Geographical Sub area 14. Gulf of Gabes, Tunisia

FISHERIES: Elasmobranchs constitute about 2% (2000 Tons/year) of the total Tunisian landings and about 70% of these landings are from GSA 14. They are captured mainly by the bottom trawl, gillnets and longlines. In the Gulf of Gabès, the Blackchin guitarfish, *Glaucostegus cemiculus* is targeted by a small artisanal fleet, attached to Zarzis port, using special gillnets from April to August and landed as by-catch throughout the year (except July to September) in trawl fisheries. Annual gillnets landings of this species are about 200 tons in Zarzis port. 20 metric tons were estimated to be landed as by-catch by trawlers working in the Gulf of Gabès.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. VIT model fitted well with the data (CV=0.16)/Virtual Population Analysis Model (VPA/ADAPT) Length Based Yield Per Recruit (for the two gears, trawler and gillnets).

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

Trawl:
F = 0.003
Gillnets:
F = $F_{MSY} = F_{0.1}$ = 0.24

STOCK STATUS: GFCM SAC 2011 assessed the stock to be subject to underfishing status. Considering that the current F is lower than the chosen reference point $F_{0.1}$ that is considered to produce good and sustainable yields. Landings show stability during 2001 to 2007.

RECENT MANAGEMENT ADVICE: The species appears in good exploitation status with a current fishing mortality rate which is lower than $F_{0.1}$, which is considered a proxy of FMSY. Catches does not show any negative trend, which is useful for checking for stability in abundance considering that the fishing effort remained almost constant during the analyzed period.

STECF COMMENTS: From the information presented in the report of the Workshop on Stock Assessment of Selected Species of Elasmobranchs in the GFCM area (DG-MARE, Brussels, December 2011), STECF is unable to determine the stock status in relation to proposed reference point or to provide objective management advice.

8. Resources in the Black Sea

8.1. 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 87 000 t in 2011. 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.

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF

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 2014. Since no precautionary level for the stock size of sprat in GSA 29 was proposed, STECF cannot fully evaluate the stock status in relation to the precautionary approach.

- 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:

STECF proposes the exploitation rate E $\leqslant$0.4 (=F$\leqslant$0.64) as limit management reference point consistent with high long term yields (FMSY proxy). Over the last few years the fishing mortality has piqued in 2004-2005 and 2009-2011 at a level of 0.6 - 0.8. The current 2011 F=0.811, that equals an exploitation rate of about E=0.46 (natural mortality M=0.95) makes the EWG to considers the stock exploited unsustainably.

- 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 exploited unsustainably, the present exploitation rate E=0.46 being above the reference point of E$\leqslant$0.4 (FMSY proxy). STECF recommends the exploitation for 2012 to not exceed the Fmsy level of 64 000 t which is bellow the expected status quo catch of 85 000 t. In the absence of an allocation key for the international sprat catches, STECF is unable to advice on a specific EU TAC for sprat in the Black Sea.

Other 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 emphasizes 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.

8.2. 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. The overall official landings of turbot in the Black Sea declined in the last 4 years from 1035 t in 2007 to less than 500 t in 2011.

Both for Bulgaria and Romania quotas of 43.2 t in 2012 (roll-over from 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

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF

F_{MSY}	0.07-0.15

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):

Uncertainties regarding the actual landings constrain STECF to interpret the SAM assessment results only in relative terms, i.e. they are considered indicative of trends only. In the absence of a biomass precautionary reference points the EWG is unable to fully evaluate the stock size in respect to this. However, survey indices and the SAM analyses indicate that the stock size is at a historic low and it is less than 10% of the SSB estimated in the end of the 1970s.

- State of the juveniles (recruits):

Recruitment has increased since 2003 but this has not yet materialized in a significant increase in SSB. However, the last year classes (2009-2011) are among the lowest observed in the time series.

- State of exploitation:

STECF propose F_{MSY} to between =0.07-0.15 as limit reference point consistent with high long term yields. F is at the historical high level around 1.00, almost 6 times F_{max}.The EWG classifies the stock of turbot in the Black Sea as being exploited unsustainably. The EWG notes that despite the recently low TACs the fishing mortality remains at a level with no signal of reduction.

STECF advises on the basis of precautionary considerations that there should be no fisheries for turbot and individuals caught unintentionally should be promptly released. STECF considers also that a management plan should be initiated to restore spawning stock biomass to the level capable producing maximum sustainable yield.

- Source of data and methods:

International landings data at age are believed to be underestimated due to illegal catches and thus are corrected for unreported catches in the assessment. Discards are considered negligible. The available data from both fisheries dependent and fisheries independent sources is considered good enough in order to perform a reliable assessment of the stock. SAM method tuned by bottom trawl survey and commercial fleet is applied.

RECENT MANAGEMENT ADVICE:

STECF advises on the basis of precautionary considerations that there should be no fisheries for turbot and individuals caught unintentionally should be promptly released. STECF considers also that a management plan should be initiated to restore spawning stock biomass to the level capable producing maximum sustainable yield.

Other 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.

8.3. 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, the total international Black Sea catch was reported to be 208,192 t with the major part, 203,026 t was reported by Turkey.

SOURCE OF MANAGEMENT ADVICE: STECF

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF

E=0.4 equals F_{MSY}(1-3)	≤ 0.54

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 600 000 t since 2008. Since no precautionary level for the stock size of anchovy in GSA 29 was proposed, STECF cannot fully evaluate the stock status in relation to the precautionary approach.

- Juveniles (recruits):

During the period 2007 to 2010 the recruitment has varied without a clear trend around 200 million individuals, declining to less than 100 million in 2011.

- Exploitation status:

STECF 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 $F_{(1-3)}$=1.23 exceeds such exploitation rate E≤0.4, which equals $Fmsy_{(1-3)}$=0.54, assuming an $M_{(1-3)}$=0.81.

The EWG-12-16 recommends the exploitation of anchovy to be sustainable and the catch in 2012 not to exceed 141 000 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 2013 not to exceed 141 000 t. 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.

Other 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.

8.4. 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 ranged from around 8 200 t to 12 000 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

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF

F_{MSY}(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 STECF 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 independent recruitment index (survey) available as none of the surveys cover the entire stock area.

- State of exploitation:

The STECF proposes F_{MSY} (1-4)$\leqslant$0.4 as limit reference point consistent with high long term yields and low risk of fisheries collapse. As the estimated F(1-4)= 0.66 exceeds $F_{MSY,}$ STECF classifies the stock of whiting in the Black Sea as being exploited unsustainably. If the stock is fished at F_{MSY} (1-4) = 0.4, catch for 2013/2014 would be 4218 and 4971 t respectively. STECF therefore recommends for 2013 a total catch not larger than 4218 t corresponding to catches at F_{MSY}.

- Source of data and methods:

International landings at data at age were constructed while discards are considered negligible. XSA analyses tuned by a short (4 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 2013 not to exceed 4218 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.

Other considerations

A short term prediction of stock size and catches assuming a status quo fishing scenario in 2012 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.

9. Stocks of the northwest Atlantic (NAFO)

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

The NAFO SC issued Multi-year advice for 2011-2013 in its 2010 Report.

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 was 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. Reported catches in 2011 (STATLANT 21) were around 9.8 Kton, while STACFIS estimated 2011 catches at 13.9 Kton.

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 2011.

STOCK STATUS: SSB in 2011 is estimated to be well above Blim. Recent recruitments are among the highest level of the time series, but these estimates are imprecise. Fishing mortality in 2011 is high, at the level of more than twice Fmax. Under all scenarios there is a low probability (<5%) of SSB being below Blim. Estimated total biomass and abundance has shown an increasing trend since the mid 2000s. Both values for 2011 are around the level of the early 90s. Estimated median SSB has increased since 2005to the highest value of the time series and is now well above Blim (14 000 t). The big increase in the last three years is largely due to six abundant year classes, those of 2005-2010, and to their early maturity. recruitment at age 1 values in 2005-2011 are higher, especially the 2010 and 2011 values.

RECENT MANAGEMENT ADVICE: Stochastic projections have been performed for 2012-2014 under three fishing mortality scenarios: (1) Fbar=F0.1 (median=0.08); (2) Fbar=Fmax (median=0.135); (3) Fbar=F2011 (median=0.339). All scenarios assumed that the Yield for 2012 is the established TAC (9 280 t). Scientific Council advises that catches in 2013 corresponding to F sq would not be viable and fishing mortality over Fmax will result in an overall loss in yield in the long term.

STECF COMMENTS: STECF agrees with the advice from the NAFO SC and notes that fishing at Fmax in 2013 is predicted to result in catches of 14 000 t. STECF notes that a new full assessment of this stock will be carried out in 2013.

STECF also notes that the Fisheries Commission has requested the Scientific Council to define Bmsy for cod in Division 3M and to propose a Harvest Control Rule (HCR) consistent with the NAFO Precautionary Approach Framework. It has also requested the Scientific Council to define the estimated timeframe to reach Bmsy under different scenarios, consistent with the proposed HCR. However, Scientific Council has been unable to make any progress towards answering this request yet.

9.2. 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 2011. 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 until 2010, but declined to 13000 t i 2011.

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 2012) and autumn (1996 to 2011). 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: Current scientific advice for the management of Div. 3LNO shrimp is based on the relationship between trends in research vessel survey indices and the commercial landings. There is no accepted assessment model. 15% of the highest survey observation of female biomass (SSB) is currently accepted as a proxy for Blim. There is no current proxy for Flim. Fisheries commission has requested advice on the identification of Fmsy, Bmsy and advice on the appropriate selection of an upper reference point for biomass. Such advice is best provided using an accepted assessment model fit to the data. Progress has been made in fitting surplus production models using both maximum likelihood and bayesian approaches.

STOCK STATUS: Biomass levels peaked in 2007, then decreased substantially by 2009 and remained at this lower level in 2010 and 2011. A predicted decline in the 2011 autumn survey biomass did not occur. However, the decreased levels of biomass in the Canadian survey series since 2007 are a reason for concern. The biomass is likely to be above Blim and in its 2012 assessment NIPAG concluded that there was no change in the status of the stock.**RECENT MANAGEMENT ADVICE:** In October 2011 the Scientific Council provided advice options (catch levels) for 2013 for shrimp in Div. 3LNO. These options were based on the average fishable biomass for the last three surveys and predicted autumn 2011 survey. The table below shows the predicted catch

levels for 2013 at various exploitation rates. In 2011 the Council adopted a 2013 TAC of 9350 t corresponding to an exploitation rate of 15.3%.

Exploitation Rate	Catch Level
5.0%	3 059 t
10.0%	6 119 t
14.0%	8 566 t
15.3%	9 350 t

The Council reviewed the status of these stocks at this September 2012 meeting, and found no significant change to warrant any update of the advice (catch levels) previously provided. Exploitation rates over the period 2006-2009 have been near 14% and were followed by stock decline. However, NAFO Scientific Council now 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., Therefore, NAFO now recommends that the TAC for 2013 be less than 8 600 t. Scientific Council is not able to quantify the absolute magnitude of the risk associated with alternative TAC options.

From an ecosystem perspective, Scientific Council also notes that positive signs observed in some fish stocks on the Newfoundland Shelf could translate into increased natural mortality levels for shrimp given its role as a forage species in this ecosystem. In this context, a particularly cautious approach to setting the TAC is to be encouraged.

STECF COMMENTS: STECF agrees with the SC (revised) recommendation for the 2013 TAC (TAC<8600 t). STECF also 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.

9.3. Shrimp (*Pandalus borealis*) in Division 3M (Flemish Cap)

The most recent advice for this stock was provided by the NAFO Scientific Council in 2010. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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. A moratorium has been imposed since 2011 and no catches have been recorded during the 2011 and 2012.

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

Catch, effort and biological data were available until 2010 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 (1988-2012). No catches have been recorded since 2010.

No analytical assessment was available. Evaluation of stock status is based on interpretation of commercial fishery and research survey data.

REFERENCE POINTS: NAFO 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 fluctuated around Blim in 2009 and 2010, but was below in 2011 and 2012. It is not possible to calculate a limit reference point for fishing mortality.

STOCK STATUS: The indices of biomass decreased sharply in 2009 to slightly below Blim and in 2011 and 2012 it has remained below the Blim proxy.This trend indicates a strong decrease of this stock caused by weak recruitment in the last eight years and an increase of the cod stock, one of their most important predators

RECENT MANAGEMENT ADVICE: The most recent assessment was undertaken in 2012. However, there has been no request from the NAFO SC to revise the advice for 2013:

The 2011 survey biomass index indicates the stock is below the Blim proxy and remains in a state of impaired recruitment. Scientific Council recommends that the fishing mortality for 2013 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 2012 Annual Meeting, the NAFO Fisheries Commission agreed that there should be no directed fishery for Northern shrimp in Divisions 3M in 2013.

9.4. 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 for 2012 was set in 16,326 t. (0.95*17185=16 326 t). Applying the harvest control rule for 2013 gives 16326*[1+2*(-0.1099)] = 12 739 t. However, as this change exceeds 5%, the HCR constraint is activated and TAC 2013 should be calculated as 0.95*16326 = 15 510 t. In 2014, there will be a full review of the current Management approach

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.

9.5. 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 (STACFIS) for 2009 and 2010 and 2011 are 5600 t, 3100 t, 5400 t respectively for Div. 3LNO. The catches for Subdivision 3Ps are 700 t, and 300 t. and 400 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:

This stock has remained at low levels since the mid-1990s, with low fishing mortality index since 2005. Recruitment index in 2010 and 2011 is 50% above average.

RECENT MANAGEMENT ADVICE: The most recent management advice was given based on 2010 assessment. This stock has remained low since the mid-1990s. Catches in Div. 3LNO in excess of recent levels (2009-11 average = 4 700 t) will increase the risk of the stock failing to rebuild.

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 recommendation by NAFO Scentific Council in 2012.

9.6. Redfish (*Sebastes spp.*) in Division 3LN

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 catches in 2010 and 2011was of 4100 t and 5395 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.

Catch data since 1959 and data from surveys conducted by Canada, Russian Federation and EU-Spain were available. Length frequencies were available for both commercial catch and surveys.

REFERENCE POINTS:

The stock is estimated to be well above Blim (30% Bmsy) and fishing mortality is estimated to be well below Flim (=Fmsy).

STOCK STATUS: The biomass of redfish in Div. 3LN is above Bmsy, while fishing mortality is below Fmsy. This stock was assessed in 2012. An ASPIC model framework was used to assess the status of the stock. This framework uses a surplus production model to describe stock dynamics. Next full assessment wil be in 2014.

RECENT MANAGEMENT ADVICE:

Redfish in Div. 3LN has been under moratorium from 1998 to 2009. NAFO recommended that 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.

Scientific Council recommends that fishing mortality in 2013 and 2014 should be kept around the current level. This corresponds to catch levels in 2013 and 2014 of around 6200 t. Increases of F above Fsq should be treated with caution. NAFO also recommends that by-catch of species under moratorium in the redfish fishery should be kept to the lowest possible level.

STECF COMMENTS: STECF agrees with the advice from NAFO.

