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Commission

# Scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements

Specific Contract No. 10 under Framework  
Contract No. MARE/2012/21



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# **Scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements**

**Specific Contract No. 10 under Framework  
Contract No. MARE/2012/21**

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## Acronyms

CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CECAF	Fishery Committee for the Eastern Central Atlantic
CFP	EU Common Fisheries Policy
CIPA	Centro de Investigaçao Pesqueira Aplicada
CLAV	Consolidated List of Authorized Vessels
CMS	Convention on Migratory Species
CPC	Contracting Party to the Convention and Cooperating non-Contracting Party, Entity or Fishing Entity
CPUE	Catch Per Unit of Effort
CRODT	Centre de Recherches Océanographiques de Dakar-Thiaroye
DCR	Data Collection Regulation
DG MARE	EU Directorate-General for Maritime Affairs and Fisheries
DLS	Data Limited Stocks
EAFM	Ecosystem Approach to Fisheries Management
EEZ	Exclusive Economic Zone
EPO	Eastern Pacific Ocean
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FPA	Fisheries Partnership Agreement
GINR	Greenland Institute of Natural Resources
HCR	Harvest Control Rule
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICES	International Council for the Exploration of the Sea
IMROP	Institut Mauritanien des Recherches Océanographiques et des Pêches
INRH	Institut National de Recherche Halieutique
IOTC	Indian Ocean Tuna Commission
ITQ	Individual Transferable Quotas
IUU	Illegal, Unreported and Unregulated (fishing)
MFHA	Ministry of Fisheries, Hunting and Agriculture (Greenland)
NAFO	Northwest Atlantic Fisheries Organisation
NEAFC	North East Atlantic Fisheries Commission
NIPAG	NAFO/ICES Pandalus Assessment Working Group
NWWG	North-Western Working Group (ICES)
PA	Precautionary Approach
RFB	Regional Fisheries Body
RFMO	Regional Fisheries Management Organisation
RFO	Regional Fisheries Organisation
RVR	Regional Vessel Register
SBT	Southern Bluefin Tuna
SCR	Scientific Council Research (NAFO)
SCRS	Standing Committee on Research and Statistics (ICCAT)
SFPA	Sustainable Fisheries Partnership Agreement
SRP	Spawning Reproductive Potential
STECF	Scientific, Technical and Economic Committee for Fisheries

TAC	Total Allowable Catch
TCAC	Technical Committee on Catch Allocation Criteria
UNCLOS	United Nations Convention of the Law of the Sea
UNFSA	United Nations Fish Stock Agreement
WCPFC	Western and Central Pacific Fisheries Commission
WGDEEP	Working Group on Biology and Assessment of Deep-sea fisheries resources (ICES)
WPB	Working Party on Billfish (IOTC)
WPTmT	Working Party on Temperate Tunas (IOTC)
WPNT	Working Party on Neritic Tunas (IOTC)
WPTT	Working Party on Tropical Tunas (IOTC)

## **ABSTRACT**

Scientific advice on the concept of surplus, as defined by the UNCLOS, was provided for three types of Sustainable Fisheries Partnership Agreements (SFPAs): i) Mixed SFPAs in West Africa, ii) Tuna SFPAs and iii) SFPAs with Greenland. For Mixed SFPAs in West Africa, methods for surplus computation were defined, including alternatives for cases of data limited stocks. These methods may use as input five parameters that could be obtained from those recent stocks assessments that are representative of the current stock status. Surplus estimates would need to be regularly updated (ideally, yearly), according to every new stock assessments and following the enforcement of a management plan (or, by default, according to a transition scheme towards reaching  $F_{msy}$  in 2020). In the case of West African transboundary stocks, a theoretical share of the surplus could be calculated using a standard rule based on historical catches within EEZs. The Surplus concept is not applicable for Tuna SFPAs, due to the high migratory character of tuna or tuna-like species, the fact that these stocks are mostly found in areas beyond national jurisdictions, the lack of direct estimates of local abundance and impossibility to calculate the capacity of the coastal States. For the SFPAs with Greenland, Surplus is considered as any TAC allocated to Greenland and not utilised by this coastal State.

## EXECUTIVE SUMMARY

### Purpose of the specific contract

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The Common Fisheries Policy (CFP) requires that Sustainable Fisheries Partnership Agreements (SFPAs) with third countries should ensure sustainable exploitation of marine resources. Specifically, the EU fishing vessels shall limit their catch to the available biological surplus as referred to in Article 62(2) and (3) of the United Nations Convention on the Law of the Sea (UNCLOS). The CFP specifically mentions that surplus should be "identified, in a clear and transparent manner, on the basis of the best scientific advice" and that for highly migratory fish stocks "the determination of the resources available for access should take due account of scientific assessments conducted at the regional level".

The main objective of this Specific Contract is to provide the Commission with scientific advice on the concept of surplus for three types of Sustainable Fisheries Partnership Agreements (SFPAs): i) Mixed SFPAs in West Africa, ii) Tuna SFPAs and iii) SFPAs with Greenland.

### Tasks to be completed

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The tasks performed to reach this objective were:

1. **Review the surplus concept for Mixed SFPAs in West Africa**, and provide scientific guidance regarding how the concept could be applied to demersal and small pelagic stocks covered by mixed SFPAs. The study should consider the single stock approach as a base case but should also evaluate how the ecosystem approach and ecosystem interactions could be considered. The surplus concept as specified by the UNCLOS is mainly based on a single stock approach. It is important to consider that the surplus concept should reflect ecosystem interactions and that in some cases, surplus might be a consequence of an overexploitation of other stocks causing imbalanced ecosystems and trophic interactions (e.g. surplus available for shrimps due to overexploitation of fish). The surplus concept should also take into account indirect impacts to local ecosystems and to resources exploited by local fisheries.
2. **Review the surplus concept for Tuna SFPAs**. Review and examine how the concept of surplus as laid down in the UNCLOS could be applied to highly migratory fish stocks.
3. **Review the surplus concept for the SFPAs with Greenland**. Evaluate and discuss the surplus concept, as defined in the UNCLOS, regarding the SFPAs with Greenland (discussion on how to apply the surplus concept for main stocks and for stocks with limited advice).

### General approach to completing tasks

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The three tasks were organized as follows:

**For Mixed SFPAs in West Africa**, the work included: 1) the review of the definition of the surplus concept and a summary of the advancements provided by previous works (i.e.: Scientific, Technical and Economic Committee for Fisheries, STECF), 2) the analysis of options that could be applied to different situations of management frameworks; 3) the review of principles or rules which might be applied and options to share the total catch and the surplus between coastal States, in case of trans-boundary stocks. In the context of the ecosystem approach: 4) the analysis of options that could be applied to different data situations in terms of quality and availability; 5) the identification of how European fisheries targeting surplus could contribute to collect information required for the implementation (in the medium term) of an ecosystem approach to fisheries management; 6) the review of the potential adverse effects of catching the surplus, on coastal fisheries and ecosystems; and 7) the review of the rules and methods applied (especially in Europe) in multispecies fisheries framework, where by-catch of overexploited stocks could be a limit for sustainability.

**For Tuna SFPAs**, the planning included the review of the surplus concepts used worldwide and how they could be applied to highly migratory tuna species to ensure the sustainable exploitation of these resources. The revision considered the natural variability and uncertainty in data and models with the aim of suggesting robust indicators.

**For the SFPA with Greenland**, the evaluation of the concept of surplus required the consideration of several options, some of them in common with those considered for West African resources. The main difference between them is that scientific advice for the main Greenlandic exploited resources is based on work carried out by international organisations such as ICES, NAFO, NEAFC or by the local Greenland Institute of Natural Resources (GINR).

To successfully achieve the objectives of the project, it was necessary to involve scientists from the different RFMOs and fishery administrations and/or fisheries research institutions, including those from each West African coastal States involved in the mixed SFPAs and from Greenland. In order to provide a framework to join these stakeholders, a Workshop on the Surplus Concept was organized.

Thus, the work for the three tasks was carried out through desk work and during the Workshop. Some desk work was still needed to complete certain aspects after the Workshop. The first five months of the project were mostly devoted to the Workshop organisation, to the revision of previous Surplus definitions and to compile and revise available information regarding the stocks fished by the EU fleets through SFPAs. This allowed to get an overview of the different situations that had to be analysed. The Workshop on the Surplus concept took place in Tenerife (Spain), 6<sup>th</sup>- 8<sup>th</sup> of October 2015, with the attendance of 25 participants, including Consortium experts and external experts from ICES, some RFMOs, coastal States institutions and other stakeholders involved. Three experts Working Groups (EWGs), one for each task (Mixed SFPAs in West Africa- EWG W Africa, Tuna SFPAs- EWG Tuna and SFPA with Greenland-EWG Greenland) completed the reviews required in its respective tasks, following the terms of reference established and providing a draft text with their main results. These works were further updated and completed during the last months of the Project to produce the final report presented here.

### **The surplus concept for Mixed SFPAs in West Africa**

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The surplus of a stock is its annual potential catch minus the potential catch of the national fleet according to its "capacity to harvest the entire allowable catch". In practice, the EWG on mixed SFPAs West Africa (EWG-W Africa) highlighted that the surplus has to be calculated in the short term, as:

$$\text{Surplus} = \text{TAC} - \text{Ycoast},$$

where:

- TAC is the total allowable catch that refers to a given harvest control rule (i.e. for a well-defined target of the fishing mortality  $F_{\text{target}}$ ), and
- Ycoast is the potential catch of the coastal State.

The EWG-W Africa noted that the surplus can be calculated for a given selectivity of the whole fishery exploiting the stock under consideration, using as input five parameters that can be obtained from usual stocks assessments, these being:

- MSY= Maximum Sustainable Yield
- $F_{\text{msy}}$ = fishing mortality providing MSY on the long term
- $F_{\text{sq}}$ = current fishing mortality
- $Y_{\text{sq}}$ = current total catch
- $Y_{\text{sq.coast}}$ = current catch of the coastal State

This report explains the rationale behind the three options previously defined by STECF in order to calculate Ycoast and provides details on the related calculations. Among the 27 demersal and small pelagic stocks analysed in the context of the SFPAs, 21 have been assessed in recent years, by the Fishery Committee for the Eastern Central Atlantic (CECAF) and/or by the National institutions.

However, in some cases, the resulting estimates have large uncertainty and the five parameters required could be obtained for 14 stocks.

The computation of the surplus also requires that a target fishing mortality ( $F_{\text{target}}$ ) has been previously adopted. The EWG-W Africa noted that ideally this should be specified in the framework of management plans and regulations defined by the coastal countries. In cases where no management plan has been defined, the default option should aim to maintain or to reach a fishing pressure equal to  $F_{\text{msy}}$ , for all stocks by 2015 where possible, or by 2020 at the latest, as stated by the CFP.

For not fully assessed stocks, the EWG-W Africa proposed procedures based on those used in ICES for Data Limited Stocks (DLS) (ICES, 2012a) but adapted to the specific needs of calculating the surplus. Three main stocks categories (with sub-categories) were defined according to the data availability and for each category a method was proposed for the surplus computation. Following the same principles as in the ICES DLS approach, an uncertainty cap (-20%) is proposed to be applied to the surplus estimate, in cases where the diagnosis on the stock status seemed highly uncertain (including the case where significant Illegal, Unreported and Unregulated –IUU– catches are suspected), while an additional precautionary buffer is used when a decrease in the stock biomass cannot be excluded from the available data. The EWG-W Africa underlined that such an approach implies updating annually the surplus estimates (according to changes observed in the stock status), and it is consistent with sustainability objectives only if stocks are managed with TACs.

For transboundary stocks, the EWG-W Africa noted that the rules to allocate the share of the total catch to each country, as well as the share of the surplus, must ideally result from a management agreement between the countries involved. In the absence of any agreement of this kind in the region, three different options were considered, according to previous regional reflexions (FAO, 2002a,b), which are based on: 1) historical catch within each EEZ over the past years; 2) zonal attachment of the resource based on biological criteria and 3) economic and social criteria. The EWG-W Africa noted that method 1 based on catch statistic implies stability and seems to be simpler to be implemented, especially in the case of small pelagics. It is also the most used worldwide.

The EWG-W Africa underlined that catching only the surplus does not mean that foreign fleets have no adverse effects on local fisheries. By decreasing the mean abundance of targeted stocks, and thus the fisheries yields of coastal States, their profitability is ineluctably impacted, with some obvious adverse effects on their potential development. In addition, by-catch species of foreign fleets can be target species for local fisheries, thus also inducing adverse effects on their profitability.

Regarding the ecosystem approach, several situations were analysed by the EWG-W Africa. One of them was the consideration of “choke species” in mixed demersal fisheries, concept already applied in European waters. “Choke species” are those by-catch species submitted to a TAC, in a way that reaching this TAC can cause vessels to stop fishing even if they still have quota for other species. Using such an approach in the surplus context would theoretically lead to the closure of the fishery when a by-catch species is overexploited (and thus, there is no surplus). In such case, foreign fleets are not just catching the surplus. Therefore, it seems reasonable to adopt the surplus concept for target species (i.e. catching only the surplus), but it is impossible in practice for by-catch species. In these cases, only the limitation of the over-surplus catch could be explored. In this scenario, the EWG-W Africa identified the main concerns related to overexploited by-catches in SFPAs in West Africa. More generally, the EWG-W Africa noted that several programmes aiming to improve fisheries selectivity (especially for shrimp fisheries) and to develop an ecosystem approach for fisheries management are currently on the way in West Africa.

### **The surplus concept for Tuna SFPAs**

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Tuna SFPAs allow EU vessels to pursue migrating tuna stocks, as they move along the shores of Africa and through the Indian Ocean, and to fish for surplus stocks in that country's EEZ, in a legally regulated environment. A total of 13 SFPA protocols are currently in force, allowing the EU fleet to operate in the Atlantic Ocean (9 active SFPAs) and in the Indian Ocean (4 active SFPAs). In the Atlantic Ocean, 5 of the SFPAs are specifically “Tuna agreements”, while the rest are mixed agreements with a Tuna component. Tuna, billfishes and pelagic sharks are assessed and managed within the framework of tuna RFMOs such as the International Commission for the Conservation of

Atlantic Tunas (ICCAT) and the Indian Ocean Tuna Commission (IOTC) for the Atlantic and Indian oceans, respectively. The review of the last assessments made by the RFMOs indicates that 25% of the assessed stocks in the Atlantic and 10% of the stocks assessed in the Indian Ocean are overfished and in overfishing situation. These percentages increase to 50% (both in the Atlantic and Indian Ocean) for stocks that are either overfished and/or in an overfishing situation.

Surplus is defined as that part of the allowable catch which a coastal State does not harvest, resulting in an overall exploitation rate for individual stocks that remains below levels at which stocks are capable of restoring themselves and maintaining populations of harvested species above desired levels. The EWG on Tuna SFPAs (EWG-Tuna) considered that due to the fact that tunas are highly migratory species and because these stocks are mostly found in areas beyond national jurisdictions, the surplus concept is not applicable for tuna and tuna-like species. In addition, it was stressed that in the case of large pelagic fish there is no direct estimates of local abundance and consequently no possibility to calculate the capacity of the coastal States. For these reasons, as stated by the United Nations Fish Stock Agreement (UNFSA) and UNCLOS, the determination of the tuna and tuna-like resources available for access should take into account scientific assessments conducted at the regional level as well as conservation and management measures adopted by relevant tuna RFMOs.

Current methods used in catch allocation at the stock level in tuna RFMOs were reviewed by the EWG-Tuna during the Workshop on the Surplus Concept. Tuna RFMOs have progressively adopted different methods to provide access use or presumptive rights to fish, such as limits on the number of vessels, vessel days, overall capacity, or as a share of a TAC. In general, the most commonly used allocation criteria are historical catches and consideration for coastal States access. Furthermore, Article 11 of the UNFSA lists several other possible criteria for consideration when determining how allocations might be provided to new members, including the status of the stocks and the current level of fishing effort.

With the objective to ensure an equitable distribution of the catches and fishing opportunities among coastal States and long distance fleets, belonging to other Contracting Parties to the Convention and Cooperating non-Contracting Parties, Entities or Fishing Entities (CPC), the implementation of a TAC must be accompanied by the development of a quota allocation system based on a weighted combination of different criteria. Although the relative value of each weight should be defined during to the negotiation step between the different CPC partners, as many of the criteria are outside the scope of the fishery science, the EWG-Tuna proposed a list of potential criteria for this type of calculation, this including biological, bio-ecological, geographical and socio-economic aspects, among others.

While the concept of surplus cannot be applied for tuna and tuna like species, access agreements between coastal countries and the EU in cases when countries would like to reallocate their tuna quota developed under the tuna RFMO mandates, should consider the concept of “Glocalisation” (i.e., from global to local). This means to alternate indicators to assess the impact of fishing pressure at a local scale (i.e., at an area scale level, for a specific fishing gear, for a fishing mode, etc.). The EWG-Tuna recommended to investigate the use of indicators related to growth and recruitment overfishing, which may be used among others for assess the fisheries at local levels. Some length-based indicators such as the size at which a year-class achieves its greatest biomass, the size at which 50% of the population reaches sexual maturity; and the mean age of the progenitor of an egg, an index of the mean age contributing to Spawning Reproductive Potential at a local scale, could be further studied to fulfil these objectives.

### **The surplus concept for the SFPA with Greenland**

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The new protocol of the SFPA between Greenland and the EU entered into force on January the 1<sup>st</sup> 2016. It considers catch allocations for Greenland halibut, capelin, cod, Northern shrimp, pelagic and demersal redfish, and a limited catch of roundnose grenadier as by-catch.

The EWG on the SFPA with Greenland (EWG-Greenland) reviewed the information available on the stocks listed in the Protocol that recently expired, which includes a few more species than the newer Protocol. We focused on stock status, exploitation level, management and knowledge of the different stocks. The fact that most of them are assessed and evaluated in the North Atlantic Fisheries

Organization (NAFO) and the International Council for the Exploration of the Sea (ICES) meant that we had a sound basis for this project.

Regarding stock status of the 17 stocks in the Protocol, 5 are in good condition: both Greenland halibut stocks, Northern shrimp in West Greenland, capelin and demersal redfish *S. norvegicus*. Cod in East Greenland is still below its historical maximum but it has recovered from its collapse in the nineties. On the other hand, 3 stocks are in poor state: West Greenland cod, demersal redfish (*S. mentella*) and snowcrab, but snowcrab is absent in the new Protocol. Finally, 7 stocks are in very poor state: Northern shrimp in East Greenland, both pelagic redfish stocks and roundnose grenadier in West Greenland, or the state is unknown (both roundnose grenadier stocks in East Greenland and both Atlantic halibut stocks). However, of these, only Northern shrimp and redfish have supported important fisheries in the past. Atlantic halibut is no longer in the agreement and the allocated TAC for roundnose grenadier in the Protocol is meant to be for by-catch.

All the target species (i.e. those whose allocation in the protocol is not meant to be for by-catch), both Greenland halibut stocks, West Greenland Northern shrimp, pelagic and demersal redfish and capelin are fully exploited, the entire TAC fished annually for most of them. Annual catch of East Northern shrimp and snow crab has been below the TAC in later years, due to the poor status of these stocks. The same applies to cod in East and Southwest Greenland, even though this stock has recovered. Advice for West Greenland cod has lately been 0 TAC.

Management and the annual TAC are based on best scientific advice, provided in most cases by NAFO (West Greenland halibut, Northern shrimp, and West Greenland roundnose grenadier) and ICES (East Greenland halibut, cod, demersal and pelagic redfish, capelin and East Greenland roundnose grenadier). Data and evaluation methods are under constant review in NAFO, and ICES organises periodically benchmark meetings where a large group of international and external experts carefully examine alternative analysis methods that could provide an even more accurate evaluation of stocks.

The spatial distribution of some of these stocks exceeds the Greenland EEZ, and Greenland shares their management with the relevant party in each case: Canada for West Greenland halibut and roundnose grenadier, Iceland for East Greenland halibut, Iceland and Norway for capelin. Redfish is managed by NEAFC, and the remaining stocks in the Protocol are managed by Greenland.

Knowledge on the target stocks is good compared to other regions of the world. Stock identity is adequately defined for more than half of the stocks. Biological data are routinely collected in surveys and in some instances in commercial vessels as well. Catch data are considered to be reliable and IUU, discards and by-catch are considered negligible in the area.

The surplus for the Greenland stocks included in the SFPAs with the EU, which are TAC regulated and transboundary stocks and for which Greenland is allocated a TAC, can be summarised by the following simple equation:

$$\text{Surplus} = \text{TAC}_{\text{GRL}} - \text{Yt}_{\text{GRL}}$$

where:

- $\text{TAC}_{\text{GRL}}$  is the TAC allocated to Greenland through NEAFC or bilateral agreements, and
- $\text{Yt}_{\text{GRL}}$  is the total annual yield taken by Greenland.

Greenland annually trades this surplus through fishing agreements, which includes the one with the EU. This last should be preferential as stated in Article 2 of the Protocol: "Greenland undertakes to offer a preferential access to available surpluses to the Union's fleet".

Because this allocation of TAC by Greenland does not exceed the advised TAC for any of the relevant stocks, it was considered unnecessary to apply more complex methods for estimation of the surplus. In addition, Greenland already makes available all its surplus to third parties; all major Greenland stocks are already fully exploited; the availability of fishing opportunities for other countries is already regulated and agreed upon; and the estimation of surplus, as part of the Greenland TAC made available to other countries, is already accounted for in the current evaluation methods, since all stocks in the Protocol are TAC regulated. The EWG-Greenland noted that as of today, improvement of



the state of the stocks with a poorer status (East Greenland Northern shrimp, cod) is the only potential increase to the surplus in Greenland.

## Conclusions

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- 1) The methods were defined, including alternatives for the specific case of data limited stocks. For most stocks currently included in **West African SFPAs**, the required parameters to compute surplus seemed to be available. This computation could be conducted for the three options identified by STECF, considering a constant selectivity and assuming that the most recent stock assessments are representative of the current stock status. Those estimates would need to be regularly updated (ideally, yearly), according to every new stock assessments and following the enforcement of a management plan (or, by default, according to a transition scheme towards reaching  $F_{msy}$  in 2020). For transboundary stocks, a theoretical share of the surplus could be calculated using a standard rule based on historical catches within EEZs.
- 2) The Surplus concept is not applicable on **tuna or tuna-like species** for several reasons, among them their high migratory character, the fact that these stocks are mostly found in areas beyond national jurisdictions, the variations of  $MSY$  over time, the lack of direct estimates of local abundance and impossibility to calculate the capacity of the coastal States. Therefore, for highly migratory fish stocks, the determination of the resources available for access should take due account of scientific assessments conducted at the regional level as well as conservation and management measures adopted by relevant tuna RFMOs.
- 3) Fishing opportunities for **Greenland** transboundary stocks are allocated to various fishing nations through different agreements. Greenland is thus allocated a share of the surplus of marine biological resources. In this framework, Surplus is considered as any TAC allocated to Greenland and not utilised by this coastal State. This can be summarised by the following expression:  $Surplus = TAC_{GRL} - Y_{GRL}$ . If Greenland fishes its entire allocated quota (i.e.  $TAC_{GRL} = Y_{GRL}$ ), or the stock status is poor, there would be no available surplus. Traditionally the amount corresponding to the surplus is traded by Greenland through agreements (including that with the EU).

## Recommended scope of a follow up study

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In face of the results obtained for Tuna and Greenland SFPAs (Tasks 2 and 3) it seems clear that a second phase of the project is not needed for these SFPAs. In the first case, the concept of surplus is not applicable to tuna stocks. In the second case, the Greenland TAC allocations have already been accounted for management purposes, and the total TAC is based on the best scientific advice. In addition, there are no unregulated emerging fisheries, or new exploitable resources in Greenland that could justify an alternative or new estimation of surplus. Thus, we considered that Task 2 (to evaluate and advice on how the surplus concept as laid down in the UNCLOS, could be applied to highly migratory fish stocks) and Task 3 (evaluate and advice on how the surplus concept as laid down in the UNCLOS could be applied to the fisheries agreement with Greenland) of the study have been fulfilled during this specific contract.

For SFPAs related to **West African countries** (Morocco, Mauritania, Senegal and Guinea-Bissau), we recommend the estimation of Surplus for all stocks considered in these SFPAs, on a short term basis and on a long term basis when possible (i.e. when stocks have been assessed, providing an estimate for all parameters required). This task requires:

- To gather information on management objectives and strategies implemented by each coastal States or by regional management bodies. For each stock included in a given SFPAs, this compilation will allow to verify if an  $F_{target}$  has been already defined on an existing management plan or on a harvest control rule adopted at the national (or regional) level. Otherwise the computation of the surplus should be based on the default transition scheme, as explained in this report.

- To compile available data necessary to estimate surplus for all stocks covered by mixed SFPAs in West Africa. For all stocks recently assessed by CECAF or by national bodies, this includes the five parameters, MSY, Fmsy, Fsq, Ysq and Ysq.coast (using the last 3 available assessments for small pelagics stocks, and the last 3 years of the last available assessment for demersal stocks). For non-assessed stocks, data required by the proposed DLS approach need to be compiled, particularly: time series of catch, abundance (based on standardized CPUEs or survey indices), and "proxy" of fishing mortalities (if any).

It should be noted that the involvement of coastal States fishery institutions might be needed for the last two points.

- To compute Surplus values on a stock by stock basis, according to the three options justified in this report (i.e. for a constant fishing effort, a constant proportion of the catch due to the coastal State, or a constant catch). Based on available data and expert judgment, this computation should take into account the high uncertainty observed in some stock assessments, following the computation rules defined in the present report.

## RESUME EXECUTIF

### Objectif du contrat spécifique

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La Politique Commune des Pêches (PCP) requiert que les Accords de Partenariat de Pêche Durable (APPD) avec des pays en voie de développement doivent prendre en compte la soutenabilité de l'exploitation des ressources marines. En particulier, les navires de pêche de l'UE doivent limiter leurs captures au niveau de la production biologique excédentaire disponible tel que référencé dans les articles 62(2) et (3) de la Convention des Nations Unies sur la loi de la Mer (UNCLOS). La PCP mentionne de manière spécifique que le surplus doit « être identifié, d'une façon claire et transparente, sur la base de la meilleure science disponible » et que pour les stocks de poissons hautement migratoires, « la définition de la ressource disponible à l'accès doit prendre en compte les évaluations scientifiques conduites à un niveau régional ».

L'objectif principal de ce Contrat Spécifique est de fournir à la Commission un avis scientifique sur le concept de surplus pour 3 types d'Accords de Partenariat de Pêche Durable (APPD) : i) APPD mixtes avec des pays de l'Afrique de l'Ouest, ii) APPD sur les thons, et iii) APPD avec le Groenland.

### Taches à effectuer

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Les taches à réaliser pour atteindre cet objectif étaient:

1. **Révision du concept de Surplus pour les APPD mixtes en Afrique de l'Ouest**, et fourniture d'un encadrement scientifique sur la manière dont ce concept pourrait être appliqué aux stocks de demersaux et de petits pélagiques couverts par les APPD mixtes. L'étude devrait considérer une approche stock par stock comme cas de base mais devrait également évaluer comment les interactions écosystémiques pourraient être intégrées dans une approche écosystémique. Le concept de Surplus tel que défini par l'UNCLOS est basé principalement sur une approche par stock unique. Il est important de considérer que le concept de Surplus devrait refléter les interactions avec l'écosystème et que dans certains cas, le Surplus pourrait être la conséquence de la surexploitation d'autres stocks causant un déséquilibre dans les écosystèmes et dans les relations trophiques (ex., le Surplus disponible pour les crevettes du à la surexploitation des poissons). Le concept de Surplus devrait aussi prendre en compte l'impact indirect sur les écosystèmes locaux et sur les ressources exploitées par les pêcheries locales.
2. **Révision du concept de Surplus pour les APPD thoniers**. Réviser et examiner comment le concept de Surplus tel que énoncé par l'UNCLOS, pourrait être appliqué aux stocks de poissons hautement migratoires.
3. **Révision du concept de Surplus pour les APPD avec le Groenland**. Evaluer et discuter le concept de Surplus, tel que défini par l'UNCLOS, dans le cadre de l'APPD avec le Groenland (discussion sur comment le concept de Surplus pour les principaux stocks et pour les stocks pour lesquels les recommandations de gestion sont limitées).

### Approche générale pour compléter les taches

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Les trois taches ont été organisées de la manière suivante:

Pour les **APPD mixtes de l'Afrique de l'Ouest**, le travail inclut : 1) la révision de la définition du concept de Surplus et un résumé des avancées produites par différents travaux (i.e. Conseil Scientifique Technique et Economique des Pêches, CSTEP) ; 2) L'analyse des différentes options de calcul du Surplus qui pourraient être appliquées à des situations de gestions différentes ; 3) l'examen des principes ou des règles et des options qui pourraient être appliqués pour le partage des captures totales et du Surplus entre États côtiers, dans le cas de stocks transfrontaliers. Dans le cadre de l'approche écosystémique : 4) l'analyse des options qui pourraient s'appliquer à des situations différentes en termes de qualité et de disponibilité des données ; 5) l'identification de la contribution

que la pêche européenne ciblant les Surplus pourrait apporter à la collecte des informations nécessaires à la mise en œuvre (à moyen terme) d'une approche écosystémique de la gestion des pêches ; 6) l'examen des effets indésirables potentiels de la capture des Surplus, sur la pêche côtière et sur les écosystèmes ; et 7) l'examen des règles et des méthodes appliquées (en particulier en Europe) dans les pêcheries multispécifiques, où la captures d'espèces surexploitées peut compromettre la durabilité de l'exploitation.

**Pour les APPD thoniers**, il a été décidé de réviser le concept de Surplus au niveau mondial et de voir comment il pourrait être appliqué aux espèces de thons hautement migratrices afin de préserver une exploitation soutenable de ces ressources.

**Pour les APPD avec le Groenland**, l'évaluation du concept de Surplus requiert de prendre en compte plusieurs options, certaines d'entre elles étant communes avec celles considérées pour les ressources de l'Afrique de l'Ouest. La principale différence entre ces deux cas est que l'avis scientifique des principales ressources exploitées du Groenland se base sur les travaux d'organisations internationales comme le CIEM, la NAFO le NEAFC ou par les instituts Groenlandais des Ressources Nationales (GINR).

Afin d'atteindre les objectifs du projet, il a été nécessaire d'impliquer les scientifiques des différentes ORGP, des administrations des pêches et/ou des instituts de recherche halieutique, y compris ceux de chaque état côtier de l'Afrique de l'Ouest impliqués dans les APPD avec l'UE et le Groenland. Dans le but de créer un cadre de travail pour rassembler ces décideurs, un Groupe de Travail dédié au concept du Surplus a été créé.

En conséquence le travail pour ces trois tâches s'est effectué sous forme de travail à distance et pendant la tenue du Groupe de Travail. Certains aspects du travail à distance ont du être complétés après la réunion du Groupe de Travail. Les cinq premiers mois du projet ont été consacrés principalement à l'organisation du Groupe de Travail, à la révision des définitions préalables du concept de Surplus, à la compilation et à la révision de l'information disponible sur les stocks pêchés par les flottes de l'UE dans le cadre des APPD afin d'obtenir un aperçu des différents cas qui devaient être analysés. Le Groupe de Travail sur le concept de Surplus s'est tenu à Tenerife (Espagne) du 6 au 8 octobre 2015, avec la présence de 25 participants, incluant les experts du Consortium, les experts extérieurs de plusieurs ORGP, ceux des instituts des états côtiers ainsi que d'autres décideurs. Trois Groupes de Travail d'experts (GTE), à savoir un pour chaque tâche : APPD mixtes de l'Afrique de l'Ouest (GTE Afrique de l'Ouest), APPD thoniers (GTE thons) et APPD avec le Groenland (GTE Groenland) ont accomplis les tâches qui leur avait été confiées, suivant en cela les termes de références établis, et en consignait par écrit les principaux résultats de leur travail. Ces résultats ont été mis à jour et complétés au cours des derniers mois du Projet afin de produire le rapport final présenté ci-après.

### **Le concept de Surplus pour les APPD mixtes de l'Afrique de l'Ouest**

Le Surplus est le potentiel de capture annuel réalisable sur un stock, moins le potentiel de capture que peuvent réaliser les flottilles de l'Etat côtier, compte tenu de leur capacité de pêche. En pratique, le groupe de travail sur les APPD mixtes de l'Afrique de l'Ouest (GT-Afrique.O) préconise de calculer le Surplus disponible à court terme comme suit :

Surplus :  $TAC - Y_{cote}$

Avec :

- TAC est le total autorisé de capture, déterminé en fonction d'une règle de gestion prédéfinie (i.e. pour une valeur cible de mortalité par pêche  $F_{cible}$  clairement identifiée)
- $Y_{cote}$  est la capture potentielle de l'Etat côtier

Le GT-Afrique.O insiste sur le fait que le Surplus ne peut être calculé que pour une sélectivité donnée, à l'échelle de l'ensemble de la pêcherie considérée. Le calcul requiert cinq paramètres qui doivent être estimés au préalable dans le processus standard d'évaluation de stock :

- RMD, le rendement maximum durable
- Frmd, la mortalité par pêche qui fournit à long terme le RMD
- Fsq, la mortalité par pêche actuelle (au status quo)
- Ysq, la capture totale actuelle
- Ysq.cote, la capture actuelle de l'Etat côtier

Ce rapport explique la logique des trois options précédemment définies par le CSTEP pour calculer Ycote et fournit des détails sur les calculs connexes du Surplus. Parmi les 27 stocks d'espèces démersales ou de petits pélagiques analysés dans le cadre des APPD, 21 ont fait l'objet d'une évaluation de stock au cours des dernières années, conduite par le Comité des pêches pour l'Atlantique Centre-est (COPACE) et/ou par les institutions nationales. Toutefois, dans certains cas, les estimations résultantes présentent une grande incertitude et les cinq paramètres requis ne pourraient être obtenus que pour 14 stocks.

Le calcul du Surplus exige également qu'une mortalité par pêche cible (Fcible) a été adoptée antérieurement. Le GT-Afrique.O note qu'idéalement, cette cible devrait être prescrite dans le cadre de plans de gestion définis par les pays riverains. Dans les cas où aucun plan de gestion n'a été défini, l'option par défaut devrait être d'atteindre ou maintenir une pression de pêche égale à Frmd, pour tous les stocks d'ici à 2015 si possible, ou d'ici à 2020 au plus tard, comme indiqué par la PCP.

Pour les stocks qui ne font pas l'objet d'une évaluation détaillée, le GT-Afrique.O propose des procédures dérivées de celles utilisées par le CIEM pour les stocks à données limitées (DLS) (CIEM, 2012) mais adaptées aux besoins spécifiques du calcul du Surplus. Trois catégories de stocks principaux (et des sous-catégories) sont définies, selon la disponibilité des données. Pour chaque catégorie une méthode est proposée pour le calcul du surplus. En suivant les mêmes principes que ceux mis en œuvre dans l'approche DLS du CIEM, on propose d'ajouter une marge d'incertitude (-20 %) à l'estimation du Surplus, dans les cas où le diagnostic sur l'état du stock apparaît très incertain (y compris dans les cas où des captures significatives illégales, non déclarées ou non réglementées (IUU) sont suspectées). Une marge de précaution supplémentaire est utilisée lorsqu'une diminution de la biomasse du stock ne peut être exclue à partir des données disponibles. Le GT-Afrique.O souligne qu'une telle approche implique la mise à jour chaque année des estimations de Surplus (en fonction des changements observés dans l'état du stock), et qu'elle n'est conforme à des objectifs de développement durable que si les stocks sont gérés par des TAC.

Pour les stocks transfrontaliers le GT-Afrique.O considère que les règles de répartition des captures totales ou du surplus entre les états côtiers concernés devraient idéalement résulter d'une convention de gestion entre les pays concernés. En l'absence de tout accord de ce genre dans la région, trois options différentes ont été examinées, en s'appuyant sur les réflexions régionales précédentes (FAO, 2002 a, b). Ces options reposent respectivement sur : 1) les prises historiques dans chaque zone économique exclusive, au cours des dernières années ; 2) la dépendance de la ressource à la zone considérée, fondée sur des critères biologiques et 3) des critères économiques et sociaux. Le GT-Afrique.O note que la première approche, basée sur les statistiques de captures, implique une stabilité des clés de répartition et semble être plus simple à mettre en œuvre, en particulier dans le cas des petits pélagiques. C'est aussi la méthode la plus utilisée dans le monde.

Le GT-Afrique.O souligne le fait que capturer uniquement le Surplus ne signifie pas que les flottes étrangères n'ont aucun effet adverse sur la pêche locale. En diminuant l'abondance moyenne des stocks ciblés, et donc les prises des États côtiers, les captures des flottes étrangères affectent inéluctablement la rentabilité de ces flottilles locales, avec des effets négatifs évidents sur leur potentiel de développement. En outre, les captures accessoires des flottes étrangères peuvent être des espèces cibles pour la pêche locale, donc également induire des effets néfastes sur leur rentabilité.

Concernant l'approche écosystémique, plusieurs aspects ont été analysés par le GT-Afrique.O. L'un d'eux est l'examen du cas des espèces limitantes dans les pêcheries démersales mixtes (les espèces dites « Choke species » en anglais, un concept aujourd'hui largement utilisé dans les eaux européennes). Ces espèces limitantes sont capturées en tant que prises accessoires et sont soumises à un TAC. Dès lors, l'atteinte du TAC peut contraindre les navires à cesser de pêcher, même si ils ont encore des quotas disponibles pour d'autres espèces. Utiliser une telle règle, dans le

contexte des surplus, conduirait théoriquement à la fermeture de la pêche dès lors qu'une seule des espèces accessoires est surexploitée (il n'y a alors aucun surplus). Autrement dit, les flottes étrangères qui capturent des espèces accessoires surexploitées pêchent inéluctablement au-delà du Surplus. Par conséquent, il semble raisonnable d'utiliser la notion de surplus (même si elle soulève des difficultés) pour les espèces cibles (dont on ne capture donc que le Surplus et pas plus), mais cette approche est inapplicable en pratique pour les espèces accessoires. Dans ce cas, la seule chose qui puisse être envisagée est de limiter les captures réalisées au-delà du Surplus. Dans cette optique, le GT-Afrique.O a identifié les principaux cas problématiques liés et des prises accessoires d'espèces surexploitées dans les APPD de l'Afrique de l'Ouest. Plus généralement, le GT-Afrique.O note que plusieurs programmes visant à améliorer la sélectivité de la pêche (surtout pour la pêche de la crevette) et à développer une approche écosystémique pour la gestion des pêches sont actuellement en cours en Afrique de l'Ouest.

### **Le concept de Surplus pour les APPD thoniers**

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Les APPD Thons permettent aux navires de l'UE de poursuivre les stocks de thons migrateurs, lors de leurs déplacements le long des côtes africaines et à travers l'Océan Indien, et ainsi de capturer le Surplus dans les ZEE de manière légale. Au total 13 protocoles d'APDD sont actuellement en vigueur, permettant aux flottes de l'UE d'opérer dans l'Atlantique (9 APDD) et dans l'Océan Indien (4 APDD). Dans l'Atlantique, 5 des ces APDD sont dirigés spécifiquement sur les accords thoniers, tandis que le reste sont des accords mixtes avec une composante thonière. Les stocks de thons, de poissons porte-épée et de requins pélagiques sont évalués et gérés par les ORGP thonières telles que la Commission Internationale pour la Conservation des thonidés de l'Atlantique (CICTA) et la Commission Thonière de l'Océan Indien (CTOI), respectivement pour l'Atlantique et l'Océan Indien. Une révision des dernières évaluations faites par ces ORGP thonières indiquent que 25% des stocks évalués dans l'Atlantique et 10% de ceux évalués dans l'Indien sont à la fois surexploités et en situation de surpêche. Ces pourcentages montent à 50% dans chaque océan si on rajoute les stocks dans un seul de ces deux états (surexploités ou en situation de surpêche).

Le Surplus est défini comme étant la part de la capture disponible qu'un état côtier ne prélève pas, dans la situation où le taux d'exploitation d'un stock individuel reste sous le niveau qui permet au stock de se restaurer et de se maintenir en dessous du niveau d'exploitation souhaitable. Les experts du GTE thon (GTE-thon) ont souligné qu'étant donné que les thons sont des espèces hautement migratrices et que ces stocks sont trouvés principalement au-delà des zones sous juridiction nationale, le concept de Surplus n'est pas applicable pour les thons et espèces affines. Par ailleurs, il a été rappelé que dans le cas des grands poissons pélagiques il n'y avait pas d'estimation directe de l'abondance locale et qu'en conséquence il n'y avait pas de possibilité de calculer une capacité potentielle de pêche des états côtiers. Pour ces raisons, et comme établi par l'Accord des Nations Unies sur les Stocks de Poissons (UNFSA) et l'UNCLOS, la détermination de l'accès aux ressources disponibles en thons et en espèces affines devrait prendre en compte les évaluations scientifiques menées dans un cadre régional ainsi que les mesures d'aménagement et de conservation adoptées par les ORGP thonières.

Les méthodes en vigueur utilisées au sein des ORGP thonières pour répartir l'allocation des prises au niveau du stock ont été révisées par le GTE Thons durant le Groupe de Travail sur le concept de Surplus. Les ORGP thonières ont adopté progressivement différentes méthodes pour permettre l'accès aux usages ou préserver les droits de pêche, telles que des limites en nombre de navires, en jours de pêche par navire, en capacité de pêche, ou en termes de partage d'un taux admissible des captures (TAC). En général, les critères d'allocation les plus utilisés sont les prises historiques par pays et l'accès à la ressource des pays côtiers. Il existe en plus selon l'article 11 de la liste de l'UNFSA plusieurs critères possibles pour déterminer comment une allocation peut être allouée à de nouveaux membres, incluant le status des stocks et le niveau actualisé de l'effort de pêche.

Dans le but d'assurer une distribution équitable des captures et des opportunités de pêche entre les états côtiers et les flottes non-riveraines, appartenant aux autres parties contractantes de la Convention et aux entités coopérantes non-contractantes, ou autres entités de pêche (CPC), la mise en place d'un TAC doit être accompagnée par le développement d'un système d'allocation des quotas des captures basé sur une combinaison pondérée de plusieurs critères. Bien que la valeur relative de chaque critère doive être définie durant la phase de négociation entre les différentes CPC

partenaires, étant donné que plusieurs de ces critères sont hors du champ de la science halieutique, le GTE Thons a proposé une liste de critères potentiels pour ce type de calcul, qui inclue entre autres des aspects biologiques, écologiques, géographiques et socio-économiques.

Bien que le concept de Surplus ne puisse pas s'appliquer aux thons et espèces affines, des accords sur l'accès à la ressource entre états côtiers et l'UE dans le cas où les pays souhaiteraient réallouer leurs quotas en thons développés sous le mandat des ORGP thonières, devraient prendre en compte le concept de « Glocalisation » (c'est-à-dire du global au local). Cela signifie l'utilisation d'indicateurs spécifiques pour mesurer l'impact de la pression de pêche à une échelle locale (par ex., sur une zone donnée, pour un engin spécifique, un mode de pêche particulier, etc.). Le GTE Thons a recommandé la recherche d'indicateurs liés à la surexploitation de croissance et de recrutement qui pourraient être utilisés parmi d'autres pour évaluer les pêcheries à un niveau local. Plusieurs indicateurs basés sur les tailles, comme la taille à laquelle une classe d'âge produit sa biomasse maximale, la taille à laquelle 50% d'une population atteint la maturité sexuelle, et un index de l'âge moyen des classes d'âge contribuant au potentiel de la biomasse reproductrice du stock au niveau local, pourraient remplir ces objectifs.

### **Le concept de Surplus pour l'APPD avec le Groenland**

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Le nouveau protocole de l'APPD signé entre le Groenland et l'UE est entré en application le 1<sup>er</sup> Janvier 2016. Il définit l'allocation des captures pour le flétan noir, le capelan, la morue, la crevette nordique, le sébaste pélagique et démersal et une capture limitée de grenadier de roche comme prises accidentelles.

Le groupe de travail sur l'APPD avec le Groenland (GT-Groenland) a examiné les informations disponibles pour les stocks inscrits dans le protocole qui vient d'expirer et qui comprend un peu plus d'espèces que le protocole récent. Nous nous sommes concentrés sur l'état des stocks, le niveau d'exploitation, la gestion et la connaissance des différents stocks. Le fait que la plupart d'entre eux est évaluée par l'Organisation des pêches de l'Atlantique Nord (OPANO) et par le Conseil International pour l'Exploration de la mer (CIEM) signifiait que nous avons une base solide pour ce travail.

Concernant l'état des 17 stocks inclus dans le protocole, 5 sont en bon état : les deux stocks de flétan du Groenland, la crevette nordique dans l'ouest du Groenland, le capelan et le sébaste démersal *S. norvegicus*. La morue du Groenland oriental est toujours inférieure à son maximum historique, mais le stock a récupéré de son effondrement des années 90. En revanche, 3 stocks sont en mauvais état : la morue du Groenland occidental, le sébaste démersal (*S. mentella*) et le crabe des neiges, mais le crabe des neiges est absent dans le nouveau protocole. Enfin, 3 stocks sont en très mauvais état, la crevette nordique dans l'est du Groenland, les stocks du sébaste pélagique et du grenadier de roche dans l'ouest du Groenland, tandis que quatre stocks ont un état inconnu (les deux stocks de grenadier de roche dans l'est du Groenland et les deux stocks de flétan de l'Atlantique). Toutefois, parmi eux, seule la crevette nordique et le sébaste ont fait l'objet de pêcheries importantes dans le passé. Le flétan de l'Atlantique n'est plus dans l'accord et le TAC alloué pour le grenadier dans le protocole est censé être destiné à des prises accessoires.

Toutes les espèces cibles (c'est-à-dire celles incluses dans le protocole qui ne sont pas censées être des prises accessoires), c'est-à-dire les deux stocks de flétan du Groenland, la crevette nordique de l'Ouest du Groenland, les sébastes pélagiques et démersaux, et le capelan, sont pleinement exploitées, avec un TAC entièrement pêché chaque année pour la plupart d'entre elles. Les prises annuelles de la crevette nordique de l'Est et du crabe des neiges ont été inférieures au TAC des dernières années, en raison du mauvais état de ces stocks. Il en va de même pour la morue dans l'est et le sud-ouest du Groenland, même si ce stock a récupéré. L'avis scientifique pour la morue du Groenland occidental a été dernièrement un TAC nul.

La gestion et le niveau des TAC annuels sont basés sur les meilleurs avis scientifiques, fournis dans la plupart des cas par l'OPANO (flétan du Groenland occidental, crevette nordique et grenadier de l'ouest du Groenland) et le CIEM (flétan du Groenland oriental, morue, sébaste démersal et pélagique, capelan et grenadier de roche de l'est du Groenland). Les données et les méthodes d'évaluation sont constamment réexaminées par l'OPANO, et le CIEM organise périodiquement des

réunions de révision où un grand groupe d'experts internationaux et externes examine attentivement les méthodes d'analyse et les choix qui pourraient fournir une évaluation des stocks plus précise.

La distribution spatiale de certains de ces stocks s'étend au-delà de la zone économique exclusive du Groenland, et le Groenland partage leur gestion avec la partie concernée dans chaque cas : Canada pour le flétan du Groenland ouest et le grenadier de roche, Islande pour le flétan du Groenland oriental, Islande et Norvège pour le capelan. Le sébaste est géré par la CPANE, et les stocks restants dans le protocole sont gérés par le Groenland.

Les connaissances sur les stocks cibles sont bonnes, par rapport à d'autres régions du monde. L'identité des stocks est suffisamment définie pour plus de la moitié des stocks. Les données biologiques sont collectées régulièrement dans les campagnes scientifiques et dans certains cas à bord des navires commerciaux. Les données de captures sont considérées comme fiables et les pêches IUU, les rejets et les prises accessoires sont considérés comme négligeables dans la région.

Le surplus pour les stocks du Groenland inclus dans l'APPD avec l'UE, qui sont réglementés par des TAC et qui sont des stocks transfrontaliers pour lesquels le Groenland s'est vu attribuer un TAC, peut se calculer d'après l'équation simple suivante :

$$\text{Surplus} = \text{TACt\_GRL} - \text{Yt\_GRL}$$

où :

- TACt\_GRL est le TAC alloué au Groenland par la CPANE ou par des accords bilatéraux, et
- Yt\_GRL est la capture annuelle totale du Groenland.

Le Groenland vend chaque année ce Surplus au travers d'accords de pêche, dont l'un avec l'Union européenne. Ce dernier devrait être préférentiel comme indiqué dans l'Article 2 du protocole: « Groenland s'engage à offrir aux flottilles l'Union un accès préférentiel aux surplus disponibles ».

