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Scientific, Technical and Economic Committee for Fisheries (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2015

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PART 3 (STECF-14-22)

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SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

REVIEW OF SCIENTIFIC ADVICE FOR 2015 – Consolidated Advice on Fish Stocks of Interest to the European Union (STECF-14-22)

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 2015 - PART 3

1.1 Introduction to the STECF Review of Advice for 2015 – Part 3

This report represents the STECF review of advice for 2015 for stocks of interest to the European Community in areas under the jurisdiction of CCAMLR, CECAF, WECAF, ICCAT, IOTC, IAATC, GFCM, NAFO, SEAFO, SPRFMO, and ICES advice on stocks in the Northeast Atlantic released since 28 June 2014.

The Report was drafted by the STECF Expert Working group (EWG) 14-16 during its meeting held in Dublin, Ireland, from 20-24 October 2014.

The STECF review of advice for 2015 Part 1 included the latest assessments and advice for stocks in the Baltic Sea and was published in June 2014. Part 2 contained the review of assessments and advice released by ICES up to the end of June 2014 and was published in July 2014. Parts 1, 2 and 3 will be combined and published in the STECF Consolidated review of advice for 2015, which will be available in mid-November 2014.

In undertaking the review, STECF has consulted the most recent reports on stock assessments and advice from appropriate scientific advisory bodies or other readily available literature, and has attempted to summarise it in a common format. For some stocks the review remains unchanged from the Consolidated Review of advice for 2014 (STECF 13-27), since no new information on the status of or advice for such stocks was available at the time the present review took place.

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.

1.2 Terms of Reference

The STECF is requested to review and comment on the scientific advice released in 2014 which has not yet been reviewed. 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 of one single report containing all stock advice.

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

In addition, when reviewing the scientific advice from ICES, and any associated management recommendations, STECF is requested to take into account Harvest Control Rules adopted in any type of multi-annual management 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 2015 (COM(2014) 388 final – see supporting documentation.

STECF is requested to take into account additional information on stock advice that is contained in the relevant special requests, also published on the ICES website. Finally, STECF is requested to give special attention to the ICES advice for species where ICES provides a complementary advice option considering there will be no more discards for the relevant fisheries, all catches being landed.

1.3 Participants

Acknowledgement

The STECF acknowledges the extensive contribution made by the following participant in preparing the Draft Review of advice for 2015 – Part 3:

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2 Resources of the North Sea

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

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 2006-2012. 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 commercially 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. The advice for this fishery in 2014 and 2015 is the same as the advice for 2013

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 that on the basis of the ICES approach to data-limited stocks, catches should not increase, unless there is evidence that this will be sustainable. This corresponds to zero catches for 2014 and 2015.

2.2 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. Discard estimates are available since 2009 and have been included in the assessments. Overall discard percentage (2011-2013) is around 10 %. In 2010 total catches were around 8300 t, 9000 t in 2011, 8800 t in 2012 and 9300 t in 2013.

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. This year's advice is (as last year's) based on a surplus production model fitted by Bayesian methods using commercial catch and effort data and trawl survey data.

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}	1.7 F_{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.

(Last changed in: 2013)

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

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✓	✓	At target
Precautionary approach (F_{lim})	✓	✓	✓	Harvested sustainably

Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{lim})	✓	✓	✓	Full reproductive capacity

The assessment using a Bayesian stock production model provides relative rather than absolute measures of stock status. The assessment shows that since the beginning of the 1990s stock biomass has been above MSY $B_{trigger}$ and fishing mortality below F_{MSY}, although in recent year's stock biomass approached MSY $B_{trigger}$ and F has been very close to F_{MSY}. Recruitment indices have increased from a low value in 2010.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of MSY considerations that catches should be no more than 10900 t in 2015. If discard rates do not change from the average of the last three years, this implies landings of no more than 9777 t. Measures should be taken to reduce discarding of small shrimp.

SPECIAL COMMENTS: The lack of robustness observed in this year's assessment (comparing it with last year's) raises concern about the reliability of an advice based on $F_{2015}=F_{MSY}$ (which would imply catches of no more than 14 800 t). Until more experience is gained concerning the retrospective revisions in this assessment, ICES advises not to increase F compared to the average F of the last 3 years (2011-2013).

The average F of 2011-2013 corresponds to $F/F_{MSY}=0.68$ (median value) in 2015, which results in catches of no more than 10 900 t. If discard rates do not change from the average of the last 3 years (10.3% between 2011 and 2013), this implies landings of no more than 9777 t in 2015.

Basis: Median F_{2014}/F_{MSY} = (catch constraint) = 0. 62; median B_{2015} > MSY $B_{trigger}$; Catches (2014) = 9.5.

Catch options 2015	**6**	**8**	**10**	**10.9**	**12**	**14**	**14.8**	**16**
Stock size (B_{2016}/B_{MSY}), median	1.19	1.17	1.14	1.14	1.12	1.10	1.08	1.04
Fishing mortality (F_{2015}/F_{MSY}), median	0.36	0.49	0.62	0.68	0.76	0.91	1.00	1.10
Probability of B_{2016} falling below B_{lim}	1%	1%	1%	1%	1%	1%	1%	1%
Probability of F_{2015} exceeding F_{lim}	1%	2%	4%	<5%	7%	12%	14%	20%

STECF COMMENTS: STECF agrees with the ICES advice that catches in 2015 should not exceed 10,900 t. When comparing this year's assessment with last year's STECF also notes the lack of robustness regarding retrospective consistency and therefore also agrees with ICES in combining the MSY approach with precautionary considerations as the basis for its advice.

STECF agrees with ICES that measures should be taken to reduce discarding of small shrimp.

2.3 Norway lobster (*Nephrops norvegicus*) - IIa (EU zone), IIIa and North Sea (EU zone)

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

FISHERIES: Nephrops in FU 6 are predominantly caught in trawl fisheries using meshes in the 80–99 mm category. A small amount of creeling takes place. Increases in the numbers of vessels using twin-rig and multi-rig gears observed in this area are likely to have increased the effective fishing power per kW hour. Total landings from the Farn have increased from 2072 t in 2011 to 2982 t in 2013, The UK fleet has accounted for virtually all landings from the Farn Deeps. Estimated discarding has fluctuated around 13% by weight in recent years.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is based UWTV surveys of absolute abundance. New size-at-maturity data were analyzed at the 2013 benchmark meeting, leading to revisions in the harvest rate reference points.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY	MSY $B_{trigger}$	858 million	UWTV survey index at start of current decline (2007) as measured by a geostatistical method.
Approach	F_{MSY}	Harvest rate 8.1%.	Equivalent to $F_{35\%SPR}$ males in 2011.
Precautionary	$F_{0.1}$	Not agreed.	
Approach	F_{max}	Not agreed.	

(last changed in 2013)

Harvest rate reference points, 2013 revisions

	Male	Female	Combined
F_{max}	11.6 %	21.6 %	15.3 %
$F_{0.1}$	7.1%	14.0 %	8.7 %
$F_{35\%SPR}$	8.1 %	15.2 %	11.1 %

For this functional unit (FU), the exploitation rate on males is usually considerably higher than on females and there is evidence of sperm-limitation following harvest rates in the region of 20%. There is evidence to suggest

that in both 2006 and 2010 mature females have not been able to successfully mate and therefore a larger male spawning potential is desirable. To this effect the harvest rate equivalent to fishing at F35%SPR for males is suggested as a proxy for F_{MSY} (F35%SPR, males = 8.1%). New size-at-maturity data were analyzed at the 2013 benchmark meeting, leading to revisions in the harvest rate reference points.

STOCK STATUS:

	Fishing pressure			
	2011	2012	**2013**	
MSY (F_{MSY})	✗	✗	✗	Above
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined
	Stock size			
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✗	✗	✗	Below trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?	Undefined

The UWTV survey indicates that the stock size has declined since 2005 and has been fluctuating near MSY Btrigger since 2007. Harvest rates have been above F_{MSY} for all years except 2008.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach that if no discard ban is in place in 2015, landings should be no more than 1127 t, assuming that discard rates do not change from the average of the last three years (2011–2013) and that a fixed proportion of discards survive.

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

Other considerations

MSY approach

Following the ICES MSY approach implies a harvest rate of 7.1%, which is below F_{MSY} because biomass is below MSY $B_{trigger}$ ($F_{MSY} \times [SSB_{2015}/MSY\ B_{trigger} = 8.1 \times (755/858)]$). Considering that no discard ban is in place in 2015, this results in landings of no more than 1127 t, assuming that discard rates do not change from the average of the last three years (2011–2013) and assuming a discard survival of 15%.

Additional considerations

In mixed fisheries projections the 'min' scenario (where fishing is assumed to stop when the catch for any one of the stocks considered meets the single-stock advice) estimates that the *Nephrops* stock in FU 6 is one of the main limiting species for 2015, together with cod.

Declines in abundance in other FUs (i.e. Firth of Forth and the Fladen grounds) may increase the risk of higher effort being deployed in this FU which would be inadvisable, given the current low level of the stock.

The stock has shown signs of overexploitation in recent years, with an unbalanced sex ratio leading to poor recruitment. Without suitable controls on the movement of effort between functional units there is nothing to prevent the effort in 2015 from increasing and moving the observed harvest ratios even further beyond the level of F_{MSY}.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 that to comply with MSY objectives landings should be no greater than 1127 tonnes.

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.

2.4 Haddock (*Melanogrammus aeglefinus*) in IIa (EU zone), in Sub-area IV (North Sea) and Divisions IIIa (Skagerrak- Kattegat) and VIa (West of Scotland)

FISHERIES: North Sea haddock is exploited predominantly by fleets from the UK (Scotland), Norway and Denmark. Haddock in Division VIa is caught mainly by fleets from the UK (Scotland) and Ireland. Most landings are for human consumption and are taken by towed gears, although there is a small by-catch in the small-mesh industrial fisheries. Substantial quantities are discarded in some years when new year-classes recruit to the fishery. Over 1963-2006, catches in Division IV and IIIa have ranged from 55 000 t to 930 000 t. In recent years catches have decreased and the estimates for 2005 to 2012 (37 600 t) represent the lowest on record. A contributory factor to the lower catches in recent years has been the maintenance of low fishing mortality rate. Over 1978-2002, catches in Division VIa have ranged from 46 400 t to 13 400 t. Subsequently catches varied between 10 900 to 6 700 tonnes between 2003 and 2007. The catches fell to around 4 100 tonnes in 2008 and varied between 3 300 and 5800 tonnes between 2009 and 2012. The total catch for Northern shelf haddock (Division IV, IIIa and VIa) was estimated to be 49 700 tonnes in 2011, 43 200 tonnes in 2012 and 43 700 tonnes in 2013.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. The age-based assessment model (TSA) is calibrated with two survey indices. Discards and industrial by-catch data were included in the assessment. Discards were estimated from the discards sampling programme from several countries, with most observations coming from Scotland. Previously haddock in IIIaW and IV were assessed separately from haddock in VIa (see additional considerations below).

MANAGEMENT AGREEMENT: There is no management plan for the whole area. A management plan for Subarea IV and Division IIIaW was agreed by EU and Norway in 2008. ICES has evaluated the plan and concludes that it can be accepted as precautionary. An EU management plan proposal for Division VIa was evaluated by ICES (Needle, 2010) and is considered to be precautionary.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
Management plan (Subarea IV)	F_{MP}	0.3	Management strategy evaluation.
	SSB_{MP}	100 000 t 140 000 t	Trigger values B_{lim} and B_{pa}.
MSY approach (whole area)	MSY $B_{trigger}$	88 000 t	1.4 × B_{lim} from segmented regression changepoint estimate.
	F_{MSY}	0.35	Estimated by application of EqSIM evaluation.
Precautionary approach (whole area)	B_{lim}	63 000 t	Segmented regression changepoint estimate.
	B_{pa}	88 000 t	B_{pa} ~ 1.4 × B_{lim}.
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

(Unchanged since: 2014)

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✓	✓	Appropriate
Precautionary approach (F_{pa},F_{lim})	?	?	?	Not defined
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

Fishing mortality has been below F_{MSY} since 2008 and SSB has been above the MSY $B_{trigger}$ since 2001. Recruitment is characterized by occasional large year classes, the last of which was the strong 1999 year class. The 2014 recruitment index is higher than recent poor recruitment years, but is still below the long-term average.

RECENT MANAGEMENT ADVICE:

The Northern Shelf haddock stock was previously assessed as two separate stocks: Subarea IV and Division IIIaW (North Sea and Skagerrak), and Division VIa (West of Scotland).

ICES advises on the basis of the MSY approach that catches should be no more than 68 690 t for the whole assessment area. If rates of discards and industrial bycatch do not change from the average of the last three years (2011–2013), this implies human consumption landings of no more than 50 163 t. Measures to reduce discards should be taken in order to protect the incoming recruitment.

Other considerations

Management plan

Management plans (or management plan proposals) for Subarea IV, Division IIIaN, and Division VIa are not relevant for the newly defined stock.

MSY approach

Following the ICES MSY approach implies fishing mortality to be increased to 0.35, which implies catches of no more than 68 690 t. If rates of discards and industrial bycatch do not change from the average of the last three years (2011–2013), this implies human consumption landings of no more than 50 163 t in 2015. This is expected to lead to an SSB of 117 476 t in 2016.

Mixed fisheries

Mixed-fisheries advice informs managers of the consequences of setting TACs for single species which are exploited in a mixed fishery (ICES, 2014c). In contrast to single-species advice there is no single recommendation because no management objectives have been defined for mixed fisheries. Mixed-fisheries forecasts explore a range of scenarios which provide insight on the overall balance between the various single-species TACs. Major differences between the outcomes of the various scenarios indicate the potential for underestimating or overestimating the advised landings corresponding to the single-species advice. The results indicate which of the species are globally limiting for the North Sea fisheries as a whole, but may not necessarily reflect the actual constraints on individual fishers.
All but the "Maximum" scenario of the mixed-fisheries analyses show an underestimate compared to the single-species advice for haddock. The revised advice for haddock, whiting, *Nephrops* in FU6, plaice, and sole, based on new survey information in November 2014, has not changed the general perception of these stocks; therefore, the mixed-fisheries projections from June remain valid

Rationale	**Total Catch 2015**	**Human consumption Landings 2015**	**Discards 2015**	**IBC 2015**	**Basis**	**Total F 2015**	**F(Landings) 2015**	**F (Disc) 2015**	**F (IBC) 2015**	**SSB 2016**	**%SSB[1)] Change**	**%TAC[2)] Change**
MSY	54.580	48.176	6.404	< 0.001	F_{MSY}	0.35	0.287	0.063	< 0.001	117.426	−28%	8%
Mixed fisheries options – minor differences with calculation above can occur due to different methodology used												
Maximum	92.735	80.792	11.943	-	A	0.71	-	-	-	80.374	−51%	84%
Minimum	12.880	11.466	1.414	-	B	0.08	-	-	-	152.156	−7%	−74%
Cod MP	18.661	16.592	2.069	-	C	0.11	-	-	-	146.776	−11%	−62%
SQ effort	33.578	29.759	3.819	-	D	0.21	-	-	-	132.999	−19%	−32%
Effort_Mgt	15.811	14.066	1.745	-	E	0.09	-	-	-	149.426	−9%	−68%

Weights in thousand tonnes.

Under the assumption that effort is linearly related to fishing mortality.

[1)] SSB 2016 relative to SSB 2015.

[2)] Total landings 2015 relative to the combined TACs 2014: TAC IV = 38.285; TAC IIIa = 2.355; TAC VIa (2014) = 3.988; Total = 44.628.

Mixed-fisheries assumptions:

A. Maximum scenario: Fleets stop fishing when the last quota is exhausted.
B. Minimum scenario: Fleets stop fishing when the first quota is exhausted.
C. Cod management plan scenario: Fleets stop fishing when the cod quota is exhausted.
D. SQ effort scenario: Effort in 2014 and 2015 as in 2013.
E. Effort management scenario: Effort reductions according to cod and flatfish management plans.

It is assumed that there is no change in fishing mortality in 2014 relative to 2013. This is based on the fact that there is no reduction in effort ceilings for 2014 compared to 2013.

Additional considerations

Haddock in the Northern Shelf were previously assessed as two separate stocks: Subarea IV and Division IIIa (North Sea and Skagerrak), and Division VIa (West of Scotland). WKHAD (ICES, 2014e) concluded that there was strong evidence that the stocks were not biologically distinct and they should therefore be assessed as a single stock.

Management should take into account protection of stock components in the different areas to avoid local depletion. ICES has not split the overall TAC between areas. To advise on a possible split ICES would need policy guidelines on the basis for the split, coupled with further analysis of stock distribution.

Management considerations

A management plan for the whole area needs to be developed, taking into account the need to protect local components of the stock.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stocks and the advice for 2015.

STECF notes that in 2013 and earlier years, two separate assessments were carried out for the stocks in the West of Scotland and the North Sea/Skagerrak. This year, the two were combined into one assessment. Last year's advice was based on the EU–Norway management plan (Subarea IV and Division IIIa) and the MSY approach (Division VIa). This year´s advice is based on the MSY approach.

STECF notes that discards are highly variable without obvious long-term trend but appear to have been declining in recent years. Discard rates in 2012 and 2013 are the lowest observed in the time-series and appear to be linked to low recruitment.

With regards to the introduction of a landing obligation in Skagerrak, STECF has estimated the following:

Assuming that the TAC is set in accordance with ICES advice on landings, the TAC in Skagerrak for 2015 in the absence of the landing obligation would be 2 647 t (representing a 12% increase on the 2014 TAC). Discards in the Skagerrak represented 11% of total discards based on the average of the years 2010-2012 (based on information from WGNSSK 2014). 11% of the 18 528 t total discards estimated for haddock in IIIa, IV and VIa for 2015 equates to 2038 t. Assuming the proportion of total haddock discarded in the Skagerrak remains the same as the average of the years 2010-2012, the estimated total catch of haddock in Skagerrak for 2015 is 4 685 t.

STECF notes that the provisions of the EU Norway management plan would imply that total catches from Subarea IV, Divisions IIa and VIa in 2015 would be 59,123 t and if rates of discards and industrial bycatch do not change from the average of the last three years (2011–2013), this implies human consumption landings of no more than 43,222 t.

The STECF has performed annual monitoring of effort trends since 2003. Overall effort (kW-days) by demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (around -40% between 2003 and 2010, levelling off at that percent since then; STECF, 2014).

STECF notes that many vessels previously belonging to the TR 2 gear group have switched to using TR1 gears as a result of the adoption of proposed technical measures for the Skagerrak. Such a switch is likely to result in a lower proportion of the catch of haddock being discarded but STECF has no objective means to estimate the magnitude of such an effect.

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

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

The stock is managed by TACs. Landings fluctuated between 110,000 and 735,000 t. in the period 1971-1997, and apart from 2000 (184,000 t) decreased substantially in the following years The fishery was closed in 2005, reopened in 2006 and closed again in 2007. Landings in 2008 and 2009 were 36,100 t and 54,500 t respectively. Due to the very high 2009 recruitment catches in 2010 amounted to 125,955 t. The fishery was closed in the first half of 2011 and 2012. Catches in 2011 and 2012 were 6500 t and 27000 t. Total catch in 2013 was 82 000 t. Historically, the fisheries have resulted in by-catches of other species, particularly whiting, haddock, saithe, and herring. By-catches of these species have been low in the recent decade. Norway pout itself has been a by-catch in the fisheries for shrimp in 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.	
Precautionary approach	B_{lim}	90 000 t	B_{lim} = B_{loss}, the lowest observed biomass in the 1980s.
	B_{pa}	150 000 t	= $B_{lim}\, e^{0.3 \times 1.65}$
	F_{lim}	Undefined.	
	F_{pa}	Undefined.	

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	?	?	?	Undefined
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined
Qualitative evaluation	↘	↗	↗	Below average

Stock size				
	2012	2013	**2014**	
MSY ($B_{escapement}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓	Full reproductive capacity

The stock dynamic is highly variable from year to year, due to recruitment variability and a short life span. Stock size has increased following the high recruitment in 2012 and is well above MSY $B_{escapement}$ in 2014. Fishing mortality has been lower than the natural mortality for this stock and has decreased in recent years to below the long-term average F (0.6). Recruitment in 2014 is the highest estimate on record.

RECENT MANAGEMENT ADVICE:
ICES advises on the basis of precautionary considerations that catches should be no more than 326 000 t in 2015.

Other considerations

Management plans

Based on a new joint EU–Norway and a later EU request, new management strategies were evaluated in September 2012 and June 2013 and considered to be consistent with the precautionary approach under certain constraints.

MSY approach

Based on the escapement strategy to be at MSY $B_{escapement}$ on 1st of January 2016, catches should not exceed 1 071 000 t in 2015. This would however imply an F of 3.83, almost three times higher than the highest historical F, and is not considered precautionary.

Precautionary approach

The very large recruitment estimate for 2014 implies high uncertainty in the forecast of SSB in 2015 and 2016. Previous experience with other short-lived stocks (such as North Sea sprat) and with management strategy evaluation for the Norway pout stock in 2012 and 2013 indicate that direct application of an escapement strategy may not be precautionary in all circumstances, and that ceilings on F and/or catch may be needed. Even though the very high recruitment estimate might not be especially uncertain in relative terms, the absolute error of the forecast SSB can easily be of the order B_{pa}, which makes the escapement strategy unreliable under very high recruitment. Therefore, ICES advises to use an upper ceiling on F at 0.6, as suggested in the evaluation for a potential management plan (ICES, 2013). This gives an estimated catch in 2015 of 326 000 t.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice. STECF notes that the advice is based on precautionary considerations and that following the MSY approach directly implies that F in 2015 would be F=3.83 and corresponding to catches of over 1 million t.

2.6 Plaice (*Pleuronectes platessa*) in Subarea IV (North Sea)

FISHERIES: North Sea plaice is taken mainly in a mixed flatfish fishery by beam trawlers in the southern and south eastern North Sea with a minimum mesh size of 80 mm. This mesh size catches plaice under the minimum landing size of 27 cm, which induces high discard rates (in the range of 50% by weight). Directed fisheries are also carried out with seine and gill net, and by beam trawlers in the central North Sea with a minimum mesh size of 100 - 120 mm depending on area. Fleets involved in this fishery are the Netherlands, UK, Belgium, Denmark, France, Germany and Norway. Landings fluctuated between 70 000 and 170 000 t (1987-2002) and are predominantly taken by EU fleets. Landings in 2008 reached a record low of 48 900 t. The 2013 landings are 78 900 t.

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

The increased use of new gears such as “SumWing” and electric “pulse trawls” will increasingly affect catchability and selectivity of plaice and sole. ICES considered that pulse trawls experienced lower catch rates (kg hr−1) of undersized sole and higher catch rates of marketable sole, compared to standard beam trawls (ICES, 2006, 2012d). Plaice catch rates decreased for all size classes. Since 2009, Dutch fishers have started using pulse trawls. In 2011, approximately 30 derogation licenses for pulse trawls were operational in the Netherlands, increasing to 42 in 2012. At the end of 2013, there were 42 derogation licenses available, of which 39 were in use by flatfish vessels. Debate is ongoing in the EU about possible amendments to EU regulations that would permanently legalize the use of pulse gears for the whole fleet. The introduction of innovative gears may lead to changes in how the ecosystem is impacted by the plaice and sole targeting fleet. Because of the lighter gear and lower towing speed, pulse vessels generate a lower swept-area per hour and reduced bycatch of benthic organisms. The new gears may change fishing patterns as well.

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

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

The current plan prescribes effort limitations (kW-days per metier) to be adjusted in line with changes in fishing mortality. In 2012, ICES evaluated a proposal by the Netherlands for an amended management plan, which could serve as the "stage 2" plan (Coers *et al.*, 2012). The amendments included changing the target F for sole and to cease reductions of effort when the stocks are within safe biological limits. ICES concluded that the plan – subject to those amendments – is consistent with the precautionary approach and the principle of maximum sustainable yield (ICES, 2012a).

In 2013, the effects of interannual quota flexibility in the management plan for plaice and sole were evaluated (ICES, 2013b). ICES concluded that the multiannual management plan is robust to inclusion of an interannual quota flexibility of 10% in terms of the probability of the stock biomass falling below B_{lim}, and average yield. This conclusion is conditional on the interannual quota flexibility being suspended when the stock is estimated to be outside safe biological limits.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
Management Plan	SSB_{MP}	230 000 t	Stage one: Article 2.
	F_{MP}	0.6 0.3	Stage one: Article 2; Stage two: Article 4.
MSY Approach	MSY $B_{trigger}$	230 000 t	Default to value of B_{pa}.
	F_{MSY}	0.25	Simulation studies and equilibrium analyses taking into account a number of possible stock–recruitment relationships (range of 0.2–0.3).
Precautionary approach	B_{lim}	160 000 t	B_{loss} = 160 000 t, the lowest observed biomass in 1997 as assessed in 2004.
	B_{pa}	230 000 t	Approximately 1.4 B_{lim}.
	F_{lim}	0.74	F_{loss} for ages 2–6.
	F_{pa}	0.60	5th percentile of F_{loss} (0.6) and implies that $B_{eq}>B_{pa}$ [1)] and a 50% probability that $SSB_{MT} \sim B_{pa}$.

(Last changed in: 2011)

STOCK STATUS:

Fishing pressure			
	2011	2012	**2013**
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓ Harvested sustainably
Management plan (F_{MP})	✓	✓	✓ Below target

Stock size			
	2012	2013	**2014**
MSY ($B_{trigger}$)	✓	✓	✓ Above trigger

Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity
Management plan (SSB_{MP})	✓	✓	✓	Above target

The stock is well within precautionary limits, has increased in the past ten years, and reached a record-high level in 2014. Recruitment has been around the long-term average since the mid-2000s. In recent years, fishing mortality has been estimated below F_{MSY} and below the target specified in the management plan.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the second stage of the EU management plan (Council Regulation No. 676/2007) that catches should be no more than 185 798 t. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 128 376 t.

Other considerations

Management plan

The North Sea plaice and sole stocks have both been within safe biological limits in the last three years, which means that the stocks are presently in stage two of the EU multiannual plan (STECF, 2014). Application of stage two of the plan is based on transitional arrangements until an evaluation of the plan has been conducted (as stipulated in article 5 of the EC regulation).

Following the EU multiannual plan stage 2 would imply fishing at the target rate of 0.3, which results in a TAC (landings) increase of more than 15%. Therefore, the maximum TAC increase of 15% is applied, resulting in catches of no more than 185 798 t. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 128 376 t. This is expected to lead to an SSB of 752 727 t in 2016.

ICES has evaluated this management plan and considers it to be precautionary (ICES, 2010).

MSY approach

Following the ICES MSY approach implies an increase in fishing mortality to 0.25, resulting in catches of 165 161 t in 2015. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 113 611 t. This is expected to lead to an SSB of 773 246 t in 2016.

Precautionary approach

The fishing mortality in 2014 should be no more than F_{pa} (0.6), corresponding to catches of no more than 343 576 t in 2015. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 237 998 t. This is expected to keep SSB above B_{pa} in 2016.

Mixed fisheries

Mixed-fisheries advice informs managers of the consequences of setting TACs for single species which are exploited in a mixed fishery (ICES, 2014c). In contrast to single-species advice there is no single recommendation because no management objectives have been defined for mixed fisheries. Mixed-fisheries forecasts explore a range of scenarios which provide insight on the overall balance between the various single-species TACs. Major differences between the outcomes of the various scenarios indicate a potential for undershoot or overshoot of the advised landings corresponding to the single-species advice. The results provide indication of which species are globally limiting for the North Sea fisheries as a whole, but may not necessarily reflect the actual constraints on individual fishers.

In all scenarios except the "Maximum", the Plaice IV management plan catch options could not be fully utilized. The revised advice for haddock, whiting, *Nephrops* in FU6, plaice and sole, based on new survey information in November 2014 has not changed the general perception; therefore, the mixed-fisheries projections from June remain valid.

Rationale	**Catch (2014)**	**Landings (2014)[3]**	**Basis**	**F(2–6) Total (2014)**	**F(2–6) HC (2014)**	**F(2–3) Disc (2014)**	**Disc. (2014)**	**SSB (2015)**	**% SSB change[1])**	**%TAC change[2])**
Management plan	179301	128376	TAC + 15%	0.287	0.15	0.25	51380	735259	0	15
Mixed fisheries options – minor differences with calculation above can occur due to different methodology used										
Maximum	279520	199978	A	0.51	-	-	79542	608786	−17	79
Minimum	75325	53520	B	0.11	-	-	21805	812718	11	−52
Cod_ MP	84667	60175	C	0.13	-	-	24492	803339	10	−46

SQ effort	151503	107902	D	0.25	-	-	43601	736365	1	−3
Effort_Mgt	118610	84387	E	0.19	-	-	34223	769298	5	−24

Weights in thousand tonnes.

1) Landings of plaice in Subarea IV, calculated as the projected total stock landings less the landings of plaice from Subarea IV in Division VIId. The subtracted value (528 t) is estimated based on the plaice catch advice for Division VIId for 2014, using the recent 3-year average (2011–2013) proportion of the Subarea IV plaice stock in the annual plaice landings in Division VIId. TAC change restrictions of 15% are applied after subtracting the Division VIId catches.

2) SSB2016 relative to SSB 2015.

3) Landings 2015 relative to TAC 2014.

Mixed-fisheries assumptions:

A. Maximum scenario: Fleets stop fishing when the last quota is exhausted.
B. Minimum scenario: Fleets stop fishing when the first quota is exhausted.
C. Cod management plan scenario: Fleets stop fishing when the cod quota is exhausted.
D. SQ effort scenario: Effort in 2014 and 2015 as in 2013.
E. Effort management scenario: Effort reductions according to cod and flatfish management plans.

It is assumed that there is no change in fishing mortality in 2014 relative to 2013. This is based on the fact that there is no reduction in effort ceilings for 2014 compared to 2013.

Additional considerations

Management considerations

Both sole and plaice stocks in the North Sea have been within safe biological limits for a number of consecutive years. Therefore ICES considers that the management plan is now in the second stage, which implies that the stocks should be managed on the basis of MSY (article 4.1). The management plan specifies that fishing mortality for plaice in the second stage should not be set below the target of 0.3 (article 4.2); the current advice for plaice is therefore based on this objective. Taking into account the procedures for setting the TAC for plaice (article 7) the TAC advice for 2015 is based on a maximum change of 15%.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 that that catches should be no more than 185 798 t. If discard rates do not change from the average of the last three years (2011–2013), this implies landings of no more than 128 376 t. This advice is conditional on whether ICES and STECF have correctly interpreted the provisions of the stage 2 of the agreed management plan (Council Regulation 676/2007).

STECF notes that in the assessment of plaice in the North Sea, ICES has taken into account information on migration of plaice between the North Sea and VIId. Similar information relating to movement of plaice between the North Sea and the Skagerrak has not been taken into account.

STECF notes that there are more northerly areas of the North Sea where concentrations of plaice are much higher than sole. North of 56°N (Council Reg. 2056/2001) the mandatory 120mm mesh nets will catch plaice with negligible sole catches. A fishery to take plaice independently of sole is therefore possible in these more northerly areas of the North Sea.

The STECF has performed annual monitoring of effort trends since 2003. Overall effort (kW-days) by demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (around -40% between 2003 and 2010, levelling off at that percent since then). Effort by beam trawl in the small mesh size (80–120 mm, BT2) has shown a continuous decline (-55% between 2003 and 2012 and -51% in 2013 compared to the 2003 value). The effort large mesh size (> 120 mm, BT1) has shown a continuous decline between 2003 and 2011 to -73% and a light increase in the last 2 year to -40% of the 2003 value in 2013 (STECF 2014).

2.7 Sole (*Solea solea*) in Sub-area IV (North Sea)

FISHERIES: Sole is mainly taken by beam trawl fleets in a mixed fishery for sole and plaice in the southern part of the North Sea. A relatively small part of the catch is taken in a directed fishery by gill-netters in coastal areas,

mostly in the 2nd quarter of the year. The stock is exploited predominantly by The Netherlands with smaller landings taken by Belgium, Denmark, France, Germany and the UK. Landings have fluctuated between 11,000 and 35 000 t (1957-2007). The landings in 2011, 2012 and 2013 are around 11 500 t, 11 600 t and 13 100 t.

The increased use of "SumWing" and electric "Pulse trawls" will increasingly affect catchability and selectivity of North Sea sole. In 2011, approximately 30 derogation licenses for Pulse trawls were taken into operation, which increased to 42 in 2012 and 2013. Debate is ongoing in the EU about extensions of an additional 42 derogation licenses as well as possible amendments to EU regulations which would permanently legalize the use of pulse gears. ICES concluded that the introduction of electric pulse systems could significantly reduce fishing mortality of target and non-target species, including benthic organisms, assuming there is no corresponding increase in unaccounted (avoidance) mortality. However, not all relevant issues (such as delayed mortality and long-term population effects) have been fully studied and ICES therefore considers that the available data are insufficient to recommend the large-scale use of electric pulse trawl in fisheries.

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

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
Management plan	SSB_{MP}	35 000 t	Stage one: Article 2.
	F_{MP}	0.4 0.22	Stage one: Article 2; Stage two: Article 4.3 – F_{MSY}.
MSY approach	MSY $B_{trigger}$	35 000 t	Default to value of B_{pa}.
	F_{MSY}	0.22	Median of stochastic MSY analysis assuming a Ricker stock–recruit relationship (range of 0.2–0.25).
Precautionary approach	B_{lim}	25 000 t	B_{loss}
	B_{pa}	35 000 t	$B_{pa}1.4 \times B_{lim}$
	F_{lim}	Not defined.	
	F_{pa}	0.4	F_{pa} = 0.4 implies $B_{eq} > B_{pa}$ and $P(SSB < B_{pa}) < 10\%$.

(last changed in: 2011)

MANAGEMENT AGREEMENTS: A multiannual plan for plaice and sole in the North Sea was adopted by the EU Council in 2007 (Council Regulation (EC) No. 676/2007) which describes two stages: a recovery plan during its first stage and a management plan during its second stage. The long-term management plan for plaice and sole in the North Sea specifies two distinct phases. The objective of stage one of the flatfish management plan was to bring both sole and plaice stocks within safe biological limits. This objective has been achieved for both stocks. The management plan foresees a re-evaluation of the biological objectives and introduction of economic and social objectives after stage one is completed. The management plan states that when stage one is completed, the Council shall decide on the basis of a proposal from the Commission on the amendment of Articles 4(2) and 4(3) and the amendment of Articles 7, 8, and 9 that will, in the light of the latest scientific advice from the STECF, permit the exploitation of the stocks at a fishing mortality rate compatible with maximum sustainable yield.

ICES considers that the management plan is presently in stage two but the implementation at this stage has not yet been fully defined.

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✗	✗	✗	Just above target
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Harvested sustainably
Management plan (F_{MP})	✓	✓	✓	Appropriate
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity
Management plan (SSB_{MP})	✓	✓	✓	Above target

SSB has been increasing since 2007 and is estimated to be above B_{pa} in 2014. Fishing mortality has declined since 1995 and is estimated to be just above F_{MSY} in 2013.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the second stage of the EU management plan (Council Regulation No. 676/2007) but cannot quantify the resulting catches. The implied landings should be no more than 11,365 t.

Other considerations

Management plan

The North Sea plaice and sole stocks have both been within safe biological limits in the last three years, which means that the stocks are presently in stage two of the EU multiannual plan (STECF, 2014). Application of stage two of the plan is based on transitional arrangements until an evaluation of the plan has been conducted (as stipulated in Article 5 of the EC regulation).

In stage two, the EU multiannual plan calls for management in line with the principles of MSY. ICES considers F_{MSY} to be 0.22. Following the EU multiannual plan stage two therefore implies fishing mortality to be reduced to 0.22, which results in a TAC (landings) reduction of less than 15%. ICES cannot quantify the resulting catches. The implied landings should be no more than 11 365 t. Discards are known to take place in the order of an additional 20% of the landings in the last three years (2011–2013).

MSY approach

Following the ICES MSY approach implies fishing mortality to be reduced to 0.22 (F_{MSY}, as SSB 2012 >MSY $B_{trigger}$). ICES cannot quantify the resulting catches. The implied landings should be no more than 11 365 t. Discards are known to take place in the order of 20% of the landings of plaice in the last three years (2011–2013). This is expected to lead to an SSB of 55 257 t in 2016.

Precautionary approach

The fishing mortality in 2015 should be no more than F_{pa} = 0.4. ICES cannot quantify the resulting catches. The implied landings should be no more than 18 804 t. Discards are known to take place in the order of an additional 20% of the landings in the last three years (2011–2013). This is expected to keep SSB above B_{pa} in 2016.

Mixed fisheries

Mixed-fisheries advice informs managers of the consequences of setting TACs for single species which are exploited in a mixed fishery (ICES, 2014c). In contrast to single-species advice there is no single recommendation because no management objectives have been defined for mixed fisheries. Mixed-fisheries forecasts explore a range of scenarios which provide insight on the overall balance between the various single-species TACs. Major differences between the outcomes of the various scenarios indicate a potential for undershoot or overshoot of the advised landings corresponding to the single-species advice. The results provide indication of which species are globally limiting for the North Sea fisheries as a whole, but may not necessarily reflect the actual constraints on individual fishers.

The "Maximum" scenario leads to an overestimate of the North Sea sole TAC in 2015, while the "Minimum" and "Cod MP" scenarios lead to an underestimate. The revised advice for haddock, whiting, Nephrops in FU6, plaice and sole, based on new survey information in November has not changed the general perception; therefore, the mixed-fisheries projections from June remain valid.

Rationale	**Landings (2014)**	**Basis**	**F landings (2014)**	**SSB (2015)**	**%SSB change** [1)]	**%TAC change** [2)]
Management plan	10 973	Stage two: $-F_{MSY}$	0.22	53 783	+23	−8
Mixed fisheries options – minor differences with calculation above can occur due to different methodology used (ICES, 2013b)						
Maximum	18.156	A	0.40	46.333	+6	+53
Minimum	6.211	B	0.12	58.793	+34	−48
Cod_MP	6.469	C	0.12	58.524	+34	−46
SQ effort	11.460	D	0.23	53.306	+22	−4
Effort_Mgt	11.328	E	0.23	53.444	+22	−5

Weights in thousand tonnes.

[1)] SSB 2016 relative to SSB 2015.

[2)] Human Consumption landings 2015 relative to TAC 2014.

Mixed fisheries assumptions

A. Maximum scenario: Fleets stop fishing when last quota exhausted
B Minimum scenario: Fleets stop fishing when first quota exhausted
C Cod management plan scenario: Fleets stop fishing when cod quota exhausted
D SQ effort scenario: Effort in 2014 and 2015 as in 2013
E Effort management scenario: Effort reductions according to cod and flatfish management plans

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015.

The STECF has performed annual monitoring of effort trends since 2003. Overall effort (kW-days) by demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (around -40% between 2003 and 2010, levelling off at that percent since then). Effort by beam trawl in the small mesh size (80–120 mm, BT2) has shown a continuous decline (-55% between 2003 and 2012 and -51% in 2013 compared to the 2003 value). (STECF, 2014)

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

FISHERIES: Whiting are taken as part of a mixed fishery, as well as a by-catch in fisheries for *Nephrops* and industrial species. Substantial quantities are discarded. Historically total catches have varied considerably ranging between 25,000 t and 153,000 t. In 2013, the Working Group estimated that about 26,965 t were caught. The human consumption landings in the North Sea in 2013 were 15,384 t with a TAC for 2013 of 18,932 t. The landings in the Eastern Channel amounted to 3,950 t.

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

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

The minimum mesh size was increased for demersal whitefish vessels to 120 mm in the northern North Sea in 2002 and this may have contributed to the substantial decrease in catches. Landing compositions from this area, in 2006 to 2009, indicate improved survival of older ages. In addition, the total number of discarded fish appears to have been reduced since 2003, from around 60% in 2003 to around 33% in 2012 and 22% in 2013. Because of the restrictive TACs, discard rates increased in 2010 and 2011, although they are estimated to have decreased again in 2012 and 2013. More selective gears were introduced in the *Nephrops* (TR2) fleet in 2012 which may also have contributed to a decline in discard rates.

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

MANAGEMENT AGREEMENT: A management plan was agreed by EU and Norway in 2014 based on an adjusted target F of 0.15. ICES evaluated this harvest control rule (ICES, 2013d) and considered it as precautionary.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
Management plan	SSB_{MP}	Undefined.	
	F_{MP}	0.15	Management plan.

MSY approach	MSY $B_{trigger}$	Undefined.	
	F_{MSY}	Undefined.	
Precautionary approach	B_{lim}	184 000 t	Provisional reference point B_{loss} (SSB in 2007 in the 2013 assessment; ICES, 2013d)
	B_{pa}	Undefined.	
	F_{lim}	Undefined.	
	F_{pa}	Undefined.	

(changed in: 2014)

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	?	?	?	Undefined
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	?	Undefined
Qualitative evaluation	→	↘	↘	Below recent average

SSB has declined in recent years and is close to the minimum value of the time-series, while fishing mortality has been declining over most of the time-series. The average level of recruitment has been low since 2003.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the EU–Norway management plan that total catches should be no more than 30 579 tonnes. If rates of discards and industrial bycatch do not change from the average of the last three years (2011–2013), this implies human consumption landings of no more than 17 190 tonnes (13 678 tonnes in the North Sea and 3512 tonnes in Division VIId). Management for Division VIId should be separated from the rest of Subarea VII.

Other considerations

Management plan

The management plan agreed by EU and Norway in 2014 (see Annex 6.3.34) is based on the previous plan with an adjusted target F of 0.15. ICES evaluated this harvest control rule (ICES, 2013d) and considered this is precautionary.

Following the agreed management plan target F (F_{target} = 0.15) results in a TAC decrease for human consumption landings of more than 15%. Therefore, the TAC constraint of 15% should be applied, resulting in human consumption landings for the total area (Subarea IV and Division VIId combined) of no more than 17 190 t in 2015. If rates of discards and industrial bycatch do not change from the average of the last three years (2011–2013), this implies catches of no more than 30 579 t.

Mixed fisheries

Mixed-fisheries advice informs managers of the consequences of setting TACs for single species which are exploited in a mixed fishery (ICES, 2014c). In contrast to single-species advice there is no single recommendation because no management objectives have been defined for mixed fisheries. Mixed-fisheries forecasts explore a range of scenarios which provide insight on the overall balance between the various single-species TACs. Major differences between the outcomes of the various scenarios indicate a potential for undershoot or overshoot of the advised landings corresponding to the single-species advice. The results provide indication of which species are globally limiting for the North Sea fisheries as a whole, but may not necessarily reflect the actual constraints on individual fishers.

In all scenarios except the "Maximum", the catch options resulting from the whiting single-species advice cannot be fully utilized. The revised advice for haddock, whiting, *Nephrops* in FU6, plaice and sole, based on new survey information in November 2014 has not changed the general perception; therefore, the mixed-fisheries projections from June remain valid.

Rationale	Total Catch 2015	Total Landings IV+VIId 2015	Total Discards 2015	Total IBC 2015	Landings IV 2015	Landings VIId 2015	Basis
Management plan	28.317	17.190	10.337	0.790	13.678	3.512	15% TAC decrease
Mixed fisheries options – minor differences with calculation above can occur due to different methodology used							
Maximum	76.754	45.494	31.260	-	41.218	4.276	A
Minimum	11.027	6.798	4.229	-	6.159	0.639	B
Cod MP	15.699	9.654	6.045	-	8.747	0.907	C
SQ effort	28.633	17.483	11.150	-	15.840	1.643	D
Effort_Mgt	13.479	8.299	5.180	-	7.519	0.780	E

Rationale	Total F 2015	F(Landings) 2015	F(Discards) 2015	F(IBC) 2015	SSB 2016	% SSB change [2)]	% TAC change[3)]
Management plan	0.186	0.127	0.053	0.006	266.012	16%	−15%
Mixed fisheries options – minor differences with calculation above can occur due to different methodology used							
Maximum	0.586	-	-	-	221.296	−4%	126%
Minimum	0.071	-	-	-	274.893	20%	−66%
Cod MP	0.102	-	-	-	270.986	18%	−52%
SQ effort	0.192	-	-	-	260.239	13%	−13%
Effort_Mgt	0.087	-	-	-	272.841	19%	−59%

Weights in thousand tonnes.

[1)] The landing split between Subarea IV and Division VIId in 2015 is the same as the proportion of landings between the areas in 2013: 79.56% landings from Subarea IV and 20.43% landings from Division VIId. This assumes that management for Division VIId is separate from Subarea VII. Total catches are based on a combined discard rate for Subarea IV and Division VIId.

[2)] SSB 2016 relative to SSB 2015.

[3)] Human consumption for Subarea IV in 2015 relative to TAC for Subarea IV and Division IIa in 2014 (16 092 t).

Mixed-fisheries assumptions:

A. Maximum scenario: Fleets stop fishing when the last quota is exhausted.
B. Minimum scenario: Fleets stop fishing when the first quota is exhausted.
C. Cod management plan scenario: Fleets stop fishing when the cod quota is exhausted.
D. SQ effort scenario: Effort in 2014 and 2015 as in 2013.
E. Effort management scenario: Effort reductions according to cod and flatfish management plans.

It is assumed that there is no change in fishing mortality in 2014 relative to 2013. This is based on the fact that there is no reduction in effort ceilings for 2014 compared to 2013.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 that total catches should be no more than 30,579 t. Assuming discard and industrial bycatches remain at the same in 2015 as the average of the last 3 years, this implies human consumption landings of no more than 17,190 t. Splitting the human consumption landings according to the proportions of overall landings in in 2013 for IV and VIId separately, implies human consumption landings of 13,678 t in the North Sea and 3,512 t in Division VIId in 2015.

STECF notes that the previous management plan was re-evaluated in 2013 and that the adjusted target F of 0.15 is considered precautionary.

The STECF has performed annual monitoring of effort trends since 2003. Overall effort (kW-days) by demersal trawls, seines, beam trawls, and gillnets in the North Sea, Skagerrak, and Eastern Channel had been substantially reduced (around -40% between 2003 and 2010, levelling off at that percent since then; STECF, 2014).

2.9 Rays and skates in the North Sea

ICES uses the common term "skate" to refer to members of the family Rajidae. The term ray, formerly used by ICES to refer to Rajidae too, is now only used to refer to other batoid fish, including manta rays, sting rays, and electric rays. ICES only provides routine advice for Rajidae.

Recent studies have identified that *Dipturus batis* comprises two species. As the taxonomic nomenclature is still to be officially agreed, ICES currently provides advice for the species complex, but will provide species-specific advice when both species are recognised. Given changes in the taxonomy of the genus Dipturus, management measures may be better implemented at genus level.

ICES does not provide advice for the generic skate assemblage, nor does it advise on the generic skate TAC in this area. This is because ICES believes that management should be at a stock-specific level. Also, the generic skate TAC does not take into account that several stocks straddle the boundary with other management units.

North Sea Eco-region Skates and Rays will be advised in 2015.

FISHERIES: Rays and skates are taken as target and by-catches in most demersal fisheries for roundfish or flatfish 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.

Landings have decleined since their peak in 1982. Most of the fisheries now take place in the south of the region in the division IVc and VIId, the major nations are UK, France and Netherlands. In 2011, *Raja clavata* compose 42 % of the total catch and 62% of the species-specific landings.

STECF COMMENTS: STECF notes that for many skates (Rajiformes), the absolute level of catch and stock status are uncertain. Assessments are based mostly on observed trends in survey time series, as these provide the longest time series of species-specific information. This information forms the basis for ICES' advice using its approach to data limited stocks. Such an approach prescribes the proportional change in the level of reported catch based on the changes in the survey estimates of stock size. However, for skates, because the accuracy and current levels of species-specific catches are variable, the level of catch that corresponds to the proportional change cannot always be accurately estimated. Hence in some instances, such an approach does not provide useful advice on future fishing opportunities. Provision of advice is further complicated as fishing opportunities for skates are currently expressed as multiple-species TACs. STECF also notes that since the implementation of the ICES approach to data limited stocks, developments in methodologies for undertaking assessments and providing management advice for data limited stocks have occurred and are documented by FAO and several ICES workshop reports on life history traits. Furthermore a special issue of Fisheries Research on such developments is shortly due to be published so there is the potential for ICES to review and revise and improve upon its current approach.

STECF also notes that in many fisheries, the survival rate of skates that are caught and discarded can be relatively high (see STECF EWG 14-11). Hence, in those fisheries primarily directed to other demersal species, the obligation to land all catches is likely to result in increased fishing mortality on skates if catches exceed TACs.

In view of the above, STECF suggests that to minimise incidental fishing-induced mortality on skates, consideration should be given to allow over-quota discarding, but that a record should be kept of the estimated quantity (weight) discarded to enable total catches to be estimated. STECF also suggests that no discarding of skates should be permitted unless the quotas for such species have been exhausted. Such a provision would not only minimise over-quota fishing-induced mortality, but would also prevent fisheries directed to other species being closed prematurely, as a consequence of a lack of quota for skates and would also help improve much-needed fishery-dependent catch data for skates.

Resume of ICES advice for 2013 and 2014 is reiterated for 2015 and provided below.

2.9.1 Common skate (*Dipturus batis-complex*) in Subarea IV and Division IIIa (North Sea and Skagerrak).

The advice given in 2012 for this stock is valid for 2013–2015: *"Based on the precautionary approach, ICES advises that there should be no targeted fishery for either Dipturus cf. flossada or Dipturus cf. intermedia, and measures should be taken to minimize bycatch".*

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

STECF COMMENTS: STECF agrees with the ICES advice for 2015. STECF also considers that any catches of *Dipturus spp*. should be recorded and all individuals should be returned to the sea as speedily as possible.

2.9.2 Thornback ray (*Raja clavata*) in Subarea IV, and Divisions IIIa and VIId (North Sea, Skagerrak, Kattegat and eastern English Channel).

The advice given in 2012 for this stock is valid for 2013–2015: *"Based on ICES approach to data-limited stocks, ICES advises that catches could be increased by a maximum of 20%. However, ICES does not advise that an individual TAC be set for this species, at present.*

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

NB: The advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% increase in catch be implemented.

STECF COMMENTS:

STECF agrees that application of the ICES approach to data-limited stocks prescribes that catches in 2015 could be increased by a maximum of 20% compared to the average catches over the period 2009-2011

Given that based on 2011 data R clavata comprise 62% of the reported species-specific landing and that R clavata are readily identifiable from other skate species, STECF suggests that consideration be given to setting a separate TAC for R clavata in the North Sea in an attempt to control fishing mortality on this species.

Applying the proportion of R clavata in the landings of skates from the North Sea in 2011 (62%) to the average reported landings of skates from the North Sea over the period 2009-2011 (2,960 kt) gives an estimated average landing of R clavata of 1,840 t. Taking into account the ICES advice that catches can be increased by up to 20%, and assuming a constant discard rate implies that landings in 2015 and 2016 could also be increased by up to 20%. Such an approach would imply a TAC for R clavata in Subarea IV, and Divisions IIIa and VIId (North Sea, Skagerrak, Kattegat and eastern English Channel) of no greater than 2,002 t.

2.9.3 Spotted ray (*Raja montagui*) in Subarea IV, and Divisions IIIa and VIId (North Sea, Skagerrak, Kattegat, and Eastern English Channel).

The advice given in 2012 for this stock is valid for 2013–2015: *"Based on ICES approach to data-limited stocks, ICES advises that catches could be increased by a maximum of 20%. However, as species-specific landings data are not complete, it is not possible to quantify the current catch. ICES does not advise that an individual TAC be set for this species, at present.*

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

NB: the advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% increase in catch be implemented

STECF COMMENTS: STECF agrees that application of the ICES approach to data-limited stocks prescribes that catches in 2015 could be increased by a maximum of 20% compared to the average catches over the period 2009-2011. However, in the absence of species-specific data on catches or landings, STECF is unable to determine an appropriate level of catch for 2015 and 2016.*Starry ray (*Amblyraja radiata*) in Subareas II, IIIa and IV (Norwegian Sea, Skagerrak, Kattegat and North Sea).*

The advice given in 2012 for 2013 and 2014 is reiterated for 2015*: "Based on ICES approach to data-limited stocks, ICES advises that catches should be reduced by 36%. However, as species-specific landings data are not complete, it is not possible to quantify the current catch. ICES does not advise on an individual TAC for this species, which is discarded in most fisheries.*

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

NB: the advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 36% reduction in catch be implemented.

STECF COMMENTS: STECF agrees that application of the ICES approach to data-limited stocks prescribes that catches in 2015 should be reduced by 36% compared to the average catches over the period 2009-2011. However, in the absence of species-specific data on catches or landings, STECF is unable to determine an appropriate level of catch for 2015 and 2016. STECF notes that as starry ray is mainly a bycatch species in fisheries directed to other demersal species, TACs are unlikely to be effective as a management tool to control fishing mortality on this species.

2.9.4 Cuckoo ray (*Leucoraja naevus*) in Subarea IV and Division IIIa (North Sea and Skagerrak and Kattegat).

The advice given in 2012 for 2013 and 2014 is reiterated for 2015: "*Based on ICES approach to data-limited stocks, ICES advises that catches could be increased by a maximum of 20%. However, as species-specific landings data are not complete, it is not possible to quantify the current catch. ICES does not advise that an individual TAC be set for this stock, at present.*

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

NB: the advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% increase in catch be implemented.

STECF COMMENTS: STECF agrees that application of the ICES approach to data-limited stocks prescribes that catches in 2015 could be increased 20% compared to the average catches over the period 2009-2011. However, in the absence of species-specific data on catches or landings, STECF is unable to determine an appropriate level of catch for 2015 and 2016.

2.9.5 Blonde ray (*Raja brachyura*) in Divisions IVc and VIId (Southern North Sea and eastern English Channel).

The advice given in 2012 for this stock is valid for 2013–2015: "*Based on ICES approach to data-limited stocks, ICES advises that catches should be reduced by at least 20%. However, as species-specific landings data are not complete, it is not possible to quantify the current catch. ICES does not advise that an individual TAC be set for this stock, at present. Additional measures should be identified that can regulate exploitation of this species. Such measures may include seasonal and/or area closures, technical measures, and tailored measures for target fisheries. Such measures should be developed by stakeholder consultations, considering the overall mixed fisheries context."*

NB: The advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% reduction in catch be implemented

STECF COMMENTS: STECF agrees that application of the ICES approach to data-limited stocks prescribes that catches in 2015 should be reduced by at least 20% compared to the average catches over the period 2009-2011. However, in the absence of species-specific data on catches or landings, STECF is unable to determine an appropriate level of catch for 2015 and 2016.

STECF notes that as blonde ray is mainly a bycatch species in fisheries directed to other demersal species and their reporting still subject to misidentification (with spotted ray), TACs are unlikely to be effective as a management tool to control fishing mortality on this species.

2.9.6 Undulate ray (*Raja undulata*) in Divisions VIId, e (English Channel).

The advice given in 2012 for this stock is biennial and valid for 2013 and 2014 and for 2015: "*Based on the precautionary approach ICES continues to advise that there be no targeted fishery for undulate ray unless information is provided to show that these are sustainable. Measures should be taken to minimize bycatch.*"

STECF COMMENTS: STECF agrees with the ICES advice that based on the precautionary approach there should be no targeted fisheies for undulate ray unless information is provided to show that these are sustainable and that measures should be taken to minimize bycatch."

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

FISHERIES: See section 2.9

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: See section 2.9

RECENT MANAGEMENT ADVICE

The advice given in 2012 for these stocks is valid for 2013–2015: "*Based on ICES approach to data-limited stocks, ICES advises that catches should be reduced by at least 20%. However, ICES does not advise that individual TACs be set for these stocks, at present.*

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

NB: The advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% reduction in catch be implemented.

STECF COMMENTS: STECF agrees that application of the ICES approach to data-limited stocks prescribes that catches in 2015 should be reduced by at least 20% compared to the average catches over the period 2009-2011. However, in the absence of species-specific data on catches or landings, STECF is unable to determine an appropriate level of catch for 2015 and 2016.

STECF also agrees with the ICES advice that additional measures should be identified that can regulate exploitation of these species. Such measures may include seasonal and/or area closures, technical measures, and tailored measures for target fisheries. Such measures should be developed by stakeholder consultations, considering the overall mixed fisheries context.

2.10 Spurdog (*Squalus acanthias*) in the North Sea

Spurdog in the North Sea is assessed as part of the spurdog stock in the Northeast Atlantic and the stock summary and advice is given in Section 6.7.

2.11 *Scyliorhinus canicula* and *Scyliorhinus stellaris* in Subareas IIa, IV and VIId

Advice for these stocks for the years 2013-2015 was given in 2012 and the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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)

Advice for 2013-2015

The advice given in 2012 for this stock is valid for 2013–2015: "*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.*"

NB: the advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% increase in catch be implemented.

STECF COMMENTS: STECF agrees with the status of the stock and the ICES advice for 2015.

2.12 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. Catches by the Danish industrial fleet for reduction into fishmeal and fish oil formed the majority of North Sea horse mackerel catches throughout the 1970s and 1980s. Catches were taken in the fourth quarter, mainly in Divisions IVb and VIId. The 1990s saw a drop in the value of industrial resources, limited fishing opportunities, and steep increases in fuel costs. In 2001, an individual quota scheme was introduced in Denmark, which resulted in a rapid restructuring of the fleet. Since then the fleet size has been radically reduced and now numbers less than 20% that in the 1980s; additionally, Danish North Sea horse mackerel catches have diminished. Since the 1990s, a larger portion of catches has been taken in a directed horse mackerel fishery for human consumption by the Dutch and German freezer-trawler fleet. Denmark has traded a limited part of its quota with other EU member states for fishing opportunities for other species. However, since only a limited amount of quota is made available to other countries the TAC has been consistently underutilized in recent years (approximately 50% in 2010–2013). The total catch taken from this stock in 2013 was 18,696 tonnes, which represents a 13% decrease compared to 2012.

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:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	?	Likely above target [1]
Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	?	Likely below target [1]

[1] Basis of the qualitative evaluation of fishing pressure and biomass is given in ICES (2014, Section 6.2.3.3).

The available information, while broadly informative, is insufficient to evaluate 2013 biomass and exploitation status. Catches in recent years have been declining slowly, with an average around 23 kt (2011–2013).

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

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

RECENT MANAGEMENT ADVICE:

ICES advises a significant reduction in catch of greater than 20%, corresponding to catches in 2015 of less than 15 200 t.

Other considerations

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

ICES approach to data limited stocks

Based on the biomass index and exploratory assessments the biomass is considered to be relatively stable at low level. Based on the exploratory assessments fishing pressure is not well known but considered to be high (3 to 6 times higher than a candidate F_{MSY}). This implies that a considerable reduction in fishing mortality is required, but ICES is unable to provide a precise estimate of the required change. ICES therefore advises a greater than 20% reduction in catches (as a PA buffer), corresponding to catches in 2015 of less than 15 200 t.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015, that catches should be less than 15,200 t.

Request to ICES to evaluate the proposal for a multi-annual plan for horse mackerel in the North Sea

STECF notes the ICES response to the Netherlands request to evaluate the proposed harvest control rule for a multi-annual plan for horse mackerel in the North Sea using various plausible parameter options. (ICES Advice 2014, Book 6, section 6.2.3.3).

STECF agrees with logical explanations given in the ICES response and with the ICES advice that, given the stock is at its lowest since the early 1990s, some of the Harvest Control Rule parameter options suggest recovery of the stock to above the present level by 2020, but none of them with 95% probability. Therefore, ICES considers none of these options as being in accordance with the precautionary approach. It is suggested that managers discuss other options with ICES that might be more suitable, including a recovery phase to reverse the decline of the stock.

3 Resources of the Celtic Sea and West of Scotland

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

There are no exploited *Nephrops* stocks in Div. Vb. In Sub-area VI and Divs. VIIb & VIIc (waters west of Ireland) the following functional units are considered by ICES:

FU no.	Name	ICES Divisions	Statistical rectangles
11	North Minch	VIa	44–46 E3-E4
12	South Minch	VIa	41–43 E2-E4
13	Clyde + Sound of Jura	VIa	39–40 E4-E5

Nephrops also occur in other areas not contained within the Functional Units. TV surveys in deep water suggest widespread distribution at low density, and surveys at Stanton Bank indicate a population there. Three *Nephrops* stocks (FUs) in Sub-area VI and one in Div. VIIb (FU 17) are currently assessed using UWTV surveys. On the basis of these, current stock abundance and harvest ratios are estimated.

MSY approach for stocks with UWTV surveys

There are no precautionary reference points defined for *Nephrops*. Under the ICES MSY framework, exploitation rates which are likely to generate high long-term yield (and low probability of stock overfishing) have been explored and proposed for each functional unit. Owing to the way *Nephrops* are assessed, it is not possible to estimate F_{msy} directly and hence proxies for F_{msy} are determined. Three stock-specific candidates for F_{msy} ($F_{0.1}$, $F_{35\%SpR}$ and F_{max}) were derived using a length-based per recruit analysis. There can be substantial differences in relative exploitation rates between the sexes in many stocks. To account for this, values for each of the candidates have been determined for males, females and the two sexes combined. The appropriate F_{msy} candidate has been selected for each Functional Unit independently according to the perception of stock resilience, factors affecting recruitment, population density, knowledge of biological parameters and the nature of the fishery (relative exploitation of the sexes and historical Harvest Rate vs. stock status).

The table below illustrates the framework against which stocks were evaluated and appropriate F_{MSY} proxies chosen. In general, $F_{35\%SPR}$ was used unless there were stock-specific justifications for either higher or lower harvest ratios.

The combined sex F_{msy} proxy should be considered appropriate provided that the resulting percentage of virgin spawner per-recruit for males or females does not fall below 20%. In such a case a more conservative sex specific F_{msy} proxy should be picked instead of the combined proxy.

		Burrow Density (average numbers/m2)		
		Low	Med	High
		<0.3	0.3-0.8	>0.8
Observed harvest rate or landings compared to stock status	>Fmax	F35%	Fmax	Fmax
	Fmax-F0.1	F0.1	F35%	Fmax
	<F0.1	F0.1	F0.1	F35%
	Unknown	F0.1	F35	F35%
Stock Size Estimates	Variable	F0.1	F0.1	F35%
	Stable	F0.1	F35%	Fmax
Knowledge of biological parameters	Poor	F0.1	F0.1	F35%
	Good	F35%	F35%	Fmax
History Fishery	Stable spatially and temporally	F35%	F35%	Fmax
	Sporadic	F0.1	F0.1	F35%
	Developing	F0.1	F35%	F35%

There may be great differences in the relative exploitation rates between the sexes for many stocks. To account for this, values for each of the candidates have been determined individually for males, females, and the two sexes combined. The combined sex F_{MSY} proxy should be considered appropriate, provided that the resulting percentage of virgin spawner-per-recruit for males or females does not fall below 20%. If this happens a more conservative sex-specific F_{MSY} proxy should be chosen instead of the combined proxy.

Where possible, a preliminary MSY $B_{trigger}$ was proposed based on the lowest observed UWTV burrow abundance, unless the stock has shown signs of stress at higher abundance (in which case a higher value is used).

Additional considerations

Management considerations

The overriding management consideration for these stocks is that management should be at the functional unit rather than the ICES subarea/division level. Management at the functional unit level should provide the controls

to ensure that catch opportunities and effort are compatible and in line with the scale of the resources in each of the stocks defined by the functional units. Current management of *Nephrops* in Subarea VI (both in terms of TACs and effort) does not provide adequate safeguards to ensure that local effort is sufficiently limited to avoid depletion of resources in functional units. In the current situation vessels are free to move between grounds, allowing effort to develop on some grounds in a largely uncontrolled way; this has historically resulted in inappropriate harvest rates from some parts.

There are also *Nephrops* catches in "other rectangles" in Division VIa, e.g. from offshore areas adjacent to Stanton Bank where Irish fishers frequently operate from the shelf edge.
There are no functional units in ICES Division VIb, but occasional small *Nephrops* landings occur.

STECF COMMENTS: STECF notes that to the West of Scotland (which comprises three *Nephrops* Functional Units (FUs)) the present aggregated management approach (overall TAC for all FUs) runs the risk of unbalanced effort distribution. Adoption of management initiatives to ensure that effort can be appropriately controlled in smaller areas within the overall TAC area (Vb & VI) is recommended. Furthermore, STECF notes that the current aggregated management of all *Nephrops* FUs in this area as a single unit is a major obstacle for a management complying with the Commissions Communication on Fishing opportunities for 2014 (COM(2013)319 final) as the rules require a TAC for each stock (in this case FU).

STECF notes that there also are *Nephrops* catches in "other rectangles" in Division VIa, e.g. from offshore areas adjacent to Stanton Bank where Irish fishers frequently operate from the shelf edge. To provide some guidance on appropriate future landings for these areas, the use of an average landings figure of around 326 tonnes could be considered (On the basis of ICES advice that catches from 'other areas' should not increase)

3.1.1 Norway lobster (*Nephrops norvegicus*) in North Minch (FU 11)

FISHERY: The *Nephrops* fishery in this area is prosecuted entirely by UK (Scottish) vessels. Total effort by Scottish *Nephrops* trawlers has shown a gradual decreasing trend since 2002. Total *Nephrops* landings increased from about 3,000 t in 2005 to around 3,800 t in 2008. In 2011 they were 2,697 t and in 2012 3,542 t. In 2013 landings were 3,395 t.

Available information indicates that landings from the late 1990s up to 2005 are most likely to be an underestimate of actual landings, but the reliability of landings figures has improved since 2006 with the introduction of buyers and sellers legislation. The *Nephrops* trawl fishery in this area takes by-catches of other species and has been observed to have extremely high discard rates of haddock and whiting in recent years. The fishery has been fairly stable over the time-series. Landings have increased in the last two years and the drop observed in 2010 seems to be mainly related to market conditions. Reported effort by all Scottish *Nephrops* trawlers has shown an increase in 2012 particularly during the first semester. It is an all-year-round fishery and creel fishing takes place mainly in the sea-loch areas, but has recently extended also to further offshore. Overall effort in terms of creel numbers is not known and there are no limits on the number of creels.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment in 2013 is based on trends in population indicators and catch options derived from UWTV surveys. For this FU, the absolute density observed in the UWTV survey is medium (~0.59 burrows m^{-2}). Historical harvest ratios in this FU have been around those equivalent to fishing at $F_{35\%SpR}$ and landings have been relatively stable in the past thirty years. $F_{35\%SpR}$ (combined between sexes) is expected to deliver high long-term yield with a low probability of recruitment overfishing and is therefore chosen as a proxy for F_{MSY}. New size-at-maturity parameters were available at the 2013 benchmark, leading to revisions in the harvest rate reference points.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	541 million individuals	Bias-adjusted lowest observed UWTV survey estimate of abundance
	F_{msy}	10.9% harvest rate	Equivalent to $F_{35\%SpR}$ combined sex. F_{MSY} proxy based on length-based yield-per-recruit analysis.
Precautionary Approach	Not agreed		

Harvest ratio reference points (2013):

	Male	Female	**Combined**
F_{max}	11.1	23.0	13.2
$F_{0.1}$	6.9	12.8	7.7
$F_{35\%SpR}$	8.2	19.6	**10.9**

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✗	✓	Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Not defined
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?	Not defined

The stock has been above MSY $B_{trigger}$ for more than 15 years. The results from the UWTV survey indicate that the abundance has decreased in 2012 and recovered in 2013 to an abundance similar to those observed in 2010–2011. The historical harvest ratios (removals/UWTV abundance) have fluctuated around the F_{MSY} proxy. The harvest ratio in 2012 increased to 17.9% and is above the F_{MSY} proxy.

RECENT MANAGEMENT ADVICE:

ICES advises, on the basis of the MSY approach and considering that no discards ban is in place in 2015, that landings should be no more than 3092 t. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 3312 t.
In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

Other considerations

MSY approach:

Following the ICES MSY approach implies a harvest ratio for the North Minch functional unit of F_{MSY} = 10.9%. Considering that no discard ban is in place in 2015, this results in landings of no more than 3092 t. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 3312 t.

Additional considerations

The stock has been above MSY $B_{trigger}$ for more than 15 years. In 2014 estimated abundance has seen a small 11% decrease in comparison to 2013. The historical harvest ratios (removals/UWTV abundance) have fluctuated around the F_{MSY} proxy. The harvest ratio in 2013 decreased to 10.0% and is below the F_{MSY} proxy.
Recent work using VMS has refined the estimate of the area. Results from a recent study on mapping the spatial extent of *Nephrops* habitat in the North Minch sea lochs indicate that the muddy habitat in the lochs is only a very small proportion of the total *Nephrops* grounds in this FU.

The minimum landing size for *Nephrops* in Division VIa is 20 mm carapace length. Discarding of both undersize and poor quality *Nephrops* sometimes takes place in this FU. Discard rates have been variable but generally lower than 20%. The mean sizes in the length compositions of larger individuals (>35 mm CL) are relatively stable, but the mean weight in landings has increased markedly in 2010 and decreased again in the last two years. To dampen this variability, the time-series average (1999–2012) was used as input for the mean weight in landings for the catch forecasts.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 that to comply with MSY objectives landings should be no greater than 3092 tonnes and catches of no more than 3312 tonnes.

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 2015 imply around 10% decrease on the status quo harvest ratio (and 10% less in landings) from this functional unit.

3.1.2 Norway lobster (*Nephrops norvegicus*) in South Minch (FU 12)

FISHERY: The *Nephrops* fishery in this area is prosecuted largely by UK vessels with a small proportion of the landings by Irish vessels. Reported effort by all Scottish *Nephrops* trawlers has shown a gradual decreasing trend since 2001. Reported effort by all Scottish *Nephrops* trawlers has shown an increase in 2012, particularly during the first semester. Inshore trawlers are mainly small, but in the offshore areas of this FU larger boats operate. Creel fishing takes place mainly in inshore areas (including the sea-lochs), but has extended further offshore in recent years. Overall effort in terms of creel numbers is not known and there are no limits on the number of creels.

Total *Nephrops* landings from this FU were above 5000 t in 2007 and 2008 but decreased to around 4300 t in 2009. Since 2010 landings have varied between 3700 and 4000 t. The 2013 landings amount to about 3800 t. The decline from 2007 to 2011 is apparently largely due to market conditions. Available information indicates that landings from the late 1990s up to 2005 are most likely to be underestimates of actual landings. The reliability of landings figures improved from 2006 with the introduction of buyers and sellers legislation. The *Nephrops* trawl fishery in this area takes by-catches of other species and has been observed to have extremely high discard rates of haddock and whiting in recent years. Larger vessels operating on the western limits of the ground generally take higher by-catches of fish.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment in 2013 is based on trends in population indicators and catch options derived from UWTV surveys.

For this FU, the absolute density observed in the UWTV survey is medium (~ 0.44 burrows m^{-2}). The fishery in this area has been in existence since the 1960s. Historical harvest ratios in this FU have been variable, but generally around $F_{35\%SPR}$. $F_{35\%SPR}$ (combined between sexes) is expected to deliver high long-term yield with a low probability of recruitment overfishing and is therefore chosen as a proxy for F_{MSY}.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	1016 million individuals	Bias-adjusted lowest observed UWTV survey estimate of abundance
	F_{msy}	12.3% harvest rate	Equivalent to $F_{35\%SPR}$ combined sex. F_{MSY} proxy based on length-based yield-per-recruit analysis.
Precautionary Approach	Not defined		

(Last changed in: 2011)

Harvest ratio reference points (2011):

	Male	Female	Combined
F_{max}	13.3	26.8	16.1
$F_{0.1}$	7.8	13.8	8.7
$F_{35\%}$	9.6	18.3	12.3

STOCK STATUS:

	Fishing pressure		
	2011	2012	**2013**
MSY (F_{MSY})	✓	✗	✓ Below target
Precautionary	?	?	? Not defined

approach (F_{pa}, F_{lim})				
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✗	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?	Not defined

The stock fell below MSY $B_{trigger}$ in 2012 but has increased since and is now above MSY $B_{trigger}$. The harvest ratio (removals/UWTV abundance) has decreased and is now below F_{MSY} proxy.

RECENT MANAGEMENT ADVICE:

ICES advises, on the basis of the MSY approach and considering that no discard ban is in place in 2015, that landings should be no more than 6382 t. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 6567 t.
In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

Other considerations

MSY approach:

Following the ICES MSY approach implies a harvest ratio for the South Minch functional unit at F_{MSY} = 12.3%. Considering that no discard ban is in place in 2015, this results in landings of no more than 6382 t. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 6567 t.

Additional considerations

The advice takes the 2014 UWTV survey results into account.

The minimum landing size for *Nephrops* in Division VIa is 20 mm carapace length. Discarding of both undersize and poor quality *Nephrops* sometimes takes place in this FU. Discard rates have been variable but generally lower than 20%. The mean sizes in the length compositions of smaller individuals (< 35 mm CL) has increased consistently (Figure 5.3.20.2.2), suggesting low recruitment in recent years. The mean weight in landings increased markedly in 2011, with some decrease over the last two years. The time-series average (1999–2013) was used as input for the mean weight in landings for the catch forecasts.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that to comply with MSY objectives landings should be no greater than 6382 tonnes and catches of no more than 6567 tonnes.

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 2014 imply a 22% increase on the status quo harvest ratio (and a 22% increase in landings) from this functional unit.

3.1.3 Norway lobster (*Nephrops norvegicus*) in Firth of Clyde (FU 13), including Sound of Jura.

FISHERY: Trawling is the predominant fishing method and fishing takes place all year round. An increasing number of creel boats operate in the Clyde due to temporal and area bans on trawling. *Nephrops* discard rates from trawl fleets in this functional unit are higher than in other FUs in Division VIa. *Nephrops* landings from FU 13 are taken entirely by UK vessels. Total *Nephrops* landings increased in the recent years, from around 3,400 t in 2005 to around 6500 t in 2007, but decreased in the two following years. However, landings increased again to 6584 t in 2012. In 2013 landings fell to 5258 t. The *Nephrops* trawl fishery in this area takes by-catches of other species, mainly haddock, whiting and some cod.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment in 2013 is based on trends in population indicators and catch options derived from UWTV surveys. Underwater TV surveys have been conducted for the Firth of Clyde subarea every year since 1995. Confidence intervals around the abundance estimates are stable throughout the series and relatively low compared with other FUs in

Division VIa. Underwater TV surveys for the Sound of Jura subarea have been more fragmented and sampling is at a relatively low level; confidence intervals are larger.

REFERENCE POINTS:

Reference points – Firth of Clyde

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	579 millions.	Lowest observed abundance estimate.
	F_{MSY}	16.4% harvest rate.	F_{MSY} proxy equivalent to F_{max} combined sex, based on length-based yield-per-recruit analysis.
Precautionary approach	Not defined.		

Reference points – Sound of Jura

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	Not defined.	
	F_{MSY}	14.5% harvest rate.	F_{MSY} proxy equivalent to $F_{35\%SPR}$ combined sex.
Precautionary approach	Not defined		

Harvest ratio reference points (2011):

	Male	Female	Combined
F_{max}	13.6	34.0	**16.4**
$F_{0.1}$	8.7	21.1	9.7
$F_{35\%SpR}$	10.7	25.7	**14.5**

STOCK STATUS:

Firth of Clyde

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✗	✗	✓	Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Not defined

Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?	Not defined

Sound of Jura

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✓	✓	Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Not defined

Stock size		
	2012–2014	
MSY ($B_{trigger}$)	?	Not defined
Precautionary approach (B_{pa}, B_{lim})	?	Not defined
Qualitative evaluation	↘	Decreasing

UWTV abundance remains above the MSY $B_{trigger}$. The harvest rate (removals/UWTV abundance) for *Nephrops* in the Firth of Clyde decreased in 2013 and is now below the proposed F_{MSY} proxy.

Harvest rates (removals/UWTV abundance) for *Nephrops* in the Sound of Jura have been well below the proposed F_{MSY} proxy in recent years. UWTV abundance in 2013 was at the lowest observed level since 2000, with 2014 showing only a slight increase. The UWTV abundance series remains too short and patchy to propose a MSY $B_{trigger}$.

RECENT MANAGEMENT ADVICE:

ICES advises, on the basis of the MSY approach and considering that no discard ban is in place in 2015, that landings should be no more than 4390 tonnes (3776 t for the Firth of Clyde and 614 t for the Sound of Jura). Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting total catch would be no more than 4861 t (4184 t for the Firth of Clyde and 677 t for the Sound of Jura). In order to ensure the stock is exploited sustainably, management of *Nephrops* should be implemented at the functional unit level. In this FU the two subareas imply that additional controls maybe required to ensure that the landings taken in each subarea are in line with the advice.

Other considerations

MSY approach:

Following the ICES MSY approach implies a harvest ratio of F_{MSY} = 16.4% for the Firth of Clyde subarea of Functional Unit 13. Considering that no discard ban is in place in 2015, this results in landings of no more than 3776 t. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 4184 t.

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without consideration of SSB in relation to MSY $B_{trigger}$. Following the ICES MSY approach implies a harvest ratio of F_{MSY} = 14.5% for the Sound of Jura subarea of Functional Unit 13. Considering that no discard ban is in place in 2015, this results in landings of no more than 614 t. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 677 t.

Additional considerations

The advice takes into account the 2014 UWTV survey results.

An increasing number of creel boats operate in the Clyde. Creeling activity often takes place during the weekend when the trawlers are not allowed to fish. One third of the creelers operate throughout the year, the rest prosecute a summer fishery.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stocks and the advice for 2015 that to comply with MSY objectives landings should be no greater than 3776 tonnes and catches of no more than 4184 tonnes in Firth of Clyde. Landings and catches in Sound of Jura should be no more than 614 t and 677 t respectively.

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 2015 imply a 35% decrease on the status quo harvest ratio (and 35 % less in landings) from this functional unit (Firth of Clyde).

STECF notes that the landings corresponding to ICES advice for 2014 imply a 15% decrease on the status quo harvest ratio (and 15% decrease in landings) from this functional unit (Sound of Jura).

3.2 Norway lobster (*Nephrops norvegicus*) in Celtic and Irish Seas

Norway lobster in this region contains 8 Functional Units:

FU no.	Name	ICES Divisions	Statistical rectangles

14	Irish Sea East	VIIa	35–38 E6; 38 E5
15	Irish Sea West	VIIa	36 E3; 35–37 E4–E5; 38 E4
16	Porcupine Bank	VIIb,c,j,k	31–35 D5–D6; 32–35 D7–D8
17	Aran Grounds	VIIb	34–35 D9–E0
19	Ireland SW and SE coasts	VIIa,g,j	31–33 D9–E0; 31 E1; 32 E1–E2; 33 E2–E3
20–21	Celtic Sea – Labadie	VIIg,h	28–29 E0, 28–30 E1; 28–31 E2; 29–30 E3
22	Celtic Sea – the Smalls	VIIg,f	31–32 E3; 31–32 E4

Most functional units are monitored by underwater TV (UWTV) surveys, in which burrows are counted by means of video analysis. For these FUs, MSY reference points for fishing mortality have been evaluated. No precautionary reference points have been defined for *Nephrops*.

MSY approach

Most functional units are monitored by underwater TV (UWTV) surveys, in which burrows are counted by means of video analysis. For these FUs, MSY reference points for fishing mortality have been evaluated. No precautionary reference points have been defined for *Nephrops*.

Under the ICES MSY approach, exploitation rates likely to generate high long-term yield (and low probability of stock overfishing) have been explored and proposed for each functional unit. Owing to the way *Nephrops* are assessed, it is not possible to estimate F_{MSY} directly and hence proxies for F_{MSY} are determined. Three candidates for F_{MSY} proxies are $F_{0.1}$, $F_{35\%SpR}$, and F_{max}. There may be strong differences in relative exploitation rates between the sexes for many stocks. To account for this, values for each of the candidates have been determined for males and females separately, and for the two sexes combined. The appropriate F_{MSY} candidate has been selected for each functional unit independently according to the perception of stock resilience, factors affecting recruitment, population density, knowledge of biological parameters, and the nature of the fishery (relative exploitation of the sexes and historical harvest rate versus stock status).

A decision-making framework based on the table below was used in the selection of preliminary stock-specific F_{MSY} proxies. These may be modified following further data exploration and analysis. The combined sex F_{MSY} proxy should be considered appropriate provided that the resulting percentage of virgin spawner-per-recruit for males or females does not fall below 20%. In such a case a more conservative sex-specific F_{MSY} proxy should be chosen over the combined proxy.

		Burrow density (average individuals m^{-2})		
		Low	Medium	High
		< 0.3	0.3–0.8	>0.8
Observed harvest rate or landings compared to stock status (historical performance)	$>F_{max}$	$F_{35\%SpR}$	F_{max}	F_{max}
	F_{max}–$F_{0.1}$	$F_{0.1}$	$F_{35\%SpR}$	F_{max}
	< $F_{0.1}$	$F_{0.1}$	$F_{0.1}$	$F_{35\%SpR}$
	Unknown	$F_{0.1}$	$F_{35\%SpR}$	$F_{35\%SpR}$
Stock size estimates	Variable	$F_{0.1}$	$F_{0.1}$	$F_{35\%SpR}$
	Stable	$F_{0.1}$	$F_{35\%SpR}$	F_{max}
Knowledge of biological parameters	Poor	$F_{0.1}$	$F_{0.1}$	$F_{35\%SpR}$
	Good	$F_{35\%SpR}$	$F_{35\%SpR}$	F_{max}
Historical fishery	Stable spatially and temporally	$F_{35\%SpR}$	$F_{35\%SpR}$	F_{max}
	Sporadic	$F_{0.1}$	$F_{0.1}$	$F_{35\%SpR}$
	Developing	$F_{0.1}$	$F_{35\%SpR}$	$F_{35\%SpR}$

Preliminary MSY $B_{trigger}$ reference points were proposed at the lowest abundance observed in the UWTV burrow abundance, unless the stock has shown signs of stress at higher abundance (in which case a higher value is used). However, the time-series of surveys in Subarea VII are too short for that. For FU 15, where a longer series of survey trawl cpue was available; this was used to estimate a preliminary MSY $B_{trigger}$.

Data limited stocks

The advice for FU 18 and 'other rectangles' also follows ICES approach to data-limited stocks, and is based on a 20% reduction (precautionary buffer) compared to the average landings of the last three years (2010–2012), according to category 6.2 (ICES, 2012). No information on discards is available for FU 18 and 'other rectangles'. Landings from 'other rectangles' are estimated because no Spanish landings have been reported to ICES in 2011 and 2012 for this area. Prior to 2011 the Spanish landings represented around one third of the total landings from 'other rectangles'.

For FUs 14, 15, 16, 17, 19, and 22, the following procedure is adopted for providing assessment and advice based on UWTV survey estimates:

- Total population numbers are estimated from the UWTV surveys, including adjustments for a range of biases associated with the method. At the benchmark meetings (ICES, 2009, 2013a) it was proposed that the UWTV surveys provide abundance estimates for *Nephrops* of 17 mm carapace length and over.
- Historical harvest ratios are calculated as the ratio of total dead catch numbers (landings and dead discards) to population numbers from the UWTV survey in each year.
- Recent fishery length compositions (landings and dead discards) are analysed using a length-based assessment model to estimate population numbers and fishing mortality-at-length for *Nephrops* of 17 mm carapace length and over. This method assumes that the length compositions are representative of a population at equilibrium. The analysis is done separately for males and females using stock-specific growth and maturity parameters.
- Yield-per-recruit and spawning biomass-per-recruit curves are derived for male and female *Nephrops*, based on fishery selectivity parameters from the length-based assessment model. The harvest ratios associated with potential F_{MSY} proxies (e.g. $F_{0.1}$, F_{max}, $F_{35\%SPR}$) for males, females, and for both sexes combined are computed. These are conditional on a fishery selectivity pattern that includes fishing mortality due to landings and dead discards of *Nephrops* in the years covered by the assessment model.

Catch options tables for 2014 are derived for F_{MSY} proxy and other options by applying the appropriate harvest ratios to the population numbers estimate from the most recent UWTV survey. This assumes that population numbers remain stable in the interim year. Landings are derived from the resultant total catch numbers after multiplying by the recent average value for proportion retained and mean weight in the landings.

STECF COMMENTS: The management approach with an aggregated TAC is a major obstacle for the application of the rules in the Commissions Communication on Fishing opportunities for 2014 (COM(2013) 319-FINAL) which requires a TAC for each stock (in this case FU). It furthermore runs the risk of unbalanced effort distribution. This is known to have been a particular problem in the Porcupine bank (FU 16) in the past, where large increases in effort were followed by a substantial decline in the stock (and subsequently quotas were introduced for the FU 16 component of Sub-area VII for 2011).

STECF notes that there are also *Nephrops* catches in "other rectangles" in Sub-area VII (including the north-west coast of Ireland which has previously been treated as a separate FU (18)). To provide some guidance on appropriate future landings for these areas, the use of an average landings figure (2010-2012) of around 235 tonnes could be considered (On the basis of ICES advice that catches from 'other areas' should not increase).

3.2.1 Norway lobster (*Nephrops norvegicus*) in FU 14, Irish Sea East (Division VIIa)

FISHERIES: Prior to 2007 landings from this FU were believed to be underreported. However, new legislation in 2007 increased the reliability of the landings data. The landings have fallen from a peak of 960 t in 2007 to 495 t in 2013. The fleet of vessels targeting *Nephrops* in 2012, with mesh sizes of 70–99 mm and where the weight of *Nephrops* landed is more than 25% of the total landing, consisted of around 25 English vessels almost entirely single-otter trawling and around 48 generally larger Northern Irish vessels, over 56% of which fish multi-rig trawls. The multi-riggers take around one third of the landings. 80 mm codends are commonly used for both types of trawl. The fishery takes place mainly in spring and early summer, when male *Nephrops* predominate. The UK *Nephrops*-directed effort in FU 14 has declined since 2007 and is estimated in 2013 to be at its lowest level since 1974. The *Nephrops* trawl fisheries take by-catches of other species especially plaice, but also whiting and cod.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment in 2014 is based UWTV surveys of absolute abundance.

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	Not defined.	No available reference. The UWTV time-series is too short.
	F_{MSY}	Harvest ratio 9.8%.	F_{MSY} proxy equivalent to $F_{0.1}$ for combined sexes, based on length-based yield-per-recruit analysis.
Precautionary approach	Not defined.		

Harvest ratio reference points (2010):

	Male	Female	Combined
F_{max}	15.8%	17.4%	16.4%
$F_{0.1}$	9.6%	10.2%	**9.8%**
$F_{35\%SpR}$	12.5%	13.5%	13.0%

STOCK STATUS:

F (Fishing Mortality)			
	2011	2012	**2013**
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined

SSB (Spawning-Stock Biomass)		
	2012–2014	
MSY ($B_{trigger}$)	?	Undefined
Precautionary approach (B_{pa}, B_{lim})	?	Undefined
Qualitative evaluations	↘	Decreasing

The abundance of *Nephrops* in FU 14 is relatively stable but has been decreasing recently. The time-series is not long enough to determine a candidate for MSY $B_{trigger}$. The current harvest rate (removals/UWTV abundance) is below the F_{MSY} proxy.

RECENT MANAGEMENT ADVICE: ICES advises that, on the basis of the MSY approach and considering that no discard ban is in place in 2015, landings should be no more than 662 tonnes. Assuming that discard rates do not change from the 2013 estimate the resulting catch would be no more than 715 t.

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

Other considerations:

MSY approach

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without consideration of SSB in relation to MSY $B_{trigger}$. Following the ICES MSY approach implies a harvest ratio of 9.8%. Considering that no discard ban is in place in 2015, this results in landings of no more than 662 t. Assuming that discard rates do not change from the 2013 estimate, this implies total catches of no more than 715 t.

Additional considerations

The advice takes into account the 2014 UWTV survey results.