9.7. 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 An exploratory three-species model has been used to investigate the joint dynamics of cod, redfish and shrimp in the Flemish Cap, and to explore the plausibility of producing a combined MSY for these three species. Different MSY scenarios were explored, including the maximization of combined yields for the three species (MS), as well as three single species scenarios where fishing rates were set to maximize the yield of each one of the individual species (Cod, Redfish, and Shrimp). Results from these explorations indicated, that simultaneously achieving the yields produced by single species MSY scenarios is not possible. Overall, achieving high yields for the fish species implies low levels of shrimp biomass, while maximizing shrimp yields would require accepting significantly lower levels of cod and redfish biomass.

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.

9.8. 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.

9.9. 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.

10. Resources in the area of CECAF

This section contains the most recent information for those stocks in the area of CECAF (Committee for the Eastern Central Atlantic Fisheries) that are currently exploited by fleets from the EU. The CECAF 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 EU 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 14 of this report.

Fishing agreements have evolved along the time. In 1999, finished that negotiated with Morocco and subsequently two other important agreements such those 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 fishing 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 EU and Mauritania in 2006 for a period of six years, reviewable every two years. The latest fishing agreement between the EU 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 exploited by European fleets in the CECAF region in 2011.

It is worth noting the general increase of catches of small pelagics detected from 1994 to 2011 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 doubled from 2010 to 2011, due to the return of vessels that had been working in the southern Pacific for the previous 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 Dakar, Senegal, from 21 to 25 May 2012. No Working Group on Demersal Resources was carried out since 2010. 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 demersal stocks, there is no updated advice and the text of the stock sections remains unchanged from the STECF Review of advice for 2012.

10.1. 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). In 2011, Zone North was 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 was allowed to fish sardine under licences category number 1 of the protocol (Small-scale fishing/north: pelagic species), although it mainly targeted anchovy, and sardines were 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 an unknown number of Moroccan purse seiners and long distance trawlers mainly from Russia and The Netherlands (through EU-Mauritania fishing agreements). The last fisheries partnership agreement between Morocco and the EU, expired in November 2011, permitted 17 European vessels to fish for small pelagics, using pelagic trawls, in zone C. Sardine was the second most abundant small pelagic species in the total catch of the sub-region (Morocco, Sahara, Mauritania and Senegal). A total of 783 900 t has been reported in 2011, 73% registered in the Moroccan zone.

Sardine constituted about 61% of the total small pelagic catches in Moroccan waters, with values around 575 000 t in 2011, lower than previous years. The average catches of sardine over the last five years (2007 to 2011) were around 690 000 t. In Mauritania, sardine exploitation in 2011 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 205 000 t in 2011, which means an increase of 65% from 2010 to 2011.

Sardine catches in Senegal, although much lower than in the rest of the area, highly increased from 2010 to 2011 (from 18 to 3 400 tonnes).

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 Dakar (Senegal), from 21 to 25 May 2012. 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} = 1 616 309 and F_{MSY} = 0.53, while target reference points were $B_{0.1}$ = 1 777 940 and $F_{0.1}$ = 0.48.

STOCK STATUS: The only biomass estimation available from acoustic surveys was that carried out in the area between Cape Juby and Cape Blanc (R/V Atlantida), which showed a biomass decrease of 60% in relation to 2010. 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). 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. The CPUE trend of the Moroccan fishery in this area showed a progressive decline of this resource since 2009. Furthermore, a progressive decrease of the sardine sizes was detected from catches during these last three years. For Zone C, the assessment results indicate that both the estimated biomass and the fishing mortality in 2011 were lower than the target values ($B_{cur}/B_{0.1}$= 85% and $F_{cur}/F_{0.1}$= 58%). The stock C was considered not fully exploited.

The CPUE decrease in the zone A+B is coincident with a CPUE increase in the zone C during the same period 2009-2011. These could be attributed to certain environmental conditions that favoured good recruitments of the sardine in the southern area.

RECENT MANAGEMENT ADVICE: For the central stock of sardine (A+B), the Working Group recommends that the 2012 total catch should not exceed the 2011 level, noting that this stock is highly dependent on recruitment, which fluctuates with changes in the environment.
The Working Group suggested that the total catch level should be adjusted to the natural fluctuations in the stock C, 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).

10.2. Anchovy (*Engraulis encrasicolus*) off Morocco and Mauritania

FISHERIES: In 2011, anchovy was mainly exploited in the northern region of the Moroccan coast by purse seiners from Morocco, and in a lesser extent, from Spain. A maximum of 20 Spanish boats were allowed to operate in north-Moroccan waters until November 2011, when the EU-Morocco fishing agreement expired. These Spanish vessels belonged to a purse seiner fleet based on the Andalusian Port of Barbate (Cádiz, South of Spain). Spanish catches in this region were mainly composed of anchovy, with a small by-catch of sardine (*S. pilchardus*), horse mackerel (*Trachurus spp*) and mackerel (*Scomber japonicus*). The activity of Moroccan boats is unknown. The anchovy is also fished in Mauritanian waters. Although it is not the main target of the fishery in the area, large quantities are caught as by-catch by the industrial pelagic trawlers fishing for sardinella, horse mackerel or mackerel.

A great increase in total anchovy catch has been experimented in the region since 2006, which is partly explained by the high increase in the European, Russian and Ukrainian effort in Mauritania, and, to a lesser extent, by that of the Moroccan fleet in zone B. Total declared anchovy catches in the region reached near 150 400 t in 2011, keeping at the same levels than 2010. Catches averaged around 135 470 t during the last five reported years (2007-2011). However, it should be noted that around 74% of total anchovy catch in the region is fished in Mauritania, mainly by the Russian and Ukrainian fleets, which account for about 69% of the total.

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 Dakar (Senegal), from 21 to 25 May, in 2012. 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. Estimations of the limit and target reference points were F_{MAX}= 2.0and $F_{0.1}$= 0.78, respectively.

STOCK STATUS: No acoustic estimations of anchovy biomass in 2011 were presented in the Working Group. Available data for anchovy in the sub-region did not allow the use of a global model. A Length Cohort Analysis (LCA) was applied in order to estimate the current F level and the relative exploitation pattern on the fishery over the last few years. A length-based Yield per Recruit Analysis was then run on these estimates, to estimate the Biological Reference Points F_{MAX} and $F_{0.1}$. The LCA results indicated that the fishing mortality level in 2011 was higher than the fishing mortality corresponding to $F_{0.1}$ ($F_{cur}/F_{0.1}$=128%). The results showed that the anchovy stock in the region was fully exploited.
The Working Group 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 the 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 the stock should be exploited with prudence and the 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). STECF notes that the assessment of anchovy in the waters off Morocco and Mauritania would benefit from improved information on catches and effort from Mauritanian waters. In addition, biological studies on stock identification of *Engraulis encrasicolu*s in the area would also help to provide better assessments and advice.

10.3. 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 2012.

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.

10.4. 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 2012.

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.

10.5. 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 2012.

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.

10.6. 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 2012.

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.

10.7. 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 2012.

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.

10.8. Atlantic horse mackerel (*Trachurus trachurus*) and Cunene horse mackerel (*Trachurus trecae*) off Mauritania and other countries in the northern CECAF region.

FISHERIES: The Atlantic horse mackerel is distributed off Western Sahara (under Moroccan administration) and Mauritania, while the Cunene horse mackerel is mainly found in Mauritanian and Senegalese waters. The limit of the distribution of these stocks is subject to long-term variations. Horse mackerels are exploited by both artisanal national fleets and industrial (mainly foreign) fleets in NW African waters. The two *Trachurus* species (*T. trachurus* and *T. trecae*) made up 96% of the total catches of horse mackerel in 2011. The Atlantic horse mackerel *T. trachurus* is mainly fished in Mauritania (83%) and Morocco (17%), while Mauritania and Senegal are the main fishing grounds for the Cunene horse mackerel *T. trecae* (81% and 14% of the catch, respectively). In 2011, fleets from Belize, the EU, Russia and Ukraine were operating in Mauritanian waters. Horse mackerels generally are the target species for the EU pelagic trawlers, mainly from The Netherlands, Lithuania, Latvia and Poland. More than 50% of the horse mackerels catch in 2011 were fished by the fleet from Belize. In the Moroccan fishing ground (Cape Spartel-Cape Bojador), *T. trachurus* is exploited by a national fleet.

The Cunene horse mackerel (*T. trecae*) is the most important species of horse mackerel in the subregion, constituting about 11% (approximately 257 000 t) of the total catch of the main small pelagic species in 2011. The catch of this species has fluctuated over the time series with an overall increasing trend in recent years.

However, in 2011 the catch decreased by 27% in the subregion. The average annual catch of the Cunene horse mackerel over the last five years (2007-2011) was estimated at about 333 000 t. About 67 600 t of Atlantic horse mackerel (*T. trachurus*) were landed in 2011 (3% of the main small pelagic fish in this year). This amount represented a decrease by 39% in relation to 2010. The average catch of Atlantic horse mackerel over the last five years was 103 400 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). This Working Group met in Dakar (Senegal), from 21 to 25 May, in 2012. 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} = 250 000 and F_{MSY} =0.25, while target reference points were $B_{0.1}$ = 275 000 and $F_{0.1}$ = 0.23. 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. Assessment of the two stocks were carried out using a surplus production model, using the CPUE of the Russian fleet as abundance index. Results showed that the estimated biomass of *T. trecae* in 2011 was near half the value of the target biomass $B_{0.1}$ and that the fishing mortality exceeded the $F_{0.1}$ level in 127%. Therefore, the fishing effort was greatly higher than the one that would keep the stocks at sustainable levels. This result evidence an overexploitation of the *T. trecae* stock. On the other hand, results of the assessment of *T. trachurus* showed that the estimated biomass and the fishing mortality in 2011 were approximately at the target levels ($B_{cur}/B_{0.1}$= 106% and $F_{cur}/F_{0.1}$= 101%). Therefore, this stock was considered fully exploited.

RECENT MANAGEMENT ADVICE: As a precautionary measure and taking into account the mixed nature of this fishery, it was suggested to decrease the effort of 2011 by 20%. The Working Group reiterated its recommendations of previous years and suggested that 2012 total catches of the two species should not exceed the 2011 level (325 000 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) that combined catches of. *T. trecae* and *T.* Trachurus from northwest Africa in 2012 should not exceed 325,000 t.

10.9. 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 (Tangier–Cape Bojador), the chub mackerel is only exploited by the Moroccan fleet. This fleet is composed of coastal purse seiners, which mainly target sardine but also fish chub mackerel depending on its availability. A purse seiners Spanish fleet has been operating in the North Zone into the framework of the EU-Morocco fishing agreement from April 2007 to November 2011, although chub mackerel catch by this fleet is negligible.

Part of these Moroccan coastal purse seiners also operates in the zone between Cap Bojador and Cap Blanc, together with a Moroccan fleet of Refrigerated Sea Water (RSW) vessels and a fleet of Russian pelagic trawlers that temporally operates under a Morocco–Russian fishing agreement. Other vessels in this area are chartered vessels operated by Moroccans and trawlers operating under the Morocco-EU fishing agreement, which ended in November 2011. The fleet of Ukrainian vessels that used to operate in this area are no longer operating since 2010. South of Cap Blanc, in the Mauritanian zone, pelagic trawlers from several countries (e.g. Russia, Ukraine, Poland, Lithuania, etc) fish mackerel on a seasonal basis. Chub mackerel is also taken as bycatch by the EU vessels (Dutch type). In The Gambia and Senegal, chub mackerel is considered as bycatch of the Senegalese artisanal fleet. In 2010, a Russian fleet composed of three industrial fishing vessels operated in Senegal.

Since 1991, the trend of total chub mackerel catches for the whole subregion has seen an overall increase over the time period. The catch in 2011 was 318 000 t, the highest of the time series. This mainly resulted from an increase in catches in zone C (north of Cape Blanc), with the Moroccan fleet being the main contributor. Higher caches were also observed to the south of Cape Blanc, in Mauritania and Senegal. In Mauritania, where the European fleet operates, total chub mackerel also has shown an increasing trend in the last years. A total of 99 800 t were registered in 2011, which represents an increase of 33% in relation to the previous year. The average catch for the last five years from Mauritanian waters (2007-2011) was estimated at around 33 100 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 Dakar (Senegal), from 21 to 25 May, in 2012. 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). Not specific values for the reference points were adopted in 2011.

STOCK STATUS: No acoustic biomass estimations of mackerel in 2011 were available to the Working Group. Fishery based assessments were carried out by applying a Schaefer dynamic surplus production model, but the results were not retained by the Working Group as there were uncertainties in relation to the abundance index used. Therefore, analytical models (XSA and ICA) were applied. The results of the XSA analysis showed that the level of fishing effort deployed was half the value of the target effort and that the current biomass was slightly below the target $B_{0.1}$. Based on these results, the Working Group considered the stock fully exploited.

RECENT MANAGEMENT ADVICE: As a precautionary approach and considering the good recruitment estimations, the Working Group recommended that the catch levels should not exceed a level of around 250 000 tonnes in 2012.

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).

STECF notes that the advice for a catch of 250,000 t for 2012 represents a 21% reduction on the catches for 2011.

10.10. 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*). Both species are considered single stock units, covering the area from the south of Senegal to Morocco. In zone C to the north of Cap Blanc, sardinellas are exploited by a fleet of Moroccan purse seiners and by industrial trawlers from the Russian Federation and the EU. The greatest exploitation 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 (trawlers from The Netherlands, France, England, Germany and Lithuania) and the Russian-type fleet (all from East-European origin). This division is based on the fact that the Dutch-type fleet specifically target sardinellas, whereas the Russian-type fleet targets horse mackerel and mackerel, and take sardinella only as secondary species. In Senegal, sardinellas are mainly exploited by the artisanal fleet. In 2011 there was also an industrial fleet of Russian trawlers operating in Senegal.

Sardinella spp constituted 26% of total catch of small pelagic fish off Northwest Africa in 2011, with 20% for round sardinella *S. aurita* and 6% for flat sardinella *S. maderensis*. The round sardinella is the second most important small pelagic species in terms of catch. Total catches of *S. aurita* in the region have increased in the last years, reaching the maximum value of 600 000 t in 2011. Over the last five years, total catch of *S. aurita* has been fluctuating around an average level of about 534 700 t. For *S. maderensis*, the catches show a general decreasing trend since 2003. Catches in 2011 were around 125 000 t. The average catch of this species for the last five years (2007-2011) was 132 200 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 Dakar (Senegal), from 21 to 25 May, in 2012**.** 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}= 854, F_{MSY}= 0.32 and target reference points for the same stock were $B_{0.1}$ = 940 and $F_{0.1}$ = 0.29.

STOCK STATUS: regional acoustic surveys were not carried out in 2011. The stocks of sardinella were assessed by applying the Schaefer dynamic surplus production model. The abundance indices of the coordinated regional acoustic surveys were used in previous years. 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 Dutch vessels in Mauritania was used as abundance index. 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. Traditionally, catches by this fleet in Mauritania are mainly composed of *S. aurita* and therefore, the CPUE in this fleet was considered to reflect the abundance of this species. The model was run both for *S. aurita*, and for the two species combined. Only the results of the assessment of *S. aurita* were accepted. These indicated that the stock is severely overexploited. The relationships between the current biomass and fishing mortality and the target levels were not presented, as they were not considered consistent.