Compte tenu du fait que pour les stocks concernés le Groenland alloue des TAC qui ne dépassent pas les TAC recommandées, il a été jugé inutile d'appliquer des méthodes plus complexes pour l'estimation du Surplus. En outre, le Groenland met déjà à disposition tous ses surplus à des tierces parties ; tous les stocks les plus importants du Groenland sont déjà pleinement exploités ; la disponibilité des possibilités de pêche pour les autres pays est déjà réglementée et reconnue ; et l'estimation du Surplus, comme partie du TAC du Groenland mis à la disposition d'autres pays, est déjà pris en compte dans les méthodes actuelles d'évaluation, étant donné que tous les stocks dans le protocole sont réglementés par des TAC. Le GT--Groenland note que l'amélioration de l'état des stocks les plus dégradés (la crevette de l'Est Groenland, la morue) est la seule voie possible d'augmentation des surplus au Groenland.

## Conclusions

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- 1) Différentes méthodes ont été définies, y compris dans le cas de stocks avec des données limitées. Pour la majorité des stocks qui sont parties prenantes des APPD de l'Afrique de l'Ouest, les paramètres requis pour calculer le Surplus semblent être disponibles. Ce genre de calcul pourrait être mené pour les trois options identifiées par le STECF, en considérant une sélectivité constante et en supposant que les évaluations des stocks les plus récentes sont représentatives des états des stocks actuels. Ces estimations mériteraient d'être actualisées de manière régulière (idéalement chaque année), en relation après chaque nouvelle évaluation des stocks et la mise en application d'un plan de gestion (ou, par défaut, par rapport au plan de transition pour atteindre la Fpme en 2020). Pour les stocks transfrontaliers, une clef de partage théorique du Surplus pourrait être calculée sur la base des prises historiques faites dans chaque ZEE.
- 2) Le concept de Surplus n'est pas applicable pour les thons et espèces affines pour plusieurs raisons, parmi lesquelles le fait qu'il s'agit d'espèces hautement migratrices, le fait que des stocks sont trouvés majoritairement dans les eaux en dehors des juridictions nationales, les variations de la PME au cours du temps, l'absence d'estimation directe de l'abondance locale et l'impossibilité de calculer une capacité de pêche pour les états côtiers. En conséquence pour les stocks



d'espèces hautement migratrices la détermination de la ressource disponible à l'accès doit prendre en compte les évaluations scientifiques menées au niveau régional ainsi que les mesures de conservation et de régulation prises par les ORGP thonières.

- 3) Les opportunités de pêche pour les stocks transfrontaliers du Groenland sont distribuées entre plusieurs pays pêcheurs grâce à différents accords. Le Groenland reçoit donc une part du Surplus des ressources marines. Dans ce contexte, le Surplus est défini comme étant la part du TAC attribué au Groenland mais qui n'est pas pêchée. Cela peut être résumé par la formule suivante :  $\text{Surplus} = \text{TACt\_GRL} - \text{Yt\_GRL}$ . Dans le cas où le Groenland pêche la totalité de la part du quota qui lui est attribuée (ex.,  $\text{TACt\_GRL} = \text{Yt\_GRL}$ ), ou si l'état du stock n'est pas bon, il n'y aura pas de Surplus disponible. Généralement, la quantité de Surplus est négociée par le Groenland par l'intermédiaire d'accords de pêche (y compris avec l'UE).

## **Recommandations en termes de poursuite de l'étude**

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Suite aux conclusions des études faites sur les APPD Thons et APPD Groenland (taches 2 et 3), il apparaît qu'une seconde phase du projet n'est pas nécessaire pour ces 2 taches. Dans le premier cas, le concept de Surplus n'est pas applicable aux pêcheries thonières. Dans le deuxième cas, le système d'allocation du TAC pour les stocks du Groenland a déjà été mis en pratique dans une optique d'aménagement et le TAC total est basé sur la meilleure connaissance scientifique. De plus, il n'y a pas dans la zone du Groenland de nouvelle pêcherie non-régulée, ou de ressource nouvelle qui pourraient justifier quelque alternative ou une nouvelle estimation du Surplus. En conséquence il apparaît que la tâche 2 (pour évaluer comment le concept de Surplus tel que défini par l'UNCLOS, pourrait être appliqué aux stocks de grands poissons migrateurs) et la tâche 3 (évaluer le même concept mais ici pour les accords de pêche avec le Groenland) ont été faites et menées à bien au cours de ce Contrat Spécifique.

Pour les APPD en rapport avec **l'Afrique de l'Ouest** (Maroc, Mauritanie, Sénégal et Guinée-Bissau), nous recommandons une estimation du Surplus pour tous les stocks considérés dans ces APPD sur le court terme et sur le long terme lorsque c'est possible (lorsque les stocks ont été évalués et donc lorsque l'on dispose des paramètres nécessaires). Cette tâche nécessite :

- De rassembler l'information sur les objectifs de gestion et sur les stratégies mise en application par chaque état côtier ou par les agences régionales de gestion. Pour chaque stock inclus dans un APPD, cette compilation permettra de vérifier si un Fcible a déjà été mis en place dans le cadre d'un aménagement existant ou si une règle de contrôle des captures (HCR) a été adoptée au niveau national (ou régional). Dans le cas contraire, le calcul du Surplus devrait être fondé sur un schéma de transition par défaut, tel qu'il a été explicité dans ce rapport.
- De rassembler toutes les données disponibles jugées nécessaires pour estimer le Surplus pour l'ensemble des stocks couverts par les APPD mixtes de l'Afrique de l'Ouest. Pour tous les stocks évalués récemment par la COPACE ou par les instituts nationaux, cela inclut 5 paramètres : PME, Fpme, Fsq, Ysq et Ysq cot (en utilisant les 3 dernières évaluations pour les stocks de petits pélagiques et les 3 dernières années de la dernière évaluation des stocks disponible pour les espèces démersales). Pour les stocks non-évalués, les données requises par l'approche DLS doivent être compilées, en particulier : la série des captures, de l'abondance (basée sur des CPUE standardisées ou sur des indices de campagnes scientifiques), et un proxy de la mortalité par pêche (si disponible).

Il faut faire noter que l'implication des institutions de recherche halieutique des États côtiers pourrait être nécessaire pour les deux points derniers.

- De calculer les estimations du Surplus pour chaque stock, selon les trois options justifiées dans ce rapport (c'est-à-dire : pour un effort constant, un pourcentage de capture constant pour l'état côtier, ou une capture totale constante). Sur la base des données disponibles et de l'avis des experts, ce calcul doit prendre en compte les niveaux élevés d'incertitude observés dans plusieurs évaluations des stocks, tout en suivant les règles de calcul qui ont été définies.

## 1. INTRODUCTION

### 1.1. Purpose of the specific contract

The purpose of the Specific Contract is to provide the Commission with scientific guidance and advice on the concept of surplus for three types of Sustainable Fisheries Partnership Agreements (SFPAs):

- Mixed SFPAs in West Africa
- Tuna SFPAs
- SFPA with Greenland.

#### ***Tender Specifications***

The official Tender, although further modified, was requested in May 2014. When initially tendered, the project objectives were broader and even too ambitious, especially considering that it was expected they would be reached in a short time period and with very limited information.

The main objective of this tender was to further develop the work started by STECF in 2012 (STECF, 2012) and provide the Commission with scientific advice on available surplus for demersal and small pelagic stocks covered by mixed Sustainable Fisheries Partnership Agreements (SFPA) in West Africa, as well as for stocks of major interests in the framework of the tuna SFPAs and the EU-Greenland SFPA. The specific tasks to be performed for each type of SFPA were:

- For Mixed SFPAs in West Africa: to perform the following tasks for small pelagic and demersal stocks covered by Mixed SFPAs in West Africa:
  - 1) Review, examine and advise how the surplus concept can be applied in the specific context of small pelagic and demersal resources in West Africa.
  - 2) Compile information on management objectives and strategies implemented by coastal States or by regional management bodies.
  - 3) Compile available data necessary to estimate surplus for the main stocks covered by the mixed agreements in West Africa and identify data gaps.
  - 4) Analyse different methods to evaluate surplus values, depending on the type of data available and the type of assessment model used.
  - 5) Deliver surplus estimates for the main stocks, when possible.

This analysis was requested to be performed for small pelagic and demersal stocks of the SFPAs with Morocco and Mauritania and for the EEZ of Guinea-Bissau and Senegal.

- For Tuna SFPAs: to evaluate and advise on how the surplus concept as laid down in the United Nations Convention of the Law of the Sea (UNCLOS)<sup>1</sup>, could be applied to highly migratory fish stocks.
- For the SFPA with Greenland: to evaluate and advise on how the surplus concept as laid down in the UNCLOS could be applied to the fisheries agreement with Greenland.

The Consortium proposal answering this tender clearly specified the need for collaboration with the institutions of the West African coastal States involved, in order to successfully perform the tasks assigned, i.e: compilation of management objectives or strategies and compilation of available data.

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<sup>1</sup> United Nations Convention on the Law of the Sea of 10 December 1982. [http://www.un.org/depts/los/convention\\_agreements/texts/unclos/UNCLOS-TOC.htm](http://www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm)

These tasks were the basis to achieve the main objective of the study and therefore success could not be guaranteed without cooperation with the coastal countries. Thus, it was recommended to the Commission to establish official collaboration frameworks with the following coastal countries fisheries institutions:

- Institut National de Recherche Halieutique (INRH)- Morocco
- Institut Mauritanien des Recherches Océanographiques et des Pêches (IMROP)- Mauritania
- Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)- Senegal
- Centro de Investigaçao Pesqueira Aplicada (CIPA)- Guinea-Bissau.

In order to allow a more progressive development of the tasks, in January 2015, DG MARE communicated its decision to split the proposed study in two phases.

The first phase was to be developed in a first contract (this one), with the main objective of providing guidance/advice on the concept of surplus for the three different types of agreements (Mixed SFPAs in West Africa, Tuna SFPAs and SFPAs with Greenland). This would involve the development of the Task 1 of West Africa SFPAs (Review of the surplus concept); and the Tasks assigned to tuna SFPAs and to the SFPAs with Greenland.

For the provision of advice in the surplus concept, DG MARE specifically requested to explore the feasibility to provide different options that could be applied to different situations of management frameworks (e.g. management objectives defined or not, management plans available, TAC/Quota systems, effort regimes), shared stocks, data quality/availability, integration of ecosystem approach and other factors.

These considerations were included in the final proposal, which constitute the current study.

## 1.2. Tasks to be performed

The tasks performed under this Specific Contract were:

1. **Review the surplus concept for Mixed SFPAs in West Africa**, and provide scientific guidance regarding how the concept could be applied to demersal and small pelagic stocks covered by mixed SFPAs. The study should consider the single stock approach as a base case but should also evaluate how the ecosystem approach and ecosystem interactions could be considered. The surplus concept as specified by the UNCLOS is mainly based on a single stock approach. It is important to consider that the surplus concept should reflect ecosystem interactions and that in some cases, surplus might be a consequence of an overexploitation of other stocks causing imbalanced ecosystems and trophic interactions (e.g. surplus available for shrimps due to overexploitation of fish). The surplus concept should also take into account indirect impacts to local ecosystems and to resources exploited by local fisheries.
2. **Review the surplus concept for Tuna SFPAs**. Review and examine how the concept of surplus as laid down in the UNCLOS could be applied to highly migratory fish stocks.
3. **Review the surplus concept for the SFPAs with Greenland**. Evaluate and discuss the surplus concept, as defined in the UNCLOS, regarding the SFPAs with Greenland (discussion on how to apply the surplus concept for main stocks and for stocks with limited advice).

### **1.3. Contents of the report**

The methodology used for completing the tasks performed during the project is detailed in Section 2, and more specifically in Section 2.1. Section 2.2 describes the organisation and development of the "Workshop on the Surplus concept", as part of the methodology used to advance and complete the three tasks.

Results are provided in Section 3. A general revision of the existing concepts of Surplus is presented in Section 3.1, based on the analysis of the most relevant documents. The results of the Tasks 1, 2 and 3 are presented in Section 3.2 (Mixed SFPAs in West Africa), Section 3.3 (Tuna SFPAs) and Section 3.4 (SFPA with Greenland). Each of these sections was organized in a number of subsections, the first always providing general information in relation of the SFPAs and the stock status (subsections 3.2.1, 3.3.1 and 3.4.1, respectively for SFPAs in West Africa, Tuna and Greenland), and the rest referring to the results of the tasks/subtasks to be performed for each task. Thus, results of the 7 subtasks to be performed for Task 1 (mixed SFPAs in West Africa) are presented in subsections from 3.2.2 to 3.2.8, while the results of Tasks 2 and Task 3 are provided in subsections 3.3.2 (Task 2, Surplus concept for tuna SFPAs) and 3.4.2 (Task 3, Surplus concept for the SFPA with Greenland).

The main conclusions of the study and a number of recommendations are provided for each SFPA in Section (for mixed SFPAs in West Africa in Section 4.1, for tuna SFPAs in Section 4.2 and for the SFPA with Greenland in Section 4.3).

Due to the important amount of information compiled for this study, annexes were added to the report. Annex 1 summarizes the current situation of the three types of SFPAs. Annex 2 includes summary tables with information on data quality/availability, stock status, management measures (availability of management plans and regulations, TAC/Quota systems, effort regulations), clearly, poorly or not defined management options, and transboundary/shared stocks, among other aspects to be considered for the revision of the surplus concept in the three types of SFPAs. Annex 3 presents the criteria used for the classification of stock status for West African, tuna and Greenland stocks. Annex 4 includes tables listing the short and completed references of the management measures indicated in Annex 1. Finally, Annex 5 presents the agenda adopted for the Workshop on the Surplus concept.

## 2. METHODOLOGY

### 2.1. Tasks developed for each type of SFPA

Although the main objective of the project (providing the Commission with scientific guidance and advice on the concept of surplus) is common for three types of SFPAs (Mixed in West Africa, Tuna and Greenland), the stocks fished and fisheries developed within each type of SFPA present different specific situations that makes necessary their separate analysis.

To address this issue a revision of the different situations to be analysed for each type of SFPA was made. For each type of SFPA, it included:

- A list of the **stocks** potentially fished within the framework of the SFPAs, indicating:
  - if they are currently fished or not in the SFPAs and
  - if they are exploited or not by the coastal State.
- An indication of the **transboundary or shared stocks**. The term "shared fish stocks", as defined by the Article 7 of the FAO Code of Conduct for Responsible Fisheries, includes the following cases (FAO, 2003):
  1. Transboundary stocks: fish resources crossing the exclusive economic zone (EEZ) boundary of one coastal State into the EEZ(s) of one or more, other coastal States.
  2. Highly migratory species: as set forth in the UNCLOS, consisting, primarily, of the major tuna species (being highly migratory in nature), the resources are to be found, both within the coastal State EEZ and the adjacent high seas.
  3. Straddling stocks: all other fish stocks (with the exception of anadromous/catadromous stocks) that are found both within the coastal State EEZ and the adjacent high seas.
  4. Discrete high seas fish stocks: fish stocks to be found exclusively in the high seas.

The above categories are not mutually exclusive. In our study we specifically consider transboundary stocks for West Africa and Greenland. All stocks of main species of tunas, billfishes, swordfish and large pelagic sharks can be considered as highly migratory and straddling stocks. In addition, although small tuna species are assumed to have narrower migration ranges than those of major tunas, they are also considered transboundary stocks.

- **Data availability.** Based on information provided by the reports of the CECAF Working Groups (WGs) and of the research institutes of coastal States (for West African stocks), by ICCAT and IOTC (for tuna) and by ICES, NAFO and the Greenland Institute of Natural Resources, the data available for each stock was searched. In principle we indicated the last year for which data are available for the corresponding stock under analysis (Tables 1, 2 and 3 of Annex 2). More information of the type of data available for assessment (catch and CPUE series, abundance indices from surveys, biological information, etc.) was further compiled and detailed for those stocks targeted in the mixed SFPAs in West Africa (Table 4) and for those included in the SFPA with Greenland (Table 3 of Annex 2). For tuna, a general explanation of the type of data used for assessments was provided in Section 3.3.1.
- **Quality of the data** used for the stock assessments. The criteria used by ICES to define data-limited stocks (DLS) categories (ICES, 2012a) were used as a basis to define category levels of **data quality**. According to ICES all stocks for which analytical quantitative assessment cannot be carried out are **data limited** (i.e. categories 2 to 6), but only those in categories 5 and 6 are **data poor**, defined as stocks for which only landings are available and / or landings are negligible.

Three data quality levels were initially adopted: High, Medium and Low. The Greenland stocks were also classified following the ICES DLS categories. Table 1 refers to the criteria adopted in each data quality level and includes the ICES corresponding stock category.

**Table 1.-** Data quality levels, based on the ICES data-limited stocks categories (ICES, 2012a).

Data Quality	ICES-Data Limited Stocks Categories		Description
High (H)	1	Data-rich stocks (quantitative assessments)	Stocks that are not considered data-limited. This category includes stocks with full analytical assessments and forecasts as well as stocks with quantitative assessments based on production models.
Medium (M)	2	Stocks with analytical assessments and forecasts that are only treated qualitatively	This category includes stocks with quantitative assessments and forecasts which for a variety of reasons are merely indicative of trends in fishing mortality, recruitment, and biomass.
	3	Stocks for which survey-based assessments indicate trends	This category includes stocks for which survey indices (or other indicators of stock size such as reliable fishery-dependant indices; e.g. lpue, cpue, and mean length in the catch) are available that provide reliable indications of trends in stock metrics such as mortality, recruitment, and biomass.
	4	Stocks for which reliable catch data are available	This category includes stocks for which a time-series of catch can be used to approximate MSY.
Low (L)	5	Data-poor stocks	This category includes stocks for which only landings data are available.
	6	Negligible landings stocks and stocks caught in minor amounts as by-catch	This category includes stocks where landings are negligible compared with discards. It also includes stocks that are part of stock complexes and are primarily caught as by-catch species in other targeted fisheries. The development of indicators may be most appropriate to such stocks.

- **Stock status**, as defined by the latest available assessment. The working group where the assessment was carried out is also indicated.
  - a) For West African stocks: the status of each stock was classified following the criteria established by CECAF (see Annex 3-A). The adopted stock status categories are “Non-fully exploited”, “Fully exploited” and “Overexploited”.
  - b) For Tuna stocks: the current status of the stocks and their trajectory over time is summarized by a two-dimension figure termed “Kobe plot”, which combines biomass and fishing mortality information (see Annex 3-B). Based on the four quadrants delimited by the target reference indicators ( $B_{current}/B_{msy}$  and  $F_{current}/F_{msy}$ ) the stock is defined as

overfished or not (for biomass) and in state of overfishing or not (for fishing mortality), respectively.

- c) For Greenland stocks: The classification of stock status is based in the ICES basis for advice (ICES, 2015c) and NAFO (2014) nomenclature, to keep consistency with the original sources of information (see Annex 3-C).
- The availability of management measures for each coastal State/RFMO was searched. When available, the type of management measure was specified (i.e.; TAC/quota systems, effort regulation, closed seasons and/or areas, etc.). The management plan or regulation where the management measure is included was referenced, whenever possible.
  - Based on the compilation of available management measures above, the management options adopted by each coastal State/RFMO and/or included in the SFPA protocols for stocks and/or fisheries were categorized as:
    - “Defined” (D) - if the coastal State/RFMO has implemented management plans or fishery regulations and those were defined (e.g. TACs or effort allocation) according to specific management objectives.
    - “Poorly defined” (PD) - if the coastal State/RFMO has implemented management plans or fishery regulations, but those were not defined according to specific objectives, TACs or effort allocation.
    - “Not defined” (ND) - if the coastal State/RFMO has no specific management plan or fishery regulations.

Tables including this information for each type of SFPA (West Africa, Tuna and Greenland) were preliminary prepared for the Interim report and further reviewed and completed during and after the “Workshop on the Surplus concept” (see Section 2.2). These tables are shown in Annex 2.

The specific work performed for each SFPA type is described below. Part of this work was developed during the “Workshop on the Surplus concept”.

### *2.1.1. Task 1: Review the surplus concept for Mixed SFPAs in West Africa*

This task includes the following subtasks:

1. Review the definition of the surplus concept and summarize the advancements provided by previous works (i.e.: STECF).

Results are presented in Section 3.2.2.

2. Provide guidance and define options that could be applied to different situations of management frameworks, namely, when i) management options are poorly or not yet defined; ii) stock trajectories towards management targets that have not been defined by a management plan; iii) management frameworks are set up by the coastal State (especially regarding a potential TAC/Quota system or effort regimes) and these may affect the determination of the surplus, as well as, the feasibility of managing the surplus while respecting the fulfilment of the management targets. This task was initially developed during the Workshop on the Surplus Concept and completed after it. Results are presented in Section 3.2.3.
3. Review principles or rules which might be applied and define options in order to share the total catch and the surplus between coastal States, in case of trans-boundary stocks.

This review was carried out during the Workshop on the Surplus Concept and results are presented in Section 3.2.4.

4. Provide guidance and define options that could be applied to different data situations in terms of quality and availability.

In order to provide scientific guidance, the work developed during the “Workshop on the Surplus concept” focused on those stocks targeted by the EU fisheries in SFPAs, to have a more operational picture regarding the availability and the quality of parameters required for the computation of the Surplus. According to the method developed by the STECF EWG this basically includes, for each stock:  $MSY$ ,  $F_{msy}$ ,  $F_{current}$ , total  $Y_{current}$  and  $Y_{current}$  of the coastal State. Then, two aspects were specifically analysed:

- a) The feasibility to define methods providing default values for certain parameters, when missing. The Data-Limited-Stock (DLS) approach, developed by ICES, was considered and adapted to the specific needs of the calculation of the surplus in the context of West African fisheries. Conditions and stocks for which this approach seemed appropriate were specified.
- b) The necessity of taking into account uncertainties of stock assessments into the Surplus estimate. The ICES DLS approach used for European fisheries includes in some cases an uncertainty cap in the computation of allowed catches (for instance, by reducing by 20% the catch advice in case of high uncertainty). The EWG-W Africa specified conditions where such an approach seemed appropriate for West African fisheries, as well as the concerned stocks.

The review was initiated during the Workshop on the Surplus Concept and further developed afterwards. Results are presented in Section 3.2.5.

Three sub-tasks were also defined in the context of the ecosystem approach:

5. Identify how European fisheries targeting surplus can contribute to collect information required for the implementation (in the medium term) of an ecosystem approach to fisheries management.

This issue was discussed during the Workshop on the Surplus concept and advances are presented in Section 3.2.6.

6. Review the potential adverse effects of catching the surplus, on coastal fisheries and ecosystems.

This problem was discussed during the Workshop on the Surplus concept. Main adverse effects are explained in Section 3.2.7.

7. Review rules and methods applied (especially in Europe) to multispecies fisheries, where by-catch of overexploited stocks could be a limit for sustainability.

This issue was discussed during the Workshop on the Surplus concept and completed afterwards. The results of the review are presented in Section 3.2.8.

### *2.1.2. Task 2: Review the surplus concept for Tuna SFPAs*

Due to the high mobility of tuna species, the concept of the surplus production defined on the tuna SFPAs is not easy to define.

This task includes the review of the surplus concepts used worldwide and how they could be applied to highly migratory tuna species to ensure the sustainable exploitation of these resources. As an example, assuming that the residence time of tuna within the EEZ areas may be estimated from tagging data, and depending on the quality of the available information, catch-based indicators (e.g., the coastal State's catches, the proportion of local catch with respect to  $MSY$ ) or effort-based indicators (e.g., the partial fishing mortality induced by the coastal fleet) could be used.



The revision took also into account the natural variability and uncertainty in data and models with the aim of suggesting robust indicators. It also explored, when possible, different options that could be applied to different management frameworks (e.g. management objectives defined or not, management plans available, TAC/Quota system, effort regimes) and ecosystem considerations.

Data on stock status, data quality/availability and management measures for each stock and RFMO were compiled. A summary table, similar to the one described for West Africa but adapted to tuna specific circumstances, was prepared in order to provide a general overview on the different situations to review. This compilation of general information on the Tuna SFPAs and stock status is presented in Section 3.3.1.

The general revisions for tuna SFPAs were performed during the “Workshop on the Surplus concept”. Results are presented in Section 3.3.2.

### *2.1.3. Task 3: Review the surplus concept for the SFPA with Greenland*

The evaluation of the concept of surplus for the SFPA with Greenland required the consideration of several options already mentioned in Tasks 1 and 2, some of them in common with those considered for West African resources (i.e: different management frameworks, integration of ecosystem approach, need for annual surplus estimates, etc.). Thus, same approaches developed in previous tasks were applied for Task 3.

The main difference between Task 3 and the previous tasks is that scientific advice for the main Greenlandic exploited resources is based on work carried out by ICES (East Greenland halibut, capelin and cod, demersal and pelagic redfish, grenadiers) and NAFO (Northern prawn, West Greenland halibut, grenadiers in West Greenland), although different methods are applied for evaluation due to the variable amount and quality of available data for the different stocks, some of which considered data poor by ICES or NAFO. The Greenland Institute of Natural Resources (GINR) also provides advice for some of the stocks (Atlantic halibut, snow crab). In addition, we note that some stocks in the region are also managed under NEAFC (e.g. redfish) and it will therefore be necessary to analyse this management advice.

Information was compiled to describe the different scenarios in relation to data availability and quality, stock status and management options of the Greenland stocks, including that provided by experts from Greenland and the relevant RFMOs during the Workshop. The final compilation is presented in Section 3.4.1.

The specific issues concerning the Surplus concept in the framework of the SFPA with Greenland were discussed during the Workshop on the Surplus concept and further developed. Results are presented in section 3.4.2.

## 2.2. Workshop on the Surplus concept

A three days international workshop “On the Surplus concept” was organized with the objective of reviewing the surplus concept, taking into account the different situations and circumstances of each SFPA. To that purpose, three Expert Working Groups (EWGs) were simultaneously working during the workshop.

1. Expert Working Group on Mixed SFPAs in West Africa (EWG-W Africa).
2. Expert Working Group on Tuna SFPAs (EWG-Tuna).
3. Expert Working Group on the SFPA with Greenland (EWG-Greenland).

### 2.2.1. Date and venue

Date: 6-8 October

Venue: IEO. Centro Oceanográfico de Canarias.

Vía Espaldón. Dársena pesquera, Parcela 8 38180.

Santa Cruz de Tenerife, Spain

Dates and venue were chosen, considering the best options for most of the participants. Although the Workshop was initially planned to take place within the three months after the contract signature (i.e. no later than early August), time constraints and prior commitments of consortium experts made advisable to delay it until October. After reviewing the calendar of availability of all the Consortium participants, the period 6-8 October was selected as the most convenient for the majority. The C.O. Canarias was the chosen venue, taking into account the good facilities that this new building offers and especially, the good connection flights with Europe and Africa to/from Tenerife airport, which made cheaper and easier the assistance of most participants.

The IEO was in charge of the Workshop organisation, which included sending out official invitations, facilitating visa arrangements (when needed), trips arrangements and payments. The IEO scientists from the Consortium based in the C.O. Tenerife arranged all the logistics needed in the building (IT systems, coffee breaks, meeting rooms) and the city (hotel lists, transports, etc.).

### 2.2.2. Contacts and invitations. List of participants.

Official invitations to the Workshop were sent out by the IEO Director to external experts during the week of 6-10 July.

A total number of 25 experts attended the Workshop on the Surplus Concept. Table 2 shows the final list of participants by institution, categorized as Consortium, External or EU experts. Some initially invited experts were not able to attend the meeting, and were substituted by colleagues from the same organisation (i.e.: CECAF). Invited experts from INRH (Morocco) and CRODT (Senegal), which initially had confirmed their attendance, cancelled their trips at the very last moment, making impossible to arrange their substitutions.

**Table 2.-** List of participants to the “Workshop on the Surplus concept” held at Tenerife (Spain), 6-8 October.

EWG	Consortium/ External/EU	Participant	Institution	Country
Mixed SFPAs in W Africa- EWG-W Africa (n=12)	Consortium	Didier Gascuel (Task 1 Coordinator)	Agrocampus Ouest	France
		Didier Jouffre	IRD	France
		Teresa García Santamaría	IEO	Spain
		Pedro Pascual	IEO	Spain
		Pablo Abaunza (FC Coordinator)	IEO	Spain
		Eva García Isarch (SCNo10 Coord.)	IEO	Spain
		Beyah Meissa	IMROP	Mauritania
		Inluta Incom	CIPA	Guinea-Bissau
		Birane Sambe	CECAF-CCLME	Senegal
		Finlay Scott	JRC	Italy
		EU	Sebastián Rodríguez (part-time)	DG MARE
	EU	Rafael Duarte (part time)	EASME	EU
Tuna SFPAs- EWG-Tuna (n=9)	Consortium	Daniel Gaertner (Task 2 Coordinator)	IRD	France
		Gorka Merino	AZTI	Spain
		Rui Coelho	IPMA	Portugal
		Daniela Rosa	IPMA	Portugal
		Josetxu Ortiz de Urbina	IEO	Spain
		Javier Ariz	IEO	Spain
	External	Laurence Kell (ICCAT)	ICCAT	Spain
		Rishi Sharma (IOTC)	IOTC (curr.CRITFC)	United States
	EU	Rafael Duarte (part time)	EASME	EU
SFPAs with Greenland- EWG- Greenland(n=6)	Consortium	Elena Guijarro (Task 3 Coordinator)	IEO	Spain
		Robert Wakeford	MRAG	United Kingdom
	External	Helle Siegstad	GINR	Greenland
		Ole Jørgensen	GINR	Greenland
		Henrik Sparholt	ICES	Denmark
	EU	Sebastián Rodríguez (part-time)	DG MARE	EU

### 2.2.3. Terms of Reference

The terms of reference for the Workshop on the Surplus Concept were defined to develop the tasks of the project that require the inputs and knowledge from external participants of the coastal countries, being the following:

1. Review the definition of the surplus concept and summarize advancements provided by previous works.
2. For Mixed SFPAs in West Africa:
  - 2.1 Review the advancements made by the STECF (EWG 12-04) and any other work in relation to West African fisheries.

- 2.2 Provide guidance and define options that could be applied to different situations of management frameworks.
  - 2.3 Define principles or rules, including if needed the different possible options, that might be applied to share the total catch and the surplus between coastal States, in case of transboundary stocks.
  - 2.4 Provide guidance and define eventual options that could be applied to different situations of data quality and availability.
  - 2.5 Review the potential adverse effects of catching the surplus, on coastal fisheries and ecosystems.
3. For Tuna SFPAs:
    - 3.1 Review the surplus concepts used worldwide and how they could be applied to highly migratory tuna species to ensure the sustainable exploitation of these resources.
    - 3.2 Provide guidance and define methods to compute the coastal State potential catches and their fishing capacity to harvest the stock taking into account the specific context of highly migratory species and according to the stock status.
    - 3.3 Provide guidance and define potential criteria useful to calculate catch allocation including ecosystem and socio-economic considerations.
  4. For the SFPA with Greenland:
    - 4.1 Review the surplus concept and how it could be applied regarding the SFPA with Greenland to ensure the sustainable exploitation of these resources.
    - 4.2 Provide guidance and define options to consider the natural variability and uncertainty in data and models, with the aim of suggesting robust indicators.
    - 4.3 Provide guidance and define options that could be applied to the current situations of data availability and management frameworks (e.g. management objectives defined or not, management plans available, TAC/Quota system, effort regimes).
    - 4.4 Provide guidance and define options taking into account ecosystem considerations.
    - 4.5 Review the potential adverse effects of catching the surplus.

#### *2.2.4. Agenda and Workshop dynamics*

The Workshop Agenda by Expert Working Group is presented in Annex 5.

The Workshop was organized as follows:

An **initial plenary session** took place at the beginning, with the aim of introducing all participants and providing a general overview of the project and expectations on the Workshop. The ToR 1 was developed during this first plenary session. Six presentations in relation to the subject were provided in this session (see Agendas in Annex 5).

After the first plenary, the participants split in the **three Experts Working Groups**: EWG for Mixed SFPAs in West Africa (EWG-W Africa) (for ToR 2), EWG for Tuna SFPAs (EWG-Tuna) (for ToR 3) and EWG for the SFPA with Greenland (EWG-Greenland) (for ToR 4). A general introduction was done by each Task Coordinator at the beginning of the EWGs, explaining the ToRs and specific issues to be considered for each SFPA. The Tasks coordinators drafted the report of the main issues discussed in their respective EWGs, providing the results and conclusions in relation to the ToRs.

The last hours of the Workshop were devoted to a **final plenary session**. Each Task Coordinator presented the results and conclusions of their respective EWGs.

It is worth mentioning that the Surplus project and some preliminary results obtained during the Workshop, and more specifically those concerning the mixed SFPAs in West Africa, were presented during the CECAF Scientific Subcommittee that was held a few days later (14-16 October, 2015) and at the same venue (C.O. Canarias, in Tenerife).

### 3. RESULTS

#### 3.1. Revision of the Surplus concept

The revisions of the Surplus concept are based on three main documents: the UNCLOS, the CFP and the work carried by STECF in 2012.

- **UNITED NATIONS CONVENTION ON THE LAW OF THE SEA (UNCLOS, 1982):**

The Article 61 of the UNCLOS of “Conservation of living resources” establishes:

1. *“The coastal State shall determine the allowable catch of the living resources in its exclusive economic zone.*
2. *The coastal State, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation. As appropriate, the coastal State and competent international organizations, whether subregional, regional or global, shall cooperate to this end.*
3. *Such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors, including the economic needs of coastal fishing communities and the special requirements of developing States, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether subregional, regional or global.*
4. *In taking such measures the coastal State shall take into consideration the effects on species associated with or dependent upon harvested species with a view to maintaining or restoring populations of such associated or dependent species above levels at which their reproduction may become seriously threatened.*
5. *Available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks shall be contributed and exchanged on a regular basis through competent international organizations, whether subregional, regional or global, where appropriate and with participation by all States concerned, including States whose nationals are allowed to fish in the exclusive economic zone.”*

The UNCLOS includes the only official reference to the surplus concept, mentioned in Articles 62.1, 62.2 and 62.3:

*“The coastal State shall promote the objective of optimum utilization of the living resources in the exclusive economic zone without prejudice to article 1” (Art. 62.1).*

*“The coastal State shall determine its capacity to harvest the living resources of the EEZ. Where the coastal State does not have the capacity to harvest the entire allowable catch, it shall, through agreements or other arrangements and pursuant to the terms, conditions, laws and regulations ..., **give other States access to the surplus of the allowable catch...**” (Art. 62.2)*

*“In giving access to other States to its EEZ..., the coastal State shall take into account all relevant factors, including, inter alia, the significance of the living resources of the area to the economy of the coastal State concerned and its other national interests, ....., the requirements of developing States in the subregion or region in **harvesting part of the surplus** and the need to minimize economic dislocation in States whose nationals have habitually fished in the zone or which have made substantial efforts in research and identification of stocks.” (Art. 62.3)*

- **COMMON FISHERIES POLICY (CFP<sup>2</sup>):**

The CFP establishes that “*Sustainable fisheries partnership agreements with third countries should ensure that Union fishing activities in third country waters are based on the best available scientific advice and relevant information exchange, ensuring a sustainable exploitation of the marine biological resources, transparency as regards **the determination of the surplus** and, consequently, a management of the resources that is consistent with the objectives of the Common Fisheries Policy. Those agreements, which provide for access to resources commensurate with the Union fleet's interests in exchange for a financial contribution from the Union, should contribute to the establishment of a high quality governance framework to ensure in particular efficient data collection, monitoring, control and surveillance measures*” (CFP, Whereas n° 51).

In Article 4.1 (33) of the CFP, “**surplus of allowable catch**” is defined as “*that part of the allowable catch which a coastal State does not harvest, resulting in an overall exploitation rate for individual stocks that remains below levels at which stocks are capable of restoring themselves and maintaining populations of harvested species above desired levels based on the best available scientific advice*”.

In this sense, in Article 4.1 (37) “*sustainable fisheries partnership agreements*” are defined as the “*international agreements concluded with another state for the purpose of obtaining access to waters and resources in order to sustainably exploit **a share of the surplus of marine biological resources**, in exchange for financial compensation from the Union which may include sectoral support.*”

In the Article 31 (2) on “*Principle and objectives of Sustainable Fisheries Partnership Agreements*” (Title II: Sustainable Fisheries Partnership Agreements), it is established that “*With the overall aim of ensuring the **sustainable exploitation of surpluses of marine biological resources**, the Union shall endeavour that the Sustainable Fisheries Partnership Agreements with third countries are of mutual benefit to the Union and the third country concerned, including its local population and fishing industry and that they contribute to continuing the activity of Union fleets and aim at **obtaining an appropriate share of the available surplus**, commensurate with the Union fleets' interest*”.

Finally, in this same Article 31 (4) is established that “**Union fishing vessels shall only catch surplus of the allowable catch** as referred to in Article 62(2) and (3) of the United Nations Convention on the Law of the Sea, and identified, in a clear and transparent manner, on the basis of the best available scientific advice and relevant information exchanged between the Union and the third country about the total fishing effort on the affected stocks by all fleets. Concerning straddling or highly migratory fish stocks, the determination of the resources available for access should take due account of scientific assessments conducted at the regional level as well as conservation and management measures adopted by relevant RFMOs”.

- **STECF (2012):**

In 2012, STECF was requested to discuss the concept of "surplus", based on the definition given in UNCLOS texts and taking into account the specific context of shared stocks and transitional periods of time before having reached reference management points. An Experts Working Group (EWG) on “International Dimension of the Common Fisheries Policy” (EWG 12-04) was carried out in Varese (Italy) in June 2012 with the aim, among others, of discussing the UNCLOS concept of “surplus”. The report of this EWG was reviewed by the STECF during its 40th plenary meeting held in July 2012 in Copenhagen.

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<sup>2</sup> Common Fisheries Policy (CFP). 2013. Regulation (EU) N° 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy. Official Journal of the European Union 354: 22-61.

STECF (2012) noted that *“...the concept of “surplus” defined in UNCLOS is somehow misleading due to the general meaning of the word “surplus”. There is a risk to consider “surplus of the allowable catch” as a fraction of the biomass that can be taken without any negative impact on the local fisheries or on the other parts of the ecosystem, which is not the case.*

*Computing surplus (S) relies on two elements, the stock’s potential (sustainable) catch (Y) and the coastal State potential catch (C): (S=Y-C). Although the definition of “surplus” seems to be simple from a theoretical point of view and all conditions for its implementation taken into account by UNCLOS, in practice it is based on these two quantities, which are not simple to estimate and combine. It requires reliable fisheries statistics to estimate the coastal State potential catches (C) and a quantitative stock assessment to estimate the stock’s potential (sustainable) catch Y”.*

STECF also noted that *“estimating surplus values is a complex process, and frequently produces estimates that are highly uncertain. Furthermore, the robustness of the estimates of MSY and coastal State potential catches to uncertainty in underlying factors is poor, resulting in a potential lack of robustness of the surplus estimates”.*

STECF recommendations included:

- The FPAs should be based on management plans, which should include management objectives, harvest control rules (HCRs), TAC or effort allocation keys and should be supported by data collection programmes, scientific advice and monitoring.
- For practical purposes and in the context of FPAs, the estimated surplus should be used to allocate the EU fleet’s share of a TAC or effort arising from a management plan.

## **3.2. Mixed SFPAs in West Africa**

### *3.2.1. General information on SFPAs and stock status*

The situation of the Mixed SFPAs between the UE and West African countries is summarized in Annex 1. The current SFPAs in force are Morocco, Guinea-Bissau and Mauritania. Due to the demersal component of the SFPAs with Senegal, (defined as a Tuna Agreement with a hake component), we also consider this SFPAs in this section.

A map of the FAO 34 Fishing area, where our study zone is included, is shown in Figure 1. The EEZs of the coastal States with Mixed SFPAs are highlighted in red. It is worth noting that in the current study, we consider the stocks exploited in Morocco as those included in the area defined by the EU-Morocco SFPAs (FAO subdivisions 34.1.31 and part of 34.1.32).

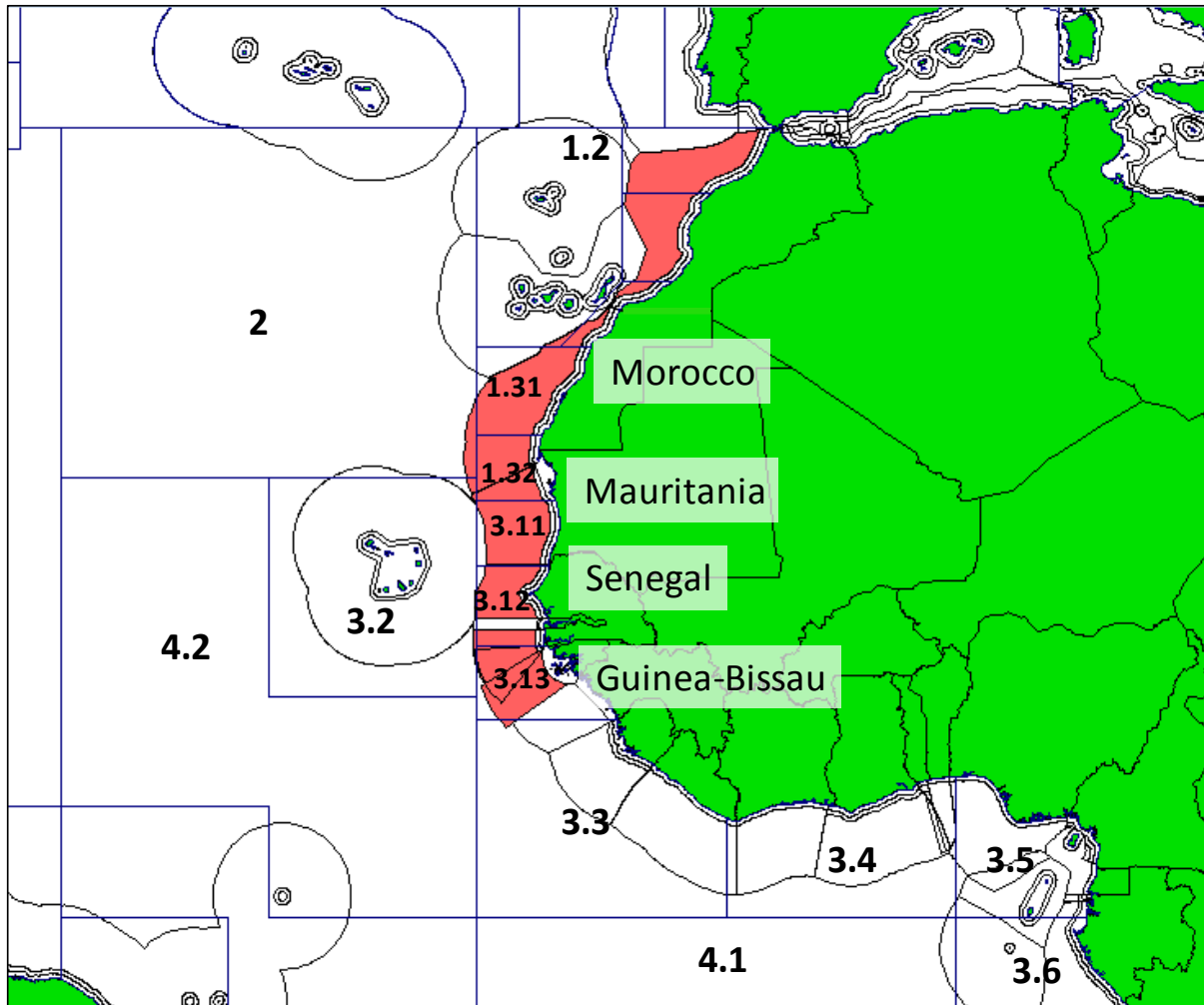
The Fishery Committee for the Eastern Central Atlantic (CECAF), is a FAO regional fishery body responsible for promoting the sustainable utilization of the marine living resources in all the Atlantic waters between Cape Spatel (35°47’N) and Ponta de Moita Seca (6°07’S)<sup>3</sup>, in the Congo River mouth, this including the EEZs of the four African countries under consideration in this section. It should be noted that the EU is member of CECAF. The Committee, which is composed of all CECAF member States, is the central body. A Scientific Sub-Committee was established in 1998, with the main function of providing appropriate advice to the Committee for fisheries managing decisions. The advice is based on the management recommendations established by the working groups (WGs), that periodically review the state of the resources. The four current CECAF WGs are: i) Working Group on the Assessment of Small pelagic Fish off Northwest Africa; ii) Small Pelagic Fish Working Group-South; iii) Working Group on the Assessment of Demersal Resources- Subgroup North; and iv)

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<sup>3</sup> <http://www.fao.org/fishery/rfb/cecaf/en>



Working Group on the Assessment of Demersal Resources- Subgroup South. The North CECAF region covers the zone between Cap Spartel and South of Senegal (this including Morocco, Mauritania and Senegal, among others) and the South CECAF region covers the zone between the South of Senegal to the Congo River (thus, including Guinea-Bissau, among others). The coastal States should provide data on the fishery activities developed in their EEZs to the WGs, for stock assessment and establishment of scientific basis for management measures.



**Figure 1.-** Map of Northwest Africa – Eastern Central Atlantic (FAO Fishing area 34), indicating the EEZs of the coastal States with current SFPAs with the EU, and the FAO Fishing subareas, divisions and subdivisions.

In order to get a global overview of the information available to perform the tasks for the Mixed SFPAs in West Africa, Table 1 of Annex 2 was prepared. This includes information on those stocks potentially fished by the EU. To developed the different subtasks of Task 1, Table 1 of Annex 2 was further split in two different tables, where additional information was added: i) Table 4, which includes all those stocks targeted by the EU fleets within the SFPAs in West Africa, either if they are assessed or not (for Subtask 1, in Section 3.2.2); and ii) Table 5, which shows the state of stocks potentially fished by the EU as by-catch and that have been assessed by CECAF and/or national institutions (for Subtask 7, in Section 3.2.8).

Table 1 of Annex 2 includes information regarding:

- **Stocks:**

Information of a total number of 51 stocks assessed by CECAF working groups, and considered as potentially exploited or affected by the EU fleet within each SFPA (Morocco, Mauritania, Senegal and Guinea-Bissau) is shown in Table 1 of Annex 2. Some stocks, especially for coastal species, are also assessed at national level by the fisheries sciences research institutes of the various coastal States. The assessments available were included in the first review (Table 1 of Annex 2). We identified 8 Mauritanian demersal stocks assessed both by CECAF and by independent local and external scientists (Meissa & Gascuel, 2015), but with different spatial limits, and in some cases with different diagnoses. Other 9 Mauritanian coastal stocks were also recently assessed (Meissa & Gascuel, 2015), and preliminary included in our study, considering that they could be eventually fished as by-catch (retained or discarded), although they do not constitute target stocks for the EU fisheries.

On the other hand, it is worth mentioning that there are certain stocks exploited within the framework of the SFPAs that have not been assessed so far, either by CECAF or by the national institutions. Some examples are scabbardfish (species belonging to the family Trichiuridae) and Atlantic pomfret *Brama brama*, exploited within the framework of the SFPA with Morocco. These non-assessed stocks are indicated in Table 4.

Although the direct exploitation of some stocks is not covered or allowed within the current SFPAs, they were included in the first compilation (Table 1 of Annex 2) for any of the following reasons:

- They were relevant fisheries for the EU fleets in previous SFPAs (i.e.: European hake *Merluccius merluccius*, deep water rose shrimp *Parapenaeus longirostris* of Morocco, the Dakhla (West Sahara, South Morocco) and Cape Blanc (Mauritania) cephalopods stocks (common octopus *Octopus vulgaris*, common cuttlefish *Sepia officinalis* and European squid *Loligo vulgaris*) or the shrimp *P. longirostris* and cephalopod stocks of *O. vulgaris*, *S. officinalis* and *L. vulgaris* of Senegal-Gambia).
- They are potentially fished and retained as by catch by other EU fleets (i.e: some finfish potentially fished by the hake fleets operating in Mauritania and Senegal, and some different finfish and cephalopod species caught as by-catch by the shrimp trawlers fishing in Mauritania).
- They could be potentially fished and discarded by the EU fleet.

Although the small pelagic fishery is not allowed in the current SFPA with Senegal (defined as a Tuna SFPA + hake component), these species were included also for Senegal, as they are shared stocks with Morocco and Mauritania (Subregion North: Morocco, Mauritania, Senegal and The Gambia), which are currently exploited by the EU in their respective SFPAs. Therefore, any potential measure to manage these stocks implemented in Senegal should also be considered in the analysis. In contrast, small pelagic stocks of Guinea-Bissau were not considered in the compilation as this fishery is not included in the current SFPA and the small pelagics of Guinea-Bissau belong to the stock of the Subregion South, and therefore, they are not supposed to be shared by the other SFPAs coastal States.

The stocks that are currently fished either as target species or as by-catch in the current West African SFPAs are indicated in Table 1 of Annex 2.

- **Shared/Transboundary stocks:**

Among the 51 stocks assessed by CECAF, a total number of 29 stocks are considered to be shared-transboundary or at least, they are assessed as the same stocks in CECAF WGs:

- 10 small pelagic stocks, which can cross the EEZs of Morocco and Mauritania (Zone C) and/or Morocco, Mauritania, Senegal and The Gambia (Subregion North).