The *Nephrops* trawl fishery takes bycatches of other species, especially plaice, but also whiting and cod. Selectivity of this fishery needs to be improved to reduce bycatches of cod, whiting, and undersized plaice.

The catch sampling data from 2013 indicate that on average around 17% (in numbers) or 7% (in weight) of the *Nephrops* caught are estimated to have been discarded.

The fishery peaks in spring/summer. Some UK vessels temporarily relocate, targeting the Farn Deeps *Nephrops* fishery on the east coast of England in the winter months.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that to comply with MSY objectives landings should be no greater than 662 tonnes and catches of no more than 715 tonnes.

STECF notes that the landings corresponding to ICES advice for 2015imply a 37% decrease on the status quo harvest ratio (and 30% decrease in landings) from this functional unit.

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 by-catches of cod, whiting and undersized plaice occur in this fishery and suggests that selectivity of this fishery should be improved.

3.2.2 Norway lobster (*Nephrops norvegicus*) in FU 15, Irish Sea West (Division VIIa)

FISHERIES: Prior to 2007, landings from this FU are believed to be underreported. However, new legislation in 2007 increased the reliability of the landings data. Estimated landings in 2008 were more than 10500 t from the Irish Sea West. Landings in 2009 and 2010 decreased to around 9000 t but increased again to more than 10100 t in 2011 and to 10527 t in 2012. In 2013 landings dropped to 8672 t. Most of the landings are taken by the UK and the Republic of Ireland. The gears used are a mixture of single- and twin-rig otter trawls. The use of specified species-selective gears has been mandatory for all Irish vessels since March 2012 and similar conditions were introduced in October 2012 for the UK (Northern Ireland) vessels. Some Irish vessels started using multi (quad) rig trawls in 2012.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment in 2014 is based on trends in population indicators and catch options derived from UWTV surveys as last year.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY approach	MSY $B_{trigger}$	3 billion individuals.	Minimum abundance observed based on a scaled trawl survey.
	F_{MSY}	HR 17.1%.	F_{MSY} proxy equivalent to F_{max} for combined sexes in 2010.
Precautionary approach	Not defined.		

Harvest ratio reference points (2010):

	Male	Female	Combined
F_{max}	17.1	17.1	**17.1**
$F_{0.1}$	11.0	10.2	10.6
$F_{35\%SpR}$	14.1	12.7	13.4

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined

Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	?	?	?	Undefined

Since 2003 stock abundance has been above MSY $B_{trigger}$. Recent harvest rates (removals/UWTV abundance) are above the F_{MSY} proxy.

RECENT MANAGEMENT ADVICE: ICES advises that, on the basis of the MSY approach and considering that no discard ban is in place in 2015, landings should be no more than 8223 tonnes. Assuming that discard

rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 9922 tonnes.

In order to ensure the stock in this functional unit is exploited sustainably, management should be implemented at the functional unit level.

Other considerations:

MSY approach

Following the ICES MSY approach implies a harvest rate of 17.1%. Considering that no discard ban is in place in 2015, this results in landings of no more than 8223 t. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 9922 tonnes.

Additional considerations

The advice takes into account the 2013 UWTV survey results.

The Nephrops trawl fishery takes bycatches of other species, especially plaice, but also whiting and cod. In response to the long-term management plan for cod (EC 1342/2008), Northern Ireland and Ireland have introduced more species-selective gears primarily to reduce bycatch of cod, but the devices thus far introduced are also know to reduce discards of other species. Despite this, selectivity of this fishery needs to be further improved to reduce bycatches of juvenile whiting in particular.

The proportion of discarded Nephrops is substantial. On average over the last three years, around 28% in numbers (or 17% in weight) of the Nephrops caught are estimated to have been discarded.

The FU 15 Nephrops fishery first developed in the late 1950s. The environment in the Western Irish Sea is very suitable for Nephrops, with a large mud patch and a gyre that retains the larvae over the mud patch, thus ensuring good recruitment. The ground can be characterized as an area of very high densities of small Nephrops. All available information indicates that size structure of catches appears to have changed little since the fishery first began.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that to comply with MSY objectives landings should be no greater than 8223 tonnes and catches of no more than 9922 tonnes.

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 Nephrops trawl fishery takes bycatches of other species, especially plaice, but also, whiting and cod. Selectivity of this fishery needs to be improved to reduce bycatches of cod, whiting and undersized plaice.

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

FISHERIES: The fishery takes place throughout the year with a peak between April and July. A seasonal closure covering much of the stock distribution area has been in place between 1 May and 31 July each year from 2010 to 2012. In 2013 the closure was only in place in the month of May. 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. 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. Fishing effort directed at *Nephrops* will also have bycatches of hake, megrim, and anglerfish in mixed fisheries. Reported total landings for this FU have decreased significantly in recent years from 2186 t in 2007 to only 825 t in 2009. Thereafter landings steadily increase again to 1260 t in 2012 t (including estimated unallocated landings). In 2013 total reported landings were 1142 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is based on indicators and an UWTV survey as last year.

This year´s advice (for 2015 is based on the MSY approach, as last year

REFERENCE POINTS:

	Type	***Value***	***Technical basis***

MSY approach	MSY $B_{trigger}$	Not defined.	
	F_{MSY}	HR 5.0%.	F_{MSY} proxy equivalent to $F_{0.1}$ for combined sex in 2013.
Precautionary approach	Not defined.		

Harvest ratio reference points (2013):

	Male	Female	Combined
F_{max}	6.6%	19.0%	11.1%
$F_{0.1}$	4.2%	12.3%	**5.0%**
$F_{35\%SpR}$	5.0%	14.3%	7.7%

STOCK STATUS:

	Fishing pressure			
	2011	2012	**2013**	
MSY (F_{MSY})	?	✓	✓	Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined

	Stock size	
	2012–2014	
MSY ($B_{trigger}$)	?	Undefined
Precautionary approach (B_{pa}, B_{lim})	?	Undefined
Qualitative evaluation	→	Stable (based on UWTV abundance)

UWTV surveys for FU 16 have been carried since 2012; these provide abundance estimates and have been relatively stable. The harvest ratio (removals/UWTV abundance) is estimated at below the F_{MSY} proxy (5%).

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the MSY approach that catches from FU 16 in 2015 should be no more than 1850 tonnes. All catches are assumed to be landed.

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

MSY approach

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without consideration of SSB in relation to MSY $B_{trigger}$. Following the ICES MSY approach implies a harvest rate at F_{MSY} = 5.0%, resulting in catches of no more than 1850 t. All catches are assumed to be landed.

Additional considerations

The advice takes into account the 2014 UWTV survey results**.**

Since 2011 a maximum limit on landings from FU 16 is included in the TAC regulation (the "of which limit"). This has increased the risk of high grading and area misreporting in this fishery. Area misreporting and highgrading in the fishery should be discouraged through management measures.

A seasonal closed area (1 May–31 July) was in place between 2010 and 2012. The duration of the closure has been reduced to one month (May) since 2013. 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 the ~25% of the stock area that is not currently covered by the closure. Productivity of deep-water *Nephrops* stocks is generally lower than in shelf waters, although individual *Nephrops* grow to relatively large sizes and attain high market prices. Other deep-water *Nephrops* stocks off the Spanish and Portuguese coast have collapsed and have been subject to recovery measures for several years, e.g. in FUs 25, 26, 27, and 31. Recruitment in *Nephrops* populations in deep water may be more sporadic than for shelf stocks with strong larval retention mechanisms. This makes

these stocks more vulnerable to the overexploitation and periods of poor recruitment that has been observed on the Porcupine Bank.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that to comply with MSY objectives landings should be no greater than 1850 tonnes (All catches are assumed to be landed).

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.

3.2.4 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. The 2012 landings amount to 1135 t and the 2013 landings to 1295 t, a 14% increase. 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. 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 indicators and an UWTV survey as last year. This year´s advice is, as last year's, based on the MSY approach.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY approach	MSY $B_{trigger}$	Not defined.	
	F_{MSY}	HR 10.5%.	F_{MSY} proxy equivalent to $F_{35\%\ SPR}$ for combined sexes in 2010.
Precautionary approach	Not 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:

	Fishing pressure			
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✗	✗	Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined

	Stock size	
	2012–2014	
MSY ($B_{trigger}$)	?	Undefined
Precautionary approach (B_{pa}, B_{lim})	?	Undefined
Qualitative evaluation	↘	Decreasing

The abundance shows a decreasing trend and the 2014 survey estimate is the lowest in the time-series. The harvest rate (removals/UWTV abundance) has increased significantly since 2011 and is now well above the F_{MSY} proxy.

RECENT MANAGEMENT ADVICE:

ICES advises that, on the basis of the MSY approach and considering that no discard ban is in place in 2015, landings should be no more than 524 tonnes. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 584 tonnes.

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

Other considerations:

MSY approach

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without considering SSB in relation to MSY $B_{trigger}$. Following the ICES MSY approach implies a harvest ratio of less than 10.5%. Considering that no discard ban is in place in 2015, this results in landings of no more than 524 t. If discard rates do not change from the average of the last three years (2011–2013), this implies total catches of no more than 584 t.

Additional considerations:

The advice takes into account the 2014 UWTV survey results.

Total discards of *Nephrops* and other organisms 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 (Anon., 2011).

The proportion of discarded *Nephrops* is substantial. On average over the last three years, around 17% (in numbers) or 10% (in weight) of the *Nephrops* caught are estimated to have been discarded.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that to comply with MSY objectives landings should be no greater than 524 tonnes and catches of no more than 584 tonnes.

STECF notes that the landings corresponding to ICES advice for 2014 imply a 12% decrease on the status quo harvest ratio (and 12% less in landings) from this functional unit.

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 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.

3.2.5 Norway lobster (*Nephrops norvegicus*) in FU19, SW and SE Ireland (Divisions VII g, j)

FISHERIES: Reported landings for this FU were 833 t in 2009, but decreased to 608 t in 2011. The reported landings for 2013 amount to 781t, almost the same as in 2012. The *Nephrops* fishery in this functional unit is mainly an otter trawl fishery using single- and twin-rigs and a codend mesh size of 80–99 mm. Similar to the situation in Aran Grounds the most recent change in the fishery is the proportion of twin-rig vessels, which has increased to over 90 % of the fleet in the past eight years. This implies a large increase in effective effort, even if such an increase is not observed in the nominal effort figures.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The 2014 assessment is based on data from UWTV survey begun in 2011. The assessment is based on indicators and an UWTV survey as last year. Last year's advice was based on the MSY approach. This year's advice is on the same basis

REFERENCE POINTS:

	Type	*Value*	*Technical basis*
MSY approach	MSY $B_{trigger}$	Not defined.	
	F_{MSY}	HR 8.1%.	F_{MSY} proxy equivalent to $F_{0.1}$ for combined sexes in 2014.
Precautionary approach	Not defined.		

Harvest ratio reference points (2014):

	Male	Female	Combined
$F_{0.1}$	8.1%	9.0%	**8.1%**
F_{max}	12.3%	13.0%	12.3%
$F_{35\%SpR}$	13.0%	15.2%	14.5%

STOCK STATUS:

Fishing pressure	2011	2012	**2013**	
MSY (F_{MSY})	✓	✗	✗	Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined

Stock size	**2012–2014**	
MSY ($B_{trigger}$)	?	Undefined
Precautionary approach (B_{pa}, B_{lim})	?	Undefined
Qualitative evaluation	→	Stable

Recent harvest rates (removals/UWTV abundance) are above the F_{MSY} proxy. The time-series of reliable abundance estimates is too short to detect a significant trend within the uncertainty bounds.

RECENT MANAGEMENT ADVICE:

ICES advises that, on the basis of the MSY approach and considering that no discard ban is in place in 2015, landings should be no more than 715 tonnes. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 1119 tonnes.

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

Other considerations

MSY approach

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without considering SSB in relation to MSY $B_{trigger}$. Following the ICES MSY approach implies a harvest ratio at F_{MSY} = 8.1%. Considering that no discard ban is in place in 2015, this results in landings of no more than 715 t. Assuming that discard rates do not change from the average of the last three years (2011–2013), this implies total catches of no more than 1119 t.

Additional considerations

The advice takes into account the 2014 UWTV survey results.

Management considerations

Abundance estimates and the F_{MSY} harvest rate are considered conservative; the time-series of UWTV observations is short, and scientific knowledge about *Nephrops* populations and fisheries in this area is limited, but improving.

Nephrops fisheries in this area are fairly mixed, landing also megrim, anglerfish, haddock, and other demersal species. Around 44% of the total catch by weight is discarded. The main discarded fish species are haddock and boarfish (Anon., 2011).

The proportion of discarded *Nephrops* in this FU is high relative to other areas (cf. the catch/landings projections). This is because the vessels tend to be small with limited space and crew so the on-board tailing of the catch is not as prevalent as in other FUs around Ireland.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that to comply with MSY objectives landings should be no greater than 715 tonnes and catches of no more than 1119 tonnes.

STECF notes that the landings corresponding to ICES advice for 2015 imply a 81% increase on the status quo harvest ratio (and 37% increase in landings) from this functional unit.

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 *Nephrops* fisheries in this area are fairly mixed also landing megrim, anglerfish, haddock and other demersal species. The main discarded species are haddock, whiting and dogfish.

3.2.6 Norway lobster (*Nephrops norvegicus*) in FU 20, Celtic Sea (Labadie, Baltimore, and Galley) and in FU 21, Celtic Sea (Jones and Cocburn)

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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 2009 total reported landings from all 2 FUs amounted to more than 3000 t, but have since decreased to 1387 t in 2013. 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.

REFERENCE POINTS:

No reference points have been defined for this stock. Fishing mortality reference points have not been estimated due to the short time-series of landings and discards length distribution for this stock.

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	?	?	?	Not defined
Precautionary approach (F_{pa}, F_{lim})	?	?	?	Undefined
Qualitative evaluation	?	?	✓	Below possible reference points

Stock size		
	2013–2014	
MSY ($B_{trigger}$)	?	Not defined
Precautionary approach (B_{pa}, B_{lim})	?	Not defined
Qualitative evaluation	↗	Increasing

The UWTV abundance has increased between 2013 and 2014. The harvest rate (removals/UWTV abundance) for *Nephrops* is below any potential F_{MSY} proxies.

RECENT MANAGEMENT ADVICE:

The new data (catch and survey) available for this stock do not change the perception of the stock. Therefore, the advice for this fishery in 2015 is the same as the advice for 2014. This corresponds to landings of no more than 2500 tonnes. Considering that no discard ban is in place for 2015, and assuming that discard rates do not change from the average of the last two years (2012–2013) the resulting catch would be no more than 3366 tonnes.

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

Other considerations

ICES approach to data limited stocks

For this stock, landings and effort have been declining. Average landings for the last 10 years of 2159 t correspond to a harvest rate of 4.7% (based on the 2014 abundance estimate). This is below the minimum harvest ratio used by ICES for any *Nephrops* stock.

The previous advice given by ICES of landings of 2500 t would imply a harvest rate of 5.5%. This is below the range of MSY harvest rates used for stocks with similar density (Fladen (FU 7) and Moray Firth (FU 9), where harvest ratios of 10.3% and 11.8% are used, respectively). Until stock-specific F_{MSY} reference points can be defined the advice given previously equates to a conservative harvest ratio (5.5%). Considering that no discard ban is in place in 2015, this results in landings of no more than 2500 t. Assuming that discard rates do not change from the average of the last two years (2012–2013), the resulting catch would be no more than 3366 tonnes.

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 that on the basis of the ICES approach to data limited stocks, catches should be no greater than 3336 t and landing of no more than 2500 tonnes..

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.

3.2.7 Norway lobster (*Nephrops norvegicus*) in FU 22, Celtic Sea (the Smalls)

FISHERIES: Landings from this Functional Unit are reported by France, the Republic of Ireland and the UK, the main contributors being Ireland (95%). These vessels mainly use twin otter trawls. The fishery occurs throughout the year with a seasonal peak in activity in May. In 2009 total reported landings amounted to more than 3000 t, but have decreased to 2633 t in 2012. The preliminary landings for 2013 are 2255 t. 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. *Nephrops* fishery in the Celtic Sea has bycatches of whiting and cod, and to a lesser extent of haddock and hake.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The assessment is based on indicators and an UWTV survey as last year. This year's advice is based on the MSY approach, as last year.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY approach	MSY $B_{trigger}$	Not defined.	
	F_{MSY} (FU 22) harvest rate.	10.9%	F_{MSY} proxy equivalent to $F_{35\%SPR}$ for combined sexes in 2011.
Precautionary approach	Not defined.		

(unchanged since 2011)

Harvest ratio reference points (2011):

	Male	Female	Combined
F_{max}	10.9%	17.7%	12.3 %
$F_{0.1}$	6.5%	10.9%	7.5 %

$F_{35\%SPR}$	8.4%	15.3%	10.9%

STOCK STATUS:

F (Fishing Mortality)			
	2011	2012	**2013**
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	?	?	? Unknown

Stock size	
	2012–2014
MSY ($B_{trigger}$)	? Undefined
Precautionary approach (B_{pa}, B_{lim})	? Undefined
Qualitative evaluation	→ Stable

The UWTV abundance index has increased in recent years and is considered to be relatively stable. Harvest rates (removals/UWTV abundance) have decreased since 2007 and have been below the F_{MSY} proxy since 2011.

RECENT MANAGEMENT ADVICE:

ICES advises that, on the basis of the MSY approach and considering that no discard ban is in place in 2015, landings should be no more than 3409 tonnes. Assuming that discard rates do not change from the average of the last three years (2011–2013) the resulting catch would be no more than 3797 tonnes.

In order to ensure the stock in this FU is exploited sustainably, management should be implemented at the functional unit level.

Other considerations

MSY approach

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without considering SSB in relation to MSY $B_{trigger}$. Following the ICES MSY approach implies a harvest rate at F_{msy} = 10.9%. Considering that no discard ban is in place in 2015, this results in landings of no more than 3409 t. Assuming that discard rates do not change from the average of the last three years (2011–2013), this results in total catches of no more than 3797 t.

Additional considerations

The advice takes into account the 2014 UWTV survey results.

Cod, whiting, and to a lesser extent haddock are landed together with *Nephrops*. The *Nephrops* trawl fleet operating in Divisions VIIgfh discards around 38% of its total catch by weight. Small *Nephrops* are the main species in the discards and the main fish species discarded are whiting, haddock, and dogfish.

The proportion of discarded *Nephrops* is substantial. On average over the last three years, around 15% in numbers (or 9% in weight) of the *Nephrops* caught are estimated to have been discarded.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that to comply with MSY objectives landings should be no greater than 3409 tonnes and catches of no more than 3797 tonnes.

STECF notes that the landings corresponding to ICES advice for 2014 imply a 29% increase on the status quo harvest ratio (and 27% increase in landings) from this functional unit.

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 *Nephrops* fisheries in this area are fairly mixed also landing Cod, whiting, and to a lesser extent haddock. The main discarded species are whiting, haddock, and dogfish.

3.3 Anglerfish (*Lophius piscatorius & Lophius budegassa*) in ICES Divisions IIIa & Vb , Subareas IV, VI, XII & XIV.

FISHERIES: Anglerfish mature at large size, resulting in a high fraction of the catch consisting of immature fish. Catches of anglerfish on the northern shelf (from Division VIb to IIIa) come from the same biological stock. Spawning appears to occur largely in deep water off the edge of the continental shelf, although mature females are rarely encountered. Anglerfish are caught widely in VIa with the highest catch rates occurring along the shelf edge in deeper waters.

Anglerfish are caught in a targeted anglerfish fishery in Sub-Area VI and as a bycatch in other demersal fisheries, including round fish fisheries in Division VIa, the haddock fishery on Rockall Bank, *Nephrops* fisheries, and fisheries in deeper waters. In the North Sea, anglerfish are caught mainly as a bycatch in demersal fisheries for mixed round fish and *Nephrops* and to a lesser extent in small meshed *Pandalus* fisheries.

The directed fishery takes place in deep water on the continental shelves in areas where cold-water corals (*Lophelia spp.*) occur, particularly at Rockall. However, demersal trawling is prohibited in several large areas at Rockall, and near the Wyville–Thomson ridge, which affords protection for corals in those areas.

Vessels from EU Member States take most of the catch. ICES estimates of landings show an increase from around 8,000 t in the mid 70's to a peak in 1995 around 35,000 t. Total landings in 2013 were 12, 054 t (440 t in Division IIIa, 7,093 t and Subarea IV; 4,142 t and 4,652 t in Subarea VI). Discards from the Scottish, Irish, and Danish fleets were 787 t in 2013.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is ICES. The assessment area includes Divisions IIIa & Subareas IV and VI.

The advice is based on a biomass index from one survey, used as an indicator of stock size. 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 in the short term (3–5 years), but they may not be suitable if the stock size is low and/or overfished.

Landings information provided in the ICES advice does not include Divisions XII and XIV but these represent only a small fraction of the stock.

REFERENCE POINTS:

No reference points have been defined for these two stocks. Because of identified problems with growth estimates and uncertainties in ageing, previous reference points are not considered to be valid.

STOCK STATUS:

Fishing pressure		
		2011–2013
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Insufficient information
Stock size		
		2012–2014
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

There is no analytical assessment for this stock. ICES uses as stock size indicator the biomass data from the Scottish and Irish anglerfish and megrim industry/science surveys for the Northern shelf (SCO-IV-VI-AMISS-Q2) in Division IVa and Subarea VI. This indicates that the average biomass has been 22% higher in the last two years (2013–2014) than the average of the three previous years (2010–2012). There is no trend in biomass over the full time-series of survey data.

MANAGEMENT OBJECTIVES: There are no explicit management objectives for this stock but the European Community and Norway are in discussions regarding the joint management of this shared stock.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the data-limited approach but cannot quantify the resulting catches. The implied landings should be no more than 14,702 t.

ICES advises that the management area should be consistent with the assessment area.

Other considerations

No reliable forecast can be presented for this stock, because the assessment is only indicative of trends.

ICES approach to data-limited stocks

For data-limited stocks for which biomass estimates are 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 biomass 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 biomass is estimated to have increased by more than 20% in the period 2010–2012 (average of the three years) to 2013–2014 (average of the two years). This implies an increase of catches of at most of 20% in relation to the last two years' average landings (2012–2013), corresponding to landings of no more than 14 702 t. For this stock, this year, ICES uses a two-year average (2012-2013) based on the availability of landings estimates.

Considering that the effort in the main fisheries has decreased significantly over the last decade, no additional precautionary reduction is needed

Discards estimates are 7% of the catch in weight, for a coverage of 82% of the stock landings. Discards for the gillnet fisheries (which constitute 18% of the stock landings) cannot be estimated. Therefore total stock catches cannot be calculated.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice that landings should be no more than 14,702 t in 2015. Given that the stock is distributed over 2 separate TAC management areas (VI; EU and international waters of Vb; international waters of XII and XIV and EU waters of IIa and IV), STECF notes that advised landings of 14,702 t should equate to the fishing opportunities for both TAC management areas combined. However, the issue of how such fishing opportunities would best be allocated remains to be resolved.

STECF considers that from a scientific perspective, it would be appropriate to allocate fishing opportunities according to the relative distribution of anglerfish biomass in the separate management areas. The trawl survey data presented in the ICES advice indicate an average total survey biomass estimate of anglerfish for the period 2012-2014 of 42,668 t, of which 16,920 t (40%) was distributed in subarea IV and 25,748t (60%) was distributed in Sub-area VI. Using the relative survey biomass estimates as a means of allocating the advised fishing opportunities, implies that in 2015 landings no greater than 5,830 t in EU waters of IIa and IV and no greater than 8,872 t in VI; EU and international waters of Vb; international waters of XII and XIV.

STECF notes that if fishing opportunities for anglerfish in 2015 were to be allocated according to the procedure outlined above, compared to the agreed TACs for 2014, they would represent a 26% decrease in fishing opportunities in EU waters of IIa and IV and an 100% increase in EU VI; international waters of Vb; international waters of XII and XIV.

STECF notes that landings from subarea XII, XIV and division Vb are not included in the ICES assessment.

3.4 Megrim (*Lepidorhombus whiffiagonis* and *Lepidorhombus boscii*) in ICES Subarea VI (West of Scotland and Rockall).

The stock summary and advice for megrim in Subarea VI is given together with Divisions IVa, Vb, XII and XIV in Section 3.5.

3.5 Megrim (*Lepidorhombus whiffiagonis*) in IVa, Vb (EU zone), VI, XII & XIV (North Sea, West of Scotland and Rockall)

The advice given in 2013 for megrim in IVa and VIa is valid for 2014-2015 and the text below for this stock remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: The main fishery is in Sub-Area VI where megrim is taken as a by-catch in trawl fisheries targeting anglerfish, roundfish species and *Nephrops*. There is however increasing targeting of megrim in response to more restrictive fishing opportunities for other species. Since 2009, ICES also provides advice on megrim in Subarea IV (North Sea). This is because the spatial distribution of landings data and survey catches provide good evidence to suggest that megrim population is contiguous between Divisions IVa and VIa.

The main exploiters are the UK (≥ 80% of catch in the past 4 years), Ireland, France and Spain.

Between 1990 and 2012 nominal catches of Megrim in Division VIa, VIb and subarea IV as officially reported to ICES have ranged from 1,920 t in 2005 to 6,150 in 1996. Combined landings have been fluctuating around 3,000t since 2008 with a combined (Divisions IVa, and VIa) nominal catch of 3, 052 t for 2012 and 2,780 t in 2013.

The main countries involved in the fisheries for megrim in Rockall are Ireland, Uk and Spain. Total official landings in 2013 amount to 278 t. Ireland taking 181 t, Uk, 58 t and Spain 39 t.

It is unclear if the trends in landings reflects trends in abundance or are a consequence of the changes in trawl effort observed over the period.

Area misreporting had been prevalent as megrim catches were misreported from Subarea VI into Subarea IV due to restrictive quotas for anglerfish (i.e. vessels targeting anglerfish misreported all landings including megrim from Subarea VI into Subarea IV). However, in the most recent years there is evidence to suggest that this has reversed as the subarea IV TAC has become more restrictive and increasing targeting of megrim in response to more restrictive fishing opportunities for other species e.g. cod. The extent of this problem is unknown and should be quantified through integrated logbook and VMS analysis. As a consequence, the management of anglers and megrim which in the past has been thought to be strongly coupled is now likely to significantly less so.

SOURCE OF MANAGEMENT ADVICE:

The management advisory body is ICES.

ICES consider that there is little evidence to suggest that the megrim in Subarea IV and Division VIa are separate stocks and concluded that megrim in Divisions VIa and IVa should be treated as a single stock and megrim in Division VIb (Rockall) should be treated as a separate stock. Consequently it provides advice, separately, for each. In both cases these assessments are landings and survey trends based rather than analytical.

REFERENCE POINTS:

Divisions IVa and VIa:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	9740 t	50% B_{MSY}
	F_{MSY}	0.33	Estimated directly from the model. Fishing mortality values expressed relative to F_{MSY}.
Precautionary Approach	B_{lim}	5844 t	30% B_{MSY}
	B_{pa}	Not defined.	
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

Division VIb (Rockall)

No reference points have been defined for this stock.

STOCK STATUS:

Divisions IVa and VIa:

F (Fishing Mortality)

	2010	2011	**2012**	
MSY (F_{MSY})	✓	✓	✓	Appropriate
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined

Biomass				
	2011	2012	**2013**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

Fishing mortality has been below F_{MSY} for almost the full time-series and the biomass well above MSY $B_{trigger}$.

Division VIb (Rockall)

	Fishing pressure	
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✓	Below poss. reference points

	Stock size	
	2012–2014	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

There is no analytical assessment for this stock. ICES uses as stock size indicator the Division VIb biomass data from the Scottish and Irish anglerfish and megrim industry/science surveys for the Northern shelf (SCO-IV-VI-AMISS-Q2). This indicates that the average biomass has been 31% higher in the last two years (2013–2014) than the average of the three previous years (2010–2012). The harvest ratio has been at a low and stable level since 2007.

RECENT MANAGEMENT ADVICE:

Divisions IVa and VIa:

The 2013 advice for this stock is biennial and valid for 2014 and 2015. New data (catch and surveys) available for this stock do not change the perception of the stock. Therefore, the advice for this fishery in 2015 is the same as the advice for 2014: *ICES advises on the basis of the MSY approach that catches should be no more than 7000 t in 2014 and 2015. If discard rates do not change from the average of the last three years, this implies landings of no more than 5950 t.*

Division VIb (Rockall): ICES advises on the basis of ICES approach to data-limited stocks but cannot quantify the resulting catches. The landings should be no more than 262 t in 2015.

ICES advises that the management area should be the same as the assessment area.

Other considerations

Divisions IVa and VIa:

MSY approach

Following the ICES MSY approach implies a fishing mortality at F_{MSY} = 0.33, resulting in catches of no more than 7000 tonnes in 2014. If discard rates do not change from the average of the last three years, this implies landings of no more than 5950 tonnes. The probability of the biomass falling below MSY $B_{trigger}$ is 1%.

Division VIb (Rockall):

ICES approach to data limited stocks

For data-limited stocks for which a biomass 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 biomass is estimated to have increased by more than 20% in the period 2010–2012 (average of the three years) to 2013–2014 (average of the two years). This implies an increase of catches of at most 20% in relation to the last three years' catches, corresponding to landings of no more than 262 t. Discarding is known to take place but cannot be quantified; therefore, total catches cannot be calculated.

The harvest ratio is considered to be low (< 3%) and both the survey and the commercial indices indicate an increase in biomass. No additional precautionary reduction is therefore needed.

Additional considerations

ICES notes that the current TAC area is inconsistent with the ICES advice area. From a biological perspective, the management and assessment units should be appropriately aligned and they should encompass the full spatial structure of the stock. ICES advises that the management area should be the same as the assessment area.

There have been substantial reductions in effort associated with the Scottish and Irish fleets since 2002, which is considered to have contributed to the decline of landings in Division VIb. Landings in Subarea VI are well below the TAC.

STECF COMMENTS:

STECF agrees with the ICES assessment of the state of the stock and the advice that catches should be no more than 7,207t in 2014 for divisions IVa and VIa. Given that the stock is distributed over 2 separate TAC management areas ((i) *EU waters of IIa and IV* and (ii) *EU and international waters of Vb; VI; international waters of XII and XIV*), STECF notes that advised catch should equate to the fishing opportunities for both TAC management areas combined. STECF notes that ICES (2014) the management and assessment units should be appropriately aligned and they should encompass the full spatial structure of the stock. ICES recommends that the management unit should match the assessment unit. Currently, there is a process to resolve how such fishing opportunities would best be allocated, but this process has not been finalised.

STECF considers that from a scientific perspective, if there is desire to maintain the current TAC area arrangements, it would be appropriate to allocate fishing opportunities according to the relative distribution of megrim biomass in the separate management areas. According to the SAMISS/IAMISS survey data, the average biomass distribution of megrim for the period 2011-2013 indicates that 57% is distributed in subarea IV and 43% is distributed in Division VIa. Using these relative survey biomass estimates as a means of allocating the advised fishing opportunities, implies that in 2015 landings no greater than 3,390 t in *EU waters of IIa and IV* and no greater than 2560 t in *EU and international waters of Vb; VI; international waters of XII and XIV*.

STECF notes that if fishing opportunities for megrim in 2015 were to be allocated according to the procedure outlined above, compared to the agreed TACs for 2014, they would represent a 63% increase in fishing opportunities in *EU waters of IIa and IV* and an 37% decrease in *EU and international waters of Vb; VI; international waters of XII and XIV*.

STECF agrees with logical explanations given in the ICES response and with the 2013 ICES advice that the management units should match the biological/assessment units.

3.6 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: The 2012 advice for this stock was biennial and valid for 2013 and 2014: "*Based on the ICES approach to data limited stocks, and taking into account the absence of landings in recent years, ICES advises that no increase of the catches should take place unless there is evidence that this will be sustainable"*. There are no new data available that change the perception of the stock. Therefore, the same advice is also applicable for 2015 and 2016.

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.

3.7 Rays and skates in ICES Subareas VI and VII

ICES uses the common term "skate" to refer to members of the family Rajidae. The term ray, formerly used by ICES to refer to Rajidae too, is now only used to refer to other batoid fish, including manta rays, sting rays, and electric rays. ICES only provides routine advice for Rajidae.

About 15 species of skate are known from the shelf seas of the Celtic Seas ecoregion, including:

(a) Important commercially exploited species (*Raja brachyura, Raja clavata, Raja microocellata, Raja montagui, Leucoraja naevus*);
(b) Infrequent species of marketable size (*Leucoraja circularis, Leucoraja fullonica, Dipturus oxyrinchus*);
(c) Stocks for which the main distribution is outside the ecoregion and is advised elsewhere (*Amblyraja radiata*);
(d) Species subject to strict EC regulations that are either currently prohibited or that should not be retained on board (*Dipturus batis* complex (*Dipturus batis* and *Dipturus* cf. *intermedia*), *Dipturus nidarosiensis, Raja undulata, Rostroraja alba*);
(e) small-bodied species that are discarded (*Rajella fyllae*).

Recent studies have identified that *Dipturus batis* comprises two species. As the taxonomic nomenclature is still to be officially agreed, ICES currently provides advice for the species complex, but will provide species-specific advice when both species are recognised. Given changes in the taxonomy of the genus Dipturus, management measures may be better implemented at genus level.

Rostroraja alba is listed as a 'prohibited species' and is addressed in a separate advice sheet in 2014.

For the first time, in 2014, ICES gives quantitative advice for skates at a stock-specific level. Until now, landings data have been too incomplete to allow ICES to provide quantitative advice per stock.

ICES does not provide advice for the generic skate assemblage, nor does it advise on the generic skate TAC in this area. This is because ICES believes that management should be at a stock-specific level. Also, the generic skate TAC does not take into account that several stocks straddle the boundary with other management units. For instance, the skate with highest landings in the ecoregion (*Leucoraja naevus*) is a stock straddling Subareas VI and VII (excl. Division VIId) and Divisions VIIIa,b,d.

FISHERIES: Skates are taken as a bycatch in mixed demersal fisheries and also targeted in some areas. Beam trawls generally capture smaller skates, and tanglenets capture larger skates. Most skates are less abundant on muddy habitats, and so may be less frequently encountered in *Nephrops* fisheries.

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.

SOURCE OF MANAGEMENT ADVICE: The main advisory body is ICES. The basis for advice is survey data (mainly from international trawl surveys). Other data, e.g. life history information and estimates of mortality, are used as supplementary information when appropriate.

REFERENCE POINTS: 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: See sections below on individual species.

RECENT MANAGEMENT ADVICE: See also sections below on individual species.

Section*	Scientific name	Stock unit	Advice (2015 and 2016)	Advice (t)
5.3.29.15	*Leucoraja naevus*	Subareas VI ,VII, and Divisions VIIIabd	Reduce landings 34%	1998
5.3.29.2	*Raja brachyura*	Divisions VIIa, f, g	Reduce landings 20%	897
5.3.29.3	*Raja brachyura*	Division VIIe	Reduce landings 20%	310
5.3.29.4	*Raja clavata*	Subarea VI	Increase landings 20%	205
5.3.29.5	*Raja clavata*	Divisions VIIa, f, g	Increase landings 20%	1235
5.3.29.6	*Raja clavata*	Division VIIe	No increase in landings	260
5.3.29.7	*Raja microocellata*	Divisions VIIf, g	Reduce catches 36%	188
5.3.29.8	*Raja microocellata*	Divisions VIId, e	Reduce landings 20%	43
5.3.29.9	*Raja montagui*	Subarea VI, Divisions VIIb, j	Reduce landings 11%	53
5.3.29.10	*Raja montagui*	Divisions VIIa, e–h	Reduce landings 4%	1118
5.3.29.11	*Raja undulata*	Divisions VIId, e	No target fishery, mitigate bycatch	-
5.3.29.12	*Raja undulata*	Divisions VIIb, j	No target fishery, minimize bycatch	-
5.3.29.13	*Leucoraja circularis*	Subareas VI and VII	Reduce landings 20%	39
5.3.29.14	*Leucoraja fullonica*	Subareas VI and VII	Reduce landings 20%	186
5.3.29.16	*Dipturus batis*-complex (*Dipturus batis* cf. *flossada*) (*Dipturus* cf. *intermedia*) and *D. nidaorsiensis* and *oxyrinchus*	Subareas VI and VII	No target fishery, minimize bycatch	-
5.3.29.17	Other skates	Subareas VI and VII, excluding Division VIId	Reduce landings 20%	789

*References are to ICES sections

STECF COMMENTS: STECF notes that for many skates (Rajiformes), the absolute level of catch and stock status are uncertain. Assessments are based mostly on observed trends in survey time series, as these provide the longest time series of species-specific information. This information forms the basis for ICES' advice using its approach to data limited stocks. Such an approach prescribes the proportional change in the level of reported catch based on the changes in the survey estimates of stock size. However, for skates, because the accuracy and current levels of species-specific catches are variable, the level of catch that corresponds to the proportional change cannot always be accurately estimated. Hence in some instances, such an approach does not provide useful advice on future fishing opportunities. Provision of advice is further complicated as fishing opportunities for skates are currently expressed as multiple-species TACs. STECF also notes that since the implementation of the ICES approach to data limited stocks, developments in methodologies for undertaking assessments and providing management advice for data limited stocks have occurred and are documented by FAO and several ICES workshop reports on life history traits. Furthermore a special issue of Fisheries Research on such developments is

shortly due to be published so there is the potential for ICES to review and revise and improve upon its current approach.

STECF also notes that in many fisheries, the survival rate of skates that are caught and discarded can be relatively high (see STECF EWG 14-11). Hence, in those fisheries primarily directed to other demersal species, the obligation to land all catches is likely to result in increased fishing mortality on skates if catches exceed TACs.

In view of the above, STECF suggests that to minimise incidental fishing-induced mortality on skates, consideration should be given to allow over-quota discarding, but that a record should be kept of the estimated quantity (weight) discarded to enable total catches to be estimated. STECF also suggests that no discarding of skates should be permitted unless the quotas for such species have been exhausted. Such a provision would not only minimise over-quota fishing-induced mortality, but would also prevent fisheries directed to other species being closed prematurely, as a consequence of a lack of quota for skates and would also help improve much-needed fishery-dependent catch data for skates.

3.7.1 Cuckoo ray (*Leucoraja naevus*) in Subareas and Divisions VI, VII, and VIIIa,b,d

FISHERIES: This is an important, offshore, commercial species, and so is only normally caught by trawl fleets rather than by inshore gill- or tanglenets. It is a bycatch in a mixed demersal fisheries targeting gadoids, hake, anglerfish, and megrim. As one of the smaller and less valuable species in the skate complex, it is not targeted and a relatively high proportion of the catch is discarded. It is mainly discarded in the target ray fisheries off eastern Ireland. In general discarding levels vary depending on market value. Minimum estimate of landings, based on reported landings in 2013 is 2591 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✗	Overexploited
Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

The average of the abundance indicator in the last two years (2012–2013) is 17% lower than the average of the five previous years (2007–2011). There is evidence that the stock is being exploited above any proxy for FMSY. Landings have declined somewhat, but the time-series is too short to infer trends.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 34%. Based on estimated species-specific landings, this would imply landings of 1998 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

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

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 five

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 17% between 2007 and 2011 (average of the five years) and 2012–2013 (average of the two years). This implies landings should decrease by 17% in relation to the last three years' average.

Considering that the exploitation level is uncertain, but likely above FMSY, an additional precautionary reduction of 20% is applied. This corresponds to landings of no more than 1998 t in each of 2015 and 2016.

Discarding is known to take place but cannot be quantified. There is some discard survival, therefore total catches cannot be calculated.

Additional considerations

Length-converted catch curves for Divisions VIIa and VIIg show that this stock is exploited above any proxy for FMSY.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

3.7.2 Blonde ray (*Raja brachyura*) in Divisions VIIa, f, g (Irish and Celtic seas)

FISHERIES: This is the main target species in the southern Irish Sea skate fishery, and an important target in the Bristol Channel skate fishery. Elsewhere this coastal and inner shelf species is mainly taken as bycatch in trawl and gillnet fisheries. As one of the larger and more marketable species in the skate complex, it may be targeted in some local, seasonal fisheries.Minimum estimate of landings, based on reported landings in 2013 is 1086 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✗	Overexploited

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

The state of the stock is unknown. Survey catch rates are increasing but this is only indicative of juveniles; no survey covers the adult part of the population. There is evidence that the stock is overexploited relative to FMSY.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 20%. Based on estimated species-specific landings, this would imply landings of 897 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

No analytic assessment can be presented for this stock. Therefore, 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 exploitation is appropriate for the stock.

For this stock, ICES advises that catches should be decreased by 20% in relation to the last three years' average, corresponding to landings of no more than 897 t in each of 2015 and 2016.

Discards are known to take place but cannot be quantified, and there is some discard survival; therefore total catches cannot be calculated.

Additional considerations

There is evidence from catch curves that F is higher than any proxy for FMSY. The catch data for this species are somewhat confounded with those of *R. montagui*.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 20% implying landings of 897 t in each of 2015 and 2016.

3.7.3 *Blonde ray (Raja brachyura) in* Division VIIe (Western English Channel)

FISHERIES: Raja brachyura is a coastal and inner shelf species that is a by catch of trawl and gillnet fisheries. As one of the larger and more marketable species in the skate complex, it may be targeted in some local, seasonal fisheries. Target fisheries often operate in areas of sandbank habitats where this species can be locally abundant. Blonde ray is an important commercial species, accounting for about a third of the skate landings in this Division. This species is usually caught as a bycatch in demersal fisheries, but may be targeted in areas of high local abundance, due to its large size and high market value. Minimum estimate of landings, based on reported landings in 2013 is 420 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

There are currently insufficient data to present longer-term trends in species-specific landings for this stock.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 20%. Based on estimated species-specific landings, this would imply landings of 310 t in each of 2015 and 2016. Discards are known to take place but have not been quantified and there is some discard survival.

Other considerations

No analytic assessment can be presented for this stock. Therefore, 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 exploitation is appropriate for the stock.

For this stock, ICES advises that catches should decrease by 20% in relation to the last three years average, corresponding to landings of no more than 310 t in 2015 and 2016.

Discards are known to take place but cannot be quantified, and there is some discard survival; therefore total catches cannot be calculated.

Additional considerations

The catch data for this species are somewhat confounded with those of R. montagui.

The discontinued survey abundance series showed some fluctuations over time. There is some concern that effort on this stock may have increased in the most recent years. Therefore the PA buffer was applied.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 20% implying landings of 310 t in each of 2015 and 2016.

3.7.4 Thornback ray *(Raja clavata) West of Scotland (Subarea VI)*

FISHERIES: Thornback ray is a coastal and inner shelf species that is a bycatch in trawl and gillnet fisheries. As one of the larger species in the skate complex, it is also targeted in some local, seasonal fisheries with trawls and static nets. Minimum estimate of landings, based on reported landings in 2013 is 219 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
		2011–2013
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
		2011–2013
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

The stock size indicator in the last two years (2012–2013) is 32% higher than the average of the five previous years (2007–2011). Available landings data are increasing, though the time-series is short.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings could be increased by a maximum of 20%. Based on best estimate of species-specific landings, this implies landings of no more than 205 t tonnes in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

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

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 five

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 increased by 32% between 2007 and 2011 (average of the five years) and 2012–2013 (average of the two years). This implies an increase of catches of at most 20% in relation to the last three years' average. This corresponds to landings of no more than 205 t in each of 2015 and 2016.

Considering that there has been a consistent increase in stock abundance over time, no precautionary reduction is needed. Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore total catches cannot be calculated.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

STECF agrees that based on the ICES approach to data-limited stocks, landings could be increased by a maximum of 20% implying landings of no more than 205 t in each of 2015 and 2016.

3.7.5 Thornback ray (*Raja clavata*) in Divisions VIIa,f,g (Irish and Celtic seas)

FISHERIES: *Raja clavata* is a coastal and inner shelf species that is a bycatch of trawl and gillnet fisheries. It is one of the most commercially important skate species in this ecoregion. It is mainly caught close to the eastern side of the Irish Sea by beam and otter trawlers, and in the Bristol Channel. Other landings come from inshore fisheries on the south coast of Ireland. As one of the larger species in the skate complex, it may be targeted in some local, seasonal fisheries. It is one of the important species in the Bristol Channel skate fishery. Minimum estimate of landings, based on reported landings in 2013 is 1050 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✓	Appropriate

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

The stock size indicator in the last two years (2012–2013) is 60% higher than the average of the five previous years (2007–2011). Available landings are stable, though the time-series is short.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings could be increased by a maximum of 20%. Based on best estimate of species-specific landings, this implies landings of no more than 1235 tonnes in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

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

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 five

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 increased by 60% between 2007 and 2011 (average of the five years) and 2012–2013 (average of the two years). This implies an increase in catches of at most 20% in relation to the last three years' average, corresponding to landings of no more than 1235 t in each of 2015 and 2016.

Considering that there has been a consistent increase in stock abundance over time and there is evidence that the stock is not overexploited, no additional precautionary reduction is needed. Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore, total catches cannot be calculated.

Additional considerations

Preliminary length-converted catch curves suggest that the stock is underexploited in relation to proxy for F_{MSY}.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings could be increased by a maximum of 20% implying landings of no more than 1235 tonnes in each of 2015 and 2016.

3.7.6 Thornback ray *(Raja clavata) in Division* VIIe (Western English Channel)

FISHERIES: This is one of the most commercially important ray species in this division. It is caught mainly close to shore. Minimum estimate of landings, based on reported landings in 2013 is 344 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	→	Stable or increasing

Trawl survey data in Lyme Bay indicated that the relative abundance of thornback ray was stable or increasing over the period 1989–2011 (Burt *et al.*, 2013). This survey no longer operates, thus recent data are lacking.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should not increase based on estimated species-specific landings; this would imply landings of 260 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

No analytic assessment can be presented for this stock. Therefore, 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, a survey conducted in 1989–2011 suggests stable or increasing abundance overall during this period. Therefore, ICES advises that catches should not increase in relation to the last three years' average, corresponding to landings of no more than 260 t in each of 2015 and 2016.

Discards are known to take place but cannot be quantified, and there is some discard survival; therefore total catches cannot be calculated

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should not increase based on estimated species-specific landings; this would imply landings of 260 t in each of 2015 and 2016.

3.7.7 Small-eyed ray (*Raja microocellata*) in Divisions VIIf, g (Bristol Channel)

FISHERIES: This is a coastal species that is a by catch of trawl and gillnet fisheries. Although not usually targeted, it is one of the important components of the Bristol Channel directed skate fishery.Minimum estimate of landings, based on reported landings in 2013 is 234 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

The stock abundance estimate (survey catch rates) in the last two years is 27% below the preceding five year average. Fishing mortality is unknown but may be increasing.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 36%. Based on estimated species-specific landings, this would imply landings of 188 t in each of 2015 and 2016. Discards are known to take place but have not been quantified and there is some discard survival.

Other considerations

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

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 five 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 2007 and 2011 (average of the five years) and 2012–2013 (average of the two years). This implies landings should be decreased by at least 20% in relation to the last three years' average.

Considering that there is no evidence that the stock is not over-exploited relative to FMSY, an additional precautionary reduction of 20% is applied'. This corresponds to landings of no more than 188 t in each of 2015 and 2016.

Discards are known to take place but cannot be quantified, and there is some discard survival, therefore total catches cannot be calculated.

Additional considerations

Displacement of effort from beam trawls to twin rigging in coastal waters may have increased mortality on this species in this area.

The potential effects of other human activities (e.g. aggregate extraction) on this species have not been evaluated.

The distribution of the juveniles of this species covers large areas of Carmarthen Bay (VIIf). These grounds are often fished by whelk potters, and the presence of such static gear may limit the impacts of trawling on the nursery grounds.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 36% implying landings of 188 t in each of 2015 and 2016.

3.7.8 Small-eyed ray *(Raja microocellata) in the English Channel (Divisions VIId, e)*

FISHERIES: This species is an occasional bycatch species in most fisheries operating in the English Channel. Minimum estimate of landings, based on reported landings in 2013 is 62 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

The stock status is unknown.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 20%. Based on estimated species-specific landings, this would imply landings of 43 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

No analytic assessment can be presented for this stock. Therefore, 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 exploitation is appropriate for the stock.

For this stock, ICES advises that catches should decrease by 20% in relation to the last three years' average, corresponding to landings of no more than 43 t in each of 2015 and 2016.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 20% implying landings of 43 t in each of 2015 and 2016.

3.7.9 *Spotted ray (Raja montagui)* in Subarea VI and Divisions VIIb,j (West of Scotland and Ireland)

FISHERIES: *Raja montagui* is a shelf species that is a bycatch in trawl and gillnet fisheries, including in mixed demersal fisheries targeting species such as cod, haddock, and whiting. It is a bycatch in mixed fisheries for other demersal species and a bycatch in fisheries targeting other larger species of skate. As one of the smaller and less valuable species in the skate complex, it is not targeted and a relatively high proportion of the catch is possibly discarded. Minimum estimate of landings, based on reported landings in 2013 is 67 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

The stock abundance estimate (catch rates in the Irish groundfish surveys) in the last two years is 11% higher than the preceding five year average.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 11%. Based on estimated species-specific landings, this would imply landings of 53 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

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

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 five 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 increased by 11% between 2007 and 2011 (average of the five years) and 2012–2013 (average of the two years). This implies landings could increase by 11% in relation to the last three years' average.

Considering that there is no evidence that the stock is not over-exploited relative to FMSY, a precautionary reduction of 20% is applied. This corresponds to landings of no more than 53 t in each of 2015 and 2016.

Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore total catches cannot be calculated.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 11% implying landings of 53 t in each of 2015 and 2016.

3.7.10 Spotted ray (*Raja montagui*) in Divisions VIIa and VII e–h (Southern Celtic seas)

FISHERIES: *Raja montagui* is a shelf species that is a bycatch in trawl and gillnet fisheries, including in mixed demersal fisheries targeting species such as cod, haddock, and whiting. It is a bycatch in mixed fisheries for other demersal species as well and a bycatch in fisheries targeting other larger species of skate. It is an important bycatch in the skate-targeted otter and beam-trawl fisheries in the southern Irish Sea and northern Celtic Sea. As one of the smaller and less valuable species in the skate complex, it is not targeted and a relatively high proportion of the catch may be discarded. Minimum estimate of landings, based on reported landings in 2013 is 1038 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✗	Overexploited

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

The average of the abundance indicator in the last two years (2012–2013) is 32% higher than the average of the five previous years (2007–2011). However, there is evidence that the stock is being exploited above any proxy for FMSY.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 4%. Based on estimated species-specific landings, this would imply landings of 1118 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

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

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 five 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 increased by more than 20% between 2007 and 2011 (average of the five years) and 2012–2013 (average of the two years). This implies landings could increase by 20% in relation to the last three years' average.

Considering that there is evidence (from a catch curve analysis) that the stock is over-exploited relative to FMSY, a precautionary reduction of 20% is applied. This corresponds to landings of no more than 1118 t in each of 2015 and 2016.

Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore, total catches cannot be calculated..

Additional considerations

Length-converted catch curves show that this stock is exploited above any proxy for FMSY. The signal from French EVHOE is consistent with the UK survey but was not combined because the area coverage from EVHOE is not appropriate for the stock.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 4% implying landings of 1118 t in each of 2015 and 2016.

3.7.11 *Undulate ray (Raja undulata) in* Divisions VIId, e (English Channel)

FISHERIES: Undulate ray is one of the main species of skate captured as bycatch in the central English Channel. This is a coastal species that was traditionally exploited by inshore fishing fleets (trawl, tanglenets, and longline) in areas of high localized abundance. French discards in Divisions VIId,e were estimated at >1700 tonnes in 2013, and at similar levels in 2011–2012. Total catch is unknown.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Stable or increasing

The current surveys cover only the fringe of the stock distribution and cannot be considered representative of the stock abundance. However, the slight increases in these surveys indices are considered to reflect range expansion from the core stock area (see supporting information), which might indicate an increasing stock. Fishing mortality is inferred to have decreased as the species is no longer targeted, and landings have ceased.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of precautionary considerations that there should be no targeted fisheries on this stock. Any possible provision for bycatch to be landed should be part of a management plan, including close monitoring of the stock and fishery.

Other considerations

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

Precautionary approach

Based on the precautionary approach, ICES advises that there be no targeted fishery for undulate ray unless information is provided to show that such fisheries are sustainable.

Additional considerations

Available evidence shows that there may be discrete stocks in the English Channel. In view of the patchy distribution, and following the precautionary approach, ICES recommends that no target fisheries should be permitted unless information is provided to show that such fisheries are sustainable.

Although locally abundant, this stock has a patchy distribution and is susceptible to local depletion if fishing mortality is too high. ICES advises against targeted fisheries. Measures to prevent targeting and control bycatch should be implemented as part of an agreed management plan. Proposed management measures must be evaluated and ICES is prepared to be involved in such a management plan evaluation.

Discard survival is relatively high for this species in this area.

The FAO Code of Conduct for developing fisheries should be followed in developing management strategies for this stock (FAO, 1996).

The generic TACs and quotas for skates in the Celtic Seas eco-region does not apply to *Raja undulata*. The TAC regulation states that, when accidentally caught, this species must not be harmed, must be promptly released, and fishermen are encouraged to use techniques to facilitate the rapid and safe release.

This stock was placed on the EU's prohibited species list from 2009 until 2013. This was a high level, long-term conservation strategy aimed at very depleted and vulnerable species. ICES did not support the listing of *Raja undulata* on this designation (ICES, 2010).

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016. Noting that discard survival of undulate ray in this area is relatively high STECF support ICES point of view regarding the listing of *Raja undulata* under EU's prohibited list.

3.7.12 Undulate ray (*Raja undulata*) in Divisions VIIb,j (Southwest of Ireland)

FISHERIES: This is a very coastal species. There is no targeted fishery for this species. There is a substantial bycatch in localized tanglenet fisheries targeting crawfish in the vicinity of Tralee Bay. It is also caught in near-shore mixed-trawl fisheries. Total catch is unknown.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
		2011–2013
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✗	Overexploited

Stock size		
		2011–2013
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✗	Below poss. reference points

The stock in Divisions VIIb and VIIj is small and isolated, mainly centred in Tralee Bay. An index of abundance in southwestern Ireland is available, based on the number of fish tagged per year in sport fisheries. This index shows a decline since the mid-1970s.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the precautionary considerations that there be no targeted fishery on this stock. This isolated stock has a very local distribution, mainly in Tralee Bay on the Southwest Irish coast; bycatch in this vicinity should be monitored and reduced to the lowest possible level. Measures to mitigate bycatch should be developed and implemented in consultation with the stakeholders.

In Divisions VIIb and VIIj, ICES considers that it is appropriate that the species continues to be promptly released if caught.

Other considerations

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

Precautionary approach

ICES advises on the basis of the precautionary considerations that there be no targeted fishery on this stock in 2015 or 2016. This isolated stock has a very local distribution, mainly in Tralee Bay on the southwestern Irish coast; bycatch in this vicinity should be monitored and reduced to the lowest possible level. Measures to mitigate bycatch should be developed and implemented in consultation with the stakeholders. In Divisions VIIb and VIIj, ICES considers that it is appropriate that the species continues to be promptly released if caught.

Additional considerations

There is a prohibition on tanglenetting in Tralee Bay and its vicinity, but it is difficult to enforce.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

3.7.13 Sandy ray (*Leucoraja circularis*) in Subareas VI and VII (Celtic Sea and west of Scotland)

FISHERIES: This is a small bycatch of mixed trawl and gillnet fisheries targeting hake, anglerfish, and megrim on the outer continental shelf. It is also a bycatch in upper slope fisheries for deep-water fish, especially using longlines. Minimum estimate of landings, based on reported landings in 2013 is 68 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

The state of the stock is unknown. Survey coverage is insufficient to describe the stock status. Sandy ray is only frequently encountered in one survey around the Porcupine bank and catch rates appear stable at low levels, but this is not considered representative of the whole stock.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 20%. Based on estimated species-specific landings, this would imply landings of 39 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

No analytic assessment can be presented for this stock. Therefore, 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 exploitation is appropriate for the stock.

For this stock, ICES advises that catches should decrease by 20% in relation to the last three years' average, corresponding to landings of no more than 39 t in each of 2015 and 2016.

Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore total catches cannot be calculated.

Additional considerations

The Spanish Porcupine survey shows low but stable abundance over time. This survey only covers the shallower part of the stock's range.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 20% implying landings of 39 t in each of 2015 and 2016.

3.7.14 Shagreen ray (*Leucoraja fullonica*) in Subareas VI and VII (Celtic Sea and West of Scotland)

FISHERIES: An outer shelf species that is usually a small by catch of trawl and gillnet fisheries, including mixed demersal fisheries targeting hake, anglerfish and megrim. Although not subject to target fisheries, it can be a relatively important bycatch of fisheries in the south-western Celtic Sea. It is also a small bycatch in some deepwater fisheries on the continental slopes and offshore banks. Minimum estimate of landings, based on reported landings in 2013 is 216 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

The state of the stock is unknown. Survey coverage is insufficient to describe the stock status. This species is now only regularly encountered in one survey. Catch rates fluctuate, but with an overall decline. This is not considered representative of the whole stock since the survey does not cover the whole stock range.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 20%. Based on estimated species-specific landings, this would imply landings of 186 t in each of 2015 and 2016. Discards are known to take place but have not been quantified and there is some discard survival.

Other considerations

No analytic assessment can be presented for this stock. Therefore, 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 exploitation is appropriate for the stock.

For this stock, ICES advises that catches should decrease by 20% in relation to the last three years average, corresponding to landings of no more than 186 t in each of 2015 and 2016.

Discards are known to take place but cannot be quantified, and there is some discard survival; therefore total catches cannot be calculated.

Additional considerations

The French survey in VIIg-k shows a decline since 1997, though numbers recorded are small and the survey does not cover the whole stock.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 20% implying landings of 186 t in each of 2015 and 2016.

3.7.15 Common skate (*Dipturus batis* complex (*Dipturus cf. flos*sada and *Dipturus cf. intermedia*), *Dipturus nidarosiensis*, and *Dipturus oxyrinchus*) in Subareas VI and VII (excluding Division VIId)

FISHERIES: *Dipturus batis* species were traditionally an important commercial species in northern European seas, taken in trawl and line fisheries. Whilst there was a larger reduction in the geographical range over the latter half of the 20th century, they remained a bycatch species along the outer shelf of the Atlantic seaboard, including trawl and tanglenet fisheries. It may be an important component of the bycatch in some areas, including parts of the Celtic Sea. *D. nidarosiensis* and D. *oxyrinchus* are generally taken on the edge of the continental shelf and upper slope. Minimum estimate of landings, based on reported landings in 2013 is 22 tonnes.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area. However, the EU prohibits the *Dipturus batis* complex species from being fished for, retained on board, transhipped, or landed. This is the highest protection possible under the EU's Common Fisheries Policy and is a long-term conservation strategy, similar to a long-term management plan for such species. In 2010, ICES evaluated the inclusion of the *Dipturus batis* complex as a prohibited species, and concluded that this stock should be removed from the list.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✗	Overexploited (*D. batis*)
Qualitative evaluation	?	Unknown (*D. oxyrinchus* and *nidarosiensis*)

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✗	Below poss. reference points
Qualitative evaluation	?	Unknown (*D. oxyrinchus* and *nidarosiensis*)

There is insufficient information to present trends in species-specific landings for these species. The common skate (*Dipturus batis*) complex is depleted in the Celtic Sea ecoregion. Individuals are rarely encountered in

surveys. Limited information suggests that both *D.* cf. *flossada* and *D.* cf. *intermedia* are found in the ecoregion. There is particular overlap in the Celtic Sea and at Rockall.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the precautionary considerations that there be no targeted fishery for these stocks and measures should be taken to minimize bycatch in 2015 and 2016.

Measures to minimize bycatch may include seasonal and/or area closures or technical measures. Such measures should be developed by stakeholder consultations, as part of a rebuilding plan, considering the overall mixed-fisheries context.

Other considerations

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

Precautionary considerations

ICES advises on the basis of the precautionary considerations that there be no targeted fishery for the *Dipturus batis* complex and measures should be taken to minimize bycatch. Given their similar life history and vulnerability to fisheries, ICES provides the same advice for *Dipturus nidarosiensis* and *D. oxyrinchus*.

Measures to minimize bycatch may include seasonal and/or area closures or technical measures. Such measures should be developed by stakeholder consultations, as part of a rebuilding plan, considering the overall mixed-fisheries context.

Additional considerations

There have been recent increases in abundance for the *Dipturus batis* complex in Subareas VI and VII. However, these increases are minor and the stock abundance is still very low relative to its historical levels.

If refuges, spawning and nursery grounds are identified, these could be used to frame management measures for these species.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

STECF notes that *Dipturus oxyrinchus and Dipturus nidarosiensis are not* currently included in the 2014 TAC and quota regulation (regulation (EU) 43/2014) as species which must not be harmed and which must be promptly released which may lead to species misreporting with the other species of the *Dipturus complex*.

3.7.16 Other skates in Subareas VI and VII (excluding Division VIId)

This advice relates to skates not specified elsewhere in the ICES advice. This includes skates not reported to species level and some other, mainly deep-water species throughout the region. It also applies to *R. clavata, R. brachyuran, and R. microcellata* outside the defined stock boundaries. The advice only relates to species belonging to the Rajidae (skates), and does not refer to manta rays, sting rays, electric rays, or devil rays.

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

MANAGEMENT AGREEMENT: There is no management plan for this stock, or for any skate stock in the ICES area.

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown
Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown

Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

The survey or abundance data available is insufficient to assess these species individually or collectively.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 20%. Based on estimated species-specific landings, this would imply landings of 789 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

No analytic assessment can be presented for this stock. Therefore, 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 exploitation is appropriate for the stock.

For this stock, ICES advises that catches should decrease by 20% in relation to the last three years' average, corresponding to landings of no more than 789 t in each of 2015 and 2016.

Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore, total catches cannot be calculated.

Additional considerations

The EU regulations require that Leucoraja naevus, Raja clavata, Raja brachyura, Raja montagui, Raja microocellata, Raja circularis, and Raja fullonica be reported separately to species level in landings.

Norwegian data probably include bycatch in the slope fisheries for ling, tusk, and deep-water species. These bycatches are likely to be mainly deep-water skate species.

Spain provided only generic skate landings data in 2013. In 2012, Spanish data was provided at species level.

STECF COMMENTS: STECF agrees that based on the ICES approach to data-limited stocks, landings should be reduced by 20% implying landings of 789 t in each of 2015 and 2016.

3.8 *Sciyliorhinus canicula* and *Sciyliorhinus stellaris* in Subareas VI and VII

Advice for these stocks for the years 2013-2015 was given in 2012 and the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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

Advice for this stock for the years 2013-2015 was given in 2012 and the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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)

Advice for 2013 -2015

The advice given in 2012 for this stock is valid for 2013-2015 : *"Based on the ICES approach to data-limited stocks, ICES advises that current 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."*The advice is summarized in the table below.

NB: The advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% increase in catch be implemented.

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 status of the stock and the ICES advice for 2015.

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

Advice for this stock for the years 2013-2015 was given in 2012 and the text below remains unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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.

3.9 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 6.9 of this report.

3.10 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 6.16 and 6.17 of this report.

3.11 Cod (*Gadus morhua*) in areas VIIe-k

FISHERIES: Cod in Divisions VIIe-k are taken as a component of mixed trawl fisheries. Landings are made mainly by French gadoid trawlers, which prior to 1980 were mainly fishing for hake in the Celtic Sea. Landings peaked in 1989 at 20,000 t following which they have been maintained between 6,000t and 13,000t until 2003. From 2004 to 2010 landings have been between 3,000t and 5,000t. Landings have increased in 2011 and 2012 to 7,200t and 7,600t respectively. Landings decreased in 2013 to 6,200 t. All landings are taken by EU fleets.

Cod is caught in a range of fisheries, including otter trawl fisheries targeting gadoids, Nephrops, or mixed demersal fish, beam trawl fisheries, and gillnet fisheries. Landings are made throughout the year, but tend to be higher during the first half of the year. The TACs have constrained catches since 2003 and the impact of the Trevose Head closure applied since 2005 has resulted in landings being spread throughout the year.

Highgrading occurred during the first part of 2011 before the TAC was revised. In 2012 and 2013, the TAC was not fully caught, mainly due to mixed-fisheries considerations for France. In 2012 and 2013 the TAC was not restrictive and the amount and length composition of the discards were similar to those observed before 2011, around 10% of the catches by weight.

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

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY approach	MSY $B_{trigger}$	10 300 t.	Provisionally set at B_{pa}.
	F_{MSY}	0.40	Provisional proxy based on F_{max} (ICES, 2011).
Precautionary approach	B_{lim}	7 300 t.	SSB in 1976.
	B_{pa}	10 300 t.	$B_{pa} = B_{lim} \times 1.4$. Biomass above this value affords a high probability of maintaining SSB above B_{lim}, taking into account the variability in the stock dynamics and the uncertainty in assessments.
	F_{lim}	Undefined.	
	F_{pa}	Undefined.	

(unchanged since: 2012)

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined

Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

Recruitment has been highly variable over time with occasional very high recruitment (e.g. 1987 and 2010). The 2011 and 2012 year classes are estimated well below the average of the time-series. SSB has increased from below Blim to well above MSY Btrigger since 2010 and is now decreasing as the result of low recruitment in recent years. Fishing mortality shows a declining trend since 2005, was around the FMSY proxy in 2011, and has increased since then.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach, but cannot quantify the resulting catches. The implied landings should be no more than 4024 tonnes.

Other considerations

MSY approach

Following the ICES MSY approach implies fishing mortality to be reduced to 0.37 (lower than F_{MSY} because SSB is 8% below MSY $B_{trigger}$). ICES cannot quantify the resulting catches. The implied landings should be no more than 4024 t. Discards are known to take place but cannot be fully quantified.

STECF COMMENTS: STECF agrees with the ICES assessment of stock status and advice for 2015.

4 Resources of the Bay of Biscay and Iberian Waters

4.1 Hake (*Merluccius merluccius*) in Divisions VIIIc, IX and X (Southern hake)

FISHERIES: This stock is exploited in a mixed fishery by Spanish and Portuguese trawlers and artisanal fleets. Landings fluctuated between 6,700 and 35,000 t (1972-2009). In recent years, they increased from 6,700t in 2003 to 19,200t in 2009. Total catch in 2013 were equal to 16,400t, of which 13,540t were landings (4,460 t trawlers, 5,740t other fleets and 3,300t unallocated) and 2,870t discards (17% of the total catch).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. ICES advice is for Subarea VIIIc and Division IXa. The advice is now based on a length-age analytical assessment (GADGET) using catch data, commercial CPUE series and survey data. This assessment includes the Gulf of Cadiz landings which were excluded from the assessment in recent years. French catches are not considered in the assessment until the full time-series is reviewed. Unallocated landings have been included since 2011.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY Approach	MSY $B_{trigger}$	Not defined.	
	F_{MSY}	0.24	F_{max} (ICES, 2010).
Precautionary Approach	B_{lim}	9000	A biomass that produces a recruitment that is at or above average (WKSOUTH; ICES, 2014b)
	B_{pa}	Not defined.	
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

STOCK STATUS:

F (Fishing Mortality)				
	2011	2012	**2013**	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined

SSB (Spawning-Stock Biomass)				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{pa},B_{lim})	?	?	?	Undefined

Fishing mortality is well above the FMSY proxy in 2013. SSB has increased since 1998. Most recruitments since 2005 have been above the historical mean.

MANAGEMENT OBJECTIVES: A recovery plan was agreed by the EU in 2005 (EC Reg. No. 2166/2005). The aim of the plan is to rebuild the stock to safe biological limits, set as a spawning-stock biomass above 35 000 tonnes by 2016, and to reduce fishing mortality to 0.27. The main elements of the plan are a 10% annual reduction in F and a 15% constraint on TAC change between years. ICES has not evaluated the plan.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach that catches should be no more than 8417 tonnes in 2015. If discard rates do not change from the average of the years 2011–2013, this implies landings of no more than 7302 tonnes.

Other considerations

Management plan

Following the agreed recovery plan (EC Reg. No. 2166/2005), a 10% reduction in F would lead to a TAC of 13 844 t, inside the 15% boundaries around the 2014 TAC (16 266 t). If the discard rate remains at the mean of the last three years, the catches would thus be 15 997 t. This catch is expected to lead to an SSB of 27 142 t in 2016.

ICES did not evaluate the plan; however, some elements of the recovery plan were evaluated by ICES in 2010 (ICES, 2010).

The current recovery plan uses target values based on precautionary reference points that are no longer appropriate.

MSY approach

Because MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without consideration of SSB in relation to MSY $B_{trigger}$.

Following the ICES MSY approach implies a reduction in fishing mortality to 0.24, resulting in catches of no more than 8417 t in 2015. If the discard rate remains as the mean of the last three years, this would result in landings of no more 7302 t. This is expected to lead to an SSB of 38 829 t in 2016.

Additional considerations

A number of regulatory measures are adopted for fishing southern hake, including minimum mesh sizes, closed areas, and seasonal restrictions (EC No. 850/98). Fishing effort limitations corresponding to a 10% reduction were initiated in 2005. TACs have been ineffective at regulating the fishery in recent years, as landings greatly exceeded the TACs.

The objective of the recovery plan was to rebuild the stock within safe biological limits, meaning to reach a SSB of 35 000 t by 2015. Since the plan's enforcement, the stock historical perception has changed and this SSB value is no longer valid. ICES has now established Blim at 9000 t and will work towards developing an appropriate Bpa value. Given the current Blim, it is expected that Bpa will be below the target biomass in the recovery plan.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 that on the basis of the MSY approach, catches should be no more than 8417 t in 2015. If discard rates do not change from the average of the years 2011–2013, this implies landings of no more than 7302 t.

STECF notes that following the provisions of the recovery plan would imply that the TAC for 2015 should be 13,844 t corresponding to a decrease of 15% compared to the agreed TAC for 2014.

4.2 Rays and skates in ICES Subareas VIII and IX

ICES uses the common term "skate" to refer to members of the family Rajidae. The term ray, formerly used by ICES to refer to Rajidae too, is now only used to refer to other batoid fish, including manta rays, sting rays, and electric rays. ICES only provides routine advice for Rajidae.

About 15 species of skate are known from the shelf seas of the Bay of Biscay and Iberian waters ecoregion:

(a) Important commercially exploited species (*Raja clavata, Raja brachyura, Raja montagui,* and *Leucoraja naevus*).

(b) Uncommon species of marketable size (*Leucoraja circularis, Dipturus oxyrinchus, Raja microocellata, Leucoraja fullonica, Raja asterias, Raja miraletus,* and *Amblyraja radiata*).

(c) Species subject to strict EC regulations that are either currently prohibited or that should not be retained on board (*Dipturus batis* complex, *Raja undulata,* and *Rostroraja alba*).

(d) small-bodied species that are discarded (*Neoraja iberica*).

Recent studies have identified that *Dipturus batis* comprises two species. As the taxonomic nomenclature is still to be officially agreed, ICES currently provide advice for the species complex, but will provide species-specific advice when both species are recognised. Given changes in the taxonomy of the genus Dipturus, management measures may be better implemented at genus level.

Rostroraja alba is listed as a 'prohibited species' and is addressed in a separate advice sheet in 2014.

For the first time, in 2014, ICES gives quantitative advice for skates at a stock-specific level. Until now, landings data have been too incomplete to allow ICES to provide quantitative advice per stock.

ICES does not provide advice for the generic skate assemblage, nor does it advise on the generic skate TAC in this area. This is because ICES believes that management should be at a stock-specific level. Also, the generic skate TAC does not take into account that several stocks straddle the boundary with other management units. For instance, *Leucoraja naevus* is a stock straddling Subareas VI and VII (excl. Division VIId) and Divisions VIIIa,b,d.

FISHERIES: Skates are taken as a bycatch in mixed demersal fisheries and also targeted in some areas. Beam trawls generally capture smaller skates, and tanglenets capture larger skates. Skates fisheries are currently managed under a common TAC, although the skate complex comprises species that may have different vulnerabilities to exploitation. Most skates are less abundant on muddy habitats, and so may be less frequently encountered in Nephrops 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 basis for the advice is survey data (mainly from international trawl surveys). Other data, e.g. life history information and estimates of mortality are used as supplementary information when appropriate.

REFERENCE POINTS: No reference points are defined for these stocks.

STOCK STATUS: See sections below on individual species.

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.

Section	Scientific name	Stock unit	Advice	Advice (t)
7.3.18.6	*Raja undulata*	VIIIa,b	No target fishery, manage bycatch	-
7.3.18.7	*Raja undulata*	VIIIc	No target fishery, mitigate bycatch	-
7.3.18.2	*Raja clavata*	VIII	Reduce landings 20%	238
7.3.18.9	*Leucoraja naevus*	VIIIc	Increase landings 1%	347
7.3.18.4	*Raja montagui*	VIII	Reduce landings 20%	94
7.3.18.5	*Raja montagui*	IXa	Reduce landings 20%.	106
7.3.18.10	*Leucoraja naevus*	IXa	Reduce landings by 4%	46
7.3.18.3	*Raja clavata*	IXa	Increase landings 20%	911
7.3.18.8	*Raja undulata*	IXa	No target fishery, manage bycatch	-
7.3.18.1	*Raja brachyura*	IXa	Not to increase	200
7.3.18.11	*Dipturus batis* complex	VIII, IXa	No target fishery, mitigate bycatch	-

	(*Dipturus* cf. *flossada*) (*Dipturus* cf. *intermedia*)			
7.3.18.12	Other skates	VIII, IXa	Reduce landings 20%	614

*References are to ICES sections

STECF COMMENTS: STECF notes that for many skates (Rajiformes), the absolute level of catch and stock status are uncertain. Assessments are based mostly on observed trends in survey time series, as these provide the longest time series of species-specific information. This information forms the basis for ICES' advice using its approach to data limited stocks. Such an approach prescribes the proportional change in the level of reported catch based on the changes in the survey estimates of stock size. However, for skates, because the accuracy and current levels of species-specific catches are variable, the level of catch that corresponds to the proportional change cannot always be accurately estimated. Hence in some instances, such an approach does not provide useful advice on future fishing opportunities. Provision of advice is further complicated as fishing opportunities for skates are currently expressed as multiple-species TACs. STECF also notes that since the implementation of the ICES approach to data limited stocks, developments in methodologies for undertaking assessments and providing management advice for data limited stocks have occurred and are documented by FAO and several ICES workshop reports on life history traits. Furthermore a special issue of Fisheries Research on such developments is shortly due to be published so there is the potential for ICES to review and revise and improve upon its current approach.

STECF also notes that in many fisheries, the survival rate of skates that are caught and discarded can be relatively high (see STECF EWG 14-11). Hence, in those fisheries primarily directed to other demersal species, the obligation to land all catches is likely to result in increased fishing mortality on skates if catches exceed TACs.

In view of the above, STECF suggests that to minimise incidental fishing-induced mortality on skates, consideration should be given to allow over-quota discarding, but that a record should be kept of the estimated quantity (weight) discarded to enable total catches to be estimated. STECF also suggests that no discarding of skates should be permitted unless the quotas for such species have been exhausted. Such a provision would not only minimise over-quota fishing-induced mortality, but would also prevent fisheries directed to other species being closed prematurely, as a consequence of a lack of quota for skates and would also help improve much-needed fishery-dependent catch data for skates.

4.2.1 Undulate ray *(Raja undulata)* in Division VIIIa,b (Bay of Biscay)

FISHERIES: Undulate ray is a bycatch species on the longline, trawl, and gillnets of the French fleet in the Bay of Biscay. French discards in Divisions VIIIa, b were estimated at 154 tonnes in 2013 (about 33% for each fleet). Except for *Leucoraja naevus*, no other ray is discarded as much in the Bay of Biscay. Total catch (2013) is unknown. Discarding is known to take place but is only quantified for part of the fisheries.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

A mark-recapture study suggests that the spawning biomass has increased in response to the fishing ban that was implemented in 2009.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of precautionary considerations that there should be no targeted fisheries on this stock. Any possible provision for bycatch to be landed should be part of a management plan, including close monitoring of the stock and fisheries.

Other considerations

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

Precautionary approach

Based on the precautionary approach, ICES advises that there be no targeted fishery in 2015 or in 2016 unless information is provided to show that these are sustainable.

Additional considerations

In view of the patchy distribution, and following the precautionary approach, ICES recommends that no target fisheries should be permitted unless information is provided to show that these are sustainable.

Although locally abundant, this stock has a patchy distribution and is susceptible to local depletion, if fishing mortality is too high. ICES advises against target fisheries. Measures to prevent targeting and control bycatch should be implemented as part of an agreed management plan. Proposed management measures must be evaluated and ICES is prepared to be involved in such a management plan evaluation.

The FAO Code of Conduct for developing fisheries should be followed in developing management strategies for this stock (FAO, 1996).

The generic TACs and quotas for skates in the Celtic Seas ecoregion do not apply to *Raja undulata*. The TAC regulation states that, when accidentally caught, this species must not be harmed, must be promptly released, and fishers are encouraged to use techniques to facilitate rapid and safe release.

This stock was placed on the EU's prohibited species list from 2009 until 2013. This was a high level, long-term conservation strategy aimed at very depleted and vulnerable species. ICES did not support the listing of *Raja undulata* on this designation (ICES, 2010).

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.2 Undulate ray *(Raja undulata)* in Division VIIIc (Cantabrian Sea)

FISHERIES: Undulate ray is mainly a bycatch caught in the Spanish gillnet fisheries. Total catch (2013) is unknown, estimated landings: unknown. Discarding is known to take place but cannot be quantified.

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

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

STOCK STATUS:

Fishing pressure		
		2011–2013
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
		2011–2013
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Raja undulata is known to have areas of local abundance along the Cantabrian coast. Scientific trawl surveys do not cover the inshore range of the species and stock status is unknown.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the precautionary approach, considering also the patchy distribution of this stock and its susceptibility to local depletion, that there be no targeted fishery for this stock in 2015 or 2016, unless information is provided to show that such fisheries are sustainable. Measures to mitigate bycatch in coastal fisheries should be implemented in 2015 and in 2016.

Other considerations

The advice is based on precautionary low catches because of missing or non-representative data. The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated.

No landings species-specific identification is available.

Fishery-independent trawl surveys do not provide reliable information on this inshore stock.

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

Precautionary approach

ICES advises on the basis of the precautionary approach, considering also the patchy distribution of this stock and its susceptibility to local depletion, that there be no targeted fishery for this stock in 2015 or 2016, unless information is provided to show that such fisheries are sustainable.

Additional considerations

Due to the inshore habitat of undulate ray, survey information is very limited for this stock. Scientific trawl surveys do not cover the inshore range of the species. In a recent commercial trammelnet fishing experience along the Basque country, undulate ray was the fourth most abundant species. Given the prohibition to land this species, fishers may avoid areas of local abundance and, therefore, commercial catch and effort data are limited and may not be informative about the status of the stock.

The advice is based on precautionary low catches because of missing or non-representative data. The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated.

No landings species-specific identification is available.

Fishery-independent trawl surveys do not provide reliable information on this inshore stock.

Regulations and their effects

The generic TAC and quota for skates in ICES Subareas VIII and IX does not apply to *Raja undulata*. The TAC regulation states that, when accidentally caught, it must not be harmed, must be promptly released, and fishers are encouraged to use techniques to facilitate rapid and safe release.

This stock was mentioned on EU's prohibited species list from 2009 until 2013. This was a high level of protection afforded to a few species and a long-term conservation strategy that aimed at very depleted and vulnerable species. ICES did not support the listing of *Raja undulata* on this designation.

Information from the fishing industry:

Scientific studies have confirmed the localized abundance of *Raja undulata* in the Cantabrian Sea (Division VIIIc).

STECF COMMENTS: STECF agrees with the ICES advice for 2015 and 2016.

4.2.3 Thornback ray (*Raja clavata*) in Subarea VIII (Bay of Biscay and Cantabrian Sea)

FISHERIES: *Raja clavata* is a coastal and inner shelf species that is a bycatch of trawl and gillnet fisheries. It is one of the most commercially important skate species in this ecoregion. This species is usually caught as a bycatch in demersal fisheries. Minimum estimates of landings, based on reported landings in 2013 is 299 tons.

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

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

STOCK STATUS:

Fishing pressure

	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

Survey idices indicate that the abundance of *R. clavata* shows a decreasing trend, with a 48% decrease between 2007-2011 (average of five years) and 2012-213 (average of two years). Fishing mortality is unknown, but the increase in landings and the decrease in abundance indicates it is increasing.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be decreased by 20%. Based on estimated species-specific landings, this would imply landings of 238 t in each of 2015 and 2016. Discarding is known to take place but has only been quantified partially; there is also some discard survival.

Other considerations

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

The advice is based on an abundance index from two surveys, used as an indicator of stock size. The uncertainty associated with the index values is not available. 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 in the short term (3–5 years), but they may not be suitable if the stock size is low and/or overfished.

The quality of landings data has improved in recent years but remains somewhat uncertain, due to misidentification at the species level. Further work is required to refine landings data and workshops are required to compile and refine all available data.

The Spanish survey data for 2013 were not used because a new vessel was used in the survey, leading to suspected changes in catchability. This issue is being addressed in intercalibration work and it is expected that these data can be included in future years when the potential bias is corrected for.

ICES approach to data-limited stocks

For data-limited stocks for which a biomass 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 years, combined with recent catch or landings data. Knowledge about the exploitation status also influences the advised catch.

For this stock the biomass in Division VIIIc is estimated to have decreased by 48% between 2007 and 2011 (average of the five years) and 2012–2013 (average of the two years). This implies catches should decrease by 20% in relation to the last three years' average. This corresponds to landings of no more than 238 t in each of 2015 and 2016.

A precautionary buffer has not been applied, considering that the survey index in Division VIIIc shows an increasing trend the longer term, whereas the survey index in VIIIabd is generally quite variable.

Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore, total catches cannot be calculated.

Additional considerations

According to the survey index calculated by the data-limited stocks (DLS) 3.2 method, the relative abundance of *R. clavata* in 2012 and 2013 appears to decrease. The surveys cover the whole stock area.

The Basque OTB cpue series displays stability over the past few years

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.4 Cuckoo ray (*Leucoraja naevus*) in Division VIIIc (Cantabrian Sea)

FISHERIES: This species is usually caught as a bycatch in demersal fisheries. This is an important offshore commercial species, and as such is normally caught by trawl fleets rather than by inshore gill- or tanglenets. It is a bycatch in the mixed demersal fisheries targeting gadoids, hake, anglerfish, and megrim. As one of the smaller and less valuable species in the skate complex, it is not targeted. In general discarding levels vary depending on market value. Minimum estimates of landings, based on reported landings in 2013 is 646 tons.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	→	Stable

The average of the abundance indicator in the last two years available in the survey (2011–2012) is 1% higher than the average of the five previous years (2006–2010). Fishing mortality is unknown.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that catches could be increased by a maximum of 1%. Based on estimated species-specific landings, this would imply landings of 347 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

Data on landings are currently not available at the appropriate spatial scale. Hence ICES cannot provide a quantification of the advised landings for 2015 and 2016.

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.

Spanish survey data for 2013 were not used because a new vessel was used in the survey, leading to suspected changes in catchability. This issue is being addressed in the intercalibration work and it is expected that these data can be included in future years when the potential bias is corrected for.

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 five preceding values, combined with recent catch or landings data. Knowledge about the exploitation status also influences the advised catch.

Considering the increase in the survey trend over the longer term no additional precautionary reduction is needed. This implies. However as total landings of no more than 347 tons are unavailable for this stock, ICES is unable to quantify the advised landings in each of 2015 and 2016.

Discarding is known to take place but cannot be quantified, and there is some discard survival; therefore, total catches cannot be calculated.

Additional considerations

An examination of French EVHOE survey catches of this species displayed continuity across the boundary between Subareas VII and VIII. Therefore *L. naevus* in Divisions VIIIa,b,d is now assessed and advised for along with *L. naevus* in Subareas VI and VII. Division VIIIc is considered to be separate from Divisions VIIIa,b,d because this is an offshore outer shelf species and there is a canyon that would block eastward exchange with the Division VIIIc stock.

This species may benefit from scavenging on trawl-damaged organisms and discards.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.5 Spotted ray (*Raja montagui*) in Subarea VIII (Bay of Biscay and Cantabrian Sea)

FISHERIES: This species is usually caught as a bycatch in demersal fisheries. Preliminary minimum estimates of landings, based on reported landings in 2013 is 172 tons.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})		Unknown
Precautionary approach (F_{pa},F_{lim})		Unknown
Qualitative evaluation		Increasing

Stock size		
	2011–2013	
MSY ($B_{trigger}$)		Unknown
Precautionary approach (B_{pa},B_{lim})		Unknown
Qualitative evaluation		Decreasing

In Subarea VIII the abundance of R. montagui decreased by 26% in the last two survey available years (2011-12) in relation to the five preceding years (2006-2010). Landings have increased since 2007 with the maximum historical peak in 2013. Fishing mortality is unknown, but the increase in landings since 2007 and the decrease in abundance indicate it is increasing.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that catches should be reduced by 20%. Based on estimated species-specific landings this would imply landings of 94 t in each of 2015 and 2016. Discards are known to take place but have only been quantified partially and there is some discard survival.

Other considerations

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.

Landings for this species in Subarea VIII in 2013 are preliminary

The Spanish survey data for 2013 were not used because a new vessel was used in the survey leading to suspected changes in catchability. This issue is being addressed in intercalibration work and it is expected that these data can be included in future years when the potential bias is corrected for.

The survey used for the advice (SpGFS-WIBTS-Q4 in VIIIc) does not cover the whole stock area. The French EVHOE-WIBTS-Q4 (VIIIab) survey has not been used in the advice because it is not considered suitable as an abundance indicator for *R. montagui.*

ICES approach to data-limited stocks

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

For this stock the biomass is estimated to have decreased by 26% between 2006 and 2010 (average of the five years) and 2011–2012 (average of the two years). This implies catches should be decreased by 20% in relation to the last three years (2011-2013) average. This corresponds to landings of no more than 94 t in each of 2015 and 2016.

Considering the increase in the survey trend over the longer term no additional precautionary reduction is needed.

Discards are known to take place but cannot be quantified, and there is some discard survival, therefore total catches cannot be calculated.

Additional considerations

This species may benefit from scavenging on trawl-damaged organisms and discards.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.6 Spotted ray (*Raja montagui*) in Division IXa (west of Galicia, Portugal, and Gulf of Cadiz).

FISHERIES: This species is usually caught as a bycatch in artisanal fisheries by Portuguese fleets and in trawl fisheries by Spanish fleets. Preliminary minimum estimates of landings, based on reported landings in 2013 is 165 tons where 100% of the Spanish landings are official but preliminary while 100% of the Portuguese landings are ICES estimates tons.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	→	Stable

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

In Division IXa the abundance of *R. montagui* shows a stable trend along the whole time-series, particularly since 2008. Last year's biomass index (2013) is similar to the average of the five previous years (2007–2011). Landings estimates increased until 2010 and have decreased in the following years.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that catches should be reduced by 20% from current levels. Based on estimated species-specific landings, this would

imply landings of no more than 106 t in each of 2015 and 2016. Discards have not been quantified and there is some discard survival.

Other considerations

The advice is based on an abundance index from the PT–GFS Survey. The uncertainty associated with the index values is not available. 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 in the short term (3–5 years), but they may not be suitable if the stock size is low and/or overfished.

According to the survey index calculated by the data-limited stocks (DLS) 3.2 method, the relative abundance of *R. montagui* appears stable The standardized cpue of the Portuguese polyvalent segment has been used as supporting information, as the scientific trawl survey data provide a longer time-series.

The quality of landings data has improved in recent years but remains somewhat uncertain, due to misidentification, mainly with *Raja brachyura.* Further work is required to refine landings data and workshops are required to compile all available data.