RECENT MANAGEMENT ADVICE:

The Working Group reported that current catches of sardinella were not sustainable and should be reduced in order to avoid a future depletion of the stock. The Working Group recommended a reduction of the fishing effort in 2012 and reinforced the recommendations expressed in the working groups of 2010 and 2011. The Working Group could not make a catch recommendation as at present it is unable to predict future recruitment.

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).

10.11. 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 2012.

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.

10.12. 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 2012.

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.

10.13. 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 2012.

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.

10.14. 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 2012.

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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11. Resources in the area of WECAF

11.1. Shrimp (*Penaeus subtilis*), French Guyana

The text below largely arises from the report prepared for DG MARE under an ad hoc contract in 2012 (Blanchard, 2012; to be found in the background document section item 6.2 of the STECF-PLEN-12-03 meeting's website on: http://stecf.jrc.ec.europa.eu/web/stecf/plen03).

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 *Farfantepenaeus. subtilis*, with its landings representing nearly 95% of the total shrimp landings of the area. The other species landed is *F. brasiliensis*, which is not separated in landings, but its proportion is estimated from market samples. Due to 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 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).

After 1999, the fishing effort continuously decreased to around 5000 days at sea in 2009 with landings of about 1500 tons. In 2010 and 2011, the fishing effort and landings decreased again to around 1000 tons. Actually, after 2000, an exponential increase of aquaculture production of shrimp from south-eastern asian with lower costs of production, lead to a decrease of the selling prices in the international market, so that the firm turnover decreased (taking also into account the increasing exploitation costs of trawlers due to the fuel price increase) and it was more economically viable to exploit the stock with less vessels.

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 most recent assessment of the shrimp stock of *Farfantepenaeus subtilis*, was conducted in early February 2012 by Ifremer using an analytical model (VPA on a monthly time step). The general conclusions are identical to the previous yearly assesments: stock biomass and recruitment are estimatesd to be at the lowest levels of the series, and recruitment shows a continuous to decline since the mid-2000s. Examination of the results of this analysis did not show a change in fishing mortality that may explain the collapse of the stock: monthly fluctuations in mortality that are very important, but the trend is downward in recent years. Since 1999, high values of recruitment are no longer observed. Since 2006, a sharp recruitment decline is estimated. Moreover, the collapse of recruitment does not seem to be completely caused by a decline in spawner abundance, although, obviously, in recent years, the low spawner abundance produces small amounts of recruitment. In contrast, the spawning biomass is directly related to the recruitment. It thus appears that the fishing may not be the main cause of the collapse of the stock biomass and recruitment.

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 notes that while fishing pressure does not seem to be the main cause of the collapse of the stock, it may exacerbate a fragile situation. If the conditions again become favorable, maintaining a minimum of shrimp is essential. In this regard, the maintenance of moderate fishing effort and/or catches is probably the most relevant measure. It should also ensure that preservation of juveniles in coastal waters (below 30 m) thanks to the fishing ban is effective. In recent years, the number of licenses does not appear to be a factor of control of fishing since the number of shrimp trawler in activity is much lower than the licenses granted. The TAC, has also rarely been achieved. It has been shown that the conditions of profitability of the vessels contribute to the self-regulation of the fishery today given the low catches. In conclusion, and in the case of a stock situation in the coming years comparable to recent years, it is likely that the fishery regulates itself regardless of the number of licenses granted. To give the stock a chance to improve if conditions again become favorable, it may be desirable to consider a revision of the TAC, and consequences of the licenses to ensure that the catches remain moderate to ensure a sustainable renewal of the stock.

11.2. Red snappers (*Lutjanus* spp.) waters of French Guyana

The text below largely arises from the report prepared for DG MARE under an ad hoc contract in 2012 (Blanchard, 2012; to be found in the background document section item 6.2 of the STECF-PLEN-12-03 meeting's website on: http://stecf.jrc.ec.europa.eu/web/stecf/plen03insert).

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 45 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 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*). Fishing effort expressed as a number of days fishing in the EEZ of French Guyana is the only data provided for both fleet segments (handline fleet and pot/trap fleet) in the logbooks. It is around 3800 days fishing. The activity of the Martinique (and more rarely of the Guadeloupe) pot fleet fishing in the EEZ of French Guiana is variable depending on the year with 1 to 6 vessels operating for 250 fishing days in total. The handline fleet for red snapper catches *Lutjanus purpureus* at 90%, while the pot fleet catches about 70% of *Lutjanus purpureus* and more than 25% of the snapper *Rhomboplites aurorubens*. The production landed in French Guyana fluctuates between 800 and 1600 tons, about 90% done by the handline fleet. 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: Because of uncertainty in assessment model inputs, stock status is uncertain.

The results of the VPA based on ages show that the red snapper recruitment in recent years seems to remain at a high level (the last 2 years subject to some reservations due to the low number of data used in the analysis) with a value of around 6 million recruits at age 1. Total biomass increased steadily since 2003 and reached in 2010 the value that was observed in the 90s, before the collapse of the stock. Spawning biomass also increases, but less rapidly than the total biomass. Average fishing mortality F on ages 2-5, is maintained at a much higher level compared to the average F on ages 6 to 11. In the early 2000s, the stock had been declared in over-exploitation by the relevant Working group of the Committee on Fisheries of the west-central Atlantic (FAO). After 2002, recruitment and spawning biomass re-grow. In 2010, the total biomass is at the same level as that observed before the fall of the stock but with a different age composition: recruitment is higher but the spawning biomass is less. The stock appears to be recovering.

RECENT MANAGEMENT ADVICE: Given the uncertainty of the results, the most recent advice recommended to avoid any further increases in effort without improvements in the assessment.

STECF COMMENTS: With the new present informations, that is to say an increase of recruitment, and a subsequent, but slower, recovery of the spawning stock biomass, we should recommend again to avoid further increases in effort (despite it has yet increased in 2012 from 41 to 45 licences delivered), in order to let the stock recover.

12. Resources in the southeast Atlantic Ocean (SEAFO)

12.1. Orange roughy (*Hoplostethus atlanticus*), SEAFO CA

The most recent advice for this stock was provided by the SEAFO Scientific Committee in 2010. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

12.2. Patagonian toothfish (*Dissostichus eleginoides*), SEAFO CA

The most recent advice for this stock was provided by the SEAFO Scientific Committee in 2010. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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 40ºS and 50ºS. 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 60ºS) 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.

12.3. Alfonsino (*Beryx* spp.), SEAFO CA

The most recent advice for this stock was provided by the SEAFO Scientific Committee in 2010. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

12.4. Deep-sea red crab (*Chaceon* spp.), SEAFO CA

The most recent advice for this stock was provided by the SEAFO Scientific Committee in 2010. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

12.5. Pelagic armourhead (*Pseudopentaceros richardsoni*)

The most recent advice for this stock was provided by the SEAFO Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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

13. 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 fisheries in the SW Atlantic, this region being the only significant area for fisheries not covered by any Regional Fisheries Management Organisation (RFMO).

This section contains updated reviews of advice for stocks in Falkland Islands' waters. The Instituto Español de Oceanografía (IEO, Spanish Institute of Oceanography) conducted 13 multidisciplinary research cruises in international waters of the SW Atlantic between October 2007 and April 2010 to provide scientific advice to the Spanish fisheries Administration, . 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.

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).

[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

[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

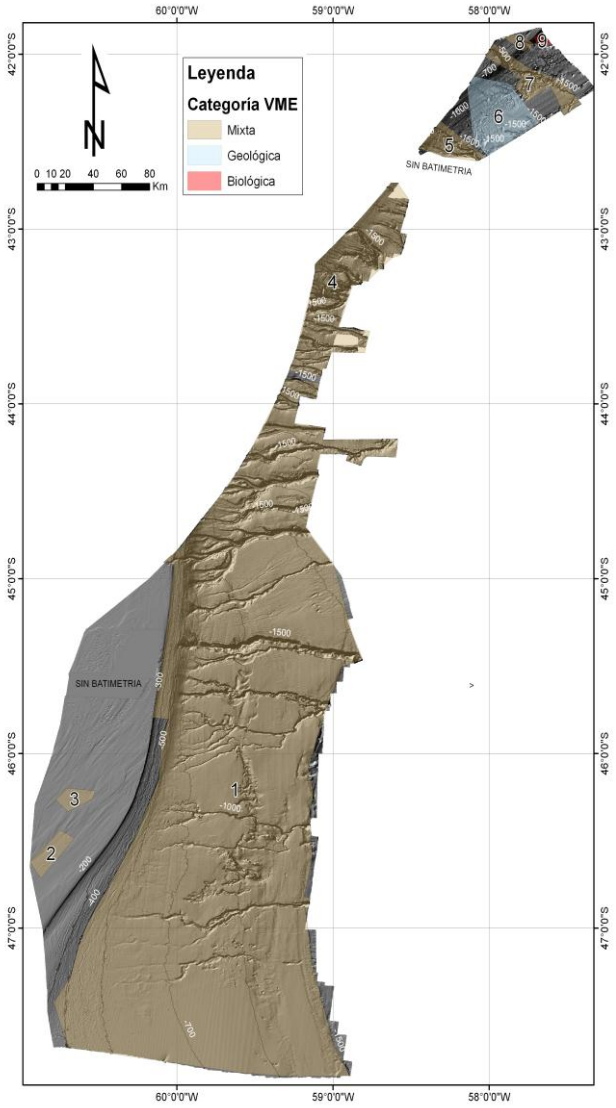


Figure 1. Candidate sites for protected areas in the HS of SW Atlantic. Only candidate areas 2 and 3 are on the continental shelf at depths less than 200 m.

As no more surveys for biomass estimations have been carried out by IEO since April 2010, no updates on stock status or advice for stocks in international waters are provided in the present section of this report.

RESOURCES IN FALKLAND ISLANDS WATERS

13.1. 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. The total catch was 22,864 t in 2011 and 9,798 t in January – September 2012. Hoki is mainly targeted in two seasons, from February-May and from July-October.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

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

STOCK STATUS: The stock is considered to be in good condition at present, however, historically, catches of hoki were quite variable and there is some concern that the current high catches may not be sustainable in the long term. Catches from 2005 to 2008 have tended to be lower than catches in the previous years 2002 to 2004 and in the years 2009-2011 the total annual catch established at the level 19,000-23,000 t – similar to the period 1998-2004. . 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.

13.2. Deep-sea grenadiers (*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, 2,058 t in 2011, and 151 t by the end of September 2012. Decrease in the total catch in the year 2012 was due to interruption of exploratory activity. Total longline bycatch in January – September 2012 was 70 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) produces all management advice and stock assessments of grenadiers.

REFERENCE POINTS: No reference points have been proposed.

STOCK STATUS: In good condition, stable as it is still mainly unexploited.

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.

13.3. 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, though in 2009 a vessel was also operating in January. 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 2012 was 1,290 t only, the lowest catch on record.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD).

PRECAUTIONARY REFERENCE POINTS: The total catch of SBW should be limited to 50,000 t or even lower in the Southwest Atlantic. It was agreed to restrict the total catch of *M. australis* in the Falkland Islands' Conservation Zones to 6,000 t. However, actual catch in 2011 yielded only 3,974 t.

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 ~200,000 t at the end of 2010. This is approximately 13% of the spawning stock biomass in the early 1990s. In the last two years with complete closure of fishing on spawning grounds, the abundance of small recruitment (12-18 cm total length) is increasing.

RECENT MANAGEMENT MEASURES: Fishing in the southern region of FICZ in the spawning grounds was banned for surimi and finfish vessels from 1 September until 15 October 2012 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.

13.4. 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, historically Spanish trawlers target red cod in spring (September-October) on their spawning grounds to the southwest of the Islands. Since 2010 these grounds are closed between 1 September and 31 October. 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 2007-2011 (3,129-5,195 t). The total catch in January-September 2012 was 2,977 t. Both 2010 and 2011 were lower than 2007-2009 mainly due to the fishing ban on their spawning grounds . The closure of the southern blue whiting spawning grounds in September may have also had an impact on catches of red cod.

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.

PRECAUTIONARY 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 and blue whiting on their common spawning grounds in September-October 2010 to allow the stock to recover. This closure continued through 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.

13.5. Argentine hake, Austral hake (*Merluccius hubbsi, Merluccius australis*), Falkland Islands

FISHERIES: Hakes are mainly caught in the western part of the FICZ. They are targeted by Spanish and Falkland Islands' registered trawlers having a special license for unrestricted finfish. The total catch of hakes in FICZ/FOCZ (Falkland Islands Interim/Outer Conservation Zone) decreased from 12,000 t in 1990 to 1,500 t in 1994-1997, and then stabilised at the level of 1,678-3,069 t in 2000-2005. Common hake (*M. hubbsi*) are targeted mainly in winter during their migrations to the Falkland waters from the Patagonian shelf. Austral hake (*M. australis*) are targeted almost exclusively in the southwest of the Islands in September-November after their spawning in the area around the Southern tip of South America. Catches of hakes increased dramatically in the last four years, peaking up to ~13,300 t in 2010 and decreasing to 9,885 in 2011. In 2012, cumulative annual catch of hakes up to 30th September attained 9,649 t which represented the 4th 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: Falkland Islands Government is responsible for management of hake resources.

PRECAUTIONARY 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 1991-1999. However, after strong recruitments in 2001-2002 when the juvenile abundance increased 5-10 times in respect to a period of 1996-2000 this stock is evidently improved, given exceptional catches of hakes in the last five years.

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.

13.6. 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). The official start of the *Illex* fishery in Falkland waters was on 15th February 2012. This year, 99 jiggers were granted licences. In February, average daily jigger catch was quite low, about 8 t per night. Summer spawners represented about 15% of the catches of jiggers and were caught exclusively in the northern part of FOCZ. In the western shelf squid belonged to the South Patagonian Stock. Situation was improved in March with three peaks in jigger catches observed on 4-5 March, 10 and 25 March. The total monthly catch reached 40,590 t. Average daily jigger catch varied from 4.3 to 24.6 t (mean 13.3 t), those of trawlers ranged between 1.3 and 13.4 t (mean 5.0 t). In April, catches decreased in relation to those in March, varying from 3.3 to 16.6 t (mean 9.9 t) that resulted in a total catch of 29,207 t. Jigger catches further decreased in May, varying from 0.9 to 12.3 t (mean 5.3 t). During the second week of May, catches improved peaking up to 21.3 t per night (maximum catch of 103 t per night), mainly in the north-western area of FICZ. Then, catches gradually decreased to 2-3 t per night in the third week and to 1-2 t during the last week of the month. During the last week of May, vessels were continually leaving the fishery, with the last vessel departing on 4 June. Overall in 2012 season, the South Patagonian Stock had medium abundance that resulted in a total catch of 87,023 t of Illex taken within the Falkland Conservation Zones (slightly higher than in previous year, when total catch resulted in 79,361 t).

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 2012, 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.