- A total of 19 demersal stocks: 4 for Mauritania, Senegal and The Gambia, 8 for Senegal and The Gambia and 7 for Guinea and Guinea-Bissau. In some cases, these stocks might be indeed single and transboundary stocks, as they share the same distribution area under two different EEZs (i.e: Senegal and The Gambia). In other cases, they are considered as single stocks in wider areas comprising neighbour countries, as a compromise solution for assessment purposes, because stock identity is unknown and the biology and ecology of the species are poorly known (i.e.: some fish stocks of Mauritania, Senegal and The Gambia, or Guinea-Guinea Bissau).

The uncertainty of stock identities remains an important issue for stock assessment in the African countries involved in mixed SFPAs. Stocks are currently assessed on a national basis or as shared stocks between neighbouring countries, sometimes with no biological basis for such assumptions. Similarly, several species are assessed as multiple stocks, because we lack information on stock identity. In these cases, practical criteria (i.e.: based on national jurisdictions) are used. Thus, it may happen that some of these species are biologically shared stocks but they are being assessed as national ones.

The transboundary/shared stocks considered as such in CECAF for assessment purposes are highlighted in grey in Table 1 of Annex 2. The same stock numbers have been allocated for the same stocks of different SFPAs for easier identification.

- **Data quality and availability**

In general, the quality of the data used for stock assessments can be considered quite poor: 12 categorized as “medium” and 31 as “low”, in relation to data quality, in the preliminary allocation included in Table 1 of Annex 2. Even for intensively studied stocks, such as Octopus and white grouper (*Epinephelus aeneus*) in Mauritania, assessment relies on data of uncertain quality and cannot be considered as data-rich stock.

Thus, there are data quality problems associated to the monitoring of specific fisheries and métiers of the coastal States, mostly related to data collection. The main constraints refer to the geographical and fleet coverage and information update. Some coastal States (i.e. Guinea-Bissau) lack an appropriate statistical network and/or administrative services able to collect the necessary information. Major difficulties arise in artisanal fisheries. Reliable scientific information from other non EU (national or foreign) fleets operating in the area (i.e.: China, Korea, Russia, convenience flags, Senegalese fleet operating in Mauritania, etc) is also lacking. Unreported by-catch, discards and IUU catches constitute a major problem in the assessment process. The statistics provided by the countries are sometimes incomplete, irregular or obsolete. Data from some fleets are not available for all years, and data for some fleets are unreliable.

Periodical surveys are conducted in the northern countries of this region (i.e. Morocco, Mauritania and Senegal) to obtain fishery independent abundance indices. Some of these series are quite long, starting in the 1970s -1980s and including in some cases information from two or more surveys per year, many of them with stock oriented objectives, only designed for stock assessment purposes and therefore collecting mostly or solely information on single target species. But some countries have interrupted these surveys series in recent years. Furthermore, sampling methodologies (geographical coverage, seasons, research vessel, fishing gears, etc.) have changed throughout the years, jeopardising the comparison of the survey abundance indices and biological parameters.

There is a general lack of basic biological information, especially in the southern coastal States, which prevents the successful implementation of tailor-made assessment models.

Some more specific information on the type of data available for each West African stock included in the SFPAs is provided in Table 4.

The data quality problem is reflected in the high variability of the calculated values for many of the species and eventually in their contradiction with estimates obtained from other data sources (i.e. CPUE from fisheries). Sometimes, diagnoses on some stocks change over time, from one working group to the next. This depends largely on the input parameters (including fishery data

provided by the countries) used to fit the models and it leads to a high uncertainty in the assessments. Among the 8 demersal stocks assessed independently by both CECAF and national experts, the diagnosis on stock status differs for 4 of them.

The data quality also varies from North to South. In general, the quality is lower in southern countries, where all the above mentioned problems are more common.

Recent reviews of the CECAF assessment made by three independent external experts (Cadrin, 2015a,b; Macguire, 2015; Pinho, 2015), agreed to the fact that these assessments are limited by the data available and that although more advanced stock assessment methods could be applied, investments in expanding the data collection (e.g., monitoring species-specific catch and effort from all fleets, representative biological sampling, surveys) must be more productive to improve stock assessments. These reviews were summarized and presented in the CECAF Scientific Subcommittee held in Tenerife (Spain) in October 2015<sup>4</sup>.

- **Stock status**

The situation of each stock, defined by the last assessment available was provided in a preliminary revision shown in Table 1 on Annex 2. These assessments were carried out within the framework of the CECAF Working Groups:

- Working Group on the Assessment of Demersal resources- Subgroup North (from Morocco to Senegal-The Gambia),
- Working Group on the Assessment of Demersal resources- Subgroup South (from Guinea-Bissau to Angola), and
- Working Group on the Assessment of Small pelagic Fish off Northwest Africa (from Morocco to Senegal-The Gambia).

In addition, stocks status, as defined by the assessments made at national level was indicated when this information was available. In a further revision, this information was updated only for the stocks considered in the mixed SFPAs in West Africa (Table 4). Thus, Table 1 of Annex 2 and Table 4 provide the stock status assessed by the last CECAF demersal WGs (2013 for the North and 2011 for the South), and from independent assessments for some Mauritanian stocks (for demersal stocks); and from the last WG for Small pelagic Fish off Northwest Africa available (Casablanca, 2015) (for small pelagic stocks). Other national assessments, from Morocco (INRH) and Mauritania (IMROP) were considered for both demersal and small pelagic stocks included in the SFPAs and presented in Table 4.

It is worth mentioning that with the exception of the WG for Small pelagic Fish off Northwest Africa, CECAF WGs are not celebrated with the desirable and convenient periodicity. Thus, one of the aspects to be considered when defining surplus is that the information on the stock status, the coastal State potential catch of the stock potential (sustainable) may most often be based on obsolete information for the majority of the stocks. In addition, as explained before, sometimes the information provided by coastal States to the WGs is not updated, making this situation even more complex (see last year available data in Table 1 of Annex 2 and data availability in Table 4). Another factor to consider is the long period usually spent between the WG meetings and the publication of the resulting reports, which makes the access to the information and results very difficult or impossible.

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<sup>4</sup> [http://ftp.fao.org/FI/DOCUMENT/cecaf/Cecaf\\_SSC7/7e.pdf](http://ftp.fao.org/FI/DOCUMENT/cecaf/Cecaf_SSC7/7e.pdf)

- **Management measures**

Management plans and regulations for West African coastal States should be defined by the coastal countries. In this sense, it is worth reminding that CECAF is not a regional RFMO itself but a Regional Fishery Body (RFB) and thus, management recommendations made by CECAF are not binding for the member States.

Table 1 of Annex 2 include every type of management measure (management plan or regulation) implemented by each coastal State to manage the stocks and/or fisheries considered. Specific management measures established for the EU fleets by the respective protocols of the SFPAs are also included. The type of management measure and the short name of the reference text that implemented them are shown. A list of the completed management references is provided in Table 1 of Annex 4. The management options indicated in this table are considered as defined, poorly defined or not defined, following the criteria explained in Section 2.1.

Some countries have management plans available, such as Morocco for the octopus fishery, Mauritania for the shrimp and octopus fishery or Guinea-Bissau for the industrial fishery (in general). Other countries, like Senegal, are in the implementation phase of new management plans for managing industrial deep shrimp fisheries (*Parapenaeus longirostris* and *Aristeus varidens*) and the artisanal fisheries, which were defined in 2010. However, the level of definition of management options is very different from one plan to another. For example, while the octopus management plan in Morocco establishes seasonal quotas to be shared by fleet types, the Fishing Management Plan of Guinea-Bissau (2015) is vague and imprecise, establishing global TACs and effort regulations by type of industrial fleet (shrimp, cephalopods and finfish vessels). In addition, no management measures have been implemented so far for the artisanal fishery in Guinea-Bissau, which sometimes targets the same stocks than the industrial one (i.e.: the octopus *O. vulgaris* or the southern rose shrimp *Penaeus notialis*). Other types of management decisions have been established for certain fisheries in Morocco (hakes, shrimps, small pelagics), although management measures are not clearly defined since the TACs or effort limitations are established for the fishery as a whole and not for the single stocks concerned. In some cases, as it occurs for Guinea-Bissau, management regulations are better defined in the SFPA Protocols, but these only affecting the EU fisheries.

Table 1 of Annex 2 was used as a baseline to develop different subtasks in relation to Mixed SFPAs in West Africa. This table contained the basic information that was further completed and/or split for different uses during the Workshop on the Surplus concept, both in relation to the stocks targeted by the EU in the SFPAs or caught as by-catch or discards.

### 3.2.2. *Subtask 1: Revision of the definition of the surplus concept and summary of advancements provided by previous works*

#### **Review of methods or options available for the surplus computation**

Before 2012, STECF was asked to deliver recommendations on "surplus" levels in the context of Western African fisheries (i.e.: Fernández-Peralta et al, 2011; García-Isarch and Sobrino, 2011; Pascual-Alayón, 2011). Nevertheless, no agreement was reached on methodologies to be applied. The Expert Working Group on International Dimension (EWG-12-04), requested by the STECF, was set up to estimate surplus available for the EU in West African countries analysing the factors that could have an impact on the estimation of Maximum Sustainable Yield (MSY), which were computed using Management Strategy Evaluation (MSE). This has constituted the basic work for further surplus estimations. One of the main conclusions was that implementing the surplus concept requires the existence of formal fisheries management and monitoring systems, which is rarely the case for Western African stocks. In addition, reliable fisheries statistics are required to estimate the coastal State potential catches and a quantitative stock assessment is needed to estimate the stock potential (STECF, 2012).

The STECF EWG on Surplus developed methods to compute the coastal State potential catches Y<sub>coast</sub>, using three options:

- (1) maintain the fishing effort of the coastal State constant,
- (2) maintain the proportion of catches of the coastal State constant, or
- (3) maintain a constant catch for the coastal State.

During the Workshop on the Surplus Concept held in Tenerife, the Expert Working Group on Mixed SFPAs in West Africa (EWG-W Africa) examined in more detail the rationale behind these three options:

As explained above, the surplus catch is the stock's annual potential catch minus the potential catch of the national fleet according to its "capacity to harvest the entire allowable catch". In practice, the surplus can be calculated either on the short term (i.e. available surplus for the next coming year, according to a given harvest control rule), or in the long term (i.e. the theoretical surplus, available under equilibrium assumption and for an Fmsy management strategy).

→ In the short term:  $\text{Surplus} = \text{TAC} - Y_{\text{coast}}$

→ In the long term:  $\text{Surplus} = \text{MSY} - Y_{\text{coast}}$

where:

- MSY is the maximum sustainable yield,
- TAC is the total allowable catch referring to a given harvest control rule (i.e. for a well-defined target of the fishing mortality ( $F_{\text{target}}$ ); see below), and
- $Y_{\text{coast}}$ , is the short or long term potential catch of the coastal State (or of the coastal States, altogether, in case of transboundaries stocks).

As a preliminary key point, it has to be underlined that all options proposed by STECF for the computation of  $Y_{\text{coast}}$  refer to a given selectivity for the whole fishery exploiting the stock of interest. In other words, all computations of the surplus are based on the assumption that the gear used to catch the stock, or the proportions of the various gears used to catch the stock, will remain constant in the coming years. This is obviously a very strong assumption, whose consequence is that any surplus calculated for a given fishery, regardless of the method used for its estimation would have to be updated when a significant change in the size selectivity of the whole fishery occurs. And this applies both in the short and the long term.

According to the method proposed by STECF, the computation of the surplus requires 5 parameters (previously estimated as outputs of available stock assessments):

- 1) MSY
- 2)  $F_{\text{msy}}$  = fishing mortality providing MSY on the long term
- 3)  $F_{\text{sq}}$  = current fishing mortality
- 4)  $Y_{\text{sq}}$  = current total catch
- 5)  $Y_{\text{sq,coast}}$  = current catch of the coastal State.

In addition the partial fishing mortality induced by the coastal fishery can be derived from these parameters ( $F_{\text{sq,coast}} = F_{\text{sq}} \cdot Y_{\text{sq,coast}} / Y_{\text{sq}}$ ).

The three options proposed by STECF in order to calculate the potential catch of the coastal State ( $Y_{\text{coast}}$ ), and thus the surplus, are defined as follow (see Figure 2 and Table 3):

- **Option 1** assumes that the "capacity of the coastal State to harvest" is defined by its current fishing effort and that this fishing effort and all other factors related to fishing mortality will remain constant in the future:

$$Y_{\text{coast}} = \text{TAC} \cdot F_{\text{sq coast}} / F_{\text{target}}$$

Where  $F_{\text{target}}$  is the fishing mortality related to the Harvest Control Rule (either  $F_{\text{msy}}$  or an  $F_{\text{target}}$  defined accordingly to a transition scheme towards  $F_{\text{msy}}$  (see Figure 2).

Nevertheless, this equation only applies when  $F_{\text{target}} > F_{\text{sq coast}}$ . In the opposite case, the coastal State is able to catch the full TAC alone, and  $Y_{\text{coast}} = \text{TAC}$ , thus Surplus = 0.

This option implies that the catch of the coastal State will change over time, according to the stock status and thus to the annual TAC. Therefore, if a stock is already overexploited in the current situation, the coastal State catch will increase on the long term, benefiting from the rebuilding of the stock. But if the stock is currently under exploited, the coastal State catch will decrease over time as the same time that the stock becomes more intensively fished (and thus as the same time that the stock abundance and the CPUEs decrease). In this option, making available the surplus means to allow an additional fishing effort from foreign countries. An unexpected consequence of maintaining the coastal fishing effort constant is that the foreign catch will be higher in the long term than the initial surplus (see Figure 2). Such a trend would probably be considered as unacceptable by the coastal State and justifies options 2 and 3.

- **Option 2** assumes that the HCR will apply for the coastal State in the same proportion than for the whole fisheries and therefore, assuming that the proportion of the catch due to the coastal State is fixed:

$$Y_{\text{coast}} = \text{TAC} \cdot Y_{\text{sq coast}} / Y_{\text{sq}}$$

This option implies that the fishing effort of the coastal State will change over time. In case of an already overexploited stock, the coastal State will have to decrease its fishing effort and its catch will decrease in the same proportion. It is likely that such a change could be considered as undesirable by coastal States. Conversely, in case of an underexploited stock, the coastal State will have to increase its fishing effort but will benefit of an increase in its catch (in the same proportion as the foreign fleets). Nevertheless, even in this case, the CPUE of the coastal State will decrease (because ineluctably selling any surplus lead to a decrease in the stock abundance).

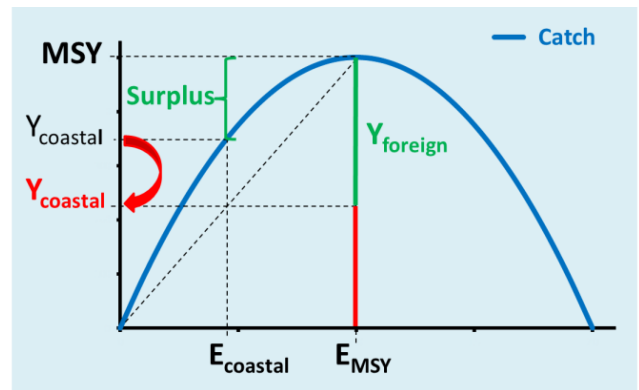
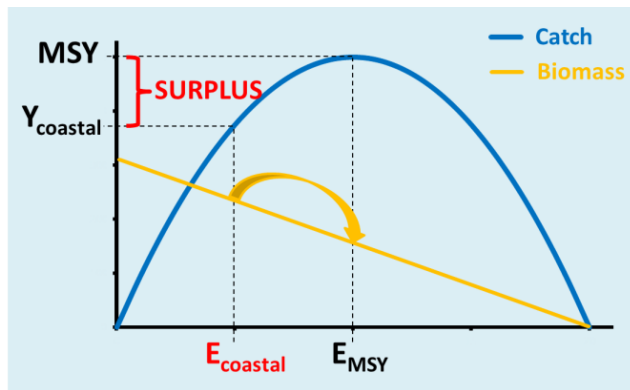
- **Option 3.** Assuming that the coastal State decides to maintain its catch constant:

$$Y_{\text{coast}} = Y_{\text{sq coast}}$$

(Nevertheless, in the simulations this equation applies only if  $Y_{\text{coast}} < \text{TAC}$ , otherwise  $Y_{\text{coast}} = \text{TAC}$ )

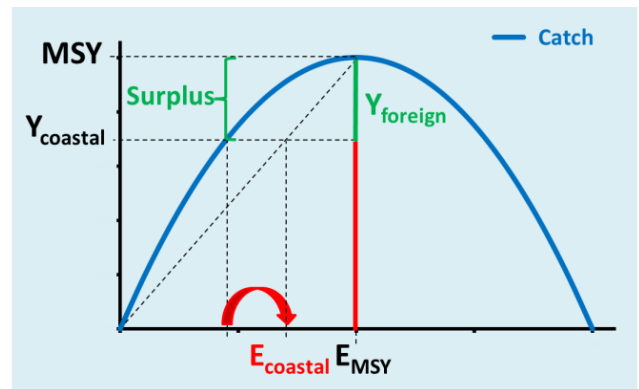
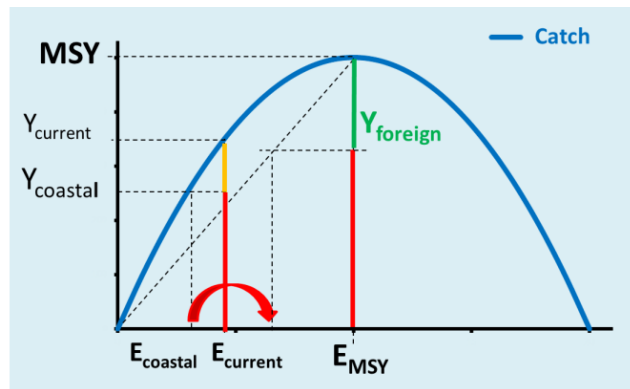
This option implies that the coastal State fishing effort will have to adapt over time. In case of an underexploited stock and following an increasing fishing pressure scenario, the effort of the coastal State will have to increase in order to compensate for the CPUE decrease. It should be notice that this situation would affect the CPUE of local fisheries (more effort to maintain same catch), while all the catch increase would be sold to foreign fleets (Figure 2). In the opposite scenario, starting with an overexploited stock and thus considering a rebuilding stock, the coastal State would have to decrease its fishing effort, in order to maintain its catch constant.

Assumptions of the three options and consequences for the coastal fishery are summarized in Table 3. An additional and important case has to be considered. Even if the stock is currently overexploited (by all the fleets together, but not due to the coastal State fishing pressure considered in isolation), the coastal State could obviously decide to develop its own fisheries and thus to increase its fishing effort. There is a number of ways to implement such development and there are methods to compute surplus, as long as the development plan of the coastal State is made available to scientists.



**Definition of the Surplus:** In the long term, the surplus is the Maximum sustainable yield MSY, minus the catch of the coastal State (at equilibrium, i.e. on average on a long term run, for a given selectivity and a mean environment). Note that in the case of underexploitation reaching Emsy implies a decrease in the stock abundance.

**Option 1:** The “capacity of the coastal State to harvest” is defined by its current fishing effort. Thus, its fishing effort remains constant when the surplus is sold. As a result, the catch of the coastal State decreases, as a consequence of the decrease in the stock abundance, while the catch of the foreign State is higher than the surplus.



**Option 2:** The HCR applies for the coastal State in the same proportion than for the whole fisheries. Therefore, the proportion of the total catch due to the coastal State is fixed. Here for instance, reaching Emsy implies a doubling of the total and coastal fishing efforts, while the catch will increase by 50%.

**Option 3:** the coastal State decides to maintain its catch constant. Thus, in case of underexploitation, it has to increase its fishing effort in order to compensate for the reduction in abundance and CPUE.

**Figure 2-** Theoretical illustration of the surplus concept and of the three options defined by STECF in order to calculate the surplus. Only a simple case is presented here, related to the long term forecast (catch at equilibrium expressed as a function of the fishing effort). In such a case, the target for the fishing mortality is Fmsy (reached for the Emsy fishing effort), leading to a TAC equal to the Maximum Sustainable Yield MSY.



**Table 3.-** Summary of options available for the surplus computation.

	Option 1	Option 2	Option 3
<b>Assumption:</b>	The “capacity of the coastal State to harvest” is defined by its current fishing effort	The HCR will apply for the coastal State in the same proportion than for the whole fisheries	The coastal State decides to maintain its catch constant
Thus:	<b>Fsq.coast=constant</b>	<b>Fcoastal/Ftotal = constant</b>	<b>Ycoast = constant</b>
<b>Surplus computation:</b>	<b>Surplus = TAC – Ycoast</b>		
	Where :		
	Ycoast = TAC · Fsq coast/Ftarget	Ycoast = TAC · Ysq coast/Ysq	Ycoast = Ysq coast
	Ftarget is defined accordingly to a transition scheme toward Fmsy	Ysq coast/Ysq = Fcoastal/Ftotal	
Only applies where :	Ftarget > Fsq coast (otherwise surplus=0)		TAC > Ycoast (otherwise surplus=0)
<b>Consequence of making available (only) the surplus:</b>			
a) If the stock is <b>overexploited</b> , the foreign catch has to decrease. Then :	the coastal State catch will increase (benefiting from the stock rebuilding)	the coastal State catch will decrease (in the same proportion as the foreign catch, thus contributing to the rebuilding of the stock)	the coastal State catch will remain constant (for a decreased fishing effort)
b) If the stock is <b>underexploited</b> . Then:	the coastal State catch will decrease (due to the decrease in the stock abundance)	the coastal State catch will increase (due to an increase in its fishing effort)	the coastal State catch will remain constant (for an increased fishing effort)

**Review of the current knowledge on stocks status – Availability of parameters required for the Surplus computation**

A table on the stocks status, based on the information provided in Table 1 of Annex 2, was updated during and after the Workshop, according to the last available information and focusing on all stocks (or species categories) included in the current SFPAs. This especially includes the following reports from CECAF:

- FAO Working Groups on the Assessment of Small pelagic Fish off Northwest Africa of years 2013 (FAO, 2015a), 2014 (FAO, 2015b), and 2015 (FAO, 2015c)
- FAO/CECAF Working Group on the Assessment of Demersal Resources – Subgroup North (of 2013) (FAO, 2015d)
- FAO/CECAF Working Group on the Assessment of Demersal Resources – Subgroup South (of 2011) (FAO, 2015e)

Thus, Table 4 considers 27 demersal and small pelagic stocks covered by the SFPAs between the EU and the West African countries (Morocco, Mauritania, Senegal<sup>5</sup> and Guinea-Bissau). Most stocks

<sup>5</sup> Tuna SFPA with a demersal component.

are also exploited by the coastal State, with the exception of *Parapenaeus longirostris* in Guinea-Bissau and probably in Mauritania. The data available (type and time-series) for the CECAF assessments are indicated, based on the most recent CECAF reports (FAO, 2015 c,d,e). Most stocks are assessed by CECAF and/or the national research institutions in charge (INRH and IMROP, for some Moroccan and Mauritanian stocks, respectively). In the cases where several assessment are available (9 stocks), similar results were obtained in relation to stock status (stocks highlighted in red in Table 4) for most stocks. The exceptions (highlighted in grey in Table 4) were: the *Sardinella aurita* stock of the subregion North (overexploited or fully exploited, from CECAF and IMROP assessments, respectively) and the *Engraulis encrasicolus* stock of the subregion North (overexploited from CECAF assessment or fully exploited from INRH assessment). However, it should be noted that the last assessment of this stock available from INRH dates from 2013 (INRH, 2013). Two stocks (*Sardina pilchardus* from Zone North in Morocco and *Sardinella maderensis*- Subregion North) have only been assessed by national institutions so far (INRH and IMROP, respectively).

The availability of the parameters to be considered for the estimation of Surplus ( $MSY$ ,  $F_{msy}$ ,  $Y_{sq}$ ,  $Y_{sq,coast}$  and  $F_{sq}$ ) is indicated for each stock (see Table 4). In general, for CECAF assessments, the information of the last Working Groups was considered for demersal stocks: 2013 for Demersal-North (FAO, 2015d) and 2011 for Demersal-South (FAO, 2015e). For small pelagics in the North region, assessments are carried out on an annual basis in the FAO Working Groups on the Assessment of Small pelagic Fish off Northwest Africa (FAO, 2015a,b,c). The availability of the parameters for the last three years is indicated in these cases. The assessment method used in each case is specified (basically, dynamic production models or LCA and Y/R methods).

Of the 27 stocks considered, 4 stocks have not been assessed by CECAF so far (i.e. not considered in any working group, at least in the recent period). This is the case for the Moroccan scabbardfish (Trichuridae) stocks, the Atlantic pomfret *Brama brama* and the *S. pilchardus* stock of North Morocco, as well as the *S. maderensis* stock mentioned above. Other 4 additional stocks have been tentatively assessed by CECAF but without conclusive diagnosis on their current status (stock status considered as still unknown, due the impossibility to fit any reliable model to the available data). These are *Pagellus* spp.- Moroccan stock, the *Caranx rhonchus* stock from the Subregion North, and the *Penaeus notialis* and *Sepia* spp. stocks of Guinea-Bissau. Among the 19 remaining stocks, a first analysis conducted by EWG on mixed SFPAs in West Africa during the Workshop on the Surplus concept suggests that assessments provide a reasonable confidence on stock status for 10 stocks (considered as “reliable” in relation to the “assessment quality” field in Table 4). For others, a diagnosis on stock status is provided by CECAF or national bodies, but some concerns have been identified (i.e.: high uncertainty due to different species considered as the same stocks, stock identity issues, poor quality of catch statistics and effort data including the case where large IUU catches are suspected, no data on discards, lack of abundance indices for certain years, or lack of information on artisanal fisheries).

The five parameters required for the surplus computation could be obtained for 14 stocks (of the 19 assessed stocks). According to the quality of assessments, a case by case analysis should be conducted to decide if these values can be used in the future, with or without considering an uncertainty cap (see Section 3.2.5).

It is worth mentioning that the stock assessments for Guinea-Bissau demersal stocks were carried out only considering data from the industrial fishery, as this country lacks information from the artisanal fishery so far. Thus, in these cases, the  $Y_{sq,coast}$  values are not available, fact that prevents the estimation of the surplus for these stocks. The only exception is the *Parapenaeus longirostris* stock, exploited only by the industrial fishery and therefore with no catch from the coastal State (i.e.,  $Y_{sq,coast}=0$ ).

**Table 4.-** Stocks targeted by EU fleets within the SFPAs in West Africa.

## A- Morocco and Morocco/Mauritania

SFPA	Stock	Data availability	CECAF assess. (year)	National assess.	Assessment Quality	DLS cat.	Parameters required for the surplus computation					Assess. method
							MSY	Fmsy	Ysq	Y <sub>sqcoast</sub>	Fsq	
Morocco	<i>Merluccius</i> spp. ( <i>M. polli</i> + <i>M. senegalensis</i> ) - Morocco	– C: 1983-1999/ 2003-2012 – CPUE: 1983-1999/2007-2010 (from the Spanish fleet, good A.I.); 2003-2008 (from Moroccan coastal fleet, bad A.I.) – No Abundance Indices (AI) from surveys – No biological information	Over (2004)	NA	Uncertainty on the stock identity (two species mixed) Old assessment	2c	Y	Y	Ycur	1999	Y	Dynamic Production Model
	<i>Sparus</i> spp. ( <i>Sparus auriga</i> + <i>Sparus aurata</i> ) -Morocco	– C: 1990-2012 – CPUE: 1990-2012 (from Moroccan cephalopod trawlers, bad A.I.) – No Abundance Indices from surveys – No biological information	Over (2013)	NA	High uncertainty (two species mixed)	1b	Y	Y	Ycur	2012	Y	
	<i>Pagellus acarne</i> -Morocco	– C: 1990-2012 – CPUE: 1990-2012 (from Moroccan cephalopod trawlers, bad A.I.) – A.I. from surveys: 1984-2012 (North)/1983-2007 and 2010-2012 (South) – Some length samplings	Over (2013)	NA	Reliable	1a	Y	Y	Ycur	2012	Y	
	<i>Dentex macrophthalmus</i> -Morocco	– C: 1990-2012 – CPUE: 1990-2012 and 2002-2012 (from 2 Moroccan fleets, bad A.I.) – No A.I. from surveys – No biological info	Unkn. (2013)	NA		3						
	<i>Pagellus</i> spp. - Morocco	– C: 1990-2012 – CPUE: 1990-2012 and 2002-2012 (from 2 Moroccan fleets, bad A.I.) – No A.I. from surveys – No biological info	Over (2013)	NA	Not reliable (only trends in CPUE and several species mixed)	2c	N	N	N	2012	N	
	<i>Trichuridae</i> ( <i>T.lepturus</i> , <i>L. caudatus</i> , <i>A. carbo</i> )	– No data available to the CECAF WGs	Not assess.	NA		3	–	–	–	–	–	
	<i>Brama brama</i>	– No data available to the CECAF WGs	Not assess.	NA		3	–	–	–	–	–	
Morocco / Mauritania	<i>Sardina pilchardus</i> -Zone North Morocco	– C: 1990-2014 – CPUE: 1990-2014 – No Abundance Indices from surveys – No biological information	Not assess.	Fully exploited (INRH, 2013)		3	2012	2012	2012	2012	2012	Dynamic Production
	<i>Sardina pilchardus</i> -Zone C	– C: 1990-2014 – CPUE: 1993-2014 (Russia, uncompleted); 2002-2014 (Moroccan RSW); 1996-2013 (EU) – A.I. from regional surveys: 1995-2013, not regular, uncompleted and some years not coordinated. – Recruit survey: 2003-2013 (uncomplet.) – Biological info: LFD (2007-2014), catch at age (1990-2014), length at age (2003-2013)	Non-fully (2015)	Moderel. exploited- (Stock South Morocco) (INRH, 2013)	Reliable	1a	2012-2014	2012-2014	2012-2014	2012-2014	2012-2014	Dynamic Production Model

B- Morocco/Mauritania

SFPA	Stock	Data availability	CECAF assess. (year)	National assess.	Assessment Quality	DLS cat.	Parameters required for the surplus computation					Assess. method
							MSY	Fmsy	Ysq	Y <sub>sqcoast</sub>	Fsq	
Morocco / Mauritania	<i>Sardinella aurita</i> - Subregion North	- C: 1990-2014 - CPUE: 2000-2013 (Dutch type trawlers in Mauritania) for both species (bad A.I.) - A.I. from acoustic surveys: interrupted in 2009. - Biological info: LFD (NA), growth param.	Over (2015)	Fully exploited (IMROP 2014 WG)	Limitation do to lack of abundance index	1b	2012-2013	2012-2013	2012-2014	2012-2014	2013-2014	LCA-Y/R
	<i>Sardinella maderensis</i> - Subregion North	- C: 1990-2014 - CPUE: 2000-2013 (Dutch type trawlers in Mauritania) for both species (bad A.I.) - A.I. from acoustic surveys: interrupted in 2009. - Limited biological information.	Not assessed	Non-fully exploited (IMROP 2014 WG)	Reliable, but only 1 assessment	1b	?	?	?	?	?	?
	<i>Trachurus trachurus</i> - Subregion North	- C: 1990-2014 - CPUE: 2000-2014 (Russian type trawlers in Mauritania) for both species (bad A.I.) - A.I. from acoustic surveys: uncompleted - Biological information: LFD, catch at age (uncompleted and NA).	Fully (2015)	Fully exploited (Stock North+A+B+C) (INRH, 2013) Fully	Reliable	1a	2012-2014	2012-2014	2012-2014	2012-2014	2012-2014	Dynamic Production Model
	<i>Trachurus trecae</i> - Subregion North	- C: 1990-2014 - CPUE: 2000-2014 (Russian type trawlers in Mauritania) for both species (bad A.I.) - A.I. from acoustic surveys: uncompleted - Biological information: LFD, catch at age (uncompleted and NA).	Over (2015)	Overexploited (IMROP WG)	Reliable	1a	2012-2014	2012-2014	2012-2014	2012-2014	2012-2014	
	<i>Scomber colias</i> - Subregion North	- C: 1990-2014 - CPUE: 1992-2014 (effort standarized to Russian type vessels in Zone A+B+C and CPUE of Marrocan purse seiners in Zone A+B). - A.I. from coordinated acoustic surveys (1999-2015, uncompleted). - Recruit surveys (2003-2013, uncomplet.). - Biological information: LFD, catch at age (1992-2014), growth parameters.	Fully (2015)	Fully exploited (Stock North+A+B+C) (INRH, 2013) Fully exploited (IMROP)	Reliable	1a	2012-2014	2012-2014	2012-2014	2012-2014	2012-2014	ICA, XSA and Dynamic Production Model
<i>Engraulis encrasicolus</i> - Subregion North	- C: 1990-2014 - CPUE: NA - A.I. from acoustic surveys: 2000-2013 (Marocco) and 2000-2010 (Mauritania) - Biological information: LFD, growth parameters (only in Zones North+A+B).	Over (2015)	Fully exploited (INRH, 2013)	Reliable in zone North+A+B, but stock identity uncertain	1b	2012-2013	2012-2013	2012-2014	2012-2014	2012-2014	LCA-Y/R	

## C- Mauritania and Senegal

SFPA	Stock	Data availability	CECAF assess. (year)	National assess.	Assessment Quality	DLS cat.	Parameters required for the surplus computation					Assess. method
							MSY	Fmsy	Ysq	Y <sub>sqcoast</sub>	Fsq	
Mauritania	<i>Caranx rhonchus</i> - North	– C: 1990-2014 – CPUE: NA. – A.I. from acoustic surveys: uncompleted – Biological information: NA	Unkn. (2015)	NA		3c	-	-	-	-	-	
	<i>Merluccius</i> spp. ( <i>M. polli</i> + <i>M. senegalensis</i> ) - Mauritania	– C: 1990-2012 – CPUE: 1983-20012 (from Spanish trawlers, good A.I.) – By-catch info from 2009-2012 – A.I. from surveys (by species): 2002-2013 – Biological info: LFD (1991-2012) and other parameters available.	Non-fully (2013)	Non-fully (IMROP 2014 WG)	Uncertainty on the stock identity (two species mixed)	1b	Y	Y	Y	2007	Y	Dynamic Production Model
	<i>Parapenaeus longirostris</i> - Mauritania	– C: 1987-2012 – CPUE: 1987-20012 (from Spanish trawlers, good A.I.) – A.I. from surveys (by species): 2000-2012 – Biological info: uncompleted LFDs, and some biological info from 2010.	Non-fully (2013)	Non-fully (IMROP 2014 WG)	Reliable	1a	Y	Y	Y	2012	Y	
	<i>Penaeus notialis</i> - Mauritania	– C: 1987-2012 – CPUE: 1987-20012 (from Spanish trawlers, good A.I.) – A.I. from surveys (by species): 2000-2012 – Biological info: uncompleted LFDs, and some biological info from 2010.	Non-fully (2013)	Non-fully (IMROP 2014 WG)	Reliable	1a	Y	Y	Y	2012	Y	
Senegal	<i>Merluccius</i> spp. ( <i>M. polli</i> + <i>M. senegalensis</i> ) - Senegal-Gambia	– C: 1983-2012 – CPUE: 1993-2005 (from Spanish trawlers, good A.I.) – No abundance indices from surveys – No biological information.	Fully (2010)	NA	Uncertainty on the stock identity (two species mixed)	1b	Y	Y	Y	2012	Y	

D- Guinea-Bissau

SFPA	Stock	Data availability	CECAF assess. (year)	National assess.	Assessment Quality	DLS cat.	Parameters required for the surplus computation					Assess. method
							MSY	Fmsy	Ysq	Y <sub>sqcoast</sub>	Fsq	
Guinea-Bissau	Sparidae - Guinea-Guinea Bissau	– C: 1994-2009 (no data from the artis.fleet, some years estimated and species mixed). – CPUE: 2005-2009 (from industrial fleet), bad A.I. – No abundance indices from surveys – No biological information.	Non-fully (2011)	NA	High uncertainty (several species mixed & no art. data)	1b or 3	Y	Y	Y	NA (no art. data)	Y	Dynamic Production Model
	<i>Pomadasys</i> spp. - Guinea-Guinea Bissau	– C: 1994-2009 (no data from the artisanal fleet, some years estimated and species mixed). – CPUE: 2005-2009 from industrial fleet), bad A.I. – No abundance indices from surveys – No biological information.	Fully (2011)	NA	High uncertainty (several species mixed, no artis. data)	1b or 3	N	N	N	NA (no art. data)	N	
	<i>Cynoglossus</i> spp. - Guinea-Guinea Bissau	– C: 1994-2009 (no data from the artis.fleet). – CPUE: 2005-2009 (from industrial fleet), bad A.I. – No abundance indices from surveys – No biological information.	Non-fully (2011)	NA	High uncertainty (several species mixed, no artis. data)	1b or 3	Y	Y	Y	NA (no art. data)	Y	
	<i>Parapenaeus longirostris</i> - Guinea-Guinea Bissau	– C: 1990-2010. – CPUE: 1990-2010 (from Spanish shrimpers, good A.I.) – No abundance indices from surveys – Some biological information from Spanish survey.	Fully (2011)	NA	Reliable	1a	Y	Y	Y	Y	Y	
	<i>Penaeus notalis</i> - Guinea-Guinea Bissau	– C: 1990-2010 (no data from the artis. fleet) – CPUE: 1990-2010 (from Spanish shrimpers) – No abundance indices from surveys – Some biological information from Spanish survey.	Unkn. (2011)	NA	Uncertainty (no artisanal data)	2c or 3	N	N	N	NA (no art. data)	N	
	<i>Sepia</i> spp. - Guinea-Guinea Bissau	– C: 1990-2010 (no data from the artis.fleet and series uncomplete for some fleets). – CPUE: 1990-2010 (from Spanish trawlers) – No abundance indices from surveys – Some biological information from Spanish survey.	Unkn. (2011)	NA	Uncertainty (no artisanal data)	2c or 3	N	N	N	NA (no art. data)	N	
	<i>Octopus vulgaris</i> - Guinea-Guinea Bissau	– C: 1990-2010 (no data from the artis.fleet and series uncomplete for some fleets). – CPUE: 1990-2010 (from Spanish trawlers) – No abundance indices from surveys – Some biological information from Spanish survey.	Non-fully (2011)	NA	Uncertainty (no artisanal data)	1b or 3	Y	Y	Y	NA (no art. data)	Y	

DLS cat.= adaptation of ICES Data Limited Stocks categories (ICES, 2012a). See Section 3.4.5.C=Catch; CPUE= Catch per Unit of Effort; A.I.= Abundance Index; LFD= Length Frequency Distributions; art./artis.=artisanal. NA= Not available

In the case of Morocco, the European catch of demersal stocks (under categories 2 and 3 of the SFPAs) is less than 2% of the total catch in the same area (Faraj et al., 2015). It should be underlined that in this case, even if the stock status was known, the surplus could not be calculated, considering that all computations should be conducted at the stock level, using parameters from the stock assessment. These parameters are not available and cannot be defined for mixed stocks, categorized as “scabbarfish, sparidae and other demersal species” (for category 2), and “croaker, sparidae” (for category 3), preventing the surplus computation.

For stocks caught as by-catches of species included in the SFPAs, an updated review is provided in Section 3.2.8.

### ***Opportunity to promote a specific option in the computation of the surplus***

According to the practice of many ICES working groups, the EWG-W Africa advised that the computation of the surplus should be based on recent values of the required parameters as follows:

- **Small pelagics stocks:** Use values of the last three available assessments (average on a case by case basis)
- **Demersal stocks:** use values of the last assessment for MSY and  $F_{msy}$  and the average of the last three years (available in the last assessment) for status quo ( $F_{sq}$ ,  $Y_{sq}$ ,  $Y_{sq,coast}$ )

In order to provide scientific guidance, during the “Workshop on the Surplus concept” the EWG-W Africa focussed on stocks currently included in SFPAs and analysed the opportunity to promote one or the other of the three options identified by the STECF EWG on Surplus. Thus, the EWG-W Africa analysed the potential consequences of using one or the other of the three options defined by STECF. Three cases have to be considered here:

#### **1. The stock is currently underexploited ( $F_{sq,coast} \leq F_{sq} \leq F_{msy}$ ):**

- Option 1** ( $F_{sq,coast} = \text{constant}$ ) implies development of foreign fisheries only, while the profitability of coastal fisheries will decrease (less catch for the same fishing effort).
- Option 2** ( $Y_{coast}/Y_{total} = F_{coast}/F_{total} = \text{constant}$ ) coastal and foreign fisheries have to develop in the same way. In such a case, catches will increase, but less than the fishing effort. Thus, the CPUE and the fisheries profitability will decrease (due to the reduction in stock abundance).
- Option 3** ( $Y_{coast} = \text{constant}$ ) the profitability of coastal fisheries will also decrease (same catch for an increased fishing effort).

The choice is a political decision belonging to the coastal State (making the surplus available to foreign fisheries or developing its own fisheries).

#### **2. The stock is currently overfished and $F_{sq,coast} \geq F_{msy}$ : NO Surplus.**

#### **3. The stock is currently overfished and $F_{sq,coast} \leq F_{msy}$ : the total F has to decrease.**

- Option 1** ( $F_{sq,coast} = \text{constant}$ ): the decrease applies to the foreign fisheries only, while the coastal fishery will benefit from the recovery of the stock (thus catches and profitability will increase).
- Option 2** ( $Y_{coast}/Y_{tot} = \text{constant}$ ): coastal and foreign fisheries have to reduce their fishing mortalities, and thus their fishing effort, in the same proportion. The coastal State is not catching its “capacity to harvest” anymore, but profitability, in terms of catch per unit of effort, will increase.
- Option 3** ( $Y_{coast} = \text{constant}$ ): the coastal fishery has to decrease its fishing mortality (same catch for less fishing effort because of the recovery of the stock; thus its

profitability will increase). Thus the coastal State is not catching its “capacity to harvest” anymore.

### ***3.2.3. Subtask 2: Options that could be applied to different situations of management frameworks***

In order to provide scientific guidance on the use of the Surplus concept, two aspects related to fisheries management were analysed by the West Africa SFPAs Expert Working Group, during the Workshop on the Surplus concept:

#### ***Options that could be applied to different situations where management options are poorly or not defined***

The “stock potential (sustainable) total catch” required for the computation of the Surplus refers to a management option which has to be preliminarily defined. Such a definition belongs to the coastal State, but it also has to follow international agreements and should be compatible with the principles of sustainability adopted by the EU. In practice, this means that, according to the commitments of the 2002 Johannesburg and 2015 Nagoya World Summits, the MSY-based objectives (implicitly defined based on the Bmsy target) should be reached, wherever possible, by 2015 and by 2020 at the latest. The European CFP aims at the enforcement of this objective, considering the exploitation rate Fmsy as the threshold. Even if article 2 of the CFP stipulates that “maintaining populations of fish stocks above biomass levels capable of producing maximum sustainable yield”, the value of Bmsy is generally neither used nor estimated in ICES working groups, while Bpa is considered as the SSB threshold (however Bpa is far below Bmsy for most stocks). International commitments apply to coastal States. Nevertheless, they may use more conservative targets for management (for instance, in order to reduce the ecosystem impacts of fishing or to maximize fisheries profitability). Consequently, managing stocks according to the MSY objective should be considered as a minimum mandatory objective.

Maximum Sustainable Yield (MSY) is the largest catch that can be taken year on year indefinitely without depleting a fish stock. In principle, managing fish stocks in accordance with MSY should enable larger catches and greater sustainability over the longer-term. The CFP in EU has the objective of ensuring high long-term fishing yields (MSY) for all stocks by 2015 where possible, and at the latest by 2020. In addition, the external dimension of the CFP states that all fishing activities by EU vessels outside of the EU are to be regulated in a manner that is consistent with the principles of the CFP, including a commitment to sustainable practice (MSY objective among others), and the promotion of Regional Fisheries Management Organisations (RFMOs). In summary, MSY is recognised worldwide as the suitable objective for renewable and profitable fisheries, harvesting the maximum amount of fish on a long term basis.

Therefore, the EWG-W Africa concluded that managing fisheries in order to maintain or to reach a fishing pressure equal to Fmsy, for all stocks by 2015 where possible and at the latest by 2020, should be considered as the default option in cases where management options are poorly or not defined.

#### ***Transition period: Opportunity, feasibility and consequences of defining acceptable default trajectories***

Implicitly, management options are defined in the long term (and at equilibrium). In the short term, during a transition period, the “stock potential (sustainable) catch” and the “coastal State potential catch”, both required for the computation of the surplus, depend on the decision made about the trajectory to get to the long term management objective. This review will provide guidance in cases where trajectories have not been defined in any management plan. For this purpose, opportunity, feasibility and consequences of defining acceptable default trajectories were discussed during the Workshop on the Surplus concept. One of the discussed options was to adapt the transition scheme defined by ICES, with the objective to reach the MSY targets by 2020 at the latest.



In practice, if a management plan has been defined by the coastal State, in compliance with the Fmsy objective (in 2020 at the latest), then the F<sub>target</sub> used for the computation of the surplus (see Section 3.2.2) should be deduced from this management plan on the basis of a case by case analysis.

In case where no management plan has been defined, the surplus could be calculated using a transition scheme, whose objective would be to reach Fmsy in 2020.

In this case, during the transition period toward Fmsy (in 2020), theoretical TACs and surplus have to be calculated using an F<sub>target</sub> defined as follows (according to the transition scheme used in European waters):

$$F_{\text{target}} = F_{\text{sq}} - (F_{\text{sq}} - F_{\text{MSY-proxy}}) / 5 \text{ for 2016}$$

$$F_{\text{target}} = F_{\text{sq}} - 2 * (F_{\text{sq}} - F_{\text{MSY-proxy}}) / 5 \text{ for 2017}$$

...

$$F_{\text{target}} = F_{\text{sq}} - 5 * (F_{\text{sq}} - F_{\text{MSY-proxy}}) / 5 = F_{\text{msy}} \text{ for 2020}$$

### 3.2.4. *Subtask 3: Revision of principles or rules which might be applied and definition of options to share the total catch and the surplus between coastal States, in case of trans-boundary stocks*

When dealing with trans-boundary stocks (e.g. the small pelagic stocks, but also some demersal finfish and cephalopod stocks), management objectives and harvest control rules should be defined at the regional level and the surplus has to be estimated for the total stock that is distributed over several countries. Here too, the MSY can be considered as the minimum mandatory objective, and it could be used as a default option when management objectives have not been defined at the regional level.

The share of the total catch that is allocated to each country, as well as the share of the surplus, has to be defined by the countries themselves during political negotiations. A very common principle, used worldwide in such a case, is to consider past catches over a reference period in order to define the share allocation. The review of principles and methods related to this issue, the availability of past catches potentially useful to define sharing schemes in the context of West African fisheries and the potential consequences of a sharing on the theoretical surplus estimation was carried out during the Workshop on the Surplus Concept.

The EWG-W Africa noted that the ideal rules to share the total catch and the surplus must arise from a management agreement between the countries involved. However, the EWG-W Africa noted the absence of any current agreement of this kind in the region, and that management of shared small pelagic fishery resources in Northwest Africa is a major concern.

Nevertheless, various initiatives have been undertaken in the region including reflexions on how to share the catch in the case of shared stocks (FAO, 2002a). Thus the EWG-W Africa discussed and made some explorations of different options to determine TAC, using this regional previous reflexion. In particular, the share method could be based on the concept of “stock zonal attachment” as defined in FAO (2002b).

Thus, according to these previous reflexions and in the absence of any agreement, several key allocation criteria can be used to share the catch between coastal States:

1. **Historical catch within each EEZ**, over the past years
2. **Zonal attachment** of the resource. Four key factors should be considered in the interpretation of zonal attachment:
  - i) the spawning areas,
  - ii) the distribution of eggs and larvae;
  - iii) the occurrence of juvenile and pre-recruits fish;
  - iv) the occurrence and migrations of the fishable part of the stocks;
3. **Other supplementary allocation criteria**, including the dependency of the economy of the country or of the coastal area on fisheries, employment and food security; engagement in research and on monitoring, control and surveillance, etc.

The discussion led to distinguish two cases concerning these shared stocks: the case of small pelagic stocks and the case of demersal stocks.

- ***For small pelagics:***

The EWG-W Africa noted that some of the data needed to calculate the share using criteria 1 and 2, could be more or less available for small pelagics, which represent the largest shared stocks in the area. In a first step, the share can thus be based on these data. However, in particular for method 2, further studies will certainly be needed to revise and strengthen the current scientific knowledge concerning these aspects of the allocation of the shared stocks.

Concerning criteria 3, although it also seems important to have additional information such as socioeconomic aspects, the discussion highlighted the difficulty of integrating this type of information at the current stage.

Therefore, the discussion focused on the two first allocation criteria. The EWG-W Africa found that the methods based in each of them would impact differently the evolution of the concerned fisheries. The method based on criterion 1 implies stability (also for capacities), while the method based on criterion 2 might involve big changes. In addition, Method 1, based on catch statistic seems to be simpler to implement. That is why the first method is preferred worldwide in fisheries when shared stock management is a matter of concern.