Landings from 2013 are preliminary.

The PT–GFS was not conducted in 2012. However, it is unlikely that the index value has drastically changed.

ICES approach to data-limited stocks

For data-limited stocks for which a biomass 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 this stock the biomass is estimated to be stable (ratio of the mean biomass index = 1) between 2007 and 2011 (average of the five years) and 2013 (no survey conducted in 2012). This implies catches are maintained in relation to 2011–2013.

Considering that exploitation status in relation to reference points is unknown, a precautionary reduction of 20% is applied. This corresponds to landings of no more than 106 t in each of 2015 and 2016.

Additional considerations

On 29 December 2011 the Portuguese Administration adopted a national legislation (Portaria no. 315/2011) that prohibits, in all of the continental Portuguese EEZ and during the whole month of May, the catch, keeping on board, and landing of any skate species belonging to the Rajidae family. In addition, for each fishing trip outside of May a maximum of 5% bycatch, in weight, of those species is allowed to be kept on board and to be landed.

On 22 August 2011 the Portuguese Administration adopted a national legislation (Portaria no. 170/2014) that establishes a minimum landing size of 520 mm (total length) for specimens of the genus Leucoraja or Raja, along the whole continental Portuguese EEZ.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.7 Cuckoo ray (Leucoraja naevus) in Division IXa (west of Galicia, Portugal, and Gulf of Cadiz).

FISHERIES: This is an important, offshore, commercial species, and so is only normally caught by trawl fleets rather than by inshore gill- or tanglenets. This species is usually caught as a bycatch in trawl and in artisanal fisheries by Portuguese fleets and in trawl fisheries by Spanish fleet. In the Western area of the Iberian Peninsula Rajidae species are usually caught as bycatch in other fisheries. In the past, there was a directed fishery for these species in the north of Spain. At the present there are no directed fisheries for skates and most of the landings come from the trawl fishery targeting other species (Rodriguez-Cabello *et al.*, 2005). In the Portuguese continental coast Rajidae species are mainly landed by the polyvalent segment, which represents around 75% of the total landed weight, followed by the trawl segment that represents around 24%. Preliminary minimum estimates of landings, based on reported landings in 2013 is 43 tons.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	→	Stable

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

An overall increasing trend in ICES Division IXa has been observed in recent years in the Gulf of Cadiz survey. The mean biomass index values in recent years are more than twice the values at the beginning of the time-series. Landings have remained stable since 2008, with a slight decrease in 2013.

The average of the abundance indicator in the last two available years, years (2011–2012) is 32% higher than the average of the five previous years (2006–2010).

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 4%. Based on estimated species-specific landings, this would imply landings of 46 t in each of 2015 and 2016. Discards have not been quantified and there is some discard survival.

Other considerations

According to the survey index calculated by the data-limited stocks (DLS) 3.2 method, the relative abundance of *L. naevus* presents an increasing trend in recent years.

The advice is based on an abundance index from the Spanish Trawl Survey. The uncertainty associated with the index values is not available. 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 in the short term (3–5 years), but they may not be suitable if the stock size is low and/or overfished.

The quality of landings data has improved in recent years but remains somewhat uncertain. Further work is required to refine landings data and workshops are required to compile all available data.

The standardized cpue of the Portuguese polyvalent and trawl segments have been used as supporting information, as scientific trawl survey data provide a longer time-series. The trend observed in the polyvalent fleet, which represents 74% of the landings, is consistent with the biomass survey trend.

On 29 December 2011 the Portuguese Administration adopted a national legislation (Portaria no. 315/2011) that prohibits, in all of the continental Portuguese EEZ and during the whole month of May, the catch, keeping on board, and landing of any skate species belonging to the Rajidae family. In addition, for each fishing trip outside of May a maximum of 5% bycatch, in weight, of those species is allowed to be kept on board and to be landed.

On 22 August 2011 the Portuguese Administration adopted a national legislation (Portaria no. 170/2014) that establishes a minimum landing size of 520 mm (total length) for specimens of the genus Leucoraja or Raja, in the whole continental Portuguese EEZ.

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 five 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 increased by more than 20% between 2006 and 2010 (average of the five years) and 2011–2012 (average of the two years). This implies landings could increase by 20% in relation to the last three years' average.

Even though an overall increasing trend is observed in the survey index, this covers only a relatively small part of the stock area (Gulf of Cadiz). The standardized commercial cpue from Portuguese fleets is stable over the available years (6 years), but not long enough to infer long-term trends. Given the uncertainty in stock status in relation to reference points, ICES considers that applying a 20% precautionary reduction is appropriate. This corresponds to landings of no more than 46 t in each of 2015 and 2016.

Additional considerations

On 29 December 2011 the Portuguese Administration adopted a national legislation (Portaria no. 315/2011) that prohibits, in all of the continental Portuguese EEZ and during the whole month of May, the catch, keeping on board, and landing of any skate species belonging to the Rajidae family. In addition, for each fishing trip outside of May a maximum of 5% bycatch, in weight, of those species is allowed to be kept on board and to be landed.

On 22 August 2011 the Portuguese Administration adopted a national legislation (Portaria no. 170/2014) that establishes a minimum landing size of 520 mm (total length) for specimens of the genus Leucoraja or Raja, along the whole continental Portuguese EEZ.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.8 Thornback ray (*Raja clavata*) in Division IXa (west of Galicia, Portugal, and Gulf of Cadiz).

FISHERIES: This species is usually caught as a bycatch in artisanal fisheries by Portuguese fleets and in trawl fisheries by Spanish fleet.

Preliminary minimum estimates of landings, based on reported landings in 2013 is 703 tons.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	→	Stable

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↗	Increasing

In Division IXa the abundance of *R. clavata* has been increasing since 2008. Landings have also increased in recent years with highest values in 2011 and 2012.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that catches could be increased by a maximum of 20%. Based on estimated species-specific landings, this would imply landings of 911 tons in each of 2015 and 2016. Discards have not been quantified and there is some discard survival.

Other considerations

According to the survey index calculated by the data-limited stocks (DLS) 3.2 method, the relative abundance of *R. clavata* presents an overall increasing trend. In recent years the mean biomass index has been much higher than at the beginning of the time-series. The surveys cover the whole stock area.

The standardized cpue of the Portuguese polyvalent segment has been used as supporting information as scientific trawl survey data provide a longer time-series.

The advice is based on a biomass index from surveys used as indicator of stock size. The uncertainty associated with the index values is not available. 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 in the short term (3–5 years), but they may not be suitable if the stock size is low and/or overfished.

The quality of landings data has improved in recent years but remains somewhat uncertain, due to misidentification at the species level. Further work is required to refine landings data and workshops are required to compile and refine all available data.

The PT–GFS was not conducted in 2012. However, it is unlikely that the index value was drastically changed.

ICES approach to data-limited stocks

For data-limited stocks for which a biomass 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 this stock the estimated biomass has increased by 20% between 2007 and 2011 (average of the five years) and the average between the 2013 Portuguese survey standardized index and the 2012 combined mean of Spanish survey standardized indices. This implies an increase of catches of at most 20% in relation to the last three years' average.

Considering that there has been a consistent increase in stock abundance over time, no additional precautionary reduction is needed. This corresponds to landings of 911 t in each of 2015 and 2016.

Additional considerations

On 29 December 2011 the Portuguese Administration adopted a national legislation (Portaria no. 315/2011) that prohibits, in all of the continental Portuguese EEZ and during the whole month of May, the catch, keeping on board, and landing of any skate species belonging to the Rajidae family. In addition, for each fishing trip outside of May a maximum of 5% bycatch, in weight, of those species is allowed to be kept on board and to be landed.

On 22 August 2011 the Portuguese Administration adopted a national legislation (Portaria no. 170/2014) that establishes a minimum landing size of 520 mm (total length) for specimens of the genus Leucoraja or Raja, valid for the whole continental Portuguese EEZ.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.9 Undulate ray (*Raja undulata*) in Division IXa (west of Galicia, Portugal, and Gulf of Cadiz).

FISHERIES: This is a coastal stock, frequently caught as bycatch in coastal fisheries along the Iberian coast that mostly operate with gillnets and trammel nets. Catches are also reported for trawlers and longlines, although in less quantities. Total catch in 2013 is unknown. Discarding is known to take place but cannot be quantified.

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

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

STOCK STATUS:

	Fishing pressure	
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary	?	Unknown

approach (F_{pa}, F_{lim})		
Qualitative evaluation	?	Unknown

	Stock size	
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Raja undulata is locally abundant in Iberian waters. There is no evidence of over-exploitation, though sustainable exploitation levels are unknown.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of precautionary considerations that there should be no targeted fisheries on this stock. Any possible provision for bycatch to be landed should be part of a management plan, including close monitoring of the stock and fishery.

Raja undulata is listed on the EU prohibited species list in Division IXa, This is a high level, long-term conservation strategy aimed at very depleted and vulnerable species. ICES does not support the listing of *Raja undulata* on this designation.

Other considerations

Available evidence shows that there may be discrete stocks in the Iberian waters. In view of the patchy distribution, and following the precautionary approach, ICES recommends that no target fisheries should be permitted unless information is provided to show that these are sustainable.

Raja undulata is locally abundant in Iberian waters. The stability and broad range (covering the species' entire range) of length–frequency distributions across years suggests that the exploitation rate is not excessive. Sustainable exploitation levels are unknown; therefore, precautionary management measures are suggested that deter target fisheries and monitoring the stock status.

The FAO Code of Conduct for developing fisheries should be followed in developing management strategies for this stock (FAO, 1995).

The generic TACs and quotas for skates in the Celtic Seas ecoregion does not apply to *Raja undulata*. The TAC regulation states that, when accidentally caught, this species must not be harmed, must be promptly released, and fishers are encouraged to use techniques to facilitate rapid and safe release.

Discard survival is relatively high for this species in this area.

Precautionary approach

Based on the precautionary approach, ICES advises that there be no targeted fishery in 2015 or in 2016 unless information is provided to show that these are sustainable.

Additional considerations

The advice is based on precautionary low catches because of missing or non-representative data. The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated.

Species-specific landings data are very limited, since the obligation to report such data was only implemented in 2009 and the prohibition on landing undulate ray was introduced in the same year.

Undulate ray is considered to be patchily distributed within this ecoregion, mostly in inshore waters and bays. The inshore nature of this species means that it is not adequately sampled in many trawl surveys.

STECF COMMENTS: STECF agrees with the ICES advice for 2015 and 2016.

4.2.10 Blonde ray (*Raja brachyura*) in Division IXa (west of Galicia, Portugal, and Gulf of Cadiz).

FISHERIES: This species is usually caught as a bycatch in artisanal fisheries by Portuguese fleets, but the trammel-net fleet occasionally targets mixed skates locally and seasonally. Preliminary minimum estimates of landings, based on reported landings in 2013 is 275 tons.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	→	Stable

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

In Division IXa the commercial cpue from the Portuguese polyvalent segment of *R. brachyura* shows a stable trend in the six-year time-series. The mean biomass index (cpue) in the last two years (2012–2013) is stable in relation to the mean of the four previous years (2008–2011).

Estimated F ($F_{current}$ = 0.14) is at a level corresponding to about 30% of the virgin exploitable spawning biomass ($F_{30\%SPR}$ = 0.15) and is also equal to $F_{0.1}$ ($F_{0.1}$ = 0.14), which may indicate that the stock has been exploited at a sustainable fishing rate.

RECENT MANAGEMENT ADVICE: Based on ICES approach to data-limited stocks, ICES advises that annual catches should not be increased from current levels. Based on estimated species-specific landings, this would imply landings of no more than 200 t in each of 2015 and 2016. Discards have not been quantified and there is some discard survival.

Other considerations

According to the commercial cpue calculated by the data-limited stocks (DLS) 3.2 method, the relative abundance of *R. brachyura* is stable, but over a limited time period.

The advice is based on an abundance index from a commercial standardized cpue time-series for the Portuguese polyvalent segment (2008-2013). The uncertainty associated with the index values is not available. 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 in the short term (3–5 years), but they may not be suitable if the stock size is low and/or overfished.

The decline in estimated total landings after 2007 is considered to be due to changes in data collection, and landings since 2008 have mainly been stable.

Survey data for this species are unreliable, given the coastal distribution and habitat specificity of blonde ray. Commercial catch and effort data are considered the most appropriate at the present time, but estimates before 2008 are unreliable and based on few data. Ongoing monitoring is needed if ICES is to be able to advise on this stock.

The quality of landings data has improved in recent years but remains somewhat uncertain, due to misidentification, mainly with *Raja montagui*. Further work is required to refine landings data and workshops are required to compile all available data.

ICES approach to data-limited stocks

For data-limited stocks for which a biomass 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 four preceding values, combined with recent catch or landings data. Knowledge about the exploitation status also influences the advised catch.

For this stock the biomass is estimated to be stable (ratio of the mean biomass index = 1) between 2008 and 2011 (average of the four years) and 2012–2013 (average of the two years). This implies catches are maintained in relation to the 2011–2013 average, corresponding to landings of 200 t in each of 2015 and 2016.

Considering that current fishing mortality is estimated to be at $F_{0.1}$ (a potential F_{MSY} proxy), no additional precautionary reduction is applied.

Additional considerations

On 29 December 2011 the Portuguese Administration adopted a national legislation (Portaria no. 315/2011) that prohibits, in all of the continental Portuguese EEZ and during the whole month of May, the catch, keeping on board, and landing of any skate species belonging to the Rajidae family. In addition, for each fishing trip outside of May a maximum of 5% bycatch, in weight, of those species is allowed to be kept on board and to be landed.

On 22 August 2011 the Portuguese Administration adopted a national legislation (Portaria no. 170/2014) that establishes a minimum landing size of 520 mm (total length) for specimens of the genus Leucoraja or Raja, along the whole continental Portuguese EEZ.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

4.2.11 Common skate (*Dipturus batis*)-complex in Subarea VIII and Division IXa (Bay of Biscay and Atlantic Iberian waters).

FISHERIES: *Dipturus batis* species were traditionally an important commercial species in northern European seas, taken in trawl and line fisheries. Whilst there was a larger reduction in the geographical range over the latter half of the 20th century, they remained a bycatch species in fisheries along the outer shelf of the Atlantic seaboard, including trawl and tanglenet fisheries.

Preliminary minimum estimates of landings, based on reported landings in 2013 is 10 kg.

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

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

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✗	Overfished

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	✗	Below poss. reference points

There is insufficient information to present trends in species-specific landings for this stock. *Dipturus batis* complex is only rarely encountered in the Biscay and Iberian ecoregions.

RECENT MANAGEMENT ADVICE: Based on the precautionary approach, ICES advises that there should be no targeted fishery for either *Dipturus* cf. *flossada* or *Dipturus* cf. *intermedia*, and measures should be taken to minimize bycatch.

Measures to minimize bycatch may include seasonal and/or area closures or technical measures. Such measures should be developed through stakeholder consultations, as part of a rebuilding plan, considering the overall mixed-fisheries context.

Other considerations

If refuges, spawning and nursery grounds are identified, these could be used to frame management measures for these species.

Precautionary approach

ICES advises on the basis of the precautionary approach that there should be no be no targeted fishery for either *Dipturus* cf. *flossada* or *Dipturus* cf. *intermedia*. Measures should be taken to minimize bycatch.

Measures to minimize bycatch may include seasonal and/or area closures or technical measures. Such measures should be developed through stakeholder consultations, as part of a rebuilding plan, considering the overall mixed-fisheries context.

Additional considerations

Dipturus batis complex species in this area receive the highest degree of protection available in the EU, being on the prohibited species list in ICES Division IIa and ICES Subareas III, IV, VI, VII, VIII, IX, and X. This may lead to species misreporting with other species like *Dipturus oxyrinchus*, which is not on this list.

The generic TAC and quota for skates in the Celtic Seas ecoregion does not apply to the *Dipturus batis* complex (*Dipturus* cf. *flossada* and *Dipturus* cf. *intermedia*) or to *Raja undulata* and *Rostroraja alba*. When accidentally caught, these species must not be harmed, promptly released, and fishers are encouraged to use techniques to facilitate rapid and safe release. In contrast, *D. oxyrinchus* is not subject to these provisions.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

STECF notes that *Dipturus oxyrinchus and Dipturus nidarosiensis are not* subject to EU listing of Prohibited species which may lead to species misreporting with the other species of the *Dipturus complex*.

4.2.12 Other skates in Subarea VIII and Division IXa (Bay of Biscay and Atlantic Iberian waters).

This advice relates to skates not specified elsewhere in the ICES advice, including skates not reported to species level and some other, mainly deep-water species throughout the region. It also applies to *R. clavata, R. brachyura,* and *R. microcellata* outside defined stock boundaries. The advice only relates to species belonging to the Rajidae (skates), and does not refer to manta rays, sting rays, electric rays, or devil rays.

Other species of skates and ray also found in this ecoregion occur in small, variable proportions in the landings. These include:

Dipturus oxyrinchus
Leuroraja circularis
Leucoraja fullonica
Raja microocellata
Raja asterias
Raja miraletus

Preliminary minimum estimates of landings, based on reported landings in 2013 is 458 tons.

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

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

STOCK STATUS:

Fishing pressure

	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	?	Unknown

There is insufficient survey or abundance data available to assess these species individually or collectively.

RECENT MANAGEMENT ADVICE: Based on the ICES approach to data-limited stocks, ICES advises that landings should be reduced by 20%. Based on estimated species-specific landings, this would imply landings of 614 t in each of 2015 and 2016. Discarding is known to take place but has not been quantified, and there is some discard survival.

Other considerations

The TAC covers all skates in Subareas VIII and IX.

The EU regulations require *Leucoraja naevus*, *Raja clavata*, and *Raja brachyura* to be reported separately to species level in landings.

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 last three years' average, corresponding to landings of no more than 614 t in 2015 and 2016.

Additional considerations

The advice is based on a precautionary reduction of catches because of missing or non-representative data. The methods applied to derive quantitative advice for data-limited stocks are expected to evolve as they are further developed and validated.

The quality of landings data has improved in recent years, but about 500 t of skates were reported in unspecified categories in 2013 (Spain). Further work is required to refine landings data and workshops are required to compile all available data.

Since legal obligations to declare most demersal elasmobranchs to species level were introduced, a greater proportion of data are reported to this level.

Stock identity of the named species needs to be refined. Connectivity with neighbouring stocks should be reviewed.

There is no information on discard rates.

Landings in Subarea VIII in 2013 are preliminary.

STECF COMMENTS: STECF agrees with the ICES advice. STECF suggest to encourage MS to repport skate landing on specic-specific basis.

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

The advice given in 2012 for this stock is valid for 2013-2015 and the text below remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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 2014-2015

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.

NB: The advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 36% reduction in catch be implemented.

Other considerations

Species-specific landings data are not currently available for skates landed in this region. For demersal sharks misidentifications are known to occur. A fishery-independent survey provides the longest time-series of species-specific information, although this survey does not sample all the size classes and habitats for the various species. The Azorean longline survey is not designed specifically to catch skates and rays and so does not provide appropriate quantitative data for most of these species. However, the survey is considered indicative of changes in stock size for thornback ray and the advice is based on abundance index from this survey, used as an indicator of stock size. The uncertainty associated with the index values is not available.

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

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 assessment of the state of the stock and the advice for 2015 and 2016.

4.4 *Scyliorhinus canicula* and *Scyliorhinus stellaris* in Subareas VIII, IX and X

4.4.1 Lesser-spotted dogfish (*Scyliorhinus canicula*) in Divisions VIIIc and IXa (Atlantic Iberian waters).

Advice for this stock given in 2012 is valid for 2013-2015 and the text below remains unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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: no reference point.

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: 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 (due to the historical use of generic landings categories), ICES is not in a position to quantify the result. ICES does not advise that an individual TAC be set for this stock".

The advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 9% reduction in catch be implemented.

The advice for 2015 is the same catch advice than for 2013 and 2014 (even if it cannot be quantified) not that a further 20% increase in catch be implemented.

Advice for 2013-2014 by individual stocks

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.

Other considerations

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.

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. 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.

4.4.2 *Scyliorhinus canicula* in VIIIabd

Advice for this stock given in 2012 is valid for 2013-2015 and the text below remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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:

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: Based on ICES approach to data-limited stocks, ICES advises that catches should be decreased by 9%. 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. ICES does not advise that an individual TAC be set for this stock.

Other considerations

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.

There is no information on stock trends in Division IXa.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015 and 2016.

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

Advice from ICES on tope is provided at the NE Atlantic regional level and is given in Section 6.9 of this report. At present, STECF is unable to provide additional information and advice for subareas VIII, IX and X separately.

4.6 Other Demersal elasmobranches in the Bay of Biscay and Iberia

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 6.16 and 6.17 of this report.

4.7 Anchovy (*Engraulis encrasicolus*) in Division VIII (Bay of Biscay)

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

After 3 years of closure, the anchovy fishery was re-opened in 2010. Catches in 2011and 2012 were 14 530 t and 14 402 t respectively. The estimated catches for 2013 are 14 192 t.

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

REFERENCE POINTS:

	Type	Value	Technical basis
MSY Approach	MSY $B_{escapement}$	Not defined	
	F_{MSY}	Not defined.	
Precautionary approach	B_{lim}	21 000 t	B_{lim}: B_{loss} (median of SSB estimates in years 1987 and 2009, the minimum estimated biomass that produced substantial recruitment, ICES, 2013b, annex 8)
	B_{pa}	Not defined	
	F_{lim}	Not defined	
	F_{pa}	Not defined	

(unchanged since 2014

Reference points MSY $B_{escapement}$ and B_{pa} are no longer provided. For a short-lived species, Bpa and MSY $B_{escapement}$ are not considered an appropriate reference point for precautionary advice. As the assessment provides the probability distributions for the SSB, it is possible to estimate directly the risk of the SSB falling below Blim.

STOCK STATUS:

Fishing pressure				
	2011	**2012**	**2013**	
MSY (F_{MSY})	-	-	-	Not relevant
Precautionary approach (F_{pa},F_{lim})	-	-	-	Not relevant
Stock size				
	2012	2013	**2014**	

MSY ($B_{trigger}$)	?	?	?	Not defined
Precautionary approach (B_{lim})	✓	✓	✓	Full reproductive capacity

The spawning-stock biomass has been above Blim since 2010. Stock biomass and Recruitment in 2014 are above the average of the historical series. The harvest rate in 2013 is below average, excluding the years 2005–2009 of fishery closures.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the precautionary approach that catches from 1 July 2014 to 30 June 2015 should be no more than 23 000 tonnes.

Other considerations

Management plan

No specific management objectives are known to ICES. A draft management plan is proposed by EC in 2009 (COM/2009/399 final). Since 2010, the TAC for July to June was set according to the proposed HCR. ICES has not evaluated this proposal. In 2014 STECF has evaluated the HCR and considers the plan precautionary.

Following the management plan proposed by the European Commission in 2009 (COM/2009/399 final, Annex 7.3.1), the TAC for the fishing season running from 1 July 2014 to 30 June 2015 should be established at 20 100 tonnes (as stated in Annex 1 of the proposal for an SSB in the range 66 001–67 000 t).

PA approach

To reduce the risk to less than 5% of the SSB in 2015 falling below Blim, catches in the period 1 July 2014–30 June 2015 should be less than 23 000 t.

Additional considerations

A draft management plan has been proposed by the EC in cooperation between STECF and the South Western Waters RAC (Annex 7.3.1). This plan has not yet been formally adopted by the EU. The plan is based on a constant harvest rate (30%), and sets a TAC as a percentage of the point estimate of the SSB as assessed at the start of the TAC period which runs from 1st July to 30th June, but with an upper bound on the TAC (of 33 000 t), and with a minimum TAC level (of 7000 t) applicable at SSB estimates between 24 000 t and 33 000 t. Following the new assessment methodology established in 2013 (ICES 2013a,b), STECF has evaluated the HCR (STECF, 2013 and 2014) and considers the plan precautionary. STECF uses the same criteria as ICES to determine if management plans are precautionary.

Recent management consists of an in-year monitoring regime, as previously recommended by ICES. The new assessment of anchovy includes the JUVENA autumn recruitment survey in addition to the spring survey results and catch data. The JUVENA acoustic index of juveniles is considered a valid indicator of the strength of the incoming recruitment. The autumn JUVENA can be used to update the stock assessment and the short term forecast in December which could serve to review the TAC that currently runs from July to June, or to provide preliminary advice for a TAC for the calendar year which would need to be updated based on the spring survey results.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock but notes that the ICES advice is not consistent with the provisions of the proposed management plan. In June 2008 STECF endorsed the approach and findings of the evaluation of the management plan presented in the report of the SGBRE-08-01 Working Group.

STECF notes that the proposed management plan has been applied to derive annual TACs for the past 4 years (2010-2011, 2011-12, 2012-13 and 2013-2014). The provision of the proposed management plan prescribe a TAC of 17 100 tonnes for the period 1 July 2014 to 30 June 2015 and would give rise to a SSB in 2015 in the range 34,000–100,000 t as specified in Annex 1 of the proposed plan.

Review of harvest control rules for anchovy in the Bay of Biscay

STECF 14 03 evaluated the HCR used to provide catch advice and considered that the current HCR remains appropriate as a basis for advising on TACs. STECF carried out a thorough evaluation, which included the change in management periods, the continuity of the HCR, the evaluation of an HCR suggested by the SWWRAC and alternative parameterizations of the HCR.

4.8 Anchovy (*Engraulis encrasicolus*) in Sub-area IX

FISHERIES: Fisheries for anchovy take place mainly by purse-seiners in Division IXa South. Contribution from other fleets in the recent fishery is almost negligible. The fleets in the northern part of Division IXa, which target sardine, occasionally target anchovy when abundant, as occurred in 1995 and 2011. Total landings in 2011 and 2012 are 10,076 t and 5,589 t respectively. For 2013 total catch is unknown, official landings amount to 5,632 t (99.8% purse-seiners and 0.2% other gear types). Discards are unknown.

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

REFERENCE POINTS: No reference points have been set for the stock. The observed harvest on the southern stock has been in the range of 10–50. These harvest rates result in 60-90% of the potential spawning biomass has been allowed to spawn.

STOCK STATUS:

Fishing pressure		
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa},F_{lim})	?	Unknown
Qualitative evaluation	✓	Below possible reference points
Stock size		
	2011–2013	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa},B_{lim})	?	Unknown
Qualitative evaluation	→	Variable without trend

The survey biomass in Division IXa South (where the main part of the landings are taken) is highly variable without clear trends. The biomass is largely composed of one year old fish. The observed harvest rates on the southern stock (10-50%) are considered low since this results in 60-90% of the potential spawning biomass being allowed to spawn. There is no information on recruitment that will form the bulk of the catches in 2015.

RECENT MANAGEMENT ADVICE: ICES cannot give catch advice for 2015. This is due to the lack of available data on year classes that constitute the bulk of the biomass and catches.

Other considerations

No reliable analytical assessment can be presented for this stock. This is because insufficient data are available. Fishing possibilities cannot be projected.

Precautionary considerations

No catch advice can be given for 2015 because of lack of available data for the year classes that will constitute the bulk of the biomass and catches.

Additional considerations

The historical fisheries management seems to have been sustainable. As this stock experiences high natural mortality and is highly dependent upon recruitment, an in-season management or alternative management measures could be considered. Information from the PELAGO and PELACUS spring surveys available on 1st of May could be used as a basis for in-year advice, depending on the surveys being carried out annually and the data are made available on time.

Results from the acoustic survey (ECOCÁDIZ) in late July this year could contribute to the knowledge on the anchovy biomass in Division IXa South in-year.

Besides maintaining the current monitoring system, an abundance survey of (0-group) juveniles is needed to improve catch advice. Juveniles will constitute the bulk of the spawning biomass and catch in the following year (Figure 7.3.2.4).

Recent studies on genetics indicate that the stock inhabiting Division IXa South (Algarve and Cadiz) is different genetically from the one inhabiting the remaining parts of Division IXa (Zarraonaindia et al., 2012). Given the differences in genetics and stock dynamics between the northern and southern parts of the area, this might imply separate management in these two regions of Division IXa.

The state of the stock in the southern area is derived from trends in the spring Portuguese acoustic survey as the main descriptor since this is the only 2014 index. A recruitment survey took place in autumn 2012 (ECOCÁDIZ RECLUTAS) pointing towards a recruitment below average, which is in line with the biomass index. The ECOCÁDIZ acoustic survey will be carried out in late July at the same time as the DEPM BOCADEVA survey. A new recruitment survey will be carried out in October 2014.

In the northern area, the combined PELAGO and PELACUS acoustic survey is used to describe the stock. The high 2011 biomass index in the survey is supported by high landings from this area. Length samples of the anchovy indicated that the outburst was due to recruitment from the area.

In order for ICES to give advice, annual surveys are needed to assess trends. Further improvements to the assessment

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015.

4.9 Horse mackerel (*Trachurus trachurus*) in ICES division IXa

FISHERIES: Horse mackerel is caught in mixed fisheries. Changes in the availability of other species caught in the same fisheries could affect the targeting of horse mackerel. Traditionally, horse mackerel catches show a large proportion of juveniles. The Spanish bottom trawl fleet, targeting mainly adult fish increased in importance until 2010 and has subsequently declined. Other species of horse mackerel are caught together with *T. trachurus* in Division IXa, in particular *T. picturatus* of which 300–800 t were caught annually in the past. The advice for Southern horse mackerel applies to the southern stock of *T. trachurus* only.

Catches decreased from the early 1960s but have been relatively stable since the early 1990s at 20 000 t – 25 000 t. Total catches in 2013 reached 29 382 t, just above the average of the last five years (2009-2013).

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

REFERENCE POINTS: No precautionary reference points have been defined for this stock. $F_{35\%SPR}$ (0.11) is proposed as a proxy for F_{MSY}. Historical fishing mortalities have on average (0.09) been at or below the candidate F_{MSY} (though actual estimates are very uncertain).

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

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✓	✓	Appropriate
Precautionary approach (F_{pa},F_{lim})	?	?	?	Not defined
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	?	?	?	Not defined
Precautionary approach (B_{pa},B_{lim})	?	?	?	Not defined
Qualitative evaluation	→	→	→	At long term average

Fishing mortality has been below F_{MSY} over the whole time series and the SSB has been relatively stable. Recruitment is estimated to be well above average in 2011 and 2012.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the MSY approach that catches should be no more than 71 824 t in 2015.

Other considerations

MSY approach

Since MSY $B_{trigger}$ has not been identified for this stock, the ICES MSY approach has been applied without consideration of SSB in relation to MSY $B_{trigger}$.

Following the ICES MSY approach implies that fishing mortality can increase to F_{MSY}, resulting in catches of no more than 71 824 t in 2014. This is expected to lead to an SSB of 536 947 t in 2016. Discards are considered negligible and therefore all catches are assumed to be landed.

Other considerations

Managers may want to consider limiting the increase in catch because the assessment and current recruitment estimates are more uncertain than usual. The uncertainty is mainly due to the missing survey in 2012. Currently, fishing mortality is well below the F_{MSY} proxy. Following the MSY approach implies increasing current fishing mortality by a factor of 2.4. Keeping the fishing mortality in 2015 at the level of 2014 (0.046) would imply catches of 31 000 t for *Trachurus trachurus*. The advice pertains to *T. trachurus*, while the TAC is set for all *Trachurus* species, including *T. picturatus* (blue jack mackerel) and *T. mediterraneus*. In 2011, 12% of the catches consisted of other species than *T. trachurus*, and this percentage can vary from year to year. Assuming a similar proportion of other *Trachurus* species in 2015, would result in a catch of all *Trachurus* species of 35 000 t.

The traditional fishery across fleets has for a long time targeted juvenile age classes. This exploitation pattern combined with a moderate exploitation rate does not seem to have been detrimental to the dynamics of the stock.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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. An average landing of 447 t for the period 2008-2013 was reported by Portugal to the Regional Coordination Meeting for the Long Distance Fisheries of 2014 (RCM LDF, 2014). A TAC in area ICES X for 2010 was set to 1229 t and was taken exclusively by Portugal. No TAC has been set since 2010.

STECF COMMENTS: No comments

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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

An average landing of 226 tonnes of *Trachurus* spp from the Canarian purse seine fleet was reported for the period 2008-2013 by Spain to the Regional Coordination Meeting for the Long Distance Fisheries of 2014 (RCM LDF, 2014). Most of these landings (62-96%) corresponded to *T. picturatus*). A TAC in area ICES X for 2010 was set at 1229 t and was taken exclusively by Spain. No TAC has been set since 2010.

STECF COMMENTS: No comments

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

FISHERY: The blue jack mackerel (*Trachurus picturatus*) is the only *Trachurus* species around the Azores Islands. It has traditionally been one of the favourite species for human consumption in the Azores and is targeted by an artisanal fleet using purse seines 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 total number

of days at sea was reduced for the purse-seiners in 2012 and 2013, although there was no regulation in force to reduce effort.

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 of 1224 t for the period 2001-2010. A reduction in catches similar to recent periods also occurred in 2012 and 2013 (561-715 t). However, landings may not represent the actual catches because discards or fish used for bait are not accounted for. Catches from purse-seiners have sharply decreased in 2012 (51%) and has remained low in 2013, in part because of a reduction of effort, and in part a reduction of the cpue. A continuous decline in consumer demands has led to the catch limits adopted by the fleet, which explains the reduction observed in the landings in recent years.

A TAC of 3 072 t, which is taken exclusively by Portugal has been set each year since 2010.

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.

Fishing pressure	
	2011-2013
MSY (F_{MSY})	? Unknown
Precautionary approach (F_{pa},F_{lim})	? Unknown
Qualitative evaluation	↘ Reduced

Stock size	
	2011-2013
MSY ($B_{trigger}$)	? Unknown
Precautionary approach (B_{pa},B_{lim})	? Unknown
Qualitative evaluation	→ Stable

No reliable analytical assessment can be presented for this stock because insufficient data are available. Fishing possibilities cannot be projected. 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 juvenile abundance indicators are estimated to be stable. Considering that exploitation has reduced in the last 2 years due to the reduction in effort in one of the two major fisheries, no precautionary reduction in catches is considered necessary. Therefore, ICES advises that catches should not increase in relation to the last two years average catch, corresponding to catches of no more than 1098 t.

RECENT MANAGEMENT ADVICE: The 2014 advice for this stock is biennial and valid for 2015 and 2016: *ICES advises on the basis of the approach for data limited stocks that catches should be no more than 1098 tonnes.*

STECF COMMENTS: STECF agrees with the ICES advice that on the basis of the ICES approach to data-limited stocks, catches in 2015 should be no more than 1098 t.

4.13 Sardine in Divisions VIIIa,b,d and Subarea VII

FISHERIES: Most catches are taken by purse-seiners and pelagic trawlers. 90% of the French catches are made from purse-seiners. Sardine catches are highest in the second semester of the year. In Spain, vessels target anchovy, mackerel, sardine, and horse mackerel; in summer, part of the fleet switches to tuna fishing during quarter 3. Discards are unknown but the available information suggests their magnitude is low and variable depending on the vessel type. Fleets and catches in subarea VII are very variable and present a mainly opportunistic nature although there are also locally some long well established small sardine fishery (e.g. Cornwall in UK, Brittany in France). In 2012, total catch was 37 kt, 100% being landed (80% purse seiners, 4% pelagic trawl, 16% diverse fleets in VII). Discards are considered negligible.

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

REFERENCE POINTS: No reference points are defined for this stock. Cohort curve analysis from the acoustic survey and catches in Division VIIIabd suggests F is around or below natural mortality (M), and is likely to be close to maximum sustainable yield.

STOCK STATUS:

F (Fishing Mortality)		
	2000–2012	
Qualitative evaluation		Below possible reference points
SSB (Spawning Stock Biomass)		
	2009–2013	
Qualitative evaluation		Decreasing to just below long term average

Catches have been relatively stable since 2000 with an increasing trend in divisions VIIIa,b,d and decreasing in subarea VII. The average of the combined biomass indices in the last two years (2011-2012) are around 27% lower than the average of the three previous years (2008-2010) in the divisions VIIIa,b,d. Recruitment in 2012 is the highest in the time series. An analysis shows that F is just below natural mortality and is likely to be close to maximum sustainable yield. There is no biomass or recruitment information for Subarea VII.

RECENT MANAGEMENT ADVICE: The 2014 advice for this stock is biennial and valid for 2014 and 2015 (see ICES, 2013a). New data (landings and surveys) available for this stock do not change the perception of the stock. Therefore, the advice for this fishery in 2015 is the same as the advice for 2014. ICES advises on the basis of precautionary considerations that catches should be no more than 27 554 t.

Other considerations

No analytic assessment can be presented. The main cause of this is lack of data, and times series of age structure are too short for divisions VIIIa,b,d while they are non-existent in subarea VII for major countries involved in that fishery. Therefore, fishing possibilities cannot be projected.

ICES approach to data-limited stocks

For data-limited stocks for which biomass indices are 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 data. Knowledge about the exploitation status also influences the advised catch.

For this stock the biomass is estimated to have decreased by more than 20 % between 2009- 2011 (average of the three years) and 2012-2013 (average of the two years). Indices are only available for VIIIabd (where major catches come from) but considered representative for the whole stock.

This implies a decrease of catches of at most 20% in relation to the average of the last 3 year catch, corresponding to catches of no more than 27 554 t.

Considering that exploitation is likely to be close to maximum sustainable yield, no additional precautionary reduction is needed.

Discards are known to take place but considered negligible, therefore all catches are assumed to be landed.

Additional considerations

Sardine is distributed in the Iberian region, to the north in Subareas VII and VIII and in the North Sea, and to the south on the Moroccan shelf. The information presented here assumes that sardine in Divisions VIIIabd and subarea VII is a unit stock, based on biological characteristics. However, some movement of fish between Divisions VIIIb and VIIIc is known to occur. The effect of this movement is uncertain but is presently considered to have little influence on the estimation of the stock in the assessed area (Divisions VIIIabd and VII).

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 and 2015 that on the basis of the ICES approach to data limited stocks, catches should be no greater than 27,554 t.

4.14 Sardine (*Sardina pilchardus*) in VIIIc and IXa

FISHERIES: Most catch is taken by purse-seiners. Sardine catches are highest in the second half of the year and catches are traditionally concentrated mainly in western part of Portugal, Galicia and Cantabrian Sea. Catches in the Gulf of Cadiz and Algarve areas have increased since 2011. In Spain, vessels target anchovy, mackerel, sardine, and horse mackerel; in summer, part of the fleet switches to tuna fishing. In Portugal, sardine is the main target species, but chub mackerel, horse mackerel, and anchovy are also landed. Most catches are taken off the northern coast. Discards are uncertain but are assumed to be negligible. Slipping estimates are available for the Portuguese fleet, but with a limited coverage in time and extent. Total catch in 2013 was 46 kt, where 100% are landings.

SOURCE OF MANAGEMENT ADVICE:

The main management advisory body is ICES.

REFERENCE POINTS:

No reference points are defined for this stock.

STOCK STATUS:

Fishing pressure			
	2011 2012	**2013**	
MSY (F_{MSY})	? ?	?	Unknown
Precautionary approach (F_{pa},F_{lim})	? ?	?	Unknown
Quality considerations	↗ ↗	↘	Above average

Stock size			
	2012 2013	**2014**	
MSY ($B_{trigger}$)	? ?	?	Unknown
Precautionary approach (B_{pa},B_{lim})	? ?	?	Unknown
Quality considerations	✗ ✗	✗	Well below average

The biomass of age 1 and older fish has decreased since 2006 and is currently around the historic low. Recruitment has been below the long term average since 2005. Fishing mortality since 2009 has been above the average of the last two decades prior to 2009.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of precautionary considerations, and taking into account current low biomass that catches in 2015 should be no more than 16 000 tonnes. Discards are considered to be negligible and all catches are assumed to be landed.

Other considerations

Management plan

ICES has evaluated a proposed management plan developed by Portugal and Spain (ICES, 2013a, Annex 7.3.19). ICES concluded the plan is provisionally precautionary, causing low probabilities of unsustainable fishing mortality, when the biomass used for comparison in the harvest control rule is the B_{1+} in the beginning of the intermediate year.

Following the proposed EC management plan implies that the TAC is set following the formula 0.36 × (B_1+ (2014) – lower trigger level) = (0.36× (188 - 135)) because the biomass is currently between the two trigger points in the harvest rule, which implies catches of no more than 19 095 t in 2015. Discards are considered to be negligible and all catches are assumed to be landed.

Precautionary considerations

The stock biomass is at a historically low level and fishing mortality peaked in 2010–2011. It has decreased since then but it is still above the long-term average. F should be brought back to where it was before the start of this increase, i.e. the 2002–2007 average (0.27). However, taking into account the low biomass, below previous B_{loss} and the below-average recruitment, ICES considers fishing mortality F should be reduced further. This

reduction is based on the ratio between the current biomass ($B_{1+(2014)}$= 188 000 t) and the average biomass in the period before high fishing mortality occurred (average $B_{1+(2002-2007)}$ = 406 000 t, ratio of 41%) to F = 0.11. This results in catches of no more than 16 000 t. Discards are considered to be negligible and all catches are assumed to be landed.

Additional considerations

Management plan evaluations

ICES has evaluated a proposed management plan developed by Portugal and Spain (ICES, 2013a). Given the available data, ICES was unable to define reference points to use for the evaluation. ICES concludes the plan is provisionally precautionary, because it gives low probabilities of exceeding F_{loss} or driving B_{1+} below B_{loss} and high probability of rapid recovery when B_{1+} declines to below trigger values. The proposed plan implies a relatively modest exploitation rate with mean F= 0.22 which is 70% of the natural mortality. As an F slightly lower than the natural mortality is a potential proxy for F_{MSY} (Deriso 1982), the plan results in exploitation in the lower range of candidate F_{MSY} values.

Further exploration of sardine stock dynamics is required; for example it may be possible to draw inferences from studies of other sardine stock dynamics at low biomass. This will provide a better informed basis for determining precautionary criteria which may improve the evaluation of the current proposed plan. Additionally, alternative settings (lower target catch, higher trigger points) and catch stabilizers could be tested to improve the performance of the plan and make it more precautionary.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2015. STECF notes that, as specified in the Commission Communication to the Council concerning a consultation on Fishing Opportunities for 2015 (COM (2014) 388 final, "the Commission will also propose TACs or effort limits at levels consistent with Commission proposals for long-term plans". STECF further notes that for sardines in areas VIIIc and IXa, ICES has evaluated a management plan developed by Portugal and Spain as requested by the EC (ICES, 2013) and concluded that the plan is provisionally precautionary. STECF notes that, according to the proposed management plan, catch in 2015 should not exceed 19 095 t.

References

ICES. 2013. Management plan evaluation for sardine in Divisions VIIIc and IXa. Report of the ICES Advisory Committee, 2013. ICES Advice, 2013. Book 7. Section 7.3.5.1

RCM LDF, 2014. Report of the Regional Co-ordination Meeting for the Long Distance Fisheries (RCM LDF), 2014. EU DATA COLLECTION FRAMEWORK (DCF), REG. 199/2008, 665/2008 and DECISION 2010/93/EU. IMARES,Wageningen UR, Institute for Marine Resources and Ecosystem Studies. IJmuiden, The Netherlands, 2/06/2014-5/06/2014. 34 pp.

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 fisheries for Northern shrimp in Sub-areas I & II (Barents Sea & Svalbard are**a**) are among the largest shrimp fisheries in the Northeast 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 30 000 t in 2011, 26,000 t in 2012 and 19,000 in 2013. In recent years Russian landings have been insignificant.

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 B_{MSY}*	Relative value. B_{MSY} is directly estimated from the assessment surplus production model and changes when the assessment is updated.
	F_{MSY}	*	Relative value. F_{MSY} is directly estimated from the assessment surplus production model and changes when the assessment is updated.
Precautionary approach	B_{lim}	0.3 B_{MSY}	Relative value.
	B_{pa}	Not defined.	
	F_{lim}	1.7 F_{MSY}	Relative value (the F that drives the stock to B_{lim}).
	F_{pa}	Not defined.	

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

STOCK STATUS:

Fishing pressure			
	2011	2012	**2013**
MSY (F_{MSY})	✓	✓	✓ Below target
Precautionary approach (F_{lim})	✓	✓	✓ Harvested sustainably
Stock size			
	2012	2013	**2014**
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 far above MSY $B_{trigger}$ and fishing mortality far below F_{MSY}.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of MSY and precautionary considerations, and considering that the stock has always been exploited far below F_{MSY}, that a catch increase, with total catches not exceeding 70 000 t, would remain precautionary. All catches are assumed to be landed.

Other considerations

MSY approach

The stock is well above MSY $B_{trigger}$ and has always been exploited far below F_{MSY}. Catches following the ICES MSY approach (fishing mortality at F_{MSY}, which would imply catches of no more than 290 000 t in 2015) would constitute a very large extrapolation from the regions covered by past data on catches. This would bring the stock in a region not seen in the history of the fishery, and the assessment model may not be robust to forecast stock dynamics under such circumstances.

An increase in annual catch to 70 000 t would move stock exploitation in the direction of F_{MSY}. This corresponds to a three-fold increase with respect to recent exploitation (fishing mortality), while waiting for a better understanding of the stock dynamics at an exploitation level not observed since the mid-1980s. A catch of 70 000 t in 2015 is forecast to result in less than 5% probability of F_{2015} exceeding F_{lim} or of B_{2016} falling below B_{lim}. All catches are assumed to be landed.

PA approach

There is a less than 5% risk of the stock falling below B_{lim} in 2016 or of the fishing mortality exceeding F_{lim} in 2015 at catch options up to 70 000 t.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock which indicates that catches of 70 000 tonnes in 2015 will maintain the stock at the current high biomass.

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

STECF also agrees with the ICES comments relating to the insensitivity of the assessment to model inputs. The assessment model best describes trends in stock development and is not fully sensitive to year-to-year changes. Large and rapid changes in recruitment may therefore not be fully captured in model predictions. Large changes have not been observed in the recent period (2004–2014). If predation on Northern shrimp were to increase rapidly outside the range in the modelled period (1970–2012), the stock size might change more than the modelling results indicate. The mechanisms behind the unexpected lack of correlation between the stock dynamics of Northern shrimp and the biomass of cod remain under investigation.

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

FISHERIES: The total catches in 2013 were 684743 t., mainly taken by Norway (359 458 t), Russia (78 521 t), Iceland (90 729 t), EU (39 210 t), and Faroe Islands (105 038 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, with two exceptions. 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 and later assessments compared to previous assessments. In 2013, an updated algorithm was implemented to derive the terminal fishing mortalities on the oldest age groups in the assessment for cohorts where there is insufficient information to estimate these. The new algorithm has increased the stability in the 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 stock–recruitment 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	$B_{lim} \times \exp(0.4 \times 1.645)$.
	F_{lim}	Not defined.	-
	F_{pa}	0.15	Based on medium-term simulations.

(last changed in: 2010)

The fishing mortality reference points presented in the advice and used in management are the average of ages 5–14 weighted over the population numbers. The MSY and PA reference points, as reviewed by ICES in 2013, are unchanged.

STOCK STATUS:

Fishing pressure			
	2011	2012	**2013**
MSY (F_{MSY})	✓	✓	✓ Appropriate
Precautionary approach (F_{pa}, F_{lim})	✓	o	✓ Harvested sustainably
Management plan (F_{MGT})	✗	✗	✗ Above limit
Stock size			
	2012	2013	**2014**
MSY ($B_{trigger}$)	✓	✗	✗ Below trigger
Precautionary approach (B_{pa}, B_{lim})	✓	o	o Increased risk
Management plan (SSB_{MGT})	✓	✗	✗ Below target

The stock is declining and estimated to be below B_{pa} in 2013. Since 1998 five large year classes have been produced (1998, 1999, 2002, 2003, and 2004). However, available information indicates that year classes born between 2005 and 2012 have been small. Fishing mortality in 2013 was at F_{pa} and F_{MSY}, but above the management plan target F.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the management plan of EU, Faroe Islands, Iceland, Norway, and Russia that catches in 2015 should be no more than 283 013 t. Minor discards are known to take place, but cannot be quantified accurately; the proportion of discards in the total catches are considered negligible.

Other considerations

Management plan

Following the long-term management plan agreed by the EU, Faroe Islands, Iceland, Norway, and Russia implies a fishing mortality in 2015 of 0.08, reduced from the target F of 0.125 due to SSB < 5 million tonnes. This gives a TAC of 283 013 tonnes in 2015 and is expected to lead to an SSB of 3.19 million tonnes in 2016.

The extent of the present period of low recruitment is unknown. An evaluation of the expected dynamics of the stock under continued poor recruitment conditions was presented in the ICES advice released in May, 2013 (ICES, 2013c). This evaluation indicates that under the present management plan, in the absence of strong year classes, SSB is expected to fluctuate around 4 million tonnes and catches will vary between 300 and 400 thousand tonnes.

For the fishing seasons 2013 and 2014, a lack of agreement between the countries on their share in the TAC has led to unilaterally set quotas which together are higher than the TAC indicated by the management plan. In addition, increased unilateral catches in 2013 taken by Greenland were reported to WGWIDE. If catches higher than the management plan continue to be taken, this will increase the likelihood of decline of the stock and increase the risk of the stock going below B_{lim}.

MSY approach

Following the ICES MSY framework implies a fishing mortality of 0.105 (F_{MSY} × SSB(2015) / MSY $B_{trigger}$) because SSB(2015) is below MSY $B_{trigger}$, resulting in catches of 366 983 tonnes in 2015. This is expected to lead to a decline in SSB in 2016 to 3.1 million tonnes.

PA approach

The precautionary approach states that should the SSB fall below B_{pa}, the fishing mortality should be reduced to ensure a safe and rapid recovery of the B_{pa}. Even zero catch in 2015 is expected to lead to a reduction in SSB in 2016 to 3.4 million tonnes.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice that the provisions of the management plan, agreed by EU, Faroe Islands, Iceland, Norway and Russia, prescribes that landings in 2014 should be no greater than 283,013t.

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, 2011 and 2012 landings amounted to 307 000 t, 315 000 t, 360 000t and 296 000t respectively. The catches over the winter period at the start of 2013 were 177 000t but declined to 66 000t in the winter fishery in 2014 adhering to the agreed TAC.

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.

REFERENCE POINTS:

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

(last changed in: 2010)

STOCK STATUS:

Fishing pressure				
	2012	2013	**2014**	
MSY (F_{MSY})	-	-	-	Not relevant
Precautionary approach (F_{pa}, F_{lim})	-	-	-	Not relevant

Stock size				
	2013	2014	**2015**	
MSY ($B_{trigger}$)	?	?	?	Undefined
Precautionary approach (B_{lim})	✓	✓	✓	>95% probability of being above limit reference point

The maturing component of the stock in autumn 2014 in the area covered by the acoustic survey was estimated to be 0.87 million tonnes. This value is considered an underestimate due to reduced survey coverage which was limited by ice. Following a correction, based on area coverage, the maturing biomass is estimated to be 1.45 million tonnes. The spawning stock in 2015 will consist of fish from the 2011 and 2012 year classes. The 2013 Joint Russian–Norwegian ecosystem survey estimated the 2011 year class to be above average level. The estimate of the 2013 year class at age 1, during the survey in August–September 2014, was found to be below the long-term average, and the 0-group observations indicated that the 2014 year class is also below the long-term average.

MANAGEMENT OBJECTIVES: In 2002, the Joint Norwegian–Russian Fisheries Commission (JNRFC) adopted a management plan, in which the fishery is managed according to a target escapement strategy that includes the predation by cod by accounting for removals based on the size of the cod stock. 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 remain unchanged 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 2015 should be no more than 6000 tonnes. All catches are assumed to be landed.

Other considerations

Management plan

The poor 2014 survey makes the advice this year particularly uncertain. Following the management plan agreed by the Joint Norwegian–Russian Fisheries Commission and based on a re-scaled 2014 acoustic survey value, catches in 2015 should be no more than 6000 t. The harvest control rule in the management plan states that the quota set should 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 that the provisions of the management plan agreed by Norway and Russia prescribes that catches in 2014 should be no greater than 6,000t.

6 Widely distributed and migratory stocks

6.1 European eel (*Anguilla anguilla*)

The stock status and advice for this stock for 2015 has not yet been released. The text below therefore remains unchanged from the Consolidated STECF review of advice for 2014 (STECF 13-27).

FISHERIES: The European eel (*Anguilla anguilla* (L.)) is found and exploited in fresh, brackish and coastal waters in almost all of Europe, in northern Africa and in Mediterranean Asia. Eel fisheries are found throughout the distribution area. Fisheries are generally organised on a small scale (a few fishermen catching 1-5 tonnes per year) and involve a wide range of gears. The fisheries are managed on a national (or lower, regional or catchment) level. Landings peaked around 1965 at 40,000 tonnes, since when a gradual decline occurred to a level of 20,000 tonnes in the late 1990s, but throughout the decades, landing statistics cover only about half the true catches. Recent years show a rapid decline in reported catches, to below 10,000 tonnes. Recruitment remained high until 1980, but declined afterwards, to a level of only 2 % of former levels in 2001, and has remained low since. Aquaculture of wild-caught recruits (glass eel) has been expanding since 1980, in Europe as well as in eastern Asia (using European glass eel). Other anthropogenic factors (habitat loss, contamination and transfer of diseases) have had negative effects on the stock, most likely of a magnitude comparable to exploitation. In 2007, eel was included in CITES Appendix II that deals with species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. The listing was due to be become effective in March 2009.

SOURCE OF MANAGEMENT ADVICE: Management advice has been provided by ICES and FAO/EIFAC. The joint ICES/EIFAC working group is the main assessment body.

STOCK STATUS:
Indications are that the eel stock remained in a critical state in 2012. Abundance of all stages of eel (glass eel, yellow eel, and silver eel) is at an historical minimum. The recruitment index (five year average) is currently at its lowest historical level for the North Sea (at less than 1% of the maximum observed value) and around 5% in the rest of its European distribution ('Elsewhere Europe') area with respect to 1960-1979. In 2012, recruitment for the series outside the North Sea ('Elsewhere Europe') has increased and returned to the level observed in 2007-2008. Recruitment of yellow eel has been declining continuously since the 1950s.

Stock indicators in the national eel management plans submitted in 2008 indicated that anthropogenic mortality was above the limit implied by EC Regulation No. 1100/2007 (EC, 2007). According to the information provided in the Eel Management Plans progress reports reviewed by ICES in 2012, in most Eel Management Units (EMUs), depending on EMU conditions, progress has been made in implementing eel-specific

management measures for commercial and recreational fisheries, hydropower, pumping stations and obstacles, restocking, management measures on habitat, and in a few cases predator control. Management measures related to fisheries have most often been fully implemented while other management measures have often been postponed or only partially implemented. Most increases in silver eel escapement since the implementation of management plans have been achieved by management measures addressing the commercial and recreational fisheries on silver eel. ICES also consider that extending actions that have proven successful, rather than pursuing untried actions or those difficult to implement, will reduce the risk of continued underachievement.

In 2007, eel was included in CITES Appendix II that deals with species not necessarily threatened with extinction, but in which trade must be controlled to avoid utilization incompatible with the survival of the species (see http://www.cites.org/eng/disc/how.shtml). The listing was implemented in March 2009. Eel was listed in September 2008 as critically endangered in the IUCN Red List.

REFERENCE POINTS: Exploitation that leaves 30% of the virgin spawning-stock biomass is generally considered to be a reasonable target for escapement. Due to the uncertainties in eel management and biology, ICES proposed a limit reference point of 50% for the escapement of silver eels from the continent in comparison to pristine conditions (ICES, 2003). This is higher than the escapement of at least 40% "pristine" set by the EC Regulation for the escapement of silver eels. ICES has evaluated the conformity of country management plans with EC Regulation 1100/2007 (ICES Advice Reports 2009 and 2010, Technical Services), but it has not evaluated the consistency of the regulation itself with the precautionary approach. ICES will undertake such an evaluation based on country reports under EC Regulation 1100/2007.

MANAGEMENT OBJECTIVES: A management framework for eel was established in 2007 through an EC Regulation (EC No. 1100/2007; EC, 2007). The objective of this regulation is the protection, recovery, and sustainable use of the stock. To achieve the objective, Member States have developed eel management plans for their river basin districts, designed to reduce anthropogenic mortalities and increase silver eel biomass.

The objective of the national eel management plans is to provide, with high probability, a long-term 40% escapement to the sea of the biomass of silver eel, relative to the best estimate of the theoretical escapement in pristine conditions (i.e. if the stock had been completely free of anthropogenic influences). ICES has evaluated the conformity of the national management plans with EC Regulation No. 1100/2007 (ICES Advice Reports 2009 and 2010, Technical Services), but it has not evaluated the consistency of the regulation itself with the precautionary approach. ICES will undertake such an evaluation based on the national reports in accordance with EC Regulation No. 1100/2007 (EC, 2007).

A coordinated approach to planning, data workshops, and stock assessment is needed to take full advantage of the 2012 reporting by Member States on monitoring, effectiveness, and outcome of the national eel management plans. The subsequent statistical and scientific assessment will include an opinion by STECF as envisaged by the EU. Independent access to the raw data, biomass, and mortality estimates (see supporting information) provided by the Member States will be required to undertake the statistical and scientific assessments of the reliability and accuracy of the estimates.

RECENT MANAGEMENT ADVICE: The status of eel remains critical and urgent action is needed. ICES reiterates its previous advice that all anthropogenic mortality (e.g. recreational and commercial fishing, hydropower, pollution) affecting production and escapement of eels should be reduced to as close to zero as possible until there is clear evidence that both recruitment and the adult stock are increasing.

Given the current record-low abundance of glass eels, ICES reiterates its concern that glass eel stocking programmes are unlikely to contribute to the recovery of the European eel stock in a substantial manner. The overall burden of proof should be that stocking will generate net benefits, in terms of contributions to silver eel escapement and spawning potential. Prior to stocking, or for continuing existing stocking, a risk assessment should be conducted, taking into account fishing, holding, transport, post-stocking mortalities, and other factors such as disease and parasite transfers. To facilitate stock recovery all catches of glass eel should be used for stocking. Stocking should take place only where survival to the silver eel stage is expected to be high and escapement conditions are good. This means that stocking should not be used to continue fishing and stocking should only take place where all anthropogenic mortalities are low.

STECF COMMENTS: STECF agrees with ICES assessment of the status of the stock and the ICES advice.

6.2 Hake (*Merluccius merluccius*) in Division IIIa, Subareas IV, VI, and VII, and Divisions VIIIa,b,d (Northern stock)

FISHERIES: Hake is caught in mixed fisheries together with megrim, anglerfish, and *Nephrops*. Discards of juvenile hake can be substantial in some areas and fleets. An important increase in landings has occurred in the northern part of the distribution area (Division IIIa, and Subareas IV and VI) in recent years. Several changes in fishing technology have occurred in the fishery in recent years: increased mesh sizes in several gears, introduction of the high vertical opening trawls in the mid-1990s, and introduction of selective gears in the *Nephrops* trawl fishery of the Bay of Biscay (square mesh panel).

Total catch in 2013 is unknown. ICES estimates of landings = 76.7 kt (19% trawl, 23% gillnet, 26% longline, and 32% unspecified gears). Discards (2013) were 15.8 kt; 75% of the known discards are included in the assessment. Additional discards are known to occur in other fleets but the data are not available.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. The advice is based on a length-based assessment using commercial catch data and 4 survey series. This stock was benchmarked in 2014.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY approach	MSY $B_{trigger}$	46 200	B_{pa} (ICES, 2014b).
	F_{MSY}	0.27	Stochastic simulations on a combined stock–recruitment relationship (ICES, 2014b).
Precautionary approach	**B_{lim}**	**33 000**	**A low biomass which was followed by a quick recovery (ICES, 2014b).**
	B_{pa}	46 200	1.4 × B_{lim} (ICES, 2014b).
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

(Last changed in:: 2014)

MANAGEMENT AGREEMENT: A recovery plan was agreed by the EU in 2004 (EC Reg. No. 811/2004, Annex 9.3.10). The aim of the plan is to increase the SSB to above 140 000 t with a fishing mortality (F_{MP}) of 0.25, constrained by a year-to-year change in TAC of 15% when SSB is above 100 000 t. This plan has not been evaluated by ICES. The target values used in the plan are based on reference points that are no longer considered appropriate by ICES.

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✗	✗	✗	Above target
Precautionary approach (F_{pa},F_{lim})	?	?	?	Undefined
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity

The spawning biomass has been increasing since 1998 and has been very high in recent years. Fishing mortality, while still above F_{MSY}, has decreased significantly over the last decade. Recruitment fluctuations appear to be without substantial trend over the whole series. After low recruitments in 2009, 2010, and 2011, the recruitment in 2012 is estimated to be the highest in the time-series.

RECENT MANAGEMENT ADVICE:

ICES advises on the basis of the MSY approach that landings should be no more than 78 457 tonnes in 2015. Even though some discards are included in the assessment, the total amount of discards cannot be quantified. Therefore, total catches cannot be calculated.

Other considerations

MSY approach

Following the ICES MSY approach implies fishing mortality at F_{MSY} = 0.27, resulting in catches of no more than 95 248 tonnes and landings of no more than 78 457 tonnes in 2015. This is expected to lead to an SSB of 277 kt in 2016.

Not all discards are accounted for in the model and in the forecast, which means the total catch cannot be quantified; therefore, advice on total catch cannot be provided.

Management plan(s)

The current recovery plan (EC Reg. No. 811/2004) uses target values based on precautionary reference points that are no longer appropriate.

Additional considerations

Discards of juvenile hake can be substantial in some areas and fleets. The spawning-stock biomass and the long-term yield can be substantially improved by reducing mortality of small fish. This could be achieved by measures that reduce unwanted bycatch through shifting the selection pattern towards larger fish. TACs have been ineffective in regulating the fishery in recent years as landings greatly exceeded the TACs. Discards of large individuals have increased in recent years because of quota restrictions in certain fleets.

Hake in the ICES area is managed and assessed as two separate stocks. There is no biological basis for the current ICES stock definition of northern and southern hake. These stocks have similar biology with an unknown degree of mixing.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advised landings for 2015 of 78,457 t.

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

6.3 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 landings increased to close to 1 000 000 t in the latter part of the decade. Landings have been above one million tonnes for most years between 1998 and 2008, with 2003 and 2004 having recorded the highest catches (around 2,300,000 t). Since 2009 landings from the northern areas have been dropping with 2011 being the lowest (around 100 000 t) in the time series. In 2013 total landings were around 522 000 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 2011 when landings were around 3 000 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 but are increasing again since.

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) 2004–2013, excluding 2010. The IBWSS survey is the only survey that covers almost the entire distributional area of the spawning stock. Norwegian bottom trawl survey in the Barents Sea, International Ecosystem Survey in the Nordic Seas in May (IESNS; age groups 1 and 2), International Blue Whiting Spawning Stock survey (IBWSS; age groups 1 and 3), the Faroese bottom trawl surveys in spring, and the Icelandic bottom trawl survey in spring are used as qualitative indices of recruitment.

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 quantitative information was available on discarding and discards were not included in the assessment. The main fishing nations (accounting for more than 80% of the catches) have a landings obligation in place which is considered correctly implemented. Therefore discards are considered negligible.

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} (ICES, 2013a).
	$F_{0.1}$	0.22	Yield per recruit (ICES, 2013a, 2013c).
	F_{MSY}	0.30	Simulations in 2013 (ICES, 2013a).
Precautionary approach	B_{lim}	1.50 million t	Approximately B_{loss} (confirmed by ICES, 2013a).
	B_{pa}	2.25 million t	$B_{lim} \exp(1.645 \times \sigma)$, with $\sigma = 0.25$.
	F_{lim}	0.48	Equilibrium stochastic simulations (ICES, 2013a).
	F_{pa}	0.32	Based on F_{lim} and assessment uncertainties (ICES, 2013a).

(last changed in: 2013)

F_{MSY} = 0.30 gives a high yield and a low risk of SSB< B_{lim}.

MANAGEMENT AGREEMENT:

A management plan was agreed by Norway, the EU, the Faroe Islands, and Iceland in 2008. The plan uses i) a target fishing mortality (F = 0.18) if SSB is above SSB_{MP} (= 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 evaluated the plan in 2008 and concluded that it is in accordance with the precautionary approach (PA). ICES evaluated a NEAFC request concerning an alternative management plan in May 2013 and further in October 2013. No agreement on the application of a new management plan has been obtained.

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✓	✓	Appropriate
Precautionary approach (F_{pa}, F_{lim})	✓	✓	✓	Harvested sustainably
Management plan (F_{MGT})	✓	✓	✓	Below target
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa}, B_{lim})	✓	✓	✓	Full reproductive capacity
Management plan (SSB_{MGT})	✓	✓	✓	Above trigger

SSB has almost doubled from 2010 (2.9 million tonnes) to 2014 (5.5 million tonnes) and is well above B_{pa} (2.25 million tonnes). This increase is due to the lowest Fs in the time-series in 2011–2013, in combination with increased recruitment since 2010 (at age 1).

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 2015 should be no more than 839 886 tonnes. All catches are assumed to be landed.

Other considerations

Management plan

The management plan agreed by Norway, EU, the Faroe Islands, and Iceland in November 2008 implies a TAC of 840 000 tonnes in 2015, compared to 1 200 000 tonnes in 2014. This is expected to lead to an increase in SSB in 2016 to 5.90 million tonnes, which is above SSB_{MP}.

MSY approach

Following the ICES MSY framework implies a TAC of 1 326 000 t in 2015 based on a fishing mortality at F_{MSY} = 0.30. This is expected to lead to a decrease in SSB in 2016 to 5.45 million tonnes, which is above MSY $B_{trigger}$ (2.25 million tonnes).

PA approach

Following the ICES precautionary approach implies a TAC of 1 402 000 tonnes in 2015 based on a fishing mortality at F_{pa} = 0.32. This is expected to lead to a decrease in SSB in 2015 to 5.38 million tonnes, which is above B_{PA} (2.25 million tonnes).

Additional considerations

Recruitment (age 1) is estimated significantly higher in 2011 - 2014 than in the years 2007–2009 with the historically low recruitments. Information from surveys and the fishery indicates a steep increase in recruitment in recent years.

There are uncertainties about the stock structure even though ICES 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 that the provisions of the management plan agreed by the EU, Norway, Faroe Islands and Iceland prescribe that catches in 2015 should be no more than 839 886 tonnes.

Request to ICES for advice regarding the blue whiting stochastic forecast

STECF notes the ICES responses to the NEAFC request for advice regarding the blue whiting stochastic forecast (ICES Advice 2014, Book 1, section 1.6.5.2).

STECF agrees with the logical explanations given in the ICES response that i) the value for 2012 recruitment was correct. There was an error in the input recruitment value for 2013. This error led to a 2% higher TAC advice and a slightly higher SSB than if the GM recruitment had been applied ii) the distribution of the spawning-stock biomass estimates have not been used to infer precautionary considerations. In 2014 ICES is using a deterministic forecast method for blue whiting and iii) that ICES has reviewed the performance of the stochastic forecast model and has determined that there are differences between the stochastic and the deterministic forecast models. ICES use the deterministic forecast method in its TAC advice to be consistent with the conclusions of its previous evaluations of the various options of the management plan.

6.3.1 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 6.3.

6.3.2 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 6.3.

6.3.3 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 6.3.

6.3.4 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 6.3.

6.3.5 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 6.3.

6.4 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 mid-aged fish mostly for the Japanese market), and older fish either for human consumption purposes (mostly for the African market) or for industrial purposes. Since 2003, the fishery has been more directed toward younger fish (ages 1–3) than fish of ages 4 to 8. In 2012, fishing mortality on younger ages reached a record-high level.

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 2013 amount to 165 000 t.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is ICES. There is large 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 varies with no trend over time. If this assumption is incorrect then the assessment results may be biased.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
MSY approach	MSY $B_{trigger}$	634 577	B_{loss} 2014 assessment; SSB in 2001.
	F_{MSY}	0.13	$F_{0.1}$ from the yield-per-recruit (Section 5.7 in ICES, 2010).
Precautionary approach	B_{lim}	Not defined.[1)]	
	B_{pa}	Not defined.[1)]	
	F_{lim}	Not defined.	
	F_{pa}	Not defined.	

(last changed in : 2014)

1) Previous PA biomass reference points were considered not consistent with the perceived state of the stock.

In 2003 ICES SGPA (ICES, 2003a) described the basis for a precautionary approach. In cases where the stock is lightly exploited, or where the range of data in the stock–recruitment plot is limited, B_{loss} is used as a proxy for B_{pa}. Western horse mackerel has been lightly exploited over its assessed history (average 1982–2013: F = 0.12). An interpretation of the S/R data shows high R events at low SSB and no clear S/R relationship. B_{loss} is used as B_{pa} consistent with SGPRP2003 logic on reference points (ICES, 2003b). It is expected that the Western horse mackerel stock will return to a low biomass state after episodic recruitment, and this state is not necessarily to be avoided with a high probability. However, there is a need to provide some biomass protection under the ICES MSY approach, and continued use of F_{MSY} at low biomass may not be precautionary. Therefore, ICES uses B_{pa} as MSY $B_{trigger}$. In the present case this implies MSY $B_{trigger} = B_{loss}$.

MANAGEMENT AGREEMENT:

In 2007, a management plan based on the triennial egg survey was proposed by the Pelagic RAC but is not used at present to set the EU TAC. The management plan was most recently evaluated by ICES in 2013 and it was concluded not to be in accordance with the precautionary approach (ICES, 2013b). A revised management plan is currently under development.

STOCK STATUS:

Fishing pressure			
	2011	2012	**2013**
MSY (F_{MSY})	✓	✗	✗ Above target
Precautionary approach (F_{pa}, F_{lim})	?	?	? Undefined

Stock size			
	2012	2013	**2014**
MSY ($B_{trigger}$)	✓	✓	✓ Above
Precautionary approach (B_{pa}, B_{lim})	?	?	? Undefined

The SSB declined steadily between 1988 and 2000 and has varied between 634 577 tonnes in 2001 and 1 506 950 tonnes in 2009. SSB is estimated to be at 772 334 tonnes in 2013 and is expected to decline below MSY $B_{trigger}$ in 2014. Fishing mortality has been increasing since 2007 and has been above F_{MSY} since 2012. Recruitment has been low from 2004 onwards.

RECENT MANAGEMENT ADVICE:
ICES advises on the basis of the MSY approach that catches in 2015 should be no more than 99 304 t.

Other considerations

MSY approach

F is low and has been below FMSY =0.13 for 15 years except for last few years, as catches have been maintained while the stock slowly declined. Recruitment has low but not unusually low for the last 20 years. The stock has relied on two episodic recruitment events (1982 and 2001) over its assessed history to keep SSB > Bloss (SSB in 2001). SSB is expected to decline further until another episodic recruitment occurs because normal (non-episodic) recruitment will not maintain the stock above its 2001 SSB. The decline will be slowed by keeping F below FMSY through the application of the ICES MSY approach.

Following the ICES MSY approach requires fishing mortality to be reduced to 0.12 in 2015, resulting in catches of less than 99 304 tonnes in 2015. This is expected to lead to an SSB of 480 681 t in 2016.

PA approach

There are no PA reference points defined for this stock.

Management plans

ICES does not advise according to the management plan because it has been recently concluded that, in its current configuration, the management plan is not consistent with the precautionary approach (PA). However, this work also showed that the plan could be made consistent with the PA through the introduction of a protection rule in the management plan. Thus, ICES advises that these modifications to the management plan would need to be evaluated before the plan is used to give catch advice.

Additional considerations

The basis for the assessment has not changed from last year.

The advice this year is the given based on MSY approach. However, the fishing mortality is modified by a biomass constraint based on MSY $B_{trigger}$, which is defined as B_{loss} based on SSB in 2001. Note that the TAC advice based on the MSY approach results in an SSB in 2015 which would be the lowest in the time-series.

ICES advice applies to all fisheries where Western horse mackerel is caught.

STECF COMMENTS: STECF agrees with the ICES assessment of the state of the stock and the advice for 2014 that on the basis of the MSY approach that catches in 2015 should be no more than 99, 304 t.

6.5 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 in the area extending from ICES Division IXa in the south to Division IIa in the north and Division XIV in the west, 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, the North Sea**,** and the Southern components. 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 ~75% the entire Northeast Atlantic stock. Similarly, the Southern Component (~22%) 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 (~3%) still exists as a discrete unit. This component spawns in the North Sea and Skagerrak (ICES Subarea IV and Division IIIaN).

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 2013, catches in this area constituted approximately half of the total reported landings. Catches from Greenland were reported for the first time in 2011, and have been increasing since then. In the Icelandic and Faroese fisheries, in the north-western part of the distribution area, mackerel are sometimes caught together with herring. In the southern part of the distribution area, Atlantic mackerel (*Scomber scombrus*) can be caught together with Spanish mackerel (*Scomber colias*). In recent years total landings (from all stock components combined) have been around 900 000 t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICES. The assessment is based on catch data, tagging data (1980–2005 recapture year), and three survey indices: SSB index from triennial egg survey (1992_basis_ age-disaggregated abundance indices from IBTS survey (age 0, 1998–2013) and from the IESSNS survey (age 6+, 2007, 2010–2014). Landings prior to 2000 are considered to be underestimated.

REFERENCE POINTS:

	Type	***Value***	***Technical basis***
Management plan	$SSB_{trigger}$	2.20 million t	Medium-term simulations conducted in 2008*.
	F_{target}	0.20–0.22	Medium-term simulations conducted in 2008*.
MSY approach	MSY $B_{trigger}$	2.36 million t	Proxy based on B_{pa}*.
	F_{MSY}	0.25	Stochastic simulation conducted at benchmark assessment in 2014.
Precautionary approach	B_{lim}	1.84 million t	B_{loss} in 2002 from 2014 benchmark assessment.
	B_{pa}	2.36 million t	$\exp(1.654 \times \sigma) \times B_{lim}$. $\sigma = 0.15$.
	F_{lim}	0.39	F_{loss}, the F that on average leads to B_{lim}.
	F_{pa}	0.26	F that on average leads to B_{pa}.

(Last changed in: 2014)

* Evaluation ongoing following the draft request submitted for evaluation by ICES.

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 it was precautionary (ICES, 2008, 2014b). However, since 2009, there has been no international agreement on TAC. Advising according to the new assessment using the management plan is still considered precautionary, even though the plan may no longer result in a long-term maximization of the yield. EU, Norway, and the Faroes have approached ICES with a draft request on a revised long-term management plan evaluation. ICES is currently carrying out analyses to answer this request draft.

STOCK STATUS:

Fishing pressure				
	2011	2012	**2013**	
MSY (F_{MSY})	✓	✓	✓	Appropriate
Precautionary approach (F_{pa},F_{lim})	✓	✓	✓	Harvested sustainably
Management plan (F_{MGT})	✗	✓	✓	At target
Stock size				
	2012	2013	**2014**	
MSY ($B_{trigger}$)	✓	✓	✓	Above trigger
Precautionary approach (B_{pa},B_{lim})	✓	✓	✓	Full reproductive capacity
Management plan (SSB_{MGT})	✓	✓	✓	Above trigger

Fishing mortality in 2013 is estimated to be 0.22, below FMSY and Fpa. Fishing mortality was above Flim during the early 2000s. SSB has increased considerably since 2002 and remains high, above Bpa and MSY Btrigger. The 2002 and 2006 year classes are the strongest in the time-series. The incoming 2011 and 2012 year classes appear to be high. There is insufficient information to reliably estimate the size of the 2013 year class and it is replaced by an RCT3 estimate.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the Norway, Faroe Islands, and EU management plan that catch in 2015 should be between 831 000 tonnes and 906 000 tonnes.

ICES advise that the existing measures to protect the North Sea spawning component should remain in place.

Other considerations

MSY approach

Following the ICES MSY framework implies that fishing mortality can be increased to 0.25 (F_{MSY}), resulting in a total catch of 1 017 000 tonnes in 2015. This would lead to an estimated SSB in 2016 of 4.2 million tonnes.

PA approach

Following the precautionary approach (PA) implies that fishing mortality in 2015 should be no higher than F_{pa} (F = 0.26), corresponding to a total catch of 1 054 000 tonnes in 2015. SSB in 2015 would remain above B_{pa}.

Additional considerations

The changes in mackerel distribution and migration have been investigated in an *Ad hoc* Group on the Distribution and Migration of Northeast Atlantic Mackerel (AGDMM – ICES, 2013b). There has been a substantial geographical expansion of the spawning distribution to the north and the northwest for the western component since 2007. However, spawning intensity in these new areas is quite low and the bulk of the egg production still occurs on the historical core spawning areas. There has also been an extension of the spawning season for the western and southern components, with an earlier start of the spawning activity and with maximum spawning intensity occurring one month earlier than in earlier years (April instead of May). A north- and westwards geographical expansion of the summer feeding distribution has also been reported by the summer surveys in the Nordic Seas (IESSNS). The distribution of juvenile mackerel was found to be very patchy, and the abundance to be highly variable between years. Expansion of nursery areas into northern coastal waters has been observed since the mid-2000s. Along with these distribution changes, physical changes in the

environment have also been recorded, with record high summer sea surface temperatures in recent years in the Nordic seas facilitating a larger potential feeding habitat for mackerel. The question remains as to whether or not these distribution changes are permanent or temporary.

In the last two years, mackerel have been caught in small numbers in summer as far north as Svalbard, and as far west as the southwest Greenlandic waters.

The stock assessment for Northeast Atlantic mackerel was benchmarked in 2014. This led to a revised perception of the stock compared to the last assessment of the stock in 2012. Despite the changes in the stock assessment, the current Management Plan fishing mortality target range is still considered to be precautionary, and ICES can continue to provide advice under this plan. However, it may no longer result in a long-term maximization of the yield. The Management Plan is being re-evaluated and should provide the appropriate combination of $B_{trigger}$ and fishing mortality range consistent with the precautionary approach and MSY objectives.

STECF COMMENTS: STECF agrees with the ICES assessment that on the basis of the Norway, Faroe Islands, and EU management plan that catch in 2015 should be between 831 000 tonnes and 906 000 tonnes.

6.6 Boarfish (*Capros aper*) in the Northeast Atlantic

FISHERIES: The fishery for boarfish is conducted with pelagic trawls. The catches are currently used for reduction to fish meal and oil, but development of a human consumption market is underway. The majority of landings to date have come from ICES Divisions VIIj (69%) and VIIh (18%) 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.

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

REFERENCE POINTS:

Reference points are not defined but are inferred within the exploratory assessment. The 2013 reference points are no longer valid as the assessment is not accepted as a category 1 assessment.

MANAGEMENT AGREEMENT: No specific management objectives are known to ICES. A management plan has been proposed by the Pelagic RAC, but has not yet been evaluated by ICES.

STOCK STATUS:

	Fishing pressure	
	2011–2013	
MSY (F_{MSY})	?	Unknown
Precautionary approach (F_{pa}, F_{lim})	?	Unknown
Qualitative evaluation	✓	Low

	Stock size	
	2012–2014	
MSY ($B_{trigger}$)	?	Unknown
Precautionary approach (B_{pa}, B_{lim})	?	Unknown
Qualitative evaluation	↘	Decreasing

The stock status is currently unknown. Survey indices and an exploratory assessment indicate that the stock is declining. Fishing mortality is low.

RECENT MANAGEMENT ADVICE: ICES advises on the basis of the data-limited approach that catches in 2015 should be no more than 53, 296t.

Other considerations

No quantitative assessment is presented for this stock. Therefore, fishing possibilities cannot be projected.

Additional considerations:

ICES approach to data-limited stocks

For data-limited stocks for which a biomass 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 Schaefer surplus production model provides and index of TSB which is estimated to have decreased more than 20% between the periods 2010–2012 and 2013–2014. This implies a decrease in catch capped at 20% in relation to the last three years' average (2011–2013), corresponding to catches in 2015 of no more than 53 296 t. The same model shows that exploitation rate in recent years is low (less than or equal to any candidate F_{MSY} reference points) and this exploitation rate is considered not detrimental to the stock; therefore, no additional precautionary reduction is needed.

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 IV, VI, VII, VIII and IX. Isolated small occurrences appear in the North Sea (ICES Subarea IV) in some years. A discontinuity in distribution was suggested between ICES Divisions VIIIc and IXa as boarfish were considered very rare in northern Portuguese waters, but abundant further south. Based on these data, a single stock is considered to exist in ICES Subareas IV, VI, VII, VIII, and in Division IXa. This distribution is broader than the current EC TAC area (Subareas VI, VII, and VIII), and for the purposes of assessment in 2014 only data from these areas were utilized. A dedicated study on the stock structure of boarfish within the Northeast Atlantic and Mediterranean Sea commenced in October 2013, the results of which will feed into future assessments.

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 advice that on the basis of the data-limited approach that catches in 2015 should be no more than 53, 296t.

STECF notes the advice that catches in 2015 should be no more than 53,296 t, is based on the ICES approach to data-limited stocks (Category 3.2.0) which prescribes an arbitrary 20% reduction on the agreed TAC for 2014. Given that the indications are that the stock has declined rapidly over the most recent 2 years (2012-2013) and that the uncertainty associated with the estimates of fishing mortality over the same period is large, STECF suggests that an additional precautionary buffer should be considered in order to further reduce the risk of continued stock decline. Applying the ICES approach to data-limited stocks for Category 3.2.0 and incorporating a precautionary buffer would imply a TAC for 2015 for Boarfish in the EU and international waters of Subareas VI VII and VIII of 42,637 t.

6.7 Spurdog (*Squalus acanthias*) in the Northeast Atlantic

Biology

Squalus acanthias is a long-lived, slow-growing, live-bearing, and late-maturing species, and is therefore particularly vulnerable to exploitation. Population productivity is low, with low fecundity and a protracted gestation period (2 years). Spurdog form size- and sex-specific shoals and aggregations of large fish (including of mature females) are easily targeted by longline and gillnet fisheries.

Environmental influence on the stock

The effect of changes in the environment on spurdog populations is not known. There may be indirect effects, as spurdog predate on small pelagic fish, which are affected by environmental conditions. An increased frequency of occurence in Norwegian waters in recent years may be caused by immigration to this area due to food availability and favourable environmental conditions.

The fisheries

Spurdog are largely taken in mixed demersal and gillnet fisheries. As the TAC was set at zero, there have been no target fisheries in EC or Norwegian waters since 2011. An unquantified amount of discarding now takes place in mixed demersal trawl and gillnet fisheries operating in EC waters. Discard mortality is low in longline fisheries, and higher in trawl and gillnet fisheries. Exact levels are unknown, and will vary with soaktime and quantity caught.

Catch Distribution: Total catch (2013) is unkown; the official catch in 2013 was 332 t. Discarding is known to take place but cannot be fully quantified.

Quality considerations

There are concerns over the quality of the catch data (including total catch and length compositions of the landings). Discarding rates since the zero TAC was introduced are uncertain, as is the survivorship of the discards. In the absence of commercial data, information from scientific trawl surveys will be increasingly important to monitor any stock recovery.

An estimate of total catch is used in the assessment for the years after the introduction of a zero TAC. Reported landings are not representative of true removals.

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 approach	MSY Btrigger	963 700 t	MSY Btrigger = BMSY (in terms of total biomass).
	MSY harvest ratio	0.029	Catch as a proportion of the total biomass, assuming average selection over the period 2008–2010, reflecting a non-target selection pattern.
Precautionary approach	Blim	Not defined.	
	Bpa	Not defined.	
	Flim	Not defined.	
	Fpa	Not defined.	

STOCK STATUS:

Fishing pressure				
	2011	2012	2013	
MSY (FMSY)	✓	✓	✓	Appropriate
Precautionary approach (Fpa, Flim)	?	?	?	Undefined

Stock size				
	2012	2013	2014	
MSY (Btrigger)	✗	✗	✗	Below trigger
Precautionary approach (Bpa, Blim)	?	?	?	Undefined

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:

Advice for 2015 and 2016

ICES advises on the basis of the MSY and the precautionary considerations that there should be no target fishery and that bycatch should be minimized. Survival of discards is highly variable. Bycatch should be managed as part of a rebuilding plan, including close monitoring of the stock and fishery.

Management plans

There is a generic EC Action Plan for the Conservation and Management of Sharks, but no specific management plan for this stock in the ICES area.

MSY considerations

Following the ICES MSY approach implies a harvest rate of 0.008 (lower than the FMSY proxy because SSB in 2015 is well below MSY Btrigger), which corresponds to catches from mixed fisheries of no more than 1408 t in 2015 and 1474 t in 2016. This is expected to lead to a total biomass of 259 310 t in 2016 and 265 544 t in 2017.

However, considering the low stock size over the last two decades and the very low productivity of the stock, it is not possible to identify any non-zero catch that would be compatible with the MSY approach. Therefore, ICES advises that there should be no target fishery and that bycatch should be minimized. Survival of discards is highly variable. Any possible provision for bycatch to be landed should be part of a rebuilding plan, including close monitoring of the stock and fishery.

PA considerations

It is not possible to identify any non-zero catch that would be compatible with the precautionary approach; recovery to any candidate Bpa will be slow and not biologically feasible under the short-term management time frames.

Spurdog is showing some signs of increase from the historical lows in the mid-2000s, but this period is very short in comparison to the longer-term decline. Spurdog is a long-lived, slow-growing, and late-maturing species and is therefore particularly vulnerable to fishing mortality. ICES thus advises on the basis of the precautionary considerations that there should be no target fishery and that bycatch should be minimized.

Survival of discards is highly variable. Any possible provision for bycatch to be landed should be part of a rebuilding plan, including close monitoring of the stock and fishery.

Additional considerations

The stock suffered high harvest rates for more than four decades, and was not managed during this time. Management measures have been restrictive only since 2009.

Historically Spurdog were subjected to large targeted fisheries but were also taken as a bycatch in mixed trawl fisheries. In the latter fisheries, measures to reduce overall demersal fishing effort may have benefitted spurdog recovery. Discarding of spurdogs has increased with the introduction of zero TACs; some individuals do survive after discarding although the number of survivors varies considerably depending on several factors (e.g. size of catch, catch method, time on deck, etc.)..

Harvest ratios have reduced below the MSY level in recent years. However, given the very low productivity of the stock, the timescale for recovery, even under zero catch, will be over a decadal time-frame (Table 9.3.26.4). Conservative management is needed as part of a rebuilding plan to deal with bycatches in mixed fisheries.

Regulations and their effects

Management measures began to impinge on fishing activities from 2007 onwards.

The current zero TAC results in increased discarding from mixed fisheries, a proportion of which are dead fish.

In 2009, a maximum landing length (100 cm) was introduced in EC waters, and this deterred many of the fisheries targeting mature female spurdog.

Norway has a minimum landing size of 70 cm (first introduced in 1964), and from 2011 no directed fishery has been permitted in Norway.

Restrictions on landings of spurdog are thought to have contributed to the increased retention of starry smooth-hounds.

Information from the fishing industry

Reports suggest that the zero TAC since 2011 has increased regulatory discards of spurdogs in mixed fisheries.

Revisions in data and methodologies

The benchmark assessment methodology implemented in 2011 has not been modified. Reliable catch data since 2011 are not available.

Uncertainties in assessment and advice

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.

6.8 Basking shark (*Cetorhinus maximus*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 Northeast 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	B_{lim}	Not defined	
	B_{pa}	Not defined	

Approach	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.

Other 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.

6.9 Tope (*Galleorhinus galeus*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: There are no currently no targeted commercial fisheries for tope in the Northeast 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 Northeast 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 Northeast 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.

6.10 Porbeagle (*Lamna nasus*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

6.11 Thresher sharks (*Alopius vulpinus* and *Alopius superciliosus*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

6.12 Blue shark (*Prionace glauca*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

6.13 Portuguese dogfish (*Centroscymnus coelolepis*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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)

6.14 Kitefin shark (*Dalatias licha*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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** 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

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 BMSY. 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 FMSY 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)

6.15 Leaf-scale gulper shark (*Centrophorus squamosus*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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).