13.7. 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 2012, the abundance of both cohorts of Loligo was record high for the last ten years. The first season yielded 34,997 t, and the second season 35,739 t with the total annual catch of 70,736 t (twice of the previous year). Unlike previous year, March-April and July-September 2012 were characterized by the prevalence of westerly and south-westerly winds, which are

thought to favour the *Loligo* aggregations. In the first season, catches of squid were stable with high daily CPUEs. It resulted in a total monthly catch of 21,155 t in March and 9,917 t in two weeks of April. The vessels fished mainly in the southern part of the *Loligo* box, having 45-50 t per day in April (maximum catch 79 t per day). Several trawlers finished the first season even 1-2 days earlier than the official closure (14 April) and headed to Spain with full holds of squid. The total biomass of the autumn-spawning cohort of *Loligo* was high, with several in-season immigrations into the fishing area. According to preliminary modelling, at least 18,000 t of the spawning stock biomass of Loligo was left in the water after the fishing season. The second season has started with relatively moderate catches in July with mean daily CPUEs of 25 t. In August, several abundant waves of Loligo immigrated to the fishing grounds, resulting in CPUEs to peak at 60 t per day. With following two immigration peaks in September 2012 (in the middle and end of the month), the total catch for the second season hit the record in the last decade. **SOURCE OF MANAGEMENT ADVICE:** The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

PRECAUTIONARY REFERENCE POINTS: A minimum spawning stock biomass of 10,000 t at the end of each fishing season.

STOCK STATUS: Stocks of both cohorts of Loligo (autumn- and spring-spawning cohorts) are in good and stable condition with the trend to grow in biomass.

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.

13.8. 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 2012 as was the advice for 2008, 2009, 2010 and 2011. The total catch in trawl and longline fisheries in January – September 2012 was 1,195 t that is slightly lower than for the same period of 2011 (1,338 t) and 2010 (1,220 t).**SOURCE OF MANAGEMENT ADVICE:** The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

PRECAUTIONARY REFERENCE POINTS: An annual TAC of 1,200 t has been assigned. **STOCK STATUS:** The fishery data for 2011 indicated a stabilised toothfish stock abundance at 51.3% SSB_0. Stock assessment recommended that a TAC of 1,200 remain for 2012. 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. Because of this stock size (but not SSB yet) began to increase since 2010. **RECENT MANAGEMENT ADVICE:** 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.

13.9. Rockcod (*Patagonotothen ramsayi*), Falkland Islands

FISHERIES: *Patagonotothen ramsayi* is the most abundant species of the genus *Patagonotothen*, which includes 14 species that inhabit the shelf waters off southern South America. This is a medium-sized fish with a maximum total length 47 cm L_T. It occurs on the Patagonian Shelf from 35ºS to the Burdwood Bank in the south (55ºS) and plays an important role in the food web both as predator and prey on Southwest Atlantic shelves, consuming a variety of benthic and bentho-pelagic crustaceans and being consumed by most large fish including hakes, toothfish, kingclip, rajids and others[4].

[4] Winter, A, Laptikhovsky, V., Brickle, P. and Arkhipkin, A. (2010). Rock cod (*Patagonotothen ramsayi* (Regan, 1913)) stock assessment in the Falkland Islands. Directorate of Natural Resources. Falkland Islands Fisheries Department.

Prior to 2007 this species was not targeted due to a lack of marketability. Catches of Spanish and Falkland trawlers in the first half of 2007 were not high, but later in the year mean daily catches sometimes exceed 30 tonnes, with some vessels attaining as much as 60-70 t/day, resulting in an annual catch of 30,635 t that year. Most of the rockcod was taken in the northwestern part of FICZ. Fish have been targeted between 100 and 300 m, and the best catches obtained between 150 and 200 m depth. In 2008 the annual catch achieved 60,165 t, 50,755 t corresponding to finfish licensed trawlers targeting rockcod and the rest taken as bycatch in other fisheries. In 2009 the annual catch reached 58,149 t, 52,594 of them corresponding to finfish licensed trawlers and the rest taken as bycatch in other fisheries. In 2010 rockcod abundance was higher than in 2007-2009 and total catch reached 41,000 t by the end of May[4].

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

PRECAUTIONARY REFERENCE POINTS: Reference points have not been defined for this stock.

STOCK STATUS: The rockcod assessment carried out by the FICZ in 2010 resulted in an estimated biomass (ExB_0) of the unexploited stock at a median value of 937,942 t with a 95% confidence interval of [594,797 to 1,941,325 t]. Median sustainable yield (Y) was estimated at a value of 72,547 t with a 95% confidence interval of [17,181 to 184,848 t].

RECENT MANAGEMENT ADVICE: Total fishing effort in 2012 was recommended to remain at the same level than in 2010-11.

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

Assessments of this stock are based on surveys only. No more surveys for biomass estimations have been made since 2010. Hence, sections 13.10 to 13.18 remain largely unchanged from the STECF review of advice for 2011.

Biomass estimations 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 impact on the VMEs found and 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 in 2011 to be designated as VMEs and closed to bottom trawling. 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. 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 *Illex* 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. Further studies carried out by the IEO analysing the impact of bottom trawling on VMEs in international waters concluded that, due to intense bottom trawling over the last 40 years by international fleets, conservation measures are not relevant in the shelf area, but they are most likely needed in the upper and middle slope. Allegations from the Spanish fishing sector to modify the coordinates of the polygons enforced for protection are still under discussion.

13.10. Patagonian 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 largely 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. In this area, hoki is caught by Spanish trawlers until 350 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 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, due to a change in the survey methodology in 2010. No new information on stock status has been made available since 2010.

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.

13.11. Deep-sea grenadiers (*Macrourus carinatus, Macrourus holotrachys*), International waters

Assessments for this stock are based on surveys only. No surveys have been undertaken since 2010. Hence the text below remains largely 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 depth, but the highest catches have been obtained 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. No new information on stock status has been made available since 2010.

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. The greater of these areas correspond to those at depths > 500 m roughly between 44º-48ºS, the area with highest concentrations of *Macrourus carinatus*. This management measure would prevent from a possible displacement of the fishery in the future, to target for this species in the mentioned area.

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.

13.12. 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 largely 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. No new information on stock status has been made available since 2010.

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.

13.13. 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. No new information on stock status has been made available since 2010.

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.

13.14. 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 44º-48ºS. Relatively low catches of the order of 50 t annually of *M. australis* have been reported from this area, as this species has a southernmost distribution to the Southeast of the Falkland Islands.

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. In International waters *M. hubbsi* is more

abundant at shallower waters, i.e. close to the 200 nm limit of the Argentinean EEZ. Therefore, the fishing strategy of the Spanish fleet when targeting hake is to fish around this area.

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. No new information on stock status has been made available since 2010.

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 (it should be noted that this species mainly distributes to the Southeast of the Falkland Islands). No new information on stock status has been made available since 2010.

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.

13.15. 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-oceanic species occurring in waters off Brazil, Uruguay, Argentina, the Falkland 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 by both bottom 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 44º-47ºS.

Concentrations of short-finned squid are found 45º-46ºS 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 in South Brazil waters and die around July or August.

In 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. Main catches of *Illex* are reported around the 300 m isobath.

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. No new information on stock status has been made available since 2010.

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.

13.16. 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 (the fishing grounds around 42ºS were not included in the geographical range of the surveys). Estimated biomass in 2010 was 42 t. No new information on stock status has been made available since 2010.

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.

13.17. Patagonian toothfish (*Dissostichus eleginoides*), International waters

FISHERIES: Patagonian toothfish is the most valuable fishery resource in the SW Atlantic and Sub-Antarctic waters around Antarctica. It is the largest known nototheniid fish, attaining more than 2 m total length. This species has been taken as a by catch since the start of the trawl fishery by the Spanish fleet. Catches from International waters are low due to its more southern distribution and bathymetric range (usually > 500 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: Biomass estimates of Patagonian toothfish by the swept-area method during surveys carried out by IEO in 2008, 2009 and 2010 resulted in 3,123, 3,716 and 1,974 t respectively. It must be taken into account, that, in 2010 and due to a change in the survey methodology to reduce the pressure impact on the VMEs, the number of trawls was halved at depths between 500 and 1000 m and none trawl was conducted > 1000 m, the depth stratum with highest densities in 2008 and 2009.

RECENT MANAGEMENT ADVICE: 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 efforts should be made to improve stock identification.

13.18. Rockcod (*Patagonotothen ramsayi*), International waters

FISHERIES: The importance of *Patagonotothen ramsayi*, both from its ecological and from the fisheries points of view, is based on the fact that it was found to be, respectively, the second and the most abundant species in the surveys carried out in 2009 and 2010 by IEO for biomass estimations in International waters of the SW Atlantic.

At the start of the fisheries by the Spanish fleet in this area in 1983, and until relatively recently, rockcod was not targeted due to market reasons and 100% discarded. A research project funded by the European Commission to analyze the potential of this species to be marketed run between 2003 and 2004, and possibly, as a result of this research, rockcod is currently one of the target species in this area. Highest catches of rockcod are reported at depths < 200 m. Small specimens (< 22 cm) are discarded, meanwhile medium – sized and large fish are processed as HGT and exported to Eastern Europe.

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: During the surveys carried by the IEO for assessment of main commercial species in this area, the estimated biomass of rockcod grew up from 19,791 t in 2008 to 80,096 t in 2009 and finally, to 121,346 in 2010, being the second more caught species in the 2009 cruise and the first one in 2010. No new information on stock status has been made available since 2010.

RECENT MANAGEMENT ADVICE: 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 efforts should be made to improve stock identification.

14. Highly migratory fish (Atlantic Ocean and Mediterranean Sea)

14.1. 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. Catch data for 2010 suggest a much more dramatic drop in catch to around 11,500 t undoubtedly in part due to the strict enforcement of the 13,500 t. quota in most of the areas. Reported catches in 2006 and 07 are likely underestimates of removals.

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 providing advice on the basis of an update assessment conducted in 2012.

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. ICCAT provided the following values based on the latest assessment approach under differing assumptions.

EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY

Current reported yield (2011)	9,779 t	
Short-term sustainable yield according to Rec.[09-06]	13,500 t or less	
	Reported Catch	Inflated Catch
Maximum Sustainable Yield[1]		
Low recruitment scenario (1970s)	21,500 t	23,370 t
Medium recruitment scenario (1950-2006)	30,700 t	35,900 t
High recruitment scenario (1990s)	52,900 t	74,900 t
$F_{0.1}$ [2,3]	0.10 yr^{-1}	0.083 yr^{-1}
$F_{2011}/F_{0.1}$	0.70	0.36
$SSB_{F0.1}$		
Low recruitment scenario (1970s)	318,500 t	342,500 t
Medium recruitment scenario (1950-2006)	452,500 t	524,100 t
High recruitment scenario (1990s)	774,700 t	1,087,000 t
$SSB_{2011}/SSB_{F0.1}$		
Low recruitment scenario (1970s)	0.89	1.16
Medium recruitment scenario (1950-2006)	0.63	0.76
High recruitment scenario (1990s)	0.37	0.37
TAC (2009 - 2012)	19,500 t - 13,500 t - 12,900 t - 12, 900 t	

STOCK STATUS: Estimates of current stock status relative to MSY benchmarks are highly sensitive to the selectivity pattern (and thus to some technical assumptions in the VPA) and, for the biomass reference point, to the hypotheses about the recruitment levels. Nonetheless, the perception of the stock status derived from the 2012 updated assessment has improved in comparison to previous assessments, as F for both younger and older fish have declined during the recent years. All the runs investigated by the Group also showed a clear increase of the SSB, but both the speed and magnitude of this upward trend remain highly uncertain, as these strongly depend on model specifications. F2011 appears to clearly be below the reference target F0.1 (a reference point used as a proxy for FMSY that is more robust to uncertainties than FMAX) in both catch scenarios: F2011/F0.1= 0.7 and 0.36 for the reported and inflated catch scenarios, respectively. If F2011 would be consistent with the Convention Objectives, current SSB remained most likely to be under the level expected at

F0.1: SSB2011/SSB0.1= 0.63 and 0.76 for reported and inflated catch scenario when considering medium recruitment. In the reported catch scenario, the median of the SSB is about 37% (high recruitment scenario) to 89% (low recruitment scenario) of the biomass that is expected under a F0.1 strategy. In the inflated catch scenario, the median SSB ranges from 37% (high recruitment) to 116% (low recruitment, the only scenario for which current biomass would be above target reference biomass level).

RECENT MANAGEMENT ADVICE: In [Rec. 09-06, 10-04] the Commission established a total allowable catch for eastern Atlantic and Mediterranean bluefin tuna at 13,500 t and 12,900 t in 2010, 2011 and 2012, respectively. Additionally, in [Rec.09-06] the Commission required that the SCRS provide the scientific basis for the Commission to establish a three-year recovery plan for 2011-2013 with the goal of achieving BMSY through 2022 with at least 60% of probability.

The Kobe matrices are presented in **Tables BFTE 1** to **3** indicating the probabilities of F<FMSY, SSB>SSBMSY and F<FMSY and SSB>SSBMSY for quotas from 0 to 30,000 t for 2013 through 2022. Shading corresponds to the probabilities of being in the ranges of 50-59 %, 60- 69 %, 70-79 %, 80-89 % and greater or equal to 90 %.

BFTE-Table 3 The probabilities of $F<F_{MSY}$ and SSB $>SSB_{MSY}$ for quotas from 0 to 30000 t for 2013 through 2022. Shading corresponds to the probabilities of being in the ranges of 50-59 %, 60- 69 %, 70-79 %, 80-89 % and greater or equal to 90 %.

Kobe II Strategy matrix, $P(F \leq F_{MSY})$ *and* $P(SSB \geq SSB_{MSY})$

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	36	46	54	63	72	82	92	97	100	100
2000	36	45	54	62	70	81	90	97	99	100
4000	36	45	53	61	69	79	89	96	99	100
6000	36	44	52	59	67	77	87	94	98	100
8000	36	43	51	58	66	75	85	92	97	99
10000	35	43	50	56	64	73	83	91	96	99
12000	35	42	48	55	63	70	80	88	95	98
12900	35	42	48	55	62	69	79	87	93	98
13500	35	42	48	54	61	69	78	87	93	97
14000	35	42	47	54	60	68	77	86	92	97
16000	35	41	46	52	58	66	74	83	90	94
18000	34	40	45	51	56	63	71	79	86	92
20000	34	39	44	49	54	60	68	75	83	88
22000	33	37	42	46	51	56	63	70	76	83
24000	30	34	38	41	46	51	56	63	69	74
26000	28	31	34	37	41	45	50	57	62	67
28000	25	27	31	34	38	41	46	51	56	60
30000	23	25	28	31	34	38	41	46	50	54

The implementation of recent regulations through [Recs. 10-04, 09-06, and previous recommendations] has clearly resulted in reductions in catch and fishing mortality rates. All CPUE indices showed increasing tendencies in most recent years. The Committee notes that maintaining catches at the current TAC (12,900 t) or at the 2010 TAC (13,500 t) under the current management scheme will likely allow the stock to increase during that period and is consistent with the goal of achieving FMSY and BMSY through 2022 with at least 60% of probability, given the quantified uncertainties. A period of stabilization in the main management regulations of the rebuilding plan would allow the SCRS to better estimate the magnitude and speed of recent trends in F and SSB in the coming years.

STECF COMMENTS: STECF note the ICCAT-SCRS advice, and notes that the results from simulation runs that SSB is expected to reach $SSB_{F0.1}$ with a greater than 50% probability by 2015 under a < 10,000 t TAC scenario based on the Kobe II matrix. However the information also implies that further reductions of TAC including a zero-catch option will provide little benefit in the probability of SSB being greater than $SSB_{0.1}$in the future This apparent contradiction underlines the difficulty in interpretation of the matrix when different assumptions or assessments have been combined in the simulations without consideration of their relative likelihoods. Basically the probability distribution has several peaks. For example assuming an inflated catch &

low recruitment scenario, SSB is virtually certain to be above $SSB_{0.1}$ in 2015 while there is very little chance of it being so assuming a high recruitment scenario .