- ***For demersal stocks:***

Some demersal species in West Africa are known or considered as transboundary stocks. Nevertheless many demersal species are rather sedentary (much less mobile than small pelagics). In addition, distribution and migration are poorly documented for some of these transboundary demersal stocks.

With this issue in mind, the EWG-W Africa considered that, assessing stocks and thus calculating the TAC and the surplus at national level could be an acceptable and practical approach as a first step.

### 3.2.5. *Subtasks 4: Options that could be applied to different data situations in terms of quality and availability*

During the Workshop on the Surplus Concept, the EWG-W Africa examined the procedures used by ICES for Data Limited Stocks (ICES, 2012a) for those stocks targeted by the EU, and proposed an adaptation of this approach to the specific needs of the calculation of the surplus in the context of West African fisheries. Three main stock categories, and some sub-categories, were considered, based on the data availability and the stock status. For each category (and subcategory) the working group proposed a method for the surplus computation, following the same principles as in the ICES DLS approach.

In particular, a 20% uncertainty cap is applied to the surplus estimate (i.e. a 20% reduction of the initial estimate), when the diagnosis on the stock status seemed highly uncertain (including the case where large IUU catches are suspected), while an additional 20% precautionary buffer is used when a decrease in the stock biomass cannot be excluded from the available data.

The EWG-W Africa suggested to use 3 main categories as follow:

1) **Stocks assessed by CECAF and/or national bodies** (i.e. the five parameters: MSY, Fmsy, Fsq, Ysq and Ysq.coast, are known):

- a. Based on a case by case analysis, the stock assessment is considered as **reliable** → The surplus is calculated, using the three options for Ycoast (see Section 3.2.2)
  - Long term: Surplus = MSY - Ycoast.
  - Short term: Surplus = TAC - Ycoast with theoretical TAC and Ycoast defined from Ftarget according to the transition scheme (see Section 3.2.3).
- b. The stock assessment is considered **not reliable** (including the case where large IUU catches are suspected):
  - The surplus is calculated in the same way.
  - A 20% uncertainty cap is applied.

2) **No stock assessment but survey data are available:**

- a. If, in addition, the current value of F (Fsq), with respect to an Fmsy proxy (F0.1 for instance) is known:
  - The Ftarget has to be defined in line with the Fmsy approach, according to an agreed management plan or to the transition scheme (see Section 3.2.3).
  - $TAC = Y_{y-1} \cdot (I_{y-2;y-1}/I_{y-5;y-3}) \cdot F_{target}/Fsq$ , where  $Y_{y-1}$  is the total catch of year y-1 (i.e. last year), and  $I_{y-2;y-1}$  is an index of the stock abundance over the years y-2 to y-1.
  - Surplus = TAC – Ycoast is calculated in the short term, using the three options for Ycoast:
    - Option 1:  $Ycoast = Ycoast_{y-1} \cdot (I_{y-2;y-1}/I_{y-5;y-3})$
    - Option 2:  $Ycoast = Ycoast_{y-1} \cdot TAC / Y_{y-1} = Ycoast_{y-1} \cdot (I_{y-2;y-1}/I_{y-5;y-3})$ . where  $Ycoast_{y-1}$  is the catch of the coastal State for year y-1 (i.e. last year)
    - Option 3:  $Ycoast = Ycoast_{y-1}$
  - Then an uncertainty cap (-20%) is applied.
  - Surplus has to be recalculated every year, according to the transition scheme.

b. The stock status is unknown:

- Short term:  $\text{Surplus} = Y_{y-1} \cdot (I_{y-2,y-1}/I_{y-5,y-3}) - Y_{\text{coast}}$  (same calculation as 2a for  $Y_{\text{coast}}$ ).
- Then an uncertainty cap (-20%) is applied.
- Then apply the Precautionary Buffer (-20%) to the catch advice, to take into account the fact that the unknown  $F_{\text{target}}/F_{\text{sq}}$  ratio could be lower than 1. Thus, calculation in 2b is consistent with 2a, assuming this ratio is equal to 0.8.
- Surplus has to be recalculated every year, according to the transition scheme.

3) **No stock assessment, no survey, but time series of catches are known:**

a. Catches have declined significantly over a period of time and this is considered to be representative of a substantial reduction in biomass. If available, trends in fishing effort do not show that the decrease in catch results from the decrease in the fishing pressure) → A recovery plan and possibly zero surplus is advised

b. Catches are increasing and this is considered to be representative of a substantial increase in biomass, or there is no clear trend in the catch, but some marked positive trends in stock indicators:

- Calculate the catch advice ( $Y_{y+1}=\text{TAC}$ ) as  $Y_{y-1}$
- Short term surplus =  $\text{TAC} - Y_{\text{coast}}$ 
  - Option 1, 2 and 3:  $Y_{\text{coast}} = Y_{\text{coast}}_{y-1}$

c. No clear trend in the catch, and no marked positive trends in stock indicators:

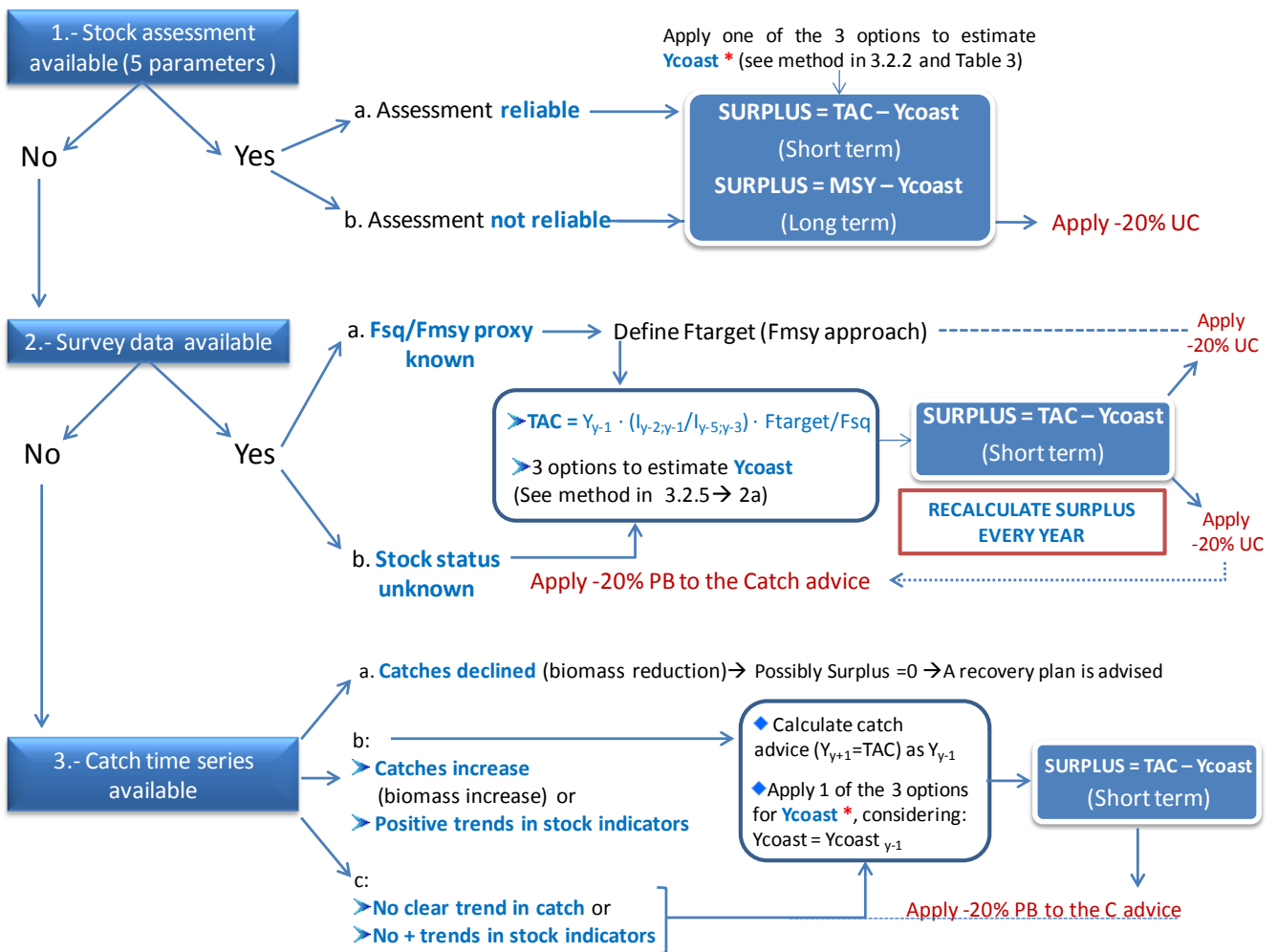
- Calculate the catch advice ( $Y_{y+1}=\text{TAC}$ ) as  $Y_{y-1}$
- Short term surplus =  $\text{TAC} - Y_{\text{coast}}$ 
  - Option 1, 2 and 3:  $Y_{\text{coast}} = Y_{\text{coast}}_{y-1}$
- Apply the Precautionary Buffer (-20%) to the catch advice

Regarding data quality (see Table 4), the category 1 defined here is equivalent to the category 1 used in the ICES DLS approach (ICES, 2012a, but it has been divided in the sub-categories 1a and 1b above, in order to take into account the high uncertainty of some stock assessments in the West African context. Categories 2a and 2b correspond to the ICES DLS 3.1.0 and 3.2, respectively. Finally, our categories 3a, 3b and 3c relate to the 4.2, 5.2 and 5.3 ICES DLS categories.

A decision tree describing the different options for Surplus computation, considering the three categories and subcategories above is shown in Figure 3.

Regarding the current stocks included in West African SFPAs, categories 1a and 1b apply to all stocks that have been assessed by CECAF or national bodies. Category 2b could for instance apply to *Pagellus spp.* in Morocco (where several species are considered within the same category), while category 3c could apply to *Caranx rhonchus* (where the required parameter for using categories 1 or 2 are not available).

It should be noted that except in category 1 (where a stock assessment is available), the surplus can be calculated on a short term basis only. This has two consequences. First, such an approach is consistent with sustainability objectives only if stocks are managed using TACs. And secondly, such surplus estimates have to be updated every year, according to changes observed in the stock status (including the hopefully recovery of stocks during the transition period toward  $F_{\text{msy}}$ ).



**Figure 3-** Decision tree for methods of Surplus computation for stocks with three categories of data availability and different subcategories to be considered for each category.

In the CEFAC framework, annual assessments are only available for small pelagics. For demersal stocks not assessed on an annual basis, surplus should be calculated based on the last available assessment. But in such a case, it could be appropriated to apply an additional uncertainty cap, based on a case by case analysis.

**3.2.6. Subtask 5: Identification of how European fisheries targeting surplus could contribute to collect the information required for the implementation (in the medium term) of an ecosystem approach to fisheries management**

In general, the concept of surplus as defined so far, is based on a single-species approach and does not consider any ecosystem interaction, which would be more reliable within the framework of the ecosystem approach. The new CFP aims to implement the ecosystem approach to fisheries management (EAFM), to ensure long-term sustainability and environmental use of marine ecosystem resources, not only in EU waters, but in all regions where the EU fleet operates. Consequently, data collection has increased over the past years in European countries to meet this new demand for information. The investment and resources required to collect this kind of information are unthinkable in West African countries, where there are still important difficulties in the collection of more basic fishery and/or biological information. However, several research institutes of African coastal States

are currently changing their observation protocols, trying to improve data collection of ecosystem parameters.

On the other hand, the EU considers that the EAFM should be followed to ensure the maintenance within meaningful ecological boundaries of goods and services provided by living aquatic resources for present and future generations. The EU Data Collection Framework (EU-DCF) is being revised and it constitutes a standard framework for collection of information from European fleets operating both within and outside European waters. Under the EU-DCF, the collection of information required to monitor the wider ecological impacts of fisheries is guaranteed even in the case of European fisheries targeting surplus.

In all existing SFPAs, European vessels have to provide catch statistic from logbooks. This should be extended to all species (including by-catch, discard, length frequencies, etc), based on on-board observers (already implemented in main fleets according to the EU- DCF).

Costal countries have developed observation and research programmes to support the development of the EAFM. Europe already supports and should continue developing research programmes and strength capacity building programmes in costal countries, especially in terms of expertise.

### *3.2.7. Subtask 6: Revision of the potential adverse effects of catching the surplus, on coastal fisheries and ecosystems*

#### ***Potential adverse effects of catching the surplus on the profitability of coastal fisheries***

As underlined by STECF (2012), catching only the surplus does not mean that foreign fleets have no adverse effects on local fisheries. By decreasing the mean abundance of targeted stocks, and thus the CPUE of the fisheries of coastal States, their profitability is impacted, with some obvious adverse effects on their potential development. In other words, catching fish necessarily reduces the abundance of the exploited stock. Depending on the option used (see Section 3.2.2 and Table 3), making the surplus available to foreign countries implies that the coastal State either will catch less fish for the same fishing effort (and costs), or will have to increase its fishing effort (and costs) in order to maintain its catch. Ineluctably, the profitability of the coastal fisheries will therefore be partially driven by the surplus catch and activities of vessels not belonging to the coastal State. In addition, by-catch species of foreign fleets can be in some cases target species for local fisheries, thus also inducing adverse effects on their profitability.

The EWG-W Africa noted this should be considered when agreeing the amount of available surplus. Where possible, bio-economic modelling approaches that include the activities and cost structures of vessels (especially those of the coastal State) should be used when developing management plans and making the surplus available to foreign countries. However, the availability of data to allow modelling at the appropriate scale to be carried out may be limited. In addition, it should be underlined that usual bio-economic models do not consider the indirect effects of the profitability of fisheries on the more global coastal economy.

#### ***Potential adverse effects of catching the surplus on ecosystems***

A general concern of the EU is to promote fisheries management that will strive to ensure that benefits from living marine resources are high while the direct and indirect impacts of fishing operations on marine ecosystems are low and not detrimental to the future functioning, diversity and integrity of these ecosystems. Despite this EU commitment there is always a risk of not attaining it, particularly for fisheries with uncertain knowledge of the stocks status or if their impact on the ecosystem is poorly evaluated.

More generally, all fisheries have an impact on ecosystems. In all cases, exploiting species reduces their abundance and this impact propagates to other species through the food web. This means that there is no fish whose catch will have no effect on the ecosystem functioning. In particular, catching

the surplus might affect predators, preys, or competitors of the targeted species, and by propagation in the food web, all ecosystem compartments. In general these effects are very complex, and not predictable. In addition, fishing gears may have an impact on habitats, also affecting the functioning of ecosystems. Obviously, this applies to all fisheries, not only those catching the surplus.

Such effects justify the now very well recognized need to develop an Ecosystem Approach to fisheries Management (EAFM) for all fisheries, everywhere in the world. But at the same time, it should be recognized that this development is still on the way and that very few management rules have been implemented, even in European waters, specifically referring to the ecosystem impact of fisheries. There is not general agreed framework on how EAFM should be applied.

Therefore, the EWG-W Africa concluded that there is currently no specific rule related to the EAFM that should or could be applied to the fisheries catching the surplus. The main operational aspects which could be identified at the moment, relates to the collection of the information required for EAFM implementation (see Section 3.2.6) and the desirable bycatch reduction, especially for already overexploited species (see Section 3.2.8). It should also be noted that probably the most important management measure taken worldwide in order to minimize the impact of fishing on ecosystems is the enforcement of spatial fisheries closures dedicated to the protection of vulnerable habitats. Such type of approach should also be encouraged.

In addition, the EWG-W Africa noted that the first step in the direction of developing an EAFM is to create observation systems and monitoring systems at the scale of ecosystems. In West Africa, such approaches have started to be developed, especially at the national level, but also at a more integrated level. This is the case of some international projects such as AWA (projet "Approche écosystémique de la gestion des pêches et de l'environnement marin dans les eaux ouest-africaines"; [www.awa-project.org](http://www.awa-project.org), involving Mauritania, Senegal and Guinea-Bissau), Indiseas ("Indicators of the seas", [www.indiseas.org](http://www.indiseas.org), involving Morocco, Mauritania and Senegal) and the Canary Current Large Marine Ecosystem (CCLME) project (<http://www.canarycurrent.org/en>) conducted by the FAO and involving all the coastal States in this region, this is from Morocco (in the North) to Guinea (in the South). These programmes started to assess the impacts of West African fisheries on marine ecosystems. Nevertheless, the EWG-W Africa was not able to identify any scientific results specifically related to the adverse ecosystem effects of catching the surplus. Obviously, this does not mean that these effects do not exist, but just that they have not been specifically assessed at the moment.

More generally, the EWG-W Africa stressed the need of research dedicated to the development of EAFM in West African countries, including the assessment of the specific impacts of foreign fleets on ecosystems. Sustaining research in that direction has to be considered an essential dimension of SFPAs.

### *3.2.8. Subtask 7: Revision of the rules and methods applied (especially in Europe) in multispecies fisheries framework, where by-catch of overexploited stocks could be a limit for sustainability*

Particular attention should be given to the question of by-catch. Rules and methods applied (especially in Europe) in multispecies fisheries, where by-catch could be an issue for sustainability, were discussed during the Workshop on the Surplus concept, as well as their potential application to West African stocks. Basically, two aspects require specific attention.

- a) Are there, among species fished as by-catch, some "choke species", whose sustainable management would require specific computation of the surplus? Such a question seems to be especially relevant for fisheries where by-catch of demersal finfish currently overexploited could be significant.

In European waters, assessing a given stock as overfished usually leads to the implementation of catch limitations. In multispecies fisheries, TAC may obviously apply to several species caught as target or as by-catch, and might lead to close the fishery when the most limiting TAC is reached (thus defining the concept of choke species). Using such an approach in the context of the

surplus would theoretically lead to close all fisheries where a species caught as by-catch is considered to be overexploited by the coastal fisheries (and therefore, there is no surplus). In such a case, it seems impossible to consider that foreign fleets are only catching the surplus. Therefore, what might be feasible (even if with difficulties) for targeted species (i.e. catching only the surplus), is impossible in practice for by-catch species. In this case, it only might be possible to try to limit the over-surplus catch.

The EWG-W Africa also analysed the question of by-catch on a fishery basis (Table 6). The impact of each fishing category was classified as low, medium or high depending on several factors as: the selectivity of the gear used; the percentage of by-catches and/or discards (based on estimated values of each fishery in certain periods, when available and/or on the values allowed by the protocols); and the level of the utilization of each fishing category (based on the catch or effort limitations established in the protocol and the catch and effort values of that fishing category in the last years).

Thus, some selective gears may have a low by-catch impact (i.e.: categories No 1, No 2, No 3 and longliners of category No 4 of the SFPA with Morocco). Other categories are considered to have a low impact because the limited fishing activity during the last years of application of the current protocol (or the last one, in the case of Mauritania), among other reasons (as gear selectivity) (i.e.: category No 6 of the SFPA with Morocco, categories No 2, No 3, No 6 and No 7 of the SFPA with Mauritania).

Although in general all pelagic and demersal trawlers may have significant by-catches, they vary from one type of fishery to another. Thus, the discards values estimated for black hake demersal trawlers (Category No 4 of the SFPA with Morocco) are considered of medium impact, being even low in Senegal and especially in Mauritania, due to the limited or null use of this type of licence during the last years of the last protocol.

Among the different fishing categories included in the mixed SFPAs with West Africa countries, the shrimp fishery (categories No 1 of the SFPA with Mauritania and Guinea-Bissau) is the one that produce the highest by-catch impact.

- b) Is it possible to define additional management measures able to avoid or to reduce unwanted by-catch?

The EWG-W Africa noted that several programmes are currently developed in Western African countries, in order to improve the gear selectivity, especially for shrimps fisheries. In Mauritania for instance a program on selectivity has been set up regarding the use of Nordmøre grid in shrimps fisheries and should be further developed in the coming years with the support of the PRAO project (Programme régional des pêches en Afrique de l'Ouest, supported by the World Bank). At the regional level, the CCLME (Canary Current Large Marine Ecosystem) project, conducted under the hospice of FAO, also aims at demonstrating and encouraging best practices and gear improvements for the reduction of by-catch in shrimps fisheries. The EWG-W Africa underlined that such type of approach should obviously be encouraged, and could be specifically supported in the frame of SFPAs.



**Table 5.-** State of by-catch stocks (by fishing categories of SFPAs) assessed by CECAF and/or national institutions.

SFPA	Stock	SFPA-Fishing Category	Data quality	Last year AvData	CECAF assessment	National assesment
MOROCCO	<i>Plectorhinchus mediterraneus</i>	No 3 (Small-scale fishing in the South)	L	2012	Over	
MAURITANIA	<i>Epinephelus aeneus</i>	No 1 (Crustacean fishery)	L	2011-2012	Over	Over
	<i>Pagrus caeruleostictus</i>	No 1 (Crustacean fishery) No 2 (Black hake fishery)	L	2011-2012	Unkn.	Over
	<i>Dentex macrophthalmus</i>	No 1 (Crustacean fishery) No 2 (Black hake fishery) No 7+8 (pelagic trawlers)	L	2012	Unkn.	
	<i>Pagellus belottii</i>	No 1 (Crustacean fishery) No 2 (Black hake fishery) No 7+8 (pelagic trawlers)	L	2011-2012	Non-fully	Over
	<i>Octopus vulgaris</i>	No 1 (Crustacean fishery)	M	2012	Over	Over
	<i>Sepia officinalis</i>	No 1 (Crustacean fishery)	L	2012	Non-fully	Fully
	<i>Psetodes belcheri</i>	No 1 (Crustacean fishery)	M	2012		Over
	<i>Cynoglossus spp.</i>	No 1 (Crustacean fishery)	M	2012		Non-fully
	<i>Dentex canariensis</i>	No 1 (Crustacean fishery) No 2 (Black hake fishery)	M	2012		Over
	<i>Plectorhinchus mediterraneus</i>	No 1 (Crustacean fishery)	L	2012		Non-fully
	<i>Pseudotolithus spp.</i>	No 1 (Crustacean fishery)	L	2012		Over
	<i>Pseudupeneus prayensis</i>	No 1 (Crustacean fishery)	M	2012		Non-fully
	<i>Umbrina canariensis</i>	No 1 (Crustacean fishery) No 2 (Black hake fishery)	M	2012		Over
	<i>Rhinobatos rhinobatos</i>	No 1 (Crustacean fishery)	M	2012		Fully
<i>Argyrosomus regius</i>	No 1 (Crustacean fishery) No 7+8 (pelagic trawlers)	M	2012		Over	
SENEGAL	<i>Pagrus caeruleostictus</i>	Hake trawlers	L	2011-2012	Unkn.	
	<i>Dentex macrophthalmus</i>	Hake trawlers	L	2012	Unkn.	
	<i>Pagellus belottii</i>	Hake trawlers	L	2011-2012	Non-fully	

**Table 6.-** Impact level of by-catch by fishing category of the current SFPAs with West Africa.

SFA (Year Last Protocol)	Fishing Category	Fishing Gear	Target Species (Protocol)	By-catch species	Discard species and percentages	Effort limitation/Effort last year	Catch limitation/Catch last year	Remark	Impact level
Morocco (2012)	No 1- "Small-scale fishing in the north: pelagic"	Purse seine	Sardine, anchovy and other small pelagic species	0% in 2014	Not available	20 vessels/ 2 vessels (4 fd)* <sup>1</sup>		High selective gear → low discards	Low
Morocco (2013)	No 2- "Small-scale fishing in the north"	Bottom set long line	Scabbardfish, sparidae and other demersal	—	Not available	35 vessels/ 20 vessels (702 fd)* <sup>1</sup>		High selective gear → low discards	Low
Morocco (2013)	No 3- "Small-scale fishing in the south"	Rods and lines	Croaker, sparidae	P. mediterraneus, Conger conger, Muraenidae, etc. (<5% allowed)* <sup>1</sup>	Not available	10 vessels/ 3 vessels (76 fd)* <sup>1</sup>		High selective gears → low discards	Low
Morocco (2013)	No 4- "Demersal fishing"	Trawl and longline	Black hake, scabbardfish, leefish/bonito	Sebastidae, Scorpaenidae, <i>Lophius spp.</i> , <i>Zeus faber</i> , Sparidae (<8% in 2014)* <sup>1</sup>	Trawlers: Grenadiers, sharks, undersized hakes, cephalopods, others (31%)* <sup>1</sup>	5 trawlers and 11 longliners/ 3 trawlers and 3 longliners (319 fd)* <sup>1</sup>		Logliners → high selectivity → low discards	Medium (trawlers) Low (longliners)
Morocco (2013)	No 6- "Industrial pelagic fishing"	Pelagic or semi pelagic trawl	Sardine, sardinella, mackerel, horse mackerel and anchovy	1.3% in 2014* <sup>1</sup>	Undersized small pelagics, forbidden species, <i>Brama brama</i> , <i>Dentex spp.</i> (<1.2% in 2014)* <sup>1</sup>	18 vessels and max. 7765 GT per vessel/ 8 vessels (495 fd)* <sup>1</sup>	80 000 t/ 45 980 t* <sup>1</sup>		Low
Mauritania (2015)	No 1- "Vessels fishing for crustaceans other than spiny lobster and crab"	Bottom shrimp trawl	Shrimps	3% fish+ cephalopods and 4% crab (2014) * <sup>2</sup> 15% fish, 10% crabs and 8% cephalopods (allowed in Protocol)	<i>Chlorophthalmus agassizi</i> , <i>Merluccius polli</i> , <i>Brotula barbata</i> , <i>Munida rutilanti</i> , <i>Pagellus bellotii</i> , etc. (60%-70%) (2010) * <sup>2</sup>		5000 t/ 1076 t* <sup>2</sup>		High

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SFA (Year Last Protocol)	Fishing Category	Fishing Gear	Target Species (Protocol)	By-catch species	Discard species and percentages	Effort limitation/Effort last year	Catch limitation/Catch last year	Remark	Impact level
Mauritania (2015)	No 2- "Black hake (non-freezer) trawlers and bottom longliners"	Bottom long line Bottom trawl for hake	Black hakes + fish	<i>Zeus faber</i> , <i>Lophius</i> spp., <i>Zenopsis conchifer</i> , <i>Helicolenus dactylopterus</i> , Sharks and Rays (9% in 2013)* <sup>2</sup> 25% for trawlers, 50% longliners (allowed in Protocol)	Trawlers: undersize hakes, Macrouridae, elasmobranchs, <i>Hoplostetus cadenati</i> , <i>Helicolenus dactylopterus</i> , invertebrates (24% in 2007-2011)* <sup>2</sup>		6000 t/ 2811 t (0 with longliners)* <sup>2</sup>		Low
Mauritania (2015)	No 3- "Vessels fishing for demersal species other than black hake with gear other than trawls"	Longline, fixed gillnets, handline, creels, seine for fishing for live bait	Demersal species other than black hakes	—	Not available		3000 t/0 * <sup>3</sup>		Low
Mauritania (2015)	No 6- "Pelagic freezer trawlers"	Pelagic trawl (freezers)	Small pelagics	Several demersal species, scabbardfish, several tuna species (3.1 % in 2013)* <sup>4</sup>	10-15%* <sup>4</sup>		250 000 t/ 118 318 t * <sup>3</sup>		Low
Mauritania (2015)	No 7- "Non-freezer pelagic vessels"	Pelagic trawl and purse seine for ind. fishing	Small pelagics	Fishing category not used in 2014	Fishing category not used in 2014		15 000 t/0* <sup>3</sup>	Fishing category not used in 2014	
Senegal (2014)	Deep water demersal species	Demersal or hake trawl	Deep-water hake ( <i>Merluccius senegalensis</i> and <i>M. polli</i> )	<i>Lophius vaillanti</i> , <i>Zeus faber</i> , Squaliformes, <i>Zenopsis conchifer</i> , <i>Chaceon maritae</i> (2.5% 2002-2005)* <sup>5</sup>	Undersized hakes, Macrouridae, elasmobranchs, <i>Lophius vaillanti</i> , invertebrates (17% in 2004)	2 vessels/	2000 t/		Low
Guinea-Bissau (2014)	No 1- "Freezer, fin-fish and cephalopod trawlers"	Standard otter trawls and other selective gears; outriggers	Fin-fish and cephalopods	Fin-fish trawlers: <9 % of cephalopod and crustaceans per fishing trip allowed. Cephalopod trawlers: <9 % of crustaceans per fishing trip allowed.	Not available	3500 GRT/year			

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SFA (Year Last Protocol)	Fishing Category	Fishing Gear	Target Species (Protocol)	By-catch species	Discard species and percentages	Effort limitation/Effort last year	Catch limitation/Catch last year	Remark	Impact level
Guinea-Bissau (2014)	No 2- "Shrimp trawlers"	Standard otter trawls and other selective gears; outriggers	Shrimps	<i>Octopus vulgaris</i> , <i>Sepia hierredda</i> , <i>Dicologlossa cuneata</i> , <i>Lophius vaillantii</i> <sup>*2</sup> 48% of fish and cephalopods in 2012 <sup>*4</sup> (<50% of fish and cephalopods allowed)	<i>Chlorophthalmus atlanticus</i> , <i>Pseudupeneus prayensis</i> , <i>Munida rutilanti</i> , <i>Cynoglossus canariensis</i> , <i>Ilisha africana</i> , <i>Synagrops microlepis</i> , etc. (67%-82%) (2011) <sup>*2</sup>	3700 GRT/year			High

\*1 Data (last year: 2014) from Faraj et al. (2015);

\*2 Data IEO (Spanish fleet);

\*3 Data (last year: 2014, 1st semester) from Comité Scientifique Conjoint APP RIM-UE (2014);

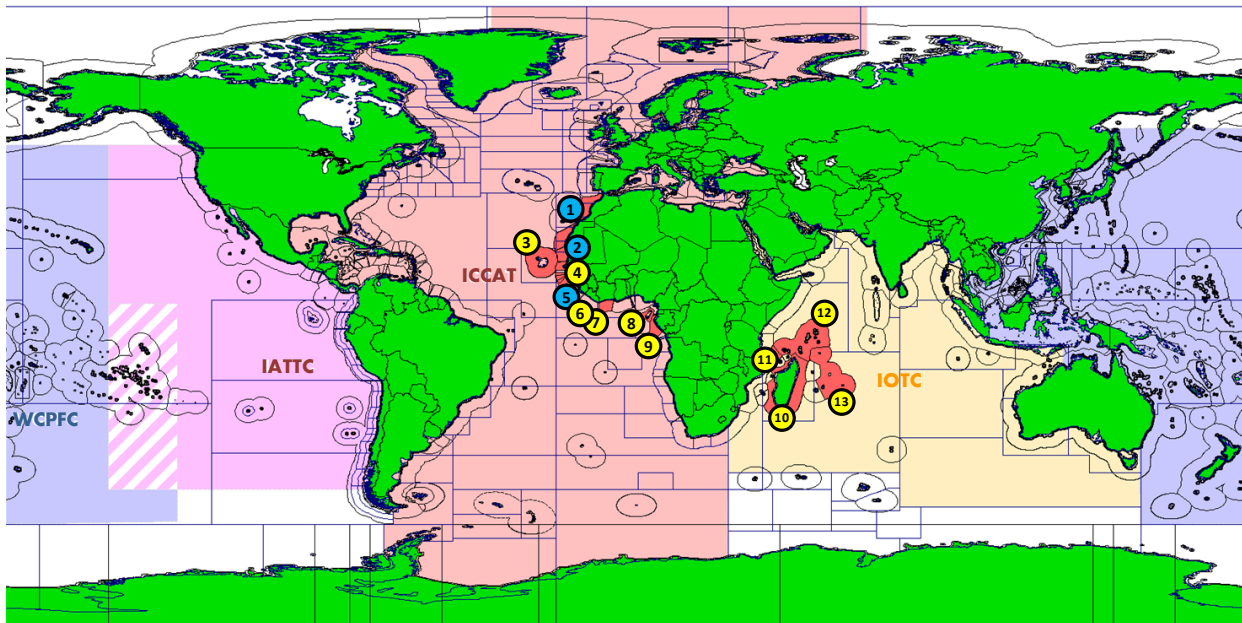
\*4 Data (last year: 2012) from Comité Científico entre a República da Guiné-Bissau e a União Europeia (2015).

### 3.3. Tuna SFPAs

#### 3.3.1. General information on SFPAs and stock status

Tuna SFPAs allow EU vessels to pursue migrating tuna stocks, as they move along the shores of Africa and through the Indian Ocean, and to fish for surplus stocks in that country's EEZ, in a legally regulated environment. These agreements also focus on resource conservation and environmental sustainability, ensuring that all EU vessels are subject to the same rules of control and transparency.

A map with the indication of the coastal States with Tuna SFPAs or SFPAs including a tuna component, at the time of drafting this report, is shown in Figure 4.



(1) Morocco (2) Mauritania (3) Cape Verde (4) Senegal (5) Guinea-Bissau (6) Liberia (7) Ivory Coast (8) Sao Tomé and Príncipe (9) Gabon (10) Madagascar (11) Comoros (12) Seychelles and (13) Mauritius

**Figure 4.-** World map, showing the coastal States with current Tuna SFPAs with the EU (in yellow) or SFPAs including a tuna fishery component (in blue). The Tuna RFMOs for the Atlantic (ICCAT), Indian (IOTC) and Pacific (WCPFC) areas are indicated.

The current situation of the Tuna SFPAs between the UE and West African, Indian and Pacific Ocean countries is summarized in Annex 1. For the Atlantic Ocean, the EU has currently 9 active SFPAs (with protocols in force) with third countries, specifically 5 Tuna agreements: Cape Verde, Ivory Coast, São Tomé and Príncipe, Gabon, Liberia; 3 Mixed Agreements with a Tuna component: Morocco, Mauritania and Guinea-Bissau; and 1 Tuna Agreement with a limited demersal component: Senegal. In the Indian Ocean, tuna SFPAs are active for Madagascar, Comoros, Seychelles, and Mauritius. The last protocol of the SFPAs in the Pacific Ocean (Kiribati) expired in September 2015.

Tropical tunas (bigeye, yellowfin, skipjack) are targeted by EU purse seine fleets mostly operating in the Atlantic and Indian Ocean tropical regions and represent highly valuable and strategic resources. At lower levels, swordfish is also exploited by European longline fleets.

Stocks assessments for tunas, billfishes and pelagic sharks are conducted within the framework of tuna RFMOs such as the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Indian Ocean Tuna Commission (IOTC) for the Atlantic and Indian oceans, respectively (see Figure 4).

Table 2 of Annex 2 includes information to be considered for the surplus revision in relation to the stocks data quality and availability, status, management measures and options:

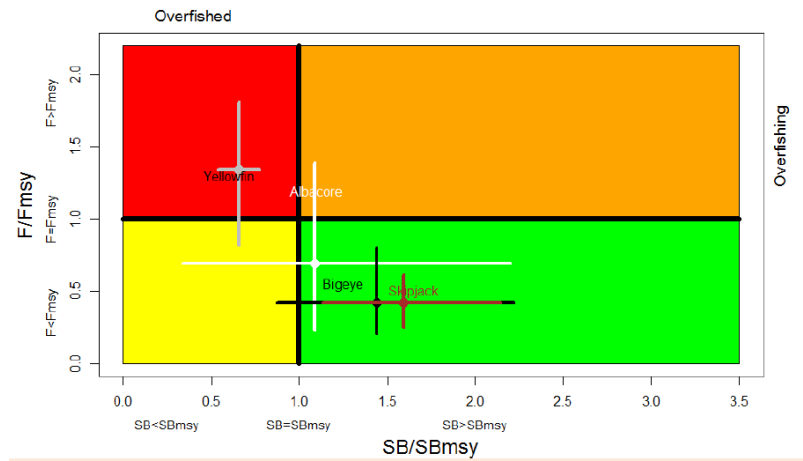
- **Stock status**

The state of the main stocks of tunas, billfishes, swordfish and pelagic sharks in the Atlantic and in the Indian Ocean are presented in Table 2 of Annex 2. The quality of the stock assessment models and diagnostics is strongly conditioned by the quality of the data submitted by each Contracting Party to the Convention and Cooperating non-Contracting Party, Entity or Fishing Entity (CPC) to ICCAT and IOTC, as well as by the knowledge on the species biology, the impact of environmental factors on the dynamic of the population and by the history of the exploitation system by different fishing gears. Consequently, even if the state of the stock is summarized into a Kobe plot for each species (see Annex 3-B), the comparison of plots between different species may be misleading as the level of uncertainty is not entirely comparable. It should also be noted that the apparent uncertainty represented sometimes in Kobe plot is conditional to the stock assessment model used.

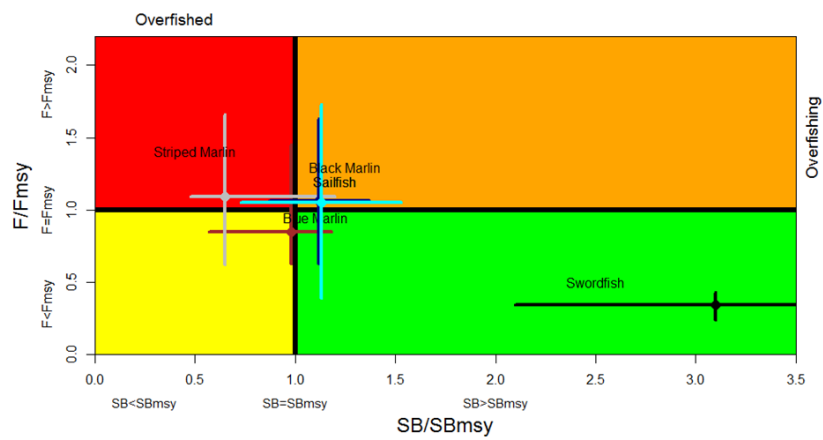
With these considerations in mind, it should be noted that the Atlantic stocks of skipjack (*Katsuwonus pelamis*), blue fin tuna (*Thunnus thynnus*) (considering scenarios of low and medium recruitment levels), swordfish (*Xiphias gladius*) in the North Atlantic, blue shark (*Prionace glauca*) both in North and South Atlantic and mako shark (*Isurus oxyrinchus*), are considered not to be overfished and not in overfishing situation. On the contrary, bigeye (*Thunnus obesus*), albacore (*Thunnus alalunga*) in the South Atlantic, black marlin (*Makaira nigricans*) and Atlantic sailfish (*Istiophorus albicans*) are both overfished and in overfishing situation, this representing 4 stocks of a total of 16 assessed stocks (25%) (see Table 2 of Annex 2). In summary, a total of 8 stocks are overfished and/or in overfishing situation, this accounting for 50% of the total assessed stocks.

Multi-stocks Kobe plots used in IOTC are presented in Figure 5, with the objective to depict in a simple form how Kobe plot may be used to follow the current status of the Indian Ocean stocks, even if different species/stocks status are not comparable as data quality, model types of model assumptions are different. Bigeye, skipjack and albacore are in the “green” quadrant of the Kobe plot, meaning that there is no evidence that overfishing is presently occurring and that the stocks are overfished, while yellowfin (*Thunnus albacores*) is in the “red” quadrant, indicating that the stock is overfished and that overfishing is occurring (Figure 5.A). Swordfish is also in the “green” quadrant of the Kobe plot for the whole Indian Ocean (Figure 4.B), although there is evidence of local overfishing for the swordfish stock in the SW Indian Ocean. The marlins and sailfish are in different status with presence of overfishing for black marlin (*Makaira indica*), and striped marlin (*Tetrapturus audax*) (Figure 4.B). Neritic tunas and mackerels (seerfishes) have become as important as or more important than the three tropical tuna species to most IOTC coastal States. There is no evidence that overfishing is presently occurring for the Kawakawa (*Euthynnus affinis*), which is in the “green” quadrant of the Kobe plot, but there is some evidence of overfishing for the longtail tuna (*Thunnus tonggol*) and the narrow-barred Spanish mackerel (*Scomberomorus commerson*) (Figure 5.C). Only 1 stock of the 10 assessed stocks, the striped marlin is considered both overfished and in overfishing, this representing 10% of the total. However, 5 stocks are overfished and/or in overfishing, this accounting for 50% of the assessed stocks.

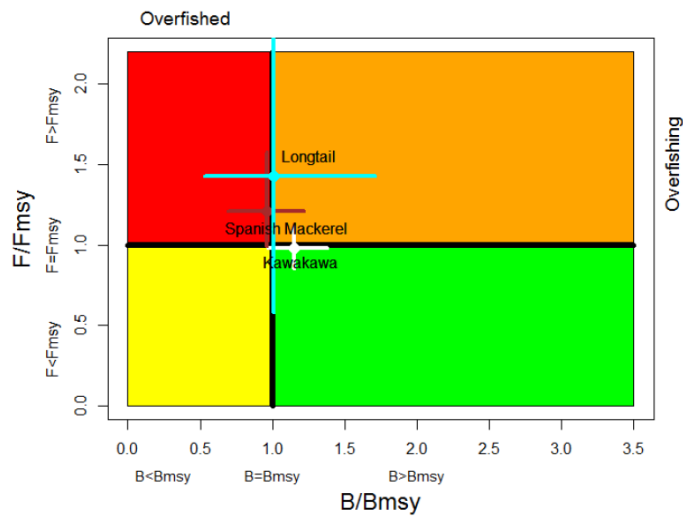
Multistocks Kobe plots are not used in ICCAT, although individual Kobe plots for Atlantic stocks are available in <http://www.iccat.int/en/assess.htm>.



**B**



**C**



**Figure 5.-** Results for the Kobe plot of assessed tuna stocks from the Indian Ocean<sup>6</sup>.

<sup>6</sup> For the sake of simplicity the estimates of the current stock status of different stocks/species have been plotted on the same figure. However, it must be kept in mind that data quality, biological knowledge and assessment models may differ between stocks and consequently individual Kobe plots are not fully comparable.

- **Data availability**

Nominal catch by gear and flag (Task I) have been collected by the tuna RFMOs since the 1950s for the Atlantic and Indian Oceans. Catch, effort and size (Task II) are submitted by CPC to tuna RFMOs by 1°square\*month for surface fleets (bait boat and purse seine) and by 5°square\*month for longline.

Biological parameters are commonly used (growth curves, sex ratio by age/size, migration rates) depending on the species under study. Natural mortality remains highly uncertain and is generally derived from bioenergetic relationships with size/age, tagging data or estimated directly within integrated stock assessment models.

CPUEs by gears and flags used are species and model-specific and may vary between successive stock assessments (see SCRS and Stock assessment species reports in ICCAT; Working Parties and Scientific Committee reports in IOTC).

A detailed description of data availability for main stocks assessed by ICCAT is provided in Anon. (2015).

- **Data quality**

Given the lack of direct estimates of the abundance (e.g., scientific survey indices) in tuna and tuna-like fisheries, the quality of the stock assessment process and the efficiency of the regulation measures taken for maintaining the shared stocks at their sustainable levels depends on the quality of the commercial data reported and the compliance of these regulations by all CPCs. For all these reasons, an important aspect of the tuna SFPAs is to reinforce cooperation between the two parties involved (EU and the coastal State), to monitor the fisheries and collect data at the scale of the regional fishery organisation, but also to routinely share relevant information in their fight against IUU fishing, e.g., IUU fleet lists, Consolidated List of Authorized Vessels (CLAV) and cross-checking transshipment information, as stated in the KOBE 3 meeting (Anon, 2011).

Some coastal States (i.e., Iran, Yemen, Indonesia, India, Mauritius in the Indian Ocean and Ghana -even if recent progress has been registered in the revision of historic data- and Guinea among others, in the Atlantic) lack an appropriate statistical network and/or administrative services capable to collect, correct, compile and submit the declarative data to the tuna RFMOs within the established deadlines. This is specifically the case for some artisanal fisheries (e.g., drifting gillnets) capturing large pelagic fishes in the Indian Ocean (which is the reason why the Low category for data quality was used, even though the data collected by the purse seine and longline fisheries are of good quality). This problem has accelerated in the recent years due to the increase in the overall catch attributed to artisanal fleets, especially in IOTC. Other industrial fleets belonging to countries without SFPA agreements, such as Ghana in the Atlantic, may have problems to perform multispecies correction in catch (ICCAT-Task I) and in the reallocation of catch/effort and size data by spatio-temporal strata (ICCAT-Task II). It should be noted that a good quality of 1° square\*month data is a key issue for defining efficient time-area restriction access or for implementing rules of surplus allocation by EEZ. Some EU fleets may also be considered as low quality data for ICCAT- Task II and by-catch information. In addition, unreported by-catch, discards and IUU catches constitutes a major problem in the assessment process.

The state of the art of the models used for tuna stock assessment has reached such levels of sophistication that the convenience of using more simplistic models able to assess the stock status with lower needs of data, parameters and assumptions is under discussion. The uncertainty in the tuna assessments coming from the models used is not as relevant as the uncertainty generated by the goodness of the quantity and quality of data available in relation to fish, fisheries and ecosystems. Data collection systems should be reinforced by: increasing sampling intensity, especially in many artisanal fleets; increasing the observers coverage in order to validate other sampling sources; enhancing tagging programmes to provide biological information for the assessments; promoting research on population dynamics; providing better definitions and quantification of the fishing effort; assessing the fleets catchability; and by a higher involvement of the industry in the RFMOs work.



- **Management measures**

Tuna RFMOs have developed different regulation measures for reaching the objectives they have adopted to maintain the stocks in suitable conditions (basically MSY and more recently the green quadrant of the Kobe plot). Table 2 of Annex 2 includes a review of the management measures (management plan or regulation) implemented for the tuna stocks by ICCAT and IOTC. This table includes the type of management measure and the short name of the reference text where this was established. A list of the completed management references is provided in Table 2 of Annex 4. The management options are considered as (i) defined, (ii) poorly defined or (iii) non defined, following the criteria explained in Section 2.1

Total Allowable Catch (TAC) is the management measure adopted for bluefin (*Thunnus thynnus*) (Eastern Atlantic and Mediterranean), bigeye (*T. obesus*), yellowfin (*T. albacores*), albacore (*T. alalunga*) (North and South Atlantic), swordfish (*X. gladius*) (North and South) in the Atlantic Ocean, and for yellowfin (*T. albacores*), and bigeye (*T. obesus*), in the Indian Ocean. In addition, a limit to licensed vessels has been implemented to restrict the fishing effort exerted on tropical and temperate tunas in the Atlantic and in the Indian oceans while minimum landing size/weight has been applied to swordfish and bluefin tuna (see Table 2 of Annex 2). The reduction of the fishing season (bluefin in the Eastern Atlantic and Mediterranean stock) or time area moratoria on FADs (for protecting juveniles of tropical tunas) and no-take areas have also been proposed or are currently in force. For several shark species, there are currently no-retention measures in place, including bigeye thresher (Atlantic and Indian Oceans), oceanic whitetip shark (Atlantic and Indian Oceans) and hammerheads (Atlantic). All these measures apply to the EU fleet fishing under SFPAs and in addition, the protocols of Tuna SFPAs (or Mixed SFPAs including tunas) indicate specific management measures addressed to the EU fleet, related to effort limitation (number of vessels authorized), authorized gears, gears characteristics, fishing zones, minimum sizes, limitation of by-catches, no retention of endangered species, etc (see Annex 1).

### 3.3.2. Review of the surplus concepts used worldwide and how they could be applied to highly migratory tuna species

The Surplus concept, within the context of Tuna SFPAs, was mainly discussed during the Workshop on the Surplus concepts. Main reviews and results are presented below:

In Article 4.1 (33) of the CFP (2013), Surplus is defined as that part of the allowable catch which a coastal State does not harvest, resulting in an overall exploitation rate for individual stocks that remains below levels at which stocks are capable of restoring themselves and maintaining populations of harvested species above desired levels. The Article 4.1 (37) of the CFP defines "Sustainable fisheries partnership agreements" as international agreements concluded with another state for the purpose of obtaining access to waters and resources in order to sustainably exploit a share of the surplus of marine biological resources.