6.16 Angel shark (*Squatina squatina*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

6.17 Smoothhounds (*Mustellus spp*) in the Northeast Atlantic

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-22).

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.

7 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 into 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 analysing together the results and options for fisheries management. The process, based on undertaking joint practical working group meetings and review sessions was launched in 2008, during the SCSA Working Group on Demersal species (Turkey, September 2008).

The outcome of the assessments already undertaken by national experts within national programmes, FAO Regional projects and/or other international initiatives are presented at the relevant working group meetings and subsequently at the SCSA meeting for review.

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 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 also

applied in 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 an approach continued in 2012, with the STECF-EWG-11-20 held in Madrid in January, STECF-EWG-12-11 held in Sete (France) in July, and STECF-EWG-12-19 held in Ancona (Italy) in December 2012. At the most recent STECF EWG assessing Mediterranean stocks, STECF 13-09 held in Barza d'Ispra (Italy), both assessments and forecast projections were carried out. The reports of STECF-EWG 12-19 and STECF-EWG 13-09 were considered when updating this report based on scientific advice released by STECF in 2013 for Mediterranean stocks. The last two working groups were held in Brussels in December 2013 (EWG 13-19) and Rome (July 2014,EWG 14-09).

The GFCM Working Groups on the Demersal Stocks and on the Small Pelagic Stocks were held in Split, Croatia in November 2012 (from the 5th to the 9th), and reviewed during the 14th session of Sub-Committee on Stock Assessment held in Rome in February 2013 (from the 18th to the 20th) and endorsed during the 15th session of the Scientific Advisory Committee (SAC) held in Rome in April 2013 (from the 8th to the 11th).The relevant meeting reports were considered when updating this report based on the scientific advice released by GFCM in 2013 for Mediterranean stocks. The most recent GFCM-SAC 16th session (March, 2014) endorsed the last conclusions of the Working Groups.

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 EU Member States, GFCM and STECF-SGMED Working Groups should be further improved in order to provide annual assessment of all stocks listed in the Council Regulations 1542/2000, 1343/2007, 199/2008 and Commission Decision 2010/93/EU, 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 118 stock assessments of 27 species. 39 updated stock reviews considered analytically assessed exploitation rates which were evaluated with regard to proposed management reference points. Advice on the most up to date available analytical stock assessments is provided for:

- 2 small pelagic species (anchovy, sardine) in 7 Geographical Sub-areas;
- 10 demersal species (, blue and red shrimp, European hake, blue whitihing, red mullet, striped red mulet, Norway lobster, deep-sea rose shrimp, brush tooths lizardfish, picarelcommon sole) in 18 Geographical Sub-Areas;

Advice if also provided for additional species for which either only a preliminary assessment has been done, or for which no updated assessment was available:

- 4 pelagic species (Spanish mackerel, sprat, horse mackerel, common dolphinfish)
- 11 demersal species (giant red shrimp, bogue, common dentex, black-bellied anglerfish, octopus, black spot seabream, common pandora, barracuda, poor cod, spottail mantis shrimp, greater forkbeard)
- 13 elasmobranch species (thresher shark, carcharhinidae, basking shark, tope shark, blackmouth catshark, blackchin guitarfish, sixgill shark, pelagic stingray, starry skate, thornback ray, small-spotted catshark, smoth hammerhead, spurdog)

STECF notes that few of the reviewed up to date assessments provided precautionary management reference points of stock size due to data deficiencies or shortage of data series.

Overall, 37 (90.2%) out of the 41 analytically assessed and reviewed stocks in the Mediterranean are classified as being subject to overfishing. Tables 7.1 summarizes the findings in detail for the various stocks (species by Geographical Sub-Areas).

Table 7.1. Stock status according to the exploitation rate for the Mediterranean and Black Sea.

		Coomon name	Scientific name	GSA																										
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	29
Small/medium pelagic	1	Anchovy	*Engraulis encrasicolus*																											
	2	Sardine	*Sardina pilchardus*																											
	3	Spanish mackerel	*Scomber japonicus*																											
	4	Sprat	*Sprattus sprattus*																											
	5	Horse mackerel	*Trachurus trachurus*																											
	6	Common dolphinfish	*Coryphaena hippurus*																											
Demersal	7	Giant red shrimp	*Aristeomorpha foliacea*																											
	8	Blue and red Shrimp	*Aristeus antennatus*																											
	9	Bogue	*Boops boops*																											
	10	Common dentex	*Dentex dentex*																											
	11	Monkfish	*Lophius budegassa*																											
	12	European hake	*Merluccius merluccius*																											
	13	Blue whitihing	*Micromesistus potassou*																											
	14	Red mullet	*Mullus barbatus*																											
	15	Striped mullet	*Mullus surmuletus*																											
	16	Norway lobster	*Nephrops norvegicus*																											
	17	Octopus	*Octopus vulgaris*																											
	18	Black spot seabream	*Pagellus bogaraveo*																											
	19	Common pandora	*Pagellus erythrinus*																											
	20	Pink shrimp	*Parapenaeus longirostris*																											
	21	Spottail mantis shrimp	*Squilla mantis*																											
	22	Common sole	*Solea solea*																											
	23	Picarel	*Spicara smaris*																											
	24	Barracuda	*Sphyraena sphyraena*																											
	25	Greater forkbeard	*Phycis blennoides*																											
	26	Poor cod	*Trisopterus minutus capelanus*																											
	27	Whiting	*Merlangius merlangus*																											
	28	Brush tooths lizardfish	*Saurida undosquamis*																											
	28	Turbot	*Scophthalmus maximus*																											
Elasmobranches	29	Thresher shark	*Alopias vulpinus*																											
	30	Carcharhinidae	*Carcharinus* spp.																											
	31	Basking shark	*Cethorinus maximus*																											
	32	Tope shark	*Galeorinus galeus*																											
	33	Blackmouth catshark	*Galeus melastomus*																											
	34	Blackchin guitarfish	*Glaucostegus cemiculus*																											
	35	Sixgill shark	*Hexanchus griseus*																											
	36	Pelagic stingray	*Pteroplatytrygon violacea*																											
	37	Starry skate	*Raja asterias*																											
	38	Thornback ray	*Raja clavata*																											
	39	Small-spotted catshark	*Scyliorinus canicula*																											
	40	Smoth hammerhead	*Sphyrna zygaena*																											
	41	Spurdog	*Squalus acanthias*																											

Status unknown: assessement done but still preliminary and/or not updated

Status: in overfishing according to Fmsy of the most up to date assessment available

Status: sustainable fished according to Fmsy of the most up to date assessment available

Status: ecologically unbalanced

Status: depleted

STECF approach to advice for Mediterranean fisheries

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 its effort to stock A if it's effort is restricted since the revenue gained would be greater.

STECF considers that if fully enforced and implemented, a restriction on landings is likely to be a more appropriate and effective management tool to control the exploitation rate on small pelagics in the Mediterranean. Hence STECF advises that consideration be given to introduce landing restrictions for small pelagic species. 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.

7.1 European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 1. Northern Alboran Sea

The results from the most recent assessment and advice for this stock were released in 2014 by GFCM-SAC4

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 considered to be 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 using 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. A new assessment based on non-equilibrium production models (BioDyn and ASPIC) was presented at the GFCM-WGSASP in 2014. The input data for the adopted modelling approach was total yearly catch (tons) and CPUE as an abundance index (Catch per unit of effort, kg fished considering all trips of the gear) over the period (2003-2012). The assessment was not accepted as there were contradictory signals between the survey, catches, trial test with the ASPIC surplus production model, and independent estimates of exploitation rate. There was uncertainty in the assessment and methodological problems in incorporating acoustic time series in the production model, so the model only relies on CPUE, which is very similar to the landings. The fishery mainly depends on recruitment: the possibility to have an index of recruitment to manage the stock should be considered. The WGSASP suggested to evaluate the trend in effort data and that CPUE be evaluated independently to its performance in the production model. The WGSASP recommended the use of available time series both for CPUE and acoustic abundance indices. In the case of fitting problems, alternative production model should be tested.

REFERENCE POINTS:

STECF proposed the following reference points as a basis for management advice:

E_{MSY} (F/Z, F age range 0-3) $\leqslant$ 0.4.

GFCM SAC has not proposed any management reference points since the assessment results were not endorsed.

STOCK STATUS: GFCM-WGASP 2014 concluded that the status of the stock is uncertain, with high fluctuations and population concentrated on first age classes.

RECENT MANAGEMENT ADVICE: No advice provided by GFCM-SAC.

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 (e.g. TAC) 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 considers that in order to avoid future loss in stock productivity and landings the exploitation rate should be not higher than E = 0.4. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.2 European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 3. Southern Alboran Sea

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 stock assessment and related biological reference points, STECF is unable to assess the status of the stock. Consequently, STECF is also unable to advise on an appropriate exploitation rate for this stock.

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

The results from the most recent assessment and advice for this stock were released in 2014 by GFCM-SAC.

FISHERIES: The current purse seine fleet in GSA 06 (Northern Spain) is composed by 130 units. The fleet has been continuously decreasing in the last two decades, from 222 vessels in 1990 to 130 in 2012. They have lost the smallest units. Anchovy is the main target species of the purse seine fleet in Northern Spain due to its high economic value. Catches in the period 1990-2012 has been highly variable, with a minimum of 2800 tons in 2007 and an average of 11500 tons. Higher catches occurred in the period 1990-94 (17000 - 22000 tons). Thereafter catches have generally been decreasing with three recoveries in 2002, 2009 and 2012. In 2012 catches amounted to only about half of the level observed between 1990 and 1994.

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. A new assessment based on a production model (BioDyn) was presented at the GFCM-WGSASP in 2014 and endorsed by GFCM-SAC. The input data for the adopted modelling approach was total yearly catch (tons) and CPUE as an abundance index (Catch per unit of effort, kg fished considering all trips of the gear) over the period (1990-2012). A biomass data series of acoustic surveys (MEDIAS) was also available.

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

$E \leqslant 0.4$. GFCM SAC adopted $E \leqslant 0.4$, $F_{MSY}=0.25$ and $B_{MSY}=47209$ tons as reference points for the stock.

STOCK STATUS: The perception of the stock status changed with the new assessment based on the BioDyn production model from overfishing to a sustainable exploitation. Based on the stock assessment summary of the GFCM-WG on small pelagics of 2014, GFCM-SAC considered the stock as sustainably exploited. F_{cur} (0.18) was lower than F_{MSY} reference point (0.25). Exploitation rate ($E_{cur}=0.24$) was also lower than E_{MSY}. The current biomass ($B_{cur}=15884$ t) was above the estimated B_{MSY}.

STECF concluded that overfishing ($E_{2010} = 0.6 > 0.4$) was occurring in 2010.

RECENT MANAGEMENT ADVICE: Based on the report of the GFCM-SAC, STECF advises that the exploitation rate should be maintained below E = 0.4 and catch at or below MSY (11854 tons), in order to avoid

future loss in stock productivity and landings. The GFCM SAC endorsed stock status and advice and stressed the limitation of the use of only CPUE indexes on production model. 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 (e.g. TAC) as a more effective management tool to control the exploitation rate on 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 agrees with the GFCM SAC assessment of the stock status and about the limitation of the use of a purse seine CPUE indices in production model. CPUEs of purse seiners as indicators of stock abundance may produce misleading conclusions about stock biomass. In addition, STECF notes that the new assessment provided by GFCM in 2014 and based on production model, changed the perception of the status of the stock provided by the XSA in 2011.

STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

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

The results from the most recent assessment and advice for this stock were released in 2014 by GFCM-SAC

FISHERIES: Both pelagic trawlers and purse seines are present in the Gulf of Lions. However, the number of boats has been decreasing these last few years and the fleet now contains 7 trawlers targeting anchovies and sardines at the same time and 3 purse-seines targeting mostly sardines but also landing a few anchovies. Most regulations (no fishing activity during the week-end, length of trawlers, etc.) are fully respected, the limitation of engine power for trawlers being the only one not to. In the Gulf of Lions, pelagic fisheries are targeting anchovy and sardine (*Sardina pilchardus*). The catches declined from 8000 t in 1998 to 2249 t in 2005, and have fluctuated between about 2500 t and 4000 t since then. The catch in 2011 was less than 1900 t.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF. In 2012 and 2014 the assessment was undertaken by the GFCM-SAC. The data sources were time series of acoustic surveys, landings and CPUE (1993-2012). Direct method by acoustics survey was used to assess trend in stock biomass.

REFERENCE POINTS: The biomass precautionary reference points proposed for this stock by GFCM-SAC in 2014 are Blim=22.889 t and Bpa=45.778 t.

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. Although biomass is more or less stable in this stock since 2005, with a slight increasing trend, anchovy average size remains small in comparison with previous years, in particular before 2005 and that commercial-sized anchovy abundance is low. The stock was judged depleted by GFCM-SAC due to its very low biomass and low commercial-sized anchovy abundance. Current biomass (18366 t) is below Blim (22889) and the stock does show any recovering associated with the decreasing trend in effort.

RECENT MANAGEMENT ADVICE:

The GFCM-SAC recommends to implement a recovery plan, which could include the monitoring of biological parameters and limiting fishery effort to allow 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 proposes that a multi-annual management plan for

small pelagic fisheries be 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 agrees with the GFCM SAC assessment of the stock status and advice. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.5 European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 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 considers 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 (e.g. TAC) 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 agrees with the assessment of the stock status and consider that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to E = 0.4 or below. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.6 European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 16. Strait of Sicily

The results from the most recent assessment and advice for this stock were released in 2014 by GFCM-SAC.

FISHERIES: In GSA 16, two operational units (OU) fishing for small pelagic are present, mainly based in Sciacca port (accounting for about 2/3 of total landings): purse seiners (lampara vessels, locally known as "Ciancioli") and midwaters pair trawlers ("Volanti a coppia"). Midwaters trawlers are based in Sciacca port only, and receive a special permission from Sicilian Authorities on an annual basis. In both OUs, anchovy represents the main target species due to the higher market price. Another fleet fishing on small pelagic fish species, based in some northern Sicilian ports, was used to target on juvenile stages (mainly sardines). However this fishery, which in the past was allowed for a limited period (usually one or two months in the winter season) by a special Regional law renewed year by year, was no more authorized starting from 2010 and it is presently stopped.

Average anchovy landings in Sciacca port over the period 1998-2012 were about 2,000 metric tons, with large interannual fluctuations. Fishing effort remained quite stable over the last decade. Anchovy biomass, estimated by acoustic methods, experienced large interannual fluctuations, ranging from a minimum of 3,100 tons in 2008 to a maximum of 23,000 tons in 2001. Current (2012) acoustic biomass estimate is above the average over the considered period (14,319 t vs.11,320 t), with an increase of +182% respect to 2011 biomass estimate.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice has also been provided by STECF. A new assessment based on both production model (BioDyn) and harvest ratios (catches/biomass from survey) were done at the GFCM-WGSASP in 2014 and endorsed by GFCM-SAC. Landings data for GSA16 were obtained from DCF for the years 2006-2012 and from census information (on deck interviews) in Sciacca port (1998-2012). Acoustic data were used for fish biomass evaluations over the period 1998-2012. The area surveyed extends over the continental shelf from the southern coast of Sicily to a depth of about 200 m.

The input data used for the adopted modelling approach was total yearly catch (tons) and as an abundance index CPUE (Catch per unit of effort, kg fished considering all trips of the gear) over the period (1990-2012), assuming that CPUE is an indicator of the stock abundance. 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 time-series of acoustic biomass estimates cover the period 1998 – 2012.

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

In 2014 GFCM-SAC agreed to use both $E_{MSY} \leqslant 0.4$ and $F_{MSY} = 0.07$ calculated from the production model. Tentative biomass RP were discussed and adopted by GFCM-SAC as $B_{lim}=0.2*B_{virgin}$ and $B_{pa} =0.5*B_{virgin}$. B_{virgin} was fixed as the maximum biomass values observed in the series (B2001=22950 t). The following values were obtained: B_{lim} = 4950 t, B_{pa} = 11475 t, B_{MSY} = 21908 t (from production model).

STOCK STATUS: Anchovy biomass, estimated by acoustic methods, experienced large interannual fluctuations, ranging from a minimum of 3,100 t in 2008 to a maximum of 23,000 tons in 2001. Current (2012) acoustic biomass estimate is above the average over the considered period (14,319 t vs. 11,320 t), with an increase of +182% respect to 2011 biomass estimate. Consequently, considering as reference point the exploitation rate $E_{MSY} \leqslant 0.4$, the stock could be considered as subjected to overfishing. An overfishing status in 2012 was also derived from the production model (F_{cur}/F_{MSY}=212%). Using the above reported RP, the current biomass estimate (14,319 tons, 2012 value) is below B_{MSY} (21,908 tons), but it is well above the adopted estimated Blim and Bpa.

GFCM-WGSASP however concluded that the assessment is uncertain. The catches and the biomass estimates provide opposite trends and the performances of the model are low. The overall picture shows a decreasing trend in biomass, a harvest rate that is fluctuating up to really high values (in 2011 was about 80%) and an increase in F. Empirical RP not reliable since an historical maximum or minimum is not obvious in the time series available.

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 stock biomass 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, the biomass declined again in 2011 and fishing mortality levels over the last years are higher than those required to achieve MSY. Given that the stock is currently overexploited, fishing mortality should be reduced by means of a multi-annual management plan until there is evidence for stock recovery. According to the MSY estimate the annual catch should be no more than 1449 tons.

The SAC endorsed stock status and advice and accepted to consider the assessment as qualitative.

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 (e.g. TAC) 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 considers that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to E = 0.4 or below. STECF agrees also with the GFCM-SAC comments on the identified precautionary RPs. Empirical RPs appear not reliable since an historical maximum or minimum is not obvious in the time series available for the stock. In addition, STECF noted that the estimated F_{MSY} (0.07) appears too low for a fast growing species like anchovy and the estimate should be re-evaluated.

STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

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

The results from the most recent assessment and advice for this stock were released in 2014 by STECF and the GFCM-SAC. STECF-EWG 14-09 carried out a combined assessment for anchovy in GSAs 17-18.

FISHERIES: Anchovies are fished by purse seiners and pelagic trawlers belonging to Italy, Croatia and Slovenia. The fishery takes place all year round: a closure period is observed from the Italian pelagic trawlers on August, while from 15th December to 15th January in Croatian purse seiners. In 2011 the closure season for the Italian fleet was extended to 60 days (August and September). Exploitation is based on all the age classes from 0 to 3+. The Italian small pelagic fishery concentrates mainly on anchovy, while the Croatian catches mainly represent sardine. The Italian fleet is composed of about 65 pairs of mid-water trawlers and about 45 purse seiners (with quite different tonnage), with the former being predominant on the latter ones. In Croatia, small pelagic (mainly sardine) are fished by purse seiners. In 2012 Slovenia had 5 actively fishing purse seiners and one active pair of pelagic trawlers. From 1988 the trend in landings is increasing with a maximum of 47055 tons in 2007. The Slovenian catches are low, less than 150 tons in 2011.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF. The present assessment of this stock has been carried out by means of VPA (i.e. ICA), tuned with echo-survey data (2000-2011), during the GFCM-SAC WG on small pelagic (WGSASP) in October 2012. Catch and fishing effort data were collected for the period 2000-2011 along with biological data. Length frequency and age length data were combined to obtain annual catch-at-age series from 2000 onwards, which represented the basic input of VPA. STECF 12-19 also conducted an assessment of the stock in December 2012. The assessment was based on the same model but using the full time series (i.e. 1975-2011). The last assessments were done at the STECF-EWG 13-19 and GFCM-WGSASP. Both Integrated Catch Analysis (ICA) and State-Space Assessment Model (SAM) with acoustic tuning are considered by GFCM for the advice. The two models used for the assessment show some differences in the historical part of the time series (both minimum and maximum levels).

Nevertheless, from 1997 the two models give the same results, with just a small discrepancy in the last couple of year.

REFERENCE POINTS: The GFCM-SAC proposed in 2012 the following reference points as a basis for management advice:

E_{MSY} (F/Z, F age range 1-3) $\leqslant$ 0.4. B_{lim} (179000 tons based on B_{loss}) and B_{pa} (250600 tons based on $B_{pa}=B_{lim}*1.4$) reference points. Biomass is expressed as total biomass.

STECF-EWG 13-19 proposed the following reference points as a basis for management advice: F_{MSY} = 0.38 (age range 1-3). B_{lim} (38791 tons) and B_{pa} (54307 tons) reference points. Biomass is expressed as spawning stock biomass.

STOCK STATUS: Due to the uncertainties in the stock assessment models, the biomass for 2012 is the average between the estimated 2012 biomass from ICA and SAM: the same principle has been applied to F and E. At the present the stock can be considered as "overexploited and in overexploitation": in fact, the biomass is low (between 12th and 19th percentile for respectively ICA and SAM) and E is higher than the reference point of 0.4. Besides, the total biomass (183.600 t) is slightly higher than the established B_{lim} and lower than B_{pa}. Exploitation rate is higher than E_{MSY} .

STECF concluded that based on SAM results the anchovy stock size fluctuated over the time period examined. Namely, maximum values of the SSB were obtained in 1978 (around 480,000 t; estimated for age 0-5). After that, the stock started to decline reaching a minimum level in 1986 (around 67,000 t). In the following years the stock started recovering until 2005, when the biomass reached its second maximum (SSB at 360,000 tons). From 2005, the stock started to decline again, reaching in 2012 a SSB biomass level of around 124,000 tons. The level of anchovy SSB in 2012 estimated for age 1 to 5 only (i.e. excluding age 0; 30431 t) is lower than the estimated reference point for both Blim and Bpa estimated by EWG 13-19.The F of ages 1 and 2 was strongly fluctuating in the observed time series. F reached high levels between 2009 and 2011 (1.52 in 2011), but in 2012 lower values were estimated (0.80). The F estimated from the SAM model ($F_{bar(1-2)}$ =0.80) is above the F_{MSY} reference point (F = 0.38) estimated during EWG 13-19. The exploitation rate in 1986, between 2000 and 2003, and in 2008-2012, is above the reference point limit estimated from Patterson for small pelagics (E=0.4). Nevertheless, in 2012, exploitation rate shows a decreasing trend, reaching the value of 0.43, just slightly above the proposed reference value of 0.4.

RECENT MANAGEMENT ADVICE: The GFCM-SAC advised to reduce fishing mortality. In this regard, according to the management plan approved for small pelagic fish in the Adriatic Sea, the current status of the stock would be classified in option 16d – ii of the plan, and therefore the advice will be to adapt F by a ratio of 0.935 (i.e. 93.5% reduction in fishing mortality).

Based on the latest assessment results, STECF concluded that the stock is currently considered to be exploited at a rate that is inconsistent with proposed reference points. STECF consider that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to F_{MSY} = 0.38 or below, corresponding to catches of 13,432 t. 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 (i.e. TAC) 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 considers that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to F = 0.38 and catches of 13.432 tons or below. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

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

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27). STECF-EWG 14-09 carried out a combined assessment for anchovy in GSAs 17-18.

FISHERIES: In Italy anchovy is exploited by pelagic trawl, purse seine and to a lower level by bottom trawl, which generate a certain amount of 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 was not 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:

E_{MSY} (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 uncertainty 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 (e.g. TAC) 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.

STECF consider that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to E = 0.40 or below. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in

the Mediterranean Sea. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.9 Anchovy (*Engraulis encrasicolus*) in Geographical Sub Areas 17 and 18. Northern and Southern Adriatic Sea

The STECF-EWG 14 08 considered that it may be useful to explore additional means to reconstruct the time-series of the landings for GSA 18, in order to combine the two GSAs with the aim of delivering more robust assessment results. No strong scientific evidence emerged to justify separate assessments for the stocks of anchovy in GSA 17 and 18 and therefore the EWG considers that anchovy in GSAs 17 and 18 should be combined in a single assessment. However, when combining the two GSAs, it is crucial to avoid the breakdown of the long time series of GSA 17. This is especially important when considering the fact that GSA 17 contains by far the largest part of the stocks of both species. A first assessment of anchovy in GSA 17 and 18 combined was carried out during the STECF-EWG 14-09.

FISHERIES: Anchovy is commercially very important in the Adriatic Sea (GSAs 17 and 18): it is targeted by pelagic trawlers (Italy) and purse seiners (Italy, Croatia, Slovenia, Montenegro, and Albania). The number of vessels targeting this species is around 400. Most of the Italian boats whose port of registry is located in GSA 18 actually fish and land in GSA 17. In Montenegro most of the catches are originated from small-scale beach seine fisheries and from the fishery with small purse seiners in coastal waters (< 70 m depth); currently, the three existing large purse seiners as well as the pelagic trawler are currently not active due to market constrains and lack of skilled fishers (UNEP-MAP-RAC/SPA. 2014): the catches therefore are really low (FAO-Statistic Database) but no information on the real magnitude and on length structure of the catches are available. Such as for Montenegro, almost no information are available for Albania, nevertheless from the FAO database it appears that also Albanian catches are small.
A multi–annual management plan for small pelagic fisheries in the Adriatic Sea has been established by the GFCM in 2012. Besides, Italy has been enforcing for years a general regulation concerning the fishing gears and since 1988 a suspension (about one month) of fishing activity of pelagic trawlers in summer. A closure period is observed from 15th December to 15th January from the Croatian purse seiners. A closure period of 60 days (August and September) and a closure period of 42 days were endorsed respectively in 2011-2012 and in 2013 by the Italian fleet.
Overall, observing the catch trend a collapse of anchovy catch in 1987 is evident. From 1988 the trend is increasing reaching the maximum of the entire time series in 2007 with 75,511 tons. From 2007 the catches are decreasing again.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice has been also provided by STECF. The stock of anchovy was asssessed during the STECF-EWG 14-09 using the State-space Assessment Model (SAM) in FLR environment with data from 1975 to 2013.
Data for GSA 18 were reconstructed using both DCF data and national statistics. For the period 1995-2004 an average proportion of catches in GSA 18 over the catches in GSA 17 was estimated from the total landings available from the sampling program from 2006 to 2013 (i.e. GSA18/GSA17 = 34.4%). This ratio was used to derive an estimate of GSA 18 landings from GSA 17 for the period 1995-2004. To account for the landings of Albania and Montenegro the FAO estimates (from the FAO database) were used: the average amount from 2004 to 2013 is about 20 t.

REFERENCE POINTS: The STECF proposed the following reference point as a basis for management advice: F_{MSY} =0.5; Blim excluding age 0 individuals = 42,550 t

STOCK STATUS: According to the assessment results of STECG EWG 14-09 the current F (1.04) is larger than F_{MSY} (0.50), which indicates that anchovy in GSA 17-18 is exploited unsustainably with respect to F_{MSY}. The biomass of anchovy (SSB mid-year excluding age 0 individuals = 38,960 t) in 2013 is below the limit reference points estimated through the medium term projection (Blim excluding age 0 individuals = 42,550 t). Status in relation to B_{MSY} is unknown.

RECENT MANAGEMENT ADVICE: STECF consider that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced in 2015 to F_{MSY} = 0.50 or below, corresponding to catches of 18,470 t. This should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations.

STECF COMMENTS: STECF agrees with the assessment of the stock status made by EWG 14-09 and 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 (e.g. TAC) as a more effective management tool for small pelagic in the Mediterranean.

7.10 European anchovy (*Engraulis encrasicolus*) in Geographical Sub Area 19. North-western Ionian Sea.

Due to a lack of information on the structure of anchovy population in the GSA19 (Western Ionian Sea), this stock was assumed to be confined within the boundaries of this Geographical Sub-Area.

FISHERIES: In the GSA 19 anchovy is mostly targeted by purseiners, but also by small scale driftnets, which provide from 22% (2007) and 38% (2012) of the total landings of this species in the GSA. The activity of the purseines and driftnets is more concentrated along the coasts of the Eastern Sicily and is characterized by a seasonality linked to the water temperature and the sea conditions. Therefore in the winter time the fishing activity is reduced. Catches are mainly from a depth range between 50-200 m and anchovy co-occurs with other important commercial species as *S. pilchardus, B. boops, Trachurus sp and Scomber sp*.

The data from 2006 to 2012 from DCF show a sharp decrease in landings from 2006 to 2007 and then values varying from a minimum of 560 tons in 2008 and 1048 tons in 2010.

Over the period 2006-2012 the annual fishing effort (GT*days at sea) of driftnets showed a sharp decrease in 2007 and an increase in 2011-2012 when the same effort of 2006 was reached. The trend of the purseine fishing effort showed the lowest values in 2007 and 2009 with peaks in 2006, 2008 and 2012.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. This is the first assessment of anchovy in the GSA19. The assessment of this stock was performed in 2013 by the STECF EWG 13-19 using data derived from the international survey MEDITS as fishery independent information regarding the state of anchovy in the GSA 19. However, it is worth to note that the MEDITS cannot be considered an accurate source of information of small pelagic species abundance. Due to the lack of information from eco-survey data, the EWG 13-19 applied separable VPA method to evaluate the status of this stock. The analysis has been performed for the period 2007- 2012, because the sharp decrease of landing from 2006 to 2007 was not supported by a decrease in effort and by abundance indices from MEDITS. The reference age chosen to run the separable VPA is the one most represented in the catch (age 1). A sensitivity analysis on the results with $F_{terminal}$ values 0.2, 0.4 and 0.6 was performed. The F_{curr} was calculated on ages 1-3 that are the most represented in the catches.

REFERENCE POINTS: The STECF EWG 13-19 proposes E<=0.4 as limit management reference point of exploitation consistent with high long term yield.

STOCK STATUS: The value of the exploitation rate for two terminal F (0.2 and 0.4) among the three tested was lower than or equal to the selected reference point.

However, due to the lack of eco-survey data that would represent a more reliable and independent source of information especially for better understanding the recruitment pattern over the time, the STECF EWG 13-19 decided that the results of the assessment could be only considered indicative of trends for SSB and R and thus should be taken with caution. Because of this it was not possible to evaluate the state of the stock.

RECENT MANAGEMENT ADVICE: As the assessment was only indicative of trends for SSB and R, the STECF EWG 13-19 was not able to provide any management advice.

STECF COMMENTS: STECF has no additional comments.

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

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF 13-27).

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:

The STECF proposed the following reference point as a basis for management advice:

E_{MSY} (F/Z, F age range 1-3) $\leqslant$ 0.4.

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 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 considers 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.

STECF considers that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to E = 0.40 or below. STECF also suggests that consideration be given to introducing landing

restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

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

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 reference points were proposed by GFCM-SAC for this stock.

The STECF proposed the following reference point as a basis for management advice:

E_{MSY} (F/Z, F age range 1-3) $\leqslant$ 0.4.

STOCK STATUS: 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.

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.

STECF proposes an exploitation rate E $\leqslant$ 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 sustainably 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 (e.g. TAC) 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 considers 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.

STECF considers that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to E = 0.40 or below. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.13 Sardine (*Sardina pilchardus*) in Geographical Sub Area 1. Northern Alboran Sea

The results from the most recent assessment and advice for this stock were released in 2014 by STECF and the GFCM-SAC.

FISHERIES: The fleet in GSA 01 the Northern Alborán Sea in 2009 was 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 101 in 2012. 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. In 2011 and 2012 annual sardine landings were around 6,300 tonnes. 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. STECF-EWG 13-19 performed a new assessment based on a separable VPA run setting three different scenarios for terminal F (0.3, 0.5 and 0.7) and using DCF catch data for the period 2002-2012. A new assessment based on a production model (BioDyn) was presented also at the GFCM-WGSASP in 2014 and endorsed by GFCM-SAC. The input data used for the adopted modelling approach was total yearly catch (tons) and as an abundance index CPUE (Catch per unit of effort, kg fished considering all trips of the gear) over the period (2003-2012), assuming that CPUE is an indicator of the stock abundance. A biomass data series of acoustic surveys MEDIAS was also available. The GFCM Sub-committee endorsed stock status and advice and stressed the limitation of the use of only CPUE indexes on production model. The GFCM SAC endorsed stock status and advice and stressed the limitation of the use of only CPUE indexes on production model.

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 adopted E$\leqslant$0.4, F_{MSY}=0.56 and B_{MSY}=12409 tons as reference points for the stock.

STOCK STATUS: Based on the report of the STECF EWG 13-19, STECF considers the last assessment only indicative of trend for SSB and R. The separable VPA results suggest an increasing SSB in 2011 and 2012.

Considering E⩽ 0.4 as reference point estimated for ages 0-2, it could be concluded that the sardine stock in GSA1 in the most recent years is being exploited sustainably. In any case, in the absence of fishery independent information the results of the present assessment should be considered with caution.
The GFCM-SAC 2014 classifies this stock as sustainably exploited since the estimated biomass is above B_{MSY} (B_{cur}/B_{MSY} =1.31) and overfishing is not occurring (E_{cur} = 0.36 < 0.4; F_{cur}=033<0.56). MSY is estimated to be 6961 tons.

RECENT MANAGEMENT ADVICE: Based on the report of the STECF SEGMED 13-19, STECF advised that the assessment is only indicative of trend for SSB and R.

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 (e.g. TAC) 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 agrees that in order to avoid future loss in stock productivity and landings the exploitation rate should be maintained below to E⩽0.4. Stock status remains unknown since the results from the separable VPA cannot be directly compared with the reference points derived from the BioDyn model. STECF agrees with GFCM comments about the limitation of the use of only CPUE indices in production model. Assuming CPUEs of purse seiners as indicators of stock abundance may produce misleading conclusions about stock biomass. In addition, the time series adopted to assess the stock appears too short to consistently reconstruct the stock dynamics and derive reliable MSY reference points.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 indicates a state of full exploitation for stock sardine in the Moroccan Mediterranean Sea. STECF notes that GFCM-SAC 2012 WG on small pelagics carried out an assessment combining the GSA 1, 2 and 3. However the assessment is considered preliminary, so no formal advice is provided.

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 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.

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 (e.g. TAC) 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.

7.15 Sardine (*Sardina pilchardus*) in Geographical Sub Area 4. Algeria

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

SOURCE OF MANAGEMENT ADVICE: The management advisory body is the GFCM-SAC. Shaefer model and Length Cohort Analysis (LCA) were applied.

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

STOCK STATUS: The GFCM SAC 2012 WG report states that the stock is fully exploited.

RECENT MANAGEMENT ADVICE: GFCM-SAC does not provide any advice as the assessment is considered preliminary.

STECF COMMENTS: STECF notes that the information presented on this stock and fishery is insufficient to permit an assessment of the status of the resource or its exploitation rate. Consequently, STECF is unable to advice on an appropriate exploitation rate for this stock or an appropriate catch level.

STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

7.16 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.

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 more recent assessment was performed by GFCM-WGSASP in 2014 using a non-equilibrium surplus production model (BioDyn package; FAO, 2004) on the series of observed abundance indexes, allowing for the optional incorporation of an environmental index, so that the r and/or K parameters of each year can be considered to depend on the corresponding value of the applied index. The input data used for the adopted modelling approach was total yearly catch (Tons) and as an abundance index CPUE (Catch per unit effort, kg fished considering only trips of the gear with landing of the specie) over the period (2003-2012), assuming that CPUE is an indicator of the stock abundance.

REFERENCE POINTS: E=0.4 (Patterson's reference point), F_{MSY} (=$F_{0.1}$) = 0.25, B_{MSY} = 59,298 t. **STOCK STATUS:** GFCM SAC in 2014 points out that the recent exploitation rate (E = 0.46) is higher than the Patterson's reference point (E=0.4), the F_{curr} (0.42) is higher than the $F_{0.1}$ reference point (0.25) and the B_{curr} is below B_{MSY} (B_{curr}/B_{MSY}=0.37).

The GFCM-SAC 2014 classifies the stock as "Overexploited and in overexploitation". Both landings and CPUE decreasing. The GFCM-SAC highlights the uncertainty in the assessment and methodological problems in incorporating acoustic time series in the production model, and stressed the limitation of the use of only CPUE indexes on production model.

RECENT MANAGEMENT ADVICE: GFCM-SAC 2014 advised a reduction of fishing mortality and the introduction of a multiannual management plan.
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 (e.g. TAC) 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 agrees that in order to avoid future loss in stock productivity and landings the exploitation rate should be maintained below to $E \leqslant 0.4$ and catch should not exceed the estimated MSY (16307 tons). STECF agrees with GFCM comments about the limitation of the use of only CPUE indices in production model. Assuming CPUEs of purse seiners as indicators of stock abundance may produce misleading conclusions about stock biomass. In addition, the time series adopted to assess the stock appears too short to consistently reconstruct the stock dynamics and derive reliable MSY reference points.

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

FISHERIES: The fishery is mostly composed 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 trawl 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, in 2010 to only 600 tonnes and increased in 2011 to 750 tonnes.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Data sources were time series of acoustic surveys, landings and CPUE (1993-2013). The acoustic surveys are performed at daytime in July. The acoustic assessment results are completed by an analysis of catches and fishing effort to

improve the fisheries diagnoses. The stock has been assessed in the framework of GFCM-WGSASP 2014 and STECF EWG 13-19. It was endorsed by GFCM-SAC.

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

STOCK STATUS: GFCM-WGSASP classified this stock as "Ecologically Unbalanced" with landings continuing to decrease, stable biomass, high recruitments, but the fish remaining small and in poor conditions. GFCM-SAC also pointed out that the juvenile-adult partition was not observed (disappearance of the two modes and changes in growth) this year and that there had been a change in the fishery, as in 2012 purse seiners contributed to 95% of the catch of sardine (previously around 20%).

RECENT MANAGEMENT ADVICE: GFCM-SAC suggested that fishing mortality should not be allowed to increase and monitoring of changes in the fishing effort/gears are required. Measures on effort should be improved (e.g., number of “fishing sets” for purse seiners).

STECF EWG 13-19 concluded that no advice could be given on the present basis.

STECF COMMENTS: STECF notes that in the absence of reference points the stock status cannot be fully evaluated because the high recruitment observed in the MEDIAS survey did not appear in the commercial catches in 2013 and there is an observed reduction in condition factor (mean weight at length is lower than previously observed). Such observations indicate that the stock dynamics may no longer be consistent with the modelling approach previously used.

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 (e.g. TAC) 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.

7.18 Sardine (*Sardina pilchardus*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

FISHERIES: In the GSA9, sardine is mainly exploited by purse seiners. Due to its low economic value, however, sardine does not represent the main target species for this fleet, while anchovy (*Engraulis encrasicolus*) is the most important species exploited by this fishery. The fishing season starts in spring (March) and ends in autumn (October). Favorable weather conditions and abundance in the catches can extend the fishing activity to the end of November. However, the maximum activity of the fleet is normally observed in the summer. Some vessels coming from the south of Italy (mainly from GSA10) join the local fleet. Sardine is also a by-catch in the bottom trawl fisheries. However, the landings yielded by these metiers are very low (about 1%) in comparison to purse seiners. Pelagic trawling is not carried out in the GSA9.

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 more recent assessment and advice for this stock was carried out by STECF EWG-13-19. Data from DCF provided at EWG-13-19, containing information on sardine landings and the respective age structure for 2006-2012, were used. A vector of natural mortality value by age was obtained using Gislason method (Gislason et al.,2010).Catch at age, weight at age, mortality at age and maturity at age data for the 2006-2012 period were compiled for age classes 0 to 4+ and used as input data for the Separable VPA. Separable VPA was computed for three different scenarios of terminal F(0.3, 0.5 and 0.7).

REFERENCE POINTS: The STECF EWG 13-19 considered E=0.4 as limit management reference point consistent with high long term yields for small pelagic species.

STOCK STATUS: Fishery independent information regarding the state of sardine in GSA9 was derived from the international survey MEDITS. The estimated biomass indices reveal a clear decreasing trend. The results of the separable VPA confirm this trend although in the last year the tendency was reversed. Considering E=0.4 as limit management reference point consistent with high long term yields for small pelagic species, the exploitation rate for sardine in GSA9 was higher than the reference point in all three scenarios. Thus, the stock

is considered to be exploited unsustainably. However, without a source of fisheries independent information coming from an echo-survey, the results of the present assessment should be considered as indicative of trend only.

RECENT MANAGEMENT ADVICE: For the relevant fleet assessed, the effort exploitation rate should be reduced until fishing mortality is below or at the same level of the proposed management reference point. However, as the assessment is only indicative of trend for SSB and R, thus the STECF-EWG 13-19 was not able to provide short term forecast for this stock.

STECF COMMENTS: STECF considers that in order to reduce fishing mortality to or below the proposed reference point (E=0.4) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects. STECF suggests the use of an independent source of information for assessment purposes e.g. acoustic survey data.

7.19 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 along the southern Sicilian coast (GSA16), accounting for about 2/3 of total landings in GSA 16, two fishing fleets 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 fishing activities, anchovy represents the main target species due to the higher market price.

Average sardine landings over the last decade (2002-2011) were about 1,900 tons, with a general decreasing trend until a minimum in 2010 (565 tons) followed by a sharp increase in 2011 (2,665 tons). Fishing effort has remained quite stable over the last decade.

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. The more recent assessment analysis has been carried out by GFCM-WGSASP 2014.

REFERENCE POINTS: GFCM-WGSASP proposed the following reference points: F_{MSY} = 0.16; $F_{current}$ = 0.18; B_{MSY} = 32,830 tons, calculated from surplus production model (BioDyn).

STECF has proposed E=0.4 as a limit reference point for exploitation rate. **STOCK STATUS:** The GFCM-WGSASP 2014 classified the stock status as "Overexploited and in Overexploitation". A tentative B_{lim} was discussed and adopted by the WG as 0.2*Bvirgin (Serchuck *et al.*, 1999 – also FAO; STECF 2012). Similarly, B_{pa} was established as 0.5*Bvirgin. Bvirgin was fixed as the maximum biomass values observed in the series (B_{v2000}=36,370 tons).

Using the above reported RPs, the current biomass estimate (13,407 tons, 2012 value) is well below B_{MSY} (32,830 tons), and even below B_{pa} (18,185 tons), but above the estimated B_{lim} (7,274 tons)

RECENT MANAGEMENT ADVICE: GFCM-SAC pointed out that F_{curr} is 11% higher than F_{MSY} and, given the low level of biomass, recommended to reduce the fishing mortality immediately. GFCM-SAC advised that the fishing mortality should be reduced by means of a multi-annual management plan.

STECF COMMENTS: STECF considers that in order to avoid future loss in stock productivity and landings the exploitation rate should be reduced to F_{MSY} = 0.16 or below. STECF agrees also with the GFCM-SAC comments on the identified precautionary RPs. Empirical RPs appear not reliable since an historical maximum or minimum is not obvious in the time series available for the stock. In addition,

STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

STECF agrees with the suggested reduction in fishing mortality and the introduction of a multiannual management plan.

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

The most recent assessment and advice for this stock was performed in December 2013 by STECF EWG 13-19 and 2014 GFCM-SAC. The STECF EWG 14-09 carried out a combined assessment for sardine in GSAs 17-18 (see Section 7.22).

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 2011 exceeded 50,000 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.

In 2011, a total of 122 vessels from Italy, Croatia and Slovenia, including both pelagic trawlers and purse seiners, were operating in GSA 17.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice has been also provided by STECF. The most recent assessment and advice for this stock was performed in December 2013 by STECF EWG 13-19 and 2014 GFCM-SAC. The STECF EWG 14-09 carried out a combined assessment for sardine in GSAs 17-18 (see Section 7.22). Both GFCM-WGSASP and STECF chose the SAM model as the final assessment due to better performance.

REFERENCE POINTS: STECF EWG 13-19 proposed B_{lim} = 167383 and B_{pa} = 234336 as limit and precautionary management reference points. EWG 13-19 considers that fishing mortality in 2014 should not exceed F_{MSY}= 0.46 corresponding to catches of 36,962 tons in 2014 and 42,031 tons in 2015. STECF EWG 13-19 estimated the $F_{bar\ (2-5)}$ for 2012 = 0.92, which is larger of the estimated F_{MSY} (0.46) value.

The assessment of GFCM-WGSASP in 2014 estimated the current biomass (B_{curr}=220,577 tons) to be above both B_{lim} (78,000 tons) and B_{pa} (109,200 tons) estimated in 2012 and B_{lim} (62,505 tons) and B_{pa} (125,010 tons) with the trend constantly increasing. It was concluded that since the exploitation rate $E_{(1-4)}$ was slightly higher than the empirical reference point of 0.4, the stock is to be considered "in high risk of overexploitation".

STOCK STATUS: Results of the state-space assessment model (SAM) applied by STECF EWG 13-19 indicated a constant increase of biomass in the last 10 years, being the 2012 the highest, with 220,577 tons. SSB of sardine in 2012 (220577 t) is higher than the estimated reference point for B_{lim} (167383 t) and slightly lower than the estimated reference point for B_{pa} (234336 t), and it is above both the limit and precautionary reference points B_{lim} (78000 t) and B_{pa} (109200 t) established from the GFCM-SAC in 2012.

The exploitation rate E(1-4) estimated from the GFCM-WGSASP and endorsed by GFCM-SAC was slightly higher than the empirical reference point of 0.4, therefore the stock was considered in "increased risk of being overexploited and in overexploitation".

RECENT MANAGEMENT ADVICE: STECF advises the relevant fleets' 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 considerations. The advice of GFCM-SAC for sardine stock in GSA17 is to "reduce fishing mortality". The

GFCM-WGSASP recommends investigating the age-length structure and the age-length keys from both the eastern and western side since they showed some inconsistencies, possibly due to methodological differences. In relation to the GFCM management plan approved for small pelagic fish in the Adriatic Sea the current status of the stock would be classified in option 16d – ii of the plan, and therefore the advice will be to adapt F by a ratio of 0.935.

STECF COMMENTS: STECF notes the need to move from split-year data to calendar-year data in order to simplify the calculations, limit the errors and allow the use of the most recent survey index available. STECF also suggests to review the age-structure of the acoustic data to improve the internal consistency of the survey and to obtain more reliable weight at age matrices.

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

The STECF EWG 13-19 carried out the latest single assessment for sardine in GSA 18. The text below remains largely unchanged from the STECF Consolidated Review of advice for 2014 (STECF 13-27). The STECF EWG 14-09 carried out a combined assessment for sardine in GSAs 17-18 (see Section 7.22).

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.

It is worthy to note that Albanian and Montenegrin catches are really low respect to the Italian ones (less than 1% for anchovy and about 11% for sardine). Besides, the Italian boats registered in the GSA 18 most probably fish in the GSA 17 (this should be confirmed having access to VMS data). For these reasons, it seemed quite reasonable to join the data from GSA 18 and GSA 17. Nevertheless, the landings data from GSA 18 span only from 2004 to 2012.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice has been also provided by STECF. The STECF EWG 13-19 carried out the latest single assessment for sardine in GSA 18. The STECF EWG 13-19 attempted to assess the state of sardine stock in the GSA 18 using an Extended Survivors Analysis (XSA) and State-space assessment model (SAM). The data used were: Italian landing data from 2004 to 2012 from DCF, Italian catch at age data from 2006 to 2012 from DCF, Italian mean weight at age data from 2006 to 2012 from DCF, landing data of Albania and Montenegro from GFCM statistics (2004-2010), acoustic survey data for the entire GSA 18 from 2005 to 2012 from DCF, natural mortality M and maturity at age: assumed equal to the vectors used for sardine stock of GSA 17.

The STECF EWG 14-09 carried out a combined assessment for sardine in GSAs 17-18 (see Section7.22).

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

STOCK STATUS: Results from both the models were not satisfactory: the log-catchability residuals at age calculated by XSA ranged between -100 and +100. Moreover, estimates for F_{bar} reached in 2011 a value of 4, really high considering the fleet composition of GSA 18. Several attempts have been made in the parameterization of SAM, changing the aggregations of the age classes for the calculation of fishing mortality, but the model seemed to have convergence problems, probably due to the shortness of the time series. Thus the assessment was not considered as acceptable.

RECENT MANAGEMENT ADVICE: STECF EWG 13-19 suggested to join the data from GSA 18 to GSA 17. STECF EWG 13-19 also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool for small pelagics in the Mediterranean Sea.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.22 Sardine (*Sardina pilchardus*) in Geographical Sub Areas 17 and 18. Northern and Southern Adriatic Sea

The STECF-EWG 14 08 considered that it might be useful to explore additional means to reconstruct the time-series of the landings for GSA 18, in order to combine the two GSAs with the aim of delivering more robust assessment results. No strong scientific evidence emerged to justify separate assessments for the stock of sardine in GSAs 17 and 18 and therefore the EWG considered that sardine in GSAs 17 and 18 should be combined in a single assessment. However, when combining the two GSAs, it is crucial to avoid the breakdown of the long time series of GSA 17. This is especially important when considering the fact that GSA 17 contains by far the largest part of the stocks of both species. A first assessment of sardine in GSA 17 and 18 combined was carried out during the STECF-EWG 14-09.

FISHERIES: Sardine is a commercially very important species in the Adriatic Sea: it is targeted mainly by pelagic trawlers (Italy) and purse seiners (Croatia, Slovenia, Italy). The number of vessels targeting this species is around 400. Most of the Italian boats whose port of registry is located in GSA 18 actually fish and land in GSA 17. In Montenegro most of the catches are originated from small-scale beach seine fisheries from the fishery with small purse seiners in coastal waters (< 70 m depth); currently, the three existing large purse seiners as well as the pelagic trawler are currently not active due to market constrains and lack of skilled fishers (UNEP-MAP-RAC/SPA. 2014): the catches therefore are likely to be rather low (FAO-Statistic Database) but no information on the real magnitude and on length structure of the catches are available. Such as for Montenegro, almost no information are available for Albania, nevertheless from the FAO database it appears that also Albanian catches are small. The catches started to decrease in the late eighties reaching a minimum in 2005 with 19,000 tons. In the last 8 years the Croatian catches grew high, reaching the maximum of the entire time series in 2013 with about 52,931 tons (about 83% of the overall catches).

A multi–annual management plan for small pelagic fisheries in the Adriatic Sea has been established by the GFCM in 2012. Besides, Italy has been enforcing for years a general regulation concerning the fishing gears and since 1988 a suspension (about one month) of fishing activity of pelagic trawlers in summer. A closure period is observed from 15th December to 15th January from the Croatian purse seiners. A closure period of 60 days and a closure period of 42 days was endorsed from the Italian fleet respectively in 2011-2012 and in 2013.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice has been also provided by STECF. The stock of anchovy was assessed during the STECF-EWG 14 09 using the State-space Assessment Model (SAM) in FLR environment with data from 1975 to 2013. Age 0 was not included in the model: the high natural mortality, in fact, drives the biomass to really high and quite unrealistic values. Since age 0 is not largely represented in the catches, the EWG 14-09 decided not to include it in the assessment. Concerning GSA 17, landings and catch at age data from 2004 were available through the DCF database for Italy and Slovenia. For Croatia, data from 2004 to 2012 were available through the Croatian experts, since Croatia is participating to the Data Collection Program starting in 2013. Data for GSA 18 were reconstructed using both DCF data and national statistics. For the period 1995-2004 an average proportion of catches in GSA 18 over the catches in GSA 17 was estimated from the total landings available from the sampling program from 2006 to 2013 (i.e. GSA18/GSA17 = 12.3%). This ratio was used to derive an estimate of GSA 18 landings from GSA 17 for the period 1995-2004. To account for the landings of Albania and Montenegro the FAO estimates (from the FAO database) were used: the average amount from 2004 to 2013 is about 20 t.

REFERENCE POINTS: The STECF-EWG 14-09 proposed the following reference point as a basis for management advice: F_{MSY} =0.23; Blim (SSB basis) excluding age 0 individuals = 153.507 tons.

STOCK STATUS: The assessment results of the STECF EWG 14-09 indicated a constant increase in total biomass starting in the late nineties, with almost stable values in the last 5 years, with a value of 336,045 tons in 2013. The same trend is reflected in the spawning stock biomass mid-year estimate that is estimated at 174,905

tons in 2013. According to this estimate the SSB in 2013 is above the B_{lim} reference point. Based on SAM results, the F_{bar} (1-3) shows the highest value in 2002 equal to 0.6 and then decrease; the estimated value for 2013 is 0.53. Thus, the current F (0.53) is larger than F_{MSY} (0.23), which indicates that sardine in GSA 17-18 is exploited unsustainably with respect to F_{MSY}.

RECENT MANAGEMENT ADVICE: The STECF EWG 14-09 advised the relevant fleets' effort be reduced until fishing mortality is below or at the proposed F_{MSY} level corresponding to a catch of 24,554 tons in 2015, 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 agrees with the assessment of the stock status made by EWG 14-09 and consider that in order to avoid future loss in stock productivity and landings the fishing mortality rate should be reduced to F = 0.23 or below.

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 (e.g. TAC) as a more effective management tool for small pelagic in the Mediterranean.

7.23 Sardine (*Sardina pilchardus*) in Geographical Sub Area 20. Eastern Ionian Sea

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 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 (e.g. TAC) 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 agrees with the assessment of the stock status made by SGMED-10-02 and consider that in order to avoid future loss in stock productivity and landings the fishing mortality rate should be reduced to E = 0.40 or below.. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 agrees with the assessment of the stock status made by SGMED-11-20 and consider that in order to avoid future loss in stock productivity and landings the fishing mortality rate should be reduced to E = 0.40 or below. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

7.25 Sprat (*Sprattus sprattus*) in Geographical Sub Area 17. Northern Adriatic and Central Adriatic

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

FISHERIES: Sprat is fished by the same fleet targeting anchovy and sardine (see Section 7.20 - 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 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 (e.g. TAC) 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 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 advice on an appropriate exploitation rate for this stock. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

7.26 Mackerel (*Scomber japonicus*) in Geographical Sub Area 3. Southern Alboran Sea

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 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 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 advice on an appropriate exploitation rate for this stock. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea.

In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.27 Horse mackerel (*Trachurus trachurus*) in Geographical Sub Area 3. Southern Alboran Sea

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 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 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 advice on an appropriate exploitation rate for this stock. STECF also suggests that consideration be given to introducing landing restrictions (e.g. TAC) as a more effective management tool to control the exploitation rate on small pelagics in the Mediterranean Sea. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.28 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 assessments of the stock of *Mullus surmuletus* in the GSA 05 were provided by STECF EWG 11-20 in January 2012 on the time data series 2000-2010, presented to the GFCM WG on Demersal Fish in November 2012 and endorsed by GFCM-SAC. The last update of the stock assessment was provided by STECF EWG 13-19 in December2013 on the time data series 2000-2012, presented to the GFCM WGSAD in January 2014 and endorsed by GFCM-SAC 16-2014.

REFERENCE POINTS: STECF EWG 13-19 and GFCM-SAC 16-2014 proposes the following reference point as a basis for management advice:

$F_{0.1}$=0.18.

STOCK STATUS: Based on the report of the GFCM WGSAD in January 2014 and STECF EWG 13-27 the stock of striped red mullet in GSA 05 is assessed as in overfishing as current F (0.54) is above the proposed $F_{0.1}$ reference point (0.18). SSB and stock biomass consistently declined over the time series since 2000 to the lowest value of the time series in 2009, increased in 2010, lowered in 2011 and decreased markedly in 2012.

RECENT MANAGEMENT ADVICE: The GFCM WGSAD in January 2014 and STECF EWG 13-19 recommended to reduce fishing mortalities by reducing the effort activity and improving the selection pattern of the fishery. The use of the information from the vessel monitoring system will also help to improve the knowledge about the spatial distribution of the fishing effort. The GFCM SAC endorses the advice. The recommendation to use VMS for the assessment/management of the stock is not sustained in the assessment sheet presented to the GFCM WGSAD. The GFCM SAC recommends to incorporate all information and discussion that led to the recommendation given in future reports. 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-fishery considerations to be developed and fully implemented.

STECF COMMENTS: STECF agrees with the recommendations of the GFCM SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015. STECF agrees with the assessment of the stock status made by EWG 13-19 and GFCM SAC and consider that in order to avoid future loss in stock productivity and landings the fishing mortality rate should be reduced to F = 0.18 or below corresponding to a catch of 25 tons in 2014 and 34.7 tons in 2015.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 2011 proposes 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-fishery considerations to be developed and fully implemented.

STECF COMMENTS: STECF agrees with GFCM-SAC advice to reduce fishing mortality.

7.30 Striped red mullet (*Mullus surmuletus*) in Geographical Sub Areas 12, 13, 14. Northern Tunisia, Gulf of Hammamet, Gulf of Gabès

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

7.31 Striped red mullet (*Mullus surmuletus*) in Geographical Sub Area 11. Sardinian Sea

FISHERIES: Striped red mullet (*Mullus surmuletus*) is one of the most important demersal target species for the commercial fisheries in Sardinia (GSA11). This species is distributed between 0 and 600 m of depth, even though may be commonly found on shelf bottoms. Generally bigger individuals are found at greater depths, mainly in summer and winter, while smaller ones are found in shallow waters where in summer, after the pelagic phase, they recruit to the bottom becoming very concentrated close to the coast. Juveniles show a patchy distribution with some main density hot spots (nurseries) showing a high spatial and temporal persistence in western and southern areas.

In this area striped red mullet is exploited by trawlers and set netters, which operate near shore. Particularly, during the period of post-recruitment (August-October), small trawlers target this species on shallower waters, near the cost.

According to official statistics the total annual landings for all species over the period 2011-2012 was on average around 3700 tons of which *M. surmuletus* constituted around the 9.8%. Landings of striped red mullet come almost exclusively from bottom trawlers and trammel nets. The trawl fleet landed around the 33% and the 54% in 2011 and 2012 respectively. The gill nets landings account yearly for about the 5% of the total.

In 2011 the percentage of discards (53%) was incredible high for this species, that generally has low discards. In 2012 discard was less than 14% for the trammel net and trawl fleets and around 45% for the gillnets (0% in the 2011).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body is the GFCM-SAC. The assessment was made by the STECF EWG 13-19 in 2013. A long time-series of fishery independent information (MEDITS survey, 1994-2012) were available to EWG 13-19, but landing information were not available before 2011 (DCF). Moreover, DCF catch data showed a series of issues which were probably related to the raising procedure and the sampling design of data collection in GSA11. In particular, checks of catch data at length showed that samples were not comparable with independent fishery data (MEDITS) and that, especially for trammel and gill nets, fisheries samplings had been improperly expanded. Consequently, the EWG 13-19 is unable to fully evaluate the quality of DCF data.

REFERENCE POINTS: No limit and precautionary management reference points could be proposed.

STOCK STATUS: Because of the shortness of the time series of catch data and because of its questionable quality, EGW 13-19 is unable to apply any method for the evaluation of the state of the stock.

RECENT MANAGEMENT ADVICE: The GFCM SAC has not released any advice on this stock. As the findings of the STECF EWG 13-19 were inconclusive with respect to stock status, STECF is unable to give any informed management advice for red mullet in GSA 11.

STECF COMMENTS: STECF has no additional comments.

7.32 Striped red mullet (*Mullus surmuletus*) in Geographical Sub Areas 15 and 16. Malta Island-South of Sicily

FISHERIES: Striped red mullet (*Mullus surmuletus*) is an important demersal target species in the Strait of Sicily (GSA 15 and 16). On average 73% of total striped red mullet landings in GSA 15 came from trawlers in 2007-2012. In GSA 16 the proportion of landings coming from bottom otter trawlers was 88% in 2004-2012, the remaining catches coming from fixed nets fisheries, especially trammel nets. Small amounts of striped red mullet are landed as by-catch from set gillnets (less than 0.5% of catches in both GSAs). The total striped red mullet landings for Italian and Maltese fleets combined in the period 2002-2012 decreased from 2616 tonnes in 2002 to 753 tonnes in 2012. The Maltese landings have increased in 2005-2012, from 7.4 tons in 2005 to 75 tons in 2012. With regards to fishing effort, data submitted by Italy and Malta in response to the annual EU fisheries Data Collection Framework (DCF) data-call in 2013 revealed a 40% decrease in fishing effort for Italian bottom otter trawl vessels larger than 24 m in the period 2004-2012. Maltese vessels were only responsible for 3.5% of total trawling effort in GSAs 15 and 16 in 2012, however the total nominal effort of Maltese trawlers increased by 78% in 2005-2012.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body is the GFCM-SAC. The assessment was performed by the STECF EWG 13-19 in 2013. The state of exploitation was assessed for the period 2002-2012 applying an Extended Survivor Analysis (XSA), calibrated with fishery independent survey abundance indices (MEDITS), and a yield-per-recruit (Y/R) analysis. Both methods were performed from the size composition of trawl and small-scale fishery landings, transforming length data to ages using the slicing statistical approach developed during STECF-EWG 11-12 (Scott et al., 2011). Input data were taken from DCF. Natural mortality vector was estimated using PRODBIOM. The assessment was also presented at the GFCM-WGSAD held at the beginning of 2014 and then endorsed by GFCM-SAC 16 2014.

REFERENCE POINTS: F_{MSY}=0.19 ($F_{0.1}$ basis) was proposed as reference point. No precautionary biomass reference points have been proposed for this stock.

STOCK STATUS: SSB fluctuated around a mean level of 1850 tons, with levels recorded in 2012 (2462 tons) similar to those estimated for 2007 and 2002. The lowest levels estimated for the time series were 1043 tons in 2009. Due to the lack of biomass reference points the EWG 13-19 and the GFCM-WGSAD were unable to evaluate the status of the stock spawning biomass in respect to these. Recruitment fluctuated around a mean level of 52000 thousands individuals, with levels recorded in 2012 (42000 thousands individuals) almost half of that estimated for 2011 (78000 thousands individuals), but higher than the value recorded in 2010 (19000 thousands individuals), which was the lowest recorded during the time series (2002-2012).
Exploitation is mostly based on age classes 1-3. The estimated value of $F_{current}$ (2012) was 0.78, and the ratio $F_{curr}/F_{0.1}$ 4.1. Hence, it was concluded that the stock is exploited unsustainably.

RECENT MANAGEMENT ADVICE: The GFCM-WGSAD suggested to repeat this assessment in 2014 with the inclusion of Tunisian catch data if available.

The STECF EWG 13-19 and GFCM SAC recommended the relevant fleets' effort and/or catches to be reduced until fishing mortality is below or at the proposed level F_{01} corresponding to a catch of 600 tons in 2014 and 874 tons in 2015, 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 STECF EWG 13-19 and GFCM-SAC recommendation.

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

FISHERIES: The Egyptian Mediterranean coast is about 1100 km extending from El-Salloum in the West to Taba city in the East. The mean annual fish production from this area is about 50 thousand ton (GAFRD; 1991-2007). The main fishing gears operated in this region are trawling, purse-seining and lining, especially long and hand lining.

The fishing grounds along the Egyptian Mediterranean coast are divided into four regions, namely: Western region (Alexandria and El-Mex, Abu-Qir, Rashid, El-Maadya and Mersa Matrouh); Eastern region (Port Said and El-Arish); Demietta region; and Nile Delta region. Red mullets are among the most valuable and highly

priced fish species in Egypt, though widely distributed along the entire coast of Mediterranean, their major fisheries are located on the area from Alexandria to Port Said. Red mullet are mainly exploited by the trawl fishery and contributed about 10% of the total trawl landings in the Egyptian Mediterranean (GAFRD annual reports). The catch of Red mullet is composed mainly of two species: *Mullus surmuletus* and *M. barbatus*, while some species of Red Sea origin have been recorded in the eastern Mediterranean. The striped red mullet, *Mullus surmuletus* is the most common species in the catch and constituted about 65% of red mullet landings. The number of trawl vessels which operated in the Egyptian Mediterranean ranged between 1100 and 1500 during 1991-2007. The vessel length varies between 18 and 22 m and width from 4 to 6 m.

SOURCE OF MANAGEMENT ADVICE: Analyses were based upon monthly length frequency distributions from trawl catches for the period January 2011 till December 2012 within a pilot study in the framework of FAO-EastMed project. Yield per recruit, biomass per recruit and biological reference points were estimated. VIT software was used for pseudo cohort analysis. In addition, the Y/R analysis implemented in the VIT was applied for the calculation of the reference point $F_{0.1}$

REFERENCE POINTS: Proposed Reference points: $F_{0.1}$=0.22

STOCK STATUS: Based on the report of the GFCM WGSAD in January 2014, the current F was 0.46. GFCM-SAC recognised that the stock was in a high overfishing status during 2011-2012.

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended to reduce the fishing mortality through fishing activity limitations. Improvement of the selection pattern of trawl fishery and enforcement of the application of the closed season will help in protecting the SSB. The lack of enforcement of the existing regulations, specifically the closed season during the last three years, can have a strong effect in this stock.

STECF COMMENTS: To achieve the objective of achieving F_{MSY} in 2015, fishing mortality in 2015 should be reduced by 52%.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no further comments.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF agrees with the recommendations of the GCFM SAC.

7.36 Red mullet (*Mullus barbatus*) in Geographical Sub area 5. Balearic Island, Spain

FISHERIES: The two species of red mullet inhabiting the Mediterranean, *Mullus surmuletus* and *M. barbatus*, are present in the GSA 5. However, *M. surmuletus* predominates in this area where the species is targeted by both the artisanal and trawl fleet working along the continental shelf. On the contrary, *M. barbatus* is caught as a by-catch species by trawlers operating mainly on the deep shelf. In the Balearic Islands, *M. surmuletus* and *M. barbatus* represent about 80% and 20% of the total red mullet catches respectively. During the 2000-2009 period, the landings of *M. barbatus* from Mallorca ranged between 10.5 and 27.8 tons. In 2011they amounted to 25.5 tons and in 2012 decreased to 15.9 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 last update of the stock assessment was provided by the STECF EWG 13-19n December 2013, presented to the GFCM-WGSAD in January 2014 and endorsed by GFCM-SAC 16-2014. An XSA tuned with abundance indices from MEDITS surveys (N/km^2) was performed using catch data (official DCF Data Call and IEO projects) for the period 2000-2012 (obtained from the

REFERENCE POINTS: The STECF EWG 13-19 and GFCM-SAC 16-2014 proposed the following reference points as a basis for management advice: F_{MSY}=0.15 ($F_{0.1}$ basis).

STOCK STATUS: No clear trend was identified for both SSB and R, with oscillations along the entire data series.
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 years 2011-2012. The current F (mean 2010-2012, ages 1-2) = 0.93 and the ratio F_{CURR} / $F_{0.1}$= 6.64 estimated by the GFCM-SAC 16-2014 indicated that the red mullet in GSA 5 is in a high overfishing status with relative low biomass level.

RECENT MANAGEMENT ADVICE: Based on the report of the GFCM-WGSAD 2014, the GFCM-SAC 16-2014 advised to reduce the fishing effort by 40% to 60% through reducing the effort activity and improving the selection pattern of the fishery.

STECF COMMENTS: STECF agrees with the advice of the GFCM-SAC that fishing mortality needs to be reduced from recent variable levels to the estimated F_{MSY}=0.15, corresponding to a catch of 3.4 tons in 2014 and 6.3 tons in 2015.

7.37 Red mullet (*Mullus barbatus*) in Geographical Sub Area 6. Northern Spain

FISHERIES: The total trawl fleet in the GSA 06 has declined from 810 boats in 1998 to 478 boats in 2012. 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 *Mullus barbatus* increased considerably between 1970s 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 fourthquarter, 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 made by individuals of age 1+ (adults). After the enforcement of the new mesh type in 2010 (40 mm square or alternatively 50mm diamond) catches in 2011 and 2012 were around 1070 tons and mainly composed by individuals of age groups 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 last update of the stock assessment was provided by the STECF EWG 14-09 and GFCM-WGSAD in January 2014. This was endorsed by GFCM-SAC 16-2014. Biological parameters are the same used in previous assessments of this stock (STECF EWG 13-19). XSA and projections were run using standard R scripts considering landings and MEDITS data for the period 1998-2012...

REFERENCE POINTS: STECF EWG 14-09 proposed the following reference points as a basis for management advice: F_{MSY} = 0.45 ($F_{0.1}$ basis); no precautionary biomass reference points have been proposed for this stock.

STOCK STATUS: Based on the report of the STECF EWG 14-09 the current F (1.47) is larger than F_{MSY} (0.45), which indicates that red mullet in GSA 6 is exploited unsustainably. The SSB showed a peak of 1884 tons in 2003 and minimum values of 800-860 tons in 2008-2009, followed by an increasing trendwhich led to the highest values of the data series in 2013 (2012 tons). Recruitment showed a maximum of $127 \cdot 10^6$ individuals in 2003, with a decreasing trend until reaching a minimum of $39 \cdot 10^6$ individuals in 2009, after that it started to increase again.

RECENT MANAGEMENT ADVICE: STECF EWG 14-09 advised the relevant fleets' 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 considerations. STECW EWG estimated that, in order to respect the proosed F_{MSY} (0.45), the catches in 2015 should not exceed 660 tons.

STECF COMMENTS: STECF agrees with the advice from the STECF EWG 14-09.

7.38 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. Information on French gillnetters is available for 2011. Between 2004 and 2012, around 100 boats were involved in the fishery. According to official statistics, during this period the total annual landings oscillated around an average value of 190 tons (280 tons 2013) and the French trawlers dominated the fishery, as they represented 76% of the boats and 83% of the landings.

Between 2010 and 2012 the number of trawlers decreased by 20% and it decreased by 40% over the 2004-2012 period. This follows management measures to reduce the number of boats. A temporary closure of 1 month by year for the trawlers has been enforced since 2011..

Catch is mainly composed by individuals of age 0, 1 and 2, while the oldest age class (5+ group) is poorly represented. In GSA 7, the trawl fishery is a multi-specific fishery. 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.rench and Spanish trawl fisheries developed along the continental shelf of the Gulf of Lions are multi-specific fisheries.

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 by the STECF EWG 14-09. For France, fishing effort data was provided on a yearly basis for OTB, OTM and GNS over the period 2012-2013. No data were available for the period 2002-2011. For Spain, fishing effort was provided for OTB over 2002-2012. During EWG 14-09 an assessment was made (using XSA tuned using MEDITS survey data) for the period 2004-2012. XSA was run considering age classes from 0 to 4+. The 'a4a' framework was used to run a variety of statistical catch at age models and compared the results to XSA.

REFERENCE POINTS: The STECF EWG 14-09 proposed the following reference point as a basis for management advice: F_{MSY}= 0.14. No precautionary biomass reference points have been proposed for this stock.

STOCK STATUS: Based on the report of the STECF EWG 14-09, The SSB shows an increasing trend since 2008. Due to the absence of reference points for biomass, the STECF EWG 14-09 was unable to evaluate the status of the stock spawning biomass in respect to these. The recruitment showed some increasing trends over the period with the highest values observed in the very recent years. The exploitation level is currently above the level estimated to be sustainable since the current fishing mortality ($F_{current\ (2011-2013)}$) is equal to 0.45. The exploitation is mainly concentrated on young individuals (age 0-2).

RECENT MANAGEMENT ADVICE: The STECF EWG 14-09 advised the relevant fleets' effort 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. In order to reach the proposed FMSY the catches in 2015 should be reduced to around 195 tons. However, this objective could be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations.

It is advisable a reduction of the fishing mortality for the fisheries that target the stock and an improvement of the exploitation pattern, which currently mainly target age 0 individuals. Such combination of exploitation rate and pattern does not allow a sustainable and productive exploitation of the stock.

STECF COMMENTS: STECF agrees with the advice from the STECF EWG 14-09.

7.39 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 GSA 9. The species is mainly exploited by a fleet of about 200 bottom trawlers, and the catches derived from artisanal fisheries are negligible. *Mullus barbatus* catch rates are much higher in late summer-autumn.

Annual landings, mostly coming from trawling, ranged from 1050 to 693 tons from 2006 and 2013. Discards of undersized individuals is in general limited (10% in weight in 2006), mainly occurring in autumn when new recruits are concentrated near the shore. Illegal landings of juveniles may occur but can be considered of limited importance and less important in recent years. 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 by the STECF EWG 14-09. An XSA implemented in R was performed to estimate the vector of F at age, using data on total annual catches by size, including discard and MEDITS survey data till 2013.. Short term prediction for 2014 and 2015 was implemented in R (www.r-project.org) using the FLR libraries and based on the results of the stock assessment performed with XSA method.

REFERENCE POINTS: STECF EWG 14-09 proposed the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = 0.6$.

STOCK STATUS: Based on the report of the STECF EWG 14-09, the species is considered overexploited, with quite consistent estimates of the current fishing mortality (0.70) obtained with the 2 alternative approaches (XSA and ASPIC) higher than the proposed reference points (F_{MSY} =0.60 from Y/R analysis and F_{MSY}=0.60 with the production model). SSB shows some variability throughout the time series, but no major trend is observed in recent years. Recruitment shows a fairly stable level along the time series, with a slight increase in the more recent year

RECENT MANAGEMENT ADVICE: STECF EWG 14-09 advised the relevant fleets' 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. In 2015 the catches should not exceed 700 tons in order to reach the proposed $F_{MSY.}$ However, this should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations.
It is advisable a reduction of the fishing mortality for the fisheries that target the stock and an improvement of the exploitation pattern, which currently mainly target age 0 individuals. Such combination of exploitation rate and pattern does not allow a sustainable and productive exploitation of the stock.

STECF COMMENTS: STECF agrees with the advice of the STECF EWG 14-09.

7.40 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. During late summer-early autumn (September-October), the species is intensely fished. About three-four months after settlement, red mullet spreads up to depths of about 100 m.

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 performed by the GFCM-WGSAD in 2014 and it was endorsed by the GFCM-SAC 16-2014. The commercial landing time series (2006-2012) and the LFDs by fleet segment from DCF were used for the assessment. MEDITS trawl survey data from 1994 to 2012 have been used in the analysis. The biological parameters estimated within DFC for the area were also used (growth parameters, length-weight relationship, sex ratio and maturity. The vector of natural mortality by age was calculated from Caddy´s formula, using the PROBIOM Excel spreadsheet (Abella et al., 1997).

As the time series covers the total number of age classes in landing (0 to 3+) at least one time was possible to make an attempt of assessment using XSA (Extended Survivors Analysis) on the times series 2006-2012.

REFERENCE POINTS: The GFCM-WGSAD proposes the following reference point as a basis for management advice: $F_{0.1} = 0.55$;

STOCK STATUS: Based on the report of the GFCM-WGSAD the stock seems sustainably exploited, being exploited at level of F (0.44) lower than the reference point (0.55). The level of biomass is intermediate according to MEDITS survey data.

RECENT MANAGEMENT ADVICE: The GFCM-SAC 16-2014 recommended to not increasing the relevant fleets' effort and/or catches to maintain fishing mortality in line with the agreed reference point. It is recommended to continue monitoring the stock next year.

STECF COMMENTS: STECF agrees with the advice from the GFCM SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.41 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 occurred. 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 dropped in 2008 and 2009. Since 2004 the total annual landings varied between 225 and 354 tons, with a consistent drop (-22% of the 6 years mean) in 2009. During 2005-2012 annual catches ranged between 171 tons in 2011 and 136 tons in 2012 with a mean of 268.7 t. The landings were mainly from demersal otter trawls (catches from other gears were 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 present assessment was done by the STECF EWG 13-19 basing on both indirect and surveys data (MEDITS, GRUND). The status of the stock was assessed by means of XSA and SURBA. 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: The STECF-EWG 13-19 proposed the following reference point as a basis for management advice: $F_{0.1} = 0.11$. No reference points for the SSB were proposed.

STOCK STATUS: MEDITS abundance (n/km²) and biomass (kg/km²) indices do not indicate any significant trends. Since no biomass reference are proposed or agreed, EWG 13-19 was unable to fully evaluate the state of the stock size in respect to biomass. However, taking into account the results obtained by the XSA analysis (current F = 1.07), the stock is considered to be exploited unsustainably.

RECENT MANAGEMENT ADVICE: The STECF-EWG 13-19 suggested that catches in 2014 should not exceed 37 tons, corresponding to $F_{0.1} = 0.11$.
The STECF-EWG 13-19 highlighted that the lack of information did not compromise the main signal of an overfishing status of the stock but the estimation of the reference points and F values would be improved using a better quality of input data for the assessment. It is worthy of note that the species seems to be harvested on continental shelf mainly from otter trawls targeting to an assemblage of coastal species. A multispecies approach should be considered for the management of this stock.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.42 Red mullet (*Mullus barbatus*) in Geographical Sub Area 17. Adriatic Sea

FISHERIES: In the Adriatic, red mullet is one of the main target species of the trawlers' fleets. The species is mainly fished by otter bottom trawl nets; very few quantities are also caught with set nets and rapido trawl. Different management regulation are applied in Italian and in Croatian waters. Fishing closure for Italian trawlers for 45 days in late summer have been enforced in 2011-2012 for the Italian fleet. Before 2011 the

closure period was 30 days in summer. Minimum landing sizes: EC regulation 1967/2006 defined 11 cm TL as minimum legal landing size for red mullet.

Along the Croatian coast bottom trawl fisheries is mainly regulated by spatial and temporal fisheries regulation measures and about 1/3 of territorial sea is closed to bottom trawl fisheries over whole year. Bottom trawl fishery is also closed half year in the majority of the inner sea. Mannini and Massa (2000) analysed trends of the red mullet landings in the Adriatic from 1972 to 1997. In that period, the landings showed an overall increase. This positive trend was constant in the western Adriatic, while in the eastern Adriatic landings decreased during the second half of the 1990s. Estimations of total mortality and analyses of trawl survey data were carried out during the 80s showing respectively an overfishing situation for the stock and higher abundances in the eastern side of the sub-basing (Arneri and Jukic, 1985)

Landings data for the Italian and Slovenian fleets were reported by the DCF, while Croatian data come from official statistics of the Fisheries Department and data were collected through logbooks. The Italian catches remained above 3000 tons from 2006 to 2009 and then started to decrease, reaching the minimum in 2012 with less than 2000 tons. The Croatian catches remained lower than 1000 tons during the time series except in 2011, when they increased up to around 1000 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 provided by the STECF was made by the STECF EWG 13-19. The assessment was performed using two methods: an XSA based on 2006-2012 DCF data (landings and age composition of the catches), tuned with fishery independent abundance indices (MEDITs and SoleMon surveys) for the period 2006-2012, and a SCAA based on 2006-2012 DCF data (landings and age composition of the catches), by gear (otter bottom trawl from Italy, Croatia and Slovenia), tuned with fishery independent abundance indices (MEDITS and SoleMon surveys) for the period 2000-2012. Total landings by gear and country were reconstructed based on data available in the ISTAT and FAO-FishstaJ database. A vector of natural mortality was obtained applying PRODBIOM. In addition, Yield per Recruit (YPR) analysis was performed for the estimation of $F_{0.1}$ (i.e. proxy of F_{MSY}). The STECF EWG 13-19 considered SCAA as the most accurate methodology to assess the red mullet stock.

Another assessment was performed at the GFCM-WGSAD in 2014 only using the XSA. This assessment was endorsed by the GFCM-SAC 16-2014. The two assessments gave different results.

REFERENCE POINTS: Basing on the SCAA the STECF EWG 13-09 proposed $F_{0.1} \leq 0.21$ as proxy for F_{MSY}.

The GFCM-WGSAD, basing on the XSA, proposed $F_{0.1}$ (estimated in 2012) = 0.20 as a proxy of F_{MSY}.

STOCK STATUS: The stock of red mullet in the GSA 17 is in a state of overfishing because the values of F_{CURR} estimated in the two assessments were higher (SCAA: $F_{CURR} \sim 0.55$; XSA: $F_{CURR} = 1.06$) than the proposed values of $F_{0.1}$

RECENT MANAGEMENT ADVICE: The STECF EWG 13-19 recommended the 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. In 2015 the catches should not exceed 1,900 tons in agrrement with the proposed F_{MSY}. However, this should be achieved by means of a multi-annual management plan taking into account mixed-fisheries considerations.

GFCM-SAC 16-2014 considered advisable a reduction fishing mortality towards the proposed reference point.. Considering the overfishing situation a reduction of fishing pressure and an improvement in exploitation pattern, especially of Italian trawlers exploiting a larger amount of Age 0+ group than Croatian and Slovenian trawlers, is advisable. However, from the analysis of the relative biomass observed in 2012 from MEDITS and from the SSB and total biomass estimated for the same year from XSA is possible to conclude that the abundance of the stock is high and there is not risk of stock depletion.

STECF COMMENTS: Despite the differing estimates of the recent level of fishing mortality arising from both assessment approaches, it is clear that recent fishing mortality rates exceed the candidate F_{MSY} reference points. Consequently STECF agrees with the advice from the GFCM that fishing mortality needs to be reduced.

7.43 Red mullet (*Mullus barbatus*) in Geographical Sub Area 19. Western Ionian Sea

FISHERIES: *Mullus barbatus* is among the species with high commercial value of the area. 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. During 2006-2011 annual catches ranged between 727 tons in 2006 and 360 tons in 2008. In 2011 total species' catches were 474 tons. The main components of the catches were age classes 0 and 1. In the contest of DCF 2006-2012, the landings of the red mullet from the otter bottom trawl and on lesser extent gillnet and trammel net showed abundance fluctuations from a minimum of 446 tons (2008) to a maximum of 872 tons (2006). However, the observed decreasing trend not resulted statistical significant. Generally, the discard was almost 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 assessment was done by the GFCM-GWSAD in 2014 and endorsed by the GFCM-SAC 16-2014. The methodology was a VPA applied year by year, using the VIT model on DCF data (2006-2012). The software used was VIT4win. A Y/R analysis was performed. In addition, the biomass and density index values derived from trawl surveys (Medits time series 1994-2012) were also observed throughout indicating an empirical relative condition in the stock biomass. **REFERENCE POINTS:** The GFCM-GWSAD proposed $F_{MSY} = 0.38$ ($F_{0.1}$ basis) as reference point.

STOCK STATUS: the GFCM-GWSAD assessed the stock to be in a status of high overfishing with relative intermediate biomass level, being the $F_{CURR} = 1.17$ and the ratio $F_{CURR} / F_{0.1} = 3.13$.

RECENT MANAGEMENT ADVICE: The GFCM-SAC 16-2014 considers that the objectives of a more sustainable harvest strategy could be achieved with a multiannual plan based on a reduction of the fishing mortality through fishing activity limitations and possibly fishing capacity decreasing, mostly focused on trawling.

STECF COMMENTS: STECF agrees with the advice from the GFCM-SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

FISHERIES: *Mullus barbatus* 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 (2005-2013) 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 STECF-EWG 14-09 in July 2013 basing on both indirect and surveys data (MEDITS).The initial derived abundance indices at age data of red mullet from the MEDITs survey did not give satisfactory results running an XSA, and therefore the STECF EWG 14-09 applied a separable VPA method to evaluate the status of this stock.

REFERENCE POINTS: The STECF EWG 14-09 proposed $F_{0.1}$ (as a proxy for F_{MSY}) = 0.303 as reference point. No precautionary biomass reference points have been proposed for this stock

STOCK STATUS: The results of the separable VPA showed a slight increase in spawning stock biomass from 2010 to 2013. Due to the absence of biomass reference points the EWG 14-09 was unable to evaluate the status of the stock spawning biomass in respect to these. The separable VPA showed a slight decrease of recruitment in 2013. The STECF EWG 14-09 was unable to evaluate the current level of F and hence the status of the exploitation of the stock.

RECENT MANAGEMENT ADVICE: STECF EWG 14-09 considers the assessment is only indicative of trend for SSB and R, the state of the stock cannot be defined and thus STECF EWG 14-09 was not able to provide management recommendations.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

FISHERIES: European hake is one of the target demersal species of the Mediterranean fishing fleets, largely exploited in GSA 1 mainly by trawlers (95% landings) on the shelf and slope, and by small-scale fisheries using gillnets (3%) and long lines (2%) on the shelf (average 2009-2012). The trawling fleet in the GSA 1 area is made up of 183 boats, averaging 35 GRT and 176 HP. During the last years, an increase in landings was observed, starting in 2002 and reaching the maximum value in 2004, followed by stabilization in catches (around 300 tons) during the period 2005-2008. Catches increased from 2009 to 2011 reaching 614 tons (the highest in the series) and then decreased to 418 tons in 2012.

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 carried out by the GFCM-WGSAD in 2014 and endorsed by the GFCM-SAC 16-2014. The analysis based on Spanish DCF data size composition of trawl catches and official landings from 2003 to 2012. VPA tuned with CPUE from commercial fleet and abundance indices from MEDITS trawl surveys was carried out applying the XSA method (Lowestoft program) over the whole period. A retrospective analysis and a yield per recruit (Y/R) analysis based on the exploitation pattern resulting from the XSA model and population parameters for the entire period was carried out.

REFERENCE POINTS: GFCM-WGSAD proposed $F_{0.1} = 0.22$ as reference point and proxy of F_{MSY}

STOCK STATUS: GFCM-WGSAD considers the stock is overexploited since the current F (1.64) is seven times higher than the F_{MSY}. Relative intermediate biomass; B_{CURR} = 1090(t), Biomass at 33 rd percentile = 890(t). The continued low abundance of adult fish in the surveyed population and landings indicate a very high exploitation rate far in excess of those achieving high yields and low risk of fisheries collapse.

RECENT MANAGEMENT ADVICE: GFCM-SAC 16-2014 advises that a reduction of the current fishing mortality is recommended by reducing the fishing effort and improving the selection pattern of the fishery.

STECF COMMENTS: STECF agrees with the advice given by GFCM SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.46 European hake (*Merluccius merluccius*) in Geographical Sub Area 3. Southern Alboran Sea

FISHERIES: In GSA 03 hake is caught by trawlers which exploit a mixed-species fish assemblage. In 2009 the overall trawl fleet of Morocco consisted of 121 vessels. Total annual landings for the period 2003-2012 oscillated between 132 and 547 tons. The effort targeting European hake oscillated between 7,200 and 11,100 fishing days and the CPUE ranged from 14,5 and 75 kg/fishing day. The fishery is multispecific and exploits a highly diversified species: the deep water pink shrimp (*Parapenaeus longirostris*), the common octopus (*Octopus vulgaris*), the axillary sea-bream (*Pagellus acarne*), the bogue (*Boops boops*), the red mullet (*Mullus barbatus*), the striped mullet (*Mullus surmuletus*), the European conger (*Conger conger*) and others fishes, Crustaceans and Cephalopods 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 most recent stock assessment available to STECF was carried out by the GFCM-SAC 16-2014. The data used in this assessment were obtained by biological sampling for length frequencies landed during 2003-2013 in the GSA 03 corresponding to the Moroccan Mediterranean waters at the ports of Nador and Al hoceima. Four models were applied for the assessment of the status of the stock. The 4 methodologies applied were VPA and Yield per Recruit using the software VIT, the LCA and

Yield per recruit using Pedro De Baros Excel sheet, the Yield per Recruit using the Hajo excel sheet and the Production Model 8 using Pedro De Baros Excel sheet.

REFERENCE POINTS: The 4 models did not allow to identify a common value of F as reference point

STOCK STATUS: GFCM-SAC 16-2014 considered that no management advice could be derived from the results.

RECENT MANAGEMENT ADVICE: GFCM-SAC 16-2014 the assessment was not endorsed

STECF COMMENTS: STECF has no further comment.

7.47 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 European hake, it is also an important by-catch in the upper slope and, in a lower level, in the middle slope. All hake catches from this area come exclusively from bottom trawlers. Annual landings of hake in 2011 was about 89.7 tons (36 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 stock assessment available to STECF was carried out by the GFCM-SAC 16-2014 using anExtended Survivor Analysis (XSA), tuned with MEDITS CPUEs, yield per recruit analysis and short-term forecast..

REFERENCE POINTS: GFCM-SAC 16-2014 proposed the following reference points as a basis for management advice:

$F_{0.1} = 0.18$

STOCK STATUS: GFCM-SAC 16-2014 concluded that the stock is in high overfishing status with relative high biomass as the F_{CURR} (mean 2010-2012, ages 0-2) was higher(1.52) than the proposed $F_{0.1}$ and the ratio $F_{CURR} / F_{0.1}$ was 8.44.