Using a probability based reference point, here $P(SSB > SSB_{0.1}) > 0.6$, can be misleading when the results from different assumptions or assessments are combined in a single Kobe matrix so that the reference point may refer to an extremely unlikely event on the likelihood surface in the very flat areas between peaks. Potentially very small changes in the parameter estimate on in the models underlying the peaks in the likelihood matrix, distorts the view of the effectiveness of management measures if the probability profile around the reference point is extremely flat. This is exemplified by the dramatic change in the estimation of stock status of western bluefin tuna compared to the advice based on the previous assessment. The 2010 assessment indicated that there was virtually zero probability of reaching SSB_{MSY} by 2020 even under a catch moratorium, while the 2012 update suggests a reasonable likelihood of reaching it in 2015 despite catches in 2010-2014. Therefore the Kobe II matrices combining models with different processes (models or assumptions) is misleading in this case.

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.

14.2. 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 providing advice on the basis of an update assessment conducted this year.

REFERENCE POINTS: B in relation to Bmsy and F in relation to Fmsy.

STOCK STATUS:

RECENT MANAGEMENT ADVICE:

The outlook for bluefin tuna in the West Atlantic is similar to that from the 2010 assessment. 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. Constant catches of 2,000 t would result in 2019 SSB nearly equal to that in 2012. If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1,200 t or less are predicted to have a 60% chance to immediately end overfishing and initiate rebuilding. The Committee notes that considerable uncertainties remain for the outlook of the western stock, including the effects of mixing and management measures on the eastern stock.

STECF COMMENTS: STECF agrees with the assessment of the state of the stock, but questions the utility of the management advice in the form of the Kobi II matrix as this suggests that there is virtually no impact in the

short-term of any management measures. The problem is the diametric opposition of the productivity scenarios examined. These result incomplete separation of sustainability indicators between the two hypotheses so that the change due to management is lost. Within a specific set of assumptions the effect of management is very clear, but without scientific advice as to the relative likelihood of the two hypothesis management if unable to interpret the results. For a more detailed explanation of the problem see Section 14.1.

14.3. Albacore (*Thunnus alalunga*), North Atlantic Ocean

The stock status for Albacore in the North Atlantic Ocean was not updated by ICCAT SCRS in 2012. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2012.

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 2011 was 19,995 t, a similar value to that observed in 2010. Catches have increased from the lowest point in the time series, in 2009.

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.

The increase in catches observed since 2009 could make the situation of this stock even worse, although current yield is still lower than the estimated MSY of 29,000 t.

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. The TAC appears to be still higher than the estimated MSY value, although recent catches have been lower than either value.

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). The Commission recommended the establishment of a Total

Allowable Catch (TAC) of 28,000 t for 2012 and 2013.

STECF COMMENTS: STECF agrees with the advice from ICCAT that catches below 28,000 t should achieve the ICCAT conservation objective of 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.

14.4. Albacore (*Thunnus alalunga*), South Atlantic Ocean

The stock status for Albacore in the South Atlantic Ocean was not updated by ICCAT SCRS in 2012. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2012.

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 2011 were 24,078 t, an increase of about 33% from 2009 catch of 18,900t.This value is above the TAC, 24,000 t, which could have an impact in the probability of recovery of the stock to MSY levels by 2020.

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 with equal weights the uncertainty from all models and scenarios).

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 in 2011 (29,900 t) would further decline the stock. However, if catches continued at the level of those experienced in the few years before the assessment, 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. TAC levels for 2012 and 2013 have been set at 24,000 t.

RECENT MANAGEMENT ADVICE: The first TAC for this stock was established by ICCAT in 1999 and for 2001 – 2003 the TAC was set at 29,200 t. In 2007, ICCAT recommended [Rec. 07-03] a catch limit of 29,900 t (the lowest estimate of MSY) until 2011. In 2011, ICCAT – SCRS recommended not to increase catches beyond 20,000 t. A TAC of 24,000 t was established in 2011, to apply in 2012 and 2013.

STECF COMMENTS: STECF agrees with the advice from ICCAT-SCRS but notes that recent reported catches have been slightly higher than the TAC, which is already higher than the 20,000 t level recommended by SCRS as likely to recover the stock by 2017/2022.

14.5. Albacore (*Thunnus alalunga*), Mediterranean Sea

The stock status for Albacore in the Mediterranean Sea was not updated by ICCAT SCRS in 2012. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2012.

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 for many years, due to unreported catches from several countries and the complete lack of data in some years from some 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.

14.6. Yellowfin (*Thunnus albacares*), Atlantic Ocean

The stock status for Yellowfin in the Atlantic Ocean was not updated by ICCAT SCRS in 2012. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2012.

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 2010 amounted to 107,678 t, and preliminary estimates for 2011 are of 100,277 t. 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 Ghanian 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 remained more or less stable in recent years.

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 (around 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.

14.7. Bigeye (*Thunnus obesus*), Atlantic Ocean

The stock status for Bigeye in the Atlantic Ocean was not updated by ICCAT SCRS in 2012. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2012.

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 70,000 t. in 2008, still at much lower levels than in the 1990s. Total landings in 2011 of Bigeye tuna in the Atlantic are currently estimated around 77,795 t a considerable decrease from 2009 (81,539 t). In the Atlantic this stock is exploited by three major gears/fisheries: longline, purse seine and baitboats (using live bait). In 2009, for example, total landings were distributed across these 3 fisheries as follows: 56% by longline, 27% by purse seine and 17% by bait boats. The decline in total catches since 1999 is mainly due to declines in the long line catches.

During the period 2005-2008 an overall TAC for the major fleets was set at 90,000 t. The TAC was later lowered (ICCAT Rec. 09-01) to 85,000 t. Estimates of catch for 2005-2011 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 (specially Ghana) 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: SCRS has estimated an MSY value of between 78,700-101,600 t (median 92,000 t)

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. 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, although the catches of fleets not under the present TAC regime should be taken into account.

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

14.8. Swordfish (*Xiphias gladius*), North Atlantic

The stock status for swordfish in the North Atlantic was not updated by ICCAT SCRS in 2012. 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 2012 (13,700) represents a near 33% 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 and the 2012 advice is based on the 2009 assessment conducted for this stock.

REFERENCE POINTS: MSY reference points for this stock are:

F_{MSY} = 0.22 B_{MSY} = 61860

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 Committee continues to note that the allowable country-specific catch levels agreed in [Recs. 06-02, 08-02, 10-02, and 11-02] continue to exceed the TAC adopted by the Commission and the scientific recommendations. Such potential catches could compromise the rebuilt state of this stock.

STECF COMMENTS: STECF agrees with the advice from ICCAT.

STECF notes the concern expressed by ICCAT/SCRS that current regulations may have had a detrimental effect on the availability and consistency of data (catches, sizes, and CPUE indices) from the Atlantic fleet and the possible effects of this on future assessments.

STECF further notes that, because of the poor size-selectivity of longliners, regulating minimum landing size may inadvertently have resulted in under-reporting of juvenile catches. Alternative methods for reducing juvenile catches, such as time and/or area closures or technological changes in gear deployment, may be more effective and their utility should be further investigated.

14.9. Swordfish (*Xiphias gladius*), South Atlantic

The stock status for swordfish in the South Atlantic was not updated by ICCAT SCRS in 2012. 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 2011, the preliminary reported catches were 12,763 t about 42% lower than the 1995 reported level and catches have been at this level following a decline in 2008 from near 15,000t.

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.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the ICCAT and the 2012 advice is based on the 2009 assessment conducted for this stock.

REFERENCE POINTS: MSY reference points for this stock are:

F_{MSY} = 0.31 B_{MSY} = 47,700

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: For the catch only model projections, constant catch scenarios were evaluated ranging from 10,000 to 17,000 t, incremented by 1,000 t for a period of 10 years. For 2009, all projection scenarios assumed a catch equal to the average catch for 2006-2008 (13,658 t). In general, catches of 15,000 t will result in the biomasses being higher than BMSY 80% of the time. Catches on the order of 17,000 will result in a probability of 0.67 of the biomass being above BMSY in ten years.

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.

14.10. Swordfish (*Xiphias gladius*), Mediterranean Sea

The stock status for swordfish in the Mediterranean Sea was not updated by ICCAT SCRS in 2012. 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 and closer to 12,000 t more recently with the exception in 2010 where closer to 13,500 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.

14.11. Skipjack (*Katsuwonus pelamis*), Eastern Atlantic

The stock status for skipjack in the Eastern Atlantic was not updated by ICCAT SCRS in 2012. The majority of the text below therefore remains largely unchanged from the STECF Review of Advice for 2012.

FISHERIES: The preliminary estimates of catches made in 2011 in the East Atlantic amounted to 173,338 t, that is, an increase of around 35% compared to the average of 2006-2010. However, it is still 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 expansion in the use of FADs and 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 seine fisheries, particularly those of EC-Spain, EC-France, NEI, Cape Verde, Guatemala and Ghana, followed by the 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).
Although the fisheries operating in the east have extended towards the west beyond 30ºW longitude, the Committee decided to maintain the hypothesis in favor of two distinct stock units, based on available scientific studies.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT. 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 were conducted in 2008 using available catches up to 2006. Although the fisheries operating in the east are extending towards the west beyond 30ºW longitude, the SCRS decided to maintain the hypothesis in favor of two distinct stock units, based on available scientific studies.

The results obtained were inconclusive, and SCRS identified a number of problems with the input data and the available information on biology and selectivity. Preliminary estimates of MSY for the whole Atlantic ocean, for example those from a Bayesian surplus production model (under a Schaefer-type parameterization) are in the range of 143 000-156 000 t.Similar models obtained sligtly higher values (155 000-170 000 t) The Committee stated the difficulty to estimate MSY under the continuous increasing conditions of the exploitation plot of this fishery (a one-way trajectory to substantially weaker effort values) and that 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 is overexploited 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 current MSY estimates, around 143,000-170,000 t

. Recent catches, 173, 338 t for 2011, are above the higher range of MSY estimates.

The Commission should also 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 2011 landings are confirmed at the levels currently estimated (173,338 t) this would imply that catches have increased above the higher range of MSY.

14.12. 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 2010 in the West Atlantic amounted to 25,175 t, while the provisional catches for 2011 are already up to 39,324 t. The catches taken by EU vessels on this stock have been, historically, negligible.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the ICCAT SCRS.

REFERENCE POINTS: MSY was tentaively estimated at around 30,000-36,000 t.

STOCK STATUS: Stock assessments for western Atlantic skipjack were conducted in 2008 using available catches up to 2006. The standardised CPUEs of Brazilian baitboats remained mostly stable, while that of Venezuelan purse seiners and USA rod and reel decreased in the last years of the series. 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.

One assessment model estimated MSY at around 30,000 t and the Bayesian surplus model (Schaefer formulation) did so at 34,000 t. Other analyses using Multifan-CL indicated MSY ranged between 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 rapid deepening of the thermocline and of the oxycline to the East).

For the western Atlantic stock, and in the light of the information provided by the trajectories of B/B_{MSY} and F/F_{MSY}, it likely that the current catch is larger than the current replacement yield.

RECENT MANAGEMENT ADVICE: No precise management recommendations were proposed by the ICCAT. Catches are recommended not to exceed MSY.

STECF COMMENTS: STECF agrees with the advice from ICCAT/SCRS and notes that recent catches have exceeded the estimated MSY.

14.13. Marlins (*Makaira nigricans* and *Tetrapturus albidus*), Atlantic Ocean

The stock status for blue marlin was not updated by ICCAT SCRS in 2012. The majority of the text pertaining to this stock therefore remains largely unchanged from the STECF Review of Advice for 2011. For White Marlin a 2012 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.

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. Preliminary catch estimates of blue marlin in 2011 are 1,920 t a considerable decrease over previous catches (3,240 and 3,160) in 2009 and 10. Catches of white marlin in 2009 and 2010 were 644 t and 372 t, respectively with preliminary estimates for 2011 around the same level (344 t). 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 a new 2012 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 = 874 t – 1,604 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: The results of the 2012 assessment indicated that the stock remains overfished but most likely not undergoing overfishing. Relative fishing mortality has been declining over the last ten years and is now most likely to be below FMSY. Relative biomass has probably stopped declining over the last ten years, but still remains well below BMSY. There is considerable uncertainty in these results. The two assessment models provide different estimates about the productivity of the stock, with the integrated model suggesting that white marlin is a stock that can rebuild relatively fast whereas the surplus production model suggests the stock will rebuild very slowly. The results from both approaches are considered to be equally plausible. These results are conditional on the reported catch being a true reflection of the fishing mortality experienced by white marlin. Sensitivity analyses suggest that if recent fishing mortality has been greater than reported, because discards are not reported by many fleets, estimates of stock status would be more pessimistic and current relative biomass would be lower and overfishing would continue. The presence of unknown quantities of roundscale spearfish in the reported catches and data used to estimate relative abundance of white marlin increases the uncertainty for the stock status and outlook for this species.

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: At current catch levels of about 400 t the stock will likely increase in size, but is very unlikely to rebuild to BMSY in the next ten year period (Table 2). Fishing mortality is highly likely to remain below FMSY. The speed at which the stock biomass may increase and the time necessary to rebuild the stock to BMSY remains highly uncertain. This will depend on whether current reported catches are true estimates of fishing mortality, and on the true productivity of the white marlin stock.

S**TECF 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 the DCF.

14.14. Sailfish (*Istiophorus platypteus)* Atlantic Ocean

The stock status for sailfish in the Atlantic Ocean was not updated by ICCAT SCRS in 2012 however ICCAT added reference points and provided additional advice so that there are significant changes 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 1,830 t and 1,500 t, respectively, for the east and west region. In 2010, catches for east and west, respectively, were 1,875 and 756 t. Preliminary catch information for 2011 suggest catches are in line with 2010 catches. 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:

ATLANTIC SAILFISH SUMMARY		
	West Atlantic	**East Atlantic**
Maximum Sustainable Yield (MSY)	600-1,100[1] t	1,250-1,950[1] t
2011 Catches (Provisional)	566 t	1,057 t
B_{2007}/B_{MSY}	Possibly < 1.0	Likely < 1.0
F_{2007}/F_{MSY}	Possibly > 1.0	Likely > 1.0
Overfished	Possibly	Likely
Overfishing	Possibly	Likely
2008 Replacement Yield	Not estimated	Not estimated
Management Measures in Effect	None[2]	None[2]

[1]Results from Bayesian production model with informative priors. These results represent only the uncertainty in the production model fit. This range underestimates the total uncertainty in the estimates of MSY.
[2] Some countries have domestic regulations.

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.

RECENT MANAGEMENT ADVICE: The Committee recommends that catches for the eastern stock should be reduced from current levels. It should be noted, however, that artisanal fishermen harvest a large part of the sailfish catch along the African coast.

The Committee recommends that catches of the western stock of sailfish should not exceed current levels. Any reduction in catch in the West Atlantic is likely to help stock re-growth and reduce the likelihood that the stock is overfished. It should be noted, however, that artisanal fishermen harvest a large part of the sailfish catch of the western sailfish stock.