The Surplus concept is not applicable for tuna and tuna-like species<sup>7</sup> which are highly migratory and mainly found in areas beyond national jurisdictions. For these reasons, as stated by the UNFSA and UNCLOS, the determination of the tuna and tuna-like resources available for access should take into account scientific assessments conducted at the regional level as well as conservation and management measures adopted by relevant tuna RFMOs. Tuna RFMOs should agree allowable catches based on the best available scientific advice and allocate catches by member States on a regional wide basis. Due to its highly migratory characteristics, it is difficult to evaluate the coastal potential catch of tunas, particularly as in the Atlantic and Indian oceans the major part of their catch is taken outside national EEZs. Also, assuming uniform distribution of the stock, fishing mortality in the high seas would affect the stock the same as fishing mortality in the coastal States EEZs. In

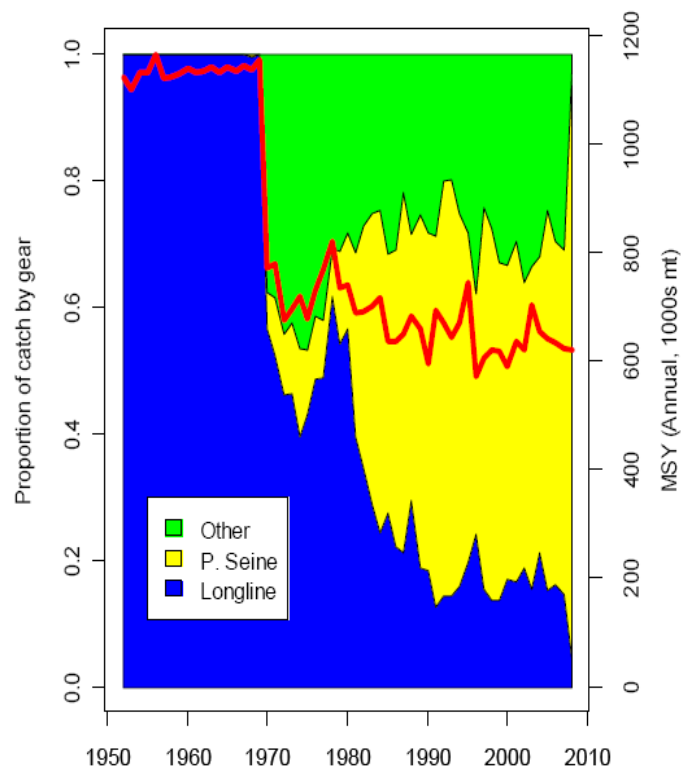
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<sup>7</sup> "Tuna and tuna-like species" is used *sensu lato* and refers to all highly migratory species managed by the tuna RFMOs, including tunas, billfishes, other highly migratory bony fishes and sharks.

addition, the spatial distribution of the age classes of the population by EEZ is in general unknown and it is unclear how to account for the multispecies characteristics of the different fisheries by area. This situation is the most common in most tuna and tuna-like like species, but may differ slightly for some particular cases as for example some more coastal hammerheads (e.g. scalloped hammerhead, *Sphyrna lewini*), that seems to have been traditionally more impacted by coastal States within their EEZs.

For all of these reasons in the case of highly migratory fish stocks, the determination of the resources available for access should take due account of scientific assessments conducted at the regional level as well as conservation and management measures adopted by relevant RFMOs (Article 31, CFP).

As explained in Section 3.1, computing surplus (S) relies on two elements, the stock's potential (sustainable) catch (Y) and the coastal State potential catch (C):  $(S=Y-C)$ . In most of the tuna RFMOs the sustainable catch (Y) is based on estimates of the Maximum Sustainable Yield (MSY). In many tuna fisheries MSY, however, is not a fixed value and varies over time (e.g. due to change in productivity, depending on the type of stock assessment model used). Also MSY from any given stock is selectivity dependent and will change depending on the mix of the gears operating in a fishery. The "global maximum catch" is achieved if a fishery can fish only on the age group for which there is the greatest positive differential between biomass added by growth, and biomass lost by natural mortality (scaled by numbers at age). However, this is very difficult to achieve as most stocks are harvested by multiple fishing gears, including gears that tend to remove very young fish (before yield per recruit potential is achieved) or older fish (where natural mortality based loss of biomass outweighs gains from growth). This is shown for a theoretical tuna like stock in Figure 6.



**Figure 6.-** Changes over time of MSY (red line) due to change in gear allocation and selectivity for a theoretical tropical tuna like species.

Because the concept of surplus cannot be applied to high migratory species, alternate indicators should be developed to assess the potential effect of local catch (species, size, spawners, etc) on the status of the global stock, as well as the adverse effects of the global overexploitation on the local catch. From global to local approaches will be discussed in a below section of this report.

### ***Review of current methods used in catch allocation in tuna RFMOs***

The five tuna regional fisheries management organisations: the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Indian Ocean Tuna Commission (IOTC), the Inter-American Tropical Tuna Commission (IATTC), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), and the Western and Central Pacific Fisheries Commission (WCPFC) have progressively adopted different methods to provide access use or presumptive rights to fish, such as limits on the number of vessels, vessel days, overall capacity, or as a share of a total allowable catch (TAC) (Grafton et al., 2006). The most commonly used for allocation criteria are historical catches and consideration for coastal States access.

For instance IATTC adopted in 2002 a resolution with the aim to limit the capacity of the tuna fleet operating in the Eastern Pacific Ocean (EPO) through the IATTC Regional Vessel Register (RVR) and to precise how vessels may be added to or removed from the Regional Register. Furthermore, IATTC has explored the use of complementary management options, such as seasonal closures of the tuna fishery. ICCAT integrated into the allocation procedure the stock status, the historical catches, the proximity to coastal States, the need to provide data for stock assessment, and also some considerations for small and developing fisheries. WCPFC adopted a ten-criteria approach for allocation which includes the status of stocks, historical catch, the needs and aspirations of small-island developing States in the Convention area, the needs of dependent coastal communities, compliance and more recently a vessel day scheme to limit total allowable effort in the purse seine fisheries. However, there is no guidance as to how these criteria are to be applied or their relative weightings. The IOTC has used gross registered Tonnage to limit the expansion of the fleets, with catch data being used to prepare allocation plans. Recently, the IOTC has established a more formalized approach to allocate catch of a tuna species using a process called the Technical Committee on Catch Allocation Criteria (TCAC). While no hard “caps” have been agreed to as yet; the CPCs are in the process of negotiating catch allocation since 2011; in addition a fleet development plan has been presented to the IOTC Commission. The CCSBT established country allocations for Southern Bluefin Tuna (SBT) for its three original members. The global TAC is based on a management procedure which ensures that the spawning biomass of SBT reaches the recommended rebuilding target.

Furthermore, Article 11 of the United Nations Fish Stock Agreement (UNFSA), builds on the earlier UN Convention on the Law of the Sea (UNCLOS), lists several other possible criteria for consideration when determining how allocations might be provided to new members, including the status of the stocks and the current level of fishing effort. However, as stated by Grafton et al. (2006), country allocations may not be effective, and may lead to substantial underreporting of catch and related sustainability problems. In addition, coastal States and CPCs without historically large catches argued for a change in the allocation mechanism

### ***Revision of the potential criteria for calculating allocation:***

With the objective to ensure an equitable distribution of the catches and fishing opportunities among coastal States and long distance fleets, belonging to others CPCs, the implementation of a TAC must be accompanied by the development of a quota allocation system based on a weighted combination of different criteria.

Among the potential criteria, the EWG-Tuna recommended considering the following:

- Proportion of specific life-stages (juveniles/adult) in the historic catch in agreement with the sustainability of the stock,
- Bio-ecological relevance of the EEZ for the targeted species (e.g., spawning area, nursery, migration path),
- Ratio of the EEZ to the total surface occupied by the stock,
- Socio-economic indicators: contribution that fisheries make to the national diet (i.e., food security), to employment and to gross domestic product (such types of indicator are currently available today (see Barange et al., 2014),

- Adaptability of the fleets in terms of potential changes in target species, fishing gears, fishing grounds, specifically resulting from the implementation of a regulation measure (e.g., a time-area ban affecting directly its EEZ),
- Quantitative and qualitative contribution of the fleet/State to the collection of the inputs used in tuna stock assessment models (fisheries data, information on fish biology, etc.),
- Degree of compliance of the fleet/State with tuna RFMOs management measures and data submission,
- Contribution of the fleet/State in terms of good fishing practices (e.g., reducing discards, mitigation of by-catch for endangered species),
- Once a TAC has been established a “pay as you polluted” rule allowing to penalize the countries responsible for the poor state of a stock.

The different criteria could be used into a simple equation to calculate first the individual quota allocation (IQA) as the average catch (AvC) of the CPC  $i$  over the reference period, weighted by the different criterion  $j$ , as follows:

$$IQA_i = AvC_i \sum W_j.$$

The percentage of the TAC allocated to a CPC could be performed then on the basis of the ratio of its IQA  $i$  to the sum of the IQAs for all CPCs. It must be stressed that the relative value of each weight ( $W_j$ ) should be defined during to the negotiation step between the different CPC partners, as many of the criteria are outside the scope of the fishery science.

***Definition of the time period of reference for calculating the anteriority of a fleet in terms of allocation (e.g., catch, effort) according to the life span of the exploited species and the state of the stock***

Considering that the period of years of reference used to calculate the anteriority of catches is not homogeneous between species and tuna RFMOs, the EWG-Tuna suggested that this procedure should be clearly defined into a transparent process. It makes sense to assume that the years of reference take into account the lifespan of the species and the response of the stock status to management measures. In addition, it is recommended to use the same years of reference for all countries rather than adopting different periods based on the years of the best catches for each country (which reinforces inequality between countries).

***From global to local: the “Glocalisation” approach***

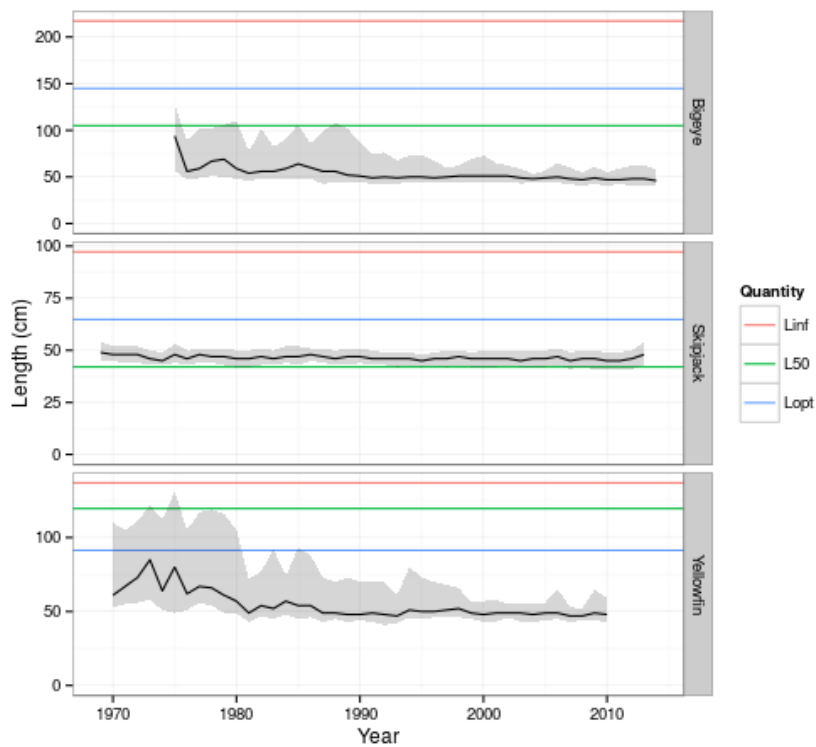
While surplus for tuna and tuna like species do not make much sense, as demonstrated previously, access agreements developed between coastal countries and the EU in cases when countries would like to reallocate their tuna quota developed under the tuna RFMO mandates, should consider the concept of “Glocalisation” (i.e., from global to local); thus alternate indicators to assess the impact of fishing pressure at a local scale (i.e., at an area scale level, for a specific fishing gear, for a fishing mode, etc) should be developed.

In Europe, the Marine Strategy Framework Directive (MSFD) has placed a legal requirement on Member States to not only consider the fishing pressure and the likely response in the system state to that pressure but also the impact of fishing on population demography, genetics and General Ecosystem Status (European Commission, 2010, descriptor 3). It is therefore important to develop indicators that help integrate these into management. For example, we look at different indicators related to growth and recruitment overfishing, which may be used among other for assess the fisheries at local levels. For growth overfishing  $L_{opt}$  (the size at which a year-class achieves its greatest biomass) could be investigated to be used (Figure 7).

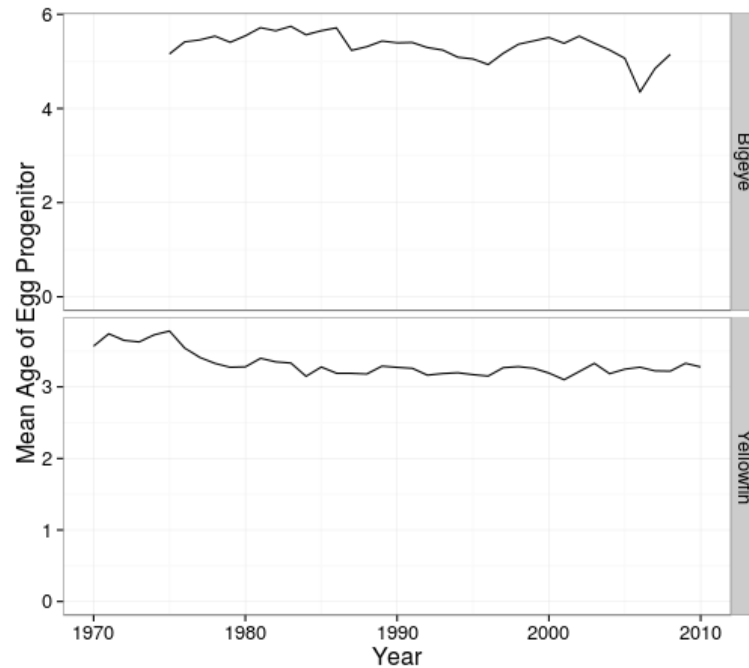
For recruitment overfishing two indicators may be used:  $L_{50}$  (the size at which 50% of the population reaches sexual maturity); and the mean age of the progenitor of an egg, an index of the mean age contributing to Spawning Reproductive Potential (SRP) (Kell et al., 2015). An illustration of the potential importance of maternal effects is evaluated in Figure 8, which shows the mean age of egg progenitor for bigeye and yellowfin, from the equation:

$$A = \frac{\sum_{a=1}^m a n_a f_a}{\sum_{a=1}^m n_a f_a}$$

where  $a$  is age, and  $f$  fecundity at age.



**Figure 7.-** Change over time of the average length of the catch (shading represents the 25th to 75th percentiles) with reference to the optimum length (Lopt, indicated in blue) and length at first maturity (indicated in green) for the 3 main species of tropical tuna (bigeye, skipjack and yellowfin) in the Atlantic ocean. The maximum size of each species (Lmax) is also indicated in red.

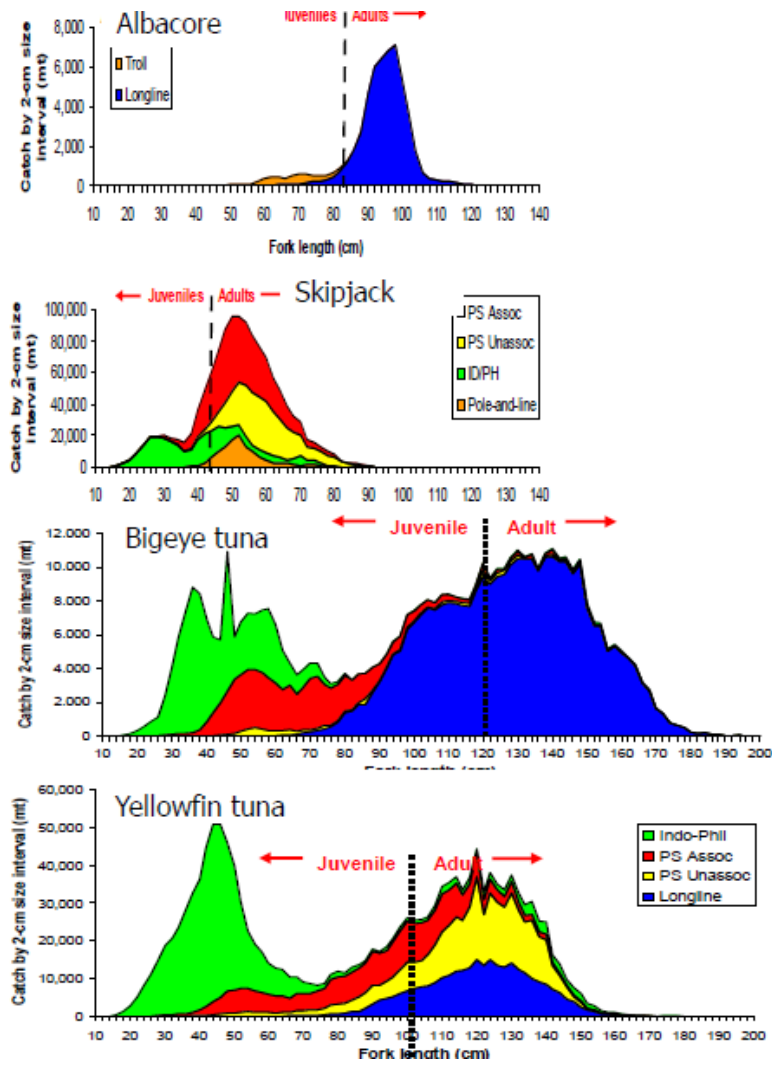


**Figure 8.-** Change over time of the mean age of the progenitor of an egg for two species of tropical tuna.

Thus a use of reference points could be essential part of management, and developing some local size indicators of populations being exploited may be a key part of the management framework for the EU. Some examples of how this may work are shown below.

Exceeding a reference point is classified as overfishing which can take a number of forms; for example, target, growth, recruitment or economic overfishing (Rosenberg and Restrepo, 1996). The first type is associated with a *target*, growth and recruitment overfishing are generally associated with *thresholds* or limit reference points and economic overfishing may be expressed in terms of either targets or limits, depending on the definition used.

It was evidenced that there is a close relationship between the current status of the stocks, age/size to maturity, and the level of catch from juvenile age classes. Even if the level of natural mortality differs between tuna species, it was showed that the stocks with relatively little juvenile fishing mortality (i.e. which concentrate on catching adults) are in better condition than the stocks for which catch of juveniles are important. These considerations are depicted in Figure 9, where it should be noted that juvenile bigeye tuna mortality is not only an issue for purse seines (PS) associated sets and Indonesia and Philippines (ID/PH) fishery, but also the longline (LL) fishery.



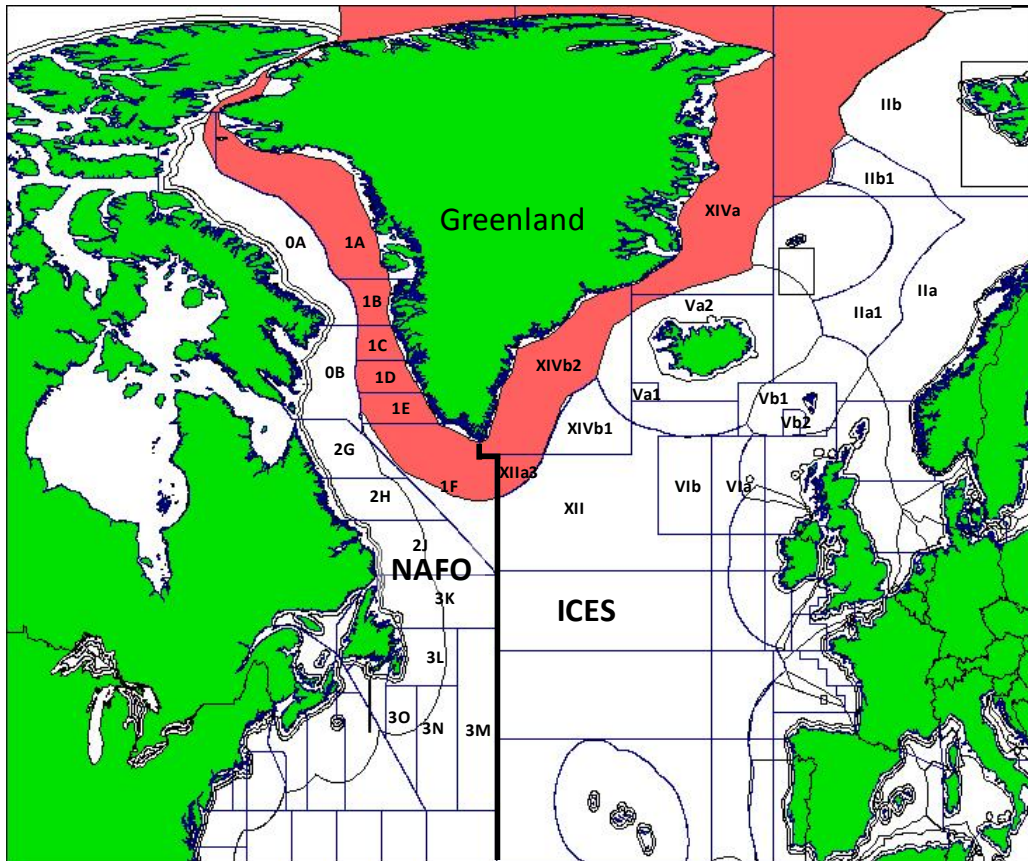
**Figure 9.-** Catch at size for the main tropical tuna species in relation with the size at first maturity (acknowledgement WCPFC).

### 3.4. SFPA with Greenland

#### 3.4.1. General information on SFPAs and stock status

The current Protocol for the SFPA with Greenland expired recently (31<sup>st</sup> of December 2015) and a new Protocol has already been agreed and signed recently (EU, 2015b), although it awaits committee decision. A brief description and a list of the stocks they include are shown in Annex 1. There are fewer stocks included in the new version (European Commission, 2015) that had not been fished lately by the EU.

Figure 10 shows the map of the Greenlandic EEZ with the NAFO and ICES statistical areas overlapped.



**Figure 10.-** Map of the North Atlantic showing the Greenland EEZ (red), with the ICES and NAFO statistical areas overlapped.

Most of the stocks considered are transboundary, straddling stocks and advice is provided for the whole distribution area of the stock, of which the Greenland EEZ is often a very small part. This is the case for shrimp, redfish, capelin and Greenland halibut. In these cases we need to turn to official agreements for detailed information on how the TAC is distributed among coastal States and other fishing nations. It must also be borne in mind that in certain cases management units do not define isolated populations. For example, it is known that the distribution pattern of the East Greenland cod stock is very complex, with juveniles (age 0 to 3 y) mainly found in West Greenland, young cod (age 4-6 y) in South Greenland and mature individuals in East Greenland north of 63°N, with a variable proportion of them migrating to Iceland. This leads to additional constraints in the assessment process and management (ICES, 2015a) and complicates the definition of surplus in the context of transboundary stocks.



Information on data quality/availability, stock status and on management measures currently in place for each stock and/or fishery was compiled for each stock included in the EU – Greenland Protocol of fishing opportunities. It must be noted that what is referred to in the Protocol as “stock components” are in several cases groupings of two management units. This is the case for example for cod, pelagic redfish and demersal redfish. This apparently small detail leads to misinterpretations because data quality and / or stock status may not be homogeneous within each category. For example, in the case of demersal redfish, one of the components has medium quality data and the stock seems to be declining while the other is a data rich stock with sustainable status (see Table 3 of Annex 2).

- **Stocks:**

The current Protocol includes 13 stock components (Table 7), but some of these categories do not quite match the corresponding management units defined for assessment purposes by ICES and NAFO, due to changes implemented in the light of new scientific evidence. Thus the listed stock categories include a total of 17 management units (14 management units for which advice is regularly provided by ICES or NAFO, plus 3 stocks regulated at national level) (Table 3, Annex 2). These three latter stocks are excluded from the proposal for the upcoming Protocol, valid from 1<sup>st</sup> of January 2016 (EC, 2015).

**Table 7.-** Nomenclature used for the different stocks included in the SFPA with Greenland Protocol and advisory bodies.

Stock component as in protocol	Management unit
Greenland Halibut in ICES Subareas XIV & V	Greenland halibut ( <i>Reinhardtius hippoglossoides</i> ) in Subareas V, VI, XII, and XIV (Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland)
Atlantic Halibut in ICES Subareas XIV & V	NA
Northern Prawn in ICES Subareas XIV & V	Northern shrimp in Denmark Strait and off East Greenland
Capelin in ICES Subareas XIV & V	Capelin ( <i>Mallotus villosus</i> ) in Subareas V and XIV and Division IIa west of 5°W (Iceland and Faroes grounds, East Greenland, Jan Mayen area)
Grenadier spp. in ICES Subareas XIV & V <sup>(1)</sup>	Roundnose grenadier ( <i>Coryphaenoides rupestris</i> ) in Mid-Atlantic Ridge (Xb, XIIc, Va1, XIIa1, XIVb1) Roundnose grenadier ( <i>Coryphaenoides rupestris</i> ) in all other areas (I, II, IV, Va2, VIII, IX, XIVa, and XIVb2)
Grenadier spp. in NAFO Subarea 1	Roundnose grenadier in Subareas 0+1
Cod in ICES Subarea XIV and in NAFO Subarea 1 <sup>(2)</sup>	Cod in ICES Subarea XIV and in NAFO Subarea 1F (East Greenland, South Greenland) Offshore cod in West Greenland (NAFO Subdivisions 1A-E)
Pelagic redfish in ICES Subareas XIV & V and in NAFO Subarea 1F <sup>(3)</sup>	<i>Sebastes mentella</i> in Subareas V, XII, and XIV and NAFO Subareas 1+2 (Shallow pelagic stock < 500 m) <i>Sebastes mentella</i> in Subareas V, XII, and XIV and NAFO Subareas 1+2 (Deep pelagic stock > 500 m)
Demersal redfish in ICES Subareas XIV & V and in NAFO subarea 1F	<i>Sebastes mentella</i> in Division XIVb (Demersal) <i>Sebastes norvegicus</i> in Subareas V, VI, XII, and XIV (Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland)
Greenland Halibut in NAFO Subarea 1 – South of 68° North	Greenland halibut in SA 0 + Div. 1A Offshore and Div. 1B-1F
Northern Prawn in NAFO Subarea 1	Northern Shrimp in Subarea 1 and Div. 0A
Atlantic Halibut in NAFO Subarea 1	Atlantic halibut in W Greenland
Snowcrab in NAFO Subarea 1	Snow crab in West Greenland

<sup>(1)</sup> This stock includes two management units according to ICES, based on what are believed to be natural restrictions to dispersal of life stages. The available evidence for stock identification was reviewed in 2007 but the results were not conclusive and there was no basis to change the management units (ICES, 2015b).

<sup>(2)</sup> The offshore cod stock was split into two management units in 2014, according to results from tagging experiments that showed that there are two distinct spawning stocks spatially separated at roughly the NAFO 1F northern limit (ICES, 2015c).

<sup>(3)</sup> The pelagic redfish stock in the Irminger Sea was divided into two management units in 2009 based on the results of the Workshop on Redfish Stock Structure, where genetic information and parasite patterns were analysed (ICES, 2009). The shallow pelagic redfish is currently under moratoria.

Hereafter this section uses the word “stock” in reference to the management units defined by advisory bodies (ICES and NAFO) because data quality and / or stock status are not always the same for the management units included in the same category as listed in the Protocol.

Of the 17 stocks currently available to EU fleets, 9 (corresponding to 7 Protocol categories) were fished, and the grenadiers were caught as by-catch in the Greenland halibut fishery. Actually, the by-catch quota for grenadier is given so that the entire Greenland halibut TAC can be taken. . The remaining 5 stocks (West and East Greenland Atlantic halibut, offshore cod in West Greenland, shallow pelagic redfish and snowcrab) were not fished.

- ***Transboundary / straddling / discrete high seas stocks:***

According to the FAO Code of Conduct for Responsible Fisheries definitions of shared stocks (see Section 2.1), the current Protocol includes several transboundary stocks (Greenland halibut, Northern prawn, capelin, cod, redfish) and discrete high seas stocks (roundnose grenadiers), whose distribution is detailed below.

- ***Data quality and availability***

Survey data are abundant in Greenland. The shrimp survey started in West Greenland in 1988, and has also been used to assess groundfish. East Greenland was surveyed several years in the 1980s and 1990s, until a new survey started in 2008. Data from the earlier surveys are however not comparable, as explained below. The German Groundfish survey started in 1982, targeting mostly cod and redfish in West and East Greenland. Greenland started its own demersal surveys in 1992 (West Greenland), 1998 and 2008 (East Greenland, also targeting cod, Greenland halibut and redfish). Greenland halibut has also been targeted by specific surveys in different periods and different spatial coverages. In general, the directed surveys in Greenland (shrimp, cod, redfish and Greenland halibut) have not all been carried out for a long time and annually, or surveyed area and /or methods have changed with time, so that results from different surveyed periods cannot be compared. For some stocks fishing statistics lack quality due to length of the data series, data aggregation, misidentification of species, spatial resolution, etc. Greenland fisheries have the added issues of a large EEZ, very limited human resources, adverse climatic conditions for good part of the year and environmental conditions characterised by the alternance of distinct climate episodes that profoundly affect its marine resources (Buch et al., 2004).

Despite the shortcomings, the different methods currently employed in the assessment and evaluation of resources aim to optimize the available information (hence the ICES effort leading to the evaluation protocols for Data Limited Stocks, ICES, 2012a), and factors known to have an impact on any given stock are included in the models when possible, as for example predation (i.e. of cod on shrimp) and cannibalism (in cod stocks).

The situation of the different stocks included in the Greenland SFPA Protocol is described as a necessary departure point for a better estimation of surplus (see Table 3 of Annex 2). Categorization of data quality follows the ICES approach for Data Limited Stocks (ICES, 2012a), and NAFO descriptions for the West Greenland stocks (NAFO, 2014).

- **Stock status**

The classification of stock status is based in the ICES basis for advice (ICES, 2015a) and NAFO (2015a) nomenclature, to keep consistency with the original sources of information. ICES uses specific terminology and pictograms to describe stock status (Annex 3-C), with the aim of avoiding misinterpretation, but also to match legal descriptions as used in the CFP. Details on the basis for advice are published annually with the advice (General Context of ICES Advice). Wording, however, varies according to the approach used for advice (MSY, precautionary approach or existing management plans). The tables with ICES terminology can be found in Annex 3-C. NAFO publishes annually an annex titled "Guidance for providing advice on Stocks Assessed with an Analytical Model", but rather than describing the advice protocol, the document answers the questions from the Fisheries Commission (NAFO, 2015b). The status of each Greenland stock included in the SFPA is indicated in Table 3 of Annex 2.

- **Management**

All the offshore stocks in the Greenland EEZ are managed with licenses and TACs. The TAC is set by NEAFC in the case of redfish within its regulatory area. Description of technical measures such as fishing gear specifications are out of the scope of this report.

For shared stocks in the North West Atlantic, for which advice is provided by ICES, TAC is set by the EU Council of Ministers and the relevant coastal States.

For shared stocks in the Davis Strait (West Greenland), advice is provided by NAFO, and there is a tacit agreement between Canada and Greenland for splitting 50:50 the set TAC for Greenland halibut, taking as divisory line for their respective EEZs the mid-line where there is less than 400 nm between the two countries. This is not applicable to cod because depth in the Davis Strait acts as a physical barrier that prevents mixing of the Greenland and Canada cod populations.

In Greenland, the Ministry of Fisheries, Hunting and Agriculture (MFHA) has overall responsibility for fisheries policy and the management of fish resources in Greenland. Detailed information on fisheries governance can be found in POSEIDON et al. (2014).

The exceptions in the current protocol are Atlantic halibut, managed by Greenland and Iceland within their EEZs, since this stock is not evaluated by ICES or NAFO, and the snowcrab, managed by Greenland. Iceland has forbidden all directed fishing of Atlantic halibut within its EEZ due to the poor state of the stock (Hafrannsóknastofnunin, 2015<sup>1</sup>). The Greenlandic stock used to be evaluated in NAFO by request until 2004 and the last year with registered catches was 2004. Atlantic halibut is now a very rare species and most likely it was deemed unnecessary to keep it in the protocol even as a by-catch species. Regarding the snow crab, this is a small local inshore trap fishery in West Greenland that is managed with TAC and seasonal closures (Burmeister, 2010), included in the previous protocol as an experimental fishery. However, catches have been very low (H. Siegstad, pers. comm.) and insufficient as to offer fishing opportunities to other countries

NAFO provides advice for Greenland halibut in West Greenland and Northern shrimp (both West and East Greenland), and ICES for the remaining stocks: Greenland halibut in East Greenland, capelin, grenadiers, cod, pelagic and demersal redfish.

The advice follows different approaches depending of the quality and quantity of available data. Thus for Greenland halibut off East Greenland, which is a data rich stock, advice is on the basis of the MSY approach. For most of the remaining stocks, however, advice is based on the precautionary approach (capelin, roundnose grenadier on the Mid-Atlantic ridge, offshore cod in West Greenland, cod in East, South Greenland, pelagic redfish and demersal redfish (*S. mentella*). The precautionary approach with precautionary buffer is applied to roundnose grenadier in all other areas and cod off East Greenland, to which the uncertainty cap is applied as well. The demersal redfish (*S. norvegicus*) is evaluated according to its management plan. Advice for Greenland halibut and Northern shrimp off West Greenland is also based in the NAFO Precautionary approach framework, but for Northern shrimp off East Greenland advice is qualitative.

In general, the SFPA Protocol allocates the EU fleet catches of the different stocks (as listed in the Protocol, see Annex 1) assuming that stock size is above a threshold size also indicated in the text. Other management measures concerning fishing zones, by-catch and discards are established.

Management measures implemented for each stock included in the SFPA are shown in Table 3 of Annex 2.

The available information for the stocks included in the Protocol regarding these aspects is described below:

**Greenland halibut in ICES Subareas XIV & V (ICES: Greenland halibut (*Reinhardtius hippoglossoides*) in Subareas V, VI, XII, and XIV (Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland)**

- **Distribution:** this is a transboundary stock. Greenland halibut in Iceland and Faroes grounds, West of Scotland, North of Azores, East of Greenland and the NEAFC regulation area (ICES, 2015c), constitutes a single management unit because stock structure and connectivity between these populations are not well understood yet, and basic biological information is also very scarce (ICES, 2013a).
- **Data availability:** survey data are available since 1998 in the case of Greenland. Iceland counts with survey data since 1996, biological samples from commercial catches and landings from international fleets and Icelandic trawlers operating within the Icelandic EEZ, although fishery statistics prior to 1995 are considered unreliable. The survey indexes from Greenland and Iceland are combined for evaluation (ICES, 2015d).
- **Data quality:** this is a **data rich** stock, categorized as **H** (High data quality, Table 3 of Annex 5).
- **Stock status:** Stock size is within safe limits, with full reproductive capacity. Catches in XIV have been on average stable since the late 1990s, oscillating between 20000-30000 t. The stock is evaluated according to the MSY approach. Fishing mortality is appropriate and the stock is **harvested sustainably** (ICES, 2015d).
- **Management measures:** they are **well defined**. A management plan was signed by Greenland and Iceland in 2014, by which in absence of a Harvest Control Rule (HCR), both countries accept ICES advice to set their TAC according to the following allocation: 37.6% for Greenland, 56.4% for Iceland and 6.0% for other nations (from both XIV and Va), and the possibility to transfer of up to 10% of the TAC to the following year (ICES, 2015d).

**Greenland halibut in NAFO Subarea 1 – South of 68° North (NAFO: Greenland halibut in SA 0 + Div. 1A Offshore and Div. 1B-1F)**

- **Distribution:** this is a transboundary stock, known in NAFO as Greenland halibut in SA 0 + Div. 1A Offshore and Div. 1B-1F (although advice is given separately for 0A + Divs 1AB, and 0B + 1CF), and it spreads over the Canadian and Greenland EEZ (NAFO Subareas 0 +1) (Jørgensen and Treble, 2015).
- **Data availability:** The stock is monitored by several surveys with different spatial coverage and targets: the Greenlandic Greenland halibut surveys in Divs. 1C-1D, since 1997; and the Baffin Bay survey (Div. 1A), carried out in 2001, 2004 and 2010; the Canadian surveys in Baffin Bay (Div. 0A) and Davis Strait (Div. 0B), conducted seven years since 1999; the Greenlandic shrimp survey in Divs.1A-1F since 1988. A combined standardized CPUE series from Div 0A+1AB is estimated. There are logbooks starting in 1987 for Divs. 0A and 1CF, and since 2000 for Divs. 1AB. Biological sampling from commercial catches is rather variable among years (Jørgensen and Treble, 2015).
- **Data quality:** advice for this stock is provided by NAFO and it is thus categorised in a different manner. NAFO considers this to be a **data limited** stock (**M**), for which advice is based on

qualitative evolution of stock biomass trends compared to a reference point and recruitment indices. The assessment is considered data limited and as such associated with a relatively high uncertainty (NAFO, 2015a). Two TACs are set for the northern ( 0A + Div 1AB) and the southern (0B + 1CF) regions with the only aim of distributing the fishing effort (O. Jørgensen, pers. comm).

- **Stock status:** the Greenland halibut stock in Davis strait is split into two management units, SA0+ Div 1AB and Div 1C-1F since 2002, and they are monitored by different surveys. Stock status in 0A+1CD is stable and trawlable biomass well above reference points (NAFO, 2015a):
- **Management measures:** they are **defined**. This stock is managed according to the NAFO Precautionary Approach protocol and it has reference points (Blim, set as 30% of the mean biomass index, estimated from surveys conducted between 1997-2012 in Div. 1CD and 1999-2012 in Div. 0A-South) (NAFO, 2015a). Canada and Greenland split the TAC in equal parts every year by tacit agreement, using as divisory the mid-line where distance between both countries is less than 400 nm. There is no management plan.

#### **Cod in ICES Subarea XIV (ICES: Cod in ICES Subarea XIV and in NAFO Subarea 1F-East Greenland, South Greenland)**

- **Distribution:** this is a transboundary stock. Cod is listed in the Protocol as cod in ICES Subarea XIV and in NAFO Subarea 1. However, this denomination includes the two newly defined offshore cod management units, as agreed upon in WKICE (ICES, 2015c), one of them being the East Greenland, Southeast Greenland cod, connected to cod populations off SE Iceland and offshore West Greenland cod, now called cod in ICES Division XIVb and NAFO Division 1F), and the West Greenland stock (cod in NAFO Divisions 1A-1E) (ICES, 2015c).
- **Data availability:** there are survey data from Greenland (since 2008) and Germany (since 1982). Sampling of commercial catches shows a large annual variability in coverage. There are logbooks since 1975, save for the years after the stock collapse in the 1990s (ICES, 2015c).
- **Data quality:** this is a **data limited stock**; category 3, more specifically category 3.2, defined as those stocks for which assessment is based on survey trends but there is no survey based proxy for MSY Btrigger and F values or proxies are unknown (ICES, 2012a). Therefore, this is defined as **M** (Medium data quality) in Table 3 of Annex 2.
- **Stock status:** stock size and SSB are **unknown but likely low**. The stock collapsed in 1990 and has shown signs of recovery since 2005, but fishing pressure is unknown (ICES, 2015d).
- **Management measures:** management options are **defined** for this stock, with catch limits. There is a management plan pending ICES evaluation. Catches are limited to 10000 t from 2014 to 2016, and the allocation to Greenland, Norway, Faroes, and EU is done on an annual basis (ICES, 2015d). Greenland sets unilaterally the TAC within its EEZ.

#### **Cod in NAFO Subarea 1 (ICES: Offshore cod in West Greenland (NAFO Subdivisions 1A-E)**

- **Distribution:** this is a Greenlandic stock because depth in the Davis Strait acts as a barrier that prevents any cod migration between Greenland and Canada. However, this denomination includes the two newly defined offshore cod management units, as agreed upon in WKICE (ICES, 2015c), one of them being the West Greenland stock (cod in NAFO Divisions 1A-1E), so small nowadays that it is mostly made up by cod originary from East Greenland and Iceland, which migrate out of West Greenland as they approach maturity (ICES, 2015c).
- **Data availability:** There are survey data from Greenland since 1992 and from the German groundfish survey (which targets cod) since 1982. Commercial catches are also routinely sampled, and there are logbooks since 1973 but since the fishery ceased in 1991 they cannot be used for assessment (ICES, 2015c, 2015e).
- **Data quality:** this is a **data limited (M)**, category 3.2 stock.



- **Stock status:** stock size and SSB are **unknown but likely increasing**. The directed fishery ceased in 1991 and both surveys show signs of recovery since 2011, but fishing pressure is unknown (ICES, 2015d).
- **Management measures:** the advice is no directed fishing (0 TAC), based on the precautionary approach for Category 3.2 stocks.

#### **Northern prawn in ICES Subareas XIV & V (NAFO: Northern shrimp in Denmark Strait and off East Greenland)**

Advice for this stock is provided by NAFO.

- **Distribution:** this is a transboundary stock. Distribution of Northern prawn in the Denmark Strait overlaps the Greenland and Iceland EEZ (Arboe, 2015a).
- **Data availability:** A survey for shrimp stock assessment has been carried out in East Greenland since 2008. The area was also surveyed in 1985-1988 by Norway, and by Greenland in 1989-1996, although indexes from neither survey are not comparable to those from the current survey due to differences in spatial coverage, methods and fishing gear (Siegstad, 2015). Catch data are available from Greenland, Iceland, Faroes, and EU since 1980 and from Norway since 2000 (Arboe, 2015a).
- **Data quality:** this is a **data rich stock (H)**.
- **Stock status:** currently the stock is at a very low level despite the low fishing pressure of the last years (NAFO, 2015a).
- **Management measures: defined**, as there is a TAC, although management plans and reference points have not been defined for this stock so far (NAFO, 2015a).

#### **Northern prawn in NAFO Subarea 1 (NAFO: Northern Shrimp in Subarea 1 and Div. 0A)**

Advice for this stock is provided by NAFO.

- **Distribution:** this is a transboundary stock, found in Davis Strait where the Greenland and Canadian EEZs meet. However, most of the shrimp stock is in NAFO Subarea 1 (Greenland EEZ), and only a small fraction of the stock extends to Div. 0A (Canadian EEZ).
- **Data availability:** the advice is based on a quantitative model run on logbook data (since 1975 for the offshore fishery), and the shrimp assessment survey data (since 1988) (NAFO, 2015a; Arboe, 2015b, Burmesteir and Kingsley, 2015).
- **Data quality:** this is a **data rich stock (H)**.
- **Stock status:** according to the NAFO Precautionary Approach, this stock is **above reference points**. A protracted decline in stock size since 2004 appears to have paused, and large numbers of small shrimps in the 2015 survey suggest good prospects for recruitment. At the end of 2015, the stock is expected to be 23% above Bmsy and the risk of being below Blim (30% of Bmsy) is very low (<1%) (NAFO, 2015a; Burmesteir and Kingsley, 2015).
- **Management measures: well defined.** Greenland has a Management Plan defined in the Greenland Fisheries Act but it has not been conveyed to NAFO. The stock is assessed as a single population and NAFO provides the annual TAC advice. However, there is no agreed procedure to set the TAC share corresponding to each country. Instead, there are two TACs enacted independently by Greenland and Canada. Canada has defined its shrimp fishing grounds as the part of Div. 0A lying east of 63°03'00"W (NAFO, 2015a; Arboe, 2015b). The Greenland Government has instituted a practice of deciding on a TAC for the entire stock and setting aside a part of that TAC (3.1%) to allow for the Canadian interest, the proportion being reckoned on the basis of habitat area, recent catches, and recent survey estimates of stock biomass in the respective EEZs. The EU quota is also deducted from the Greenland TAC before dividing the remainder between the coastal fleet (43%) and the offshore fleet (57%) quotas. Canada normally

sets a TAC equal to 16 % of the advised TAC by Scientific Council (N. Hammeken, pers. comm.).

**Capelin ICES Subareas XIV & V (ICES: Capelin (*Mallotus villosus*) in Subareas V and XIV and Division IIa west of 5°W (Iceland and Faroes grounds, East Greenland, Jan Mayen area)**

- **Distribution:** this is a transboundary stock, found in Iceland and Faroes grounds, East Greenland, and Jan Mayen area, and managed as a single stock (*Capelin in Subareas V and XIV and Division IIa west of 5°W (Iceland and Faroes grounds, East Greenland, Jan Mayen area, ICES, 2015e)*).
- **Data availability:** Two annual acoustic surveys have been carried out in the Iceland-East Greenland-Jan Mayen area since 1978, and fisheries statistics go back to 1969 (ICES, 2015e).
- **Data quality:** this is a **data rich stock (H)**.
- **Stock status:** it is below historical levels but **within safe limits**. Fishing mortality and stock status for 2015 will be determined later in the year, but the spring survey results gave an SSB equal to the average of the past ten years. This stock was in moratoria in 2008/2009. Currently it is evaluated under the precautionary approach (ICES, 2015d).
- **Management measures: well defined.** There is a management plan dating from 1989 agreed upon by Iceland, Greenland and Norway, which is periodically revised. In May 2015 a HCR was agreed upon, and approved at an ICES benchmark meeting in 2015 (WKPELA). It is based on a two step TAC so that an initial TAC equalling 2/3 of the predicted TAC, calculated on the condition that 400 000 t of the SSB are left for spawning (this is the HCR). The final TAC is adjusted depending of the results of the winter survey on the same year class. There is a common understanding among the coastal States that Iceland estimates the final TAC according to the HCR. This final TAC requires approval of the Advisory Committee of the Marine Research Institute in Iceland and is subsequently sent to the stakeholders and the Chair of ICES NWWG (A. Guðmundsdóttir, pers. comm). There is also a seasonal closure from April to late June (ICES, 2015e).

**Pelagic redfish in ICES Subareas XIV & V and in NAFO Subarea 1F**

This stock was split into two management units, the shallow pelagic and the deep pelagic, in 2009, following a workshop where new genetic and parasite patterns data were reviewed (ICES, 2009).

**a) Shallow pelagic stock < 500 m (*Sebastes mentella* in Subareas V, XII, and XIV and NAFO Subareas 1+2)**

- **Distribution:** this is a transboundary stock, found in the Irminger Sea with a distribution including the Greenland and Iceland EEZs and NEAFC regulation area.
- **Data availability:** Catch data are mostly provided by Iceland, Greenland, Faroes, Norway, Germany and Russia. However, catches from Russia, which is the main fishing nation for this stock, are not disaggregated by depth. Biological data are obtained from commercial catches on board trawlers from different nations. Acoustic surveys have been carried out in the Irminger Sea since 1982, some by single countries, others as joint surveys, until an international survey (carried out mostly by Iceland, Germany and Russia) was established in 1999. However, age structure, location of nursery and mating areas and natural mortality are largely unknown, and juvenile redfish are very difficult to identify to species levels (ICES, 2012b, 2013b, 2013c, 2015e).
- **Data quality:** this is a **data limited (M)**, category 3 stock (ICES, 2015d).
- **Stock status:** stock size and SSB are unknown but likely low and stable (ICES, 2015d).
- **Management measures: poorly defined.** This stock is managed by NEAFC, but there is no HCR and no agreement on stock structure, TAC and allocation key between contracting parties (ICES, 2015d, 2015e). It was first assessed by ICES in 2009 but the lack of information prevented a full evaluation. Since 2010 ICES has consistently advised on not conducting any directed fishery and keep by-catch to a minimum. Annual NEAFC agreements on Management of Redfish

in the Irminger Sea have also issued a ban on the shallow pelagic redfish fishery for years, and the agreement for 2016 states that it is essential to prohibit fishing on shallow pelagic redfish (NEAFC, 2016). However, and due to the lack of agreement among all involved parties, the directed fishery for this stock continues.

**b) Deep pelagic stock >500 m (*Sebastes mentella* in Subareas V, XII, and XIV and NAFO Subareas 1+2)**

- **Distribution:** this is a transboundary stock, found in the Irminger Sea with a distribution including the Greenland and Iceland EEZs and NEAFC regulation area.
- **Data availability:** The same data available than for shallow pelagic stock above is applicable to the deep pelagic stock (ICES, 2012b, 2013b, 2015e).
- **Data quality:** this is a **data limited (M)** stock, category 3 (ICES, 2015d).
- **Stock status:** stock size and SSB are **unknown but likely low and declining** (ICES, 2015d).
- **Management measures: poorly defined.** This stock is managed by NEAFC, but there is no HCR and no agreement on stock structure, TAC and allocation key between contracting parties (ICES, 2015d, 2015e). NEAFC (2016) issues the TAC for the current year and in agreement with ICES advice of keeping catches below 10 000 t limits total catch of the deep pelagic stock to 8500 t to split among contracting parties as usual. In addition NEAFC announces that will try to establish a long-term management plan for redfish in the Irminger Sea and adjacent waters during 2016.

**Demersal redfish in ICES Subareas XIV & V and in NAFO subarea 1F**

The demersal redfish stock includes two species that constitute separate management units. The German and Greenlandic demersal surveys demonstrated that the demersal redfish found in the Greenland slope includes *S. mentella* and *S. norvegicus*, although fish smaller than 18 cm cannot be identified to species level.

In addition, the redfish stock in the Irminger Sea was split into three management units (ICES, 2009), two of them being the shallow and deep pelagic stocks discussed above, and the third being the redfish found in the Icelandic shelf slope. This however did not include the redfish on the Greenland slope, thus it was decided to evaluate separately redfish in XIVb until the stock identity is better known (ICES, 2015b).