RECENT MANAGEMENT ADVICE: GFCM-SAC 16-2014 advises to reduce fishing mortality. Although an updated of growth parameters is recommended after certain years, the growth parameters used in the last assessment were the most reliable considering that otholiths reading for this species has stopped in Spain, following an agreement in the ICES area, due to the problems in otolith reading. The same applies to GSA 1 and GSA 7. This was considered an issue to be taken into consideration.

STECF COMMENTS: STECF agrees with the advice given by GFCM SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.48 European hake (*Merluccius merluccius*) in Geographical Sub Area 6. Northern Spain

FISHERIES: Hake is one of the most important target species for the trawl fisheries in GSA 6. It is also caught by longliners, and gill and trammel netters. The annual landings of this species, which are mainly composed by juveniles living on the continental shelf, fluctuated around 3,100 tons since 2005. Landings by fishing gears other than bottom trawl represented less than 10% of the annual total catches over 2002-2013, except 2006-2007 (around 15%). The trawl fleet in GSA 6 has been decreasing over the last 10 years, from around 670 vessels in 2004-2005 to 540 in 2012.

Trawl fisheries in GSA 6 are regulated by “Orden AAA/2808/2012” published in the Spanish Official Bulletin (BOE nº 313 29 December 2012) containing an Integral Management Plan for Mediterranean fishery resources.

To the traditional fisheries regulations already in place (e.g. the daily and weekly fishing effort limited to 12 hours per day five days a week; trawl cod end 40 mm square mesh or 50 mm diamond stretched mesh; engine power of maximum 373 kW; license system; minimum landing size of 20 cm TL), this plan adds that fishing mortality for hake in GSA 6 should be kept at or below the reference value $F_{MSY} = 0.15$ and that fishing effort be reduced by 20% or more over the period 2013-2017 (based on the effort established on 1 January 2013). This fishing effort reduction will be measured in terms of number of vessels, engine power and tonnage.

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 STECF EWG 14-09 using data coming from DCF annual landings (t) in GSA 6 in the period 2002-2013, by fishing gear. Stock assessment using XSA was performed, calibrated with fishery independent survey abundance indices (MEDITS) for the period 2002-2013. A deterministic short term prediction for the period 2014 to 2016 was performed using the FLR routines provided by JRC, based on the results of the XSA stock assessments performed during EWG 14-09 for the years 2002–2013.

REFERENCE POINTS: STECF EWG 14-09 proposes the following reference points as a basis for management advice: $F_{MSY} = 0.15$ ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: Based on the report of the STECF EWG 14-09 no clear trends were identified for SSB, with oscillations around 1500 t in the period 2002-2013. The current F (1.48) is larger than F_{MSY} (0.15) and the ratio F_{curr}/F_{MSY} is 9.87, indicating that hake in GSA 6 is exploited unsustainably. No precautionary biomass reference points have been proposed for this stock. As a result, EWG 14-09 was unable to evaluate the status of the stock spawning biomass in respect to these.

In the period 2002-2013 recruitment decreased from 346 to around 110 millions. In 2010- 2012 recruitment values were the lowest of the whole period.

RECENT MANAGEMENT ADVICE: The STECF EWG 14-09 noted that, according with the proposed F_{MSY} in 2015 the catches should not exceed 680 tons. STECF EWG 14-09 advised that, in order to achieve this objective, a reduction in trawling fishing effort, along with a reduction of gillnet and long lining effort is recommended in the context of a multi-annual management plan taking into account the multi-species landings of the trawl fishery.

STECF COMMENTS: STECF agrees this advice.

7.49 European hake (*Merluccius merluccius*) in Geographical Sub area 7. Gulf of Lions.

FISHERIES: Hake is one of the most important demersal target species for the commercial fisheries in the Gulf of Lions (GSA 7). In this area, hake is exploited by French trawlers, French gillnetters, Spanish trawlers and Spanish longliners. Since 1998, an average of 243 boats have been involved in this fishery and, according to official statistics, the total annual landings for the period 1998-2013 have oscillated around an average value of 2008 tons (1690.03 tons in 2013). In 2009, because of the large decline of small pelagic fish species in the area, the trawlers fishing small pelagics have diverted their effort on demersal species. Between 1998 and 2013, the number of French trawlers operating in the GSA 07 has decreased by 39%, while it decreased by 20% between 2010 and 2013.The French trawler fleet is the largest both for the number of boats and the catch realised (41% and 72%, respectively). The length of hake in the trawler catches ranges between 3 and 92 cm total length (TL), with an average size of 21 cm TL. The second largest fleet is the French gillnetters (41 and 14% respectively, range 13-86 cm TL and average size 39 cm TL), followed by the Spanish trawlers (11 and 8%, respectively, range 5-88 cm TL, and average size 24 cm TL), and the Spanish longliners (6 and 6%, respectively, range 22-96 cm TL and average size 52 cm TL).

The hake trawlers exploits a highly diversified species assemblage: Striped red mullet (*Mullus surmuletus*), red mullet (*Mullus barbatus*), angler fish (*Lophius piscatorius*), black-bellied angler fish (*Lophius budegassa*), European conger (*Conger conger*), poor-cod (*Trisopterus minutus capelanus*), fourspotted megrim (*Lepidorhombus boscii*), soles (*Solea spp.*), horned octopus (*Eledone cirrhosa*), squids (*Illex coindetii*), gilthead seabream (*Sparus aurata*), European seabass (*Dicentrarchus labrax*), seabreams (*Pagellus spp.*), blue whiting (*Micromesistius poutassou*) and tub gurnard (*Chelidonichtys lucerna*).

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 STECF EWG 14-09. The information used for the assessment of the stock consisted in annual size composition of catches (official landings) and biological parameters estimated from data collected. The vector of natural mortality by age was calculated from Caddy´s formula, using the PROBIOM Excel spreadsheet (Abella et al., 1997). For the period of the study (1998-2012), the methodology applied were: 1) a tuned virtual population analysis (VPA), applying the XSA method considering, as tuning fleet French MEDITS survey indices; 2) the a4a method using the same time series of the XSA The software used was FLR. For 2012, the reference point F0.1 was not re-estimated since 2011, because of no rationale for that. The reference point of 2011 was estimated using the yield per recruit (Y/R) analysis. XSA retrospective analysis did not show any trend. Short term predictions were run in R (www.r-project.org) using the FLR libraries (http://www.flr-project.org/) and the results of the a4a model. The input parameters were the same used for the a4a stock assessment and its results. An average of the last three years has been used for weight at age, maturity at age and F at age. The assessment was also submitted to the GFCM-SAC 16-2014

REFERENCE POINTS: STECF EWG 14-09 proposes F_{MSY} = 0.17 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: Being F_{CURR} (mean last 3 years, ages 0-3) =1.67 and the ratio F_{CURR} /F_{MSY} = 9.82, the

STECF EWG 14-09 and GFCM-SAC 16-2014 concluded that the stock is in a high overfishing status with a relative low abundance with periodically higher recruitments (1998, 2001-2002 and 2007) which ensured the sustainability of the stock at the lower level of abundance of the series. Since 2007, the recruitment has reached the lowest level of the historical series 1998-2012.

The SSB shows a decreasing trend over the analyzed period. Since the older individuals, older than age 3, are not fished and very poorly sampled by the MEDITS survey, the SSB level can not be estimated with high confidence. In the absence of a precautionary reference point the STECF EWG 14-09 was unable to fully evaluate the stock size status.

The highest recruitment values observed over the period are in 1998, 2002-2003 and 2007. Since 2007, the recruitment follows a decreasing trend and is currently at a low level.

RECENT MANAGEMENT ADVICE: STECF EWG 14-09 considers the exploitation level above the level estimated to be sustainable. The exploitation is mainly concentrated on younger individuals. In order to fit with the proposed F_{MSY} in 2015 the catches should not exceed 220 tons.. The important decrease in capacity of the french trawler fleet since 1998, reducing the number of boats by 39%, is likely to start to have an effect on the stock and STECF EWG 14-09 recommends to pursue in that direction so that this trend could be confirmed. STECF EWG 14-09 also 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.

And GFCM-SAC 16-2014 considers:

- Improve the fishing pattern of the trawlers so that the minimum length of catches is consistent with the minimum legal landing size

- Reduce the effort of trawlers, longliners and gillnetters.

- Freezing of the effort in the Fishery Restricted Area

It is important to notice that some management measures have been taken since 2011 (reduction from 2010 to 2012 by 20% of the number of trawlers). This measure was enforced in 2013. Also, temporary closures for the trawlers (1 month per year) are enforced since 2011.

STECF COMMENTS: STECF agrees with the advice from the STECF EWG 14-09 and the GFCM SAC..

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

FISHERIES: Hake is one of the main target species of bottom trawlers in the GSA 9 in terms of landings, incomes and vessels involved. The analysis of available information suggests that about 50% of landings of

hake are obtained by bottom trawl vessels, the remaining fraction being provided by artisanal vessels using set nets, in particular gillnets.

The trawl fleet of GSA 9 accounted for 301 vessels in 2012 based in several ports: Viareggio, Livorno, Porto Santo Stefano, Civitavecchia, Fiumicino, Anzio, Terracina, Gaeta, Formia.They accomplish daily fishing trips exploiting both continental shelf and slope areas. Hake fishing grounds comprise all the soft bottoms of continental shelf and the upper part of continental slope. Fishing pressure shows a spatial pattern inside the GSA 9 according to the distribution of the fleets and the distance of the fishing grounds from the main ports.

The artisanal fleets, according to the last official data (2012), accounted for 1266 vessels that operate in several harbours along the continental and insular coasts. Of these, about 40 vessels, mainly located in some harbors of the GSA 9 (e.g. Marina di Campo, Ponza, Porto Santo Stefano), utilize gillnets and target medium and large-sized hakes (larger than 25 cm TL), mainly from November to May.

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 14-09 has provided the most recent advice. A 40 years' time series of hake catches in the GSA 9 was obtained from the official FAO landings statistic. These landings data were compared with the official DCF landings for the period 2004-2010 to derive a scaling factor to be applied over the entire time series.

The state of exploitation was assessed for the period 2005-2013 applying an Extended Survivor Analysis (XSA) method calibrated with fishery independent survey abundance indices (MEDITS). In addition, a yield-per-recruit (Y/R) analysis was carried out. Both methods were performed from the size composition of trawl and small-scale fishery landings, transforming length data to ages using the slicing statistical approach developed during STECF-EWG 11-12 (Scott et al., 2011). Input data were taken from DCF. Natural mortality vector was estimated using PRODBIOM.

Short term prediction for 2014 and 2015 was implemented in R (www.r-project.org) using the FLR libraries and based on the results of the stock assessment performed with XSA method conducted in the framework of the EWG 14-09.

REFERENCE POINTS: STECF EWG 14-09 proposed F_{MSY} = 0.22 ($F_{0.1}$ basis) as a management reference point.

STOCK STATUS: STECF EWG 14-09 classified the stock as being subject to overfishing since current the current F (1.30) is larger than F_{MSY} (0.22), and the ratio F_{CURR} /F_{MAX} is 5.91, which indicates that hake in GSA 9 is exploited unsustainably. Recruitment ranged between 50 and 120 million in the period 2005-2013 with a decreasing trend over the analysed time series. In 2005-2013, the SSB was estimate to be between 790 and 1419 t with levels estimated in 2012-2013 lower to levels calculated for 2005-2011. No precautionary biomass reference points have been proposed for this stock. As a result, EWG 14-09 is unable to evaluate the status of the stock spawning biomass in respect to these.

RECENT MANAGEMENT ADVICE:

STECF considers that in order to reduce fishing mortality to or below the proposed $F_{MSY}$and to avoid future loss in stock productivity and landings the catches in 2015 should not exceed 450 tons. STECF also considers that the reduction of fishing effort and catches of fleets that exploit this stock would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF agrees with the advice from the STECF EWG 14-09.

7.51 European hake (*Merluccius merluccius*) in Geographical Sub Area 10. Southern and Central Tyrrhenian Sea.

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: *M. merluccius* is with red mullet and deep-water pink shrimp a 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*. The landings fluctuates around 1,100 and 1,600 tons with the maximum in 2006 and the minimum in 2012 (1082 tons). Most part of the landings of hake is from trawlers and nets (GNS and GTR), however 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 2013 by EWG 13-09.

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

F_{MSY} = F0.1 ≤ 0.14

F CURRENT = 0.96

STOCK STATUS: The stock appeared to be subject to overfishing in 2006-2012 and a considerable reduction in fishing mortality is necessary to approach the F_{MSY} reference point.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF notes that current F is estimated to be well above the proposed FMSY reference point and continued fishing at such a level poses a serious risk to the productivity of the stock and the future viability of the fishery.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

An attempt to assess the stock was done during STECF-EWG 13-09, however due to data limitation, the assessment has not been accepted.

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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

STOCK STATUS: STECF concluded that the stock is exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF notes that current F is estimated to be well above the proposed FMSY reference point and continued fishing at such a level poses a serious risk to the productivity of the stock and the future viability of the fishery.

7.53 European hake (*Merluccius merluccius*) in Geographical Sub Areas 12-16. Strait of Sicily

FISHERIES: Hake, *Merluccius merluccius*, is one of the most important demersal target species of the commercial fisheries in the south-central Mediterranean Sea (GFCM-GSAs12-16). In this area, hake is exploited by 5 fishing fleet components: Italian coastal trawlers, Italian distant trawlers, Tunisian trawlers, Tunisian gillnets and Maltese trawlers. Annual landings of hake for 2010-2012 was about 2000 tons. Trawlers targeting hake exploit a highly diversified species assemblage: Striped mullet (*Mullus surmuletus*), Red mullet (*Mullus barbatus*), Angler (*Lophius piscatorius*), Black-bellied angler (*Lophius budegassa*), European conger (*Conger conger*). Length frequency distribution of hake catches ranges between 8 and 66 cm total length (TL), with an average size of 20 cm TL.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The joint assessment of this stock was made in 2014 by the GFCM-WGSAD. The assessment was performed using length cohort analysis (LCA) and Yield per Recruit as implemented in VIT4Win (Lleonart and Salat 1992, 1997) and ANALEN. Current mean F and exploitation pattern were assessed using the steady state LCA by length on LFD of 2010, 2011 and 2012 and by mean data 2010-2012.

The assessment was endorsed by GFCM-SAC 16 2014.

REFERENCE POINTS: The GFCM-WGSAD proposed F_{MSY}=0.1 ($F_{0.1}$ basis) as reference point.

STOCK STATUS: The values of $F_{current}$ showed a progressive increase in the study period (2010-2012). The results of the assessment revealed a high (growth) overfishing status and low abundance of the stock being the ratio $F_{curr}/F_{0.1}$ = 5.8. The stock is subjected to growth overfishing.

RECENT MANAGEMENT ADVICE: The GFCM-SAC recommended F be reduced in order to reach the proposed value of $F_{0.1}$ and the fishing pattern improved by increasing the selectivity of gears to reduce the pressure on juveniles

STECF COMMENTS: STECF agrees with the assessment of the stock status and with the advice from the GFCM-SAC. The STECF also notes that the pressure on juveniles might be further reduced by adopting time and/or spatial management measures such as to decrease the fishing time at sea, especially in the areas with higher concentration of juveniles.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

A new joint stock assessment based on data from GSAS 12-16 has been performed (See Section7.53).

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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. The stock is exploited by a fleet of Italian, Maltese and Tunisian trawlers and gillnetters. In 2011 the Italian fleet landed about 65% of the total annual landing (1672 tons). 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.

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.
In 2012 an assessment covering a wider area (GSA 12-13-14-15-16) was attempted by GFCM working group on demersal species. This assessment was however considered as preliminary and not endorsed by the GFCM SAC.

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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF notes that current F is estimated to be well above the proposed FMSY reference point and continued fishing at such a level poses a serious risk to the productivity of the stock and the future viability of the fishery.

7.55 European hake (*Merluccius merluccius*) in Geographical Sub Area 17 Adriatic Sea.

FISHERIES: The fisheries for hake are one of the most important in the GSA 17. Fishing grounds mostly correspond to the distribution of the stock (SEC (2002) 1374). In GSA 17 hake is a target species of the Italian and Croatian otter trawlers as well as Croatian artisanal vessels using long lines and gillnets.

Management regulations applicable in 2014-2015 Italy, Slovenia and Croatia:

- Fishing closure for trawling: 30-60 days in summer.
- Minimum landing sizes: EC regulation 1967/2006: 20 cm TL for hake.
- Cod end mesh size of trawl nets: 40 mm (stretched, diamond meshes) till 30/05/2010. From 1/6/2010 the existing nets will be replaced with a cod end with 40 mm (stretched) square meshes or a cod end with 50 mm (stretched) diamond meshes.
- Towed gears are not allowed within three nautical miles from the coast or at depths less than 50 m when this depth is reached at a distance less than 3 miles from the coast.

Moreover, Croatia maintained regulation measures applied before 2013:

Bottom trawl fisheries is closed one NM from the coast and island in inner sea, 2 NM around island on the open sea, and 3 NM about several island in the central Adriatic. Bottom trawl fisheries are closed also in the majority of channel area and bays. About 1/3 of the territorial waters is closed for bottom trawl fisheries over whole year and additionally 10% is closed from 100-300 days per years.

On the basis of DCR data for Italy through DCR from 2006 to 2013, from Slovenia from 2005 to 2013 and from Croatia (2013) landings are due mainly to bottom otter trawlers. However, on the basis of STECF 13-05 report, the species is target also for Croatian long liners and for Croatian gill-net.

According to the FAO statistics, in the Adriatic Sea, the annual landings of hake in the 1980s and 1990s were estimated at around 2,000-4,000 t, with some peaks over 5,000 tons. A decreasing trend occurred from 1993 to 2000, followed by a positive trend.

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 undertaken in 2014 by STECF EWG 14-09. . The analyses have been performed according to steady state VPA using VIT program (Lleonart and Salat, 1992) only on 2013, because of inconsistencies and incompleteness of data in DCF for 2012.

REFERENCE POINTS: STECF EWG 14-09 proposes
$F_{MSY} = F_{0.1} =$ 0.28 as proxy for F_{MSY} and as limit management reference point consistent with high long term yields.

STOCK STATUS: The current F (1.01) was larger than F_{MSY} (0.28), which indicates that hake in GSA 17 is exploited unsustainably. The STECF EWG 14-09 was unable to provide any scientific advice of the state of the SSB given the preliminary state of the data and analyses. No precautionary biomass reference points have been proposed for this stock. As a result, EWG 14-09 was unable to evaluate the status of the stock spawning biomass in respect to these.

RECENT MANAGEMENT ADVICE: STECF EWG 14-09 advices the relevant fleets' 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 considerations.

STECF COMMENTS: STECF agrees with the advice from the STECF EWG 14-09. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.56 European hake (*Merluccius merluccius*) in Geographical Sub Area 18. Southern Adriatic Sea

FISHERIES: Hake is one of the most important species in the Geographical Sub Area 18 representing more than 20% of landings from trawlers. In this area, hake is exploited by trawlers, especially of demersal métier, from Italy, Albania and Montenegro. Italian longliners also exploit this stock. Around 700 boats are potentially involved in this fishery. Total annual landings obtained by DCF for Italy and by National Statistics for Albania and Montenegro for the years 2007-2012 are in the range 4639 (2008) to 3406 (2012), which is the lower value in the time series. The fishing effort in terms of nominal effort (kW*days) (DCF data for Italy) is decreasing. The bulk of the catches is from age 0 and 1 in each year of the time series with average numbers of 31,879 and 26,877 individuals (in thousands) respectively. 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*. As observed in 2012, the production of hake in GSA 18 is split in 17% caught by Italian longlines, 74% by Italian trawlers, about 1% by Montenegrin trawlers and about 8% by Albania 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 assessments were performed by STECF-EWG 13-19 in 2013 and GFCM WGSAD in 2014. This latter was endorsed by GFCM-SAC 16-2014. The information used for the assessment of the stock consisted of annual size composition of catches (estimated from quarterly sampling in the main landing ports), official landings, and biological parameters estimated from data collected in the GSA18 (2007-2012) for the DCF. The vector of natural mortality by age was calculated from Caddy´s formula, using the PROBIOM Excel spreadsheet (Abella et al., 1997)

For the period of the study (2007-2012), the methodology applied was a tuned VPA, applying the XSA method considering as tuning fleet MEDITS survey indices of the GSA. The software used was FLR. The FLR script for estimating reference points was also used. Simulation analysis to predict the effects of possible management options were accomplished using ALADYM model that was parameterized using the outputs from XSA as regards mortality and recruitment, while growth, natural mortality, length weight relationships were the same inputs as XSA. Fishing mortality was shaped by selectivity models. Three scenarios were simulated: one with a gradual decrease of the fishing mortality to reach F0.1 in 2020, a second scenario with the increase of mesh size to 60 mm in 2014 and a third one with a fishing ban of one month for all the fleets (additional for the Italy trawlers).

REFERENCE POINTS: GFCM-SAC 16-2014 proposed F_{MSY} = 0.18 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: GFCM-SAC 16-2014 considered the stock in a high overfishing status and intermediate biomass (estimates on the MEDITS survey time series) as the current F (1.0) was higher than the proposed reference point.

RECENT MANAGEMENT ADVICE: GFCM-SAC 16-2014 objectives of a more sustainable harvest strategy could be achieved with a multiannual plan that foresees a reduction of fishing mortality through fishing limitations. The stock is characterized by fluctuations of recruitment and abundance, which contribute to sustain the catches. Overfishing is currently occurring as current fishing mortality exceeds the $F_{0.1}$ levels and thus it is necessary to consider a considerable reduction of the fishing mortality to allow the achievement of $F_{0.1.}$

STECF COMMENTS: STECF agrees with the advice of GFCM-SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.57 European hake (*Merluccius merluccius*) in Geographical Sub Area 19. Western Ionian Sea

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: European hake is fished with bottom trawl (OTB) and different small-scale gears (long-line (LLS), gillnet (GNS) and trammel net (GTR)). The main fisheries operating in GSA 19 are from Gallipoli, Taranto, Schiavonea and Crotone. The fishing pressure varies between fisheries and fishing grounds. Over 2006-2012, annual landings ranged between 1565 t in 2006 and 657 t in 2012.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. The most updated assessment was undertaken in 2013 by STECF EWG-13-09.

REFERENCE POINTS: Precautionary reference points have not been proposed for this stock.

$F_{MSY} = F_{0.1} \leq 0.22$

$F_{CURRENT} = 1.21$

STECF proposes F_{MSY} = 0.22 ($F_{0.1}$ basis) as management reference point.

STOCK STATUS: The stock is considered exploited unsustainably. A considerable reduction is necessary to approach the F_{MSY} reference point.

RECENT MANAGEMENT ADVICE: The catches of hake in GSA 19 is mainly due to otter trawler, with an important contribution from longlines. STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF notes that current F is estimated to be well above the proposed FMSY reference point and continued fishing at such a level poses a serious risk to the productivity of the stock and the future viability of the fishery.

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

The results from the most recent assessment and advice for this stock were released in 2011. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

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

FISHERIES: The Italian fleets exploit this stock 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 1996-2012 (data source: FAO-FishStat; ISMEA-SISTAN and DCR 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 landing of this species was around 2000 tons in the overall GSA, and in 2012 it amounted to around 1900 tons. 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: Advice on this stock is provided by both the GFCM SAC and the STECF. The latest advice provided by the STECF was based on the stock assessment performed in 2013 during the STECF EWG 13-09, then submitted to the GFCM WGSAD in 2014 and endorsed by the GFCM-SAC 16-2014.

REFERENCE POINTS: STECF EWG 13-09 and GFCM WGSAD proposed the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.31$.

STOCK STATUS: STECF EWG 13-09 and GFCM WGSAD classified the stock status as being subject to overfishing ($F_{2012} = 0.93$).

RECENT MANAGEMENT ADVICE: STECF and GFCM-SAC recommended to reduce the fishing mortality towards the proposed reference point F_{MSY}. Considering the overexploited situation and the low values of SSB

of the sole stock in GSA 17 a reduction of fishing effort and an improvement in exploitation pattern is advisable, especially of Italian *rapido* trawlers and gillnetters, which mainly exploit juveniles.

STECF and GFCM-SAC considered that the best option to reduce effort and improve the exploitation pattern for sole in GSA 17, would be to introduce a closure for rapido trawling within 17 km of the Italian coast during the summer-fall period (June- December).

STECF and GFCM-SAC noted that in recent years, some Italian artisanal fleets fish with gill net in the main spawning area during periods when trawling is prohibited. Additional measures to restrict exploitation of sole in the spawning area are desirable, to afford further protection to the Adriatic sole stock.

STECF COMMENTS: STECF agrees with the assessment of the stock status and with the advice from STECF EWG 14-09 and GFCM-SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.60 Anglerfish (*Lophius budegassa*) in Geographical Sub Area 6. Northern Spain

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 in 2012 by STECF EWG 12-10.

REFERENCE POINTS: No STECF proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = 0.15$; $F_{CURRENT} = 0.72$

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

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

The results from the most recent assessment and advice for this stock were released in 2007. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 considers 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. STECF points out that no new assessment has been presented to the GFCM-SAC since 2007.

7.62 Blackspot seabream (*Pagellus bogaraveo*) in Geographical Sub Area 1 and 3. North and South Alboran Sea

No additional information on this stock was available to the STECF since 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: The stock is exploited by Spanish and Moroccan long-liners on the continental slope of the Alboran Sea. 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. The Spanish fleet is made up by 94 longliners. 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. In 2009-2011 the Spanish catch declined from 592 to 258 tons whereas the Moroccan catch increased slightly from 98 to 154 tons in the same period.

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 2012. A length cohort analysis was carried out on landings and length frequency data for the years 2009-2011.

REFERENCE POINTS: GFCM SAC proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.11$; $F_{40\%SSBvirgin} = 0.12$.

STOCK STATUS: Based on the report of the GFCM SAC, overfishing was occurring in 2009-2011 ($Fbar_{2-6} = 0.194 > 0.11$).

RECENT MANAGEMENT ADVICE: The joint assessment of blackspot seabream in GSAs 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. GFCM-SAC advices to reduce the effort level to set the fishing mortality level to a more sustainable value. Rationalize the management of this fishery by establishing similar management measures in both countries (Morocco and Spain).

STECF COMMENTS: STECF agrees with the advice from the GFCM SAC. STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

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

The results from the most recent assessment and advice for this stock were released in 2011. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 point 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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.64 Bogue (*Boops boops*) in Geographical Sub Area 3. Southern Alboran Sea

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 obtained by biological sampling for length frequencies of *Boops boops* 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 .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 that overfishing is taking place and advises that a management plan being implemented taking account of mixed fisheries effects with the aim of reducing fishing mortality towards the proposed F_{MSY} reference point.

7.65 Norway Lobster (*Nephrops norvegicus*) in Geographical Sub Area 05 - Balearic Island

No additional information on this stock was available to the STECF since 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 GFCM-SAC WG on demersal.

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

$F_{MSY} = F_{0.1} =$ 0.134

STOCK STATUS: GFCM-SAC considered the stock as subjected to overfishing, $F_{current}$ (0.447) is higher than F_{MSY}.

RECENT MANAGEMENT ADVICE: GFCM-SAC advised to reduce fishing mortality.

STECF COMMENTS: STECF agrees with GFCM-SAC. STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

7.66 Norway Lobster (*Nephrops norvegicus*) in GSA 6. Northern Spain.

FISHERIES: Norway lobster is caught in GSA 6 exclusively by bottom trawlers fishing on the upper slope, between 350-600 m depth. Landings of Norway lobster in GSA 6 oscillated between minimum values around 200 t and maximum values around 500 t in the period 2001-2013 with an increasing trend since 2007. The size frequency of the landings (average 2009-2013) shows a mode around 27-30 mm CL. The percentage of individuals under the MLS is less than 1%.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. In 2014 the STECF EWG 14-09 made the assessment of this stock. The assessment has been performed with a pseudocohort analysis using VIT for each available year (2009-2013).

REFERENCE POINTS: The STECF EWG 14-09 proposed F_{MSY}=0.15 ($F_{0.1}$ basis) as reference point.

STOCK STATUS: Stock abundance showed values between80-140*10^6 individuals. No precautionary biomass reference points have been proposed for this stock. As a result, the EWG 14-09 was unable to evaluate the status of the stock spawning biomass in respect to these.
The estimated value of F_{curr} (0.59) was higher than the proposed $F_{0.1}$ (0.15), indicating that the Norway lobster in GSA 6 is exploited unsustainably.

RECENT MANAGEMENT ADVICE: The STECF EWG 14-09 noted that the data series is still too short to identify any clear trend in the population parameters. However, considering the estimated value of F_{curr}, the EWG 14-09 advises the relevant fleets' effort to be reduced until fishing mortality is below or at the proposed F_{MSY} level 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 agrees with the assessment of the stock status and with the STECF EWG 14-09 advice. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.67 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 9 for total annual landing and economic 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 9 accounts for about 350 trawlers. To date about 80-100 of them are involved in this fishery. In the last eight years the total landing of Norway lobster in GSA 9 showed an evident decreasing trend, from a maximum of 260 tons in 2007 to 148 tons in 2013. The catch is mainly composed by adult individuals over the size at first maturity, while discarding of specimens under the Minimum Conservation Size (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 14-09. An XSA analysis was performed using 2006-2013 DCF data (biomass landed and age composition of the catches), tuned with fishery independent abundance indices (MEDITS survey). A vector of natural mortality was obtained applying PRODBIOM. In addition, Yield per Recruit (YPR) analysis was performed for the estimation of $F_{0.1}$ (i.e. proxy of F_{MSY}).

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 EWG 14-09 proposes the estimated $F_{MSY}=0.21$ as limit management reference point for sustainable exploitation, consistent with high long term yield. The current F (0.43) is larger than F_{MSY} (0.21), which indicates that Norway lobster in GSA 9 is exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF EWG 14-09 advised that fisheries effort 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 reducing fishing effort of the relevant fleets by means of a multi-annual management plan taking into account mixed-fisheries effects. Catches of Norway lobster in 2015 consistent with F_{MSY} would not exceed 75 tons.

STECF COMMENTS: STECF agrees with the assessment of the stock status and with the STECF EWG 14-09 advice.

7.68 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 tonnes; in 2010 Spanish trawlers landed 164 tonnes. Females dominate in the landings, nearly 70-80% of the total. The number of red shrimp vessels for the whole GSA 5 has been decreased steadily from the early 1990s, and in 2011 the fleet was made up of 17 vessels, which landed a total of 120 tonnes of blue and red shrimp.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The most recent available assessment was done by GFCM-WGSAD in 2014 and endorsed by GFCM SAC.

REFERENCE POINTS: GFCM-SAC proposed the reference points $F_{MSY} = F_{0.1} = 0.10$.

STOCK STATUS: Based on the report of the GFCM-WGSAD, overfishing was occurring in 2014 ($F_{curr} = 0.58$).

RECENT MANAGEMENT ADVICE: GFCM-SAC recommended to decrease the fishing mortality. This could be achieved through management measures like temporal fishing time reduction for periods such as the beginning of the recruitment period at the beginning of autumn.

STECF COMMENTS: STECF agrees with the advice from the GFCM-SAC. STECF considers that to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.69 Blue and red Shrimp (*Aristeus antennatus*) in Geographical Sub Area 6. Northern Spain

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: Blue and red shrimp (*Aristeus antennatus*) is one of the most important crustacean species for the trawl fisheries in GSA 6 (Northern Spain). This resource is an important component of the commercial landings in some ports of GSA 6, 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 6. Exploitation is based on very young age classes, mainly 1- and 0-year old individuals. Landings in GSA 6 over 2002-2011 fluctuated between 308 t in 2005 and 743 tons in 2009, with an average of about 600 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 stock assessment using the most updated data was done in 2012 by STECF EWG 12-10. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2002-2011; standardized indices from MEDITS bottom trawl survey were used as tuning fleets. STECF notes that GFCM-SAC 2012 WG on demersal species carried out assessments for blue and red shrimp in GSA 6, but agrees with GFCM SCSA that all data for this stock in GSA 6 should be combined in a single assessment. The STECF EWG 12-10 is thus retained as the basis for advice.

REFERENCE POINTS: STECF proposes $F \leq 0.30$ as management reference point (basis $F_{0.1}$ as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 1.05$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.70 Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 11. Sardinian Sea

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 (kwdays) 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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.71 Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Areas 12-16. Strait of Sicily

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: Giant red shrimp are a key target species for the Sicilian and Maltese bottom otter trawl fleets operating on the slope of the continental shelf in the Strait of the Sicily throughout the year. Based on the available information and the distribution of fishing ground targeted by the Sicilian long distance trawl fleet, giant red shrimp found in the Central Mediterranean GSAs 12-16 were considered to form a single stock for the purpose of this assessment. *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.* Other commercial species frequently caught together with giant red shrimp are the deep water rose shrimp (*Parapenaeus longirostris*), Norway lobster (*Nephrops norvegicus*), blue and red shrimp (*A. antennatus*), greater forkbeard (*Phycis blennoides*) and hake (*Merluccius merluccius*). Yield for Italian and Maltese trawlers combined in the period 2005-2011 peaked in 2010, at 1684 tons. The lowest landings were reported in 2008, at 1287 tonnes. The average of giant red shrimp landings was 1474 tons from Sicilian trawlers and 31 tonnes from Maltese trawlers in 2005-2011; the average annual contribution of Maltese catches to the total catch in this period was 2.1%. No information is available on giant red shrimp catches by the Tunisian trawl 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 stock assessment was done in 2012 by STECF EWG 12-19. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2006-2011; standardized indices from MEDITS bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF proposes $F \leq 0.30$ as management reference point (basis F_{01} as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis (F_{curr} = 1.67).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort

and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.72 Blue and red shrimp (*Aristeus antennatus*) in Geographical Sub Areas 15-16. Malta Island and South of Sicily

No additional information on this stock was available to the STECF since 2013, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: The key target species for the Sicilian and Maltese bottom otter trawl fleets operating on the slope of the continental shelf in the Strait of the Sicily is the giant red shrimp, *Aristaeomorpha foliacea*. However whilst *A. foliacea* is fished mainly in the central – eastern side of the Strait of Sicily, it is substituted by the blue and red shrimp *A. antennatus* on the western side of the channel. Other commercial species frequently caught together with blue and red shrimp are the deep water rose shrimp (*Parapenaeus longirostris*), Norway lobster (*Nephrops norvegicus*), greater forkbeard (*Phycis blennoides*) and hake (*Merluccius merluccius*). Yield for Italian and Maltese trawlers combined in the period 2009-2012 peaked in 2012, at 94 tonnes. The lowest landings were reported in 2009, at 42.18 tonnes. The average of blue and red shrimp landings was 61 tonnes from Sicilian trawlers and 2 tonnes from Maltese trawlers in 2009-2012; the average annual contribution of Maltese catches to the total catch in this period was 3.6%.

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 done in 2013 by STECF EWG 13-09. A length cohort analysis was carried out based on 2009-2012 data using VIT software.

REFERENCE POINTS: STECF proposes $F \leq 0.26$ as management reference point (basis F_{01} as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 0.81$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.73 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 1. Northern Alboran Sea

A new assessment was done for *Parapeneus longirostris* combining GSA 1, 3 and 4 (see Section 7.74), hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: In GSA 1, deepwater pink shrimp is a target species for around 170 trawling vessels (in 2011) operating on the upper slope and it is one of the most important crustacean species for the trawl fisheries. The species is caught almost exclusively as a by-catch by trawlers working in the deep continental shelf and the upper slope (100–400 m). No artisanal boats target this species. During the last 10 years the total landings showed important oscillations, ranging between a minimum of 66 tonnes in 2006 and a maximum of 250 tonnes in 2009; in 2012 239 tonnes of deepwater pink shrimp were landed in GSA 1.

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 done in 2013 by STECF EWG 13-09. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2001-2012; standardized indices from MEDITS bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF proposes the following reference points as a basis for management advice: F0.1 = 0.26.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis (F_{curr} = 0.43).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF notes that the assessment for pink shrimp in GSA 1 is unlikely to relate to the geographical range of the stock. An assessment summary for GSAs 1, 3 and 4 (Alboran sea) is given in Section 7.74.

STECF COMMENTS: STECF notes that the assessment for pink shrimp in GSA 1 is unlikely to relate to the geographical range of the stock. An assessment summary for GSAs 1, 3 and 4 (Alboran sea) is given in Section 7.74.

7.74 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 1, 3 and 4. Alboran Sea. Algeria, Morocco and Spain.

FISHERIES: In GSAs 1, 3 and 4 Algerian, Moroccan and Spanish trawlers are targeting deepwater pink shrimp. The number of the trawlers catching *Parapenaeus longirostris* in 2011 was 502 in Algeria, 115 in Morocco and 121 in Spain. Total catches showed a decreasing trend from 2 257 tons in 2003 to 1220 tons in 2008, before increasing to 2 049tons in 2009 and decreasing again in 2010-2011 (average of 1380 tons).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The assessment was provided by the GFCM-WGSAD in 2013 and it was endorsed by the GFCM-SAC. Catch per unit effort information for the coastal fishery was used as the basis of a Schaefer production model run. A length cohort analysis analysis was run using the VIT software using trawl catch length frequency data for 2009-2011 from GSA 1 and GSA 3 (Morocco and Spain). A yield per recruit analysis was run to estimate reference points.
The more recent assessment was carried out by GFCM-WGSAD in 2014 for GSA 3 only. This assessment was considered qualitative and inconclusive and was not endorsed by the GFCM-SAC.

REFERENCE POINTS:.

STOCK STATUS: The working group considered the stock status uncertain although with a relatively high level of biomass. The production model was not considered appropriate due to the shortness of the data series, as it were not long enough and did not display fluctuations reflecting substantial changes in fishing effort. Nevertheless, biomass indices from commercial fleet and tsurveys showed similar and homogeneous trends. The assessment was considered qualitative and could not be endorsed.

RECENT MANAGEMENT ADVICE: No management advices provided by GFCM SAC

STECF COMMENTS: STECF has no additional comments.

7.75 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 6. Northern Spain

FISHERIES: Deep-water pink shrimp (*Parapenaeus longirostris*) is one of the main crustacean species for trawl fisheries in the GFCM geographical sub-area Northern Spain (GSA-06). It is an important component of landings in some ports and occasionally a target species of the trawl fleet composed of approximately 260 vessels that operates on the upper slope. The annual landings showed a very sharp decrease at the beginning of the times series, from the maximum observed in 2001 (331 tons) to the minimum observed in 2004 (76 tons). Landings remained relatively stable during the period 2005-2012, fluctuating between 102 and 141 tons, and decreased in 2011 reaching up 92 tons that are the lowest in the last seven years. Yield increased slightly to 99 tons in 2012.

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 were done in 2013 by STECF EGW 13-09 and in 2014 by the GFCM-WGSAD. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2001-2012; standardized indices from MEDITs bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF and GFCM-SAC proposed $F_{MSY} \leq 0.27$ as a management reference point (basis $F_{0.1}$ as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF and GFCM-SAC considered the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 1.48$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.76 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 9. Ligurian and northern Tyrrhenian

No additional information on this stock was available to the STECF since 2012, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 a 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 consider that the stock in 2010 was being exploited sustainably. STECF considers that a multi-annual management plan should be established with the aim of maintaining fishing mortality below the proposed F_{MSY}.

STECF COMMENTS: STECF has no additional comments.

7.77 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 10. Southern and Central Tyrrhenian.

No additional information on this stock was available to the STECF since 2013, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 in 2006 were 1088 tonnes, then declined to 370 tonnes in 2010, before increasing again until 2012, when 459 tonnes were landed.

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 done in 2013 by STECF EGW 13-09. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2006-2012; standardized indices from MEDITS bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF proposes $F \leq 0.93$ as a management reference point (basis $F_{0.1}$ as proxy of F_{MSY}) of exploitation consistent with high long term yield

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 1.24$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.78 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 12-16. Strait of Sicily

FISHERIES: Trawling for pink shrimp *Parapenaeus longirostris* is carried out on the continental shelf of the Central Mediterranean throughout the year, and catches often include Norway lobster (*Nephrops norvegicus*), giant red shrimp (*Aristaeomorpha foliacea*), hake (*Merluccius merluccius*), blue and red shrimp (*Aristeus antennatus*), scorpionfish (*Helicolenus dactylopterus*), greater forkbeard (*Phycis blennoides*), red Pandora (*Pagellus bogaraveo)*, common Pandora (*Pagellus erythrinus*) and monkfish (*Lophius spp.*). 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 2011, 22 Maltese, 390 Sicilian and 70 Tunisian trawlers were fishing for pink shrimp in the GSAs 12-16, landing a total of 8234 tons of pink shrimp.

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 pink shrimp assessment was carried out as part of the FAO project MedSudMed in 2012 and endorsed by the GFCM-SAC in 2013. The assessment was based on 2007-2011 data, using length cohort analysis implemented in VIT software, and a preliminary XSA assessment tuned with survey data from GSAs 15and 16. The GFCM-WGSAD performed the most recent assessment in 2014 that was endorsed by the GFCM-SAC. The assessment used the 2007-2012 data and LCA.

REFERENCE POINTS: GFCM-SAC proposed the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = 1$

STOCK STATUS: GFCM SAC concluded that overfishing is occurring since F_{cur} (2010-2012) = 1.8.

RECENT MANAGEMENT ADVICE: Considering the current exploitation pattern, characterized by high values of F on small-sized shrimps due to small trawlers targeting this fraction of the population, and considering $F_{0.1}$ as target reference points, the GFCM-SAC recommended a reduction of about 40% of current F. The protection of juveniles is also recommended. This objective may be attained by improving the exploitation pattern of trawlers targeting juveniles, and by protecting the nursery areas.

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

STECF agrees with the GFCM SAC recommendation to investigate the effect of the method applied on the $F_{0.1}$ calculation since the $F_{0.1}$ value seems higher than in other GSAs.

STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.79 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 18. Southern Adriatic Sea

FISHERIES: Deep-water rose shrimp is an important species in demersal trawl fishery of the whole Geographical Sub Area 18. The species is only targeted by trawlers and fishing grounds are located along the coasts of the whole GSA. Catches from trawlers are from a depth range between 50-60 and 500 m and the species may co-occurs with other important commercial species such as *M. merluccius*, *Illex coindetii*, *Eledone cirrhosa*, *Lophius* spp., *Lepidorhombus boscii*, *N. norvegicus*. Landings are rather stable in the observed years with a slight increase in 2009 (933 tons) and a small decrease in 2011 (862 tons), while fishing effort of trawlers is decreasing. The Italian fleet contributes 71% of the total fishing mortality exerted on pink shrimp in GSA 18, while Albanian and Montenegrin trawlers account for about 27.1% and 1.7% respectively.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. The STECF-EWG 12 10 carried out an assessment in 2012, which was presented at the GFCM-SCSA and subsequently endorsed by the GFCM-SAC in 2013. The analysis was carried using length cohort analysis implemented in VIT software based on 2008-2011 data. The most recent assessment, based on XSA, was performed in 2014 by the GFCM-WGSAD and further endorsed by the GFCM-SAC.

REFERENCE POINTS: GFCM-SAC proposed $F \leq 0.75$ as a management reference point (basis F_{01} as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: The stock is considered exploited unsustainably. GFCM SAC concluded that overfishing is occurring since $F_{cur} = 1.36$.

RECENT MANAGEMENT ADVICE: The GFCM SAC advises that it is necessary to consider a considerable reduction of the fishing mortality to allow the achievement of $F_{0.1}$. This can e gradually achieved by multiannual management plans that foresee a reduction of fishing mortality through fishing limitations. As observed in 2012, the contribution of each country to the total production of *P. longirostris* in the GSA18 is the following: Italy 60%, Albania 38% and Montenegro 2%.

STECF COMMENTS:

STECF agrees with the advice from the GFCM-SAC. STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.80 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 19. North-western Ionian Sea.

FISHERIES: In the north-western Ionian Sea, fishing occurs from coastal waters to 700–750 m. The most important demersal resources are targeted by trawlers are red mullet (*Mullus barbatus*) on the continental shelf, hake (*Merluccius merluccius*), deep-water rose shrimp (*Parapenaeus longirostris*) and Norway lobster (*Nephrops norvegicus*) over a wide bathymetric range and the red shrimps (*Aristeus antennatus* and *Aristaeomorpha foliacea*) on the slope. Annual landings decreased sharply from 2002 (1126 tons) to 2012 (488 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 was done in 2013 by the STECF EGW 13-09 and in 2014 by the GFCM-WGSAD that was subsequently endorsed by the GFCM-SAC. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2006-2012; standardized indices from MEDITS bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF and GFCM-SAC proposed $F_{0.1} \leq 0.67$ as a management reference point (basis $F_{0.1}$ as proxy of F_{MSY}) of exploitation consistent with high long term yield.

STOCK STATUS: STECF and GFCM-SAC considered the stock to be exploited unsustainably based on the results of the assessment (F_{curr}=1.6).

RECENT MANAGEMENT ADVICE: GFCM SAC endorsed the assessment and proposed to reduce fishing mortality to achieve the estimated $F_{0.1}$ levels. A more sustainable harvest strategy could be achieved with a multi-annual plan that foresees reduction of fishing mortality through fishing limitations and improving selectivity pattern.

STECF COMMENTS: STECF agrees with the advice from the GFCM-SAC. STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

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

The results from the most recent assessment and advice for this stock were released in 2013. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: In GSA 9 the giant red shrimp, *Aristaeomorpha foliacea*, is one of the most important target species of the otter bottom trawl fishery carried out on the muddy bottoms of the upper and middle slope. The main fishing grounds are located in the central and southern part of the GSA 09 (eastern Ligurian Sea, northern and central Tyrrhenian Sea). The species is mainly exploited by the trawl fleets of Porto S. Stefano and Porto Ercole, in Tuscany, and Fiumicino, Anzio, and Terracina, in Latium. Total landings of giant red shrimp decreased from about 60 tonnes in 2006 to 24 tonnes in 2007, in 2008 and 2009 landings remain quite stable

(around 30-40 tonnes) before increasing up to about 70 tonnes in 2011. In 2012 52 tonnes of *A. foliacea* were landed in GSA 9.

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 done in 2013 by STECF EWG 13-09. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2006-2012; standardized indices from MEDITS bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF proposes $F \leq 0.36$ as a management reference point (basis F_{01} as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 0.62$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.83 Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 10. Southern and Central Tyrrhenian Sea.

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: In GSA 10 the giant red shrimp, *Aristaeomorpha foliacea* is targeted by trawlers and fishing grounds are located offshore, beyond depths of 200 m, mainly southward Salerno Gulf. Landings decreased from 2006 (412 tonnes) to 2008 (113 tonnes) before increasing in 2009 (207 tonnes) and 2010 (189 tonnes). In 2011 observed landings of giant red shrimp in GSA 10 were 141 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 stock assessment was done in 2012 by STECF EWG 12-19. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2006-2011; standardized indices from MEDITS bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF proposes $F \leq 0.4$ as a management reference point (basis F_{01} as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 0.48$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.84 Blue and red shrimp (*Aristeus antennatus*) in Geographical Sub Area 10. Southern and Central Tyrrhenian Sea.

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: In GSA 10 the giant red shrimp, *Aristeus antennatus* is targeted by trawlers and fishing grounds are located offshore, beyond 200 m of depth, mainly at a depth range between 400 and 700 m depth. Blue and red shrimp are caught together with *A. foliacea*, *P. longirostris* and *N. norvegicus*, *P. blennoides*, and *M. merluccius*, depending on operative depth and area. Landings decreased from 2006 (51.6 tonnes) to 2008 (23 tonnes) and then increased slightly in 2009 (27 tonnes). Thereafter, a new slight decrease is observed in 2010 (20 tonnes) followed by a remarkable increase in 2011 (49 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 stock assessment was done in 2012 by STECF EWG 12-19. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2006-2011; standardized indices from MEDITS bottom trawl survey were used as tuning fleets.

REFERENCE POINTS: STECF proposes $F \leq 0.31$ as a management reference point (basis $F_{0.1}$ as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 0.51$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.85 Giant red shrimp (*Aristaeomorpha foliacea*) in Geographical Sub Area 18. Southern Adriatic Sea.

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: In GSA 18 the giant red shrimp, *Aristaeomorpha foliacea* is targeted by trawlers and fishing grounds are located offshore, beyond depths of 200 m, mainly in the northernmost and southernmost parts of the GSA between 400 and 700 m depth. Giant red shrimp occurs with *A. antennaus*, *P. longirostris* and *N. norvegicus*, depending on operative depth and area. Landings decreased from 2006 (166 tonnes) to 2009 (88 tonnes) before increasing in 2009 (127 tonnes). In 2011 observed landings of giant red shrimp in GSA 18 were 75 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 stock assessment was done in 2012 by STECF EWG 12-19. A length cohort analysis was carried out using VIT software based on 2009-2011 data; management reference points were estimated based on a yield per recruit analysis.

REFERENCE POINTS: STECF proposes $F \leq 0.3$ as a management reference point (basis $F_{0.1}$ as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF considers the stock to be exploited unsustainably based on the results of the analysis ($F_{curr} = 1.0$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort

and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 and also presented during the WG on stock assessment of the GFCM SCSA.

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

$F_{MSY} = F_{0.1} =$ 0.3

$F_{\text{CURRENT (ages 2-7)}} =$ 0.72

STOCK STATUS: The stock is considered to be exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 considers 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: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

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

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 agrees with the advice from the GFCM SAC. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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. The effort of Italian otter trawl >24 m LOA decreased by 32% since 2004. Whereas the effort of Maltese trawlers of LOA>24 m showed an increasing trend. A decreasing pattern was also clear for both Italian and Maltese small scale vessels (6-12 m) equipped with trammel-nets.

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 by STECF EWG 12-10 and GFCM demersal WG meeting in November 2012 and endorsed by GFCM-SAC.

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

$F_{MSY} = F_{0.1} =$ 0.45

$F_{CURRENT} =$ 1.3

STOCK STATUS: GFCM-SAC concluded that the stock showed a decreasing SSB trend, from 2,389 t in 2007 to 1,147 t in 2011. Both STECF and GFCM-SAC considered the stock to be exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF and GFCM-SAC 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. STECF considers that this would best be achieved by implementing multi-

annual fleet-management plans that take into account mixed-fishery effects. The current high discarding rate of juveniles of the 0 group needs to be reduced by improving the trawl net selectivity (i.e. adoption of sorting grids) and through the reduction of fishing effort on the continental shelf in autumn.

STECF COMMENTS: STECF has no additional comments.

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

The results from the most recent assessment and advice for this stock were released in 2010. The text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 agrees with the advice from the GFCM SAC. STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

7.92 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 5. Balearic Island

The results from the most recent assessment and advice for this stock were released in 2013 (STECF) and 2014 (GFCM).

FISHERIES: In the Balearic Islands (western Mediterranean), commercial trawlers develop up to four different fishing tactics, which are associated with the shallow shelf, deep shelf, upper slope and middle slope, mainly targeted to: (i) *Spicara smaris*, *Mullus surmuletus*, *Octopus vulgaris* and a mixed fish category on the shallow shelf (50-80 m); (ii) *Merluccius merluccius*, *Mullus* spp., *Zeus faber* and a mixed fish category on the deep shelf (80-250 m); (iii) *Nephrops norvegicus*, but with an important by-catch of big *M. merluccius*, *Lepidorhombus* spp., *Lophius* spp. and *Micromesistius poutassou* on the upper slope (350-600 m) and (iv) *Aristeus antennatus* on the middle slope (600-750 m). The pink shrimp, *P. longirostris*, is an important by-catch species in the upper slope. Historical landings showed important oscillations with maximum values around 30-50 tonnes in 2000-2002 and values lower than 20 tonnes for the rest of the years. In 2012, 4.17 tonnes of pink shrimp were landed by bottom otter trawlers in GSA 5.

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 done in 2013 by STECF EGW 13-09 and GFCM-WGSAD and endorsed by GFCM-SAC 16-2014. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions from 2002-2012; standardized indices from bottom trawl surveys (BALAR and MEDITS) were used as tuning fleets.

REFERENCE POINTS: STECF and GFCM-SAC proposed F ≤ 0.62 as a management reference point (basis $F_{0.1}$ as a proxy of F_{MSY}) consistent with high long term yields.

STOCK STATUS: STECF and GFCM-SAC considers that *P. longirostris* in GSA 5 is exploited unsustainably. The current F_{0-2}= 0.77, and thus slightly higher than $F_{0.1}$= 0.62.

RECENT MANAGEMENT ADVICE: GFCM-SAC adviced to reduce fishing mortality toward the agreed refeence point. STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.93 Pink shrimp (*Parapenaeus longirostris*) in Geographical Sub Area 11. Sardinia

No additional information on this stock was available to the STECF since 2012, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 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

STOCK STATUS: The stock is considered exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.94 Norway Lobster (*Nephrops norvegicus*) in Geographical Sub Areas 15-16. Malta Island and South of Sicily

The results from the most recent assessment and advice for this stock were released in 2013 (STECF) and 2014 (GFCM).

FISHERIES: Norway lobster in the Strait of Sicily is caught almost exclusively by the bottom trawlers. It is one of the main commercial species for trawlers exploiting fishing grounds on the upper slope to target mainly

the deep-sea pink shrimp (*Parapenaeus longirostris*) and the giant red shrimp (Aristaeomorpha foliacea). Other accompanying species of commercial relevance are *Merluccius merluccius*, *Lepidorhombus* spp., *Lophius* spp..

The stock is exploited by trawlers being basically a by-catch of vessels targeting deep-sea pink shrimps and giant-red shrimps. Landings data for GSA16 collected within the Data Collection Framework (DCF) ranged between 428 (2004) and 797 t (2007). The contribution of the Maltese fleet was less than 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 stock assessments available to STECF were carried out in 2013 at STECF EWG 13-09 and GFCM-WGSAD and endorsed by GFCM-SAC 16-2014

REFERENCE POINTS: STECF EWG 13-09 and GFCM-SAC 16-2014 proposed the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.20$.

STOCK STATUS: STECF EWG 13-09 and GFCM-SAC 16-2014 classified the stock as sustainably exploited ($F_{2012} = 0.15$).

RECENT MANAGEMENT ADVICE: STECF an GFCM-SAC consider that in order to maintain fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should not be increased.

STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.95 Norway Lobster (*Nephrops norvegicus*) in GSA 18 – South Adriatic

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.96 Common octopus (*Octopus vulgaris*) in Geographical Sub Area 5. Balearic Islands

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.97 Blue whiting (*Micromesistius potassou*) in Geographical Sub Area 1. Northern Alboran Sea

The results from the most recent assessment and advice for this stock were released in 2012. The text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: Trawl is the main fleet exploiting blue whiting in GSA 1. The number of trawlers decreased slightly from 2002 (187) to 2010 (167). In the case of biggest vessels (>24 m), they have increased during this period. There was no information about specific effort for blue whiting in GSA 01. The majority of landings are

reported by otter trawlers. Landings fluctuated during the period 2002-2011 with a maximum value of 3125t in 2006 and a minimum value of 426t in 2008. Discards are reported in the period 2009-2011 but there was no detailed length or age distribution of these discards.

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 was provided by STECF-EWG-12-19 (December 2012).

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

$F_{MSY} \leq 0.3$ (basis $F_{0.1}$)

STOCK STATUS: Based on the assessment results, showing that F_{cur} was between 1.0 and 1.4 in the period 2009-2011, STECF concludes that the stock of blue whiting in GSA01 is subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.98 Blue whiting (*Micromesistus potassou*) in in Geographical Sub Area 6. Northern Spain

The results from the most recent assessment and advice for this stock were released in 2014.

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 2002-2013 with a maximum value of 4,723 t in 2006 and a minimum value of 829 t in 2012. Trawl discards in weight were considered high, especially in the last three years (2011-2013)

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 stock was assessed 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. In 2014 a new assessment was carried out at STECF-EWG 14-09. An Extended Survivor Analysis (XSA) was carried out on 2009-2013 DCF data calibrated with fishery independent survey abundance indices (MEDITS). A yield per recruit analysis was performed for the period 2009-2011.

REFERENCE POINTS: STECF-EWG 14-09 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: Based on the assessment results, showing that F_{0-3} was between 1.68 and 2.63 in the period 2009-2013, STECF-EWG 14-09 concludes that the stock of blue whiting in GSA01 is subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF-EWG 14-09 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this

would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.99 Blue whiting (*Micromesistus potassou*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

The results from the most recent assessment and advice for this stock were released in 2014.

N**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 stock was assessed 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. The assessment was updated in 2014 during STECF-EWG 14-09. Catch at age, weight at age, mortality at age and maturity at age data for the 2009-2013 period were compiled for age classes 0 to 4+, tuned with fishery independent abundance indices (MEDITS survey), were used as input data for the XSA. In addition, Yield per Recruit (YPR) analysis was performed for the estimation of F01 (i.e. proxy of FMSY).

REFERENCE POINTS: STECF EWG 14-09 proposed $F_{0.1} = 0.32$ as proxy of F_{MSY} and as the exploitation reference point.

STOCK STATUS: Results obtained did not show a particular trend the stock size. SSB showed a stable trend, varying around a mean value of about 260 t in the period 2009-2013. No precautionary biomass reference points have been proposed for this stock. The recruitment of fluctuated around a mean value of about 7.6 million individuals without a clear pattern over the time period. Based on the assessment results, showing that F_{0-3} was between 0.67 and 0.38 in the period 2009-2013, STECF-EWG 14-09 concludes that the stock of blue whiting in GSA09 is subject to overfishing.

RECENT MANAGEMENT ADVICE: STECF-EWG 14-09 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.92 Black-bellied anglerfish (*Lophius budegassa*) in Geographical Sub Area 5. Balearic Islands

No additional information on this stock was available to the STECF since 2013, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: In the Balearic Islands (western Mediterranean), commercial trawlers develop up to four different fishing tactics, which are associated with the shallow shelf, deep shelf, upper slope and middle slope (Guijarro and Massutí 2006; Ordines et al. 2006), mainly targeted to: (i) *Spicara smaris*, *Mullus surmuletus*, *Octopus*

vulgaris and a mixed fish category on the shallow shelf (50-80 m); (ii) *Merluccius merluccius*, *Mullus* spp., *Zeus faber* and a mixed fish category on the deep shelf (80-250 m); (iii) *Nephrops norvegicus*, but with an important by-catch of big *M. merluccius*, *Lepidorhombus* spp., *Lophius* spp. and *Micromesistius poutassou* on the upper slope (350-600 m) and (iv) *Aristeus antennatus* on the middle slope (600-750 m). The black bellied anglerfish, *L. budegassa*, is an important by-catch species in the upper slope although it is also caught in the shallow and deep shelf. SSB oscillates between 2001 and 2007, with a decreasing trend thereafter and with the minimum values at the end of the data series (2009-2011).

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 2013 at STECF EWG 13-05. An Extended Survivor Analysis (XSA) was performed using as input data bottom trawl landings and age distributions (from sliced length frequency distributions) from 2001-2011 (2002-2011 from DCF data and 2001 from other projects). Biological parameters used correspond to those available from GSA 06. Bottom trawl surveys (BALAR and MEDITS) were used as tuning fleets.

REFERENCE POINTS: STECF proposed $F_{0.1} = 0.18$ as proxy of F_{MSY} and as the exploitation reference point consistent with high long term yields.

STOCK STATUS: Assessment results showed an increasing trend in F during the period analysed. Recruitment showed fluctuations, with a maximum in 2009. SSB showed a certain decreasing trend, with the lowest values of the data series observed in the last three years. The current F_{1-5} (1.13) is larger than $F_{0.1}$ (0.18), which indicates that black-bellied anglerfish in GSA 05 is exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.93 Black-bellied anglerfish (*Lophius budegassa*) in Geographical Sub Area 7. Gulf of Lions

No additional information on this stock was available to the STECF since 2012, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 trawl 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 and GFCM WG demersal in November 2012. 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. The GFCM demersal WG of November 2012 has also performed an LCA/XSA analysis but the assessment results were considered preliminary and not endorsed by the GFCM-SAC.

REFERENCE POINTS: STECF 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: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.94 Black-bellied anglerfish (*Lophius budegassa*) in Geographical Sub Area 15-16. Malta Island-South of Sicily

No additional information on this stock was available to the STECF since 2012, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 and presented to the GFCM WG on demersal species of November 2012. 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. GFCM-SAC endorsed the STECF assessment presented to the GFCM WG.

REFERENCE POINTS: STECF 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. 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, STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.95 Poor cod (*Trisopterus minutus capelanus*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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: STECF 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 to be exploited unsustainably.

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.96 Greater forkbeard (*Phycis blennoides*) in Geographical Sub Area 9. Ligurian and North Tyrrhenian Sea

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: On average around 80% the landings are taken by the otter trawl fleet, the remain portion is taken by small scale fishery using trammel net and gill net. Total landings of greater forkbeard, based both on

National statistics and DCF, increased from 2007 to 2010 and remained stable in the last year with about 30 tons. Despite the seasonality fluctuations are a proper characteristic of the landings of this species, as shown by the LPUE (kg/boat/day) produced by the fleet of Santa Margherita Ligure in the period 1987-1996 and in more recently years (2009-2010 and 2011-2012) the mean LPUE values decrease respect to the past. Discards is occurring in otter trawl fleet and are represented by young specimens (mainly under 20 cm of total length) and represents more than 91% of the total catch (351 tons 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 assessments available to STECF were carried out in 2012 at STECF EWG 12-19.

REFERENCE POINTS: STECF EWG 12-19 proposes the following reference points as a basis for management advice: $F_{MSY} = F_{0.1} = \leq 0.32$.

STOCK STATUS: STECF EWG 12-19 classified the stock as unsustainably exploited ($F_{2011} = 0.89$).

RECENT MANAGEMENT ADVICE: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF notes that a mistake occurred in the latest STECF EWG 12-19 report, where the value of $F_{current}$ in 2011 was reported as 1.01 instead of 0.89.

7.97 Mantis shrimp (*Squilla mantis*) in GSA 10. South Tyrrhenian Sea.

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 age classes 4 to 7, the analysis was carried out using a plus group for age 3 and older.

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: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.STECF also stresses the need 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.

7.98 Mantis shrimp (*Squilla mantis*) in Geographical Sub Area 17. Northern Adriatic

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: Although *S. mantis* ranks first among the crustacean landed in the Adriatic Italian ports of GSA 17, the species is not the target of a specialised fishery, but it is only an important component of local multispecies trawl and gillnet fisheries. Only in the Gulf of Trieste there a target artisanal fisheries with creels. In the Italian side of the GSA 17, the species is exploited by different types of gears although 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 GFCM-SAC. 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, a separable VPA and a yield per recruit analysis was performed 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: GFCM-SAC 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 results of the analyses conducted with a steady state VPA and a separable VPA show that the mantis shrimp in GSA 17 is fished unsustainably, being the current F (2011) estimates with VIT model and separable VPA respectively of 0.93 and 1.00, higher than the proposed reference point ($F_{0.1} = 0.50$). The MEDITS and SoleMon surveys also indicate a general decreasing trend in stock biomass.

RECENT MANAGEMENT ADVICE: GFCM-SAC 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 agrees with the assessment of the stock status and considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

7.99 Mantis shrimp (*Squilla mantis*) in Geographical Sub Area 18. Southern Adriatic Sea.

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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: STECF 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: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.STECF also emphasized the necessity to analyse a longer data series in order to confirm the results obtained for 2011.

STECF COMMENTS: STECF also notes that the assessment is likely to benefit from a thorough review of the parameters for growth and natural mortality.

7.100 Red mullet (*Mullus barbatus*) in Geographical Sub Area 18. Southern Adriatic Sea.

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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: STECF 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: STECF considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

STECF COMMENTS: STECF has no additional comments.

7.101 Barracuda (*Sphyraena sphyraena*) in Geographical Sub Areas 12-13. Northern Tunisia-Gulf of Hammamet

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 $F_{0.1}$ as the reference for fishing mortality and adopted as the proxy for F_{MSY} in the absence of a more appropriate proxy.

7.102 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 together with a number of other demersal species. Since 2006 the number of licensed bottom trawlers operating in GSA25 has been gradually reduced from 8 to 2. The artisanal vessels are around 500. In 2005-2013 on average 93% of total striped red mullet landings in GSA 25 came from small scale vessels measuring up to a maximum length overall (LOA) of 12 m and using trammel nets. The remaining catches came from bottom otter trawlers. In the period 2005-2013 the total landings of this species decreased from 70 t (2005) to 22 t (2013); landings recorded in 2013 were at the lowest level recorded in the time series. The decrease in catches was observed both for vessels using trammel nets (from 62 t in 2005 to 21 t in 2013) and for vessels using bottom otter trawl (from 8.5 t in 2005 to 1.2 t in 2013). For trawlers a slight increase in landings was observed in 2013 (1.20 t) compared to 2011 (0.2 t) and 2012 (0.3 t). The most exploited age classes by the artisanal fleet are the

ages 1 and 2, while the bottom trawl fishery mainly exploits the age classes 2 and 3. 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 is the GFCM-SAC. Since 2008, the GFCM-WGSAD, STECF-SGMED WG and STECF EWGs have undertaken assessments and STECF has provided advice to the European Commission. A new assessment has been performed in 2014 by the STECF EWG 14-09 using a data set from 2005 to 2013. Due to the lack of effort data for the main fleet segment targeting the striped red mullet in GSA 25 and especially to the lack of reliable information from MEDITS surveys the EWG 14-09 applied a separable VPA method to evaluate the status of this stock.
DCF data of commercial catches were used and the analysis was carried out using sex combined data. The annual size distributions of GSA 25 catches were converted into numbers at age using the age slicing routine developed by Jardim et al. (2014) and the von Bertalanffy growth function estimates given in Charilaou (2011). Maturity at age data was based on the information given in Charilaou (2011) and natural mortality at age was calculated with the PRODBIOM method. Weight at age information for catches was based on available official data for the years 2005-2010. The reference age chosen to run the separable VPA was the one most represented in the catch (i.e. age 1). A sensitivity analysis on the results with $F_{terminal}$ values 0.06, 0.12 and 0.18 was been performed. The management reference point F_{MSY} was estimated based on all three model runs and the same result was obtained.

REFERENCE POINTS: EWG 14-09 proposed $F_{0.1}$ (as a proxy for F) = 0.14 as limit and precautionary management reference point. No precautionary biomass reference points have been proposed for this stock.

STOCK STATUS: The results of the separable VPA showed a slight increase in spawning stock biomass from 2009 to 2012, followed by a small decrease in 2013, and a sharp decrease of recruitment in recent years. However, as no precautionary biomass reference points were proposed for this stock the STECF EWG 14-09 was unable to evaluate the status of the stock spawning biomass. The separable VPA showed a sharp decrease of recruitment in recent years. However, the EWG noted that, MEDITS surveys are usually carried out in June-July in GSA 25, which is too early to sample juveniles.

F_{curr} calculated based on the geometric mean of the years 2011-2013 for the best fit model ($F_{terminal}$ = 0.12) was 0.17. However due to the poor survey data quality, the EWG 14-09stated that the assessment had to be considered as only indicative of trends and the estimated value of the current exploitation rate as not reliable. Thus EWG 14-09 was not able to assess the state of exploitation in respect to this.

RECENT MANAGEMENT ADVICE: Since the assessment is only indicative of trend, the state of the stock could not be defined and thus EWG 14-09 was not able to provide management recommendations.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

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

FISHERIES: Picarel (*Spicara smaris*) is the most important demersal fish targeted by bottom trawl fisheries in GSA 25, covering ~ 64% of the total catch. It is exploited in depths ranging from 50-100 meters mainly along the southern coast of Cyprus, and mostly distributed in depths less than 100 m. It inhabits sandy and muddy bottoms. The species in GSA 25 is considered as a single stock, although this has not been evidenced by studies on population structure. Landings fluctuated between 78 and 1030 t in the period 1970-2012 (data source: DCF, FAO-FishStat, DFMR reports).

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 last upgraded assessment for the period 2005-2012 has been performed in 2014 within the GFCM –WGSAD and endorsed by GFCM-SAC. Fisheries Library in R statistical language was used to implement Extended Survivor Analysis (XSA) as an assessment method. Biological reference points of $F_{0.1}$ and F_{max} were estimated from the FLBRP library in R using the Yield per Recruit analysis.

REFERENCE POINTS: The GFCM proposed F_{MSY}=0.14 ($F_{0.1}$ basis) as reference point

STOCK STATUS: Considering the estimated value of $F_{current}/F_{0.1}$ (0.6), the GFCM –WGSAD concluded that the resource is in sustainable exploitation (S) with a relative intermediate biomass. The assessment carried out by the GFCM –WGSAD was endorsed by the GFCM-SAC

RECENT MANAGEMENT ADVICE: The GFCM recommended to not increase the fishing mortality. It should be considered that the exploitation is not orientated towards juveniles. Hence, in the case of increasing fishing mortality and yearly bad recruitment, there could be a high risk of stock depletion.

STECF COMMENTS: STECF agrees with the assessment of the stock status derived by the XSA and with the GFCM recommendation. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.104 Bogue (*Boops boops*) in Geographical Sub area 25. Cyprus

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 considers that in order to reduce fishing mortality to or below the proposed F reference point ($F_{0.1}$) and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects. STECF agrees with the GFCM-SAC recommendation to improve the analyses for this stock by using an age-based analytical approach.

7.105 Common dolphinfish (*Coryphaena hippurus*) in Geopgraphical Sub Areas 4, 5, 11-16

FISHERIES: Common dolphinfish is an epipelagic, fast swimming oceanic species common in the Mediterranean waters. Based on EU DCF data, the EU fishing fleet is targeting *C. hippurus* in GSA 5 and 6 (Spain), GSA 10, 16, 19 (Italy) and GSA 15 (Malta). Minor quantities of dolphin fish are also caught as by-catch in other countries, including in Cyprus (GSA 25) and Slovenia (GSA 17). The main commercial fishing gear for his species in the Mediterranean is based on the use of Fish Aggregating Devices (FADs), where the aggregatory behaviour of common dolphinfish under floating materials is used to exploit this resource seasonally. The individuals targeted by the FAD fishery are juveniles in the age group 0, which have been spawned in late spring and early summer during the spawning peak of this species in the Mediterranean (Massuti and Morales-Nin, 1995). The fishing season extends from August to December, when juveniles are the most abundant around the Balearic Islands, Tunisia, Sicily and the Maltese Islands. The net used to catch the

dolphinfish which have aggregated under the FAD is a special surrounding net similar to a purse seine, however lacking a purse-line; the net is not closed at the bottom.

Based on catch data available from the GFCM Capture Production database for the period 2000-2010, Italy was responsible for 42%, Tunisia for 36%, Malta for 14%, Spain for 6% and Libya for 2% of landings. Malta and Spain seem to be the only countries which did not increase their total dolphinfish landings. Italian landings seem to have increased dramatically since 2005 but, considering that FAD fisheries are a traditional activity in some parts of Italy, it is likely that such increase can be linked to an improvement of the official statistics. Tunisian landings have increased steadily since the 1980s, and Libyan fishermen for the first time harvested as many dolphinfish as Malta in 2009. Considering the period 2005-2010, Italy was responsible for 56%, Tunisia for 27%, Malta for 10%, Spain for 6% and Libya for 3% of landings. DCF data for the years 2011 and 2012 indicate a decreasing trend in overall catches; however it is not possible to confirm this trend without data for the Tunisian fleet in recent years.

For the European fishing fleets (Spain, Malta and Italy), 67% of catches recorded in 2012 came from fishing vessels using surrounding nets (i.e. the FAD fishery), 28% came from longlines and most of such catches are likely to be by-catch, e.g. from the longline fisheries targeting swordfish, 2% from gill and trammel nets and the remaining percentage from trolling lines and 'mixed gears' reported for Italian GSAs. Catches reported by Slovenia through the DCF for 2012 were negligible (0.06 tonnes); no data on catches or bycatch from longline fleets in Greece or Cyprus are available.

Since there is no minimum legal landing size for this species and the fishery targets juveniles of a particular size range, there are no discards of the target species.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body is the GFCM-SAC. The assessment was discussed during the STECF EWG 13-19 in 2013.

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

STOCK STATUS: The status of the stock is unknown as the data quality for *C. hippurus* is still too poor to allow for a formal assessment of stock status to be carried out.
RECENT MANAGEMENT ADVICE: Due to a lack of suitable data to assess this species, EWG 13-19 was not in a position to formulate any scientific advice for common dolphinfish.
EWG 13-19 proposed that the issue of data quality for this species should be addressed by (i) including the relevant effort parameters (total number of FADs and number of FADs targeted per fishing trip) in the DC-MAP for future monitoring (ii) collecting information on additional variables required for a sound standardization of CPUEs through a series of targeted studies in the EU Member States concerned. In addition, a series of targeted studies aimed at gathering up to date / historical information on fishing effort, and variables required for standardising CPUE should be conducted in third countries (notably Tunisia and Libya) fishing *C. hippurus*, possibly by involving the FAO regional projects.
Due to the biology of the species as well as the nature of the fishery, EWG 13-19 considered that *C. hippurus* should in future be assessed by the RFMOs GFCM and/or ICCAT.

STECF COMMENTS: In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

7.106 Brush tooth lizard fish (*Saurida undosquamis*) in Geographical Sub area 26. South Levant Egypt

FISHERIES: Brush tooth lizard fish, *Saurida undosquamis* is one of the most important demersal target species of the commercial fishery in Egypt. It represented around 70% (912 tons) of the total landing of the family Synodontidae during 2012, which is nearly equal to 2% of the total Egyptian Mediterranean landed catch. The bulk of the landed catch of this species comes from trawling, while a negligible percentage of the landings comes from the artisanal fisheries. The size of the fish samples ranged between 9 cm and 36 cm and the mean length was 19.8 cm.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body is the GFCM-SAC. The assessment was carried out by GFCM-WGDSA in 2014 using data sets of the period 2011-2012. The information used for the assessment of the stock consisted of catch length structure, length weight relationship, and total length at the end of each year of life, Von Bertalanffy growth parameters, Sex ratio, length at first sexual maturity, the values of total (Z) and fishing mortalities (F). The vector of natural mortality by age was calculated from Caddy's

formula, using the PROBIOM Excel spreadsheet. Length cohort analysis and Beverton & Holt Yield per recruit analysis were performed in order to estimate the limit and target reference points. (FiSAT, LFDA, Vit 4 win & ProdBiom, 2009).

REFERENCE POINTS: The GFCM-WGDSA proposed F_{MSY}=0.247 ($F_{0.1}$ basis) as reference point.

STOCK STATUS: The current values of fishing mortality estimated in the two years (0.588 during 2011 and 0.537 during 2012) were higher than the $F_{0.1}$ reference point, and the ratio $F_{curr}/F_{0.1}$ (2.02 and 2.17 in 2011 and 2012 respectively) showed that the lizard fish stock in the GSA 26 is in a state of high overfishing. The fact that the length at first capture (Lc= 14.12 cm) is almost equal to the length at first maturity (L_{50} = 15 cm) seems to indicate that the fishery is mainly focused on spawners.

RECENT MANAGEMENT ADVICE: The GFCM-WGDSA recommended to reduce the fishing mortality to the proposed $F_{0.1}$ level by limiting trawl fishing activities and improving the selection pattern of the trawl fishery. GFCM-SAC endorsed this advice.

STECF COMMENTS: STECF considers that to reduce the fishing mortality to or below the proposed F reference point and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. In the absence of a reliable catch forecast STECF is unable to provide the level of catch corresponding to F_{MSY} in 2015.

8 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, 1970-2010, 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 2010 the total nominal landing in the Mediterranean was decreasing to minimum value of 7641 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. Red List Assessment was conducted by IUCN Shark Specialist Group in 2014 for European stocks, final evaluation is not yet available.

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 75% of the total landings in 2010. In the Mediterranean, the collection of stock related variables is requested by DCF 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.

No assessment was conducted by GFCM since 2011 meeting, (SCA-SCSA Stock assessment of selected species of elasmobranchs), in 2012 a workshop on age determination of elasmobranchs in the GFCM area was organized in order to enhance the knowledge on biological parameters lacking for Mediterranean area.

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 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.

8.1 Basking shark (*Cetorhinus maximus*)

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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. Basking Shark have more recently been reported in North Western Ionian Sea and Southern Adriatic from the MEDLEM FAO-GFCM program (Carlucci et al, 2014).

On the basis of the most recent data reported by the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2010), 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. Basking shark is included in the Action Plan for Conservation of Cartilaginous Fishes in Mediterranean Sea from UNEP (United Nation Environment Program, 2003). 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 incidental catches of Basking shark for all concerned fisheries.

8.2 Thresher shark (*Alopias vulpinus*)

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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, 1970-2010), 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 1996-2010, 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 6 t in 2010.

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 monitor the possible impacts of fisheries on thresher shark; there is a need to improve the reporting of incidental catches of thresher shark for all concerned fisheries. STECF suggests that regarding the wide distribution of the species and the lack of information on stocks identity, all incidental catches should be reported by the nations, and cooperation within the involved RMFO's should be encouraged to minimize incidental catches.

8.3 Tope shark (*Galeorhinus galeus*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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, 1970-2010), landings for this species are only reported by Spain (2004-2010), ranging between 15 and 38 t (33 t in 2010) and France (5 t in 2009 and 5t in 2010), 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 the understanding of the current situation of tope shark in the Mediterranean, STECF notes that the extent of incidental catches should be estimated and additional fisheries-dependent data by managemnet area is required and should be encouraged.

8.4 Smooth hammerhead (*Sphyrna zygaena*)

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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, 1970-2010), landings for this species are only reported by Albania (4 t in 2004) corresponding to around 0.3% of the total catch of elasmobranchs in the central Mediterranean. No catches were reported since 2004. 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).

In 2013, *Sphyran zygaena* was listed on Appendix II of CITES (Conference of Parties 16, Bangkok). However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

RECENT MANAGEMENT ADVICE: None.

STECF COMMENTS: To improve the 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.

8.5 *Carcharhinus spp.*

The stock status and advice for this stock for 2015 remains unchanged from that given for 2015. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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, 1979-2010) 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.

In 2013, *Carcharhinus longimanus* was listed on Appendix II of CITES (Conference of Parties 16, Bangkok). However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

RECENT MANAGEMENT ADVICE: None.

STECF COMMENTS: To improve the 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.

8.6 Sixgill shark (*Hexanchus griseus*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2015 (STECF-13-27).

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. On the basis of the most recent data reported in the FAO-GFCM Capture Fisheries Production Dataset (Fishstat, 1970-2010), landings for this species are only reported by Malta (4 t in 2010)..

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: To improve the 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 enhance biological knowledge of the species.

8.7 Small-spotted catshark (*Scyliorhinus canicula*) in Geographical Sub-Area 9. Ligurian and North Tyrrhenian Sea

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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, 1970-2010) and they amounted to around 30 tonnes/year in the period 2000-2010 (39 t in 2010), 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.

8.8 Blackmouth catshark (*Galeus melastomus*) in Geographical Sub-Area 9. Ligurian and North Tyrrhenian Sea

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-13-27).

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 shrimp 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.

EC addressed a special request to ICES WGEF in May 2013 regarding the modification of the deep-sea shark list. Opinion was asked on the exclusion of Blackmouth Catshark (*Galeus malanostomus*) and inclusion of Lowfin Gluper Shark (*Centrophorus lusanitus*) from Annex of. Council Regulation (EU) No 1262/2012. ICES WGEF stated that there is sufficient scientific information to warrant the exclusion of Blackmouth Catshark (*Galeus melanostomus*) and the inclusion of all *Centrophorus spp*. in the deep-shark list.

STECF COMMENTS: STECF agrees with the GFCM-SAC advice and the recent ICES WGEF statement on the deep-shark list revision. 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.

8.9 Pelagic stingray (*Pteroplatytrygon violacea*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-13-27).

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.

8.10 Thornback ray (*Raja clavata*) in Geographic Sub Area 9. Ligurian and Northern Tyrrhenian

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

8.11 Starry skate (*Raja asterias*) in Geographic Sub Area 9. Ligurian and Northern Tyrrhenian

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 $F_{0.1}$ 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.

8.12 Thornback ray (*Raja clavata*) in Geographic Sub Area 15-16. Malta Island and South of Sicily

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

8.13 Small-spotted catshark (*Scyliorhinus canicula*) in Geographical Sub-Area 4. Algeria.

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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, and 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 utilized using the mixed approach. The results have been compared to the yield per recruit performed (Y/R) by NOAA program with the female's 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 agrees with the recommendations of the GFCM. To this aim STECF considers 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.

8.14 Blackchin guitarfish (*Glaucostegus cemiculus*) in Geographical Sub area 14. Gulf of Gabes, Tunisia

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 = 0. 17 $F_{MSY} = F_{0.1} = 0.19$

STOCK STATUS: GFCM SAC 2011 assessed the stock to be subject to underexploited 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 that 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.

9 Resources in the Black Sea

9.1 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. 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). 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 in the Baltic (Raykov, 2006) except in Turkish waters. Sprat fishing takes place on the continental shelf on 15-110 m of depth (Shlyakhov, Shlyakhova, 2011). 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. 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 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. 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 but dropped to 12000 t in 2012. The total landings in 2012 were around 35000 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. STECF EWG 14-14 and the GFCM WG on Black Sea assessed the stock using the Integrated Catch Analysis method applied to catch-at-age data. During 1993-2013 there were large changes in the catch, which increased steadily from a low level of about 17 thousand tons in 1993 to a first peak level of about 72 thousand tons in 2002, and a subsequent peak of almost 121 thousand tons in 2011.

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 STECF assessment, in recent years the SSB is at medium levels (180.000-300.000 t) with a decreasing trend since 2010. In 2013, the SSB has dropped to 179.464 t. Under a constant recruitment scenario

and status quo F = 0.446, in 2014 the SSB is expected to increase to 198,189 and to decrease to 185,093 t by 2016.

- State of the juveniles (recruits):

Recruitment reached a low in 2010-2011 and since then started to increase. Recruitment estimates are rather imprecise due to the lack of survey data. In short-term forecast we used a geometric mean over the 2010-2012 values, equal to 99 217 596

- State of exploitation:

Fishing mortality in 2012 (F=0.45) is below the F_{MSY} (0.64) producing $E_{MSY} \leq 0.4$. *Status quo* fishing implies catches in the range of 36397 - 34200 t over 2014 – 2016, which are below the F_{MSY} catch of 48755 t.

RECENT MANAGEMENT ADVICE: GFCM SAC consider that the stock in 2012 was being exploited sustainably. Similarly STECF found an exploitation rate below the reference point of $E \leqslant 0.4$ (F_{MSY} proxy) in 2013. STECF recommends the exploitation for 2014 to not exceed the F_{MSY} level, which corresponds to 48,755 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

The EWG 14-14 suggests that an international hydroacoustic survey is needed to monitor the condition of sprat across all waters of the Black Sea, including the national waters of Bulgaria, Romania, Georgia, Russia, Turkey and Ukraine. There is concern that the fishery for sprat produces significant quantities of bycatch and discard of other fish species (e.g., whiting, turbot, dogfish, and other species). The EWG suggests that there should be increased sampling of the sprat fishery by at-sea observers to quantify the amount of bycatch and discarding.

STECF COMMENTS: STECF has no additional comments.

9.2 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 seine 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 official landings during last 5 years range between 485 and 1035 t. Mis-reporting and illegal catches also occur. The overall official landings of turbot in the Black Sea declined in the last 6 years from 1035 t in 2007 to less than 528 t in 2012. The total catches including unreported landings range from 1901 t (2008) to 963 t (2012).

For Bulgaria and Romania quotas of 43.2 t in 2013 (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.

During the 37th Session of the General Fisheries Commission for the Mediterranean (GFCM), a recommendation was adopted to establish a set of minimum standards for turbot fisheries in the Black Sea. This recommendation established a minimum conservation size (45 cm) for turbot and a minimum mesh size (400 mm) for gillnets. At the national level, different technical or management measures are in force in Bulgaria, Romania, Turkey and Ukraine.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 fisheries in Ukraine have 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 1st May up to 30th June.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF. The more recent assessment was carried out in 2014 by GFCM-WGBS and

STECF EWG-14-14. Data used for both assessmentswere catch at age from 1950-2012 for the Black Sea stock and catch at length for the Ukrainian data. The models used were SAM and LCA respectively.

REFERENCE POINTS: The STECF EWG 14-14 proposes that F_{MSY} for this stock to be equal to 0.26 (i.e. F which maximises average catch in the long run) as the limit reference point consistent with high long term yields. Limit and precautionary management biomass reference points proposed by STECF EWG 14-14 are: Blim = 3535 t: Bpa= 4949 t.

STOCK STATUS: STECF EWG 14-14 concluded that the:

- State of the adult abundance and biomass (SSB): SSB is still at very low level (around 1634 t) and it is around of a half of the estimated B_{lim} (3535 t).
- State of the juveniles (recruits): The low abundant recruitment after 2007 is not able to result in significant increase of SSB during the recent years.
- State of exploitation: In 2013, the F is at the high level around 1.33, more than 5 times F_{MSY} (0.26).
- Source of data and methods: The data set for the period 1950-2013 was compiled using the historical data sources and new data for 2013. Available data of total landings, catch at ages, weights and maturity at age are considered appropriate for assessing the stock using the state-space assessment model (SAM) (Nielsen et al., 2012). All assessments were performed with version 0.99-3 of FLSAM, together with version 2.5 of the FLR library (FLCore). Five tuning series (4 surveys and 1 commercial CPUE series) were compiled from previous assessments and recent data.

The GFCM-WGBS considers the Black Sea stock as "Depleted and in overfishing" and the Northwest population (Ukrainian waters) "in overfishing, with a slight decreasing trend in SSB".

Source of data and methods:

The STECF EWG-14-14 used data from the period 1950-2013 compiled from historical data sources and new data for 2013. Available data, consisting of total landings, catches at age, weights and maturity at age, were considered appropriate for assessing the stock using the State-space Assessment Model (SAM) (Nielsen et al., 2012). All assessment runs were performed using version 0.99-3 of FLSAM, together with version 2.5 of the FLR library (FLCore). Five tuning series (four surveys and one commercial CPUE series) were compiled from previous assessments and recent data. In 2012, a new survey fleet for the Eastern Ukrainian Black Sea area was added to the existing survey fleets of Bulgaria, Romania, Western Ukrainian area and Turkish commercial CPUE. In 2013 only one survey, covering the Romanian Black Sea area was carried out. One CPUE derived from commercial fishing vessels along Turkish Black Sea coast was provided and used in the assessment.

The GFCM-WGBS used two different assessments that cover different part of the Black Sea turbot populations. Models differed in the estimation on IUU catches and in several technicalities. Model results were different, however both models agree that current fishing mortality is not sustainable.

RECENT MANAGEMENT ADVICE: The EWG classifies the stock of turbot in the Black Sea as being exploited unsustainably and at the risk of collapse. STECF EWG 14 14 considers that on the basis of precautionary considerations there should be no directed fisheries for turbot and bycatch should be minimised. The GFCM-WGBS considers the Black Sea stock as "Depleted and in overfishing" and the Northwest population (Ukrainian waters) "in overfishing, with a slight decreasing trend in SSB".

STECF advises that in order to achieve the CFP objective of reaching FMSY in 2015, fishing mortality on turbot in the black sea should be reduced by 86 % in 2015, implying that catches from the Black Sea stock should not exceed 213 t.

The GFCM-WGBS suggested a recovery/management plan following the “proposed minimal structure, criteria and measures for multiannual management plans for turbot fisheries in the Black Sea”, especially in relation to the fight against IUU. Fishing mortality has also to be reduced to allow the biomass to recover. GFCM-SAC endorsed the advice.

STECF COMMENTS: STECF considers that in order to minimise the rish of further stock decline and maximise the chnces of stock rebuilding, catches of turbot from GSA 29 in 2015 shuld be 0 t.