One approach to reduce fishing mortality could be the use of non-offset circle hooks as terminal gear. Recent research has demonstrated that in some longline fisheries the use of non-offset circle hooks resulted in a reduction of istiophorid mortality, while the catch rates of several of the target species remained the same or were greater than the catch rates observed with the use of conventional J hooks or offset circle hooks. The Committee considers that this approach may be more efficient and enforceable than time-area closures and, thus, it recommends that the Commission considers this alternative approach. Currently, three ICCAT Contracting Parties (Brazil, Canada, and the United States) already mandate or encourage the use of circle hooks on their pelagic longline fleets. In addition, reducing fishing mortality of sailfish from non-industrial fisheries should be considered.

The Committee 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.

14.15. Spearfish, Atlantic Ocean

The stock status for spearfish in the Atlantic Ocean was not updated by ICCAT SCRS in 2012. 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. The reported landings in 2010 were 246 t a level which appears to have been maintained since the early 1980 after initially declining from a high around 1,250 t in 1966. In recent years large catches of billfish continue to be reported as unclassified billfish and reporting gaps remain for many important fleets. In addition the ICCAT 2012 report suggests that the roundscale spearfish is regularly misidentified as white marlin which further compromises the reliability of these catch estimates.

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.

14.16. Mediterranean Spearfish (*Tetrapturus belone*)

The stock status for Mediterranean spearfish was not updated by ICCAT SCRS in 2012. 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.

14.17. 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 2010 preliminary catch amounted to 5around 72,000 t, of which: 1,608 t of Blackfin tuna; 20,177 t of Bonito; 15,819 t of Little tunny; 4,359 t of Frigate tuna; 9,742 t of King mackerel; 5,974 t of Atlantic Spanish mackerel; 2,871 of Serra Spanish mackerel; 1,770 t of Wahoo, 9,307 t of Bullet tuna, 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.

14.18. 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.

14.19. Shortfin Mako (*Isurus oxyrinchus*), North Atlantic Ocean and Mediterranean.

The most recent advice for this stock was provided by ICCAT SCRS in 2012. A data-preparation meeting was held in 2011. The assessment models used were: (1) a Bayesian surplus production model, (2) a catch-free model, and (3) an age-structured production model using the data from Long Line fisheries CPUE of US, Japana and Spain for the northern stock and Uruguay. Combined CPUE series using a GLM approach were also estimated for each stock using two weighting schemes: (a) area covered by each fishery, and (b) catch.

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 2009, stock status of shortfin mako in the Mediterranean remains unclear and futher investigations are needed to clarify its status. The western basin of Mediterranean is considered to be a nursery area for the short fin mako but the western Mediterranean population is currently considered as belonging to the northeast Atlantic stock for assessment purposes.

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). In Atlantic reported catches in 2007 are 3,915 t (but SCRS estimates a total of 5,996 t), in 2008 accounted 5284 t (Task 1), while preliminary and incomplete catch reports in 2010 amount to 5432 t. EU fleets report the majority of the catches: EC-Spain (1,6521 in 2010 (55 % of the total catch) and 3115 in 2009) and EU Portugal (1652 in 2010 (30%) and 1672 t in 2009),while lower or occasional catches are reported by EU-France (15 t in 2009) and EU-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.

GFCM:SAC13/2011/Dma2 reported shortfin mako (*Isurus oxyrhincus)* in the trap of Sidi Daoud, north of Tunisia (fixed trap tagerting blue fin tuna), the sharks are 0.3 and 2.3% in biomass of total catch (Hatour et al., 2004). Shortfin mako is the second species of elasmobranch captured in surface longlines mediterannaen fisheries targeting swordfih (after Blue shark *Prionace glauca*). GFCM:SAC13/2011/Dma2 also mentioned some by-catches of shortfin mako in drift net fiecheries from France, Italy , Morocco and Tunisia.

A number of standardized CPUE data series for shortfin mako were presented in 2012 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: The ICCAT has competence for the management advice throughout the ICCAT Convention area and for reporting catches from the large pelagic fisheries. Advice can also be provided by ICES and SAC-GFCM for all the other fisheries. IUCN also provides advice on the conservation status of shortfin mako.

REFERENCE POINTS: Estimates of SSB/SSBMSY across all ***CFASPM*** scenarios explored in the 2012 assessments, ranged from 1.63 to 2.04 and estimates of F/FMSY ranged from 0.16 to 0.62.

STOCK STATUS: ICCAT- SCRS report in 2012 includes the assessment of the shoprtfin mako in the North Atlantic. Assessment of the status of North Atlantic stock of shortfin mako shark was conducted with updated time series of relative abundance indices and annual catches. Coverage of Task I and number of CPUE series have increased since the last stock assessment in 2008, with Task I data being available for most major longline fleets. The available CPUE series showed increasing or flat trends for the finals years of each series (since the last stock assessment) for North, hence the indications of potential overfishing shown in the previous stock assessment have diminished and the current level of catches may be considered sustainable.

The results indicated in general that the status of the North Atlantic stock is healthy and the probability of overfishing is low; however, they also show apparent inconsistencies between estimated biomass trajectories and input CPUE trends, producing wide confidence intervals in estimated trajectories and other parameters. In the south Atlantic particularly, the increasing trend in the abundance indices since the 1970s is not consistent with the increasing catches. Taking into consideration results from the modeling approaches used in the assessment, the associated uncertainty, and the relatively low productivity of shortfin mako sharks, the Working Group recommends, as a precautionary approach, that the fishing mortality of shortfin mako sharks should not be increased until more reliable stock assessment results are available for both the northern and southern stocks. The high uncertainty in past catch estimates and deficiency of some important biological parameters, particularly for the southern stock, are still obstacles for obtaining reliable estimates of current status of the stocks.

The IUCN listed the shortfin mako as “Vulnerable” in 2007:

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 2012 assessment.

RECENT MANAGEMENT ADVICE: ICCAT SCRS in 2012 recommends, as a precautionary approach, that the fishing mortality of shortfin mako sharks should not be increased until more reliable stock assessment results are available for both the north and south stocks.

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.

Research recommandation:

The ICCAT- SCR- SSG recommends the development of a Special Research Program on Sharks focused on the reduction of the main sources of uncertainty in the formulation of scientific advice. The program will be defined during 2013 and framed within the SCRS Science Strategic Plan foreseen for the period 2014-2020. The ICCAT- SCRS- SSG considers this a priority as this research program could resolve many of the issues/problems experienced by the Group during the 2012 assessment session. This program would largely address many of the following recommendations.

Due to the past reporting problems of shark species, especially prior to 1997, the ICCAT- SCRS- SSG had difficulties in obtaining reliable estimates of total catches by species. The Working Group, acknowledging coverage of Task 1 and the number of CPUE series have increased since the last stock assessment in 2008, considers proper reporting of species-specific Task I data critical as well as conducting analyses aimed at obtaining reliable estimates of shark catches by species for the entire time series.

The ICCAT- SCRS- SSG analyzed new alternative series of catches, including those provided by EUROSTAT and FAO, and found important unexplained discrepancies. The ICCAT- SCRS- SSG recommends investigation into the reasons for these discrepancies through the coordinated work of database experts from each organization (ICCAT/EuroStats/Fao).

There is a need for CPCs to determine whether their Task 1 shark catches include or not dead discards. Therefore, the ICCAT- SCRS- SSG recommends that the CPCs conduct a crosscheck analysis with their

observer data to verify this information.

The ICCAT- SCRS- SSG recommends conducting data mining to recover historical data together with the exploration of comparative analysis of CPUE of SMA with CPUE of other target and non-target species, within a modeling framework, as a potential method of estimating historical catches of SMA.

Due to the uncertainty in the estimates of the absolute level of historic catches, the Working Group recommends the development and evaluation of alternative methods for providing management advice that are less dependent on absolute catch data, e.g. catch-free methods, those based on trends, those that make use of length-based or tagging information, and hierarchical models that can make use of information from multiple stocks or fleets.

The ICCAT- SCRS- SSG encourages the continuation of elasticity analysis in order to evaluate the relative importance of assumptions made in the assessment and management of shark species and in the establishment of an objective basis for defining research priorities on biological aspects and in the recovery of fishery statistics. The ICCAT- SCRS also recommends the integration of methods such as the elasticity analysis with the ERA application.

The ICCAT- SCRS- SSG recommends that a proposal for biological sampling priorities be defined during the Sharks Working Group meeting in September 2012 based on the ERA (and potentially elasticity) outcomes. Moreover, the coordination of the ongoing and future sampling activities conducted by the different CPCs should be encouraged. The ICCAT- SCRS- SSG emphasized again the critical necessity that observers be allowed to collect biological samples from those species whose retention is prohibited by current regulations.

The ICCAT- SCRS- SSG acknowledges the importance of ICCAT and considers that the information provided by sound scientific observer programs and/or its alternative scientific monitoring approach are critical for filling the gaps in knowledge on the fishing activities impacting sharks populations and specifically paragraph 2a, i.e., species composition of the catches, Task I, Task II. Therefore, ICCAT- SCRS- SSG encourages CPCs to make available the information obtained by these programs as soon as possible.

Considering the need to improve stock assessments of pelagic shark species impacted by ICCAT fisheries, the ICCAT- SCRS- SSG recommends that the CPCs provide the corresponding statistics of all ICCAT and non-ICCAT fisheries capturing these species, including recreational and artisanal fisheries. The Working Group considers that a basic premise for correctly evaluating the status of any stock is to have a solid basis to estimate total removals.

In the future, relevant RFMOs should be identified with which collaboration can be carried out regarding research on shark species of common interest.

The ICCAT- SCRS-SSG recommends that one of the main priorities for the By-catch Coordinator be the collation of the observer data collected by the different CPCs to make it available to the different SCRS Working Groups, especially to the Sharks Working Group and the Sub-Committee on Ecosystems. The Working Group encourages a closer collaboration with the SCECO in relation to the optimization of the observer programs in general.

STECF COMMENTS:

STECF agrees with the ICCAT- SCRS-SSG advice that, as a precautionary approach, the fishing mortality of shortfin mako sharks should not be increased until more reliable stock assessment results are available for both the north and south stocks. STECF also agrees with SCRS/ICCAT the research recommendations for enhancement of data quality and collaboration within countries involved and RMFO's concerned.

14.20. Shortfin Mako (*Isurus oxyrinchus*), South Atlantic Ocean.

The most recent advice for this stock was provided by ICCAT SCRS in 2012. A data-preparation meeting was held in 2011. The models used were: (1) a Bayesian surplus production model, (2) a catch-free model, and (3) an age-structured production model using Long Liners fisheries CPUE data from the Uruguay, Japan, Brazil and Spain the the southern stock. Combined CPUE series using a GLM approach were also estimated for each stock using two weighting schemes: (a) area covered by each fishery, and (b) catch.

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: All inputs for the South Atlantic stock were the same as for the North Atlantic, except for the indices, which included Uruguay, Japan, Brazil, Spain, and Portugal. Only two runs were explored: no weighting (run 11), and inverse CV weighting (run 12). Stock status estimates were very similar to those for the North Atlantic, with an estimated relative depletion of 72% of virgin conditions. In this case there was somewhat more information in the data as the estimates of M and alpha differed more from the means of the specified priors than in all cases for the North Atlantic. However, F for the historic and modern periods had to be fixed for the model to fit the indices. The current fishing mortality was estimated at 38-40% of what would be required to drive the stock to MSY (F/FMSY=0.38-0.40) and current SSB was estimated at a little over 2 times that producing MSY (SSB/SSBMSY=2.00-2.16). As in the North Atlantic, stock status was not overfished and overfishing not occurring although again, the fit of the estimated relative biomass to the CPUE series was poor.

STOCK STATUS: For the South Atlantic, the catches and most of the CPUE indices increased between the 1970s and the present. As in the North Atlantic, the catches and the CPUE data are not consistent with each other. All 13 runs had good diagnostics of convergence, although several of the runs estimated the starting biomass ratio close to the lower boundary of 0.2. The models generally estimated either a flat or an increasing trend at the mode of the posterior distribution. The credibility intervals of the B/BMSY trend were relatively narrow, but F/FMSY was poorly estimated. The posterior distributions for r were very similar to the prior, but K had a very flat posterior, with a non-zero probability of values as high as the upper bound of K.

For the South Atlantic stock, both the CPUE indices and the catches appear to be increasing from the 1970s to the present. Several of the model runs fit this trend by assuming that the population had been severely depleted in 1971 and increased throughout the time series. However, there is no evidence of large fisheries in the South Atlantic before the 1970s. The trend could be partly explained by better reporting of shark catches over time. Increases in catchability may also be a factor.

All the model runs estimated a median biomass above BMSY and a median fishing mortality rate below FMSY. The continuity run estimated a lower biomass than the current model runs, presumably because of the lower mean value for the prior for r.

For both the North and South Atlantic stocks, because of the uncertainty in catch data, the ICCAT SCRS-SSG (shark study group) mentioned using alternative methods to estimate population status, such as size-based methods, tagging data and life history data. For example, life history data has been used to estimate r, and FMSY can be calculated from r. Fishing mortality rates can be estimated using length data and then used to compute current fishing mortality relative to FMSY. Tagging and recapture data can also be used to estimate fishing mortality rates. Such methods require fewer assumptions about historical catches. Simulation testing could be used to evaluate any proposed method. In addition, it was suggested that a hierarchical modeling exercise be conducted to evaluate the CPUE indices for all species and all fleets together, to determine whether any of the trends in the CPUE indices can be explained by changes in regulations or changes in fishing methodology. For example, in the Uruguayan longline fishery, there appears to be a correlation between shortfin mako shark and swordfish catches, which may indicate that increased swordfish targeting increases mako catches.

The IUCN listed the shortfin mako as “Vulnerable” in 2007:

RECENT MANAGEMENT ADVICE: ICCAT SCRS in 2012 recommends, as a precautionary approach, that the fishing mortality of shortfin mako sharks should not be increased until more reliable stock assessment results are available for both the north and south stocks.

Other research recommendations, provided by ICCAT SCRS- SSG in 2012 are presented section 14.19

STECF COMMENTS: STECF agrees with the ICCAT- SCRS-SSG advice that, as a precautionary approach, the fishing mortality of shortfin mako sharks should not be increased until more reliable stock assessment results are available for both the north and south stocks. STECF also agrees with SCRS/ICCAT the research recommendations for enhancement of data quality and collaboration within countries involved and RMFO's concerned (presented 417.19)

14.21. 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.

Other considerations

APEX Tagging program results was presented during the ICCAT 2011 : 1960 porbeagle tagged off the northest coast of USA since 1961, 360 recaptures were registered in 2011 with a maximum of 10 year at liberty (average 41% < year at liberty) suggesting few intrusion in the central Atlantic.

UK electronic tagging studies (14 sharks and 2062 days of data) was conducted recently around the British Isles. The furthest confirmed distance recorded by a porbeagle shark from the British Isles, was from a shark which moved to the west central Atlantic after being tagged in north-west Ireland during the summer.

A recent genetic study suggests that the stock is genetically robust, although further confirmation is required.

The history of the fishery is not well documented, and reports often emphasized or omitted some aspects (economic drivers, Danish participation, results of the 1958–62 Norway prospecting) that may alter the perception of the fishery dynamics.