**a) *Sebastes mentella* in Division XIVb (Demersal)**

- **Distribution:** demersal *S. mentella* is found within the Greenland EEZ.
- **Data availability:** Data are collected from three surveys: the German cod survey (since 1982), the Greenland deep water survey (since 1998) and the Greenland shallow water survey (since 2008). Logbook data are available since 1974 but prior to the surveys it was unknown that there were two redfish species. In addition, the directed fishery started in 2009. Thus these data cannot be used in the assessment. Catches from the older logbooks have been split according to catch composition in the surveys. Survey indexes are uncertain because none of them targets specifically redfish and connectivity to other stocks is unknown (ICES, 2012b, 2013b, 2015d, 2015e).
- **Data quality: data limited (M),** Category 3.2 stock. Survey results and samples from the commercial fishery showed that *S. mentella* dominated commercial catches, being the ratio *mentella* / *norvegicus* estimated at 80:20 in 2010. It is uncertain how catches were split in earlier years. However, the percentage of *S. mentella* decreased to 63% in 2014 (ICES, 2015e).
- **Stock status:** stock size and SSB are **unknown and likely declining**; fishing mortality is unknown but increasing (ICES, 2015d).



- **Management measures: defined.** The stock is TAC regulated, although there is no management plan or reference points for it (ICES, 2015e). The TAC has consistently been well above the ICES advice (ICES, 2014d). Within the Greenland EEZ a joint *mentella* / *norvegicus* TAC is set by the Ministry of Fisheries, Hunting and Agriculture. This joint TAC has been set at 8500 t over the last years (reasons undisclosed), and it includes the Greenland share for *S. norvegicus* (R. Hedeholm, pers. comm).

**b) *Sebastes norvegicus* in Iceland and Faroes grounds, West of Scotland, North of Azores, and East of Greenland**

- **Distribution: this is a transboundary stock**, widely distributed among Iceland and Faroes grounds, West of Scotland, North of Azores, and East of Greenland (ICES, 2015e).
- **Data availability:** German redfish survey dates from 1982. In addition, there are logbooks since 1978 and biological samples are taken from commercial catches, although there is annual variability in coverage. The directed fishery reopened in 2009 after a pause of about ten years.
- **Data quality:** this is a **data rich** stock. The data have the uncertainty associated to aggregating species (ICES, 2015d).
- **Stock status:** considering all the distribution area (Iceland and Faroes grounds, West of Scotland, North of Azores, and East of Greenland), this stock is **above all biological reference points**, has fully reproductive capacity. The surveys indicate increasing SSB for the last 20 years. Fishing mortality is slightly above the limit but nevertheless still within the range expected in the management plan (ICES, 2015d).
- **Management measures: well defined.** This stock has a management plan and HCR, evaluated by ICES. The management plan is based on a fixed fishing mortality that is linearly reduced if SSB declines below 220000 t (Btrigger). The lowest reference point for SSB is 160000 t (Blim), estimated from the lowest run of the model. Iceland and Greenland use TAC and the Faroes effort limits (ICES, 2015e). There is an agreement between Greenland and Iceland by which Greenland gets 10% of the annual *S. norvegicus* TAC.

**Grenadier spp. in ICES Subareas XIV & V**

ICES distinguishes two management units for roundnose grenadier in East Greenland. There are no genetic results available to back up this distinction, or data suggesting that the species undertake migrations. The current stock division is based on what are believed to be natural barriers to dispersal of all life stages.

**a) Roundnose grenadier (*Coryphaenoides rupestris*) in Mid-Atlantic Ridge (Xb, XIIc, Va1, Xlla1, XIVb1)**

- **Distribution:** this is a discrete high seas stock, found in seamounts. There is very little known about connectivity between grenadier populations in the North Atlantic.
- **Data availability:** Landing data are aggregated per ICES Subareas. Size frequency data are available from Russian (1972-1990) and Spanish (2011-2014) trawlers. Maturity and age estimates are also available from samples taken in Russian trawlers prior to 1990. The Soviet Union also carried out acoustic surveys between 1972 and 1990 (ICES, 2015b).
- **Data quality:** this is a **data poor (L)** stock, category 5. There are problems with species misidentification (ICES, 2015f).
- **Stock status: unknown**, as the fishing pressure (ICES, 2015f). This is a demersal deep water species found in seamounts, thus local depletions may occur under excessive fishing pressure.
- **Management measures: defined.** Given the lack of information, TAC for 2016 was estimated from past landings and a precautionary buffer was applied to the resulting figure (ICES, 2015f).

**b) Roundnose grenadier (*Coryphaenoides rupestris*) in all other areas (I, II, IV, Va2, VIII, IX, XIVa, and XIVb2)**

- **Distribution:** this is a discrete high seas stock. There is very little known about connectivity between grenadier populations in the North Atlantic (NAFO, 2015a).
- **Data availability:** same as for the roundnose grenadier stock above.
- **Data quality:** this is a **data poor (L)** stock, category 6 (ICES, 2015f).
- **Stock status: unknown**, as it is the fishing pressure (ICES, 2015f).
- **Management measures: defined.** This is a stock with negligible landings and there is a general lack of information. Thus, TAC for 2016 was estimated in basis to past landings and a precautionary buffer was applied to the resulting figure (ICES, 2015f).

**Grenadier spp. in NAFO Subarea 1 (NAFO: Roundnose grenadier in Subareas 0+1)**

- **Distribution:** this is a discrete high seas stock, found in seamounts. There is very little known about connectivity between grenadier populations in the North Atlantic. The stock found in Subareas 0 and 1 is thought to be part of a stock widely distributed in the North Atlantic (NAFO, 2015a).
- **Data availability:** There has not been a directed fishery since 1978 and it has been caught lately as by-catch in small quantities (even less than 10 t). There is no survey that has ever covered the whole distribution area in the entire period, thus available survey data cannot be analysed jointly, neither are they comparable. There have been surveys carried out by Japan (1987-1995, Subarea 1 down to 500m), Russia (1986-1992, Divs 0B and 1CD down to 1250 m until 1988 and down to 1500m afterwards), Greenland (since 1997, in 1CD between 400 and 1500m) and Canada (four surveys since 2000 in Div 0B down to 1500m). There have also been joint surveys between Canada and Greenland in Divs 0A and 1A since 1999 but roundnose grenadier has been rarely found (NAFO, 2014).
- **Data quality:** this is a **data poor (L)** stock. It is suspected that roughhead and roundnose grenadier have been missidentified in recent fishing statistics, as their distribution overlaps somewhat in certain fishing grounds (NAFO, 2014).
- **Stock status:** there has been a gradual increase in biomass since 2010 but biomass has been very low since 1997. The Canadian surveys in 2000 and 2001 also found very low biomass. Assessment is qualitative due to the scarcity of data (NAFO, 2015a).
- **Management measures: poorly defined.** NAFO (2015a) advised avoiding directed fishing of roundnose grenadier in the whole area until the new assessment is carried out in 2017, restricting catches to by-catch in other fisheries. There is no management plan or reference points for this stock.

**Atlantic halibut in ICES Subareas XIV & V**

- **Distribution:** this is a transboundary stock, but stock structure and connectivity between the Greenland and Iceland populations are not well understood yet.
- **Data availability:** within the Iceland EEZ there are disaggregated landing data and survey data, both series going back several decades (Hafrannsóknastofnunin, 2015). Within the Greenland EEZ there are biomass and abundance data collected during the annual shrimp survey (Nygaard and Jørgensen, 2015). There are no details in the literature on the biological data available.
- **Data quality:** it is likely that this is a **data poor** stock, categorized as **L** (Low data quality) in Table 3 of Annex 2.
- **Stock status:** fishable biomass within the Iceland EEZ has increased slightly over the last two years but it still is very low compared to the 1985 index. In addition, most specimens found in the

survey are immature fish thus recovery is expected to be very slow (Hafrannsóknastofnunin, 2015). In the Greenland EEZ, stock size is estimated from the results of the shrimp survey. According to the 2013 survey, stock size in East Greenland was 36 t (Nygaard and Jørgensen, 2015).

- **Management measures: defined** in subarea V, where all directed fisheries have been banned since 2012. No information has been found for subarea XIV.

#### **Atlantic halibut in NAFO Subarea 1**

- **Distribution:** this is a transboundary stock, found in both the Canadian and Greenland EEZ (NAFO Subareas 0 +1).
- **Data availability:** there are catch data, although in recent years catch has ranged from 5 to 12 t only. Additional data for this stock are collected in the shrimp survey off West Greenland, but they are limited to biomass and abundance estimation (Nygaard and Jørgensen, 2015).
- **Data quality:** this is a **data limited stock (M)**.
- **Stock status:** no information has been found about the state of this stock. The latest estimate, obtained from the West Greenland shrimp survey is 1470 t (Nygaard and Jørgensen, 2015), but no additional data were shown to put this number into perspective.
- **Management measures: not defined.** To our knowledge there is no management plan or biological reference points for this stock.

#### **Snow crab in NAFO Subarea 1**

- **Distribution:** snow crab is found in discrete populations in West Greenland fjords, commercially exploited in small local fisheries from Upernavik in NW Greenland to Narsaq-Qaqortoq in the South. It is also found offshore between Paamiut and Disko Bay.
- **Data availability:** The fishery started in the mid-1990s but logbooks have been mandatory only since 1999 for ships >75 GRT, and since 2002 for ships < 75 GRT. The smaller boats (<10 m) operating inshore, however, are only requested to provide landing data. Surveys were initiated in two of the management areas in 1997, expanded to another two in 2002 and to the remaining two areas in 2003. In recent years, however, only Sisimiut and Disko Bay could be surveyed (Burmeister, 2012).
- **Data quality:** this is a **data limited stock (M)**.
- **Stock status:** in 2010, the stock seemed to be above safe levels in two of the management areas but its status in the other four was unknown due to lack of data (Burmeister, 2012).
- **Management measures: defined.** Although there is not a defined management plan, the stock is subject to a TAC. The fishery is managed with licenses and quotas for the 6 management units, seasonal closures, a (non-monitored) move on rule when more than 20% of caught crabs have soft shells (during moulting) and a minimum catch size for both sexes (Burmeister, 2012).

The state of all the stocks, advisory bodies and managers responsible for each of them are resumed in Table 8.

**Table 8.-** Status, advisory bodies and managers of the stocks considered in the EU-Greenland SFPA.

Fishery	Species	Region	Status	Assess.	Management
Target	Greenland halibut	West	good	NAFO	Greenland–Canada
		East	good	ICES	Greenland–Iceland
	Cod	West	poor	ICES	Greenland
		East	rebuilding	ICES	Greenland
	Northern shrimp	West	good	NAFO	Greenland
		East	very poor	NAFO	Greenland
	Redfish (shallow pelagic)	East	very poor	ICES	NEAFC
	Redfish (deep pelagic)	East	poor	ICES	NEAFC
	Redfish (demersal <i>S. mentella</i> )	East	poor	ICES	Greenland
	Redfish (demersal <i>S. norvegicus</i> )	East	good	ICES	Greenland
	Capelin	East	good	ICES	Greenland–Iceland–Norway
	Snow crab	West	poor	Greenland	Greenland
	By-catch	Grenadier RNG	West	very poor	NAFO
East			unknown	ICES	Greenland
Atlantic halibut		West	unknown	-	-
	East	unknown	-	-	

### **Issues affecting assessment and management**

Of the 17 management units considered in the protocol, 5 are data rich (East Greenland halibut, both Northern shrimp stocks, demersal *S. norvegicus* and capelin), 7 are data limited (West Greenland halibut, both cod stocks, all three *S. mentella* stocks and snow crab), and 5 are data poor (all three roundnose grenadier stocks and both Atlantic halibut stocks).

Catch data are reliable and available for all stocks, and IUU fishing is not a problem in the region. Discard data of target species and data on by-catch of other marketable species are scarcer but both discards and by-catch are considered to be negligible. Coral and sponge catch reporting has been mandatory for fishing vessels since 2011, when catches are above a certain threshold.

Biological data are often the main issue in the assessment process. For example, stock identity is well defined for only half of the stocks (see Table 9).

**Table 9.-** Short description of knowledge available for Greenland fisheries on different aspects considered relevant for precise stock assessment.

Species	Region	Stock identity	Recruitment	IUU fishing	Catch data*	Discard level	By-catch	Vulnerable spp. occurrence
Greenland halibut	West	D-	Known	Negl	A	Negl	Negl	PK
	East	D-		Negl	A	Negl	Negl	Unk
Cod	West	D+	WK	Negl	A	Negl	Negl	PK
	East	D+	WK	Negl	A	Negl	Negl	PK
Northern shrimp	West	D+	PK	Negl	A	Negl	Negl	PK
	East	D+	WK	Negl	A	Negl	Negl	PK
Shallow pelagic redfish	East	D	Unk	Negl	A	Negl	None	NA
Deep pelagic redfish	East	D	Unk	Negl	A	Negl	None	NA
Demersal redfish ( <i>S. mentella</i> )	East	D-	Unk	Negl	A	Negl	Negl	PK
Demersal redfish ( <i>S. norvegicus</i> )	East	D+	Known	Negl	A	Negl	Negl	PK
Capelin	East	D+	WK	Negl	A	Negl	Negl	NA
Snow crab	West	D+	Known	None	A	Likely	Negl	Unk.
Grenadier RNG	West	D-	Unk	Negl	A	NA	NA	NA
	East	D-	Unk	Negl	A	NA	NA	NA
Atlantic halibut	West	D-	Unk	Negl	A	NA	NA	NA
	East	D-	Unk	Negl	A	NA	NA	NA

D-: poorly defined; D+: well defined; D: defined;  
 PK: Partly known; WK.: well known; Unk.: Unknown;  
 Negl: negligible;  
 A: available; NA: not available;

In NAFO, updating of methods and models for assessment is an ongoing, continuous process carried out by the Scientific Council. In ICES, assessment methods are periodically benchmarked and evaluated by expert groups that include external reviewers to ensure that all the available information is optimally used.

For example, according to the best scientific evidence, cod has been recently split into three management units: West Greenland offshore cod, cod in ICES subarea XIV and NAFO Subarea 1F (East and South Greenland), and inshore cod (West Greenland, out of the scope of this report). The fishery in the East and South Greenland stock was resumed recently since the collapse in 1990 (ICES, 2015e).

Only the pelagic redfish fishery has serious evaluation and management issues, derived of the lack of agreement on the management units adopted by ICES and the annual TAC decided by NEAFC. Consequently there are two crucial obstacles for assessment and management of pelagic redfish stocks:

- 1) An important part of the logbook data supplied to the working group are not split by depth, which is the main requirement for the assessment of these stocks,
- 2) Total catch of both management units largely exceeds the annual TAC (which has been 0 for the shallow component for several years), preventing the use of any of the ICES evaluation methods for data limited stocks, and also affecting the management strategies intended by NEAFC towards stock rebuilding (i.e. progressive annual TAC decrease).

However, it is difficult to estimate the impact of this situation within the Greenland EEZ, other than overfishing of the stock.

### ***Potential solutions towards improved management***

While it would be desirable to know more on recruitment, post-recruitment processes and stock identity of all stocks, if only for the sake of knowledge, more data does not need to be the key to better management: Greenland halibut in East Greenland is a stock with good status despite poor knowledge of its stock identity and recruitment dynamics. On the other hand, these aspects are well known for both cod stocks but their status is unknown and both collapsed in the 1990s. Besides, additional data collection is difficult to implement when human and economic resources are limited.

There are two complementary approaches that could improve both our understanding of the stocks and the assessment and management processes. One is implementing binding management plans for the main stocks, since they are available only for East Greenland halibut, West Northern shrimp and capelin stocks. The second is developing multi-species community models to reduce uncertainty of ecosystem effects of fishing, as it was done in the DEEPFISHMAN project (Blanchard et al. 2014, Scott et al., 2014) and ecosystem models (Hyder et al., 2015), as tools towards ecosystem based management of fish stocks.

### ***Ecosystem considerations***

For the time being, the only example of the ecosystem approach applied to fisheries management is the production model used in the evaluation of Northern shrimp stocks, which includes cod predation. Besides, this fishery got in 2013 the MSC certificate, which is consistent with the UN FAO Code of Conduct for Responsible Fishing, Guidelines for the Ecollabelling of Fish and Fishery Products from Marine Capture Fisheries (FAO, 2009), and the ISEAL Code of Good Practice for setting Social and Environmental Standards, as revised in 2010.

### ***3.4.2. The surplus concept for the SFPA with Greenland***

This issue was discussed by the Expert Working Group on the SFPA with Greenland, during the Workshop on the Surplus concept. We have not found information on prior work regarding surplus for the Greenland-EU SFPA. However, the main findings of STEFC (2012) regarding the UNCLOS (1982) definition of the surplus concept and the complexities in deriving this apparently simple estimate (explained in Section 3.1.1) apply also to this case.

Article 6.2 of UNCLOS says: "The coastal State shall determine its capacity to harvest the living resources of the EEZ. Where the coastal State does not have the capacity to harvest the entire allowable catch, it shall, through agreements or other arrangements and pursuant to the terms, conditions, laws and regulations ..., give other States access to the surplus of the allowable catch..."

If Greenland were to have insufficient capacity to take up their share of any allocated quota for stocks distributed wholly within their area of national jurisdiction, or there were additional fishing resources not accounted for we could consider this to be a 'surplus' as defined under UNCLOS. However, in the text below we demonstrate that Greenland already fully utilises the regulated species found wholly

within national waters, and fisheries research has not currently identified other viable fisheries within the EEZ. Hence there is no additional 'surplus' under UNCLOS definition.

The EWG-Greenland found that the CFP text could fit better the case of Greenland fisheries in Article 4.1 (33), which defines surplus of allowable catch as: “that part of the allowable catch which a coastal State does not harvest, resulting in an overall exploitation rate for individual stocks that remains below levels at which stocks are capable of restoring themselves and maintaining populations of harvested species above desired levels based on the best available scientific advice”.

The CFP definition is much broader in scope and implies a 'surplus' that also includes transboundary stocks beyond EEZs. We therefore define in the next section which species are found (i) exclusively within Greenlandic EEZ (see above), and (ii) those which are transboundary (i.e. NEAFC), as species with a transboundary distribution (i.e. redfish, capelin) do not apply directly to the UNCLOS definition of surplus.

Fishing opportunities for the East Greenland transboundary stocks in the protocol are allocated to various fishing nations through NEAFC based on fully exploited stocks (including application of the precautionary approach). Having been allocated a share of the 'surplus of marine biological resources' (CFP definition) it then remains a political concern how TACs are fished, and by whom (i.e. whether they are traded or not). Similarly, distribution of TAC for transboundary West Greenland stocks (Northern shrimp, Greenland halibut) is agreed upon with Canada. Under these circumstances we could call 'surplus' any TAC allocated to Greenland and not utilised by them, but it cannot be viewed as an additional 'surplus', since these allocations have already been accounted for management purposes through NEAFC or bilateral agreements in the case of West Greenland stocks, and the total TAC is based on scientific advice provided by GINR, ICES and/or NAFO.

The surplus for Greenland stocks regulated by TAC and transboundary stocks for which Greenland is allocated a TAC, can be summarised by the following simple equation:

$$St = TACt\_GRL - Yt\_GRL$$

where:

- St is the total annual surplus;
- TACt\_GRL is the TAC allocated to Greenland through NEAFC or bilateral agreements, and
- Yt\_GRL is the total annual yield taken by Greenland.

If Greenland takes its entire allocated quota (i.e.  $TACt\_GRL = Yt\_GRL$ ), or the stock status is poor, there would be no available surplus. Traditionally the amount corresponding to the surplus is traded by Greenland through agreements, including that with the EU, which should be preferential as stated in Article 2 of the Protocol: “Greenland undertakes to offer a preferential access to available surpluses to the Union's fleet”.

It should be noted that considering that annual TACs are available for the Greenland stocks included in the SFPAs, surplus could be perfectly estimated in the short term ( $Surplus = TAC - Y_{coast}$ ) and on an annual basis and thus, long term estimations ( $Surplus = MSY - Y_{coast}$ ) are not needed in this context (see Section 3.2.2). These surplus estimates should be updated every year, according to changes observed in the stock status and the consequent TAC allocations.

For those stocks where there is a potential surplus for Greenland stocks (amount that the country usually trades), Table 10 shows advised TAC, the allocated TAC for Greenland (i.e. TACt\_GRL), total catch by Greenland (i.e. Yt\_GRL) and total catch of all stocks in the Protocol, except for grenadiers.

**Table 10.-** Advice and catch for main Greenland stocks (2009-2014), in thousand tonnes (H. Siegstad, pers. comm.)

Fishery	Stock	Advice /Catch	2009	2010	2011	2012	2013	2014	
Greenland Halibut	West (Davis Strait)	Advice CAN - GRL	11	14	14	14	14	14	
		TACt_GRL	6	7	7	7	7	7	
		Yt_GRL <sup>(1)</sup>	1	2	2	3	4	4	
		Catch in GRL EEZ	6	7	7	7	8	7	
	West (Baffinbugt)	TACt_GRL	7	7	7	7	7	8	
		Yt_GRL <sup>(1)</sup>	6	6	6	6	6	7	
		Catch in GRL EEZ	7	6	6	6	7	8	
		Total catch	13	13	13	13	13	16	
	East	Advice IS - GRL	5	5	5	0	20	20	
		TACt_GRL	10	12	12	13	9	8	
		Yt_GRL <sup>(2)</sup>	3	0	3	5	3	2	
		Catch in GRL EEZ	10	10	11	12	9	8	
Total catch		27	26	26	29	27	21		
Cod	West	Advice	No fishery						
		TACt_GRL	Joint TAC for EAST and WEST - SEE east						
		Catch in GRL	0	0	0	0	0	0	
	East	Advice	No fishery						
		TACt_GRL	15	10	5	6	7	10	
		Catch in GRL	5	3	5	5	6	8	
Shrimp	West	Advice	110	110	120	90	80	80	
		TACt_GRL	115	115	124	102	87	83	
		Catch in GRL	135	134	124	111	95	85	
	East	Advice	12	12	12	12	12	2	
		TACt_GRL	13	12	12	12	12	8	
		Yt_GRL <sup>(3)</sup>	1	1	0	1	0	0	
		Catch in GRL	5	4	1	2	2		
Pelagic redfish	Shallow	GRL joint TAC*	10	7	9	7	6		
		Advice	20	No fishery					
		ICES XIV, NAFO	2	2	0	3	1	1	
		Total catch	2	2	0	3	2	6	
	Deep	Advice	20	20	20	20	20	20	
		ICES XIV	33	51	47	27	41	23	
		Total catch	54	59	47	33	46	24	



Fishery	Stock	Advice /Catch	2009	2010	2011	2012	2013	2014
Demersal redfish	East	Advice <i>S.mentella</i>	None	None	F	1	4	4
		Advice <i>S.norvegicus</i>	0	0	30	None	40	52
		TACt_GRL mixed	1	7	7	7	7	7
		Yt_GRL (mixed)	1	6	7	6	6	5
		Catch in GRL (Sm)	1	7	7	6	7	5
		Catch in GRL (Sn)	0	2	1	2	1	3
Capelin	East	<i>Fishing season</i>	<i>08/09</i>	<i>09/10</i>	<i>10/11</i>	<i>11/12</i>	<i>12/13</i>	<i>13/14</i>
		Advice	0	150	390	765	570	160
		Total catch	15	156	457	684	541	187
		TACt_GRL	0	5	13	51	18	50
		Catch by GRL	0	5	18	22	17	21
Snowcrab	West	Advice	4	3	2	2	2	2
		Catch by GRL	3	2	2	2	2	2

Notes: 0 stands for catches < 1t. CAN= Canada; IS= Iceland.

(\*) Greenland gets a joint TAC for the shallow and deep pelagic redfish stocks.

(1) Jørgensen and Treble (2015) SCR15-032,

(2) ICES 2015a-NWWG

(3) Arboe (2014a)

(4) Arboe (2014b)

It can be seen for example, that for West Greenland halibut (Davis Strait) in 2014, the total advised TAC was 14 000 t, of which the Greenland TAC allocation (i.e. TACt\_GRL) was 7 000 t. Of this TAC allocation, reports indicate that Greenland caught 4 000 t (i.e. Yt\_GRL), leaving a surplus of 3 000 t to trade (i.e. St). The total catch within the Greenland EEZ (7 000t) shows that the entire surplus was utilised. In fact the table shows that the surplus within Greenland EEZ has been fully utilised in most cases: all Greenland halibut stocks, West Greenland Northern shrimp, deep pelagic redfish, demersal redfish and snowcrab. The West Greenland Northern shrimp stock in Division 1 is fished only by Greenland, unlike the rest of the stocks, fished by international fleets. Catches for East Greenland Northern shrimp and cod are lower than the TAC, but this is simply because stock size is too small to catch the entire TAC, as highlighted above.

The Table format varies for redfish, separating catches from Greenland EEZ (ICES XIV and NAFO 1F) from those taken in the Irminger Sea, although there is a “flexibility” scheme between Greenland and NEAFC Regulatory Area (RA) by which redfish catches can be equally taken from inside or outside the Greenland EEZ. However, Greenland has not fished shallow pelagic redfish since 2004, and the deep pelagic stock since 2010. Both in 2009 and 2010, the Greenlandic catch was below 2000 t, meaning that these stocks are exploited by foreign fleets (ICES, 2015d). The demersal redfish fishery catches both *S. mentella* and *S. norvegicus*, by a 80/20 ratio. Advice is provided separately for each species but Greenland gets a joint TAC for both, of which only a small part is fished by foreign nations.

The capelin quota is also caught, although due to its stock distribution, catches are disaggregated by fishing nation rather than by ICES Subarea.

Table 10 shows the TAC allocated to Greenland and Greenlandic catches. The difference between both figures (surplus) is traded with other countries. For capelin it is not straightforward to give a number of tons caught within the Greenland EEZ, thus catch by Greenland alone is given.

For redfish stocks, catch in Greenland has been obtained from the latest Northwestern Working Group report (ICES, 2015e), assuming that catch from ICES Division XIV equals catch within the Greenland EEZ.

Finally, the snowcrab is a small inshore fishery also fully exploited by Greenlandic fishermen (e.g.,  $TAC_{2014\_GRL} = Y_{2014\_GRL} = 2\,000\text{ t}$ ;  $S_{2014} = 0\text{ t}$ ).

### ***Potential adverse effects of catching the surplus***

Understanding the concept of surplus as the proportion of quotas allocated to Greenland that are made available to other countries, this topic would refer to the risks exploiting fish populations. In principle, the risk of overfishing is rather slim for most stocks. Although the different stocks are evaluated with diverse methods, depending of the amount and quality of data available, advice tends to be conservative to minimize the risk of a too high quota. Some of the measures implemented in ICES and NAFO to estimate the TAC are running the models with different theoretical fishing pressures to see how they would affect biomass in the upcoming years, or limiting fishing mortality according to management plans, or application of uncertainty caps and/or precautionary buffers in the case of data-limited stocks. In addition, the available information on Greenland fisheries suggests that the IUU fishing should not be a problem in the surplus calculations proposed above. The catch data are reliable and by-catch and discards of target species are considered negligible in most fisheries. The fishery with most discards was the shrimp fishery, but they were eliminated with the implementation of technical measures (a sorting grid attached to the trawl, mesh size) and move-on regulations that force vessels to abandon the fishing grounds if bycatch of important commercial species is above the legal threshold.

However, fishing has inherent adverse effects on fish populations, and in the case of demersal fisheries the negative impact extends to their habitats and accompanying species. Negative effects are detected even after a few bottom trawl hauls, and they intensify as fishing pressure increases. Profound alteration of bottom topography and increased mortality of target and accompanying species leads to benthic faunal assemblages dominated by species highly resilient to fishing activities and changes in community composition due to selective removal of key predator or prey species. Nevertheless, given that the Greenland demersal fisheries have taken place for decades, it is most likely that the shift towards benthic communities and non-target species very resilient to fishing has already taken place and therefore catching the surplus will not have any significant additional adverse effect on habitat or accompanying species.

Regarding the target stocks, catching the surplus will contribute to the suite of impacts widely described elsewhere for intensively exploited commercial species, such as biomass reduction and changes in size structure, with decreasing average maximum size (Worm et al., 2009).

#### 4. CONCLUSIONS AND RECOMMENDATIONS

The study of how to apply the concept of Surplus in the three types of SFPAs that the EU signs with third countries (mixed SFPAs with West Africa, Tuna SFPAs and SFPAs with Greenland) resulted in the definition of three different situations: one in which this concept is not applicable (Tuna SFPAs) due to the nature of the stocks to be considered (see section 4.2 below), and two other situations, in which the quality of information, assessments and management measures available derives in more complex (mixed SFPAs in West Africa) or simpler (SFPAs with Greenland) definitions of Surplus. The surplus catch is the stocks annual potential catch minus the potential catch of the national fleet according to its “capacity to harvest the entire allowable catch”. In practice, the surplus can be calculated either on the short term (i.e. available surplus for the next coming year, according to a given harvest control rule:  $\text{Surplus} = \text{TAC} - \text{Ycoast}$ ), or in the long term (i.e. the theoretical surplus, available under equilibrium assumption and for an Fmsy management strategy:  $\text{Surplus} = \text{MSY} - \text{Ycoast}$ ) (STECF, 2012). All Greenland stocks are managed by TACs and therefore Surplus could be estimated in the short term, and updated on an annual basis. In the case of West African stocks, where management strategies are not well defined, the computation of the surplus involves the consideration of three different options assuming different management strategies.

##### 4.1. Surplus concept for mixed SFPAs in West Africa

The surplus is the stocks annual potential catch minus the potential catch of the national fleet according to its “capacity to harvest the entire allowable catch”. In practice, the surplus has to be calculated on the short term, as:

$$\text{Surplus} = \text{TAC} - \text{Ycoast}$$

where TAC is the total allowable catch referring to a given harvest control rule (i.e. for a well-defined target of the fishing mortality  $F_{\text{target}}$ ), and Ycoast is the potential catch of the coastal State. As underlined by STECF, catching only the surplus does not mean that foreign fleets have no adverse effects on local fisheries. By decreasing the mean abundance of targeted stocks, and thus the CPUE of the fisheries of coastal States, it impacts their profitability and may affect their potential development.

The surplus can be calculated, for a given selectivity of the whole fishery exploiting the stock of interest, using as input five parameters issued from usual stocks assessments. The report explains the rationale of the three options previously defined by STECF in order to calculate Ycoast and provides details on the related calculations.

The computation of the surplus also requires that a targeted fishing mortality ( $F_{\text{target}}$ ) has been previously determined. The EWG-W Africa noted that this value should be ideally specified in the frame of management plans and regulations defined by the coastal countries. In case where no management plan has been defined, managing fisheries in order to maintain or to reach a fishing pressure equal to Fmsy, for all stocks by 2015 where possible and at the latest by 2020, should be considered as the default option. Accordingly, the surplus could be calculated using a default transition scheme, whose objective would be to reach Fmsy in 2020.

For not fully assessed stocks, an adaptation of the procedures used by ICES for Data Limited Stocks (ICES, 2012a) to the specific needs of the surplus calculation for West African stocks is proposed. Three main categories of stocks (and some sub-categories) were defined according to the data availability, and for each category a method was proposed for the surplus computation. Following the same principles as in the ICES DLS approach, an uncertainty cap (-20%) is applied to the surplus estimate in cases where the diagnosis on the stock status seemed to be highly uncertain, while an additional precautionary buffer is used when a decrease in the stock biomass cannot be excluded from the available data. Such an approach would imply the surplus estimates to be updated every year (according to changes observed in the stock status), and is consistent with sustainability objectives only if stocks are managed using TACs.

Ideally, rules to share the total catch that is allocated to each country, as well as the share of the surplus, must result from a management agreement between the countries involved. In the absence

of any agreement of this kind in the region, three different options could be used, according to previous regional reflexions (FAO, 2002a and b). These options are respectively based on: 1. historical catch within each EEZ over the past years; 2. zonal attachment of the resource based on biological criteria (spawning areas, distribution of eggs and larvae, occurrence of juveniles, migrations of the fishable part of the stocks...); 3. economic and social criteria (such as the dependency of the economy on fisheries, employment and food security, engagement in research, monitoring or surveillance...). Method 1, based on catch statistic implies stability and seems to be simpler to implement, especially for small pelagics, and it is also the most commonly used worldwide.

Following the ecosystem approach, TAC may apply in European waters to species caught as by-catch, and might lead to close the fishery when the TAC is reached (thus defining the concept of choke species). Using such an approach in the context of the surplus would theoretically lead to close all fisheries where a species caught as by-catch is assessed as overexploited by the coastal State (and thus has no surplus). In such a case, it appears impossible to consider those foreign fleets are only catching the surplus. In this case, the limitation of over-surplus catch should be tried. In that perspective, main concerns related to overexploited by-catches in SFPAs in West Africa were identified.

Several programmes which should be encouraged are currently on the way in West Africa in order to improve fisheries selectivity (especially for shrimps fisheries) and develop an ecosystem approach to fisheries management.

## **4.2. Surplus concept for Tuna SFPAs**

The Surplus concept is not applicable for tuna and tuna-like species for several reasons such as: i) their highly migratory characteristic (assuming uniform distribution of the stock, fishing mortality in the high seas would affect the stock in the same way as fishing mortality in the EEZs); ii) these stocks are mainly found in areas beyond national jurisdictions; iii) MSY (from which surplus is performed) varies over time (due to changes in productivity and due to the variety of the gears); iv) there is no direct estimates of local abundance and no possibility to calculate the capacity of the coastal States, instead there are stock level MSY estimations. Therefore, for highly migratory fish stocks, the determination of the resources available for access should take due account of scientific assessments conducted at the regional level as well as conservation and management measures adopted by relevant RFMOs.

Tuna RFMOs have progressively adopted different methods to provide access use or presumptive rights to fish, such as limits on the number of vessels, vessel days, overall capacity, or as a share of a TAC. In general, the most commonly used for allocation criteria are historical catches and consideration for coastal States access. Furthermore, Article 11 of the United Nations Fish Stock Agreement (UNFSA) lists several other possible criteria for consideration when determining how allocations might be provided to new members, including the status of the stocks and the current level of fishing effort.

With the objective to ensure an equitable distribution of the catches and fishing opportunities among coastal States and long distance fleets, belonging to others CPCs, the implementation of a TAC must be accompanied by the development of a quota allocation system based on a weighted combination of different criteria. Although the relative value of each weight should be defined during the negotiation step between the different CPC partners, as many of the criteria are outside the scope of the fishery science, a list of potential criteria for this type of calculation is proposed.

While the concept of surplus cannot be applied for tuna and tuna like species, access agreements developed between coastal countries and the EU in cases when countries would like to reallocate their tuna quota developed under the tuna RFMO mandates, should consider the concept of "Glocalisation" (i.e., from global to local); thus alternative indicators to assess the impact of fishing pressure at a local scale (i.e., at an area scale level, for a specific fishing gear, for a fishing mode, etc) should be developed. The use of indicators related to growth and recruitment overfishing are recommended to be investigated. Some length-based indicators such as the size at which a year-class achieves its greatest biomass, the size at which 50% of the population reaches sexual maturity; and the mean age of the progenitor of an egg, an index of the mean age contributing to Spawning Reproductive Potential at a local scale could be further studied to fulfil these objectives.

### 4.3. Surplus concept for the SFPA with Greenland

Management and the annual TAC of Greenland stocks are based on scientific advice, provided in most cases by NAFO (West Greenland halibut, Northern shrimp, and West Greenland roundnose grenadier) and ICES (East Greenland halibut, cod, demersal and pelagic redfish, capelin and East Greenland roundnose grenadier). The spatial distribution of some of these stocks exceeds the Greenland EEZ, and Greenland shares their management with the relevant party in each case: Canada for West Greenland halibut and roundnose grenadier, Iceland for East Greenland halibut, Iceland and Norway for capelin. Redfish is managed by NEAFC, and the remaining stocks in the Protocol are managed by Greenland.

Fishing opportunities for Greenland transboundary stocks are allocated to various fishing nations through different agreements. Greenland is thus allocated a share of the surplus of marine biological resources (CFP definition), it then remains a political concern how TACs are fished, and by whom (i.e. whether they are traded or not). Under these circumstances we could call 'surplus' any TAC allocated to Greenland and not utilised by this coastal State. The surplus for Greenland stocks regulated by TAC and transboundary stocks for which Greenland is allocated a TAC, can be summarised by the following simple equation:

$$St = TACt\_GRL - Yt\_GRL$$

where  $St$  is the total annual surplus ;  $TACt\_GRL$  is the TAC allocated to Greenland through NEAFC or fishery agreements, and  $Yt\_GRL$  is the total annual yield taken by Greenland.

If Greenland would take its entire allocated quota (i.e.  $TACt\_GRL = Yt\_GRL$ ), or the stock status is poor there would be no available surplus. Traditionally the amount corresponding to the surplus is traded by Greenland through fisheries agreements (including that with the EU). This last should be preferential as stated in Article 2 of the Protocol: "Greenland undertakes to offer a preferential access to available surpluses to the Union's fleet". Because this allocation of TAC by Greenland does not exceed the advised TAC for any of the relevant stocks, it was considered unnecessary to apply more complex methods for estimation of the surplus. Improvement of the state of the stocks with a poorer status (East Greenland Northern shrimp, cod) is the only potential increase to the surplus in Greenland.

### 4.4. Recommendations

For SFPAs related to **West African countries** (Morocco, Mauritania, Senegal and Guinea-Bissau), we recommend that the Surplus should be calculated for all stocks considered in these SFPAs, on a short term basis and on a long term basis when possible (i.e. when stocks have been assessed, providing an estimate for all parameters required). This includes:

- To gather information on management objectives and strategies implemented by each coastal States or by regional management bodies. For each stock included in any given SFPA, this compilation should determine if an  $F_{target}$  has been already defined in any existing management plan or any harvest control rule (HCR) adopted at the national (or regional) level. Otherwise the computation of the surplus will be based on the default transition scheme, as explained above in this report.
- To compile the available data necessary to estimate surplus for all stocks covered by the mixed agreements. For all stocks recently assessed by CECAF or by national bodies, this includes the five parameters  $MSY$ ,  $F_{msy}$ ,  $F_{sq}$ ,  $Y_{sq}$  and  $Y_{sq.coast}$  (using the last 3 available assessments for small pelagics stocks, and the last 3 years of the last available assessment for demersal stocks). For not assessed stocks, data required by the proposed DLS approach should be compiled: time series of catch, abundance (based on standardized CPUEs or index from survey), and proxy of fishing mortalities (if any). It should be noted that the involvement of coastal States fishery institutions might be needed for the last two points.
- To compute values of the surplus on a stock by stock basis, according to the three options justified in this report (i.e. for a constant fishing effort, a constant proportion of the catch due to the

coastal State, or a constant catch). Based on available data and expert judgment, this computation should take into account the high uncertainty observed in some stock assessments, following the computation rules defined in the present report.

As stated before, Surplus concept is not applicable for **Tuna SFPAs**. However, several recommendations can be made based on the results of this project:

- To consider a “glocalization” approach (i.e., from global to local) for access agreements between coastal countries and the EU in cases when countries would like to reallocate their tuna quota developed under the tuna RFMO mandates. This means to develop alternative indicators to assess the impact of fishing pressure at a local scale (i.e, at an area scale level, for a specific fishing gear, for a fishing mode, etc). The use of reference points are an essential part of management, and developing some local scale indicators of populations being exploited will be a key part of the management framework for the EU.
- To investigate different indicators based on life history parameters or stock assessment results to apply the “glocalization” approach to estimate the share of the CPCs quota not used that can be shared with third countries through SFPAs.

For the **SFPA with Greenland**, main recommendations are the following:

- In order to improve the assessment and management process of certain stocks: i) to implement binding management plans for the main stocks (only available for East Greenland halibut, West Northern shrimp and capelin stocks); and b) to develop multi-species community models to reduce uncertainty of ecosystem effects of fishing, as tools towards ecosystem based management of fish stocks.
- To use the simple equation “ $St = TACt\_GRL - Yt\_GRL$ ” for Surplus estimations. Greenland stocks and transboundary stocks with Greenland are regulated by TAC allocated to Greenland through NEAFC or bilateral agreements. Traditionally the amount corresponding to the surplus is traded by Greenland through fishery agreements (including that with the EU).

Considering that Task 1 (“Review, examine and advice how the surplus concept can be applied in the specific context of small pelagic and demersal resources in West Africa”), Task 2 (“Evaluate and advice on how the surplus concept as laid as laid down in the UNCLOS could be applied to highly migratory fish stocks ) and Task 3 (“To evaluate and advice on how the surplus concept as laid down in the UNCLOS could be applied to the fisheries agreement with Greenland”) have been achieved during this study, a potential follow up would only be needed for those tasks related to Mixed SFPAs with West Africa. It should be noted that some of the activities (e.g. data compilation) will always need the involvement of the coastal States scientific institutions.

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## ANNEX 1

### CURRENT SITUATION OF SUSTAINABLE FISHERIES PARTNERSHIP AGREEMENTS (SFPAs)

#### Mixed SFPAs in West Africa

- **Morocco**

The current FPA between the EU and Morocco<sup>8</sup> entered into force on 28 February 2007 for a period of four years. It has been tacitly renewed, from 28 February 2011 to 27 February 2015. The current Protocol to this Agreement was signed on 18 November 2013<sup>9</sup> and endorsed by the Council and the European Parliament. It entered into force on 15 July 2014 following the completion of the internal ratification procedures by Morocco<sup>10</sup>.

This FPA include fishing opportunities for small pelagic and demersal fisheries:

***For small pelagics:***

- **Fishing category No 1: Small-scale fishing in the north: pelagic.** For a maximum number of 20 artisanal purse seiners fishing in North Morocco (North of 34°18'00"N) and targeting anchovy, sardine and other small pelagic species.
- **Fishing category No 6: Industrial pelagic fishing.** For a maximum number of 18 industrial pelagic or semi-pelagic trawlers fishing south of 29°N and targeting sardine, sardinella, mackerel, horse mackerel and anchovy, with an allocated quota of 80 000 tonnes/year.

***For demersal:***

- **Fishing category No 2: Small-scale fishing in the north.** For a maximum number of 35 artisanal vessels fishing in North Morocco (North of 34°18'00"N) with bottom set loglines and targeting scabardfish, sparidae and other demersal species.
- **Fishing category No 3: Small-scale fishing in the south.** For a maximum number of 10 artisanal vessels fishing south of 34°40'00"N, with rods and lines and targeting croakers and sparidae.

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<sup>8</sup> COUNCIL REGULATION (EC) No 764/2006 of 22 May 2006 on the conclusion of the Fisheries Partnership Agreement between the European Community and the Kingdom of Morocco and FISHERIES PARTNERSHIP AGREEMENT between the European Communities and the Kingdom of Morocco. Official Journal of the European Union 29.5.2006. L141/1- 8.

<sup>9</sup> COUNCIL DECISION of 16 December 2013 on the conclusion, on behalf of the European Union, of the Protocol between the European Union and the Kingdom of Morocco setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Union and the Kingdom of Morocco (2013/785/EU). Official Journal of the European Union 21-12-2013. L 349/1-3 and PROTOCOL between the European Union and the Kingdom of Morocco setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Union and the Kingdom of Morocco. Official Journal of the European Union 7-12-2013. L 328/2-39.

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- **Fishing category No 4: Demersal fishing.** For a maximum number of 16 vessels (5 trawlers and 11 longliners), fishing south of 29° N, targeting black hake, scabbardfish, and leerfish/bonito.

- **Mauritania**

The current FPA between the EU and Islamic Republic of Mauritania was concluded and entered into force on 2006<sup>11</sup>. On 10 July 2015, the EU and Mauritania initiated a new 4-year Protocol to the FPA, which entered into force in December 2015<sup>12</sup>. Under this Protocol, the EU fleet will be allowed to fish in Mauritanian waters for shrimp, demersal fish, tuna and small pelagic fish, up to a total of 281 500 tonnes a year, under new operational conditions.

Apart from tuna, small pelagics and demersal fisheries are included in the following Fishing categories:

***For demersal:***

- **Fishing category No 1: Vessel fishing for crustaceans other than spiny lobster and crab.** For a maximum number of 25 vessels operating in Mauritanian waters at any one time and with an established TAC of 5000 t/year. They target shrimps with authorized by-catches of 15% fish, 10% crabs and 8% cephalopods.
- **Fishing category No 2: Black hake (non-freezer) trawlers and bottom longliners.** For a maximum number of 6 vessels operating in Mauritanian waters at any one time and with a 6000 t/year of TAC. They target black hakes with authorized by-catches of 25% and 50% of other fish than black hake, for trawlers and longliners, respectively.
- **Fishing category No 3: Vessels fishing for demersal species other than black hake with gear other than trawls.** For a maximum number of 6 vessels operating in Mauritanian waters at any one time. The authorized gears for this fishery are longlines, fixed gillnets with specific characteristics, handlines, creels and seines for fishing live bait. The TAC established is 3000 t/year.

***For small pelagics:***

- **Fishing category No 6: Pelagic freezer trawlers.** For a maximum number of 19 vessels operating in Mauritanian waters at any one time., with an allocated TAC of 225 000 tonnes/year.
- **Fishing category No 7: Non freezer pelagic vessels.** With an allocated TAC of 15 000 tonnes/year, that shall be deducted from the TAC of Category 6, if this fishing opportunity is used.

- **Senegal**

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<sup>11</sup> COUNCIL REGULATION (EC) No 1801/2006 of 30 November 2006 on the conclusion of the Fisheries Partnership Agreement between the European Community and the Islamic Republic of Mauritania and FISHERIES PARTNERSHIP AGREEMENT between the European Community and the Islamic Republic of Mauritania. Official Journal of the European Union 8.12.2006. L 343/1- 8.

<sup>12</sup> COUNCIL DECISION (EU) 2015/2191 of 10 November 2015 on the signing, on behalf of the European Union, and provisional application of the Protocol setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Islamic Republic of Mauritania for a period of four years, PROTOCOL setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Islamic Republic of Mauritania for a period of four years and COUNCIL REGULATION (EU) 2015/2192 of 10 November 2015 on the allocation of the fishing opportunities under the Protocol setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Islamic Republic of Mauritania for a period of four years. Official Journal of the European Union 1-12-2015. L 315/1-74.

The current SFPA between the EU and Senegal<sup>13</sup> covers the period 20 November 2014 – 19 November 2019, and is tacitly renewed for 5-year periods. This fisheries agreement allows EU vessels from Spain and France to fish in the Senegalese waters and is part of the tuna network fisheries agreements in West Africa<sup>14</sup>. As this is the first agreement signed after the CFP reform, among the four mentioned for West Africa, it is the only one specifically named as a “Sustainable” Fisheries Partnership Agreement (SFPA) instead only Fisheries Partnership Agreement (FPA). Although included in this section of Mixed SFPAs in West Africa for practical reasons, this is strictly considered as a “Tuna + hake component” SFPA. This hake component involves fishing possibilities for demersal resources, which had been excluded for a long time, since the end of the FPA 2002-2006. More specifically, the Fishing Category for “Deep water demersal species” gives fishing opportunities to a maximum number of 2 conventional demersal or hake trawlers, targeting deep water black hakes (*Merluccius polli* and *Merluccius senegalensis*) and with maximal catches of 2 000 tonnes/year.

- **Guinea-Bissau**

The current FPA between the EU and Guinea-Bissau started on 16 June 2007<sup>15</sup>. It is tacitly renewed for 4-year periods. This FPA allows EU vessels mainly from Spain, Portugal, Italy, Greece and France to fish in Guinea-Bissau's waters. It is a multi-species agreement covering tuna as well as cephalopods, shrimps and demersal species. The agreement is part of the tuna network of fisheries agreements in West Africa and is one of only 3 multi-species agreements in the region (the others being Morocco and Mauritania).

The last Protocol<sup>16</sup> between the EU and Guinea-Bissau was signed in October 2014, with an application period of 3 years. This meant the reopening of the EU fisheries at the beginning of 2015, after a lapse of more than 3 years. Only tuna and demersal fisheries possibilities are included in the FPA, the demersal being specifically the following:

- **Fishing category No 1: Freezer, fin-fish and cephalopod trawlers.** For a maximum tonnage of 3 500 GRT/year.
- **Fishing category No 2: Shrimp trawlers.** For a maximum tonnage of 3 700 GRT/year.

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<sup>13</sup> COUNCIL DECISION of 8 October 2014 on the signing, on behalf of the European Union, and provisional application of a Sustainable Fisheries Partnership Agreement between the European Union and the Republic of Senegal and the Implementation Protocol thereto (2014/733/EU) and Agreement on a Sustainable Fisheries Partnership between the European Union and the Republic of Senegal. Official Journal of the European Union. 23-10-2014. L304/1-40.

<sup>14</sup> [http://ec.europa.eu/fisheries/cfp/international/agreements/senegal/index\\_en.htm](http://ec.europa.eu/fisheries/cfp/international/agreements/senegal/index_en.htm)

<sup>15</sup> COUNCIL DECISION of 4 December 2007 concerning the conclusion of the Agreement in the form of an Exchange of Letters on the provisional application of the Protocol setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Republic of Guinea-Bissau for the period 16 June 2007 to 15 June 2011, AGREEMENT in the form of an Exchange of Letters on the provisional application of the Fisheries Partnership Agreement between the European Community and the Republic of Guinea-Bissau for the period 16 June 2007 to 15 June 2011 and FISHERIES PARTNERSHIP AGREEMENT between the European Community and the Republic of Guinea-Bissau for the period 16 June 2007 to 15 June 2011. Official Journal of the European Union. 27.12.2007.L 342/1-37.