The STECF notes that no progress in overcoming the past gaps has been achieved. These gaps concern data and information (e.g. quality of the official landings and effort data, the unknown rates of discards and IUU catch), stock identification and boundaries, lack of annual research surveys covering the whole distribution area of the turbot population in the Black Sea, harmonization in survey methods and age reading procedures.

9.3 Anchovy (*Engraulis encrasicolus*) in GSA 29

FISHERIES: The fleet exploiting anchovy is characterized by purse seiners usually coupled with a carrier boat. In some years when the sprat fishery is not profitable or schools are dispersed over wide areas, paired pelagic trawlers also take part in the anchovy fishery. Other gears, such as gillnet, coastal trap or pound nets, make negligible contributions to the total landings. Majority of the landings is obtained by Turkey by purse seine vessels. In accordance with a bilateral agreement, since 2003, a small part of the Turkish purse seiners move to Georgian waters as soon as the Black Sea anchovy season is over on the Turkish coast. These boats are licensed to catch anchovy within the jurisdictional waters of Georgia and their catch is landed and registered at the Georgian ports. 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. Intense 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 2005 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 2012, the total international Black Sea catch was reported to be about 190 000 t with the major part, 126,000 t made by the Turkish fleets.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. STECF EWG 14-14 applied both XSA and ASPIC for the assessment of the stock in Black Sea using catch data from 1988 to 2013. In the previous assessments (2010 and 2011), experts provided data pertaining to their countries. In 2012, Turkish catch at age data was re-estimated based on length-frequency distribution of the commercial catch monitored by Trabzon Fisheries Central Fisheries Research Institute (SUMAE) and the ALKs provided by the same institute. To fill the gaps in the missing years some literature data were also used. In 2011, 2012 and 2013 the data collected within the Turkish Fisheries Data Collection Frame (TFDCF) work was simply added to the historical data. Catch-at-age data for 2013 are derived from the raised national landings statistics by countries and added to the historic catch at age data set compiled during the previous meetings. In 2012, a remarkable part of the 0 year class anchovies were discarded, and estimated discard was treated as unreported catch and simply added to the official landings and to the catch at age data. In 2013 (apparently recruitment was not as strong as in 2012) discarded anchovy was negligibly low; hence disregarded. STECF-EWG pointed out that XSA, when applied to short lived species such as anchovy, has considerable drawbacks. Yet, lack of harmonization in the otolith interpretations among different countries and even among the experts of the same country weakens the appropriateness of the method for anchovy stock assessment. On the other hand the anchovy stock in the Black Sea was first assessed by STECF in 2011 and XSA has always been the major method used for assessment since very beginning. Therefore in this assessment the priority is given to this method to ensure consistency with the previous works.

Considering the aging and mixing problems mentioned above, the Black Sea anchovy stock was assessed also applying a non-equilibrium stock production model (ASPIC). The data series used in the assessment incorporated the Turkish purse seine CPUE since 1970, the CPUE for the former USSR for the same period and the Turkish purse seiners fishing in the Georgian water. In addition, to the CPUE data overwintering and spawning stock biomass estimates were also added to the model.

Finally, the GFCM WG on Black Sea analysed data for the subspecies *E. encrasicolus* maeoticus in the Black Sea-Azov Sea area using purse seiners ("lampara") catch data for the period 1992-2012.

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF

F_{MSY}	$F_{MSY} = F \leq 0.56$, consistent with the exploitation rate $E \leq 0.4$.

STOCK STATUS:

The STECF assessment provided the following results:

- State of the adult abundance and biomass (SSB): The two models results show an increase in the spawning stock biomass and the degree of increase varies with the model settings. However, given the absence of a biomass reference point, the EWG 14-14 was unable to fully evaluate the stock status with respect to it.
- State of the juveniles (recruits): Recruitment displays a cyclic pattern with peaking values observed in 1994, 1999, 2006, 2012, which usually followed by a drop within the last 25 years. The pulse of a strong year class usually affects the next years' SSB. This is the case during 2013; the strong recruitment gave rise to the number of spawners next year.
- State of exploitation: Estimated F is very much dependent on the level and type of shrinkage used in the XSA assessment. General trend in the last ten years, however, indicates a slight decrease in the fisheries mortality. The XSA estimates the current $F_{(1:3)}$ for 2013 as 1.2, which is higher than the F_{MSY} (0.56) estimated based on precautionary exploitation rate. The average of the last 5 years' F estimate is 1.37.

The assessment done by GFCM on the sub-species *E. encrasicolus maeoticus* resulted in a moderate exploitation status of the stock, although uncertainties in the status of the stock were clearly identified.

RECENT MANAGEMENT ADVICE: Both the assessment models performed by the STECF EWG 14-14 suggest a lower F_{MSY} than the current fishing mortality. Given that Turkey, as the main exploiter of the Black Sea anchovy reduced both fishing effort and the level of catch in the last two years at least another year is required to evaluate the response of the stock to the protective measures.

The GFCM-SAC advice is to not increase fishing mortality for the stock of *E. encrasicolus maeoticus.*

STECF COMMENTS: STECF notes that the catch and weight at age data is quite inconsistent over the years. This is most probably due to not so well harmonized age-length keys (ALKs). Not only ALKs differ from country to country, there is also a year to year inconsistency within the national datasets. There is a great need to set up an age reading protocol for the anchovy in the Black Sea. The inconsistency in the ALKs may also be due to fact that in some year Azov anchovy, which grows slower than the BS anchovy and hence displays different ALKs, expands its overwintering range and mixes with the Black Sea anchovy. None of the countries proving catch and weight at date to the assessment pays particular attention to existence of Azov anchovy in the catch and possible effects of mixing on the data. The contribution of Georgia in the total anchovy landing has been increasing during the last years. The only information received from Georgia is the total landings. Only Turkey continues to conduct hydroacoustic surveys in the Black Sea. As the area coverage of these surveys is restricted to the Turkish EEZ, the areas beyond and particularly the Georgian waters are still lacking.

STECF notes that current F is estimated to be well above the proposed F_{MSY} reference point and continued fishing at such a level poses a serious risk to the productivity of the stock and the future viability of the fishery.

STECF considers that in order to reduce fishing mortality to or below the proposed F reference point and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

9.4 Whiting (*Merlangius merlangus*) in GSA 29

FISHERIES: The whiting fishery in the Black Sea is almost solely conducted by Turkey which since 1990s lands about 99% of the catch of the region. In the last 5 years, landings have ranged from around 8200 t to 12000 t and were reported to be around 6300 t in 2012. There are four main gear exploiting whiting along the Turkish Black Sea coast, namely: trawl nets (about 82.0% of total catch); gill nets (13.6% of total catch); purse seines (3.7%) and lines (0.6%). It should be noted that fishing in Turkey is conducted without limitation of annual catch or fishing efforts although technical measures are applied. They include minimum mesh size for trawl cod-end (40 mm) and legal landing size (13 cm). Remarkable decrease occurred in Turkish landings of whiting caught by bottom trawls in recent two decades and the decrease seems on-going. The main reasons was related to the illegal fishery by infringements of time and area, mesh size applications and increase in fishing effort. The mean length of landed catch decreased from 19.7 cm to 8.9 cm and the landings from 16.3 to 8.1 thousand tons from 1990 to 2012 (STECF-EWG 14-14).

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. STECF EWG 14-14 applied XSA for the assessment of the stock in Black Sea using catch data form 1994 to 2013. Turkish CPUE and Romanian survey data were used for tuning the assessment.

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):

From 1994 to 2013 for age-classes 2 to 8+ the SSB varied cyclically with peaks in 2000 and 2009, but the SSB estimate for 2013 is the lowest of the series (20,000 t). Given the absence of a biomass reference point, the EWG 14-14 was unable to fully evaluate the stock status with respect to it.

The STECF assessment done in 2014 produced a consistently higher stock biomass estimates than the 2013 assessment. From 1994 to 2013 for age-classes 2 to 8+ the SSB varied cyclically with peaks in 2000 and 2009. The SSB estimate for 2013 is 12.200 t. Given the absence of a biomass reference point, the EWG 14-14 was unable to fully evaluate the stock status with respect to it.

- State of the juveniles (recruits):

EWG 14-14 was unable to fully evaluate the state of recruitment due to the selection of only age 2-8+ for the assessment. The available information on age-0 and age-1 fish was considered unreliable due to the high rate uf unreported discards.

- State of exploitation:

The EWG 14-14 proposed FMSY (1-4) ≤ 0.4 as the limit reference point consistent with high long term yields and low risk of fisheries collapse. As the estimated F(2-4) = 1.15 exceeds F_{MSY}, the EWG 14-14 classified the stock as being potentially exploited unsustainably. However, given the uncertainty regarding the amount of discards, the assessment results are mainly indicative of trends.

RECENT MANAGEMENT ADVICE: The assessment was only accepted as indicative of trends due to the large uncertainty in the assessment results caused by the poor quality of the discard data and thus a deterministic short term projection of stock size and catch was not performed.

STECF COMMENTS: STECF notes that the assessment is affected by the lack of reliable catch and discard data as well as lack of data on fishing effort that targets whiting. In addition STEFC notes discrepancies in determining the age of fish older than two years and highlights that no progress was made in improving the data quality and the assessment from 2013.

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.

9.5 Spurdog or Piked Dogfish (*Squalus acanthias*) in GSA 29

FISHERIES: In the last 25 years, in the Black Sea the largest catches of spurdog have been from along the coast of Turkey, although this species was not the target of any fisheries, instead being caught as by-catch in trawl and purse seine operations, mainly during the winter. In the rest of the Black Sea countries most spurdog are harvested during spring and autumn months by target fishing that uses gill-nets of 100 mm mesh-size or that uses long-lines, and as by-catch in trawl fisheries for sprat. During the 25 years for which landings data are available the largest annual catches of spurdog occurred during the early years of the series, with the peak landings of 6,159 t in the first year of the series (1989). Although the cumulative landings were taken primarily by Turkey and Ukraine, spurdog has lost its commercial importance in these countries. In the last three years, 2011-2013, about 40% of the landings were produced by Bulgaria. EU fisheries exploiting these stocks (Bulgaria and Romania), for 2013, in terms of fleets, fishing gears, deployed fishing effort (capacity in N°-GT-kW, activity in days at sea, gear characteristics), catches and catch composition, size composition, discards, fishing grounds and seasonality, are presented only by Romania, most of data being reported through National Data Collection Programme and part of data have been also uploaded in the JRC data base.

SOURCE OF MANAGEMENT ADVICE: The management advisory body is GFCM-SAC. Since 2008 advice is also provided by STECF. The more recent assessment was carried out in 2014 by GFCM-WGBS and STECF EWG-14-14. The assessment models used were VIT and XSA.

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF EWG 14-14

$F_{0.1}$ = (F_{MSY} proxy)	0.03

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: STECF EWG 14-14 proposed that the:

- State of the adult abundance and biomass (SSB):

Based on the XSA results as indicative of trend, SSB is estimated to be at the lowest observed level in the time series.

- State of the juveniles (recruits):

Based on the XSA results as indicative of trend, recruitment is estimated to be at the lowest observed level in the time series.

- State of exploitation:

Based on the VIT analysis, the fishing mortality rates during 2012 and 2013 were estimated to be 0.239 and 0.112 respectively. XSA estimates of current rates of fishing mortality are high (~0.3) and estimates of F for past years were erratic, exceeding 0.7 four times during 1999 to 2009. ICES estimated that F_{MSY} for spurdog in the North East Atlantic, expressed as the proportion of the total catches over the total biomass, is equal to 0.029, which corresponds approximately to an F of 0.03. Given (a) the uncertainty in the VIT and YPR-LEN analyses, linked to the assumption of constant recruitment, (b) the preliminary nature of the XSA analysis, and (c) the absence of more reliable information, the EWG considers it precautionary to use the F_{MSY} value estimated by

ICES for spurdog in the North East Atlantic as an appropriate proxy for F_{MSY} for spurdog in the Black Sea.In 2013, the F is estimated to be substantially larger than F_{MSY}. STECF EWG 14 14 classifies the stock of dogfish in the Black Sea as being exploited unsustainably and at risk of collapse.

- Source of data and methods:

The catch-at-age matrices were based on length compositions and age/length keys from Ukrainian and Romanian samples. The VIT4Win software was applied to assess the population variables based on standard VPA and cohort analyses for data from 1989-2013. The final results were based on the analysis that assumed M = 0.15 and a terminal F of 0.15. The exploratory run with XSA was based on the same biological information used in the VIT and with landings at age tuned by CPUE at age derived from the Romanian scientific demersal surveys (2009-2013).

RECENT MANAGEMENT ADVICE: The 2014 GFCM-WGBS suggested, and GFCM-SAC endorsed, that a recovery plan is needed. 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 consider that in order to minimise the risk of further stock decline and maximise the chances of stock rebuilding, catches of spurdog in 2015 should be 0 t.

STECF COMMENTS: STECF notes the need for a fishery-independent scientific survey to monitor spurdog in the Black Sea and collect stock biological parameters.

STECF suggests that to improve future assessments and a gain better understanding of the current status of spurdog in the Black Sea, additional fisheries-dependent data are also required.

9.6 Mediterranean horse mackerel (*Trachurus mediterraneus*) in GSA 29

FISHERIES: Almost the whole horse mackerel catch (98.2%) is caught by large bag-shaped nets. A large part of the catch (80%) in Turkish waters is caught in the autumn and the first part of winter (September-December). The catches of Black Sea horse mackerel were realized by active (bathypelagic trawls and surrounding nets) and passive fishing gears (gill netting, trawl net, trap nets. Horse mackerel stocks in the Black Sea are usually caught by Turkish fishermen by using active (bottom trawler, pelagic trawler and large bag-shaped nets) and passive (extension and longline) nets. The data set of landings is available for the period 1950 – 2013. It is evident that during the periods (1956 – 1965) the catches have continued to grow and their mean values reached – 19007 tons. During the period 1966 – 1975 the total average catch have increased to 21041 tons. The next decade (1976 – 1985) the horse mackerel catches have also increased from 20576.3 to 141077 tons, respectively. The period 1986 – 1995 was characteristic with abrupt decline in the catches of the fish from 977408 to 15906 tons. The next 7 years (1996 – 2002) represented a period of prolonged decreasing of the mean horse mackerel catch-mean values reached-12343.64 tons. In 1992 was achieved a catch of 21065 t. Upon 1994 the amounts of catches decreased especially in 1998-1999 period. In 2013 decrease in catches of horse mackerel was reported, at the level of 20213 t. The following table list the landings (tons) by nation. In the Black Sea coast of Turkey, horse mackerel production was 18979 tons in 2013, which covered 9% of the total fish landings in the same marine 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. STECF EWG 14-14 applied XSA for the assessment of the stock in Black Sea given the availability of a tuning fleet of commercial CPUE from Turkey for years 2005-2013.

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF

E_{MSY}	≤ 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):

Assessment formulations indicate that the SSB in 2013 is decreasing from previous year and fluctuating since 2005. In the absence of total stock size estimates and biological reference points, EWG 14-14 is unable to fully evaluate the stock size with regard to the precautionary approach.

- State of the juveniles (recruits):

EWG 14-14 was unable to fully evaluate the state of recruitment due to the selection of only age 2-8+ for the assessment. The available information on age-0 and age-1 fish was considered unreliable due to the high rate of unreported discards.

- State of exploitation:

The EWG 14-14 proposed E_{MSY} (1-4) $\leq$ 0.4 as the limit reference point consistent with high long term yields and low risk of fisheries collapse. Fishing mortality in 2013 is estimated to be F = 1.42, corresponding to an exploitation rate of 0.78, which is almost double E_{MSY} exploitation rate of 0.4. The stock has been subject to overfishing for several years.

RECENT MANAGEMENT ADVICE: To achieve the CFP objective of achieving FMSY by 2015, fishing mortality in 2015 should be reduced by 49%. In the absence of a reliable catch forecast, STECF is unable to estimate the corresponding catch level.

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 is affected by the lack of reliable catch and discard data as well as lack of data on fishing effort that targets whiting. In addition STEFC notes discrepancies in determining the age of fish older than two years and highlights that no progress was made in improving the data quality and the assessment from 2013.

The assessment assumes that horse mackerel in the Black Sea be assessed and managed as a unit stock, but the scientific basis for this assumption has not been established. Genetic, morphometric and life-history studies on horse mackerel in the Black Sea are needed to identify possible stock boundaries.

More robust fishery sampling for age and size composition by all Black Sea nations is needed to provide better estimates of annual catch-at-age. In particular, given that catches and the importance of red mulled for the fishery of Bulgaria has been rising in recent years, this species needs to be sampled and submitted under the Data Collection Programme.

The current assessment only has a single tuning index (based on Turkish data) and trends in that index may not be representative of trends in other regions where the stock occurs and is fished. The Turkish sampling project is finishing in 2014, which will make it very problematic to use catch-at-age and tuning data from Turkey in the future.

STECF notes that current E is estimated to be well above the proposed E_{MSY} reference point and continued fishing at such a level poses a serious risk to the productivity of the stock and the future viability of the fishery.

STECF considers that in order to reduce fishing mortality to or below the proposed E reference point and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects.

9.7 Red mullet (*Mullus barbatus*) in GSA 29

FISHERIES: Red mullet is one of the most important commercial species for Black Sea countries. In Turkey, it is mostly caught by bottom trawlers as a target fish species. A 10% of the landings come from small-scale vessels using gillnets. In EU waters the stock is exploited mainly by Bulgaria (256.8 t during 2013, 30% of the Black Sea total), with only small amounts landed by the Romanian fleet (2.5 t during 2013, about 0.3% of the Black Sea total). In the waters of Georgia, the mean annual catch was 28 tons in 1997-2005. Along the coasts of the Russian Federation target fisheries for red mullet are performed mainly with passive fishing gears. The catches was over 100 tons in 1998. In 2002, the total biomass of red mullet was estimated to be 1200 tons, with an exploited biomass of 960 tons and TAC of 200 tons. In Ukrainian waters, target fishing for red mullet was permitted only with beach seines and bottom set traps. The amount of unreported catches of red mullet cannot be evaluated at present.

In Turkey the red mullet fishery is regulated by area and season closures, mesh size limitations, and minimum legal size limit. In Ukraine the fisheries regulations set the minimum commercial fishing size, the allowable by-catch of juveniles in non-target fisheries, and the minimum mesh size in beach seines and in scrapers. In Bulgaria bottom-trawling is prohibited in Bulgarian waters and there is a closed season for all coastal fisheries.

SOURCE OF MANAGEMENT ADVICE: The scientific advisory body to the GFCM is the GFCM-SAC. Since 2008, the STECF-SGMED WG and STECF EWGs have also undertaken assessments and STECF has provided advice to the European Commission. STECF EWG 14-14 performed a quantitative assessment of the red mullet stock in the Black Sea using XSA over the period 1990 to 2013.

REFERENCE POINTS:

Table of limit and precautionary management reference points proposed by STECF

F0.1	≤ 0.46

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):

The SSB followed a consistent downward trend with periodic increases due to good recruitment (in 1994-1996 and 2004-2007). It decreased from 5000 - 6000 t in 1990s to the current 1500-2000 t (1173 t in 2013). In the absence of total stock size estimates and biological reference points, EWG 14-14 is unable to fully evaluate the stock size with regard to the precautionary approach.

- State of the juveniles (recruits):

Recruitment increased up to 2008 and since then started a decreasing trend. However, recruitment estimates are considered rather imprecise due to the lack of survey data.

- State of exploitation:

Total catches have been gradually decreasing since 1996 under a consistently high fishing pressure due mainly to the Turkish fishery. The fishing mortality rate during 2013 is estimated to be F = 1.17, which is more than 2.5 times the F_{MSY}. The stock has been subject to overfishing for several years.

Under the status quo F scenario, catches are expected to remain low 733 - 680 t in 2014 - 2016, respectively. Under F_{MSY} fishing catches should drop to 331-419 t, which would results in a SSB increases to 1360 t.

RECENT MANAGEMENT ADVICE: The EWG14-14 endorses the stock assessment for horse mackerel given the improvement over previous year's assessments. The main reason for accepting the current XSA assessments is the availability this year of a tuning fleet from commercial CPUE from Turkey that is considered sufficiently reliable and is deemed appropriate for tuning the bulk of the catches coming from the Turkish series.

STECF COMMENTS: STECF notes that current F is estimated to be well above the proposed F_{MSY} reference point and continued fishing at such a level poses a serious risk to the productivity of the stock and the future viability of the fishery.

To achieve the CFP objective of achieving FMSY by 2015, fishing mortality in 2015 should be reduced by 60%.

STECF advises that in order to achieve the CFP objective of reaching F_{MSY} in 2015, fishing mortality on red mullet in the Black sea should be reduced by 60 % in 2015, implying that catches from the Black Sea stock should not exceed 331 t.

STECF considers that in order to reduce fishing mortality to or below the proposed F reference point and to avoid future loss in stock productivity and landings, fishing effort and catches of fleets that exploit this stock should be reduced. STECF also considers that this would best be achieved by implementing multi-annual fleet-management plans that take into account mixed-fishery effects

10 Stocks of the northwest Atlantic (NAFO)

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

FISHERIES: The cod fishery on Flemish Cap has traditionally been a directed fishery by Portuguese trawlers and 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 by-catches 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. STACFIS reported catches in 2012 and 2013 to be around 13400 and 14000 tons.

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 B_{lim} for this stock. $F_{lim} = F_{MSY}$ (*F30%*) = 0.13 (developed in Scientific Council 2014 – not used in the 2014 assessment). $F_{max} = 0.145$.

STOCK STATUS: Current SSB is estimated to be well above *Blim*. Recent recruitments are relatively high, but these estimates are imprecise. Fishing mortality in 2013 is high, at the level of more than twice *Fmax*.

RECENT MANAGEMENT ADVICE: In the short term this stock can sustain values of F up to Fmax, however any fishing mortality above Fmax will result in an overall loss in yield in the long term. Therefore NAFO Scientific Council considers that yields at Fsq are not a viable option. Projections are heavily influenced by the 2010 and 2011 year classes, which is estimated to be extremely large, but with high uncertainty. Given the uncertainty in the projections, Scientific Council makes recommendations for 2015 only. The stock should be reassessed in 2015.

SPECIAL COMMENTS: The F_{MSY} *(=Flim* = 0.13) was developed in Scientific Council 2014 – but not used in the 2014 assessment).

STECF COMMENTS: STECF agrees with the recommendation/advice from the NAFO SC and notes that fishing at the Fmax level in 2014 and 2015 is predicted to result in catches of around 14500 t and 11000 t respectively. STECF notes the recommendation of a new full assessment of this stock to be carried out in 2015.

10.2 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 by-catches of fish is mandatory for all fleets in the fishery. Catches have fluctuated around 25 000 t in recent years until 2010, but declined since then. In 2012 and 2013 they were down to around 10000 t and 8600 t. A further decline of catches in 2014 is expected, as only 1700 t were reported up to August 2014.

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

Catch and effort data are available from the commercial fishery. Biomass (total, fishable and female spawning stock) indices are available from research surveys conducted in Div. 3LNO during spring (1999 to 2013) and autumn (1996 to 2012). CPUE, while reflecting fishery performance, is not effectively indicating the status of the resource. The trends of these CPUE indices show conflicting patterns with the survey biomass indices and were therefore not used as indicators of stock biomass..

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 (= around 19000 t). 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 at a level of around 130000 t. However, the stock has declined since 2007, and in 2013 the risk of being below B_{lim} is greater than 95%.. Recruitment indices have decreased since 2008 and are now among the lowest observed values. Given expectations of poor recruitment and relatively high fishing mortality, the stock is not predicted to increase in the near future.

RECENT MANAGEMENT ADVICE: In view of the stock situation at present (2014) NAFO recommends that there be no directed fishery on this stock in 2015.

SPECIAL COMMENTS: Recent genetic analysis shows that this stock is part of a wider population spanning NAFO Subarea 2 and at least Div. 3KL. Migrations of shrimps across the management-area boundaries are not accounted for in the assessment and therefore introduce additional uncertainty. Scientific Council recommends exploration of alternative approaches that take into account the entire stock area.

STECF COMMENTS: STECF agrees with the NAFO SC recommendation for 2014 (no directed fishery).

10.3 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 2013 (STECF 12-22).

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 around 45 000 tons and since then there has been an almost continuous decline to around 5400 t in 2009 and 2000 t in 2010. A moratorium has been imposed as from 2011 and no catches have been recorded since 2010.

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 (1988-2013). Because of the moratorium catch and effort data have not been available since 2010, and therefore a standardised CPUE series is available only up to 2010. No

analytical assessment is available. Evaluation of stock status is based upon interpretation of commercial fishery up to 2010, 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 survey female biomass index was at a high level from 1998 to 2007, and has declined to second lowest level in 2014, well below Blim. As for recruitment: All year-classes after the 2002 cohort (i.e. age 2 in 2004) have been weak. These trends indicate a strong decrease of this stock caused by weak recruitment in the last 10 years. During the same period an increase of the cod stock has been observed, one of their most important predators.

RECENT MANAGEMENT ADVICE: The most recent assessment was undertaken in 2013. The NAFO advice for 2015 is the same as for 2014: No directed fishery.

STECF COMMENTS: STECF agrees with the advice from NAFO on the basis of single stock management, i.e. there should be no directed fishery for Northern shrimp in Divisions 3M in 2015.

10.4 Greenland Halibut (*Reinhardtius hippoglossoides*) in Sub-area 2 and Divisions 3KLMNO

Advice for this stock for the years 2013 and 2014 was given in 2012 and the text below remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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. Estimates of total catches for 2011 and 2012 are not available.

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.

The Fisheries Commission adopted in 2010 an MSE approach for Greenland halibut stock in Subarea 2 + Division 3KLMNO (FC Doc. 10/12). This approach considers a survey based harvest control rule (HCR) to set a TAC for this stock on an annual basis. This is achieved by montoring and updating the survey slope and to compute the TAC according to this HCR. The data series included in the HCR computation are the Canadian Fall Divs. 2J3K index, the Canadian Spring Div. 3LNO index and the EU Flemish Cap index covering depths from 0-1400m.

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 2008-2011, 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 + λ x 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. The TAC for 2015 is calculated as: 15 441*[1+1*(0.0089)] = 15 578 t.

STECF COMMENTS: STECF agrees with the advice given by the NAFO Scientific Council in 2010 and the use of the the survey based HCR for computing annual TACs

10.5 Skates & Rays (*Rajidae*) in areas 3LNO

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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: Thorny skate is caught in directed gillnet, trawl and long-line fisheries. In directed thorny skate fisheries, cod, monkfish, American plaice and other species are landed as bycatch. In turn, Thorny skate are also caught as bycatch in gillnet, trawl and long-line fisheries directing for other species. The fishery in NAFO Divs. 3LNO is regulated by quota. 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 2011 and 2013 are 5500 t, 4300 t, 4400 t respectively for Div. 3LNO.

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; 1996-2012) and autumn (1990-1994, 1995-2012) 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, 1997-2012), EU-Portugal (2002-2004, 2006-2011), Canada (1994-2008, 2010, 2012), and Russia (1998-2011). Based upon a qualitative evaluation of stock biomass trends and recruitment indices, the assessment is considered data limited and as such associated with a relatively high uncertainty. Input data are research survey indices and fishery data. The next full assessment of this stock will be in 2016.

REFERENCE POINTS: There are presently no biological reference points for thorny skate in Div. 3LNOPs.

STOCK STATUS:

The stock has been increasing very slowly from low levels since the mid-1990s. Recruitment in 2010-2013 is above average.

RECENT MANAGEMENT ADVICE: The stock has shown little improvement at recent catch levels (approximately 5 000 t, over 2006 - 2013), therefore Scientific Council advises no increase in catches.

STECF COMMENTS: STECF agrees with the advice from the NAFO Scientific Council.

10.6 Redfish (*Sebastes spp.*) in Division 3LN

Advice for this stock for the years 2015 and 2016 was given in 2014.

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 2012 and 2013 were of 4300 t and 6000 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.

The assessment is based on a surplus production model was used where input data comes from research surveys and the fishery. The model settings are constrained with an MSY at the average level of 21 000 t for the 1960-1985 period; the results were consistent with the previous assessments. As the MSY was fixed in the model, the results are conditioned on this assumption. Management decisions based on this assessment should take into account this added uncertainty. The Scientific Council notes that a variety of HCRs have been tested for this stock (see section VII.1.c.vii of the Scientific Council Report) through a management strategy evaluation.

The next assessment is scheduled for 2016.

REFERENCE POINTS:

The stock is estimated to be well above Blim (30% BMSY) and fishing mortality is estimated to be well below Flim (=F_{MSY}).

STOCK STATUS: The stock is estimated to be at 1.4 x B_{MSY}. There is a low risk of the stock being below B_{MSY}. Fishing mortality is below F_{MSY} (0.22 F_{MSY}), and the probability of being above F_{MSY} is very low. Recent recruitment (2005 – 2013) appears to be above average.

RECENT MANAGEMENT ADVICE:

Fishing mortality up to 1/3 *FMSY* corresponding to a catch of 10 200 t in 2015 and 2016 has low risk (<10%) of exceeding *Flim*, and is projected to maintain the stock at or above *BMSY*. Fishing mortality up to 2/3 *FMSY* also has low risk of exceeding *Flim*, and maintaining the stock at or above *BMSY*. However given the uncertainties in the assessment, a higher TAC should be reached by a stepwise increase from the current catch level.

STECF COMMENTS: STECF agrees with the advice from NAFO.

10.7 Redfish (*Sebastes spp*.) in Division 3M

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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. Estimated total catches of redfish in 2012-2013 were 7600, 11100 and 7700 t

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the NAFO Scientific Council. The next assessment is to take place in 2015.

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. Because of weaker incoming recruitment and uncertainty regarding current levels of natural mortality, NAFO Scientific Council recommends not to increase the current (2013) TAC (6 500 t) in 2014 and 2015.

STECF COMMENTS: STECF agrees with the advice from the NAFO Scientific Council.

10.8 Redfish (*Sebastes* spp.) in Division 3O

There are two species of redfish that have been commercially fished in Div. 3O; the deep sea redfish (*Sebastes mentella*) and the Acadian redfish (*Sebastes fasciatus*). 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 declined since then. In 2012-2013 total annual landings were 6400 t and 7500 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: The assessment is considered data limited and as such associated with a relatively high uncertainty. Input data are research survey indices and fishery data. Surveys indicate that the stock has increased since the early 2000s. There is nothing to indicate a change in the status of the stock in 2013.

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. Advice (recommendations) for 2014 -16 is based on survey indices and catch trends:

There is insufficient information on which to base predictions of annual yield potential. Stock dynamics and recruitment patterns are also poorly understood. Catches have averaged about 13 000 t since the 1960s and over the long term, catches at this level appear to have been sustainable. NAFO Scientific Council is unable to advise on a more specific TAC level.

Special Comments: Length frequencies suggest that the Div. 3O redfish fishery targets predominantly immature fish.

The next full assessment is planned for in 2016.

STECF COMMENTS: STECF notes that at the September 2013 NAFO Annual Meeting the NAFO Scientific Council did not advise any specific annual TAC for the years 2014 -16, but pointed out that annual catch levels of around 13 000 t appear to have been sustainable.

10.9 White hake (*Urophycis tenuis*) in Divisions 3NO, 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. 3NO and sub-div. Ps 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. Catches decreased to an average of 677 t in 2005-2010. Catches declined to 202 t and 139 t in 2011 and 2012 respectively in Div. 3NO.

Catches of white hake in Sub-div. 3Ps were at their highest in 1985-1993, averaging 1 114 t, decreasing to an average of 668 t in 1994-2003. Since 2007 Catches further declined to 202 t and 212 t in 2011 and 2012 respectively in Sub-div. 3Ps.

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: Based on current information (2012-2013) there is no significant change in the status of this stock. Stock biomass remains at relatively low levels, and no large recruitments have been observed since 2000

RECENT MANAGEMENT ADVICE: Based on the low recruitment, NAFO Scientific council advises that catches of white hake in Div. 3NO should not exceed their current levels of 100-300 t.

Special comments

The next full assessment of this stock is planned for 2015.

STECF COMMENTS: STECF agrees with the advice from NAFO that catches of white hake in Div. 3NO should not exceed their current levels of 100-300 t.

11 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 have been recently 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 Fisheries Partnership Agreements (FPAs) between the EU and the coastal countries. These FPAs 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 15 of this report.

FPAs have evolved along the time, as explained in previous reports (STECF-10-03, STECF-11-15, STECF-12-22, STECF-13-27). Since 2009, Morocco, Mauritania and Guinea-Bissau have been the only CECAF coastal countries with FPA with the EU for demersal and/or small pelagic fishery, after the cease of these fishing activities in Senegal (2008) and Guinea (2009). However, the period 2011-2014 has been critical for the EU fishing activity in these countries due to the expiry of some FPAs, the new and restrictive conditions imposed by new FPAs or for other reasons as explained below.

The last FPA EU-Morocco expired in December 2011. After months of negotiation, the current protocol was published in December 2013 (OJEU, 7-12-2013, L328/2-328/39). This would be applied for a period of four years and allow more than 100 European vessels to fish in Moroccan waters. This protocol has finally been implemented and the fishery re-opened in Moroccan waters in September 2014.

The expiration of the FPA EU-Mauritania on the 31st July 2012 meant the cessation of most of the fishing activities of the EU fleets in this fishing ground. The current protocol was published in December 2012 (COUNCIL DECISION of 18 December 2012, 2012/827/EU), establishing very restrictive and not profitable conditions for most EU fleets, which mostly abandoned the Mauritanian fishing ground in April-May 2012 (pelagic trawlers) or July-August 2012 (shrimper and cephalopod fleets). The cephalopod fishing opportunities were excluded by this protocol. The decision of the EU/Mauritania Joint Committee of 5 November 2013 (OJEU 2014/36/EU) has implemented some technical modifications, concerning the freezer shrimper and small pelagic fleets, which allowed them to re-enter the Mauritanian fishing ground. Thus, these fisheries have been newly operating in Mauritania since November 2013 and are expected to continue until the end of the agreement, in December 2014.

The circumstances explained above have involved significant changes in the fishing activities developed by the European fleets in Mauritanian waters, affecting both the small pelagic trawlers and the demersal fleets. The most relevant change is the closure of the cephalopod fishery at the end of the FPA in July 2012.

The most recent protocol with Guinea-Bissau terminated on 15 June 2012. A new protocol was initiated in February 2012 but its adoption procedure was suspended following the military coup in Guinea-Bissau in April 2012. At the beginning of October 2014, the EU and Guinea-Bissau agreed on a new protocol to implement the EU/Guinea Bissau FPA. This will be valid for three years, and will replace the one of 2012, providing fishing opportunities for fish, shrimps and cephalopods.

Two FAO/CECAF Working Groups met in the period November 2013-October 2014. The FAO/CECAF Working Group on the Assessment of Demersal Resources (Subgroup North) was held in Fuengirola, Spain,

from 18 to 27 November 2013. Although the assessments have not yet been formally published, the WG report was available to the STECF. The FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa was held in Banjul, The Gambia, from 19 to 24 May 2014. The results from the assessments have not yet been formally published and the WG report was not available to the STECF. Thus, the text on the small pelagic stocks remains largely unchanged from that given in the Consolidated Review of advice for 2014 (STECF-13-27). No Working Group on Demersal Resources (South) has been carried out since 2011. Thus, there is no updated advice and the text of the stock sections remains mostly unchanged from the STECF Review of advice for 2014 (STECF 13-27).

As explained in previous reports, there is a serious lack of basic information regarding fisheries and biological information of CECAF stocks, which do not allow the application of state-of-the-art assessment methods currently in use for other fisheries. Therefore, a standard methodology has been used in the CECAF Working Groups during the last years, which is based on the application of a dynamic production model Biodyn (Barros, 2007a), specifically 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, 2007b),

11.1 Sardine (*Sardina pilchardus*) off Morocco, Western Sahara (under Moroccan administration), Mauritania and Senegal

Advice for this stock for the years 2014 and 2015 was given in 2014 but this information is not available for the STECF, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27). Only information from Mauritania is available for the STECF through the Report of the 7th Meeting of the Joint Scientific Committee RIM-UE (Comité Scientifique Conjoint APP RIM-EU, 2014).

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). Sardines of Zone North used to be exploited as by-catch by a maximum of 20 Spanish vessels (see STECF-12-22). However, this purse seine fishery has been closed during the period 2012-2014, due the lack of FPA between the EU and Morocco. Fisheries for sardine in zones A and B are exclusively carried out by Moroccan boats. Those in zone C are fished by an unknown number of Moroccan purse seiners and long distance trawlers mainly from Russia and previously, by The Netherlands (until the end of the FPA). 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 were reported in 2011, 73% registered in the Moroccan zone.

In 2011, sardine constituted about 61% of the total small pelagic catches in Moroccan waters, with values around 575 000 t, lower than previous years. The average catches of sardine over the last five years reported (2007 to 2011) were around 690 000 t.

In Mauritania, sardine catches highly increased from 2009 to 2011, reaching a maximum around 200 000 t in 2011. However, a catch drop occurred from 2011 to 2013, mainly due to the EU fleet withdrawal from the zone (in April 2012), followed by that of the non EU fleets (in August 2012). Catches in 2013 were only 7% of those registered in 2011 (Comité Scientifique Conjoint APP RIM-EU, 2014). The general drop in catches of small pelagic occurring in Mauritania during 2012 and 2013 was greater for sardines and sardinella. This was mainly due to the significant reduction of the EU fishing effort, especially during the beginning of the year, which is the fishing season of these resources. In addition, the new fishing zone implemented by the protocol was not adequate for fishing these species.

In 2013, 12 EU trawlers returned to Mauritania, 2 “Dutch type” and 10 “Russian type”. During the period January-May 2014, the number of EU trawlers increased to 20, 8 “Dutch type” and 12 “Russian type”. The increase of the “Dutch type” number of vessels in 2014 is related to the good sardine fishing occurring in North Mauritania during this period and to the extension of the Port of Nouadhibou, where these trawlers can currently land their catches.

The fishing effort of the Mauritanian artisanal fishery has greatly increased during the last years, in relation to a great demand from the fish meal factories located in Nouadhibou and Nouakchott (Comité Scientifique Conjoint APP RIM-EU, 2014).

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 Working Group on the Assessment of Small Pelagic Fish off Northwest Africa, 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 Banjul, (The Gambia), from 19 to 24 May 2014. The results from the assessments have not yet been formally published and the WG report was not available to the STECF. Thus, the stock status and advice for this stock for 2015 remains largely unchanged from that given for 2014 (STECF 13-27), based on the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa held in Dakar (Senegal) in 2012 (FAO, 2013).

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.

There was not new assessment of sardine-stock C from the last WG (2014). Thus, the WG considered the assessment results of 2011 and concluded that this stock was not fully exploited, (Comité Scientifique Conjoint APP RIM-EU, 2014).

RECENT MANAGEMENT ADVICE: For the central stock of sardine (A+B), the Working Group recommended 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 FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa of the Committee for the Eastern Central Atlantic Fisheries (CECAF).

11.2 Anchovy (*Engraulis encrasicolus*) off Morocco and Mauritania

Advice for this stock for the years 2014 and 2015 was given in 2014 but this information is not available for the STECF, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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. In 2012, 2013, and 2014, the Spanish purse seiners did not operate in Moroccan waters due to the expiry of the FPA EU-Morocco in November 2011. 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 usually caught as by-catch by the EU industrial pelagic trawlers fishing for sardinella, horse mackerel or mackerel.

A great increase in total anchovy catch was experimented in the region during the period 2006-2011, which was partly explained by the high increase of 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. The catches of this species decreased in 2012, due to the withdrawal of the EU fleet from the Mauritanian fishing ground in April-May 2012 (Comité Scientifique Conjoint APP RIM-UE, 2013).

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 met in Banjul, (The Gambia), from 19 to 24 May 2014. However, the results from the assessments have not yet been formally published and the WG report was not available to the STECF. Thus, the stock status and advice for this stock for 2015 remains unchanged from that given for 2014 (STECF 13-27), based on the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa held in Dakar (Senegal) in 2012 (FAO, 2013).

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}= 2.0 and $F_{0.1}$= 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 were not available for whole the analyzed period. In Morocco, data were only available in the North Zone A+B. Furthermore, there were uncertainties about the stocks identity in the region. In addition, the abundance indexes from acoustic surveys showed important fluctuations that were 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 FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa 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.

11.3 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 2013.

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 have been traditionally 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 in 2011, restricted the hake fishery to Mauritanian waters.

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 6,470 t and 22,600 t over the period 1983-2012. Most of the catches of these species were made in Mauritania where they have followed a cyclical but general increasing trend from 1983 to 2002, when a maximum historic value of 15 900 t was attained by 40 national and European vessels operating in the area. The Mauritanian fleet experimented and important regression from 2000 to 2007, when it completely stopped its activity. The EU (Spanish) has been the only fleet operating in the area since 2007. Spanish catches have oscillated, following a general decreasing trend, until a minimum level around 3100 t in 2012. Only two Spanish vessels have been operative in the area in the period 2012-2014. Several reasons explain the withdrawal of most vessels targeting black hakes in Mauritania: the price decrease of this product in the international market, the high competence of black hakes from other zones (Namibia, Chile, Argentina, etc.) and the restrictive conditions imposed by the last FPAs, among others. The data available on the exploitation of these species are limited to Mauritania, since there are no fleets targeting black hakes neither in Morocco nor in Senegal and only two vessels fish black hake in The Gambia since 2010.

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 Fuengirola (Spain) from 18 to 27 November 2013. 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} = 26 494, F_{MSY} = 0.37 and target reference points were $B_{0.1}$ = 29 144 and $F_{0.1}$ = 0.33.
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 the Mauritanian stock, current black hake biomass resulted to be over the biomass required to produce maximum sustainable yield and over the target biomass (($B_{cur}/B_{0.1}$= 127%). Current fishing effort was lower than that corresponding to the target effort ($F_{cur}/F_{0.1}$= 50%) and to the MSY. These results showed that the stock was not fully exploited. This is related to decrease of the fleet targeting black hakes during the last eight years period, with only two vessels targeting black hakes since 2011. Moroccan and Senegalese stocks were not assessed, since there are no fleet targeting black hakes in these waters.

RECENT MANAGEMENT ADVICE: Taking into consideration the contradictory results of the different assessments essays performed, the Working Group recommended obtaining information on the catches of black hake as bycatch from other fleets (retained and discarded) and their sizes through an observation programme. The current fishing effort should be increased 10%, whilst waiting for confirmation on the state of the stocks.

STECF COMMENTS: 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.

11.4 Octopus (*Octopus vulgaris*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2013.

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. Since 1996, FPAs between the EU and Mauritania had allowed EU vessels (mainly Spanish) to fish octopus in Mauritania. The FPA of 2006 involved a significant reduction of the fishing effort, from 54 cephalopod trawlers (2006) to 30 (2012). The last protocols of the FPA (July 2012 and December 2012) did not included fishing opportunities for EU cephalopod trawlers, and thus, this EU fishery is closed since July 2012. The total number of cephalopod

national and foreign vessels actively operating in Mauritanian waters has suffered a continue decrease, from 193 in 2003 to 130 in 2012.

Octopus is the target species of the industrial and artisanal cephalopod fleets in Mauritania, accounting for more than 85% in landings from the industrial fleet and than 95% from the artisanal fleet. Overall catches of octopus in the period 1990-2012 have ranged from a minimum of 17,400 t in 1998 and a maximum of 44,600 t in 1992. After peaking in year 2000 with 13 000 t, European (mainly Spanish) catches showed a continuous decreasing trend. This represented a catch drop of 61% during the last 12 years period, until the end of this fishery in July 2012. Octopus catches from the Mauritanian industrial fleet have declined after peaking in 1992 (27 500 tonnes), oscillating between 5400 and 10 400 tonnes during the period 2000-2012. Catches from this fleet recovered during the last two years from the drop registered in 2010. Octopus catches from the Mauritanian industrial fresh trawlers have suffered a continuous decrease since 1993, with the minimum value registered in 2010 (1050 tonnes). This decline has followed a fishing effort reduction of this fleet. Catches from the Mauritanian artisanal fleet were stabilized between 3000-6000 tonnes during the period 1995-2007. An increased occurred during the following two years, with a maximum of 17 800 tonnes in 2009. After a new drop in 2010, catches increased in 2011 and 2012.

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 Fuengirola (Spain) from 18 to 27 November 2013. 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 of Cape Blanc (Mauritania) (21ºN-16ºN). 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} = 36 402 and F_{MSY} = 0.76. Target reference points were $B_{0.1}$ = 40 043 and $F_{0.1}$ = 0.68.

STOCK STATUS: The Schaefer dynamic production model was used to assess the Cape Blanc (Mauritanian) octopus stock. Results showed that biomass in 2012 was below that producing the target biomass ($B_{cur}/B_{0.1}$= 84%) and that fishing mortality is higher than that needed to reach the target $F_{0.1}$ ($F_{cur}/F_{0.1}$= 130%). The Cape Blanc octopus stock was therefore considered overexploited. These results were the same as those from previous assessments (FAO/CECAF WGs of 2002, 2007, 2010 and IMROP 2006). However, certain improvement of the stock state was noted. This improvement was also confirmed by the trend analysis of other indicators, as the abundance indices from the Mauritanian surveys and as the average size of the caught individuals.

RECENT MANAGEMENT ADVICE: Taking into account the effort reduction in Mauritania during the last years and the abundance improvement of the Cape Blanc octopus stock, it was recommended not to increase the fishing mortality level of 2012. The WG also recommended reinforcing 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.

11.5 Cuttlefish (*Sepia hierredda* and *Sepia officinalis*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2013.

FISHERIES: Cuttlefish species are taken as 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. Main catches (around 75%) are reported by the Mauritanian fleet, which operates in a shallower area than the EU (Comité Scientifique Conjoint APP RIM-UE, 2013). Catches from the Mauritanian fleet showed a decreasing trend during the period 1990-2012, from around 7100 tonnes in 1990 to 1750 tonnes in 2011, followed by an increase to 2500 tonnes in 2012. The European (mainly Spanish) catches reached maximal values in the period 1999-2001, followed by a sharp drop during the last years, with only 200 t in 2012, year when the fishery was closed.

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 Fuengirola (Spain) from 18 to 27 November 2013. 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). Limit reference points were B_{MSY} = 4000 and F_{MSY} = 0.94. Target reference points were $B_{0.1}$ = 4400 and $F_{0.1}$ = 0.85.

STOCK STATUS: The Schaefer dynamic production model was applied to assess the Cape Blanc (21ºN-16ºN) cuttlefish (*Sepia* spp.) stock. Results showed that biomass in 2012 was higher than that producing the target biomass ($B_{cur}/B_{0.1}$= 145%) and that fishing mortality was lower than that needed to reach the target $F_{0.1}$ ($F_{cur}/F_{0.1}$= 47%). The Mauritanian Cape Blanc cuttlefish stock was therefore considered not fully exploited. This improvement of the stock status in relation to previous years agrees with the increasing trend of the abundance indices from the Mauritanian scientific surveys during the last years, and is related to the effort decrease from cephalopod trawlers.

RECENT MANAGEMENT ADVICE: Taking into account that this species is caught as bycatch by those fleets targeting octopus, the same recommendations made for this species were considered valid for the cuttlefish stock. Therefore, the CECAF Working Group decided to recommend not increasing the fishing mortality level of 2012 and reinforcing management measures.

STECF COMMENTS: STECF notes that the advice not to increase fishing mortality on cuttlefish is based on multi-species considerations.

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.

11.6 Coastal prawn (*Farfantepenaeus notialis*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2013.

FISHERIES: The crustaceans of commercial importance in Mauritanian waters are in order of importance, the deep water rose shrimp (*Parapenaeus longirostris*), the Southern pink shrimp (*Farfantepenaeus notialis*) and the striped red 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 2000s, a Mauritanian fleet developed at the same time than other foreign fleets. Thus, the shrimp fishing activity, was increased during the middle 1990s-middle 2000s. However, it dropped in a 50% from 2007 to 2008, due to several reasons as the imposition of a second close season by the Mauritanian authorities in May and June and the transformation of most of the Mauritanian shrimpers to cephalopod trawlers. This fishery was temporally closed with the withdrawal of the EU (mainly Spanish) of the Mauritanian fishing ground in July-August 2012, at the end of the last FPA. The fishery was re-opened in November 2013, subject to more restrictive conditions.

F. notialis catches made by the all the industrial fleets operating in the area suffered significant fluctuations between 1993 and 2012, varying between 405 t (1993) and 2747 t (2005), with three main peaks occurring in 1999, 2002 and 2005-2006. After the 2006 peak, catches continuously decreased. They newly recover in 2010 and 2011 to drop again due to the effort reduction of the Spanish fleet at the end of the FPA in 2012. Since 2008 and until the end of the EU activity in 2012, the European (Spanish and Italian) fleet was the main responsible of the *F. notialis* fishery (Comité Scientifique Conjoint APP RIM-UE, 2013).

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 Fuengirola (Spain) from 18 to 27 November 2013. 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} = 5000 and F_{MSY} = 0.51. Target reference points were $B_{0.1}$ = 5500 and $F_{0.1}$ = 0.46.

STOCK STATUS: The Schaefer dynamic production model was applied to assess the stock of the Mauritanian southern rose shrimp. The dynamical model showed a good fit, indicating a situation of fully exploitation (in terms of biomass) but not in terms of fishing mortality. The biomass in 2012 was at the same level that the level of the MSY and slightly lower than the target biomass $B_{0.1}$ ($B_{cur}/B_{0.1}$= 92%). However, the F_{cur} was much lower than F_{MSY} and $F_{0.1}$ ($F_{cur}/F_{0.1}$= 29%), due to the fact that the effort targeting this species during the last year was very low, as the EU fishery was only developed until July 2012 and the Spanish fleet mainly targets this species from the summer until the end of the year. In addition, the effort deployed by other fleets in previous years was very much reduced from 2007 onwards and very low during the last five years.

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. Considering the exceptional situation in 2012 (end of the EU-Mauritania FPA and the closure of the shrimper fishery at the end of July 2012), the Working Group recommended not to increase the 2011 fishing mortality.

STECF COMMENTS: STECF notes that the advice implies fishing at F=0.22, which is less than F_{MSY} (F=0.51) and less than the target F0.1 (F=0.46).

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.

11.7 Deepwater shrimp (*Parapenaeus longirostris*) off Mauritania

The results from the most recent assessment and advice for this stock were released in 2013.

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 2000s, a Mauritanian fleet developed at the same time than other foreign fleets. Therefore, the fishing effort that had diminished at the beginning of the 1990s was newly increased during the following years. However, the shrimp fishing activity decreased 50% from 2007 to 2008, mainly due to the imposition 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. This fishery was temporally closed, after the withdrawal of the EU shrimper fleet, at the end of the FPA in August 2012. The fishery was re-opened in November 2013, subject to more restrictive conditions.

P. longirostris is the main target species in the fishery accounting for more than 50% to the total production. Catch of this species have suffered large interannual fluctuations, showing a general increasing trend during the period 1991-2007, followed by a general decrease the years after. Total catches of deep water rose shrimp made by all the fleets operating in the area have oscillated from 497 t (1992) to 5 984 t (2007). Catches dropped after peaking in 2007 to values around 1400 t in 2009, being followed by a new increase (in 2010 and 2011) and decrease (in 2012), this last due to the end of the EU fishery in August 2012. The exploitation of *P. longirostris* during the last years was mainly performed by the Spanish fleet, with a small contribution (less than 4%) of other national and foreign fleets (Comité Scientifique Conjoint APP RIM-UE, 2013).

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 Fuengirola (Spain) from 18 to 27 November 2013. 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} = 5744 and F_{MSY} =0.60. Target reference points were $B_{0.1}$ = 6318 and $F_{0.1}$ = 0.54.

STOCK STATUS: The Schaefer dynamic production model was applied to assess the Mauritanian stock of *P. longirostris*. The stock resulted to be not fully exploited. The current biomass was over the target biomass $B_{0.1}$ ($B_{cur}/B_{0.1}$=140%) and the fishing mortality in 2012 was below the target reference point ($F_{cur}/F_{0.1}$=44%). As it happened in the previous assessment of 2010, the stock seems to be in a good state. Besides the excellent recruitment of 2007, there has been a continued and important decrease in fishing effort by a reduction in the number of boats targeting this species in Mauritanian waters. In fact, the effort in 2012 was the minimum of all the historical series, due to the close of the EU shrimper fishery at the end of July 2012, when the FPA expired.

In addition, the activity of the Mauritanian shrimper fleet, relatively important in previous years, was reduced since 2008 and only 4 vessels were operative in 2012. However, the situation of low exploitation of this stock should be taken with care due to the natural fluctuations of the species (short life cycle and therefore highly dependent on recruitment).

In addition, other assessment was made considering a unique stock for Mauritania-Senegal-The Gambia. The results showed a similar situation than the Mauritanian stock and the Senegal-The Gambia stock, being especially close to those obtained for the Mauritanian stock assessment. In spite of the uncertainty of the stock identities, the similarity of the results made possible to accept the assessment of the three countries together.

RECENT MANAGEMENT ADVICE: Considering the exceptional situation in 2012 (end of the EU-Mauritania FPA and closure of the fishery at the end of July 2012), the CECAF Working Group recommended not increasing the 2011 fishing mortality (F=0.32).

STECF COMMENTS: STECF notes that the advice implies fishing at F=0.32, which is less than F_{MSY} (F=0.60) and less than the target F0.1 (F=0.54).

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. Research on biological studies focussed on the identification of stocks of *P. longirostris* should be undertaken in the region.

11.8 Atlantic horse mackerel (*Trachurus trachurus*) and Cunene horse mackerel (*Trachurus trecae*) off Mauritania and other countries in the northern CECAF region.

Advice for this stock for the years 2014 and 2015 was given in 2014 but this information is not available for the STECF, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27). Some information from Mauritania is available for the STECF from the Report of the 7th Meeting of the Joint Scientific Committee RIM-UE (Comité Scientifique Conjoint APP RIM-EU, 2014).

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 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%. The average annual catch of the Cunene horse mackerel over the period 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.

Around 70-80% of the total catches of *T. trachurus* and *T. trecae* are reported in the Mauritanian EEZ, which constitutes the main fishing area for these species in the North West African region. *Trachurus* spp are the main target species for the industrial small pelagic fishery in Mauritania, considering all the fleets together. Most catches are carried out by the "Russian type" vessels (Russia, Ukraine, Belize, etc.). The EU fleet only represented around 20% of the total catches in Mauritania (Comité Scientifique Conjoint APP RIM-EU, 2014). This fleet abandoned the Mauritanian fishing ground in May 2012, due to the restrictive conditions of the new FPA, being followed by the non EU fleets in August 2012. In 2013, 12 EU vessels returned to Mauritania (2 "Dutch type" and 10 "Russian type" vessels). During the period January-May 2014, the number of EU trawlers increased to 20 (8 "Dutch type" and 12 "Russian type" trawlers) (Comité Scientifique Conjoint APP RIM-EU, 2014).

The EU catches of both species together (*T. trachurus* and *T. trecae*) in Mauritanian waters decreased in 2012, when the EU fleets left the fishing ground. A slight increased was recorded in 2013, due to the return of some European vessels (from Poland and the Baltic countries). The non EU catches followed their decreasing trend in 2013, due to the reduction of the fishing effort, as no vessels were operating during the first semester of the year (Comité Scientifique Conjoint APP RIM-EU, 2014).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa of the Committee for the Eastern Central Atlantic Fisheries (CECAF). The last FAO Working Group was held in Banjul (The Gambia), from 19 to 24 May 2014. However, the results from the assessments have not yet been formally published and the WG report was not available to the STECF. Thus, the stock status and advice for this stock for 2015 remains largely unchanged from that given for 2014 (STECF 13-27), based on the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa held in Dakar (Senegal) in 2012 (FAO, 2013).

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 considered one stock for each *Trachurus* species in the whole region. Assessments of the two stocks were carried out using a surplus production model, using the CPUE of the Russian fleet as the 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 evidenced an overexploitation of the *T. trecae* stock. The 2014 WG concluded that despite the catch reduction during 2012 and 2013, this stock was still overexploited (Comité Scientifique Conjoint APP RIM-EU, 2014). 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). Even considering the fact that the *T. trachurus* stock was not overexploited, taking into account the multi species character of this fishery, the 2014 WG recommended not exceeding the effort level of 2011 and a catch level of 260 000 tonnes for both the species together (Comité Scientifique Conjoint APP RIM-EU, 2014).

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).

11.9 Mackerel (*Scomber japonicus*) off Mauritania and other countries in the northern CECAF region.

Advice for this stock for the years 2014 and 2015 was given in 2014 but this information is not available for the STECF, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27). Some information from Mauritania is available for the STECF from the Report of the 7th Meeting of the Joint Scientific Committee RIM-UE (Comité Scientifique Conjoint APP RIM-EU, 2014).

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. 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 that used to fish into the framework of the EU-Morocco FPA, which ended in November 2011. The Ukrainian fleet 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 used to be 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. The general increasing trend of catches of *S. japonicus* in the region has been also observed in Mauritanian waters. Almost 30% of the total catches in North West Africa occurs in the Mauritanian EEZ, the EU fleet contributing to 20% of this total (Comité Scientifique Conjoint APP RIM-EU, 2014). A total of 99 800 t were registered in 2011, which represented an increase of 33% in relation to the previous year. The average catch for the last five years reported period 2007-2011 in Mauritanian waters was estimated at around 33 100 t.

The effort of the industrial fishery for small pelagics in Mauritania dropped in 2012, due to the withdrawal of the EU trawlers in April, followed by that of the non EU fleets in August. In 2013, 12 EU trawlers returned to Mauritania (2 "Dutch type" and 10 "Russian type"). During the period January-May 2014, the number of EU trawlers increased to 20 (8 "Dutch type" and 12 "Russian type") (Comité Scientifique Conjoint APP RIM-EU, 2014).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa of the Committee for the Eastern Central Atlantic Fisheries (CECAF). The last FAO Working Group was held in Banjul (The Gambia), from 19 to 24 May 2014. However, the results from the assessments have not yet been formally published and the WG report was not available to the STECF. Thus, the stock status and advice for this stock for 2015 remains largely unchanged from that given for 2014 (STECF 13-27), based on the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa held in Dakar (Senegal) in 2012 (FAO, 2013).

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. In 2014, a quota of 257 000 tonnes was recommended by the WG for the whole region (Comité Scientifique Conjoint APP RIM-EU, 2014).

STECF COMMENTS: STECF agrees with the advice from the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa of the 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.

11.10 Sardinella *(Sardinella aurita* and *Sardinella maderensis*) off Mauritania and other countries in the northern CECAF region.

Advice for this stock for the years 2014 and 2015 was given in 2014 but this information is not available for the STECF, hence the text below remains largely unchanged from the Consolidated STECF review of advice for

2014 (STECF-13-27). Some information from Mauritania is available for the STECF from the Report of the 7th Meeting of the Joint Scientific Committee RIM-UE (Comité Scientifique Conjoint APP RIM-EU, 2014).

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. Industrial pelagic trawlers from the EU used to exploit sardinellas in Zone C until the expiry of the EU-Morocco FPA at the end of 2011. The greatest fishery takes place in Mauritania and Senegal. In Mauritania, sardinellas are mainly exploited by long-distance trawlers from the EU. Pelagic trawlers from other foreign countries contribute to this fishery, together with some small purse seiners, and with 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 was based on the fact that the Dutch-type fleet specifically targets sardinellas, whereas the Russian-type fleet targets horse mackerel and mackerel, fishing sardinella only as by-catch. 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 had increased in the last years, reaching the maximum value of 600 000 t in 2011, followed by a great decrease in 2012, due to the withdrawal of the EU fleet. Total catch of *S. aurita* fluctuated around an average level of about 534 700 t in the period 2007-2011. For *S. maderensis*, catches show a general decreasing trend since 2003, with values around 125 000 t in 2011. The average catch of this species for the last five year period available (2007-2011) was 132 200 t.

Catches of *S. aurita* in Mauritanian waters contributed to 42% of the total catches in the region during the period 2002-2012. The EU vessels (mainly "Dutch type") fish up to 20% of the total catches from the industrial fleets in Mauritanian waters (Comité Scientifique Conjoint APP RIM-EU, 2014). This fleet abandoned the Mauritanian fishing ground in May 2012, due to expiry of the last EU-Mauritania FPA and the restrictive conditions of the new protocols. Some vessels returned after November 2013, when the technical measures established for this fleet where modified following the Decision of the EU-Mauritania Joint Committee (2014/36/EU).

The effort of the industrial fishery for small pelagics in Mauritania dropped in 2012, due to the withdrawal of the EU trawlers in April, followed by that of the non EU fleets in August. In 2013, 12 EU trawlers returned to Mauritania (2 "Dutch type" and 10 "Russian type"). During the period January-May 2014, the number of EU trawlers increased to 20 (8 "Dutch type" and 12 "Russian type"). The increase of the "Dutch type" number of vessels in 2014 is related to the good sardine fishing occurring in North Mauritania during this period and to the extension of the Port of Nouadhibou, where these trawlers can land their catches. The fishing effort of the artisanal fishery has greatly increased during the last years, in relation to a great demand from the fish meal factories located in Nouadhibou and Nouakchott (Comité Scientifique Conjoint APP RIM-EU, 2014). In 2013, sardinella catches from the artisanal fleet exceeded by far those from the industrial fishery, which were strongly declining. 28% of the sardinella artisanal catches corresponded to *S. maderensis* (Comité Scientifique Conjoint APP RIM-EU, 2014).

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa of the Committee for the Eastern Central Atlantic Fisheries (CECAF). The last Working Group was held in Banjul (The Gambia), from 19 to 24 May 2014. However, the results from the assessments have not yet been formally published and the WG report was not available to the STECF. Thus, the stock status and advice for this stock for 2015 remains largely unchanged from that given for 2014 (STECF 13-27), based on the FAO Working Group on the Assessment of Small Pelagics off Northwest Africa held in Dakar (Senegal) in June 2012 (FAO, 2013)**.**

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.

In 2014, the WG performed a LCA for *S. aurita.* Results showed that the stock was overexploited in the region (North Werst Africa). However, due to the recurrent sampling problems (especially in the Senegalese zone), the length frequencies do not give a very accurate estimation of the demographic structure in the south zone of the distribution area. Thus, the diagnosis provided keeps uncertain (Comité Scientifique Conjoint APP RIM-EU, 2014).

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. In 2014, as a precautionary measure, the WG recommended an effort reduction of all the fleets fishing sardinellas in the whole region (Comité Scientifique Conjoint APP RIM-EU, 2014).

STECF COMMENTS: STECF agrees with the advice from the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa of the Committee for the Eastern Central Atlantic Fisheries (CECAF).

11.11 Other demersal finfish in Mauritanian waters

The results from the most recent assessment and advice for this stock were released in 2013.

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 three seabreams (family Sparidae): *Pagellus bellottii*, *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 Fuengirola (Spain) from 18 to 27 November 2013. 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 estimated for those stocks assessed were the following:

Species-Stock	$B_{0.1}$	$F_{0.1}$
Pagellus bellottii-Mauritania, Senegal and The Gambia	14874	0.72
Epinephelus aeneus-Mauritania, Senegal and The Gambia	65039	0.05

STOCK STATUS: Assessments conducted by application of dynamic surplus production models concluded the following situations: the stock of red pandora (*Pagellus bellotti*) from Mauritania, Senegal and The Gambia was not fully exploited ($B_{cur}/B_{0.1}$=158% and $F_{cur}/F_{0.1}$=26%).; the stock of grouper (*Epinephelus aeneus*) from Mauritania, Senegal and The Gambia was overexploited ($B_{cur}/B_{0.1}$=34% and $F_{cur}/F_{0.1}$=762%). .The models did not provide reliable results for the bluespotted seabream *Pagrus caeruleostictus* (stock Mauritania, Senegal and The Gambia) and for the large-eye dentex *Dentex macrophthalmus* (stock Mauritania, Senegal and The Gambia).

RECENT MANAGEMENT ADVICE: The Working Group recommended not exceeding the 2012 level of fishing effort for *P. bellottii,* as a precautionary measure, as well as reducing the fishing mortality on *E. aeneus.* As a precautionary measure, the WG also recommended not exceeding the 2008 fishing mortality level on *P. caeruleostictus.* Although the fitting quality of the model did not allow giving precise conclusions on the state of the stock of *D. macrophthalmus* in Mauritania, Senegal and The Gambia, the abundance indices obtained in the Mauritanian research surveys during the last years showed low abundance levels for this species. Thus, as a precautionary measure, the WG recommended not exceeding the fishing mortality level of 2012.

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 fleets operating in the area.

11.12 Deepwater shrimps off Guinea-Bissau

Last advice for this stock was given in 2011. The text below remains largely unchanged from the Consolidated review of advice for 2013 (STECF-13-27).

FISHERIES: The deep water rose shrimp (*Parapenaeus longirostris)* and the striped red shrimp *(Aristeus varidens*) constituted the main deep water shrimp resources in Guinea-Bissau. These species have been traditionally exploited in a fishery conducted by European trawlers that operate into the framework of FPAs 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, was the bigger communitarian fleet in the area, followed by the Portuguese fleet (5 vessels). This fleet increase in Guinea-Bissauan waters was mainly 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* was the main target species of the Spanish fleet, constituting around the 65% of its total annual catches. Between 1998 and 2011, in the period after the civil war in Guinea-Bissau, Spanish catches of *P. longirostris* oscillated between 39 t (1998) and 1104 t (2009). The EU shrimper fishery ceased again in April 2012, after the military coup in Guinea-Bissau, which also resulted in suspension of the adoption of the new FPA protocol.

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 Accra (Ghana) in 2011. 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 the FAO/CECAF assessment working group on demersal resources (subgroup south), including crustaceans, was in 2008 (FAO, 2012).

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} = 3000 and F_{MSY} =0.71. Target reference points were $B_{0.1}$ = 3300 and $F_{0.1}$ = 0.64.

STOCK STATUS: *A. varidens* is not assessed in the CECAF Working Group. *P. longirostris* of Guinea-Bissau was considered as a single stock for the assessment. The Schaefer dynamic production model was applied to assess this stock. Results showed that the deep water rose shrimp stock was fully exploited. The current biomass was over the target biomass $B_{0.1}$ ($B_{cur}/B_{0.1}$=139%) and the fishing mortality in 2010 was below the target reference point ($F_{cur}/F_{0.1}$=63%).

RECENT MANAGEMENT ADVICE: As a precautionary approach, the Working Group recommended not increasing the fishing effort and keeping the total catch below the average of most recent three years (2008-2010) of 2000 tonnes.

STECF COMMENTS: STECF agrees with the assessment and advice from the CECAF Working group. However, STECF notes there are inconsistencies between the data provided by Guinea-Bissau to the WG and to

the Joint Scientific Committees (JSCs) for FPAs between the EU and Guinea-Bissau. Thus, the results of this assessment should be considered with caution.

Financial constraints do 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 historic data and assessments. Research on biological studies focussed on the identification of stocks should be undertaken in the region. Furthermore, the presence of onboard observers is desirable in order to obtain reliable estimates of total catches (retained and discarded) produced by the fleets operating in the area.

11.13 Octopus (*Octopus vulgaris*) off Guinea-Bissau

Last advice for this stock was given in 2011. The text below remains largely unchanged from the Consolidated review of advice for 2013 (STECF-13-27).

FISHERIES: The cephalopod fishery in waters off Guinea-Bissau was mainly 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 during the last years was developed by industrial trawlers mainly from the EU (Spain and Portugal) and China, being the Chinese fleet the one with the greatest effort in the area, followed by the Spanish fleet. The Spanish statistical series is the longer available. Spanish catches of octopus oscillated between very low values after the civil war years in Guinea-Bissau to a maximum value of 1187 t in 2007, when the higher effort was exerted by the Spanish fleet in these waters. The EU cephalopod fleet left this fishery after the military coup in April 2012.

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 Accra (Ghana) in 2011. 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 the FAO/CECAF assessment working group on demersal resources (subgroup south), was in 2008 (FAO, 2012).

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} = 5000 and F_{MSY} =0.5. Target reference points were $B_{0.1}$ = 5500 and $F_{0.1}$ = 0.45.

STOCK STATUS: The Working Group considered a single stock of *O. vulgaris* from Guinea-Bissau. The Schaefer dynamic production model was applied to assess it. Results showed that the octopus stock was not fully exploited. The current biomass was over the target biomass $B_{0.1}$ ($B_{cur}/B_{0.1}$=150%) and the fishing mortality in 2010 was below the target reference point ($F_{cur}/F_{0.1}$=34%).

RECENT MANAGEMENT ADVICE: the Working Group recommended not exceeding the effort levels exerted during the period 2007-2009, and keeping the catch at the average of the last years around 3000 tonnes. The WG noted that the data provided in 2010 were provisional and thus, they were not considered for the recommendation. In addition, the WG recommended reviewing the statistics series of all fleets that harvest this resource.

STECF COMMENTS: STECF agrees with the assessment and advice from the CECAF Working group.

However, STECF notes there are inconsistencies between the data provided by Guinea-Bissau to the WG and to the Joint Scientific Committees (JSCs) for FPAs between the EU and Guinea-Bissau. In addition the assessment was made with uncompleted data. Therefore, the results of this assessment should be considered with caution. Financial constraints do 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 historic data and assessments. The lack of information of other countries targeting the same resource in the area does not permit reliable assessments of the stocks. Furthermore, the presence of onboard observers is desirable in order to obtain real estimations of total catches (retained and discarded) produced by the fleets operating in the area.

11.14 Cuttlefish (*Sepia spp*.) off Guinea-Bissau

Last advice for this stock was given in 2011. The text below remains largely unchanged from the Consolidated review of advice for 2014 (STECF-13-27).

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 was developed by industrial trawlers mainly from the EU (Spain and Portugal) and from China, this last being the one exerting the greatest effort in the area, followed by the Spanish fleet. The Spanish statistical series is the longer available. Spanish catches of cuttlefish oscillated between very low values after the civil war years in Guinea-Bissau to a maximum value of 570 t in 2007. The EU cephalopod fleet left this fishing ground after the military coup in April 2012.

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 Accra (Ghana) in 2011. 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 the FAO/CECAF assessment working group on demersal resources (subgroup south), including crustaceans, was in 2008 (FAO, 2012).

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). No specific values were adopted as reference points, as the assessment was rejected.

STOCK STATUS: The Working Group considered a single stock of *Sepia spp* from Guinea-Bissau. The Schaefer dynamic production model was applied to assess this stock. 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, as there was a general lack of information from important fleets operating in the area (i.e.: the Chinese fleet).

RECENT MANAGEMENT ADVICE: As a precautionary approach, the Working Group recommended that the fishing effort should not exceed the level corresponding to the average 2007-2009 period.

STECF COMMENTS: STECF agrees with the advice from the CECAF Working Group. The lack of information of other countries targeting the same resource in the area does not permit reliable assessments of the stocks. STECF suggests that an on-board observer scheme is implemented to obtain representative samples from all fleets participating in the fishery.

Financial constraints do 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 historic data and assessments.

REFERENCES:

Barros, P., 2007a. Biomass dynamic model with environmental effects. User instructions. *In*: Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. *FAO Fisheries Report* No. 849: 213-224.

Barros, P., 2007b. Projections of future yields and stock abundance using dynamic surplus production models: general concepts. And implementation as excel spreadsheets. *In*: Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. *FAO Fisheries Report* No. 849: 225-238.

Comité Scientifique Conjoint APP RIM-UE, 2013. Rapport de la sixième réunion du Comité Scientifique Conjoint de l'Accord signé entre la République Islamique de Mauritanie et l'Union européenne. Rennes, 20 pp + Annexes.

Comité Scientifique Conjoint APP RIM-UE, 2014. Rapport de la septième réunion du Comité Scientifique Conjoint de l'Accord signé entre la République Islamique de Mauritanie et l'Union européenne. Madrid, 27 pp + Annexes.FAO/CECAF, 2006. Report of the FAO/CECAF Working Group on the Assessment of Demersal resources. Conakry, Guinea, 19-29 September 2003. CECAF/ECAF Series 06/67. FAO. Rome, 2006. 357 pp.

FAO, 2006. Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. Banjul, Gambia, 2–11 May 2006. Rapport du Groupe de travail de la FAO sur l'évaluation des petits pélagiques au large de l'Afrique nord-occidentale. Banjul, Gambie, 2-11 mai 2006. FAO Fisheries Report/FAO Rapport sur les pêches. No. 811. Rome, FAO. 192p.

FAO, 2012. Report of the FAO/CECAF Working Group on the Assessment of Demersal Resources–Subgroup South. Freetown, Sierra Leone, 9–18 October 2008. CECAF/ECAF SERIES 11/73. 311 pp.

FAO, 2013. Report of the FAO Working Group on the Assessment of Small Pelagic Fish off Northwest Africa. Dakar, Senegal, 21–25 May 2012. FAO Fisheries and Aquaculture Report No.1036. FIRF/R1036 (Bi). 245 pp.

12 Resources in the area of WECAF

12.1 Shrimp (*Penaeus subtilis*), French Guyana

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 from the EU (all French). The main shrimp species exploited on the continental shelf is *Farfantepenaeus subtilis*, with 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 1500 t and 5600 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 Asia 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 were identical to the previous yearly assesments: stock biomass and recruitment were estimated to be at the lowest levels of the series, and recruitment showed a continuous 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 were no longer observed. Since 2006, a sharp recruitment decline was estimated. Moreover, the collapse of recruitment did not seem to be completely caused by a decline in spawner abundance, although, obviously, in recent years, the low spawner abundance produced small amounts of recruitment. In contrast, the spawning biomass was 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 3317 t decided by the 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 4 000 t 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 favourable, 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 favourable, 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.

12.2 Red snappers (*Lutjanus* spp.) waters of French Guyana

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 50-120 m. 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 fishing days. 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 showed that the red snapper recruitment in recent years seemed 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 increased, but less rapidly than the total biomass. Average fishing mortality F on ages 2-5, was 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-grew. In 2010, the total biomass was at the same level as that observed before the fall of the stock but with a different age composition: recruitment was higher but the spawning biomass was lower. The stock appeared 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 information, 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.

13 Resources in the southeast Atlantic Ocean (SEAFO)

13.1 Orange roughy (*Hoplostethus atlanticus*), SEAFO CA

The most recent advice for this stock was provided by the SEAFO Scientific Committee in 2012 and the text below remains largely unchanged from the STECF Consolidated Review advice for 2014 (STECF 13-27)..

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 between 2005 and 2011There was also no reported fishing for Orange roughy in the SEAFO CA during 2012 to August 2013.

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 2012 report of the SEAFO Scientific Committee and reproduced below.

There is no data available for orange roughy within the SEAFO CA, as a result SC cannot provide a reliable state of the stock assessment within the CA. SC recommends that orange roughy assessment should be done separately for each aggregation area found in the SEAFO CA and subsequent quotas.

SC therefore recommend a status quo for the 2013-2014 TAC: Zero (0) tonnes in Sub-Division B1 and 50t in the remainder of the SEAFO CA.

STECF COMMENTS: STECF agrees with the advice from the SEAFO Scientific Committee that separate assessments for orange roughy for each aggregation area are desirable. However in the absence any reliable information on stock status and exploitation rate, STECF is unable to quantify an appropriate catch level for orange roughy in the SEAFO convention area.

13.2 Patagonian toothfish (*Dissostichus eleginoides*), SEAFO CA

The most recent advice for this stock was provided by the SEAFO Scientific Committee in 2012 and the text below remains largely unchanged from the STECF Consolidated Review advice for 2014 (STECF 13-27).

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. Reported landings for 2011 and 2012 are 201t and 125 t respectively. The provisional reported landings for are 40 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: The opinion of SEAFO Scientific Committee was divide on appropriate advice for a TAC for 2014. The majority opinion was a recommendation to maintain a TAC of 230 t for 2014. The minority opinion was a recommendation that the 2014 TAC be set at the MSY level (381 tons) calculated by the model.

STECF COMMENTS: STECF notes that the SEAFO Fishery Commission has a TAC for toothfish in the SEAFO convention area of 276 t for 2014.

13.3 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 largely unchanged from the Consolidated STECF Review of Advice for 2014 (STECF 13-27).

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 2012 Report of the SEAFO SC and relates to 2013 and 2014 as follows:

Information available on the stock status does not allow evaluating the stock status of the species. SC considers that there is not enough information to revise the TAC that has been proposed in 2010. SC agreed that inter-sessional work will be done in order to improve and update the advice on this species.

SC recommends a TAC of 200t is fixed for the SEAFO CA for 2013 and 2014.

STECF COMMENTS: STECF notes that the SEAFO Fishery Commission has set a TAC of 200 t for alfonsino for 2013 and 2014 in the SEAFO Convention Area.

13.4 Deep-sea red crab (*Chaceon* spp.), SEAFO CA

FISHERIES: The fishery for deep-sea red crab is mainly located at Valdivia Bank (Sub-Division B1) and the main targeted species is *Chaceon erytheiae* although others *Chaceon* species are also distributed in the SEAFO CA. Since 2001 reported annual landings have varied from less than 1 t in 2001 and a peak of approximately 800 t in 2007. Vessels from Japan, Namibia, EU (Spain) and EU (Portugal) have all participated in the fishery for deep-sea red crabs. Reported landings in 2010 and 2011 were 200 t and 175 t respectively. Provisional landings for 2012(to end October 2012) aree reported as 5 t. Currently, the fishery usually takes place during approximately three months per year and is carried out by one or two vessels. In recent years landings of deep sea red crab have been from Sub-division B1 only. The preliminary estimate of catches in 2013 from Subarea B1 is 198 t. There are no reported catches from the remainder of the Convention area for 2013.

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 opinion of SEAFO Scientific Committee was divided on appropriate advice for a TAC for 2014. The majority opinion was a recommendation that the STATUS QUO be maintained for 2014 - i.e. 200t in Division B1, and 200t for the remainder of the SEAFO CA. The minority opinion recommended that the deep-sea red crab global TAC (400 tons) for 2014 be allocated as follows: 300 tons in Division B1 ("Footprint"), in order to monitor the sustainable level, and 100 tons for the rest area of Division B1 reserved for the experimental fisheries.

STECF COMMENTS: STECF notes that the SEAFO Fishery Commission has set TACs for deep- sea red crab in the SEAFO convention area for 2014 of 200 t for Sub-division B1, and 200t for the remainder of the SEAFO CA.

13.5 Pelagic armourhead (*Pseudopentaceros richardsoni*)

FISHERIES: Pelagic armourhead has an oceanic distribution, primarily in the vicinity of seamounts at depths ranging from 200 m – 500 m and are caught in the bottom and mid-water trawl fisheries directed to orange roughy and alfonsino in SEAFO regions A, C and B1. Between 1976 and 1982 reported landings varied between 53 t and 1435 t. Between 1983 and 2005, reported annual landings varied from zero and 25 t. No landings have been reported for the years 2005-2009 and apart from area B1, no catches of pelagic armourhead were reported for the years 2010 - 2011. Reported catches from area B1 in 2010 and 2011 were 918 t and 132 t respectively and in 2012 provisionally-reported catches were 117 t. There are no reported catches from the SEAFO convention area for 2013.

SOURCE OF MANAGEMENT ADVICE: The main management advisory body is the Scientific Committee of the SEAFO.

REFERENCE POINTS: No 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 reach a consensus on the recommendation regarding the Southern boarfish TAC and thus presented two alternative views;

Majority View: The analyses were done on available catch & effort data and revealed that the CPUE, as an indicator of stock abundance, has declined sharply from 2010 to 2011 and remained low during 2011 and 2012 (Fig. 5). At the same time, there is a need for the continuation of data collection on this resource for getting a better idea of the stock status. For these reasons it is recommended that the 2014 TAC for Armourhead be set at 100 tons in Division B1.**Minority View:** The minority view maintains the motivation as based on the results of the 2012 assessment and recommended that the 2014 TAC for Armourhead be set at 450t for Division B1.

STECF COMMENTS: STECF notes that the SEAFO Scientific Committee was unable to agree on the management options for pelagic armourhead. STECF also notes that no TAC has been agreed for 2014 and 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**.**

14 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, this ban being still in force.

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

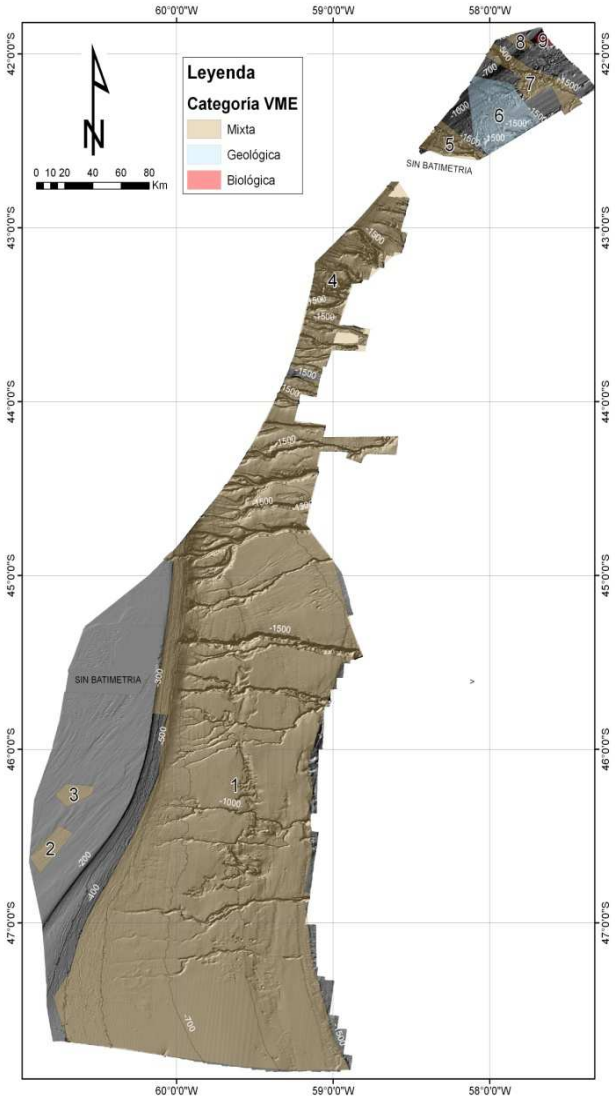

Figure 1. Candidate sites for protected areas in the HS of SW Atlantic. Only candidate areas 2 and 3 are on the continental shelf at depths less than 200 m.

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. However, updated information on stock status and advice within Falkland waters provided by the Falkland Islands Fisheries Department (FIFD) and data on landings and fishing activity by the Spanish fishing fleet (2011-2013) supplied by the Spanish General Secretariat for Fisheries (Secretaría General de Pesca, SGP) are presented in this section. The source data for fishing activity and catches of the Spanish fishing fleet correspond to logbooks filled in by skippers of vessels operating both within Falkland waters, as well as in the high seas.

RESOURCES IN FALKLAND ISLANDS WATERS

14.1 Patagonian hoki (*Macruronus magellanicus*), Falkland Islands

FISHERIES: Hoki is mainly exploited in the western part of the Falkland Islands Interim Conservation and Management Zone (FICZ) and is targeted by various European and Falkland Islands registered finfish trawlers. This stock is also a bycatch in the skates and *Loligo* fisheries. In the surimi fishery, one vessel briefly targeted hoki aggregations during summer 2011-2012. In early 1990s, when hoki was a by-catch, catches were around 10,000 t and then increased to an annual average of 20,500 t a decade later when vessels started targeting it. From 2002, catches varied between 15,869 t (2012) and 26,970 t (2002) without exhibiting any trend. In 2014,

total catch of hoki from January through to the end of September was 7,109 t (it was the lowest total catch observed for this period since 2004). Exploitation started in February and catches were high until April when a total of 4,000 t of hoki was caught and then slowed down gradually until mid-September when one week of catches >100 t per day were observed. Catches were then low. In 2014, finfish trawlers fishing with unrestricted licence mainly targeted hake which was abundant in the north of FICZ. Finfish trawlers fishing under restricted licence targeted rock cod in the north and northwest of the FICZ. In these areas, hoki abundance was low and that explained the low catches of this species. The total catches for the January-September periods were 18,850 t in 2011, 9,785 t in 2012 and 15,187 t in 2013.

Logbooks from Spanish trawlers provided by the SGP reported total landings of hoki from Falkland waters up to 5,737 t in 2009, 12,722 t in 2010, 12,235 in 2011, 7,887 t in 2012 and 8,555 t in 2013, showing a decreasing trend during the analysed period.

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: Hoki stock is presently considered to be in good condition. However, catches of hoki have always been quite variable from one year to another. Low catches observed in 2014 were therefore not necessarily an evidence of overexploitation. Hoki is a migratory species, it is abundant in the Falkland Islands, Chilean and Argentinean waters. The high inter-annual variability of catches is also related to the incidence of skipped spawning. Specimens that do not take part into reproduction do not migrate to the spawning grounds and remain in the Falklands' waters where they are exploited by finfish trawlers.

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.

14.2 Deep-sea grenadiers (*Macrourus carinatus*, *Macrourus holotrachys*), Falkland Islands

There is neither specialized fishery, nor exploratory fishery for grenadiers in 2013-2014, hence the text below remains unchanged from the STECF review of advice for 2014 (STECF 13-27) concerning FIFD advice. The only updated information in this subsection is total landings reported by Spanish skippers.

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.

Logbooks from Spanish trawlers provided by the SGP reported a marked variability in total landings of grenadiers from Falkland waters of 741 t in 2009, 179 t in 2010, 1,778 in 2011, 100 t in 2012 and 59 t in 2013.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

REFERENCE POINTS: No precautionary 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.

14.3 Southern blue-whiting (*Micromesistius australis*), Falkland Islands

FISHERIES: From 1992, southern blue whiting (SBW) was targeted by surimi vessels in the Falkland Islands' waters. This fleet targeted SBW in the southwest of Falkland Island Interim Conservation Zone (FICZ) from October to March (2005–2006), or from October to January (2007–2011). In this season, post-spawning fish aggregate and stay for feeding in the Falklands' waters and then disperse. In 2012 and 2013, CPUEs were very low and led to an absence of targeted exploitation in 2014. SBW is now a by-catch to other trawlers (finfish, skate or *Loligo* trawlers). In 2014, from January through to the end of September, 2,142 t of SBW were caught. Trawling started in February, with two weeks of good catches observed between 9th to 23rd February. Then, catches were low until end of March when a week of good catches appeared. In April, catches slowed progressively down and from May to August, almost no catch was observed. In September, 1,669 t of SBW were caught as a by-catch southeast of the Falkland Islands during the *Loligo* fishing season at the time of SBW migration to the spawning area. In 2014, finfish trawlers fishing with unrestricted licence mainly targeted hake which is abundant in the north of FICZ. Finfish trawlers fishing under restricted licence targeted rock cod in the north and northwest of the FICZ that showed little evidence of SBW in those areas. This explains the low catches of SBW observed in finfish trawling fleet. The total catches for the January-September periods were 1,761 t in 2011, 1,273 t in 2012 and 2,151 t in 2013.

The Spanish SGP reported total landings of southern blue whiting from Falkland waters of 1,938 t in 2009, 341 t in 2010, 789 t in 2011, 1,048 t in 2012 and 592 t in 2013.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

PRECAUTIONARY REFERENCE POINTS: No reference points have been proposed.

STOCK STATUS: In April 2012, the last stock assessment of SBW undertaken by FIFD in the southwest Atlantic gave an estimation of the SSB around 225,000t (15% of the initial biomass estimated at 1,517,221 in the early 1990s). The 2012 biomass was not significantly different from the estimations of 2011 suggesting that the stock was stabilizing at a low level. The closure of fishing on spawning grounds seems to give good results as bigger specimens were observed in the by-catch.

RECENT MANAGEMENT MEASURES: 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, since 2011, maximum catch was 3,974 t (2011).