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 and that regarding the large distribution of this species and its aggregative behaviour, some international collaborative survey could be a way fill the lack of information requested for an assessment.

Porbeagle has been recently listed to the CITES Appendix III (2012/044) by Belgium, Cyprus, Denmark11, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland. Appendix III is a list of wildlife and plant species identified by particular CITES Party countries as being in need of international trade controls.

14.22. 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.

Porbeagle has been recently listed to the CITES Appendix III (2012/044) by Belgium, Cyprus, Denmark11, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden and United Kingdom of Great Britain and Northern Ireland. Appendix III is a list of wildlife and plant species identified by particular CITES Party countries as being in need of international trade controls.

14.23. 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.

14.24. 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.

14.25. 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.

14.26. 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 50ºN and 50ºS latitude. A characteristic of this species is usually their tendency to segregate temporally and spatially by size-sex, according to its respective processes of feeding, mating-reproduction, gestation and birth. Numerous aspects of the biology of this species are still poorly understood or completely unknown, particularly for some regions, which contributes to increased uncertainty in quantitative and qualitative assessments.

ICCAT/SCRS (2009) reported that ecological risk assessments for eleven priority species of sharks (including blue shark) caught in ICCAT fisheries demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. All species considered in the ERA are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end.

For both North and South Atlantic blue shark stocks, although the results are highly uncertain, biomass is believed to be above the biomass that would support MSY and current harvest levels below FMSY. Results from all models used in the 2008 assessment were conditional on the assumptions made (*e.g.*, estimates of historical catches and effort, the relationship between catch rates and abundance, the initial state of the stock in

the 1950s,and various life-history parameters), and a full evaluation of the sensitivity of results to these assumptions was not possible during the assessment. Nonetheless, as for the 2004 stock assessment, the weight of available evidence does not support hypotheses that fishing has yet resulted in depletion to levels below the Convention objective. No new trials have been carried out in 2010.

The blue shark is subject to the UN agreement on highly Migratory Stocks. In IUCN (2007), the blue shark is classified as Near Threatened globally.

RECENT MANAGEMENT ADVICE: No specific management advice was provided by ICCAT/SCRS in 2009. Precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. Management measures should ideally be species-specific whenever possible.

STECF COMMENTS: STECF again recommends improving the data collection on the blue shark from all the fisheries and Member States involved, with the purpose of assessing the status of this stock. STECF notes that this species is a mandatory one in the EC Data collection framework and in the EC POA.

14.27. 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.

14.28. 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.

14.29. 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.

Article 19 of EC Regulation No. 44/2012 prohibits the retention, transshipment or landing any part or whole carcass of bigeye thresher shark *Alopias superciliosus* in any fishery, and also prohibits any directed fishery for thresher sharks Alopias spp. in the ICCAT area.

Other considerations

Some Van Bertalanffy growth parameters for the bigeye thresher shark of the tropical northeastern Altantic estimated on 117 specimens ranging from 176 o 407 cm TL as well as maturity information on the bigeye thresher shark from the Atlantic were provided by Fernandez-Carvalho et al. (2011 and 2012). Significant differences were found in the size distribution of the species and the sex ratios between the North and South Atlantic. Sizes at first maturity (L50) were estimated at 206.09 cm FL for females and 159.74 cm FL for males.

Ecological risk assessments were undertaken by ICCAT- SRCS- SSG for 11 pelagic sharks (ICCAT, 2011). These analysis demonstrated that the bigeye thresher has the lowest productivity and highest vulnerability with a productivity rate of 0.010, and that the common thresher is 10th in rank with a productivity rate of 0.141

One *A. supersillosus* was electronically tagged in Gulf of Mexico in 2008 by Carlson & Gulak. After 120 days at sea the bigeye thresher shark moved from 51 km, spending most of his time between 25 and 50 m depth in waters between 20 and 22 °C. Compare to previous studies by Weng & Block (2004) this individual exhibit very light diurnal movement pattern that may be caused by the deep of the tagging location.

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.

14.30. 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.

14.31. 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.

14.32. 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.

14.33. 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.

14.34. 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.

15. 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 2011.

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 875,000 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 1.18 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 (in number of boats) 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 form 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.

15.1. 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 2011) 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 for some species and/or areas.

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 reported 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

.The Working Party on Ecosystems and Bycatch (meeting in September 2012) has reviewed an Ecological Risk Assessment for Indian Ocean Sharks but this has still to be reviewed and endorsed by the scientific committee.

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.

15.2. 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 % increase from 2009. 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 around 350,000 t.

STOCK STATUS:

The 2011 updated assessment undertaken by the Scientific Committee (SC14) gave more optimistic results than the previous (2010) 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 stil;l close to an overfished state and overfishing has probably occurred in recent years.
- The ratio of Fcurrent/FMSY is 0.84 (range: 0.63-1.10), indicating that the situation is close to overfishing and that overfishing probably occurred in recent years.
- The stock does not appear to be in an overfished state as spawning biomass is above the BMSY level (Bcurrent/BMSY = 1.61. Range: 1.47-1.78).
- The median value of MSY is estimated to be 350,000 tonnes (range of 290,000 and 435,000 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°. A resolution has 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. A recent recommendation has established a set of interim target and limit reference points for IOTC stocks.

- 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.

15.3. 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 2010 was estimated at 72,000 t, a 30% decline from 2009, mostly due to the longline effort decrease due to the Somalian piracy.

Bigeye is predominantly caught by industrial long liners, as a bycatch on the FAD skipjack fishery by purse seines, and occasionally by artisanal fisheries.

1. 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 deep longliners. Catches by longline have been declining from a high in 2004.
2. 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 bigeye 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 2011 updated assessment conducted by the Scientific Committee of IOTC (SC14) gave similar results to the 2010 assessment in terms of average trends. The uncertainty in the results iss perceived to be significant, 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 at 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 0.70 (range of 0.5-0.9), indicating that overfishing is not likely to be occurring.
- The ratio of spawning biomass Bcurrent/B_{MSY} is estimated at 1 (range of 0.80-1.24). This indicates that that the stock is not in a clearly overfished state but it is close to it.

- 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:
Despite the uncertainty on estimated MSY values and the levels of error in the nominal catch data for bigeye, the recent declines in catches led the SC to recommend no ,anagement action, but suggested that catches should be closely monitored and should not exceed the catch levels of 2009, 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.

15.4. Skipjack (*Katsuwonus pelamis*)

FISHERIES: Skipjack catches in the Indian Ocean in 2010 were about 417,500 tonnes, a slight decrease of 7% from 2009. Purse seine (39%) and gillnets (37%) dominate the catches, followed by pole-and-line (17%). The pole-and-line catches have been decreasing markedly 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.
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 fleet during the last 10 years) of the skipjack tuna caught by purse-seine was taken in FAD-associated 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).

Catches of skipjack by industrial purse seiners have declined over the last five years, although the are still in the range observed since the full development of the FAD fishery.The activities of pirates off the coast of Somalia have meant that approximately ten purse-seine vessels have left the Indian Ocean, that the purse-seine fleet has avoided traditional skipjack fishing grounds where catch rates were high, and that boats have been required to change their fishing activties to increase security, but no clear 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: A complete stock assessment of skipjack has first conducted in 2011. The results indicate that no overfishing is ocurring, as catches are around 80% of the current estimate of MSY (565,000 t), as the stock is not overfished. Large uncertainties remain in this evaluation of stock status given the problems at interpretaing the available indices of abundance.Independent 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 the continued decline in skipjack catches, for both industrial purse seiners and Maldivian pole and line vessels, but indicated that the effects of piracy, in the first case, and a combination of fuel prices, live bait availability and operational considerations, in the second, are the main reasons behind the observed trends.

RECENT MANAGEMENT ADVICE: Given the stock status estimates, no inmediate management advice is provided for the stock. The Scientific Committee did recommend that catches should not exceed the average level for the 2005-2009 period of 512,000 t, given the available estimate of MSY. The projections barried out across a range of catch scenarios, indicate that the risk of exceeding the MSY-based reference points will increase if catches were to increase. Also, the continuing decline of catches in the Maldivian fishery are of concern and suggest the stock should be closely monitored.

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 recent stock assessment results, no inmediate advice is necessary.

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 catches will not be able to grow at the rates observed in the past. 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.

15.5. 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 catches in 2010 were reported at 18,800 t. 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 between 29,000 and 34,000 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 2011, 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 0.30 – 0.53 (B_{2009}/B_0). MSY estimates varied from 29,900 t to 34,200 t.
- 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. The stock appears to have been overfished in this area, although recent trends in catches have allow for stock rebuilding. Any increase in catches in this regions is likely to increase the risk of exceeding the MSY reference points.

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 of recovery and biomass exceeds B_{MSY}

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.

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.

16. 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 2011 were again around 500,000 tonnes (including dead discards), a as in 2010. 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 (WPO)

About 55 percent of the world production of tuna is from the western and central Pacific Ocean (WCPO). Catches of skipjack, yellowfin, bigeye and albacore in 2011 were 2,250,000 tonnes, 12 % less than the record in 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%).

16.1. 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. $B/B_{MSY} \approx 0.96$, $SSB/SSB_{MSY} \approx 0.71$, $F/F_{MSY} \approx 0.89$

STOCK STATUS:

- There is uncertainty about recent and future levels of recruitment and biomass. There have been two, and possibly three, different productivity regimes, and the levels of MSY and the biomasses corresponding to the MSY may differ among the regimes. The population may have recently switched from a high to an intermediate productivity regime.
- The recent fishing mortality rates are lower than those corresponding to the MSY, and the recent levels of spawning biomass are estimated to be at about that level. As described in IATTC Stock Assessment Report 12 and previous assessments, these interpretations are uncertain, and highly sensitive to the assumptions made about the steepness parameter of the stock-recruitment relationship, the average size of the older fish, and the assumed levels of natural mortality. The results are more pessimistic if a stock-recruitment relationship is assumed, if a higher value is assumed for the average size of the older fish, and if lower rates of natural mortality are assumed for adult yellowfin;
- The recent levels of spawning biomass predicted by the current assessment are more optimistic than those from the previous assessment (IATTC Stock Assessment Report 12). This result is due to a recent decline in the fishing mortality levels for middle-age and older yellowfin tuna since 2009 which is estimated by the current assessment.
- Increasing the average weight of the yellowfin caught could increase the MSY.

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 considers that in order to prevent any further decline in spawning biomass, fishing mortality for yellowfin tuna in the EPO should not be allowed to increase.

16.2. 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[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.

No new stock assessment was conducted and there is no new information to inform stock status for WCPO yellowfin in 2012; therefore, the a) Stock status and trends and b) Management advice and implications from SC7 are still current.

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

[5] (http://www.spc.int/oceanfish/)

region 3 in 2009, yielded very similar results particularly with respect to stock status. Nonetheless, there appear 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.

16.3. Eastern Pacific Bigeye (*Thunnus obesus*)

FISHERIES: Bigeye catches in 2011 were about 82,500 tonnes, a 12% decrease from 2010. 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 (150ºW) of the EPO; the longline catches less sporadic, but at lower levels between 160ºW and 180º.

Bigeye are not often caught by purse seiners in the EPO north of 10ºN, but a substantial portion of the longline catches of bigeye in the EPO is made north of that parallel. Bigeye tuna do not move long distances (95% of tagged bigeye showed net movements of less than 1000 nautical miles), and current information indicates little exchange between the eastern and western Pacific Ocean. This is consistent with the fact that longline catch-per-unit-of-effort (CPUE) trends differ among areas. It is likely that there is a continuous stock throughout the Pacific Ocean, with exchange of individuals at local levels. Currently, there are not enough tagging data to provide adequate estimates of movement between the eastern and western Pacific Ocean.

There have been substantial changes in the bigeye tuna fishery in the eastern Pacific Ocean (EPO) over the last 15 years. Initially, the majority of the bigeye catch was taken by longline vessels, but with the expansion of the fishery on fish associated with fish aggregating devices (FADs) since 1993, the purse-seine fishery has taken an increasing proportion of the bigeye catch.

Overall, the catches in 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 25,200 t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Advisory Committee (SAC) of IATTC.

REFERENCE POINTS: MSY is estimated to be 90,500 tonnes at current exploitation, but could be 209,000 if all catches were taken by longline . $B/B_{MSY} \approx 1.33$, $SSB/SSB_{MSY} \approx 1.33$, $F/F_{MSY} \approx 0.89$.

STOCK STATUS:

- The results of the new assessment indicate a recent recovery trend for bigeye tuna in the EPO (2005-2010), subsequent to IATTC tuna conservation resolutions initiated in 2004. However, an apparent slight decline of the spawning biomass has begun at the start of 2011 and, under the current levels of fishing mortality and average recruitment, recent spikes in recruitment are predicted not to sustain the early observed population rebuilding trend.
- There is uncertainty about recent and future recruitment and biomass levels;
- The recent fishing mortality rates are estimated to be slightly above the level corresponding to MSY, and the recent levels of spawning biomass are estimated to be above that level. As described in IATTC Stock Assessment Report 11, these interpretations are uncertain and highly sensitive to the assumptions made about the steepness parameter of the stock-recruitment relationship, the average size of the older fish, the assumed levels of natural mortality for adult bigeye, and the historic period of the bigeye exploitation used in the assessment. The results are more pessimistic if a stock-recruitment relationship is assumed, 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 results are more optimistic if a lower value is assumed for the average size of the older fish, and if higher levels of natural mortality are assumed for adult bigeye.

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 notes that the latest assessment indicates that F is above F_{MSY}. In an attempt to reduce F to F_{MSY}, STECF agress that regulations currently in place should be strengthened.

16.4. 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 2011 were about 151,500 tonnes (-7% compared to 2010). 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 1974 – 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.

No new stock assessment was conducted and there is no new information to inform stock status for WCPO bigeye in 2012; therefore, the a) Stock status and trends and b) Management advice and implications from SC7 are still current.

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}.

16.5. 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 lates estimates of skipjack catches in the EPO remain highly variable with 238,900, 152,100 and 284,700 tonnes taken in 2009-2011. Skipjack catches in the EPO are notoriously variable probably due to changing distributions of fish and fisheries. 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 2005 assessment indicated that the estimation of MSY reference points was highly uncertain. A new assessment was developed in 2012, but found many of the same problems the conclusions from the analysis were:

- There is uncertainty about the status of skipjack tuna in the EPO.
- There may to be differences in the status of the stock among regions.
- There is no evidence that indicates a credible risk to the skipjack stock(s).

RECENT MANAGEMENT ADVICE: IATTC has provided 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.

16.6. 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 2011 are estimated around 1,540,200 t. Purse seining, which accounts for 85% of the catches, has been increasing steadily for three decades has also declined in 2011. 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 near 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. The geographic distribution of fishing activities shows some recent changes.

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[6] 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.

No stock assessment was conducted and there is no new information to inform stock status for WCPO skipjack in 2012; therefore, the a) Stock status and trends and b) Management advice and implications from SC7 are still current.

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:

[6] (http://www.spc.int/oceanfish/)

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.

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.

16.7. 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 2010 were 68,300 tonnes, just below the average of the previous five years. 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 2010 were reported to be around 68,000 t. about 12% less than in 2009 (77,000 t).

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)

No new stock assessment and management advice was provided. The ALBWG recommended no changes to its stock status determination in 2011, i.e., the stock is considered healthy and neither overfished nor experiencing overfishing.