<sup>16</sup> COUNCIL DECISION of 16 October 2014 on the signing, on behalf of the European Union, and provisional application of the Protocol setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Republic of Guinea-Bissau (2014/782/EU) and PROTOCOL setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Republic of Guinea-Bissau. Official Journal of the European Union. 13-11-2014. L328/1-32.

## **Tuna SFPAs**

Sustainable fisheries partnership agreements in tuna fisheries allow EU vessels to pursue migrating tuna and tuna-like stocks along the western coasts of Africa, through the Indian Ocean and some areas of the Pacific. The 9 tuna-specific SFPAs (Cape Verde, Côte d'Ivoire, Sao Tomé and Príncipe, Gabon, Liberia, Madagascar, Comoros, Seychelles and Mauritius), the 3 Mixed SFPAs (Morocco, Mauritania and Guinea-Bissau) and the Tuna SFPAs with a demersal component (Senegal) in those oceans are summarized in Table 1 of Annex 1 below. Among the mutual advantages of such SFPAs it should be stressed that in addition to the financial contribution from EU to the access rights to the national EEZs, EU supports sustainable fisheries development in the partner countries by strengthening their administrative and scientific capacity through a focus on sustainable fisheries management, monitoring, control and surveillance as well as scientific capacity building. Transparency is one aspect that is also currently more efficiently dealt with under EU public bilateral agreements in comparison to private agreements. Another relevant point is that the SFPAs will reinforce cooperation between the EU and its partners, especially in their fight against IUU fishing. The specific details of each SFPAs are provided below<sup>17</sup>:

- **Cape Verde**

The current SFPAs between the EU and Cape Verde entered into force on 20.3.2007 for a period of 5 years. It has been tacitly renewed, from 29.03.2012 to 29.03.2017. This SFPAs allows EU vessels from Spain, Portugal and France to fish in Cape Verdean waters and is part of the tuna network fisheries agreements in West Africa. Following the expiration of the 2011-2014 Protocol on 31.08.2014, a new Protocol was signed and entered into provisional application on 23.12.2014. This will cover a period of 4 years and will offer 71 EU vessels fishing opportunities for tuna and tuna-like species in Cape Verdean waters. The first fisheries agreement concluded between the EU and Cape Verde dates back to 1990.

- **Comoros**

The SFPAs concluded between the EU and Comoros covers the period 1.1.2005 – 31.12.2011 and has been tacitly renewed for a period of 7 years. The protocol covers the period 1.1.2014 – 30.12.2016. This SFPAs allows EU vessels mainly from Spain, France and Portugal to fish in the Comoros waters and is part of the tuna network fisheries agreements in the Indian Ocean. The first fisheries agreement concluded between the EU and Comoros dates back from 1988.

- **Côte d'Ivoire**

The SFPAs concluded between the EU and Côte d'Ivoire covers the period 1 July 2007 - 30 June 2013. It is tacitly renewed for 6-year periods. This SFPAs allows EU vessels mainly from Spain, Portugal and France to fish in the Ivorian waters and is part of the tuna network fisheries agreements in West Africa. The first fisheries agreement concluded between the EU and Côte d'Ivoire dates back from 1990.

- **Gabon**

The SFPAs has been concluded between the EU and Gabon for 6 years tacitly renewable. It allows EU vessels from Spain and France to fish in the Gabonese waters and is part of the tuna network fisheries agreements in West Africa. The first fisheries agreement concluded between the EU and Gabon dates back from 1998.

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<sup>17</sup> [http://ec.europa.eu/fisheries/cfp/international/agreements/index\\_en.htm](http://ec.europa.eu/fisheries/cfp/international/agreements/index_en.htm)

- **Guinea - Bissau**

The current SFPA concluded between the EU and Guinea-Bissau started on 16 June 2007. It is tacitly renewed for 4-year periods and allows EU vessels mainly from Spain, Portugal, Italy, Greece and France to fish in Guinea-Bissau's waters. It is a multi-species agreement covering tuna as well as cephalopods, shrimps and demersal species. The agreement is part of the tuna network of fisheries agreements in West Africa.

- **Liberia**

On 5 June 2015, the EU and the Republic of Liberia initialized a new, 5-year SFPA and associated Protocol. The Agreement and Protocol mark the beginning of a new partnership given that there has never been a SFPA between the EU and Liberia. The new SFPA also further expands the EU network of tuna fisheries agreements in West Africa. The new Protocol offers opportunities to 28 purse seiners and 6 surface longline vessels to fish for tuna and tuna-like species in Liberian waters, based on a reference tonnage of 6 500 tonnes.

- **Madagascar**

The current protocol to the SFPA between the EU and Madagascar was signed on 19 December 2014 and covers the period 1 January 2015 – 31 December 2018. This allows EU vessels mainly from Spain, Portugal, Italy and France to fish in Malagasy waters and is part of the tuna network fisheries agreements, in the south-west zone of the Indian Ocean. The first fisheries agreement concluded between the EU and Madagascar dates back from 1986.

- **Mauritania**

In 2015, the European Union and the Islamic Republic of Mauritania initiated a new 4-year Protocol to the Fisheries Partnership Agreement (FPA). Under the Protocol, the EU fleet will be allowed to fish in Mauritanian waters for shrimp, demersal fish, tuna and small pelagic fish. The current Protocol entered into force in December 2015. The first fisheries agreement concluded between the EU and Mauritania dates back from 1987.

- **Mauritius**

On 23 February 2012 the EU and Mauritius initialed a new SFPA and Protocol, which covers the period 28.1.2014 – 27.1.2017. It allows vessels from Spain, France, Portugal, Italy and the United Kingdom to fish in the Mauritian waters and is part of the tuna network fisheries agreements in the Indian Ocean. The first fisheries agreement concluded between the EU and Mauritius dates back from 1989.

- **Morocco**

The current SFPA between the EU and Morocco entered into force on 28 February 2007 for a period of four years. It has been tacitly renewed, from 28 February 2011 to 27 February 2015. The current Protocol was signed on 18 November 2013 and entered into force on 15 July 2014 following the completion of the internal ratification procedures by Morocco. The first fisheries agreement concluded between the EU and Morocco dates back to 1988. At that time, it was by far the most important fisheries agreement between the EU and a third country. However, the parties did not reach an agreement to renew the protocol in 1999 and there was no agreement until the February 2007.

- **São Tomé e Príncipe**

The SFPA between the EU and São Tomé and Príncipe was concluded in 2007. The current Protocol covers the period 23.5.2014 - 22.5.2018 and allows EU vessels mainly from Spain, Portugal and France to fish in the São Tomé and Príncipe waters, as part of the tuna network fisheries agreements in West Africa. The first fisheries agreement concluded between the EU and São Tomé and Príncipe dates back to 1984.

- **Senegal**

The current SFPAs concluded between the EU and Senegal covers the period 20 November 2014 – 19 November 2019, and is tacitly renewed for 5-year periods. It allows EU vessels from Spain and France to fish in the Senegalese waters and is part of the tuna network fisheries agreements in West Africa. A Framework Agreement, one of the first bilateral fisheries agreements ever concluded by the EU, was adopted in 1980.

- **Seychelles**

The current SFPAs concluded between the EU and Seychelles covers the period November 2013 to November 2019, and is tacitly renewed for 6-year periods. It allows EU vessels from Spain, France, Italy and Portugal to fish in Seychelles waters, with tuna purse seiners and surface longliners. The first fisheries agreement concluded between the EU and Seychelles dates back from 1987.

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PROTOCOL setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Republic of **Guinea-Bissau**. OJEU L328:3-32. 13.11.2014

PROTOCOL setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Union and the Democratic Republic of **SãoTomé and Príncipe**. OJEU L168:3-26. 7.6.2014

PROTOCOL setting out the fishing opportunities and the financial contribution provided for by the Fisheries Partnership Agreement between the European Union and the **Gabonese Republic**. OJEU L250:2-23. 20.9.2013



PROTOCOL setting out the fishing opportunities and the financial contribution provided for by the Fisheries Partnership Agreement between the European Union and the Republic of **Mauritius**. OJEU L79:9-33. 18.3.2014

PROTOCOL setting out the fishing opportunities and the financial contribution provided for by the Fisheries Partnership Agreement between the European Union and the Republic of **Seychelles**. OJEU L4:3-37. 9.1.2014

**Table 1** - Summary of current Tuna SFPA's indicating the start and period of the agreement, the type and number of vessels authorized, and the adopted technical conservation measures.

SFPA	Period of SFPA	Start of protocol application	Protocol period (years)	No of tuna seiners vessels authorized	No of pole-and-line tuna vessels authorized	No of surface longliners vessels authorized	Technical conservation measures
Cape Verde	30.03.2012 — 29.3.2017	23.12.2014	4	28	13	30	<ul style="list-style-type: none"> <li>— Prohibited species</li> <li>Specific measures by type of vessels about:                             <ul style="list-style-type: none"> <li>— Fishing zones</li> <li>— Authorised gear</li> <li>— Target species</li> <li>— By-catch: Compliance with ICCAT and FAO recommendations.</li> </ul> </li> </ul>
Comoros	1.1.2012 — 31.12.2018	1.1.2014	3	42	-	20	<ul style="list-style-type: none"> <li>— Fishing zones</li> </ul>
Côte d'Ivoire	NA	1.7.2013	5	28	-	10	<ul style="list-style-type: none"> <li>— Prohibited species</li> <li>— Compliance with ICCAT recommendations regarding all technical measures applicable to each gear fishing activities</li> <li>Specific measures by type of vessels about:                             <ul style="list-style-type: none"> <li>— Fishing zones</li> <li>— Authorised gear</li> <li>— By-catch: Compliance with ICCAT and Convention on Migratory Species (CMS) recommendations</li> </ul> </li> </ul>
Gabon	NA	24.07.2013	3	27	8	-	<ul style="list-style-type: none"> <li>— Prohibited species</li> <li>— Compliance with all ICCAT recommendations</li> <li>Specific measures by type of vessels about:                             <ul style="list-style-type: none"> <li>— Fishing zones</li> <li>— Authorised gear</li> <li>— By-catch: Compliance with ICCAT and FAO recommend.</li> </ul> </li> </ul>

\*CMS= Convention on Migratory Species

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SFPA	Period of SFPA	Start of protocol application	Protocol period (years)	No of tuna seiners vessels authorized	No of pole-and-line tuna vessels authorized	No of surface longliners vessels authorized	Technical conservation measures
Guinea-Bissau	NA	24.11.2014	3	28 <sup>*1</sup>	12	28 <sup>*1</sup>	— Compliance with all ICCAT recommendations for tuna-fishing vessels and surface longliners Specific measures by type of vessels about: — Fishing zones — Authorised gear — By-catch: Compliance with CMS and ICCAT recommendations
Liberia	-	NA	5	28	-	6	
Madagascar	01.01.2013 — 21.12.2018	01.01.2015	4	40	-	— over 100 GT: 32 — 100 GT or below: 22	— Fishing zones — Compliance with IOTC recommendations and Malagasy legislation regarding all technical measures applicable to each gear fishing activities
Mauritania	30.11.2012 — 29.11.2018	02.12.2015	4	25	15 <sup>*2</sup>	15 <sup>*2</sup>	— Compliance with all ICCAT recommendations and resolutions. Specific measures by type of vessels about: — Fishing zones — Authorised gear
Mauritius	NA	28.1.2014	3	41	-	45	— Compliance with Mauritius fisheries legislation and IOTC recommendations Specific measures by type of vessels about: — Fishing zones — Authorised gear — By-catch: Compliance with IOTC resolutions

<sup>1</sup> Total of tuna seiners and surface longliner vessels

<sup>2</sup> Total of pole-and-line and longliner vessels

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SFPA	Period of SFPA	Start of protocol application	Protocol period (years)	No of tuna seiners vessels authorized	No of pole-and-line tuna vessels authorized	No of surface longliners vessels authorized	Technical conservation measures
Morocco	NA	15.04.2014	4	-	27	-	<ul style="list-style-type: none"> <li>— Fishing zones</li> <li>— Authorised gear</li> <li>— Target species</li> </ul>
Sao Tomé & Príncipe	NA	23.5.2014	4	28	-	6	<ul style="list-style-type: none"> <li>— Fishing zones</li> <li>— Compliance with ICCAT recommendations regarding all technical measures applicable to each gear fishing activities</li> </ul>
Senegal	20.11.2014 — 19.11.2019	20.11.2014	5	28	8	-	<ul style="list-style-type: none"> <li>— Fishing zones</li> <li>— Compliance with all ICCAT recommendations and resolutions</li> </ul>
Seychelles	2.11.2013 — 1.11.2019	18.1.2014	6	40	-	6	<ul style="list-style-type: none"> <li>— Fishing zones</li> <li>— Compliance with Seychelles fisheries legislation and all IOTC measures</li> </ul>

### **SFPA with Greenland**

The latest Protocol signed by the EU and Greenland<sup>18</sup> applies for a 3-year period starting on January the 1<sup>st</sup>, 2013, although the FPA is valid for six years. The agreement is mixed but quota allocation depends on TAC and quota regulations of the different stocks, thus fishing opportunities are agreed upon annually, assuming that stock size is large enough. The protocol sets threshold stock sizes for cod, redfish, Greenland halibut and Northern prawn, and no fishing opportunities are given if stocks fall below said thresholds, which were the following for the 2013-2015 protocol (in tonnes):

STOCKS	NAFO 1	ICES XIV / V
Cod	30000	
Redfish	2500	10000
Greenland halibut	4700	4000
Northern Prawn	75000	1500

The protocol specifies fishing restrictions (gear, number of vessels, fishing area, by-catch limits) applicable in each case, and states that fishing within the Greenlandic EEZ must comply with Greenlandic regulations.

The FPA also allows for the possibility that Member States under the Protocol may not apply to fully use the fishing opportunities, in which case the Commission can consider applications from other Member States.

The current protocol includes an indicative level of fishing opportunities, stating that if any given years it is advisable that fishing opportunities are below the indicative figures, Greenland will compensate the EU with equivalent fishing opportunities the following year or with other fishing opportunities in the same year.

The indicative level of fishing opportunities (in annual tonnes) authorised by Greenland for the years 2013-2015 (current protocol) and for 2016 onwards (proposal for the new protocol) are shown in the following table. The proposal for the new Protocol includes fewer stocks (Atlantic halibut in West and East Greenland, and snowcrab are excluded) but adds a by-catch limit, although its allocation among species is not detailed.

There is a proposal for a new Protocol to be implemented on January the 1st, 2016 (EC, 2015)<sup>19</sup>, that will be valid for 5 years. This new Protocol was signed last November (EC, 2015b)<sup>20</sup> and published shortly before being signed (EC, 2015c)<sup>21</sup>.

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<sup>18</sup> COUNCIL DECISION of 16 July 2012 on the signing, on behalf of the European Union, and the provisional application of the Protocol setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community on the one hand and the Government of Denmark and the Home Rule Government of Greenland, on the other hand (2012/653/EU) and PROTOCOL setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community (1) on the one hand, and the Government of Denmark and the Home Rule Government of Greenland (2), on the other hand. Official Journal of the European Union. 23-10-2012. L293/4-27.

<sup>19</sup> Proposal for a COUNCIL DECISION on the signing, on behalf of the European Union, and the provisional application of the Protocol initialled on 20 March 2015 setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community on the one hand, and the Government of Denmark and the Home Rule Government of Greenland, on the other hand. COM (2015) 347 final. 2015/0153 (NLE).

<sup>20</sup> EC, 2015b. Official Journal of the European Union, L 323, 9 December 2015.

Stock components	2013-2015 (tonnes/year)	New Protocol (tonnes/year)
Cod in ICES Subarea XIV and in NAFO Subarea 1	2200	1800
Pelagic redfish in ICES Subareas XIV & V and in NAFO Subarea 1F <sup>*1</sup>	3000	2200
Demersal redfish in ICES Subareas XIV & V and in NAFO subarea 1F	2000	2200
Greenland Halibut in NAFO Subarea 1 – South of 68° N	2500	2500
Greenland Halibut in ICES Subareas XIV & V (V, XII & XIV in new proposal)	4315	5200
Northern Prawn in NAFO Subarea 1	3400	2600
Northern Prawn in ICES Subareas XIV & V	7500	5100
Atlantic Halibut in NAFO Subarea 1	200	—
Atlantic Halibut in ICES Subareas XIV & V	200	—
Snowcrab in NAFO Subarea 1	250	—
Capelin in ICES Subareas XIV & V	60000	20000
Grenadier spp. in ICES Subareas XIV & V	100	100
Grenadier spp. in NAFO Subarea 1	100	100
By-catch		1126

\*<sup>1</sup> Unless fished under the pelagic redfish flexibility scheme Appendix 4 to the Annex (added in proposal for the new protocol)

The new Protocol is more restrictive, offering smaller fishing opportunities for cod (80% of current protocol), pelagic redfish (73%), Northern prawn (71%, both areas combined), capelin (33%), and withdrawing Atlantic halibut and snowcrab. On the other hand there is a slight increase of fishing opportunities for Greenland halibut in ICES XIV and V (17%) (EU, 2016).

Greenland has also fisheries agreements with Norway, Russia, Faroes and Iceland for several species but these are based on exchange of fishing opportunities and there is no payment made for fishing licenses. The other differences between these and the FPA with the EU is that unlike EU vessels, Russia does not have to exhaust its redfish quota in NEAFC waters to use Greenlandic quota.

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<sup>21</sup> EC, 2015c. Official Journal of the European Union, L 305, 21 November 2015.

**ANNEX 2**

**Table 1-** Table of stocks potentially fished in Mixed SFAs with West Africa, indicating the working group where they were lastly assessed, their data quality, availability and status, the type of management measure and reference, and management option (defined, poorly or non defined). Cells in grey indicate transboundary stocks.

SFPA	WG	Ref.	Stock #	Stock	In SFPA	Expl. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O
MOROCCO	FAO/CECAF WG Demersal resources- North-2013	FAO, 2015d	WA-1	<i>Merluccius merluccius</i> -Morocco	N	Y	M	2012	Over	<ul style="list-style-type: none"> <li>• Closed seasons and areas</li> <li>• Global tonnage, number and/or type of licensed vessels and gears</li> <li>• Minimum sizes</li> </ul>	<ul style="list-style-type: none"> <li>• Arr. MAPM n° 4195-14 <u>pêche merlu.</u></li> <li>• Arr. MAPM n° 337-14- <u>pêche des espèces halieutiques (b).</u></li> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> </ul>	D
			WA-2	<i>Merluccius spp. (M. polli + M. senegalensis)</i> Morocco * <sup>1</sup>	Y	Y	L	1999	Over			D
			WA-3	<i>Sparus spp</i> -Morocco	Y	Y	L	2012	Over	<ul style="list-style-type: none"> <li>• Closed seasons/areas by fishing gear</li> <li>• Global tonnage, number and/or type of and/or gears</li> <li>• Minimum sizes</li> </ul>	<ul style="list-style-type: none"> <li>• Arr. MAPM n° 335-14- pêche des espèces halieutiques (a).</li> <li>• Arr. MAPM n° 337-14 pêche des espèces halieutiques (b).</li> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> <li>• Council Decision 2013/785/EU-FPA EU-Morocco.</li> </ul>	PD
			WA-4	<i>Pagellus acarne</i> -Morocco	Y	Y	L	2012	Over			PD
			WA-5	<i>Dentex macrophthalmus</i> -Morocco	Y	Y	L	2012	Unkn.			PD
			WA-6	<i>Pagellus spp.</i> Morocco	Y	Y	L	2012	Over			PD
			WA-7	<i>Plectorhinchus mediterraneus</i> -Morocco	N	Y	L	2012	Over	—	—	ND
			WA-8	<i>Parapenaeus longirostris</i> -Morocco	N	Y	M	2012	Over	<ul style="list-style-type: none"> <li>• Closed seasons and areas</li> <li>• Global tonnage, number and /or type of licensed vessels and gears</li> <li>• Minimum sizes</li> </ul>	<ul style="list-style-type: none"> <li>• Arr. MAPM n° 4198-14 - pêche des crevettes.</li> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> </ul>	D

\*<sup>1</sup> Last assessment in FAO/CECAF WG on the Assessments of Demersal resources. Conakry (Guinea), 2003.

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SFPA	WG	Ref.	Stock #	Stock	In SFPA	Expl. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O
MOROCCO	FAO/CECAF WG Demersal- North-2013	FAO, 2015d	WA-9	<i>Octopus vulgaris</i> -Dakhla	N	Y	M	2012	Over	<ul style="list-style-type: none"> <li>• Limitation of number of licenses by type of fleet (coastal, deep sea and artisanal).</li> <li>• Global and seasonal quota shared by type of fleet</li> <li>• Closed seasons and areas</li> <li>• Global tonnage, number and/or type of vessels and gears</li> <li>• Minimum sizes</li> </ul>	<ul style="list-style-type: none"> <li>• Plan d'aménagement de la pêche poulpière (2001, 2004, 2011-2012)</li> <li>• Arr. MAPM n° 335-14- pêche des espèces halieutiques (a).</li> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> </ul>	D
			WA-10	<i>Sepia officinalis</i> -Dakhla	N	Y	L	2012	Over	<ul style="list-style-type: none"> <li>• Closed seasons/areas by fishing gear</li> <li>• Global tonnage, number and/or type of vessels and/or gears</li> <li>• Minimum sizes</li> </ul>	<ul style="list-style-type: none"> <li>• Arr. MAPM n° 337-14 pêche des espèces halieutiques (b)..</li> <li>• Arr. MAPM n° 2010-10-taille minimale.</li> </ul>	PD
			WA-11	<i>Loligo vulgaris</i> -Dakhla	N	Y	L	2012	Over	<ul style="list-style-type: none"> <li>• Minimum sizes</li> </ul>	<ul style="list-style-type: none"> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> </ul>	PD
	FAO WG Small pelagic Fish off NW Africa- 2015	FAO, 2015c	WA-12	<i>Sardina pilchardus</i> -Zone A+B	N	Y	M	2014	Non-Fully	<p><b>For the North and Central Atlantic</b></p> <ul style="list-style-type: none"> <li>• Global tonnage, number and/or type of licensed vessels</li> <li>• Closed seasons and areas</li> <li>• Percentages of allowed by-catch</li> </ul> <p><b>For the South Atlantic</b></p> <ul style="list-style-type: none"> <li>• Global tonnage, number and/or type of licensed vessels</li> <li>• Global TAC for small pelagics</li> <li>• Closed areas</li> <li>• Number and types of authorized gears</li> <li>• Percentages of allowed by-catch</li> </ul> <p><b>For all the EEZ:</b> Minimum sizes</p>	<ul style="list-style-type: none"> <li>• Arr. MAPM n° 4196-14- pêche des petits pélagiques de l'Atlantique Nord-Méditerranée et de l'Atlantique Centre.</li> <li>• Council Decision 2013/785/EU-FPA EU-Morocco.</li> </ul>	PD
			WA-13	<i>Sardina pilchardus</i> -Zone C	Y	Y	M	2013	Non-fully		<ul style="list-style-type: none"> <li>• Council Decision 2013/785/EU-FPA EU-Morocco.</li> </ul>	PD
			WA-14	<i>Sardinella aurita</i> Subregion North	Y	Y	L	2014	Over		<ul style="list-style-type: none"> <li>• Arr. MAPM n° 1132-14- pêche des petits pélagiques en l'Atlantique Sud.</li> <li>• Arr. MAPM n° 2719-11- interdiction pêche des petits pélagiques 5 ans entre les 25° et 24°N.</li> <li>• Council Decision 2013/785/EU-FPA EU-Morocco.</li> </ul>	PD
			WA-15	<i>Sardinella maderensis</i> Subregion North	Y	Y	L	2014	Unkn.		<ul style="list-style-type: none"> <li>• Arr. MAPM n° 1132-14- pêche des petits pélagiques en l'Atlantique Sud.</li> <li>• Arr. MAPM n° 2719-11- interdiction pêche des petits pélagiques 5 ans entre les 25° et 24°N.</li> <li>• Council Decision 2013/785/EU-FPA EU-Morocco.</li> </ul>	PD
			WA-16	<i>Sardinella spp</i> Subregion North	Y	Y	L	2014	Unkn.		<ul style="list-style-type: none"> <li>• Arr. MAPM n° 1132-14- pêche des petits pélagiques en l'Atlantique Sud.</li> <li>• Arr. MAPM n° 2719-11- interdiction pêche des petits pélagiques 5 ans entre les 25° et 24°N.</li> <li>• Council Decision 2013/785/EU-FPA EU-Morocco.</li> </ul>	PD
			WA-17	<i>Trachurus trachurus</i> Subregion North	Y	Y	M	2014	Fully		<ul style="list-style-type: none"> <li>• Arr. MAPM n° 1132-14- pêche des petits pélagiques en l'Atlantique Sud.</li> <li>• Arr. MAPM n° 2719-11- interdiction pêche des petits pélagiques 5 ans entre les 25° et 24°N.</li> <li>• Council Decision 2013/785/EU-FPA EU-Morocco.</li> </ul>	PD
			WA-18	<i>Trachurus trecae</i> -SR North	Y	Y	M	2014	Over		<ul style="list-style-type: none"> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> </ul>	PD
			WA-19	<i>Scomber japonicus</i> -SR North	Y	Y	M	2014	Fully		<ul style="list-style-type: none"> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> </ul>	PD
			WA-20	<i>Engraulis encrasicolus</i> -Zone North+A+B	Y	Y	L	2013	Over		<ul style="list-style-type: none"> <li>• Arr. MAPM n° 2010-10 - taille minimale.</li> </ul>	PD



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SFPA	WG	Ref.	Stock #	Stock	In SFPA	Expl. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O	
MAURITANIA	FAO/CECAF WG on the Assessment of Demersal resources- North-2013	FAO, 2015d	WA-21	<i>Merluccius</i> spp. ( <i>M. polli</i> + <i>M. senegalensis</i> )-Mauritania	Y	Y	L	2012	Non-fully	<ul style="list-style-type: none"> <li>Licences (for industrial fisheries)</li> <li>Global TAC</li> <li>Minimal legal size</li> </ul>	<ul style="list-style-type: none"> <li>Décret n° 2002-073-code de des pêches</li> <li>Council Decision 2015/2191/EU-FPA EU-RIM</li> </ul>	PD	
			WA-22	<i>Epinephelus aeneus</i> Mauritania-Senegal-Gambia	Y (bc)	Y	L	2011-2012	Over				ND
			WA-23	<i>Pagrus caeruleostictus</i> Mauritania-Senegal-Gambia	Y (bc)	Y	L	2011-2012	Unkn.				ND
			WA-24	<i>Dentex macrophthalmus</i> -Mauritania-Senegal-Gambia	Y (bc)	Y	L	2012	Unkn.				ND
			WA-25	<i>Pagellus belottii</i> -Mauritania-Senegal-Gambia	Y (bc)	Y	L	2011-2012	Non-fully				ND
			WA-26	<i>Parapenaeus longirostris</i> -Mauritania	Y	NA	M	2012	Non-fully	<ul style="list-style-type: none"> <li>Licences (for industrial fisheries)</li> <li>Global TAC</li> </ul>	<ul style="list-style-type: none"> <li>Décret n° 2002-073-Code des pêches</li> <li>Plan d'aménagement et de gestion- crevett.</li> </ul>	PD	
			WA-27	<i>Penaeus notialis</i> -Mauritania	Y	Y	M	2012	Non-fully	<ul style="list-style-type: none"> <li>Closed season and areas</li> <li>Minimal legal size</li> </ul>	<ul style="list-style-type: none"> <li>Council Decision 2015/2191/EU-FPA EU-RIM</li> </ul>	PD	
			WA-28	<i>Octopus vulgaris</i> -Cape Blanc	Y (bc)	Y	M	2012	Over	<ul style="list-style-type: none"> <li>Catch control</li> <li>Exclusion of foreign fleets</li> <li>Licences for industrial and artisanal fish.</li> <li>Closed season and areas</li> <li>Minimal mesh size and legal size (weight)</li> </ul>	<ul style="list-style-type: none"> <li>Décret n° 2002-073-Code des pêches</li> <li>Plan d'aménagement et de gestion-céphal.</li> </ul>	D	
			WA-29	<i>Sepia officinalis</i> -Cape Blanc	Y (bc)	Y	L	2012	Non-fully	<ul style="list-style-type: none"> <li>Licences (for industrial fisheries)</li> <li>Closed season and areas</li> </ul>	<ul style="list-style-type: none"> <li>Décret n° 2002-073- Code des pêches</li> <li>Plan d'aménagement et de gestion-céphal.</li> </ul>	PD	
			WA-30	<i>Loligo vulgaris</i> -Cape Blanc	N	Y	L	2012	Non-fully	<ul style="list-style-type: none"> <li>Minimal legal size</li> </ul>		PD	

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SFPA	WG	Ref.	Stock #	Stock	In SFPA	Exp. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O
MAURITANIA	FAO WG Small pelagic Fish off NW Africa- 2015	FAO, 2015c	WA-13	<i>Sardina pilchardus</i> -Zone C	Y	Y	M	2013	Non-fully	<ul style="list-style-type: none"> <li>• Licences (for industrial fisheries)</li> <li>• Global TAC</li> <li>• Minimal legal size</li> </ul>	<ul style="list-style-type: none"> <li>• Décret n° 2002-073-Code des pêches</li> <li>• Plan d'aménagement et de gestion des pêcheries de petits pélagiques en discussion</li> <li>• Council Decision 2015/2191/EU-FPA EU-Mauritania (en cours)</li> </ul>	PD
			WA-14	<i>Sardinella aurita</i> Subregion North	Y	Y	L	2014	Over			PD
			WA-15	<i>Sardinella maderensis</i> Subregion North	Y	Y	L	2014	Unkn.			PD
			WA-16	<i>Sardinella spp</i> -North	Y	Y	L	2014	Unkn.			PD
			WA-17	<i>Trachurus trachurus</i> Subregion North	Y	N	L	2014	Fully			PD
			WA-18	<i>Trachurus trecae</i> Subregion North	Y	N	M	2014	Over			PD
			WA-31	<i>Caranx rhonchus</i> -North	Y	Y	L	2013	Unkn.			
			WA-20	<i>Scomber japonicus</i> Subregion North	Y	N	M	2014	Fully			PD
			WA-32	<i>Ethmalosa frimbiata</i> Subregion North	N	Y	L	2013	Over	<ul style="list-style-type: none"> <li>• Licences (for industrial fisheries)</li> </ul>	<ul style="list-style-type: none"> <li>• Décret n° 2002-073-Code des pêches</li> </ul>	ND
	Independent assessments	Meissa & Gascuel, 2015	WA-22 <sup>2</sup>	<i>Epinephelus aeneus</i> – Mauritania	Y (bc)	Y	M	2012	Over	See WA-21 above.	See WA-21 above.	ND
			WA-23 <sup>2</sup>	<i>Pagrus caeruleostictus</i> – Mauritania	Y (bc)	Y	M	2012	Over	See WA-22 above.	See WA-22 above.	ND
			WA-25 <sup>2</sup>	<i>Pagellus bellottii</i> – Mauritania	Y (bc)	Y	M	2012	Over	See WA-23 above.	See WA-23 above.	ND
			WA-26	<i>Parapenaeus longirostris</i> – Mauritania	Y	NA	M	2012	Non-fully	See WA-25 above.	See WA-25 above.	PD
			WA-27	<i>Penaeus notialis</i> – Mauritania	Y	Y	M	2012	Non-fully	See WA-26 above.	See WA-26 above.	PD

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SFPA	WG	Ref.	Stock #	Stock	In SFPA	Expl. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O
MAURITANIA	Independent assessments	Meissa & Gascuel, 2015	WA-28 <sup>2</sup>	<i>Octopus vulgaris</i> – Mauritania	Y (bc)	Y	M	2012	Over	See WA-27 above.	See WA-27 above.	D
			WA-29 <sup>2</sup>	<i>Sepia officinalis</i> - Mauritania	Y (bc)	Y	M	2012	Fully	See WA-28 above.	See WA-28 above.	PD
			WA-30 <sup>2</sup>	<i>Loligo vulgaris</i> - Mauritania	N	Y	M	2012	Over	See WA-29 above.	See WA-29 above.	PD
			NA1	<i>Psettoodes belcheri</i> – Mauritania	Y (bc)	Y	M	2012	Over	• Licences (for industrial fisheries) • Closed areas	• Décret n° 2002-073 règlement général d'application du code des pêches	ND
			NA2	<i>Cynoglossus</i> spp. – Mauritania	Y (bc)	Y	M	2012	Non-fully			ND
			NA3	<i>Dentex canariensis</i> - Mauritania	Y (bc)	Y	M	2012	Over			ND
			NA4	<i>Plectorhinchus mediterraneus</i> Mauritania	Y (bc)	Y	L	2012	Non-fully	• Licences (for industrial fisheries) • Closed areas • Minimal legal size		ND
			NA5	<i>Pseudotolithus</i> spp. – Mauritania	Y (bc)	Y	L	2012	Over			ND
			NA6	<i>Pseudupeneus prayensis</i> – Mauritania	Y (bc)	Y	M	2012	Non-fully			ND
			NA7	<i>Umbrina canariensis</i> – Mauritania	Y (bc)	Y	M	2012	Over			ND
			NA8	<i>Rhinobatos rhinobatos</i> – Mauritania	Y (bc)	Y	M	2012	Fully	• Licences (for industrial fisheries) • Closed areas		ND
			NA9	<i>Argyrosomus regius</i> – Mauritania	Y (bc)	Y	M	2012	Over	• Licences (for industrial fisheries) • Closed areas • Minimal legal size		• Décret n° 2002-073-Code des pêches • Plan d'aménagement et de gestion des pêcheries de corbine et mulets en discussion

\*2 Same stock but with different spatial limits.

## Scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements

SFPA	WG	Ref.	Stock #	Stock	In SFPA	Expl. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O
SENEGAL	FAO/CECAF WG on the Assessment of Demersal resources- North-2013	FAO, 2015d	WA-33	<i>Arius</i> spp.- Senegal-Gambia	N	Y	L	2011-2012	Unkn.	• Closed seasons and areas (global measures for all species)	<ul style="list-style-type: none"> <li>• Code de la pêche maritime (1998)</li> <li>• Décret d'application du code de la pêche (du 19 fev 1998)</li> <li>• Arrêté N°005165 MEMTMI/DPM/MDT du 08 aout 2006 sur repos biologiques.</li> <li>• Arrêté du 27/09/2012 fixant pour l'année 2012 les périodes de repos biologiques (for industrial fleet)</li> </ul>	ND
			WA-34	<i>Pseudotolithus</i> spp. Senegal-Gambia	N	Y	L	2011	Non-fully			ND
			WA-22	<i>Epinephelus aeneus</i> Mauritania-Senegal-Gambia	N	Y	L	2011-2012	Over	• Closed seasons and areas (global measures for all species) • Minimal legal size		ND
			WA-23	<i>Pagrus caeruleostictus</i> Mauritania-Senegal-Gambia	Y (bc)	Y	L	2011-2012	Unkn.			ND
			WA-24	<i>Dentex macrophthalmus</i> Mauritania-Senegal-Gambia	Y (bc)	Y	L	2012	Unkn.	• Closed seasons and areas (global measures for all species) • Minimal legal size		ND
			WA-25	<i>Pagellus belottii</i> Mauritania-Senegal-Gambia	Y (bc)	Y	L	2011-2012	Non-fully			ND
			WA-35	<i>Parapenaeus longirostris</i> Senegal-Gambia	N	Y	M	2011	Non-fully	• Closed seasons and areas (global measures for all species)		ND
			WA-36	<i>Penaeus notialis</i> Senegal-Gambia	N	Y	L	2011	Over	• Closed seasons and areas (global measures for all species) aMinimal legal size.		ND
			WA-37	<i>Octopus vulgaris</i> Senegal-Gambia	N	Y	L	2011	Non-fully	• Closed season (specific for octopus) and areas • Minimal legal size.		ND
			WA-38	<i>Sepia officinalis</i> Senegal-Gambia	N	Y	L	2011	Non-fully	• Closed seasons and areas (global measures for all species)		ND
			WA-39	<i>Loligo vulgaris</i> Senegal-Gambia	N	Y	L	2011	Unkn.			ND
			WA-40 <sup>3</sup>	<i>Merluccius polli</i> & <i>M. senegalensis</i> -Senegal-Gambia	Y	Y	L	2009	Fully (uncert.)	<ul style="list-style-type: none"> <li>• Closed season and area.</li> <li>• Authorized types of gear and vessels</li> <li>• By-catch limitation</li> <li>• Global TAC per year</li> <li>• Effort limitation (No vessels/year=2)</li> </ul>		• Council Decision 2014/733/EU-FPA EU-Senegal.

<sup>3</sup> Last assessment in FAO/CECAF WG on the Assessments of Demersal resources-Subgroup North. Agadir (2010)

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SFPA	WG	Ref.	Stock #	Stock	In SFPA	Exp. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O	
SENEGAL	FAO WG Small pelagic Fish off NW Africa- 2015	FAO, 2015c	WA-13	<i>Sardina pilchardus</i> -Zone C	N	Y	M	2013	Non-fully	• Closed seasons and areas (global measures for all species).		ND	
			WA-14	<i>Sardinella aurita</i> Subregion North	N	Y	L	2014	Over			ND	
			WA-15	<i>Sardinella maderensis</i> Subregion North	N	Y	L	2014	Unkn.			ND	
			WA-16	<i>Sardinella</i> spp. Subregion North	N	Y	L	2014	Unkn.			• Loi No 98 - 32 du 14 Avril 1998 portant code de la pêche maritime	ND
			WA-17	<i>Trachurus trachurus</i> Subregion North	N	N	L	2014	Fully	• Closed seasons and areas (global measures for all species)		• Décret d'application du code de la pêche (du 19 fev 1998)	ND
			WA-18	<i>Trachurus trecae</i> Subregion North	N	Y	M	2014	Over	• Minimal legal size.		• Arrêté N°005165 MEMTMI/DPM/MDT du 08 aout 2006 sur repos biologiques	ND
			WA-31	<i>Caranx rhonchus</i> Subregion North	N	Y	L	2013	Unkn.				
			WA-19	<i>Scomber japonicus</i> Subregion North	N	Y	M	2014	Fully				ND
			WA-32	<i>Ethmalosa frimbiata</i> Subregion North	N	Y	L	2013	Over				ND

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SFPA	WG	Ref.	Stock #	Stock	In SFPA	Expl. CS	Data qual.	Last year AvData	Stock status	Type of management measure	Short reference of management measure	M.O
GUINEA-BISSAU	FAO/CECAF WG Demersal resources- South - 2011	FAO, 2015e	WA-41	<i>Pseudotolithus elongatus</i> Guinea-Guinea Bissau	N	Y	L	NA	Fully	<ul style="list-style-type: none"> <li>• Global TAC for demersal fish and max. number of fish vessels (only for industrial fleet).</li> </ul> For EU freezer,fin-fish and cephalopod trawlers: <ul style="list-style-type: none"> <li>• Fishing area</li> <li>• Global annual vessels tonnage.</li> <li>• Authorized gear</li> <li>• By-catch limitations</li> </ul>	<ul style="list-style-type: none"> <li>• Fishing management plan. Guinea-Bissau 2015.</li> <li>• Council Decision 2014/782/EU-FPA EU-Guinea Bissau.</li> </ul>	ND
			WA-42	<i>Pseudotolithus</i> spp. Guinea-Guinea Bissau	N	Y	L	NA	Over			ND
			WA-43	<i>Galeoides decadactylus</i> Guinea-Guinea Bissau	N	Y	L	NA	Fully			ND
			WA-44	Sparidae Guinea-Guinea Bissau	Y	Y	L	NA	Non-fully			ND
			WA-45	<i>Arius</i> spp. Guinea-Guinea Bissau	N	Y	L	NA	Non-fully			ND
			WA-46	<i>Pomadasys</i> spp. Guinea-Guinea Bissau	Y	Y	L	NA	Fully			ND
			WA-47	<i>Cynoglossus</i> spp. Guinea-Guinea Bissau	Y	Y	L	NA	Non-fully			ND
			WA-48	<i>Parapenaeus longirostris</i> Guinea Bissau	Y	N	M	2010	Fully	<ul style="list-style-type: none"> <li>• Global TAC for crustaceans and max. N of shrimp vessels (only for industrial fleet).</li> </ul> For EU shrimp trawlers: <ul style="list-style-type: none"> <li>• Fishing area</li> <li>• Global annual vessels tonnage.</li> <li>• Authorized gear</li> <li>• By-catch limitations</li> </ul>	<ul style="list-style-type: none"> <li>• Fishing management plan. Guinea-Bissau 2015.</li> <li>• Council Decision 2014/782/EU-FPA EU-Guinea Bissau.</li> </ul>	PD
			WA-49	<i>Penaeus notalis</i> Guinea Bissau	Y	Y	L	2010	Unkn.			ND
			WA-50	<i>Sepia</i> spp. Guinea Bissau	Y	Y	L	2010	Unkn.			<ul style="list-style-type: none"> <li>• Global TAC for cephalopods and max. number of cephalopod vessels (only for industrial fleet)</li> </ul> For EU freezer,fin-fish and cephal.trawlers: <ul style="list-style-type: none"> <li>• Fishing area</li> <li>• Global annual vessels tonnage.</li> <li>• Authorized gear</li> <li>• By-catch limitations</li> </ul>
			WA-51	<i>Octopus vulgaris</i> Guinea Bissau	Y	Y	L	2010	Non-fully	ND		

**Notes:**

- WG = Working Group:
  - FAO/CECAF WG Demersal- North-2013= FAO/CECAF Working Group on the Assessment of Demersal resources- Subgroup North (Fuengirola, 2013) (FAO, 2015d).
  - FAO WG Small pelagic Fish off NW Africa- 2015= FAO Working Group on the Assessment of Small pelagic Fish off Northwest Africa (Casablanca, 2015) (FAO, 2015c).
  - FAO/CECAF WG Demersal resources- South- 2011= FAO/CECAF Working Group on the Assessment of Demersal resources- Subgroup South (Accra, 2011) (FAO, 2015e).
- In SFPA: In SFPA= Yes (Y) or No (N), if the stock is fished (or not) within the framework of the current SFPA (last SFPA in the case of Mauritania). Bc=by-catch.
- Exp.CS= Exploited by the coastal State: Yes (Y), No (N) or information No Available (NA).
- Data qual.= Data quality.
- Last year AvData= Last year of available data.
- Stock status: Fully=Fully exploited; Non-fully= Non-fully exploited; Over=Overexploited; Unkn.= Unknown
- M.O.= Management Option (D=defined; PD= Poorly defined; ND= Non defined).
- Transboundary stocks highlighted in grey.

**Table 2-** Table of stocks potentially fished within the framework of Tuna SFAs, indicating the reference of the last assessment, data quality and availability, stocks status, type of management measures and their references and management option (defined, poorly or non defined).

SFPAs	Ass. Ref.	Stock #	Stock	Exp. CS	DQ	LY Av Data	Year Ass.	Stock status indicators (Kobe Plot)	Stock status	Type of management measure	Short reference of management measure	M.O
Cape Verde, Cote d'Ivoire, Gabon, Liberia, Sao Tomé and Principe, Senegal, Guinea-Bissau, Morocco, Mauritania	2015 ICCAT SCRS Report	T-1	<i>Thunnus albacares</i> Atlantic	Y	H	2014	2011	B2010 < Bmsy F2010 < Fmsy	Overfished: YES Overfishing: NO	Time-area moratorium on FAD for protecting juveniles TAC= 110,000 t Effort limitation (No. Vessels)	[Rec. 93-04] - Fishing effort [Rec. 11-01] Time-area closure for FAD. TAC [Rec. 09-01], [Rec. 06-01], Rec[04-01] - Limits on No. fishing vessels	D
		T-2	<i>Thunnus obesus</i> Atlantic	Y	H	2014	2015	B2014<=Bmsy F2014>=Fmsy	Overfished: YES Overfishing: YES	Time-area moratorium on FAD for protecting juveniles TAC= 65,000 t	[Rec. 11-01] – Total allowable catch, Time-area closure for FAD, Limits on No. of fishing vessels	D
		T-3	<i>Katsuwonus pelamis</i> East Atlantic	Y	H	2014	2014	Not estimated, no evidence of overfishing	Overfishing: NO	Time-area closure	[Rec-11-01] - Time-area closure	PD
		T-4	<i>Thunnus thynnus</i> East Atlantic and Mediterranean sea	Y	M	2014	2014	_LowRecr.sce: B2013>SSBF0.1 _Med Recr.sce: SSB2013 > SSBF0.1 _High Recr sce: SSB2013 < SSBF0.1 F2013 < F0.1	_Low Recr scen: Overfished: NO _Med Recr scen: Overfished: NO _High Recr scen: Overfished: YES Overfishing: NO	TAC (2010 - 2014)= 13,500t - 12,900 t - 12, 900 t - 13,500 t – 13,500 t	[Res. 09-06, 10-04, 12-03, and 13-07] - TACs	D
		T-5	<i>Thunnus alalunga</i> North Atlantic	Y	H	2014	2013	SSBcur<SSBmsy Fcur < Fmsy	Overfished: YES Overfishing: NO	Effort limitation (No. Vessels) TAC=28,000 t	[Rec. 98-08] -Limit No. of vessels [Rec. 13-05] - Total allowable catch	D
		T-6	<i>Thunnus alalunga</i> South Atlantic	Y	M	2014	2013	B2012 < Bmsy F2012 > Fmsy	Overfished: YES Overfishing: YES	TAC=24,000 t	[Rec. 13-06]: - Total allowable catch	D
		T-7	<i>Makaira nigricans</i> Atlantic	Y	L	2014	2011	SSB2009< SSBmsy F2009 > Fmsy	Overfished: YES Overfishing: YES	Total harvest limitation	[Rec. 12-04] - Total harvest	D



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SFPAs	Ass. Ref.	Stock #	Stock	Exp. CS	DQ	LY Av Data	Year Ass.	Stock status indicators (Kobe Plot)	Stock status	Type of management measure	Short reference of management measure	M.O
Cape Verde, Cote d'Ivoire, Gabon, Liberia, Sao Tomé and Principe, Senegal, Guinea-Bissau, Morocco, Mauritania	2015 ICCAT SCRS Report	T-8	<i>Tetrapturus albidus</i> Atlantic	Y	L	2014	2012	SSB2010 < SSBmsy F2010 <= Fmsy ?	Overfished: YES Overfishing: NO?	Total harvest limitation	[Rec. 12-04] - Total harvest	D
		T-9	<i>Istiophorus albicans</i> Eastern Atlantic	Y	L	2014	2009	B2007 < Bmsy ? F2007 > Fmsy ?	Overfished: YES Overfishing: YES	—	—	ND
		T-10	<i>Xiphias gladius</i> North Atlantic	Y	H	2014	2013	B2011 > Bmsy F2011 < Fmsy	Overfished: NO Overfishing: NO	TAC 13,700 t Minimum size	[Rec. 13-02] - Country-specific TACs, Minimum size	D
		T-11	<i>Xiphias gladius</i> South Atlantic	Y	M	2014	2013	B2011 > Bmsy ? F2011 < Fmsy ?	Overfished: NO ? Overfishing: NO?	TAC 15,000 t Minimum size	[Rec. 13-03] - Country-specific TACs, Minimum size	D
		T-12	"Small tunas" Eastern Atlantic only <i>Auxis rochei, Sarda sarda, Orcynopsis unicolor, Auxis thazard Euthynnus alletteratus Scomberomorus tritor Acanthocybium solandri Coryphaena hippurus</i>	Y	L to M	2014		—	?	—	—	ND
		T-13	<i>Prionace glauca</i> North Atlantic	Y	M	2014	2008	B2007 > Bmsy F2007 < Fmsy	Overfished: NO Overfishing: NO	—	—	ND
		T-14	<i>Prionace glauca</i> South Atlantic	Y	M	2014	2008	B2007 > Bmsy F2007 < Fmsy	Overfished: NO Overfishing: NO	—	—	ND
		T-15	<i>Isurus oxyrinchus</i> North Atlantic	Y	L	2014	2012	B2010 > Bmsy F2010 < Fmsy ERA (high vulnerability)	Overfished: NO Overfishing: NO	—	—	ND

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SFPAs	Ass. Ref.	Stock #	Stock	Exp. CS	DQ	LY Av Data	Year Ass.	Stock status indicators (Kobe Plot)	Stock status	Type of management measure	Short reference of management measure	M.O
C.Verde,C.Ivoire,Gabon, Liberia,etc.	2015 ICCAT SCRS Rep.	T-16	<i>Isurus oxyrinchus</i> South Atlantic	Y	L	2014	2012	B2010 > Bmsy F2010 < Fmsy ERA (high vulnerability)	Overfished: NO Overfishing: NO	—	—	ND
		T-17	<i>Lamna nasus</i> (Porbeagle) NorthEast Atlantic	Y	L	2014	2009	B2008<Bmsy ? F2008<Fmsy ? ERA (high vulnerability)	Overfished: YES Overfishing: NO	—	—	ND
Comoros, Madagascar, Mauritius, Mozambique (expired on January 2015), Seychelles	IOTC-PTmT05 2014	T-18	<i>Thunnus alalunga</i> Indian Ocean	Y	L	2012	2014	B2012 > Bmsy F2012 < Fmsy	Overfished: NO Overfishing: NO	<ul style="list-style-type: none"> <li>• F2020 &lt; Fmsy and B2020 &gt; Bmsy</li> <li>• Effort limitation</li> </ul>	[Res 13-09] - Conservation of albacore [Res 12-11] - Limitation on fishing capacity	PD
	2015 IIOTC SC	T-19	<i>Thunnus obesus</i> Indian Ocean	Y	M	2013	2013	B2012 > Bmsy F2012 < Fmsy	Overfished: NO Overfishing: NO	<ul style="list-style-type: none"> <li>• TAC = 110000 t</li> <li>• Ban on discards by purse-seine vessels</li> <li>• Effort limitation</li> </ul>	[Res 14-02] - Conservation and management of tropical tunas [Res 13-11] - ban on discards of tropical tunas and recommendation for non-targetted species caught by purse seiners [Res 12-11] - Limitation on fishing capacity	D
		T-20	<i>Katsuwonus pelamis</i> Indian Ocean	Y	M	2013	2014	B2013 > Bmsy F2013 < Fmsy	Overfished: NO Overfishing: NO	<ul style="list-style-type: none"> <li>• Ban on discards by purse-seine vessels</li> <li>• Effort limitation</li> </ul>	[Res 13-11] - ban on discards of tropical tunas and recommendation for non-targetted species caught by purse seiners [Res 12-11] - Limitation on fishing capacity	PD

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SFPAs	Ass. Ref.	Stock #	Stock	Exp. CS	DQ	LY Av Data	Year Ass.	Stock status indicators (Kobe Plot)	Stock status	Type of management measure	Short reference of management measure	M.O
Comoros, Madagascar, Mauritius, Mozambique (expired on January 2015), Seychelles	2015 IOTC SC	T-21	<i>Thunnus albacares</i> Indian Ocean	Y	M	2014	2015	B2012 < Bmsy F2012 > Fmsy	Overfished: YES Overfishing:	<ul style="list-style-type: none"> <li>TAC = 300000 t</li> <li>Ban on discards by purse-seine vessels</li> <li>Effort limitation</li> </ul>	[Res 14-02] - Conservation and management of tropical tunas [Res 13-11] - ban on discards of tropical tunas and recommendation for non-targetted species caught by purse seiners [Res 12-11] - Limitation on fishing capacity	PD
	2015 IOTC SC	T-22	<i>Xiphias gladius</i> Whole Indian Ocean	Y	M	2013	2014	B2013 > Bmsy F2013 < Fmsy	Overfished: NO Overfishing: NO	<ul style="list-style-type: none"> <li>Effort limitation</li> </ul>	[Res 12-11] - Limitation on fishing capacity	PD
		T-23	<i>Xiphias gladius</i> SW Indian Ocean	Y	M	2013	2014	B2013 < Bmsy F2013 < Fmsy	Overfished: YES Overfishing: NO			PD
		T-24	<i>Makaira indica</i> Indian Ocean	Y	L	2013	2014	B2013 > Bmsy F2013 > Fmsy	Overfished: NO Overfishing: YES			PD
		T-25	<i>Makaira nigricans</i> Indian Ocean	Y	L	2013	2013	B2011 < Bmsy F2011 < Fmsy	Overfished: YES Overfishing: NO			PD
		T-26	<i>Tetrapturus audax</i> Indian Ocean	Y	L	2013	2013	B2011 < Bmsy F2011 > Fmsy	Overfished: YES Overfishing: YES			PD
	2015 IOTC SC	T-27	<i>Euthynnus affinis</i> Indian Ocean	Y	L	2013	2015	B2013 > Bmsy F2013 < Fmsy	Overfished: NO Overfishing: NO	<ul style="list-style-type: none"> <li>Effort limitation</li> </ul>	[Res 12-11] - Limitation on fishing capacity	PD

**Notes:**

- Ass.ref. = Assessment references
  - 2015 ICCAT SCRS Rep.= Report of the Standing Committee on Research and Statistics (SCRS)-2015
  - 2015 IOTC SC Report = Report of the Scientific Committee of IOTC. 2015.