Fishing in the southern region of FICZ corresponding to southern blue whiting spawning grounds is banned for all vessels from 15 August until 15 October to protect pre-spawning aggregations and 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.

14.4 Red cod (*Salilota australis)*, Falkland Islands

FISHERIES: Red cod is a straddling stock across the Patagonian Shelf. It forms spawning aggregations in the south west of the Falklands Zone in austral spring (September-October), where trawlers target red cod at this time. For the remaining part of the year, it is a non-targeted by-catch in the hoki and hake fisheries. Catches of red cod peaked in 1999 with an annual catch of 9,312 t. Between 1999 and 2003, there was a rapid decline in annual catch to 2,285 t. In 2006, the annual catch increased to 3,469 t, and stabilised from 2007-2013 (ranging between 3,129 - 5,195 t). The total catch in January – September 2014 was 2,639 t, lower than 2013 for the same period, which is likely due to a distinct change in recent fleet behaviour targeting hake for an extended period in the north of the Falklands Zone. Since 2010 spawning grounds have been closed between 1 September and 31 October from any fishing. Despite the currently low annual catch to date this year, the increasing trend since 2010 (with a record high in 2013), is suggestive of a positive effect of the spawning ground temporal closure.

The Spanish SGP reported total landings of red cod caught within Falkland waters of 904 t in 2009, 1,960 t in 2010, 2,281 t in 2011, 2,616 t in 2012 and 2,150 t in 2013 landings remaining more or less stable over recent years.

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: Stocks appear to have stabilised with signs of catch increase since the temporal closure of spawning grounds. 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 to allow the stock to recover. This closure continued through 2014.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.5 Argentine hake, Austral hake (*Merluccius hubbsi, Merluccius australis*), Falkland Islands

FISHERIES: Common hake (*Merluccius hubbsi*) are generally caught between 170 and 220 m in the north of the Falkland Islands Conservation Zone (FICZ). In 1990, annual catch of hake was 12,000 t and then decreased to an average of 1,500 t during the 1994-1997 period. Between 2000 and 2005, catches ranged between 1,678 and 3,069 t. Common hake are generally targeted in winter when they migrate from the northern part of the Patagonian shelf to Falkland waters. Austral hake (*Merluccius australis*) are exploited in the southwest of the FICZ between September and November after the spawning season which takes place in winter around the southern tip of South America. Annual catches of both species of hake increased from 1,927 t (2004) to 11,908 (2007) and then stabilized around 11,500 t until 2013. In 2014, from the start of the year to the end of September, 13,737 t of common hake were caught which is the highest cumulative catch observed in the last ten years. The total catch for the January-September period were 8,750 t in 2011, 9,673 t in 2012 and 10,685 t in 2013. In 2014, exploitation started in February with low catches (<10 t per day) until the end of March. In April, daily catches were between 10 t and 50 t per day. From May to the end of September daily catches were between 50 t and 100 t with some short periods >100 t (3 weeks end of May beginning of June, 5 days beginning of July, 4 days two weeks later and 3 weeks from mid-August to beginning of September).

The Spanish SGP reported total landings of hakes (common and austral hakes) caught within Falkland waters of 3,760 t in 2009, 11,252 t in 2010, 7,266 t in 2011, 10,576 t in 2012 and 9,439 t in 2013.

SOURCE OF MANAGEMENT ADVICE: The Falkland Islands Fisheries Department (FIFD) is responsible for management advice to the Falkland Islands Government.

PRECAUTIONARY REFERENCE POINTS: No reference points have been proposed.

STOCK STATUS: Common hake is a shared stock between Falkland Islands and Argentina. Only a small proportion of the stock migrates to the Falkland waters. In the 1990s, the stock biomass was very low, however, strong recruitments in 2001 and 2002 helped to increase the stock biomass 5-10 times in respect to the second half of the 1990s. High catches observed since 2008 and year 2014 with the best catches over the last ten years suggest that hake exploitation in the Falkland Islands is sustainable.

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.

14.6 Argentine short-finned squid (*Illex argentinus*), Falkland Islands

FISHERIES: The year 2014 showed another bountiful year for *I. argentinus*. Some positive indicators of the high abundance of *Illex* squid was received in January-February from the high seas region; international waters located outside 200 nautical mile conservation zones. More than 150 jiggers and trawlers fished there and had

good catches attaining 15-20 t of squid per fishing day. The question however remained whether these abundant aggregations of squid would move south to Falkland waters. The inflow of relatively warm shelf waters formed late this year, in the beginning of March. Squid of the South Patagonian Stock migrated from the high seas in that inflow, and concentrated along its eastern edge. By the end of the first week of March, some 90 jiggers started to work within the boundaries of the inflow. Their daily catches improved to 18-20 t per night, and during the second week almost the whole fleet (105 vessels) was fishing for *Illex* there. Catches gradually increased to 40-55 t per vessel/night, with maximum catches reaching 165 t per vessel/night. Until the end of April, the whole fleet continued fishing for *Illex* in the boundaries of the inflow, with consistently high catches (average 46 t per vessel/night). On the 22 April, the total daily catch of *Illex* by all vessels fishing inside FICZ/FOCZ recorded the highest value since the beginning of the regulated fishery in the 1987. A total of 6,701 t of squid was taken. The fishery remained stable in May, with average monthly CPUE of 53.7 t per night fishing. The abundance of squid was so high, that vessels quite often fished for the part of the night, or with half of their fishing arms. In May, the majority of jigging fleet targeted the late maturing SPS squid that migrated from the Argentinean EEZ through the western part of FICZ. Some vessels still fished for early maturing SPS squid in the northern part of FICZ/FOCZ and had also excellent catches there. In the middle of the month, all Taiwanese vessels finished their licensed fishing period and departed from FICZ. Only 30 Korean jiggers remained in the fishery as they were licensed to fish until the end of the fishery. In June, CPUEs decreased to 39 t per night. Jigging fleet fished mainly in the western part of FICZ. In the second week, the fleet relocated to the northern part of FICZ/FOCZ and had stable catches of about 33 t per night there. The fishery was closed as planned on 15 June 2014. The total annual catch of *Illex* in 2014 season hit the absolute record of 306,000 t.

The Spanish SGP reported total landings of *Illex* squid caught by Spanish trawlers within Falkland waters up to 674 t in 2009, 890 t in 2010, 1,945 t in 2011, 585 t in 2012 and 2,745 t in 2013.

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 2014, the winter-spawning South Patagonian Stock had a high 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.

14.7 Patagonian squid (*Doryteuthis* (formerly *Loligo) gahi*), Falkland Islands

FISHERIES: *Doryteuthis* (*Loligo*) *gahi* is the second major squid fishery resource in the Falkland waters. This squid occurs almost exclusively within Falkland Islands waters. The fishing effort is stable consisting of 16 mainly Falkland registered trawlers. Similar to 2013, the abundance of both cohorts of *Loligo* in 2014 was at medium level for the last decade.

The *Loligo* fishing season started on 24 February. Daily CPUEs of all sixteen licensed trawlers were high, averaging 24-30 t per day. Vessels had exceptionally good catches in the northern part of the *Loligo* Box where migrations of quite small (8-9 cm in length) and immature squid took place from their nearshore nursery grounds to offshore feeding grounds. However, colder than usual water temperatures around the Falkland Islands delayed migrations of the bulk of *Loligo* stocks to their feeding grounds. During the first three weeks of March daily catches fluctuated between 10 and 15 t per vessel/day. A real breakthrough happened on 21 March, when several vessels found dense concentrations of *Loligo* in the northern part of the *Loligo* Box. During the next five days, the fleet fished squid up to their freezing capacity with average daily catches of 66.5 t per vessel (maximum 97.6 t). On 23 March, the total daily catch of the fleet hit the highest record since 1996 of 1,102 t of squid per day. As expected, these aggregations were soon fished out and dispersed to more 'normal' levels. Another peak of abundance occurred during the second week of April in deeper waters of the northern area (50-65 t per vessel/day). Despite the slow start, more than 28,000 t of *Loligo* was taken by the end of the first

season, making it the third highest *Loligo* catch in the last 10 years after 2010 and 2012. The total estimate for *Loligo* biomass remaining in the *Loligo* Box at the end of the first season was 30,500 t, with the risk of this biomass being less than 10,000 t at the end of the season being negligible.

The second fishing season started a week later on 22nd July mainly in the southern part of the *Loligo* box. The catches were quite stable at 29 t per day, with maximum catches up to 60 t per day. Some vessels fished in the north, and had also good catches of larger squid. In the last two days of the month, catches dropped to 19 t due to bad weather and redistribution of squid stock. In August, the stock was slowly depleted with no significant pulses of recruitment to the fishery. During the first week of September, mean CPUEs ranged between 13 and 17.4 t per day. They gradually decreased to 9-10 t per day during the second week. Another pulse of recruitment finally appeared in the southern part of the Box on 15-16th September, when mean CPUEs increased to 14-18 t per day (maximum 53 t per day). This peak in abundance was gradually depleted by the fleet by the end of the month, with mean CPUEs varying between 8.5 and 13 t per day. Total escapement biomass was calculated at 17,250 t. The risk of season-end biomass having fallen below the 10,000 t conservation threshold stands at zero. The total catch for the whole year attained 48,599 t, making it the 5th highest annual catch in the last decade

The Spanish SGP reported total landings of *Loligo* squid caught by Spanish trawlers within Falkland waters of 737 t in 2009, 4,246 t in 2010, 3,111 t in 2011 and 7,041 t in 2012 and 6,871 t in 2013.

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: Stock biomasses of both cohorts of *Loligo* (autumn- and spring-spawning cohorts) in 2014 are high and despite and the trend in both catches and stock biomass over the past few years has been increasing.

RECENT MANAGEMENT ADVICE: To ensure the proportional exploitation of both cohorts of *Loligo*, it was recommended to extend the first season by two weeks, and shorten the second season by the same amount of days. In 2014, the first step of this recommendation was implemented with one week extension of the first season (till 22nd April) and one week shortening of the second season (starting on 22nd July).

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.8 Patagonian toothfish (*Dissostichus eleginoides*), Falkland Islands

FISHERIES: The Patagonian toothfish fishery in the Falklands Zone is targeted by a single longline vessel (occasionally two vessels) in waters deeper that 600m, and is a non-targeted by-catch species in the trawl fisheries on the shelf. It is the most valuable resource in terms of price per kilo, and is the first MSC certified fishery in the Falklands. The total toothfish catch in trawl fishery (shelf) has been in decline since 2010; however catches in the targeted fishery have been relatively stable during the same period. Total catch in the trawl and longline fisheries from January – September 2014 was 936 t, which is low compared to the same period of 2013 (1,270 t), and recent years.

The Spanish SGP reported total landings of *Dissostichus* caught by Spanish trawlers within Falkland waters of 82 t in 2009, 363 t in 2010, 297 t in 2011, 156 t in 2012 and 93 t in 2013.

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 is set after modelled stock assessment and analysis of biological trends. A reference point of 0.45 ($SSB_{current}$: B_o) is set for stock conservation action to be taken.

STOCK STATUS: Modelled stock assessments carried out in 2014 indicated a drop below the reference point and MSY in 2013. In response to this, the TAC for the targeted fishery will be reduced to 1,040 t for 2015, conservatively balancing model results and likely uncertainty in the model and biological knowledge. Despite

falling catch on the shelf, consistent recruitment of juvenile fish to the shelf is detected, and the adult population size structure remains stable.

RECENT MANAGEMENT ADVICE: Temporal closure of spawning grounds on the Burdwood Bank (between 1st July and 31st August) have remained in place since 2007 in order help the stock rebuild by enhancing potential recruitment. In 2015, the temporal closure will be extended by one month (1st June to 31st August) and extend in size to encompass more of the Burdwood Bank during critical spawning periods.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of this stock. Evidence supports a separate Falkland stock from Argentine stocks however; efforts are currently being made to improve stock identification.

14.9 Rockcod (*Patagonotothen ramsayi*), Falkland Islands

FISHERIES: Rock cod is exploited in the north west of the Falkland Islands Interim Conservation and Management Zone (FICZ) and is targeted by various European and Falkland Islands registered finfish trawlers. This stock has been a major bycatch in all demersal trawl fisheries since the declaration of the FICZ in 1987. The species was first targeted commercially in 2008, since that time catches have been between 76,500 tonnes in 2010 and 32,500 tonnes in 2013. The low catch in 2013 was partially due to very low prices for the species and vessels targeting other species.

During 2014 exploitation was low in the first quarter, with lower than normal trawling effort in all of the fisheries, up until March trawling effort was 60% of the average for 2008-2013. Trawling effort increased in April but catches remained low. By the end of April cumulative catch was 19,400 tonnes, 15% of the average. Catches in May were better with 9,110 tonnes caught, slightly lower than the average of 9,880 tonnes. From June to September catches were always above average, with record catches in all months bar September. Total catch for June to September was 37,100 tonnes, well above the average of 24,400 tonnes.

The Spanish SGP reported total landings of roc cod caught by Spanish trawlers within Falkland waters of 14,050 t in 2009, 40,947 t in 2010, 32,083 t in 2011, 38,044 t in 2012 and 9,500 t in 2013. Landings reported by Spanish trawlers in 2013 show the same dropping trend than catches reported by FIFD in the same year.

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: A rock cod abundance survey was carried out in 2011, and one is planned for late October to early November 2014. At least some of the catch variability can be said to result from targeted effort reducing when catch value is low, with 2013 seeing the fishing fleets targeting lower volume higher value species outside the rock cod areas of higher abundance.

RECENT MANAGEMENT ADVICE: To reduce the bycatch of juvenile fish, an increase of mesh size to 110 mm in the trawl codend with square mesh panel fitted to the top of the upper panel has been proposed and will be implemented by all finfish vessels from 1 January 2015. Recommended TAC of 60,000 t was also implemented since 2013.

STECF COMMENTS: STECF notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

RESOURCES IN INTERNATIONAL WATERS

Assessments of these stocks carried out by the Spanish Institute of Oceanography between 2008 and 2010 were based on annual swept-area cruises. No more surveys for biomass estimations have been made since 2010. Hence, sections 18.10 to 18.18 remain largely unchanged from the STECF review of advice for 2014 (STECF 13-27). The most relevant change refers to landings reported by Spanish trawlers operating in this area until 2013, made available by the Spanish fishing administration (SGP).

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.

14.10 Patagonian hoki (*Macruronus magellanicus*), International waters

FISHERIES: Hoki is fished as a by catch during *Illex* and hake fisheries by bottom trawlers mainly from Spain, until 350 m depth.

Landings of hoki by Spanish trawlers in international waters reported by the SGP amounted to a total of 1,016 t in 2009, 587 t in 2010, 1,676 t in 2011, 1,305 t in 2012 and 117 t in 2013, these data clearly indicating that this species mainly distributes within Falkland waters (see Section 14.1).

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: It is unclear if this is a separate stock from hoki in Argentine or Falkland Islands waters, so effort to improve stock identification are desirable. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.11 Deep-sea grenadiers (*Macrourus carinatus*, *Macrourus holotrachys*), International waters

FISHERIES: Commercial catches of *Macrourus carinatus and Macrourus holotrachys* are negligible in the area where the fisheries take place in international waters (<300 m depth). Results from the three mentioned research surveys carried out by IEO indicate that despite being the most abundant species in the study area, Patagonian grenadier (*Macrourus carinatus*) is mainly distributed between 500-1000 m depth, far beyond the depth range in which the fleet operates (98% of the commercial hauls at less than 300 m depth). Similarly, *Macrourus holotrachys* has its highest densities between 1001-1500 m depth.

Landings of grenadiers by Spanish trawlers in international waters reported by the SGP amounted to a total of 28 t in 2010, 18 t in 2011, 4 t in 2012 and 63 t in 2013. It is unknown to which extent these low catches can be attributed to a deeper distribution of this species (> 700 m) beyond the depth range of the fishery, or to misreporting. Usually the Spanish trawlers do not fish at depths greater than 400 m.

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: It is unclear if this is a separate stock from Patagonian grenadier in Falkland waters, so efforts to improve stock identification are desirable. STECF notes that in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.12 Southern blue-whiting (*Micromesistius australis*), International waters

FISHERIES: Southern blue whiting is fished as by catch during *Illex* and hake fisheries by bottom trawlers from several countries, mainly from Spain.

Landings of southern blue whiting by Spanish trawlers in international waters reported by the SGP amounted to a total of 33 t in 2009, 10 t in 2010, 52 t in 2011, 53 t in 2012 and 37 t in 2013, these low catches due to a southernmost distribution of this species (see Section 14.3).

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: 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. STECF notes that in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.13 Red cod (*Salilota australis)*, International waters

FISHERIES: Red cod is caught as by-catch in hake and *Illex* squid fisheries by bottom trawlers from several countries, mainly from Spain.

The Spanish SGP reported total landings of red cod by Spanish trawlers in international waters up to a total of 188 t in 2009, 157 t in 2010, 217 t in 2011, 193 t in 2012 and 22 t in 2013.

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: It is unclear to which extent this is a separate stock from red cod in Argentine or Falkland Islands waters, so efforts to improve stock identification are desirable. STECF notes that in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.14 Argentine hake, Austral hake (*Merluccius hubbsi, Merluccius australis*), International waters

FISHERIES: Argentine hake is targeted by bottom trawlers from several countries, mostly Spain. International waters are the most important area for Spanish trawlers targeting for hakes in the SW Atlantic. The highest catches for this fleet in the Patagonian Shelf, including Falkland waters, were recorded in 1990 with more than 100,000 t, corresponding most of them to the high seas area. 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 southwest 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.

Landings reported by the Spanish SGP referring to Spanish trawlers operating on the high seas were up to a total of 8,574 t in 2009, 17,094 t in 2010, 16,596 t in 2011, 21,779 t in 2012 and 25,910 t in 2013, being this area (the high seas) the most significant one regarding common hake. Landings of austral hake from the high seas area are negligible.

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 southwest 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: 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. STECF notes that

in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.15 Argentine short-finned squid (*Illex argentinus*), International waters

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 around 45ºS in January-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.

Landings of *Illex* squid reported by the Spanish SGP referring to Spanish vessels operating on the high seas were up to a total of 3,828 t in 2009, 6,016 t in 2010, 8,460 t in 2011, 14,089 t in 2012 and 13,505 t in 2013, being this geographical area the most significant one for the Spanish fleet, regarding *Illex* squid.

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: 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. STECF notes that in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.16 Patagonian squid (*Doroteuthys* (formerly *Loligo) gahi*), International waters

FISHERIES: *D. 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.

Landings of *D. gahi* reported by the Spanish SGP referring to Spanish vessels operating on the high seas were up to a total of 56 t in 2009, 1,312 t in 2010, 2,377 t in 2011, 5,726 t in 2012 and 2,234 t in 2013.

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 *D. 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: It is unclear if this is a separate stock from Argentine or Falklands stocks, so effort should be made to improve stock identification. STECF notes that in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.17 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).

Landings of toothfish reported by the Spanish SGP referring to Spanish vessels operating on the high seas were up to a total of 18 t in 2009, 16 t in 2010, 50 t in 2011, 27 t in 2012 and 52 t in 2013.

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: It is unclear if this is a separate stock from Argentine or Falklands stocks, so efforts should be made to improve stock identification. STECF notes that in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

14.18 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 mainly to Eastern Europe.

Landings of rockcod reported by the Spanish SGP referring to Spanish vessels operating on the high seas were up to a total of 4,392 t in 2009, 1,683 t in 2010, 2,727 t in 2011, 3,224 t in 2012 and 11,149 t in 2013.

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: It is unclear if this is a separate stock from Argentine or Falklands stocks, so efforts should be made to improve stock identification. STECF notes that in order to provide informative advice, information from the fisheries exploiting this stock throughout its range is required. STECF also notes the need for a multilateral approach for the assessment and management of the fisheries in the SW Atlantic.

15 Highly migratory fish (Atlantic Ocean and Mediterranean Sea)

15.1 Bluefin (*Thunnus thynnus*), Eastern Atlantic and Mediterranean

In 2014, the SCRS conducted an update of the 2012 assessment of Atlantic bluefin tuna (Anon. 2013). In this update, the available data included catch, effort and size statistics through 2013. As previously discussed, there are considerable data limitations for the eastern stock up to 2007.

FISHERIES: It is very well known that introduction of fattening and farming activities into the Mediterranean in 1997 and good market conditions resulted in rapid changes in the Mediterranean fisheries for bluefin tuna mainly due to increasing purse seine catches. In the last few years, nearly all of the declared Mediterranean bluefin fishery production was exported overseas. Declared catches in the East Atlantic and Mediterranean reached a peak of over 50,000 t in 1996 and then decreased substantially, stabilizing around TAC levels established by ICCAT for the most recent period. Both the increase and the subsequent decrease in declared production occurred mainly for the Mediterranean. Since 2008, there was a significant decrease in the reported catch following more restrictive TACs. Declared catch was, as used in the assessment (with minor updates for 2012 and 2013 at the time of the meeting), 23,849 t, 19,751 t, 11,148 t, 9,774 t, 10,852 t, and 13,133 t for the East Atlantic and Mediterranean, of which 16,205 t, 13,066 t, 6,835 t, 5,790 t, 7,019 t, and 9,016 t were declared for the Mediterranean for those same years.

Information available has demonstrated that catches of bluefin tuna from the East Atlantic and Mediterranean were seriously under-reported between the mid 1990s through 2007. The Committee views this lack of compliance with TAC and under-reporting of the catch as a major cause of stock decline over that period. The Committee has estimated that realized catches during this period could have been in the order of 50,000 t to 61,000 t per year based on the number of vessels operating in the Mediterranean Sea and their respective catch rates. Estimates for 2008 and 2009 using updated vessel capacity and performance statistics from the various reports submitted to ICCAT under [Rec. 08-05] result in estimates that are significantly lower than the corresponding reported Task I data (see the 2010 ICCAT Data Preparatory Meeting on Bluefin Tuna) (Anon. 2011c). Although care is needed considering estimates of catch using these capacity measures, the Committee's interpretation is that a substantial decrease in the catch occurred in the eastern Atlantic and Mediterranean Sea in 2008 and 2009. Available indicators from the Bay of Biscay baitboat fisheries (small and medium fish) shows a general increasing trend over the whole time period, with more variable values after the mid 80s, with two peaks in the 90s and one in the mid 2000s. This CPUE index covers the longest period (1952-2013), during which changes in selectivity took place, especially during the most recent periods because of changes in management regulations. The Spanish baitboat fishery sold most of its quota to other Spanish fisheries in 2012

and 2013. This CPUE index now includes the French baitboat fishery data and has been standardized and updated accordingly.

Indicators from Moroccan and Spanish traps targeting large fish (spawners) are standardized catch per unit of effort (CPUE) up to 2012 and include released individuals, which represent more than 10,000 individuals in 2012. The Moroccan trap index was further updated up to 2014 including 25,000 released individuals during that year. CPUE of Moroccan and Spanish traps showed a substantial increasing trend over the last years and large fluctuations, with period of high catch rates, as in the early 1980s, late 1990s and late 2000s and periods of lower catch rates, as in the mid 1990s and mid 2000s. However, in 2013, the access to Spanish trap facilities has not been allowed to scientific observers and no data are available to ensure the continuity of this time-series. The Committee strongly requires to ensure the access to Spanish traps for coming years.

Indicators from Japanese longliners targeting large fish (spawners) in the East Atlantic (South of 40ºN) and the Mediterranean Sea displayed a recent increase after a general decline since the mid 1970s. However, this index has not been updated since 2009 because this fleet did not operate in the Mediterranean and rarely in the East Atlantic (South of 40ºN) in recent years. Indicators from Japanese longliners targeting medium to large fish in the northeast Atlantic were available since 1990 and has been updated to 2013. This index showed a strong increasing trend over the last 3 years. This index becomes more valuable since the major part of Japanese catch come from this fishing ground in recent years. The size of bluefin caught in this area showed a large contribution of the 2003 year class. The combined effects of this high proportion of the 2003 year class, the contraction of the spatial coverage of the Japanese longliners in recent years in response to a lower number of boats, and management regulations may affect the ability of this index to track changes in bluefin tuna abundance. However, the method used to standardize this index does not show irregularities and the continuity of this index seems to be ensured.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT SCRS providing advice on the basis of an update assessment conducted in 2014.

REFERENCE POINTS: STECF notes 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 (2013)	13,333 t	
	Reported catch	Inflated catch
Maximum Sustainable Yield[1]		
Low recruitment scenario (1970s)	23,256 t	23,473 t
Medium recruitment scenario (1950-2006)	33,662 t	36,835 t
High recruitment scenario (1990s)	55,860 t	74,248 t
$F_{0.1}$ [2,3]	$0.07yr^{-1}$	$0.07\ yr^{-1}$
$F_{2013}/F_{0.1}$	0.40	0.36
$SSB_{F0.1}$		
Low recruitment scenario (1970s)	351,500 t	354,600 t
Medium recruitment scenario (1950-2006)	508,700 t	556,600 t
High recruitment scenario (1990s)	843,800 t	1,121,000 t
$SSB_{2013}/SSB_{F0.1}$		
Low recruitment scenario (1970s)	1.60	1.74
Medium recruitment scenario (1950-2006)	1.10	1.11
High recruitment scenario (1990s)	0.67	0.55
TAC (2010 - 2014)	13,500 t - 12,900 t - 12, 900 t - 13,500 t – 13,500 t	

[1] Approximated as the average of the potential long-term yield that is expected at a $F_{0.1}$ strategy. The levels of these yields have been computed using the selectivity pattern over 2009-2011 and can substantially change according to different selectivity patterns.

[2] The Committee decided, on the basis of current published literature, to adopt $F_{0.1}$ as the proxy for F_{MSY}. $F_{0.1}$ has been indeed shown to be more robust to uncertainty about the true dynamics of the stock and observation errors than F_{MAX}. Values are given for both reported and inflated catch scenarios, respectively. $F_{0.1}$ have been also computed using the 2012 selectivity pattern and can thus substantially change according to different selectivity patterns

[3] The recruitment levels do not impact $F_{0.1}$.

STOCK STATUS: The updated assessment results indicated that the spawning stock biomass (SSB) peaked over 300,000 t in the late 1950s and early 1970s and then declined to about 150,000 t until the mid 2000s. In the most recent period, the SSB showed clear signs of sharp increase in all the runs that have been investigated by the Committee, up to almost 585,000 t in 2013 for the update of the 2012 Base Case which corresponds to the maximum estimated SSB over the period. However, the magnitude and the speed of the SSB increase vary substantially among the runs (an SSB between 439,000 t and 647,000 t in 2013) and are, therefore, still rather uncertain. This increase corresponds to a 4-fold increase in SSB over the past decade and ranges from 3 to 4.5-fold across the sensitivities examined. Trends in fishing mortality (F) for the younger ages (ages 2-5) displayed a continuous increase until recent years. Since 2008, F at ages 2-5 decreased sharply to reach the lowest historical values. For oldest fish (ages 10+), F had been decreasing during the first 2 decades and then rapidly increased since the 1980s and finally declined since the late. These recent trends in F are consistent with those obtained during the 2012 stock assessment. For the 1995-2007 years, Fs for older fish are also consistent with a shift in targeting towards larger individuals destined for fattening and/or farming. Recent recruitment levels remain uncertain due to limited information about incoming year class strength and uncertainties in the indicators used to track recruitment. While the reduction in catch less than the minimum size improves the yield per recruit, it makes recent recruitments more difficult to estimate, especially without a recruitment index. The Committee noted that this is the first assessment to estimate extraordinarily large year classes in 2004-2007 (over 40% higher than the highest observed recruitments in the rest of the 64 year time series), and that these high estimates are driven mostly by the recent trends in the two fishery dependent indices for older fish. Therefore, caution is warranted until the very high estimates of recruitment for these year classes can be confirmed.

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. In addition to those uncertainties, the current perception of the stock status is also closely related to the assumptions made about stock structure and migratory behavior, which remain poorly known. Nonetheless, the perception of the stock status derived from the 2014 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 Committee also showed a clear increase of the SSB. F2013 appears to clearly be below the reference target F0.1 (a reference point used as a proxy for F_{MSY} that is more robust to uncertainties than FMAX) in both catch scenarios: F2013/F0.1= 0.4 and 0.36 for the reported and inflated catch scenarios, respectively. If F2013 would be consistent with the Convention Objectives, current SSB is most likely to be above the level expected at F0.1: SSB2013/SSB0.1= 1.10 and 1.11 for reported and inflated catch scenario when considering medium recruitment. In the reported catch scenario, the median of the SSB is about 67% (high recruitment scenario) to 160% (low recruitment scenario) of the biomass that is expected under a F0.1 strategy. In the inflated catch scenario, the median SSB ranges from 55% (high recruitment) to 174% (low recruitment).

RECENT MANAGEMENT ADVICE: In [Res. 09-06, 10-04, 12-03, and 13-07] the Commission established a total allowable catch for eastern Atlantic and Mediterranean bluefin tuna between 12,900 t and 13,500 t since 2010. Additionally, in [Rec. 09-06] the Commission required that the SCRS provide the scientific basis for the Commission to establish a recovery plan with the goal of achieving B_{MSY} through 2022 with at least 60% of probability.

The Kobe II matrix ($F<F_{MSY}$ and $SSB>SSB_{MSY}$ is shown in BFTE-Table 3 for quotas from 0 to 30,000 t for 2014 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%. It should be kept in mind, however, that the Kobe matrices cannot integrate some important sources of uncertainties that currently remain unquantified as mentioned in section BFTE-4 and detailed report. ICCAT REPORT 2014-2015 (I) 88

The implementation of recent regulations through [Recs. 13-07, 12-03, 10-04, 09-06, and previous recommendations] has clearly resulted in reductions in catch and fishing mortality rates, and in a substantial increase in the spawning stock biomass for the Continuity run and the 7 sensitivity analyses of the updated assessment. All CPUE indices show increasing trends in the most recent years. However, the Committee notes that the present assessment is an update of the 2012 assessment which relies only on a Continuity model and 7 sensitivity analyses. This update showed lack of stability of VPA results to slight changes in data inputs and model specifications.

In the light of the results of the updated assessment, there are continuing positive signs of the success of the rebuilding plan and the efficiency of the management measures taken by the Commission. Noting that the goal of achieving B_{MSY} (through 2022) with at least 60% probability might already have been, or will soon be reached, the Commission should consider adding a new phase to the current recovery plan.

The Committee noted that maintaining current TAC or moderately and gradually increasing over recent TACs under the current management scheme should not undermine the success of the rebuilding plan and should be consistent with the goal of achieving F_{MSY} and B_{MSY} through 2022 with at least 60% of probability. However, as the Committee was not able to provide the Commission with a robust advice on an upper bound for the TAC because of differing views about the implications of the uncertainties associated with the assessment, no agreement could be reached about the upper limit for such an increase that would not jeopardize the recovery of the stock. In equivalent situations, other scientific fora have similarly recommended moderate increases of the TAC, in applying the precautionary approach. To this end, and among other possible targets (e.g. F0.1, Fmax, etc.), a gradual increase (in steps over e.g. 2 or 3 years) of the catch to the level of the most precautionary MSY estimate would allow the population to increase even in the most conservative scenario (low recruitment scenario), noting the Commission's desire to maintain the stock in the green zone [13-07]. Nevertheless the SCRS scientists were not able to reach a consensus on the number of steps to complete the rebuilding plan, or on the management strategies.

Such stepped increases should be reviewed annually by the Commission on the advice of the SCRS (such reviews should consider stock indicators but would not necessarily extend to update stock

assessment).

BFTE-Table 3. The probabilities of $F<F_{MSY}$ and SSB $>SSB_{MSY}$ for quotas from 0 to 30000 t for 2014 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 %.

TAC	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	63	67	73	80	89	94	98	99	100
2000	63	67	73	80	88	94	97	99	100
4000	63	67	72	79	87	93	97	99	100
6000	63	67	72	79	87	93	97	99	100
8000	63	67	72	79	86	92	96	98	99
10000	63	67	72	78	86	92	96	98	99
12000	63	67	72	78	85	91	95	98	99
13500	63	67	71	77	84	91	94	97	99
14000	63	67	71	77	84	90	94	97	99
15000	63	67	71	77	84	90	94	97	99
16000	63	67	71	77	83	90	94	97	99
18000	63	67	71	76	83	89	93	96	98
20000	63	67	71	76	82	88	93	96	98
22000	63	67	70	76	82	88	92	95	97
24000	63	67	70	75	81	87	91	94	97
26000	63	67	70	75	80	86	90	94	96
28000	63	67	70	75	80	85	89	93	95
30000	63	66	69	74	79	84	89	92	95

STECF COMMENTS: STECF notes that the dramatic change in perception of the stock status between 2012 and 2014 illustrates that the probabilities of $F<F_{MSY}$ and $SSB>SSB_{MSY}$ for different TACs are also uncertain and cannot be considered a reliable indication of the true probability of achieving those objectives. As such STECF considers that they are misleading and should not be used as a basis for management decisions on appropriate TACs. The 2012 assessment results for example indicated that there was an extremely low probability of achieving the management objectives for F and SSB by 2022 even with zero catch. However, the 2014 assessment results indicate that there is a relatively high probability (>60%) that such objectives will already have been reached in 2014 for any catch level between 0 t and 30,000 t. The results from both assessments are based on the same principles, suggesting that similar dramatic changes are just as likely to occur in future assessments thereby making it difficult to give appropriate management advice.

In light of this uncertainty the management recommendation provided by ICCA-SCRS to only allow TACs to increase in small increments seems reasonable, but would forego large potential yields in the short to medium term.

STECF notes that the apparent stock recovery is in a significant part, due to an estimated increase in recent recruitment ensuring that SBB has roughly tripled in a decade reaching levels never before observed from a state of stock that has been considered for red species listing. STECF agrees that all indications are of a substantial increase in SSB over the last decade, however for a top predator such large successive recruitments would also expect to bring with it some density dependent effects in growth. Conversely, the data suggest that the mean weight in the catch has increased 5-9 fold over the same period. If this is an artefact of the change in selectivity as discussed in the SCRS report and not a true increase in the mean weight in the catch, then the current estimates of SSB will be considerably overestimated.

15.2 Bluefin (*Thunnus thynnus*), Western Atlantic

FISHERIES: Western bluefin fisheries have been managed by TAC since the early eighties and catches were relatively stable around 2,500 t until 2001, increased in 2002 to 3,319 t and have been declining since then, reaching 1,624 t in 2007. In 2008, catches increased again to 2,015 t 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.

The catch in 2013 was 1,484 t . The decline through 2007 was primarily due to considerable reductions in catch levels for U.S. fisheries. Since 2002, the Canadian annual catches have been relatively stable at about 500-600 t (735 t in 2006); the 2006 catch was the highest recorded since 1977 (972 t). The 2013 Canadian catch (including dead discards) was 480t. Japanese catches have generally fluctuated between 300-500 t, with the exception of 2003 (57 t), which was low for regulatory reasons, and 2009 (162 t). Japanese landings for 2011 were considerably higher than previous at 578 t, while catches in 2012 and 2013 were 289 t and 317, respectively.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT SCRS providing advice on the basis of an update assessment conducted this year.

REFERENCE POINTS: B in relation to B_{MSY} and F in relation to F_{MSY}.

WEST ATLANTIC BLUEFIN TUNA SUMMARY
(Catches and Biomass in t)

Current (2013) Catch (including discards)	1,484 t	
Assumed recruitment	Low potential	High potential
Maximum Sustainable Yield (MSY)	3,050 (2807-3307)[1]	5,316 (4,442-5863)[1]
SSB_{MSY}	13,226 (*12,969-13,645*)[1]	63,102 (50,096-72,921)
SSB_{2013}/SSB_{MSY}	2.25 (1.92-2.68)[1]	0.48 (0.35-0.72)[1]
F_{MSY}	0.20 (0.17-0.24)[1]	0.08 (0.07-0.10)[1]
$F_{0.1}$	0.12 (0.11-0.13)[1]	0.12 (0.11-0.13)[1]
$F_{2010-2012}/F_{MSY}$[2]	0.36 (0.28-0.43)[1]	0.88(0.64-1.08)[1]
$F_{2010-2012}/F_{0.1}$	0.60 (0.50-0.72)[1]	0.60 (0.50-0.72)[1]
Stock status	Overfished: NO	Overfished: YES
	Overfishing: NO	Overfishing: NO
Management Measures:	[Rec. 08-04] TAC of 1,900 t in 2009 and 1,800 t in 2010, including dead discards. [Rec. 10-03, 12-02, 13-09] TAC of 1,750 t in 2011-2014, including dead discards.	

[1] Median and approximate 80% confidence interval from bootstrapping from the assessment.
[2] $F_{2010-2012}$ refers to the geometric mean of the estimates for 2010-2012 (a proxy for recent F levels).

STOCK STATUS: The 2014 assessment estimated trends that are consistent with previous analyses in that spawning stock biomass (SSB) declined steadily from 1970 to 1992and then fluctuated around 25 to 30% the 1970 level for about the next decade (BFTW-Figure 5). In recent years, however, there appears to have been a gradual increase in SSB from about 32% of the 1970 level in 2003 to an estimated 55% in 2013. Since 1998, when the rebuilding plan was adopted, the SSB has increased by 70%. The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets (BFTW-Figure 5). Fishing mortality on spawners (ages 9 and older) declined markedly after 2003.

Estimates of recruitment were very high in the early 1970s (BFTW-Figure 5), and previous analyses involving longer catch and index series suggest that recruitment was also high during the 1960s. Since 1977, recruitment has varied from year to year without trend with the exception of strong year-classes in 2002 and 2003. The current assessment suggests that both the 2002 and 2003 year classes were large; but the estimate of a strong 2002 year class may be an artefact of the lack of direct observations of the age of fish in the catch and recent regulations in the United States that limited the take of fish in that size range. Under the current maturity assumptions (age 9 and older) the 2002/2003 year classes started to contribute to the spawning biomass in 2011/2012.

A key factor in estimating MSY-related benchmarks is the highest level of recruitment that can be achieved in the long term. Assuming that average recruitment cannot reach the high levels from the early 1970s, recent F (2010-2013) is 36% of F_{MSY} and SSB2013 is about 225% of SSB_{MSY} (BFTW-Figure 6, BFTW-Figure 7). In contrast, estimates of stock status are more pessimistic with respect to spawning biomass if a high recruitment potential scenario is considered, with F =88% of F_{MSY} and SSB2013 =48% of SSB_{MSY}. However, the Committee notes that this is the first assessment where the stock was estimated to not be undergoing overfishing under both recruitment scenarios.

Compared to the 2012 assessment, the 2014 assessment estimated higher levels of SSB for all years dating back to the late-1990s, largely due to a rapid increase in one index and corrections to account for regulatory changes in another. In addition, the SSB_{MSY} currently estimated under the high recruitment potential scenario is is updated to be 33% lower than had been estimated during the 2012 assessment due to revised estimates of the high recruitment potential (Figure 4) scenario, and the SSB_{MSY} currently estimated under the low recruitment potential scenario is updated to be 2% higher than had been estimated during the 2012 assessment. The reestimation of the SSB_{MSY} values resulted in a more optimistic perception of stock status, even under the high recruitment hypothesis. The increase in SSB between 2011 and 2013 estimated in the 2014 assessment is 5%.

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. Here two assessments with little overlap in their probability distributions in terms of estimates of F and SSB are used within a probability framework. Unfortunately this gives the impression that large changes in TAC have little effect on the likely future stock status. This impression is misleading, because within each individual assessment the stock will be considerably better off at low TACs. The median estimate of the joint marginal probability of independent estimates should not be used in the provision of the advice.

15.3 Albacore (*Thunnus alalunga*), North Atlantic Ocean

The stock status for Albacore in the North Atlantic Ocean Sea was not updated by ICCAT SCRS in 2014, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: The northern stock is exploited by surface fisheries targeting mainly immature albacore and longline fisheries targeting both immature and adult individuals. 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. . However, Chinese Taipei fishing effort decreased in late 1980s due to a shift towards targeting on tropical tuna, and then continued at this lower level to the present. Over time, the relative contribution of different fleets to the total catch of North Atlantic albacore has changed, which resulted in differential effects on the age structure of the stock. Since the 1980s, a significant reduction of the effective albacore area fished was observed for both longline and surface fisheries.

Total reported landings, steadily increased since 1930 to peak above 60,000t in the early 1960s, declining afterwards, largely due to a reduction of fishing effort by the traditional surface (troll and baitboat) and longline fisheries. Some stabilization was observed in the 1990s, mainly due to increased effort and catch by new surface fisheries (driftnet and mid-water pair pelagic trawl), with a maximum catch in 2006 at 36,989 t and, since then, a decreasing trend of catch is observed in the North Atlantic. The total catch in 2013 was 20,948 t, and the average catch in the last five years has remained about 20,000 t, the lowest recorded in the time series since 1950. During these years, the surface fisheries contributed to approximately 80% of the total catch. In 2013 ICCAT established a TAC for 2014 to 2016 of 28,000 t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT SCRS. The most recent assessment for North Atlantic albacore was undertaken in 2013.

REFERENCE POINTS: MSY=31,700t

STOCK STATUS: Based on the 2013 assessment (which includes catch and effort since the 1930s and size frequency since 1959), ICCAT-SCRS consider that spawning stock is currently still overfished but close to the B_{MSY} levels (SSB_{2012}/SSB_{MSY}=0.94), and that overfishing is not occurring.

RECENT MANAGEMENT ADVICE: Projections at the current TAC level (28,000 t) indicate that the stock would rebuild by 2019 with 53% probability, which would meet the objective of the albacore recovery plan (11-04). The recovery of the stock with similar probabilities would be faster (by 2016) if the catches remain at the level of recent catches (around 20,000 t). Higher probabilities of rebuilding would require longer timeframes. For instance, 75% probability of rebuilding would be achieved by 2019 with a constant catch of 20,000 t, and by 2027 with a constant catch of 28,000t. Catches above 34,000 t would not rebuild the stock with at least 50% probability in the projected timeframes.

These projections were complemented by a set of projections under alternative provisional HCRs that could serve the Commission to decide on desired timeframes and probabilities for recovering the north Atlantic stock and which are consistent with the decision framework of Rec [11-13] in that there is a high probability of $F<F_{MSY}$ in as short a time as possible. Longer time frames provide more options for HCR parameters that project higher probabilities of being 'Green'. The HCR projections indicate, for example, should the Commission wish to have a 'high probability' of 75% within a 10 year time-frame, then the HCR with a Biomass Threshold at B_{MSY} paired with a Target F of $0.9*F_{MSY}$ would provide the highest expected 10 year cumulative catch amongst options and the average catch expected from 2014-2016 would be approximately 26,260 t. Should the Commission consider a 'high probability' of 60% sufficient within a five year time-frame, then the HCR with a Biomass Threshold at BMSY paired with a Target F of $0.9*F_{MSY}$ would also meet that objective and provide the highest expected cumulative catch amongst options that would provide at least 60% probability within five years and the average catch from 2014-2016 would remain approximately 26,260 t. Unlike the constant catch projections, the HCR projections imply increasing catch as the population biomass increases resulting in higher cumulative catch over time to achieve equivalent conservation objectives of a constant catch policy. Consideration of implementation and other uncertainties in these projections would likely change the probability level estimates.

S**TECF COMMENTS:** STECF agrees with the advice from ICCAT that catches below 28,000 t should achieve by 2019, the ICCAT conservation objective of B_{MSY}.

STECF notes that to achieve recovery to B_{MSY} and maintain the stock at or above that level with high probability, fishing mortality will need to be less than F_{MSY}. The trade-offs between the level of F and the probability of achieving B_{MSY} are illustrated in the 2013 ICCAT SCRS report.

15.4 Albacore (*Thunnus alalunga*), South Atlantic Ocean

The stock status for Albacore in the South Atlantic Ocean Sea was not updated by ICCAT SCRS in 2014, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: The recent total annual South Atlantic albacore landings were largely attributed to four fisheries, namely the surface baitboat fleets of South Africa and Namibia, and the longline fleets of Brazil and Chinese Taipei .The surface fleets are entirely albacore directed and mainly catch sub-adult fish (70 cm to 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, between 5ºS and 20ºS, being

likely related to favorable environmental conditions for spawning, particularly of sea surface temperature. The longline Chinese Taipei 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 cm to 120 cm FL) than the surface fleets.

Albacore landings increased sharply since the mid-1950s to reach values oscillating around 25,000 t between mid-1960s and the 1980s, 35,000 t until the last decade were they oscillated around 20,000 t. Total reported albacore landings for 2013 were 19,148 t, lower than the last five year average. The Chinese Taipei catch in 2013 was significantly below the last five year average. In fact, the Chinese Taipei catch in the last years has decreased compared to historical catches, mainly due to a decrease in fishing effort targeting albacore. Chinese Taipei longliners (including boats flagged in Belize and St. Vincent and the Grenadines) stopped fishing for Brazil in 2003, which resulted in albacore only being caught as by-catch in tropical tuna-directed longline fisheries. The 2013 catch for Brazil is higher than catches in the recent past. However, albacore is only caught as by-catch in Brazilian tropical tuna-directed longline and baitboat fisheries. The significantly higher average catch of about 4,287 t during the period 2000-2003 was obtained by the Brazilian longline fleet when albacore was a target species.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT SCRS. The management is based on the 2013 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 19,109 t and 28,360 t with a median value of 25,228 t.

STOCK STATUS: Considering all scenarios, there is 57% probability for the stock to be both overfished and experiencing overfishing, 13% probability for the stock to be either overfished or experiencing overfishing but not both, and a 30% probability that biomass is above and fishing mortality is below the Convention objectives.

RECENT MANAGEMENT ADVICE: Results indicate that, most probably, the South Atlantic albacore stock is around the spawning biomass and the fishing mortality that can sustain the maximum sustainable levels. However, there is considerable uncertainty about the current stock status, as well as on the effect of alternative catch limits on the rebuilding probabilities of the southern stock.

Projections at a level consistent with the 2013 TAC (24,000 t) showed that probabilities of being in the green area would exceed 50% only after 2020. Similar probabilities could be achieved earlier with lower TAC values.

With catches around 20,000 t, probabilities of 50% would be exceeded by 2015, and probabilities of 60% would be exceeded by 2018. Further reductions in catches would increase the probability of recovery in those timeframes. And likewise, increases would reduce rebuilding probabilities and extend the timeframes. Catches over the current TAC (24,000 t) will not permit the rebuilding of the stock with at least 50% probability over the projection timeframe.

STECF COMMENTS: STECF agrees with the advice from ICCAT-SCRS but notes projections from the last round of assessment models indicate that the probability of stock recovery to MSY levels by 2020 is less than 50% with catches at the level of the current TAC. This fact, in conjunction with the large uncertainty in the stock assessment, would indicate the need for more conservative management.

15.5 Albacore (*Thunnus alalunga*), Mediterranean Sea

The stock status for Albacore in the Mediterranean Sea was not updated by ICCAT SCRS in 2014, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

The catch series was revisited and compared to additional sources of information. This allowed identifying some catches that were not included in the ICCAT database, which requires further revisions. In 2013, the reported landings were 1,675 t, substantially below those in the last decade. The majority of the catch came from longline fisheries. EU-Italy is the main producer of Mediterranean albacore, with around 65% of the catch during the last 10 years. In 2013 the Italian catch was substantially lower than the last five year average.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT SCRS 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 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: In 2011, the first stock assessment for Mediterranean albacore was conducted, using data up until 2010. The methods used were adapted to the "data poor" category of this stock. The more data-demanding methods applied, such as a production model, gave unrealistic results.

Some CPUE series for Mediterranean fisheries became available. However, these series were discontinuous and highly variable, with no clear trend over the last couple of decades. Since they are mostly very short, and there is little overlap between time series, they may or may not accurately characterize biomass dynamics in Mediterranean albacore.

The results of the 2011 assessment, based on the limited information available and in simple analyses, point to a relatively stable pattern for albacore biomass in the recent past. Recent fishing mortality levels appear to have been reduced from those of the early 2000s, which were likely in excess of F_{MSY}, and might now be at about or lower that level.

RECENT MANAGEMENT ADVICE: 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 fishing mortality levels appear to have been reduced from those of the early 2000s, which were likely in excess of F_{MSY}, 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.

15.6 Yellowfin (*Thunnus albacares*), Atlantic Ocean

The stock status for Yellowfin in the Atlantic Ocean was not updated by ICCAT SCRS in 2014, hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: Catch levels for 2013 are considered provisional. Therefore, recent trends in catch are described with respect to 2012. Overall Atlantic catches declined by nearly half from the peak catches of 1990 (193,114 t) to the 102,294 t estimated for 2012. A provisional 108,343 t was estimated for 2010 at the time of the assessment; 112,777 t is currently being estimated for 2010 after revisions to reports and estimates.

In the eastern Atlantic, purse seine catches declined by nearly half from 128,307 t in 1990 to a low of 48,160 t in 2007, and has increased to 69,570 t in 2012 (YFT-Table 1; YFT-Figure 2). Baitboat catches declined by more than 70% from 1990 to 2012 (from 19,648 t to 5,816 t). Longline catches, which were 10,253 t in 1990, have declined to 5,510 t in 2012. In the western Atlantic, purse seine catches (predominantly from Venezuela)

declined by nearly 90% from a peak in 1994 (19,612 t) to 1,373 t in 2009, before reversing the trend and increasing to 7,903 t in 2013. Baitboat catches also reached a low (886 t) in 2008, declining nearly 90% from 7,094 t in 1994, recovered somewhat in subsequent years, but fell again to 1,108 t in 2012. Longline catches, which were 11,790 t in 1994, have fluctuated since between 10,000 t and 16,000 t, and were 12,153 t in 2012.

Purse seine catch levels had been held in check until 2007 in large part by a continued decline in the number of purse seine vessels in the eastern Atlantic. As a recent indicator, the number of purse seiners from the European and associated fleet operating in the Atlantic had declined from 44 vessels in 2001 to 25 vessels in 2006, with an average age of about 25 years (see SKJ-Figure 9 for trends in number of vessels and carrying capacity). By 2009, however, the number of purse seiners increased by about 45% to 36 in 2009, as vessels moved from the Indian Ocean to the Atlantic. At the same time, the efficiencies of these fleets have been increasing, particularly as the vessels which had been operating in the Indian Ocean tended to be newer and with greater fishing power and carrying capacities. Overall carrying capacity of the total purse seine fleet in 2010 had increased to about the same level as in the 1990s and FAD based fishing has accelerated more rapidly than free school fishing (although both have substantially increased), with the number of sets on FADs reaching levels not seen since the mid-1990s. The number of European and associated fleet purse seiners operating in the Atlantic declined slightly to 32 as of 2013, but fishing power and carrying capacity remain high.

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).

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 F_{MSY}. 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 catch levels on the order of 110,000 t was expected to lead to a biomass somewhat above B_{MSY} 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 harvests on FADs could have negative consequences for yellowfin and bigeye tuna, 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. The Committee notes that the closure implemented in Rec. 11-01 may be more effective than that implemented by Rec. 04-01.

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.

15.7 Bigeye (*Thunnus obesus*), Atlantic Ocean

The stock status for Bigeye in the Atlantic Ocean was not updated by ICCAT SCRS in 2014, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: The stock has been exploited by three major gears (longline, baitboat and purse seine fisheries) and by many countries throughout its range of distribution and ICCAT has detailed data on the fishery for this stock since the 1950s. Scientific sampling at landing ports for purse seine vessels of the EU and associated fleets have been conducted since 1980 to estimate bigeye tuna catches. The size of fish caught varies among fisheries: medium to large for the longline fishery, small to large for the directed baitboat fishery, and small for other baitboat and for purse seine fisheries.

The major baitboat fisheries are located in Ghana, Senegal, the Canary Islands, Madeira and the Azores. The tropical purse seine fleets operate in the Gulf of Guinea in the East Atlantic and off Venezuela in the West Atlantic. In the eastern Atlantic, these fleets are comprised of vessels flying flags of Ghana, EU-France, EUSpain and others which are mostly managed by EU companies. In the western Atlantic the Venezuelan fleet dominates the purse seine catch of bigeye tuna. While bigeye tuna is now a primary target species for most of the longline and some baitboat fisheries, this species has always been of secondary importance for the other surface fisheries. In the surface fishery, unlike yellowfin tuna, bigeye tuna are mostly caught while fishing on floating objects such as logs or man-made fish aggregating devices (FADs). During 2010-2012, landings in weight of bigeye tuna caught by the longline fleets represent 53%, purse seine fleets represent 32% and baitboat fleets represent 14% of the total bigeye tuna catch.

The total annual Task I catch increased up to the mid-1970s reaching 60,000 t and fluctuated over the next 15 years. In 1991, catch surpassed 95,000 t and continued to increase, reaching a historic high of about 133,000 t in 1994. Reported and estimated catch has been declining since then and fell below 100,000 t in 2001. This gradual decline in catch has continued, although with some fluctuations from year to year. The preliminary estimate for 2013 is 63,066 t. After the historic high catch in 1994, all major fisheries exhibited a decline of catch while the relative share by each fishery in total catch remained relatively constant. These reductions in catch are related to declines in fishing fleet size (longline) as well as decline in CPUE (longline and baitboat). The number of active purse seiners declined by more than half from 1994 until 2006, but then increased since 2007 as some vessels returned from the Indian Ocean to the Atlantic. The number of European and associated purse seiners operating in 2009- 2012 was similar to the number operating in 2003-2004.

IUU longline catches were estimated from Japanese import statistics but the estimates are considered uncertain. These estimates indicate a peak in unreported catches of 25,000 t in 1998 and a quick reduction thereafter. The Committee expressed concern that historical catches from illegal, unreported and unregulated (IUU) longliners that fly flags of convenience from the Atlantic might have been poorly estimated. The magnitude of this problem has not yet been quantified, because available statistical data collection mechanisms are insufficient to provide alternative means to calculate unreported catch.

Species composition and catch at size from the Ghanaian fleet of baitboats and purse seiners, has been thoroughly reviewed. This review has led to new estimates of Task I and Task II catch and effort and size for these fleets for the period 1973-2012. This revision has shown that catches of bigeye tuna by Ghanaian fleets were significantly lower than it was previously estimated by an average of 2,500 tons over the period 1996-2005 but greater for the period 2006-2012. Estimates for 2006-2012 are under review and are considered provisional. Significant catches of small bigeye tuna continue to be channeled to local West African markets, predominantly in Abidjan, and sold as “faux poissons” in ways that make their monitoring and official reporting challenging. Monitoring of such catches has recently progressed through a coordinated approach that allows ICCAT to properly account for these catches and thus increase the quality of the basic catch and size data available for assessments.

Mean average weight of bigeye tuna decreased prior to 1998 but has been relatively stable, at around 10 kg during the last decade (BET-Figure 3). This weight, however, is quite different according to the fishing gear, around 62 kg for longliners, 7 kg for baitboats, and 4 kg for purse seiners. In the last ten years all longline fleets have shown increases in mean weight of bigeye tuna caught, with the average longline-caught fish increasing from 40 kg to 60 kg between 1999 and 2010. During the same period purse seine-caught bigeye tuna had weights between 3 kg and 4 kg. Bigeye tuna caught in free schools are more than two times heavier than those caught around FADs. This difference in weight between these two fishing modes is even more pronounced since 2006. Since FAD catches began being identified separately in 1991 by EU and associated purse seine fleets, the

majority (75%-80%) of bigeye tuna are caught in sets associated with FADs. Similarly baitboat-caught bigeye tuna weighted between 6 and 10 kg over the same period, showing greater inter-annual variability in fish weight than longline or purse seine caught fish.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT SCRS. 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.

MANAGEMENT MEASURES: During the period 2005-2008 an overall TAC for major countries was set at 90,000 t. The TAC was later lowered [Rec. 09-01 and later modified by Rec. 11-01] to 85,000 t. Estimates of reported catch for 2005-2013 (BETTable 1) have been always lower than 85,000 t with the exception of 2011. Note, however, that catches for 2006-2012 are still under revision.

Concern over the catch of small bigeye tuna partially led to the establishment of spatial closures to surface fishing gear in the Gulf of Guinea [Recs. 04-01,08-01 and 11-01] The Committee examined trends in average bigeye tuna weight as a broad indicator of the effects of such closures. Although there have been significant changes in the average size of bigeye tuna caught since 2004 by certain fleets, such as increases in average size of fish caught by purse seiners operating in free schools and by longliners, it cannot be quantified whether changes are the result of spatial closures. The Committee also analyzed the ICCAT conventional tag database for evidence of an effect of spatial closures. Again, this analysis failed to provide any conclusive evidence in support of the hypothesis that spatial closures led to a reduction in the fishing mortality of juvenile bigeye tuna. The Committee notes that the closure implemented in Rec. 11-01 may be more effective than those implemented before by Rec. 04-01 and Rec 08-01.

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

15.8 Swordfish (*Xiphias gladius*), North Atlantic

The stock status for swordfish in the North Atlantic Ocean was not updated by ICCAT SCRS in 2014, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

FISHERIES: For the past decade, the North Atlantic estimated catch (landings plus dead discards) has averaged about 12,150 t per year. The catch in 2013 (11,980 t) represents a 41% decrease since the 1987 peak in North Atlantic landings (20,236 t). These reduced landings have been attributed to ICCAT regulatory recommendations and shifts in fleet distributions, including the movement of some vessels in certain years to the South Atlantic or out of the Atlantic. In addition, some fleets, including at least the United States, EU-Spain, EU-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.

Available catch per unit effort (CPUE) series were evaluated by the Committee and certain indices were identified as suitable for use in assessment models (Japan, Portugal, Morocco, Canada, Spain and USA). Most of the CPUE series have an increasing trend since the late 1990s, but the U.S. catch rates remained relatively flat. There have been some recent changes in United States regulations that may have impacted catch rates, but these effects remain unknown.The most frequently occurring ages in the catch include ages 2 and 3.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT SCRS and the 2013 advice is based on the 2013 assessment conducted for this stock.

REFERENCE POINTS: MSY reference points for this stock are MSY=13,660 t (13,250-14,080), F_{MSY} = 0.22 B_{MSY} = 65,060**.**

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 B_{MSY}. 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 overfished (B> B.) and overfishing is not occurring ($F<F_{MSY}$). However, catches in 2012 (13,972 t) slighty exceeded the TAC (13,700 t) which could slow down the recovery of the stock if catches continue to grow. Catches over 15,000 t are likely to decrease the probability of the stock remaining above B_{MSY} over the next decade to less than 50%.

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: For continuity of advice relative to previous assessments, ASPIC results are used although other models were considered. These show the ranges of total catch limits and associated probabilities associated with stock status by year. The current TAC of 13,700 t has an 83% probability of maintaining the North Atlantic swordfish stock in a rebuilt condition by 2021 while maintaining nearly level biomass. This TAC would be in accordance with [Rec.11-13], adopted by the Commission that indicates that 'For stocks that are not overfished and not subject to overfishing (i.e., stocks in the green quadrant of the Kobe plot), management measures shall be designed to result in a high probability of maintaining the stock within this quadrant'. However, the Committee acknowledges that without better direction from the Commission with regard to what constitutes a 'high probability', it cannot provide more specific advice. TACs up to 14,300 t would still have a higher than 50% probability of maintaining the stock in a rebuilt condition by 2021 but would be expected to lead to greater biomass declines**.**

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.

15.9 Swordfish (*Xiphias gladius*), South Atlantic

The stock status for swordfish in the South Atlantic Ocean was not updated by ICCAT SCRS in 2014, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 are comparable to the peak of North Atlantic harvest (20,236 t in 1987). 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 was partly due to a shift to other oceans and target species. In 2013, the 7,787 t reported catches were about 64 % lower than the 1995 reported level (SWO-ATL-Figure 4). The SCRS received reports from Brazil and Uruguay that those CPCs have reduced their fishing effort directed towards swordfish in recent years. Uruguay recently received increased albacore quotas that may allow increased effort for swordfish in the near future.

Six data sets of relative abundance indices (Brazil, Japan, Spain, Uruguay, South Africa and Chinese Taipei) were made available to the Committee. These CPUE indices were standardized using various analytical approaches. The standardized CPUE series presented show different trends and high variability which indicates that at least some are not depicting trends in the abundances of the stock. Two combined indices were produced, one excluding Brazil and the other excluding both Brazil and Chinese Taipei data series.

Since 1991, several fleets have reported dead discards. The volume of Atlantic-wide reported discards since then has ranged from 143 t (in 2013) to 1,139 t (in 2000) per year. The Committee expressed concern due to the low percentage of fleets that have reported annual dead discards (in t) in recent years.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the ICCAT SCRS and the 2013 advice is based on the 2013 assessment conducted for this stock.

REFERENCE POINTS: MSY reference points for this stock have not been estimated.

STOCK STATUS: The results of all models indicated that there was a conflicting signal for several of the indices used and substantial conflict between the landings history and the indices. There was low confidence in the estimation of the absolute productivity level of the stock or on MSY-related benchmarks. Determination of likely stock status was this based on qualitative indicators (mean size in catch) and comparison with trends observed in the North Swordfish stock. Conclusions are therefore highly debatable and uncertain.

RECENT MANAGEMENT ADVICE: SCRS considered that no advice could be provided given the uncertainties in the stock status and productivity.

STECF COMMENTS: STECF generally agrees with the advice from ICCAT, but notes with concern the high degree of uncertainty in the stock assessment. It appears that the current regulations are having the effect of degrading data sources further, likely leading to future increases in the uncertainty of assessments and the inability to evaluate the efficacy of the management plan being developed.

15.10 Swordfish (*Xiphias gladius*), Mediterranean Sea

The stock status for Mediterranean swordfish was updated by ICCAT SCRS in 2014.

In the last 15 years Mediterranean swordfish production has fluctuated without any specific trend at levels higher than those observed for much larger areas such as the North and South Atlantic. This situation supports the hypothesis that the biological and oceanographic conditions prevailing in the Mediterranean favour the high productivity of large pelagic fish. The most recent assessment was conducted in 2014, making use of catch and effort information through 2013. The present report summarizes assessment results and readers interested in more detailed information on the state of the stock should consult the report of the latest stock assessment session.

FISHERIES: Mediterranean swordfish landings showed an upward trend from 1965-1972, stabilized between 1973-1977, and then resumed an upward trend reaching a peak in 1988 (20,365 t;). The sharp increase between 1983 and 1988 may be partially attributed to improvement in the national systems for collecting catch statistics;

thus earlier catches may be higher than those appearing in Task I tables. Since 1988, the reported landings of swordfish in the Mediterranean Sea have declined fluctuating mostly between 12,000 to 16,000 t. Those levels are relatively high and similar to those of bigger areas such as the North Atlantic. This could be related to higher recruitment levels in the Mediterranean than in the North Atlantic, different reproduction strategies (larger spawning areas in relation to the area of distribution of the stock) and the lower abundance of large pelagic predators (e.g. sharks) in the Mediterranean.

The currently reported Task-I catch for 2013 was 9155 t, which is the lowest annual catch since 1983. It should be noted that the total 2013 catch estimate that was used during the assessment was considerably higher (12,164 t) due to the unavailability of Italian catch data at that time and the assumptions made (average of the 2010-2012 period) regarding the missing Italian production in 2013. The biggest producers of swordfish in the Mediterranean Sea in recent years (2003-2013) are EU-Italy (41%), Morocco (14%), EU-Greece (9%), Tunisia (8%) and EU-Spain (10%). Also, Algeria, EU-Cyprus, EU-Malta and Turkey have fisheries targeting swordfish in the Mediterranean. Minor catches of swordfish have also been reported by Albania, Croatia, EU-France, Japan, and Libya. The Committee recognized that there may be additional fleets taking swordfish in the Mediterranean, for example, Egypt, Israel, Lebanon, Monaco and Syria, but the data are not reported to ICCAT or the FAO.

In recent years (2003-2013), the main fishing gears used are surface longlines (on average, representing 84% of the annual catch) and gillnets. Since 2012, gillnets have been eliminated following ICCAT recommendations for a general ban of driftnets in the Mediterranean. Minor catches are also reported from harpoon, trap and fisheries targeting other large pelagic species (e.g. albacore) from 2009-2010 a mesopelagic longline gear has been gradually introduced and nowadays has replaced the surface longline gear in almost all Italian swordfish fleets. This is particularly noteworthy, as these fisheries are among the largest within the stock area, and the changes have implications for the use of catch rates as indices of abundance in the stock assessments.

A study presented during the latest assessment session examined the effects of the introduction of this new mesopelagic longline in the Ligurian Sea fishery. The results showed a significant increase of swordfish mean size and nominal CPUE, with a decrease of the by-catch for the first two years (2010 and 2011). A substantial decline, both of mean size and CPUE values, was recorded in the 2012, and followed by a small recovery in 2013. The introduction of this new gear revealed that a fraction of the swordfish population, made up of large spawners, may be not fully available to the traditional surface longlines. This fishery, however, is confined to a rather small area and its catches represent a small part (<10%) of the total Italian catch. Therefore, it is unknown if the above findings are representative of the fleets using mesopelagic longlines.

Standardised CPUE series from various longline and gillnet fisheries targeting swordfish, which were presented during the 2014 stock assessment session, did not reveal any trend over time (SWO-MED-Figure 2). CPUE series, however, did not cover the earlier years of the reported landings. Similarly to CPUE, no trend over the past 25 years was identified regarding the mean fish weight in the catches.

SOURCE OF MANAGEMENT ADVICE: The advisory bodies are ICCAT SCRS and GFCM through the joint GFCM/ICCAT working groups. The current management advice is based on the most recent (2014) stock assessment.

REFERENCE POINTS:

MEDITERRANEAN SWORDFISH SUMMARY	
Maximum Sustainable Yield	~15,000 [1]
Current (2013) Yield	9,155 t [2]
Current (2013) Replacement Yield	9,540 t[1]
Relative Biomass (B_{2013}/B_{MSY})	0.27 [1]
Relative Fishing Mortality	
F_{2013}/F_{MSY}	1.82 [1]
$F_{2013}/F_{0.1}$	2.97 [1]
Management Measures in Effect:	Driftnet ban [Rec. 03-04] Three month fishery closure, gear specifications (number and size of hooks and length of gear), MLS regulations, and a license registry [Rec. 13-04]. [3]

[1] Highly uncertain estimates based on the XSA and equilibrium analyses.
[2] As of September 2014.
[3] Certain additional fishery restrictions are implemented at the national level.

STOCK STATUS: Two forms of assessment (production modelling – ASPIC, BSP and age-structured analysis - XSA) indicated that current SSB levels are much lower than those in the 80s, although no trend appears since then. However, the XSA, ASPIC and BSP models gave different estimates of the absolute abundance, which caused them to produce very different estimates of stock status. Given the lack of trend in the relative abundance indices that introduces uncertainty in production modeling estimates and the limitations of the examined approaches, it was considered that the XSA provides a more reliable assessment of stock status than the production models. This is also in line with the previous assessments that provided advice based on XSA results.

XSA results indicate that recruitment shows a slightly declining trend in the last decade, while stock biomass remains stable at levels that are about 1/3 of that in the mid 1980s .There appears to have been a recent decline in F, particularly for ages 1 and 2.

Results of equilibrium yield analyses based on the XSA assessment in which we have more confidence indicated that the stock is overfished and subject to overfishing. Current (2013) SSB is less than 30% of B_{MSY} and F is almost twice the estimated F_{MSY}. Results indicate that the stock is overfished throughout the whole period considered in the XSA assessment (1985-2013). Note, however, that there is considerable uncertainty about the stock status relative to the Convention objectives, mainly due to the lack of clear signal in the data, the lack of abundance indices before 1987 and the discrepancy between the assumed 2013 catch and the official Task-I data.

The Committee 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.

MANAGEMENT MEASURES: ICCAT imposed a Mediterranean-wide one month fishery closure for all gears targeting swordfish in 2008, followed by a two-month closure since 2009. Through Recommendations 11-03 and 13-04 the Commission has adopted additional management measures intended to bring the stock back to levels that are consistent with the ICCAT Convention objective. Those measures include an additional one month closure accompanied by minimum landing size regulations, a fishing license control system, and specifications on the technical characteristics of the longline gear. Several countries have also adopted additional fishery restrictions at the national level. The EU introduced a driftnet ban in 2002 and in 2003 ICCAT adopted a recommendation for a general ban of this gear in the Mediterranean [Rec. 03-04]. Rec. 04-12 forbids the use of various types of nets and longlines for sport and recreational fishing for tuna and tuna-like species in the Mediterranean.

After the adoption of the aforementioned Recommendations, reported catches have decreased significantly from the 2000s´ level, being the catches in 2012 and 2013 the minimum values of the last three decades. In addition, reported catches of juvenile swordfish of less than 90 cm has also decreased on average 54% in the last two years compared with the levels of the decade of 2000s. Apart from the seasonal closures, the introduction of the

mesopelagic LL by some fleets in place of surface longline effort, may have contributed to the observed decrease of catches of juveniles.

RECENT MANAGEMENT ADVICE: Assessment provided signals of decreasing fishing mortality trends since 2010 and it is likely that this is mainly due to the management measures adopted by the Commission. Given that there is considerable uncertainty about the stock status and the shortness of the time series with which to fully evaluate the effectiveness of the most recent management measures, the Committee recommends to maintain the current management measures of Mediterranean swordfish as adopted in [Rec. 13-04] until additional data permits a conclusion as to whether or not they are sufficient to allow the stock to rebuild to a level in line with the Convention objectives.

However, it has been noted that the recently adopted management measures may have increased discard levels of undersized swordfish; therefore it is recommended to closely monitor the fishery and that every component of the Mediterranean swordfish mortality be adequately reported to ICCAT by the CPCs. Moreover, as it has been noted that the number of vessels in the ICCAT records of vessels authorized to catch Mediterranean swordfish is generally higher than the vessels that are active in each CPC, the Committee recommends that the implications of this potential excess capacity should be considered by the Commission.

STECF COMMENTS: STECF notes that assessment models used by the ICCAT SCRS give different perceptions of the stock status in relation to B_{MSY}. While both models indicate that the biomass is below B_{MSY}, the degree to which the stock is overfished is substantially different in the two models. STECF agrees with the finding that the stock is overfished but is unable to quantify by how much it is overfished. Nevertheless, STECF broadly agrees with the advice from ICCAT.

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.

15.11 Skipjack (*Katsuwonus pelamis*), Eastern Atlantic

The stock status for skipjack in the Eastern Atlantic was updated by ICCAT SCRS in 2014.

FISHERIES: Following the historic record catch in 2012 (258,300 t), the total catches of skipjack throughout the Altantic Ocean (including catches of "faux poisson" landed in Côte d'Ivoire) remain high at 221,600 t. This represents a very sharp rise compared to the average catches of the five years prior to 2010 (157,600 t). It is possible, however, that the catches of a segment of the Ghanaian purse seine fleet, transshipped at sea on carriers, have escaped the fishery statistics collection process before 2011. In addition, following the expert missions carried out in Ghana which have shown the existence of bias in the sampling protocol which aims to correct the multi-species compositions of the catches reported in the logbooks, Ghanaian Task I and II statistics have been reviewed in several stages (1973-2005). The last review for the period 2006-2012 shows that the skipjack catches reported by Ghana were underestimated by around 28%, which gives an average of 12,000 t/year. Therefore, all of these historical data have consequently been corrected.

The numerous changes that have occurred in the skipjack fishery since the early 1990s (e.g. the progressive use of FADs and the latitudinal expansion and the westward extension of the fishing area) have brought about an increase in skipjack catchability and in the proportion of biomass exploited. Currently, the major fisheries are the purse seine fisheries, particularly those of EU-Spain, Ghana, Curaçao, Belize, Panama, EU-France, Guinea and Cape Verde, followed by the baitboat fisheries of Ghana, EU-Spain, EU-Portugal and Senegal. The preliminary estimates of catches made in 2013 in the East Atlantic amounted to 203,500 t, which is an increase of about 54% as compared to the average of 2005-2009. It should be noted that there has been a sharp increase in the skipjack catches by the European purse seiners, probably due to the high selling price of this species since 2011. This increase in catches is accompanied by changes in fishing strategies since the proportion of skipjack catches using floating objects has continued to increase. This is the result to some extent of the sharp reduction in seasonal fishing by European purse seiners on free schools after 2006 off the coast of Senegal and of the emergence as from 2012 of atypical fishing off FADs – since it involves single-species schools composed of large individuals – between August and November off the coast of Mauritania These changes in fishing strategy can take place differently in the purse seine fleets, including in fleets that operated similarly in the past and are therefore difficult to integrate into stock assessment models.

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 2014, using catch data available to 2013. The previous assessment of skipjack stocks was conducted in 2008 (Anon. 2009a). This report covers the most recent information on the state of the stock.

REFERENCE POINTS: Maximum sustainable yield is estimated to be around 143,000 t – 170,000 t.

STOCK STATUS: Committee has analysed two standardized fishery indices from the EU-purse seine fishery: an index which accounts for skipjack caught in free schools off the coast of Senegal up to 2006 and the second index which characterises fish captured off FADs and in free schools in the equatorial areaThe increase in CPUE of the European purse seiners in the late 1990s is partly the consequence of the increase in the catches of positive sets under FADS, in particular for Spanish vessels since 2011. In addition, the introduction of the price of skipjack (price adjusted for inflation) into the standardisation of the CPUE has not improved the fit. Furthermore, the regular increase in the skipjack yields of the baitboats based in Senegal may only be the result of an increase in catchability linked to the adoption of the so-called "baitboat associated school" fishing towards the mid 1980s. No marked trend has been observed for the Canary Islands baitboats, nor for the peripheral fishery of the Azorean baitboat fishery. Although the Committee has only considered a single stock for the East Atlantic, due to the very low apparent exchange rates between the sectors (based on available information, only 0.9% of tagged fish on both sides of the latitude 10ºN have exceeded this limit), a decrease in abundance for a local segment of the stock would probably have little repercussion on abundance in other areas (refer to notion of stock viscosity).

Regardless of the model used: 2 surplus biomass production models (one non-equilibrium conventional model, and one Bayesian model), a model based only on catch and a mortality estimation model based on the average sizes of fish captured, the Committee was not in a position to provide a reliable estimate of the maximum sustainable yield and therefore nor provide advice on the state of the eastern stock. This applies in the Bayesian case, (1) after testing different working hypotheses on the a priori distribution of the input parameters of the surplus production model (i.e. the growth rate and the carrying capacity), and on the impact of the growth of the catchability coefficient on the CPUE of each fleet), and (2) after performing a retrospective analysis in the case of the catch-only based model. The absence of definition of a fishing effort associated with FADs for the purse seiners, the difficulty of taking into account changes in catchability, the lack of marked contrast in the datasets despite the historical development of the fishing pressure and the fact that the catches and the CPUEs have increased in parallel in recent years are constraints for effective use of the classic stock assessment methods. The Committee has also highlighted that it is difficult to estimate the MSY in conditions of continuous growth of catches without having reliable indicators on the response of the stock to these increases. These indicators may be improved CPUE series, fishing mortality estimates from tagging programmes or other indicators on the exploitation of this species.

Even if caution must be exercised when formulating a diagnosis on the state of the stock in the absence of quantification by an adequate approach, there is no evidence of a fall in yield, or in the average weight of individuals captured. The estimated value of the MSY, according to the catch-only assessment model, has tended to increase in recent years but at a growth rate that is lower than that observed for the catches for the same period. However, according to this model, although it is unlikely that the eastern skipjack stock is overexploited, current catches could be at, even above, the MSY.

As in the past, it is difficult to know whether this hypothesis can be applied to all spatial components of this stock in the East Atlantic, due to the moderate exchange rates which seem to exist between the different sectors of this region. The Committee considers that the MSY should be higher than that estimated in the 2008 assessment in a different exploitation plot to the current one, but cannot express an opinion on the level of the new MSY and the sustainability of the current catches, nor on the repercussions of this exploitation plot on juveniles of the two other species of tropical tunas.

Taking into account the biological and fishery specificities of skipjack, the Committee has attempted to develop Harvest Control Rules based on the proportion of individuals whose sizes are larger than the reference sizes (e.g. size at sexual maturity, the size corresponding to the length which maximises the catches for a given cohort, etc.) The Committee recommends, however, that due to the multi-species nature of the tropical tuna

fishery, the HCRs on skipjack take into account the consequences of targeting skipjack on the other two species of tropical tunas.

MANAGEMENT MEASURES: There is currently no specific regulation in place for skipjack tuna. Several time/area regulatory measures on banning fishing on FADs [Rec. 98-01] and [Rec. 99-01] or on complete closure to surface fleets [Rec. 04-01] have however been implemented in the East Atlantic but the intended aim was to protect yellowfin and bigeye tuna juveniles.

The new Recommendation [Rec. 11-01] which replaces that concerned with the complete closure of the surface fishery [Rec. 04-01] and establishes a new moratorium on FAD fishing in the area that extends from the African coast to 10ºS and 5ºW latitude to 5ºE longitude during the months of January and February, entered into force in 2013. Due to the shift by the European fleet outside the regulated area and the decrease in activity of the Ghanaian purse seiners during the moratorium period, a slight fall in catches of bigeye juveniles has been observed but no significant change has been observed for skipjack and yellowfin tuna.

RECENT MANAGEMENT ADVICE: Despite the absence of evidence that the eastern stock is overexploited, but considering (1) the lack of quantitative findings for the eastern stock assessment, and (2) pending the submission of additional data (including on FADs and on the Grand Tropical Tuna Tagging Programme recommended by the Committee), which are necessary to improve the stock assessment, the Committee recommends that the catch and effort levels do not exceed the level of catch in recent years. In addition, the Commission should be aware that increasing harvests and fishing effort for skipjack could lead to involuntary consequences for other species that are caught in combination with skipjack in certain fisheries

Despite recent progress, the Committee has expressed its concern regarding uncertainties which the underreporting of skipjack catches may have on the perception of the state of the stocks. The Commission should be aware that increasing harvests and fishing effort for skipjack could lead to involuntary consequences for other species that are harvested in combination with skipjack in certain fisheries.

STECF COMMENTS: STECF agrees with the advice from ICCAT/SCRS

15.12 Skipjack (*Katsuwonus pelamis*), Western Atlantic.

A stock assessments for West Atlantic skipjack was conducted in 2014 (Anon. 2014) using catch data available to 2013. The previous assessment of skipjack stocks was conducted in 2008 (Anon. 2009a). This report covers the most recent information on the state of the stock.

FISHERIES: In the West Atlantic, the major fishery is the Brazilian baitboat fishery, followed by the Venezuelan purse seine fleet. The preliminary estimates of catches in 2013 made in the West Atlantic amounted to 18,000 t (against the historic record of 40,000 t in 1984). This sharp decrease in 2013 compared to the large catches reported by Brazilian baitboats in 2012 is due to incomplete reporting by Brazil in 2013. As the fishing effort of this fleet has not increased, these variations could be the result of changes in catchability at local level of this fishery. 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 tentatively estimated at around 30,000-32,000 t.

STOCK STATUS: The CPUEs in the West used in the assessment were those of the Brazilian baitboat which remain relatively stable, those of the Venezuelan purse seiner, the US pelagic longline and a larval index. In addition, the average weight of skipjack caught in the West Atlantic is higher than in the East (3 to 4.5 kg compared to 2 to 2.5 kg), at least for the Brazilian baitboat fishery.

The model based on catches and the non-equilibrium surplus biomass production model have estimated respectively the MSY at 30,000 t - 32,000 t (which remains close to the previous estimates in the order of 34,000 t). The fishing mortality vector estimated by a method based on the development of average size of individuals captured over time (mainly from Brazilian catches) shows a profiles which is very close to that estimated by the non-equilibrium surplus biomass model.

It should be emphasised that all these analyses rest on the assumption of a single western stock from the US coast to Brazil and correspond to the current geographic coverage of this fishery.

For the western Atlantic stock, in light of the information provided by the trajectory of B/B_{MSY} and F/F_{MSY} ratios, it is unlikely that the current catch is larger than the replacement yield.

RECENT MANAGEMENT ADVICE: No precise management recommendations were proposed by the ICCAT. Catches are recommended not to exceed MSY. Despite recent progress, the Committee has expressed its concern regarding uncertainties which the underreporting of skipjack catches may have on the perception of the state of the stocks.

STECF COMMENTS: STECF agrees with the advice from ICCAT/SCRS and notes that recent catches are close to the estimated MSY.

15.13 Marlins (*Makaira nigricans* and *Tetrapturus albidus*), Atlantic Ocean

The most recent assessment for blue marlin was carried out by the ICCAT SCRS in 2011. The majority of the text pertaining to blue marlin stock therefore remains largely unchanged from the STECF Review of Advice for 2014 (STECF 13-27). For White Marlin a 2012 assessment forms the basis of the 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.

Task I catches of blue marlin in 2013 were 1,098 t, compared to 1,834 t reported for 2012. Task I catches of white marlin in 2012 and 2013 were 376 t and 415 t, respectively. Task I catches of both species to be considered preliminary. Due to the work conducted by the Committee and improved reporting by CPCs the amount of unclassified billfish has been minimized.

SOURCE OF MANAGEMENT ADVICE: The advisory body is ICCAT. Blue marlin advice is based on the 2011 assessment while white marlin advice is based on a new 2012 assessment.

REFERENCE POINTS:

ATLANTIC BLUE MARLIN SUMMARY	
BUM	
Maximum Sustainable Yield	2,837 t (2,343 – 3,331 t)[1]
Current (2013) Yield	1,098 t[2]
Relative Biomass (SSB_{2009}/SSB_{MSY})	0.67 (0.53 – 0.81)[1]
Relative Fishing Mortality (F_{2009}/F_{MSY})	1.63 (1.11 – 2.16)[1]
Overfished	Yes
Overfishing	Yes
Conservation and Management Measures in Effect:	Recommendation [Rec. 12-04]. Reduce the total harvest to 2,000 t in 2013, 2014, and 2015

[1] Stock Synthesis version 3.2.0.b model results. Values correspond to median estimates, 95% confidence interval values are provided in parenthesis.
[2] 2013 yield should be considered provisional.

ATLANTIC WHITE MARLIN SUMMARY	
MSY	874 t [1] - 1604 t [2]
Current (2013) Yield	415 t [3]
Relative Biomass:	
B_{2010}/B_{MSY}	0.50 (0.42-0.60)[4]
SSB_{2010}/SSB_{MSY}	0.322 (0.23-0.41)[5]
Relative Fishing Mortality:	
F_{2010}/F_{MSY}	0.99 (0.75-1.27)[4] 0.72 (0.51-0.93)[5]
$Catch_{recent}$[6]/$Catch_{1996}$ Longline and Purse seine	0.30
Overfished	Yes
Overfishing	Not likely[7]
Conservation and Management Measure in Effect:	Recommendation [Rec. 12-04]. Reduce the total harvest to 400 t in 2013, 2014, and 2015

[1] ASPIC estimates.
[2] SS3 estimates.
[3] 2013 yield should be considered provisional.
[4] ASPIC estimates with 10 and 90 percentiles.
[5] SS3 estimates with approximate 95% confidence intervals.
[6] Catch $_{recent}$ is the average annual longline and purse seine catch for 2009-2011.
[7] Overfishing could be occurring if catches are under reported.

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 B_{MSY} and the fishing mortality above F_{MSY} (2011).

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 F_{MSY}. Relative biomass has probably stopped declining over the last ten years, but still remains well below B_{MSY}. 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: In 2012, the Commission implemented [Rec. 12-04], intended to reduce the total harvest to 2,000 t in 2013, 2014, and 2015 to allow the rebuilding of the blue marlin stock from the overfished condition. The Committee expressed its concern on the effectiveness of such measure in light of severe under reporting currently occurring in some fisheries. Therefore, the Committee alerts the Commission that unless such non-compliance issues are properly addressed the adoption of additional measures might be rendered ineffective.

The Commission may consider the adoption of measures such as, but not limited to the mandated 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 marlin 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 member nations (Brazil, Canada, and the U.S.) already mandate or encourage the use of circle hooks on their pelagic longline fleets. In addition, reducing fishing mortality of blue marlin from non-industrial fisheries should be considered.

WHITE MARLIN**:** In 2012, the Commission implemented [Rec. 12-04], intended to reduce the total harvest to 400 t in 2013, 2014, and 2015 to allow the rebuilding of the white marlin stock from the overfished condition. The Committee expressed its concern on the effectiveness of such measure in light of the misidentification of spearfishes in the white marlin catches, which causes uncertainty in stock assessment results and enforcement related problems.

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 marlin 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 white marlin from non-industrial fisheries should be considered.

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.

15.14 Sailfish (*Istiophorus platypteus)* Atlantic Ocean

The stock status for sailfish in the Atlantic Ocean was not updated by ICCAT SCRS in 2013, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

Task I catch for 2013 was 1,090 t and 412 t for the east and west stocks, respectively. Task I catches of sailfish for 2013 are preliminary because they do not include reports from all fleets. 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
2013 Catches (Provisional)	412 t	1,090 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.

15.15 Spearfish, Atlantic Ocean

No additional information on this stock was available to the STECF since 2013, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 three 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.

15.16 Mediterranean Spearfish (*Tetrapturus belone*)

No additional information on this stock was available to the STECF since 2013, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 two SCRS reports.

15.17 Small tunas (Black skipjack, Frigate tuna, Atlantic bonito, Spotted Spanish mackerel, King mackerel and others), Atlantic and Mediterranean

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-13-27).

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.

There are more than 10 species of small tunas, but only five of these account for about 88% of the total reported catch by weight. These five species are: Atlantic bonito (Sarda sarda), frigate tuna (Auxis thazard) which may include some catches of bullet tuna (Auxis rochei), little tunny (Euthynnus alletteratus), king mackerel (Scomberomorus cavalla), and Atlantic Spanish mackerel (Scomberomorus maculatus). In 1980, there was a marked increase in reported landings compared to previous years, reaching a peak of about 145,560 t in 1988 . Reported landings for the 1989-1995 period decreased to approximately 91,764 t, and then an oscillation in the

values in the following years, with a minimum of 61,705 t in 2008 and a maximum of 132,433 t in 2005. Overall trends in the small tuna catch may mask declining trends for individual species because annual landings are often dominated by the landings of a single species. These fluctuations seem to be 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 2013 is 91182 t. 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 catches in the ICCAT area.

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.

15.18 Luvarus (*Luvarus imperialis*), Mediterranean Sea

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

15.19 Shortfin Mako (*Isurus oxyrinchus*), North Atlantic Ocean and Mediterranean.

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

During 2013 ICCAT Shark Specialist Group held a meeting to develop a Special Research Programme on sharks, as recommended at the 2012 shortfin mako assessment meeting. The Shark Research and Data Collection Programme was drafted during the meeting and an approach for identifying key research needs and components of and a roadmap for developing the 2015-2020 SCRS Strategic Plan was outlined.

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, Japan 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 further investigations are needed to clarify its status. The western basin of Mediterranean is considered to be a nursery area for the shortfin 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 5,174 t in 2004 (but SCRS estimates about 7,000 t). In the North Atlantic reported catches in 2013 are 3,635 t, while in 2012 they were 4,477t. EU fleets report the majority of the catches: EC-Spain (1,509 in 2013 (41.5 % of the total catch) and 2,308 in 2012) and EU Portugal (801 in 2013 (22%) and 1,023 t in 2012).Catches from the USA have been constant since 2005, while in recent years Morocco and Belize have reported large catches.

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 (1997-2012), bar 2008 and 2009, Portugal (1998, 2000, 2002, 2005 and 2006) and Cyprus (2006, 2007 and 2012). The catches ranged from 2 to 8 tonnes in the

period 1997-2004. Portugal reported a large increase in 2005 to15 t. Catches returned to low levels from 2006 onwards. No catches have been reported for 2013.

GFCM: SAC13/2011/Dma2 reported shortfin mako (*Isurus oxyrinchus*) in the trap of Sidi Daoud, north of Tunisia (fixed trap targeting 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 Mediterranean fisheries targeting swordfish (after Blue shark *Prionace glauca*). GFCM: SAC13/2011/Dma2 also mentioned some by-catches of shortfin mako in drift net fisheries 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/SCRS 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/SSB_{MSY} across all ***CFASPM*** scenarios explored in the 2012 assessments, ranged from 1.63 to 2.04 and estimates of F/F_{MSY} ranged from 0.16 to 0.62.