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.

16.8. Southern Pacific albacore (*Thunnus alalunga*)

FISHERIES: Catches in 2011 were about 75,000 tonnes, a 13% decrease from 2010. The main fishing gear is longline, accounting for >90% of the catch in recent years. Relatively minor amounts are taken by other gears including trolls. The 2011 South Pacific troll albacore catch (3,119 mt) was higher than the catch in the past two years, mainly due to higher catches experienced in the New Zealand domestic fishery.

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.

Prior to 2001, south Pacific albacore catches were generally in the range 25,000–44,000 mt, although a significant peak was attained in 1989 (49,076 mt), when driftnet fishing was in existence. Since 2001, catches have greatly exceeded this range, primarily as a result of the growth in several Pacific Islands domestic longline fisheries. The south Pacific albacore catch in 2011 (75,258 mt) was the third highest on record (about 12,000 mt lower than the record catch in 2010 of 87,048 mt).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. Fcurrent/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:Given the recent expansion of the fishery and recent declines in exploitable biomass available to longline fisheries, and given the importance of maintaining catch rates, the SC recommends that longline fishing mortality be reduced if the Commission wishes to maintain economically viable catch rates.

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.

16.9. 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 more than 5,000 t in 2008 and 9. Preliminary catches for 2010 are 4,700 t of which about a quarter has been discarded. 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.

16.10. 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). Recent catches have continued to be hgihgly variable with 3,000 t taken in 2010 and 8,000 t taken in 2011.

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.

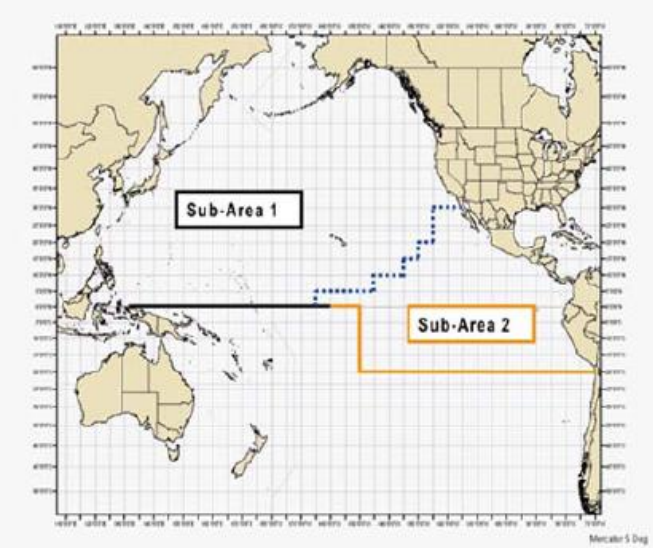
RECENT MANAGEMENT ADVICE: No management advice.

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.

16.11. 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). **No stock assessment was conducted and there is no new information to inform stock status for Eastern Pacific swordfish in 2012;** therefore, the a) Stock status and trends and b) Management advice and implications from SC7 are still current.

REFERENCE POINTS: No precautionary reference points have been proposed for this stock. MSY = 25,000 t., SSB/ SSBmsy = 1.45 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. The 2011 assessment only covers the southwestern part of the stock and it is unknown whether the stock status report is applicable to the eastern stock as a whole.

16.12. 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. No stock assessment was conducted and there is no new information to inform stock status for Western and central Pacific swordfish in 2012; therefore, the a) Stock status and trends and b) Management advice and implications from SC6 are still current.

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

16.13. 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. **No new assessment was conducted and there is no new information to inform stock status for blue marlin** therefore, the a) Stock status and trends and b) Management advice and implications from the previous assessment are still current.

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.

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.

16.14. 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 2004 to 2008 of about 2,100). The reported catches in the EPO in 2009 and 10 were considerably lower (879 and 1,349 t) but these data may still be incomplete.

The principal recreational fisheries for striped marlin in the EPO operate within about 50 to 100 miles of the shores of Mexico. These are generally characterized as catch-and-release for all marlin species. Sport-fishing trips increasing from about 32,500 trips in the early 1990s to about 55,500 trips in recent years, with annual catches of striped marlin increasing from about 13,300 fish to about 30,000 fish over this period. A record high catch of about 58,000 individuals was taken in 2007, the most recent year for which complete data are available, and the preliminary estimate for 2008 is of the same magnitude.

Average release rate for the 1999-2007 period was about 77.4 percent (range: 72.4 to 82.5). Assuming 100 percent mortality of fish released, and the reported annual median weight of fish sampled, then the conservative estimate of average annual mortality resulting from the recreational fishery during 1990-2006 was about 195 t (range: 115 to 310), and the mortality associated with the record high catch in 2007 was about 545 t. At a mortality rate of about 25 percent (Domeier et al., 2003), the mortality in 2007 was about 140 t.

SOURCE OF MANAGEMENT ADVICE: Traditionally, the advisory body was IATTC, but currently both ISC and the WCPFC also deal with this species.

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

STOCK STATUS:

The stock structure of striped marlin is uncertain. Analyses of catch rates using generalized additive models suggest that in the north Pacific there appear to be at least two stocks, distributed principally east and west of about 145º-150ºW, with the distribution of the stock in the east extending as far south as 10°-15°S. Genetic studies provide a more detailed picture of stock structure. McDowell and Graves (2008) suggest that there are separate stocks in the northern, north-eastern, and south-eastern, and south-western Pacific. Preliminary reports of more recent genetic studies indicate that the striped marlin in the EPO off Mexico, Central America, and Ecuador are of a single stock and that there may be juveniles from an identified Hawaiian-stock present seasonally in regions of the northern EPO. In 2011 stock assessments were presented for two of these stock units with divergent stock status estimates, in addition to which, the sum of the assessments cover significantly less than the total striped marlin in the Pacific. Stock status for the entire population therefore remains uncertain.

North Pacific Striped Marlin:

The WCNPSTR stock is overfished and experiencing overfishing. The current (2010) spawning biomass is 65% below SB_{MSY}=2,713 mt and the current fishing mortality (2007-2009) exceeds F_{MSY}=0.61 by 24%.

The SC8 recommends that the ISC conduct an additional set of projections of the WCNPO striped marlin based on the 2012 stock assessment results. The projections should be based on resampling only recruitment from the most recent 5 year period (2004-2008). Recruitment during that period is below the average of the 1994-2008 and may represent a different and more pessimistic recruitment regime than assumed in the current projections. The 8 harvest scenarios examined in the 2012 stock assessment should be evaluated with this more pessimistic assumption, and an additional run using this recruitment scenario and constant catch at the 2011 level should also be included. Probabilities of stock recovery as well as trajectories of spawning biomass and catch should be documented and presented to WCPFC9.

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 southwest Pacific striped marlin assessment results indicate that the stock is fully exploited, is not experiencing overfishing but may be overfished. The SC noted that recent catches are close to MSY, and that recent fishing mortality is slightly below F_{MSY}, and that recent spawning biomass is slightly below SB_{MSY}. The recent catch increase is driven in part by increases in catch in the northern area of the stock area that is not subject to the current CMM for this stock.

SC8 recommends measures to reduce overall catch of this stock, through the expansion of the geographical scope of CMM 2006-04 to cover the distribution range of the stock. In designing such a measure to implement this recommendation from SC8, the Commission may need to consider the historic trends in the fishery, including the catch declines in the traditional central and southern areas and the recent catch increases in the northern areas. SC8 recognizes that striped marlin is often caught as a non-target species. SC8 therefore recommends data analysis be conducted to identify areas of high catch concentration that could be subject to targeted management.

Southeast Pacific striped marlin: The no assessment is available for this portion of the stock, but it is not clear to which extent the catches are considered in the SW stock.

RECENT MANAGEMENT ADVICE:

North Pacific Striped Marlin:

Reducing fishing mortality would likely increase spawning stock biomass and may improve the chances of higher recruitment.

Fishing at a constant catch of 2,500 mt was estimated to increase spawning biomass by 133% to 223% by 2017.

Fishing at a constant catch of 3,600 mt was estimated to increase spawning biomass by 48% to 120% by 2017.

In comparison, fishing at the current (2007-2009) fishing mortality rate was estimated to increase spawning biomass by 14% to 29% by 2017, and fishing at the average 2001-2003 fishing mortality rate would lead to a spawning biomass decrease of 2% under recent recruitment to an increase of 6% under the stock-recruitment curve assumption by 2017.

Northeast Pacific Striped Marlin: There is no management advice with respect to this stock component

Southwest Pacific Striped Marlin:

SC8 recommends measures to reduce overall catch of this stock, through the expansion of the geographical scope of CMM 2006-04 to cover the distribution range of the stock. In designing such a measure to implement this recommendation from SC8, the Commission may need to consider the historic trends in the fishery, including the catch declines in the traditional central and southern areas and the recent catch increases in the northern areas. SC8 recognizes that striped marlin is often caught as a non-target species. SC8 therefore recommends data analysis be conducted to identify areas of high catch concentration that could be subject to targeted management.

Southeast Pacific striped marlin: There is no management advice with respect to this stock component

STECF COMMENTS: STECF agrees with the advice.

16.15. 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 1982 to 2010 ranged between 108 t to 358 t; the average catch in the last five years was about 165 t and the 2010 estimate (189t) suggests little change compared to recent years

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.

16.16. 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 appear to have an episodic nature. In 94-97 catches were around a 150t doubling sharply between 98 and 03 before declining to arounsd 225 t in 04-08. Recent catches in 09 and 10 are greater than 450t. This may be a reporting issue as this species has been given relatively low priority by both fishery and management.

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 agrees with this advicec.

16.17. 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 1994 and 2004 catches in the EPO averaged around 1,400t, but catches have shown a continued steep decline since then to 95t in 2010 although it is not clear how complete the rececnt years' information is.

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.

16.18. 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.

16.19. 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. Jack mackerel catches by all but one of the fleets continued to decline in 2011, with overall 2011 catches being 69% of 2010 catches.

SOURCE OF MANAGEMENT ADVICE: The advisory body for the Chilean jack mackerel is the South Pacific Regional Fisheries Management Organisation (SPRFMO). However its commission has only rececntly been internationally accepted and is due to meet for the first time in 2013 so no official sotck or management advice has been issued. The stock status and management advice below are based on the scientific working group of the SPRFMO.

REFERENCE POINTS: The South Pacific Regional Fisheries Management Organisation[7] 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. Reference points have not yet been revised, but the new assessment suggests a a biomass reference point of around 30% of virgin biomass with and F_{MSY} of around 0.25.

STOCK STATUS: The ratio of estimated total biomass to the biomass that would have existed had no fishing occurred has declined steadily throughout most of the history of this fishery. Under the JJM assessment model base case, the 2011 ratio of total biomass relative to the potential unfished biomass is estimated to be 14%, ranging from 10% (model 3) to 19% (model 2) in sensitivity analyses.

[7] SPRFMO-III-SWG-16

The 2011 assessments results indicate a continuing decrease in fishing mortality and a slight increase in estimated total biomass over 2010, but a continuing decrease in spawning biomass. There continue to be indications of slightly improved recruitment in recent years, although the updated assessment indicates that the apparently strong recruitment observed by a number of fleets in 2010 was actually lower than the recruitment in 2009, and well below longterm average levels.

With respect of the currently accepted reference points the stock status cannot be evaluated. According to the projections of the new assessment the stock is overfished and overfishing is occurring.

RECENT MANAGEMENT ADVICE:

Projection results under the assumption of average recruitment at the levels estimated for the recent five year period 2006 – 2010 indicate that catches should be maintained below 520,000 t to maintain spawning biomass at least at current levels. Catches below 390,000 t are projected to have a high probability of resulting in spawning stock rebuilding under most projections.

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 scientific working group of SPRFO and hopes that the reference point issue caused by the change in the assessment can be resolved at the first commission meeting.

17. Resources in the Antarctic

The 2012 final report of the 2012 meeting of CCAMLR was not available to STECF. The text below remains unchanged from the STECF Review of advice for 2012. Note that for many of the stocks listed below, the advice on fishing opportunities for 2011/2012 and 2012/2013 fishing seasons, were agreed in 2011 and are presented in the relevant sections below.

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).

17.1. Toothfish (*Dissostichus* spp.)

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.1. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 48.3, South Georgia

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.2. Toothfish (*Dissostichus eleginoides* en *D. mawsoni*) in Subarea 48.4, South Sandwich Islands

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.3. Patagonian tootfish (*Dissostichus eleginoides*) in Division 58.5.1., Kerguelen Islands

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.4. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 58.5.2., Heard and McDonald Islands

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.5. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 58.6, Crozet Islands

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.6. Patagonian tootfish (*Dissostichus eleginoides*) in Subarea 58.6 and 58.7, Prince Edward and Marion Islands

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.7. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fishery in Subarea 48.6

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.8. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fishery Division 58.4.1.

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.9. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fishery in Division 58.4.2.

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.10. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fishery in Division 58.4.3a, Elan Bank

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.11. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) exploratory fisheries in Subareas 88.1 and 88.2, Ross Sea

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.12. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) closed fishery in Division 58.4.3b, Banzare Bank

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.13. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) closed fisheries in Divisions 58.4.4a and 58.4.4b, Ob and Lena Bank

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.14. Patagonian tootfish (*Dissostichus eleginoides*) and Antarctic toothfish (*D. mawsoni*) closed fisheries in Subarea 88.3.

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.1.15. Patagonian tootfish (*Dissostichus eleginoides*) other closed fisheries

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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

17.2. Icefish (*Champsocephalus gunnari*)

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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).

17.2.1. 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.

17.2.2. Icefish (*Champsocephalus gunnari*) in Subarea 48.3, South Georgia

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.3. Other finfish species in the Convention Area

17.3.1. Other finfish species closed fisheries

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.4. Elasmobranchs

17.4.1. Skates and Rays (Rajidae) in Subarea 48.3, South Georgia

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.4.2. Skates and Rays (Rajidae) in Division 58.5.2, Heard and McDonald Islands

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.4.3. Sharks in the Convention Area

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.5. Crabs (*Paralomis* spp.)

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.5.1. Crabs (*Paralomis* spp.) Subarea 48.3

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.5.2. Crabs (*Paralomis* spp.) exploratory fishery in Subarea 48.2

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.6. Krill (*Euphausia superba*)

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.6.1. Krill (*Euphausia superba*) Area 48

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.6.2. Krill (*Euphausia superba*) Area 58.4.1

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.6.3. Krill (*Euphausia superba*) Area 58.4.2

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.6.4. Krill (*Euphausia superba*) Area 88

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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.

17.7. Squid (*Martialia hyadesi*)

17.7.1. Squid (*Martialia hyadesi*) Subarea 48.3

The most recent advice for this stock was provided by the CCAMLR Scientific Committee in 2011. Hence, the following text remains unchanged from the Consolidated STECF Review of Advice for 2012.

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 advice is that the existing Conservation Measure 61-01 on *M. hyadesi* should remain in force.

STECF COMMENTS: STECF has no comments.

18. 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

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Abstract

The STECF review of scientific advice for 2013 Part 3 was drafted by the STECF-EWG 12-17 Expert Working Group held in Santa Cruz de Tenerife, Canary Islands, from 8-12 October 2012. The Report was reviewed and adopted by the STECF at its 41st plenary session held in Brussels from 5-9 November 2012.

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

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