- Exp.CS= Exploited by the coastal State: Yes (Y), No (N) or information No Available (NA).
- DQ= Data quality (H= High, M=Medium; L=Low).
- LY Av. Data= Last year of available data.
- Year Ass.= Year of last assessment
- M.O. = Management Option (D=defined; PD= Poorly defined; ND= Non defined).

**Table 3-** Table of stocks potentially fished within the framework of the SFPAs with Greenland, indicating management units, data quality and availability, stock status, working group where it was assessed and references, management measures and management option (defined, poorly or non defined).

Stock #	Stock as in protocol of SFPAs	Management unit/ICES code <sup>1</sup>	M.U. #	In SFPAs	Expl. by GRL	DQ <sup>2</sup>	Data availability	Last year AvData	Stock status	Working Group	Reference	Management measure	M.O.
GR-1	Greenland Halibut in ICES Subareas XIV & V	<i>Reinhardtius hippoglossoides</i> in Subareas V, VI, XII, and XIV (Iceland and Faroes grounds, W Scotland, N Azores, E Greenland)/ghl-grn	MU-GR-1	Y	Y	R (H)	Survey indexes: GRL deep since 1998, IS SMH since 1996 Commercial indexes: Icelandic trawlers since 1985 International landings since 1991 (XIVb) and 1985 (Va)	2014	Within safe limits	ICES NWWG	ICES 2015a ICES 2015b ICES 2013b	TAC - MSY appr. Manag. plan agreed by Greenland and Iceland, pending ICES evaluation	D
GR-2	Atlantic Halibut in ICES Subareas XIV & V	NA	—	N	N	P (L)	Survey indexes: IS-SMH (1996), GRL-trawl survey (2008) Scarce landing data.	2014	Likely very low	Internal assessm.	Hafrannsóknastofnunin, 2015	No directed catch in ICES V	ND
GR-3	Northern Prawn in ICES Subareas XIV & V	Northern shrimp in Denmark Strait and off East Greenland	MU-GR-2	Y	Y	R (H)	East Greenland shrimp survey (2008) International catch and effort (1980)	2014	Very low	NAFO NIPAG	NAFO, 2014 Arboe, 2014a	TAC based on qualitative analysis (B index trends)	D
GR-4	Capelin in ICES Subareas XIV & V	<i>Mallotus villosus</i> in Subareas V and XIV and Div. IIa west of 5°W (Iceland and Faroes grounds, East Greenland, Jan Mayen area)/cap-icel	MU-GR-3	Y	Y	R (H)	Survey index from Iceland (1978) Landings (1982) Catch location (1982) Stomach samples from predators (1985)	2014	Within safe limits	ICES NWWG	ICES 2015a ICES 2015b ICES 2015c	TAC based on PA. Seasonal closure. Manag. Plan implemented pending ICES evaluation	D
GR-5	Grenadier spp. in ICES Subareas XIV & V	<i>Coryphaenoides rupestris</i> in Mid-Atlantic Ridge (Xb, XIIc, Va1, XIIa1, XIVb1)/rng-1012	MU-GR-4	?	N	5 (L)	Survey index: Russian acoustic survey (1972-1990). Landings (2011)	2014	Unknwn	ICES WGDEEP	ICES 2015d ICES 2015e	TAC based on PA.	D
		<i>C. rupestris</i> in all other areas (I, II, IV, Va2, VIII, IX, XIVa, and XIVb2)-rng-oth	MU-GR-5	?	N	6 (L)	Negligible landing data	2014	Unknwn		ICES 2015d ICES 2015e	TAC based on PA with precaution. buffer	D

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Stock #	Stock as in protocol of SFPA	Management unit/ICES code <sup>*1</sup>	M.U. #	In SFPA	Expl. GRL	DQ <sup>*2</sup>	Data availability	LYear AvData	Stock status	Working Group	Reference	Management measure	M.O.
GR-6	Grenadier spp.in NAFO Subarea 1	Grenadier spp.in NAFO Subarea 01	MU-GR-6	N	N	DL (L)	Latest landing data from 1978.	2010	Very low	NAFO SCR	NAFO, 2015	TAC, no catch until 2017	ND
GR-7	Cod in ICES Subarea XIV and in NAFO Subarea 1	Cod in ICES Subarea XIV and in NAFO Subarea 1F (East Greenland, South Greenland)/cod-offgr	MU-GR-7	Y	Y	3.2 (M)	Survey indexes: GRL deep (2008), German Greenland groundfish survey (Ger(GRL)-GFS-Q4,1982); Commercial indexes: not used due to time gaps	2014	Rebuilding	ICES NWWG	ICES 2014a 2015a 2015b 2015c	TAC based on PA with uncertainty cap and precautionary buffer	D
		Offshore cod in West Greenland (NAFO Subdivisions 1A-E)/cod-offgr	MU-GR-8	N	N	3.2 (M)	Survey indexes: GRL deep (1992), German Greenland groundfish survey (Ger(GRL)-GFS-Q4, 1982); Commercial indexes: available since 1973 but not used due to time gaps	2013	Unknown, likely increasing			PA: No catch in 2016 Management plan-2014 Fish.Closure.	D
GR-8	Pelagic redfish in ICES Subareas XIV & V and in NAFO Subarea 1F	<i>Sebastes mentella</i> in Subareas V, XII, and XIV and NAFO Subareas 1+2 (Shallow pelagic stock < 500 m)/smr-sp	MU-GR-9	N	N	3 (M)	International Survey index (1992) Landings (1982), not used as unsuitable	2015	Unknown, likely low and stable	ICES NWWG	ICES 2013 ICES 2014b	PA: No catch in 2015	PD
		<i>S.mentella</i> in Sub. V, XII, and XIV and NAFO Sub. 1+2 (Deep pelagic stock > 500 m)/smn-dp	MU-GR-10	Y	N	3 (M)	International Survey index (1992) Landings (1982), not used as unsuitable	2015	Unknown, likely low and declining		ICES 2015a ICES 2013 ICES 2014b, 2014c, 2012	PA: Reduce significantly 2015 catch	PD
GR-9	Demersal redfish in ICES Subareas XIV & V and in NAFO subarea 1F	<i>Sebastes mentella</i> in Division XIVb (Demersal)-smn-grl	MU-GR-11	Y	NA	3.2 (M)	Survey indices (GER(GRL)-GFS-Q4 (1982), GRL-SHALLOW (2007), GRL-DEEP (1998); Landings since 1992,not used.	2014	Unknown, likely declining	ICES NWWG	ICES 2015a ICES 2014 ICES 2012	PA: Reduce 2015 catch to 3500 t	D
		<i>S.norvegicus</i> in Sub. V, VI, XII, and XIV (Iceland and Faroes grounds, W Scotland, N Azores, E Greenland)- smn-5614	MU-GR-12	Y	NA	R (H)	Survey indexes: IGS (Va, 1985), AGS (Va, 1996), GER (GRL)-GFS-Q4 (1982); Landings: from Va since 1978, from East Greenland since early 1950s.	2014	Above all BRPs.		ICES 2012 ICES 2014c	TAC based on MP;Manag.plan evaluated in 2014. HCR accepted in 2014.	D

Scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements

Stock #	Stock as in protocol of SFPA	Management unit/ICES code <sup>*1</sup>	M.U. #	In SFP A	Expl. GRL	DQ <sup>*2</sup>	Data availability	Last year AvData	Stock status	Working Group	Reference	Management measure	M.O.
GR-10	Greenland Halibut in NAFO Subarea 1 – South of 68° North	Greenland halibut in SA 0 + Div. 1A Offshore and Div. 1B-1F	MU-GR-13	Y	Y	DL (L)	Survey indexes: GHL survey (1997), GRL-DEEP (2001,2004,2010), GRL-groundfish trawl survey (1988), Canadian deep sea surveys in Baffin Bay (1999) International landings (mid 1960s)	2013	0A+1CD: above RPs. 0B+1C-1F: lowest since 1997 0A+1AB: above RPs.	NAFO SCR	NAFO, 2015 Jorgensen, 2014	TAC NAFO PA framework	D
GR-11	Northern Prawn in NAFO Subarea 1	Northern Shrimp in Subarea 1 and Div. 0A	MU-GR-14	Y	Y	R (H)	Greenland trawl survey (1988) International catch and effort (1976)	2014	Above RPs.	NAFO NIPAG	Arboe, 2014a,b Kingsley, 2014 NAFO, 2014	TAC NAFO PA framework	D
GR-12	Atlantic Halibut in NAFO Subarea 1	Atlantic halibut in W Greenland	MU-GR-14	N	N	DL (L)	Greenland trawl survey (1988) Latest landing data from 2004	2004	Unknown	Internal assessm.	Siegstad et al., 2005	—	ND
GR-13	Snowcrab in NAFO Subarea 1	Snow crab in West Greenland	MU-GR-16	N	NA	DL (L)	Trap survey index (1997) Catch data (1999 offshore, 2002 inshore)	2009	Safe levels in 2 manag. areas, unknown in 4.	Internal assessm.	Burmeister, 2010	TAC Seasonal and spatial closures	D

\*<sup>1</sup> For stocks assessed by ICES.

\*<sup>2</sup> ICES Data Limited Stock category (ICES, 2012a) and data quality: High (H), Medium (M) or Low (L) as defined in Table 2.1 of Section 2.1.

**Notes:**

- M.U.= Management unit.
- Working Groups:
  - ICES NWWG= ICES North-Western Working Group
  - Internal assessm.= Internal assessment.

- NIPAG= NAFO/ICES Pandalus Assessment Working Group
  - ICES WGDEEP= ICES working group on biology and assessment of deep-sea fisheries resources
  - NAFO SCR= NAFO Scientific Council Research
- In SFPA= Yes (Y) or No (N), if the stock is fished (or not) within the framework of the current SFPA.
  - Exp.CS= Exploited by the coastal State: Yes (Y), No (N) or information No Available (NA).
  - DQ.= Data quality.
  - Last year AvData= Last year of available data.
  - M.O.= Management Option (D=defined; PD= Poorly defined; ND= Non defined).
  - PA= Precautionary approach.

Reference of management measures not included (see explanation in Annex 4).



## ANNEX 3

### Criteria for the classification of fish stock status

#### A- West African stocks

Table 1- Criteria followed by CECAF (FAO, 2011)

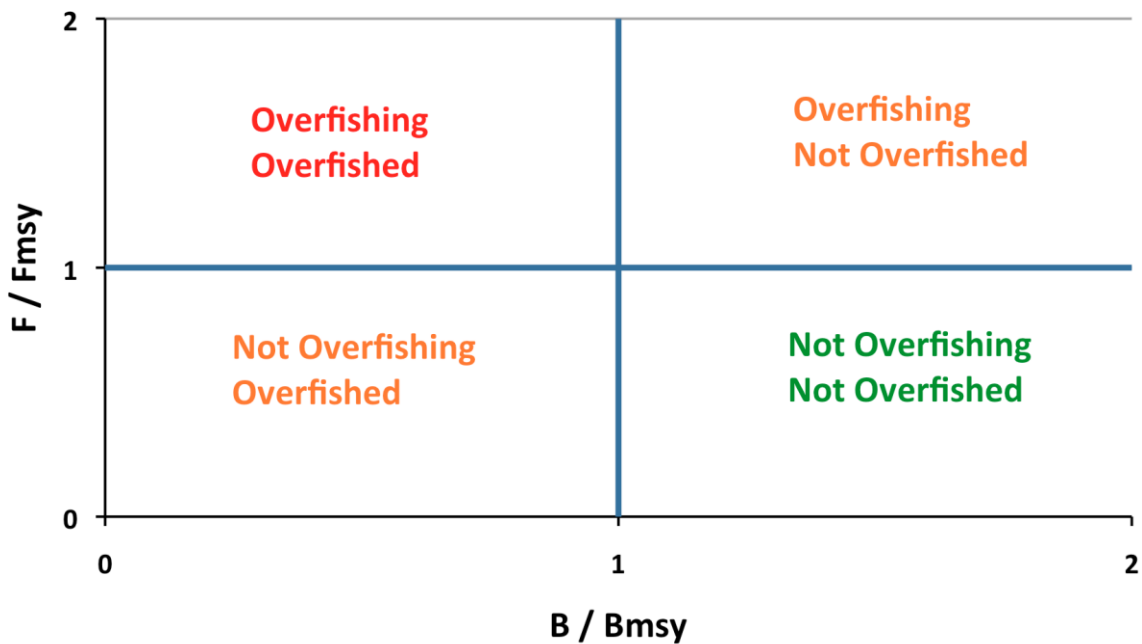
Category	Characteristics
Overexploited	<ol style="list-style-type: none"> <li>1. <b>Stock abundance</b> <ul style="list-style-type: none"> <li>• Estimates of current stock biomass are &lt; 40 percent of the estimated unfished stock size.</li> <li>• Catch rates (CPUE) are &lt; 40 percent of the initial levels.</li> <li>• Survey abundance indices are &lt; 40 percent of the initial values.</li> </ul> </li> <li>2. <b>Spawning potential</b> <ul style="list-style-type: none"> <li>• Spawning stock biomass is &lt; 20 percent of the unfished biomass.</li> </ul> </li> <li>3. <b>Catch trend</b> <ul style="list-style-type: none"> <li>• Catches have dropped significantly from a peak without a clear cut in fishing effort.</li> <li>• Current catch is &lt; 50 percent of the maximum after a 5-year smoothing.</li> </ul> </li> <li>4. <b>Size/age composition</b> <ul style="list-style-type: none"> <li>• Size/age composition unstable (excessively affected by recruitment, too few size classes in the exploited population given a species' life history).</li> <li>• Trends in size/age compositions are evident that indicate increasing (and/or excessive) fishing mortality.</li> </ul> </li> </ol>
Fully exploited	<ol style="list-style-type: none"> <li>1. <b>Stock abundance</b> <ul style="list-style-type: none"> <li>• Estimates of current stock biomass are between 40 and 60 percent of the estimated unfished stock size.</li> <li>• Catch rates (CPUE) are between 40 and 60 percent of the catch rates of the initial fishery stage.</li> <li>• Survey abundance indices are between 40 and 60 percent of the initial values.</li> </ul> </li> <li>2. <b>Spawning potential</b> <ul style="list-style-type: none"> <li>• Spawning stock biomass is between 20 and 40 percent of the unfished biomass.</li> </ul> </li> <li>3. <b>Catch trend</b> <ul style="list-style-type: none"> <li>• Catches have stabilized at or close to the peak values in the last 5–10 years although there may be interannual fluctuations.</li> </ul> </li> <li>4. <b>Size/age composition</b> <ul style="list-style-type: none"> <li>• Size/age composition is stable (not excessively affected by recruitment, enough age or size classes in the exploited population given a species' life history).</li> </ul> </li> </ol>
Non-fully exploited	<ol style="list-style-type: none"> <li>1. <b>Stock abundance</b> <ul style="list-style-type: none"> <li>• Estimates of current stock biomass are &gt; 60 percent of the estimated unfished stock size.</li> <li>• Catch rates (CPUE) are &gt; 60 percent of the initial catch rates.</li> <li>• Survey abundance indices are &gt; 60 percent of the initial values.</li> </ul> </li> <li>2. <b>Spawning potential</b> <ul style="list-style-type: none"> <li>• Spawning stock biomass is &gt; 40 percent of the unfished biomass.</li> </ul> </li> <li>3. <b>Catch trend</b> <ul style="list-style-type: none"> <li>• Catches increased over time when fishing effort has increased.</li> </ul> </li> <li>4. <b>Size/age composition</b> <ul style="list-style-type: none"> <li>• Size/age composition of the catch has been stable and has not shown large changes in comparison with that of the initial stage of the fishery.</li> </ul> </li> </ol>

## B- Tuna stocks

The "Kobe Plot" is a simple way of summarizing stock assessment results in two dimensions that has gained importance in the last decade within tuna RFMOs stock assessment working groups. On the X-axis, the plot represents the estimates of the biomass (or spawning biomass), expressed relative to the reference point BMSY (when the values are below 1, the stock is "overfished"). On the Y-axis, it represents fishing mortality relative to the reference point FMSY. If this ratio is below 1, the stock is "being overfished" or "overfishing is occurring". The ratio of 1 for each relative index allows defining 4 quadrants with different meaning in terms of management strategy. The four quadrants of the plot are coloured with: green ( $F < FMSY$  and  $B > BMSY$ ), red ( $F > FMSY$  and  $B < BMSY$ ), and the other two quadrants in yellow.

At the beginning of the exploitation the trajectory of the stock starts in the lower right quadrant (defined as the suitable or green quadrant) but as fishing effort and fishing mortality increase, the upper right quadrant may be reached and if no conservative measure is taken (as  $F_{year} > F_{msy}$ ) the stock may cross the vertical line ( $B_{year}/B_{msy}$ ) and be in an unsuitable situation in the upper left quadrant (i.e., the red quadrant where  $B_{year} < B_{msy}$  and  $F_{year} > F_{msy}$ ). Then when fishing mortality is reduced the stock will recover progressively in the lower left quadrant before to reach the green quadrant when  $B_{year}$  will be larger than  $B_{msy}$ .

The graph below shows the Kobe plot used in tuna RFMOs for representing the trajectory and the current state of the stock.



## C- Greenland stocks

The following tables indicate the symbols and text used by ICES in the different advice approaches (Tables 1 and 2) and for management plans (Table 3). The complete list of acronyms can be found in [http://www.ices.dk/community/Documents/Advice/Acronyms\\_and\\_terminology.pdf](http://www.ices.dk/community/Documents/Advice/Acronyms_and_terminology.pdf)

Table 1.- Terminology and symbols for the MSY approach:

MSY reference points	Explanation	Sign	Text
Fishing mortality ( $F_{MSY}$ )	$F < F_{MSY}$ and	✓	Appropriate
	$F \ll F_{MSY}$ (~ 0)	✓	Below
	$F > F_{MSY}$	✗	Above
	No reference point defined	?	Undefined
Biomass (MSY $B_{trigger}$ )	$SSB = MSY B_{trigger}$ or $SSB > MSY B_{trigger}$	✓	At trigger or above trigger
	$SSB \geq MSY B_{escapement}$	✓	At or above escapement
	$SSB < MSY B_{trigger}$	✗	Below trigger
	$SSB < MSY B_{escapement}$	✗	Below escapement
	No reference point	?	Undefined
	Stock status unknown	?	Unknown

Table 2.- Terminology and symbols for the precautionary approach:

Precautionary reference points	Explanation	Sign	Text
Fishing mortality ( $F_{pa}, F_{lim}$ )	$F \leq F_{pa}$	✓	Harvested sustainably
	$F_{lim} > F > F_{pa}$	○	Increased risk
	$F > F_{lim}$	✗	Harvested unsustainably
	No reference point	?	Undefined [or Below possible reference points]
	Stock status unknown	?	Unknown
Biomass ( $B_{pa}, B_{lim}$ )	$SSB \geq B_{pa}$	✓	Full reproductive capacity
	$B_{lim} < B < B_{pa}$	○	Increased risk
	$SSB < B_{lim}$	✗	Reduced reproductive capacity
	No reference point	?	Undefined [or Above possible reference points]
	Stock status unknown	?	Unknown

Table 3.- Terminology and symbols for management plans:

Management plan <sup>1</sup> reference points	Explanation	Sign	Text
Fishing mortality ( $F_{MP}$ )	$F < F$ mgt target / limit	✓	Below
	$F$ within defined range	✓	At or Within range
	$F > F$ mgt target / limit	✗	Above
Biomass ( $SSB_{MP}$ )	$SSB >$ target, limit or trigger biomass	✓	Above
	$SSB$ within defined range	✓	At or Within range
	$SSB <$ target, limit or trigger biomass	✗	Below

## ANNEX 4

## Short and completed reference list of management measures

**Table 1-** List of short and completed references of management measures implemented in Morocco, Mauritania, Senegal and Guinea-Bissau.

Coastal State	Short reference	Completed reference management measure
MOROCCO	Arr. MAPM n° 4195-14 <b>pêche merlu.</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 4195-14 du 25 novembre 2014 réglementant la pêche de certaines espèces de merlu.
	Arr. MAPM n° 335-14- <b>pêche des espèces halieutiques (a).</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 335-14 du 3 février 2014 réglementant la pêche de certaines espèces halieutiques dans la zone maritime située en Atlantique entre Roissa et Moulay Bouzerktoune.
	Arr. MAPM n° 337-14- <b>pêche des espèces halieutiques (b).</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 337-14 du 3 février 2014 réglementant la pêche de certaines espèces halieutiques dans la zone maritime située en Atlantique entre Ferkelik et Legzira.
	Arr. MAPM n° 4198-14 - <b>pêche des crevettes.</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 4198-14 du 25 novembre 2014 réglementant la pêche de certaines espèces de crevettes.
	Arr. MAPM n° 4196-14- <b>pêcherie des petits pélagiques de l'Atlantique Nord-Méditerranée et de l'Atlantique Centre.</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 4196-14 du 25 novembre 2014 relatif à la pêcherie des petits pélagiques de l'Atlantique Nord-Méditerranée et à la pêcherie des petits pélagiques de l'Atlantique Centre.
	Arr. MAPM n° 1132-14- <b>pêcherie des petits pélagiques en l'Atlantique Sud.</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 1132-14 du 16 avril 2014 modifiant et complétant l'arrêté n° 3279 du 16 décembre 2010 relatif à la « pêcherie des petits pélagiques en Atlantique sud » amendé par l'arrêté n° 1175-13 du 8 avril 2013.
	Arr. MAPM n° 2719-11- <b>interdiction pêcherie des petits pélagiques 5 ans entre les 25° et 24°N</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 2719-11 du 27 Septembre 2011 interdisant la pêche de la sardine, de l'anchois, du maquereau, du poisson sabre ainsi que celle des sardinelles et des chinchards pour une durée de cinq ans au large des côtes comprises entre les parallèles 25° et 24°, sur une distance de 15 milles marins.
	Arr. MAPM n° 2010-10 - <b>taille minimale.</b>	Arrêté du Ministre de l'Agriculture et de la Pêche Maritime n° 2010-10 du 26 Juillet 2010 modifiant et complétant l'arrêté n° 1154-88 du 3 Octobre 1988 fixant la taille marchande minimale des espèces pêchées dans les eaux maritimes marocaines.
	Plan d'aménagement de la <b>pêcherie poulpière</b> (2001, 2004, 2011-2012)	Plan d'aménagement de la pêcherie poulpière (2001, 2004, 2011-2012). (Full reference NA).
	Council Decision 2013/785/EU-FPA EU-Morocco.	Council Decision of 16 December 2013 on the conclusion, on behalf of the European Union, of the Protocol between the European Union and the Kingdom of Morocco setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Union and the Kingdom of Morocco (2013/785/EU).

Coastal State	Short reference	Completed reference management measure
MAURITANIA	Décret n° 2002-073-code de des pêches	Décret n° 2002-073 règlement général d'application du code des pêches
	Plan d'aménagement et de gestion- crevett.	Plan d'aménagement et de gestion des pêcheries crevettières. (Full reference NA).
	Plan d'aménagement et de gestion-céphal.	Plan d'aménagement et de gestion des pêcheries céphalopodières. (Full reference NA).
	Plan d'aménagement et de gestion des pêcheries de petits pélagiques en discussion.	Plan d'aménagement et de gestion des pêcheries de petits pélagiques en discussion. (Full reference NA).
	Council Decision 2015/2191/EU-FPA EU-Mauritania.	Council Decision (EU) 2015/2191 of 10 November 2015 on the signing, on behalf of the European Union, and provisional application of the Protocol setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Islamic Republic of Mauritania for a period of four years.
SENEGAL	Code de la pêche maritime (1998)	Loi N° 98 - 32 du 14 Avril 1998 portant Code de la Pêche Maritime.
	Décret d'application du code de la pêche (1998)	Décret fixant les modalités d'application de la Loi portant Code de la Pêche Maritime (1998).
	Arrêté N°005165 MEMTMI/DPM/MDT du 08 aout 2006 sur repos biologiques	Arrêté N°005165 MEMTMI/DPM/MDT du 08 aout 2006 fixant les périodes de repos biologiques pour les navires de pêche industrielle exerçant dans les eaux sous juridiction sénégalaise.
	Arrêté du 27/09/2012 fixant pour l'année 2012 les périodes de repos biologiques	Arrêté du 27/09/2012 fixant pour l'année 2012 les périodes de repos biologiques pour les navires de pêche industrielle démersale exerçant dans les eaux sous juridiction sénégalaise.
	Council Decision 2014/733/EU-FPA EU-Senegal.	COUNCIL DECISION of 8 October 2014 on the signing, on behalf of the European Union, and provisional application of a Sustainable Fisheries Partnership Agreement between the European Union and the Republic of Senegal and the Implementation Protocol thereto (2014/733/EU) and Agreement on a Sustainable Fisheries Partnership between the European Union and the Republic of Senegal. Official Journal of the European Union. 23-10-2014. L304/1-40.
GUINEA-BISSAU	Fishing management plan. Guinea-Bissau 2015.	Plano de gestao das pescas para o ano 2015. Secretaria de Estado das Pescas e Economia Maritima.
	Council Decision 2014/782/EU-FPA EU-Guinea Bissau.	Council Decision of 16 October 2014 on the signing, on behalf of the European Union, and provisional application of the Protocol setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Republic of Guinea-Bissau (2014/782/EU) and PROTOCOL setting out the fishing opportunities and financial contribution provided for in the Fisheries Partnership Agreement between the European Community and the Republic of Guinea-Bissau. Official Journal of the European Union. 13-11-2014. L328/1-3

**Table 2-** List of short and completed references of management measures implemented for tuna by RFMO.

SFPAs	RFMO	Stock	Short reference	Completed reference management measure
Cape Verde, Cote d'Ivoire, Gabon, Liberia, Sao Tomé and Príncipe, Senegal, Guinea-Bissau, Morocco, Mauritania	ICCAT	<i>Thunnus albacares</i> -Atlantic	[Rec. 93-04] - Fishing effort	[Rec. 93-04];- Effective fishing effort not to exceed 1992 level
			[Rec. 15-01] Time-area closure for FAD. TAC	[Rec. 15-01]: Time-area closure for FAD associated surface fishing (see BET below); TAC of 110,000 t beginning in 2013.
			[Rec. 09-01], [Rec. 06-01], [Rec. 04-01] - Limits on numbers of fishing vessels	Other measures also impacting yellowfin tuna : [Rec. 09-01], [Rec. 06-01], [Rec. 04-01]: - Limits on numbers of fishing vessels less than the average of 1991 and 1992. - Specific limits of number of longline boats; China (45), Chinese Taipei (75), Philippines (10), Korea (16). - Specific limits of number of purse seine boats; Panama (3).
		<i>Thunnus obesus</i> -Atlantic	[Rec. 15-01] – Total allowable catch, Time-area closure for FAD, Limits on numbers of fishing vessels	[Rec. 15-01]: Total allowable catch for 2016 and subsequent years is set at 65,000 t for Contracting Parties and Cooperating non-Contracting Parties, Entities or Fishing Entities. – Limits on numbers of fishing vessels notified to ICCAT in 2015; for LL China (65), Chinese Taipei (75), Philippines (5), Korea (14), EU (269) and Japan (231). Specific limits of number of purse seine boats; EU (34) and Ghana (17). – No fishing with natural or artificial floating objects during January or february in the area encompassed by the African coast, 4° S, 5°Nand 20°W.
		<i>Katsuwonus pelamis</i> -East Atlantic	[Rec-11-01] - Time-area closure	Other measures also impacting skipjack; Rec. 11-01
		<i>Thunnus thynnus</i> - East Atlantic and Mediterranean sea	[Res. 09-06, 10-04, 12-03, and 13-07] - TACs	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 BMSY through 2022 with at least 60% of probability.
		<i>Thunnus alalunga</i> -North Atlantic	[Rec. 98-08] -Limit number of vessels	[Rec. 98-08]: Limit number of vessels to 1993-1995 average.
			[Rec. 13-05] - Total allowable catch	[Rec. 13-05] TAC of 28,000 t for 2014-2017
		<i>Thunnus alalunga</i> -South Atlantic	[Rec. 13-06]: - Total allowable catch	[Rec. 13-06]: TAC of 24,000 t for 2014-2016
		<i>Makaira nigricans</i> -Atlantic	[Rec. 12-04] - Total harvest	[Rec. 12-04] .Reduce the total harvest to 2,000 t in 2013, 2014, and 2015
<i>Tetrapturus albidus</i> -Atlantic	[Rec. 12-04] - Total harvest	[Rec. 12-04] - Reduce the total harvest to 400 t in 2013, 2014, and 2015		
<i>Xiphias gladius</i> -North Atlantic	[Rec. 13-02] - Country-specific TACs, Minimum size	Country-specific TACs, [Rec. 13-02]; 125/119 cm LJFL minimum size		
<i>Xiphias gladius</i> -South Atlantic	[Rec. 13-03] - Country-specific TACs, Minimum size	Country-specific TACs, [Rec. 13-03]; 125/119 cm LJFL minimum size		



SFPAs	RFMO	Stock	Short reference	Completed reference management measure
Comoros, Madagascar, Mauritius, Mozambique (expired on January 2015), Seychelles	IOTC	<i>Thunnus alalunga</i> - Indian Ocean	[Res 13-09] - Conservation of albacore	Resolution 13/09 on the conservation of albacore caught in the IOTC area of competence
			[Res 12-11] - Limitation on fishing capacity	Resolution 12/11 on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties.
		<i>Thunnus obesus</i> - Indian Ocean	[Res 14-02] - Conservation and management of tropical tunas	Resolution 14/02 for the conservation and management of tropical tunas stocks in the IOTC area of competence.
			[Res 13-11] - Ban on discards of tropical tunas and recommendation for non-targetted species caught by purse seiners.	Resolution 13/11 On a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and a recommendation for non-targetted species caught by purse seine vessels in the IOTC area of competence.
			[Res 12-11] - Limitation on fishing capacity	Resolution 12/11 on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties.
		<i>Katsuwonus pelamis</i> - Indian Ocean	[Res 13-11] - Ban on discards of tropical tunas and recommendation for non-targetted species caught by purse seiners.	Resolution 13/11 On a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and a recommendation for non-targetted species caught by purse seine vessels in the IOTC area of competence.
			[Res 12-11] - Limitation on fishing capacity	Resolution 12/11 on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties.
		<i>Thunnus albacares</i> - Indian Ocean	[Res 14-02] - Conservation and management of tropical tunas	Resolution 14/02 for the conservation and management of tropical tunas stocks in the IOTC area of competence.
			[Res 13-11] - Ban on discards of tropical tunas and recommendation for non-targetted species caught by purse seiners.	Resolution 13/11 On a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and a recommendation for non-targetted species caught by purse seine vessels in the IOTC area of competence.
			[Res 12-11] - Limitation on fishing capacity	Resolution 12/11 on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties.
<i>Xiphias gladius</i> - Whole Indian Ocean	[Res 12-11] - Limitation on fishing capacity	Resolution 12/11 On The implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties.		
<i>Xiphias gladius</i> - SW Indian Ocean				
<i>Makaira indica</i> - Indian Ocean				
<i>Makaira nigricans</i> - Indian Ocean				
<i>Tetrapturus audax</i> - Indian Ocean				
<i>Euthynnus affinis</i> - Indian Ocean				
<i>Thunnus tonggol</i> - Indian Ocean				
<i>Scomberomorus commerson</i> -Indian				

### **Greenland reference list of management measures**

The Greenland Ministry of Fisheries, Hunting and Agriculture (MFHA) is responsible for the fisheries policy and the management of fish resources in Greenland waters, and the Greenland Institute of Natural Resources (GINR) provides the biological basis for fisheries management advice to the MFHA.

Act No. 18 of 31 October 1996 on Fisheries (the 'Fisheries Act'), amended by ten subsequent Acts is the legal framework for management of fisheries in Greenland. There are several management plans, developed for cod in offshore waters, West Greenlandic shrimp, lumpfish and snow crab. Offshore fisheries (and some inshore fisheries) are regulated through the setting of Total Allowable Catches (TACs) and individual vessel quotas or individual transferable quotas (ITQs).

Search of the latest official communication regarding fishing opportunities in Greenland has not been very fruitful. Greenlandic experts agree on pointing that quotas are published yearly in the Ministry's website rather than on a periodical publication. The contact they facilitated in the Government provided the following links (in Danish), referred to TACs for 2015:

[http://naalakkersuisut.gl/~media/Nanoq/Files/Attached%20Files/Fiskeri\\_Fangst\\_Landbrug/DK/2015/TAC%20for%20rejer%202015\\_DK\\_KAL-1.pdf](http://naalakkersuisut.gl/~media/Nanoq/Files/Attached%20Files/Fiskeri_Fangst_Landbrug/DK/2015/TAC%20for%20rejer%202015_DK_KAL-1.pdf) and

[http://naalakkersuisut.gl/~media/Nanoq/Files/Attached%20Files/Fiskeri\\_Fangst\\_Landbrug/DK/2015/TAC%20og%20kvoter%202015\\_DK.pdf](http://naalakkersuisut.gl/~media/Nanoq/Files/Attached%20Files/Fiskeri_Fangst_Landbrug/DK/2015/TAC%20og%20kvoter%202015_DK.pdf)

Further search in the internet lead to the <http://faolex.fao.org/> site, where regulations are compiled and partly translated. The site includes links to the original documents and the website <http://www.lovgivning.gl/>, where information is available in Inuit and Danish. Among the translated documents in the FAO site there are several with the title "Order nr \_ on fishery quota in \_", but they apply to the scallop and coastal Greenland halibut fisheries. Nothing was found in reference to offshore stocks.



## ANNEX 5

# Workshop on the Surplus Concept-Agendas

### WORKSHOP ON THE SURPLUS CONCEPT

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Tenerife, 6-8 October 2015

#### Agenda

#### General time schedule:

#### Tuesday 6<sup>th</sup> October – Thursday 8<sup>th</sup> October

09:00 - 18:30	Meeting time
10:30 - 11:00	Coffee break
13:00 - 14:00	Lunch break
16:00 - 16:30	Coffee break

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#### EXPERT WORKING GROUP: Mixed SFPAs in West Africa

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#### *Tuesday, 6<sup>th</sup> October 2015*

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#### 09:00 - 10:30 - Plenary session

- Welcome, introduction of the participants, organisation and house rules.
- Discussion on the proposed ToRs, adoption of the agenda.
- Presentations on:
  - “Framework Contract No. MARE/2012/21-Scientific Advice for Fisheries Beyond EU Waters”- Pablo Abaunza (IEO Deputy Director and Framework Contract Coordinator).
  - “EASME- Role of EASME and study objectives ”- Rafael Duarte (EASME)
  - “Project on the provision of scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements” (Specific Contract No10)”- Eva García Isarch (IEO, Project Coordinator).
- Review the definition of the surplus concept and summarize advancements provided by previous works (ToR1).
  - “The surplus concept: previous definitions”-Eva García Isarch.
  - “Surplus-Policy Approach”- Sebastián Rodríguez Alfaro (DG MARE)
  - “Estimating Surplus”- Finlay Scott (JRC)

#### 11:00 – 13:00- EWG- Mixed SFPAs in West Africa

- Discussion on specific ToRs and advancements presented in the interim report.
- Discussion and adoption of the agenda of the EWG.

#### 14:00 - 18:30- EWG- Mixed SFPAs in West Africa. Work, discussions and report on:

- Stock status for stocks included in Mixed SFPAs.
- Methods (and options) developed by the STECF EWG for the computation of Surplus; potential alternative methods. Opportunity to promote one or the other of the methods/options.

- Availability of estimates required for the computation of the Surplus (basically,  $MSY$ ,  $F_{msy}$ ,  $F_{current}$ , total  $Y_{current}$ , and  $Y_{current}$  of the coastal State).

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**Wednesday, 7th October 2015**

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**09:00 - 13:00- EWG- Mixed SFPAs in West Africa.** Work, discussions and report on:

- Feasibility to define methods providing default values for some parameters required when missing.
- Guidance and options that could be applied to different situations of data quality and availability. Feasibility, consequences and potential ways to take into account uncertainty in the computation of the surplus.

**14:00 – 18:30- EWG- Mixed SFPAs in West Africa.** Work, discussions and report on:

- Options that could be applied to different situations of management frameworks. Opportunity, feasibility and consequences of considering the  $MSY$  objective as the default option where management options are poorly or not defined. Potential alternative options.
- Transition period: Opportunity, feasibility and consequences of defining acceptable default trajectories.
- Principles or rules, including possible options that might be applied to share the total catch and the surplus between coastal States, in case of transboundary stocks. Review of principles and methods; availability of past catches potentially usable to define such a sharing, in the context of West African fisheries; potential consequences of a sharing on the calculus of surplus.

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**Thursday, 8<sup>th</sup> October 2015**

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**09:00 - 13:00- EWG- Mixed SFPAs in West Africa.** Work, discussions and report on:

- Identification of how European fisheries targeting surplus could contribute to collect the information required for the implementation of an Ecosystem Approach to Fisheries Management (EAFM).
- Review of the potential adverse effects of catching the surplus on ecosystems. Main effects expected on the profitability of coastal fisheries.
- Review of rules and methods applied (especially in Europe) in multispecies fisheries framework, where by-catch of overexploited stocks could be a limit for sustainability. Identification among species fished as by-catch, of potential “choke species”, whose sustainable management would require specific computation of the surplus.
- Review of potential additional management measures able to avoid or to reduce unwanted by-catches.

**14:00 - 18:30- Plenary session**

- Presentation of the “EWG for Mixed SFPAs in West Africa” results and conclusions.
- Presentation of the “EWG for Tuna SFPAs” results and conclusions.
- Presentation of the “EWG for the SFPA with Greenland” results and conclusions
- Discussion
- Report assemblage and reading
- Adoption of the draft report.

## WORKSHOP ON THE SURPLUS CONCEPT

Tenerife, 6-8 October 2015

### Agenda

#### General time schedule:

#### Tuesday 6<sup>th</sup> October – Thursday 8<sup>th</sup> October

09:00 - 18:30	Meeting time
10:30 – 11:00	Coffee break
13:00 - 14:00	Lunch break
16:00 – 16:30	Coffee break

### EXPERT WORKING GROUP: Tuna SFPAs

#### Tuesday, 6<sup>th</sup> October 2015

#### 09:00 - 10:30 - Plenary session

- Welcome, introduction of the participants, organisation and house rules.
- Discussion on the proposed ToRs, adoption of the agenda.
- Presentations on:
  - “Framework Contract No. MARE/2012/21-Scientific Advice for Fisheries Beyond EU Waters”- Pablo Abaunza (IEO Deputy Director and Framework Contract Coordinator).
  - “EASME- Role of EASME and study objectives ”- Rafael Duarte (EASME)
  - “Project on the provision of scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements” (Specific Contract No10)”- Eva García Isarch (IEO, Project Coordinator).
- Review the definition of the surplus concept and summarize advancements provided by previous works (ToR1).
  - “The surplus concept: previous definitions”-Eva García Isarch.
  - “Surplus-Policy Approach”- Sebastián Rodríguez Alfaro (DG MARE)
  - “Estimating Surplus”- Finlay Scott (JRC)

#### 11:00 – 13:00- EWG- Tuna SFPAs

- Discussion on specific ToRs and advancements presented in the interim report.
- Discussion and adoption of the agenda of the EWG.

#### 14:00 - 18:30- EWG Tuna SFPAs. Work, discussions and report on:

- Review surplus concepts used worldwide and how they could be applied to highly migratory tuna species.
- Review of current methods used in catch allocation in tuna RFMOs.

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**Wednesday, 7th October 2015**

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**09:00 - 13:00- EWG Tuna SFPAs.** Work, discussions and report on:

Revision of the potential criteria useful for calculating allocation:

- catch-based indicators, effort-based indicators,
- bio-ecological relevance of the ZEE (spawning area, nursery, migration path),
- socio-economic indicators (e.g., dependence of the fishery sector to the national economy),
- adaptability of the fleets in terms of potential changes in target species, fishing gears/modes,
- contribution of the fleet to the collection of the inputs (fisheries data, biological information) used in tuna stock assessment and for ensuring good fishing practices (e.g., reducing discards, mitigation of catch for endangered species)
- compliance with tuna RFMOs management measures

**14:00 – 18:30- EWG Tuna SFPAs.** Work, discussions and report on:

Methods for computing the coastal State potential catches and their fishing capacity to harvest the stock taking into account the specific context of high migratory species and according to the stock status (e.g., maintaining either the proportion of nominal fishing effort or the proportion of catches of the coastal State constant).

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**Thursday, 8<sup>th</sup> October 2015**

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**09:00 - 13:00-EWG Tuna SFPAs.** Work, discussions and report on:

- Definition of the time period of reference for calculating the anteriority of a fleet in terms of allocation (e.g., catch, effort) according to the life span of the exploited species and the state of the stock
- Other methods (e.g. catch shares based on a combination of historical catch and auction quotas?)

**14:00 - 18:30- Plenary session**

- Presentation of the “EWG for Mixed SFPAs in West Africa” results and conclusions.
- Presentation of the “EWG for Tuna SFPAs” results and conclusions.
- Presentation of the “EWG for the SFPAs with Greenland” results and conclusions
- Discussion
- Report assemblage and reading
- Adoption of the draft report

## WORKSHOP ON THE SURPLUS CONCEPT

Tenerife, 6-8 October 2015

### Agenda

#### **General time schedule:**

#### **Tuesday 6<sup>th</sup> October – Thursday 8<sup>th</sup> October**

09:00 - 18:30	Meeting time
10:30 – 11:00	Coffee break
13:00 - 14:00	Lunch break
16:00 – 16:30	Coffee break

### **EXPERT WORKING GROUP: SFPAs with Greenland**

#### ***Tuesday, 6<sup>th</sup> October 2015***

#### **09:00 - 10:30 - Plenary session**

- Welcome, introduction of the participants, organisation and house rules.
- Discussion on the proposed ToRs, adoption of the agenda.
- Presentations on:
  - “Framework Contract No. MARE/2012/21-Scientific Advice for Fisheries Beyond EU Waters”- Pablo Abaunza (IEO Deputy Director and Framework Contract Coordinator).
  - “EASME- Role of EASME and study objectives ”- Rafael Duarte (EASME)
  - “Project on the provision of scientific advice on the estimation of surplus for Sustainable Fisheries Partnership Agreements” (Specific Contract No10)”- Eva García Isarch (IEO, Project Coordinator).
- Review the definition of the surplus concept and summarize advancements provided by previous works (ToR1).
  - “The surplus concept: previous definitions”-Eva García Isarch.
  - “Surplus-Policy Approach”- Sebastián Rodríguez Alfaro (DG MARE)
  - “Estimating Surplus”- Finlay Scott (JRC)

#### **11:00 – 13:00- EWG- SFPA with Greenland**

- Discussion on specific ToRs and advancements presented in the interim report.
- Discussion and adoption of the agenda of the EWG.

#### **14:00 - 18:30- EWG\_ SFPA with Greenland. Work, discussions and report on:**

- Adaptation of the surplus concept to the SFPA with Greenland: an alternative definition.
- Review of current methods used in catch allocation within Greenland EEZ for foreign fleets.
- Revision of data availability and quality for stocks in the Protocol in the context of the ICES Guidance Report for DLS. Do the categories remain the same when considering strictly the Greenland EEZ?

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**Wednesday, 7th October 2015**

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**09:00 - 13:00- EWG- SFPA with Greenland.** Work, discussions and report on:

- Revision of methods described in STECF (2012): can they be adapted to data poor species in Greenland EEZ?
- Classification of management units according to the feasibility to estimate surplus:
  - a) Management units for which surplus can be estimated
  - b) Management units for which surplus could be estimated with relatively easy-to-get additional data
  - c) Management units for which surplus cannot be estimated

**14:00 – 18:30- EWG- SFPA with Greenland.** Work, discussions and report on:

- Options that could be applied to the current situation of stocks for which surplus can be estimated and to stocks for which surplus could be estimated with easy-to-get additional data.

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**Thursday, 8<sup>th</sup> October 2015**

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**09:00 - 13:00- EWG- SFPA with Greenland.** Work, discussions and report on:

- Identification of how European fisheries targeting surplus could contribute to improve data availability.
- Revision of the potential adverse effects of catching the surplus, both for Greenland fisheries but also for stock status on a wider spatial scale.

**14:00 - 18:30- Plenary session**

- Presentation of the “EWG for Mixed SFPAs in West Africa” results and conclusions.
- Presentation of the “EWG for Tuna SFPAs” results and conclusions.
- Presentation of the “EWG for the SFPA with Greenland” results and conclusions
- Discussion
- Report assemblage and reading
- Adoption of the draft report

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