STOCK STATUS: ICCAT- SCRS report in 2012 includes the assessment of the shortfin 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 recommendations:

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.

15.20 Shortfin Mako (*Isurus oxyrinchus*), South Atlantic Ocean.

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 longline fisheries CPUE data from the Uruguay, Japan, Brazil and Spain 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 landed1,080 t in 2013, equal to 56.6% of the total catch, (with 1,197 t in 2012) and EC-Portugal (132 t in 2013 and 176 t in 2012). Japan, Brazil, and in recent years Chinese Taipei and Namibia also provide large landings.

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/F_{MSY}=0.38-0.40) and current SSB was estimated at a little over 2 times that producing MSY (SSB/SSB_{MSY}=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/B_{MSY} trend were relatively narrow, but F/F_{MSY} 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 B_{MSY} and a median fishing mortality rate below F_{MSY}. 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 F_{MSY} can be calculated from r. Fishing mortality rates can be estimated using length data and then used to compute

current fishing mortality relative to F_{MSY}. 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 15.19.

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.

15.21 Porbeagle (*Lamna nasus*) in the North-West Atlantic

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27)

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 porbeagle fishery ranged from a minimum 68 t in 2011 to a maximum of 2,725 t in 1994. 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), UK (15 t in 2008 and 11 t 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 in 2008, all related to the NW Atlantic. Since 2009 only Canada, USA, Norway and Japan have reported catches. Canadian catches are on the decrease while Japanese catches are increasing. 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. The TAC for the Northeast Atlantic is 436 t.

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, and 287 t in the NE Atlantic.

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 B_{MSY}, but recent fishing mortality is below F_{MSY} 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 by ICCAT/ICES since 2009.

A recent analysis by Campana *et al.* (2013), utilising a forward-projecting age- and sex-structured population dynamics model found that the Canadian porbeagle population could recover from depletion, even at modest fishing mortalities. The population is projected forward from an equilibrium starting abundance (assumed an unfished equilibrium at the beginning of 1961–prior to directed commercial fisheries) and age distribution by adding recruitment and removing catches. All models predict recovery to 20% of spawning stock numbers before 2014 if the fishing mortality rate is kept at or below 4% of the vulnerable biomass. Under the low productivity model, recovery to spawning stock numbers at maximum sustainable yield (SSN_{MSY}) was predicted to take over 100 years at exploitation rates of 4% of the vulnerable biomass.

Porbeagle is subject to the UN agreement on highly Migratory Stocks. In IUCN (2004), porbeagle is classified as Endangered for the North West Atlantic.

Porbeagle is listed under CMS Appendix II (Convention Migratory Species 2007). The range states of Appendix II species (migratory species with an unfavourable conservation status that need or would significantly benefit from international cooperation) are encouraged to conclude global or regional agreements for their conservation and management (www.cms.int).

In 2013, a renewed proposal to list porbeagle shark on Appendix II of CITES was accepted at the Conference of Parties (16) Bangkok. However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

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 northeast 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.

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.

15.22 Porbeagle (*Lamna nasus*) in the South-West Atlantic

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 porbeagle fishery ranged from a minimum of 0 t in many years to a maximum of 85 t in 2008, while catches in 2013 account for 30 t. The largest portion of the catch is obtained by surface longlines. EU nations haven't reported landings since 2009. The major, recent, catches are reported by Japan (25 t in 2012 and 16 t in 2013) and Uruguay (12 t in 2012 but nothing reported for 2013). Korea reported 14 t in 2013. 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.

Porbeagle is listed under CMS Appendix II (Convention Migratory Species 2007). The range states of Appendix II species (migratory species with an unfavourable conservation status that need or would significantly benefit from international cooperation) are encouraged to conclude global or regional agreements for their conservation and management (www.cms.int).

In 2013, a renewed proposal to list porbeagle shark on Appendix II of CITES was accepted at the Conference of Parties (16) Bangkok. However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

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.

15.23 Porbeagle (*Lamna nasus*) in South-East Atlantic

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 porbeagle fishery ranged from a minimum of 0 t in many years to a maximum of 85 t in 2008 while catches in 2013 account for 30 t. The largest portion of the catch is obtained by surface longlines. EU nations haven't reported landings since 2009. 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.

Porbeagle is listed under CMS Appendix II (Convention Migratory Species 2007). The Range States to CMS Appendix II species (migratory species with an unfavourable conservation status that need or would significantly benefit from international cooperation) are encouraged to conclude global or regional agreements for their conservation and management (www.cms.int).

In 2013, a renewed proposal to list porbeagle shark on Appendix II of CITES was accepted at the Conference of Parties (16) Bangkok. However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

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 notes that better reporting of the porbeagle catches from all the fisheries and Member States involved is required, with the purpose to assess the state of the resource and the possible impacts due to the different fisheries.

15.24 Porbeagle (*Lamna nasus*) in the Mediterranean Sea

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 out 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 Italy and Malta. Landings are very sporadic, reaching a peak of 3 tonnes in 2004. Since 2009 only Malta has reported 1 t of landings. 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 Mediterranean 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).

Porbeagle is listed under CMS Appendix II (Convention Migratory Species 2007). The range states of CMS Appendix II species (migratory species with an unfavourable conservation status that need or would significantly benefit from international cooperation) are encouraged to conclude global or regional agreements for their conservation and management (www.cms.int).

In 2013, a renewed proposal to list porbeagle shark on Appendix II of CITES was accepted at the Conference of Parties (16) Bangkok. However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

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.

15.25 Blue shark (*Prionace glauca*) in the North Atlantic

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 38,083 t in 2011, the highest record so far. The major catches are reported by EC-Spain, with 28,666 t in 2013 (28562 t in 2012), usually accounting for more than 60% of the total North Atlantic catches. Other catches are reported also by EC-Portugal with 3,463 t in 2012 (3,725 t in 2013). Portuguese catches peaked in 2010 at 8,261t. Japan reported 2,210 in 2013 (2,437 t in 2012), and Belize has reported increasing catches since 2009, standing at 1,216t in 2013.

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 2007.

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 F_{MSY}. 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.

15.26 Blue shark (*Prionace glauca*) in South Atlantic

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 with many countries not reporting any catch. Historical catches range from 0 t in the '80s to 34,926 t in 2011. The major catches are reported by EC-Spain, with 10,408 t in 2013 (14,348 t in 2012), usually accounting for about 40% of the total South Atlantic catches. Catches are also reported by EC-Portugal with 1,646 t in 2013 (2,424 t in 2012), Brazil with 1,008 t in 2013 (1,607 t in 2012), Namibia with 1147 t in 2013 (1,439 t in 2012) and Japan with 2,271 t in 2013 (3,060 t in 2012).

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 F_{MSY}. 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.

15.27 Blue shark (*Prionace glauca*) in the Mediterranean Sea

The stock status and advice for this stock for 2015 remains largely unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 216 t in the period 1989-2013. In 2010, reported catches reached the historical maximum of 216 t. Reported catches in subsequent years are 40 t in 2011, 42 t in 2012 and 101 t in 2013. The highest catches are reported by EU-Italyand EU-Spain.

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 EU Data collection framework but the understanding of this stock cannot improve if some EU-countries and non-EU countries will continue in non-reporting their catches to ICCAT or GFCM.

15.28 Thresher shark (*Alopias vulpinus*) in the Atlantic Ocean and the Mediterranean

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

15.29 Bigeye thresher shark (*Alopias superciliosus*) in the Atlantic Ocean and the Mediterranean

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 10^{th} 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.

15.30 Smooth hammerhead (*Sphyrna zygaena*) in the Atlantic Ocean and the Mediterranean Sea

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

In 2013, Sphyran zygaena was listed on Appendix II of CITES (Conference of Parties 16, Bangkok). However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

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.

15.31 Other Hammerhead sharks (*Sphyrnidae*) in the Atlantic Ocean and the Mediterranean Sea

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

In 2013, *Sphyrna mokarran* and *Sphyran zygaena* were listed on Appendix II of CITES (Conference of Parties 16, Bangkok). However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

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.

15.32 Carcharhinus spp.

The stock status and advice for this stocks/species for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-13-27).

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 following:

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)
Carcharhinidae	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*.

Retaining on board, transhipping or landing any part or whole carcass of oceanic whitetip sharks (*Carcharhinus longimanus*) and silky shark (*Carcharhinus falciformis*) taken in any fishery is prohibited in the ICCAT area by Council Regulation (EC) N° 44/2012

In 2013, *Carcharhinus longimanus* was listed on Appendix II of CITES (Conference of Parties 16, Bangkok). However, the implementation of this listing has been delayed by 18 months (14 September 2014) to enable Range States and importing States to address potential implementation issues.

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.

15.33 Blue stingray (*Pteroplatytrygon violacea*)

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

15.34 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.

16 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 2013.

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. Preliminary estimates of catches of skipjack, yellowfin, bigeye and albacore in 2012 are around 830,000000 tonnes, a 2% decline from 2011. There has been a general tendency for the total catch of those species to decline since 2005, when a record 1.20 million tonnes were caught.

Average catches for the period 2007-2012 provide an indication of the recent performance of the fisheries: Skipjack accounts for 48% of the catches in weight, followed by yellowfin (35%), bigeye (12%), 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. Recent decreases in piracy activity and its geographic extension is bringing fleets back into their previous patterns of exploitation, and the Scientific Committee has warned that this could bring an increase in both nominal and effective effort.

Despite recent 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 in the region. Many smaller tuna and tuna-like species are not currently assessed by the IOTC, although data on these is improving and some fishery indicators are now available.

16.1 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 2012) 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 stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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 Scientific Committe has in 2012 reviewed an Ecological Risk Assessment (ERA) for Indian Ocean sharks. Tables 16.1 and 16.2 show the 10 most vulnerable species, for longline and purse seine, respectively, and compares this list with those for which IOTC requests catch information be included in logbooks.

Table 16.1: List of the 10 most vulnerable shark species to longline gear compared to the list of shark species/groups required to be recorded in logbooks, as listed in Resolution 12/03 on the recording of catch and effort by fishing vessels in the IOTC area of competence (from Table 4, IOTC-2012-SC15-R[E]).

PSA vulnerability ranking	Most susceptible shark species to longline gear	FAO Code	Shark species listed in IOTC Resolution 12/03 for longline gear	FAO Code
1	Shortfin mako (*Isurus oxyrinchus*)	SMA	Blue shark (*Prionace glauca*)	BSH
2	Bigeye thresher (*Alopias superciliosus*)	BTH	Mako sharks (*Isurus* spp.)	MAK
3	Pelagic thresher (*Alopias pelagicus*)	PTH	Porbeagle shark (*Lamna nasus*)	POR
4	Silky shark (*Carcharhinus falciformis*)	FAL	Hammerhead sharks (*Sphyrna* spp.)	SPN
5	Oceanic whitetip shark (*Carcharhinus longimanus*)	OCS		
6	Smooth hammerhead (*Sphyrna zygaena*)	SPZ		
7	Porbeagle (*Lamna nasus*)	POR		
8	Longfin mako (*Isurus paucus*)	LMA		
9	Great hammerhead (*Sphyrna mokarran*)	SPM		
10	Blue shark (*Prionace glauca*)	BSH		

Table 16.2: List of the 10 most vulnerable shark species to purse seine gear compared to the list of shark species/groups required to be recorded in logbooks, as listed in Resolution 12/03 on the recording of catch and effort by fishing vessels in the IOTC area of competence (from Table 5, IOTC-2012-SC15-R[E]).

PSA vulnerability ranking	Most susceptible shark species to purse seine gear	FAO Code	Shark species listed in IOTC Resolution 12/03 for purse seine gear	FAO Code
1	Oceanic whitetip shark (*Carcharhinus longimanus*)	OCS	Whale sharks (*Rhincodon typus*)	RHN
2	Silky shark (*Carcharhinus falciformis*)	FAL		
3	Shortfin mako (*Isurus oxyrinchus*)	SMA		
4	Great hammerhead (*Sphyrna mokarran*)	SPM		
5	Pelagic stingray (*Pteroplatytrygon violacea*)	PLS		
6	Scalloped hammerhead (*Sphyrna lewini*)	SPL		
7	Smooth hammerhead (*Sphyrna zygaena*)	SPZ		
8	Longfin mako (*Isurus paucus*)	LMA		
9	Dusky shark (*Carcharhinus obscurus*)	DUS		
10	Tiger shark (*Galeocerdo cuvier*)	GAC		

- 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).
- Catches of unidentified shark in 2012 totaled 42,793 t (average 2008-2012 48,708 t).

Blue shark (*Prionace gluaca*)

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. Apparently, as other shark stocks have declined fewer blue sharks are being discarded.

- 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.
- Catches reported in 2012 were of 21,901 t for blue shark.(average 2008-2012 24,204 t)

Silky shark (*Carcharhinus falciformis*)

- 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 deep-water 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.

- 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.
- Catches reported in 2012 were of 4,177 t for silky shark (average 2008-2012 3,443 t)

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.
- 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.
- Catches reported in 2012 were of 412 t for Oceanic whitetip shark (average 2008-2012 292 t)
- This species has been added to CITES appendix II effective from 14 September 2014

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.
- 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.
- Catches reported in 2012 were of 1,426 t for shorfin mako shark (average 2008-2012 1,300 t)

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 pole wards seasonally.

Catches reported in 2012 were of 80 t for scalloped hammerhead shark (average 2008-2012 74 t)

This species was added to CITES appendix II effective from 14 September 2014.

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.

16.2 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 2012 were about 369,000 tonnes, a 21 % increase from 2011. 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 344,000 t.

STOCK STATUS:

The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

. The 2012 updated assessment undertaken by the Scientific Committee (SC15) provided results that did not differ greatly from those in 2011. Point estimates from the base case model used by the Scientific Committee suggested that the stock was not overfished and overfishing is not occurring.

- The ratio of Fcurrent/F_{MSY} is 0.69 (range: 0.59-0.90), indicating that the situation is not of concern, although overfishing probably occurred in the 2004-2006 period of high catches.
- The stock does not appear to be in an overfished state as spawning biomass seems to be above the B_{MSY} level (Bcurrent/B_{MSY} = 1.24. Range: 0.91-1.40), although uncertainty is large.
- The median value of MSY is estimated to be 344,000 tonnes (range of 290,000 and 453,000 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 by catch rates, but no mitigation measures are in place and monitoring is extremely deficient.

RECENT MANAGEMENT ADVICE:

Total catch has continued to increase with 368,663 t landed in 2012, a value over previous MSY estimates (344,000 t), in comparison to 327,490 t in 2011 and 300,000 t in 2010. However, catch rates have improved in the purse seine fishery while remaining stable for the Japanese longline fleet. Therefore it is difficult to know whether the stock is moving towards a state of being subject to overfishing. If the provisional catch estimate for 2013 confirms the increasing trend, it may be necessary to carry out a new stock assessment in 2014.

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

16.3 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 2012 was estimated at 115,793 t, 7 % above the 2008-2012 average, mostly due to increased longline catches.

Bigeye is predominantly caught by industrial long liners, but also as a by catch of juveniles on the FAD skipjack fishery by purse seines, and occasionally by artisanal fisheries.

- The longline fisheries started to target bigeye in the 1970s and mainly catch adults >80 cm. Large bigeye tuna (above 30 kg) are primarily caught by deep longliners. Catches by longline have been declining from a high in 2004.
- There was a rapid development of the purse seine fisheries during the 1990s in association with drifting

and floating FADs. These fleets mainly catch small 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 = 132,000 t (98,000-207,000).

STOCK STATUS: A new stock assessment conducted in 2013 by the Scientific Committee of IOTC (SC14) gave similar results to the 2010, 2011 assessments in terms of average trends. The final overall estimates of stock status differ somewhat due to the revision of catch history and updated standardised CPUE indices. The updated assessment indicates that the stock is probably not overfished and overfishing is probably not occurring.

1. The ratio of Fcurrent/F_{MSY} is estimated at 0.42 (range of 0.21-0.8), indicating that overfishing is not likely to be occurring.
2. The ratio of spawning biomass Bcurrent/B_{MSY} is estimated at 1.44 (range of 0.87-2.22). This indicates that that the stock is not in a clearly overfished state but it is close to it.
3. The median estimate of MSY is 132,000 tonnes. Given that the mean annual catch for the period 2008-2012 was 107,603 t, it appears that the stock is being exploited at close to 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 (2010, 2011) are believed to have been related, at least in part, to the expansion of piracy in the northwest Indian Ocean.

If catch remains below the estimated MSY levels then immediate management measures are not required. However continued monitoring and improvement in data collection, reporting and analysis is required to reduce the uncertainty in assessments

STECF COMMENTS: STECF agrees with the advice from the Scientific Committee of the IOTC and stresses the importance of improved data collection for assessment purposes.

16.4 Skipjack (*Katsuwonus pelamis*)

FISHERIES: Skipjack catches in the Indian Ocean have continued to decline with 314,537 t landed in 2012 in comparison with 2011 landings of 384,537 t, a decrease of 25% on the 2008-2012 average. 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 2007 to 2011 of 435,500t.

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 they 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 activities 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: MSY = 478,000 t (360,000 – 598,000t)

STOCK STATUS: The stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

A complete stock assessment of skipjack has first conducted in 2011 and updated in 2012. The results indicate that no overfishing is occurring, as catches are around 80% of the current estimate of MSY (478,000 t), as the stock is not overfished. Large uncertainties remain in this evaluation of stock status given the problems at interpreting 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 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 carried 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, but is likely to be insignificant according to the analyses conducted by the Scientific Committee.

STECF COMMENTS: STECF notes that given the recent stock assessment results, no immediate management advice has been given.

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.

16.5 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 2007 to 2011 was 21,900 t and catches in 2011 were reported at 19,600 t, this increased to 26,184 t in 2012. 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 stock status and advice for this stock for 2015 remains unchanged from that given for 2014. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27). The 2014 meeting of IOTC will be in December.

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 south-western 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: The most recent catch estimate of 26,184 t in 2012 indicates that the stock status is unlikely to have changed and the stock remains not overfished and not subject to overfishing. However, recent revisions to the catch history for swordfish make it timely for a new stock assessment to be undertaken in 2014. The decrease in longline catch and effort in recent years has lowered the pressure on the Indian Ocean stock as a whole, indicating that current fishing mortality would not reduce the population to an overfished state.

STECF COMMENTS: STECF agrees with the advice from the Scientific Committee of the IOTC.

17 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%).

17.1 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 (180,000 t) the lowest since 1984. Catches in 2012 were about 191,000 tonnes, a 9% decrease from 2011 and 13% less than the most recent 5-year average catch (2007 – 2011) at 219 000t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Advisory Committee (SAC) of IATTC.

REFERENCE POINTS: MSY is estimated to be 259,000. $B/B_{MSY} \approx 0.83$, $SSB/SSB_{MSY} \approx 0.85$, $F/F_{MSY} \approx 1.01$

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 MSY levels 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 at the MSY level, and the recent levels of spawning biomass are estimated to be below that level. As described in the most recent 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 pessimistic than those from the previous assessment. This result is due to a recent increase in the fishing mortality levels for middle-age yellowfin tuna since 2008 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 equal to B_{MSY} ($B/B_{MSY} = 0.83$). 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} ($F/F_{MSY} = 1.01$). 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-12-01, 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 since 2011;

- 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 - 2014.

- An extension of the monthly reporting requirement for longline catches of bigeye in Resolution C-12-01 (paragraph 11) be extended to include longline catches of yellowfin. All CPCs with annual catches of yellowfin greater than 500 metric tons (t) should provide those reports to the Director.

STECF COMMENTS: STECF agrees with the stock status 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. If it becomes apparent that recent recruitment levels are reduced compared to the peak period 1985-2003 fishing mortality will need to be reduced in order for the stock to recover to B_{MSY} levels.

17.2 Western and Central Pacific Yellowfin (*Thunnus albacares*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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 2012 are the larges catches in the time series around 656,700 tonnes following a more or less steady increase since 1983. 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.

There is some indication of a negative effect of El Nino event on catches interannually, but these effects are small when considering the longterm increase in catches. It is unclear whether the reductions are linked to poor recruitment during these years, or whether the oceanographic events lead to a shift in the spatial distribution of the stock in relation to the fishery.

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 yellowfin in 2013; therefore, the a) Stock status and trends and b) Management advice and implications from SC8 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 pessimistc than 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 Fcurrent/F_{MSY} is estimated to be 0.77 with a range between 0.58 and 0.90, indicating that overfishing is not occurring.

- The mediam MSY is estimated to be 538,800 tonnes with a range between 480,000 and 580,000 tonnes.

The western equatorial region accounts for the most of the WCPO yellowfin catch. In previous assessments, there were concerns that the stock status in this region (region 3) might differ from the stock status estimated for the entire WCPO. A comparison between the results from the WCPO models and a model encompassing only region 3 in 2009, yielded very similar results particularly with respect to stock status. Nonetheless, there appear 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 SSB_{MSY}.

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.

In 2012 the SC added the following comment to the management advice:

The SC noted that the total yellowfin catch in 2012 was 655,668t which was a significant (26%) increase over 2011 and a 22% increase over 2007□11.

STECF COMMENTS: STECF agrees with the management advice of WCPFC.

17.3 Eastern Pacific Bigeye (*Thunnus obesus*)

FISHERIES: Bigeye catches in 2012 were about 89,000 tonnes, roughly in line with 2011 catches. 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%).

Prior to 1994, longliners caught an average of 94% of the bigeye in the EPO (average 80 thousand t; range; 46 to 104 thousand t). During 1997-2011 this percentage dropped to an average of 40%, with a low of 25% in 2008 (average: 44 thousand t; range: 26 to 74 thousand t). The preliminary estimate of the longline catch in the EPO in 2012 is 19 thousand t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Advisory Committee (SAC) of IATTC.

REFERENCE POINTS: MSY is estimated to be 107,000 tonnes at current exploitation pattern, but could be over 200,000 if all catches were taken by longline. $B/B_{MSY} \approx 1.02$, $SSB/SSB_{MSY} \approx 1.08$, $F/F_{MSY} \approx 0.95$.

STOCK STATUS:

- The results of this assessment indicate a recent recovery trend for bigeye tuna in the EPO (2005-2010), subsequent to IATTC tuna conservation resolutions initiated in 2004. However, a decline of the spawning biomass began at the start of 2011, persisted through 2012 and reduced both summary and spawning biomasses to their lowest historic levels at the start of 2013. This decline may be related to a series of recent below-average recruitments which coincide with a series of strong la Niña events. However, at current levels of fishing mortality, and if recent levels of effort and catchability continue and average recruitment levels persist, the SBR is predicted to stabilize at about 0.21, very close to the level corresponding to MSY.
- There is uncertainty about recent and future recruitment and biomass levels.
- The recent fishing mortality rates are estimated to be slightly below the level corresponding to MSY, and the recent levels of spawning biomass are estimated to slightly above that level. These interpretations are uncertain and highly sensitive to the assumptions made about the steepness parameter of the stock-recruitment relationship, the assumed rates of natural mortality for adult bigeye, and the weighting assigned to the size-composition data, in particular to the longline size-composition data. The results are more pessimistic if a stock-recruitment relationship is assumed, if lower rates of natural mortality are assumed for adult bigeye, and if a greater weight is assigned to the size-composition data, in particular the longline fisheries.

RECENT MANAGEMENT ADVICE: Regarding bigeye tuna, the assessment results indicate a recovering trend during 2005-2010, subsequent to the adoption of the IATTC tuna conservation resolutions initiated in 2004. However, a reduction of the spawning biomass commenced at the beginning of 2011 and persisted through 2012, which reduced both the summary and spawning biomasses to their lowest historical levels at the beginning of 2013. At current levels of fishing mortality, and if the recent levels of catch and effort and average

recruitment levels continue, it is predicted that the spawning biomass will stabilize at a level very close to that corresponding to the MSY.

The main conservation measure established by IATTC for yellowfin is Resolution C-12-01, 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 since 2011;
- 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 - 2014.

STECF COMMENTS: STECF agrees with the advice on stock status, but given the uncertainty around the assessment is unable to determine if the management measures currently in place are sufficient to ensure sustainable exploitation of the stock.

17.4 Western Pacific Bigeye (*Thunnus obesus*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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 2012 were about 162,000 tonnes (10% higher than the average of the previous 5 years and the 3rd highest since 1983). 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 (173,750 t) was the second highest on record (slightly lower than the record catch taken in 1974 – 176,706 t).

SOURCE OF MANAGEMENT ADVICE: The Western and Central Pacific Fisheries Commission (WCPFC) is responsible for the management of this stock.

The Secretariat of the Pacific Community's (SPC's) Oceanic Fisheries Programme 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 2013; therefore, the a) Stock status and trends and b) Management advice and implications from SC8 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, SSBcurrent/ SSB_{MSY} = 1.19 (0.86-1.49) and Fcurrent/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 2010 assessments, 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 Fcurrent/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 SSBcurrent/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 SSBcurrent < 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, it was not possible to check whether CMM2008-01 has reduced fishing mortality for bigeye tuna to the levels specified.

In 2012 the SC added the following statement to the management advice in addition to maintaining previous advice:

The SC noted that the total yellowfin catch in 2012 was 655,668t which was a significant (26%) increase over 2011 and a 22% increase over 2007□11.

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}.

17.5 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 195,000 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.

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. Catches in the last five years vary between 152,000 and 310,000 t.

SOURCE OF MANAGEMENT ADVICE: The advisory body is the Scientific Advisory Committee (SAC) of IATTC.

REFERENCE POINTS: MSY n/a. $F/F_{MSY} \geq 1$. $B/B_{MSY} \sim 1$

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 concern with the skipjack stock is the constantly increasing exploitation rate. However, this appears to have leveled off in recent years, and the effort has declined. The data- and model-based indicators have yet to detect any adverse consequence of this increase. The average weight was below its lower reference level in 2009, which can be a consequence of overexploitation, but can also be caused by recent recruitments being greater than past recruitments or expansion of the fishery into areas occupied by smaller skipjack. Any continued decline in average length is a concern and, combined with leveling off of catch and CPUE, may indicate that the exploitation rate is approaching, or above, the level associated with MSY.

The main conservation measure established by IATTC for yellowfin is Resolution C-12-01, which bbincludes 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 since 2011;
- 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 - 2014.

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-12-01 is intended to decrease F, but the relationship between effort and F is unlikely to be linear.

17.6 Western and central Pacific skipjack (*Katsuwonus pelamis*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

FISHERIES: The WCPO Skipjack stock supports the largest tuna fishery in the World, accounting for 40% of worldwide tuna landings. Catches in 2012 are provisionally estimated at 1,600,000 t right around the average over the last five years, but about 60% higher than catches in the second half of the 90s. Purse seining, which accounts for 85% of the catches, has been increasing steadily for three decades. In contrast, pole-and-line fishing has been declining steadily.

Catches of western and central Pacific skipjack tuna increased steadily from 1970, and more than doubled during the 1980s. The yields were relatively stable during the 1990s and ranged from 870,000 to 1,300,000 tonnes. A Japanese pole-and-line fleet previously dominated the fishery; however this has now been superseded by purse seiners. Over the past 5 years the catch has been 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 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 2013; therefore, the a) Stock status and trends and b) Management advice and implications from SC8 are still current.

REFERENCE POINTS: Base case assessment model estimated the MSY as 1,503,600 tonnes (1274000 – 1818000), Fcurrent/F_{MSY} = 0.37 (0.22-0.53), andSSBcurrent/SSB_{MSY} = 2.94 (2.45-3.69).

STOCK STATUS:

The 2011 updated assessment gave similar results to the previous (2008) assessment, and indicated the following:

- The principal conclusions are that skipjack is currently exploited at a moderate level relative to its biological potential. Furthermore, the estimates of SSBcurrent/SSB_{MSY} and Fcurrent/F_{MSY} 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 around 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 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 2012 the SC added the following statement to the management advice in addition to maintaining previous advice:

The SC noted that the total skipjack catch in 2012 was 1,664,309mt which was a significant (9%) increase over 2011 but the same as the average over 2007□11.

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.

17.7 Northern Pacific Albacore (*Thunnus alalunga*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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).

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. Landings in 201 175,640 t, a 7% increase compared to 2010 (70,693 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 most recent advice was issues by ISC in 2011. It noted that F2006-2008 is significantly below F2002-2004 and provided the following recommendations on conservation advice. This advice has not been updated since then:

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.

17.8 Southern Pacific albacore (*Thunnus alalunga*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

FISHERIES: Total south Pacific catch in 2012 (89,258t) was a 24% increase over 2011 and a 22% increase over 2007-2011. Longline catches (86,064t) increased 25% from 2011 and 22% on 2007-2011. Troll and other catches (3,158t) were down 8% on 2011, but up 15% on 2007-2011

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 < F_{MSY}) and that the stock is not overfished (SB2009 >SSB_{MSY})

RECENT MANAGEMENT ADVICE: WCPFC advises that at the time of their meeting no new assessment was available and the advice issued the previous year was still applicable. This suggests that 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; it also notes that a more recent assessment has been conducted which IATTC has incorporated into their advice which is as follows:

The assessment of South Pacific albacore, which was carried out in 2012 with MULTIFAN-CL by scientists of the Secretariat of the Pacific Community, incorporated catch and effort data, length-frequency data, tagging data, and information on biological parameters. Although there were sources of structural uncertainty, in particular growth, it was concluded that the stock was above the level corresponding to the maximum sustainable yield (MSY). Specifically, the biomass-based reference points Bcurrent/B_{MSY} and SBcurrent/SB_{MSY} were estimated to be above 1.0, and therefore the stock was not in an overfished state. In addition, it was concluded that the risk for overfishing to be occuring was low (fishing mortality reference point Fcurrent/F_{MSY} with a median estimate of 0.21). There appeared to be no need to restrict the fisheries for albacore in the South Pacific Ocean, but additional research to attempt to resolve the uncertainties in the data was recommended.

17.9 Black skipjack (*Euthynnus alletteratus*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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 landings for 2012 are 4,800 t of which roughly 10% are 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 that catches have been between 3,000 and 5,000 t since purse seine discard information became available in 1993. Substantial increases in recent landings are mainly due to the retention of a greater proportion of catches as opposed to changes in targeting or effort.

17.10 Pacific bonito (*Sarda sp*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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 16,641 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 highly variable in general,with 2011 and 12 catches being close to 8,000 t.

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.

17.11 Eastern Pacific swordfish (*Xiphias gladius*)

The stock status and advice for this stock for 2014 remains unchanged from that given for 2013. The text below therefore remains largely unchanged from the Consolidated STECF review of advice for 2013 (STECF-12-22).

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 have increased dramatically to well over 20,000 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 2013; 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/ SSB_{MSY} = 1.45 and F> F_{MSY}.

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. STECF further notes that revisions to catches in recent years are substantially greater than those used in the 2011 assessment suggesting that the management advice may not be robust.

17.12 Western and central Pacific swordfish (*Xiyphias gladius*) WECAF south of 20S.

The most recent assessment and advice for this stock was provided by the WCPFC in 2013. The text below therefore remains unchanged from the STECF Consolidated review of advice for 2014 (STECF 13-27)

FISHERIES: The Southern region of the WCPFC convention area (0-50S; 140E -130W) comprises both the South-West Pacific (SWP) with an eastern bound of 175W and the South-Central Pacific (SCP).

In the South-West Pacific (SWP) swordfish have been taken primarily as by-catch in the Japanese tuna longline fisheries since the 1950s, with reported annual catches fluctuating around 2000 t over the period 1970-1996. Japanese catches declined since the late 1990s, when the targeted Australian and New Zealand longline fisheries rapidly developed, with total annual catches averaging around 4000 t from 1997-2002. Catches have declined from 2002-2007, with total catches in 2006-7 now around the levels observed prior to 1997. Fiji, Papua New Guinea, Vanuatu and New Caledonia have reported the largest catches among the Pacific Island nations. Standardized catch rates declined substantially for all the major fleets during the period from around 1999-2004. Since 2004, there has been a substantial increase in the Australian and New Zealand catch rates, however, the increase is not as evident in the Japanese fleet. Mean size composition has declined in the well-sampled Australian fishery since the mid 1990s. Most of the swordfish catch in the SWP is taken in the region between 20-40S.

The magnitude of the SCP swordfish catches has been comparable to the SWP since around 2000. Unlike the SWP, the majority of the swordfish in the SCP have been taken as by-catch in the equatorial tuna longline fisheries. Japanese SCP swordfish have been primarily a by-catch species since the early 1950s, and Korean catches began in the mid-1970s. Taiwanese fleets have taken substantial catches since ~2000. Beginning in 2004, the Spanish fleet has rapidly expanded, and this targeted fishery recorded the largest catches of all nations in the SWP-SCP in 2006. French Polynesia, Cook Islands and Vanuatu represent the majority of the SCP Pacific Island catches. There is no compelling evidence for changes in size composition in the SCP catches, however, size data are limited. Swordfish catch rates observed in the SCP suggest that swordfish abundance is stable or increasing in recent years. However, the operational level data available for conducting catch rate standardization analyses are limited, and some conflicting trends suggest that targeting changes are affecting CPUE trends for at least some of the fleets.

SOURCE OF MANAGEMENT ADVICE: WCPFC. Scientific advice is provided by the scientific committee of WCPFC.

REFERENCE POINTS: The median reference point estimates from the two assessments using different growth curves suggest SBcurrent/SB_{MSY} = 2.07 Fcurrent/F_{MSY} = 0.74 with an estimate of MSY around 8,000t.

STOCK STATUS: The main conclusions of the current assessment (based upon the median of the uncertainty grid estimates, and the plausible range of key model runs) are as follows.

• The relatively steep decline in biomass over the period 1997 to 2011 over all key model runs, despite the no concurrent temporal change in recruitment, is a notable feature of the current assessment. It is concurrent with large increases in catch particularly in region 2, and declines in CPUE and median fish sizes in the main fisheries. The recent increase in the AU_1 CPUE index is best described by the Ref.case model for which the faster Hawai'ian growth schedule is made; whereas no increase is predicted when the slower Australian growth schedule is assumed.

• Estimates of absolute biomass and equilibrium yield were sensitive to including the NZ_2 standardized CPUE time series in the model fit (key model run cpopt_TW_NZ). The recent declines in the Ref.case model indices for region 2 appear to be consistent with declines in median size over the same period, whereas the NZ_2 index is in conflict with this trend, and is derived from a limited spatial distribution. On this basis, the cpopt_TW_NZ model is considered unreliable, or at least highly uncertain, and this model estimate is excluded from the ranges of the key model runs provided below.

• The key source of uncertainty in this assessment is the assumed growth/maturity/mortality at age schedule. Estimates of stock status are highly uncertain with respect to this assumption. Across the uncertainty grid, where the Hawai'ian schedule was assumed, the probability of Fcurrent/F_{MSY} being less than 1 was less than 2%, while where the slower Australian schedule was assumed, this increased to 51%.

• Total and spawning biomass are estimated to have declined most notably since the late 1990s, with more gradual declines before that time. Current levels of total biomass Bcurrent/B0 = 44 – 68 % and spawning biomass SBcurrent/SB0 = 27 - 55% (range of key model runs).

• When the non-equilibrium nature of recent recruitment is taken into account, we can estimate the level of depletion that has occurred. It is estimated that, for the current period, spawning potential is at 26 - 60% (range of key model runs) of the level predicted to exist in the absence of fishing while assuming the historical estimated annual recruitments.

• Recent catches are between 82% of the MSY level and 102% above the MSY level of between 5299 and 12,730 mt (range of key model runs). Within this range,

- assuming the Hawai'ian schedule produces estimates between 82% of the MSY level and 24% above the MSY level, while,
- assuming the Australian schedule produces estimates that are between 53 and 102% above the MSY level.

• Based on these results, we conclude that under the Hawai'ian schedule current catches are around the MSY level, while under the Australian schedule current levels of catch are above the MSY level.

• Fishing mortality for adult and juvenile swordfish is estimated to have increased sharply in the mid 1990s following the significant increases in catches at that time. Fcurrent/F_{MSY} was estimated to be between 0.33 and 1.77 (range of key model runs). Within this range:

- assuming the Hawai'ian schedule produces estimates between 0.40 to 0.70, while,
- assuming the Australian schedule produces estimates that are between 1.06 to 1.77.

• Based on these results, we conclude that under the Hawai'ian schedule overfishing is not occurring, while under the Australian schedule overfishing is occurring.

• Current stock status compared to the B_{MSY}-related reference points indicates that the current total and spawning biomass are: Bcurrent/B_{MSY} from 1.15 to 1.85 and SBcurrent/SB_{MSY} from 1.15 to 3.53, (range of key model runs). Within this range:

O assuming the Hawai'ian schedule produces estimates between 1.51 to 1.58, and 1.86 to 2.54, respectively, while,

O assuming the Australian schedule produces estimates are between 1.15 to 1.37, and 1.15 to 1.80, respectively.

• Under either growth/maturity/mortality schedule, current stock status is predicted to be above the level supporting MSY. Based on these results, we conclude that the stock is not in an overfished state.

• Based on these results above, and the recent trend in fishing mortality, we conclude that under the Hawai'ian schedule overfishing is not occurring, but under the Australian schedule, overfishing is occurring, the stock is not in an overfished state.

• Other assumptions tested in the key model runs that notably affected the estimates of stock status included: lower steepness equating to higher Fcurr/F_{MSY} and lower SBcurr/SB_{MSY}, and higher steepness producing the opposite effect; and where no movement was assumed, more optimistic estimates of stock status were obtained.

RECENT MANAGEMENT ADVICE:

SC9 recommended that given the current uncertainty in the assessment that the Commission adopt a precautionary approach when considering future management arrangements. Given this, SC9 recommended that there be no increase in fishing mortality over current (2007-2010) levels.

Noting that recent catches between the equator and 20°S now represent the largest component of the catch in Region 2 (equator to 50°S, 165°E to 130°W), SC9 recommended that the Commission consider developing appropriate management measures for this Region which is not covered by CMM 2009-03.

STECF COMMENTS: STECF aggreess with the advice of the WCPFC

17.13 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 catches in the EPO were 3,937 t in 2004, about 3,676 t in 2005 and 2,093 t in 2006. The preliminary catch estimate in 2007 is only about 136 t. Spain reported catches of 16.7 t in the WCP and 1.1 t in EPO in 2007.

SOURCE OF MANAGEMENT ADVICE: The advisory body is IATTC, but WCPFC and ISC also share competence.

REFERENCE POINTS: F_{MSY} = 0.32.

STOCK STATUS: Based on the finding of the ISC blue marlin stock assessment, the following information on stock status and trends is provided:

- Estimates of total stock biomass show a long term decline.

- Current fishing mortality on the stock (average F, ages 2 and older) averaged F = 0.26 during 2009-2011 and was below F_{MSY}. (F_{MSY} (age 2+)=0.32)
- The predicted value of the spawning potential ratio (SPR, the predicted spawning output at current F as a fraction of unfished spawning output) is currently $SPR_{2009\text{-}2011}$ = 23%.
- The overall trends in spawning stock biomass and recruitment indicate a long-term decline in spawning stock biomass and suggest a fluctuating pattern without trend for recruitment.
- Pacific blue marlin spawning stock biomass decreased to the MSY level in the mid-2000's, and since then has increased slightly.
- The base case assessment model indicates that the Pacific blue marlin stock is currently not overfished and is not subject to overfishing relative to MSY-based reference points.

RECENT MANAGEMENT ADVICE: Based on the results of the stock assessment, the stock is not currently overfished and is not experiencing overfishing. The stock is nearly fully exploited. Stock biomass has declined since the 1970's and has been stable since the mid- 2000's with a slight recent increase. The fishing mortality rate should not be increased from the 2009-2011 level to avoid overfishing.

STECF COMMENTS: STECF agrees with the assessment of the status of the stock and the advice from the IATTC.

17.14 Pacific Striped Marlin (*Kajikia audax formerly Tetrapturus audax*)

No additional information on this stock was available to the STECF since 2012, hence the text below remains unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

17.15 Pacific Black Marlin (*Makaira indica*)

No new information on the status of this stock is available to the STECF. Hence the text below remains largely unchanged from the Consolidated STECF review of advice for 2014 (STECF-13-27).

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.

17.16 Pacific Shortbill Spearfish (*Tetrapturus angustirostris*)

No additional information on this stock was available to the STECF since 2012. Hence the text below remains unchanged from the Consolidated STECF review of Advice for 2014 (STECF-13-27).

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 around 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 has no comments.

17.17 Indo-Pacific Sailfish (*Istiophorus platypterus*)

FISHERIES: Indo-Pacific sailfish is caught mainly under gillnets (79%) with remaining catches recorded by troll and hand lines (17%), longlines (4%) or other gears. The average annual catch over recent years is estimated at over 28,000 t. In recent years, the countries attributed with the highest catches of Indo-Pacific sailfish are situated in the Arabian Sea (India, I.R. Iran, Pakistan and Sri Lanka). Smaller catches are reported for line fishers in Comoros and Mauritius and by Indonesia longliners. This species is also a popular catch for sport fisheries (e.g. Kenya, Mauritius, and the Seychelles).

Catches of Indo-Pacific sailfish greatly increased since the mid-1990s (from around 5,000 t in the early 1990s to almost 29,000 t in 2011). The increases are largely due to the development of a gill net/longline fishery in Sri Lanka and, especially, the extension in the area of operation of Iranian gillnet vessels to areas beyond the EEZ of I.R. Iran. In the case of Iranian gillnets, catches have increased from less than 1,000 t in the early 1990's to over 9,800 t in 2012.

Catches of Indo-Pacific sailfish under drifting longlines and other gears have also increased - to a lesser extent than catches from gillnet - from around 1,500 t to over 2,500 t in recent years. However, it is likely that longline fleets under report catches of this species due to its little commercial value. In recent years, deep-freezing longliners from Japan have reported catches of Indo-Pacific sailfish in the central western Indian Ocean, between Sri Lanka and the Maldives and the Mozambique Channel.

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 quantitative stock assessment is currently available for Indo-Pacific sailfish in the Indian Ocean; due to a lack of fishery data and poor quality of available data for several gears, only preliminary stock indicators can be used. A data poor approach was pursued by the WPB in 2013, though results were considered preliminary and require further sensitivity analysis. Therefore **stock status remains uncertain**. However, aspects of the biology, productivity and fisheries for this species combined with the data poor status on which to base a more formal assessment are a cause for considerable concern. Research emphasis on improving indicators and exploration of stock assessment approaches for data poor fisheries are warranted. Given the limited data being reported for coastal gillnet fisheries, and the importance of sports fisheries for this species, efforts must be made to rectify these information gaps. Records of stock extirpation in the Gulf should also be examined to examine the degree of localised depletion in Indian Ocean coastal areas.

Outlook. The estimated increase in coastal gillnet catch and effort in recent years is a substantial cause for concern for the Indian Ocean stock as a whole, however there is not sufficient information to evaluate the effect this will have on the resource. The following key points should be noted:

- the Maximum Sustainable Yield estimate for the whole Indian Ocean is unknown.
- annual catches of Indo-Pacific sailfish are highly uncertain and need to be further reviewed.
- improvement in data collection and reporting, particularly for coastal gillnet and sports fisheries, is required to further assess the stock.
- research emphasis on improving indicators and further exploration of stock assessment approaches for data poor fisheries are warranted.

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.

17.18 Chilean jack mackerel (*Trachurus murphyi*)

FISHERY: The Chilean Jack mackerel (*Trachurus murphyi*, Nichols 1920) is widespread throughout the South Pacific, along the shelf and oceanic waters adjacent to Ecuador, Peru, and Chile, and across the South Pacific along the Subtropical Convergence Zone in what has been described as the "Jack mackerel belt" that goes from the coast of Chile to New Zealand within a 35o to 50o S variable band across the South Pacific. 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.

The fishery for jack mackerel in the south-eastern Pacific is conducted by fleets from the coastal states (Chile, Peru and Ecuador), and by distant water fleets from various countries, operating beyond the EEZ of the coastal states. The fishery by the coastal states is done by purse seiners. The largest fishery exists in Chile, where the fish are used mainly for the production of fish meal. In Peru, the fishery is variable from year to year. Here the fish is taken by purse seiners that also fish for anchovy. According to government regulations, the jack mackerel in Peru may only be used for human consumption. Ecuador constitutes the northern fringe of the distribution of jack mackerel. Here the fish only occur in certain years, when the local purse seiners may take substantial quantities (80 000 tons in 2011).

Part of the catch is processed into fish meal but recently horse mackerel has been promoted to be used for human consumption. The distant water fleets operating for jack mackerel outside the EEZs have been from a number of parties including China, Cook Islands, Cuba, European Union (Netherlands, Germany and Lithuania), Faroe Islands , Korea, , Japan, Russian Federation, Ukraine and Vanuatu,. These fleets consist exclusively of pelagic trawlers that freeze the catch for human consumption. In the 1980s a large fleet from Russia and other Eastern European countries operated as far west as 130° W. After the economic reforms in the communist countries around 1990, the fishery by these countries in the eastern Pacific was halted. It was not until 2003 that foreign trawlers re-appeared in the waters outside the EEZ of the coastal states.

The fishery for jack mackerel is generally a mono-specific fishery. In the offshore fishery the catch consists for 90 – 98% of jack mackerel, with minor by-catches of chub mackerel (*Scomber japonicus*) and Pacific bream (*Brama australis*).

SOURCE OF MANAGEMENT ADVICE: The advisory body for the Chilean jack mackerel is the South Pacific Regional Fisheries Management Organisation (SPRFMO). The stock status and management advice below are based on the 2013 scientific working group of the SPRFMO.

REFERENCE POINTS: Provisional estimates are: $F_{MSY} = 0.25$, $B_{MSY} = 5.5$ million t

STOCK STATUS: Fishing mortaility in in 2013 is estimated to have been above F_{MSY}. Spawning stock Biomass in 2013 is estimated to have been below B_{MSY}. Fishing effort in the next 10 years at or below current (2013) levels are projected to have a high probability of increased spawning biomass from the current level of 2.8 million t.

RECENT MANAGEMENT ADVICE:

The SPRFMO Science Committee advises to maintain 2014 catches at or below 440 000t.

STECF COMMENTS: STECF agrees with the advice provided by scientific working group of SPRFO. While there are some are a number of key uncertainties associated with both the assessment and projections these have been addressed by exploring different assumptions in model runs and comparing the results.

18 Resources in the Antarctic

Resources in the Antarctic are managed under a convention administered by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). The 2013/14 fishing season started on 1 December 2012 and ended on 30 November 2013. Members' fishing vessels operated in the fisheries targeting mackerel icefish (*Champsocephalus gunnari*), toothfish (*Dissostichus eleginoides* and/or *D. mawsoni*) and krill (*Euphausia superba*) during the fishing season. The reported data are the totals up to 20 September 2014, but some fisheries were at that time fishing still in progress in some areas.

Assessments were carried out for following finfish fisheries in the Convention Area, including the biennial assessments for the fisheries for Patagonian toothfish (*D. eleginoides*) in Subareas 48.4 and Divisions 58.5.2, 58.5.1 & 58.6, the fisheries for *Dissostichus* spp. in Subareas 88.1 and 88.2, the annual assessments for mackerel icefish (*C. gunnari*) in Subarea 48.3 and Division 58.5.2, and the development of advice on precautionary catch limits and other issues relevant to management of CCAMLR fisheries.

18.1 Toothfish (*Dissostichus* spp.)

The reported total catch of toothfish (*Dissostichus* spp.) for the fishing season 2013/14 to 20 September was 11,590 tonnes (12,565 tonnes in 2012/13).

Commercial fisheries

18.1.1 *Patagonian tootfish (Dissostichus eleginoides) in Subarea 48.3, South Georgia*

FISHERIES: Longline fishing for Patagonian toothfish (*Dissostichus eleginoides*) in Subarea 48.3 began in the late 1980s and expanded rapidly during the 1990s. Annual catches are in generally in the range of 3,000 to 5,000 tonnes, with a peak in 2002/03 at 7,500 tonnes. In the mid to late 1990s there was significant illegal fishing, 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).

The fishery in 2013/14 for *D. eleginoides* in Subarea 48.3 operated in accordance with CM 41-02 and associated measures, with a catch limit of 2,400 tonnes. Six vessels, using longlines, reported a total catch of 2,180 tonnes. There has been no significant IUU catch since the 2000/01 season.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. A preliminary assessment based on an integrated assessment (CASAL) was used with catch-at-length, CPUE, tagging and survey abundance data. The assessment results were consistent with those of 2011. The 2-fleet model estimated B_0 at 87,665 tonnes, with the spawning stock biomass status in 2013 at 0.52 of B_0. The average recruitment and CV from 1992 to 2006 were used for the stock projections with a lognormal empirical randomisation method of recruitment. Cetacean depredation on longlines was estimated in 2011/12 and 2012/13 to be 4.2% and 5.4% respectively. The stock assessment was based on estimates of total removals that were determined from the reported catches adjusted by the depredation correction factor. The precautionary catch limit was set at 2,400 tonnes.

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). 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.

RECENT MANAGEMENT ADVICE: The catch limit for *D. eleginoides* in Subarea 48.3 was set at 2,400 tonnes for 2014/15, subdivided for the Management Areas: 0 tonnes in A, 720 tonnes in B and 1,680 tonnes in C, in each season. 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.

18.1.2 *Patagonian toothfish (Dissostichus eleginoides) in Subarea 48.4, South Sandwich Islands*

The assessment and management of *Dissostichus* spp. fisheries in Subarea 48.4 has always been based on separate assessments for the northern and southern management area, in which the assessment for the Northern Area was carried out for *D. eleginoides*, using CASAL, whilst for the Southern Area a Petersen biomass estimate was calculated for *D. eleginoides* and *D. mawsoni* combined. In 2012 it was decided that species-specific assessments should be developed for the subarea to provide more appropriate assessments and management of the fisheries.

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 due to 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, targeting 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 fishery for *Dissostichus* spp. in Subarea 48.4 in 2013/14 operated in accordance with CM 41-03 and associated measures. The catch limit for *D. eleginoides* was 45 tonnes. The total reported catch was 44 tonnes and Subarea 48.4 was closed at 1 April 2014.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. A preliminary age based CASAL assessment for *D. eleginoides* was performed based on data for 2009 – 2014. *D. eleginoides* biomass was estimated using CASAL updated with 2014 data, and was estimated to be at 83% of B in 2014. The resulting long-term catch that satisfied the CCAMLR harvest control rules was 40 - 43 tonnes.

REFERENCE POINTS: $SSB_{t+35years}$ >= 50% SSB_0; probability of SSB dropping below 20% of SSB_0 <0.1.

STOCK STATUS: A total of 470 *D. eleginodies* have been tagged and released to date, and a total of 10 fish have been recaptured in block C. The fishery is still largely based on a range of strong recruitment events that occurred around 1994–1996.

RECENT MANAGEMENT ADVICE: For the portion of Statistical Subarea 48.4 open for fishing a catch limit of 42 tonnes for *D. eleginoides* was set for 2014/15, with a limit on by-catch for macrourids of 11.2 tonnes (16% of the catch limit for *Dissostichus* spp.) and a limit for rajids of 3.5 tonnes (5% of the catch limit for *Dissostichus* spp.) and the maintenance of a move-on rule for by-catch species (CM 41-03).

STECF COMMENTS: STECF has no comments.

18.1.3 *Antarctic toothfish (Dissostichus mawsoni) in Subarea 48.4, South Sandwich Islands*

The assessment and management of *Dissostichus* spp. fisheries in Subarea 48.4 has always been based on separate assessments for the northern and southern management area, in which the assessment for the Northern Area was carried out for *D. eleginoides*, using CASAL, whilst for the Southern Area a Petersen biomass estimate was calculated for both *D. eleginoides* and *D. mawsoni* combined. In 2012 it was decided that species-specific assessments should be developed for the subarea to provide more appropriate assessment and management of the fisheries.

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 due to 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, targeting 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 fishery for *Dissostichus mawsoni* in Subarea 48.4 in 2012/13 operated in accordance with CM 41-03 and associated measures. The catch limit for *D. mawsoni* was 24 tonnes. The total reported catch was 24 tonnes and Subarea 48.4 was closed at 1 April 2014.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. The first species-specific biomass estimates for *D. mawsoni* in Subarea 48.4 were performed using the Chapman estimator and estimated at 725 tonnes. The catch limit for 2014/15 was estimated by applying the same harvest rate as in previous years which is based on the harvest rate of *D. eleginoides* in Subarea 48.3 ($\gamma = 0.038$).

REFERENCE POINTS: $SSB_{t+35years} >= 50\% SSB_0$; probability of SSB dropping below 20% of $SSB_0 <0.1$.

STOCK STATUS: No data are available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: For Subarea 48.4 a catch limit of 28 tonnes for *D. mawsoni* was set for 2014/15, with a limit on by-catch for macrourids of 11.2 tonnes (16% of the catch limit for *Dissostichus* spp.) and a limit for rajids of 3.5 tonnes (5% of the catch limit for *Dissostichus* spp.) and the maintenance of a move-on rule for by-catch species (CM 41-03).

STECF COMMENTS: STECF has no comments.

18.1.4 *Patagonian tootfish (Dissostichus eleginoides) in Division 58.5.1., Kerguelen Islands*

FISHERIES: The fishery for *Dissostichus eleginoides* operates in the French EEZ around the Kerguelen Islands in Division 58.5.1. The fishery began in 1984/85 as a trawl fishery targeting *D. eleginoides*, however, trawling targeting other species between 1979 and 1984 caught small amounts of toothfish as by-catch. Trawling continued to 2000/01; a longline fishery began in 1991/92 and continues to the present. The fishery is active throughout most of the year and only longlining is currently permitted in this fishery and operates in the French EEZ around the Kerguelen Islands (outside the 12 n mile zone and down to the 500 m isobath) in Division 58.5.1. The catch limit of *D. eleginoides* set by France in its EEZ in Division 58.5.1 for 2013/14 was 5,100 tonnes, and this was allocated to seven longliners. The catch for the current season reported to 20 September 2014 was 3,017 tonnes. The estimated IUU catch for the 2012/13 season was zero inside the French EEZ. Some IUU fishing may have occurred outside the EEZ.

SCOURCE OF MANAGEMENT ADVICE: The fishery inside the EEZ of the Kerguelen Islands is managed by France. CCAMLR provides general management advice for Division 58.5.1. An updated and revised assessment of the Patagonian toothfish (*Dissostichus eleginoides*) stocks in Kerguelen using a CASAL model with data from the recent POKER survey (2013) and fishery data up until September 2014.

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 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: Although the long-term yield was not calculated, preliminary results show stable estimates of biomass and SSB, that never fall below 60% of the initial biomass considering the actual level of catches of 5,100 tonnes, satisfying the CCAMLR decision rules. The current catch limit of 5,100 tonnes can be forwarded to 2014/15. No new information was available on the state of fish stocks in Division 58.5.1 outside areas of national jurisdiction and it was therefore recommended that the prohibition of directed fishing for *D. eleginoides*, described in CM 32-02, remains in force.

STECF COMMENTS: STECF has no comments.

18.1.5 *Patagonian tootfish (Dissostichus eleginoides) in Subarea 58.5.2., Heard and McDonald Islands*

FISHERIES: From 1996/97 to 2001/02 the fishery was a trawl fishery, only in recent seasons the fishery has been prosecuted by trawl, longline and pot. The fishery in 2012/13 for *D. eleginoides* in Division 58.5.2 operated in accordance with CM 41-08 and associated measures. The catch limit was 2,730 tonnes and fishing was conducted by one trawl and three longline vessels. The total reported catch up to 20 September 2014 was 1,909 tonnes. 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. The revised model with estimated YCS for 1986–2009 and including tag data for 2012 and 2013 was recommended to be used to provide management advice. The estimated median B_0 was 108,586 tonnes and the median SSB status in 2014 at 0.65 of B_0.

REFERENCE POINTS: $SSB_{t+35years}$ >= 50% SSB_0; probability of SSB dropping below 20% of SSB_0

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. Preliminary results show different estimates for the initial and current biomass.

RECENT MANAGEMENT ADVICE: The catch limit for *D. eleginoides* in Division 58.5.2 west of 79°20'E was set at 4,410 tonnes in 2014/15 (CM 41-08).

STECF COMMENTS: STECF has no comments.

18.1.6 *Patagonian tootfish (Dissostichus eleginoides) in Subarea 58.6, Crozet Islands inside French EEZ*

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. In 2013/14 the catch limit for *D. eleginoides* was 700 tonnes, and this was allocated to six longliners. The total catch for the current season reported to 20th of September 2014 was 382 tonnes. 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 2013/14.

SCOURCE OF MANAGEMENT ADVICE: An updated and revised assessment of the Patagonian toothfish (*Dissostichus eleginoides*) was carried out and included estimated levels of depredation by killer whales from gereralised additive model (GAM).

REFERENCE POINTS: $SSB_{t+35years}$ >= 50% SSB_0; probability of SSB dropping below 20% of SSB_0

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: Preliminary results show stable estimates of biomass and SSB, that never fall below 60% of the initial biomass considering the actual level of catches of 700 tonnes, satisfying CCAMLR decision rules. The catch limit for *D. eleginoides* in Subarea 58.6 (French EEZ) was set at 700 tonnes and 60 tonnes orca depredation. 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 32-02, remains in force.

STECF COMMENTS: STECF has no comments.

18.1.7 *Patagonian tootfish (Dissostichus eleginoides) in Subarea 58.6 and 58.7, Prince Edward and Marion Islands inside South Africa EEZ*

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 CCAMLR 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. South Africa informed that the catch limit of *D. eleginoides* in the South African EEZ for 2013/14 was 450 tonnes and two vessels were allowed to conduct fishing in this area. 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 revised operational management procedure to form the basis for a management advice is under development by South Africa, with CPUE comparisons between Spanish and trotlines and the continuation of 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: An assessment model used to set the catch limit has recently been updated by South Africa, enabling the model to incorporate more data and it was used to set the 2014/15 catch limit. The catch limit was likely to remain the same as in 2013/14: 450 tonnes. No new information was available on the state of fish stocks in Subareas 58.6 and 58.7 and Division 58.4.4 outside areas of national jurisdiction. Therefore, the prohibition of directed fishing for *D. eleginoides*, described in CM 32-02 remains in force.

STECF COMMENTS: STECF has no comments.

Exploratory fisheries

18.1.8 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) exploratory fishery in Subarea 48.6*

FISHERIES: The longline fishery for *Dissostichus* spp. in Subarea 48.6 began as a new fishery in 1996/97 (CM 114/XV). In 1999, the Commission agreed that high levels of IUU fishing for *Dissostichus* spp. in the Convention Area had rendered it unrealistic to consider this fishery as 'new', and the fishery was re-classified as exploratory. Licensed longline vessels have fished the exploratory fishery for *Dissostichus* spp. in Subarea 48.6 since 2003/04, and the dominant species in the catches in recent seasons was *D. mawsoni*. The catch limit for *Dissostichus* spp. in 2013/14 was 538 tonnes. The total reported catch by two vessels using longlines was 153 tonnes. SSRU D was closed at 10 February 2014 following completion of research fishing with a total reported catch of 50 tonnes (100% of the catch limit).

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. 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. It therefore recalled the continuation of the research by Japan, South Africa and the Republic of Korea using longlines only. Precautionary catch limit for research in 2014/15 in Subarea 48.6 was set at 538 tonnes, with 28 tonnes in Research blocks 486_1 en 486_2 for *D. eleginoides* and 170 tonnes for *D. mawsoni* in Research block 486_2, 50 tonnes in Research block 486_3, 100 tonnes in Research block 686_4 and 190 tonnes in Research block 486_5 all for *Dissostichus* spp. (CM 41-04).

STECF COMMENTS: STECF has no comments.

18.1.9 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) exploratory fishery Division 58.4.1.*

FISHERIES: The exploratory longline fishery for *Dissostichus* spp. in Division 58.4.1 was first agreed by the Commission in 1998/99 (CM 166/XVII), and licensed longline vessels first operated in this fishery in 2004/05. The exploratory fishery for *Dissostichus* spp. in Division 58.4.1 operated in accordance with CM 41-11 and associated measures. In 2013/14 the catch limit for *Dissostichus* spp. was 724 tonnes. Research fishing was conducted in the research block by one vessel using longlines and the total catch was 101 tonnes. 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.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: Data show that juvenile fish inhabit mostly the shelf, while larger fish live on the slope and pre-spawning fish are found either on their northward spawning migration or inhabit the deeper slope. Further unkown.

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. It therefore recalled the continuation of the research by Japan (1), Spain (1) and Republic of Korea (1), using longlines only. Additionally, the Republic of Korea will perform a tagging experiment with release satellite pop-up tags and an ageing program. The precautionary catch limit for *Dissostichus* spp. in 2014/15 will remain the same as in last fishing season, 724 tonnes: 0 tonnes in SSRUs A&B, 257 tonnes in SSRU C, 42 tonnes in SSRU D, 315 tonnes in SSRU E, 0 tonnes in SSRU F, 68 tonnes in SSRU G and 42 tonnes in SSRU H. The exploratory fishery shall be conducted by Japan (one vessel), Republic of Korea (one vessel) and Spain (one vessel) using longlines only (CM 41-11).

STECF COMMENTS: STECF has no comments.

18.1.10 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) exploratory fishery in Division 58.4.2.*

FISHERIES: The exploratory fishery for Dissostichus spp. In Division 58.4.2 was first agreed by the Commission in 2000, with a trawling fishery which was permitted in association with a new fishery for *Chaenodraco wilsoni, Lepidonothen kempi, Trematomus eulepidotus* and *Pleurogramma antarcticum.* The exploratory trawl fishery was also permitted in 2001/02 in association with a new fishery for *Macrourus* spp. 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*. No research fishing was carried out in Division 58.4.2 in 2013/14.

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).

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: Data show that juvenile fish inhabit mostly the shelf, while larger fish live on the slope and pre-spawning fish are found either on their northward spawning migration or inhabit the deeper slope. Further 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. in 2014/15 for research by Japan (one vessel), Spain (one vessel) and the Republic of Korea (one vessel), all using longlines only, was set at is set at 30 tonnes for SSRU A and 35 tonnes in SSRU E (CM 41-05).

STECF COMMENTS: STECF has no comments.

18.1.11 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) exploratory fishery in Division 58.4.3a, Elan Bank outside areas of national juridiction*

FISHERIES: Longline fishery for *Dissostichus* spp. In Division 58.4.3 began as a new fishery in 1997, but was reclassified as exploratory in 2000. 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. The catch limit for *Dissostichus* spp. in Division 58.4.3a was 32 tonnes. Research was performed by two vessels using longlines, with a total reported catch of 32 tonnes. Division 58.4.3a was closed at 31 August 2014 after completion of research fishing.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. In the absence of an assessment using the CCAMLR decision rules, an estimation of the geometric mean of Petersen biomass estimates was used for the estimate of biomass for this division, including the 24 tags recaptured during research fishing in 2013/14. The estimated biomass was 386 tonnes.

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 2014/15 and the Commission endorsed the continuation of research with the requirement that each vessel set a minimum of five research sets, separated by at least 3 n miles, east of the 70°E meridian, after which research sets (CM 41-01) can continue within the research block defined in 2012. The precautionary catch limit for *Dissostichus* spp. outside areas of national jurisdiction was set at 32 tonnes for Research block 5843a_1 in 2014/15 (based on Petersen biomass estimate), with a minimum for each vessel of 10 tonnes. The exploratory fisheries shall be conducted by France (one vessel) and Japan (one vessel), using longlines only (CM 41-06).

STECF COMMENTS: STECF has no comments.

18.1.12 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) exploratory fishery in Division 58.4.3b, Banzare Bank outside areas of national juridiction*

FISHERIES: Longline fishery for *Dissostichus* spp. in Division 58.4.3 began as a new fishery in 1997, but was reclassified as exploratory in 2000. 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 small-scale research units (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*). There was no fishing conducted in 2013/14.

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 outside areas of national jurisdiction on Banzare Bank, SSRUs A-E is set at 0 tonnes for 2014/15 and (CM 41-07).

STECF COMMENTS: STECF has no comments.

18.1.13 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) exploratory fisheries in Subarea 88.1, Ross Sea*

FISHERIES: In 2005 the Subareas 88.1 and 88.2 were split into two areas for the purposes of stock assessment: (i) the Ross Sea (Subarea 88.1 and SSRUs 882A–B), and (ii) SSRU 882E. The catch limits for the Subarea 88.1 and 88.2 SSRUs in the Ross Sea were changed as part of a three-year experiment starting in 2005/06. The SSRUs between 150°E and 170°E (881A, D, E, F) and between 170°W and 150°W (882A–B) were closed to fishing to ensure that effort was retained in the area of the experiment. To assist administration of the SSRUs, the catch limits for SSRUs 881B, C and G were amalgamated into a 'north' region and those for SSRUs 881H, I and K were amalgamated into a 'slope' region. 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. The catch limit for Subarea 88.1 was 3,044 tonnes including 43 tonnes set aside within the SSRUs 881J,L (catch limit for the subadult survey). Exploratory fisheries in 2013/14 was conducted by 20 vessels using longlines only, with a reported catch of 2,900 tonnes of *Dissostichus* spp. in Subarea 88.1 plus 25 tonnes from the subadult survey within the SSRUs 881J,L. Subarea 88.1 was closed at 17 January 2014.

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.

REFERENCE POINTS: SSB_t+35years >= 50% SSB_0; probability of SSB dropping below 20% of SSB_0 <0.1.

STOCK STATUS: The stocks in Subarea 88.1 is considered fully exploited. A new stock assessment was undertaken in 2012. MCMC estimates of initial (equilibrium) spawning stock abundance (B_0) were 73,870 tonnes (95% credible interval (CI) 69,070–78,880 tonnes), and current biomass ($B_{current}$) was estimated as 80% B_0 (95% CI 76.8–81.3%). The projected biomass trajectory assumes a future constant catch of 3,282 tonnes.

RECENT MANAGEMENT ADVICE: The exploratory fisheries shall be conducted by Australia (1), Japan (1), Republic of Korea (3), New Zealand (3), Norway (1), Russia (5), Spain (1), Ukraine (2) and the UK (2), using longlines only. The total catch of *Dissostichus* spp. in Subarea 88.1 in 2014/15 shall not exceed a precautionary catch of 3,044 tonnes and was devided over the SSRUs: 0 tonnes in SSRUs A,D-F&M, 371 tonnes in SSRUs B,C&G (total), 2,099 tonnes in SSRUs H-J (total) and 306 tonnes (total) in SSRUs in J&L (CM 41-09). A research catch limit of 200 tonnes was set aside for the research survey in Subarea 88.2 SSRUs A&B (CM 41-10). A discrete research catch of 68 tonnes (60 sets) was set aside for the pre-recruit research survey near Terra Nova Bay by New Zealand (CM 24-01).

STECF COMMENTS: STECF has no comments.

18.1.14 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) exploratory fisheries in Subarea 88.2, Ross Sea*

FISHERIES: In 2005 the Subareas 88.1 and 88.2 were split into two areas for the purposes of stock assessment: (i) the Ross Sea (Subarea 88.1 and SSRUs 882A–B), and (ii) SSRU 882E. The catch limits for the Subarea 88.1 and 88.2 SSRUs in the Ross Sea were changed as part of a three-year experiment starting in 2005/06. The SSRUs between 150°E and 170°E (881A, D, E, F) and between 170°W and 150°W (882A–B)

were closed to fishing to ensure that effort was retained in the area of the experiment. 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. In 2013/14, the catch limit for *Dissostichus* spp. was 390 tonnes. Fishing was conducted by 14 vessels using longlines only, with a reported catch was 426 tonnes (103% in SSRU H en 122% in SSRU C-G) and Subarea 88.2 was closed at 26 January 2014.

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. A stock assessment for *D. mawsoni* in SSRU 882H was calculated employing the Petersen tag-recapture method using all years of tag releases. The estimated stock biomass in 2014 was 20 649 tonnes. Estimates of biomass from each of the four fishing grounds based on the CPUE by analogy method ranged from 2,834 tonnes to 4,913 tonnes and equalled a total of 15,000 tonnes. Based on an exploitation rate of 0.04, a precautionary catch limit for each of the SSRUs 882C-G ranged from 112 to 195 tonnes, with a total of 600 tonnes. Although these estimates were uncertain, they provided some reassurance that a total catch of 419 tonnes for the southern SSRUs could be considered precautionary for a short-term period of two years.

REFERENCE POINTS: SSB_t+35years >= 50% SSB_0; probability of SSB dropping below 20% of SSB_0 <0.1.

STOCK STATUS: Limited data available on the stock structure of fish in this fishery.

RECENT MANAGEMENT ADVICE: The exploratory fisheries shall be conducted by Australia (1), Republic of Korea (3), New Zealand (3), Norway (1), Russia (5), Spain (1), Ukraine (2) and the UK (2), using longlines only. The research in SSRUs A&B shall be conducted by four vessels (one vessel each from New Zealand, Norway, Russia and the UK in 2014/15 and 2015/16. The total catch of *Dissostichus* spp. in Subarea 88.2 in 2014/15 and 2015/16 shall not exceed a precautionary catch limit of 619 tonnes. The catch limit for SSRU 882H is set at 200 tonnes. The other 419 tonnes is divided over the SSRUs 882C-G, with no more than 200 tonnes to be taken from any of the SSRUs 882C-G (CM 41-11). A multinational survey to map bathymetry and collect biological data from toothfish will take place in the northern part of SSRUs 882A–B, with a discrete research catch limit of 200 tonnes (50 tonnes per vessel) is set aside from the catch limit established in CM 41-09. This research catch limit is deducted from the total catch limit for Subarea 88.1.

STECF COMMENTS: STECF has no comments.

Closed fisheries

18.1.15 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) closed fishery in Subarea 48.2 – South Orkney Islands*

FISHERIES: In 1998, Chili conducted a survey in Subareas 48.1, 48.2 and 88.3, in order to investigate the presence of *Dissostichus* spp. During the survey industrial longlines (Spanish system) were used, with variable quantities of fish hooks (1,440 to 4,320) set between 600 and 2,550 m of detph.

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: Ukraine will undertake research fishing for *Dissostichus* spp. in Subarea 48.2, in order to provide CCAMLR with data necessary to estimate biomass of *Dissostichus* spp. by undertaking a longline research survey during February–April over a three-year period (2015 – 2017). The survey in 2015 is effort limited with a total of 30 sets and a research catch limit of 75 tonnes.

STECF COMMENTS: STECF has no comments.

18.1.16 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) closed fishery in Subarea 48.5, Weddell Sea*

FISHERIES: Directed fishing on Patagonian tootfish (*D. eleginoides*) and Antarctic toothfish (*D. mawsoni*) in Subarea 48.5 was prohibited in 1997. Russia has performed research in Subarea 48.5 in 2012/13 and 2013/14. The reported catch in 2013/14 was 228 tonnes of *Dissostichus* spp.

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 Commission was unable to provide advice regarding the proposal by Russia to continue research in Subarea 48.5 in 2014/15 and could not provide no new advice on precautionary catch limits for this subarea. Directed fishing for *Dissostichus* spp. in Subarea 48.5 is prohibited in 2014/15 (CM 32-09).

STECF COMMENTS: STECF has no comments.

18.1.17 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) closed fishery in Divisions 58.4.4a and 58.4.4b, Ob and Lena Bank*

FISHERIES: In 1995, Division 58.4.4 was subdivided into Division 58.4.4a (Ob Bank) and Division 58.4.4b (Lena Bank). 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). 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). After the catch prohibition in 2002/03, one survey was undertaken by Japan in 2007/08 in research blocks A-D. In 2010 the same vessel returned to the same area for a survey, but it was decided that the area was to large to have adequate prohability of recapture. The research effort was concentrated in the Research blocks B & C in 2010/11 and 2011/12. Due to the high rate of depredation by killer whales in Research block B, the survey moved to Research blocks C and D in 2012/13. In 2013/14, a Japanese-flagged longliner conducted research fishing in accordance with a research plan submitted under CM 24-01. The precautionary catch limit was 60 tons and a total reported catch of 31 tons *D. eleginoides* was taken in SSRUs C and D. The estimated IUU fishing was 30–50 tonnes in 2012 in this area.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. A revised stock status assessment was performed for *D. eleginoides* in research blocks C and D using CPUE analogy method, Petersen method and CASAL model. The estimated stock size in block C was 709, 401 and 850 tonnes in CPUE analogy method, Petersen method and CASAL Len_1 model (vulnerable biomass in 2013), respectively. The stock sizes of *D. eleginoides* in block D was estimated at 948 tonnes by only using CPUE method, as the catch and tagging data in block D was not enough to be applied to Petersen method and CASAL models.

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 research fishing proposed by France and Japan in 58.4.4.b may proceed in 2014/15 with a total catch limit of 60 tonnes: 25 tonnes in SSRU C and 35 tonnes in SSRU D.

STECF COMMENTS: STECF has no comments.

18.1.18 *Patagonian tootfish (Dissostichus eleginoides) and Antarctic toothfish (D. mawsoni) closed fisheries in Subarea 88.3.*

FISHERIES: There is a prohibition of directed fisheries on toothfish (*Dissostichus* spp.) in Subarea 88.3 (CM 32-16), other than for scientific research purposes in accordance with Conservation Measure 24-01, from 1 December 2003 until the fishery is reopened by the Commission based on the advice of the Scientific Committee. In 2010/11, a Russian-flagged longliner conducted research fishing in accordance with a research plan submitted under CM 24-01. The vessel caught 5 tonnes of *D. mawsoni*. No research was conducted in 2013/14.

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 fishery is closed (CM 32-02).

STECF COMMENTS: STECF has no comments.

18.1.19 *Patagonian tootfish (Dissostichus eleginoides) in other closed fisheries*

FISHERIES: There is a prohibition of directed fisheries Patagonia toothfish (*Dissostichus eleginoides*) in:

- 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.
- 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.

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.

STECF COMMENTS: STECF has no comments.

18.2 Mackerel icefish (*Champsocephalus gunnari*)

In 2013/14, 6 member states fished for icefish by trawling in Subareas 48.1, 48.2 and 48.3 and Division 58.5.2 with a total reported catch on 20 September of 1131 tonnes (2003 tonnes in 2012/13, 1011 tonnes in 2011/12, 11 tonnes in 2010/11, 378 tonnes in 2009/2010 and 1,916 tonnes in 2008/09).

18.2.1 *Icefish (Champsocephalus gunnari) in Subarea 48.3, South Georgia*

FISHERIES: The fishery for *C. gunnari* in Subarea 48.3 operated in accordance with CM 42-01 and associated measures. The fishing season started on 1 December 2013 and remained open. The catch limit for *C. gunnari* in Subarea 48.3 was set at 4,635 tonnes for 2013/14, while the catch up to the 20 September 2014

was 4 tonnes. At the time of the Commission meeting directed fishing was still ongoing. There has been no evidence of IUU activity in this fishery.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. In 2013 a preliminary assessment was performed, based on a random stratified bottom trawl survey (January 2013) of the South Georgia and Shag Rocks shelves by the UK. A total catch of 42.9 tonnes was reported from the research survey, with an exceptionally large catch of 22 tonnes of *C. gunnari* taken in a single haul in the northwest stratum. A bootstrap procedure was applied to the survey data to estimate the demersal biomass, but the station with the exceptionally large catch was omitted from the analysis as a precautionary approach to biomass estimation.

REFERENCE POINTS: $SSB_{t+2years} >= 75\% SSB_{current}$.

STOCK STATUS: The procedure for the length-based assessment estimated the median demersal biomass at 106,548 tonnes, with a one-sided lower 95% confidence interval of 49,640 tonnes. The harvest control rule, which ensures 75% biomass escapement after a two-year projection period, was applied to determine catch limits for *C. gunnari* in Subarea 48.3. The catch limits calculated from the assessment for *C. gunnari* in Subarea 48.3 were 4,635 tonnes for 2013/14 and 2,659 tonnes for 2014/15.

RECENT MANAGEMENT ADVICE: The catch limit for *C. gunnari* in Subarea 48.3 was set at 2,659 tonnes for 2014/15 and operated in accordance with CM 42-01 (move-on-rule and others) and associated measures.

STECF COMMENTS: STECF has no comments.

18.2.2 *Icefish (Champsocephalus gunnari) in Division 58.5.1, Kerguelen Island*

FISHERIES: In the French EEZ of Kerguelen, trawl fisheries have been closed since 1994/95 due to the decline of stocks prior to those years.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. In 2013, POKER Biomass survey was undertaken at Kerguelen Islands (Division 58.5.1). The 2013 data was added to the previous results of 2006 and 2010 for a short term assessment of *C. gunnari* on Kerguelen EEZ. Potential yields for 2013/14 and 2014/15 were estimated. Only the 1+ to 3+ cohorts were projected and indicated that catches of 840 tonnes in the 2013/14 season and 580 tonnes in the 2014/15 season or 0 tonnes in the 2013/14 season and 1,490 tonnes in the 2014/15 season satisfies the CCAMLR decision rules.

REFERENCE POINTS: $SSB_{t+3years} >= 75\% SSB_{current}$.

STOCK STATUS: Usually, the mackerel icefish's population is composed of one or two cohorts, that dominate in terms of abundance and biomass. On the Kerguelen plateau, the lifetime of mackerel icefish doesn't exceed 5 years. These particularities led to a large variation in abundance of mackerel icefish and the amount of production available to the fishery.

RECENT MANAGEMENT ADVICE: Because there was no fishing in 2013/14, the catch limit for mackerel icefish in 58.5.1 was set at 1,490 tonnes.

STECF COMMENTS: STECF has no comments.

18.2.3 *Icefish (Champsocephalus gunnari) in Division 58.5.2, Heard and McDonald Islands*

FISHERIES: The fishery for *C. gunnari* in Division 58.5.2 was operated in accordance with CM 42-02 and associated measures. Fishing was conducted by one vessel using a semi-pelagic trawl with a total catch up to 20 September 2014 of 1,123 tonnes.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR. A short-term assessment was conducted in the generalised yield model (GYM), using the one-sided bootstrap lower 95% confidence bound and updated with data from the 2014 survey and fixed model parameters. With the expectation that the current 4+ and 5+ cohorts are fully exploited, only the 1+ to 3+ cohorts were projected for evaluating whether proposed catches met the CCAMLR decision rules.

REFERENCE POINTS: $SSB_{t+3years} >= 75\% SSB_{current}$.

STOCK STATUS: Stock level is highly variable and dependent on recruitment. A responsive management strategy, using a short term (2 year) assessment approach based on the results of groundfish surveys has been used since 2000. There is evidence of cyclic behaviour in adult population size, with a peak in the fishery every three years.

RECENT MANAGEMENT ADVICE: The catch limits were set at 309 tonnes in 2014/15 and 275 tonnes in 2015/16 satisfying the CCAMLR decision rules (CM 42-02).

STECF COMMENTS: STECF has no comments.

18.3 Other finfish species in the Convention Area

18.3.1 *Other finfish species closed fisheries*

FISHERIES: There is a prohibition of directed fisheries on finfish, other than toothfish (*Dissostichus* spp.) and mackerel 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.

18.4 Elasmobranchs

18.4.1 *Skates and Rays (Rajidae) in Subarea 48.3, South Georgia*

FISHERIES: There was no directed fishing allowed for any species other than *Dissostichus eleginoides* and *Champsocephalus gunnari* in Subarea 48.3 in the 2013/14 fishing season. No data on bycatch of skates and rays were provided at the Scientific Committee 2014 for the fishing season 2013/14. STATLANT data shows that bycatch of skates and rays in Subarea 48.3 for the fishing season 2012/13 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 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.

18.4.2 *Skates and Rays (Rajidae) in Division 58.5.1, Kerguelen Island*

FISHERIES: There was no directed fishing allowed for any species other than *Dissostichus eleginoides* and *Champsocephalus gunnari* in Statistical Division 58.5.1 in the 2013/14 fishing season. No data on bycatch of skates and rays were provided at the Scientific Committee 2014 for the fishing season 2013/14. STATLANT data shows that bycatch of skates and rays in Division 58.5.1 during fishing season 2012/13 was approximately 307 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 58.5.1.

STECF COMMENTS: STECF has no comments.

18.4.3 *Skates and Rays (Rajidae) in Division 58.5.2, Heard and McDonald Islands*

FISHERIES: There was no directed fishing allowed for any species other than *Dissostichus eleginoides* and *Champsocephalus gunnari* in Statistical Division 58.5.2 in the 2013/14 fishing season. No data on bycatch of skates and rays were provided at the Scientific Committee 2014 for the fishing season 2013/14. STATLANT data shows that bycatch of skates and rays in Division 58.5.2 during fishing season 2012/13 was approximately 41 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.

18.4.4 *Sharks in the Convention Area*

FISHERIES: Directed fishing on shark species in the Convention Area, for purposes other than scientific research, is prohibited (32-18). This prohibition shall apply until such time as the Scientific Committee has investigated and reported on the potential impacts of this fishing activity and the Commission has agreed on the basis of advice from the Scientific Committee that such fishing may occur in the Convention Area. Any by-catch of shark, especially juveniles and gravid females, taken accidentally in other fisheries, shall, as far as possible, be released alive. No data on bycatch of sharks were provided at the Scientific Committee for the fishing season 2013/14. STATLANT data show that bycatch of sharks during 2012/13 was less than 30 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.

18.5 Crabs (*Paralomis* spp.)

During the fishing season 2013/14 there were no directed fisheries on crabs within the Convention Area, and no notifications of intention to fish for crabs in 2014/15 have been received by CCAMLR.

18.5.1 *Crabs (Paralomis spp.) Subarea 48.3*

FISHERIES: Crabs were not harvested during 2013/14 in Subarea 48.3, and no notifications of intention to fish for crabs in 2014/15 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.

18.5.2 *Crabs (Paralomis spp.) exploratory fishery in Subarea 48.2*

FISHERIES: An exploratory fishery for crabs in Subarea 48.2 was carried out for the first time during the 2009/10 season. The fishery was prosecuted in accordance with the requirements of CM 52-02, and a total of 79,140 pot hours and 17 sets were completed. Only three *Paralomis formosa* were captured, and it was concluded that the crab fishery in Subarea 48.2 was not likely to be viable. Crabs were not harvested during 2013/14 in Subarea 48.2, and no notifications of intention to fish for crabs in 2014/15have 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.

18.6 Krill (*Euphausia superba*)

In 2013/14, five Members with a total of 12 vessels fished for krill with a total catch of 285,028 tonnes. This was the highest reported catch since 1991.

18.6.1 *Krill (Euphausia superba) Area 48*

FISHERIES: In 2013/14, five Members with a total of 12 vessels fished for krill in Area 48 with a total catch of 285,028 tonnes. 146,437 tonnes was taken in Subarea 48.1, which reached 94% of its allocated trigger level (155,000 tonnes) and Subarea 48.1 was closed on 17 May 2014. 72,442 tonnes and 66,147 tonnes of krill was taken from Subarea 48.2 and Subarea 48.3, respectively. The final reported catch was not available, since the krill fisheries was still on-going.

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. To avoid concentration of the catch as the trigger level is approached, a spatial allocation of the trigger level (620,000 tonnes) by subarea has been set up as follows: 25% for Subarea 48.1, 45% for Subarea 48.2, 45% for Subarea 48.3 and 15% for Subarea 48.4. No more than 75% of the catch limit shall be taken within 60 n miles of known breeding colonies of land-based krill-dependent predators (CM 51-04). 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.

18.6.2 *Krill (Euphausia superba) Area 58.4.1*

FISHERIES: The 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 2013/14.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: Unknown.

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.

18.6.3 *Krill (Euphausia superba) Area 58.4.2*

FISHERIES: The total catch limit for *Euphausia superba* in Division 58.4.2 is 2,645 million tonnes in any fishing season. The total catch limit is further subdivided into two subdivisions within Statistical Division 58.4.2

as follows: west of 55°E, 1.448 million tonnes; and east of 55°E, 1.080 million tonnes. Until the Commission has defined an allocation of this total catch limit between smaller management units, as the Scientific Committee may advise, the total catch in Division 58.4.2 is limited to 260,000 tonnes west of 55°E and 192 000 tonnes east of 55°E in any fishing season (CM 51-03). The fishing season begins on 1 December and finishes on 30 November of the following year. There was no directed fishing on krill in Division 58.4.2 in 2013/14.

SCOURCE OF MANAGEMENT ADVICE: The main management advisory body is CCAMLR.

REFERENCE POINTS: None available for this fishery.

STOCK STATUS: In 2012 an update of the estimates of krill biomass for Division 58.4.2 was made and was estimated at 24.48 million tonnes (CV 0.20), with 14.87 million tonnes (CV 0.22) in the western area, and 8.05 million tonnes (CV 0.33) in the eastern area.

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. Until the Commission has defined an allocation of this total catch limit between smaller management units, precautionary catch limit shall be limited to 260,000 tonnes west of 55°E and 192,000 tonnes east of 55°E in any fishing season.

STECF COMMENTS: STECF has no comments.

18.6.4 *Krill (Euphausia superba) Area 88*

FISHERIES: There was no directed fishing on krill in Area 88 in 2013/14.

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.

18.7 Squid (*Martialia hyadesi*)

During the fishing season 2013/14 there were no directed fisheries on squid within the Convention Area, and no notifications of intention to fish for squid in 2013/14 have been received by CCAMLR.

18.7.1 *Squid (Martialia hyadesi) Subarea 48.3*

FISHERIES: No target fishery for squid (*Martialia hyadesi*) was carried out in the last seasons and no new request has been submitted to CCAMLR for exploratory fishing in the 2014/15 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.

19 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
B_{MSY}	The spawning stock biomass that can support MSY
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
F_{MSY}	The fishing mortality rate that is expected to deliver MSY
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
JRC	Joint Research Centre of the European Commission
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
MEY	Maximum Economic Yield
MSY	Maximum sustainable yield
MSVPA	Multi Species VPA
NAFO	Northwest Atlantic Fisheries Organisation
NEA	Northeast 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)
SEAFO	Southeast Atlantic Fisheries Organisation
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)
SPC	Southern Pacific Commission
SPRFMO	South Pacific Regional Fisheries Management Organisation
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

20 CONTACT DETAILS OF STECF MEMBERS AND EWG-14-16 List of Participants

1 - Information on STECF members and invited experts' affiliations is displayed for information only. In some instances the details given below for STECF members may differ from that provided in Commission COMMISSION DECISION of 27 October 2010 on the appointment of members of the STECF (2010/C 292/04) as some members' employment details may have changed or have been subject to organisational changes in their main place of employment. In any case, as outlined in Article 13 of the Commission Decision (2005/629/EU and 2010/74/EU) on STECF, Members of the STECF, invited experts, and JRC experts shall act independently of Member States or stakeholders. In the context of the STECF work, the committee members and other experts do not represent the institutions/bodies they are affiliated to in their daily jobs. STECF members and invited experts make declarations of commitment (yearly for STECF members) to act independently in the public interest of the European Union. STECF members and experts also declare at each meeting of the STECF and of its Expert Working Groups any specific interest which might be considered prejudicial to their independence in relation to specific items on the agenda. These declarations are displayed on the public meeting's website if experts explicitly authorized the JRC to do so in accordance with EU legislation on the protection of personnel data. For more information: http://stecf.jrc.ec.europa.eu/adm-declarations

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21 List of Background Documents

Background documents are published on the meeting's web site on:
https://stecf.jrc.ec.europa.eu/ewg1416

List of background documents:

1. EWG-14-16 – Doc 1 - Declarations of invited and JRC experts (see also section 10 of this report – List of participants)

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Abstract

STECF EWG-14-16 was held on 20 – 24 October in Dublin (Ireland). The meeting produced the 3rd report in 2014 focussing on the review of stocks of EU interest. STECF adopted the report during its plenary meeting on 10 – 14 November 2014.

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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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